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ATA Environmental
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TRANSFIELD SERVICES

TRANSFIELD SERVICES KEMERTON TRUST

KEMERTON POWER STATION REFERRAL SUPPORTING DOCUMENTATION

VOLUME I

VERSION 3
DECEMBER 2003
REPORT NO: 2003/179

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EXECUTIVE SUMMARY

Project Outline

Transfield Services Kemerton Trust (TSKT) proposes to construct and operate a dual fuel open cycle power station within the core of the Kemerton Industrial Park. Natural gas is the primary fuel and distillate (ultra low sulphur diesel) will be available on site as back up.

Western Power Corporation's (WPC) short and medium term power demand forecasts have indicated that new generating capacity will be required from 2005 to meet the general increase in consumer demand across the South West Interconnected System (SWIS) and of major industries that may be planned for the South West.

As a result of WPC's power demand forecasts the Minister for Energy announced an Electricity Generation Strategy in June 2002. This strategy included the requirement for the addition, from 2005, of about 240MW of peaking capacity to the SWIS to meet the forecasted power generation needs.

TSKT, a wholly owned subsidiary of Transfield Services Limited, was selected by WPC, as part of the competitive procurement process for peak load generation on the SWIS, to construct and operate a peaking power station to assist WPC in meeting the forecasted power generation needs.

Construction is proposed to commence in August 2004 and commissioning completed by 31 October 2005.

The proposed power station will consist of two Siemens V94.2 gas turbine generator sets delivering a sent out capacity of at least 260.9 MW.

The power station turbine generators will be fitted with dry, low NOx burners (DLN) capable of operating on either natural gas or ultra low sulphur diesel. The power station will operate in simple cycle mode (often also called open cycle mode) primarily on gas with liquid fuel as back up. The power station can meet the emissions regulation requirements without the use of water using either fuel.

The open cycle units will use predominantly natural gas and will operate as a peaking plant and be capable of meeting the short duration, high power demands for electricity. The plant may also be required to operate as spinning reserve. Western Power Corporation advises that they expect Kemerton Power Station's estimated total long run average capacity factor for both peaking and spinning reserve will be approximately 10%. All power generated by the units will be sold to WPC and customers connected to the SWIS.

The natural gas fuel supply for the project will be taken from the existing Dampier to Bunbury Natural Gas Pipeline (DBNGP). Greenhouse gas emission rates for Kemerton Power Station at full load will be less than WPC's current average emission rate.

Electricity produced will be exported to the SWIS through either the existing 330kV or 132 kV tie line from the power station to WPC's substation north of the Kemerton Industrial Park. Environmental approval for new tie-ins or significant upgrades to the existing line will be the subject of a separate referral by WPC.

The key characteristics of the Project are presented in Table A1.

TABLE A1
KEMERTON POWER STATION KEY PROJECT CHARACTERISTICS
(260.9 MW OPEN CYCLE PEAKING PLANT)

Element	Description	
Project purpose	Provide peaking power to the SWIS	
Project life	25 years	
Power generating capacity	Nominal 260MW	
Energy generated per year	Approximately 240GWh	
Thermal efficiency At 40°C, 40% relative humidity, and 101.3kPa ISO conditions 15°C, 60% relative humidity	Natural gas 28.6% HHV 31.8% LHV[3] 30.2% HHV 33.5% LHV[3]	Liquid fuel 29.3% HHV 31.4% LHV[3] 30.9 % HHV 33.0% LHV[3]
Plant operating modes	Mode 1 - Peaking plant for 5% of the time at 100% load Mode 2 - Spinning reserve for 10% of the time at 55% load	
Operating hours	Approximately 1000 hours per year	
Estimated capacity factor	Approximately 10%	
Facility footprint Site area including buffer	2 hectares 28 hectares	
Plant facilities		
Proposed technology Number and size of gas turbines Number of stacks Height of stacks Number of liquid fuel storage tanks	2 x Siemens V94.2 gas turbine generators 2 x 130.5MW 2 35m 1 x 1.5ML tank	
Construction period	Approximately 16 months	
Inputs		
Cooling water	None	
General water requirements	20kL/day - For dust suppression during construction 30kL/yr - For domestic use	
Natural gas	Approximately 3PJ per year (approximately 900 hours per year) taken from the Dampier to Bunbury Natural Gas Pipeline	
Liquid fuel (Backup)	Up to 6 ML per year ultra low sulphur diesel (less than 100 hours per year) Sulphur content of diesel – 50ppm maximum	
Outputs		
Wastewater	None	
Solid waste	<10 tpa	

Element	Description	
Air emissions:	Natural gas (based on 900h per year at full load)	Liquid fuel (based on 100h per year at full load)
Oxides of nitrogen (NO_X)	<39.1 g/s (127 tpa)	<114.2 g/s (41.1 tpa)
Oxides of sulphur (SO_X)[1]	g/s (negligible tpa)	4.06 g/s (1.146 tpa)
Oxides of sulphur (SO_X)[2]	0.0 g/s (negligible tpa)	0.406 g/s (0.146 tpa
Particulate matter	2.0 g/s (6.48 tpa)	7.62 g/s (2.74 tpa)
Carbon monoxide (CO)	21.7 g/s (70.3 tpa)	20.9 g/s (7.54tpa)
Polycyclic aromatic hydrocarbons (PAHs)	0.00087 g/s (0.0028 tpa)	0.016 g/s (0.0057 tpa)
Non-methane volatile organic compounds (NMVOCs)	0.83 g/s (2.69 tpa)	0.16 g/s (0.058 tpa)
Greenhouse gas emissions	Approximately 160,000 tpa $CO_{2\text{-}e}$ (Assuming approximately 900 hours per year operation on natural gas and 100 hours per year operation on liquid fuel)	
Average greenhouse intensity	667.6.1 kg $CO_{2\text{-}e}$/MWhr (Assuming approximately 900 hours per year operation on natural gas and 100 hours per year operation on liquid fuel)	
Predicted noise level	<28 dB(A) at closest residences	

Notes:
[1] Emissions modelling based on use of normal distillate (500 ppm sulphur content)
[2] Emissions modelling based on use of ultra low sulphur diesel (50 ppm sulphur content)
[3] Lower Heating Values (LHV) are manufacture guarantee values.

Key Environmental Factors

The key environmental factors for this project that have been assessed in this referral document are:

- Terrestrial Flora And Vegetation;
- Specially Protected (Threatened) Fauna;
- Surface And Groundwater Quality;
- Gaseous And Particulate Emissions;
- Greenhouse Gas Emissions;
- Noise And Vibration;
- Solid And Liquid Wastes;
- Hydrocarbons And Hazardous Materials;
- Aboriginal Heritage;
- Risks And Public Safety;
- Social And Economic Issues;
- Visual Impact; and
- Transport.

A summary of the proposal characteristics, potential environmental impacts and proposed management measures to mitigate those impacts is presented in Table 7 (refer Section 6).

TSKT's environmental commitments are presented in Table A2.

Based on the assessment of each environmental factor, it is concluded that the Environmental Protection Authority's objectives for each factor will be achieved given the nature of the proposal, characteristics of the existing environment, proposed environmental management measures and environmental commitments proposed by TSKT.

TABLE A2
TRANSFIELD SERVICES KEMERTON TRUST
PROPONENT ENVIRONMENTAL COMMITMENTS

NO	TOPIC	OBJECTIVE/S	ACTION	TIMING	ADVICE
1	Construction Environmental Management	To ensure all aspects of project construction are conducted such that environmental impacts are minimised as far as practicable, and that regulatory requirements are complied with.	1. Prepare a Construction Environmental Management Program (CEMP) which will include the following plans: • Flora and Vegetation Management Plan (see commitment 3); • Fauna Management Plan (see commitment 5); • Groundwater Management Plan (see commitment 6); • Surface and Stormwater Water Management Plan (see commitment 8); • Air Emissions and Dust Management Plan (see commitment 10); • Noise Management Plan (see commitment 13); • Solid and Liquid Waste Management Plan (see commitment 15); • Hydrocarbon and Hazardous Material Handling Plan (see commitment 17); • Aboriginal Heritage Management Plan (see commitment 19); • Community Consultation Plan (see commitment 20); and • Dewatering Management Plan (see commitment 22); 2. Implement the approved Construction Environmental Management Program (CEMP) described in 1.1 above.	Prior to Construction	DEP
2	Operational Environmental Management	To ensure all aspects of project operation are conducted such	1. Prepare an Operational Environmental Management Program (OEMP) which will include but not be limited to the following plans: • Flora and Vegetation Management Plan (see	Prior to Commissioning	DEP

NO	TOPIC	OBJECTIVE/S	ACTION	TIMING	ADVICE
		that environmental impacts are minimised as far as practicable, and that regulatory requirements are complied with.	commitment 4); • Groundwater Management Plan (see commitment 7); • Surface and Stormwater Water Management Plan (see commitment 9); • Air Emissions Management Plan (see commitment 11); • Noise Management Plan (see commitment 14); • Solid and Liquid Waste Management Plan (see commitment 16); • Hydrocarbon and Hazardous Material Handling Plan (see commitment 18); • Community Consultation Management Plan (see commitment 21). 2. Implement the approved Operational Environmental Management Program (OEMP) described in 2.1 above.		
3	Terrestrial Flora and Vegetation	To maintain the abundance, species diversity, geographic distribution and productivity of vegetation communities during construction	1. Prepare a Construction Flora and Vegetation Management Plan which will address but not be limited to: • Construction Lay-down Site Rehabilitation; • Dieback Hygiene; • Weed management and control; • Clearing of blue gums; • Monitoring requirements; and • Reporting requirements. 2. Implement the approved Flora and Vegetation Management Plan described in 3.1 above.	Prior to Construction	DEP/CALM
4	Terrestrial Flora and Vegetation	To maintain the abundance, species diversity, geographic distribution and	1. Prepare an Operational Flora and Vegetation Management Plan which will address but not be limited to: • Dieback Hygiene; • Weed management and control;	Prior to Commissioning	DEP/CALM

NO	TOPIC	OBJECTIVE/S	ACTION	TIMING	ADVICE
		productivity of vegetation communities during operation	• Clearing of blue gums in buffer; • Monitoring requirements; and • Reporting requirements. 2. Implement the approved Operational Flora and Vegetation Management Plan described in 4.1 above.		
5	Terrestrial Fauna Specially protected (Threatened) fauna.	To protect Specially Protected (Threatened) Fauna species and their habitats, consistent with the provisions of the *Wildlife Conservation Act 1950* during construction	1. Prepare a Construction Fauna Management Plan which will address but not be limited to: • Feral and introduced animal management; • Management of species location if required; • Monitoring requirements; and • Reporting requirements. 2. Implement the approved Construction Fauna Management Plan described in 5.1 above.	Prior to Construction	DEP/CALM
6	Groundwater Quality	To monitor groundwater quality and identify and mitigate sources of contamination during construction	1. Prepare a Construction Groundwater Management Plan which will address but not be limited to: • Sample bore locations; • Parameters and sample frequency for monitoring; • Mitigation and contingency measures; • Reporting requirements. 2. Implement the approved Construction Groundwater Management Plan described in 6.1 above.	Prior to Construction	DEP/WRC
7	Groundwater Quality	To monitor groundwater quality and identify and mitigate sources of contamination during operation	1. Prepare an Operational Groundwater Management Plan which will address but not be limited to: • Zero process water discharge; • Design and bore construction; • Sample bore locations; • Parameters and sample frequency for monitoring; • Mitigation and contingency measures;	Prior to Commissioning	DEP/WRC

NO	TOPIC	OBJECTIVE/S	ACTION	TIMING	ADVICE
			• Reporting requirements. 2. Will implement the approved Operational Groundwater Management Plan described in 7.1 above.		
8	Surface Water Quality	To manage the potential effects of the construction of the project on surface water quality and to maintain existing flow paths where possible	1. Prepare a Construction Surface and Storm Water Management Plan which will address but not be limited to: • Management of contaminated surface water runoff; • Monitoring requirements; • Mitigation and contingency measures; • Reporting requirements. 2. Will implement the approved Construction Surface and Storm Water Management Plan described in 8.1 above.	Prior to Construction	DEP/WRC
9	Surface Water Quality	To manage the potential effects of the operation of the project on surface water quality and to maintain existing flow paths where possible	1. Prepare an Operational Surface and Storm Water Management Plan which will address but not be limited to: • Management of contaminated storm waters such that none leaves the site; • Recovery mechanisms and structures for chemical and hydrocarbon spillages, • Monitoring requirements; • Response and contingency measures; and • Reporting requirements. 2. Implement the approved Operational Surface and Storm Water Management Plan described in 9.1 above.	Prior to Commissioning	DEP/WRC
10	Air Quality - Gaseous Emissions	To protect surrounding land users such that gaseous and particulate emissions will Not adversely affect	1. Prepare a Construction Air Emissions/Dust Management Plan which will address but not be limited to: • the use of water sprays to wet the site during windy conditions; • the use of speed limits to minimise dust generated by	Prior to Construction	DEP

NO	TOPIC	OBJECTIVE/S	ACTION	TIMING	ADVICE
		their welfare and amenity or cause health problems. To ensure that conditions which could promote the formation of photochemical smog are managed to minimise the generation of smog and any subsequent impacts.	vehicle movements; • the use of minimum drop heights when loading and unloading soils and other excavated materials; minimisation of areas of disturbed and/or exposed soils; • Incident management; • Responsibilities; • Reporting Requirements; and • Employee training and awareness. 2. Implement the approved Construction Air Emissions / Dust Management Plan described in 10.1 above.		
11	Air Quality - Gaseous Emissions	To ensure that best practicable measures are taken to minimise discharge of gaseous and particulate emissions to the atmosphere. To protect surrounding land users such that gaseous and particulate emissions will not adversely affect their welfare and amenity or cause	1. Prepare a Operational Air Emissions Management Plan which will address but not be limited to: • Stack emission monitoring program (sampling location, frequency, parameters, standards and limits); • Reporting schedules; • Incident management; • Responsibilities; and • Employee training and awareness. 2. Implement the approved Operational Air Emissions Management Plan described in 11.1 above.	Prior to Commissioning	DEP

NO	TOPIC	OBJECTIVE/S	ACTION	TIMING	ADVICE
		health problems. To ensure that conditions which could promote the formation of photochemical smog are managed to minimise the generation of smog and any subsequent impacts.			
12	Greenhouse Gas Emissions	To ensure that potential greenhouse gas emissions emitted from proposed projects are adequately addressed and best practicable measures and technologies are used in Western Australia to minimise Western Australia's greenhouse gas emissions.	Pursue greenhouse gas reduction through: • Commitment to participate in the Greenhouse Challenge program. • Prepare a Greenhouse Gas Management Strategy under the Greenhouse Challenge program • Implement a Greenhouse Gas Management Strategy under the Greenhouse Challenge program • Operate and maintain the plant to "Good Electricity Practice" as defined in the National Electricity Code.	Prior to Construction and throughout Operation	DEP/Australian Greenhouse Office

NO	TOPIC	OBJECTIVE/S	ACTION	TIMING	ADVICE
13	Noise	To protect the amenity of nearby residents from noise impacts resulting from construction activities associated with the proposal by ensuring that noise levels meet the *Environmental Protection (Noise) Regulations 1997.*	1. Prepare a Construction Noise Management Plan which will address but not be limited to: • Noise management procedures for construction; • Retention of vegetation (plantation blue gums) where practicable to assist in noise mitigation; • Implement alternative noise attenuation packages to provide enhanced levels of noise control to meet boundary level noise limits if necessary; and • Implement a complaint management procedure to receive, investigate and action noise complaints. 2. Implement the approved Construction Noise Management Plan described in 13.1 above.	Prior to Construction	DEP
14	Noise	To protect the amenity of nearby residents from noise impacts resulting from operational activities associated with the proposal by ensuring that noise levels meet the *Environmental Protection (Noise) Regulations 1997.*	1. Prepare an Operational Noise Management Plan which will address but not be limited to: • Maintenance of equipment that contribute to overall plant noise; • the use of silencers where necessary; and; • noise monitoring and reporting as necessary. • Implementation of a complaint management procedure to receive, investigate and action noise complaints. 2. Implement the approved Operational Noise Management Plan described in 14.1 above.	Prior to Commissioning	DEP
15	Waste	Ensure that the generation of all	1. Prepare a Construction Solid and Liquid Waste Management Plan to address but not be limited to the	Prior to Construction	DEP/Shire of Harvey

NO	TOPIC	OBJECTIVE/S	ACTION	TIMING	ADVICE
	Management	wastes follows consideration of waste reduction in accordance with the waste hierarchy of reduction, reuse, recycling, treatment, and disposal during construction.	following: • Compliance with the requirements of the DoE and Regulations in relation to the management, handling and storage of wastes including application of the waste hierarchy of reduction, reuse, recycling, treatment, and disposal ; • Implementation of waste reduction and recycling initiatives where recyclable wastes will be removed by an approved contractor; • General refuse and putrescible (domestic and industrial) solid waste and inert materials (not suitable for recycling) will be disposed of at the nearby Kemerton landfill in accordance with the Health Dept of WA and Landfill Board requirements • Solvents and hazardous liquids will be collected and removed from the site for recycling or disposal in an approved liquids disposal area. • Prohibit burning of waste onsite at all times. • Educate employees in non-hazardous solid waste management. • Preparation of annual waste reports 2. Implement the approved Construction Solid and Liquid Waste Management Plan described in 15.1 above.		
16	Waste Management	Ensure that the generation of all wastes follows consideration of	1. Prepare an Operational Solid and Liquid Waste Management Plan to address but not be limited to the following:	Prior to Commissioning	DEP/Shire of Harvey

NO	TOPIC	OBJECTIVE/S	ACTION	TIMING	ADVICE
		waste reduction in accordance with the waste hierarchy of reduction, reuse, recycling, treatment, and disposal during operation.	• Compliance with the requirements of the DoE and Regulations in relation to the management, handling and storage of wastes including application of the waste hierarchy of reduction, reuse, recycling, treatment, and disposal ; • Implementation of waste reduction and recycling initiatives where recyclable wastes will be removed by an approved contractor; • General refuse and putrescible (domestic and industrial) solid waste and inert materials (not suitable for recycling) will be disposed of at the nearby Kemerton landfill in accordance with the Health Dept of WA and Landfill Board requirements; • Solvents and hazardous liquids will be collected and removed from the site for recycling or disposal in an approved liquids disposal area; and • Prohibit burning of waste onsite at all times. • Educate employees in non-hazardous solid waste management. • Preparation of annual waste reports 2. Implement the approved Operational Solid and Liquid Waste Management Plan described in 16.1 above.		

NO	TOPIC	OBJECTIVE/S	ACTION	TIMING	ADVICE
17	Hydrocarbon and Hazardous Materials	Design and construct (including bunding) in accordance with Australian Standards AS 1940 (Standards Australia 1993) and requirements of the DoIR and the *Explosives and Dangerous Goods Act 1961.*	1. Prepare a Construction Hydrocarbon and Hazardous Materials Handling Plan to address but not be limited to: • Tracking of the volume of hydrocarbon and hazardous waste materials produced; • Identification of disposal options. • Appropriate transport, storage and handling procedures; • Appropriate clean-up and emergency procedures for spillages; • Monitoring requirements; • Contingency and Response Measures; • Reporting requirements. 2. Implement the approved Construction Hydrocarbon and Hazardous Materials Handling Plan described above in 17.1.	Prior to Construction	DEP/DoIR
18	Hydrocarbon and Hazardous Materials	Operate in accordance with Australian Standards AS 1940 (Standards Australia 1993) and requirements of the DoIR and the *Explosives and Dangerous Goods Act 1961.*	1. Prepare an Operational Hydrocarbon and Hazardous Materials Handling Plan to address but not be limited to: • Tracking of the volume of hydrocarbon and hazardous waste materials produced; • Identification of disposal options. • Appropriate transport, storage and handling procedures; • Appropriate clean-up and emergency procedures for spillages; • Monitoring requirements; • Contingency and Response Measures; • Reporting requirements. 2. Implement the approved Operational Hydrocarbon and Hazardous Materials Handling Plan described above in 18.1.	Prior to Commissioning	DEP/DoIR

NO	TOPIC	OBJECTIVE/S	ACTION	TIMING	ADVICE
19	Heritage	To protect any sites of significance uncovered during the construction phase of the project.	1. Prepare a Construction Aboriginal Heritage Management Plan to address but not be limited to: • Procedures to ensure compliance with the Aboriginal Heritage Act, 1972; • Consideration of recommendations of the Archaeological and Ethnographic Site Identification Survey Report (AIC, 2003) and adopt appropriate measures to address these recommendations where practicable. • Procedures for protection of a site of significance uncovered during construction; and • Procedure for continued liaison with relevant parties during construction. 2. Implement the approved Construction Aboriginal Heritage Management Plan described above in 19.1.	Prior to Construction	DIA
20	Social and Economic Issues	Ensure that any potential impacts from the development on the nearby community are minimised. Ensure that recreational use of the areas surrounding the Kemerton Industrial Park is not compromised.	1. Prepare a Construction Community Consultation Plan to address but not be limited to: • General community consultation associated with the environmental approval process; • Targeted consultation with nearby landowners and communities. • Consultation with the Shires of Harvey, (and/or Dardanup and City of Bunbury) and Kemerton Community Committee; • Local waterbody users representative groups; • Opportunities to engage local workforces. 2. Implement the approved Construction Community Consultation Plan described above in 20.1.	Prior to Commissioning	Kemerton Community Committee

NO	TOPIC	OBJECTIVE/S	ACTION	TIMING	ADVICE
21	Social and Economic Issues	Ensure that any potential impacts from the development on the nearby community are minimised. Ensure that recreational use of the areas surrounding the Kemerton Industrial Park is not compromised.	1. Prepare an Operational Community Consultation Plan to address but not be limited to: • General community consultation associated with the environmental approval process; • Targeted consultation with nearby landowners and communities. • Consultation with the Shires of Harvey,(and/or Dardanup and City of Bunbury) and Kemerton Community Committee; • Local waterbody users representative groups; • Opportunities to engage local workforces. 2. Implement the approved Operational Community Consultation Plan described above in 21.1.	Prior to Commissioning	Kemerton Community Committee
22	Groundwater	To ensure the discharge water from de-watering activities during the construction phase will have no adverse impacts on the groundwater table, and /or the water quality or flow regime of surface water bodies (including wetlands).	1. Prepare a Construction Dewatering Management Plan to address but not be limited to: • Definition of the commencement date, duration, anticipated quantity and frequency of discharge; • Monitoring requirements; and • Reporting requirements. 2. Implement the approved Construction Dewatering Management Plan described above in 22.1.	Prior to Construction	DEP/WRC
23	Decommissioning	To provide the framework to ensure that the site is left in an environmentally acceptable condition at closure	1. Prepare a Preliminary Decommissioning Plan. The Preliminary Decommissioning Plan will address: • conceptual plans for the removal or, if appropriate retention of the plant and infrastructure;	Within six months of the date of publication of the Ministerial Statement	

NO	TOPIC	OBJECTIVE/S	ACTION	TIMING	ADVICE
			• a conceptual rehabilitation plan for all disturbed areas and a description of a process to agree on the end land use(s) with all stakeholders; • a conceptual plan for the care and maintenance phase; and • management of noxious materials to avoid the creation of contaminated areas. 2. Prepare a Final Decommissioning Plan. The Final Decommissioning Plan will address: • removal or, if appropriate retention of the plant, access roads, corridors and/or infrastructure in consultation with relevant stakeholders; • rehabilitation of all disturbed areas to a standard suitable for the agreed new land use(s); • identification of contaminated areas, including provision of evidence of notification and proposed management measures to relevant statutory authorities. 3. Implement the Final Decommissioning Plan	At least six months prior to the anticipated date of decommissioning; or at a time agreed with the EPA.	DEP/Shire of Harvey

1. INTRODUCTION

1.1 Proposal Overview

The purpose of this document is to provide the Environmental Protection Authority (EPA) with relevant information to determine the level of assessment for the Transfield Services Kemerton Trust (TSKT) proposal to construct and operate a dual fuel open cycle power station within the core of the Kemerton Industrial Park.

Western Power Corporation's (WPC) short and medium term power demand forecasts have indicated that new generating capacity will be required from 2005 to meet the general increase in consumer demand across the South West Interconnected System (SWIS) and of major industries that may be planned for the South West.

As a result of WPC's power demand forecasts, the Minister for Energy announced an Electricity Generation Strategy in June 2002. This strategy included the requirement for the addition, from 2005, of about 240MW of peaking capacity to the SWIS to meet the forecasted power generation needs.

The sources of energy currently available in Western Australia for power generation include natural gas, coal, petroleum oil and various renewable energy sources such as wind, solar power and fuel cells. All major sources were reviewed by WPC for possible application to meet the power generation requirements.

WPC considered that while renewable energy offers many options for power generation it is unlikely that the renewable options currently available could meet the scale of immediate power generation requirements (240MW). Therefore, for the power competitive procurement process, WPC focussed on the conventional fuels of natural gas, coal or liquid fuel.

TSKT, a wholly owned subsidiary of Transfield Services Limited, was selected by WPC, as part of the competitive procurement process for peak load generation on the SWIS, to construct and operate a peaking power station to assist WPC in meeting the forecasted power generation needs.

The proposed power station will consist of two Siemens V94.2 gas turbine generator sets delivering a sent out capacity of at least 260.9 MW.

The power station turbine generators will be fitted with dry, low NOx burners (DLN) capable of operating on either natural gas or low sulphur diesel. The power station will operate in simple cycle mode (often also called open cycle mode) primarily on gas with liquid fuel as back up. The power station can meet the emissions regulation requirements without the use of water using either fuel.

Kemerton Power Station (KPS) uses two simple cycle gas turbines. (A gas turbine operation is described thermodynamically as a Joule-Brayton cycle. The "open cycle" often also called simple cycle is derived from this nomenclature). KPS's role is to provide support to the grid during rapid changes in generation such as when other generation fails, or during unusually high loads such as air-conditioning loads that

occur over intense but short periods. The lower capital cost of the simple cycle provides low cost insurance.

Combined cycle plant combines two thermodynamic processes, the Joule-Brayton and the Rankine cycles. The Rankine cycle describes the thermodynamics associated with boilers and steam turbines. Combined cycle plants are more efficient than simple cycle plants but have a significant penalty in capital and operating costs.

Simple cycle also has another significant advantage over combined cycle in this application; simple cycle can be rapidly started and ramped to full load in minutes, compared with combined cycle plant that can take more than an hour.

1.2 Proponent Details

1.2.1 Proponent

The Proponent for the proposed power station is **Transfield Services Kemerton Trust**, a wholly owned subsidiary of Transfield Services Limited.

Transfield Services Limited is an Australian company and has operations throughout Australia, New Zealand and other countries. Transfield Services Limited has offices in Perth and has a significant commitment to Western Australia. Twenty two percent of Transfield Services Limited's Australian workforce is located in Western Australia and operations in Western Australia form an integral part of the company.

Address of Proponent

Level 12, Maritime Towers
201 Kent St
SYDNEY NSW 2000

Key Contact

Company Secretary
Attention: Mr Fred Bidwell

Phone: (02) 9475 5600
Fax: (02) 9475 5618
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1.2.2 Environmental Record

The environmental requirements for the proposed Kemerton Power Station are very similar to those experienced previously at the Yabulu "greenfield" site of Transfield Services Limited's Townsville power station. Transfield Services Limited follows a zero discharge regime at its Townsville power station, which is within 5km of the Coral Sea and hence falls under the auspices of the Great Barrier Marine Park Committee. Transfield Services Limited's environmental management of the Townsville power station has been very favourably reviewed by the local Townsville

EPA office. TSKT will undertake a similar management philosophy in relation to the environment for the KPS Project. TSKT confirms that it has the capability to provide all the necessary resources (human or otherwise) to implement all environmental conditions and commitments.

1.3 Site Location and Land Use

1.3.1 Location of Power Station

The proposed power station site is located in the north east of the Kemerton Industrial Park (Figure 1). The Kemerton Industrial Park is located in the South West of Western Australia, approximately 140km south of Perth, in the locality of Wellesley, within the Shire of Harvey and lies approximately 17km north east of Bunbury (Figure 2).

The total area of the site is 28ha and the entire 28ha are currently under Blue Gum (*Eucalyptus globulus*) plantation with little understorey vegetation. The construction footprint will be up to 15ha and the final operational footprint is expected to be approximately 2ha.

The power station site is located in part of the area previously designated as Site D in the Kemerton Power Station Strategic Environmental Review (WPC, 2002).

An illustration of site access, linear infrastructure and utilities for the power station is shown in Figure 3.

1.3.2 Criteria for Site Selection

A range of potential power station sites was identified in a site selection study undertaken by WPC. The criteria considered in the study were:

- Planning/Land Zoning – appropriate zoning and compatible land use;
- Availability of infrastructure and services – such as transmission lines, fuel and water supply, site access, labour forces, waste disposal options;
- Land Capability – suitability of factors such as drainage, topography and soil type;
- Environmental Factors – buffer distances for noise and air impacts, sensitive ecological areas, hydrology and groundwater;
- Socio-economic Factors – community lifestyle, visual impacts, community perceptions etc.; and
- Sustainable Development Opportunities – e.g. enhancement of conservation values, development of carbon sinks, re-vegetation

The five sites identified using the above criteria to be the most suitable to meet the short-term power requirements of the power procurement process were:

- Kemerton Industrial Park;
- Kwinana Industrial Area;
- Pinjar Gas-Fired Power Station (Expansion);

- Collie Coal-Fired Power Station (Expansion); and
- Bunbury (old power station site).

Kemerton was selected as the optimal site to provide the ability to diversify peaking generation capacity away from existing concentrations at Pinjar as well as allowing for generation capacity to be available from the south of the load centre in Perth.

Kemerton also offers not only the ability to connect to the grid via the 330kV transmission line, but also the 132 kV line to help with reliability of the electricity system. The proposed KPS's proximity to large base-load generators south of Perth such as Collie also enhances the integrity and security of the system.

The benefits of siting the peaking plant at Kemerton include:

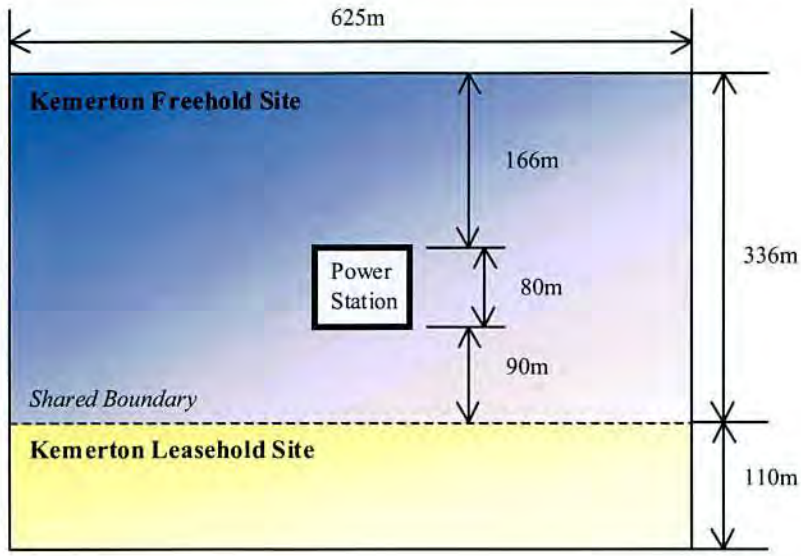
- the suitability of the Kemerton Industrial Park for major industry is well established;
- considerable community consultation has been undertaken for the Kemerton Industrial Park for over 15 years;
- detailed studies have already been conducted into air emissions, noise, water supply and waste management as part of previous planning for the Kemerton Industrial Park;
- proximity to natural gas and power transmission lines;
- noise emissions from the site will comply with the criteria at the boundary of the buffer zone;
- the site is consistent with the Final Concept Plan for Kemerton Industrial Park such that it minimises fragmentation of the larger areas of the core, leaving these areas available for future major industrial developments; and
- existing roads provide access to the site.

As part of the planning process for the expansion of the Kemerton Industrial Park, an extensive visual impact assessment was undertaken to identify concerns and limit the impact on the local community. The proposed power station site is well screened from the public through-roads (Old Coast Road) by a dunal ridge. A more detailed discussion on the visual impact of the power station can be found in Section 7.12.

1.3.3 Land Ownership

The site is currently owned by the Department of Conservation and Land Management (CALM) but TSKT proposes to acquire the freehold title to an initial block of 28ha land but allow WPC an option to purchase over 6.7ha to enable a proposed Stage 2 development by WPC to occur. If Stage 2 does not eventuate at Kemerton, the 6.7ha land will be retained as a noise buffer on the southern side of the power station site.

The KPS, with a footprint of 2ha, will be located in the middle of the site as shown below. A distance of approximately 90m will be retained from the centre of the power station to all of the site boundaries that will be remain as vegetation buffer.



1.3.4 Zoning

While this site is currently proposed to be incorporated into the core of the Kemerton Industrial Park as part of the planned expansion of the Park through the Greater Bunbury Region Scheme (GBRS), the timing of the GBRS will be too late to meet the construction requirements. Therefore to enable construction to begin in time an application was made to rezone the site "Industrial (Heavy)".

The rezoning of this site to "Industrial (Heavy)" was gazetted on the 11 November 2003 and is effective from this date.

1.4 Need for Project

To satisfy existing customer demands for electrical power and to maintain the safety and reliability of the electricity system over the next decade, WPC, the principal generator, transmitter, distributor and retailer of electricity in Western Australia, believes an increase in total generating capacity of 700 – 900MW will be required over this period.

A first stage in providing the required increase in generating capacity is the proposed power station at the Kemerton Industrial Park. This power station will be a peaking plant.

The fast starting capability and low capital cost are the key considerations in the selection of peaking plant. The primary purpose of peaking plant is to cover the short periods of high power demands within the network and being capable of starting quickly in times of emergency, such as a major unit tripping out of service. Low capital cost as a key driver in generator selection because of the lower hours of

operation of peaking plant. More costly, higher efficiency combined cycle machines, if required to fill peaking roles, could impact the overall cost of electricity and jeopardise the reliability of the electricity network because of longer start times.

The State of Western Australia and the South West Region will benefit from the project in the following ways:

- capital investment of $150 million in the South West Region;
- employment of up to 100 people during the construction phase;
- permanent employment of up to 5 people for the operating power station and contingent maintenance workforce;
- avoidance of future shortfalls in electricity supply;
- provision of additional electricity for future new industries; and
- provision of incentives for other industries to establish in Kemerton Industrial Park by the provision of a more reliable power supply.

Western Power's Requirements

Western Power's requirements are:

- 220MW - 260MW of peaking generation plant, dedicated to Western Power's use, to be commissioned prior to the summer of 2005-06;
- the available capacity required to be measured in summer conditions of 40° C and
  40% relative humidity;
- the Power Station to have dual fuel (natural gas with liquid fuel back-up) capability; and
- the Power Station to have rapid starting capability and high starting reliability.

Western Power will dispatch the Power Station at its discretion to suit overall load and system conditions. Dispatch of any plant by WPC is based generally on the incremental fuel and operating cost of each available unit on the system with the aim of minimising the total delivered cost of electricity. Technical constraints (including loading rates and minimum fuel takes) are also taken into account in the operation of all of the units on the system.

