Dampier-Bunbury Natural Gas Pipeline Corridor

Review of the Kemerton Alignment

Prepared for
Gas Pipeline Working Group
by Strategen

July 2006

Dampier-Bunbury Natural Gas Pipeline Corridor

Review of the Kemerton Alignment

Strategen is a trading name of
Glenwood Nominees Pty Ltd
Suite 7, 643 Newcastle Street, Leederville WA 6007
ACN: 056 190 419

July 2006

Disclaimer and Limitation

This report has been prepared for the exclusive use of the Client, in accordance with the agreement between the Client and Strategen ("Agreement").

Strategen accepts no liability or responsibility whatsoever for it in respect of any use of or reliance upon this report by any person who is not a party to the Agreement.

In particular, it should be noted that this report is a qualitative assessment only, based on the scope of services defined by the Client, budgetary and time constraints imposed by the Client, the information supplied by the Client (and its agents), and the method consistent with the preceding.

Strategen has not attempted to verify the accuracy or completeness of the information supplied by the Client.

Client: Department of Industry and Resources

Report	Version	Prepared by	Reviewed by	Submitted to Client	
				Copies	Date
Preliminary Draft Report	1a	ND/SM/DB	CW/WM	Email	25/08/05
Draft Report	2c	ND/SM/DB/LM	WM/HV	Email	07/11/05
Draft Report	3	ND	CW	Email/2	30/11/05
Final Report	a	ND/KS	CW	Email	04/04/06
Final Report 2	2	ND/SM	ND	Email/3	21/07/06

EXECUTIVE SUMMARY

1 BACKGROUND AND SCOPE

The Western Australian Government, through the Gas Pipeline Sale Steering Committee (GPSSC), the Gas Pipeline Working Group (GPWG) and the Department of Planning and Infrastructure (DPI), has committed to expanding the existing Dampier to Bunbury Natural Gas Pipeline (DBNGP) corridor. The GPWG has obtained the necessary approvals for expanding the Kwinana to Kemerton section of the DBNGP corridor and DPI is now commencing to put the expanded corridor in place.

It is proposed to expand the width of the DBNGP corridor from its approximate width of 30 m[1], currently supporting two pipelines, to a total width of 50 m, so that it can support up to 5 or 6 pipelines. However, in some locations where there are potentially environmentally sensitive areas adjacent to the existing corridor, it has been considered appropriate to establish a duplicate corridor deviating around these areas instead of widening the existing corridor. The duplicated corridor along these deviations will be up to approximately 30 m wide.

Although this approach has received conditional approval from the Environmental Protection Authority (EPA) at a strategic level, the new proposed route raised considerable concerns among affected landholders, resulting in the Minister for Planning and Infrastructure committing to a further review of all notional routes.

This further review is based on work previously undertaken on existing and alternative alignments and includes consultation with key stakeholders, including landholders potentially affected by the proposed duplicated corridor, and relevant government agencies. Its purpose is to propose a final alignment that best achieves a balance between protecting environmental and social values. Importantly, the final alignment needs to be able to meet environmental standards and legislation, have reasonable expectation of achieving the necessary government approvals over the next 50 years and be appropriate for pipeline construction.

The length of the pipeline corridor under review is shown in Figure 1, and covers the section from north of Forestry Road, Harvey, to the boundary of the Kemerton Industrial Estate Buffer Area. The review includes the following alignment options, as presented in earlier documents:

- widening of the existing gas pipeline corridor to a maximum of 50 m, along either of the two margins
- creation of a new corridor, up to 30 m wide, along the alignment proposed in the SER , including the deviations designated as Kemerton option A, Kemerton option B, the Coolup deviation and the Pines deviation
- creation of a new corridor, up to 30 m wide, along a deviated alignment designated as the ‘new proposed route.

These routes are shown in Figure 1 (Figure 6 of the EPA Bulletin).

[1] Note that the existing pipeline corridor, between the Worsley Lateral and the Clifton Rd terminus is only 16 m wide at present.

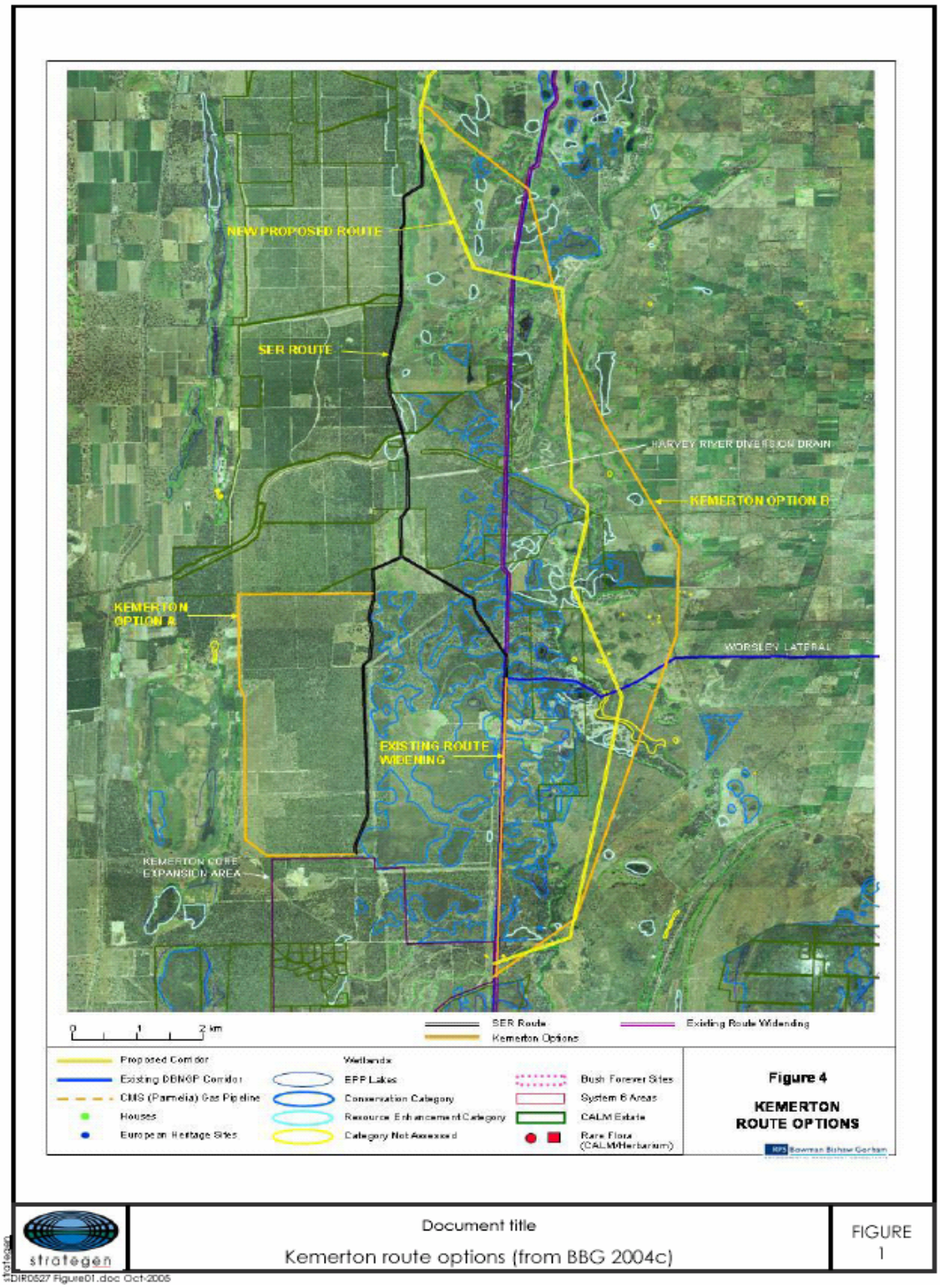

Figure 1 DBNGP Alignment options under consideration in the study area (from BBG 2004c)

2 KEY CONSULTATION OUTCOMES

Consultation with landholders that would be affected by the new proposed route determined that:

- both as a group and as individuals, those affected land owners that provided feedback were all strongly opposed to the construction of a new gas pipeline corridor across their properties
- the affected landowners did not believe that they had received sufficient or plausible reasons why the existing natural gas pipeline corridor could not be expanded to accommodate the new pipeline.
- the affected landowners felt that they had been kept suitably informed about the new proposed pipeline by the mail-outs that they had received and the meetings that they had attended
- many landholders had existing corridors across their land and believed that the management of corridors, in general, was inadequate
- the main concerns were loss of productive farm land and a reduction on long term property values and that these aspects might not be adequately compensated for

Consultation with both environmental agencies showed that CALM and DoE highly value the vegetation in and around the study area, as it is the largest, continuous area of vegetation remaining on the southern Swan Coastal Plain. According to the agencies, any proposals affecting the area must be able to demonstrate that they will not affect the viability of the area as a whole, such as increasing fragmentation or introducing new risks. Only after this could be confidently demonstrated, would specific factors be examined, such as:

- the extent and quality of regrowth since the original disturbance(s) along the corridor
- a rehabilitation programme that would address the shortfalls identified above
- minimisation and management of dewatering impacts (mainly through timing)

Both CALM and DoE were of the opinion that a 'whole of government' approach was necessary to identify and plan for a permanent infrastructure corridor through the area, given the high growth rate of the southwest of the state and the number of corridors already present.

3 COMPARISON OF ALIGNMENT OPTIONS

A number of specific reviews were conducted to identify the assessment factors applicable to the comparison, including:

- legislation and policy review
- a review of the impacts of the construction and maintenance of the existing pipeline through the study area
- identification of the constraints in pipeline design, construction and operation that might apply.

The comparison concluded that:

- In terms of net environmental impact, there was little to differentiate between the SER alignment and the option of widening the existing alignment – the former has a sizeable impact on dryland vegetation, while the latter is more associated with wetland impacts. The latter option offers the benefit of being the shortest route and keeps all the pipelines within the same corridor.

- The new proposed alignment developed by CALM and DoE affects a relatively low 8.8 ha of three well-represented vegetation types. It does not cross any Conservation Category or EPP wetlands, but does, however, come in close proximity to the Byrd Swamp Nature Reserve. In terms of environmental acceptability, this option appears to be an obvious choice.
- Although the new proposed alignment is 4 km longer and includes an additional 7 bends and 2 river crossings, its major drawback is the high number of landholders it affects.
- Through the 10 km of the study area, the original corridor intersects 7 – 8 ha of Conservation Category wetlands and the margins of an EPP lake. In addition to the existing pipeline, the wetlands are intersected by other infrastructure such as roads and powerlines. A silica sand mining operation and a golfing fairway also occur within one of the wetlands and the EPP lake, respectively. The mapped boundaries and classification of a number of wetlands within the corridor have been shown as open to reassessment.
- Widening of the existing corridor by 30 m to accommodate an extra four pipelines over the next 100 years will involve repeated disturbance to areas of high conservation value, such as Conservation Category wetlands. However, the EPA recognises that there is an existing pipeline corridor and that wetland areas have previously been disturbed. In locations within the study area, these wetlands have recovered to a level where the regenerating wetland vegetation communities closely resemble the adjacent undisturbed vegetation (EPA 2005c).
- An option to construct a single additional large diameter pipeline along the existing alignment in areas already disturbed exists. This option is capable of supplying an extra 125 terajoules/day of gas (based on similar projects)

4 CONCLUSION

The review concludes that, of the two main options: widening the existing corridor or deviating through farmland, there is no clear short-term advantage in adopting either option. Impacts to landholders might be satisfactorily redressed through financial compensation and better management of the relationship between landholders and users of the corridor. On the other hand, impacts to the environment can be minimised through correct management, rehabilitation, and improvements to construction methods and they can also be offset, in accordance with EPA policies.

In these regards, it appears that both the environmental and social impacts of the two options are localised and easily offset. It is difficult to predict the long-term or regional impacts of either option.

Hence, there may be some merit in considering the third option of constructing a single pipeline that will satisfy current expansion needs, while a strategic approach to managing infrastructure corridors (through the study area) is considered. This may involve consolidation of the multiple infrastructure corridors over time and possibly the rehabilitation of the major areas of disturbance.

In the twenty years since the DBNGP was first constructed, the level of environmental significance of the corridor area through Kemerton has markedly increased, resulting in the need to identify alternative alignments. On this basis, it is difficult to predict with certainty that any particular pipeline alignment is guaranteed of receiving the necessary approvals over a 50-year time frame.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

PART I - BACKGROUND

1. INTRODUCTION

The Western Australian Government, through the Gas Pipeline Sale Steering Committee (GPSSC), the Gas Pipeline Working Group (GPWG) and the Department of Planning and Infrastructure (DPI), has committed to expanding the existing Dampier to Bunbury Natural Gas Pipeline (DBNGP) corridor.

The GPWG has obtained the necessary approvals for expanding the Kwinana to Kemerton section of the DBNGP corridor, and DPI is now commencing to put the expanded corridor in place.

The section of the DBNGP corridor will be expanded from its approximate width of 30 m[2], currently supporting up to two pipelines, to a total width of 50 m, so that is can support up to 5 or 6 pipelines. However, in some locations where there are potentially environmentally sensitive areas adjacent to the existing corridor a duplicate corridor deviating around these areas has been proposed instead of widening the existing corridor. The duplicated corridor will be up to approximately 30 m wide.

An environmental review undertaken by Bowman Bishaw Gorham (BBG 2004a), on advice from the Department of Environment (DoE) and the Department of Conservation and Land Management (CALM), determined that such a deviation was warranted in the Kemerton area to avoid further impact on native vegetation and wetlands adjacent to the existing corridor.

After assessment of several potential alignments, a deviation to the west of the existing alignment (Figure 1) was considered to be the most appropriate route (designated in this report as the 'SER route'[3]) and was described in the Strategic Environmental Review (SER) referral to the Environmental Protection Authority (EPA), under Section 16e of the *Environmental Protection Act 1986* (the EP Act), in March 2004 (BBG, 2004a). However, in response to the SER, CALM and DoE[4] indicated that they would not support the SER route on environmental grounds.

To facilitate the identification of an environmentally acceptable expanded corridor alignment, a study team comprising CALM, DoE, DPI and GPWG identified and reviewed a number of additional alignment options, with CALM and DoE agreeing to an alignment that deviated to the east of the current corridor, crossing mostly privately-owned, agricultural land. Heritage and environmental studies of the alignment indicated that it could be acceptable in these regards, with the alignment receiving conditional endorsement from the EPA in November 2004 (EPA 2004a) This alignment is designated as the 'new proposed route'. The new proposed route raised considerable concerns among affected landholders, resulting in the Minister for Planning and Infrastructure committing to a further review of the route, as well as all other notional routes.

---

[2] Note that the existing pipeline corridor, between the Worsley Lateral and the Clifton Road terminus is only 16 m wide at present.

[3] This alignment is alternately designated as the 'proposed route', the 'Kemerton Deviation', the 'preferred alignment' or the 'SER route' in the SER, its appendices and subsequent documents, as well as the EPA bulletin. This report will use 'SER route' to refer to the alignment originally submitted to the EPA.

[4] For the purposes of this review, the EPA Services Unit is included in references to the DoE.

This current review is based on work previously undertaken on existing and alternative alignments and includes consultation with key stakeholders. It considers the overall (social and environmental) impact of the implementation of a pipeline corridor on the land.

1.1 PURPOSE

The purpose of the review is to propose a final alignment that best achieves a balance between protecting environmental and social values.

The final alignment needs to be able to meet environmental standards and legislative requirements, have reasonable expectation of achieving the necessary government approvals over the next 50 years and should be appropriate for pipeline construction[5].

1.2 SCOPE

The length of the pipeline corridor under review (the study area) is shown in Figure 1, and covers the section from north of Forestry Road, Harvey, to the boundary of the Kemerton Industrial Estate Buffer Area. The review includes the following alignment options, as presented in the SER and subsequent documents:

- Option 1: the new proposed route, i.e. the creation of a new, deviated corridor, up to 30 m wide.
- Option 2: the SER route, i.e. the creation of a new corridor, up to 30 m wide, along the alignment proposed in the SER, including the deviations designated as Kemerton Option A, Kemerton Option B, the Coolup deviation and the Pines deviation
- Option 3: widening of the existing gas pipeline corridor to a maximum of 50 m, along either of the two corridor margins (as shown)

These alignment options are shown in Figure 1.

