Bunbury Harbour City - Marlston Hill development — proposed changes to environmental conditions

---

Landcorp and the South West Development Commission

Report and recommendations
of the Environmental Protection Authority

Environmental Protection Authority
Perth, Western Australia
Bulletin 774
March 1995

THE PURPOSE OF THIS REPORT

This report contains the Environmental Protection Authority's environmental assessment and recommendations to the Minister for the Environment on the environmental acceptability of the proposal.

Immediately following the release of the report there is a 14-day period when anyone may appeal to the Minister against the Environmental Protection Authority's report.

After the appeal period, and determination of any appeals, the Minister consults with the other relevant ministers and agencies and then issues his decision about whether the proposal may or may not proceed. The Minister also announces the legally binding environmental conditions which might apply to any approval.

APPEALS

If you disagree with any of the contents of the assessment report or recommendations you may appeal in writing to the Minister for the Environment outlining the environmental reasons for your concern and enclosing the appeal fee of $10.

It is important that you clearly indicate the part of the report you disagree with and the reasons for your concern so that the grounds of your appeal can be properly considered by the Minister for the Environment.

ADDRESS

Hon Minister for the Environment
12th Floor, Dumas House
2 Havelock Street
WEST PERTH WA 6005

CLOSING DATE

Your appeal (with the $10 fee) must reach the Minister's office no later than 5.00 pm on 14 April 1995.

Environmental Impact Assessment (EIA)

Process Timelines in weeks

Date	Timeline commences from receipt of full details of proposal from proponent	Time (weeks)
25 July	Proponent Document Released for Public Comment	1
5 Sept	Public Comment Period Closed	6
14 Sept	Issues Raised During Public Comment Period Summarised by DEP and Forwarded to the Proponent	1.5
11 Nov	Proponents response to the issues raised received	8
9 Jan	EPA reported to the Minister for the Environment	7

ISBN. 0 7309 5720 9
ISSN. 1030 - 0120
Assessment No. 893

Contents

Contents (cont'd)

Figures

Contents (cont'd)

Summary and recommendations

The Environmental Protection Authority (EPA) has been requested by the Minister for the Environment under Section 46 of the *Environmental Protection Act 1986,* to report on the proposed changes to environmental conditions for the Bunbury Harbour City development.

This development was assessed by the EPA and approved by the Minister for the Environment in 1992, and environmental conditions were set in 1993.

The Marlston Hill site is located north of the Bunbury CBD. The site has been used previously for industrial purposes including storage of petroleum products, railway workshops, a sewage treatment plant and grain storage facilities. LandCorp and the South West Development Commission propose to redevelop the site for residential purposes.

This document describes the outstanding environmental issues relating to this development which have been identified through the environmental impact assessment process. They include:

- traffic noise in residential areas;
- transportation planning;
- remediation of soil and groundwater contamination and associated dust control; and
- risk and hazards from hazardous goods handling in the Outer Harbour.

Traffic Noise

A study was undertaken by Herring Storer Acoustics (HSA) of likely traffic noise, particularly the impact of truck noise on the residential areas. HSA adopted Main Roads WA standards of 63dB $L_{A\ L10\ 18\ hour}$ as a maximum acceptable outdoor noise environment for the period 0600 to 2400 hours. HSA considered this level reasonably acceptable to at least 80% of people exposed, and reasonably achievable in most circumstances. HSA concluded that with a proposed setback of 25 m to residential sites, noise levels from traffic would be within these guidelines.

For night time HSA considered a level of 60dB (A) should apply for the night time between 2200 and 0700 hours, as trucks on occasions will run twenty four hours a day, and the lower noise standard would consider the potential for disturbing residents.

At present there are no noise regulations in Western Australia to address the impact of traffic noise at a residence as criteria for assessment of road traffic noise are not covered by the Department's Environmental Protection Draft (Noise) Guidelines. However, this proposal is a new urban development subjected to existing road noise, and this level of noise is likely to be intrusive, particularly at night. The Main Roads design criteria do not take this into account, and consequently the Department and the EPA considered these criteria inappropriate for assessing this proposal.

The proponents state that calculations show that noise reduction features such as a 25m setback, the use of dense graded asphalt, and a 1.2 m high solid boundary wall can be implemented to reduce noise levels by up to 11dB(A) outside residences immediately facing Casuarina Drive. The Department predicts that this will not protect indoor sleeping conditions sufficiently, and will affect outdoor recreation values at night in summer.

The EPA considers that based on French research and World Health Organisations standards, indoor noise should not exceed 35dBL_{Aeq} and an instantaneous noise level of 45dB$L_{A\ max}$ between 10pm and 7am. The Department predicts that the proposed noise attenuation features for houses adjacent to Casuarina Drive will not reduce noise levels to that standard.

The EPA considers that the developer should be required to ensure that this indoor noise standard is met by measures such as sound proofing and mechanical ventilation to the bedrooms of the affected houses, to ensure reasonable sleeping conditions in summer.

The EPA recommends that appropriate building regulations be attached to a Special Use Zone in the Town Planning Scheme Amendment to give effect to noise mitigation and the provision

of adequate ventilation. This will ensure that there is knowledge of the building conditions when people are preparing building applications, and enforcement of the conditions when Council approves building applications.

Transportation Planning

Trucking is the preferred alternative to the Outer Harbour at present, particularly for the low volume, high value, short haulage, mineral sands industry.

However, the EPA supports the preservation of the railway reserve from Brunswick Junction to central Bunbury because of the long term greenhouse gas reduction, energy conservation and public transport benefits, and notes that a rail reserve is included within the Proposed Zoning in Figure 2.

Site Remediation

The results of site investigations confirm that elevated concentrations of heavy metals, organochlorine pesticides and petroleum hydrocarbons are present on the site. There is also a plume of groundwater which contains elevated levels of hydrocarbons. In some instances the proponents could not investigate sites fully, because access was not available. In these cases further investigations to confirm the extent of contamination will be necessary.

Based on the site investigation, a preliminary management plan has been prepared, which provides a brief description of the concentrations of contaminants found; a proposed remediation plan; any further investigations necessary to allow finalisation of the Preliminary Management Plan; and a programme for lease holder negotiations and remediation work.

The proponents are responsible for all remediation and further investigation work required, and their responsibilities are outlined in the commitments made by the proponents in Appendix 1. The EPA has agreed with this approach.

Risks and Hazards

A risk assessment was undertaken to identify what restrictions the Bunbury Harbour City development may place on the handling of hazardous materials at the Outer Harbour. The study included the identification of potential hazards that may affect the development; a risk analysis for these possible scenarios; determining whether any operations that are acceptable in terms of risk without the proposed development, would not be acceptable with the proposed residential development; and recommendations on the control of risk at the Outer Harbour

The results of the risk assessment indicate that the maximum cumulative individual risk in the Bunbury Harbour City development from the handling of dangerous goods through the Outer Harbour is approximately 5×10^{-7} per year, provided the dangerous goods imported, stored and transported from the Outer Harbour are limited to the type and maximum quantity detailed in the proposal.

The EPA is satisfied that risks imposed upon the proposed residential development from the Bunbury Port Authority's (BPA's) activities will not exceed those outlined in the EPA's individual risk criteria for the assessment of risk from industry. The EPA also considers that risk of transporting hazardous substances should be in accordance with the standards applied by the Department of Minerals and Energy with advice from the West Australian Advisory Committee on Hazardous Substances (WAACHS). The EPA would encourage BPA to implement a safety management system and management practices to contain risk, and to undertake a more comprehensive societal risk assessment for the importation of the nominated goods, such as explosives and ammonium nitrate.

Conclusion

The Environmental Protection Authority considers that Landcorp and the South West Development Commission have identified the potential impacts from the above environmental issues as much as possible at this stage. The Authority believes that the proposal will not have any significant adverse environmental impacts.

The Environmental Protection Authority has concluded that the project is acceptable on environmental grounds subject to the proponent's commitments and the Environmental Protection Authority's recommendations in this report.

Summary of Recommendations	
1.	The proposal to rezone land is acceptable on environmental grounds subject to the recommendations contained in this report and the proponents' commitments.
2.	A zone for "Special Use - Residential R15" should be declared, with the building guidelines set down as Development Conditions to give effect to noise attenuation and to the provision of adequate ventilation.
3.	Landcorp and the South West Development Commission should carry out soil and groundwater remediation programmes according to the Assessment Criteria listed in Table 3, and/or to the satisfaction of the Department of Environmental Protection.
4.	The proponents should prepare and implement a 'Dust Management Strategy" to control dust (wind blown particulates from any of the sites), to ensure that there are no confirmed complaints about dust, to the requirements of the Department of Environmental Protection.
5	There should be no clearance of survey documents before the Department of Environmental Protection and the Health Department of Western Australia agree the remediation has been carried out to a standard such that there is no risk to potential residents or other users.

Notes in addition to Recommendations

Note 1	The EPA supports the preservation of the railway reserve from Brunswick Junction to central Bunbury because of the long term greenhouse gas reduction, energy conservation and public transport benefits.
Note 2	The EPA notes that in relation to risk factors the rezoning may limit an expansion of activities in the Outer Harbour.

1. Introduction and background

1.1 Background

In 1992, the Environmental Protection Authority (EPA) assessed a proposal by the previous proponents, the Department of Marine and Harbours and the South West Development Authority. The proposal was for a marina development and a land rezoning called Bunbury Harbour and City Development, and the assessment was at the level of Public Environmental Review. The EPA reported to the Minister in 1992 (Bulletin 660) and the environmental conditions were set in March 1993.

The EPA has been requested by the Minister for the Environment under Section 46 of the Environmental Protection Act 1986, to inquire into the current proponents' (Landcorp and South West Development Commission) proposed changes to the environmental conditions for the Bunbury Harbour and City Development.

This report, Bulletin 893, contains the EPA's recommendations to the Minister for the Environment, who will decide on any modifications to the environmental conditions.

1.2 The Bunbury Harbour and City proposal (1992)

The original proposal consisted of two parts, the marina and the rezoning, and their location is shown in Figure 1.

1.2.1 The marina

The marina development is to occur in three stages, a launching ramp and seventy serviced pens; groynes, marina car parking and additional pens; and land reclamation, commercial leasehold lots and a new beach.

The three industrial lease lots are considered as part of the marina complex, and are a permitted land use under the current City of Bunbury Town Planning Scheme.

However, in its assessment of the marina development, the EPA did not consider the acceptability of land uses proposed for the reclaimed land, such as the festival retail lots, beach village, hotel and condominiums. The acceptability of such land uses will be considered in the EPA's recommendations relating to the rezoning part of the proposal.

1.2.2 The rezoning

It is proposed that the area shown in Figure 2 be rezoned from the current uses to Residential, Central Business District, Industrial (including General Industry and Port Industry), and Special Use zones. Changes in land use cannot occur under the current City of Bunbury Town Planning Scheme unless the scheme is amended.

1.2.3 Existing and adjacent land use

Existing land use is predominantly fuel storage tanks, heavy machinery workshops and warehouse/storage facilities. An historic hotel, some historic grain silos and a tourist lookout area are also within this area.

To the north lies the Outer Harbour, which is used primarily by mineral sands companies, although other goods including hazardous goods such as methanol and ammonium nitrate are loaded or unloaded at the Outer Harbour.

Trucks carrying mineral sands or other goods must travel through the proposed rezoning area from Koombana Drive to reach the Outer Harbour. Further details about traffic to and from the Outer Harbour appear in section 4.1 below.

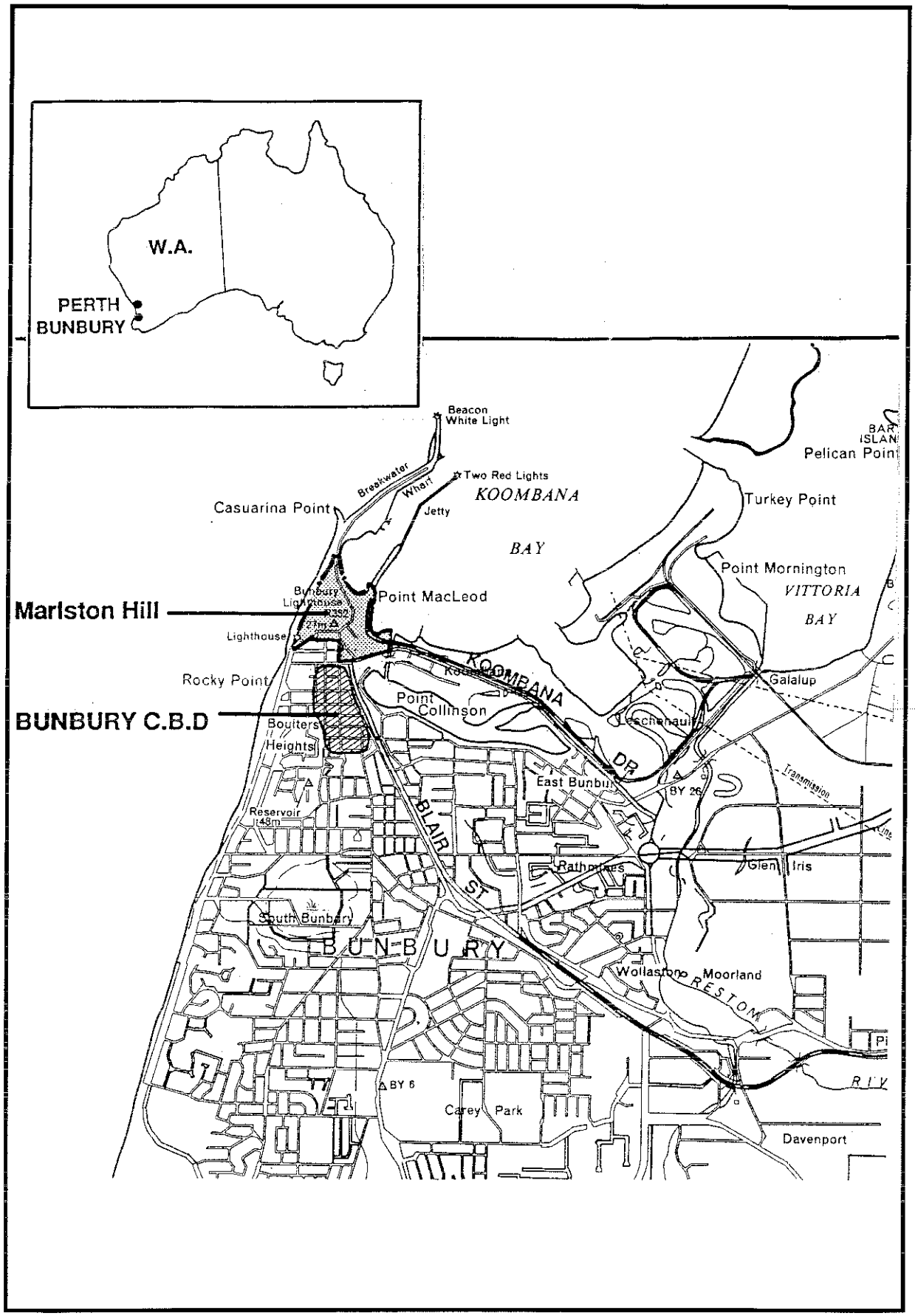

Figure 1. Location of the Bunbury Harbour and City proposal

To the south, existing land uses include a tourist hotel, shops and other typical central business district premises, residential areas, parks and recreation areas.

1.3 Public submissions

Fourteen public submissions were received on the Bunbury Harbour and City Development in 1992, which raised a number of issues concerning the incompatibility between the proposed land uses and continued use of the Outer Harbour.

1.4 Assessment of the marina

The EPA considered that most of the potential environmental impacts associated with the marina development were addressed adequately by the proponents' commitments, some of which were amended to address concerns expressed by the Authority. The Authority concluded that the marina portion of the proposal could proceed.

1.5 Assessment of the rezoning

In its 1992 assessment, the EPA considered that there was both insufficient information and sufficient uncertainty in the information provided to assess the environmental acceptability of the proposed rezoning of the land from industrial to residential. Consequently the EPA recommended that approval for the rezoning should be withheld until some important environmental issues were addressed in more detail. The EPA endeavoured to link resolution of these issues with the planning approval process, so that ultimately a joint environmental and planning decision would result.

The EPA considered that the key issues which would affect whether or not rezoning should proceed were noise, transportation planning, clean-up of contaminated sites and risks and hazards associated with the handling of hazardous goods at the Outer Harbour.

Other issues which would affect structure planning were sewerage provision and drainage, coastal setback and coastal management. The Authority considered that these issues could be dealt with through the planning process.

1.6 Environmental conditions

The EPA released its report and recommendations on the proposal in November 1992. In March 1993 the seven environmental conditions. Part of the conditions is a Note which reads:

"If the proponent wishes to pursue the changing of the land use in the area covered by this proposal to residential and tourist uses, the issues of concern to the Environmental Protection Authority may be addressed through a publicly available revised structure plan with associated text, which should be referred to the Environmental Protection Authority.

Land uses consistent with the proposed rezoning should not be implemented, until after the Minister for the Environment has considered an Environmental Protection Authority report and recommendations on a revised structure plan, which addresses issues raised in Environmental Protection Authority Bulletin 660."

The current assessment arises from this note.

2. Description of the rezoning proposal

The site is divided into three precincts: the Marlston Hill Residential Precinct, Victoria Street Extension Precinct, and Waterfront Concourse Precinct. Each precinct contains different topography, proposed land uses and built form. Existing and proposed rezoning is shown in Figure 2.

Marslton Hill is adjacent to the Bunbury Central Area and forms part of a peninsula between Koombana Bay and the Indian Ocean. The Hill is a landmark and tourist destination with 360^0 views over the city and coastline.

Victoria Street Extension is flatter land to the east and south of Marlston Hill, and consists of Guppy Park, railway land and disused road reserves. The Waterfront Concourse lies further to the east, adjacent to Koombana Bay, and consists of railway and other Crown land.

Most of the land within the three precincts is owned by the State Government. Land is vested with the Bunbury City Council, the Bunbury Port Authority, is leased to sports clubs and private companies or is controlled by a number of government departments and agencies.

2.1 Planning context

Rezoning of the land from port and industry related uses has been requested to allow development of Marlston Hill primarily for residential purposes, and for mixed use commercial, tourist and recreation facilities in the two adjacent precincts.

Alternative land uses considered were continued industrial and port use, public open space and no development. Increased concentration of port and industrial uses was not necessary due to the development of the new Inner Harbour. Intensification of existing uses was considered to be unacceptable because of the close proximity to the Bunbury Central Area. Recreational use of Marlston Hill and the waterfront is currently restricted by port industries. The no development option would not provide any gains for the community in terms of recreation or industry.

Following rezoning and subdivision/amalgamation, land will be ceded to the Crown and vested in Council for new roads, parks, local drainage and community purposes. The Department of Marine and Harbours will hold vesting for the harbour bed and the Bunbury Port Authority will retain overall control of the Port Area, its access (Casuarina Drive) and servicing infrastructure. LandCorp and SWDC will control the development, staging and servicing of the project area prior to vesting or sale to other parties.