Western Power's modelling suggests that on current information and assumptions the new units will operate at capacity factors between 1 and 5 percent, with the higher usage in the years immediately prior to the next increment of baseload or mid merit capacity. Under some scenarios, such as restricted gas availability at the Kemerton location, the capacity factor could be less than the above estimates, (and in these circumstances an increase in liquid fuel operation may occur). However, on rare occasions it might be required to operate well above that level during periods of lower reserve margins. Other scenarios, such as increased spinning reserve requirements associated with greater wind generation or a very large baseload unit installed in the SWIS in future years, could increase the expected capacity factors. A long-run average annual capacity factor covering both peak loads and spinning reserve is expected to be below 10%. In any event, the full capacity of the Power Station will be required to be dispatched in a highly flexible manner to meet system requirements.

The Kemerton Power Station is expected to maintain its performance in the 220MW – 260MW range. The capacity of the units of the Power Station will be measured on a sent-out basis adjusted to hot weather maximum conditions at 40°C. This reflects the ambient conditions under which the plant is most likely to operate. All of the power station's capacity is dedicated to Western Power for its sole use under the terms of a Power Purchase Agreement (PPA). Western Power expects that there may be significant periods of minimal use, but these are determined by the conditions on the South West Integrated System (SWIS).

The primary requirement is that the selected Power Station is available to operate and can operate reliably at the peak periods of the year. Thus, in addition to the standard measures of rated capacity and annual average availability, Western Power also requires standards related to the number of unit trips, unit start failures and failure to meet dispatch instructions fully.

The Kemerton Power Station conducts, at its cost, tests of the capacity and other operating characteristics of the Power Station to ascertain whether the Power Station is capable of performing in accordance with the Plant Requirements. Tests will be conducted at least once every year and after each scheduled outage. Additionally, Western Power may also require a start test and capacity test before the peak seasons.

1.5 Approvals Process

Environmental approval for the proposal is required under the *Environmental Protection Act 1986.* No Commonwealth Government environmental approval is believed necessary.

1.5.1 Kemerton Strategic Environmental Review Background

Power procurement requires the establishment of new power generating facilities and in order to streamline and accelerate the Western Australian approval process, avoid community confusion arising from possibly many concurrent public assessments of power generating facilities and satisfy the projected commissioning date WPC opted to follow a two-stage environmental approval process:

- Stage 1: A Strategic Environmental Review (SER) of select sites, which included a SER for the Kemerton Power Station. The SER documents were prepared by Western Power and assessed by the EPA under Section 16(e) of the Environmental Protection Act 1986; and

- Stage 2 (this document): A detailed Environmental Review of the final development proposal at the selected site will be undertaken by the successful Bidder in accordance with Section 38 of the *Environmental Protection Act 1986.*

The objective of the Section 16(e) SER was to obtain advice and "in principle" approval prior to submission of final tenders, enabling full specification of environmental performance for the proposed power station in the tender process.

The Environmental Protection Authority (EPA) issued its advice (Bulletin 1067) in response to WPC's Strategic Environmental Review, and provided advice to the Minister for the Environment on any environmental constraints that may apply to the installation of power generation facilities at Kemerton, and the other sites.
The EPA's advice with respect to the Kemerton site as extracted from Bulletin 1067 is summarised in the Table 1 below. The extract of information on Kemerton from Bulletin 1067, as made available by WPC, is provided as Appendix 1.

TABLE 1
SUMMARY OF EPA SECTION 16(e) ADVICE FOR THE PREFERRED SITE AT THE Kemerton Industrial Park

Environmental Factor	Specific EPA Advice	Issue Addressed in Section
Vegetation	Removal of any native vegetation is minimised and offset measures applied; and Declared rare flora are managed in accordance with CALM's requirements.	Section 7.1.3
Specially Protected (Threatened) Fauna	Liaise with CALM in relation to management strategies.	Section 7.2.3
EPP lakes and other specially protected wetlands	Demonstrate that any impacts on wetlands are avoided or minimised.	Section 7.5.3
Rivers and ephemeral streams	N/A	Not Addressed
Greenhouse gas emissions	If the fuel source has a higher greenhouse gas intensity, such as coal, the EPA would expect the proponent to demonstrate appropriate measures to mitigate greenhouse gas emissions.	Section 7.4.3
Gaseous and particulate emissions	Ensure that the NO_x controls meet the requirements of EPA Guidance Statement 15 or any updates thereto.	Section 7.3.3
Noise	Enhanced noise attenuation measures are implemented to ensure the appropriate regulations are met.	Section 7.6.3
Marine ecosystems	N/A	N/A
Groundwater	N/A	Section 7.5.3
Risk and hazard	N/A	Section 7.10.3
Heritage issues	N/A	Section 7.9.3

1.5.2 Assessment on Referral Information (ARI)

This document has been prepared by TSKT to support the "Referral of a Proposal to the Environmental Protection Authority under Section 38(1) of the Environmental Protection Act" form.

Given the previous Strategic Environmental Review for the KPS undertaken by WPC and the limited number of significant environmental factors which can be readily managed by the proponent, it is believed that an *Assessment on Referral Information* may be applicable for this proposal.

1.5.3 Works Approval/Licensing

Following approval by the Minister for the Environment for the KPS Project, TSKT will be required to prepare a works approval application that incorporates the EPA's conditions for submission to and approval from the Department of Environment (DoE) for the construction of the power station.

The completed power station will be required to operate under a DoE Licence for prescribed premises. This licence is issued under Part V of the *Environmental Protection Act 1986.*

The proponents will also be required to obtain a Licence for the storage of dangerous goods (diesel fuel) issued under the *Explosives and Dangerous Goods (Dangerous Goods Handling and Storage) Regulations 1992* by the Department of Industry and Resources (DoIR).

1.5.4 Other Processes

TSKT will work with the Shire of Harvey to obtain the necessary municipal approvals required for the project such as:

- Certificate of Classification/ Building Licence under *Local Government (Misc. Provisions) Act 1960*, sect. 374C(5) and *Building Regulations 1989* Regulation 20(4)(5);
- Approval for the installation and operation of appropriate liquid waste treatment facilities; and
- Approval from Harvey Shire Council for disposal of waste during construction.

Other Licence or registration requirements include:

- Electricity Undertaking Approval (Generating Licence) under Section 7 of the *Electricity Act 1945*;
- Type "B" Gas Appliance for Gas Turbines from Office of Energy; and
- Work Place registration under *Occupational Safety and Health Act 1984* and Regulations 1996.

2. DESCRIPTION OF PROPOSAL

2.1 Description of the Plant

A listing of the key characteristics of the KPS is presented in Table 2. A preliminary site plan is illustrated in Figure 4.

TABLE 2
KEMERTON POWER STATION KEY PROJECT CHARACTERISTICS
(260.9 MW Open Cycle Peaking Plant)

Element	Description	
Project purpose	Provide peaking power to the SWIS	
Project life	25 years	
Power generating capacity	Nominal 260MW	
Energy generated per year	Approximately 240GWh	
Thermal efficiency At 40°C, 40% relative humidity, and 101.3kPa ISO conditions 15°C, 60% relative humidity	Natural gas 28.6% HHV 31.8% LHV[3] 30.2% HHV 33.5% LHV[3]	Liquid fuel 29.3% HHV 31.4% LHV[3] 30.9 % HHV 33.0% LHV[3]
Plant operating modes	Mode 1 - Peaking plant for 5% of the time at 100% load Mode 2 - Spinning reserve for 10% of the time at 55% load	
Operating hours	Approximately 1000 hours per year	
Estimated capacity factor	Approximately 10%	
Facility footprint Site area including buffer	2 hectares 28 hectares	
Plant facilities		
Proposed technology Number and size of gas turbines Number of stacks Height of stacks Number of liquid fuel storage tanks	2 x Siemens V94.2 gas turbine generators 2 x 130.5MW 2 35m 1 x 1.5ML tank	
Construction period	Approximately 16 months	
Inputs		
Cooling water	None	
General water requirements	20kL/day - For dust suppression during construction 30kL/yr - For domestic use	
Natural gas	Approximately 3PJ per year (approximately 900 hours per year) taken from the Dampier to Bunbury Natural Gas Pipeline	
Liquid fuel (Backup)	Up to 6 ML per year ultra low sulphur diesel (less than 100 hours per year) Sulphur content of diesel – 50ppm maximum	
Outputs		
Wastewater	None	
Solid waste	<10 tpa	

Element	Description	
Air emissions:	Natural gas (based on 900h per year at full load)	Liquid fuel (based on 100h per year at full load)
Oxides of nitrogen (NO_X)	<39.1 g/s (127 tpa)	<114.2 g/s (41.1 tpa)
Oxides of sulphur (SO_X)[1]	g/s (negligible tpa)	4.06 g/s (1.146 tpa)
Oxides of sulphur (SO_X)[2]	0.0 g/s (negligible tpa)	0.406 g/s (0.146 tpa
Particulate matter	2.0 g/s (6.48 tpa)	7.62 g/s (2.74 tpa)
Carbon monoxide (CO)	21.7 g/s (70.3 tpa)	20.9 g/s (7.54tpa)
Polycyclic aromatic hydrocarbons (PAHs)	0.00087 g/s (0.0028 tpa)	0.016 g/s (0.0057 tpa)
Non-methane volatile organic compounds (NMVOCs)	0.83 g/s (2.69 tpa)	0.16 g/s (0.058 tpa)
Greenhouse gas emissions	Approximately 160,000 tpa CO_{2-e} (Assuming approximately 900 hours per year operation on natural gas and 100 hours per year operation on liquid fuel)	
Average greenhouse intensity	667.6.1 kg CO_{2-e}/MWhr (Assuming approximately 900 hours per year operation on natural gas and 100 hours per year operation on liquid fuel)	
Predicted noise level	<28 dB(A) at closest residences	

Notes:
[1] Emissions modelling based on use of normal distillate (500 ppm sulphur content)
[2] Emissions modelling based on use of ultra low sulphur diesel (50 ppm sulphur content)
[3] Lower Heating Values (LHV) are manufacture guarantee values.

2.2 Power Station Operating Characteristics

The plant will operate as a peaking plant meeting the short durations where high demands occur. This equates to operating approximately 5% of the time when periods of high demand occur. For the KPS the plant will also operate in spinning reserve. This is when the plant is operating at very low load on gas in anticipation of the times when high demand is likely to occur. High demand occurs usually in summer when high temperature conditions give rise to high air conditioning loads.

The KPS will normally operate on natural gas. Ultra low sulphur diesel is used as a back up liquid supply. Approvals will be sought to use either fuel to provide redundancy in generating capability, and greater stability to the SWIS.

The dual fuel capability of this plant means that either fuel type can be used alternately. If natural gas supply pressure or gas availability from the pipeline is insufficient for the power station to operate at full output the station can switch to diesel without interruption to station output.
The following are the contracted plant performance targets:

- Guaranteed Performance = 248.3 MW
- Equivalent availability factor % = 97.0
- Thermal efficiency LHV% = 31.9% / 31.5% for gas/diesel @ 40 deg C and 40% Relative Humidity (RH)
- CO_{2-e} emissions (tonnes/ MWh sent out) = 0.6481 gas @40 deg C, 40% RH
  = 0.8431 diesel @40 deg C, 40% RH

Each of the two off-board combustion chambers is equipped with Hybrid Burners, Patent Award 1986, developed by Siemens Power Generation. The burners technology is called Dry Low NOx (DLN). The essential difference, compared to conventional burners, is the capability of achieving low NOx and minimal CO emissions without water or steam injection.

By employing hybrid burners, gas turbines fired with natural gas can be operated in the load range from 50% to 100% base load with very low NOx emissions. These extremely low emission values are achieved merely by applying primary control measures to reduce thermal NOx production.

- Minimum Guaranteed Load for DLN change-over on gas is 50% Maximum Continuous rating (MCR).

- Minimum Guaranteed Load for DLN change-over on liquid fuel is normally 50% MCR.

In order to comply with the Department of Environment's upper limit for NOx emissions on liquid fuel, Siemens have reduced firing temperature from 1060°C to 1030°C.

This DLN technology provides the least overall environmental impact, at a higher efficiency than similar wet combustion systems. The benefits are that the air emissions are reduced, and there is no need for water, nor is there any water treatment-plant or waste-water disposal required.

Schematics of end views and elevations of the power station are presented in Figures 5 and 6 respectively.

The unit's emission targets are outlined in the Table 3 below.

TABLE 3
PLANT AIR EMISSION TARGETS

Emission Target	
Natural Gas Operation at MCR, HWM conditions, corrected to 15% oxygen	
NOx:	< 25ppm
CO:	< 25ppm
Fuel Oil Operation at MCR, HWM conditions, corrected to 15% oxygen	
NOx:	< 73ppm
CO:	< 25ppm

2.3 Power Transmission

Electricity produced will be exported to the SWIS through a new 2km 330kV transmission line to an existing 330kV grid connection. The new transmission line is subject to a separate EPA application from WPC.

The power station can be dispatched either remotely from WPC dispatch centre located in East Perth or locally from power station control room.

The power station will be connected to 330kV network via a small 330kV substation that will be designed and built by WPC and will be located on the western side of the power station.

WPC and LandCorp as a part of land subdivision will provide a 22kv overhead line, also subject to a separate EPA application from WPC, to an on-site 600kVA transformer.

2.4 Services and Utilities

2.4.1 Gas Supply

The power station will be operated on natural gas supplied to the power station via Dampier to Bunbury Natural Gas Pipeline (DBNGP) which is located down the eastern boundary of the site. Due to the limited capacity of the pipeline (due to pipe diameter reduction south of junction MLV-154) a buried 5km long gas lateral will bring gas from junction MLV-154 located on the DBNGP pipeline to the gas gate station that will be constructed by the pipeline operator Epic Energy on the eastern boundary of the site. The delivery point for the gas will be located immediately downstream of the new gas gate station built on the power station land.

During periods when gas is not available the power station will operate on liquid fuel (ultra low sulphur diesel). The power station will be able to store 1.5ML of liquid fuel. The fuel supply will be guaranteed by a Fuel Supply Agreement with one of the major liquid fuel distributors.

2.4.2 Liquid Fuel Supply

The major plant items that will be installed as part of the Liquid Fuel Supply Agreement are:

- fuel storage tank with capacity of 1.5 ML;
- road tanker receiving facility with pumping rate to tank of 21,66 lpm;
- associated bunding;
- transfer pumps and pipework from tank to gas turbine injection pumps; and
- fire protection system.

2.4.3 Water

During construction, water will be required for dust suppression. Water will be trucked to site for this purpose. Water for amenities and potable water will also be trucked to site. Highest water use during construction will occur for approximately four months while the site works are underway for dust suppression. An estimated 20kl/day is required for dust suppression, depending upon ambient conditions. During the construction period of fourteen months, potable water will be required for drinking

and amenities use by the construction work force at a rate of approximately 750KL per year.

The open cycle peaking plant will not require water for its operation. The only water required would be raw water for the fire fighting system, potable water for the control room and other amenities and water for compressor blade cleaning.

Rainwater from the Office block roof shall be directed to the raw water storage facility. Raw water will be used for fire fighting and plant wash down. All machine wash down water will be collected separately and subsequently removed by licensed contractor for disposal.

Drinking water will be bottled water and water for amenities and ablutions will be trucked in. Trucked water for amenities allows a high turn over and maintenance of good quality water suitable for amenities.

The Kemerton Industrial Park may impose a requirement that all sites must have reticulated water in its subdivision application. This is not currently required.

Total water use during operations for the site is estimated to be 30 kL per year based on current power production projections. This is based on the following consumption:

- Potable and Amenities – 22 kL/year.
- Compressor Washing – 6 kL/year.
- General site use – 2kL/year.

2.4.4 Access Road

This is to be provided by dedicating the existing privately-owned haul road (the extension of Treasure Road) as a public road.

The Engineering, Design and Construction (EDC) Contractor will build an access road from the haul road to the power station.

2.5 Transport

During construction, traffic movements will consist mostly of private cars and light commercial vehicles. For several months from the beginning of the project, logging activities are anticipated to take place, and earth-moving activities will be undertaken to prepare the site and lay foundations. After this time heavy vehicle traffic will be at a minimum, with only six large transport movements delivering large plant equipment such as two generators and two gas turbines each of several hundred tonnes, and two step-up transformers.

Fuel tanker movement frequency during operations will depend on the consumption of liquid fuel.

TSKT has been advised that the minimum response time for the road tankers to be ready is 6 hours. Within the lead-time period, the Liquid Fuel Supplier can arrange for at least 3 pocket road trains (each with 70kL capacity) and 2 single barrel trucks (each with 35kL capacity) to commence operation. When operating at full load entirely on diesel the power station will require 80kL of fuel per hour.

After assessing the delivery distance, load times, unload times and mandatory driver breaks three trips would occur on the first day of operation on diesel and four trips per day on subsequent days if operation on diesel will be sustained.

2.6 Workforce

During construction the workforce will slowly build to a peak workforce of approximately 100 persons on site. Towards the end of the construction, as the commissioning phase begins, the workforce will decline.

When the plant is operating a workforce of only three people is expected on site demonstrating the highly automated nature of the plant.

2.7 Waste Management

2.7.1 Stormwater

Transfield will direct all rainwater from Turbine building roofs to soak wells.

2.7.2 Domestic Sewage

During construction worker amenities will include temporary sealed tank liquid waste and pump out systems. Given the depth to the water table and sensitivity of the surrounding area, it is anticipated that operational workforce requirements will be met by sealed tank liquid waste and pump out systems.

2.7.3 Solid Wastes

Small quantities of solid waste comprising principally building and packaging wastes will be produced during construction. These wastes will be recycled wherever possible. Wastes that cannot be recycled will disposed of to an approved off-site landfill facility. The Kemerton Landfill site abuts the southern edge of the Kemerton Industrial Park.

All solid waste (< 10 tpa) produced during operation will be disposed of at an appropriate landfill facility. Solid hazardous waste will be disposed of to suitably licensed waste disposal facilities.

2.7.4 Liquid Wastes

The operations on the site will be managed as zero discharge. Areas of potential contamination such as unloading station, fuel storage area, transformer area, etc will be fully bunded and sealed and water run off will be routed to an oily water separator. All oily waste and recovered oils will be collected by a waste oil recycling company.

2.8 Development and Commissioning Strategy/Timeframe/Project Life

The construction is scheduled start in August 2004 with expected completion of commissioning by 31 October 2005.

2.9 Sustainable Energy

According to the "Hope for the Future: The Western Australian State Sustainability Strategy" (Government of Western Australia, 2003) the long-term goal for sustainable energy use in Western Australia depends on encouraging and facilitating movement away from our reliance on combustion of fossil fuels to practices that conserve energy and encourage the use of more benign alternative forms of energy, including renewable energy.

In the short-term, one of several important initiatives within the energy portfolio that has the potential to lead to a more sustainable outcome in the development of our energy systems is the public power procurement process to facilitate the replacement of old inefficient electricity generators in regional areas of the State with new, cleaner and more efficient technologies at the most economic price (Government of Western Australia, 2003).

The EPA's Preliminary Position Statement No. 6 "Towards Sustainability" (2002a) also discusses the issue of sustainability and energy. The EPA discusses sustainability and energy in the context of greenhouse gas emissions and concludes that meeting any realistic Australian emissions targets will involve a gradual move away from conventional coal-fired electricity to less carbon intensive forms of energy, such as the direct use of natural gas. Kemerton Power Station is evidence of this trend towards lower carbon intensive power generation.

3. DESCRIPTION OF EXISTING ENVIRONMENT

The existing environment of the overall Kemerton Industrial Park (core and buffer) has been extensively described in the Kemerton Power Station Strategic Environmental Review (Western Power Corporation, 2002) and therefore the following descriptions will be predominantly restricted to the power station site and its immediate surrounding area.

3.1 Physical Environment

3.1.1 Climate

The Kemerton Industrial Park experiences a Mediterranean type climate characterised by hot dry summers with high evaporation and cool wet winters during which much of the rainfall occurs. Although temperatures are high in summer, they are lower than inland areas due to local onshore breezes. The evaporation and rainfall control seasonal fluctuations in the water table aquifer.

Rainfall

The average annual rainfall for the Kemerton Industrial Park is approximately 830mm, with almost 80% of the rainfall recorded between May and September (Aquaterra, 2002).

Wind

Winds in the Kemerton area are determined largely by the locations of the sub-tropical high-pressure ridge and the migratory low-pressure systems (extra-tropical cyclones) which exist on the poleward side of the ridge.

In summer, morning winds blow predominantly from the south east or east, usually at 11 – 20km/hr, and swing to the west in the afternoon, usually at 21 – 30km/hr. Winter morning winds may occur from any quarter but predominantly from the north and north east, up to 20km/hr. In the afternoon they tend to swing to the north, north west and west, usually over 10km/hr and frequently over 20km/hr (WPC, 2002).

3.1.2 Topography and Landform

Two main topographic features dominate the landscape around the Kemerton Industrial Park. These are a north – south running dune of up to 45m above Australian Height Datum (AHD) bounding the western edge of the industrial core zone; and a gently undulating plain about 15m AHD dominating the industrial core zone and eastern buffer zone. This plain rises slightly in elevation towards the east close to the Wellesley River, up to approximately 20m AHD.

A small part of the Kemerton Industrial Park (mostly on the far eastern boundary of the Park) occurs on the Pinjarra Plain landform system. The Pinjarra Plain landform is basically an alluvial plain, consisting also of river terraces and stream deposits (at the same level as the plain), swamps and drainage areas. The soils are moderately to

poorly drained sandy clays (duplex soils), mainly of alluvial origin, as well as uniform fine textured soils with a clay surface. Most areas of the plain have poor natural drainage because of the flat topography and predominantly duplex soils, which give rise to perched water tables in winter. The highly productive well-drained soils are adjacent to the major rivers, either on the higher or lower terraces.

The power station site is located within a low-lying area, less than 15m AHD. This site lies within the gently undulating plain within the north eastern area of the expanded industrial core (WPC, 2002).

3.1.3 Hydrology/Wetlands

The following description of the hydrology for the Kemerton Industrial Park has been extracted from the Kemerton Water Study Phase 2 (Aquaterra, 2002).

The Kemerton Industrial Park generally has low topographic relief, apart from a ridge aligned in a north-south direction on the central-west side of the Park. The major surface drainage feature around the Park is the Wellesley River, which forms the eastern and south eastern boundaries of the Kemerton Industrial Park.

Due to the low topographic relief, parts of the Kemerton Industrial Park are seasonally inundated, especially on the east. A number of artificial drains have been constructed in the area to drain (multiple use) wetlands and cleared palusplain. These drains generally flow to the east and south, discharging into the Wellesley River.

The are a number of permanent and seasonal wetlands in the eastern half of the Park. The Benger Swamp is the largest wetland in the area and lies approximately 2km west of the Wellesley River.

Water quality in the wetlands will be dependent on hydraulic connection to groundwater and the concentration of salts through evapotranspiration processes. The water table occurs very near to the surface all year round in the eastern part of the Kemerton Industrial Park.

Although there are no wetlands of significance within the Kemerton Power Station site there are conservation category wetlands to the north (Conservation Category). and south of the site. The management of potential impacts on this wetland, which may occur as a result of the power station, is discussed in Section 7.5.3.

3.1.4 Hydrogeology

The following description of the hydrogeology for the Kemerton Industrial Park has been extracted from the Kemerton Water Study Phase 2 (Aquaterra, 2002).

The superficial formation aquifer is an anisotropic unconfined aquifer with a saturated thickness of approximately 20m to 40m. It consists predominantly of clay and sand in the east and sand and limestone in the west. The transmissivity generally increases from east to west and ranges from 50 to 1150 m^2/d. Topography, drainage and surface geology influence the hydrogeological regime of the superficial formation, giving rise to the potential for groundwater mounding to occur in areas of high relief.

The Kemerton area lies within the Myalup groundwater flow system. A low mound (Mialla Mound), centred on and to the north of the Estate has formed in the water table and locally modifies groundwater flow directions.

The aquifer is recharged by rainfall but a large proportion of the infiltration is lost due to evapotranspiration processes from the wetlands and areas where the water table is at a shallow depth. Recharge rates have been estimated to be higher in the central part of the coastal plain than in the east or west because of low clay content, shallow water table and low topographic gradient. Estimates of groundwater recharge for the area range between 25% and 60% of annual rainfall. The predominance of downward head differences in nested monitoring bores indicates that regular recharge occurs throughout the area. Pumping in areas of shallow water table has been identified as a way of increasing the renewable groundwater resource, as it would induce greater recharge and substantially reduce local discharge losses by evapotranspiration. However, there could also be environmental impacts associated with implementation of this approach.

Groundwater flow is generally westwards from the Darling Scarp, and seasonal variations in the water table are in the order of 1 to 2m. Variations in water level can usually be correlated with variations in rainfall. The presence of wetlands, drains and lakes complicates the groundwater flow regime. The hydraulic gradient is relatively steeper to the west, towards the ocean, and is low in the central part of the coastal plain. Groundwater discharges locally to watercourses, swamps and wetlands (including Myalup Swamp), the Wellesley River, Leschenault Inlet, to the Leederville Formation and to the Indian Ocean across a saline interface. Inflow into the superficial formation also occurs from the Leederville Formation and from the Harvey River Diversion Drain. In the Kemerton area, estimated groundwater throughflow (Myalup flow system) to represent 7-17% of the potential rainfall recharge to the superficial aquifer.

Groundwater to the west of the Wellesley River is generally fresh to marginal (250 to 1,500mg/L TDS) and to the east, it is generally brackish. In local discharge areas west of the Wellesley River, the salinity can be as high as 20,000mg/L TDS. Fresh groundwater (< 500mg/L TDS) is generally more extensive at the water table than at the base of the aquifer. The groundwater salinity generally increases in the direction of groundwater flow but there are significant local variations due to variations in permeability, irrigation, evapotranspiration process and leakage from the Guildford Clay. A saline interface is present along the western boundary of the aquifer at the coast.

Leederville Formation

The Leederville Formation is recharged mainly by downward leakage from the superficial formation. There is a vertical head difference of about 8m between the Superficial and Leederville Formations in the southern part of the Estate. This indicates downwards leakage from the superficial aquifer into the Leederville Formation. Upwards leakage from the Yarragadee Formation to the Leederville may also occur in some areas. The main recharge area around Kemerton for the Leederville aquifer is between the Wellesley River and Myalup Swamp, where there

is a downward vertical gradient and the overlying superficial formation is predominantly sand.

Regional groundwater flow is westward, discharging offshore. Discharge is also likely to occur through upward leakage into the superficial formation between Myalup Swamp and the saline interface closer to the coast. Artesian flows may be encountered in the low-lying area west of Myalup Swamp. The hydraulic gradient is low and seasonal variation in potentiometric head is of the order of 0.5m. Exploratory drilling for industries within the Estate indicated an aquifer transmissivity of about 400m^2/d.

Water is freshest (850 to 1,500mg/L TDS) between the main recharge area and the saline interface near the coast. The remainder of the aquifer is brackish to saline (1,500 to 19,000mg/L TDS). The saline interface is estimated to occur at around 45m depth in the Leederville (below the base of superficial formation) at a distance of between 1km and 2km inland from the coast.

Cattamarra Coal Measures

The Cattamarra Coal Measures (CCM) (formerly known as Cockleshell Gully Formation) is a confined multilayered aquifer composed of siltstone and shale interbedded with sandstone. Based on groundwater salinity, the formation is divided into two parts separated by a shale layer - an upper sequence containing fresh groundwater and a lower sequence containing brackish groundwater. From monitoring bores on the Binningup Line, potentiometric heads in the CCM are higher than those in the Leederville Formation. This indicates that recharge by downward leakage probably does not occur around the Binningup Line, although it could occur further to the north. Recent test bore drilling has indicated that static water levels in the upper part of the CCM at Kemerton are about 6 to 7m higher than in the lower part of the CCM. This indicates a potential restriction of groundwater flow between the lower and upper parts of the CCM. The natural seasonal variation in potentiometric head is of the order of 0.5m, and artesian flows may be encountered in low lying areas near the coast. Exploratory drilling by Rockwater for industries within the Estate estimated an aquifer transmissivity of 400 to 1500m^2/d.

The groundwater salinity ranges between 2,510 and 26,100mg/L TDS. The active flow system in the west contains brackish groundwater (2,500 to 7,000mg/L TDS) and the remainder of the aquifer is saline. The salinity levels are probably a reflection of the distance from recharge and the low permeability of the sediments. In the Kemerton area, the salinity in the CCM is brackish (<3,000mg/L).

3.1.5 Geology/Soils

The geology of the Kemerton region was mapped in 1979 at 1:50,000 scale as part of the Geological Survey of Western Australia Urban Geology series. The information presented in this section is derived from the Harvey (2031-Lake Preston) sheet.

The Bassendean Dune system which occupies the area of the Kemerton Industrial Park east of the ridgeline, forms a gently undulating to rolling landscape with broad very low rises rarely more than 20m above mean sea level and intervening low-lying

poorly-drained areas. The Bassendean sands are typically fine to medium grained and have low fertility and water holding capacity. There is an extensive mosaic of seasonal wetlands within this system, in the zone immediately west of the Wellesley River.

The Bassendean sands vary in thickness from low rounded dunes (up to 15m thick) to a thin veneer (usually 2 – 5m thick). The sands are typically fine to medium grained, well drained grey to off-white in colour at the surface and pass though cream to yellow layers at depth. They are indistinguishable from the sands of the Spearwood System and mostly defined by the older age reflected in the more deflated physiography.

The Bassendean sands overlie the Guildford Formation, which is a more clay-based sediment formed of sandy and silty clays through to clayey sands with some semilithified lateritised clay. This unit is less permeable than the overlying Bassendean and a perched water table in the overlying sands may form springs at the edge of the dunes. The Guildford Formation may be waterlogged in winter. Where the Guildford formation is coarser and better drained it is used extensively for horticulture and vegetable gardens.

The Guildford Formation encroaches on the eastern boundary of the Kemerton Industrial Park. The soils are moderate to poorly drained sandy clays mainly of alluvial origin as well as uniform fine textured soils with a clay surface.

The power station site is located within the Bassendean System. The major soil types in the area are Bassendean sands overlying the clayier Guildford Formation. To the south of the site there are some swamp deposits and to the north east lies the Guildford Formation.

3.2 Biological Environment

3.2.1 Vegetation/Flora

A detailed spring flora and vegetation survey was carried out at the proposed power station site from the 10th to 11th of October 2002 (see Appendix 2). The results of this survey are summarised below.

Flora

The entire area of the power station site is currently under blue gum (*Eucalyptus globulus*) plantation (Figure 7).

As the vegetation did not appear to warrant more systematic survey, the blue gum plantation area now proposed for construction was only traversed for weed and threatened flora species.

No flora species of conservation significance were recorded from the blue gum plantation and the preliminary assessment of the plantation area was confirmed. All flora and vegetation types of significance identified during the survey were restricted

to the remnant habitats of the southern portion of the 28ha lot considered for the power station site.

No Declared Rare Flora or priority species were located within the area of power station site.

Weeds

Several species or environmental weeds were recorded from a damp drain through the middle of the plantation, including **Acetosella vulgaris,* Couch **Cynodon dactylon* and Mallow **Malva parviflora.* Annual grass weeds Barley grass **Hordeum leporinum*, Annual veldt grass **Ehrharta longiflora* and Wild oats **Avena barbata* were common on disturbed areas and bushland margins.

One species of Declared Plant under the *Agriculture and Related Resources Protection Act 1976* the Narrow leaved cotton bush ****Gomphocarpus fruticosus*** was recorded in the power station site.

This species is a P1 and P4 Declared Plant for the City of Bunbury and Harvey Shire and surrounding areas. P1 are those species for which 'The movement of plants or their seeds is prohibited within the State'. P4 are those plants for which the 'Aim is to prevent infestation spreading beyond existing boundaries of infestation'. This species was recorded at the western end of the study area near the drain that runs through the centre of the Blue Gum plantation.

A discussion in relation to the management of vegetation and weeds can be found in Section 7.1.

3.2.2 Fauna

As part of the overall environmental assessment of the proposed power station, a Spring Fauna Survey of the 28ha site was undertaken in October 2003 (see Appendix 3). A summary of the results is provided below.

The aims of the fauna survey were to:

- assess the terrestrial fauna in the proposed development area; and
- assess the potential for rare or threatened species to be present.

No Priority or Schedule fauna were trapped or observed in the study region.

Avifauna

Seventeen species of birds were observed in the study area (Table 4). This was significantly lower than the expected number of species for the region. Active drilling and truck activity in the nearby area (less than 100 m away) likely reduced birds in the survey area.

TABLE 4
AVIFAUNA FOUND IN THE STUDY AREA

Species	
Nankeen Kestrel	*Falco cenchroides*
Australian Ringneck	*Barnardius zonarius*
Southern Boobook Owl	*Ninox novaeseelandiae*
Laughing Kookaburra	*Dacelo novaeguineae*
Splendid Fairy-wren	*Malurus splendens*
White-browed Scrubwren	*Sericornis frontalis*
Yellow-rumped Thornbill	*Acanthiza chrysorrhoa*
Red Wattlebird	*Anthochaera carunculata*
Singing Honeyeater	*Lichenostomus virescens*
Rufous Whistler	*Pachycephala rufiventris*
Magpie-lark	*Grallina cyanoleuca*
Australian Magpie	*Gymnorhina tibicen*
Grey Currawong	*Strepera versicolor*
Australian Raven	*Corvus coronoides*
White-breasted Robin	*Eopsaltria georgiana*
Scarlet Robin	*Petroica multicolor*
Silvereye	*Zosterops lateralis*

Reptiles and Amphibians

Four species of reptiles and amphibians were trapped in the study area (Table 5). No additional species were captured by hand searches.

TABLE 5
REPTILES AND AMPHIBIANS FOUND IN THE STUDY AREA

Species	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Site 8
Heleioporus eyrei	2	3	6	3	2		2	2
Hemiergis quadrilineata		1	1	1				2
Morethia obscura				1		1		1
Tiliqua rugosa				1				

Mammals

No mammals were trapped and only the Western Grey Kangaroo (Macropus fuliginosus) and Rabbit (Orcyctolagus cuniculus) were observed in the area. Tracks of cats (Felis catus) and foxes (Vulpes vulpes) were also located.

A discussion relating to the management of fauna is discussed in Section 7.2.3.

3.3 Aboriginal and European Heritage

As identified in the Kemerton Strategic Environmental Review (Water Corporation, 2002) the site at Kemerton has been subject to surface disturbance through clearing, grazing and tree planting.

The Strategic Environmental Review has indicated that fifteen Aboriginal sites are located within a 5km radius of the proposed development.

As part of the overall environmental assessment of the proposed power station, a Heritage Survey of the 28ha site was undertaken in October 2003 (see Appendix 4). No sites of significance have been identified in the power station site.

A summary of the results is provided in Section 7.9.2.

4. REGIONAL SOCIO-ECONOMIC ENVIRONMENT

4.1 Demographics

The Kemerton Industrial Park is the largest industrial estate in the South West and is one of Western Australia's strategic industrial areas. Planning of the Industrial Park has been ongoing since the mid-1980s.

The Park is located immediately east of the Leschenault Estuary and the Australind townsite and west of the Wellesley River. The Old Coast Road, a major route connecting Bunbury to Perth, abuts the western boundary of the Park and separates the Park from the nearest townsites. The Park is also serviced by a 330kV power grid and a gas pipeline (DPNGP).