1.3 METHODOLOGY

The review focuses on information submitted as part of the SER assessment process, other previously available information, and information derived from interviews and consultation with stakeholders, including DoE, CALM, DPI and affected landholders.

[5] Consistent with DoIR Tender Document RFQ035DIR0405, p9.

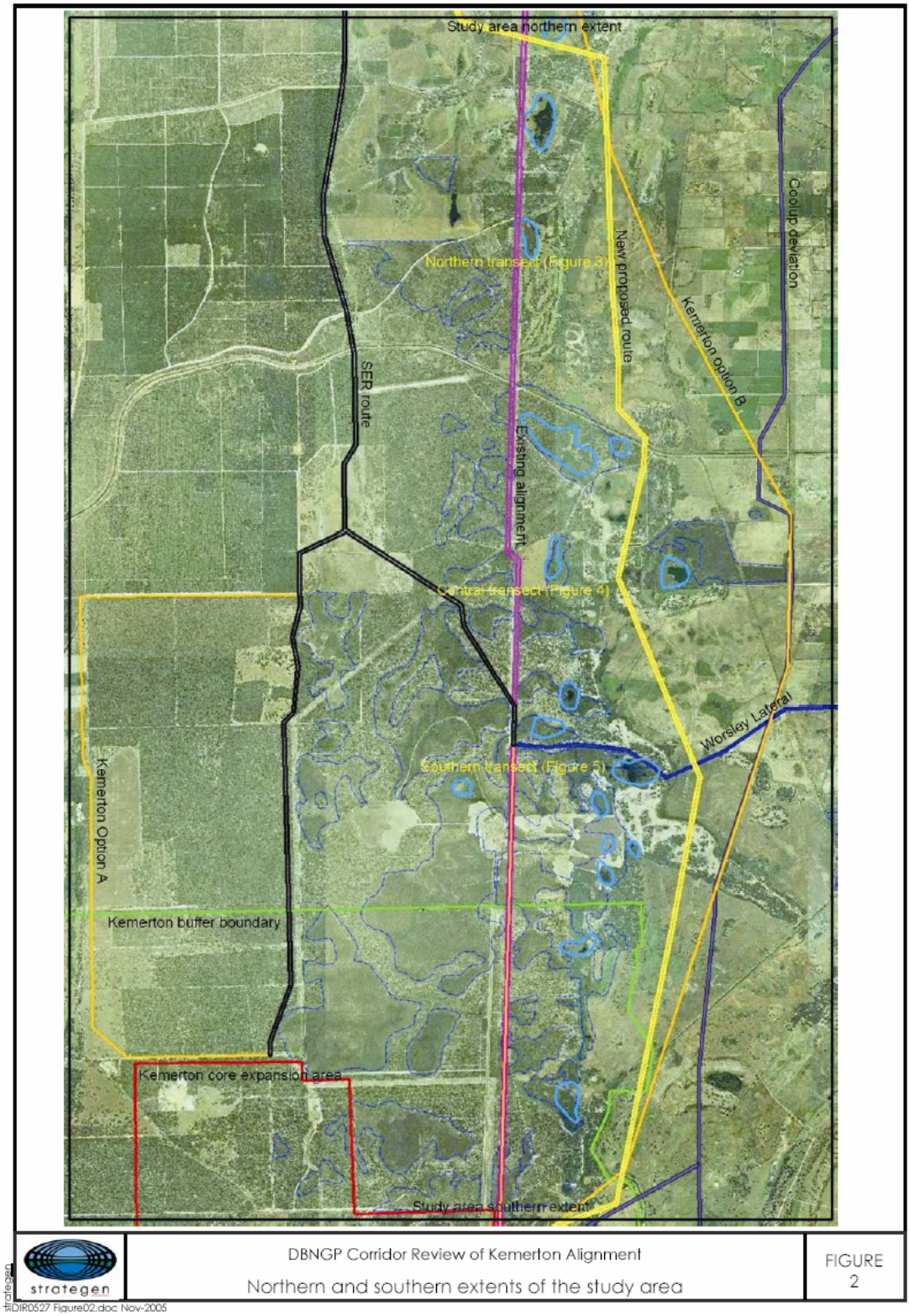

Figure 1 The Kemerton study area

1.3.1 Review of the SER and other studies

Aerial photography, previous reports and other study documentation on alternative routes have been reviewed to determine all relevant environmental, heritage, and social (including landholder and cost) issues that could potentially be associated with each option. Documentation reviewed included:

- Aerial photography showing all alternative routes examined to date (both hard copy and electronic)
- 2004 SER document by Bowman Bishaw and Gorham (BBG) which included an assessment of several alternative routes but proposed a route to the west of the current alignment with access to Kemerton from the north.
- Formal responses from the CALM and DoE on the environmental acceptability of various alternatives.
- Documentation relating to the CALM/DoE proposed route (east of the current corridor) for DBNGP alignment, where available.
- Heritage review documentation.
- EPA Bulletin 1153 (Dampier to Bunbury Natural Gas Pipeline Corridor Widening - Kwinana to Bunbury Project) in response to the 'new proposed route'.
- Records of discussions between relevant landholders and DoE, GPWG and representatives of the Minister for State Development.
- Records of the landholder's correspondence to the Minister for Planning and Infrastructure.

This review of information provided a preliminary summary of benefits, issues and constraints of each of the routes.

1.3.2 Interviews with key stakeholders

A consultation program was developed as part of study scoping. Three categories of stakeholders and methods of consultation were identified:

- Consultants who previously prepared reports – such as BBG and Mattiske Consulting, were interviewed by phone or in person to clarify information in the SER and associated reports, and to obtain further information about the routes considered.
- Key personnel from the DoE, CALM, DPI, GPWG/GPSSC and pipeline operators were interviewed to identify and obtain relevant data and information.
- Landowners - 20 Landholders that could potentially be affecting the DBNGP proposal were identified. The community consultation process is described in Section 5.3.

1.3.3 Review of environmental legislation and important policies that apply to the Corridor

Relevant legislative requirements were identified and addressed to ensure that the final proposed DBNGP corridor alignment is likely to be environmentally acceptable. Each route was assessed against government legislative requirements, policy, and guidance statements regarding environmental, heritage and social aspects. A number of conditions or requirements have been

developed that might further minimise or mitigate potential environmental impacts, in addition to those identified in the SER and by the EPA.

The review also identified aspects of the legislative and policy content that might affect the acceptability of future pipeline installations.

1.3.4 Review of biodiversity impacts

As a result of the site visit and meetings with the relevant government agencies, Mattiske Consulting has prepared a revised comparison of the SER, existing corridor and the new proposed routes (Table 1). In addition, additional information on the sensitivity of particular vegetation types and plant species to disturbances associated with pipeline construction was provided. This information is used in Section 7.

1.3.5 Review of the impact of installation and operation of gas pipelines on the current alignment

The potential (or perceived) implications of gas pipelines and designation of pipeline corridors on local land-uses were assessed on the basis of:

- integrating landholder feedback and information reviewed from previous studies and key stakeholders
- examining acceptable and perceived impacts on the environment and landholders from the existing corridor.
- considering the cumulative impacts of other linear infrastructure in the area (e.g. railways, major roads, powerlines) in regards to environment, social and heritage values.

Additional environmental surveys and investigations

The review included additional surveys of the existing pipeline corridor and alignment options to assess the accuracy of available mapping of the routes and environmental features (both by consultants and the government agencies) and obtain additional information on the disturbance and degree of recovery of vegetation following construction of the existing pipelines. The original botanical consultant involved in the preparation of the SER proposal (SER) conducted a site visit to clarify previous and potential impacts of the pipeline on the vegetation of the area.

1.3.6 Comparison of alignment options and development of a preferred route, based on the overall impact

The final comparison of alignment options was based on the outcomes of the above reviews and interviews. Key environmental, policy and social factors were identified and, where possible, the effects of the preferred route were described. The comparison included an estimate of the likelihood of receiving environmental approvals in the short and medium terms.

2. PROCESS TO DATE

This section reviews available information presented as part of the SER process, including EPA Bulletin No. 1153 (EPA 2004a) containing its advice to the Minister for the Environment.

The focus of the review is the study area, and the proposed alignments within it. In some instances, clarification has been sought from the involved agencies, and also the operators of the existing pipeline.

2.1 SER DOCUMENT

The SER, published in March 2004 by Bowman Bishaw Gorham (BBG), was prepared in accordance with Section 16e of the EP Act and examined the potential environmental impacts of future pipeline construction within the proposed, expanded corridor.

The actual construction of the pipelines themselves will be referred to the EPA for environmental assessment, but will be subject to the environmental commitments made within the SER[6].

The proposal

The stated purpose of the SER was 'to provide future pipeline proponents and the State government with assurance that pipeline construction is feasible and that no major environmental or regulatory barriers to construction are present' (BBG 2004a, page i).

Under the proposal, the existing DBNGP corridor would be expanded to 50 m, which would enable the construction of up to 4 additional gas pipelines within the proposed corridor over the next 100 years. Alternative alignments were proposed where expanding the existing corridor would affect environmentally sensitive areas or incompatible land uses. The alternative alignments consist of a second, 30 m wide corridor.

The SER presented a number of deviation options, recognising that each option had a particular mix of advantages and constraints. The SER options for the study area are shown in Figure 1.

Stakeholder consultation

The GPWG conducted briefings and consultation with local governments, key government agencies and landholders affected by the widening or deviation of the corridor.

The SER was made available for a four-week public review period. All landholders along the proposed alignments were sent the Executive Summary of the SER by post, and a full version of the SER on request.

[6] As the new proposed route was not assessed in the SER, contact was not made with the landowners during this period of the proposal.

Alternative alignments and deviations

The SER described a number of possible corridor expansion options in the Kemerton area including:

- expansion of the existing corridor for its full length (Option C of this review)
- the Coolup deviation which terminated at Australind
- the Pines deviation identified after the decision was made to terminate the corridor at Kemerton
- the Kemerton (SER) route (Option B of this review)

Minor options for the SER route were investigated to avoid bushland and wetlands to the north of Kemerton. These options included SER option A (to the west) and SER option B (to the east). Both options are 30 m-wide deviations from the existing pipeline corridor, as shown in Figure 1.

2.2 SER RESPONSE TO SUBMISSIONS

The Final Response To Submissions (BBG 2004c) was issued in November 2004 and addressed submissions received during the SER public and agency review process.

A total of 119 issues were raised in submissions (not all of which related to the study area), including:

- the conservation significance and scientific value of the Kemerton population of the black-striped jollytail (HRLCDC[7])
- the importance of the Kemerton woodlands in relation to a number of bird species (HRLCDC)
- the absence of studies into the impacts of existing pipelines on the protected wetlands (anonymous)
- that protection of CC and RE wetlands should be in accordance with the EPA Wetland Position Statement (DoE)
- that mechanisms exist for re-evaluating CC or RE wetlands, in regards to vegetation condition (DoE)
- that the proposed preferred alignment (SER route) from the Shire of Harvey Boundary to the Kemerton Core Expansion Boundary is acceptable, but Kemerton Option A should be further considered (DoE)
- the need for recognition of the conservation significance of bushland north of Kemerton (several responses)

In addition to the above, a further 29 issues related to the impacts of the corridor on private farmland (mostly in areas not associated with this review).

The SER Response to Submissions also contains updated maps of the route, showing a number of proposed minor alignments in the vicinity of Kemerton.

[7] Harvey River LCDC (LandCare Group)

This document also contained an assessment which ranked the five alignment options against a series of factors. According to this assessment, which provided no weighting of the factors, the new proposed alignment attained the worst score out of the five options. This was principally because it affected the most landowners, crosses the Wellesley River, has adverse ground conditions and due to its affect on a small area of State Forest. Expansion of the existing route was ranked as the third best option and the SER route was ranked as the best.

2.3 EPA BULLETIN 1153 - DAMPIER TO BUNBURY NATURAL GAS PIPELINE CORRIDOR WIDENING – KWINANA TO BUNBURY PROJECT

Bulletin No. 1153 (EPA 2004a) outlines the advice provided to the Minister by the EPA, following examination under Section 16(e) of the EP Act of corridor widening of the Kwinana to Bunbury section of the Dampier to Bunbury Natural Gas Pipeline. The conceptual advice notes that there are no major constraints that would preclude the use of the proposed corridor (including the new proposed route near Kemerton) for construction of future pipelines. However, there are a number of environmental factors that will relate to the construction of a pipeline and will need to be addressed in the referral under Section 38 of the EP Act.

However, the assessment outlines the need to further investigate issues such as the flora and vegetation in Kemerton, impacts on wetlands, disposal of waste from the development, surface and groundwater impacts, and pollution issues such as noise, dust and vibration. Importantly, the Bulletin recommends that the proponent investigate offsetting the loss of significant vegetation within the alignment.

Bulletin 1153 assesses the proposal on a concept basis, on currently available information.

2.4 AGENCY ADVICE

The objectives of the consultation with agency representatives were:

- to identify policy constraints
- to identify possible future directions of the agencies relative to the proposal
- to develop frameworks to identify and implement control measures and offsets

Officers from CALM and DoE (including EPASU) that had been involved in the assessment of the SER and the identification of the new proposed route were interviewed over the telephone, following an initial meeting with the GPWG[8]. Based on these interviews, meetings were held with CALM and DoE to examine the alternative alignments and the precise management objectives of each agency in regards to the alignments.

Originally, both CALM and DoE had advised the GPWG that the widening of the original alignment and the SER route would be environmentally unacceptable. CALM and DoE then suggested the new proposed route that avoided large areas of native vegetation but affected a larger number of landowners. The EPA considered this new route as potentially acceptable (EPA 2004a).

[8] DoE/EPASU representatives were absent from this meeting (21 June 2005).

CALM and EPASU were asked to provide further information on why the original expanded corridor alignment option was inappropriate, as well as their views on other subsequent alignment options.

CALM

CALM stated that its objective in regards to managing its estates and native vegetation in the study area was to protect and preserve the contiguous nature of the Wellesley wetlands, mainly as a system, but also as individual lakes. This objective required CALM to recommend alternative alignments that would avoid the wetlands and also reduce clearing requirements through the large areas of bushland north of Kemerton, recognised as being the largest area of remnant vegetation on the southern Swan Coastal Plain.

In recognition of the concerns expressed by the potentially affected landholders, CALM advised that for it to re-examine expanding the existing corridor through the study area, the following aspects would need to be assessed:

- the extent and quality of regrowth since the original disturbance(s) along the corridor
- a rehabilitation program for affected areas
- minimisation and management of dewatering impacts during construction (mainly through timing)

The high number of infrastructure corridors cutting through vegetation in the study area and increasing demand for expanding these corridors was acknowledged and that long-term strategic planning, with outcomes protected by policy, offered a means of reducing or avoiding future conflicts. CALM believed that the option of installing a single, large-diameter pipeline through the existing DBNGP easement might be worthy of consideration.

DoE

Consistent with the position of CALM, DoE stated that the vegetation was highly valued in and around the study area, as it is the largest, continuous area of vegetation remaining on the southern Swan Coastal Plain. As a principle, any proposals affecting the area must be able to demonstrate that they will not affect the viability of the area as a whole, such as increasing fragmentation or introducing new risks. This would need to be confidently demonstrated before specific factors would be examined, such as impacts on EPP lakes and Conservation Category wetlands. DoE considered that it would only be appropriate to discuss environmental offsets if these aspects could be satisfactorily addressed.