Removal of all industrial installations and site restoration will be carried out prior to the sale of residential land to the public.

3. Environmental impact assessment process

The environmental impact assessment for this proposal followed the *Environmental impact assessment administrative procedures 1993.*

The Section 46 Report was released for public review from 25 July to 5 September 1994. Seven written submissions were received with 2 representing industry and the remainder from State and local government bodies.

Details of the major issues raised during the public review were summarised and provided to the proponent for a response. The summary of submissions and the proponents' response to that summary appears in Appendix 1, and a list of submitters appears as Appendix 2.

EXISTING ZONING

PROPOSED ZONING

Town Planning SchemeNo.6
Amendment No. 159

RESERVES
PARK, RECREATION & DRAINAGE

COMMUNICATIONS RESERVE
Arterial Road as denoted
Sub Arterial Road as denoted
Railway

ZONES
RESIDENTIAL
CENTRAL BUSINESS DISTRICT (C.B.D.)
INDUSTRIAL
General Industry G.I.

SPECIAL USE S.U.
Motel M
Bunbury Harbour City BHC
Marina Use M.U.
Caravan Park C.P.

Figure 2. Existing and proposed rezoning

Limitation

This evaluation has been undertaken using information currently available. The information has been provided by the proponent through preparation of the Section 46 document (in response to guidelines issued by the DEP), by DEP officers utilising their own expertise and reference material, by utilising expertise and information from other State Government agencies, and by contributions from EPA members.

The EPA recognises that further studies and research may affect the conclusions. Accordingly, the EPA considers that if the proposal has not been substantially commenced within five years of the date of this report, then such approval should lapse. After that time, further consideration of the proposal should occur only following a new referral to the EPA.

4. Evaluation

The major environmental issues for this proposal identified through the environmental impact assessment process include:

- traffic noise in proposed residential areas;
- transportation planning;
- clean up of site contamination; and
- risks and hazards from the Outer Harbour.

4.1 Traffic noise in proposed residential areas

4.1.1 Objective

The objective of the assessment is to ensure that proposed residential areas on Marlston Hill are not disturbed by traffic on Casuarina Drive.

4.1.2 Evaluation framework

Technical Information

The area proposed for redevelopment lies south of the Bunbury Outer Harbour, which is used for the loading of mineral sands and the occasional loading and unloading of hazardous goods. The only access to the Outer Harbour is via Casuarina Drive, which bisects the area proposed for redevelopment. Casuarina Drive is used primarily by mineral sands trucks, and also by light vehicles to reach the Outer Harbour, the boat launching ramp and the marina.

The Bunbury Port Authority estimates that there are on average 130 truck movements per day (65 each way or 5.42 truck movements per hour) along Casuarina Drive. The majority of these trucks are mineral sands trucks. This estimate does not include any increase which may occur if Gwalia Consolidated proceeds with its silica sand project. Trucking to the port operates 24 hours per day, and the number of truck movements increases up to 40 per hour during the loading of a ship. Table 2 provides a spread of likely truck movements.

Table 1 Spread of Likely Truck Movements (Westralian Sands Submission p.3)

	BASE LOAD	DIRECT SHIPPING A	B
Average truck movements/hour	6	40-45	40-45
Duration of movements hrs/day	24	5-15	24
Estimated occurrences days/year	365	12	8

Explanatory comments:

1. Base load refers to the routine trucking from mine site to port storage facilities.
2. Direct shipping comes from remote site to load a ship (approximately 25% of all tonnage shipped).
3. A = small ship loads in a typical shipment between 2,000 - 10,000 tonnes.
4. B=larger shipments of a single product, typically around 25,000 tonnes which can require about 30 hours continuous loading.
5. Base load work continues 24 hours a day all year. Smaller shipments via direct shipping can be from 5-15 hours duration depending on the cargo capacity.

In December 1993, Sinclair Knight Merz commissioned Herring Storer Acoustics (HSA) to model possible traffic noise, particularly from the movement of trucks along Casuarina Drive. The objective was to ensure that the proposed residential areas on Marlston Hill are not disturbed by traffic along Casuarina Drive.

HSA adopted Main Roads Western Australia standards of 63dB $L_{A\,L10\ 18\ hour}$ as a maximum acceptable noise environment for the period 0600 to 2400 hours, which means that 63dB (A) is the level of noise that would be exceeded for 10% of the time between 0600 hours and 2400 hours (HSA Traffic Acoustic Assessment p.1). This is a level which HSA considers is reasonably acceptable to at least 80% of people exposed, and which is reasonably achievable in most circumstances. For night time HSA states that 'it was considered a level of 60dB (A) should apply for the night time between 2200 and 0700 hours, as trucks on occasions will run around the clock, and the lower level would consider the annoyance potential.'(HSA Traffic Acoustic Assessment p.2)

The results are given in Table 2 for locations at 10 and 20 and 25 m from the main road.

Table 2 Predicted Traffic Noise Along Casuarina Drive.(HSA p.3)

	TRUCKS ONLY		TOTAL TRAFFIC
	6 per hour	40 per hour	Sound Pressure Level L_{10} 18 hour (dB (A))
	Sound Pressure Level L_{Aeq}		
Level at 10m	63	67	68
Level at 20m	58	62	60
Level at 25m	56	60	58

The maximum instantaneous level at 25m caused by a truck passing would be 70dB(A), and HSA states that the resultant levels at 25 m are all within the more critical night time criterion of 60 dB(A).

The consultants concluded that with a proposed set back of 25m for residential sites, noise levels from traffic would be within Main Roads Western Australia guidelines.

4.1.3 Existing policy framework

At present there are no noise regulations in Western Australia to address the impact of traffic noise at a residence, as there are no criteria for road traffic noise assessment in the Department's proposed Environmental Protection (Noise) Regulations or the Noise Abatement (Neighbourhood Annoyance) Regulations 1979.

4.1.4 Public submissions

Two major submissions were received on noise, covering the following range of noise related issues.

4.1.4.1 Number of trucks

One submission stated that: the Structure Plan discusses truck numbers, but does not address the distribution of movements; and that heavy vehicle movements are most intrusive during the quiet evening period (particularly the 2200-0700 hours period), when there is negligible light traffic, and when heavy vehicle movements would approach 100% of all vehicle movements.

A submission stated that the number of truck movements increases significantly to about 700 movements per day twice per month when ships are being loaded, and during the non-summer months increases up to 1200 truck movements per day once every four weeks, and that this results in increases in the noise levels well above the guidelines. Even higher levels of noise are expected if the mineral sands traffic increases, and this may result in more than 2200 vehicles per day (equivalent to around 90 vehicles per hour).

Another submission stated that there is also no clear indication about the extent of direct ship loading, when product stored off site from the berth is trucked to and directly loaded onto the ship. (Base load shipping occurs every day, except Christmas day.) During periods of direct shipping, the number of truck movements is likely to increase by up to 40-45 movements/hour.

One submission stated that the extent of the maximum truck traffic is not specified , but Casuarina Drive is designed to carry 40,000 vehicles per day, with the potential for very high levels of noise, and that the benefits of using rail for similar transport would be a much lower frequency and volume of traffic, and a subsequent reduction of likely noise levels at lesser cost to the home owners, whilst the developers would have the land not required for setbacks, available for sale.

This submission also said that the potential mineral sands and other truck traffic noise is expected to have a greater impact on the community than that produced from similar transport operations by rail; and that the adequacy of the proposed noise management measures for road freight to achieve the Guidelines is questionable.

Proponents' response

The maximum number of trucks that could be expected is 40 trucks per hour during periods of direct shipping. During this period and during the evening period the trucks could contribute 100% of all traffic movements. The results of modelling meet the Main Roads guidelines.

The proponent does not agree with the submitter's statement "This results in increases in the noise levels well above the guidelines". The quoted 700 truck movements per day equates to 29 truck movements per hour. Modelling also shows that truck movements of 40-45 movements per hour meets the Main Roads guidelines.

The number of trucks using the Outer Harbour is expected to decrease over time. Additional mineral sands (including silica sands) exports will use the Inner Harbour. BHP is proposing to use the Inner Harbour for export of mineral sands from their Beenup mine. Both Gwalia Consolidated and the Port Authority intend to develop a berth at the Inner Harbour for silica sands as exports grow.

In addition the mineral sands industry forecasts a decrease in truck numbers because payloads on trucks will increase by the introduction of pocket road trains. Truck movements will decrease probably by 30% over 3-5 years with no reduction in through-put.

The proponent disagrees with the submitter's comment 'The measures would not be adequate to reduce the maximum truck only traffic noise to acceptable levels within 25m of the road, when recorded outside buildings.' Modelling shows that noise levels will meet the guidelines.

Casuarina Drive is not designed to serve 40,000 vehicles per day, although it may have the theoretical capacity to handle that number. It has been designed with dual lanes and lane separation to increase safety on the road because it will used by mineral sands trucks. The addition of a rail link would not reduce the required size of Casuarina Drive, nor would it decrease the impact of mineral sands exports on residents for the reasons outlined above.

4.1.4.2 Timing of operations

One submitter states that trucking operations 24 hours per day would probably result in residents adjacent to Casuarina Drive being subject to high levels of noise at night, especially if they were outdoors.

Proponents' Response

The levels of noise that the residents would be exposed to at night have been shown to meet the Main Roads guidelines.

4.1.4.3 Ground borne and wayside airborne noise

One submission states that the relative contribution of these noise sources is not specified in the document, nor is it apparent from the description of the methodology used, that the sample points were located in places likely to detect the full range of sounds generated.

The submission also states that ground borne and wayside airborne noise impacts from rail traffic are unlikely to be as significant as road noise, since rail traffic would operate at much lower speeds, and with a reduced frequency of accelerating and braking. New rail technologies and practices that reduce wheel-rail interaction are being developed, which would further enhance rail's advantages.

On this basis the provision of a rail link within the Structure Plan would provide an alternative transport option that is compatible with the proposed noise-sensitive premises and land uses within the Structure Plan area.

Proponents' Response

Noise level measurements were made at the site and were of actual truck movements down the road in question. Subsequent modelling was based on these measured noise levels. The proposed road will be of a higher standard than the existing road, and therefore tyre and suspension noise will be less.

Due to the high wheel loading of a train, ground borne vibration would be greater than that from a truck. There are other noises from rail traffic such as brake squeak, low frequency engine noise, warning horns and bells from level crossings.

4.1.4.4 Noise and building guidelines

One submission states that Sinclair Knight Merz proposes a number of special measures to reduce the noise levels expected from total traffic to within acceptable levels, and that these would involve additional costs. The measures would not be adequate to reduce the maximum truck only traffic noise to acceptable levels within 25m of the road, when recorded outside buildings.

The submitter considers that it is not clear whether the quoted noise reductions indoor/outdoor are achievable, and/or if this relies on closed windows, and if so, whether this is realistic. The submitter understands a typical reduction of 22dB(A) is acceptable to the EPA.

This submitter therefore agrees with the proponent's Commitment No 3 in the Town Planning Scheme Amendment, which refers to specific building guidelines, which are to be approved by Council/DPUD. The submitter was advised verbally that these guidelines would be lodged as conditions on titles. The Town Planning Scheme Amendment does not indicate this. Commitment No 3 seems to propose that the guidelines be a condition of subdivision. On its own, this does not appear appropriate, because the building guidelines or requirements should be a condition of the building permit.

The submitter believes these measures should be adopted, even if a carefully calculated noise model supports the proponent's view that 60dB(A) $L_{10\ 1\ hour}$ levels are acceptable at night, and that this level can be met without imposing such guidelines. It is to the benefit of all involved to achieve the lowest possible noise environment, especially as the likely cost would be quite limited, compared to the economic benefits derived from unhindered, long term road access to the Outer Harbour.

The submitter therefore requests that the Amendment specifically designates the area of residences facing Casuarina Drive as "Special Use - Residential R15" and include the zone in Appendix IV First Schedule : Special Uses, with the building guidelines set down as Development Conditions in that Schedule. This will ensure that there is knowledge of the building conditions when people are preparing building applications, and enforcement of the conditions when Council approves building applications.

Proponents' response

Calculations have shown that with noise reduction features such as the use of open graded asphalt and a 1.2m high solid barrier fence, noise levels would be reduced by up to 8dB(A). This will result in typical levels from total traffic of 52 dB (L_{Aeq} assuming 40 trucks per hour) and 50dB(A) for all traffic, at the front facade of the first row of houses with the proposed 25m setback.

Building houses with brick walls and tile or metal roofs, and installing 10mm thick laminated glass windows, solid hardwood doors with seals, thicker ceilings and extra above ceiling insulation particularly to the first row of houses would reduce internal noise levels by an additional 5dB(A).

If the above noise reduction features were implemented, resulting noise levels from trucks and traffic would be less than the stated "acceptable criteria", and the impact of noise on residents would minimal.

Sound reduction factors for assessment of noise levels inside houses are as follows: Standard construction 28dB(A), and Special 32dB(A). The above reductions are extracted from Australian Standard 2021-1985.

The proponents support the proposition that 'the Amendment specifically designates the area of residences facing Casuarina Drive as "Special Use - Residential R15" and include the zone in Appendix IV First Schedule: Special Uses, with the building guidelines set down as Development Conditions in that Schedule'.

4.1.5 Evaluation

Herring Storer Acoustics has adopted 63 dB $L_{A\ L10\ 18\ hour}$ as a maximum acceptable noise environment for the period 0600 to 2400 hours. Subsequently the Department of Environmental Protection expressed the view that the acceptable noise level should be reduced, because this proposal is a new urban development subjected to existing road noise, and this level of noise is likely to be intrusive, particularly at night. The Main Roads design criteria do not take this into account, and consequently DEP considers these criteria inappropriate for assessing this proposal.

Most environmental protection authorities are of the opinion that:

- 58 dB $L_{A\ L10\ 18\ hour}$ is a desirable criterion, but very difficult to achieve in many cases;
- that levels of 68 dB $L_{A\ L10\ 18\ hour}$ and higher are unacceptable; and
- that steady degradation of the noise environment occurs as the $L_{A\ L10\ 18\ hour}$ level increases from 58 to 68 dB $L_{A\ L10\ 18\ hour}$. (Langford pers. comm. 1994)

For night time the HSA report states that "it was considered a level of 60 dB(A) should apply for the night time between 2200 and 0700 hrs, as trucks on occasions can run around the clock, and the lower level would consider the annoyance potential". Whether the 60 dB L_A value is to be taken as an L_{10} level, an L_{eq} level or a maximum for each vehicle passby is not specified. However the Department considers that maximum passby levels for individual vehicles are considered the most appropriate indicator of annoyance and sleep disturbance for residents for the night time period of 2200 to 0700 hours.

The ability to get to sleep and the likelihood of being awakened are both related to noise levels. The World Health Organisation recommends 35 dB L_{Aeq} as the minimum interior noise level to achieve an acceptable sleeping environment (World Health Organisation Environmental Health Criteria 12, 1980).

French research has established that a noise environment where the indoor Leq is 35d B L_A to 37 dB L_A, and the peak levels do not exceed 45 dB L_A, will ensure that at least 2/3 of the noise induced sleep pattern changes and awakenings that would otherwise occur are avoided. L_{eq} is determined in this case over the 8 hour period from 2000-0600 hours. (Vallet, Gagneux, Blanchet, Favre and Labiale 1988) This study supports the World Health Organisation recommendation.

The Department considers that the structure of a typical Australian house will attenuate typical traffic noise by about 10 dB L_A when windows are part open and about 20 dB L_A with all windows and doors closed. Thus the Department considers that it would be realistic to add 10 dB L_A to the World Health Organisation recommendation to reach an acceptable outdoor level. However, traffic noise measurements are normally made at a location one metre in front of the residential facade facing the road. A measurement made in this manner is influenced by noise reflected from the building facade. This reflected component adds 2dB to the actual level. Therefore a total correction of +12 dB L_A should be made to convert an indoor level to an equivalent outdoor level, as measured 1 metre from a building facade.

This gives an outdoor Leq of 47 to 49 dB L_A over the period 2200-0600 hours as the fully acceptable maximum. Similarly the peak level of 45 dB L_A inside established by the French research can be adjusted to 57 dB L_A outside.

On the basis of the above information, the maximum levels considered to provide a fully acceptable situation are 50 dB $L_{A\ 10\ hour}$ for the period 2200 to 0700 hours and 57 dB L_A maximum as measured 1 metre from a building facade, for any vehicle passby.

The proponents state that calculations show that noise reduction features such as a 25m setback, the use of dense graded asphalt, a 1.2 m high solid boundary wall, and special house construction for each property immediately facing Casuarina Drive, can be implemented to reduce noise levels by up to $11dB_{(A)}$ outside residences. The Department predicts that this will not protect indoor sleeping conditions sufficiently, and will affect outdoor recreation values at night in summer.

4.2 Transportation planning

4.2.1 Objective

The objective is to ensure that transportation planning issues are addressed in the proposal.

4.2.2 Evaluation framework

Technical Information

The Westrail freight line to the Outer Harbour, although not in operation currently, will be retained in the short term. However, the Inner Harbour which is serviced by rail, will become ultimately the main focus of port industry for the Bunbury region. Trucking to the Outer Harbour is the preferred alternative at present, particularly for the low volume, high value, short haulage mineral sands industry. The retention of the Outer Harbour line is inconsistent with the proposals in the Marlston Hill Structure Plan, as all enquiries and discussions with the Steering and Technical Committees led to the conclusion that rail transport of mineral sands is not viable.

4.2.3 Public submissions

Westrail stated that a rail alignment to the Outer Harbour could be accommodated with minimum disturbance to land use and amenity, and that this would be compatible with the proposed land uses in the Structure Plan. The proposed alignment would run parallel to the road on its northern side. It would sweep in a curve from the railway bridge across the "cut" to the north of the silos and link with the alignment of the road. Westrail states that the railway line would have less visual impact than a road, and could be included in the landscaping proposals outlined in the Structure Plan.

Westrail also stated that:

- rail transport would have greater scheduling flexibility because of increased haulage capacity, and would minimise disturbance at night, especially between 1900 and 0700;
- that rail transport would involve even less risk than that calculated for road transport;
- provision of road-based transport only does not address the public's growing concern to protect the environment;
- in Australia, road transport is estimated to provide about 26% of Greenhouse gas emissions, and that these contribute to global warming through emissions of carbon dioxide, nitrogen oxides and volatile hydrocarbons;
- inadequate regulation of diesel engine vehicles which make up the bulk of road freight transport is a significant contributor to atmospheric pollution, as trucks burn between two and four times as much fuel as trains, depending on the task;
- a study by Avenell, Harris and Manly (1991) showed that the conversion of 50% of road freight to rail would reduce carbon dioxide emissions by 21%, but despite this the Structure Plan promotes a road transport system rather than the alternative rail transport system;
- a rail link would contribute significantly to efficient energy use and a reduction in gaseous emissions including greenhouse gases, and contribute to measures which reduce global warming.