The Western Australian Government has purchased all of the land within the core of the Park with the exception of two lots. The Kemerton Industrial Park managers have indicated their desire to continue negotiating to purchase these lots.

4.2 Existing Industry within the Kemerton Industrial Park

All existing industries within the Kemerton Industrial Park are located off Marriott Road (Figure 2). The two main industries in the Park are Millennium Inorganic Chemicals (MIC) and Simcoa Operations. There are also a number of ancillary industries (BOC Gases, Nufarm-Coogee and Cockburn Cement) that support the operations of MIC. A brief description of each is given below.

Millennium Inorganic Chemicals Ltd (MIC) - operates a titanium dioxide plant and is the largest industry in terms of water requirements and wastewater discharge.

Simcoa Operations Pty Ltd - operates the only fully integrated silicon metal production plant in the world. The industrial site consists of a sawmill, two charcoal retorts, two submerged arc electric furnaces, a filter house and product packaging and dispatch facilities. Raw materials used by the plant include low ash charcoal and quartzite.

British Oxygen Corporation (BOC Gases) - operates an air separation plant. The plant was commissioned in November 1988 to supply MIC with their oxygen and nitrogen requirements. The plant processes air by removing dust, moisture and carbon dioxide, before cooling down the process and producing oxygen and nitrogen.

Nufarm-Coogee Pty Ltd (Nufarm) - operates a chlor-alkali plant on a site immediately adjacent to the eastern boundary of MIC's plant site. Some process chemicals used by MIC are sourced from Nufarm's chlor-alkali plant.

Cockburn Cement - operates a lime slaking plant, supplying slurry lime for MIC's operations. The process involves hydration of the lime to slurry, which is then pumped to the MIC site.

In addition to the above, Kemerton Silica Sands operates a sand mining operation just north of the Kemerton Industrial Park. The company mines silica sand, which is exported for glass making. The mining comprises a dredging operation from which sand is pumped to a processing plant, which grades and separates heavy minerals, by an electromagnetic process.

5. COMMUNITY CONSULTATION

5.1 Introduction

An essential feature of any major proposal is the need to consult and address relevant issues with the wider community. TSKT has recognised the importance of keeping the residents of Kemerton, Australind and surrounding areas, businesses, landowners, local authorities and interest groups fully informed about the proposed Kemerton Power Station. A targeted public consultation process has been undertaken to ensure these groups and individuals have the opportunity to comment on any aspect of the project. This pro-active approach to community consultation has provided opportunities for public awareness and comment.

The consultation process has proved to be very effective in developing a more environmentally sound project with broader community acceptance.

5.2 Consultation Activities Undertaken

Discussions and communications offered during the consultation process have provided a substantial amount of information on potential environmental and social issues of concern to the community and decision-making authorities. The cooperation and input of these individuals and organisations is gratefully acknowledged.

5.2.1 Stakeholder and Decision Making Authorities Meetings

Meetings were held with representatives of a variety of key stakeholders to discuss the project to gain comments from the stakeholders. Representatives of Transfield Services Kemerton Trust attended the meeting of the combined Kemerton Industrial Park Coordinating Committee and Kemerton Industrial Park Community Committee.

Targeted meetings to inform stakeholders of the proposed power station were held during the last two weeks of October 2003 with the following stakeholder groups:

- Shire of Harvey (31 October 2003)
- LandCorp (31 October 2003)
- CALM (24 October 2003, 6 November 2003)
- Department of Industry and Resources (31 October 2003)
- Main Roads – Bunbury (24 October 2003)
- Department of Environment – Bunbury (24 October 2003)
- Kemerton Industrial Park Coordinating Committee (31 October 2003)
- Kemerton Industrial Park Community Committee (31 October 2003)
- South West Chamber Of Commerce (31 October 2003)
- South West Development Commission (31 October 2003)
- Kemerton Silica Sands Pty Ltd (6 November 2003)

In summary, issues discussed with stakeholders included:

- an overview of Transfield Services Kemerton Trust;
- objectives and benefits of the proposal;

- project description;
- environmental issues and management; and
- implementation schedule.

5.2.2 Newspaper Advertisements

Project information and details of the Public Information Display were advertised in the *Bunbury Herald,* the *Harvey Reporter* and the *South Western Times* newspapers. These papers have a regional circulation of about 40,000. Advertisements in the Community newspapers included full-page descriptions and maps.

5.2.3 Public Information & Display

A Public Information Display was held on the 24 and 25 October 2003 in the Australind Shopping Centre. Opening hours on the 24 October were 9.00am to 9.00pm and on the 25 October 9.00am to 5.00pm. The event sought to provide an overview of the project to the general public in an informal setting. Project environmental team members were available to discuss aspects of the project with interested people.

A two-page leaflet describing this project was provided during the Public Information Displays. The leaflet provided a summary of the proposed project and provided advice in relation to the public information and display events to follow and provided contact details for further information/comments. A two-week public comment or submission period closed on the 5 November 2003. At the end of this period no further comments or submissions were received.

The display provided specific information for the public, including:

- overview description of the project;
- proposed location and structure plan for development; and
- description of project design to mitigate impacts.

An attendance and comment record sheet was established to assist in recording public views and suggestions to be later considered in refining the project. Seventy-three attendees provided comments. The record sheet also served to provide a contact list to provide specific feedback if requested to the public as the project progressed.

On completion of the Public Information Display in the Australind Shopping Centre the display was moved to the Public Library in Australind where it was displayed for a two-week period from the 25 October – 7 November 2003.

5.2.4 Environmental Consultations

Meetings or information have been provided to the following organisations:

- Leschenault Inlet Management Authority (LIMA) (meeting – 24 October 2003);
- Conservation Council of Western Australia (information sent 24 October 2003); and

- South West Environment Centre (information sent 17 October 2003).

5.2.5 Government

The following Members of Parliament have been provided with a briefing (either documentation and/or a meeting) regarding the proposed power station:

- Hon. J. Cowdell (MLC)
- Mr B. Masters (MLA)
- Hon. Dr. C. Sharp (MLC)
- Mr M. Murray (MLA)
- Mr J. Bradshaw (MLA)
- Hon. B. House (MLC)
- Mr A. Dean (MLA)

5.2.6 Discussions with Private Landowners within the Kemerton Industrial Park

Information briefings have been provided to Mr Peter Wine; and Mr Lyndon Edwards being the two private landowners in the Kemerton Industrial Park.

5.3 Summary of Issues Raised during Consultation

A brief overview of the comments received during the consultation is presented below in Table 6 and is further discussed in Section 6.

TABLE 6
COMMENTS DURING INITIAL CONSULTLATION

Stakeholder	Flora and Vegetation	Fauna	Air Emissions	Noise and Vibration	Heritage	Transport	Surface and Groundwater	Solid and Liquid waste	Visual amenity	Public Safety
Community Members	X	X	X	X						
Private Landowners			X	X					X	X
Members of Parliament				X						
Shire of Harvey				X						
DoE			X				X			
DoIR							X			X
CALM										
LIMA							X			
Conservation Council of WA										
SW Environment Centre										

Stakeholder	Flora and Vegetation	Fauna	Air Emissions	Noise and Vibration	Heritage	Transport	Surface and Groundwater	Solid and Liquid waste	Visual amenity	Public Safety
Kemerton Industrial Park Community Committee			X	X						
Kemerton Industrial Park Coordinating Committee				X			X			

The response of Transfield to these comments is presented in section 8.

6. IDENTIFICATION OF ENVIRONMENTAL FACTORS

Following it's review of Strategic Environmental review for the Kemerton Power Station, and in consideration of appropriate references, public and government submissions and the proponent's response to submissions, the EPA determined that the following strategic environmental factors are relevant to the proposal (EPA, 2002):

- Terrestrial Flora and Vegetation;
- Specially Protected (Threatened) Fauna;
- Surface and Groundwater Quality;
- Gaseous and Particulate Emissions;
- Greenhouse Gas Emissions;
- Noise and Vibration;
- Hydrocarbons and Hazardous Materials;
- Aboriginal Heritage; and
- Public Safety.

The following environmental factors were not considered by the EPA to be relevant given the nature of the proposal and proposed management measures to be implemented.

- Dust;
- Waste;
- Social and Economic Issues;
- Visual Impact; and
- Transport.

Notwithstanding, this referral document addresses these issues in light of information currently available under the present proposal.

Potential impacts on marine ecosystems was deemed to be a relevant factor by the EPA given the original proposal to construct a wastewater pipeline and to discharge effluent via an ocean outfall facility. The power station proposed as part of this referral will not require any water for cooling or injection purposes. Accordingly, as no pipeline is required, Marine Ecosystems are not considered to be a relevant factor in the current proposal.

The following table (Table 7) summarises the key environmental factors applicable to the current proposal, the environmental objectives for each factor, project characteristics that contribute to potential environmental impacts, proposed management and mitigation measures that will be implemented to address these impacts, and the predicted environmental outcome.

TABLE 7
SUMMARY OF IDENTIFICATION OF KEY ENVIRONMENTAL FACTORS & PROPOSED MITIGATION AND MANAGEMENT STRATEGIES

Environmental Factors	EPA Objective	Proposal Characteristics	Potential Environmental Impacts	Mitigation and Management Strategies	Predicted Outcome
Biophysical					

Terrestrial Flora and Vegetation	To maintain the abundance, species diversity, geographic distribution and productivity of vegetation communities.	The KPS footprint will occupy 2ha of a dedicated 28ha site within the Kemerton Industrial Park. Up to 15ha of *E globulus* cultivated plantation will be removed during the construction of this proposal. 10ha will be used only during construction.
		
		A spring survey for DRF and Priority Flora has been undertaken and indicated that no populations of DRF are present on the power station site.
		
		Whilst no priority flora were identified in the Spring Survey on the site, two priority flora ***Acacia semitrullata*** **(Priority 3 Flora)** and ***Jacksonia sparsa*** **ms (Priority 4 Flora)** were identified in the vicinity.
			The proposed KPS layout would result in the clearing and subsequent re-planting of all or part of about 10ha of *E globulus* plantation used during construction.
			
			Fragmentation of habitats may occur due to the construction of the gas pipeline and establishment of overhead transmission cable corridors.
			
			A spring survey for DRF and Priority Flora has been undertaken and indicated that no populations of DRF or Priority flora will be impacted by the construction of the power station.
			
			As the proposed design is open cycle and no water is used, no removal of vegetation for construction of the wastewater treatment system or a wastewater disposal pipe will be required.
			
			There remains the potential for the spread of weeds and dieback during construction.
				No removal of native vegetation will occur because of the construction of the power station, consistent with the EPA, Guidance Statement. All disturbance of native vegetation on the south of the site will be avoided.
				
				The footprint area occurs entirely within an existing Blue Gum plantation.
				
				Recommendations to locate the KPS more fully within the Blue Gums plantation have been accommodated, avoiding impacts on the Priority Flora and DRF.
				
				The following mitigation measures are proposed to limit impacts during construction and operation:
				• Implementation of the Contractor's HSE Management System on all facets of the development; and
				• Develop and implement a Construction Environmental Management Plan (CEMP) including but not be limited to a Flora Management Plan including but not limited to the following aspects:
				  • Site Rehabilitation Plan;
				  • Dieback Hygiene Plan;
				  • Weed Management and Control Plan.
					It is considered the minimisation of direct losses of Terrestrial Flora and disturbed vegetation located within an existing cultivated Blue Gums plantation and implementation of the CEMP will ensure the EPA's objective in relation to this factor can be met.

Fauna (Specially Protected (Threatened) Fauna)	Protect Specially Protected (Threatened) Fauna species and their habitats, consistent with the provisions of the *Wildlife Conservation Act 1950.*	Up to 15ha of *E globulus* plantation will be removed during implementation of the proposal. Further disturbance may occur because of the construction of linear infrastructure such as gas pipelines and power transmission cables. Based on a review of existing literature, six species of listed fauna and eight species of Priority fauna could potentially occur near the plant site. A spring fauna assessment, including trapping has been undertaken and confirms the generally degraded and highly modified nature of the Blue Gums plantation proposed as the site. No scheduled or priority fauna species of significance was found on the proposed site during the survey.	Removal of vegetation will affect its dependant fauna, resulting in direct loss of individuals and potential impacts on the species. Mobile species may be forced to move to less disturbed areas. Linear infrastructure such as power transmission lines or gas pipelines may fragment fauna populations. Removal of habitats in areas required for the plant, such as gas pipeline and transmission infrastructure, will be the subject of a separate referral.	Disturbance of remnant flora and accordingly their dependant fauna has been reduced as far as possible in site selection. Implementation of the Contractor's HSE Management System and the Operator's HSE on all facets of the development will ensure management to an acceptable standard. Even though habitat removal for gas pipeline and transmission infrastructure is subject for separate referral, design strategies have already been implemented to minimise impacts on site. Gas pipelines follow existing gas pipeline routes and the transmission grid connection is now located 5km from the site. Low voltage lines for construction power and station power during operations follow existing road easements. The following additional mitigation measures are proposed to limit impacts during construction and operation: • Development and implementation of an EMP for operations; • Implementation of the Contractor's HSE Management	It is considered the avoidance of direct losses of terrestrial flora and accordingly their dependant fauna through location within an existing cultivated Blue Gums plantation will ensure the EPA's objective in relation to this factor can be met.

Environmental Factors	EPA Objective	Proposal Characteristics	Potential Environmental Impacts	Mitigation and Management Strategies	Predicted Outcome

				System on all facets of the development;
				• Develop and implement a CEMP including but not be limited to a:
				  • Fauna Management Plan;
				  • Flora Management Plan (including clearing procedures); and
				  • Noise Management Plan.
				• Development and implementation of an EMP for operations.	

Air Quality - Gaseous and Particulate Emissions	To ensure that best practicable measures are taken to minimise discharges of gaseous and particulate emissions to the atmosphere. To protect surrounding land users such that gaseous and particulate emissions (including dust) will not adversely affect their welfare and amenity or cause health problems. To ensure that conditions which could promote the formation of photochemical smog are managed to minimise the generation of smog and any subsequent impacts.	Industrial sectors dominate sulphur dioxide emission, and significantly contribute emissions of dust and oxides of nitrogen. This contribution is caused by the combustion of heavy fuel, and diesel, although in WA natural gas is rapidly becoming the fuel of choice to minimise these impacts. During operation, atmospheric emissions of significance include NOx, SO_2 (when operating on liquid fuel) and to a lesser extent particulates and unburnt hydrocarbons. There are a number of industries within the Kemerton Industrial Park that are minor emitters of NOx, SO_2 and particulates. Outside the Park, there are only small emitters in the region apart from the two Alumina Refineries, which are locatedover 30km away. Air modelling determined that combined emissions from operation of the proposed power station (using gas and liquid fuel respectively) and existing industries will result in ambient concentrations outside the Kemerton buffer zone as follows: • NOx (max 1-hour ave) – 3.3% and 6.9% of NEPM criteria • SOx (max 1-hour ave) - 0% and 14% of NEPM criteria • Particulates (max 24-hour ave) - 1% and 1% of NEPM criteria	Impacts from regional sources are relatively small. Air quality modeling for NOx, SOx and particulates arising from operation of the proposed power station has been undertaken, and the results added to emissions from existing Kemerton sources. Worst-case modeling (continuous operation on liquid fuel under worse case local meteorological conditions) indicates emissions will at all times be well within the NEPM criteria for all parameters modeled. Sulphur dioxide (SO_2) is a colourless gas. It reacts on the surface of a variety of airborne solid particles, is readily soluble in water and can be oxidised within airborne water droplets. High concentrations of SO_2, together with suspended particles have been implicated in major smog events. There is evidence that some species of plants are affected by SO_2. NO_2 is a reddish-brown gas. It is a strong oxidant and soluble in water. Young children and asthmatics are the groups at greatest risk from ambient NO_2 exposures. Other environmental effects of NO_2 and NO_x compounds can include increased acidic deposition and vegetation effects. Particulate matter is a complex mixture of organic and inorganic substances, present in the atmosphere as both liquids and solids. Fine particulates in particular can be injurious to health.	TSKT will install dry low NOx burners on gas turbine units. Acceptance testing of emissions will be undertaken during commissioning, and repeated at regular intervals during normal operation as identified by the DoE, including during liquids operation. The plant operates predominantly on gas and ultra low sulphur diesel fuel is proposed as a back-up fuel for occasions where gas pipeline pressures in the area are too low to use. Development and implementation of an EMP for operations.	It is considered the measures identified will reduce air emissions arising from the operation of the plant to within NEPM criteria and be managed to meet the EPA's objective in relation to this factor.
Construction Dust	To protect the surrounding land users such that dust emissions will not adversely impact upon their welfare and amenity or cause health problems and meet the requirements in EPA Policies, Guidelines and Criteria for EIA No 18, *Air Quality Impacts from*	The air emissions of significance during construction is dust. There are at present no sources of dust at the site, however up to 15 Ha may be disturbed during the construction period, with resulting potential for dust generation. The nearest dust sensitive premises are located about 1.8km from the development site.	Dust emissions arising from construction activities may have the potential to adversely affect human health, visual amenity, and the surrounding vegetation and fauna. The generation of dust during construction also has a nuisance value.	The following mitigation measures are proposed to limit dust impacts during construction and operation: • Implementation of the Contractor's HSE Management System on all facets of the construction; • Application of EPA Policies, Guidelines and Criteria for EIA No. 18, *Air Quality Impacts from Development Sites* during construction of the plant; and • Produce a Dust Management Plan as a component of	Given the distance to dusts sensitive premises and measures identified to reduce or control construction dust in the Dust management Plan, it is believed this factor can be managed to meet the EPA's objective.

Environmental Factors	EPA Objective	Proposal Characteristics	Potential Environmental Impacts	Mitigation and Management Strategies	Predicted Outcome
	Development Sites.	During operations, the rehabilitated site should produce no dust sources.		the broader CEMP.	
Greenhouse Gas Emissions	To ensure that potential greenhouse gas emissions emitted from proposed projects are adequately addressed and best practicable measures and technologies are used in Western Australia to minimise Western Australia's greenhouse gas emissions.	Gas will be the major fuel used. Ultra low sulphur diesel will be available as back-up fuel if gas pipeline pressures in the area are too low for the power station to use. Liquid fuels are anticipated to be in use for a maximum 100 hours annually. Lower CO_{2-e} per unit energy is produced on gas (natural gas produces about 62% of distillate). The context for greenhouse gas emissions is global. In response to the greenhouse issue, there is significant potential worldwide for efficiency gains, substitution for lower carbon fuels such as natural gas, and the application of renewable energy technologies. Greenhouse gas emissions associated with electricity supplied into the SWIS increased by 20% on 1990 by the year 2000. Over the same period, however, electricity consumption increased by 33%. The improved greenhouse gas emission rate for electricity supplied into the SWIS is reflected by the generally downward trend in carbon intensity over that time. The carbon intensity was 0.98t CO_2e/MWh in 1990 and 0.89 in 2000 (a decrease of 9%). This is largely due to increased sourcing of electricity from high efficiency co-generation plant and the overall increased penetration of gas-fired generation into the supply system. Emissions from the proposed KPS are expected to contribute 148,190tpa of CO_{2-e}.	Combustion of fossil fuels will result in output of greenhouse gases. Damage caused by air pollution can be assessed in terms of effects on health and deterioration of inert materials, plants, other animals and degradation of the atmosphere itself. Emissions can be dispersed and diluted in the atmosphere before reaching people or air pollution samplers or monitors (receptor points). The use of natural gas as a fuel however provides significant opportunities in the reduction of atmospheric emissions per unit of generation during firing.	The predominant use of gas by the proponent is consistent with maintaining the downward trend in carbon intensity in electricity generation. The proponent is committed to the greenhouse gas reduction through: • Commitment to participate in the Greenhouse Challenge program. This will include the preparation of Greenhouse Gas Management Strategy under the Greenhouse Challenge Program; • Develop best practicable thermal efficiency design and operating goals; • Implementation of scheduled maintenance procedures to ensure optimal plant performance; and	Combustion of fossil fuels will result in output of greenhouse gases, principally CO_2. However, the technology and fuel proposed will ensure that the rate of greenhouse gases emitted per unit of energy is low and meets the EPA's objectives.
Surface Water and Groundwater Quality	To retain the integrity, functions and environmental values of protected wetlands, and to ensure that EPP lakes are protected and their key ecological functions are maintained. To maintain the integrity, functions and environmental values of rivers and ephemeral streams, and to ensure that alterations to surface drainage do not adversely impact native vegetation.	Shallow groundwater flow is generally to the West, although local preferential flow towards the Wellesley River to the East is known to occur. KPS operational water requirements are limited to drinking water and sanitary requirements. The Kemerton Industrial Park falls within the boundaries of the Leschenault Inlet Management Area which aims to protect the Leschenault Estuary, an environmentally significant water resource. There are also a number of environmentally significant wetlands in the vicinity of the proposed power	Shallow groundwater flow is generally to the West. Pollutants may migrate to wetlands and damplands, and eventually enter Leschenault Inlet. Potential sources of surface and groundwater pollution include: • Sediment; • Sewerage and grey water; • Hydrocarbons; and • Chemical agents and cleaners • Solid Wastes The existing man-made drainage line traverses a portion of the proposed site, and although there would be no	The following mitigation measures are proposed to limit impacts during construction and operation: • Development and implementation of an EMP for operations; • Implementation of the Contractor's HSE Management System on all facets of the construction. Similarly, the Operator will implement its HSE Management System for subsequent operations; • Comply with the requirements of the Department of Industry and Resources (DoIR) in relation to transport and storage of flammable or dangerous chemicals • Surface drainage line will be intercepted and diverted around the plant site.	It is considered the measures identified will reduce or contain contaminant losses within the plant such that losses to surface or groundwater can be managed to meet the EPA's objective in relation to this factor.

Environmental Factors	EPA Objective	Proposal Characteristics	Potential Environmental Impacts	Mitigation and Management Strategies	Predicted Outcome
	To maintain the quality of groundwater so that existing and potential uses, including ecosystem maintenance, are protected.	station site that are fed by surface water runoff and groundwater. An existing man-made drain line passes through the site. Re-alignment of this drain will be undertaken to avoid the site plant footprint. The Kemerton Industrial Park is underlain by an unconfined superficial aquifer. This aquifer is further underlain with the confined aquifers (by increasing depth) of the Leederville Formation and the Cockleshell Gully Formation. The depth to the water table over much of the area is less than 2m. Groundwater in the superficial aquifer ranges in salinity from 100 to 8,500mg/L TDS.	direct discharge of wastewater or contaminated stormwater into wetlands or the Wellesley River or its tributaries, there is the potential for contaminants to be transported to the Leschenault Estuary and other wetlands. There is a likelihood that construction activities will involve dewatering to allow establishment of foundations at depths below the groundwater table.	Preparation of a Stormwater Management Plan as a component of the broader CEMP to include but not be limited to: Preparation of a dewatering management plan; Redirection of storm waters around the site, Management of contaminated storm waters such that none leaves the site, Recovery mechanisms and structures for chemical and hydrocarbon spillages such that no hydrocarbons from diesel storage facilities enter the environment, Surface and groundwater monitoring	
Noise and Vibration	To protect the amenity of nearby residents from noise impacts resulting from activities associated with the proposal by ensuring that noise levels meet the *Environmental Protection (Noise) Regulations 1997 (As Amended).*	Peaking plant operation will generally be during daylight hours on working days. The boundary of the nearest noise sensitive premises to the proposed site to the west is less than 2km distant. Kemerton Industrial Park managers are actively seeking purchase of properties within the Kemerton expanded Industrial Core and buffer. Sound pressure levels have been determined for the operating plant, and the technology supplier has made a commitment to attenuate the plant such that the noise at the station boundary will not exceed 60dB(A). Noise modelling has been undertaken on the anticipated combined sound power that indicates power station noise projecting onto surrounding are will be less than 32dB(A) at noise sensitive premises. Vibration is not expected to be an issue given the type of plant and distance to sensitive receptors.	Noise will be generated at the proposed site during construction and during operation. Unacceptable noise levels can cause sleep disturbance, annoyance and adverse health effects. The power station will not contribute significantly to noise at the nearest noise sensitive premises and are predicted to achieve the allowable noise criteria at the boundary of the power station buffer zone. <u>Construction Noise</u> Construction activities will occur during daylight hours and principally during weekdays. Using standard construction plant, noise emissions will not be detectable above existing background at sensitive premises beyond the Industrial Park boundary. <u>Operational Noise</u> Gas turbine and generator sets would be the main source of noise from the power station.	Noise emissions at the nearest existing residences, can be managed by engineering design methods and installation of required noise attenuation measures to comply with the *Environmental Protection (Noise) Regulations 1997 (As Amended)* at all times, including achieving not more than 60dB(A) at the boundary. The Contractor will develop and implement a noise management component to the CEMP for the project, including but not limited to: • Acceptance testing from equipment suppliers; • Noise management procedures for construction and operation; • Retention of vegetation (plantation Blue Gums) where practicable to assist in noise mitigation; • Noise monitoring as required by the DoE during operation; • Alternative noise attenuation packages can provide enhanced levels of noise control to meet boundary level noise limits; and • Development and implementation of an EMP for operations.	It is considered that acoustical treatment measures incorporated during construction and operation (if necessary) will reduce noise levels in the surrounding environment to meet the EPA's objective in relation to this factor.
Liquid and Solid Wastes	Ensure that the generation of all wastes follows consideration of waste reduction in accordance with the waste hierarchy of reduction, reuse, recycling, treatment, and disposal.	The construction and operation of the proposed power station will result in the generation of minor quantities of solid waste (<10tpa) and domestic waste (peaking at 15kL/day during construction and up to 0.3kL/day during operation). Solid waste produced during construction and operations will include wood, paper and domestic rubbish. Liquid wastes from ablutions will be stored in sealed facilities prior to being removed offsite by a licenced liquid waste contractor.	The inappropriate storage and disposal of wastes can lead to environmental problems including: ▪ the contamination of ground or surface waters; ▪ flammable hazards; ▪ the creation of nuisance conditions such as offensive odours or wind-blown waste; and ▪ encouragement of vermin such as feral cats and foxes.	The following mitigation measures are proposed to limit waste impacts during construction and operation: • Development and implementation of an EMP for operations; • Implementation of the Contractor's HSE Management System on all facets of the construction; • Implementation of the Operator's HSE Management System during operation; • Compliance with the requirements of the DoE and relevant Regulations in relation to the management of wastes including application of the waste hierarchy;	It is considered that the application of accepted waste management practices during construction and plant operation will meet the EPA's objective in relation to this factor.

Environmental Factors	EPA Objective	Proposal Characteristics	Potential Environmental Impacts	Mitigation and Management Strategies	Predicted Outcome
		A waste oil tank for collection and storage of waste oil from the oil separator pit will be constructed and bunded in accordance with DoIR requirements, with oils collected for disposal offsite by a licensed contractor.		• Solvents and hazardous liquids will be collected and removed from the site for recycling or disposal in an approved liquids disposal area; • Inert waste materials generated during construction and operation that are not suitable for recycling will be disposed at the nearby Kemerton landfill in accordance with the Health Dept of WA and Landfill Board requirements. • Other materials such as steel will be recycled. • Putrescible/cribroom wastes (approximately $10m^3$ / year) will be deposited to landfill. • Production of a Waste Management Plan as a component of the broader Operation EMP and CEMP to include but not be limited to: – Implement specifications relating to waste management; – Educate employees in non-hazardous solid waste management; and – Regular waste collection and disposal to the existing approved site.	
Hydrocarbon and Hazardous Materials	Design and construct (including bunding) in accordance with Australian Standards AS 1940 (Standards Australia 1993) and requirements of the DoIR's Dangerous Goods Division and the *Explosives and Dangerous Goods Act 1961* and Regulations (1992).	The operation of the power station would require the transportation, storage and handling of hydrocarbon products including liquid fuel (1.5ML), lubricating oils (30KL) and greases and degreasers. Small quantities of hazardous materials such as herbicides (50L), detergents (20L) and small quantities of solvents may also be used and stored on- site.	The potential impacts associated with these activities include: ▪ discharge of hydrocarbons to the environment contaminating surface and ground waters, the atmosphere and soil; ▪ creation of acute and/or chronic toxic hazards; and ▪ creation of flammable or explosive hazards.	The following mitigation measures are proposed to limit impacts arising from hydrocarbons and hazardous material storage during construction and operation: • Development and implementation of an EMP for operations; • Implementation of the Operator's HSE Management System on all facets of the development; • Comply with the requirements of the DoIR and relevant Regulations in relation to the management hazardous and flammable materials; • Produce a Hydrocarbon Management Plan as a component of the broader Operation and CEMP to include but not be limited to; – Reduce the volume of hydrocarbon and hazardous waste materials produced; – Identify disposal options; – Segregate stormwater from being in contact with contaminatation; – Ensure appropriate transport, storage and handling procedures; and – Ensures appropriate clean-up and emergency procedures for spillages.	It is considered that the application of accepted hazardous waste management practices during construction and plant operation would meet the EPA's objective in relation to this factor.
Social Surrounds					
Aboriginal Heritage	To ensure that changes to the biophysical environment do not adversely affect historical and cultural associations and	An area of up to 15ha will be disturbed as a result of the implementation of this proposal. This area has been previously disturbed	Construction without due consideration for heritage sites may result in the loss of these sites. A heritage survey has been conducted within the area	A detailed Aboriginal Heritage Survey of the Project area has been implemented. TSKT will develop and implement a Heritage Management	Given the prior history of the site, relatively small footprint and results of the heritage

Environmental Factors	EPA Objective	Proposal Characteristics	Potential Environmental Impacts	Mitigation and Management Strategies	Predicted Outcome
	comply with relevant heritage legislation.	through the planting of Blue Gums, and is in private ownership. Being an open cycle power station that uses dry low NOx burners (i.e. no water is used), no wastewater effluent discharge to the ocean will be required, and no pipeline that could impact on significant sites will be constructed.	encompassing the power station and specific buffer. No sites of significance have been identified in the power station site, although a number of sites are known to exist within the Kemerton Industrial Park. There are no identified sites within 4km of the subject land.	Plan as a component of the CEMP to include but not be limited to: • Development of a protocol for liaison with Aboriginal consultants for the duration of construction works; • Site inductions regarding heritage; • Actions in the event that any archaeological material (including human skeletal material) is found; and • Identification of site personnel responsibilities.	survey undertaken to date, it is concluded that the EPA's objectives in relation to this factor are likely to be met.
Public Health & Safety Risk	To ensure that risk from the proposal is as low as reasonably achievable and complies with acceptable standards and EPA criteria including Guidelines and Criteria for EIA No. 2, *Guidance for Risk Assessment and Management: Offsite Individual Risk from Hazardous Industrial Plant* (EPA, 2000a).	Major hazards at the site relate to the storage and use of significant quantities of natural gas, various lubricants and distillate, and the transport of the fuels. Gas will be delivered to the site by a lateral to be constructed from the existing take off point to the north of the Kemerton Industrial Park. A bunded fuel tank and fuel unloading facility will handle and store 1.5ML diesel fuel on site.	There are quantifiable health risks involved with natural gas and diesel fuels that have the potential to impact on public and occupational health. However, aside from stored hydrocarbons and the inventory of gas between successive valves, there is minimal stored energy in the form of compressed air or hydraulic systems. Appropriate storage for the following chemicals will be provided during construction: lubricating oils, waste oil, acetylene, oxygen, inhibitor cooling water, detergent, degreaser, paints and thinners. A review of hazardous materials and processes during operations show that only turbine oil, turbine blade detergent and weed killer may be used in the power station indicating that the power station could be categorized as being Low Risk. The power station is located within a designated High Risk Category assigned to the proposed site under the Kemerton Expansion Study. The site does not exceed the specified 'threshold quantities' for the storage and processing of dangerous goods that would trigger its identification as a major hazard facility. The quantity of diesel stored at the site (1.5 ML), although low risk, has the potential to cause significant impacts on water bodies such as nearby wetlands and potentially the Leschenault Inlet in the case of catastrophic failure or as a result of road accidents during transport.	Public health and safety requirements can be met through adhering to: • Australian Standards AS 3814 – 2002 (Industrial and commercial gas fired appliances), • AS1940 (The storage and handling of flammable and combustible liquids as revised); • AS 1692 (Tanks for flammable and combustible liquids); and • The Gas Standard Act 1972, Petroleum Pipelines Act 1961, Explosives and Dangerous Goods Act 1961 and Regulations; Public access to the site will be limited by perimeter fencing and hazards indicated by signage using accepted practice. Recommendations in the Preliminary Quantified Risk Assessment will be adopted to further reduce the overall risk at the site boundary. Accordingly: • The off-site individual fatality risk criteria set by the EPA can be met. • All reasonable and practicable measures will be taken to minimise the off-site emissions and individual risk from industrial plant to as low as reasonably practicable (ALARP). • The area between the power station boundary and the Plant will be fenced to create a clear buffer zone at least as wide as the $1x10^{-6}$ contour, meeting the EPA's Policies, Guidelines and Criteria for EIA No. 2, *Guidance for Risk Assessment and Management: Offsite Individual Risk from Hazardous Industrial Plant* (EPA, 2000a).	It is considered that the application of accepted engineering practices during detailed design and construction will achieve a level of risk to meet the EPA's objective in relation to this factor.
Social and Economic Issues	Ensure that any potential impacts from the development on the nearby community are minimised.	The proposed KPS would offer benefits to the local communities through employment, the use of local labour, service industries and local supplies of materials, particularly during construction. The construction phase is	There may be social impacts on the local community resulting from this transient workforce, however these would be temporary in nature. There are not expected to be any significant impacts on	TSKT will develop and implement a Community Consultation Plan as a component of the broader Operation EMP and CEMP to include but not be limited to; ▪ General community consultation associated with the environmental approval process;	It is considered that given the nature of the proposal and the application of considered community consultation practices, social and economic

Environmental Factors	EPA Objective	Proposal Characteristics	Potential Environmental Impacts	Mitigation and Management Strategies	Predicted Outcome
	Ensure that recreational use of the areas surrounding the Kemerton Industrial Park is not compromised.	expected to extend over a period of up to 12-18 months and the construction workforce for each development stage is expected to peak at around 100 personnel. During the operational phase of the KPS, permanent on-site personnel would be about 5 operators and a variable maintenance workforce engaged for several weeks each year and any immediate requirements. This level of manning could easily be accommodated within the nearby communities.	nearby agricultural land use or tourism.	▪ Targeted consultation with nearby landowners and communities. ▪ Housing of construction workforce; ▪ Consultation with the Shires of Harvey, Dardanup City of Bunbury and Kemerton Community Committee; ▪ Local waterbody users representative groups; ▪ Opportunities to engage local workforces.	issues arising from construction can be managed to meet the EPA's objectives in relation to this factor.
Visual Impact	Visual amenity of the area adjacent to the project should not be unduly affected by the proposal.	Stacks (2) servicing each of the gas turbines are a maximum 35m in height. The KPS is set within an existing Blue Gum plantation due for rotation, to be re-grown to Blue Gums for the life of the project. From a comparison of the height of the structures within the proposed power station and the results of the visual impact assessment for the proposed expansion of the Kemerton Industrial Park, it is unlikely that the power station would be visible from any areas to the west of the Park. However, the power station may be visible from farmhouses and other public areas to the east of the Park.	The KPS will replace a 'vegetated' (Blue Gum) landscape. The 35m stacks will extend above the existing tree line. The power station will be set within an industrial Park with considerable screening provided by surrounding trees.	Management of visual amenity aspects will include limiting clearing and good housekeeping practices. Lighting will comply with Australian Standard AS 4289. The relatively small footprint and low profile (compared to existing or proposed industrial facilities), implementation of sympathetic colour schemes together with the use of screening where possible will minimise visual impacts. Revegetation with appropriate screening and selected locally sourced plants.	The relatively small footprint and low profile (compared to existing or proposed industrial facilities), implementation of sympathetic colour schemes together with the use of screening where possible, will ensure that the EPA's objectives in relation to this factor are met.
Transport	Ensure that transportation and storage of fuels/chemicals complies with the Australian Dangerous Goods Code so as to ensure that risk is as low as reasonably achievable. Ensure that roads are maintained and road traffic managed to meet an adequate standard of level of service and safety;. Ensure the requirements of Main Roads of Western Australia are met.	Gas will be provided from the existing Dampier to Bunbury Natural Gas Pipeline. Road tankers using existing public roads will supply Ultra Low Sulphur diesel. This increased traffic would result from workforce commuting and construction related deliveries of material and equipment. All traffic would access the power station site through the existing access roads or roads developed under the Kemerton Expansion Final Concept Plan.	Hazards to the public range from direct (collision) to indirect (road damage from heavy vehicle use). Professional drivers in licensed and well-maintained trucks will undertake road transport. The construction phase would result in increased traffic on the access roads to the Kemerton Power Station. A maximum of 300 vehicle movements during peak construction is anticipated, reducing to an anticipated ten vehicle movements per day during operation when using gas. When using liquid fuel additional six movements will be required for fuel tankers on the first day, followed by eight movements per day on subsequent days where gas is not available for plant operation. Operation on liquid fuel is not expected to extend longer than three days in succession.	Transport routes for heavy vehicles during the construction and operational phase shall be along main roads designed for heavy transport applications. Bypass roads have been constructed around all major urban areas. In addition the following measures will be implemented: Coordination of all proposed traffic delays during the construction phase with Main Roads WA and relevant Shire; Scheduling the movement of construction items that could obstruct regular traffic; Flow to minimise delays and road closure; Installation of appropriate signage; Monitoring the movement of oversize vehicles to and from site; and Notifying the community of any planned night-time transport to site.	It is considered that given the primary fuel (gas) is delivered by pipeline, the insignificant increase in road traffic, proposed access routes and adequate conditions of existing roads for proposed vehicle types and movements, it is considered that transport issues can be managed to meet the EPA's objectives in relation to this factor.