DoE further advised that, if it were to re-examine the option to expand the existing DBNGP easement, it would require more detailed descriptions of certain aspects of the proposed pipeline construction to ensure that maximum efforts were being implemented to minimise environmental impacts. Such aspects would include:

- minimum working widths through different landscapes
- maximising the capacity of the pipeline (to reduce repeated disturbances)
- proximity to powerlines

As with CALM, DoE was of the opinion that a 'whole of government' approach was supported to identify and plan for a permanent infrastructure corridor through the area, given the high growth rate of the southwest of the state and the number of corridors already present.

2.5 CONSULTATION WITH THE PIPELINE PROPONENTS AND OPERATORS

The objectives of the consultation with pipeline managers and operators were:

- to identify practical constraints
- to examine the possibility to provide acceptable offsets

The SER does not represent an assessment of a single proposal to construct a pipeline, but is instead part of a review by the EPA of potential future proposals, undertaken to identify possible constraints that might apply to those proposals, in terms of achieving necessary environmental outcomes. As such, there was no proponent to discuss options for avoiding or minimising environmental impacts through design or pipeline construction practices.

Instead, Alinta Networks, as the operators of the existing pipeline, were contacted via telephone and email to discuss engineering options that might be available to reduce impacts and address the concerns of the EPASU (DoE).

Staff from the DPI who are responsible for managing the DBNGP corridor, were also interviewed to discuss their expectations regarding future management of the expanded corridor.

Technical information provided by Alinta Networks (and other sources) included:

- There is no specified minimum separation distance between overhead powerlines and gas pipelines, in regards to induced current[9]. Instead, measures to mitigate the induced current are implemented, such as increasing the earthing of the pipeline or reducing its conductive length by installing rubber flanges between pipe sections. The relevant Australian Standard specifies a maximum contact voltage in lieu of a separation distance.
- The affect of overhead powerlines on corrosion rates of pipelines is varied and can be mitigated through corrosion control systems and increased induced current mitigation measures (DIPRA, 1997).
- Separation between gas pipelines is a management measure to minimise the risk of encountering the original buried pipeline while constructing subsequent pipelines. Other measures are available that also minimise this risk, such as thicker walled pipes.
- Working widths can be minimised during construction by maximising the use of disturbed areas for placing soil stockpiles and other associated infrastructure. While the width of the trench is set by the diameter of the pipe and local soil conditions, the amount of disturbance on each side of the trench can be managed to reduce impacts in sensitive areas.

[9] Voltage can be induced in pipelines from overhead powerlines in close proximity. Long distances of exposure to powerlines, typically in the order of several kilometres, can result in induced voltages of many thousands of volts, unless mitigation is installed (AS2885.1 1997). Mitigation is usually in the form of the provision of earthing, at appropriate intervals, or the use of insulating rubber gasket joints (DIPRA, 1997). The Australian Standard for the construction of gas pipelines, AS 2885.1 1997, specifies maximum voltage potential, as opposed to a minimum separation distance.

- The installation of an additional pipe (looping) and additional compressors will enable the throughput of the DBNGP to be increased to a much larger extent than just the addition of a single pipe.

The DPI Infrastructure Corridors[10], as corridor managers, highlighted that the final alignment will need to be attractive to new pipeline operators. Increases in the length of the pipeline, the number of bends, crossovers and other obstacles, such as river crossings, will be reflected in higher construction and maintenance costs, which will ultimately affect the tariff prices. In locations where the new proposed alignment went through native vegetation or close to nature reserves, the DPI expressed concern that future pipeline operators might be required to install additional deviations around these areas, if they became more environmentally significant in the future.

The DPI acknowledged that suitable environmental offsets may play a part in the environmental acceptability of the less socially-sensitive alignment options, such as widening the existing pipeline easement.

[10] The Infrastructure Corridor Team within the Land Asset Management Services Branch of the Department for Planning and Infrastructure, administers the *Dampier to Bunbury Pipeline Act 1997* on behalf of the Land Access Minister.

Table 1 Key environmental characteristics of each pipeline alignment option (from BBG 2004b, 2004c)

	New proposed route	SER	Expansion of existing route
Landform and soils	Palusplain and Guildford Formation (cracking clays)	Palusplain and sandy soils	Palusplain and sandy soils, mostly over clay
Area of bushland affected	8.8 ha of Bassendean Complex – Central and Southern (0.04%)	17.8 ha of Bassendean Complex – Central and Southern (0.07%)	24 ha of Bassendean Complex – Central and Southern (0.12%)
Condition	Mostly cleared grazing land, with disturbed remnant communities	Mostly disturbed along route option Also area historically been grazed and logged	Frequent disturbance as contiguous to power line and existing gas pipeline route. Also area historically been grazed and logged
Vegetation communities	3 plant communities M2, M3 and P2. Regarded as low risk by Gibson et al 1994	10 plant communities C4, M3, P2, P4, K2, B3, B4, B5, H1 and F2 (minor realignment will avoid B4 and F2)	9 plant communities B3, B4, B5, P2 (disturbed), P3; M2, K2, H1 and H3
Declared Rare Flora	None	None	None
Priority Species	*Acacia semitrullata* (P3) in communities M2 and M3	*Acacia semitrullata* (P3) in multiple communities, Boronia juncea subsp. *juncea* (P1) in community H3 and *Acacia flagelliformis* (P4) within community H2	*Acacia semitrullata* (P3) in multiple communities, *Boronia juncea* subsp. *juncea* (P1) in community H3
TEC's	No TEC directly affected, although alignment abuts TEC 9 (based on Gibson et al. 1994 – plant community 9); indirect impacts from access and potential spread of disease	Nil	Nil
Weeds	*Gomphocarpus fruticosus* and *Zantedeschia aethiopica* (P1/P4) for Harvey municipality	*Zantedeschia aethiopica, Rubus fruticosus, Gomphocarpus fruticosus* (P1/P4) and *Echium plantagineum* (P1)	*Zantedeschia aethiopica, Rubus fruticosus, Gomphocarpus fruticosus* (P1/P4) and *Echium plantagineum* (P1)
Dieback issues	Yes	Yes	Yes
EPP wetland	Nil	Nil	0.3 ha, badly mapped, does not contain wetland vegetation
Conservation Category Wetlands	Some wetlands present, but not conservation category wetlands, as previously disturbed	0.35 ha of poor quality Conservation Category wetland	7 – 8 ha of varying quality Conservation Category wetlands, mostly H1 and H2 damplands Area on proposed alignment already been cleared for powerline and gas pipeline
Areas of significance	Adjacent Byrd Swamp Nature Reserve is an A Class Nature Reserve vested in the Conservation Commission for the conservation of flora and fauna and has an IUCN category of 1a: a strict nature reserve - protected area managed mainly for science.	Wellesley area wetlands are considered to be significant because of a lack of remnant vegetation left to link native vegetation corridors from the coast to eastern areas of the Swan Coastal Plain	Wellesley area wetlands are considered to be significant because of a lack of remnant vegetation left to link native vegetation corridors from the coast to eastern areas of the Swan Coastal Plain.
River crossings	None (crosses under Harvey Diversion Drain)	None (crosses under Harvey Diversion Drain)	Crosses the Wellesley River twice
No of landholders	17	10	6
No of bends	11	23	15
Other notes	Avoids pine plantations	This alignment option occurs within or adjacent to current or adjoining disturbed corridor and tracks	This alignment option occurs within or adjacent to current or adjoining disturbed corridor and tracks

3. LEGISLATIVE AND POLICY REVIEW

3.1 INTRODUCTION

Existing and draft policies, guidelines and parliamentary reports that may apply to the expansion of the DBNGP alignment were reviewed. The purpose of the review is to identify:

- political and legislative constraints that might limit the alignment options
- enacted special mechanisms that might either over-ride or offset constraints
- relevant precedents or case studies
- accepted guidance or direction that has been provided on matters relating to infrastructure placement or relevant environmental and social factors

The articles examined in the review included:

- *Dampier To Bunbury Pipeline Act 1997*
- *Dampier to Bunbury Pipeline* (Corridor) *Regulations 1998*
- *Environmental Protection* (Clearing Of Native Vegetation) *Regulations 2004*
- Part V Division 2 of the *Environmental Protection Act 1986*
- Draft *Environmental Protection* (Swan Coastal Plain Wetlands) *Regulations 2004*
- *Environmental Protection* (Swan Coastal Plain Lakes) *Policy 1992*
- *Land Administration Act 1997*
- EPA Position Statement 2 - Clearing Of Native Vegetation
- EPA Position Statement 4 – Environmental Protection Of Wetlands
- EPA Position Statement Number 9, Environmental Offsets
- EPA Guidance Statement 10 – Level Of Assessment For Proposals Affecting Areas Within System 6 Or The Swan Coastal Plain Region Of System 1
- Greater Bunbury Region Scheme
- Water and Rivers Commission Position Statement: Wetlands
- Report Of The Standing Committee On Public Administration And Finance In Relation To The Impact Of State Government Actions And Processes On The Use And Enjoyment Of Freehold And Leasehold Land In Western Australia, May 2004

3.2 CORRIDOR LAND-USE AND ACCESS

3.2.1 Pipeline and corridor legislation

The *Dampier to Bunbury Pipeline Act 1997* provides for the disposal of a gas pipeline belonging to the State and the holding of a State land corridor. The pipeline corridor is owned by the Crown and will continue to be owned by the Crown, while existing and future pipelines are privately owned.

Section 29 of the Act provides the DBNGP Land Access Minister the ability to acquire a right, title or interest in property by either agreement or under Part 9 of the *Land Administration Act 1997*. This gives the Minister the ability to compulsorily acquire land for the corridor.

Section 33 provides the ability to bring additional land into the corridor. This additional land can be, but does not necessarily need to be for the use of a pipeline that was part of or connected to the original pipeline.

The Act provides the ability to acquire land to expand the pipeline, either through voluntary or compulsory acquisition, if it can be demonstrated as reasonably appropriate to do so and has the approval of the designated Land Access Minister.

3.2.2 Greater Bunbury Region Scheme

The Greater Bunbury Region Scheme (GBRS) was prepared by the Western Australian Planning Commission (WAPC 2000) and referred to the EPA in 1996. The scheme was formally assessed with EPA recommendations and advice provided to the Minister for the Environment, and a decision is pending.

As part of the assessment, the EPA identified several areas that require special consideration or further assessment. One such area identified as requiring special consideration is the Special Consideration Area (SCA) number 2, being the Kemerton Industrial Buffer Zone Area. This area was identified by the EPA as containing wetlands and vegetation that are regionally significant and should be conserved.

The GBRS also identified the potential for offsetting environmental impacts and the potential to use management plans to protect identified vegetation and wetlands, despite development in the immediate areas.

3.2.3 Parliamentary review

The Report of the Standing Committee on Public Administration and Finance - *The Impact of State Government Actions and Processes on the Use and Enjoyment of Freehold and Leasehold Land in Western Australia*, reviews the actions of Government in acquiring land for public works, and provides recommendations to reduce the impact of the acquisition process on the leaseholder.

The report, tabled in March 2004, identifies common misconceptions amongst the community regarding the compulsory acquisition of 'freehold' land by the State, and recommends the State Government produce documentation advising the public what 'freehold' means and the powers of the State to acquire the land. Importantly for the DBNGP project, the report recommends "that wherever practical, State Government Departments, Agencies and Bodies use existing easements and service corridors for their infrastructure projects."

The report recommends the development of an appropriate method and level of compensation for those landholders whose land is subject to an electricity transmission line easement. The recommendation includes the establishment of this method through legislation. This method and compensation could be applied to the acquisition of all service corridors, not just for electricity line easements.

The Committee recommended that the reasonable costs of obtaining independent land valuation and compensation assessment advice, independent legal advice on rights and on any offer and associated documentation, be paid to landholders for both voluntary and compulsory acquisitions land. The

Committee recommended that a standard scale of costs be developed for this purpose, which may include information from the Land Valuers Licensing Board's Scale of Fees.

The Committee recommended that a single, independent, land acquisition agency be established, with the sole purpose of acquiring interests in land at a fair price. This agency should adopt the Committee's model land acquisition procedure for all interests in land acquired. The Committee was provided information on the methods used by Main Roads WA as an effective method to acquire land.

Finally, the Committee recommended that the State Government amend relevant legislation to provide for the same level of compensation be paid to land acquired voluntarily as to those acquired under Parts 9 and 10 of the *Land Administration Act 1997*.

The State Government's response to the Committee's report was tabled in the Legislative Assembly on 26 October 2004 (Tabled Paper 2947), essentially supporting the majority of recommendations made by the Committee, including using existing easements and service corridors more major infrastructure projects, where practical.

3.3 ENVIRONMENTAL PROTECTION LEGISLATION AND POLICIES

3.3.1 Wetlands

Draft Swan Coastal Plain Wetlands policy and regulations

The revised draft *Environmental Protection* (Swan Coastal Plain Wetland) *Policy 2004* (EPA, 2004c) seeks to protect wetlands of high ecological value on the Swan Coastal Plain. The policy provides purpose of the policy, policy area and wetland register.

The purpose of the policy is to protect the environmental values and prevent or control pollution to certain wetlands of the Swan coastal plain.

The revised draft *Environmental Protection* (Swan Coastal Plain Wetland) *Regulations 2004* (EPA, 2004d) establishes the environmental quality, criteria to determine wetland significance and environmental value, prescribes alterations of wetlands, identifies activities that cause environmental harm, and defines the boundaries of the Swan Coastal Plain, in regards to this Policy.

The definition of wetland given in the policy states: "an area of seasonally, intermittently or permanently waterlogged or inundated land on the Swan coastal Plain, whether natural or otherwise, and includes a lake, swamp, marsh, spring, dampland, tidal flat or estuary; or part of such an area."

The EPA can register a wetland providing it meets one or more of the following environmental quality criteria:

- the wetland is recognised internationally, nationally or regionally as provided in regulation 5 of the regulations, i.e. the wetland is recognised if the wetland is an important feeding, breeding or resting site for significant birds;
- the wetland has at least one of the significant natural attributes referred to in regulation 6 of the regulations, i.e. supports declared protected or rare fauna, vegetation in "good, very good, excellent or pristine condition", threatened ecological communities, part of a natural wetland type with less than 30% of wetlands of that type or is a significant habitat or refuge of native or migratory fauna;

- the wetland has at least 2 of the environmental values listed in regulation 7 of the regulation, i.e. the wetland is a significant site of pollen records, unusual sediments (as indicators of historical change), unusual geomorphology or hydrology for the scientific community, the wetland is a public resource for water-based and land-based recreation, significant archaeological or historical heritage site, of Aboriginal significance or site of educational study.

A wetland can be removed from the register by the EPA if the wetland does not meet or no longer meets at least one of the three environmental quality criteria.

Proposals that might, if implemented, result in environmental harm[11] to a protected wetland, must be referred to the EPA for assessment under Section 38 of the EP Act.

EPA Position Statement 4

EPA Position Statement 4 (EPA, 2004b) outlines the environmental and ecological benefits provided by wetlands and provides an understanding as to why wetlands are considered important by the EPA and principles for their protection. The Position Statement also recognises the pressure to expand and develop land for urban, industrial and agricultural activities.

Position Statement 4 recognises that wetlands provide a source of food and nutrients for fauna and flora, form an important social role through recreation and landscape amenity and are an important habitat refuge for fauna. Further, the Position Statement recognises that wetlands perform an important function with regard to improving water quality and hydrological balance, particularly during storm events.

The EPA outlines its principles for the protection of wetlands through the protection of environmental values and functions, restoration of the biological diversity of wetland habitats, ensure 'wise use' of wetlands and preferable provide for no net loss of wetland values and functions. Consequently, as Position Statements are designed to be considered during proposal development, the EPA identifies the need to ensure that projects that potentially impact on wetlands meet generally accepted environmental standards.

Expansion of the existing DBNGP corridor, along its existing alignment or that proposed in the SER has the potential to affect a number of wetlands. Consequently, consideration needs to be given to the application of principles of wetland protection outlined in the Position Statement, including:

- the protection of wetland values and functions
- restoration of the biological diversity of wetland habitats
- 'wise use' of wetlands
- preferably no net loss of wetland values and functions.