4.2.4 Proponents' response

The proponents stated that:

- provision of a rail link would have a significant impact on the development. It would take up additional land area as it is not possible to reduce the size of Casuarina Drive, which would still be used by mineral sands trucks for the reasons discussed above. A rail link would preclude the development of a major hotel and associated tourist facilities in the foreshore precinct, and would inhibit free access from the residential development to the commercial and foreshore areas;

- they do not agree that the effect on the views would be minimal. Barriers would be required along the railway to protect pedestrians in the areas of public open space. The rail link would impede access to the foreshore and tourist precincts, because it would be necessary to cross both the road and the railway line to gain access;
- the average life of a mine is only 2-8 years. Providing a rail link for such a short time period is not economic;
- there are a variety of mineral sands products, and it is necessary to avoid cross-contamination between the products by having dedicated transport, conveyance and storage facilities for each product. There are currently no facilities at the Outer Harbour for the unloading of trains, and because of the above requirement, such a system would be extremely expensive;
- some product cannot be moved efficiently by rail even if rail freight were significantly cheaper. For example Cable Sands transport their mineral sands a distance of only 3 km to the Outer Harbour from their processing facility;
- it is debatable whether rail can meet peak loading times , and additional truck loading may be required. In addition there would be great difficulties in scheduling the transport of mineral sands, because while one company was loading, it would not be possible for the other companies to continue to base load;
- the use of rail for the transport of mineral sands to the Outer Harbour is not considered economically viable by the mineral sands industry, who are the main users of the Outer Harbour. Rail has not been used for over 20 years despite a rail link being available;
- the use of rail for the transport of mineral sands would have an insignificant impact on Australia's carbon dioxide emissions and the Greenhouse effect because the mineral sands industry in the region accounts for approximately 0.034% of Australia's total freight carried by road. The contribution that this trucking makes to Australia's carbon dioxide emissions is 0.0018%.

4.2.5 Evaluation

The EPA recognises the scheduling difficulties when both road and rail are used for transporting mineral sands, and the costs of separate handling facilities for each mineral sands type.

The EPA understands that retaining a rail link to the Outer Harbour is not an economically viable option given that use of the Outer Harbour will decline in the future. The EPA also recognises that retaining this rail link may encourage the continuing importation of hazardous goods from the Outer Harbour.

However the EPA has a commitment to achieving a reduction in Greenhouse Gas production, and to the provision of more environmentally sensitive forms of transport, and therefore makes the following conclusion:

In addition, the EPA supports the preservation of the railway reserve from Brunswick Junction to central Bunbury because of the long term greenhouse gas reduction, energy conservation and public transport benefits.

4.3 Clean up of contaminated sites

4.3.1 Objective

To ensure that both soil and water are remediated to a standard such that the site is suitable for residential use.

4.3.2 Evaluation framework

Technical Information

The Australia and New Zealand Environment Conservation Council (ANZECC) and the National Health and Medical Research Council (NHMRC) have developed a set of criteria for the assessment of site contamination in Australian conditions. There are no specific Western Australian soil or groundwater criteria for assessment of contamination.

Wherever possible ANZECC and NHMRC criteria have been used, but they provide only background and investigation levels for assessment of soil contamination, and do not provide any levels for the assessment of groundwater contamination.

Where ANZECC criteria are not available, that is for some soil parameters and for all water parameters, the proponents have used international criteria. For this proposal, international criteria were adopted in the following order of preference, Dutch, Canadian and French.

There are no published criteria for petroleum hydrocarbon soil contamination related to chain lengths. The criteria proposed for this site are based on the clean-up criteria for residential standards set by the Victorian Environmental Protection Authority for the clean-up of the Bayside site, Port Melbourne. The data correlate loosely with the Dutch B criteria of 100 mg/kg for fuel and 1000 mg/kg for mineral oil.

The value and source of criteria adopted for each parameter are presented in Table 3 Summary of Assessment Criteria. Three concentrations are given in the criteria:

- A = reference or background level;
- B = investigation or further investigation level;
- C = clean up level.

The Department of Environmental Protection has advised that the Dutch A, B, and C levels are considered within the context of the following descriptions:

Below A - the soil is regarded as uncontaminated;

Above A - a preliminary investigation is required, and action taken if necessary;

Above B - a detailed investigation is required, and action taken if necessary;

Above C - action must be taken.

The Australian and New Zealand Guidelines for the assessment and management of contaminated sites (ANZECC and NHMRC 1992) refer to two basic approaches for dealing with contaminated sites. The first approach involves a rigid adherence to a set of predetermined soil criteria. This approach was used for soil contamination.

The second approach relies on careful consideration of site specific data to derive acceptance criteria to ensure that public health and the environment are protected. This second approach may involve the use of modelling techniques including hydrogeological models and risk estimation, and will take into consideration exposure scenarios. This approach was used for the groundwater contamination.

Groundwater and soil samples were collected following strict protocols to prevent cross-contamination during drilling, sampling or transport of the samples. A plan of the contaminated sites in shown in Figure 3.

Table 3 - Summary of Assessment Criteria (Sinclair Knight Merz Appendix C p 37)

	Soil Criteria				Groundwater Criteria			
	A (mg/kg)	B (mg/kg)	C (mg/kg)	Document Source	A (µg/l)	B (µg/l)	C (µg/l)	Document Source
Total Petroleum Hydrocarbons								
- C6-C9			100	3		-	500	3
- C10-C14			500	3		-	500	3
- C15-C28			1000	3		-	-	
- C29-C36		-	-			-	-	

	Soil Criteria				Groundwater Criteria			
	A (mg/kg)	B (mg/kg)	C (mg/kg)	Document Source	A (µg/l)	B (µg/l)	C (µg/l)	Document Source
Monoaromatic Hydrocarbons								
- Benzene	0.01	1	5	1,2	0.2	1	5	2
- Toluene	0.05	3	30	1,2	0.5	15	50	2
- Ethyl benzene	0.05	5	50	2	0.5	20	60	2
- Xylenes	0.05	5	50	1	0.5	20	60	2
Metals								
- Arsenic	0.2-30	20	50	1,2	10	30	100	2
- Cadmium	0.04-2	3	20	1,2	1	2.5	10	2
- Chromium	0.5-110	50	800	1,2	20	50	200	2
- Copper	1-190	60	500	1,2	20	50	200	2
- Mercury	0.001-0.1	1	10	1,2	0.2	0.5	2	2
- Nickel	2-400	60	500	1,2	20	50	200	2
- Manganese		500	5000	1,5		-	-	-
- Lead	<2-200	300	600	1,2	20	50	200	2
- Zinc	2-180	200	3000	1,2	50	200	800	2
Phenols								
- Total Phenols	0.03-0.5	1	10	2	0.5	15	50	2
Organochlorine Pesticides								
- Aldrin	0.001-0.05	1	5	1,2	0.1	0.5	2	2
- Dieldrin	0.005-0.05	0.2	5	1,2	0.1	0.5	2	2
- DDT	0.001-0.97	1	5	1,2	0.1	0.5	2	2
Polychlorinated Biphenyls								
- Total	0.02-0.1	1	10	1,2		-	-	
Polycyclic Aromatic Hydrocarbons								
- Napthalene	0.1	5	50	2	0.2	7	30	
- Acenaphthylene		-	-			-	-	
- Acenapthene		-	-			-	-	
- Fuorene		-	-			-	-	
- Phenanthrene		10	100	2		2	10	2
- Anthracene	0.1	10	100	2	0.1	2	10	2
- Fluoranthene	0.1	10	100	2	0.002	1	5	2
- Pyrene	0.1	10	100	2	0.002	1	5	2
- Benzo (a) anthracene		1	10	4		0.5	2	4
- Chrysene		5	50	4		1	5	4
- Benzo (b) fluoranthene		-	-			-	-	
- Benzo (k) fluoranthene		-	-			-	-	
- Benzo (a) pyrene	0.1	1	10	2	0.01	0.2	1	2
- Dibenzo (a,h) anthracene		1	10	4		0.2	1	4
- Benzo (gh) perylene		-	-			-	-	
- Indeno (1, 2, 3-cd) pyrene		1	10	4		10	5	4

Document Source

1 = ANZECC + NHMRC (1992). Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites.

2 = Dutch Criteria. Assink, J.W. and Van den Brink, W.M. (1986). Contaminated soils, First International TNO Conference on Contaminated Soil 11-15 November 1985. Mattinus Nijhoff Publishers, The Netherlands.

3 = Victorian EPA (1990). Acceptance Criteria in the Clean - up Notice for the Bayside Site, Port Melbourne.

4 = Canadian Criteria
Ministry of Environment, Quebec (1986). Ground Water and Soil Contamination Indicators.

5 = French Criteria
Environment Ontario (1989). Guidelines for Decommissioning and Clean Up of Sites in Ontario.

4.3.2.1 Groundwater

'The geology of the area comprises a thin veneer of coastal sands overlying Bunbury Basalt. The upper several metres of basalt have weathered to clay locally, resulting in a lithological succession of sand, clay and basalt. Groundwater occurs within the sand where the sands are below the local water table. The basalt contains groundwater only where fractured, and is probably not a significant pathway for groundwater movement. The clays will retard the movement of groundwater due to their low permeability' (Sinclair Knight p. 2).

Therefore the simplified hydrogeological model consists of a sand aquifer several metres thick perched upon the weathered clayey surface of the basalt. Recharge is by direct infiltration of rainfall, and groundwater movement is towards Koombana Bay and Casuarina Boat Harbour (Rockwater Pty Ltd Site Investigation, Marlston Hill December 1993 p 1-2).

The investigation involved the installation of eight monitoring bores to approximately 2m below the water table. A summary of groundwater petroleum hydrocarbon contamination found is presented in Table 4.

Table 4 - Summary of Groundwater Total Petroleum Hydrocarbons (ug/l) (Sinclair Knight Merz Appendix C p.17)

Hydrocarbons	MW 14	A Level	B Level	C Level
C6 - C9	400	-	-	500
C10-C14	-	-	-	500
C15-C28	-	-	-	-
C29-C36	-	-	-	-

MW = Monitoring Well; A = reference or background level; B = investigation or further investigation level; C = clean up level; - = Not detected at detection level of 200 ug/l for C6-C9, 200 ug/l for C10-C14, 500 ug/l for C15-C28, and 1000 ug/l for C29-C36.

Elevated concentrations of petroleum hydrocarbons were detected in the groundwater sample in MW 14 on the BP terminal site. The concentration does not exceed Victoria EPA clean up criteria for residential sites.

Elevated concentrations of total petroleum hydrocarbons were detected in bores BN 1, BN2, and BN 3 on the Shell site in November 1992 prior to demolition of the structures on the site. However investigations in November 1993 did not detect any total petroleum hydrocarbons in the groundwater at these bore locations. The consultants consider that the likely explanation is that the plume of contaminated groundwater has migrated from the site.

Elevated levels of monoaromatic hydrocarbons were found in 3 bores (MW 3, MW4, and MW 6) on the BP site adjacent to the rail gantry, the drainage soakage pit and the fill gantry. Elevated levels were also detected west of the BP terminal site (MW 14) and west of the Shell site (MW 15). Levels which greatly exceed Dutch C levels were found in one location on Shell's site (SH1). Table 5 summarises the findings.

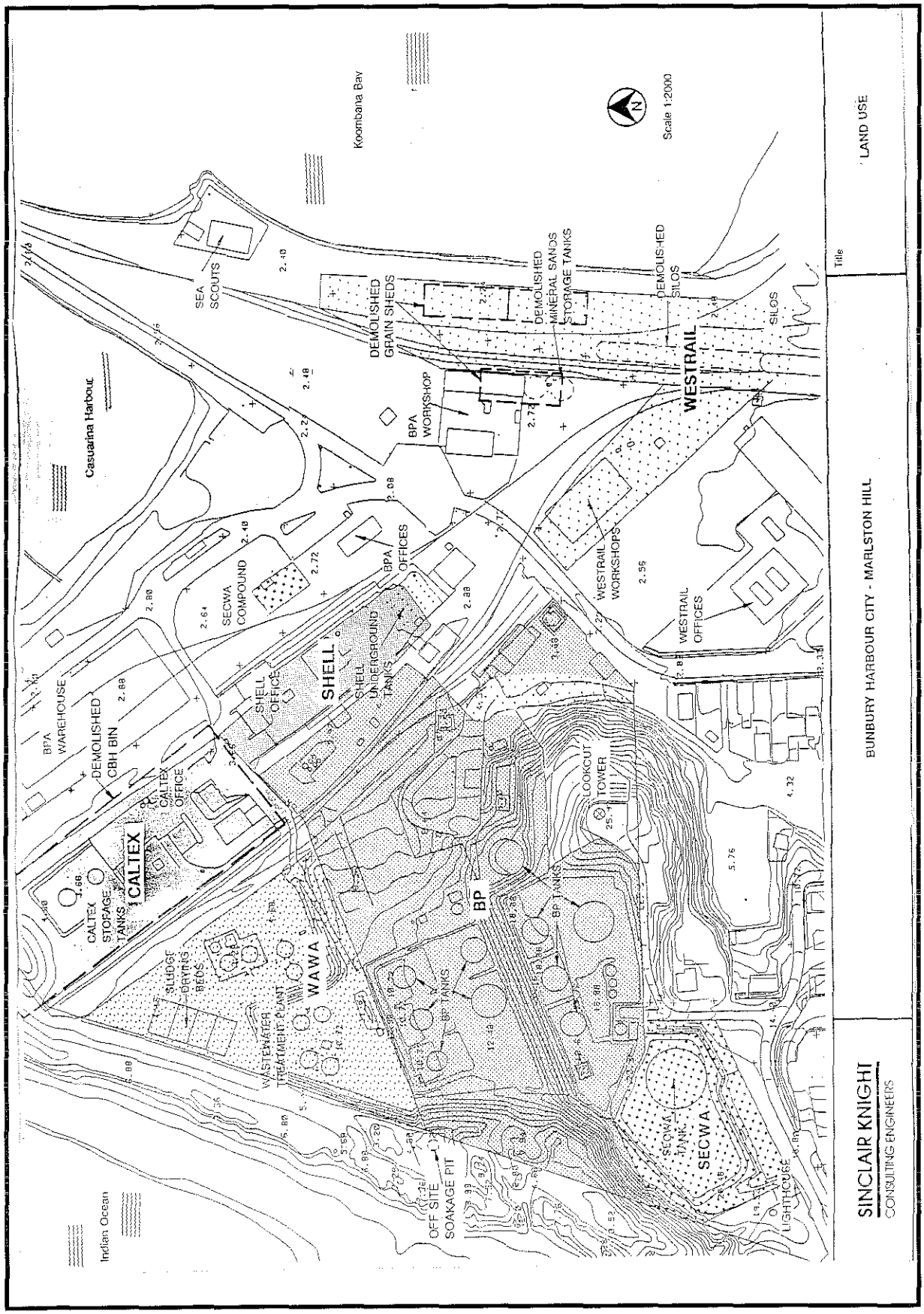

Figure 3. Contaminated Sites (Sinclair Knight Merz Figure 2)

Table 5 Summary of Groundwater Monoaromatic Hydrocarbons (ug/l) (Sinclair Knight Merz Appendix C p.18)

	MW14	MW15	MW3	MW4	MW6	SH1	A Level	B Level	C Level
Benzene	320	340	40	62	130	1000	0.2	1	5
Toluene	30	20	-	-	17	5000	0.5	15	50
Ethyl-benzene	260	-	26	61	170	2600	0.5	20	60
Xylene	560	-	76	62	390	14000	0.5	20	60

MW = monitoring well, A = reference or background level; B = investigation or further investigation level; C = clean up level; - = Not detected at detection levels of 10 mg/l for Benzene, Toluene and Ethyl-benzene, and 30 mg/l for Xylene.

Groundwater samples from bores MW 14 and MW 15 contained the hydrocarbons - benzene, toluene, ethyl benzene and xylene, known as BTEX which are natural components of petrol. Samples from MW 14 contained total petroleum hydrocarbons (TPH). These bores are located immediately down-gradient from existing BP monitor bores MW3, MW4 and MW 6, which were shown in 1991 to yield groundwater containing BTEX. No other contaminants were groundwater samples collected from other monitor bores (Rockwater p.8).

Contaminant plumes in groundwater migrate as a function of several variables, of which the groundwater velocity is generally the most significant. Other variables include hydrodynamic dispersion, and the density of the contaminant. For example, petrol may be limited largely to the capillary fringe, and move less rapidly than indicated by the hydraulic gradient and retardation processes. Calculations of plume migration rates should take these factors into account (Rockwater p. 8).

Based on the water table contours, the estimated hydraulic gradient on the flat area down gradient from the BP site, is 1 in 220. The gradient on the BP site will be steeper. Based on the hydraulic gradient, and adopting an estimated hydraulic conductivity of 10m/day and an effective porosity of 0.3, the calculated groundwater velocity is 0.15m/day.

Based on this information, Rockwater estimated that it would take 3 1/2 years for the plume of contaminated groundwater to reach Koombana Bay, south of the Sea Scouts (Sinclair Knight Merz Assessment of Contamination Final Report July 1994 p. 19).

It is likely that the cause of the elevated total petroleum and monoaromatic hydrocarbon levels in the groundwater is from a leak or spills from the BP terminal site. It is also possible that leakage is occurring from the Shell site.

4.3.2.2 Soils

Twelve soil borings and a sludge sample from the sewerage drying pond were collected. Soil samples from bores MW 14 (BTEX and TPH) and MW 15 (BTEX) and SB 17 (PAH - polycyclic aromatic hydrocarbons) contained hydrocarbons.

Soil samples were commonly found to contain metals, but with some exceptions, at levels below that which would be considered as contamination (i.e. below Level A).

The sewerage sludge sample (SB16) was shown to contain many metals, TPH, and numerous unidentified organic components (Rockwater p. 8).

In some instances a full investigation was not possible as access to the site was not available or the site was still operational. In these cases further investigations to confirm the extent of

contamination will be necessary. Details on the extent of the contamination found on each site are summarised as follows:

4.3.2.2.1 British Petroleum (BP)site

BP has two sites: the Terminal which is the larger BP site adjacent to the sewage treatment plant, and the Depot, a smaller site located between Caltex (to the east) and Shell (to the north). Both sites have been used for the storage and distribution of petroleum products since the early 1900s.

BP engaged Mackie-Martin to assess contamination on the BP Depot site (Mackie-Martin 1993). Groundwater Technology Australia Pty Ltd assessed the BP Terminal site, which included the SECWA storage tank site (Groundwater Technology 1992).