Source – modified from EPA Bulletin 1067

7. ENVIRONMENTAL MANAGEMENT

7.1 Terrestrial Flora and Vegetation

7.1.1 EPA Objective

To maintain the abundance, species diversity, geographic distribution and productivity of vegetation communities.

7.1.2 Potential Environmental Impacts

The KPS footprint will occupy 2ha of a dedicated 28ha site within the Kemerton Industrial Park. Up to 15ha of *Eucalyptus globulus* cultivated plantation will be removed during the construction of the power station site, construction laydown areas and corridors for access roads and infrastructure. This includes the clearing and subsequent re-planting of all or part of approximately 10ha of *E globulus* plantation used during construction. It is considered that the plantation itself has little or no value from a flora conservation perspective.

A spring survey for Declared Rare Fauna (DRF) and Priority Flora was undertaken in October 2002 (Appendix 2) and indicated that no populations of Declared Rare Fauna are present on the proposed power station site. Similarly, no priority flora were identified in the Spring Survey on the proposed site, however two priority flora, *Acacia semitrullata* (Priority 3 Flora) and *Jacksonia sparsa ms* (Priority 4 Flora) were identified in remnant vegetation to the south. Flora surveys by Biota Environmental Services classified this vegetation as being in Good to Poor condition (Biota Environmental Services, 2003). Consistent with findings in the Strategic Environmental Review (WPC, 2002), the disturbance of native vegetation on the south of the site has been avoided. This layout was placed as far to the north as far as possible, subject to compliance with the noise criteria at the northern boundary.

The proposed power station is an open cycle system using dry low NOx technology and does not require the use of water for NOx reduction (injection) or cooling. Accordingly, the construction of a wastewater treatment system or a wastewater disposal pipeline will not be required and impacts on vegetation associated with this infrastructure will be avoided.

Other than clearing within the plantation, there remains the potential for the introduction and spread of weed species and dieback (*Phytophthora* species) during construction. Dust generated during construction also has the potential to be deposited on remnant vegetation. The leakage or spillage of environmentally hazardous materials or hydrocarbons also has the potential to impact on remnant vegetation during the construction phase.

Fragmentation of habitats may occur due to the construction of the gas pipeline and establishment of overhead transmission cable corridors. Specific impacts associated with power transmission lines or the gas lateral have not been assessed in this document. Assessments of impacts and development of management strategies for any clearing for new transmission line corridors and gas laterals would be undertaken

by WPC and the gas supplier in a separate approvals process and have not been considered in this assessment.

7.1.3 Environmental Management and Mitigation

As previously discussed, recommendations in the SER (WPC, 2002) to locate the power station more fully within the *E Globulus* Blue Gums plantation have been accommodated, avoiding impacts on the Priority Flora to the south of the site. No removal of remnant native vegetation will occur as a result of the construction of the power station, consistent with the EPA Guidance Statement.

Even though habitat removal for gas pipeline and transmission infrastructure is subject for separate referral, design strategies have already been implemented to minimise impacts on site. Gas pipelines follow existing gas pipeline routes and the transmission grid connection is now located 5km from the site. Low voltage lines for construction power and station power during operations will follow existing road easements.

Reduced plant productivity due to construction dust will be minimised through the use of water carts and appropriate dust suppression methodologies. This issue is discussed further in Section 7.3.3.

The management and storage of hazardous materials and hydrocarbons that are potentially hazardous to vegetation will be in accordance with strategies outlined in Section 7.8.3.

Disturbed areas within the power station footprint will be rehabilitated either to native vegetation species consistent with that of the surrounding areas or replanting to plantation Blue Gums.

The site dieback status has been determined as uninterpretable. Accordingly, dieback hygiene procedures will be adopted to minimise the spread of the disease, consistent with best practice. This will essentially involve the identification of areas likely to be affected, establishment of appropriate controls for machinery, topsoil and mulch from affected areas, and implementation of strict washdown procedures for equipment and vehicles known to access affected areas.

The earthworks associated with the project have the potential to introduce or spread weed species, particularly from areas of cleared farmland to areas of native vegetation. Weed infestation and coverage between 10 and 60% has been identified in the plantation area. A number of measures will be implemented to prevent the introduction or movement of weeds throughout the site including:

- assessments of weed potential prior to topsoil removal;
- separate storage and end use of weed infested topsoil; and
- implementation of adequate weed control by use of selective herbicides or selective application techniques consistent with Blue Gum plantation practice.

The Construction Contractor's Health Safety and Environmental Management System (HSEMS) will be implemented for all aspects of the development phase. A

Preliminary CEMP has been developed to ensure that construction impacts on vegetation are minimised as far as practicable during the construction phase. The CEMP will be finalised following the EPA's assessment of this referral document, and during the Works Approval assessment process under Part V of the *Environmental Protection Act.* The Preliminary CEMP includes (but is not limited to) procedures and strategies for:

- clearing management to minimise the extent of vegetation removal during plant and laydown construction. Areas to be cleared would be marked in the field to avoid unnecessary areas being cleared. Clearing will be conducted in stages where possible;
- Site Rehabilitation;
- Dieback Hygiene Management; and
- Weed Management and Control.

TSKT will implement it's own HSEMS during the operational phases of the project to ensure that potential impacts on flora species are minimised.

7.1.4 Predicted Outcome

Given the proposed location of the project entirely within an existing cultivated Blue Gum Plantation, and the commitment to implement the Preliminary CEMP it is considered that direct losses of remnant native vegetation, priority flora and DRF will be prevented. Accordingly, the EPA's objective in relation to this factor can be met.

7.2 Fauna and Specially Protected (Threatened) Fauna)

7.2.1 EPA Objective

Protect Specially Protected (Threatened) Fauna species and their habitats, consistent with the provisions of the *Wildlife Conservation Act 1950.*

7.2.2 Potential Environmental Impacts

The principal impacts on local fauna are likely to result from the removal of vegetation for most potentially significant fauna species. During the construction phase, potential impacts on fauna and their habitats would be through the removal of habitat that occurs within the areas required for the power station site, construction laydown areas and corridors for access roads, infrastructure. Up to 15ha of *Eucalyptus globulus* Blue Gum plantation will be removed during implementation of the proposal of which 10ha will be re-planted after the plant is commissioned.

Further disturbance may occur because of the construction of linear infrastructure such as gas pipelines and power transmission corridors. As previously discussed, assessments of impacts and development of management strategies for any clearing for new transmission line corridors and gas laterals would be undertaken by WPC and the gas supplier in a separate approvals process and have not been considered in this assessment.

Based on a review of existing literature, and results of a spring fauna survey recently completed, six species of listed fauna and eight species of Priority fauna could potentially occur near the plant site (WPC, 2002).

A spring fauna survey, involving trapping, avifauna surveys, spotlighting survey and hand searches was undertaken in October 2003 and confirms the generally degraded and highly modified nature of the Blue Gum plantation proposed as the site. No Scheduled or Priority Fauna were observed or trapped in the area, after extensive searching and trapping effort. The complete fauna survey report is presented as Appendix 3. The location of fauna field survey sites is presented in Figure 7.

Removal of vegetation will affect its dependant fauna, resulting in direct loss of individuals and potential impacts on the species. Mobile species may be forced to move to less disturbed areas.

In accordance with findings of the SER (WPC, 2002), the power station site has been located further north on the designated land so as to further reduce potential impacts on fauna of the nearby wetlands. However, there remain potential indirect impacts on fauna in habitat around the site from factors such as noise.

7.2.3 Environmental Management and Mitigation

Disturbance of remnant flora and accordingly their dependant fauna has been reduced as far as possible in site selection.

Implementation of the Contractor's HSE Management System (during construction) and TSKT HSE Management System (during operation) for all aspects of the proposal will ensure environmental management to an acceptable standard.

Even though habitat removal for gas pipeline and transmission infrastructure is subject for separate referral, design strategies have already been implemented to minimise impacts on site. Gas pipelines follow existing gas pipeline routes and the main transmission grid connection is now located 2km from the site. Low voltage lines for construction power and station power during operations will follow existing easements.

Clearing management strategies are detailed in the Environmental Management and Mitigation section for terrestrial flora and vegetation (Section 7.1.3). Noise management strategies are detailed in Section 7.6.3.

A Preliminary Construction Environmental Management Plan has been developed to ensure that construction impacts on fauna species are minimised as far as practicable during the construction phase. The CEMP will be finalised following the EPA's assessment of this referral document, and during the Works Approval assessment process under Part V of the *Environmental Protection Act.* The CEMP includes (but is not limited to) procedures and strategies for:

- clearing management to minimise the extent of vegetation removal during plant and laydown construction. Areas to be cleared would be marked in the field to

avoid unnecessary areas being cleared. Clearing will be conducted in stages where possible;
- Site Rehabilitation; and
- Noise Management.

7.2.4 Predicted Outcome

It is considered the avoidance of direct losses of terrestrial flora and accordingly their dependant fauna through location within an existing cultivated Blue Gum plantation will ensure the EPA's objective in relation to this factor can be met.

7.3 Air Quality, Gaseous and Particulate Emissions

7.3.1 EPA Objective

To ensure that best practicable measures are taken to minimise discharges of gaseous and particulate emissions to the atmosphere.

To protect surrounding land users such that gaseous and particulate emissions (including dust) will not adversely affect their welfare and amenity or cause health problems.

To ensure that conditions which could promote the formation of photochemical smog are managed to minimise the generation of smog and any subsequent impacts.

7.3.2 Potential Environmental Impacts

Air Quality and Gaseous Emissions

In general, industrial sectors dominate sulphur dioxide emission, and significantly contribute emissions of dust and oxides of nitrogen. This contribution is caused by the combustion of heavy fuel, and diesel, although in WA natural gas is rapidly becoming the fuel of choice to minimise these impacts.

During operation, atmospheric emissions of significance include NOx, SO_2 (when operating on liquid fuel) and to a lesser extent particulates and unburnt hydrocarbons. There are a number of industries within the Kemerton Industrial Park that are minor emitters of NOx, SO_2 and particulates. Outside the Kemerton Industrial Park, there are only small emitters in the region apart from the two Alumina Refineries, which are located over 30km away.

Sulphur dioxide (SO_2) is a colourless gas. It reacts on the surface of a variety of airborne solid particles, is readily soluble in water and can be oxidised within airborne water droplets. High concentrations of SO_2, together with suspended particles have been implicated in major smog events. There is evidence that some species of plants are affected by SO_2.

NO_2 is a reddish-brown gas. It is a strong oxidant and soluble in water. Young children and asthmatics are the groups at greatest risk from ambient NO_2 exposures. Other environmental effects of NO_2 and NO_x compounds can include increased acidic deposition (acidification of rain, mists and fogs), deposition of nitrogen to the soils adding to soil nitrogen levels and vegetation effects (WPC, 2002).

Particulate matter is a complex mixture of organic and inorganic substances, present in the atmosphere as both liquids and solids. Fine particulates can have adverse respiratory and health implications. For gas turbines particulates are considered an insignificant issue (see Section 7.3.3).

Impacts from regional sources are relatively small. Air quality modeling for NOx, SOx and particulates arising from operation of the proposed power station has been undertaken, and the results added to emissions from existing Kemerton sources. Worst-case modeling (continuous operation on liquid fuel under local meteorological conditions) indicates emissions will at all times be well within the NEPM criteria for all parameters modeled. Modelling results are discussed further in Section 7.3.3.

Dust

The air emission of significance during the construction phase of the project is dust. There are at present no sources of dust at the site, which is predominated by a cultivated Blue Gum plantation, however up to 15ha may be disturbed during the construction period, with resulting potential for dust generation.

As presented in the SER (WPC, 2002), the potential for dust emissions during the construction phase would be largely related to local wind conditions, coupled with the frequency and duration of rainfall. During dry weather conditions, the wind may cause re-suspension of dust from areas of construction activity (e.g. where trucks are entering or departing the site). The main activities that may contribute to dust generation during the construction phase include:

- Vegetation clearing;
- Earthmoving activities;
- Unloading trucks;
- Vehicular movement on unsealed tracks; and
- Wind action on cleared/graded areas and soil stockpiles.

The nearest dust sensitive premises are located approximately 1.8km from the development site.

Dust emissions arising from construction activities may have the potential to adversely affect human health, visual amenity, and the surrounding vegetation and fauna. The generation of dust during construction also has a nuisance value.

7.3.3 Environmental Management and Mitigation

The plant will operate predominantly on gas and ultra low sulphur diesel fuel is proposed as a back-up fuel for occasions where gas pipeline pressures in the area are insufficient to run the gas turbines.

Consistent with the commitments made in the SER (WPC, 2002), TSKT will install dry low NOx (DLN) burners on gas turbine units. The essential difference, compared to conventional burners, is the capability of achieving low NOx and minimal CO emissions without water or steam injection. The additional benefit is that there is no need for water or a water treatment plant and consequent waste-water disposal.

The gas turbines fired with natural gas can be operated in the load range from 50% to 100% full load with very low NOx emissions. These extremely low emission values are achieved by applying primary control measures to reduce thermal NOx production. The Minimum Guaranteed Load for DLN change-over on gas is 50% Maximum Continuous Rating (MCR). The Minimum Guaranteed Load for DLN change-over on liquid fuel is normally 50% MCR. In order to comply with the EPA upper limit for NOx emissions, the firing temperature will be reduced from 1060°C to 1030°C when operating on liquid fuel.

Stack Emissions

For emissions from industrial sources, the WA EPA Environmental Protection Authority (EPA, 2000a) specifies in its Guidance Statement Number 15 "*Emissions of Oxides of Nitrogen from Gas Turbines*", that "all reasonable and practicable means should be used to prevent and minimise the discharge of waste". For new assessments the EPA requires an assessment of the best available technologies (BAT) for minimising the discharge of waste for the processes and justification for the adopted technology. This guidance document states that for new large gas turbines burning natural gas, dry low NOx burner technology is best practice for open cycle. This technology could achieve NOx emissions at base load of 25ppmv (dry at 15% oxygen reference level).

The guidance document does not specifically mention gas turbines operating on liquid fuels. NOx emission from standard burners running on liquid fuels can be as high as 270ppm, however water injection can reduce NOx emissions to as low as 42ppm and in this case represents best practice (WPC, 2002). The EPA guidance document specifies that the AEC/NHMRC guidelines (1986) should be used as an upper limit for NOx emissions from new turbine installations. Table 8 below presents criteria specified in the AEC/NHMRC guidelines.

TABLE 8
NATIONAL GUIDELINES FOR EMISSIONS OF OXIDES OF NITROGEN FROM GAS TURBINES (AEC/NHMRC, 1986)

Fuel	Rated Electrical Output	Maximum NOx Emission Concentration	
		(g/m^3)	Equivalent (ppmv)
Gaseous Fuel	<10MW	0.09	44
	>10MW	0.07	34
Other Fuels	< 10MW	0.09	44
	> 10MW	0.15	73

Notes:
1) Gas volumes expressed dry at 0°C and at an absolute pressure equivalent to one atmosphere.
2) Oxides of nitrogen calculated as NO_2 at a 15% oxygen reference level.

Kemerton Power Station Emissions

The atmospheric emissions of significance from the KPS are oxides of nitrogen, sulphur dioxide (when the power station is operating on liquid fuel) and, to a much lesser extent, particulate and unburnt hydrocarbons. Of these, oxides of nitrogen, particulate matter and sulphur dioxide are important on a local scale, with oxides of nitrogen also having the potential to contribute to photochemical smog. Carbon dioxide is important due to its contribution to the greenhouse effect rather than local air quality, and is more fully described in Section 7.4.2.

The maximum emissions of oxides of nitrogen, sulphur dioxide and particulate from each open cycle unit are given in Table 9 below along with the assumed emission characteristics used in the WPC assessment (WPC, 2002).

TABLE 9
AIR EMISSION CHARACTERISTICS FROM EACH OPEN CYCLE UNIT

Parameter	Units	SKM (2002a) Nominal 120MW Open Cycle Unit Characteristics		Transfield V94.2	
		(Gas)	(Liquid Fuel)	(Gas)	(Liquid Fuel)
Power per Unit	MW	120	120	(130)	(120)
Stack Height	(m)	40	40	35	35
Stack Diameter (Equivalent)	(m)	5.5	5.5	5.5	5.5
Mass Flow	(kg/s)	402.8	402.8	525.5 (477.5)	477.3
Exit Volume	(Nm^3/s) dry	292	292	Not Available	Not Available
Exit Volume	(Am^3/s) wet	955	955	1,222 (1,135)	1,181 (1,097)
Exit Temperature	(°C)	550	550	538 (555)	521 (537)
Exit Velocity	(m/s)	40.2	40.2	51.4 (48.3)	(46.6)
NO_x Exit Concentration	(ppmv, dry, 15% O_2)	25	42 – 270	<25 (<25)	<73 (<73)
NO_x Emission Rate per unit	(g/s)	14.95	25.1 – 161.5	<19.55 (<17.77)	55.2 (50.2)
Particulate Emission Rate per unit	(g/s)	0.44	3.2	1.0 (1.0)	3.81 (3.81)
SO_x Emission Rate per unit	(g/s)	0.025	46 – 110	Negl	2 .03 (2.03)

Notes:

1) Exhaust flows, concentrations and emission rates given at ambient temperature for the WPC assessment was given at ISO conditions (15°C, 60% RH and 101.3 kPa) for GE Frame 9 machines. Transfield figures given at ISO conditions and in brackets at 40 deg C, 40% RH and 101.1 kPa for V94.2 Siemens machines.
2) TSKT parameters from e-mails from Peter Winch (pers. comm., 2003) though with the exit velocities based on the exit volumes calculated from the mass flows and exit densities.
3) SO_2 emissions based on an equivalent SO_2 content of 2.7 mg/m^3 in natural gas and approximate gas consumption at full load with liquid fuel emission based on a sulphur content range from 0.25% to 0.6% for liquid fuels. Transfield SO_2 emissions are based on normal distillate with a maximum sulphur content of 0.05%.
4) For combustion of liquid fuel, the NO_x values are given with and without water injection, whilst the Transfield NO_X figures are achieved through detuning the gas turbine.

Source: Appendix 5, Volume 2

The Siemens V9.2 gas turbines have been detuned from the nominal 130 MW per unit to 124 MW per unit (when operating at 40 °C), such that they can achieve the NO_X emissions when running on distillate. This is achieved by reducing the firing temperature.

The emissions from the proposed turbine are provided both at an ambient temperature of 40 °C and at standard ISO conditions (15 °C, 60% relative humidity and 101.3kPa) when burning gas. For modelling for the entire year, constant emission parameters have been used, with the ISO emission parameters chosen as these lead to slightly more conservative (approximately 5%) ground level concentrations. As no emission parameters at ISO conditions were available when using distillate, these were estimated based on the ratio of the ISO to 40 °C parameters for the gas fired case, excepting for particulate and SO_2 which were assumed to be constant with temperature and based on fuel consumption (Appendix 5).

The power station design specifications indicate that NOx emissions will comply with criteria specified in EPA Guidance Statement 15, when the facility is operating on gas (25ppmvd). When operating on liquid fuel, NOx emissions are expected to be 73ppmvd and will comply with the AEC/NHMRC (1986) concentration limit. It is noteworthy that the proposed peak load power station is expected to operate on liquid fuel for less than 100 hours per year (ie less than approximately 1% of the time).

Ambient Air Quality

For ambient ground level concentrations, the WA EPA applies the National Environmental Protection Measure (NEPM) standards (NEPC, 1998) presented Table 10 below. These specify a maximum ambient air quality concentrations to be achieved within 10 years.

TABLE 10
NATIONAL ENVIRONMENTAL PROTECTION MEASURE AMBIENT AIR QUALITY STANDARDS AND GOALS (NEPC, 1998)

Pollutant	Averaging Period	Maximum Conc^n ppm (µg/m^3) unless otherwise stated	Goal within 10 years Max. Allowable Exceedences
Carbon monoxide	8 hours	9.0 ppm (11.25mg/m^3)	1 day a year
Nitrogen dioxide	1 hour	0.12 ppm (246)	1 day a year
	1 year	0.03 ppm (61)	None
Photochemical	1 hour	0.10 ppm (214)	1 day a year
Oxidants (as ozone)	4 hour	0.08 ppm (171)	1 day a year
Sulfur dioxide	1 hour	0.20 ppm (572)	1 day a year
	1day	0.08 ppm (228)	1 day a year
	1 year	0.02 ppm (57)	None
Lead	1 year	0.50 µg/m^3	None
Particles as PM 10	1 day	50 µg/m^3	5 days a year

Notes: Modified from Schedule 2, NEPC (1998)
Refer to the full document for definitions

As per the SER (WPC, 2002), this referral document proposes that the NEPM standards apply outside the Kemerton Industrial Park buffer zone and at residential premises within the Kemerton Industrial Park.

Impacts on vegetation are assessed against the World Health Organisation (WHO) guidelines for protection of vegetation from the direct affect of gaseous sulphur dioxide, oxides of nitrogen and ozone (WHO, 2000). As previously discussed, oxides of nitrogen and sulphur dioxide can effect vegetation through the deposition of nitrogen to the soils adding to soil nitrogen levels and the acidification of rain, mists and fogs. However, given the relatively small source of emissions and the infrequent nature of operation on the open cycle units (less than 1,000-hours per year at peak load), these effects on vegetation are considered minor. Accordingly, comparison will only be made to the WHO European guidelines for direct impacts on vegetation.

The guidelines for the pollutants of interest at Kemerton being, sulphur dioxide and oxides of nitrogen, are listed below.

TABLE 11
WORLD HEALTH ORGANISATION AIR QUALITY GUIDELINES FOR EUROPE (WHO, 2000)

Pollutant	Vegetation Category	Guideline (µg/m3)	Time Period
Oxides of nitrogen	All Vegetation	75	24-hour
	All Vegetation	30	Annual Mean
Sulfur dioxide	Agricultural Crops	30	Annual and winter mean (6 month winter)
	Forests and Natural Vegetation	20	Annual and winter mean (6 month winter)
	Lichens	10	Annual Mean

Predicted ground level concentrations from the proposed power station development were determined using the air dispersion model DISPMOD (v6.1), local meteorological data and emission characteristics for each source.

Meteorological data for the assessment was obtained from the meteorological station within the Kemerton Industrial Park as monitored by the Bureau of Meteorology for LandCorp. As per the preliminary modelling conducted as part of the SER (WPC, 2002), cumulative air quality impacts were modelled taking into account of the proposed power station in combination with the existing industries at the Kemerton Industrial Park (Simcoa, Millennium Inorganic Chemicals and Nufarm Chlor-Alkali Plant).

Specific methodologies, assumptions and details regarding input data applied to the modelling are presented in Appendix 5.

Modelling Results

Predicted maximum 1-hour average ground level concentrations of NOx and NO_2 from existing industries within the Kemerton Industrial Park are summarised in Table 12, and the predicted 1-hour maximum NO_2 concentration contours for operation on gas is presented in Figure 8.

TABLE 12
PREDICTED MAXIMUM 1-HOUR AVERAGE GROUND LEVEL CONCENTRATIONS OF NO_X AND IMPLIED NO_2 LEVELS

Source	Power Station Fuel	Maximum on Modelled Grid		Maximum Outside the Kemerton Buffer Zone		
		NO_X ($\mu g/m^3$)	Implied NO_2 ($\mu g/m^3$)	NO_X ($\mu g/m^3$)	Implied NO_2 ($\mu g/m^3$)	NO_2 as % of NEPM
Max 1-hour						
Existing Industries	Not Applicable	25	14.5	13.5	8	3.3
KPS	Gas	20	11.6	10.7	6.3	2.6
	Liquid	57	32.4	30	17	6.9
Existing and KPS	Gas	25	14.5	13.5	8	3.3
	Liquid	57	32.4	30	17	6.9
Annual Average						
Existing Industries	Not Applicable	0.51	0.3	0.26	0.15	0.24
KPS	Gas	0.11	0.065	0.11	0.065	0.10
	Liquid	0.32	0.19	0.32	0.19	0.29
Existing and KPS	Gas	0.51	0.3	0.28	0.17	0.27
	Liquid	0.53	0.31	0.32	0.19	0.29

Note: The NEPM standards of 0.12ppm and 0.03ppm are equivalent to 246$\mu g/m^3$ and 62$\mu g/m^3$ at 0°C and 101.3 kPa.

Considering contributions from existing industries alone, maximum (1-hour) predicted NOx levels outside the buffer are predicted to be 13.5$\mu g/m^3$ with an implied NO_2 concentration of 8$\mu g/m_3$. This is within 3.3% of the NEPM criteria.

Predicted NO_2 levels from the power station operating on gas are 11.6 and 0.065 $\mu g/m^3$. Outside the buffer the maximum concentrations are 6.3 and 0.065 $\mu g/m^3$ which are 2.6% and 0.1% of the NEPM standards.

The maximum 1-hour average ground level concentrations of NO_2 within the modelled grid, for the plant operating on liquid fuel is estimated to be 32.4 $\mu g/m^3$. Outside the buffer the maximum concentrations are 17 and 0.19 $\mu g/m^3$ which are 6.9% and 0.29% of the NEPM standards.

Predicted cumulative impacts from the existing and cumulative concentrations are similar to either the concentrations from the existing industry or that from the power station alone. This is a result of the large separation of the existing industry and the proposed power station. Figure 8 presents maximum 1-hour average NO_2 concentrations from combined sources with the power station run on gas. Maximum

1-hour and annual average concentrations outside the buffer with the KPS operating on gas are predicted to be 8 and 0.17 $\mu g/m^3$ which are 3.3% and 0.27% of the NEPM standards. When operating on distillate the maximum 1-hour and annual average concentrations outside the buffer are predicted to be 17 and 0.19 $\mu g/m^3$ which are 6.9% and 0.29% of the NEPM standards. Figure 9 illustrates maximum 1-hour NO_2 average ground level concentrations from combined sources with the power station running on distillate.

The above indicates that predicted NO_2 concentrations will be low. Considering that the maximum background levels can be up to 0.05ppm (102.5 $\mu g/m^3$) indicates that the industry sources are a small component of the total sources in the region. In the unlikely advent that the maximum concentrations from industry occur on a day with high NO_2 from fires the concentrations would still remain at around 50% of the NEPM (Appendix 5).

NOx Impacts on Vegetation

An assessment of the likelihood for NOx impacts on vegetation can be made by comparing the ambient levels for effects on vegetation to guidelines recommended by the WHO (2000). These are a 24-hour guideline of 75µg/m3 and an annual guideline of 30µg/m3 for NOx.

With the existing industry and power station assumed to be operating on distillate continuously, the highest 24-hour and annual average concentration anywhere on the modelled grid is predicted to be 5.1$\mu g/m^3$ and 0.53$\mu g/m^3$, which are 6.8% and 1.8% of the recommended WHO guidelines respectively. These estimates are conservative as they assume that the power station would be operating on liquid fuel without water injection for 24-hours for the entire year, whereas a peaking plant would only operate for approximately 4 hours per day. Therefore it can be assumed that vegetation impacts from NOx emissions would not be a significant issue for the proposed power station and existing industry.

Particulates

Table 13 below presents the predicted maximum 24-hour average concentrations of particulates (as PM10) from existing industries, from the proposed power station alone and from existing industries and proposed power station combined. PM_{10} particulate levels are predicted to be low (0.5$\mu g/m^3$) for (<1% of the NEPM standard outside of the buffer zone) and is not considered to be a significant issue.

TABLE 13
PREDICTED MAXIMUM 24-HOUR AVERAGE GROUND LEVEL CONCENTRATIONS OF PM_{10}

Source	Power Station Fuel	Maximum on Modelled Grid	Maximum outside the Kemerton Buffer Zone	
		PM_{10} ($\mu g/m^3$)	PM_{10} ($\mu g/m^3$)	PM_{10} as % of the NEPM
Existing Industries	-	1.6	0.5	1.0
240MW OCGT	Gas	0.08	0.08	0.16
	Liquid Fuel	0.3	0.3	0.6
Existing Industry and 240 OCGT	Gas	1.6	0.5	1.0
	Liquid Fuel	1.6	0.5	1.0

Note: The NEPM standard is $50\mu g/m^3$ with up to 5 exceedances per year.

Sulphur Dioxide

The potential SO_2 emissions from the power station depend on the sulphur content of the fuel. Assuming Ultra Low Sulphur diesel usage, Table 14 presents the predicted maximum 1-hour, 24-hour and annual average concentrations of sulphur dioxide.

TABLE 14
PREDICTED MAXIMUM 1-HOUR AVERAGE GROUND LEVEL CONCENTRATIONS OF SULPHUR DIOXIDE

Source	Power Station Fuel	Maximum SO_2 on the Modelled Grid ($\mu g/m^3$)	Maximum outside the Kemerton Buffer Zone	
			SO_2 Conc. ($\mu g/m^3$)	SO_2 as % of the NEPM
Maximum 1-hour				
Existing Industries	Not Applicable	184	80	14
240MW OCGT	Liquid	2	1	0.18
240MW OCGT and Existing industries	Liquid	184	80	14
Maximum 24-hour				
Existing Industries	Not Applicable	27.2	14	6.1
240MW OCGT	Liquid	0.2	0.2	0.09
240MW OCGT and Existing industries	Liquid	27.2	14	6.1
Annual Average				
Existing Industries	Not Applicable	3.14	1.45	2.5
240MW OCGT	Liquid	0.01	0.01	0.018
240MW OCGT and Existing industries	Liquid	3.14	1.45	2.5

Notes:
The NEPM 1-hour, 24-hour and annual standards of 0.2ppm, 0.08 and 0.02ppm are equivalent to $570\mu g/m^3$, $229\mu g/m^3$ and $57\mu g/m^3$ respectively at 0°C and 101.3kPa. Concentrations of SO_2 from the power station when gas fired are not presented as they are negligible.

Predicted concentrations from the power station when operating on distillate will be low with the maximum 1-hour, 24-hour and annual average concentrations outside the buffer of 1, 0.2 and 0.01 $\mu g/m^3$ which are 0.18%, 0.09% and 0.018% of the respective NEPM standards.

When operating on gas, SO_2 emissions will be negligible. As such, the power station will add negligible SO_2 to existing levels.

The maximum concentrations from existing sources and the power station are predicted to be 80$\mu g/m^3$, 14$\mu g/m^3$ and 1.45$\mu g/m^3$ for the maximum 1-hour, 24-hour and annual average concentrations, which are 14%, 6.1% and 2.5% of the NEPM standards. These concentrations are considered however to be over-predicted due to the simple way in which emissions from existing sources have been modelled.

SO_2 Impacts on Vegetation

Impacts of sulphur dioxide on vegetation can likewise be assessed with reference to the WHO (2000) guidelines for protection of vegetation (Table 11). These are annual and winter means of 30µg/m3 for agricultural crops, 20µg/m3 for forests and natural vegetation and 10µg/m3 for the most susceptible organism, lichen.

Model predictions assuming the power station running continuously with the open cycle units operating on liquid fuels estimated that the maximum annual concentrations from the power station in isolation would be 0.01$\mu g/m^3$. This concentration is well below the recommended annual concentration for the most susceptible organism, lichen. Also, this is an overestimate of the impact as the power station would run on liquid fuels for less than 100-hours per year and the concentrations from the power station operating on gas would be negligible.

On a cumulative basis, maximum SO_2 levels are predicted to be 3.14$\mu g/m^3$ occurring within a few hundred metres of the Simcoa plant. The predicted concentrations from modelling is considered an overestimate due to the coarse approximation used to model the emissions. Therefore, potential SO_2 impacts on vegetation from the existing industries and proposed power station is considered negligible.

In order to verify modelling studies and to monitor emissions performance, acceptance testing of emissions will be undertaken during commissioning, and repeated at regular intervals during normal operation as identified by the DoE, including during liquids operation.

Regional Air Quality Impacts

Photochemical smog is not deemed to be a problem in the Greater Bunbury Region (WAPC, 2000). Smog modelling studies undertaken for the Peel Region, which is north of Bunbury concluded that the Peel Region will occasionally experience smog events due to the transport of pollutants from the Perth region. However as the Kemerton region is a further 100km south, it can be assumed that smog entering the Bunbury region from Perth would be less than that reaching the Peel region and that any smog from emissions from the Bunbury region would be highly unlikely to reach Perth (WAPC, 2000).

The relative potential for smog can also be gauged by comparing the emissions of the major smog forming substances; oxides of nitrogen and non-methane volatile organic compounds from the Bunbury region to that of Perth. It is considered that the power station options would have a minor impact on existing low levels of smog as:

- Present emissions of NO_x from Kemerton are 7.68g/s, which is 0.38% of Perth anthropogenic emissions (motor vehicles and industry etc) of around 2,000g/s (DEP, 2002), with emissions of volatile organic compounds estimated at 0.1g/s compared to 1,700g/s for Perth (0.006%);

- Emissions from other industry in the Bunbury region are negligible (excluding consideration of more distant sources at Wagerup and Worsley); and

- The power station would emit 39g/s and 110g/s of NO_x when operating on gas or distillate which are 1.95 % and 5.5% of Perth emissions. For non-methane VOC's the power station would emit minor emissions.