[11] Environmental harm is defined as direct or indirect harm resulting from removal or damage to native flora, fauna, habitat or environmental values eg. filling, mining, construction, discharging water, taking groundwater, removing, killing native vegetation, burning, disposing of waste material into the wetland area.

3.3.2 Native vegetation

EPA Position Statement 2

Position Statement 2 *Environmental Protection of Native Vegetation in Western Australia* (EPA 2000) presents the position of the EPA in regards to the application of the National Strategy for the Conservation of Australia's Biological Diversity. Western Australia is a signatory to the strategy and, as such, the principles embodied in that strategy have to be followed whenever clearing of native vegetation is being considered by the signatory governments.

While the pipeline corridor is outside of the designated agricultural area that is the principle focus of the Statement, the EPA advises that the principles of biodiversity protection will still apply.

EPA Guidance Statement 10

EPA Guidance Statement 10 (EPA 2003a) provides guidance on what the EPA considers to be regionally significant vegetation and on the level of assessment that should be expected for proposals affecting regionally significant areas within regions specified by the statement. The Guidance Statement aims to ensure that developments are compatible with the intent of the recommendations and or conservation values of these areas.

Guidance Statement 10 refers proponents to relevant documents such as the Greater Bunbury Region Scheme, EPA Position Statement 4 - Environmental Protection of Wetlands, Guidance Statement 33 – Guidelines for Environment and Planning and Threatened or Poorly Reserved Plant Communities, to ensure that all aspects relevant to the environmental attributes of the project area have been considered. Through this advice and the identification of the likely level of assessment that will be assigned to proposals that impact on regionally or locally significant areas, the document encourages proponents to redesign or modify proposals to reduce impacts on significant areas.

The document identifies the reduced level of assessment that would be expected for those sites that prevent or minimise impacts on significant areas. The Guidance Statement identifies proposals impacting on Ramsar, EPP, Conservation Category and nationally significant wetlands, as likely to be formally assessed or unlikely to be environmentally acceptable. Further, those proposals likely to have a significant impact or result in direct loss of vegetation are also likely to be subject to formal assessment or unlikely to be environmentally acceptable.

As the proposal is within the areas defined in this Guidance Statement, an indication of the likely level of assessment, and information required for the assessment can be determined. Indications from this statement are that if the proposal is likely to have a significant impact on areas of significant vegetation or wetlands, the proposal is likely to attract formal assessment.

3.3.3 Mitigation

EPA Position Statement 9 *Environmental Offsets* (EPA, 2005b) recognises that environmental impacts are, at times unavoidable, and that some areas require a higher level of protection. The aim of the offsetting process is to achieve a net environmental benefit where impacts are unavoidable.

The EPA recognises that offsets should be a last resort to mitigate environmental impacts and that all options, outlined in the preferred order below, must have been exhausted prior to the offset process:

- avoid

- minimise
- rectify
- reduce

The principles adopted with regard to the acceptance of environmental offsets as part of the EPA decision making process include:

- environmental offsets only considered after all reasonable attempts to mitigate adverse impacts have been exhausted
- the offset package should address direct and contributing offsets
- offsets should be like for like
- positive offset rations should apply where the risk of failure is apparent
- there must be a robust and consistent assessment process
- offsets must meet all statutory requirements
- offsets must clearly define the impact it is intended for, they must be fully documented and enforceable
- offsets must ensure a long lasting benefit

The EPA holds the presumption against recommending approval for proposals that are likely to have significant adverse impacts to critical assets. The EPA does not consider it appropriate to validate or endorse the use of offsets where projects are predicted to have significant adverse impacts on critical assets, where critical assets include:

- the public Conservation Reserve System
- native vegetation
- biodiversity
- wetlands
- wild and scenic rivers identified by DoE and Australian Heritage Commission.
- important landscapes, natural features or environmental icons.
- areas where new or additional emissions present a significant risk to human health or the environment, or where the emissions exceed a prescribed environmental or health standard.
- ecosystems vulnerable to threats
- heritage

The EPA notes, however, that in some circumstances, significant adverse impacts may be approved by Ministers to provide an essential community service, public benefit, or to allow strategic, social or economic development to occur. In these circumstances the EPA advice is that such projects should be conditional on consideration or development of on-site impact mitigation and development and implementation of an acceptable, comprehensive offsets package for significant, residual adverse impacts.

3.4 RELEVANT ASSESSMENTS

The EPA has recently assessed a number of proposals that relate to the proposal to expand the DBNGP corridor through the study area. These proposals are situated within, or close to, the study area or involve the expansion of the DBNGP corridor through other sensitive areas.

3.4.1 Bulletin 1206 – Kwinana lateral gas pipeline (November 2005)

The proposal is to construct and operate a 23 km underground gas transmission pipeline within the existing DBNGP corridor, commencing at Kwinana Junction Main Line Valve (MLV) 139. The proposed pipeline passes predominantly through cleared agricultural properties, with some sections passing through public open space (Leda Nature Reserve and surrounds) and remnant vegetation, including two Conservation Category wetlands. The clearing footprint for the construction of the pipeline would be within the existing 30 m-wide DBNGP corridor and would itself be 23.5 m wide, except in environmentally sensitive areas, where it would be only 20 m.

As identified in the SER (BBG 2004a). there was no additional land available for alternative alignments and the proposed pipeline has been designed to maximise the use of the existing DBNGP corridor. This has been achieved by providing the equivalent of four times the capacity of the existing pipeline(s) in one larger pipeline, removing the need for several smaller pipelines.

The existing easement was cleared in the 1980's, when the existing pipelines were originally constructed, but regrowth has occurred since, and therefore some clearing (22 ha) is required. The wetland communities disturbed during construction have recovered to the level where they now closely resemble adjacent, undisturbed vegetation. However, the dunal woodland vegetation communities have not recovered to the same extent.

The proponent has committed to full rehabilitation, restricted clearing, retention of key habitat trees (that are not located within the direct line of the pipeline) and other specified management measures aimed at reducing or mitigating the potential impacts of the pipeline. The EPA concluded that it is unlikely that the EPA's objectives would be compromised, provided there is satisfactory implementation by the proponent of the conditions and commitments presented in the bulletin. The EPA reiterated its existing advice that, despite its conclusions in this case, its preference was for pipelines to be located in an alternative easement which avoids environmentally sensitive areas.

3.4.2 Bulletin 1204 – Kemerton lateral gas pipeline (October 2005)

The proposal to construct and operate a 5 km pipeline from the DBNGP to supply natural gas to the Kemerton Power Station was considered by the EPA as being able to be managed to meet the EPA's environmental objectives (subject to conditions). The proposed pipeline would begin at Main Line Valve 154/155, then run south within the existing DBNGP easement for approximately 5 km, then deviate west for approximately 100 m to the power station site (Figure 2). Approximately 8 ha of vegetation would be disturbed during construction, al within the existing easement.

Consistent with the recommendations of EPA Bulletin 1153, the proponent considered alternative routes to minimise environmental impact on the area. The route shown in Figure 2 was selected as the preferred route, with the proponent noting that this route would keep similar infrastructure assets together in a controlled corridor, leading to increased public safety and minimal environmental disturbance.

The EPA concluded that the impacts on flora and vegetation as a result of the proposed clearing and trench construction are able to be managed by restricting clearing and undertaking rehabilitation. The potential impacts to wetlands are not likely to be significant, given the time of the proposed trench construction (summer) and that rehabilitation would occur in wetland areas.

The EPA noted that, while advising that the construction of the 5 km lateral pipeline could be managed so as not to compromise the EPA's objectives, it should not be seen as a precedent that future gas pipelines within this, and other environmentally sensitive areas of the existing DBNGP corridor would be considered acceptable. The EPA reiterated its earlier advice (EPA 2004a) that its preference is that future pipelines are located in an alternative easement which avoids environmentally sensitive areas. The details of the EPA's assessment and recommendations are shown in Table 2.

Table 2 EPA Assessment of Kemerton lateral pipeline (from Bulletin 1204)

EPA consideration	Recommendations
Vegetation clearing and pipeline construction activities would be confined to the easement, with the proponent committing to retaining large habitat trees and rehabilitating the disturbance.	The proponent shall not disturb vegetation outside of the existing easement.
Impacts on specially protected flora species would be minimal in both a local and regional context due to the small area of disturbance.	The proponent shall manage Declared Rare Flora and implement a comprehensive rehabilitation plan.
The Priority 3 species, the Black-striped Minnow (*Galaxiella nigrostriata*) would be at minimal risk from construction activities due to the known locations of these species and the management of altered wetland hydrology.	The proponent shall minimise indirect impacts to fauna from altered hydrology by implementing a wetlands management plan and an acid sulphate soils/dewatering management plan.
The potential for fauna to be trapped in open trenches exists, but can be minimised and managed.	The proponent shall limit the length of trench open at any time and have a specific person to check and remove trapped fauna.
The fauna habitat to be disturbed is represented elsewhere in the Kemerton area and that fauna so far identified did not have ranges restricted to the immediate area.	The proponent shall reserve habitat trees.
The wetlands traversed by the proposed pipeline route (2.1 km of the 5 km route goes through categorised geomorphic wetlands) have high conservation values, but recognises that the wetland areas have been previously disturbed and are recovering well (and that consideration has been given to alternative routes).	The proponent to undertake construction during summer, implement a wetlands management plan and an acid sulphate soils/dewatering management plan.
The disturbance to the wetlands is temporary, can be managed in a way that minimises impact (eg timing of dewatering) and best practice rehabilitation measures would be used to restore the ecological values of the wetland systems.	
The proposal would require the clearing of (previously cleared) vegetation in a sensitive area, but that recovery was promising.	The proponent to restrict clearing and implement a rehabilitation plan.
There was a potential for weeds and dieback to spread along the pipeline.	The proponent to manage the spread of weeds and dieback.

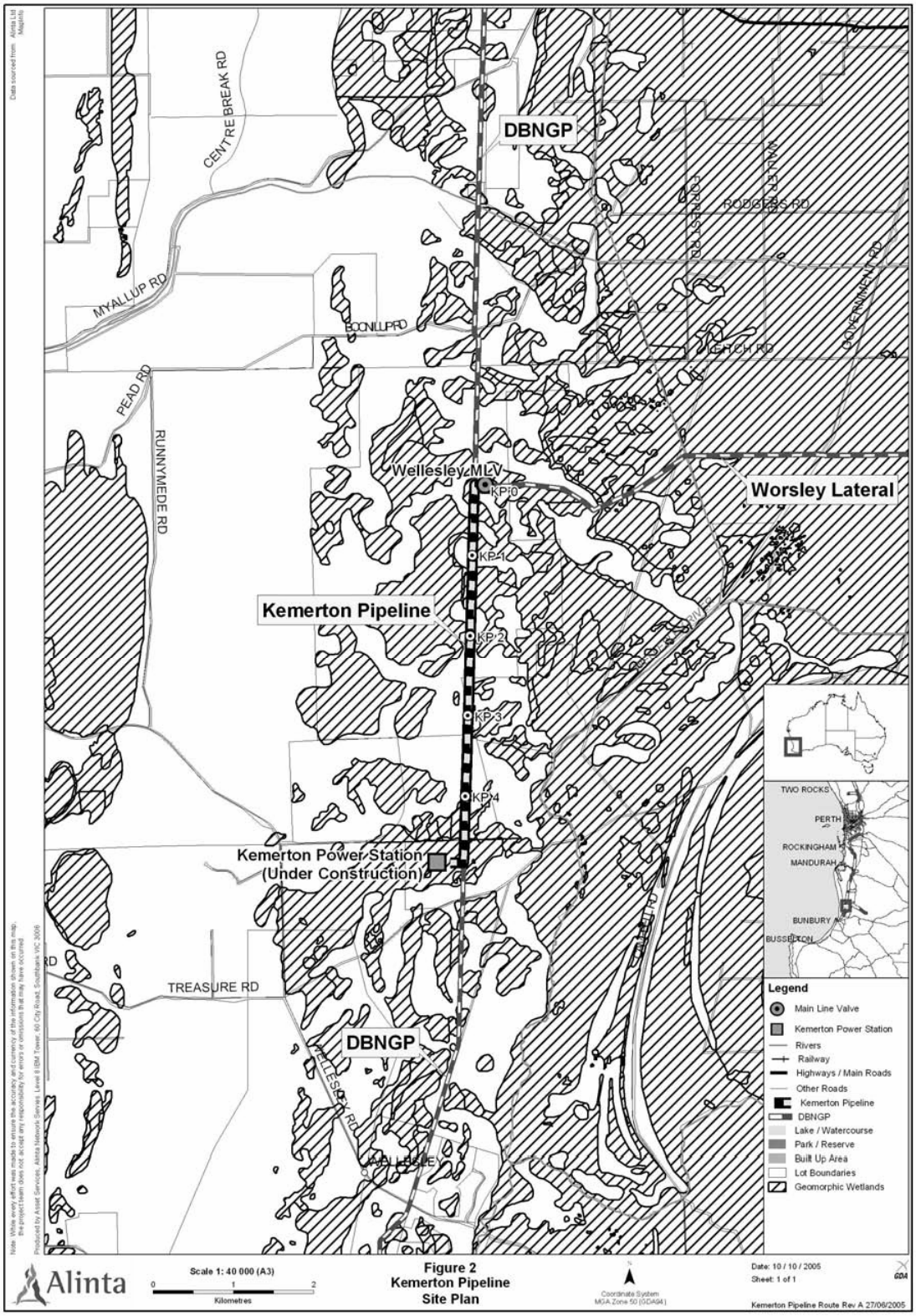

Figure 2 Location of lateral gas pipeline assessed in EPA Bulletin 1204 (EPA 2005b)

3.4.3 Bulletin 1183 – Kemerton silica sand mining revised proposal – additional mining areas and transfer of land for conservation (July 2004)

The Kemerton silica sand mining proposal is an example of where the offsetting of environmental impacts has been used in the development of identified areas within the Kemerton region. EPA Bulletin 1183 (EPA 2004e) identifies the procedure used to enable the mining of two high conservation areas due to the transfer of ownership of land containing Threatened Ecological Communities to CALM. In this situation, an area previously approved for mining by the EPA was identified as having a Muchea Limestone Community Threatened Ecological Community.

The proponent proposed the mining of two wetland areas identified as having high ecological value and proposed to be registered under the draft Environmental Protection (Swan Coastal Plain Wetlands) Policy and Regulations.

The EPA assessment identified that these were significant areas, but ranked the TEC over the wetlands in regard to ecological significance. Consequently, on the basis that there was an environmental benefit, the EPA recommended that the Minister approve the extension to the mining on condition of the abovementioned transfer of land occur.

3.4.4 Bulletin 1019 - Dampier to Bunbury Natural Gas Pipeline land corridor expansion project (July 2001)

In July 2001, the EPA issued Bulletin 1019, providing advice to the Minister for Environment and Heritage on matters regarding the proposal by Western Australian Government to expand the land corridor for the Dampier to Bullsbrook section of the DBNGP. The proposal would ultimately widen the corridor by 70 m to enable future accommodation of up to six additional pipelines and system upgrades. This is a slightly larger increase than the proposed 30 m expansion through the study area.

The proposed expanded corridor was designed with the objective of avoiding National Parks, conservation reserves and significant non-reserved bushland areas in the agricultural region, where possible. This same objective was not applied as rigorously in the pastoral region where conservation reserves are much larger, being more difficult to deviate around, and native vegetation more contiguous. A number of further deviations were recommended by CALM to avoid impacts on nature reserves and environmentally sensitive area, with a large number being adopted by the proponent. Several recommended deviations through nature reserves were not able to be implemented for practical reasons.

CALM considered that the loss to the conservation reserve system should be compensated at rates equivalent to mining compensation rates, not as unimproved agricultural variations. Funding should be provided to acquire additional conservation areas within the relevant bioregions for vesting in the National Parks and Nature Conservation Authority (now the Conservation Commission).

A clear outline of the options and obstacles considered when deciding to place the proposed pipeline corridor route through conservation reserves and road reserves should be provided. The EPA considered that the pipeline corridor would be aligned to avoid nature reserves and other areas of high conservation value where practicable.