BP has undertaken additional investigations to enable them to prepare a detailed management plan in 1994. These reports have been made available to Sinclair Knight, and their data is included in the Contamination Report. Soil vapour techniques were used to detect the presence of volatile organic compounds in sub-surface soil on the site. The results give a general idea of the location of hydrocarbon contamination, and there are isolated areas of lead contamination. Groundwater beneath the site is contaminated with monoaromatic petroleum hydrocarbons. Elevated lead levels were detected in several locations on the BP site. In some locations the Dutch C criteria were exceeded.

The BP Depot site has been demolished, and a bioremediation pile has been established on the site to treat contaminated soils. It is expected that treated soils would be suitable for backfill use in 1994 (Mackie Martin 1993)

4.3.2.2.2 Shell site

This site has been used since 1927 as a fuel storage depot. Groundwater Technology Australia (GTA) carried out a soil vapour survey at the site, which provides only a relative indicator of volatile organic compound (VOC) concentrations, and not necessarily actual concentrations.

'The vapour survey indicated that no significant hydrocarbon losses had occurred around the truck loading gantry, diesel bowser, rail discharge points, underground tanks T2-T12 and the former locations of the truck discharge point (point 30), and drum fillers (points 26-27)' (GTA 1993). Although ground water flow has not been determined, at point 28 located in the inferred downgradient direction from the adjacent ex Mobil filling gantry, no hydrocarbon vapours were detected.

The soil vapour survey delineated three areas of soil vapour impact: beside the triple interceptor (720ppm), around the ULP Tank T1 (404->2500ppm), and around the tanker truck discharge point (1560 -1650 ppm). Soil and groundwater sampling is required to quantify levels of absorbed and dissolved phase impact at the site.

Soil vapour next to the first of the interceptors indicates that dissolved hydrocarbons, and possibly separate phase hydrocarbon, have leaked from the interceptors. Hydrocarbon vapour around ULP Tank T1 could have been the result of either leakage from the tank itself, suction and delivery points, or surface spillage. Hydrocarbon vapour to the north of the discharge points could reflect spillages or leakage from buried delivery lines. Soil and groundwater sampling

No soil samples were taken on the Shell site, but based on the fact that lead contamination was found on the BP site, there may be lead contamination on the Shell site.

4.3.2.2.3 Caltex site

A grain bin was constructed on this site in the 1970's and later demolished. The grain in the silos was treated probably with pesticides to prevent insect attack. In 1985 fuel storage facilities were constructed.

The proponents' consultants were not granted access to the site to undertake soil vapour analysis. Based on the data available for the BP and Shell sites, petroleum hydrocarbon is likely to be present. However, bores down-gradient of the site have been installed, and no contamination has been detected. Based on the fact that there is lead contamination on the BP site, there may be lead contamination on the Caltex site.

The pesticide dieldrin was detected at depths of 0.1 and 0.5m in the soil profile adjacent to the Caltex site. Table 6 summarises the soil organochlorine pesticide data:

Table 6. Soil Organochlorine Pesticide Data (Sinclair Knight Merz Appendix C p.16)

	SB4 (0.1m)	**SB4(0.5m)**	**B Level**	**C Level**
Dieldrin mg/kg	0.3	1.9	0.2	5

(SB = Soil Boring Site; B = ANZECC level B investigation levels; C = Dutch C criteria)

4.3.2.2.4 Wastewater treatment plant site

The treatment plant was commissioned in 1962 by the Water Authority to treat domestic wastewater from the town of Bunbury. It consists of primary treatment tanks, trickling filters, secondary settlement and concrete sludge digestion tanks, and sludge drying beds.

The sewage sludge in the drying beds has been found to be contaminated with elevated levels of arsenic, cadmium, zinc, copper and petroleum hydrocarbons. The sludge is routinely removed from the treatment works and disposed of off site. Table 7 summarises the soil heavy metal data:

Table 7. Heavy Metal Contamination (mg/kg) (Sinclair Knight Merz p12)

	SB13 0.1m	MW 14 0.1m	MW 17 0.1m	SB16 Sludge	B Level	C Level
Arsenic	-	-	-	17.0	20	50
Cadmium	-	-	-	4.25	3	20
Copper	80			363	60	500
Zinc	-	1,104	210	625	200	3000

SB = Soil Boring; MW = Monitoring Well

Petroleum hydrocarbons were detected in the sludge from the wastewater treatment plant at concentrations which exceed the Victorian Department of Environmental Protection clean-up standard.

4.3.2.2.5 Bunbury Port Authority land

This site contains a workshop and warehouses. Elevated concentrations of zinc were recorded adjacent to BPA's workshop (MW 17), (see Table 7), that exceed ANZECC environmental investigation concentrations, but do not exceed Dutch C criteria. The source of the metal is not known. No metal contamination of the groundwater was detected.

4.3.2.2.6 Westrail land

The majority of Westrail's heavy engineering activities were carried out in the area south of the existing workshop. The existing workshop was constructed in the early 1940's. It has always been used for the service and maintenance of motor vehicles and minor plant and equipment. Drainage from the workshop containing waste oils, solvents and detergents is collected, and discharged to an interceptor, which is cleaned out by a contractor. Discharge from the interceptor and drainage from the car park flows into a sump, and thence into Koombana Bay.

Elevated copper concentrations were detected at one point only south of the Westrail workshops (SB13). This concentration exceeds ANZECC level B investigation criteria but does not exceed Dutch C criteria. Concentrations of zinc and lead marginally above the ANZECC level A background criteria were also detected at this point. None of the metal levels were above Dutch C criteria. The source of the metals is not known.

4.3.3 Comments from key government agencies

The Department of Health Western Australia has commented that the department is not concerned with the remediation techniques, provided that they do not cause pollution. However the department is interested in any contamination left at the end of the remediation process, and whether it would pose a health problem.

The Water Authority of Western Australia has commented that commitments in Appendix 1 Section 3.7 regarding the waste water treatment plant are acceptable. However, should local groundwater be required for purposes associated with the development, such as reticulation of public open space or road reserves, a licence will be required from the Water Authority prior to development of the source works. This may be an issue because of the amount of water available, the type of development and the extent of landscape proposals.

4.3.4 Public submissions

There were no public submissions on site contamination and consequently no response from the proponents.

4.3.5 Evaluation

4.3.5.1 Groundwater

Concentrations of some hydrocarbon compounds in the groundwater greatly exceed Dutch C assessment criteria The proponents state the groundwater is not suitable for use for drinking or irrigation and that therefore there is no risk to future residents from contaminated groundwater. However, the proponents have made a commitment to remediate the groundwater if necessary, to the satisfaction of DEP and the Health Department of WA, using pumping and air stripping or other appropriate technology.

The Australian and New Zealand Environment Conservation Council Australian Water Quality Guidelines for Fresh and Marine waters quote an acceptable concentration of benzene as 300ug/L. No guidelines are available for the other monoaromatic compounds. The highest concentration of benzene detected in the groundwater was 340ug/L. The EPA has released draft water quality guidelines that quote 1ug/L as a maximum allowable concentration of benzene in fresh and marine waters. Appropriate water quality criteria have not been agreed yet.

The EPA considers that the groundwater should be remediated because Koombana Bay will be used increasingly for recreation when the new development is completed at Marlston Hill.

The EPA also considers that the amount of remediation for the groundwater cannot be determined until the results of all investigations are known and appropriate remediation criteria and methods are agreed with the Pollution Prevention Division of DEP.

4.3.5.2 BP site

BP proposes to remediate soil on the site to residential standards, using both on and off site bio-remediation techniques, and to dispose of areas of soil contaminated with lead to secure landfill (see p.35). However, the proponents recognise that they are ultimately responsible for ensuring that the commitments are met.

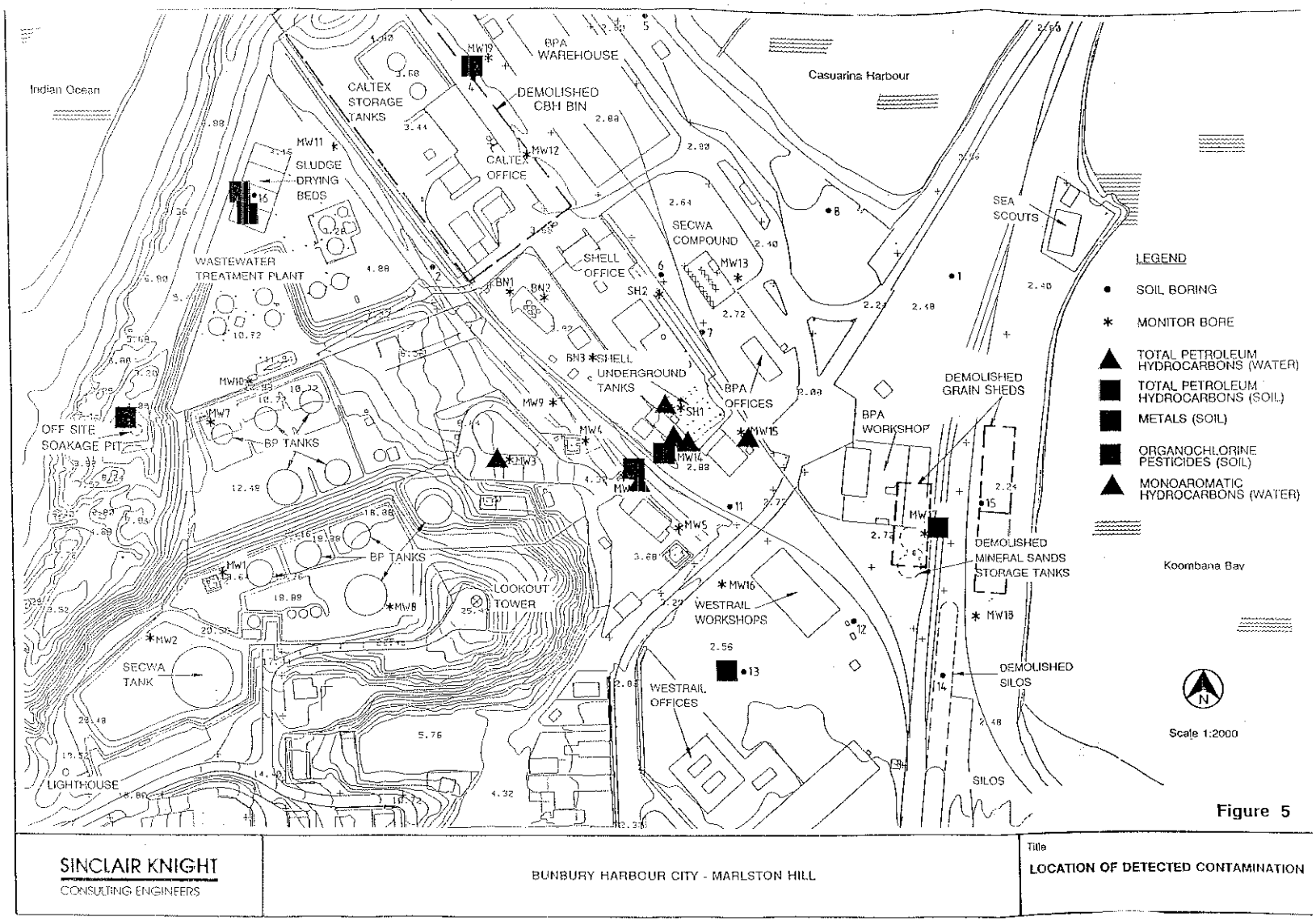

Figure 4. Location of detected contamination (Sinclair Knight Merz Figure 5)

The EPA considers that remediation methods and criteria should take into account the EPA's general comments on this issue (See 4.3.5.8. below), and must be approved by the Pollution Prevention Division of DEP, after the final investigations are completed and the results are known.

4.3.5.3 Shell site

Soil and groundwater sampling is required to quantify levels of absorbed and dissolved hydrocarbon phase at the site. There may also be lead contamination of the soil.

Shell may wish to undertake remediation of the site. The site will be remediated using the same techniques and remediation criteria outlined for the BP Site. Irrespective of who does the remediation, the proponents recognise that they are ultimately responsible for ensuring that the commitments are met.

The EPA considers that remediation methods and remediation criteria should take into account the EPA's general comments on this issue, and must be approved by the Pollution Prevention Division of DEP, after the final investigations are completed and the results are known.

4.3.5.4 Caltex site

The proponents have prepared a remediation management plan based on the assumption that the site is contaminated, and will require remediation to remove petroleum hydrocarbons and lead contamination, using the same techniques and remediation criteria outlined for the BP site.

The proponents consider that remediation of the dieldrin contamination is not necessary, as the site is to be covered by 0.5 - 1 m of clean fill, and that fill will eliminate all exposure pathways to residents of the site. However, the site may need to cleared of contamination to a greater depth than 1m to protect workers during service installation and building construction. The proponents are aware of this, and have recognised this in their commitments.

Once access is obtained, further investigations to confirm the existence of dieldrin contamination beneath the site can be undertaken. Should further investigations reveal higher concentrations of dieldrin or a greater extent of contamination than currently known, then the proponents have made a commitment to carry out remediation of the site to acceptance criteria based on health and environmental risk assessments.

Caltex may wish to undertake remediation of the site. Irrespective of who does the remediation, the proponents recognise that they are ultimately responsible for ensuring that the commitments are met.

The EPA considers that remediation methods and criteria should take into account its general comments on this issue, and must be approved by the Pollution Prevention Division of DEP, after the final investigations are completed and the results of contamination are known.

4.3.5.5 Wastewater treatment site

All sewage sludge will be removed from the site and disposed in accordance with normal Water Authority procedures. Should there be contamination of the soil beneath the sludge drying beds, this soil will also be removed.

The proponents plan to place at least 1-2m of fill over the lower area of the site including the locations of SB 13, MW 14 and MW 17 where elevated levels of copper and zinc were detected. However, the site may need to cleared of contamination to a greater depth than 1m to protect workers during service installation and building construction. The proponents are aware of this, and have recognised this in their commitments.

The proponents state that 'there is a possibility that the metals will become mobilised and leach from the site into the ocean. However they consider that because no heavy metals were detected in any groundwater samples, and because the site is underlain by calcareous sands, the pH will be high, which will reduce the chance of the metals becoming mobilised. In addition the amount of heavy metal contamination on the site is small so the risk to the receiving waters is considered extremely low' (Sinclair Knight p.19).

The Water Authority will decommission the plant and clear the site. Irrespective of who does the remediation, the proponents recognise that they are ultimately responsible for ensuring that the commitments are met.

Depending on the results of further investigations, the EPA considers that remediation methods and criteria should take into account its general comments on this issue and must be approved by the Pollution Prevention Division of DEP, after the final investigations are completed and the results are known.

4.3.5.6 Bunbury Port Authority land

On the basis of on current findings, the proponents consider that remediation of the heavy metals found is not considered necessary, as the site is to be covered by 0.5 - 1m of clean fill. The proponents consider that this will eliminate all exposure pathways to residents and other users of the site. However, the site may need to cleared of contamination to a greater depth than 1m to protect workers during service installation and building construction. The proponents are aware of this, and have recognised this in their commitments.

The heavy metals are considered to be relatively immobile, and the proponents consider that the impact of heavy metal contamination on Koombana Bay is likely to be negligible.

Once the workshops are decommissioned, the proponents will carry out further investigation to confirm the extent of heavy metal contamination. If higher concentrations of heavy metals are found, the proponents have made a commitment to carry out remediation of the site if necessary, based on health and environmental risk assessments.

The Environmental Protection Authority considers that the final remediation methods and criteria should take into account its general comments on this issue, and must be approved by the Pollution Prevention Division of DEP, after the final investigations are completed and the results are known.

4.3.5.7 Westrail land

Once the workshops are decommissioned, the proponents will carry out further investigations to confirm if there is any heavy metal or other contamination, and if necessary carry out remediation of the site based on health and environmental risk assessments.

The Environmental Protection Authority considers that the final remediation methods and criteria should take into account its general comments on this issue, and must be approved by the Pollution Prevention Division, after the final investigations are completed and the results are known.

4.3.5.8 General

The proponents have proposed the following programme for removal of structures from the site and site remediation:

Table 8 Site Clearance and Remediation Programme

Site	Site Clearance	Site Remediation
BP	Mid 1996	Mid 1996
Shell	Mid 1996	Mid 1996
Caltex	Mid 1996	Mid 1996
WAWA	Early 1996	Mid 1996
BPA	End 1994	Mid 1996
Westrail	Mid 1995	Mid 1996

In its evaluation of this issue, the EPA has considered:

- the nature and extent of contaminants identified from recent site surveys;
- historical land use information;
- the limited availability of groundwater for irrigation or potable use; and
- commitments made by the proponent to undertake further investigations and to develop a remediation programme.

The EPA considers that the proponents must develop a programme of further investigations after existing operations have ceased, when access for sampling of groundwater and soil is not restricted, and put forward remediation strategies for the contaminated sites based on the following comments.

The EPA's preferred order of options for site clean-up and management of contaminated sites is that outlined by the Australian and New Zealand Environmental and Conservation Council and the National Health and Medical Research Council (1992). They are:

- on-site treatment of the soil so that the contaminant is either destroyed, or the associated hazard is reduced to an acceptable level;
- off-site treatment of excavated soil which, depending on the residual levels of contamination in the treated material, is then returned to the site.

Should it not be possible for either of these options to be implemented, other options that could be considered include:

- removal of contaminated fill to an approved site or facility, followed where necessary by replacement with clean fill;
- isolation of the soil by covering with a properly designed barrier;
- choosing a less sensitive land use to minimise the need for treatment of the contamination (this may include partial treatment of the site); and
- leaving the contaminated material in-situ, providing there is no immediate danger to the environment or community and the site has appropriate controls in place.

For disposal to an approved local waste disposal site, the Office of Waste Management has advised that the contaminated soil will have to meet the Waste Acceptance Criteria for Class 3 landfill (an ordinary sanitary landfill site). If the soil does not meet these criteria, then it would have to be disposed of to a Class 4 landfill site either at Rockingham or Gidgegannup, subject to local authority approval.

While the EPA will continue to consider proposals involving the removal of materials to secure landfill sites, it considers that a better approach in the formulation of proposals is to consider treatments for the destruction or reduction and extraction of contaminants.

The Environmental Protection Authority concludes that Landcorp and the South West Development Commission should carry out a comprehensive soil and groundwater investigation programme for those contaminated sites not yet fully investigated, and subsequently develop remediation proposals to meet the requirements of the Pollution Prevention Division of DEP.

4.4 Risks and hazards

The proposed Marlston Hill development will reduce the distance between the Outer Harbour and the residential population, and the EPA requested the proponents to commission a risk assessment for the shipment of hazardous materials through the Outer Harbour.

4.4.1 Objective

The Port Authority wishes to ensure that the continued use of the Outer Harbour for the handling of dangerous goods is not compromised by the proposed development. The EPA wishes to ensure that residents of the proposed development are protected from the hazards associated with the transportation and handling of hazardous goods at the Outer Harbour.