Dust

The following mitigation measures are proposed to limit dust impacts during construction and operation:

Unsealed roads and exposed areas will be regularly watered down to minimise dust lift-off.

Permanent access roads will be sealed.

General housekeeping practices will be undertaken to ensure there is no accumulation of waste materials within the plant site that may generate dust

Areas of the site that are disturbed during the construction phase and that will no longer be accessed during operation will be rehabilitated with Blue Gums or native vegetation. Accordingly, the rehabilitated site should produce no dust sources. Procedures will be put in place to prevent unauthorised access to rehabilitated areas to enhance the success of regrowth.

Dust emissions will be monitored on a regular basis through visual inspections of disturbed and open areas.

Nearby landusers will be advised of appropriate contacts that will field and address any valid dust complaints.

Ambient dust monitoring will not be conducted unless dust is determined to be an issue at the site boundary.
Implementation of the Contractor's HSE Management System (during construction) and TSKT HSE Management System (during operation) for all aspects of the proposal will ensure environmental management to an acceptable standard.

A Dust Management Plan has been developed as a component of the broader CEMP. Performance criteria for dust management dictated in the CEMP encompasses

application of EPA Policies, Guidelines and Criteria for EIA No. 18, *Air Quality Impacts from Land Development Sites* (EPA, 2000b) during construction of the plant. The proposed mitigation measures presented above are also prescribed in the CEMP, and will be implemented by the Construction Contractor.

7.3.4 Air Toxics

The US EPA Rule (National Emission Standards for Hazardous Air Pollutants for Stationary Combustion Turbines) was promulgated in 29 August 2003 (Appendix 5, Addendum). This rule has yet to be ratified by the US Congress and the US Senate before it enters the US Federal Register. The US EPA Rule is aimed at reducing air toxics (such as formaldehyde, acetaldehyde, toluene, xylenes and benzene) from new gas turbines and expects that either carbon monoxide catalytic oxidation systems or other means of controlling emissions are installed to comply with the formaldehyde emission limit of 91ppb at the stack exit plane. The rule is to apply to major sources that are defined as those that emit more than 10 ton per year of a single Hazardous Air Pollutant (HAP) or 25 ton per year of all HAPs. In the Fact Sheet issued by the US EPA (Appendix 5, Addendum), they observed that nine gas turbines per year over the next five years (total 45) out of 218 new gas turbines during the period (page 134, US EPA, 2003a) would be affected by the Rule for a total cost of $US 143 M to remove a total of 98 tons of formaldehyde per year by the fifth year.

The 130 MW gas turbines at Kemerton power station operate at approximately 80ppb formaldehyde i.e less than the proposed US EPA Rule.

An assessment of the air toxics from the proposed Kemerton Power Station indicates that:

- The US EPA emission factors for gas turbines without HAPs control are unreliable and significantly biased towards very small machines running at low loads. Emission factors for the larger turbines as proposed for the 130 MW Kemerton Power Station units are significantly lower with the available tests indicating that most turbines of this size would be below the US EPA Rule (91ppb) when running at > 80% of full load. When running at lower loads between 50% and 80% of full load the available test data indicates that formaldehyde emissions from lean pre-mix burner technology based gas turbines may be at the rule level of 91ppb to higher than the rule by 2.6 times.

- Predicted ground level concentrations of air toxics from the proposed power station are low. Using a best estimate of the emissions it is considered that the highest relative concentrations outside the buffer will be for formaldehyde at around 0.02% of the NEPM standard and 0.1% of the Victorian design ground level concentration when running at 55% load. When operating on distillate the maximum ground level concentrations outside the buffer are also low with the relative highest being formaldehyde at 0.14% of the Victorian DGLC.

- On an annual basis it is estimated that the emissions will be around 0.31 tpa of formaldehyde and 0.315 tpa of toluene. This compares to emissions of 49 and 11.5 tpa from wood heaters in Collie alone and to 413 and 593 tpa from all sources in the southwest (excluding large industry).

- The US EPA Rule defines major sources of Hazardous Air Pollutants as those that either emit more than 10 ton per year (9.07 tonne per year) of a single pollutant or more than 25 tpa (22.68 tonne per year) of all pollutants combined. The Kemerton Power Station emits 2.08 tpa of any single pollutant (i.e 23% of the level where regulation would apply) and 6 tpa in total of all Hazardous Air Pollutants (or 26.5% of the level where regulation would apply). The Kemerton Power Station is therefore well below any criteria from either health or general environmental consideration.

Available data indicate that emission levels of HAP are lower for gas turbines than for other combustion sources. This is due to the high combustion temperatures reached during normal operation.. The emissions data also indicate that formaldehyde is the most significant HAP emitted from combustion turbines. For natural gas fired turbines, formaldehyde accounts for about two-thirds of the total HAP emissions. Polycyclic aromatic hydrocarbons (PAH), benzene, toluene, xylenes, and others account for the remaining one-third of HAP emissions. The formation of carbon monoxide during the combustion process is a good indication of the expected levels of HAP emissions. Similar to CO emissions, HAP emissions increase with reduced operating loads. Typically, combustion turbines operate under full loads for greater fuel efficiency, thereby minimizing the amount of CO and HAP emissions (USEPA, 2000)

Values calculated for CO, PAH and NMVOC for the Kemerton Power station are shown in Table 15.

TABLE 15
ESTIMATED ANNUAL QUANTITIES AND EMISSION RATES FOR CO, PAH AND NMVOC

Air emissions (2 units operating):	Natural gas	Liquid fuel
Carbon monoxide (CO)	21.7 g/s (70.3 tpa)	20.9g/s (7.54 tpa)
Polycyclic aromatic hydrocarbons (PAHs)	0.00087g/s (0.0028 tpa)	0.016g/s (0.0057 tpa)
Non-methane volatile organic compounds (NMVOCs)	0.83g/s (2.69 tpa)	0.16g/s (0.058 tpa)

7.3.5 Predicted Outcome

It is considered the measures identified will reduce air emissions arising from the operation of the plant to within NEPM criteria and be managed to meet the EPA's objective in relation to air emissions from KPS Operation.

Given the distance to dust sensitive premises and implementation of measures identified to reduce or control construction dust as part of the Dust Management Plan, it is believed that construction phase dust emissions can be managed to meet the EPA's objective.

7.4 Greenhouse Gas Emissions

7.4.1 EPA Objective

To ensure that potential greenhouse gas emissions emitted from proposed projects are adequately addressed and best practicable measures and technologies are used in Western Australia to minimise Western Australia's greenhouse gas emissions.

7.4.2 Potential Environmental Impacts

Since the pre-industrial era, human activities are known to have significantly increased the atmospheric concentrations of greenhouse gases. Scientific observations generally support the argument for changes in the global climate system that are linked to this increased atmospheric concentration of greenhouse gases. The Intergovernmental Panel on Climate Change (IPCC) estimates that the global average surface temperature increased by about 0.6°C over the 20th century, and that most of the observed warming over the past 50 years is likely to be attributable to human activities (IPCC, 2001). The main contributing greenhouse gases are carbon dioxide, methane, nitrous oxide and ozone. Other greenhouse gases covered by the Kyoto Protocol to the United Nations Framework Convention on Climate Change are hydrofluorocarbons, perfluorocarbons and sulphur hexafluoride. Australia has ratified the Framework Convention but not the Kyoto Protocol (Environ, 2002).

A comprehensive discussion of greenhouse gas considerations is presented in the SER (WPC, 2002) for this project. Greenhouse impacts were discussed in relation to the SWIS as a whole rather than for an isolated case such as the Kemerton Power Station, given its global implications, and is most appropriately managed as a component of a regional and industry-wide strategy.

The Greenhouse review contained in the SER presented the following summary of the changes in the greenhouse gas emissions specifically related to Western Power's Power Procurement Program and plant retirement/replacement (WPC, 2002).

- Greenhouse gas emissions associated with electricity produced into the SWIS (both generated by Western Power and purchased by Western Power from independent producers) were 9.079Mtpa of CO_2 equivalent in 1990.

- By 2000 this had increased by 20% to 10.935Mtpa. This increase was not proportional with electricity demand on the SWIS which increased by 33% on 1990.

- The greenhouse gas emission rate for electricity supplied into the SWIS (measured as carbon intensity over that time) has fallen from 0.98 tonnes CO_2e/MWh in 1990 to 0.89 in 2000 (a decrease of 9%), largely due to increased sourcing of electricity from high efficiency cogeneration plant and the overall increased penetration of gas-fired generation into the supply portfolio.

- This reduced carbon intensity represents a saving of over 1Mtpa of CO2e in 2000 compared to producing the electricity at the 1990 intensity.

Based on two scenarios for power procurement (as detailed in Section 3.5.4.2.1 of WPC, 2002), the SWIS carbon intensity was predicted to continue to decrease to either 0.70 or 0.76 tonnes CO2e/MWh by 2010. This is a reduction of 29 or 22% respectively from the 1990 carbon intensity of 0.98 tonnes CO2e/MWh. This is despite a predicted growth in electricity demand between 1990 and 2010 of approximately 76% (WPC, 2002).

The calculations presented in the Strategic Environmental Review (WPC, 2002), though only indicative, illustrate the impact that coal-fired power generation would be the least preferred from a greenhouse perspective taking into account greenhouse emissions at the generating plant site. Notwithstanding, the arguments for Western Australia to maintain coal-fired power generation in the suite of power supply options, most importantly the need to maintain some diversity of energy sources to ensure security of power supply and cost competitiveness, are not ignored.

Table 16 compares the thermal efficiency and greenhouse gas emissions intensity of a range of conventional power generation plants in WA, with the 2000 emissions intensity for the SWIS.

TABLE 16
COMPARISON OF GREENHOUSE GAS EMISSIONS FROM CONVENTIONAL POWER GENERATION PLANT (ADAPTED FROM TABLE 3-1 OF WPC, 2002)

Power Station	Fuel	Typical Capacity Factor	kg CO2-e/MWhr (Sent Out)
Peaking Plant			
Kemerton Power Station	Gas/Liquid Fuel	10%	Gas 648.1 Ultra Low Sulphur Diesel 843.1
Pinjar	Gas	8%	700
Typical New Gas-fired Open Cycle	Gas	10%	700
Mid Merit			
Muja A/B	Coal	53%	1,205
Kwinana B	Gas	21%	610
Typical New Gas-fired Combined Cycle	Gas	50%	400
Base Load			
Muja C/D	Coal	73%	1,030
Collie Power Station	Coal	79%	950
Cockburn 1	Gas	85%	405
Western Power Regional ReciprocatingEngines	Liquid Fuel	80%	Typical 750 Lowest 675
Typical New Coal-fired Power Station	Coal	85%	900
Typical New Gas-fired Combined Cycle	Gas	85%	400
South West Interconnected Grid	All	43%	890

Note:
1) Source: Table 3-1, Kemerton Power Station Strategic Environmental Review (WPC, 2002)
2) A value of 0.7 tonnes CO_{2e}/MWh for the new open cycle plant instead of a typical value of 0.6 tonnes CO_{2e}/MWh was used to account for the lower efficiency that results when running at part load, typical of peaking plant.

Overall Greenhouse Impact of the Kemerton Power Station

Gas will be the major fuel used. Ultra low sulphur diesel will be available as back-up fuel if gas pipeline pressures in the area are too low for the power station to use. Liquid fuels are anticipated to be in use for a maximum 100 hours annually. Lower $CO_{2\text{-}e}$ per unit energy is produced on gas (natural gas produces about 62% of distillate).

The principal greenhouse gas emitted by the proposed KPS will be carbon dioxide (CO_2). The quantities of nitrous oxide produced are extremely small (< 2 parts per million parts of CO_2). Nevertheless their effect is included together with unburnt methane and therefore the greenhouse gas emissions are expressed in terms of carbon dioxide equivalent emissions.

Table 17 presents a summary of the overall greenhouse emissions impact of the project. The estimated annual averages presented assume an overall load factor for the gas turbines of approximately 10% and an average current emissions intensity of the SWIS of 890 kg $CO_{2\text{-}e}$/MWh, compared to this project's 648.1 kg $CO_{2\text{-}e}$/MWh whilst operating on gas. Whilst the plant is operating on Ultra Low Sulphur diesel (at an estimated 100 hours per year worse case operating scenario), the greenhouse emission intensity was determined to be 843.1 kg $CO_{2\text{-}e}$/MWh. Greenhouse emission intensities were determined in accordance with Technical Guidelines – AGO Generator Efficiency Standards (AGO, 2001). At 50% load factor using gas, the carbon dioxide equivalent is approximately 25% higher than at full load, or 806 kg CO_2e/MWh.

Diesel fuel is provided only as a back-up fuel to gas. If gas is unavailable at Kemerton, other plants contracted to WPC would most likely fulfill the spinning reserve requirement. Operation of KPS on diesel in spinning reserve would be an extremely unlikely event.

TABLE 17
CALCULATED GREENHOUSE EMISSION INTENSITIES
KEMERTON POWER STATION OPEN CYCLE GAS TURBINE
(Ten Percent Capacity Factor)

Fuel	Operating State		SWIS average current emissions intensity of the SWIS
	Peaking kg CO_2e/MWh	Spinning Reserve kg CO_2e/MWh	
Gas	**648.1**	**806**	**890**
Ultra Low Sulphur Diesel	**843.1**	**0**	
Energy generated by KPS		GWh	229
Natural gas consumption by KPS		PJ/yr	2.87
Gross carbon dioxide equivalent emissions by KPS Open Cycle GT units		Tonnes $CO_{2\text{-}e}$/yr	148,190
Emissions from equivalent quantity of power generated by current SWIS assets.		Tonnes $CO_{2\text{-}e}$/yr	203,490
Emissions avoided from project's electricity generation compared to current SWIS.		**Tonnes $CO_{2\text{-}e}$/yr**	55,300

The estimations demonstrate that regardless of the operating state or fuel used for the KPS, the predicted greenhouse emission intensities are at least 5% lower than that for the current SWIS average. Over the expected annual operating regime where an estimated capacity factor of approximately 10% is expected, CO_{2-e} emission reduction of between approximately 25,000 to 55,300tpa could be achieved. The actual reduction will depend upon the operating regime

7.4.3 Environmental Management and Mitigation

Consistent with commitments presented in the SER (WPC, 2002), the following management strategies will be implemented to manage Greenhouse emissions from the power station:

- TSKT will become a signatory to the Greenhouse Challenge. The Greenhouse Challenge will include the preparation of a Greenhouse Gas Management Strategy under the Greenhouse Challenge Program, with annual reporting of emissions and progress against agreed abatement actions to the Australian Greenhouse Office.

- Best practicable thermal efficiency design and operating goals will be developed and worked towards.

- Implementation of scheduled maintenance procedures to ensure optimal plant performance.

In the event that the actual greenhouse intensity for an existing plant is outside expected performance range options for greenhouse efficiency improvement will be identified and evaluated in accordance with Australian Greenhouse Office Technical Guidelines for Generator Efficiency Standards v1.2 (AGO, 2001). The process for selecting and agreeing on greenhouse efficiency improvements will involve the following key steps:

- Identify a range of greenhouse efficiency options and associated cost or benefit. For each option derive the cost/t of CO_2 equivalent avoided.

- Undertake a detailed technical and economic analysis of each option.

- Establish preferred option(s), (progressively) implement and document the anticipated reduction in greenhouse intensity.

WPC initiatives presented in the SER (WPC, 2002) to pursue a range of initiatives in renewable energy, including wind farms and biomass conversion are supported. Notwithstanding, given the purpose of the proposed KPS and the quantity and reliability of the power supply requirements conventional fossil fuel power stations are the only viable options for the SWIS Power Procurement Process.

Given that coal, gas and liquid fuels are the only viable energy options in Western Australia, the use of gas as a primary fuel for the Kemerton gas-fired Power Station will result in the least possible greenhouse emissions as gas has the lowest greenhouse intensity, followed by liquid fuels and then coal. The predominant use of gas for this

project is consistent with maintaining the downward trend in carbon intensity in electricity generation.

7.4.4 Predicted Outcome

Combustion of fossil fuels will result in output of greenhouse gases, principally CO_2. However, the technology and fuel proposed will ensure that the rate of greenhouse gases emitted per unit of energy is low and meets the EPA's objectives.

7.5 Surface and Groundwater Quality

7.5.1 EPA Objective

To retain the integrity, functions and environmental values of protected wetlands, and to ensure that EPP lakes are protected and their key ecological functions are maintained.

To maintain the integrity, functions and environmental values of rivers and ephemeral streams, and to ensure that alterations to surface drainage do not adversely impact native vegetation.

To maintain the quality of groundwater so that existing and potential uses, including ecosystem maintenance, are protected.

7.5.2 Potential Environmental Impacts

The Kemerton Industrial Park is underlain by an unconfined superficial aquifer. This aquifer is further underlain with the confined aquifers (by increasing depth) of the Leederville Formation and the Cockleshell Gully Formation. The depth to the water table over much of the area is less than 2m. Groundwater in the superficial aquifer ranges in salinity from 100 to 8,500mg/L TDS. As shallow groundwater flow is generally towards the west, there is potential for pollutants in groundwater to migrate to wetlands and damplands, and eventually enter Leschenault Inlet.

Impacts on Surface Water

There are also a number of environmentally significant wetlands in the vicinity of the proposed power station site that are fed by surface water runoff and shallow groundwater flows.

A drainage line traverses a portion of the proposed site. Although there would be no direct discharge of wastewater or contaminated stormwater into wetlands or the Wellesley River or its tributaries, there is the potential for contaminants to be transported to the Leschenault Estuary and other wetlands via one or all of the following pathways:

- Uncontained stormwater from the site running into drainage channels that reaches the Wellesley River;

- Leaching of contaminants into the groundwater, which then is expressed within wetlands or the Wellesley River or its tributaries; and

- Accidental leakage or spillage of wastewater, hydrocarbons or other hazardous materials running directly into wetlands, the Wellesley River or the Leschenault Estuary.

As part of construction phase, earthworks and surface contouring will be undertaken at the site. These activities will have the potential to alter the existing surface water flows within and outside the site. In particular, realignment of an existing man made drain line that passes through the site will be undertaken to divert it around the site plant footprint. The SER (WPC, 2002) raised a number of relevant impacts on surface water that could potentially result from project construction:

- Increased erosion and sediment transport as a result of diversion of upstream surface runoff around the site;

- Soil deposition down gradient of project site;

- Increased surface run-off volumes due to the creation of additional hard surfaces; and

- Accidental release of hydrocarbons (fuel, lubricants and oil) required for normal earthmoving equipment during construction.

In addition, potential sources of pollutants to surface and groundwater during plant operation include:

- Potentially contaminated stormwater containing sediment or hydrocarbons from power station facilities;

- Hydrocarbons (such as backup fuel during operation, lubricants and oils) transport, storage, handling and disposal;

- Sewerage and grey water;

- Transport, storage, handling and disposal of chemical agents and cleaners; and

- Solid wastes.

Impacts on Groundwater Flow Due to Foundations

The main turbine and generator foundation for the power station is likely to extend to a depth of 2m below ground surface, with a surface area of 18m x 6m ($108m^2$). There will also be a number of piers and corner footings extending to a depth of up to 6m, with a surface area of about 1 m^2. Advice was sought from specialist hydrogeological consultants in relation to the possible influence of foundations. This advice is provided as Appendix 6.

The local groundwater flow gradient across the site is about 0.001, indicating a fairly transmissive aquifer. The superficial aquifer in the area is approximately 28m thick, with an average depth to water of about 2m (ranging between 1 and 3m). As such, installation of foundations to a depth of 2m, and piers with a small areal projection and up to a depth of 6m below ground level will not significantly influence groundwater flow directions in the area (Appendix 6).

Impacts on Groundwater from Spillage of Hazardous Liquid Chemicals including Diesel

A bunded bulk storage tank with capacity of 1.5ML will be located on the site. This will serve as storage of back up liquid fuel in the event that there is insufficient pressure in gas supply lines to allow full operation of the power station. As previously discussed, there is potential for loss of liquid hydrocarbons to the environment due to spillage during tank loading or failure of connections, valves, transfer lines or the tank itself, if containment measures are not taken.

The Water and Rivers Commission Position Statement "Wetlands" (Water and Rivers Commission, 2001) recommends a minimum buffer width of 200m for the protection of wetlands from pollution sources. The 1.5 ML bulk fuel tank is within 200m of a wetland to the north of the site (classed as Conservation Category by the Water and Rivers Commission) and could be a major potential source of pollutants in the event of a catastrophic tank failure or major spillage if containment was not employed TSKT has put in place safeguards and controls in the facility design to ensure that potential impacts on any nearby wetlands is prevented during operation of the plant.

The 1.5ML bulk fuel tank has been designed to ensure zero potential for export of hydrocarbons to surface or groundwaters. These measures include appropriate bunding to contain the quantity of fuel plus 10% and bund wall heights to capture jetted fuel ejected from tanks splits, plus lining with impervious concrete designed to appropriate Australian Standards of containment and fire fighting (see Section 7.8.3).

In addition, the mitigation measures proposed in Sections 7.5.3, 7.7.3 and 7.8.3 will further reduce any potential for impacts on the nearby wetlands.

The site's natural level is approximately 1 m above the annual average maximum ground water levels. Fill will be brought to the site for areas requiring plant to be constructed to ensure local flooding does not inundate the facility. Site levels where inundation of plant is to be prevented will be brought to a level of 300 mm above the lowest point on Treasure Road which runs north to south on the eastern side of the site. This will prevent inundation from water dammed by the road.

Aquaterra (2002) recommendations for distances between pad and finished floor levels and average annual maximum ground water levels of 0.5 m will be met.

The fate of hydrocarbons in groundwater is discussed further in Section 7.8.2.

7.5.3 Environmental Management and Mitigation

Consistent with commitments in the Strategic Environmental Review (WPC, 2002), drainage and hydrology impacts will be managed in accordance with the Environmental Protection Authority (EPA) Draft Guidance No. 26 '*Management of Surface Run-Off from Industrial and Commercial Sites*' (EPA, 1999).

Additionally, surface and groundwater management will be consistent and in accordance with requirements of the Leschenault Inlet Management Authority (LIMA) for the protection of the Leschenault Estuary. In particular, management strategies will be consistent with the Leschenault Waterways Management Programme (Waterways Commission, 1992) and LIMA policy of no net increase of nutrient discharge within the Management Area.

Construction

In accordance with commitments made in the Strategic Environmental Review (WPC, 2002), the following monitoring strategies will be undertaken during the construction of the power station:

- Preparation of a Stormwater Management section as a component of the broader Surface Water Management Plan in the CEMP. This Management Plan will incorporate the construction phase mitigation measures proposed below.

- Redirection of storm waters around the site whilst preventing obstruction of natural surface water flows and drainage. Specifically, the agricultural drainage channel will be intercepted and diverted around the plant site (refer Figure 4). The drain will be reconstructed with the same cross section and depth as the existing drain, so as not to change the flow regime nor to promote the export of groundwater that may contain pollutants such as nutrients from the site in shallow depth to groundwater areas, prior to discharging them into Wellesley River.

- A clean surface water drainage system would be provided comprising open channels, pipes and sedimentation trap(s). Clean surface runoff would be diverted around the construction site and discharged into sediment traps prior to release into the environment.

- Appropriate erosion control methodologies such as sediment traps, drain design and energy dissipating structures will be applied to control the velocity of flows in unlined open drains to prevent scour.

- Management of storm waters such that contaminants are removed prior to discharge from the site.

- Implementation of recovery procedures for chemical and hydrocarbon spillages.

- Drainage and water collection structures will be inspected on a regular basis and properly maintained.

- Sewerage and grey water will be directed to temporary sealed treatment and storage facilities ('Portaloos') or systems designed to accommodate and treat peak volumes of effluent generated during the construction phase. Treatment systems will be established and operated in accordance with Health Department and Shire of Harvey requirements.

- A groundwater monitoring network will be installed and a groundwater monitoring program implemented that would be aimed at establishing baseline groundwater quality at the site, and to detect any changes that may occur during the construction period. The location of monitoring bores will be sited such that these may be utilised to measure operational groundwater impacts. Accordingly, the development of the complete monitoring network will be conducted following finalisation of the power station's as-built configuration.

- A surface water quality monitoring program will be implemented to reflect change (if any) in surface (drain) water quality arising from implementation of this proposal.

- The performance of drainage systems and the Stormwater Management section of the Surface Water Management Plan would be monitored and formally audited on at least a biannual basis during construction.

The building foundations for the development are typically up to 2m deep with the depth to water table ranging from 1 to 3m, so much of the foundation will be below the water table. Accordingly there is a likelihood that dewatering will be required to proceed with earthworks and construction. The proposed management and disposal of dewatering effluent in an acceptable manner will be presented in a Dewatering Management Plan developed as part of the broader Construction Environmental Management Plan. The Dewatering Management Plan addresses requirements of the Water and Rivers Commission Water Quality Protection Note *Dewatering of Soil* (Waters and Rivers Commission, 2003), and incorporates the following mitigation measures to ensure that impacts from dewatering are addressed prior to commencement of dewatering activities:

- defined commencement date, duration, anticipated quantity and frequency of discharge and the measures that will be used to minimise this volume;

- assessment of the radius of influence and profile of any watertable drawdown cone (including threat to any existing structures due to settling);

- predictions of the typical and worst case quality of water to be discharged;

- estimates of the typical quality of water to be discharged and the worst case water quality;

- details of an agreed monitoring program for ensuring the quality of water discharged to the environment will meet agreed targets;

- presents options for treatment if needed, such as settling basins, chemical dosing, aeration for iron removal, etc;

- measures to ensure that de-watering activities do not result in adverse impacts arising from changes to the groundwater table below neighbouring properties, and /or the water quality or flow regime of surface water bodies (including wetlands); and

- procedures for reporting of Incidents and Exceedances.

The final method of disposal of dewatering effluent will be assessed as part of the detailed design phase for the project, but may include reinjection or discharge to a soakage pit. This will be subject to the quality and quantity of effluent, as well as requirements of Local Government Act 1995 By-laws, and requirements of the Department of Environment. Discharge to existing wetlands is considered to be the least preferred disposal option. Proposed disposal methodologies will be reviewed and presented as part of the final CEMP to be submitted to the Department of Environment in support of an application for a Works Approval.

Operation

Power Station operational water requirements will be limited to drinking water and sanitary requirements. Drinking water will be bottled water and water for amenities and ablutions will be trucked in. Trucked water for amenities allows a high turn over and maintenance of good quality water suitable for amenities. Water will also be utilised for dust suppression during construction. During operation, the site will be designed for zero process water discharge. No process waters will be required for plant operation other than for domestic purposes and fire fighting.

In accordance with design commitments presented in the Strategic Environmental Review (WPC, 2002), during the plant operation phase clean water will be separated from potentially contaminated stormwater as the primary method of environmental impact mitigation. Other measures to be implemented will include the following:

- All infrastructure which could potentially leak or spill contaminating substances would be sealed and bunded and the stormwater would be diverted into a lined storage area (or sump) via a sediment trap(s) and oily water separator(s). Only water determined to be uncontaminated (with respect to applicable water quality criteria) will be discharged into the 'clean' surface water drainage system. If the stormwater is found to be contaminated, measures will be taken to re-treat the stormwater to acceptable levels prior to discharge or the stormwater would be transported off-site for treatment and disposal by a licenced contractor.

- The 1.5ML bulk fuel tank has been designed to ensure zero potential for export of hydrocarbons to surface or groundwaters. Specific information on measures to mitigate potential impacts associated with the storage and handling of 1.5ML of liquid fuel on site is presented in Section 7.8.3.

- Implementation of water sensitive design principals such as the collection of stormwater runoff on site in rainwater tanks for re-use later as a water supply source. Rain water from the Office block roof shall be directed to the raw water storage. Raw water is used for firefighting and plant wash down. Other water sensitive design principles that may be incorporated into the development where

possible include infiltration of excess stormwater runoff from Turbine building roofs into the soil near its source via soakwells to promote additional recharge into the aquifer.

- Implementation of traditional design principals where the rates of surface runoff significantly exceed the infiltration rate such as using roads, pipes and open channels to discharge stormwaters to receiving water bodies.

- Sewerage and grey water will be directed to treatment systems designed to accommodate, treat and if appropriate store peak volumes of effluent generated during the construction phase. Treatment systems will be established and operated in accordance with Health Department and Shire of Harvey requirements.

- A surface water monitoring programme will be established and implemented to assess potential impacts from surface water discharges as a result of site operations. Water monitoring parameters will include pH, Total Suspended Solids turbidity, metals, Total Petroleum Hydrocarbons, nutrients and water volumes.

- A groundwater monitoring programme will be established and implemented to determine potential changes in groundwater quality as a result of site operations. As previously discussed, the location of monitoring bores will be determined following finalisation of the power station's as-built configuration. In principle, monitoring bores will be installed on the power station boundary (between the power station and the nearest wetland), on the inferred up hydraulic gradient side (to monitor background groundwater quality) and on the inferred downgradient side of potential contaminant sources (fuel storage and transfer areas, wash down areas and sumps, oil/water separators, and other chemical storage or handling areas).

- Groundwater monitoring parameters will include pH, Total Dissolved Solids, Total Petroleum Hydrocarbons and nutrients.

The Contractor's HSE Management System will be implemented on all facets of the construction. Similarly, the Operator will implement its HSE Management System for the subsequent operations phase. In relation to transport and storage of flammable or dangerous chemicals, activities will comply with the requirements of the DoIR.

Additional management strategies for the prevention of contamination of surface water and groundwater during construction and operation are detailed in Sections 7.7.3 and 7.8.3.

7.5.4 Predicted Outcome

It is considered the measures identified will reduce or contain contaminant losses within the plant such that losses to surface or groundwater can be managed to meet the EPA's objective in relation to this factor.

7.6 Noise and Vibration

7.6.1 EPA Objective

To protect the amenity of nearby residents from noise impacts resulting from activities associated with the proposal by ensuring that noise levels meet the *Environmental Protection (Noise) Regulations 1997 (As Amended).*

7.6.2 Potential Environmental Impacts

The *Environmental Protection (Noise) Regulations 1997 (As Amended)* stipulate the allowable noise levels that can be received at any noise sensitive premises from another premises. The allowable noise level is determined by the calculation of an influencing factor, which is added to the baseline criteria set out in Table 1 of the *Regulations*. However, under the Regulations noise emissions for the Kemerton Industrial Park have an adjustment of +5 dB(A) to the influencing factor. The Regulations under Section 5, subclause (5) of Schedule 3 state:

"Where a noise emission from any premises located within the boundaries of the area known as the Kemerton Industrial Park Policy Area, as specified in the Shire of Harvey District Planning Scheme No. 1, is assessed, an adjustment of 5 dB(A) is to be added to the influencing factor determined under subclause (1) at the point of reception of the noise emission in respect of any period between –

a) 0900 hours and 1900 hours on Sunday or public holiday;
b) 1900 hours and 2200 hours on any day;
c) 2200 hours and 0700 hours on Monday to Saturday inclusive; and
d) *2200 and 0900 hours on a Sunday or public holiday."*

Therefore, the assigned noise level at the various times of the day would be as listed in Table 18.

TABLE 18
ASSIGNED NOISE LEVELS AT RESIDENCE

Time of Day	Assigned Noise Level		
	L_{A10}	L_{A1}	L_{max}
0700 - 1900 hours - Monday to Saturday	50	60	70
0900 - 1900 hours - Sunday & Public Holidays	45	55	70
1900 - 2200 hours - All Days	45	55	60
2200 - 0700 hours - Monday to Saturday	40	50	60
2200 - 0900 hours - Sunday & Public Holidays	40	50	60

Note: The L_{A10} noise level is the noise that is exceeded for 10% of the time.
The L_{A1} noise level is the noise that is exceeded for 1% of the time.
The L_{Amax} noise level is the maximum noise level recorded.

In accordance with Regulation 7, noise emissions from the power station would be considered as not "significantly contributing" to any exceedance of the Regulatory criteria assigned level at any noise sensitive premises, if the noise received at the premises is 5 dB(A) below the assigned noise level. Therefore, to comply with

Regulation 7, noise emissions due to the Power Station at the nearest noise sensitive premises would need to be 35 dB(A) or less.

The assigned noise levels are also conditional on no annoying characteristics existing such as tonal components etc. If such characteristics exist and cannot be practicably removed, then any measured level is adjusted accordingly. The adjustments that apply are shown in the Table 19.

TABLE 19
NOISE ADJUSTMENTS

Tonality	Modulation	Impulsiveness
+5 dB	+5dB	+10dB

The nearest noise sensitive premises to the proposed site is approximately 1.8 km to the west of the power station.

Noise can be generated at the proposed site during construction and during operation. Generally speaking, unacceptable noise levels can that cause sleep disturbance, annoyance and also adverse health effects.

Construction activities will occur during daylight hours and principally during weekdays. Standard construction plant and earthmoving equipment will be utilised, and will be the main source of noise emissions during construction. No blasting will be required.

Gas turbine and generator sets would be the main source of noise from the power station during operation.

During operation, vibration is almost undetectable and is not expected to be an issue given the proposed plant design, which relies on accurate balancing of rotors and prevention of excessive vibration to operate effectively. Vibration is constantly monitored in gas turbines because of the significant damage that can occur. Extremely low levels of vibration are required for the plant to operate and achieve 25 years of high performance. Early detection of imperceptible changes in vibration finger prints is a key maintenance indicator. Given the distance to sensitive receptors and the nature of local geology that is not conducive to transmission of vibration, the potential for vibration impacts during the construction and operation phase is deemed to be insignificant.

Noise assessment and modelling was conducted to assess the likely noise impacts from the proposed power station. The modelling study is presented as Appendix 7. Determination of the noise emission propagation from the Power Station was facilitated using an environmental noise modelling computer program, "SoundPlan" Version 6.0. Both overall noise level contour plots (far field) and single point (near field) calculations were performed and are presented as Figures 10 and 11 respectively.

Input data for computer modelling included:

- Topographical data.
- EPA standard weather condition for the night period (see Table 4).
- Octave band sound power levels based on current design data for the Kemerton Power Station.

Weather conditions for the modelling were generally in accordance with the Environmental Protection Authority's *"Draft Guidance for Assessment of Environmental Factors No.8 - Environmental Noise"* for the night period and as listed in the Table 20 below.

TABLE 20
METEOROLOGICAL CONDITIONS APPLIED IN NOISE MODELLING

Condition	Night Period
Temperature	15 °C
Relative humidity	50%
Pasquil Stability	Class E
Wind speed	3 m/s

With the noise control included in the design of the power station, noise emissions from the power station would not be tonal and no penalties/adjustments would be applied to the calculated noise level.

The predicted overall noise levels at the boundary of the power station and the closest point at the boundary of the Kemerton Industrial Park are listed in Table 21 below. Noise contour plots are attached as Figures 10 and 11.

TABLE 21
RESULTANT NOISE LEVELS AT POWER STATION SITE BOUNDARY

Location	Calculated Noise Level (dB(A))
Northern Boundary	57
Eastern Boundary	52
Southern Boundary	60
Western Boundary	50
Closest Boundary of Kemerton Industrial Park	28

The closest noise sensitive residence is located approximately 1.8km to the northwest of the power station. Based on noise modelling conducted, the predicted overall noise at this premises will be less than 32 dB(A).