With regards to rare and specially protected flora, the proposal determined that, until a pipeline proponent conducts flora surveys along the route, the actual presence or absence of such flora within the corridor cannot be determined. In the event that DRF are found within the alignment, Ministerial

consent to take DRF cannot be presumed and if there is a threat of extinction, the consent may not be possible.

The EPA did not identify any constraints that would preclude the use of the proposed widened corridor for the construction of the future gas pipeline(s), based on information available at that time, however, proponents would need to commit to and implement a number of specified commitments.

The EPA concluded that all environmental factors identified in the assessment could be managed in an environmentally acceptable manner and that it is unlikely that the EPA's environmental objectives would be compromised, subject to future pipeline proponent(s) agreeing to adopt the recommended commitments detailed in its report and implementing them in a satisfactory manner.

3.4.5 Bulletin 995 – Perth Bunbury Highway Peel Deviation (September 2000)

Bulletin 995 provides the EPA's advice to the Minister for Environment and Heritage on the proposal by Main Roads Western Australia (MRWA) to construct an inter-regional road, on the eastern side of the Peel-Harvey Estuary, to bypass Mandurah (EPA 2000). The proposal extends from the southern most portion of the proposed Kwinana Freeway at Stock Road, Lakelands (near Mandurah) south to where it intersects Old Coast Road approximately 2.5 km north of Johnston Road. The proposal also intersects native vegetation and wetlands of the southern Swan Coastal Plain, within 20 km of the study area.

To avoid environmentally-sensitive areas, the proposal examined numerous alignment options and, as such, was able to avoid any wetlands protected by the *Environmental Protection* (Swan Coastal Plain Lakes) *Policy*. However, the alignment intersects a wetland of conservation significance (at the Serpentine River crossing) and impacts on vegetation contained within an area identified for proposed addition to the Yalgorup National Park.

The EPA concluded that the proposal was capable of being designed and managed to meet the EPA's objectives, provided there was satisfactory implementation by the proponent of the recommended conditions set out in the report, including the proponent's commitments.

PART II - COMPARISON OF ALIGNMENT OPTIONS

4. GENERAL OVERVIEW

The comparison of alignment options was on the basis that expanding the existing corridor along its length through the study area is the 'default' option, due to its benefit of keeping all gas pipelines within the same corridor. However, the presence of high conservation value wetlands within the expanded corridor requires a thorough appraisal of all development options that would avoid direct or indirect impacts on the wetlands (EPA 2004b).

The options (alternative alignments and deviations) described in the SER and Bulletin 1153 that were compared with the expanded corridor option were:

- the SER route, which involves creating a new corridor to the west of the existing alignment, with a spur to the east to connect with the existing Worsley lateral
- the new proposed route, which departs from the SER corridor north of Forestry Road, Harvey, deviating to the east of the existing corridor and proceeding south along a new alignment through predominantly farming country, before rejoining the existing DBNGP corridor on the outskirts of the Kemerton Industrial Park.

Each of the alignments in the comparison has particular environmental, social and economic impacts. The importance of each factor was reviewed and the magnitude or severity of the impact of each option described.

In regards to other alignment options and deviations, this review supports the findings of the SER in that they can be eliminated due to critical factors, such as incompatibility of land use or cost.

4.1 RELEVANT FACTORS

Each expansion option potentially affects a range of important factors. Each factor may also be affected to a different extent under each option. Some of these factors may be critical, meaning that no significant impact is acceptable. In addition, some factors may be more important in the decision-making process than others.

Ranking the importance of relevant factors by applying a weighting factor is a means of increasing the transparency of the decision-making process. However, it is usual that different groups of people will consider different factors to be more important. For example, reconciling the priority of government agency expectations with those of landholders is difficult.

An alternative approach is to consider the significance of the potential affect of the pipeline on each factor. This will depend on the extent of the impact and the time it takes for the factor to recover to its previous state. This latter variable is described as the sensitivity of the factor to impact. For example, it appears that wetland vegetation may more readily recover following pipeline construction than the drier vegetation types.

A comprehensive list of relevant assessment factors and aspects affecting their sensitivity to the impact is provided in Table 3. The key environmental characteristics potentially affected by each of the three pipeline alignment options are listed in Table 1.

Table 3 Relevant environmental factors and variables determining their sensitivity to pipeline construction

Factor	Details	Sensitivity
Cracking clay soils	• subject to seasonal shrinkage and swelling • machinery access and excavation difficult in winter • one of the reasons used to eliminate the Coolup deviation • sandy soils generally preferred	Depends on time of year and total length of traverse
Farmland	• some land uses incompatible with gas pipelines, such as tree crops and irrigated pastures • pipeline construction activities and future access requirements would impact on farming activities and management resources • presence of pipeline could limit development potential	Depends on existing/planned land use and compensation arrangements/agreements
Low-lying areas with winter inundation	• require extensive dewatering, sometimes even in summer, which can result in plant stress • discharge water requires management – sometimes areas are associated with acid sulphate soils	Depends on the time of year of the dewatering and the relative depth to the watertable
Native vegetation	• clearing of native vegetation requires approval under the Environmental Protection Act • some vegetation types are more sensitive to pipeline construction activities than others, eg vegetation on elevated Bassendean sands appears more sensitive to disturbance than heath and other low-lying vegetation • disturbance of isolated remnants may be less of an impact than fragmentation of more continuous or larger areas of vegetation • disturbance to CALM estate usually requires a suitable offset	Depends on vegetation type, condition, connectivity and representation in the wider area
Nature reserves/System 6	• pipelines may result in fragmentation or introduction of new disease/risk vectors • will require appropriate offsets if disturbances are unavoidable (Bulletin 1019)	Depends on availability of other options and appropriate offsets
Number of affected landholders	• each landholder affected by construction of a new pipeline or easement will, presumably, require compensation • negotiation of compensation and changes to titles for right of access take time • disaffected landholders may become politically active/effective	Depends on the position of landholders and capacity for remuneration
Pipeline bends	• bends in the pipeline increase construction and pumping costs, which will ultimately affect the ability to raise capital or attract new operators and increased tariffs	Depends on the number and angle of bends.
Pipeline crossings	• construction of a new pipeline across an existing pipeline adds to safety risks and construction costs	Depends on number of crossings
Pipeline length	• increased length of pipe over the route equates to increased capital investment and operating and maintenance costs • will ultimately result in higher tariffs • may affect ability of current operator to attract future operators	Depends on relative increase
Protected fauna	• disturbance to key habitat features, such as vegetation, water quality or groundwater levels may affect populations • open trenches and increased traffic may result in individual deaths	Depends on local distribution of population
Protected flora and vegetation	• Declared Rare Flora (DRF) and priority flora require Ministerial approval to remove; approval should not be presumed • disturbance to Threatened Ecological Communities may require approval from the Commonwealth Minister for the Environment	Depends on local distribution of DRF/PF/TEC
Proximity to powerlines	• induced current considerations require additional earthing measures • use of heavy/tall equipment near power lines during construction	Depends on proximity and voltage of powerline
River crossings	• requires underground horizontal boring, adding to construction cost and maintenance difficulty • could result in damage to riparian vegetation and processes	Depends on number and width of crossings
Scope for successful rehabilitation	• can significantly assist in recovery of construction disturbances, thus minimising the overall impact to vegetation and fauna • wetlands have recovered well with only minimal rehabilitation, while the drier vegetation types have limited recovery (presumably due to inadequate rehabilitation measures)	Depends on vegetation type, and resource availability and application of rehabilitation practices
Silviculture (pine forestry)	• tall trees, such as pines, cannot be planted within gas pipeline corridors • firebreaks are usually routinely deep-ripped as part of maintenance programs; heavy vehicle use in pine forests is also frequent • pine forests carry a high fire risk, which may be applicable to the risk management of the pipeline design	Appears to be a critical factor

Factor	Details	Sensitivity
Wetlands	• disturbance of wetlands and lakes protected under the SCP Lakes EPP requires Ministerial approval • disturbance or amendment of mapped boundaries of Conservation Category wetlands also requires formal approval • preliminary assessment indicates that the existing pipeline has not impacted on groundwater levels and that wetland vegetation has reasonably recovered, unassisted • a question remains regarding the environmental value of wetlands that already have gas pipelines through them • a number of Conservation Category wetlands are subject to the influence of mining	Depends on ecological significance of each wetland and the relative impact of the pipeline to the whole system. Deemed to be a critical factor in the SER (requires Minister of Environment to over-rule)

5. NEW PROPOSED ROUTE

5.1 OVERVIEW

The new proposed alignment was developed by CALM and DoE, at the invitation of the GPWG, after those two Agencies expressed significant concerns with the alignment presented in the SER.

This new proposed alignment departs from the SER corridor north of Forestry Road, Harvey, deviating to the east of the existing corridor and proceeding south along a new alignment through predominantly farming country, before rejoining the existing DBNGP corridor on the outskirts of the Kemerton Industrial Park. It affects a relatively low area of native vegetation (8.8 ha) containing three vegetation types that are considered to be well represented. It does, however, come near the Byrd Swamp Nature Reserve. It does not cross any Conservation Category or EPP wetlands, but intersects three Resource Enhancement Category wetlands. On the basis of available information, this option appears the most obvious choice, in terms of environmental impact.

In regards to other factors, the route is 4 km longer than the existing alignment, traverses cracking clay soils and includes an additional seven bends and two river crossings. The most critical drawback, however, is the high number of landholders affected. It is the voiced opposition of these landholders to the alignment that led to this review.

5.2 KEY ENVIRONMENTAL IMPACTS

5.2.1 General landform

The northern end of the study route is Palusplain, before the soils become heavy to moderate Guildford Formation clays and sandy clays, which are prone to shrinking and swelling.

5.2.2 Vegetation and flora

The 49 ha that this alignment will occupy currently contains 8.8 ha of native vegetation that would require clearing. The native vegetation is predominantly of the Bassendean Complex – Central and South vegetation complex (Heddle et al. 1994), of which 27% of the pre-European distribution remains, 0.7% in reserves (EPA 2003a). The affected area equates to 0.04% of the existing population. A very small amount (>0.1 ha) of degraded vegetation of the Southern River Complex would also be affected.

A total of nine vegetation communities were defined and mapped for this option for the Kemerton area (BBG 2004c). Five of the communities are largely cleared or highly modified, consisting of native trees over pasture or else sedges, rushes and occasional shrubs (G1, P5, P6, F1 and S1).

The three woodland communities with any largely intact native understorey (M2, M3 and P2) were compared with those communities described by Gibson et al. (1994) for the southern Swan Coastal Plain as follows:

- M2 corresponds to Community type 21c ‘Low lying *Banksia attenuata* woodlands or shrublands’

- M3 corresponds to Community type 21a 'Central *Banksia attenuata – Eucalyptus marginata* woodlands'
- P2 (disturbed) corresponds to Community type 12 '*Melaleuca teretifolia* and/or *Astartea* aff. *fascicularis* shrublands'

All three community types are regarded as well-reserved and at low risk by Gibson et al (1994) and none was proposed for inclusion on the Threatened Ecological Community database by English and Blythe (1997). The presence of the Priority 3 species *Acacia semitrullata* confers extra importance on communities M2 and M2. There are no recorded DRF in the areas of native vegetation.

While the proposed alignment will not directly impact on an identified threatened ecological community, it abuts the Byrd Swamp Nature Reserve, which is an A Class nature reserve vested in the Conservation Commission for the conservation of flora and fauna. Importantly, the nature reserve has an occurrence of the Threatened Ecological Community Type 09 "Dense shrublands on clay flats" as described in Gibson et al (1994) and has an IUCN category of 1a: a strict nature reserve - protected area managed mainly for science. The TEC category of threat is listed as Vulnerable. The possibility exists, therefore, of indirect impacts from access and potential spread of disease. This possibility could be managed by creating a suitable buffer between the proposed corridor alignment and the Byrd Swamp Nature Reserve.

The declared weeds *Gomphocarpus fruticosus* (narrowleaf cotton bush) and *Zantedeschia aethiopica* (arum lily) (P1/P4) have been recorded in the area of the alignment option.

Wetlands

The proposed alignment does not intersect any EPP or Conservation Category wetlands, but does intersect three Resource Enhancement Category wetlands.

5.3 SOCIAL ISSUES IDENTIFICATION

5.3.1 Objective

Landowners that had been identified by the GPWG as being impacted by the new proposed route were consulted with to identify relevant factors and document the extent of the impact of the pipeline on those factors, as seen by the landowners.

5.3.2 Method

Using a list of affected landowners and contact details supplied by the GPWG, parties who were contactable by phone were asked a series of prepared questions. Responses to the questions, as well as other relevant comments, were recorded by the interviewer. A cover letter and a sheet of the same questions were mailed out to those landowners that could not be contacted via phone. The list of parties contacted and the questionnaire used in the survey is provided in Appendix 1.

5.3.3 Observations

Both as a group and as individuals, those affected land owners who provided feedback were all ardently opposed to the construction of a new gas pipeline corridor across their properties. A strongly-held point of view was that the case for protecting the vegetation adjacent to the existing corridor by

creating a new corridor through farmland had not been convincingly presented. Many land holders believed that the government agencies had over-estimated the sensitivity and conservation values of bushland and wetlands adjacent to the existing DBNGP pipeline corridor, on the basis that these environments were already disturbed.

Several landowners indicated that they already had infrastructure corridors 'criss-crossing' their farms. The main concerns were loss of productive farm land and a reduction on long term property values. Table 4 contains a summary of the responses collected during the consultation process, with the full list provided in Appendix 1.

Generally, affected landholders felt that they had been kept suitably informed about the new proposed pipeline by mail-outs they had received and meetings they had attended. However, the same landholders felt that responses they had received to their questions and letters to various agencies and Ministers were generally inadequate.

Overall, the affected landowners did not believe that they had received sufficient or plausible reasons why the existing natural gas pipeline corridor could not be expanded to accommodate the new pipeline, thus negating the need to deviate across their properties.

A total of 17 landholders were identified as being directly affected by the proposed alignment.

Table 4 Summary of relevant responses, with identified pertinent advice based on available information

Most common responses from consultation	Relevant advice
It is common sense to use existing corridor	The option to widen the existing route along its entire extent through the study area was advised against by DoE & CALM, on environmental grounds (BBG 2004a). Wherever practical, State Government departments, agencies and bodies use existing easements and service corridors for their infrastructure projects. (Gov. WA 2004a).
Decrease in property value/ reduce resale due to loss of productivity/ limit land owners rights eg. sub-division, building, fences, and other uses	The State Government will compensate for the full value of land which is the subject of requisition (DPI 2005b) The Act* states that historical land use such as cropping and grazing are permitted uses (DPI 2005b). The Act* provides for measures to safeguard the integrity of the pipeline and protect people and property from fire and/or explosion. Part of the process of preventing such disasters is to have a say in the subdivision of land where it affects the corridor (DPI 2005c). Buildings of any type are not permitted under any circumstances in the pipeline corridor (DPI 2005c). Restrictions on subdividing will be enforced (Epic Energy). Where private land is required for a public purpose which will alter the existing granted land use (as distinguished from anticipated land use) on that private land, the Crown should either compensate fairly for the downgrading of the permissible land use or acquire the property outright (Gov. WA 2004a).
Reduced options for management for the property/ changes to farming practices/ restricted long term farming practices and farming machinery access/ additional maintenance costs, responsibilities and liabilities in the future	Ploughing, sowing and harvesting are permitted as long as machinery weight is not excessive, rips do not exceed 300 mm, no contour alternations and no change to soil depths above pipeline (DPI 2005c). The principle for agriculture is to preserve as far as possible the use of the land by the owner, particularly with respect to crops (DPI 2005c). Planting fruit trees, vines, trees and shrubs are permitted within the corridor as long as they are shallow rooted, not directly above gas pipe and do not obstructed line of sight between warning signs (DPI 2005c). The Act* states that historical land use such as cropping and grazing will be permitted (DPI 2005b). Land owner will not endure any additional maintenance costs. Pipeline operator access points will be designed to minimise disruption to landowners during pipeline inspection and maintenance (DPI 2005b). Where private land is required for a public purpose which will alter the existing granted land use (as distinguished from anticipated land use) on that private land, the Crown should either compensate fairly for the downgrading of the permissible land use or acquire the property outright (Gov. WA 2004a).