4.4.2 Evaluation framework

Technical Information

The Port Authority has the following licences for the importation and handling of hazardous goods:

- Ammonium Nitrate, export of 2000t in freight containers;
- Explosives, 25 kg export/import; and
- Methanol, no limit on the quantity for import/export, but storage is limited to 3982 kL.

The last ammonium nitrate shipment handled at the Outer Harbour was in 1988, and there are no immediate plans for the further shipments. Methanol is the only hazardous material being handled currently through the Outer Harbour.

The Port Authority considers that the following hazardous goods may be handled in the future:

- 35,000t per year of methanol;
- 20,000t per year of ammonium nitrate; and
- 100t per year of explosives.

There are no plans to handle other hazardous goods at the Outer Harbour, as there are no storage facilities or acceptable sites for storage facilities closeby. The Port Authority has no licences for handling hazardous goods at the Inner Harbour.

DNV Technica modelled the risks associated with each of the future scenarios for the handling and transportation of the hazardous materials listed above, and for the cumulative risk from all operations (DNV Technica Quantitative Risk Assessment of Bunbury Outer Harbour, 1994).The study included the identification of potential hazards that may affect the development; a risk analysis for these possible scenarios; determining whether any operations that are acceptable in terms of risk without the proposed development, would not be acceptable with the proposed residential development; and recommendations on the control of risk at the Outer Harbour. The results are presented in the form of risk contours, and the cumulative individual risks are shown in Figure 5.

The results indicate that the maximum cumulative individual risk in the Bunbury Harbour City Development from the handling of dangerous goods through the Outer Harbour is approximately 5×10^{-7} per year, provided the dangerous goods imported, stored and transported from the Outer Harbour are limited to the type and maximum quantity detailed in the proposal. However DNV state that 'the risks should not be taken to be an exact representation of the actual risks, rather they may be considered as an upper bound' (Ibid 4.11).

DHV also concluded that, based on consideration of the estimated frequencies and consequences of the events modelled, the development would increase the societal risk exposure of the Bunbury community by a negligible amount, and would not place any restrictions on trade expansion due to societal risk considerations. DNV also recommended that a more detailed risk analysis be undertaken should the shipment increase significantly above their current levels or licence limits.

4.4.3 Existing policy framework

The EPA has established criteria that detail the acceptable level of risk associated with industrial operations (EPA Bulletin 611). The following guidelines are applicable:

- A risk level in residential zones of less than one in a million per year is so small as to be acceptable to the Environmental Protection Authority.
- A risk level for "sensitive developments", such as hospitals, schools, child care facilities and aged care housing developments of between one half and one in a million per year is so small as to be acceptable to the Environmental Protection Authority.

- Risk levels from industrial facilities should not exceed a target of fifty in a million per year at the site boundary for each individual industry, and the cumulative risk level imposed upon an industry should not exceed a target of one hundred in a million per year.
- A risk level for any non-industrial activity located in buffer zones between industrial facilities and residences, lower than ten in a million per year is so small as to be acceptable to the Environmental Protection Authority.
- The EPA has not yet established criteria for societal risk.
- The EPA has a philosophy of managing risks to the lowest reasonable and practicable level.

In relation to societal risk, the EPA relies on advice from the Department of Minerals and Energy on the assessment of societal risk on a case by case basis.

4.4.4 Comments from key government agencies

Officers from the Department of Minerals and Energy, Explosives and Dangerous Goods Division, have examined the quantitative risk assessment and have found that the methodology is satisfactory, and that the risks indicated meet the Environmental Protection Authority criteria.

4.4.5 Public submissions

Bunbury Port Authority supports the conclusions reached in the Risk Assessment.

The Port Authority also supports the statement in the Section 46 Document (p.7) that investigation be undertaken in the future for more suitable options for offloading and transporting hazardous goods. The Port Authority considers that the south side of the Inner Harbour is unsuitable for handling these products due to its proximity to residential areas, but is considering the northern side of the Inner Harbour. However the Port Authority is concerned about the acceptability of this site due to Bunbury Council's recent approval of residential development at Pelican Point, and its encroachment to the proposed hazardous cargo handling area.

Westrail considers that rail transport of hazardous goods would involve even less risk than that calculated for road transport; and states that records from the Department of Minerals and Energy for the past three years show that a significant majority of transport accidents occur during road transport of dangerous goods; and that while heavy vehicles are less frequently involved in accidents than cars, the environmental severity and human consequences of those accidents tend to be much greater. Westrail considers that given the likely traffic flows, the potential for accidents between trucks hauling to Outer Harbour and other traffic would be greater than if dangerous goods were carried by rail, and thus separated from tourist and residential traffic.

4.4.6 Proponents' response

The proponents state "the issue of risk associated with the transport of dangerous good by rail as against road is complex due to differing routes, methods for handling the hazardous materials, sizes of load, etc. The statement that 'rail transport of hazardous goods would involve even less risk that calculated for road transport' is difficult to substantiate without more detailed study. The definitive report of the Health and Safety Commission in the UK (HSC) on the issue of transport of hazardous materials (Major Hazards Aspects for the Transport of Dangerous Substances) concludes 'What is clear from our assessment (HSC) is that one cannot justifiably say that road is generally safer than rail or visa versa'." Sinclair Knight Merz Response to Summary of Public Submissions p. 6.)

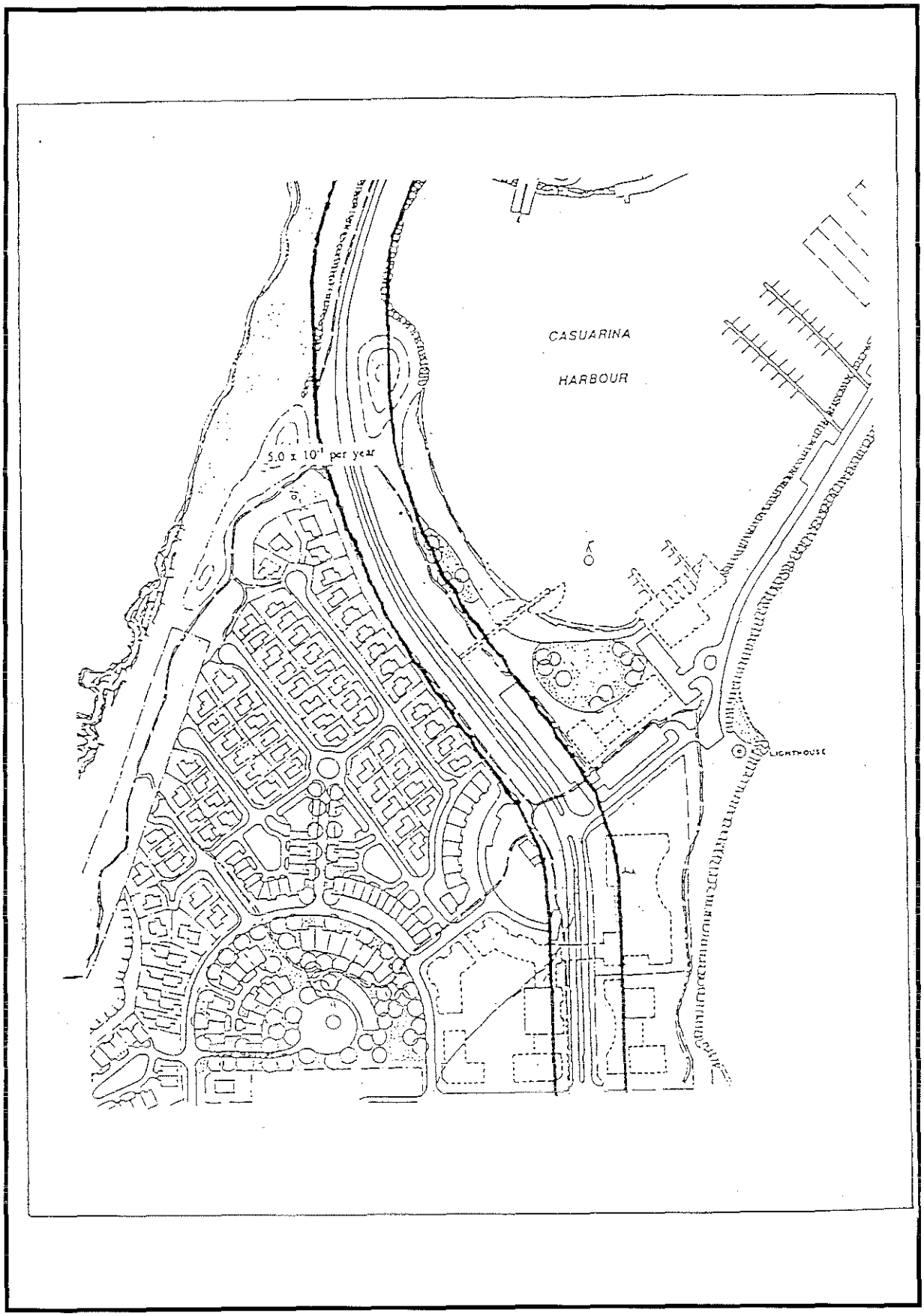

Figure 5. Cumulative individual risk contours near the proposed development

Further the concept of avoiding avoidable risk involves an element of practicality similar to the 'as low as reasonably practicable' philosophy required in off shore safety cases and espoused in the WorkSafe "Draft National Standard for the Control of Major Hazard Facilities". The practicality or desirability of transporting the defined hazardous materials by rail is significantly curtailed by the following reasons:

- The risks due to transport by road have already been assessed to be very small. Even assuming that rail transport does reduce the risk, then the absolute reduction in risk from using rail transport in comparison to road transport is likely to be small.
- In order for rail transport to be cost effective larger individual shipments than can be handled by road are required. This will increase the potential for larger sized events.
- The Outer Harbour is the preferred location for unloading the hazardous materials detailed in the Environmental Documentation, due to separation distance, operational requirements of the port, existing storage tanks, etc., but there is a lack of rail facilities. Therefore, in order to move this material by rail, either a new rail spur to the Outer Harbour would have to be built at considerable cost (due to land loss to the development, infrastructure costs, operational costs) or the material would have to be transported from the port area by road, travelling past the Bunbury Harbour City Development to the existing rail spur and then loaded onto rail. The only practical route for a rail spur to the Outer Harbour would be along the beach front area, where tourist facilities and residential facilities (ie the proposed hotel) would be exposed to the risk associated with the rail transport.
- The residential facilities are separated from the roadway by approximately 30m for the most of the route, which means that the potential for collision and the risk to the public are reduced. It should be noted the effect of the dual carriageway in reducing the potential for accidents has been factored conservatively into the risk calculation.

4.4.7 Evaluation

The EPA is satisfied that risks imposed upon the proposed residential development from the Bunbury Port Authority's activities, will not exceed those outlined in the EPA's risk criteria for the assessment of risk from industry.

In keeping with the EPA's philosophy of managing risk to the lowest reasonable and practicable level, the Bunbury Port Authority should be encouraged to implement a safety management system and management practices to contain risk if the quantities of hazardous materials through the Outer Harbour increase significantly. The EPA alsoconsiders that risk of transporting hazardous substances should be in accordance with the standards applied by the Department of Minerals and Energy with advice from the West Australian Advisory Committee on Hazardous Substances (WAACHS).

Similarly, if the shipment of methanol, ammonium nitrate or explosives increase significantly above their current levels or licence limits, a more detailed societal risk assessment should be carried out. However, it is not practicable to calculate this until details of exactly what is to be handled, the method of importation, transport routes to destination etc are finalised.

The EPA agrees with the Port Authority that the northern side of the Inner Harbour could be a suitable location for the handling of hazardous goods. However the EPA noted in its approval of the Pelican Point proposal in 1992 that use of this site would be constrained if all residential development at Pelican Point was approved.

The EPA concludes that the extension of the rail from the Cut to the Outer Harbour may encourage the expansion of handling hazardous goods at this site, and that was to be discouraged.

The EPA notes that in relation to risk factors, the rezoning may limit an expansion of industrial and port related activities in the Outer Harbour in the future.

5. Discussion and synthesis

5.1 Noise

The EPA considers that the standards for overnight noise in the Herring Storer Acoustics report are unlikely to be acceptable to future residents next to Casuarina Drive. The EPA does not intend to protect outdoor recreational values, but based on French research and World Health Organisations standards, considers that indoor noise should not exceed $35L_{eq}$ and an instantaneous noise level of 45 maximum between 2200 and 0700 hours.

Therefore, the EPA considers that housing design and sound proofing measures must be used to ensure this standard is met. The EPA also recognises that occupiers of these houses may need to sleep with the windows closed in the summer to achieve noise attenuation to the above standard.

The EPA therefore recommends that the proponents ensure that sufficient means of ventilation other than windows are installed in these houses to maintain adequate air quality in the bedrooms in the summer, and that this ventilation is such that no significant additional internal noise is generated when it is in use.

The EPA recommends that 'the Amendment specifically designates the dwellings facing Casuarina Drive as "Special Use - Residential R15" and include the zone in Appendix IV First Schedule: Special Uses, with the building guidelines set down as Development Conditions in that Schedule', to give effect to noise mitigation and provision of adequate ventilation.

This will ensure that there is knowledge of the building conditions when people are preparing building applications, and enforcement of the conditions when Council approves building applications.

5.2 Transportation

The EPA has considered the scheduling difficulties when both road and rail are used for transporting mineral sands, and the costs of separate handling facilities for each mineral sands type. The EPA considers that retaining a rail link to the Outer Harbour is not a viable option, given that use of the Outer Harbour will decline in the future. The EPA also recognises that retaining this rail link may encourage the continuing importation of hazardous goods from the Outer Harbour.

The EPA therefore supports the preservation of the railway reserve from Brunswick Junction into Central Bunbury because of the long term greenhouse gas reduction, energy conservation and public transport benefits, and notes that a rail reserve is included within the Proposed Zoning in Figure 2.

5.3 Site contamination and remediation

The proponents have not been able to gain access to all the potentially contaminated sites. The amount of remediation for either the soil or the groundwater cannot be determined until the results of all investigations are known, and the appropriate criteria are agreed with DEP.

The EPA considers that Landcorp and the South West Development Commission should carry out soil and groundwater remediation programmes according to the Assessment Criteria listed in Table 3 in this report and/or to the satisfaction of the Pollution Prevention Division of the Department of Environmental Protection.

Because the site is to be rezoned to residential, the Environmental Protection Authority considers that there should be no clearance of survey documents before the Department of Environmental Protection and the Health Department of Western Australia agree that remediation has been carried out to a standard such that there is no risk to potential residents or other users. The proponents have made commitments to this effect.

5.4 Risk assessment

The results of the risk assessment indicate that the maximum cumulative individual risk in the Bunbury Harbour City Development from the handling of dangerous goods through the Outer Harbour is approximately 5 x 10^{-7} per year, provided the dangerous goods imported, stored and transported from the Outer Harbour are limited to the type and maximum quantity detailed in the proposal.

The EPA is satisfied that risks imposed upon the proposed residential development from the Bunbury Port Authority's (BPA's) activities will not exceed those outlined in the EPA's risk criteria for the assessment of risk from industry. In keeping with the EPA's philosophy of managing risk to the lowest reasonable and practicable level, if quantities of materials increase significantly, BPA should implement a safety management system and management practices to contain risk, and undertake a more detailed societal risk assessment for the importation of methanol, explosives and ammonium nitrate. The EPA considers that risk of transporting hazardous substances should be in accordance with the standards applied by the Department of Minerals and Energy with advice from the West Australian Advisory Committee on Hazardous Substances (WAACHS).

The EPA acknowledges that the extension of the rail from the Cut to the Outer Harbour may encourage the expansion of handing hazardous goods at this site, and that would be inappropriate.

The EPA notes that in relation to risk factors the rezoning to residential may limit an expansion of activities such as the handling of hazardous goods in the Outer Harbour.

5.5 Other issues

Other issues such as sewerage provision, drainage, coastal setback and coastal management can be dealt with through the Planning Process.

However, the EPA also considers that the proponents must prepare and implement a programme to control dust from any of the sites prior to the commencement of any ground disturbing activity, and this has been addressed in the proponents' commitments.

6. Conclusion, recommendations and notes

The Environmental Protection Authority has examined the proposal and the commitments to environmental management made by the proponent, and has sought advice from relevant government and private agencies. It is satisfied that, using information currently available, the following recommendation may be made to the Minister for the Environment.

Recommendation 1

The Environmental Protection Authority concludes that the proposed changes by Landcorp and the South West Development Commission to the Environmental Conditions to the Bunbury Harbour and City Development are acceptable on environmental grounds, subject to the satisfactory implementation of proponents' commitments and incorporation of EPA recommendations.

In reaching this conclusion the Environmental Protection Authority identified the main environmental issues requiring detailed consideration as:

- **traffic noise along Casuarina Drive;**
- **transportation planning;**
- **remediation of contaminated soil and groundwater; and**

- **risks and hazards associated with the handling of hazardous goods at the Outer Harbour.**

The EPA concludes that the environmental issues mentioned above have been addressed adequately by either environmental management commitments given by the proponents or by the EPA's recommendations in this report.

Other issues such as sewerage provision, drainage, coastal setback and coastal management can be dealt with through the planning process.

Recommendation 2

The Environmental Protection Authority recommends that the City of Bunbury's Town Planning Scheme be amended to designate specifically the area of residences facing Casuarina Drive as "Special Use - Residential R15" and include the zone in Appendix IV First Schedule : Special Uses, with the building guidelines set down as Development Conditions in that Schedule to give effect to noise attenuation and the provision of adequate ventilation.

Recommendation 3

The Environmental Protection Authority recommends that Landcorp and the South West Development Commission should carry out soil and groundwater remediation programmes according to the Assessment Criteria listed in Table 3 in this report and/or to the satisfaction of the Department of Environmental Protection.

Recommendation 4

The Environmental Protection Authority recommends that the proponents prepare and implement a 'Dust Management Strategy" to control dust (wind blown particulates from any of the sites), to ensure that there are no confirmed complaints about dust, to the requirements of the Department of Environmental Protection.

Recommendation 5

The Environmental Protection Authority recommends that there should be no clearance of survey documents before the Department of Environmental Protection and the Health Department of Western Australia agree the remediation has been carried out to a standard such that there is no risk to potential residents or other users.

Notes

Although not raised in the referral, but as a consequence of the public comment, the EPA supports the preservation of the railway reserve from Brunswick Junction to central Bunbury because of the long term greenhouse gas reduction, energy conservation and public transport benefits.

The EPA notes that in relation to risk factors the rezoning may limit an expansion of activities in the Outer Harbour.

DEP has established an implementation and auditing system that requires the proponent to advise DEP on how it would meet the requirements of the environmental conditions and commitments of the project. The proponent would be required to develop a Progress and Compliance Report for this project as a section of the recommended audit programmes.