Noise received at the boundary of the site would comply with Regulatory requirements of 60 dB(A) during operation.

Noise emissions from the power station would comply with regulatory requirements at all residences located outside the boundary of the Kemerton Industrial Park at all times. The resultant levels within sensitive areas would be less than 35 dB(A) and therefore, noise emissions from the power station would be considered as NOT

"significantly contributing" to any excess at a residence and would be deemed to comply with the *Environmental Protection (Noise) Regulations 1997(As Amended)* at all times (Appendix 7).

Noise emissions from the proposed power station are predicted to be well below ambient noise levels at residences of concern and hence intrusive characteristics will not be an issue.

7.6.3 Environmental Management and Mitigation

Noise emissions at the nearest existing residences, will be managed by engineering design methods and installation of required noise attenuation measures to comply with the *Environmental Protection (Noise) Regulations 1997 (as Amended)* at all times, including achieving not more than 60dB(A) at the boundary.

Sound pressure levels have been determined for the operating plant, and the technology supplier has made a commitment to attenuate the plant such that the noise at the station boundary will not exceed 60dB(A). This aspect is evident in noise modelling completed for the power station (Appendix 7)

The power station will not contribute significantly to noise at the nearest noise sensitive premises, and on a cumulative basis, when combined with the potential future industry mix as determined for the Kemerton Expansion Study. Noise levels are predicted to achieve the allowable noise criteria at the boundary of the power station buffer zone.

Notwithstanding, a noise management component to the CEMP for the project will be developed and implemented, to include:

- Acceptance testing from equipment suppliers;
- Noise management procedures for construction and operation;
- Retention of vegetation (plantation Blue Gums) where practicable to assist in noise mitigation;
- Noise monitoring as required in Environmental Protection Licence conditions issued by the DoE for operation; and
- Use of alternative noise attenuation packages to provide enhanced levels of noise control to meet boundary level noise limits if required.

7.6.4 Predicted Outcome

It is considered that acoustical treatment measures incorporated during construction and operation (if necessary) will reduce noise levels in the surrounding environment to meet the EPA's objective in relation to this factor.

7.7 Liquid and Solid Wastes

7.7.1 EPA Objective

Ensure that the generation of all wastes follows consideration of waste reduction in accordance with the waste hierarchy of reduction, reuse, recycling, treatment, and disposal.

7.7.2 Potential Environmental Impacts

The construction and operation of the proposed power station will result in the generation of minor quantities of solid waste (<10tpa) and domestic waste (peaking at 4kL/day during construction and up to 0.2kL/day during operation).

Compressor blade washing produces approximately 2kL of liquid waste three times per year. (see Section 2.4.4) that will be disposed of off-site by a licensed contractor.

A waste oil tank for collection and storage of waste oil from the oil separator pit will be constructed and bunded in accordance with Department of Industry and Resources (DoIR) requirements, with oils collected for disposal offsite by a licensed contractor.

Solid waste produced during construction and operations will include wood, paper and domestic rubbish.

The inappropriate storage and disposal of wastes can lead to environmental problems including:

- the contamination of ground or surface waters;
- flammable hazards;
- the creation of nuisance conditions such as offensive odours or wind-blown waste; and
- encouragement of vermin such as feral cats and foxes.

7.7.3 Environmental Management and Mitigation

The following mitigation measures are proposed to limit impacts arising from poor waste management practices during construction and operation:

- No waste will be permanently stored or disposed of on the premises.
- No waste will be burnt at any time.
- The requirements of the DoE and Regulations in relation to the management of wastes including application of the waste hierarchy (Prevention, Reduction, Reuse/Recycling, Disposal) will be complied with at all times.
- Solvents and hazardous liquids will be collected and removed from the site for recycling or disposal in an approved liquids disposal area. The area will be suitably bunded and of an impervious nature to prevent soil and groundwater contamination in the event of accidental spillage.

- A dedicated scrap metal and laydown yard will be established to temporarily store materials that may be recycled or made available for scrap metal merchants.

- Inert waste materials generated during construction and operation that are not suitable for recycling will be disposed at the nearby Kemerton landfill in accordance with the Health Dept of WA and Landfill Board requirements.

- Putrescible/cribroom wastes (approximately $10m^3$ / year) will be deposited to landfill or reused as compost and mulch for landscaped gardens as appropriate.

- Implementation of the Contractor's HSE Management System on all facets of the construction.

- Implementation of the Operator's HSE Management System during operation.

- Production of a Waste Management Plan as a component of the broader Operation and CEMP to include each of the abovementioned mitigation measures.

- Education of employees in non-hazardous solid waste management.

The following management practices will be implemented to minimise the generation of hydrocarbon waste and to manage clean up and disposal during the construction phase of the project as well as during the operating life of the Plant:

- Use of absorbent materials to collect spillage.

- Use of spill capturing platforms for drum storage.

- Effective maintenance of all valves and piping systems installed to prevent the mixing of hydrocarbons with clean stormwater.

- Reuse and/or recycling of waste oil where possible.

- Appropriate storage of waste oil, prior to its collection by an authorised waste contractor, where it cannot be recycled.

- Storage and subsequent collection for off-site disposal of oily rags, used absorbent and similar materials.

The Water and Rivers Commission Position Statement "Wetlands" (Water and Rivers Commission, 2001) recommends a minimum buffer width of 200m for the protection of wetlands from pollution sources. The mitigation measures proposed for the management of solid and liquid wastes will ensure that there is zero potential for export of contaminants to surface or groundwaters that could impact on the nearby wetlands. Mitigation measures discussed in Sections 7.5.3 and 7.8.3 will further reduce any potential for impacts on the nearby wetlands.

The management of hydrocarbon waste will be included in the Waste Management Plans for construction and operational phase Environmental Management Plans for the project to manage waste from the site.

7.7.4 Predicted Outcome

It is considered that the application of accepted waste management practices during construction and plant operation will meet the EPA's objective in relation to this factor.

7.8 Hazardous Materials Management Including Hydrocarbons

7.8.1 EPA Objective

Design and construct (including bunding) in accordance with Australian Standards AS 1940 (Standards Australia 1993) and requirements of the DoIR's Dangerous Goods Division and the *Explosives and Dangerous Goods Act 1961* and Regulations (1992).

7.8.2 Potential Environmental Impacts

The operation of the power station would require the transportation, storage and handling of hydrocarbon products including liquid fuel (1.5 ML), lubricating oils (30 kL) and greases and degreasers. Small quantities of hazardous materials such as herbicides (approximately 50 L), detergents (approximately 20L) and small quantities of solvents may also be used and stored on- site. These are summarised in Table 22 below.

TABLE 22
HAZARDOUS MATERIAL INVENTORY

Material	Hazard	Quantities (Storage)
Natural Gas	Flammable	Consumption of 2.87PJ/annum
Liquid Fuel	Combustible	1.5ML
Lubricating Oils	Combustible	30kL
Cleaning Fluids	Flammable	20L
Paints and thinners	Combustible/Flammable	200L
Herbicides	Toxic/Poison	50L
Battery fluids	Corrosive	200L

Precise descriptions of the types and quantities of other hazardous materials likely to be used are not currently available, but will be presented as part of Works Approval supporting documentation.

As discussed in the Strategic Environmental Review (WPC, 2002), waste hydrocarbons (oils, grease, degreaser and fuels) would also be generated from workshops, plant areas where rotating equipment and lube oil systems are located, liquid fuel storage and filling areas, waste oil storage and vehicle washdown facilities.

The potential impacts associated with these activities include:

- discharge of hydrocarbons to the environment contaminating surface and ground waters, the atmosphere and soil;
- creation of acute and/or chronic toxic hazards; and
- creation of flammable or explosive hazards.

Fate Of Diesel In Groundwater Aquifers

Diesel spills contained within impermeable bunded compounds would be unlikely to reach the soil and the underlying aquifer given design requirements that will be in accordance with Australian Standards AS 1940 (Standards Australia 1993) and requirements of the DoIR's Dangerous Goods Division and the *Explosives and Dangerous Goods Act 1961* and Regulations (1992).

Available information indicates that the depth to groundwater in the vicinity of the power station may be between 1m and 3m below ground level and the superficial geology is permeable Bassendean sand with an estimated recharge potential of about 40%. On this basis it is considered that an accidental spill of diesel in the vicinity of the proposal area would be likely to impact on local groundwater quality (Appendix, 6).

In the event of a diesel spill it is anticipated that the time for diesel to travel from unsealed ground to the water table would be in the order of hours. Once diesel reaches the groundwater it does not dissolve readily into the groundwater. Diesel product generally persists in the aquifer as a separate phase (ie floating on the groundwater table) and would migrate under the influence of local groundwater gradients. Dissolved phase diesel component chemicals may persist in the aquifer for years, depending on the volume of the spill and aquifer characteristics (Appendix 6).

As discussed in Section 7.5.2, the Water and Rivers Commission Position Statement "Wetlands" (Water and Rivers Commission, 2001) recommends a minimum buffer width of 200m for the protection of wetlands from pollution sources. The 1.5 ML bulk fuel tank is within 200 m of a wetland to the north of the site (classed as Conservation Category by the Water and Rivers Commission) and could be a major potential source of pollutants in the event of a catastrophic tank failure or major spillage if containment was not employed.

On this basis, TSKT has put in place numerous safeguards and controls in the facility design to ensure that potential impacts on any nearby wetlands is prevented during operation of the plant. In essence, the 1.5ML bulk fuel tank has been designed to ensure zero potential for export of hydrocarbons to surface or groundwaters. These measures are discussed in detail in 7.8.3 below, and primarily includes the storage of all liquid hydrocarbons within an appropriately sized, impervious (concrete) bunded area designed in accordance with AS 1940 for *The Storage and Handling of Flammable and Combustible Liquids*. Similarly all pipework and connections will be located within impervious trenches, and any spillages will be captured and contained within impervious oil separator pits.

In addition, the mitigation measures proposed in Sections 7.5.3 and 7.7.3 will further reduce any potential for impacts on the nearby wetlands.

7.8.3 Environmental Management and Mitigation

The sensitive nature of the environment surrounding the power station and the proximity of the site to a nearby wetland has been a major consideration in the design of hydrocarbon storage and handling facilities at the site. The following mitigation measures are proposed to limit impacts arising from hydrocarbons and hazardous material storage during construction and operation:

- All fuel, lubricant and oil would be stored in bunded facilities in accordance with Australian Standards including *The Storage and Handling of Flammable and Combustible Liquids,* AS 1940. The bunded facilities will be constructed from impervious materials to ensure no export of contaminants to surface or groundwater.

- Minimisation, segregation and containment of areas that could be contaminated with hydrocarbons by the use of appropriate bunding and drainage systems. This would include refuelling areas, storage areas, vehicle washdown areas and workshops.

- Installation of oil interceptor traps/oil separators to remove hydrocarbons from areas that could be contaminated with hydrocarbons.

- All pipework and connections around hydrocarbon storage facilities will be placed within concrete trenches underlain with impervious membranes. The trenches will be covered to prevent ingress of rain or water. Detection systems will be installed to identify any change in pipeline pressures due to pipe failure or leakage.

- An inspection and maintenance schedule will be implemented to ensure that all equipment used on-site would be inspected to ensure it is not leaking fuel or oils to the environment.

- Regular housekeeping inspections will be undertaken during the construction and operation phase to ensure that the capacity of any hydrocarbon or hazardous material storage bunding is maintained through the removal of stormwater from bunds.

- Procedures would be developed to ensure all spills of hydrocarbon or hazardous materials would be contained where possible and immediately cleaned up. Spillage within impervious bunded areas will be directed to oily water separators pits capable of containing 35kL of liquid. There will be zero potential for hydrocarbons to be exported to natural surface or groundwater systems.

- In the event of a major diesel spillage, it is considered that recovery of diesel from the aquifer is a costly and time-consuming process and could take a period of weeks before the extent of the spill has been adequately delineated and an

appropriate diesel recovery system is designed and operating. Generally, it is reasonable to expect that the rate of recovery of free flowing diesel product from most aquifers is typically much less than 50% of the volume spilled. This is because the balance of the diesel is mostly adsorbed to soil, which should ideally be excavated as soon as possible after the spill occurred. Notwithstanding a Spill Response Procedure will be developed as part of the CEMP and will be promoted to suit operational activities. The Spill Response Procedure will prescribe immediate measures, responsibilities, communications, reporting and follow up actions that must be undertaken to prevent impacts on the environment including groundwater, surface water and local wetlands. In essence systems and procedures will be implemented to ensure no loss of hydrocarbons to the receiving environment.

- Hazardous materials would be stored and handled in accordance with guidance provided on relevant Material Safety Data Sheets and requirements of DoIR and relevant Regulations in relation to the management hazardous and flammable materials.

- Only suitably trained and certified personnel would be involved in the application of herbicides, and herbicides would only be applied only if climatic conditions are favourable (e.g. no rain, low winds) within 24 hours before and/or after spraying. Advice will be sought from CALM with respect to proper herbicide application.

- Consistent with commitments made in the Strategic Environmental Review (WPC, 2002), a Hydrocarbon Management Plan will be developed as part of the Operational Environmental Management Plan based around a framework that:
  - Reduces the volume of hydrocarbon waste materials produced;
  - Segregates hydrocarbons from stormwater to reduce the volume of waste materials;
  - Ensures appropriate transport, storage and handling procedures;
  - Ensures appropriate clean-up procedures for spills; and
  - Defines environmentally acceptable methods for the disposal of waste consistent with the Waste Management Plan contained in the CEMP and proposed operational Waste Management Plan.

- Implementation of the Contractor's HSE Management System on all facets of the construction.

- Implementation of the Operator's HSE Management System during operation.

7.8.4 Predicted Outcome

It is considered that the application of proposed hazardous materials management practices during construction and plant operation would meet the EPA's objective in relation to this factor.

7.9 Aboriginal Heritage

7.9.1 EPA Objective

To ensure that changes to the biophysical environment do not adversely affect historical and cultural associations and comply with relevant heritage legislation.

7.9.2 Potential Environmental Impacts

Construction without due consideration for heritage sites may result in the loss of these sites.

An area of up to 15ha will be disturbed because of the implementation of this proposal. This area has been previously disturbed through the planting of Blue Gums, and is in private ownership. Being an open cycle power station that uses dry low NOx burners (i.e. no water is used), no wastewater effluent discharge to the ocean will be required, nor effluent pipeline required.

A heritage survey has been conducted within the area encompassing the power station and specific buffer area (AIC, 2003). The complete heritage survey report is presented as Appendix 4. The assessment was conducted using the following methodology:

- Search and analysis of the Department of Indigenous Affairs (DIA) sites database for known and recorded sites and the reports of previous surveys completed in, or near, the project area;
- Completion of an archaeological inspection of the project area;
- Pre-consultation, with the indigenous people ascertained to have knowledge of the area;
- Field inspection of the first stage of project area with those of the people who wish to do so;
- Discussions with the view to amending the project to avoid any sensitive areas, where possible;
- Submission of the draft reports to all the participating groups asking for input; and
- Submission of the final reports to all groups including the Perth offices of the DIA.

No sites of significance have been identified in the power station site, although a number of sites are known to exist within the Kemerton Industrial Park. The negative survey results would suggest that the area may have been exploited by prehistoric human populations in a manner that left little or no archaeological signature in the landscape. Much of the survey area has been highly modified and this almost certainly has altered the archaeological signature of the area (Appendix 4, 2003).

7.9.3 Environmental Management and Mitigation

Transfield will develop and implement a Heritage Management Plan as a component of the CEMP to include but not be limited to:

- Procedures to ensure compliance with the Aboriginal Heritage Act, 1972.
- TSKT will consider the recommendations of the Archaeological and Ethnographic Site Identification Survey Report (AIC, 2003) and adopt appropriate measures in the CEMP to address these recommendations where practicable, prior to the commencement of construction.
- Mitigation of impacts to unregistered wetland locations that were a traditional source of food and the location of the turtle that is important in *turtle dreaming*. (This issue is addressed in Section 7.5.3).
- All staff and contracting personnel are made fully aware of their responsibilities and obligations under the (*Aboriginal Heritage Act, 1972).*
- Establishment of actions in the event that any archaeological material (including human skeletal material) is found during the construction phase.

7.9.4 Predicted Outcome

Given the prior history of the site, relatively small footprint, results of the heritage survey undertaken to date and management and mitigation measures to be implemented, it is concluded that the EPA's objectives in relation to this factor are likely to be met.

7.10 Public Health and Safety Risk

7.10.1 EPA Objective

To ensure that risk from the proposal is as low as reasonably achievable and complies with acceptable standards and EPA criteria including Guidelines and Criteria for EIA No. 2, *Guidance for Risk Assessment and Management: Offsite Individual Risk from Hazardous Industrial Plant* (EPA, 2000a).

7.10.2 Potential Environmental Impacts

Major hazards at the site relate to the operation of a dual fuel Gas Turbine (GT) storage and use of significant quantities of natural gas, various lubricants and distillate, and the transport of the fuels. Gas will be delivered to the site by a lateral to be constructed from the existing take off point to the North of the Kemerton Industrial Park.

Gas Turbine

The hazards from a GT operating on dual fuels are either a gas leak from the distribution inlet manifold, or a leak of combustible liquid (lubrication oils or diesel) under pressure which produces a flammable mist. Ignition sources stem from the combustion chambers where there are hot external surfaces (>500°C). As turbines get larger and spin faster, mechanical and thermal fatigue becomes the life limiting factor for peaking machines, whilst corrosion, oxidation and creep are dominant for continuous duty machines (REMS, 2003).

Natural Gas Pipeline and Feed

Natural gas (DG Class 2.1) is a much safer supply of energy than say LPG, because any releases of natural gas or methane which is lighter than air (gas density 0.55) will disperse rapidly. Notwithstanding, external interference is the largest single threat to pipeline safety. The gas pipeline lateral into the power station site will be buried up to the point of the GT's which reduces the potential for external interferance.

Natural gas that is released from a high pressure pipeline through a small hole will cool to well below 0°C and will initially drift as a dense cloud, resulting in a potential safety risk.

Diesel Storage

A bunded fuel tank and fuel unloading facility will handle and store 1.5 ML diesel fuel on site. Potential hazards associated with the bulk fuel storage relate to:

- Working pressures and structural stresses;
- Tank failure due to direct breaches or collision;
- Inadequate bunding of storage tank and provision of any spill areas;
- Inadequate Fire Safety Plan (FESA Special Risks) and emergency response procedures;
- Lack of safe access to and egress from all working locations;
- Potential ignition sources;
- Inadequate provisions (vents) designed for vapour dispersal at a safe point;
- Inadequate signage and placarding; and
- Lack of Emergency Shutdown Devices (ESD) for truck unloading.

The quantity of diesel stored at the site, although low risk, has the potential to cause significant impacts on water bodies such as nearby wetlands and potentially the Leschenault Inlet in the case of catastrophic failure or as a result of road accidents during transport. The management of diesel loss to the environment is discussed in Sections 7.5.3 and 7.8.3.

Aside from stored hydrocarbons and the inventory of gas between successive valves, there is minimal stored energy in the form of compressed air or hydraulic systems. Appropriate storage for the following chemicals will be provided during construction: lubricating oils, waste oil, acetylene, oxygen, inhibitor cooling water, detergent, degreaser, paints and thinners.

A review of hazardous materials and processes during operations show that only turbine oil, turbine blade detergent and weed killer may be used in the power station indicating that the power station could be categorized as being Low Risk. The Power Station is located within the High Risk Category assigned to the proposed site under the Kemerton Expansion Study.

The site does not exceed the specified 'threshold quantities' for the storage and processing of dangerous goods that would trigger its identification as a major hazard facility.

Preliminary Quantitative Risk Assessment

A Preliminary Quantitative Risk Assessment (PQRA) was conducted for the Power Station (REMS, 2003). The PQRA is presented as Appendix 8 of this report. The PQRA was conducted in accordance with the requirements in EPA Policies, Guidelines and Criteria for EIA No. 2, *Guidance for Risk Assessment and Management: Offsite Individual Risk from Hazardous Industrial Plant* (EPA, 2000c). The risk assessment methodology included the following components:

- Hazard Analysis – to identify key hazards on the premises as a result of proposed plant operations and infrastructure;
- Event Analysis - to determine potential events which can be realised from a process upset or plant failure;
- Consequence Analysis - to determine the consequences from the scenarios selected in the Hazard and Event Analysis that will be adopted in detailed modelling. The consequence analysis also looks at interplant spacing issues to determine the risk of 'knock-on' impacts between individual plant units; and
- Event Frequency Estimation – based on established data for similar industries and project designs.

The results from the computerised modelling of risk levels are shown as Figures 12 and 13 of this report. The lines represent levels of equal risk (iso-risk contours) which are drawn for the values of:

- One in a million per year ($1x10^{-6}$) which is the residential risk criterion (dark blue line);
- Five in a million per year ($5x10^{-6}$) which is the criterion for commercial uses (light blue line); and
- Ten in a million per year ($10x10^{-6}$) which is the fenceline risk criterion for industrial buffer areas (green line).

The power station easily meets the industrial boundary risk criterion with the green line well within the site boundary. Whilst the risk line crosses the boundary at the point where the gas pipeline enters the site and shows the green line touching the fenceline, in reality the risk level of $10x10^{-6}$ is not reached for a gas pipeline.

The risk level is concentrated around the on-site operating areas as expected. The main on-site risk contributors are vapour cloud explosion and diesel bund fire. The total risk level for the control room is 1.66×10^{-4} which is high for an operational and administration area, with 93% of the risk coming from a bund or fuel tanker incident. The suitability of the location of the control room will be reviewed based on the above results.

With respect to the effects of a gas cloud explosion, the risk assessment reinforces the need for gas detection in external areas and automatic shutdown devices to prevent incidents resulting in damage to plant.

As there there is no off-site risk and there are no immediate neighbours to the power station site, there is no societal risk to consider.

In summary, the assessment determined that the only offsite impact is expected to be from the gas pipeline which enters the site to the east. It can confidently be stated that the individual risk of fatality level at the plant lot boundary will easily meet the EPA's industrial buffer risk criterion of 10×10^{-6} fatalities per annum.

7.10.3 Environmental Management and Mitigation

The following management and mitigation measures will be implemented to ensure compliance with public health and safety requirements and to minimise the overall risk associated with the Project:

- Adhering to the Gas Standard Act 1972, Petroleum Pipelines Act 1961, Explosives and Dangerous Goods Act 1961 and Regulations;
- Adhering to Industry safety practices, codes and standards (Australian Gas Association);
- Adhering to Australian Standards AS 3814 – 2002 (Industrial and commercial gas fired appliances), AS1940 (The storage and handling of flammable and combustible liquids as revised) and AS 1692 (Tanks for flammable and combustible liquids);
- Conducting safety reviews (HAZOPs, fire safety and safety management systems) throughout the design and engineering of the LNG plant to ensure compliance with specified design standards;
- Spacing of plant equipment according to International Standards and Codes of Practice to afford passive protection;
- Elimination/control of ignition sources, hazardous area zoning;
- Design of work areas to prevent ingress by flammable vapour;
- Using fail-safe emergency shutdown (ESD) systems at critical points;

- Conducting systematic assessments and audits continually during its operation to check that practices are maintained to appropriate standards;
- On-site surveillance and security; and
- On-site fire fighting and emergency response capabilities (with FESA).

In response to findings in the preliminary hazard and risk modelling assessment, the following measures will be implemented:

- The location of the control room will be reviewed as to the possibility of locating it further to the west. The design of the control room will include both over pressure and radiation protection;
- Gas detection will be strategically located around the gas turbine area; and
- The emergency shutdown devices (ESD), offsite monitoring and emergency response procedures will be established to take into account the limited manning at site.

Public access to the site will be limited by perimeter fencing and hazards indicated by signage using accepted practice. The area between the power station boundary and the Plant will be fenced to create a clear buffer zone at least as wide as the $1x10^{-6}$ contour, meeting the EPA's Policies, Guidelines and Criteria for EIA No. 2, *Guidance for Risk Assessment and Management: Offsite Individual Risk from Hazardous Industrial Plant* (EPA, 2000c)

All reasonable and practicable measures will be taken to minimise the off-site emissions and individual risk from industrial plant to as low as reasonably practicable (ALARP).

The PQRA (Appendix 8, 2003), concluded that the EPA's objectives can be met in that:

- The off-site individual fatality risk criteria set by the EPA can be met; and
- All reasonable and practicable measures will be taken to minimise the off-site emissions and individual risk from industrial plant to as low as reasonably practicable (ALARP).

7.10.4 Predicted Outcome

It is considered that the application of accepted engineering practices during detailed design and construction will achieve a level of risk to meet the EPA's objective in relation to this factor.

7.11 Social and Economic Issues

7.11.1 EPA Objective

Ensure that any potential impacts from the development on the nearby community are minimised.

Ensure that recreational use of the areas surrounding the Kemerton Industrial Park is not compromised.

7.11.2 Potential Environmental Impacts

The proposed power station would offer benefits to the local communities through employment, the use of local labour, service industries and local supplies of materials, particularly during construction. The construction phase is expected to extend over a period of up to 12-18 months and the construction workforce for each development stage is expected to peak at around 100 personnel.

As discussed in the Strategic Environmental Review (WPC, 2002), the proposed development is likely to have a number of indirect benefits to the local economy. These would come mainly through the use of local labour, service industries and local supplies of materials during construction.

Other possible impacts on the local community which would mainly occur during the construction phase of the project and are therefore likely to be temporary in nature include.

- Housing of the construction workforce;
- Increased pressure on services such as health and education for a short period of time during the construction phase;
- Occasional disruptions to utilities such electricity services during the construction phase;
- Nuisance impacts associated with the construction works such as dust and noise; and
- Increased traffic, from construction workforce and heavy construction vehicles.

During the operational phase of the power station, permanent on-site personnel would be about 5 operators and a variable maintenance workforce engaged for several weeks each year and any immediate requirements. This level of manning could easily be accommodated within the nearby communities without exerting excessive pressure on the services and infrastructure of the community.

Potential impacts associated with dust and noise from the construction phase have been discussed in Sections 7.3.2 and 7.6.2 and potential impacts from traffic are discussed in Section 7.13.2.

Therefore the most significant potential social impact experienced during the operational phase would relate to visual impacts from the power station itself, which is dealt with in Section 7.12.2.

There are not expected to be any significant impacts on nearby agricultural land use or tourism.

7.11.3 Environmental Management and Mitigation

TSKT proposes to utilise the local workforce and services where possible. This would decrease the pressure placed on local communities by an influx of people associated with the development into the region.

TSKT will develop and implement a Community Consultation Plan as a component of the broader Operation and CEMP. Strategies within the Plan will be prepared in consultation with the Kemerton Industrial Park and Community Committee, Shire of Harvey and City of Bunbury.The Plan will include but not be limited to:

- General community consultation associated with the environmental approval process and construction and operational activities. Details of community consultation that has been completed to date is discussed in Section 5;
- Targeted consultation with nearby landowners and communities of any planned disruptions to services during the construction phase;
- Housing of the construction workforce, which is expected to peak at 100 personnel and extend over a period of up to 18 months for each development phase;
- Capacity of existing health and education facilities to cope with an influx of personnel during the construction phase;
- Opportunities to engage local workforces; and
- Other issues associated with transient workforces.

7.11.4 Predicted Outcome

It is considered that given the nature of the proposal and the application of considered community consultation practices, social and economic issues arising from construction can be managed to meet the EPA's objectives in relation to this factor.

7.12 Visual Impact

7.12.1 EPA Objective

Visual amenity of the area adjacent to the project should not be unduly affected by the proposal.

7.12.2 Potential Environmental Impacts

A stack servicing each of the gas turbines will be a maximum 35 m in height. The power station is set within an existing Blue Gum plantation due for rotation, to be re-grown to Blue Gums or rehabilitated to native vegetation for the life of the project.

As detailed in the Strategic Environmental Review (WPC, 2002), the closest major public road access to the Kemerton Industrial Park is the Old Coast Road, which travels north south approximately 6km west of the preferred site. The Kemerton Industrial Core is shielded from the Old Coast Road by two dunal ridge systems and a parkland buffer zone. This buffer area is located between heavy industry and surrounding land uses and comprises:

- Appropriate landscaping of industrial development;
- Maintenance of the existing woodlands and parklands;
- Establishment of plantation buffers;
- Conservation of wetlands; and
- Provision of passive recreational facilities.

A visual impact assessment of the northern most areas of the proposed expansion of the Kemerton Industrial Park was undertaken by BSD Consultants (WPC, 2002). The assessment showed that, in almost all cases where there is continuous vegetation coverage within the road reserves of public roads, the Kemerton Industrial Core would be screened from view. However from some sparsely vegetated locations, some of the developments containing stacks in excess of 60m were visible and the buildings (35m high) were only just visible from two of the 14 locations assessed. The average height of structures within the power station would be 15 – 20m, with the stacks likely to be up to 35m high. The Strategic Environmental Review (WPC, 2002) therefore concluded that the power station would not be visible from any areas to the west of the Kemerton Industrial Park. However, the power station may be visible from farmhouses and other public places to the East of the Park.

The power station will be set within an industrial Park with considerable screening provided by surrounding trees. Whilst it is likely that the two 35m stacks will extend above the existing tree line, the overall visual impact is expected to be low given that viewed from the east, the site will be observed against a backdrop of the ridge aligned in a north-south direction on the central-west side of the Park, sand dunes to the west, existing Blue Gums plantation (to be retained to the west of the site), and transmission power lines.

A view shed analysis was conducted to assess the likely visual intrusion of the power station taking into account surround landuse and topography. Observation points used to assess potential visual impacts are shown on Figure 2. Results of analyses of the "Placed Power Station" from East North East and East South East are illustrated in Plates 1 and 2 and suggest that the power station would be barely visible.

7.12.3 Environmental Management and Mitigation

To improve the visual amenity of the proposed power station, the following management strategies (consistent with commitments made in the Strategic Environmental Review (WPC, 2002)) will be undertaken where appropriate:

- Where possible, buildings would be coloured to blend into the surrounding terrain;
- Building graphics/signage would be restricted to areas where they are not visible from outside of the Industrial Park;
- All temporary disturbances would be rehabilitated and revegetated with local species or Blue Gums;
- Revegetation will commence immediately following construction;
- Compliance with any formal guidelines established for the Kemerton Industrial Park to reduce visual impact;
- Clearing will be limited to that which is absolutely necessary for construction;
- Good housekeeping practices will be maintained at all times;
- Lighting will comply with Australian Standard AS 4289;
- The implementation of sympathetic colour schemes will also minimise visual impacts.

7.12.4 Predicted Outcome

The relatively small footprint and low profile (compared to existing or proposed industrial facilities), implementation of sympathetic colour schemes together with the use of screening where possible, will ensure that the EPA's objectives in relation to this factor are met.

7.13 Transport

7.13.1 EPA Objective

Ensure that transportation and storage of fuels/chemicals complies with the Australian Dangerous Goods Code so as to ensure that risk is as low as reasonably achievable.

Ensure that roads are maintained and road traffic managed to meet an adequate standard of level of service and safety.

Ensure the requirements of Main Roads of Western Australia (MRWA) are met.

AusRoads is the association of Australian and New Zealand road transport and traffic authorities. AusRoads produce a series of publications that identify best practice in road safety design construction and management practice, including:

- AP-1/89 Rural Road Design.
- AP11 Guide to Traffic Engineering Practice.
- AP-12/91 Road Maintenance Practice.

7.13.2 Potential Environmental Impacts

Gas will be provided from the existing Dampier to Bunbury Natural Gas Pipeline. Road tanker using existing public roads will supply Ultra Low Sulphur diesel for use as back up fuel supply when gas supply is deemed inadequate for plant operation.

The construction phase would result in increased traffic on the access roads to the Kemerton Power Station This increased traffic would result from workforce commuting and construction related deliveries of material and equipment.

During the construction phase, the workforce traffic would mostly occur between 6.30am and 7.30am, and again between approximately 5.30pm and 6.30pm. Construction related deliveries will occur during normal construction hours (7am to 6pm, Monday to Friday).
Traffic associated with the construction phase would build up as the peak construction period is reached and then decrease as the plant nears the commissioning phase.

Hazards to the public range from direct (collision) to indirect (road damage from heavy vehicle use). Professional drivers in licensed and well-maintained trucks will undertake road transport.

The construction phase would result in increased traffic on the access roads to the Kemerton Power Station. A maximum of 300 vehicle movements during peak construction is anticipated, reducing to an anticipated 10 vehicle movements per day during operation when using gas. This assumes that no car-pooling arrangements are established and that each worker drives one motor vehicle and could be significantly reduced with the introduction of car-pooling and construction related bus services.

Additional traffic movements can be expected when using back-up liquid fuel as this will be transported in via road tankers or single barrel trucks. Delivery will be via three pocket road trains (each with 70kL capacity) and two single barrel trucks (each with 35kL capacity) to commence operation. In general, three trips would occur on the first day of operation diesel and four trips per day on subsequent days if gas was still not available.

All traffic would access the power station site through the existing access roads (Figures 2 and 3) or roads developed under the Kemerton Expansion Final Concept Plan.

The Kemerton Expansion Study (WPC, 2002) addressed the issue of traffic and transportation for the expansion of the Kemerton Industrial Park and developed a general traffic and transportation strategy. This study determined that the existing

road network combining Marriott Road with the Old Coast Road is of a satisfactory standard to accommodate expected traffic movements between Kemerton and Bunbury and traffic volumes to 2020 and beyond.

7.13.3 Environmental Management and Mitigation

Transport routes for heavy vehicles during the construction and operational phase shall be along main roads designed for heavy transport applications. Bypass roads have been constructed around all major urban areas. MRWA advises major roads are constructed for the purposes of heavy haulage and capacity to increase road usage remains.

The private 8m chip seal bitumen road from the junction of Treasure and Wellesley Roads was constructed and is maintained by Kemerton Silica Sands Pty Ltd. (KSS) Initial meetings have been held with KSS management and Kemerton Industrial Park managers in relation to the use, safety and upkeep of this segment of the transport route.

TSKT will develop and implement procedures to address the following aspects:

- Coordination of all proposed traffic delays during the construction phase with Main Roads WA and relevant Shire;
- Scheduling the movement of construction items that could obstruct regular traffic;
- Flow to minimise delays and road closure;
- Installation of appropriate signage;
- Monitoring the movement of oversize vehicles to and from site;
- Small road awareness component of induction and toolbox briefings; and
- Notifying the community of any planned night-time transport to site.

7.13.4 Predicted Outcome

It is considered that given the primary fuel (gas) is delivered by pipeline, insignificant increase in road traffic, proposed access routes and adequate conditions of existing roads for proposed vehicle types and movements, it is considered that transport issues can be managed to meet the EPA's objectives in relation to this factor.

8. ENVIRONMENTAL COMMITMENTS

Transfield Services Kemerton Trust, as proponent for the Kemerton Power Station project, is committed to ensuring that all aspects of development of the proposal is undertaken in a manner that minimises the impacts on the environment. Accordingly, TSKT has proposed a series of commitments which will be met to ensure environmental objectives are met at all times. The commitments are presented in Table 23.