Most common responses from consultation	Relevant advice
Increased environmental impact by creating a new corridor vs. widening the existing corridor/ introduction of weeds/ increased bio-security risk	Wherever practical, State Government departments, agencies and bodies use existing easements and service corridors for their infrastructure projects. (Gov. WA 2004a). Bulletin 1153 (EPA 2004a) In some areas it may be necessary to deviate from the existing corridor to avoid environmentally sensitive areas. In these areas a separate 30m wide corridor should be established. The potential impacts on DRF and vegetation communities can be minimised through the management measures outlined in the SER document and are environmentally acceptable, given the current level of knowledge Conservation Category and Resource Enhancement wetlands should be provided appropriate protection in line with the DoE wetland position statement. Consideration should be given to investigating the current classification of wetlands in relation to their current condition with a view of providing information by which the pipeline alignment can be more accurately determined (submission by DoE to SER). Bulletin 1206 (EPA 2005c) The route for the DBNGP Loop 10 traverses two CC wetlands. These wetlands have been previously disturbed but have recovered well. The EPA notes that the disturbance of these wetlands is temporary and best practice rehabilitation measures will be used to restore the ecological values of the wetland. Investigations of the Loop 10 easement indicate that the wetland communities have recovered from the original pipeline installation to a level where the regenerating communities closely resemble the adjacent undisturbed vegetation. However, dunal woodland communities have not recovered to the same extent. Revegetation will be addressed in a rehabilitation management plan. The EPA believes that weeds and plant diseases such as phytophthora cinnamomi can be addressed through methods implemented through a Rehabilitation Management Plan. The Kemerton area has been identified as being an environmentally sensitive area (EPA 2004a) Bulletin 1204 (EPA 2005a) The route for the Kemerton Lateral gas pipeline dissects several CC wetlands and one multiple use wetland, with a total of approximately 3 ha cleared for the pipeline (less than 1% of the total area of those wetlands dissected by the route). The EPA acknowledges that there is an existing pipeline and the wetlands have been previously disturbed but have recovered well. The EPA notes that the disturbance of these wetlands is temporary and best practice rehabilitation measures will be used to restore the ecological values of the wetland. Investigations of the proposed Kemerton Lateral easement (existing DBNGP easement) indicate that the wetland communities have recovered from the original pipeline installation to a level where the regenerating communities closely resemble the adjacent undisturbed vegetation. However, dunal woodland communities have not recovered to the same extent. Revegetation will be addressed in a rehabilitation management plan.
Safety concerns with a high pressure gas line beneath property	AS2885 (Australian Standard) will be enforced during construction and operation. This standard is recognised by the Council of Australian Governments (COAG) as the governing standard for high-pressure transmission pipelines designed, constructed and operated throughout Australia (DPI 2005b). Warning Marker signs will be on all fence lines crossing the corridor and at other appropriate locations to clearly notify persons of the potential risk (DPI 2005c).

* The *Dampier to Bunbury Pipeline Act 1997*

6. SER ROUTE

Although presented as the preferred option in the SER, the preparation of which included consultation with relevant agencies, the SER alignment through the study area was eliminated following the public release of the SER on the basis of advice received from CALM and EPASU. This advice was not presented in the SER Response to Submissions, although a favourable response from the DoE was presented (BBG 2004c).

At the northern extent of the study area, the alternative DBNGP corridor proposed in the SER (i.e. the SER route) is situated approximately 1.8 km to the west of the existing alignment. The SER route deviates from the existing alignment just south of the Wagerup Lateral, 15 km to the north of the study area (Figure 1)**.** The 30 m wide deviation was considered necessary to avoid numerous Conservation Category wetlands and areas of remnant vegetation that exist between the Wagerup Lateral and Kemerton Industrial Park.

The SER route tracks the boundary between the tall sand dune that runs north-south through the study area and agricultural land. The dune is predominantly pine plantation, although areas of native vegetation do exist. At Boonilup Road, a spur to the Worsley Lateral is proposed, approximately 2.5 km to the southeast and crossing the existing DBNGP corridor.

Although the SER route avoids directly impacting on any EPP lakes and only affects 1 Conservation Category wetland through the study area, it still requires the disturbance of 17.8 ha of native vegetation. In light of this, a number of local deviations were presented in the SER, recognising that each option had a particular mix of advantages and constraints.

6.1.1 Possible deviations

Coolup Deviation

The Coolup Deviation avoids areas of protected wetland and important vegetation in the southern section of the alignment. The option follows cleared farmland to the east of the existing corridor, but crosses low-lying areas that were subject to winter inundation and high summer water tables and areas under irrigation. Consequently, this option requires extensive dewatering. Several areas of cracking clay soils are also located in the proposed route, characterised by seasonal swelling and shrinking, and difficult access during winter. Because of these factors, it was identified that the potential impacts to areas of high value farmland might be difficult to manage. This corridor option was several kilometres to the east of Kemerton, resulting in increased pipeline cost and land requirements to join the corridor with Kemerton.

Despite its apparent environmental acceptability, the Coolup Deviation was deemed inappropriate, based on the above factors, and eliminated from the options (BBG 2004a, p 19).

Pines Deviation

The Pines deviation was identified following the decision by the GPWG to terminate the corridor at Kemerton, instead of Australind. This option runs through low-intensity farm land, pine plantation and some native forest. The deviation was, however, not considered a viable option due to the considerable distance (6 kilometres) from the Worsley Lateral, and was not considered compatible with pine forestry operations, despite its low environmental values.

Kemerton Option A (West Route)

Kemerton Option A avoids a 3 km stretch through native vegetation on CALM land by deviating about 2 km to the west. The option was discounted due to the number of required bends making the pipeline constrictive to flow.

Kemerton Option B (East Route)

Kemerton Option B is not dissimilar to the Coolup Deviation. It has the lowest number of bends and area of vegetation to be cleared, but was discounted on the basis of overall length, ground conditions, and impacts on landholders, nature reserves and rivers.

6.2 KEY ENVIRONMENTAL IMPACTS

6.2.1 General landform

The northern end of the SER route through the study area is Palusplain for the first kilometre, and then becomes mostly high, dry, sandy soils. The soils are Bassendean Sands over most of the route, with some Spearwood Sand in the South.

6.2.2 Vegetation and flora

The SER route currently contains a reported total of 17.8 ha of native vegetation[12] that will require clearing (BBG 2004c). The native vegetation is entirely Bassendean Complex – South and Central vegetation complex (Heddle et al. 1994), of which 27% of the pre-European distribution remains, 0.7% in protected areas (EPA 2003a). The affected area equates to 0.07% of the existing population.

A total of 11 plant communities were defined and mapped for this option in the Kemerton area (BBG 2004b), namely C4, M3, P2, P4, K2, B3, B4, B5, H1 and F2. A minor realignment of the route can avoid the single occurrence of the B4 community and also an area of the F2 community.

The two plant communities C4 and P2 are highly modified, consisting of native trees over pasture or sedges. Of the remaining communities, types B4, B5, and M3 are known to support Priority Flora taxa and thus are considered to be of local significance by Mattiske (BBG 2004b). None of the communities are defined as Regionally Significant, in that none are limited to specific landform types or uncommon in the regional context. No communities are recognised as a threatened ecological community or supports DRF.

The SER route does not impact on any nature reserves or System 6 areas and does not cross any natural rivers.

Plant disease

The fungal disease *Phytophthora cinnamomi* has been confirmed on the low-lying wetlands within the study area of the SER route and consequently there is a need to take a precautionary approach to all of the vehicle movements along the route to ensure maximum vehicle hygiene is maintained at all times.

[12] This clearing requirement includes areas south of the study area. The area within the study area is estimated at 15.5 ha.

This dieback has been present for some time and has led to a decline in several susceptible species including *Banksia littoralis* and *B. ilicifolia* in these low-lying areas (BBG 2004b).

6.2.3 Wetlands

The lateral to the Worsley Lateral from the SER route intersects a Conservation Category wetland, affecting an area of 0.35 ha within its mapped boundary. The disturbance is adjacent to the existing pipeline and the wetland has very little of its original vegetation remaining (BBG 2004c). One Resource Enhancement Category wetland will also be affected.

6.3 SOCIAL ISSUES IDENTIFICATION

According to the SER, the route would affect 10 landholders, not counting the State Government. The SER route proceeds along the property boundaries of most of the affected properties and would be expected to result in negligible inconvenience to the landholders. As stated in Section 2, the GPWG conducted consultation with landholders and other parties affected by the SER route and the SER itself was open for public review.

This review did not seek comment from those landholders that might be affected by the SER route.

6.4 OTHER CONSIDERATIONS

6.4.1 Compatibility with surrounding landuse

Over much of its length through the study area, the SER route traverses cleared access roads adjacent to the pine forests along the north-south dune. While not specifically discussed in the SER, the Forest Products Commission advised the GPWG that it considered that a gas pipeline corridor was not compatible with pine forestry operations, including particularly the movement of heavy fire-fighting and tree harvesting machinery (BBG 2004a, 2004c).

6.5 LATERAL OPTIONS

The SER route splits into two at Boonilup Road, with the lateral to the Worsley Lateral heading to the southeast. The continuing route south runs along the western side of a 60 m-wide cleared power-line corridor, through what appears to be high quality, high value native vegetation of the M3 community type, owned by CALM (approximately 9 ha would be disturbed).

The landscape on the eastern side of the power-line corridor appears to be of lesser quality and outside of the CALM estate, but the route would intersect a further 3 ha of Conservation Category wetlands. The presence of the 60 m-wide cleared power-line corridor may have already detracted from the continuous nature of vegetation through the area.

The option to direct all gas pipelines along the lateral to the Worsley Lateral, where it joins the existing DBNGP corridor and pipelines, would avoid the 9 ha of M3 vegetation, but would intersect approximately 1.5 ha of Conservation Category wetlands along the existing corridor.

7. WIDENING OF EXISTING ROUTE

Increasing the width of the existing corridor in the Kemerton area was considered, preferably along its western margin. Under this option the corridor would increase its current width of approximately 16 m to, at most, 50 m. This would allow all future pipelines to be located within the one corridor along the shortest possible distance.

However, native vegetation, and Conservation Category and EPP Wetlands (collectively identified as the Wellesley Wetlands) near the expanded corridor were considered major constraints. Other constraints identified included high tension powerlines and residences. The SER considered a number of local deviations were needed to avoid these constraints. These deviations meant that installation of the new pipeline would require multiple crossings of the existing pipeline, resulting in significant cost implications for pipeline construction.

Given these factors, expansion of the existing corridor through the study area was deemed economically and environmentally undesirable (BBG 2004a).

7.1 KEY ENVIRONMENTAL IMPACTS

7.1.1 General landform

The northern end of the SER route through the study area is Palusplain for the first kilometre, before grading into extensive wetland areas in the south. Soils are mainly Bassendean Sand or Bassendean Sand over Guildford clays.

7.1.2 Vegetation and flora

The 40 ha that this alignment option will occupy currently contains approximately 24 ha of native vegetation that will require clearing. The native vegetation is of the Bassendean Complex – Southern and Central vegetation complex (Heddle et al. 1994), of which 27% of the pre-European distribution remains, 0.7% in protected areas (EPA 2003a). The potential affected area would equate to 0.12% of the existing population.

A total of nine vegetation communities were defined and mapped within this alignment for the study area (BBG 2004b), namely the *Banksia* woodland communities B3, B4 and B5 (the latter two types predominate along the alignment); the *Melaleuca* woodland communities P2 (disturbed) and P3; the *Eucalyptus marginata* subsp. *marginata* woodland community M2 (also locally widespread along alignment); the *Kunzea* community K2 and the closed heath communities H1 and H3.

The vegetation community types B4, B5, H3 and M3 are known to support Priority Flora taxa, including the P1 species *Boronia juncea* subsp. *juncea* in community H3, and thus are considered to be of local significance by Mattiske (BBG 2004b). None of the communities are defined as Regionally Significant, in that none are limited to specific landform types or uncommon in the regional context. No communities are recognised as a threatened ecological community or support DRF.

The SER route does not impact on any nature reserves or System 6 areas and does not cross any natural rivers.

Plant disease

The fungal disease *Phytophthora cinnamomi* has been confirmed on the low-lying wetlands within the study area and consequently there is a need to take a precautionary approach to all of the vehicle movements along the route to ensure maximum vehicle hygiene is maintained at all times. This dieback has been present for some time and has led to a decline in several susceptible species including *Banksia littoralis* and *B. ilicifolia* in these low-lying areas (BBG 2004b).

7.1.3 Wetlands

Expanding the existing alignment through the study area will intersect 0.3 ha of an EPP lake, however, the vegetation has been partly cleared and the remainder is mapped as the M2 community type (*E. marginata* woodland).

Of more concern is the extensive area of Conservation Category wetland that would be intersected by the expansion. Between 7 and 8 ha of wetland area would be further disturbed by the construction of additional gas pipelines. Other influences also exist, such as historical grazing, the construction of the Harvey Diversion Drain and the present Kemerton Silica Sand mining operations. The sensitivity to the vegetation of the area, including wetland vegetation, to pipeline construction is discussed in Section 7.1.4

7.1.4 Impacts from historical pipeline construction

Existing information regarding the environmental impacts caused by, or associated with, the construction and operation of gas pipelines (through the study area or similar landscapes) is not readily available[13]. Assessment (at a preliminary level) of the impacts of the existing pipeline on vegetated and wetland areas disturbed by previous pipeline construction offers some information on what future impacts might be, particularly the ability of the landscape and vegetation to recover from the clearing and construction activities. A preliminary assessment was conducted as part of this review, using site visits, photography, mapping and further advice from the botanical consultant for the SER.

Pipeline proponents (ECOS 2005a) and the EPA (EPA 2005a, 2005c) have made the following observations in regards to pipeline construction:

- the particular protected (Conservation Category) wetlands have been disturbed as a result of previous pipeline construction, prior to their current protected status
- the wetland communities within these areas have recovered to the extent that the regenerating communities now resemble the adjacent undisturbed vegetation.

These observations are consistent with the findings of this assessment.

[13] The DoE (2004) distributed material to affected landowners, via the GPWG in December 2004 ('Synopsis of the Natural Values of the Kemerton Bushland and the Potential Damaging Impacts of Service Corridors'), describing briefly the conservation significance of the Kemerton Bushland and listing the negative impacts of service corridors on native bushland. As mentioned in Section 4, affected landowners did not consider the information in the material sufficient to reject the option of widening the existing corridor.

Impacts on wetland vegetation

Visually, wetland vegetation (mapped as closed heath H1 and H3), showed little evidence of previous disturbance, apart from the absence of emergent shrubs above the sedges (Figure 5). The absence of significant structure in the upper soil profile and the ability of the sedge species to propagate using rhizomes might be sufficient to overcome the original soil disturbances. It is also possible that the recolonisation of taller shrubs and trees may be fire-dependent.

A range of mining companies and private landholders have established techniques for maintaining and regenerating native vegetation and wetland systems. In this context, observations along the current gas pipeline alignment reflect the capacity of many wetland and dampland species to re-establish after temporary disturbances. The rate at which species and communities re-establish is dependent on the degree and extent of the disturbance. In the dampland areas near Kemerton the species rapidly re-colonise disturbed areas and it is expected that if the root masses of many of the species are only disturbed within the actual pipeline trench it would result in minimal short term impacts on the species and vegetation.