It is the EPA's experience that details of the proposal may alter through the detailed design and construction phase. In many cases alterations are not environmentally significant or have positive effects on the environmental performance of the project. The EPA believes that such

non-substantial changes, ane specially those that improve the environmental performance and protection, should be provided for.

The EPA believes that any approval for the proposal base on this assessment should be limited to five years. Accordingly, if the proposal has not been commenced substantially within five years of the date of this report, then such approval should lapse. After that time, a new referral to the Authority is required.

7. Change to existing environmental conditions

The marina section of the Bunbury Harbour City development is currently subject to Environmental Conditions and Commitments (Appendix 1) as a result of the assessment of the original proposal in 1992. Part of these conditions is a Note that reads:

"If the proponent wishes to pursue the changing of the land use in the area covered by this proposal to residential and tourist uses, the issues of concern to the Environmental Protection Authority may be addressed through a publicly available revised structure plan with associated text, which should be referred to the Environmental Protection Authority."

Land uses consistent with the proposed rezoning should not be implemented, until after the Minister for the Environment has considered an Environmental Protection Authority report and recommendations on a revised structure plan, which addresses issues raised in Environmental Protection Authority Bulletin 660."

This Bulletin meets the requirements of the note, and therefore a change to the original set of conditions is recommended. This change consists of the removal of the note. A separate set of conditions for the rezoning is recommended, which is consistent with having separate proponents for the rezoning.

The draft recommended environmental conditions appear in Section 8 of this report.

8. Recommended environmental conditions

Based on its assessment of this proposal and recommendations in this report, the Environmental Protection Authority considers that the following Recommended Environmental Conditions are appropriate for the marina.

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

BUNBURY HARBOUR CITY DEVELOPMENT (435)

DEPARTMENT OF MARINE & HARBOURS
SOUTH WEST DEVELOPMENT AUTHORITY

The marina development part of the proposal may be implemented subject to the following conditions:

1 **Proponent Commitments**
The proponent has made a number of environmental management commitments in order to protect the environment.

1-1 In implementing the proposal, the proponent shall fulfil relevant commitments (which are not inconsistent with the conditions or procedures contained in this statement) made in the Public Environmental Review and in response to issues raised following public submissions. The relevant commitments are extracted from those consolidated in Environmental Protection Authority Bulletin 660 as Appendix 1 and a copy is attached.

2 Implementation

Changes to the proposal that are not substantial may be carried out with the approval of the Minister for the Environment.

2-1 Subject to these conditions, the manner of detailed implementation of the proposal shall conform in substance with that set out in any designs, specifications, plans or other technical material submitted by the proponent to the Environmental Protection Authority with the proposal. Where, in the course of that detailed implementation, the proponent seeks to change those designs, specifications, plans or other technical material in any way that the Minister for the Environment determines on the advice of the Environmental Protection Authority, is not substantial, those changes may be effected.

3 Sand Excavation, Point Casuarina Beach

3-1 Prior to any excavation of sand from Point Casuarina beach, the proponent shall determine and report on the following:

1 the coastal stability of Point Casuarina beach;

2 the implications of sand excavation on adjacent beaches to the south and to the north; and

3 the approximate amount of sand which may be taken from Point Casuarina beach (in cubic metres) without adversely affecting the amenity of this and other beaches in the area,

to the requirements of the Environmental Protection Authority on advice of the Department of Planning and Urban Development.

3-2 The proponent shall only remove sand from Point Casuarina beach in a manner consistent with the report prepared in accordance with condition 3-1, to the requirements of the Environmental Protection Authority on advice of the Department of Planning and Urban Development.

4 Sullage Disposal

4-1 Prior to the leasing of any moorings or pens constructed as part of the marina development, the proponent shall provide means for sullage tank effluent disposal at the marina development.

5 Proponent

These conditions legally apply to the nominated proponent.

5-1 No transfer of ownership, control or management of the project that would give rise to a need for the replacement of the proponent shall take place until the Minister for the Environment has advised the proponent that approval has been given for the nomination of a replacement proponent. Any request for the exercise of that power of the Minister shall be accompanied by a copy of this statement endorsed with an undertaking by the proposed replacement proponent to carry out the project in accordance with the conditions and procedures set out in the statement.

6 Time Limit on Approval

The environmental approval for the proposal is limited.

6-1 If the proponent has not substantially commenced the project within five years of the date of this statement, then the approval to implement the proposal as granted in this statement shall lapse and be void. The Minister for the Environment shall determine any question as to whether the project has been substantially commenced. Any application to extend

the period of five years referred to in this condition shall be made before the expiration of that period, to the Minister for the Environment by way of a request for a change in the condition under Section 46 of the Environmental Protection Act. (On expiration of the five year period, further consideration of the proposal can only occur following a new referral to the Environmental Protection Authority.)

7 Compliance Auditing

In order to ensure that environmental conditions and commitments are met, an audit system is required.

7-1 The proponent shall prepare periodic "Progress and Compliance Reports", to help verify the environmental performance of this project, in consultation with the Environmental Protection Authority.

Procedure

The Environmental Protection Authority is responsible for verifying compliance with the conditions contained in this statement, with the exception of conditions stating that the proponent shall meet the requirements of either the Minister for the Environment or any other government agency.

If the Environmental Protection Authority, other government agency or proponent is in dispute concerning compliance with the conditions contained in this statement, that dispute will be determined by the Minister for the Environment.

Kevin Minson MLA
MINISTER FOR THE ENVIRONMENT

Based on its assessment of this proposal and recommendations in this report, the Environmental Protection Authority considers that the following Recommended Environmental Conditions are appropriate for the rezoning.

STATEMENT TO AMEND CONDITIONS APPLYING TO A PROPOSAL (PURSUANT TO THE PROVISIONS OF SECTION 46 OF THE ENVIRONMENTAL PROTECTION ACT 1986)

BUNBURY HARBOUR CITY DEVELOPMENT (435) SECTION 46

LANDCORP AND THE SOUTHWEST DEVELOPMENT COMMISSION

The implementation of the rezoning proposal is now subject to the following conditions.

1 Proponent Commitments
The proponent has made a number of environmental management commitments in order to protect the environment.

1-1 In implementing the proposal, the proponent shall fulfil the commitments made in the Proponent's document of July 1994 and in response to issues raised following public submissions and the commitments published in Environmental Protection Authority Bulletin 774; provided that the commitments are not inconsistent with the conditions or procedures contained in this statement. These commitments are consolidated in Environmental Protection Authority Bulletin 756 as Appendix 4. (The modified commitments of December 1994 are attached.)

2 Implementation
Changes to the proposal which are not substantial may be carried out with the approval of the Minister for the Environment.

2-1 Subject to these conditions, the manner of detailed implementation of the proposal shall conform in substance with that set out in any designs, specifications, plans or other technical material submitted by the proponent to the Environmental Protection Authority with the proposal. Where, in the course of that detailed implementation, the proponent seeks to change those designs, specifications, plans or other technical material in any way that the Minister for the Environment determines on the advice of the Environmental Protection Authority, is not substantial, those changes may be effected.

3 Site Contamination and Remediation
The proponents shall remediate the soil and groundwater.

The proponents shall carry out soil and groundwater remediation programmes according to the Assessment Criteria listed in Table 3 in the Bulletin and/or to the satisfaction of the Department of Environmental Protection.

3-1 Clearance of survey documents shall not be carried out until the Health Department of Western Australia and the Department of Environmental Protection agree that the soil and groundwater have been remediated to their satisfaction.

4 Dust Control
Control of dust arising from ground disturbance is required.

4-1 Prior to the commencement of any ground disturbing activity, the proponents shall prepare a 'Dust Management Strategy' to control dust (wind blown particulates from any of the sites) to ensure that there are no confirmed complaints, to the requirements of the Department of Environmental Protection.

4-2 The proponents shall implement the "Dust Management Strategy' during and after remediation of the sites to the satisfaction of the Department of Environmental Protection.

4 Proponent

These conditions legally apply to the nominated proponent.

4-1 No transfer of ownership, control or management of the project that would give rise to a need for the replacement of the proponent shall take place until the Minister for the Environment has advised the proponent that approval has been given for the nomination of a replacement proponent. Any request for the exercise of that power of the Minister shall be accompanied by a copy of this statement endorsed with an undertaking by the proposed replacement proponent to carry out the project in accordance with the conditions and procedures set out in the statement.

5 Time Limit on Approval

The environmental approval for the proposal is limited.

5-1 If the proponent has not substantially commenced the project within five years of the date of this statement, then the approval to implement the proposal as granted in the statement of 29 April 1992 shall lapse and be void. The Minister for the Environment shall determine any question as to whether the project has been substantially commenced.

Any application to extend the period of five years referred to in this condition shall be made before the expiration of that period, to the Minister for the Environment by way of a request for a change in the condition under Section 46 of the Environmental Protection Act. (On expiration of the five year period, further consideration of the proposal can only occur following a new referral to the Environmental Protection Authority.)

6 Compliance Auditing

In order to ensure that environmental conditions and commitments are met, an audit system is required.

6-1 The proponent, in consultation with the Department of Environmental Protection, shall prepare an Audit Programme, which includes requirements for the preparation of periodic Compliance Reports.

6-2 The proponent shall subsequently implement the Audit Programme required by condition 8-1.

7 Decommissioning

The satisfactory decommissioning of the project, removal of the plant and installations and rehabilitation of the site and its environs is the responsibility of the proponent.

7-1 At least six months prior to decommissioning, the proponent shall prepare a decommissioning and rehabilitation plan.

7-2 The proponent shall implement the plan required by condition 7-1.

Procedure

1 The Department of Environmental Protection is responsible for verifying compliance with the conditions contained in this statement, with the exception of conditions stating that the proponent shall meet the requirements of either the Minister for the Environment or any other government agency.

2 If the Department of Environmental Protection, other government agency or proponent is in dispute concerning compliance with the conditions contained in this statement, that dispute will be determined by the Minister for the Environment.

The City of Bunbury and the State Planning Commission in the City of Bunbury Town Planning Scheme Amendment will designate specifically the area of residences facing Casuarina Drive as "Special Use - Residential R15", and include the zone in Appendix IV First Schedule : Special Uses, with the building design and construction guidelines discussed in the text. These shall be set down as Development Conditions in that Schedule and shall be used to achieve an internal noise standard of 35 $dB_{(A)}$ Leq at night, and air quality in the bedrooms that meets the standards specified in Australian Standards 1668.2-1991, when the windows are shut.

The following Development Conditions shall apply:

- bedrooms shall preferably be placed in the part of the house furthest away from the road.

Some or all of the following Development Conditions shall be used to achieve the above standards:

- all walls should be constructed of double brick;
- all roof materials should be either clay or concrete tiles;
- all glazing should be 10mm thick laminated;
- all external doors should be of solid core construction with seals;
- all ceilings should be insulated;
- all plasterboard in the ceilings should be 19mm thick.
- mechanical ventilation in the bedrooms.

Hon Peter Foss MLC
MINISTER FOR THE ENVIRONMENT,
WATER RESOURCES, THE ARTS
AND FAIR TRADING

9. References

Australian and New Zealand Environment and Conservation Council, Australian Water Quality Guidelines for Fresh and Marine Waters, 1992.

ANZEC AND NHMRC (1992) Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites.

Assink, J.W. and Van den Brink, W.M. (1986). Contaminated soils, First International TNO Conference on Contaminated Soil 11-15 November 1985. Mattinus Jijhoff Publishers, The Netherlands.

Bunbury Port Authority correspondence.

Department of Environmental Protection, Draft Noise Regulations 1993.

Department of Environmental Protection, Personal Communications from Senior Environmental Officer and Senior Noise Officer (1994), Pollution Management Branch.

Department of Environmental Protection, Summary of Public Submissions September 1994

Department of Minerals and Energy Explosives and Dangerous Goods Division correspondence

DNV Technica, Final Report - Quantitative Risk Assessment of Bunbury Outer Harbour for Marlston Hill Structure Plan, Appendix B, 1994.

Environment Ontario, Guidelines for Decommissioning and Clean Up of Sites in Ontario

Environmental Protection Authority, Bulletin 711, Draft Western Australian Water Quality Guidelines for Fresh and Marine Waters, 1993.

Environmental Protection Authority Bulletin 278, Guidelines, Risks and Hazards of Industrial Developments on Residential Areas in Western Australia, 1987.

Environmental Protection Authority, Bulletin 611, Criteria for the Assessment of Risk from Industry, 1992.

Environmental Protection Authority, Bulletin 699, Clean-up of contaminated site Mc Cabe Street, Mosman Park, August 1993.

Groundwater Technology, Final Assessment Report, BP Bunbury Terminal, Henry Street, Bunbury, March 1992.

Herring Storer Acoustics, Bunbury Harbour City Development, Traffic Acoustic Assessment Appendix A, 1993.

Landcorp and the South West Development Commission - Marlston Hill - Proposed Changes to Environmental Conditions (Section 46) 1994.

Mackie Martin and Associates, Evaluation and Assessment of Hydrocarbon Soil Contamination on 13 South Eastern Western Australian Sites, BP Deport, Bunbury, November 1992.

Ministry for the Environment, Quebec, Ground Water and Soil Contamination Indicators, 1986.

Rockwater Pty Ltd. Bunbury Harbour City Development, Site Investigation, December 1993.

Sinclair Knight Merz, Correspondence with the Department of Environmental Protection 1994.

Sinclair Knight Merz, Marlston Hill, Assessment of Contamination - Draft Final Report Appendix C, January 1994.

Sinclair Knight Merz, Marlston Hill, Assessment of Contamination - Final Report, Appendix C, July 1994.

Sinclair Knight Merz, Response to Summary of Public Submissions 1994.

Standards Australia, Australian Standard 2021, 1985.

Standards Australia, Australian Standard AS 1668.2 - 1991 Mechanical ventilation for acceptable indoor air quality.

Standards Australia, Australian Standard As 1668.2 Supplement 1 - 1991 Mechanical ventilation for acceptable indoor air quality - Commentary.

UK Health and Safety Commission, Major Hazards Aspects for the Transport of Dangerous Substances 1991.

Vallet, M., Gagneux, J., Blanchet, V., Favre, B., and Labiale, G. (1988) Long term sleep disturbance due to traffic noise", Journal of Sound and Vibration, 90, 173-191.

Victoria Environmental Protection Authority, Acceptance Criteria in the Clean-up Notice for the Bayside Site, Port Melbourne, 1990.

Western Australia, Noise Abatement (Neighbourhood Annoyance) Regulations 1979.

World Health Organisation Environmental Health Criteria 12, World Health Organisation, Geneva, 1980.

Appendix 1

Proponents' commitments

The proponents, LandCorp and South West Development Commission, undertake to abide by all commitments in this Section 46 Report. The commitments are summarised below.

1. Traffic Noise

1.1 The proponents commit to provide a residential setback of 25 metres from the edge of the carriageway of the proposed sub arterial road (Casuarina Drive). The setback will incorporate a dual use path, a landscape buffer and an elevation change between the road and residential blocks. The proponents commit to provide a setback of 10 metres from the edge of the carriageway for the proposed sub arterial road (Casuarina Drive) for the commercial areas. The proponents commit to build Casuarina Drive with a surface of dense graded asphalt.

1.2 The proponents commit to build a wall of solid construction 1.2 metres high along the residential boundary of all lots facing Casuarina Drive.

Procedures for Noise Management

1.3 The proponents commit to recommending that the City of Bunbury and the State Planning Commission designate specifically in the City of Bunbury Town Planning Scheme Amendment the area of residences facing Casuarina Drive as "Special Use - Residential R15", and include the zone in Appendix IV First Schedule : Special Uses, with the building design and construction guidelines discussed in the text. These shall be set down as Development Conditions in that Schedule and shall be used to achieve an internal noise standard of 35 $dB_{(A)\ Leq}$ at night and an instantaneous noise level of 45 maximum between 2200 and 0700 hours. Should it be necessary to have the windows shut to achieve this internal noise standard, then air quality in the bedrooms must meet the standards specified in Australian Standards1668.2-1991 when the windows are shut.

The proponents are prepared to accept that some or all of the following Development Conditions shall be used to achieve the above noise standards:

- bedrooms shall preferably be placed in the part of the house furthest away from the road.
- all walls shall be constructed of double brick;
- all roof materials shall be either clay or concrete tiles;
- all glazing shall be 10mm thick laminated;
- all external doors shall be of solid core construction with seals;
- all ceilings shall be insulated;
- all plasterboard in the ceilings shall be 19mm thick;
- mechanical ventilation.

2. Drainage

2.1. The proponents commit to design and build drainage basins to retain stormwater drainage flows up to a 1 in 10 year, 72 hour recurrence event.

3. Site Contamination

Some sites may be remediated by others.

3.1 The proponents commit to ensure that further investigations and final remediation plans are submitted to the Pollution Prevention Division of the Department of Environmental Protection for approval on a site by site basis.

3.2 The proponents commit to ensure that all soil and groundwater on the site will be remediated to the satisfaction of the Pollution Prevention Division of Department of Environmental Protection.

3.3 The proponents commit that clearance of survey documents will not proceed until the site has been remediated to the satisfaction of the Department of Environmental Protection with advice from the Health Department of Western Australia.

3.4 BP Site

The proponent makes the following commitments in relation to the BP sites (including the off site soakage pit):

3.4.1. to undertake remediation of the site to ensure that petroleum hydrocarbons and lead contamination of soil and any other contamination consistent with site history, meet the criteria set out below, and/or other criteria determined by the Department of Environmental Protection with advice from the Health Department of Western Australia;

Parameter	Criteria mg/kg	Source
C_{6-9}	100	EPA (Victoria)
C_{10-14}	500	EPA (Victoria)
C_{15-28}	1000	EPA (Victoria)
Benzene	0.5	Dutch B
Toluene	3	Dutch B
Ethyl benzene	3	Dutch B
Xylene	5	Dutch B
Lead	300	ANZECC Environmental Investigation Level

3.4.5 to undertake validation testing upon completion of the remediation to the satisfaction of the Department of Environmental Protection with the advice of the Health Department of Western Australia.

3.5 Shell Site

The proponent makes the following commitments in relation to the Shell site:

3.5.1 to undertake a comprehensive survey to determine the nature and extent of petroleum hydrocarbon and lead contamination and of any other contamination consistent with site history, of the soil and/or groundwater;

3.5.2 to undertake remediation of the site to ensure that petroleum hydrocarbons, lead and any other soil or groundwater contamination consistent with site history, meets remediation criteria to the satisfaction of the Pollution Prevention Division, Department of Environmental Protection;

3.5.3 to undertake validation testing upon completion of the remediation to the satisfaction of the Department of Environmental Protection with the advice of the Health Department of Western Australia.