TABLE 23
TRANSFIELD SERVICES KEMERTON TRUST
PROPONENT ENVIRONMENTAL COMMITMENTS

NO	TOPIC	OBJECTIVE/S	ACTION	TIMING	ADVICE
1	Construction Environmental Management	To ensure all aspects of project construction are conducted such that environmental impacts are minimised as far as practicable, and that regulatory requirements are complied with.	1. Prepare a Construction Environmental Management Program (CEMP) which will include the following plans: • Flora and Vegetation Management Plan (see commitment 3); • Fauna Management Plan (see commitment 5); • Groundwater Management Plan (see commitment 6); • Surface and Stormwater Water Management Plan (see commitment 8); • Air Emissions and Dust Management Plan (see commitment 10); • Noise Management Plan (see commitment 13); • Solid and Liquid Waste Management Plan (see commitment 15); • Hydrocarbon and Hazardous Material Handling Plan (see commitment 17); • Aboriginal Heritage Management Plan (see commitment 19); • Community Consultation Plan (see commitment 20); and • Dewatering Management Plan (see commitment 22); 2. Implement the approved Construction Environmental Management Program (CEMP) described in 1.1 above.	Prior to Construction	DEP
2	Operational Environmental	To ensure all aspects of project	1. Prepare an Operational Environmental Management Program (OEMP) which will include but not be limited to	Prior to	DEP

NO	TOPIC	OBJECTIVE/S	ACTION	TIMING	ADVICE
	Management	operation are conducted such that environmental impacts are minimised as far as practicable, and that regulatory requirements are complied with.	the following plans: • Flora and Vegetation Management Plan (see commitment 4); • Groundwater Management Plan (see commitment 7); • Surface and Stormwater Water Management Plan (see commitment 9); • Air Emissions Management Plan (see commitment 11); • Noise Management Plan (see commitment 14); • Solid and Liquid Waste Management Plan (see commitment 16); • Hydrocarbon and Hazardous Material Handling Plan (see commitment 18); • Community Consultation Management Plan (see commitment 21). 2. Implement the approved Operational Environmental Management Program (OEMP) described in 2.1 above.	Commissioning	
3	Terrestrial Flora and Vegetation	To maintain the abundance, species diversity, geographic distribution and productivity of vegetation communities during construction	1. Prepare a Construction Flora and Vegetation Management Plan which will address but not be limited to: • Construction Lay-down Site Rehabilitation; • Dieback Hygiene; • Weed management and control; • Clearing of blue gums; • Monitoring requirements; and • Reporting requirements. 2. Implement the approved Flora and Vegetation Management Plan described in 3.1 above.	Prior to Construction	DEP/CALM

NO	TOPIC	OBJECTIVE/S	ACTION	TIMING	ADVICE
4	Terrestrial Flora and Vegetation	To maintain the abundance, species diversity, geographic distribution and productivity of vegetation communities during operation	1. Prepare an Operational Flora and Vegetation Management Plan which will address but not be limited to: • Dieback Hygiene; • Weed management and control; • Clearing of blue gums in buffer; • Monitoring requirements; and • Reporting requirements. 2. Implement the approved Operational Flora and Vegetation Management Plan described in 4.1 above.	Prior to Commissioning	DEP/CALM
5	Terrestrial Fauna Specially protected (Threatened) fauna.	To protect Specially Protected (Threatened) Fauna species and their habitats, consistent with the provisions of the *Wildlife Conservation Act 1950* during construction	1. Prepare a Construction Fauna Management Plan which will address but not be limited to: • Feral and introduced animal management; • Management of species location if required; • Monitoring requirements; and • Reporting requirements. 2. Implement the approved Construction Fauna Management Plan described in 5.1 above.	Prior to Construction	DEP/CALM
6	Groundwater Quality	To monitor groundwater quality and identify and mitigate sources of contamination during construction	1. Prepare a Construction Groundwater Management Plan which will address but not be limited to: • Sample bore locations; • Parameters and sample frequency for monitoring; • Mitigation and contingency measures; • Reporting requirements. 2. Implement the approved Construction Groundwater Management Plan described in 6.1 above.	Prior to Construction	DEP/WRC

NO	TOPIC	OBJECTIVE/S	ACTION	TIMING	ADVICE
7	Groundwater Quality	To monitor groundwater quality and identify and mitigate sources of contamination during operation	1. Prepare an Operational Groundwater Management Plan which will address but not be limited to: • Zero process water discharge; • Design and bore construction; • Sample bore locations; • Parameters and sample frequency for monitoring; • Mitigation and contingency measures; • Reporting requirements. 2. Will implement the approved Operational Groundwater Management Plan described in 7.1 above.	Prior to Commissioning	DEP/WRC
8	Surface Water Quality	To manage the potential effects of the construction of the project on surface water quality and to maintain existing flow paths where possible	1. Prepare a Construction Surface and Storm Water Management Plan which will address but not be limited to: • Management of contaminated surface water runoff; • Monitoring requirements; • Mitigation and contingency measures; • Reporting requirements. 2. Will implement the approved Construction Surface and Storm Water Management Plan described in 8.1 above.	Prior to Construction	DEP/WRC
9	Surface Water Quality	To manage the potential effects of the operation of the project on surface water quality and to maintain existing flow paths where possible	1. Prepare an Operational Surface and Storm Water Management Plan which will address but not be limited to: • Management of contaminated storm waters such that none leaves the site; • Recovery mechanisms and structures for chemical and hydrocarbon spillages, • Monitoring requirements; • Response and contingency measures; and • Reporting requirements.	Prior to Commissioning	DEP/WRC

NO	TOPIC	OBJECTIVE/S	ACTION	TIMING	ADVICE
			2. Implement the approved Operational Surface and Storm Water Management Plan described in 9.1 above.		
10	Air Quality - Gaseous Emissions	To protect surrounding land users such that gaseous and particulate emissions will Not adversely affect their welfare and amenity or cause health problems. To ensure that conditions which could promote the formation of photochemical smog are managed to minimise the generation of smog and any subsequent impacts.	1. Prepare a Construction Air Emissions/Dust Management Plan which will address but not be limited to: • the use of water sprays to wet the site during windy conditions; • the use of speed limits to minimise dust generated by vehicle movements; • the use of minimum drop heights when loading and unloading soils and other excavated materials; minimisation of areas of disturbed and/or exposed soils; • Incident management; • Responsibilities; • Reporting Requirements; and • Employee training and awareness. 2. Implement the approved Construction Air Emissions / Dust Management Plan described in 10.1 above.	Prior to Construction	DEP
11	Air Quality - Gaseous Emissions	To ensure that best practicable measures are taken to minimise discharge of gaseous and particulate	1. Prepare a Operational Air Emissions Management Plan which will address but not be limited to: • Stack emission monitoring program (sampling location, frequency, parameters, standards and limits); • Reporting schedules;	Prior to Commissioning	DEP

NO	TOPIC	OBJECTIVE/S	ACTION	TIMING	ADVICE
		emissions to the atmosphere. To protect surrounding land users such that gaseous and particulate emissions will not adversely affect their welfare and amenity or cause health problems. To ensure that conditions which could promote the formation of photochemical smog are managed to minimise the generation of smog and any subsequent impacts.	• Incident management; • Responsibilities; and • Employee training and awareness. 2. Implement the approved Operational Air Emissions Management Plan described in 11.1 above.		

NO	TOPIC	OBJECTIVE/S	ACTION	TIMING	ADVICE
12	Greenhouse Gas Emissions	To ensure that potential greenhouse gas emissions emitted from proposed projects are adequately addressed and best practicable measures and technologies are used in Western Australia to minimise Western Australia's greenhouse gas emissions.	Pursue greenhouse gas reduction through: • Commitment to participate in the Greenhouse Challenge program. • Prepare a Greenhouse Gas Management Strategy under the Greenhouse Challenge program • Implement a Greenhouse Gas Management Strategy under the Greenhouse Challenge program • Operate and maintain the plant to "Good Electricity Practice" as defined in the National Electricity Code.	Prior to Construction and throughout Operation	DEP/Australian Greenhouse Office
13	Noise	To protect the amenity of nearby residents from noise impacts resulting from construction activities associated with the proposal by ensuring that noise levels meet the *Environmental Protection (Noise)*	1. Prepare a Construction Noise Management Plan which will address but not be limited to: • Noise management procedures for construction; • Retention of vegetation (plantation blue gums) where practicable to assist in noise mitigation; • Implement alternative noise attenuation packages to provide enhanced levels of noise control to meet boundary level noise limits if necessary; and • Implement a complaint management procedure to receive, investigate and action noise complaints.	Prior to Construction	DEP

NO	TOPIC	OBJECTIVE/S	ACTION	TIMING	ADVICE
		Regulations 1997.	2. Implement the approved Construction Noise Management Plan described in 13.1 above.		
14	Noise	To protect the amenity of nearby residents from noise impacts resulting from operational activities associated with the proposal by ensuring that noise levels meet the *Environmental Protection (Noise) Regulations 1997.*	1. Prepare an Operational Noise Management Plan which will address but not be limited to: • Maintenance of equipment that contribute to overall plant noise; • the use of silencers where necessary; and; • noise monitoring and reporting as necessary. • Implementation of a complaint management procedure to receive, investigate and action noise complaints. 2. Implement the approved Operational Noise Management Plan described in 14.1 above.	Prior to Commissioning	DEP
15	Waste Management	Ensure that the generation of all wastes follows consideration of waste reduction in accordance with the waste hierarchy of reduction, reuse, recycling, treatment, and	1. Prepare a Construction Solid and Liquid Waste Management Plan to address but not be limited to the following: • Compliance with the requirements of the DoE and Regulations in relation to the management, handling and storage of wastes including application of the waste hierarchy of reduction, reuse, recycling, treatment, and disposal ; • Implementation of waste reduction and recycling	Prior to Construction	DEP/Shire of Harvey

NO	TOPIC	OBJECTIVE/S	ACTION	TIMING	ADVICE
		disposal during construction.	initiatives where recyclable wastes will be removed by an approved contractor; • General refuse and putrescible (domestic and industrial) solid waste and inert materials (not suitable for recycling) will be disposed of at the nearby Kemerton landfill in accordance with the Health Dept of WA and Landfill Board requirements • Solvents and hazardous liquids will be collected and removed from the site for recycling or disposal in an approved liquids disposal area. • Prohibit burning of waste onsite at all times. • Educate employees in non-hazardous solid waste management. • Preparation of annual waste reports 2. Implement the approved Construction Solid and Liquid Waste Management Plan described in 15.1 above.		
16	Waste Management	Ensure that the generation of all wastes follows consideration of waste reduction in accordance with the waste hierarchy of reduction, reuse, recycling,	1. Prepare an Operational Solid and Liquid Waste Management Plan to address but not be limited to the following: • Compliance with the requirements of the DoE and Regulations in relation to the management, handling and storage of wastes including application of the waste hierarchy of reduction, reuse, recycling, treatment, and disposal ;	Prior to Commissioning	DEP/Shire of Harvey

NO	TOPIC	OBJECTIVE/S	ACTION	TIMING	ADVICE
		treatment, and disposal during operation.	• Implementation of waste reduction and recycling initiatives where recyclable wastes will be removed by an approved contractor; • General refuse and putrescible (domestic and industrial) solid waste and inert materials (not suitable for recycling) will be disposed of at the nearby Kemerton landfill in accordance with the Health Dept of WA and Landfill Board requirements; • Solvents and hazardous liquids will be collected and removed from the site for recycling or disposal in an approved liquids disposal area; and • Prohibit burning of waste onsite at all times. • Educate employees in non-hazardous solid waste management. • Preparation of annual waste reports 2. Implement the approved Operational Solid and Liquid Waste Management Plan described in 16.1 above.		

NO	TOPIC	OBJECTIVE/S	ACTION	TIMING	ADVICE
17	Hydrocarbon and Hazardous Materials	Design and construct (including bunding) in accordance with Australian Standards AS 1940 (Standards Australia 1993) and requirements of the DoIR and the *Explosives and Dangerous Goods Act 1961.*	1. Prepare a Construction Hydrocarbon and Hazardous Materials Handling Plan to address but not be limited to: • Tracking of the volume of hydrocarbon and hazardous waste materials produced; • Identification of disposal options. • Appropriate transport, storage and handling procedures; • Appropriate clean-up and emergency procedures for spillages; • Monitoring requirements; • Contingency and Response Measures; • Reporting requirements. 2. Implement the approved Construction Hydrocarbon and Hazardous Materials Handling Plan described above in 17.1.	Prior to Construction	DEP/DoIR
18	Hydrocarbon and Hazardous Materials	Operate in accordance with Australian Standards AS 1940 (Standards Australia 1993) and requirements of the DoIR and the *Explosives and Dangerous Goods Act 1961.*	1. Prepare an Operational Hydrocarbon and Hazardous Materials Handling Plan to address but not be limited to: • Tracking of the volume of hydrocarbon and hazardous waste materials produced; • Identification of disposal options. • Appropriate transport, storage and handling procedures; • Appropriate clean-up and emergency procedures for spillages; • Monitoring requirements; • Contingency and Response Measures; • Reporting requirements.	Prior to Commissioning	DEP/DoIR

NO	TOPIC	OBJECTIVE/S	ACTION	TIMING	ADVICE
			2. Implement the approved Operational Hydrocarbon and Hazardous Materials Handling Plan described above in 18.1.		
19	Heritage	To protect any sites of significance uncovered during the construction phase of the project.	1. Prepare a Construction Aboriginal Heritage Management Plan to address but not be limited to: • Procedures to ensure compliance with the Aboriginal Heritage Act, 1972; • Consideration of recommendations of the Archaeological and Ethnographic Site Identification Survey Report (AIC, 2003) and adopt appropriate measures to address these recommendations where practicable. • Procedures for protection of a site of significance uncovered during construction; and • Procedure for continued liaison with relevant parties during construction. 2. Implement the approved Construction Aboriginal Heritage Management Plan described above in 19.1.	Prior to Construction	DIA

NO	TOPIC	OBJECTIVE/S	ACTION	TIMING	ADVICE
20	Social and Economic Issues	Ensure that any potential impacts from the development on the nearby community are minimised. Ensure that recreational use of the areas surrounding the Kemerton Industrial Park is not compromised.	1. Prepare a Construction Community Consultation Plan to address but not be limited to: • General community consultation associated with the environmental approval process; • Targeted consultation with nearby landowners and communities. • Consultation with the Shires of Harvey, (and/or Dardanup and City of Bunbury) and Kemerton Community Committee; • Local waterbody users representative groups; • Opportunities to engage local workforces. 2. Implement the approved Construction Community Consultation Plan described above in 20.1.	Prior to Commissioning	Kemerton Community Committee
21	Social and Economic Issues	Ensure that any potential impacts from the development on the nearby community are minimised. Ensure that recreational use of the areas surrounding the Kemerton Industrial Park is not compromised.	1. Prepare an Operational Community Consultation Plan to address but not be limited to: • General community consultation associated with the environmental approval process; • Targeted consultation with nearby landowners and communities. • Consultation with the Shires of Harvey,(and/or Dardanup and City of Bunbury) and Kemerton Community Committee; • Local waterbody users representative groups; • Opportunities to engage local workforces. 2. Implement the approved Operational Community Consultation Plan described above in 21.1.	Prior to Commissioning	Kemerton Community Committee
22	Groundwater	To ensure the discharge water from	1. Prepare a Construction Dewatering Management Plan to address but not be limited to:	Prior to Construction	DEP/WRC

NO	TOPIC	OBJECTIVE/S	ACTION	TIMING	ADVICE
		de-watering activities during the construction phase will have no adverse impacts on the groundwater table, and /or the water quality or flow regime of surface water bodies (including wetlands).	• Definition of the commencement date, duration, anticipated quantity and frequency of discharge; • Monitoring requirements; and • Reporting requirements. 2. Implement the approved Construction Dewatering Management Plan described above in 22.1.		
23	Decommissioning	To provide the framework to ensure that the site is left in an environmentally acceptable condition at closure	1. Prepare a Preliminary Decommissioning Plan. The Preliminary Decommissioning Plan will address: • conceptual plans for the removal or, if appropriate retention of the plant and infrastructure; • a conceptual rehabilitation plan for all disturbed areas and a description of a process to agree on the end land use(s) with all stakeholders; • a conceptual plan for the care and maintenance phase; and • management of noxious materials to avoid the creation of contaminated areas. 2. Prepare a Final Decommissioning Plan. The Final Decommissioning Plan will address: • removal or, if appropriate retention of the plant, access roads, corridors and/or infrastructure in consultation with relevant stakeholders;	Within six months of the date of publication of the Ministerial Statement At least six months before the anticipated date of decommissioning; or at a time agreed with the EPA.	DEP/Shire of Harvey

NO	TOPIC	OBJECTIVE/S	ACTION	TIMING	ADVICE
			• rehabilitation of all disturbed areas to a standard suitable for the agreed new land use(s); • identification of contaminated areas, including provision of evidence of notification and proposed management measures to relevant statutory authorities. 3. Implement the Final Decommissioning Plan		

9. CONCLUSION

The key environmental factors for this project that have been assessed in this referral document are:

- Terrestrial Flora and Vegetation;
- Specially Protected (Threatened) Fauna;
- Surface and Groundwater Quality;
- Gaseous and Particulate Emissions;
- Greenhouse Gas Emissions;
- Noise and Vibration;
- Solid and Liquid Wastes;
- Hydrocarbons and Hazardous Materials;
- Aboriginal Heritage;
- Risks and Public Safety;
- Social and Economic Issues;
- Visual Impact; and
- Transport.

A summary of the proposal characteristics, potential environmental impacts and proposed management measures to mitigate those impacts is presented in Table 7.

Based on the assessment of each environmental factor, it is concluded that the Environmental Protection Authority's objectives for each factor will be achieved given the nature of the proposal, characteristics of the existing environment, proposed environmental management measures and environmental commitments proposed by TSKT.

10. REFERENCES

AEC/NHMRC (1986) *National Guidelines for Control of Emissions of Pollutants from New Stationary Sources*. Australian Government Publishing Service, Canberra, 1986.

(AGO) Australian Greenhouse Office (2001) Technical Guidelines - Generator Efficiency Standards.

Aquaterra (2002) *Kemerton Water Study Phase 2*. Report prepared for Landcorp April 2002. Unpublished

Biota Environmental Services (2002) *Kemerton Power Station and Wastewater Pipeline Flora, Vegetation and Fauna Survey*. Report prepared for Sinclair Knight Merz and Western Power, April 2003.

(DEP) Department of Environmental Protection (2002) *Perth Airshed Inventory Update 1998-1999*. Technical Series 110, Department of Environmental Protection, Perth, January 2002.

(EPA) Environmental Protection Authority (1998) *Guidance for the Assessment of Environmental Factors No 8 – Environmental Noise* (draft), June 1998.

(EPA) Environmental Protection Authority (1999) Draft Guidance No. 26 '*Management of Surface Run-Off from Industrial and Commercial Sites*

(EPA) Environmental Protection Authority (2000a) *Guidance for the Assessment of Environmental Factors No. 15 – Guidance Statement for Emissions of Oxides of Nitrogen from Gas Turbines*, May 2000.

(EPA) Environmental Protection Authority (2000b) *Guidance for the Assessment of Environmental Factors No. 18 – Prevention of Air Quality Impacts from Land Development Sites*, March 2000.

(EPA) Environmental Protection Authority (2000c) Guidelines and Criteria for EIA No. 2, *Guidance for Risk Assessment and Management: Offsite Individual Risk from Hazardous Industrial Plant* EPA, 2000.

(EPA) Environmental Protection Authority (2002a) *Preliminary Position Statement No. 6 "Towards Sustainability"*

(EPA) Environmental Protection Authority (2002b) *Guidance for the Assessment of Environmental Factors No. 12 – Guidance Statement for Minimising Greenhouse Gas Emissions*, October 2002.

Environ (2002) Pinjarra Cogeneration Project Environmental Referral, December, 2002.

Government of Western Australia, (2003) *Hope for the Future: The Western Australian State Sustainability Strategy*. Department of Premier and Cabinet, Perth, September 2003.

(IPCC) Intergovernmental Panel on Climate Change (2001) *Third Assessment Report – Summary for Policy Makers – a Report of Working Group 1 of the Intergovernmental Panel on Climate Change*. January 2001.

(NEPC) National Environmental Protection Council (1998*) National Environmental Protection Measure for Ambient Air Quality*. National Environmental Protection Council, 26 June 1998.

(US EPA) Compilation of Air Pollutant Emission Factors AP-42, Fifth Edition, Volume 1: Stationary Point and Area Sources, Chapter 3.1 "Stationary Gas Turbines", April 2000.

Water and Rivers Commission (2001) *Position Statement : Wetlands*. June 2001.

Water and Rivers Commission (2003) *Water Quality Protection Note: Dewatering of Soil.*

Waterways Commission (1992) Leschenault Waterways Management Programme. Waterways Commission, Report No. 26 January 1992.

(WAPC) Western Australian Planning Commission (2000) *Industry 2030 Greater Bunbury Industrial Land and Port Access Planning*, Final, April 2000.

(WPC) Western Power Corporation, (2002) *Kemerton Power Station: Strategic Environmental Review*, June 2002. Prepared by Sinclair Knight Merz for Western Power Corporation.

(WHO) World Health Organisation (2000) *Air Quality for Europe*. 2nd Edition, WHO Regional Publications, European Series, No. 91.

11. GLOSSARY

Abbreviations

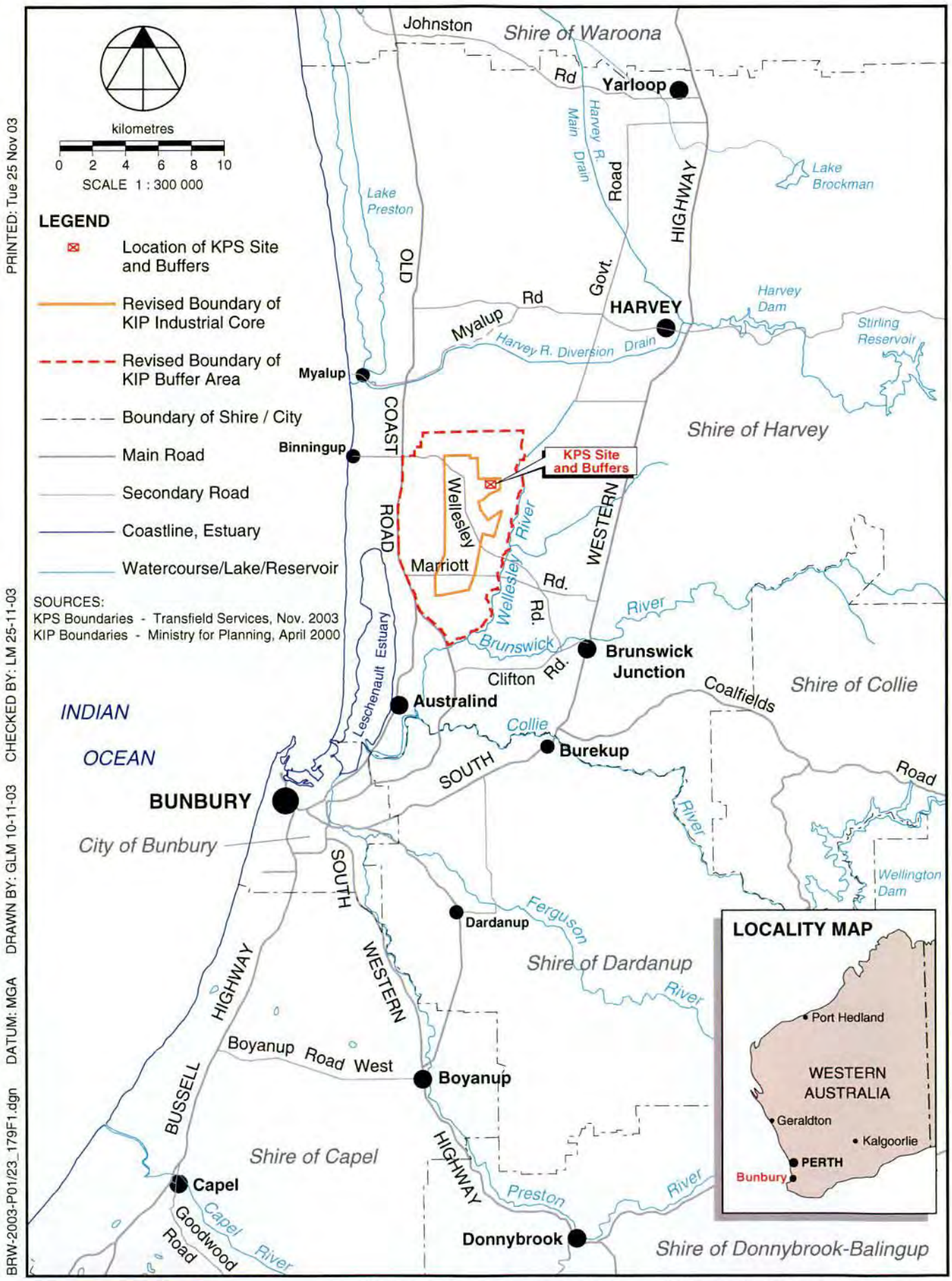
AGO	Australian Greenhouse Office
CO	Carbon monoxide
CO_2	Carbon dioxide
CO_{2-e}	Carbon dioxide equivalent
DLN	low NO_x burners
DoE	Department of Environment
DoIR	Department of Industry and Resources
EPA	Environmental Protection Authority (Western Australia)
GT	Gas turbine alternator/generator
ISO	International Standards Organisation
MCR	maximum continuous rating
NEPC	National Environmental Protection Council
NEPM	National Environmental Protection Measure
NO_2	Nitrogen dioxide
NOx	Oxides of nitrogen
SER	Strategic Environmental Review
SO_2	Sulphur dioxide
SOx	Oxides of sulphur
STKT	Transfield Services Kemerton Trust
SWIS	South West Interconnected System
TDS	total dissolved solids
WPC	Western Power Corporation
WRC	Water and Rivers Commission

Units

dB	decibels
dB (A)	decibels (A-weighted)
GW	gigawatts
GWh	gigawatt hours
GWh/yr	gigawatt hours per year
ha	hectares
kL	kilolitre
km	kilometres
kV	kilovolts
L	litres
lpm	litres per minute
m	metres (length)
m^2	square metres (area)
m^2/d	square metres per day
m^3	cubic metres (volume)
ML	megalitres
ML/yr	megalitres per year
m/s	metres per second
MW	megawatts
MWh	megawatt hours

PJ	petajoules
ppm	parts per million
t	tonnes
tph	tonnes per hour
tpa	tonnes per annum
°C	degrees Celsius (or Centigrade)
%	percent

FIGURES



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KEMERTON POWER STATION - ENVIRONMENTAL REFERRAL

REGIONAL LOCATION

FIGURE 1

BRW-2003-P01/23_179f2.dgn DATUM: MGA DRAWN BY: TE/GLM 7-11-03 CHECKED BY: HVW 7-11-03 PRINTED: Fri 07 Nov 03

LEGEND

- Proposed Kemerton Power Station Site and Buffers
- Revised Boundary of K.I.P. Buffer Area
- Revised Boundary of Industial Core
- Dampier to Bunbury Gas Pipeline
- Proposed Gas Lateral
- Transmission Line 330kv
- Transmission Line 132kv
- Substation

kilometres
0 0.5 1 1.5 2 2.5
SCALE 1 : 50 000

Dampier-Bunbury Gas Pipeline
Existing Gas Lateral
Proposed Gas Lateral
Proposed KPS Site & Buffers
Dampier-Bunbury Gas Pipeline

HARVEY RIVER DIVERSION DRAIN
BOONILUP ROAD
LEITCH ROAD
RUNNYMEDE ROAD
ARTHUR ROAD
WELLESLEY RIVER
BINNINGUP ROAD
WELLESLEY ROAD
COAST ROAD
OLD SPRINGHILL ROAD
TREASURE ROAD
BUFFALO ROAD
WELLINGTON ROAD
WELLESLEY RD
MARRIOTT ROAD
DEVLIN ROAD
GAS GATE STATION
INDIAN OCEAN
MYALUP SWAMP
MIALLA LAGOON
LESCHENAULT ESTUARY
Wastewater Treatment Plant
Piggery
Abbatoir
Energy Equipment
Simcoa
MIC, Nurfarm, BOC and Cobckburn Cement

SOURCE: WESTERN POWER, 14-8-01

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KEMERTON POWER STATION
ENVIRONMENTAL REFERRAL

KEMERTON INDUSTRIAL PARK

FIGURE 2

PRINTED: Tue 11 Nov 03

BRW-2003-P01/23_179F3.dgn DATUM: MGA Zone 50 DRAWN BY: GLM 8-11-03 CHECKED BY: HVW 8-11-03

Lot 500

Lot 501

Lot 32

Road Reserve

Existing Mine Access Road

Proposed Gas Lateral

Existing Dampier - Bunbury Gas Pipeline

Power Line Option 1

Power Line Option 2

Power Line Option 3

Firebreak

Access Road

KPS Buffer

KPS SITE

Laydown Area

Gas Lateral

Gas Conditioning Plant

Switchyard

Relocated Drain & Tracks

Lot 502

Noise Buffer

Road Reserve

Existing 330 kv Transmission Line

Existing 132kv Transmission Line

Lot 1

Lot 18

SOURCES: KPS Infrastructure - Tranfield Services, Nov. 2003
Cadastra - DLI, Nov. 2003
Other data - From Aerial Photograph, DLI, Jan. 2003

metres

0 100 200 300 400

SCALE 1 : 6 000

NOTE: Elements are Indicative and Subject to Detailed Design

LEGEND

- Cadastral Boundary
- Existing Drain
- Existing Tracks within K.I.P.
- K.P.S. Infrastructure Firebreak (same colour as infrastructure)

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KEMERTON POWER STATION
ENVIRONMENTAL REFERRAL

PROVISIONAL SITE ACCESS LINEAR INFRASTRUCTURE AND UTILITIES

FIGURE 3

PRINTED: Tue 11 Nov 03

CHECKED BY: HVW 7-11-03

DRAWN BY: TE/GLM 7-11-03

DATUM: Not Spatially Correct

BRW-2003-PO1/Referal-f5.dgn

NOT BINDING FOR EXECUTION

N

E=385769
N=6329988

E=386394
N=6329987

N=6329900

N=6329800

N=6329700

E=385768
N=6329652

E=386394
N=6329652

E=386100
N=6329872.70

E=386221
N=6329739.70

134m

178m

REROUTED DRAIN DITCH

Site Installation area
10000 m2

TP1
TP2
TP3
TP4
TP5
TP6
TP7
TP9
TP10

E=385800
E=385900
E=386000
E=386100
E=386200
E=386300
E=386400

Stage1 Site Boundary

LEGEND

11/12UBA01/02/03	STRUCTURE FOR POWER CONTROL CENTER (PCCs)
10/11/12UBD	STRUCTURE FOR LV AUXILIARY POWER TRANSFORMERS
11UBC	STRUCTURE FOR HV AUXILIARY POWER TRANSFORMER
11/12UBF	STRUCTURE FOR GENERATOR TRANSFORMERS
00UBH	STRUCTURE FOR OIL-COLLECTING PIT/OIL SEPARATOR
00UBN	STRUCTURE FOR EMERGENCY POWER GENERATING SET
11UBX	STRUCTURE FOR GENERATOR CIRCUIT BREAKER
00UB2	STRUCTURE FOR CABLE CONDUITS
00UCA	CONTROL ROOM, ADMINISTRATION, WORKSHOP AND STORAGE BUILDING
00UEH	STRUCTURE FOR UNLOADING OF LIQUID FUELS
00UEJ	STRUCTURE FOR STORAGE OF LIQUID FUELS
00UEK	BUND WALL FOR STORAGE OF LIQUID FUELS
00UEL	STRUCTURE FOR FORWARDING OF LIQUID FUELS
11/12UEN	STRUCTURE FOR GAS METERING AND FILTER
01-05UEY	STRUCTURE FOR PIPE SLEEPER WAY
01/02UEZ	STRUCTURE FOR PIPE DUCT
00UGA	STRUCTURE FOR RAW WATER TANK
00UGC	STRUCTURE FOR DEMINERALIZED WATER STORAGE
00UGG	STRUCTURE FOR POTABLE WATER STORAGE
00UKY	STRUCTURE FOR SEWAGE PLANT
11/12UHN	STACK FOUNDATION
11/12UMD	GAS TURBINE PACKAGE
11/12URB	STRUCTURE FOR FIN FAN COOLERS (SERVICE WATER)
11/12URC	STRUCTURE FOR FIN FAN COOLERS LUBE OIL)
00USQ	STRUCTURE FOR FIRE FIGHTING WATER PUMPS
11/12URY	STRUCTURE FOR PIPE SLEEPER WAY
UZA	ROADS
UZJ	FENCING AND GATE
	GATE
	FENCING
	HARDSTANDING AREA
	TERMINAL POINT
TP1	FUEL GAS
TP2	FUEL OIL
TP3	330kV-HV-CONNECTION
TP4	DEMIN WATER
TP5	RAW WATER
TP6	ACCESS ROAD
TP7	POWER SUPPLY FOR CONSTRUCTION
~~TP8~~	~~CONSTRUCTION WATER~~ DELETED
TP9	RAINWATER DISCHARGE
TP10	POTABLE WATER

BUILDING LEVEL ±0.00m = 115m ABOVE M.S.L. (ASSUMED)
FINAL GROUND LEVEL -0.30m = +114.70m ABOVE M.S.L. (ASSUMED)

Kemerton Power Station SC 2 V94.2 AUS379

Siemens AG W721

AUS379-UC01-U-1

SOURCE: Transfield Services Ltd, 5-2003

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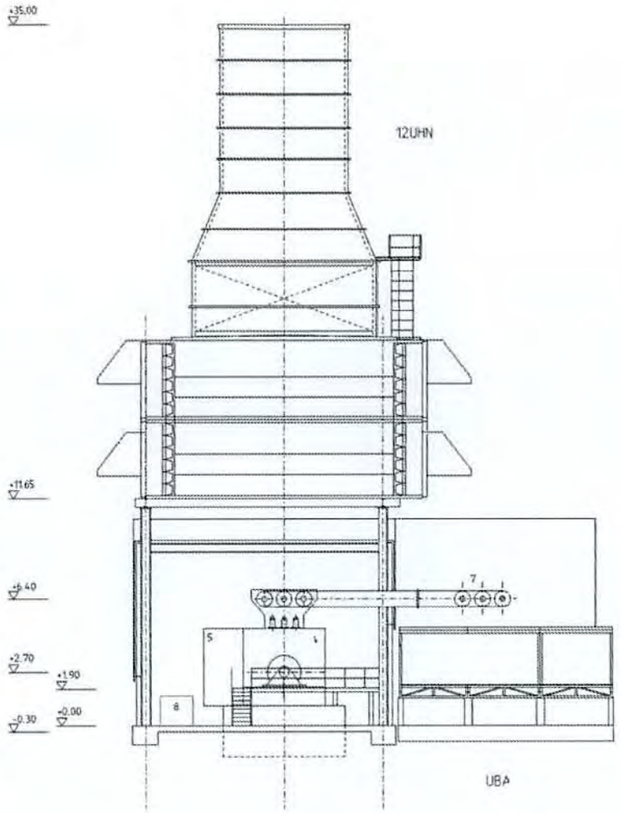
KEMERTON POWER STATION
ENVIRONMENTAL REFERRAL