Impacts on vegetation on elevated areas

The capacity to regenerate vegetation on the drier slopes is variable and is in part largely dependent on the extent of the effort involved with rehabilitation programs. Many of the plant communities on the Swan Coastal Plain have been modified through disease or weed infestations. Consequently, many of these disturbances appear to pose a greater threat to the vegetation than the localised clearing for infrastructure facilities. There is an opportunity to instigate a range of disease and weed control measures over a wider area, leading to an improvement in biodiversity values. In the areas near Kemerton, the latter could include weed management, implementation of appropriate fire regimes, removal and control of introduced species (e.g. veldt grass, Watsonia, Gladiolus, pines), feral animal control and management of inappropriate human activities. The presence of large fallen logs and the dominance of some species (*Kunzea ericifolia*) reflect the extent of past management practices. Efforts in this area would rapidly compensate for any localised disturbance as the findings could be used to manage the biodiversity values over larger areas.

Effectiveness of rehabilitation

The preliminary assessment of vegetation condition over the existing pipeline indicates that the rehabilitation measures, if any, that were originally employed during the construction of the pipeline, have had little positive effect. It appears that the extent of rehabilitation management employed on the upper slopes was mostly limited to the spreading of felled timber and brush over the disturbed area. It does not seem as if any replanting or re-seeding was undertaken.

On this basis, it is presumed that the good recovery of the wetland vegetation is more a function of the abilities of the plants themselves, than management that was applied.

7.1.5 Impacts on hydrology

Surface drainage

The SER (pp 86 & 97) states that physical impacts associated with construction through watercourses and drainage lines may include:

- physical disturbance of the watercourse, which may have implications for long term bank stability and rehabilitation of the crossing
- disturbance to riparian flora and fauna
- deterioration in surface water quality.

The existing corridor crosses the Harvey River (Myalup) Diversion Drain. The gas pipeline goes underneath the drain, with little apparent disturbance to the watercourse and its banks. There was no visible evidence of deterioration of water quality or increase in sediment load or movement. The pipeline was presumably constructed using a method other than the normal open-cut technique, such as horizontal boring.

Site visits identified a number of gullies and brooks on largely cleared farmland that were also crossed by the pipeline. Unlike the drain crossing, the pipeline had been constructed through these areas using conventional methods (excavation). Preliminary observations indicated that the pipeline corridor appeared to be more saturated/inundated than the surrounding land, but only marginally so. This may be attributable to settling/consolidation of the backfill. There were no indications that drainage was otherwise affected.

Groundwater levels

The SER (pp 87 – 89) states that potential impacts on groundwater levels may arise during pipeline construction as a result of dewatering of trenches. It was proposed to minimise such impacts by carrying out construction activities in sensitive areas in late summer, when the watertable is at its lowest.

The DoE, in its synopsis[14], states that service corridors negatively impact on subtle hydrological regimes, which could impact on habitat-sensitive local populations, such as the Black-Striped Jollytail.

The existing corridor traverses the Wellesley Wetlands, which are considered to be of local and regional conservation significance. In this area, the winter watertable is above ground surface in some areas, creating ephemeral lakes. A number of these lakes and other low-lying areas are classified as Conservation Category wetlands, under the draft Swan Coastal Plain wetlands policy.

The existing pipeline corridor crosses seven of these protected lakes (Figure 1). A preliminary assessment of the impact of pipeline construction on the water level in these lakes was conducted through site visits in July and August, during which the depth and distribution of surface water along the pipeline and adjoining tracks was recorded. Visual inspection indicated that standing water was more evident along the pipeline access track than the immediate surrounds. This is attributed to soil

[14] "Synopsis of the Natural Values of the Kemerton Bushland and the Potential Damaging Impacts of Service Corridors, DoE 2004.

erosion and/or compaction by vehicular traffic lowering the surface profile. As a result, the watertable intersects these lower areas first. This was observed along other tracks that were not associated with the pipeline. This aspect aside, however, there did not appear to be any noticeable difference between the presence or absence of standing water in areas on or adjacent to the pipeline and wider areas of the same elevation.

The Mine Manager of Kemerton Silica Sands (KSS) provided information on the hydrogeology of the area during an interview (Appendix 1). According to KSS, there were no significant aquitards present and that the superficial groundwater formation was quite deep and relatively uniform, and that this interpretation was consistent with the KSS groundwater monitoring results that were reported annually to the DoE.

7.2 SOCIAL ISSUES IDENTIFICATION

The Mining Manager of the Kemerton Silica Sands mining operation was consulted to identify concerns that the company might have over the expansion of the existing DBNGP corridor.

The company's chief concern, as identified by the Manager, would be the extra costs associated with moving the mining dredge across additional pipelines, when the time came to move the dredge across into areas on the other side of the corridor.

7.3 OTHER CONSIDERATIONS

7.3.1 Wetland mapping

It is acknowledged by the EPA (EPA 2004a) and DoE (WRC 2002) that the validity of the current classification and mapped boundaries of protected wetlands should be the subject of further investigation, particularly with regards to accurately determining environmental impacts.

A preliminary review of the wetland mapping of the study area was conducted by comparing high-resolution, geo-referenced aerial photographs with digitised datasets provided by the DoE.

The objectives of the review were to use the high-resolution aerial photography to:

- assess the accuracy of mapped boundaries for gazetted wetlands and lakes, relative to existing and proposed corridor boundaries
- gain additional information on the general condition and distribution of native vegetation, as well as land uses of the study area.

Digitised wetland and lake boundaries, priority and protected flora, land tenure, corridor alignments and existing roads and tracks were overlain onto high-resolution aerial photography (0.5m/pixel). The sections of the existing corridor that intersected vegetation and/or gazetted lake/wetland boundaries were selected for particular investigation. These sections were extracted from the digital data set, in 1 km lengths. As a comparison, the maps provided in the SER typically covered 12 km or more. The individual one (1) kilometre sections are included in Appendix 2.

To confirm the spatial accuracy of the aerial photographs, ground-truthing was carried out using a hand-held GPS to record key reference points. Wetland and lake margins were also recorded, based

on vegetation changes. The spatial accuracy of the aerial photograph base map was identified as being between 3 and 12 m over the study area.

There are two EPP lakes in the study area that are shown to be potentially intersected or marginally encroached by the existing or widened DBNGP corridor; the boundaries of which are shown to be incorrectly mapped (also noted in SER Response to Submissions). As can be seen in Figures K and L in Appendix 2, the EPP lakes contain, within their mapped bounds, cleared paddocks, dry areas and a golfing fairway. Deviating around the mapped boundaries of these lakes would achieve little to protect the lake, but would increase the requirement to remove native vegetation.

Wetlands that have been mapped and assigned management categories under the draft policy/regulations (EPA 2004b) are individually described in Table 5. There are eight such Conservation Category wetlands identified in the study area that would be intersected by the existing corridor (seven of which are already intersected).

A total of 1540 m of the 11 km existing pipeline intersects the mapped boundaries of these wetlands through the study area. The review identified that many of the boundaries appear to over-estimate the aerial extent of the wetlands. In two cases, there appears to be little wetland vegetation within the mapped boundaries and a detailed on ground investigation appears warranted to clarify if these wetlands exist as shown. The review estimated that, following remapping and reclassification of the wetlands, the linear intersection could be reduced to as low as 770 – 1000 m. Formal resolution of the extent of wetlands would require more detailed assessment of the vegetation and the relationship to groundwater of each mapped wetland.

Table 5 Conservation Category wetlands within the study area that could be influenced by widening the existing corridor

North	Fig	Comments
6330300 N	B	Approximately 1.3 ha of CC wetland potentially disturbed. The wetland is already traversed by a road and a powerline corridor, in addition to the existing pipeline (a new pipeline has been assessed by the EPA).
6331800 N	C	Approximately 0.4 ha of CC wetland potentially disturbed. The classification of the wetland should be re-evaluated. The more elevated vegetation has been disturbed by grazing and historical timber felling, but is in apparently good condition.
6332900 N	D	Approximately 0.2 ha of CC wetland. Historical disturbances to the surrounding vegetation are apparent.
6333500 N	E	Approximately 2.6 ha of CC wetland potentially disturbed, however, this wetland is currently being mined for silica sands and appears to be significantly disturbed in the majority of areas.
6334200 N	F	Approximately 1.2 ha of CC wetland potentially disturbed. Dunal vegetation appears degraded, presumably from grazing.
3665600 N	G	The expanded corridor intersects the margins of three CC wetlands (0.9 ha). Remapping of wetland boundaries appears warranted. The dunal vegetation has been subject to previous disturbances and includes a number of pine trees.
6336600 N	K	The expanded corridor would intersect 3 CC wetlands (0.8 ha), but this could be reduced to 1 (0.2 ha) if the expansion is shifted to the other side of the existing corridor. This section includes cleared farmland and numerous other infrastructure corridors.

North	Fig	Comments
6337700 N	I	Although this section would intersect 1.5 ha of CC wetland, the wetland runs adjacent to the Myalup Main Drain (Harvey River Diversion), which has a basement approximately 20 - 30 m below ground surface and has probably greatly reduced the frequency of inundation of the wetland (if it still occurs at all). Vegetation did not appear to be of wetland type.
6339500 N	K	The existing corridor and expanded corridor intersect 0.3 ha of EPP lake. However, the lake also contains within its margins a fairway of the Harvey Golf Club. The pipeline corridor is within the drier margins of the lake.

7.3.2 Expansion of a single additional pipeline of high capacity

Consistent with comments from agencies and the public, the option of installing a single, large diameter pipeline down the existing corridor (looping) has been considered and the potential environmental impacts through the study area examined. 'Looping' is the duplicating of an existing pipeline between compressor stations for a certain distance. Once the specified distance is reached, it then ties back into the parallel pipeline. The consequence of this design results in the gas flow rate being increased (ECOS 2005a).

Construction aspects

Proximity to overhead powerlines

Through the study area, the distance between the overhead powerlines (132 kV) and the closest gas pipeline ranges from 14 to 21 m. It is therefore possible that an additional pipeline could be installed between the existing pipeline and the overhead powerlines, if sufficient induction mitigation measures were included in its construction.

Note that working near overhead powerlines is a safety issue. It is presumed that this will be addressed at the time of pipeline construction (regardless of route).

Proximity to other gas pipelines

Where both pipelines are present within the existing corridor, they are separated by a relatively constant gap of 8 m. The SER Response to Submissions indicates that this gap can be reduced by a number of means, including the use of thicker-walled pipes and other (unspecified) construction techniques. The separation distance between gas pipelines is not stipulated in the Standard, but is to be taken into consideration with other relevant aspects (such as wall diameter, etc).

Number of pipe crossings

The construction of an additional pipeline between the existing pipeline and the adjacent 132 kV powerlines does not appear, in the first instance, to require any crossings of the existing pipeline.

Working widths

The SER indicates that the working width, that is, the width along the constructed pipeline that will be disturbed during construction activities, is generally 20 to 30 m wide. It is also indicated that it is possible to reduce this width in environmentally-sensitive areas. Employing reduced working widths,

in particular, through wetland areas, could significantly reduce potential impacts associated with pipeline construction.

Rehabilitation

The science and practice of rehabilitating native vegetation and landscapes following various levels of disturbance has advanced since the pipeline was first constructed. The application of 'Best Practice' rehabilitation measures to those areas disturbed by pipeline construction (possibly including historic impacts) would be expected.

Environmental factors

Clearing of good quality vegetation

Transects of the existing pipeline are provided in Figures 3, 4 and 5. Photographs of vegetation are also provided.

Through the areas of elevated slopes and flats, the condition of the vegetation between the pipeline and the powerlines is extremely poor, with the majority of the length being previously cleared. However, wetland areas appear to have recovered quite considerably since the initial disturbance. Future disturbances, using modern construction and rehabilitation methods, would also be expected to have only a short-term impact.

Impacts on Conservation Category lakes and wetlands

As identified in Section 7, eight Conservation Category wetlands are crossed by the existing pipeline. The importance and potential impacts of pipeline construction on these lakes is also discussed. Reassessment of wetland and lake boundaries is likely to reduce the areas of current Conservation Category wetlands. This reassessment and a proposal to minimise and mitigate disturbances associated with the construction, including rehabilitation and like-for-like offsets, could be expected to receive conditional environmental approval.

Impacts on Conservation Category lakes and wetlands

As identified in Section 7, eight Conservation Category wetlands are crossed by the existing pipeline. The importance and potential impacts of pipeline construction on these lakes is also discussed. Reassessment of wetland and lake boundaries is likely to reduce the areas of current Conservation Category wetlands. This reassessment and a proposal to minimise and mitigate disturbances associated with the construction, including rehabilitation and like-for-like offsets, could be expected to receive conditional environmental approval.

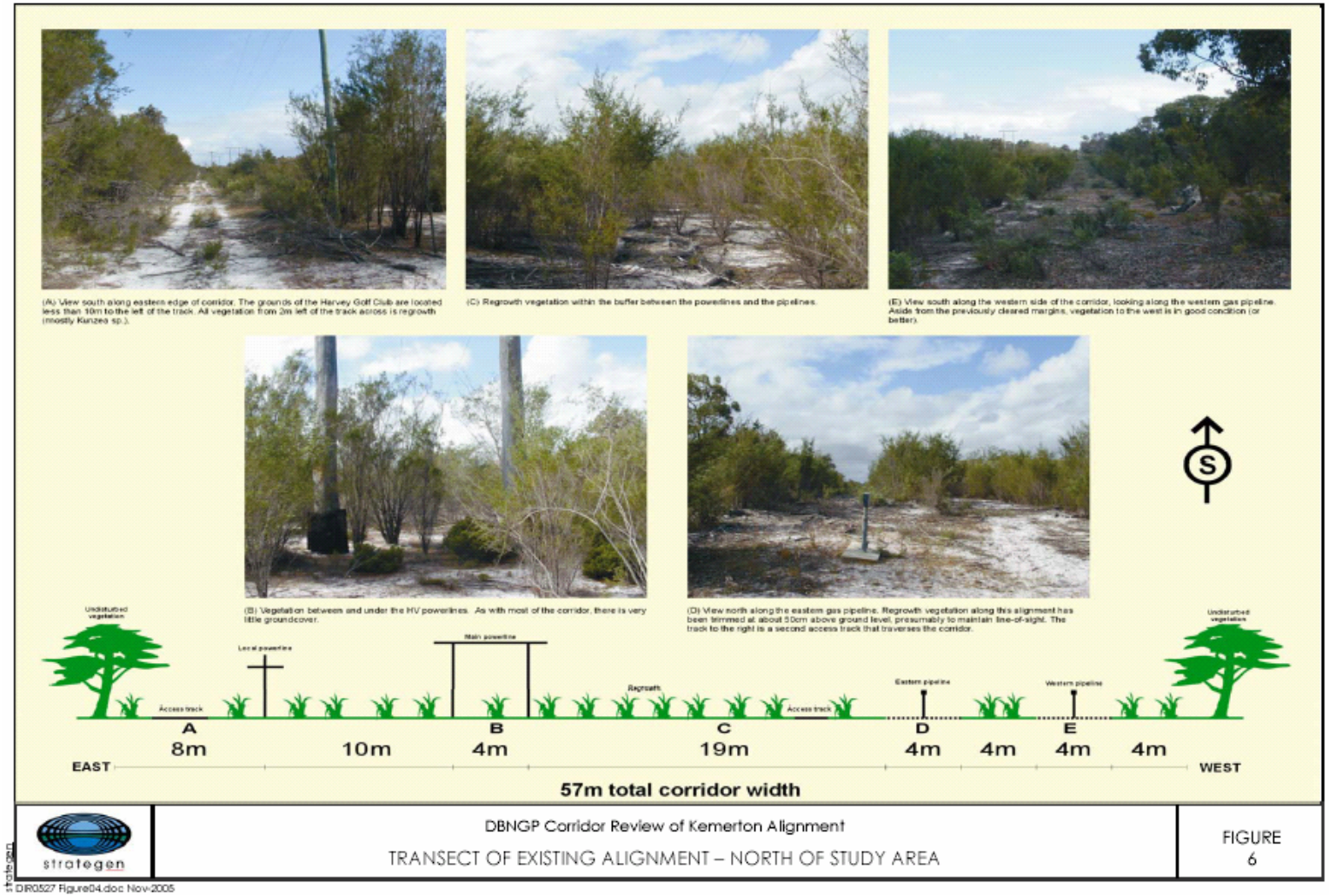

Figure 3 Transect across the combined DBNGP pipeline corridor and overhead powerline corridor – northern end of study area.