3.6 Caltex Site

The proponent makes the following commitments in relation to the Caltex site:

3..6.1 to undertake a comprehensive survey to determine the nature and extent of petroleum hydrocarbon and lead soil contamination and any other contamination consistent with site history;

3.6.2 to undertake additional soil testing to determine the extent and severity of dieldrin and any other pesticide contamination;

3.6.3 to undertake remediation of the site to ensure that petroleum hydrocarbons, lead and any other soil contamination consistent with site history, meet remediation criteria to the satisfaction of the Pollution Prevention Division, Department of Environmental Protection;

3..6.4 to undertake to cover the site with 0.5-1 m of clean fill to the satisfaction of the Pollution Prevention Division, Department of Environmental Protection.

3.6.5 to undertake further remediation of the site should significantly higher concentrations of dieldrin or other organochlorine pesticides be detected. Remediation criteria and methods would be based on health and environmental risk assessments to the satisfaction of the Department of Environmental Protection with the advice of the Health Department of Western Australia;

3.6.7 to undertake validation testing upon completion of the remediation to the satisfaction of the Department of Environmental Protection with the advice of the Health Department of Western Australia.

3.7 Wastewater (WAWA) Treatment Plant

The proponent makes the following commitments in relation to the wastewater treatment plant site:

3.7.1 to remove all remaining sewage sludge;

3.7.2 to undertake testing for heavy metals and any other contaminants consistent with site history in the soil below the sludge drying beds;

3.7.3 to remove any contaminated soil from below the sludge drying beds should remediation be deemed necessary. Remediation criteria and methods would be based on health and environmental risk assessments to the satisfaction of the Pollution Prevention Division, Department of Environmental Protection;

3.7.4 to undertake validation testing upon completion of remediation to the satisfaction of the Department of Environmental Protection with the advice of the Health Department of Western Australia.

3.8 Bunbury Port Authority Land

The proponent makes the following commitments in relation to land owned by the Bunbury Port Authority:

3.8.1 once the sites have been cleared the proponents commit to undertake testing for heavy metals and any other contamination consistent with site history, using criteria and methods
to the satisfaction of the Pollution Prevention Division, Department of Environmental Protection;

3.8.2. to undertaken additional soil testing to determine the extent and severity of dieldrin and any other pesticide contamination;

3.8.3 to undertake remediation of the site should significantly higher concentrations of heavy metals or other contaminants consistent with site history be detected. The proponent commits to use remediation criteria and methods based on health and environmental risk assessments to the satisfaction of the Pollution Prevention Division, Department of Environmental Protection with the advice of the Health Department of Western Australia;

3.8.3 to cover the site with 0.5-1 m of clean fill if required and to dispose of contaminated soil to the satisfaction of the Pollution Prevention Division, Department of Environmental Protection, with the advice of the Office of Waste Management.

3.8.4 if remediation is undertaken, to undertake validation testing upon completion of remediation to the satisfaction of the Pollution Prevention Division, Department of Environmental Protection with the advice of the Health Department of Western Australia.

3.9 Westrail Land

The proponent makes the following commitments in relation to land owned by the Westrail:

3.9.1 once the sites have been cleared., the proponents commit to undertake testing for heavy metals and any other contaminants consistent with site history, to criteria and methods to the satisfaction of the Pollution Prevention Division, Department of Environmental Protection;

3.9.2 to undertake remediation of the site should significantly higher concentrations of heavy metals or other contaminants be detected. Remediation criteria/ methods would be based on health and environmental risk assessments to the satisfaction of the Pollution Prevention Division, Department of Environmental Protection with the advice of the Health Department of Western Australia;

3.9.3 to undertake to cover the site with 0.5-1 m of clean fill if required and to dispose of contaminated fill to the satisfaction of Pollution Prevention Division, Department of Environmental Protection with the advice of the Office of Waste Management.

3.9.4 if remediation is undertaken, to undertake validation testing upon its completion of remediation to the satisfaction of the Department of Environmental Protection and the Health Department of Western Australia.

4. Groundwater Remediation

4.4.1 The proponents commit to undertake the installation of monitoring bores to confirm whether there is any contamination of the groundwater, and if so where it is and how much contamination there is;

4.4.2. the proponents commit to undertake groundwater modelling to determine the concentration of monoaromatic petroleum hydrocarbons or other likely contamination consistent with site history, reaching Koombana Bay to the satisfaction of Pollution Prevention Division, Department of Environmental Protection.

4.4.3 the proponents commit to present the findings of the groundwater modelling to the Department of Environmental Protection so that the Department may determine the need for remediation and the appropriate criteria;

4.4.4 should remediation be necessary, then the proponents commit to remediate the groundwater using criteria and technology to the satisfaction of the Pollution Prevention Division, Department of Environmental Protection ;

4.4.5 if remediation is undertaken, the proponents commit to undertake validation testing upon completion of remediation to the satisfaction of the Department of Environmental Protection with the advice of the Health Department of Western Australia.

5 Management Plans

The proponents will ensure that the development proposal will assume an integrated approach consistent with existing Management Plans for the area, eg Bunbury Coastal Plan; Koombana Parks Reserves Management Plan.

Appendix 2

Summary of submissions and proponents' response

SUMMARY OF PUBLIC SUBMISSIONS

1. Use of Outer Harbour

The Marlston Hill Structure Plan is supported on the clear understanding that the continued use of the Outer Port Harbour and Casuarina Boat Harbour and the security of tenure of users is guaranteed.

2. Rail Transport

The Plan excludes provision of a rail link to the Harbour because it was not seen to be viable, with the implication that the only option for transport of goods will be by road. The rail option was discounted without a reasoned evaluation of the likely environmental and economic benefits resulting from the discontinued use of Casuarina Drive by mineral sands and other trucks.

Rail transport is a viable option and will become more attractive as the costs of rail freight are expected to continue to fall in the next few years. It is recommended that the Structure Plan be amended on environmental grounds to incorporate a rail link to the Outer Harbour.

3. Proposed Rail Alignment

The provision of a rail link would remove the need for the development of Casuarina Drive as such a significant road, as there would be a reduction in vehicular traffic, particularly trucks. This would allow provision of a rail alignment paralleling the road on its northern side, which would sweep in a curve from the railway bridge across the "cut" to the north of the silos and link with the alignment of the road.

The effect on the views from the subject land and from within the site would be minimal. The existing line along the north shore between the cut and the silos is an example of how railway can be accommodated within parkland with no negative visual impacts.

A rail link can be accommodated without minimum disturbance to land use and amenity. A rail link would not require any additional land where the proposed link parallels Casuarina Drive. Some disturbance to the Structure Plan would occur between where the proposed line parallels the road and where the proposed railway station is located in the Structure Plan. The rail line would extend to the north of the proposed Museum building associated with the silos, but this could be achieved without significant disturbance to the proposed buildings or facilities.

The development of the Watercourse Precinct would still be as proposed. It would be easier for pedestrian and vehicular traffic to cross a rail link than the road, given the limited number of trips and slower travelling speeds of trains. There would be only one vehicular crossing on the proposed rail alignment.

The rail link would also be compatible with the land uses proposed in the Structure Plan It would abut the proposed recreational and tourism areas, but would not be incompatible with these activities. In Fremantle where low level aesthetic fencing has been provided, allowing good access at a number of crossing points and focussing pedestrian movement into preferred activity areas. A similar approach in Bunbury would support the objectives of the Structure Plan, while meeting requirements for safety and a high standard of amenity for the area.

4. Land Use Zoning and Extent of Development

There is conflict between the extent of development indicated by the Locality Plan and by the Precincts Plan. It would be of concern if the proposed Structure Plan were to encompass

Casuarina Boat Harbour as indicated by the Locality Plan. It is understood that this is not the case, and that the Precinct Plan defines the correct limits of the area under consideration.

The area adjacent to the public boat ramps and fishing industry facilities is defined by Town Planning Scheme No. 6 - Amendment No 159 as Special Use Zone - Marina Use. Either the Department of Transport should be referred to as the Proponent for this development or this area should be deleted from the Structure Plan currently under discussion.

The extent of land and seabed currently vested in the Minister for Transport for Harbour Purposes and managed by the Department of Transport should be shown in Figure 4.

A Special Use Zone - Marina Use is proposed for the causeway land adjacent to the Old Port Timber Jetty, and it is further proposed to extend this use out on the jetty over the water, depending on the capacity of the local community to maintain the supporting structure. The Zoning Plan should reflect this use.

5. Boat Harbour Development and Beach

5.1 Water Quality

Water quality within the boat harbour will depend on a number of factors, including the condition of the parent water body, tidal exchange, water circulation and boat usage. There may be occasions, particularly during holidays in summer when the boat harbour water quality is suitable for the purpose for which the harbour has been designed, but not for extended periods of swimming. Therefore the area should be referred to as "beach" rather than as a "swimming beach for children".

5.2. Parking

Limited commercial parking for access to the foreshore would inhibit family access to the beach. As Casuarina Drive is a dual carriageway, it is suggested that additional parking areas off the eastern lane, should be provided.

5.3. Revetment wall

The revetment wall near the boat ramps is shown extending to the children's beach. There are no current plans to extend the existing wall.

6. Noise

6.1 Number of Trucks

The nature and severity of noise impacts from trucks using Casuarina Drive will depend on the number of trucks. The Structure Plan states that there are currently a total of 130 truck movements per day in a total traffic count of 2, 200, that there is some 65 each way, and that the majority of these are mineral sands trucks.

Sinclair Knight reported current maximum sound pressure levels between 95 and 111dB. Predicted levels of between 67 and 97 dB are reported to occur 10% of the time over the 18 hour period, from 0600h to 2400h for an increased traffic flow of 2200 vehicles per day.

DEP guideline levels are 63 dB for 10% of the time, except for the night between 2200h and 0700h when 60dB is acceptable.

What this does not address is the distribution of movements. Heavy vehicle movements are most intrusive during the quiet evening period and particularly the 2200-700 hours period, when there is negligible light traffic, and when heavy vehicle movements would approach 100% of all vehicle movements.

There is also no clear indication given in the document about the extent of direct ship loading, when product stored off site from the berth is trucked to and directly loaded onto the ship. Base load shipping occurs every day although there would be limited or no movement on Christmas Day. During the periods of direct shipping, the number of truck movements may increase up to 40-45 movements per hour.

The attached table provides a spread of likely truck movements.

The number of truck movements increases significantly to about 700 movements per day twice per month when ships are being loaded, and during the non-summer months increases up to 1,200 truck movements per day once every four weeks. This results in increases in the noise levels well above DEP guidelines. Even higher levels of noise are expected if the mineral sands traffic increases, and this may result in more than 2200 vehicles per day (equivalent to around 90 vehicles per hour)

Sinclair Knight proposes a number of special measures that could be employed to reduce the noise levels expected from total traffic to within acceptable levels, including special provisions for house construction, particular kinds of road surface, the use of sound barriers, and a 25 m setback of buildings from the road. All these would involve additional costs. The measures would not be adequate to reduce the maximum truck only traffic noise to acceptable levels within 25m of the road when recorded outside buildings. The extent of maximum truck traffic is not specified, but Casuarina Drive is designed to carry 40,000 vehicles per day, with the potential for very high levels of noise.

The benefits of using rail for similar transport would be a much lower frequency and volume of traffic, and a subsequent reduction of likely noise levels at lesser cost to the home owners, whilst the developers would have the land not required for setbacks, available for sale.
The potential mineral sands and other truck traffic noise is expected to have a greater impact on the community than that produced from similar transport operations by rail. In addition the adequacy of the proposed noise management measures for road freight to achieve the Guidelines is questionable.

6.2 Timing of Operations

The Structure Plan indicated that a curfew is not acceptable, and therefore trucking operations will occur 24 hours per day. This would probably result in residents near to Casuarina Drive being subject to high levels of noise at night, especially if they were outdoors. Rail transport because of increased haulage capacity would have greater scheduling flexibility which would minimise disturbance at night, especially between 1900h and 0700h.

6.3 Ground Borne and Wayside Airborne Noise

This noise is caused by wheel-road interactions, traffic acceleration and braking, and by auxiliary equipment. The relative contribution of these sources is not specified in the document, nor is it apparent from the description of the methodology used, that the sample points were located in places likely to detect the full range of sounds generated.

The ground borne and wayside airborne noise impacts from rail traffic are unlikely to be as significant, since rail traffic would operate at much lower speeds, and with a reduced frequency of accelerating and braking. New rail technologies and practices that reduce wheel-rail interaction are being developed which would further enhance rail's advantages.

On this basis the provision of a rail link within the Structure Plan provides an alternative transport option that is compatible with the proposed noise-sensitive premises and land uses within the Structure Plan area.

6.4 Noise and Building Guidelines

It is not clear whether the quoted noise reductions indoor/outdoor are achievable and/or if this relies on closed windows, and if so, whether this is realistic. We understand a typical reduction of 22dB(A) is acceptable to the EPA.

We therefore agree with the proponent's Commitment No 3 (p.41) which refers to specific building guidelines. In Commitment No 3 in the Amendment, these guidelines are to be approved by Council/DPUD. We were advised verbally that these guidelines would be lodged as conditions on titles. The Amendment does not indicate this. Commitment No 3 seems to propose that the guidelines be a condition of subdivision. On its own, this does not appear appropriate because the building guidelines or requirements should be a condition of the building permit.

We believe these measures should be adopted, even if a carefully calculated noise model supports the Proponent's view that 60dB(A) L_{10} 1 hour levels are acceptable at night, and this level is met without imposing such guidelines. It is to the benefit of all involved at this stage to achieve the lowest possible noise environment, especially as the likely cost would be quite limited compared to te economic benefits derived from unhindered, long term road access to the Outer Harbour.

We request that the Amendment specifically designates the area of residences facing Casuarina Drive as "Special Use - Residential R15" and includes the zone in Appendix IV First Schedule : Special Uses, with the building guidelines set down as Development Conditions in that Schedule. This will ensure that there is knowledge of the building conditions when people are preparing building applications and enforcement of the conditions when Council approves building applications.

7. Public Safety and the Transport of Dangerous and Hazardous Goods

The risk analysis concludes that the Marlston Hill development will not be an impediment to the handling of hazardous goods at the Outer Harbour. However, rail transport of the hazardous goods would involve even less risk than that calculated for road transport.

Casuarina Drive will be used simultaneously by trucks, residential traffic and tourist traffic. Despite increased design criteria for the road, the risks associated the interaction of road transport of hazardous goods with non-industrial traffic is of concern. This appears inconsistent with the philosophy of avoiding avoidable risks cited in EPA Bulletin 660 Bunbury Harbour City Development.

Records from the Department of Minerals and Energy for the past three years show that a significant majority of transport accidents occur during road transport of dangerous goods. A study by the UK. Health and Safety Executive identified corridors of population along road routes, lack of traffic separation and traffic density as significant factors that may contribute to an increased risk to public safety.

While heavy vehicles are less frequently involved in accidents than cars, the environmental severity and human consequences of those accidents tend to be much greater. Public safety within the Structure Plan area should be evaluated as a significant factor in a fair comparison between road and rail options.

Given the likely traffic flows , the potential for accidents between trucks hauling to Outer Harbour and other traffic would be greater than if dangerous goods were carried by rail and thus separated from tourist and residential traffic.

8. Energy use, the Greenhouse Effect and Gaseous Emissions

The provision of road based transport only does not address the public's growing concern to protect the environment. In Australia road transport is estimated to provide about 26% of the Greenhouse gas emissions which contribute to global warming through emissions of carbon dioxide, nitrogen oxides and volatile hydrocarbons.

The inadequate regulation of diesel engine vehicles, which make up the bulk of road freight transport, is a significant contributor to atmospheric pollution. Trucks burn between two and four times as much fuel as trains depending on the task.

Despite this the Structure Plan promotes a road transport system, rather than the alternative rail transport system. A study by Avenell, Harris and Manly in 1991 has shown that the conversion of 50% of road freight to rail would reduce carbon dioxide emissions by 21%. Given the relative efficiencies of rail in Western Australia, the emission reduction would probably be higher. On this basis a rail link would contribute significantly to efficient energy use and a reduction in gaseous emissions including Greenhouse gases, thus contributing to measures that combat global warming.

9. Dust

If a rail link is incorporated in the Structure Plan, dust is not expected to be in excess of that currently experienced by road freight. Dust needs to be considered for both rail and road transport.

10. Groundwater

Should local ground water be required for purposes associated with the development, such as reticulation of public open space or road reserves, a licence will be required from the Water Authority prior to development of the source works.

PROPOSED CHANGES TO ENVIRONMENTAL CONDITIONS - BUNBURY HARBOUR CITY DEVELOPMENT - MARLSTON HILL

RESPONSE TO SUMMARY OF PUBLIC SUBMISSIONS

The following is the proponent's response to the 'Summary of Public Submissions' for the above project sent to Sinclair Knight Merz, from the Department of Environmental Protection, 14 September 1994. Comments on the proposal for a rail link are attached.

1. USE OF OUTER HARBOUR

The 'Proposed Changes to Environmental Conditions' document clearly states its commitment to the continued use of the Outer Harbour and Casuarina Boat Harbour. The document states: '*The Outer Harbour will retain its role as a general cargo port with particular emphasis on the handling of mineral sands and to a lesser extent, hazardous goods.*'

The Bunbury Port Authority, Port Strategy states *'The existing trades of the Outer Harbour, which include imports of methanol and vegetable oil and exports of mineral sands, will continue to be handled there until well into the 21 st century.'*

2. RAIL TRANSPORT

The use of rail for the transport of mineral sands to the Outer Harbour is currently not considered economically viable by the Mineral Sands Industry who are the main users of the Outer Harbour. Rail to the Outer Harbour has not been used for over 20 years despite a rail link being available.

Rail is not considered currently viable and unlikely to be viable in the future for the following reasons:

- The mineral sands industry is broadly spread over the region. The capital cost of providing rail links over such a large area for relatively small tonnages is expensive.

- The average life of a mine is only 2-8 years. Providing a rail link for such a short time period is not economic.

- There are a variety of mineral sands products produced. It is necessary to avoid cross-contamination between the products. To do this it is necessary to have dedicated transport, conveyance and storage facilities for each product. The unloading system to meet this requirement would be extremely expensive. There are currently no facilities at the Outer Harbour for the unloading of trains.

- The average distance that a tonne of mineral sands is transported from processing facilities to port is 19 km. In addition, there are other short journeys from the mine sites to processing facilities. It is not thought practical to use rail for these journeys as the locations of the mine sites vary.

- Additional storage facilities would be required at the Outer Harbour to accommodate a full train load. Significant amounts of additional storage would also be required at the processing facilities. Alternatively, hauling of smaller train loads will increase haulage costs.

- It is unlikely that there would be sufficient rail facilities to cope with peak ship loading requirements. It is common for 5%-10% of the total annual export to be loaded in only a few days.

Should there be mines with sufficient freight volumes where rail may be a viable option then these can be accommodated by utilising the Inner Harbour which has a well developed rail system. If there were further development in the area requiring bulk export in the future significant expenditure in providing unloading facilities would be necessary. This capital expenditure would be better spent in the Inner Harbour.