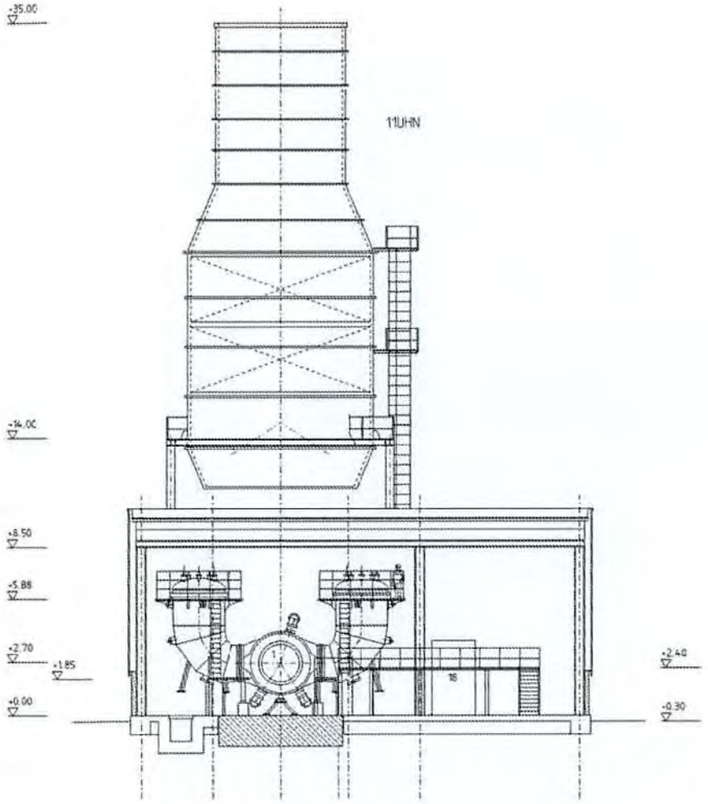
SITE PLAN

FIGURE 4

NOT BINDING FOR EXECUTION



12UMB



11UMB

UBA POWER CONTROL CENTER
UBD STRUCTURE FOR LV AUXILIARY POWER TRANSFORMERS
UBE STRUCTURE FOR HV AUXILIARY POWER TRANSFORMER
UBF STRUCTURE FOR GENERATOR TRANSFORMER
UBN STRUCTURE FOR EMERGENCY POWER GENERATING SET
UBX STRUCTURE FOR GENERATOR CIRCUIT BREAKER
UBZ STRUCTURE FOR CABLE CONDUITS
UEN GAS METERING AND FILTER
UEZ STRUCTURE FOR PIPE DUCT
UHN EXHAUST STACK
UMB GAS TURBINE PACKAGE
1 GAS TURBINE
2 AIR INTAKE DUCT
3 LUBE OIL TANK
4 GENERATOR
5 GENERATOR COOLER
6 FILTERHOUSE
7 GENERATOR BUS DUCT
8 CLOSED COOLING WATER PUMPS
9 VENTILATION AIR INTAKE

11 ERECTION OPENING
12 ASSEMBLY OPENING

14 DEHUMIDIFIER
15 EXHAUST DIFFUSER

17 COLLECTING PIT
18 FUEL GAS SKID
19 HYDRAULIC SKID

26 PURGE WATER SKID
27 FUEL OIL SKID
28 NOISE PROTECTION WALL
URB STRUCTURE FOR FIN FAN COOLERS (SERVICE WATER)
URC STRUCTURE FOR FIN FAN COOLERS (LUBE OIL)
USA STRUCTURE FOR HVAC SYSTEM
UTX STRUCTURE FOR IGNITION GAS TANK

SOURCE:

ATA Environmental
environmental scientists

KEMERTON POWER STATION
ENVIRONMENTAL REFERRAL
END VIEW
FIGURE 5

PRINTED: Tue 11 Nov 03
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DATUM: Not Applicable
BRW-2003-PO1/23_179F6.dgn

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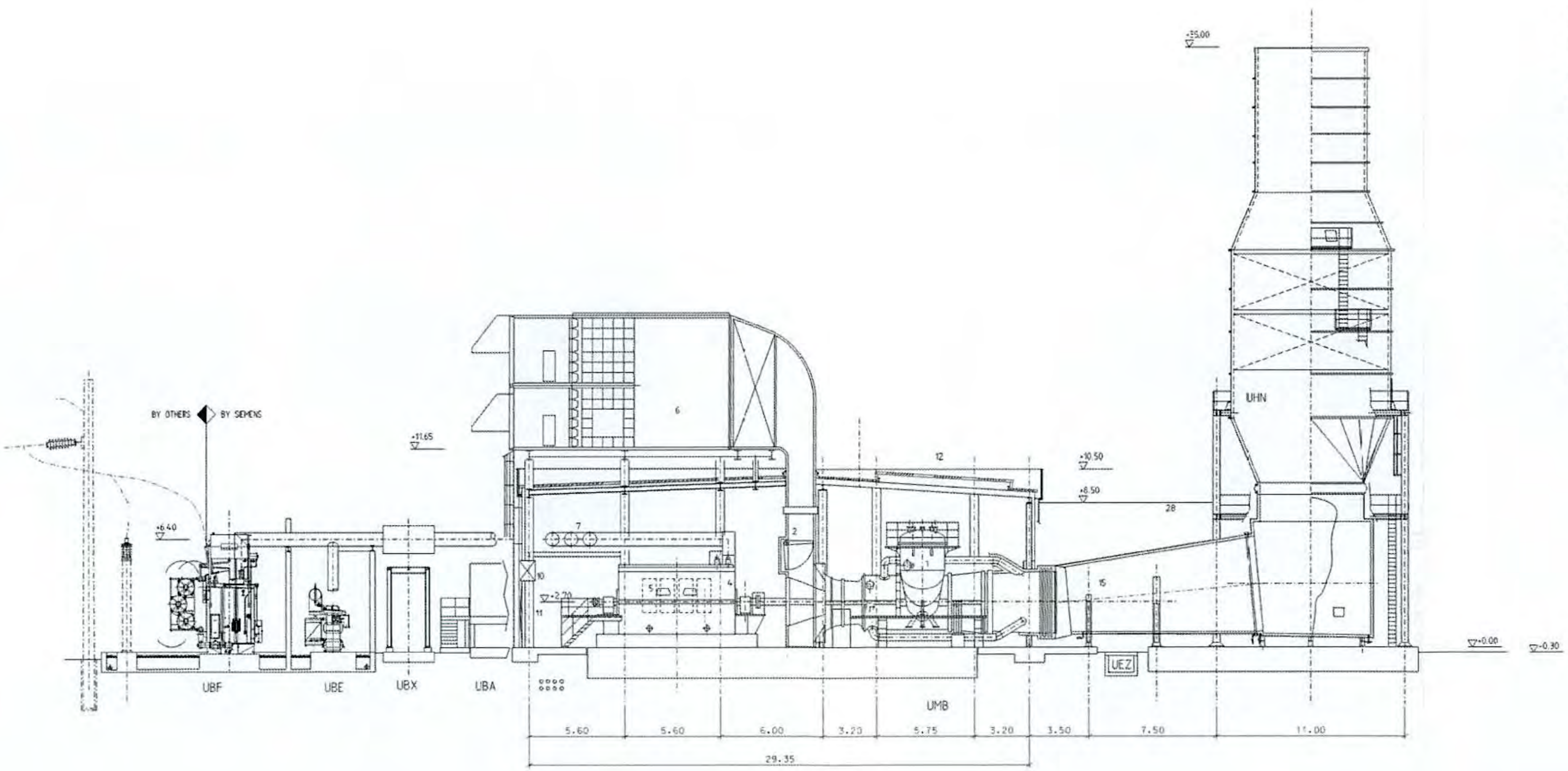
NOT BINDING FOR EXECUTION



BY OTHERS
BY SIEMENS
+6.40
+11.65
+2.20
+10.50
+6.50
+25.00
+0.00
-0.30
UHN
UBF
UBE
UBX
UBA
UMB
UEZ
5.60
5.60
6.00
3.20
5.75
3.20
3.50
7.50
11.00
29.35
UBA POWER CONTROL CENTER
UBD STRUCTURE FOR LV AUXILIARY POWER TRANSFORMERS
UBE STRUCTURE FOR HV AUXILIARY POWER TRANSFORMER
UBF STRUCTURE FOR GENERATOR TRANSFORMER
UBN STRUCTURE FOR EMERGENCY POWER GENERATING SET
UBX STRUCTURE FOR GENERATOR CIRCUIT BREAKER
UBZ STRUCTURE FOR CABLE CONDUITS
UEM GAS METERING AND FILTER
UEZ STRUCTURE FOR PIPE DUCT
UHN EXHAUST STACK
UMB GAS TURBINE PACKAGE
1 GAS TURBINE
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3 LUBE OIL TANK
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5 GENERATOR COOLER
6 FILTERHOUSE
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17 COLLECTING PIT
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26 PURGE WATER SKID
27 FUEL OIL SKID
28 NOISE PROTECTION WALL
URB STRUCTURE FOR FIN FAN COOLERS (SERVICE WATER)
URC STRUCTURE FOR FIN FAN COOLERS (LUBE OIL)
USA STRUCTURE FOR HVAC SYSTEM
UTX STRUCTURE FOR IGNITION GAS TANK

SOURCE:

ATA Environmental
environmental scientists

KEMERTON POWER STATION
ENVIRONMENTAL REFERRAL
ELEVATION
FIGURE 6

PRINTED: Tue 11 Nov 03

CHECKED BY: HVW 8-11-03

DRAWN BY: GLM 8-11-03

DATUM: MGA Zone 50

BRW-2003-P01/23_179F7.dgn

DaH

DaH

DaH

Em/Cc

Em/Cc

Lot 500

Lot 501

Lot 32

Em/B

Em/Cc

DaH

DaH

Road Reserve

2

1

Em/Cc

3 KPS Buffer

KPS SITE

EgP7

EgP

Lot 502

4

8

Noise Buffer

EgP

Em/Cc

CORE EXPANSION AREA FOR K.I.P.

5

6

Cl

Road Reserve

Em/B

DaH

EgP

Em/B

Cl

Lot 18

Lot 1

Em/B

DaH

Em/B

Mp

metres

0 100 200 300 400

SCALE 1 : 6 000

LEGEND

- Proposed KPS Site Boundary
- Proposed KPS Buffer Boundary
- Boundary of Core Expansion for K.I.P.
- Cadastral Boundary
- 8 Location of Fauna Trapping Grid
- Boundary of Vegetation Communities

VEGETATION COMMUNITIES

DaH	Species rich Dampland Heath
EgP	*Eucalyptus globulus* Plantation
Em/B	*Eucalyptus marginata/Banksia attenuata/Banksia grandis* Woodland
Em/Cc	*Eucalyptus marginata/Corymbia calophylla* Woodland
Mp	Scattered or Parkland Cleared *Melaleuca preissiana* trees
Cl	Cleared

SOURCES: KPS and Buffers - Tranfield Services, Nov. 2003
Aerial Photograph - DLI, Nov 2003, Taken Jan 2003
Cadastra - DLI, Nov. 2003

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KEMERTON POWER STATION
ENVIRONMENTAL REFERRAL

SITE VEGETATION COMMUNITIES & FAUNA FIELD SURVEY LOCATIONS

FIGURE 7

PLATES

Plate 1 View Analysis of Placed Power Station from East North East

Plate 2 View Analysis of Placed Power Station from East South East

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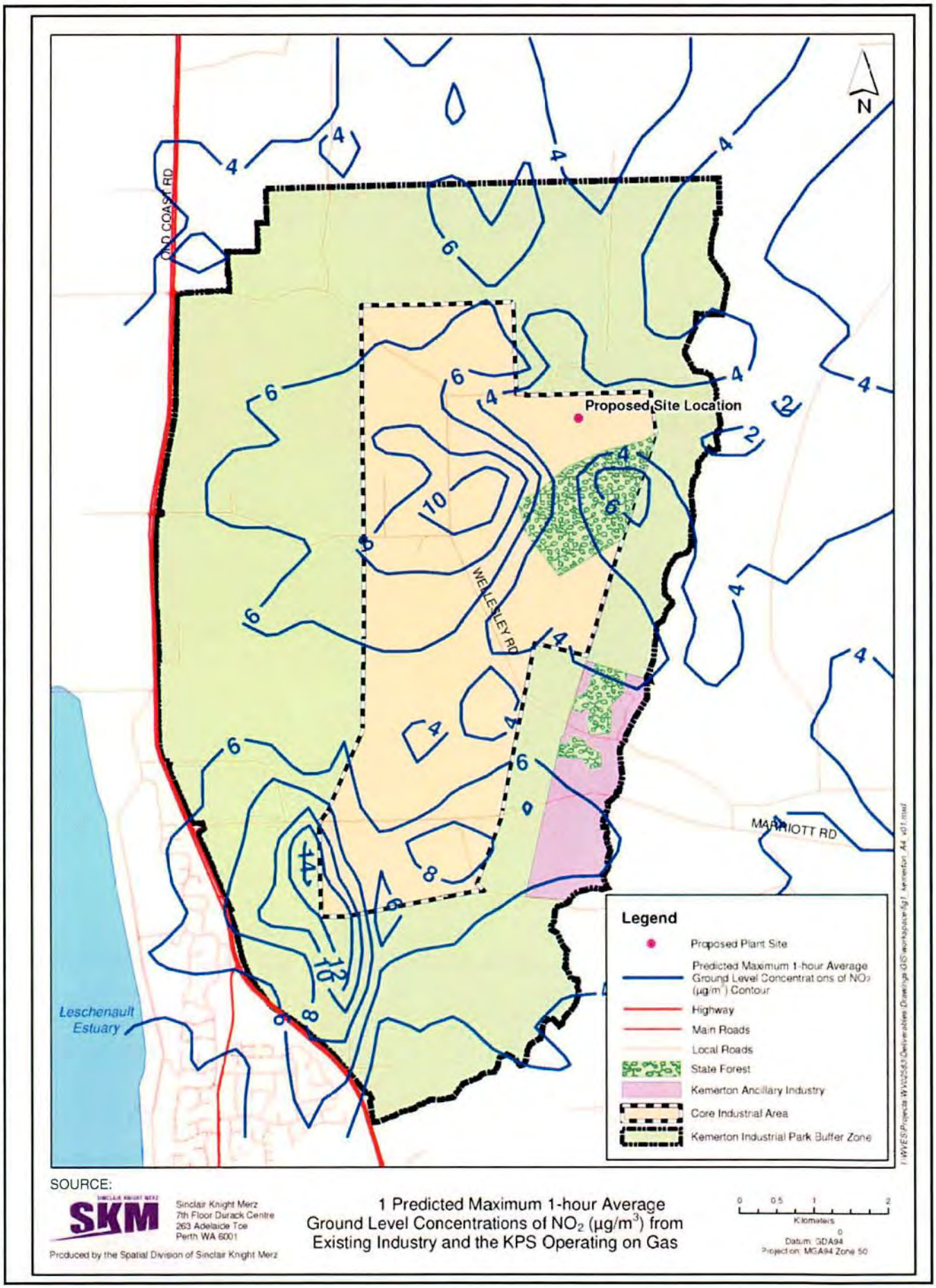

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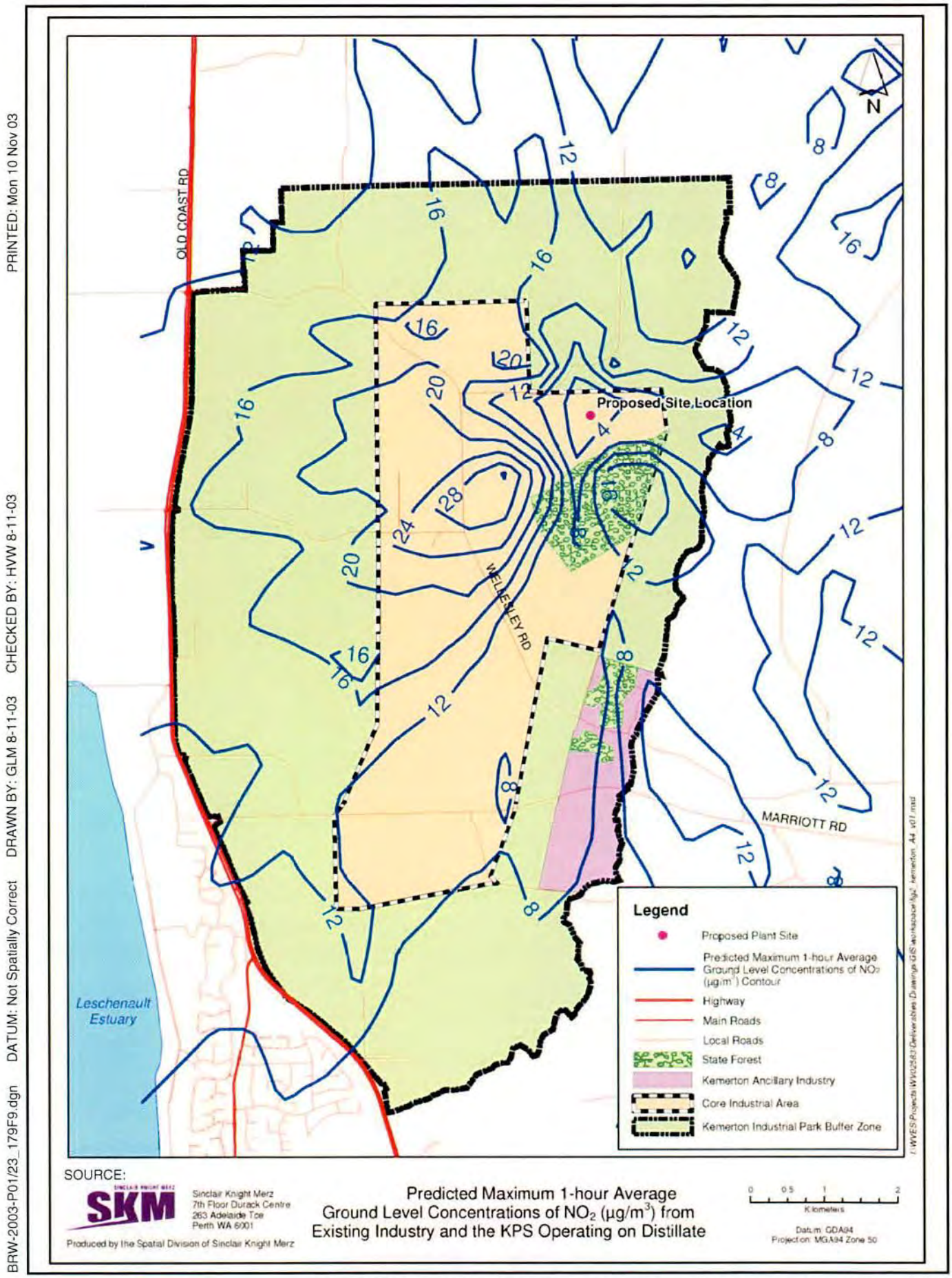
KEMERTON POWER STATION - ENVIRONMENTAL REFERRAL

KPS 1 HR MAXIMUM NO_2 OPERATING ON GAS

FIGURE 8



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KEMERTON POWER STATION - ENVIRONMENTAL REFERRAL

KPS 1 HR MAXIMUM NO_2 OPERATING ON DISTILLATE

FIGURE 9

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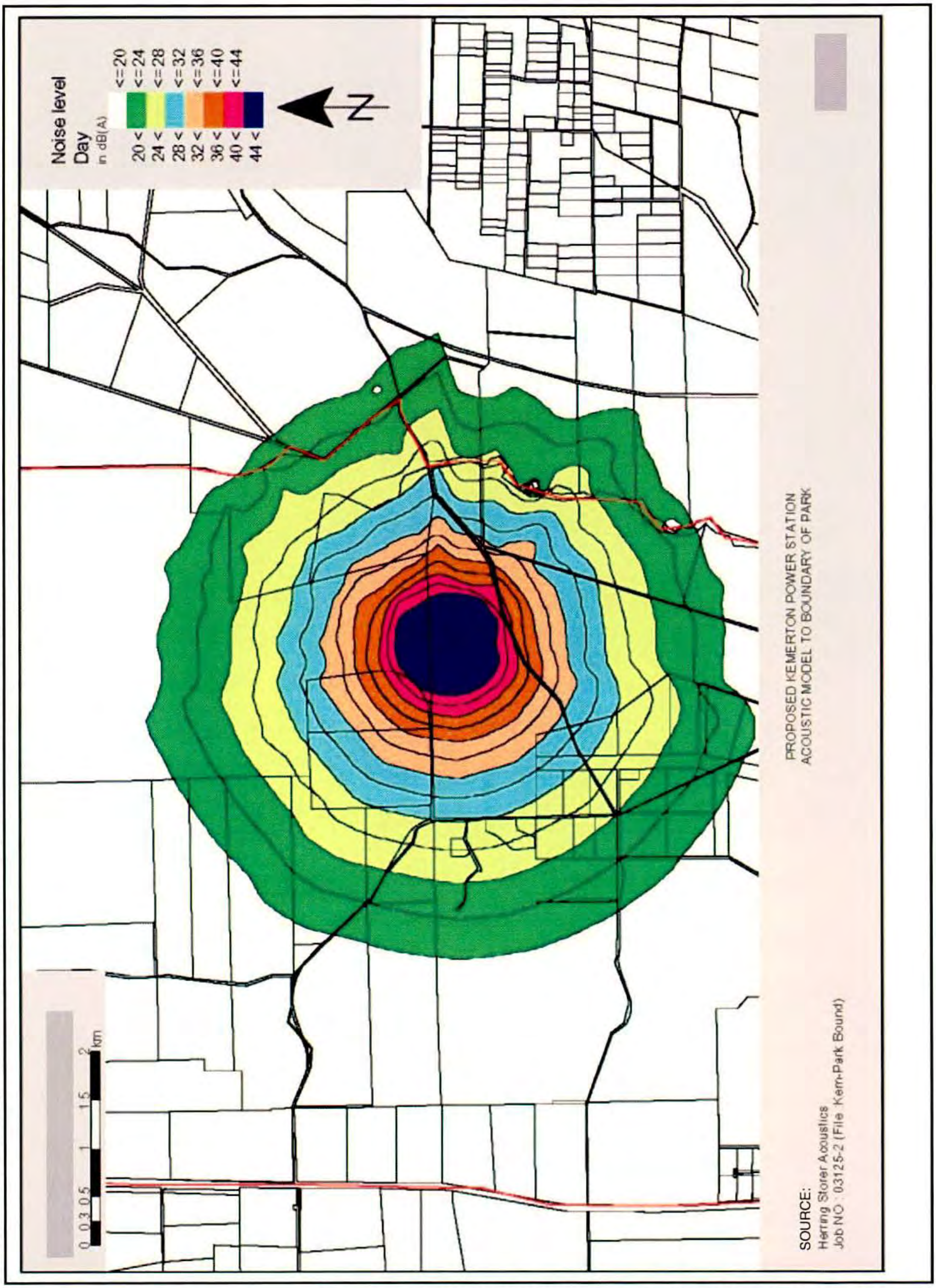

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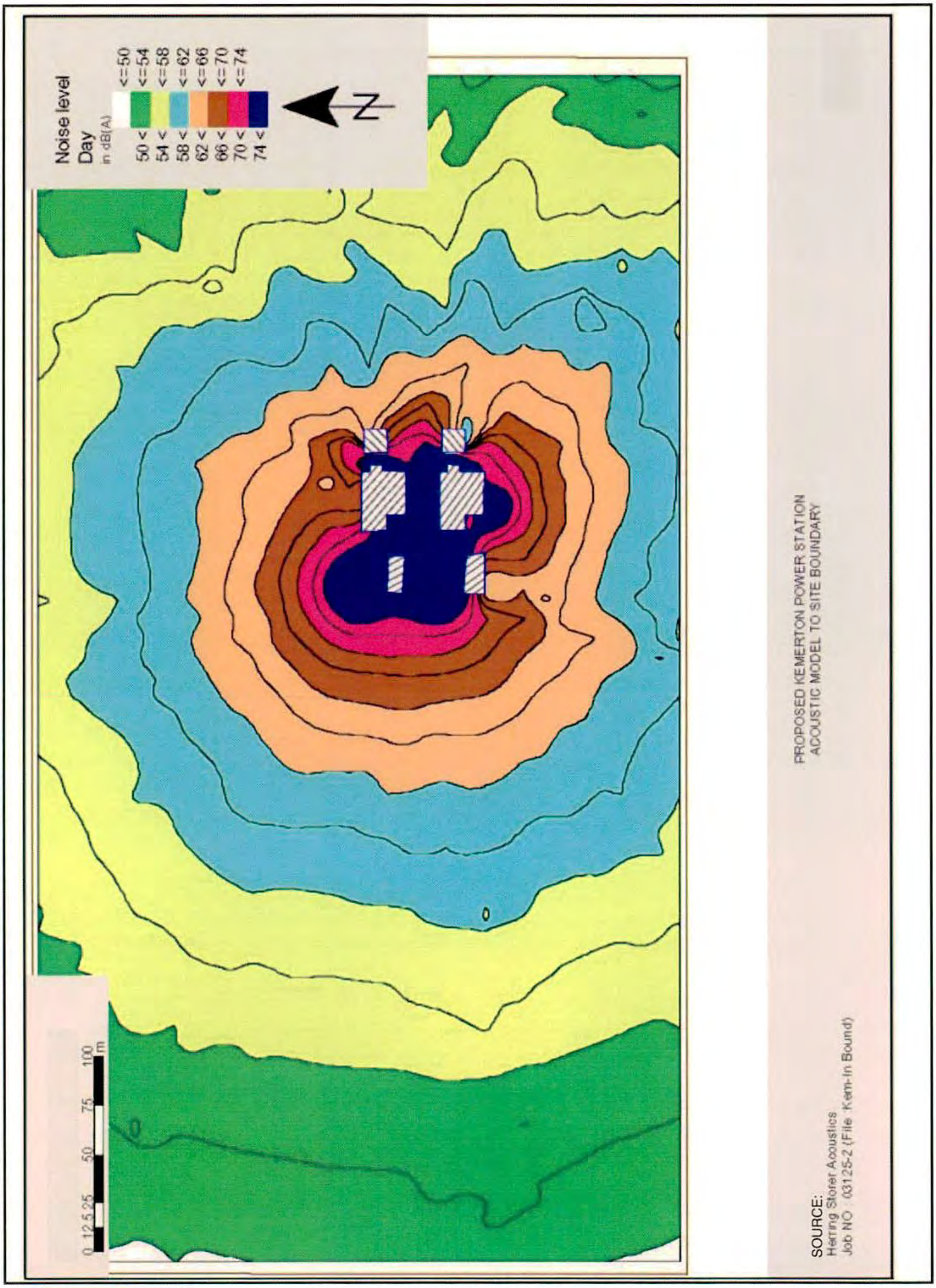
KEMERTON POWER STATION - ENVIRONMENTAL REFERRAL

ACOUSTIC MODEL TO BOUNDARY OF PARK

FIGURE 10

BRW-2003-P01/23_179F11.dgn DATUM: Not Spatially Correct DRAWN BY: GLM 8-11-03 CHECKED BY: HVW 8-11-03 PRINTED: Sat 08 Nov 03



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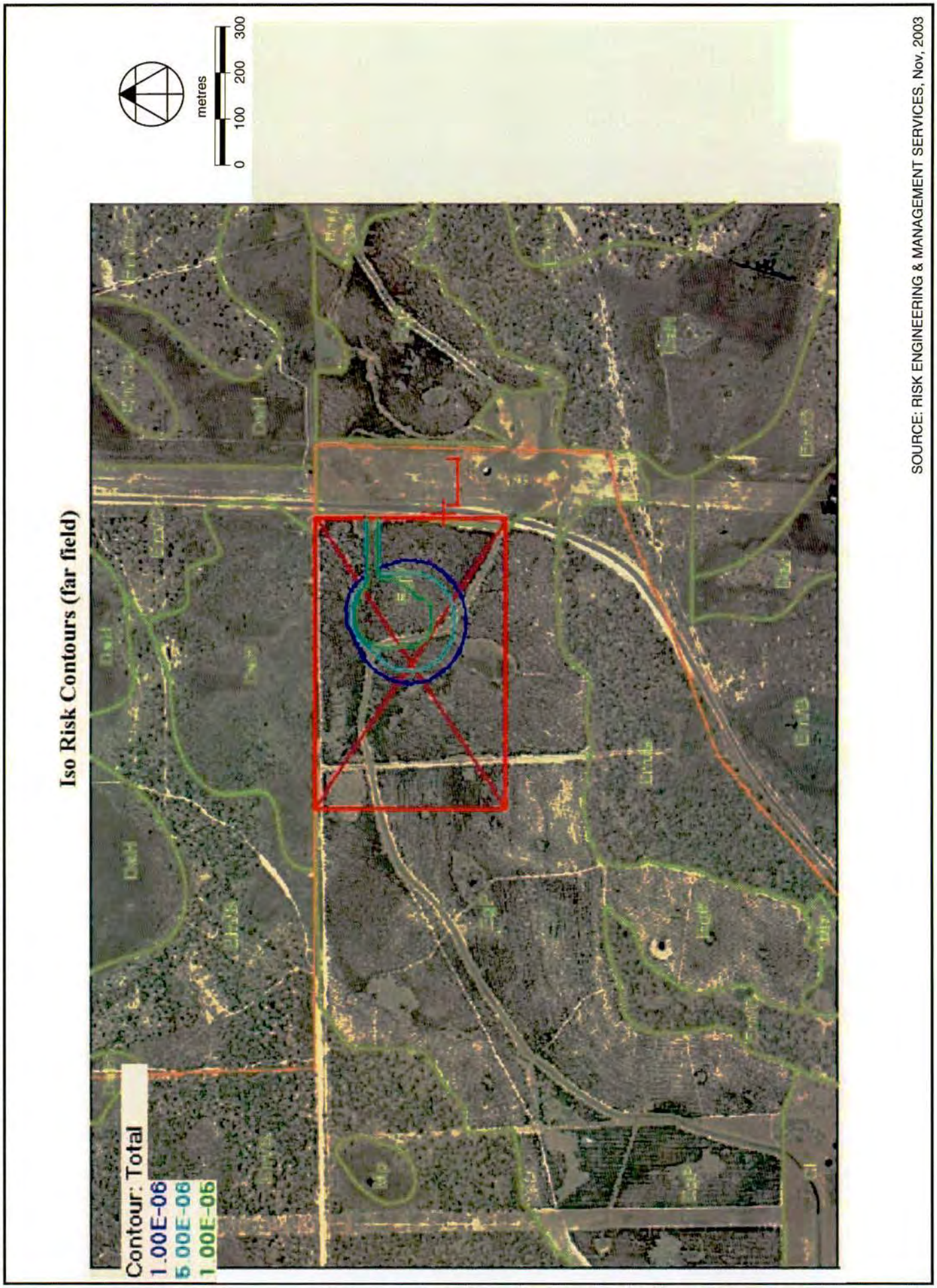
KEMERTON POWER STATION - ENVIRONMENTAL REFERRAL

ACOUSTIC MODEL TO SITE BOUNDARY

FIGURE 11



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KEMERTON POWER STATION - ENVIRONMENTAL REFERRAL

KPS ISO RISK CONTOURS (FAR FIELD)

FIGURE 12

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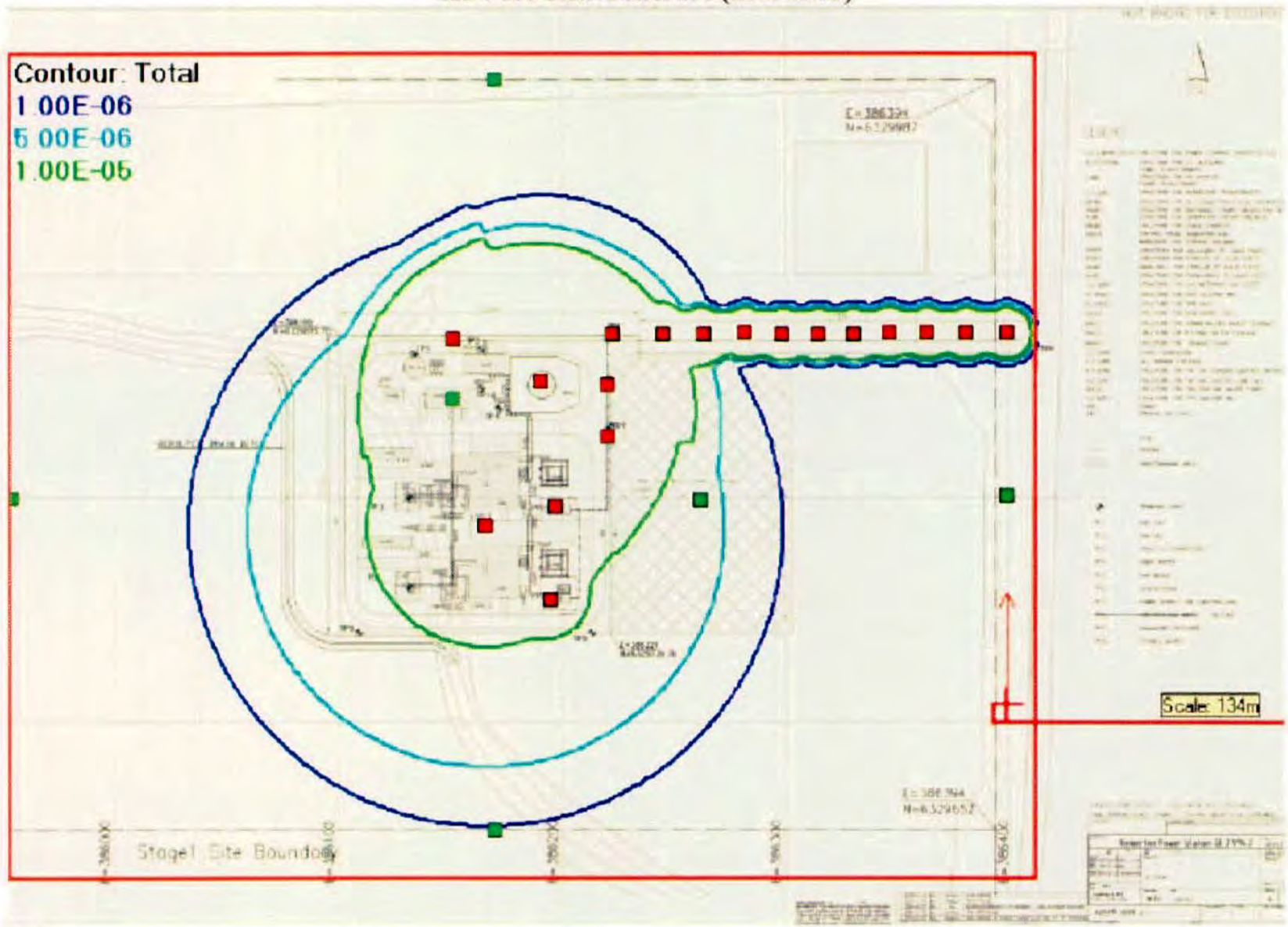
KEMERTON POWER STATION - ENVIRONMENTAL REFERRAL

KPS ISO RISK CONTOURS (NEAR FIELD)

FIGURE 13



SOURCE: RISK ENGINEERING & MANAGEMENT SERVICES, Nov, 2003