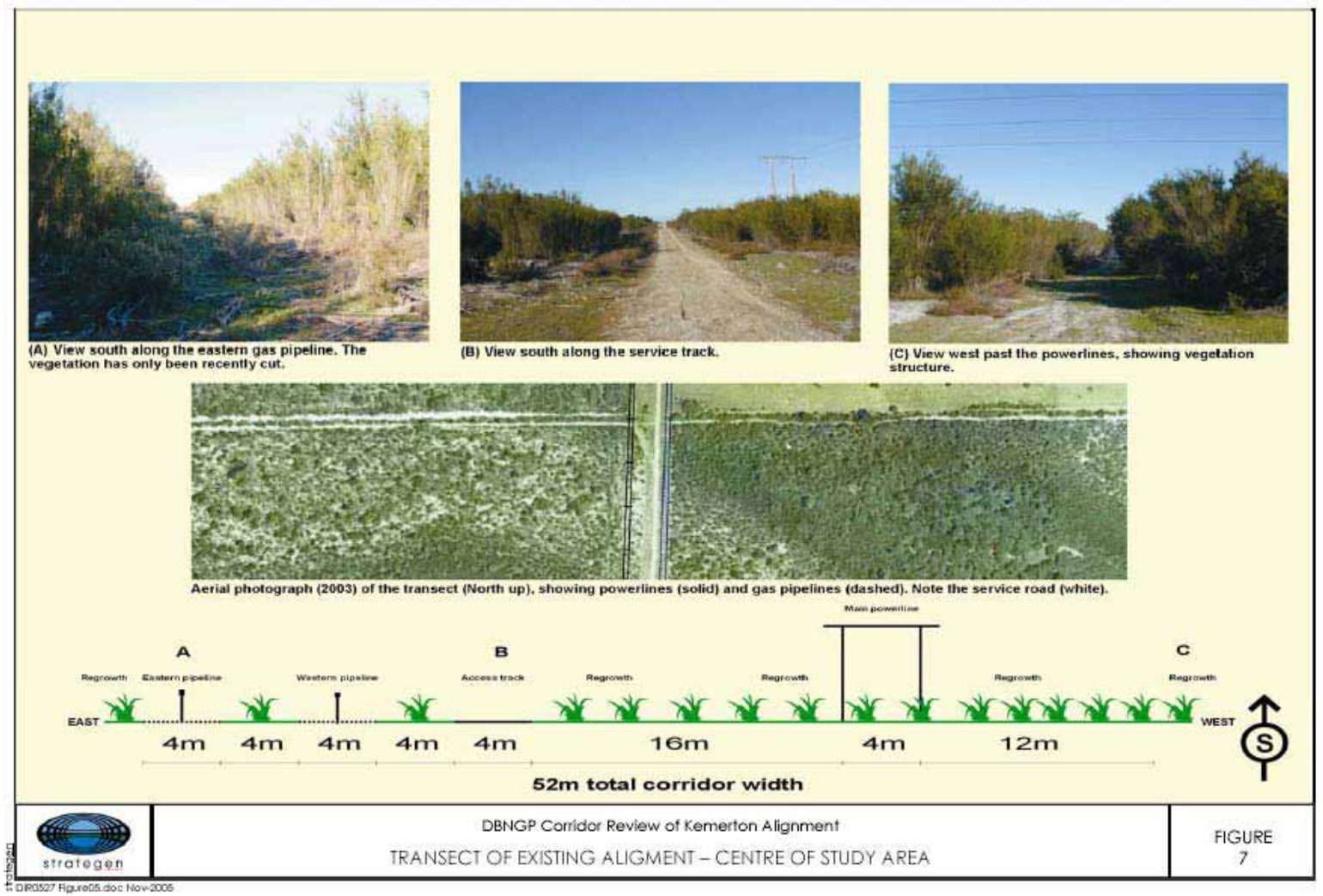

Figure 4 Transect across the combined DBNGP pipeline corridor and overhead powerline corridor – centre of study area.

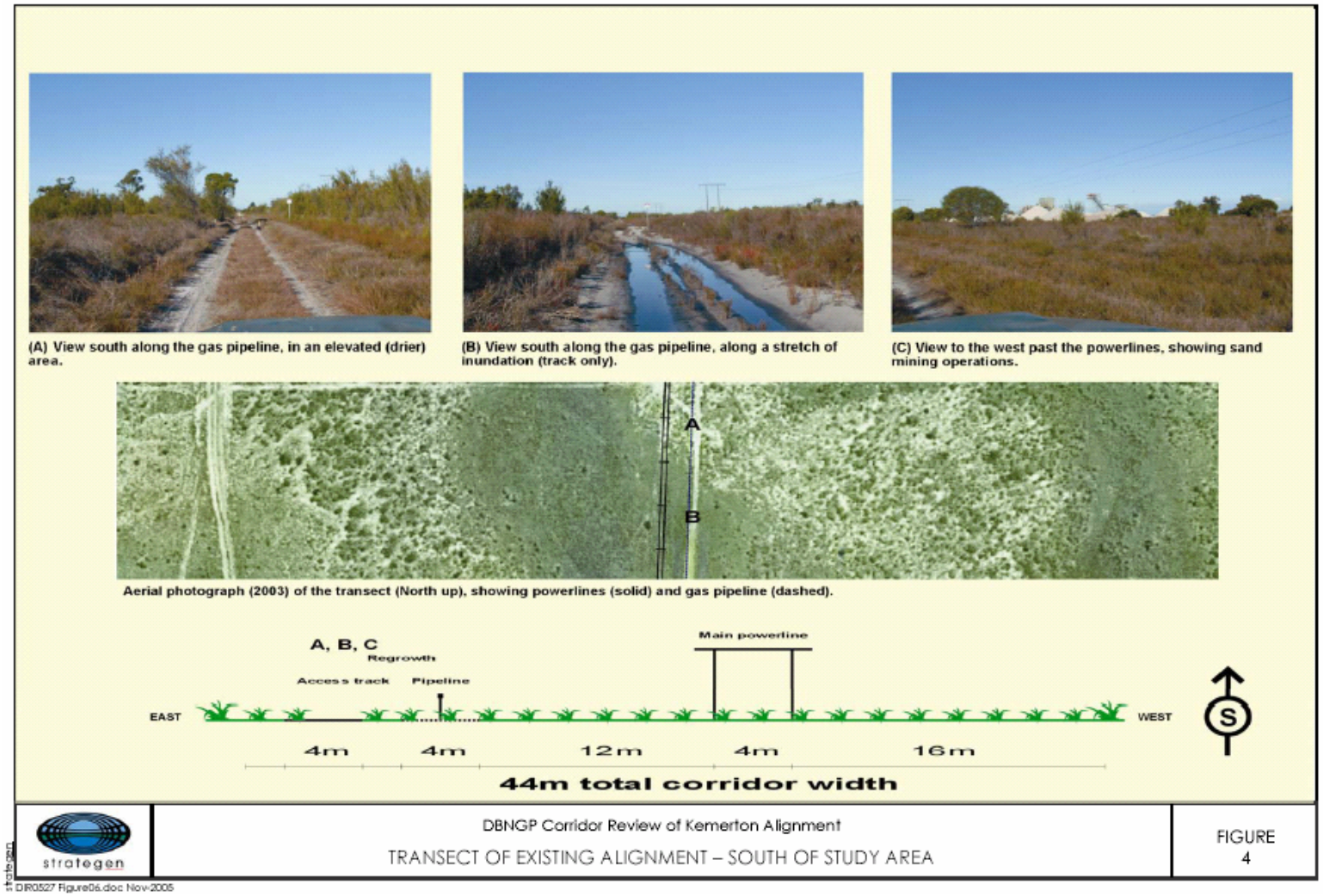

Figure 5 Transect across the combined DBNGP pipeline corridor and overhead powerline corridor – southern end of study area

8. CONCLUSION

8.1 SUMMARY

At the commencement of this review, the status of the alignment options in the study area was:

- the Coolup deviation was discounted due to a significant increase in the length of the corridor.
- the Pines deviation was discounted due to the considerable distance (6 kilometres) from the Worsley Lateral, and the corridor being deemed incompatible with pine forestry operations
- Kemerton Deviation Options A and B were both discounted due to engineering considerations
- the option of extending the existing corridor for its full length was eliminated in the SER on the basis of potential impacts on native vegetation, including Conservation Category wetlands at Kemerton (Wellesley Wetlands).
- the original preferred option (the SER route) was not favoured by DoE or CALM due to impacts on wetlands and vegetation.
- the 'new proposed route' route outlined by DoE and CALM has been identified as having significantly fewer environmental issues, but appears to be strongly disfavoured by the private landholders whose properties will be affected by the new corridor.

8.2 OUTCOME

Whether or not the values of the Kemerton wetlands are sufficient to warrant the social and economic impacts of establishing and constructing future pipelines along the new proposed route is difficult to establish.

The government agencies advise that the regional value of the Kemerton bushlands is important as it is the largest continuous area of native vegetation in the southern Swan Coastal Plain. However, the continuous nature of the vegetation is questionable, given the number of infrastructure corridors already crossing the area. In this regard, will widening of an existing underground service reduce this key environmental value?

The SER route and the widening of the existing alignment both have environmental impacts. It is possible that the bushland clearing requirements of the SER route could be reduced by half through the study area by moving the alignment slightly to the west and into low-lying country. However, this will disturb Conservation Category wetlands. The protection of disturbed Conservation Category wetlands against future, repeated disturbances is the major cause for the agencies advising against widening the existing DBNGP corridor. It is apparent from consultation that the agencies have not been able to satisfactorily present their case in this regard to the landowners affected by the new proposed alignment. There is certainly a lack of available information or studies on the impacts of pipeline construction on vegetation in the area and an examination of the ways these impacts may be avoided or minimised.

Based on the recovery of native vegetation disturbed by previous construction activities, wetland vegetation appears to be significantly less sensitive to pipeline construction than the drier vegetation types. This may be grounds to favour alignments through wetlands rather than through dry vegetation. There are rehabilitation techniques available for seeding and inplanting within disturbed vegetation

communities, thereby encouraging the maintenance and improvement of biodiversity values in already disturbed or modified sites. There would be a need to undertake and monitor any rehabilitation adopted near the pipelines.

Overall, the environmental impacts associated with pipeline construction through native vegetation and wetlands in the study area do not appear to be inconsistent with EPA policies on the matter and the impacts themselves may be manageable. However, whether or not these considerations are sufficient to guarantee environmental acceptability requires specific assessment by the EPA and the development of appropriate management and offset measures. Certainly, the costs associated with securing access to privately-owned farmland and the additional costs of pipeline construction associated with the new proposed route could be better used to derive a net environmental benefit for the project.

8.2.1 Suggested alternative

The recommended option is to utilise the existing corridor for the addition of a single gas pipeline, and to minimise the impact on the environment by implementing the measures previously identified. This approach is considered to be reasonably consistent with the relevant environmental protection framework, while avoiding the significant social issues.

Over the 11 km length of the corridor through the study area, only a negligible area of good quality vegetation will be disturbed, as the majority of the alignment is previously disturbed. Thus the risk of not obtaining environmental approval is considered to be low provided appropriate management and offset measures are developed.

The addition of an extra gas pipeline is estimated as being capable of supplying an additional 127 terajoules of gas per day (based on the performance of the Southern Looping Project (ECOS 2005a)).

9. REFERENCES

Gov. WA 2004a, *The Impact of State Government Actions and Processes on the Use and Enjoyment of Freehold and Leasehold Land in Western Australia*, Standing Committee on Public Administration and Finance, Government of Western Australia, Tabled 14 May 2004.

Gov. WA 2004b, *Tabled Paper No. 2947Whole of Government Response to the Report on the Impact of State Government Actions and Processes on the Use and Enjoyment of Freehold and Leasehold Land in Western Australia,* Government of Western Australia, Tabled 26 October 2004.

BBG 2004a, *Dampier to Bunbury Natural Gas Pipeline Corridor Widening – Kwinana to Bunbury Project Strategic Environmental Review*, Bowman Bishaw Gorham, March 2004.

BBG 2004b, *Dampier to Bunbury Natural Gas Pipeline Corridor Widening – Kwinana to Bunbury Project Strategic Environmental Review Appendices*, Bowman Bishaw Gorham, March 2004.

BBG 2004c, *Dampier to Bunbury Natural Gas Pipeline Corridor Widening – Kwinana to Bunbury Project Strategic Environmental Review Final Response to Submissions*, Bowman Bishaw Gorham, November 2004.

DoE 2004, *Synopsis of the Natural Values of the Kemerton Bushland and the Potential Damaging Impacts of Service Corridors*, Department of Environment, 2004.

Department of Planning and Infrastructure. Government of Western Australia. Dampier to Bunbury Natural Gas Pipeline Corridor – Land Use and Access Guidelines, June 2005 V2.

Department of Planning and Infrastructure. Government of Western Australia. Dampier to Bunbury Natural Gas Pipeline Corridor – Land Use and Access Guidelines, October 2005 V3.

DIPRA 1997, *The Effect of Overhead AC Powerlines Paralleling Ductile Iron Pipelines*, Ductile Iron Pipe Research Association (USA), August 1997.

ECOS (2005a) DBNGP *Looping 10 Project Assessment on Referral Information (ARI)*, Ecos Consulting (Aust) Pty Ltd, November 2005.

ECOS (2005b) *Kemerton Lateral Gas Pipeline Project Assessment on Referral Information (ARI)*, Ecos Consulting (Aust) Pty Ltd, October 2005.

EPA 2005a, *Kemerton Lateral Gas Pipeline,* Bulletin 1204, Environmental Protection Authority, October 2005.

EPA 2005b, *Environmental Offsets Position Statement No. 9,* Preliminary Version 2, Environmental Protection Authority, July 2005.

EPA 2005c, *Southern Looping Project, Loop 10 South of Kwinana,* Bulletin 1206, Environmental Protection Authority, November 2005.

EPA 2004a, *Dampier to Bunbury Natural Gas Pipeline Corridor Widening – Kwinana to Bunbury Project (Section 16e advice)* Bulletin 1153, Environmental Protection Authority, November 2004.

EPA 2004b, *Environmental Protection of Wetlands*, Position Statement No. 4, Environmental Protection Authority, November 2004.

EPA 2004c, *Environmental Protection (Swan Coastal Plain Wetlands) Policy 2004*, Draft, Environmental Protection Authority, 2004.

EPA 2004d, *Environmental Protection (Swan Coastal Plain Wetlands) Regulations 2004*, Draft, Environmental Protection Authority, 2004.

EPA 2004e, *Kemerton Silica Sands Mining Revised Proposal,* Bulletin 1183, Environmental Protection Authority, July 2004.

EPA 2003a, *Levels of Assessment for Proposals Affecting Natural Areas, Guidance No 10*, Environmental Protection Authority, January 2003.

EPA 2001, *Dampier to Bunbury Natural Gas Pipeline Land Corridor Expansion Project,* Bulletin 1019, Environmental Protection Authority, July 2001.

EPA 2000, *Perth Bunbury Highway Peel Deviation*, Bulletin 995, Environmental Protection Authority, September 2000.

Epic Energy, *Dampier to Bunbury Natural Gas Pipeline, Proposed Access Arrangement Under the National Access Code*, Further information in response to the draft decision, Public Version. October 2001.

Standards Australia 2004, *DR04561 Pipelines – Gas and Liquid Petroleum Part 1: Design and Construction*, Draft for Public Comment, 2004

WAPC 2000, *Greater Bunbury Region Scheme – Scheme Report for Public Comment*, Western Australian Planning Commission, August 2000.

WRC 2002, *Wetlands Position Statement*, Water and Rivers Commission, Perth Western Australia, 2002.