Rail transport of mineral sands is currently not viable. Therefore, it is still necessary to construct Casuarina Drive to the standard outlined in the Structure Plan to meet the requirements of mineral sands trucks.

It is considered that the provision of a rail link would have a significant impact on the development. The link would take up additional land area as it is not possible to reduce the size of Casuarina Drive for the reasons discussed above. This would affect the viability of the development and preclude the development of a major hotel and associated tourist facilities. The provision of a rail link would also further inhibit free access from the residential development to the commercial and foreshore areas.

3. PROPOSED RAIL ALIGNMENT

The provision of a rail link would not reduce the need for the development of such a significant road to the Outer Harbour as the rail transport for mineral sands is not currently viable. As it is not possible to reduce the size of the road, the provision of a rail link would require additional land area that would impact on the development.

The proponent does not agree with the comment that the effect on the views from the subject land would be minimal. Barriers would be required along the line of the railway to protect pedestrians in the areas of public open space. Although the existing line along the north shore between the cut and the silos currently has minimal visual impact, the existing area is not heavily used by the public. The rezoning of the land would encourage the public into the area so protective barriers would be required because of increased train frequency.

The rail link would further impede access to the foreshore and tourist precincts. This is because it would be necessary to cross both the road and the railway line to gain access to these precincts.

4. LAND USE ZONING AND EXTENT OF DEVELOPMENT

Figure 1 - Locality Plan has been modified to reflect the extent of the development proposed in the Structure Plan. Figure 1 now matches the extent of the development as show in **Figure 2 - Precinct Plan**. The modified figure is attached.

Figure 2 - Precinct Plan shows the area subject to Structure Planning included in this development. The area next to the public boat ramps and fishing industry facilities is not included for development within this proposal. The Structure Plan only reflects current land use in this area and does not show any modification to existing land uses or environment. It is therefore proposed that this area should not be deleted from the Structure Plan, but that the Structure Plan be modified to delineate the area that will be the subject of development proposals. The modified Structure Plan is attached.

Figure 4 - Existing Ownership and Tenure has been modified to reflect the extent of land and seabed currently vested for Harbour Purposes under the Minister for Transport. The modified Figure is attached.

It is proposed that the zoning over the jetty and the adjacent causeway land be zoned Special Use - Bunbury Harbour City. The specific uses that will be allowed in this zone will be included in the relevant schedule. The specific uses allowed will include marina activities. The zoning of Bunbury Harbour City rather than Marina Use is proposed as it will allow the development of facilities that will complement the Bunbury Harbour City Development.

5. BOAT HARBOUR DEVELOPMENT AND BEACH

The Structure Plan and other figures referring to a 'Swimming Beach for Children' in Casuarina harbour have been modified to refer to a 'Beach'.

The Structure Plan and other figures have been modified to show parking on the eastern side of Casuarina Drive for family access to the beach.

The Structure Plan and other figures have been modified to ensure that the revetment wall near the boat ramps does not extend to the Beach in Casuarina Harbour.

6. NOISE

6.1 Number of Trucks

The second paragraph is referring to sound power levels. This is the theoretical level of the source as used in calculations and is not the noise heard by the ear at a distance. The actual noise levels heard at various distances have been modelled and are shown in **Appendix A, Noise and Traffic Studies - Table 3.**

The maximum number of trucks that could be expected is 40 trucks per hour during periods of direct shipping. During this period and during the evening period the trucks could contribute 100% of all traffic movements. This scenario has been modelled and the results of the modelling are shown in **Table 3 - Appendix A.** The results of modelling meet Department of Environmental Protection (DEP) guidelines. The scenario of 45 trucks per hour has also been modelled. The level of noise from this trucking level also meets DEP guidelines.

The proponent recognises that the following typical truck movements can occur:

	Base Load	Direct Shipping	
		A	B
Average truck movements/hour	6	40-45	40-45
Duration of movements (hrs/day)	24	5-15	24
Estimated occurrences days/year	365	12	8

The proponent does not agree with the statement '*This results in increases in the noise levels well above DEP guidelines*'. The quoted 700 truck movements per day equates to 29 truck movements per hour. As discussed above, modelling shows that truck movements of 40-45 movements per hour meets DEP guidelines.

The number of trucks using the Outer Harbour is expected to decrease over time. Additional mineral sands (including silica sands) exports will use the Inner Harbour. BHP is proposing to use the Inner Harbour for export of mineral sands from their Beenup mine. It is the stated intention of both Gwalia Consolidated and the Port Authority to develop a berth at the inner harbour for the trade in silica sands as exports grow. In addition the mineral sands industry forecasts the decrease in truck numbers by increasing the payloads on trucks by the introduction of pocket road trains. It is expected that truck movements will decrease by 30% over 3-5 years with no reduction in through-put.

The proponent disagrees with the comment '*The measures would not be adequate to reduce the maximum truck only traffic noise to acceptable levels within 25m of the road when recorded outside buildings.*' Modelling shows that noise levels will meet DEP guidelines. Casuarina Drive is not designed to serve 40,000 vehicles per day, although it may have the theoretical capacity to handle that number. It has been designed with dual lanes and lane separation to increase safety on the road because

the road will be used for mineral sands trucks.

As discussed above, the addition of a rail link would not reduce the required size of Casuarina Drive. The proponent does not agree that the addition of a rail link would decrease the impact of mineral sands exports on residents for reasons outlined above.

6.2 Timing of Operations

The levels of noise that the residents would be exposed to at night have been shown by modelling to meet DEP guidelines.

Rail transport does not provide greater scheduling flexibility for the reasons listed below:

- To achieve transport by rail a large increase in storage at the Outer Harbour and at processing facilities would be required.

- Some product cannot be efficiently moved by rail even if rail freight were significantly cheaper. For example, Cable Sands transport their mineral sands a distance of only 3 km to the Outer Harbour from their processing facility.

- It is debatable whether rail can meet peak loading times. Additional truck loading may be required to meet peak loading requirements. In addition there would be great difficulties in scheduling the transport of the mineral sands as while one company was loading it would not be possible for the other companies to continue to base load.

6.3 Ground Borne and Wayside Airborne Noise

Noise level measurements were made at the site and were of actual truck movements down the road in question. Subsequent modelling was based on these measured noise levels. The proposed road will be of a higher standard than the existing road and therefore tyre and suspension noise will be less.

Due to the high wheel loading of a train, ground borne vibration would be greater than from a truck. There are other considerations with rail traffic such as brake squeak, low frequency engine noise, warning horns and bells from level crossings.

6.4 Noise and Building Guidelines

Sound reduction factors for assessment of noise levels inside houses were as follows:

- Standard 28 dB(A) (STC)
- Special 32 dB(A) (STC)

The above reductions are extracted from Australian Standard 2021-1985. The STC values have been applied directly to the predicted dB(A) levels.

The proponent supports the proposition that '*..the Amendment specifically designates the area of residences facing Casuarina Drive as "Special Use - Residential R15" and include the zone in Appendix IV First Schedule: Special Uses, with the building guidelines set down as Development Conditions in that Schedule.*'

7. PUBLIC SAFETY AND THE TRANSPORT OF DANGEROUS AND HAZARDOUS GOODS

Hazardous and Dangerous Goods:

The issue of risk associated with the transport of dangerous goods by rail as against road is complex due to differing routes, methods for handling the hazardous materials, sizes of load, etc.. The statement that '*rail transport of hazardous goods would involve even less risk than that calculated for road transport'* is difficult to substantiate without more detailed study. In fact the definitive report of the health and Safety Commission in the UK (HSC) on the issue of transport of Hazardous Materials (Major Hazards Aspects for the Transport of Dangerous Substances) concludes: '*What is clear from our assessment (HSC) is that one cannot justifiably say that road is generally safer than rail or visa versa.*'

Further the concept of avoiding avoidable risk involves an element of practicality similar to the 'as low as reasonably practicable' (ARLRP) philosophy required in off-shore safety cases and espoused in the WorkSafe 'Draft National Standard for the Control of Major Hazard Facilities.' The practicality or desirability of transporting the defined hazardous materials by rail is significantly curtailed by the following items:

- The risks due to transport by road have already been assessed to be very small. Even assuming that rail transport does reduce the risk, then the absolute reduction in risk from using rail transport in comparison to road transport is likely to be small.

- In order for rail transport to be cost effective larger individual shipments than can be handled by road are required. This will increase the potential for larger sized events.

- Lack of rail facilities in the Outer Harbour. The Outer Harbour is the preferred location of unloading the hazardous materials detailed in the Environmental Documentation (due to separation distance, operational requirements of the port, existing storage tanks, etc.). Therefore, in order to move this material by rail either a new rail spur to the outer harbour would have to be built at considerable cost (due to land loss to the development, infrastructure cost, operational costs) or the material would have to be transported from the port area by road travelling past the Bunbury Harbour City Development to the existing rail spur and then load it onto rail. The only practical route for a rail spur to the outer harbour would be along the beach front area where tourist facilities and residential facilities (ie proposed hotel) would be exposed to the risk associated with the rail transport.

- In the Bunbury Harbour City development the separation of the residential facilities from the roadway (approximately 30m from the road from the Outer

Harbour) and dual carriageway for the majority of the route means that potential for collision and the risk to the public are reduced. It should be noted the effect of the dual carriageway in reducing the potential for accidents has (conservatively) not been factored into the risk calculation.

- Rail services are not available to all likely destinations for the Hazardous Materials (eg Baldivis Explosives Reserve). This will mean that the hazardous materials will have to be off-loaded from rail into road transport with all the associated risk during unloading and loading for final delivery.

- The route used by rail transport to the final destination may be significantly longer than by direct road transport potentially increasing the risk profile of the rail transport.

Based on the above it is concluded that the high cost of transporting the small amounts of hazardous materials proposed to be handled at the Outer Harbour by rail and the relatively small potential for risk reduction makes it extremely likely that a cost benefit analysis would show that the risk reduction gained in requiring transport by rail (if any) would not justify the expenditure required.

Therefore, as the use of road transport to handle the relatively small amounts of dangerous goods from the outer harbour has been shown to have an acceptably small risk profile (even once the Bunbury Harbour City is completed) and the use of rail transport is likely to prove to be unwarranted, the proposed road transport option should be considered appropriate.

Public Safety:

Westralian Sands state '*Our road cartage contractor has never been involved in a fatality nor near fatality in nearly 20 years of operations involving tens of millions of kilometres travelled. Even Westrail does not have such a record. In fact, based on statistics for this Industry in the South West, rail has a higher safety risk than road cartage.*'

Casuarina Drive has been designed to ensure a superior standard of safety by the inclusion of dual lanes, in each direction limited access to the Casuarina Drive, no direct access from individual lots, and a divided road.

8. ENERGY USE, THE GREENHOUSE EFFECT AND GASEOUS EMISSIONS

It is estimated that the transport sector produces 26% of total carbon dioxide emissions in Australia. It is also estimated that of this contribution, trucks and buses contribute 19%. (Road Facts, Austroads, 1994). Therefore, the total contribution of trucks and buses to carbon dioxide emissions is 5%.

It is estimated that the total amount of freight carried by trucks in 1992 is 95.58 billion tonne - kilometres (Road Facts). The mineral sands industry exports approximately 850,000 tonnes per year. Each truck travels an average 19 km from processing facilities to the port (personal communication, Ian Schache). It is also estimated that this transport represents approximately 50% of the total freight carried by the industry, including mine to processing facilities transport. Therefore, the mineral

sands industry in the region accounts for approximately 0.034% of Australia's total freight carried by road. The contribution that this trucking makes to Australia's carbon dioxide emissions is 0.0018%.

It is estimated that it would not be practical to transfer more than 50% of the mineral sands freight to rail because it is unlikely that rail could substitute for the carrying of freight from the mine to processing facilities. It is also assumed that rail transport contributes half of the carbon dioxide emissions of road transport per freight unit. Based on the above the transfer of freight from road to rail for the journeys from the processing facilities to the port would reduce the carbon dioxide emissions by 0.00045% of Australia's total carbon dioxide emissions.

In addition it should be noted that the unloading of rail cars would be energy inefficient as front end loaders would be used. It is also predicted that the use of pocket road trains will increase the efficiency of road transport.

It is concluded that the use of rail for the transport of mineral sands would have an insignificant impact on Australia's carbon dioxide emissions and the Greenhouse effect.

9. DUST

The requirements for dust prevention will be similar for both road and rail. The mineral sands industry meets the normal standards for dust control on transport vehicles. All mineral sands trucks are covered with tarpaulins for all journeys.

The mineral sands industry has made a clear commitment to install dust collection equipment for the Outer Harbour loading facility. It is expected that this equipment will significantly reduce dust emissions from the loading operations.

10. GROUNDWATER

The proponents will ensure that they have all relevant permits including any required from the Water Authority for the extraction of groundwater.

Registered Office:
Jenkin Road
Capel
Western Australia

Postal Address:
P.O. Box 96
Capel
Western Australia
6271

Telephone STD 097
27 1200 ISD + 61 97

Facsimile
27 2353

Telex
93905

A.C.N. 008 675 018

Westralian Sands Limited

FACSIMILE

Ref SRV2
16 September 1994

ATTENTION:	MR MICHAEL BARRETT
COMPANY:	SWDA
FAX NO:	912 025
FROM:	MR IAN SCHACHE
FAX NO:	(097) 272 353
TOTAL PAGES:	6
SUBJECT:	**MARLSTON HILL AMENDMENT**

Dear Michael

Westrail's John Goodall provided us with a copy of their submission on this subject. I understand he met with Chris Fitzhardinge earlier this week to discuss it.

We have reviewed the Westrail document and provided verbal and written comments to John Goodall. Attached for your information, is a copy of our written comments.

I am unaware as to who would take the ultimate decision on their request to retain a rail easement. Therefore, please feel free to provide copies of our comments to anyone you feel may have a role to play. I have also sent a copy to the EPA.

Yours faithfully

I S SCHACHE
General Manager

fmarlh.op1;nm

WESTRALIAN SANDS LIMITED

COMMENTS ON WESTRAIL'S PROPOSAL -

RETAINED RAIL LINK TO THE BUNBURY OUTER HARBOUR

1. An assertion is made in the Westrail document that all increases in Outer Harbour throughput directly increases truck movements. This is logical and correct, provided there are no other changes made in the type of transport.

   What has been overlooked is that the Outer Harbour users have approval for, and are converting to, a new truck type with larger payloads. There is a forecast to reduce truck movements by 30% over 3-5 years for the same throughput.

   Should an increase in throughput occur, then up to 40% additional tonnage can be achieved with no more truck movements than operate now.

2. The Westrail document relies heavily on a growth in export tonnages forecast in the March 1994 Bunbury Port Authority Strategy document. It has been assumed (incorrectly) by the authors that additional mineral sands tonnages forecast would also be exported through Bunbury's Outer Harbour.

   2.1 The BPA document allows for the development of BHP's Beenup operation. BHP have stated categorically, such material, if and when this project eventuates, would be exported through Bunbury's Inner Harbour.

   2.2 Any growth in Outer Harbour exports depends on the activity of the existing users:-

Company	**Forecast Future Tonnages**
Westralian Sands Limited	Declining - conversion of more ilmenite to value added SR
Cable Sands (WA) Pty Ltd	Increasing although amount depends on domestic sales
RGC Mineral Sands Ltd	Declining as ore reserves depleted
ISK Australia	Shut down - unknown future operations

   In fact, the forecast for Outer Harbour tonnages is to remain static on recent year's performances and possibly to decline slightly in the medium term.

   2.3 Cable Sands (WA) Pty Ltd is the only company likely to increase output. This operation is located barely 3kms from the Outer Harbour and would realistically continue to truck product to the Outer Harbour even if other industry sectors converted to rail.

2.4 Inclusion of silica sand in growth forecasts is also misleading. While some initial exports may be through the Outer Harbour, it is the stated intention of both Gwalia Consolidated and the Port Authority to develop a berth at the Inner Harbour for this trade as it grows.

Therefore, in summary, the argument developed in the Westrail document is totally flawed. When coupled with the introduction of modern trucks, there is a forecast for declining transport movements in the Outer Harbour area from Industry's viewpoint.

3. The Westrail document suggests old rail lines in the Outer Harbour area provide a historical link to product cartage by rail. It could be argued on similar grounds that the wooden jetty in the Outer Harbour area demonstrates a link to the days of sail. Does this suggest we should return to the past in shipping standards?

Rail can only be seriously considered in terms of reliability and viability.

3.1 Cartage cost projections for rail are noted. Clearly, we have to accept the data at face value. It raises an interesting point that if such costs are achievable, then why does Westrail charge more?

3.2 The simplistic analysis in the Westrail document merely indicates an unloading facility could be built near the Outer Harbour storage facilities.

There are glaring omissions in this analysis. Examples are listed.

* Mineral Sands is a multi-commodity industry. There are four separate products shipped by Westralian Sands - synthetic rutile, ilmenite, zircon and leucoxene. Product quality is paramount and cross contamination must be avoided. To achieve this, we and the other companies:-

  . dedicate specific trucks to products to avoid cross contamination

  . dedicate specific unloading hoppers, conveying systems and storage to specific products to again, avoid cross contamination.

  A single rail unloading station for the industry or even one per company, would not be acceptable. The costs and special requirements would be prohibitive.

* No consideration is given to additional storage required at site to store product to make up a full train load.

* No consideration is given to rail activity adjacent to a Marina (shunting, etc.).

* No consideration is given to the fact some product storage is available in Bunbury - no where near rail facilities.

* No consideration given to small tonnage lots loaded onto ships (e.g. zircon/leucoxene).

Even if Westrail could ever achieve a fully competitive haulage rate, the final cost in additional capital, interference in ship loading schedules and additional manpower required to check and verify activities in our view, clearly make this a non-viable alternative.

3.3 Each company within this industry usually has a contract with a single trucking firm. The total work scope includes concentrate cartage from mines to plants; waste return to mine; products purchased ex other companies within the Industry and cartage of export products to the port.

This latter item represents perhaps 40% of all tonnage transported by this company within the region. If part or all of this tonnage was switched to rail, the road transport costs for the remainder of the business would increase due to a reduced base to distribute overheads; lower ability to utilise trucks in the fleet, etc.

Westrail have been advised previously but seem unwilling to accept, that fragmentation in transport methodology must lead to increased transport cost (even if that component taken to rail was as low or lower than existing road transport costs).

It is unreasonable and inappropriate to merely look at one transport sector within the Industry without taking into account impacts any change may have, in other sectors.

4. The Westrail document notes that when there is ship loading from external storage, truck numbers can increase by as many as 40 trucks per hour. This is correct.

However, this is for a relatively low tonnage of product shipped (less than 5% for Westralian Sands) and applies largely to material shipped by Cable Sands from their North Shore facility in Bunbury.

There are clear implications which originate from this fact which include:-

* a rail connection would at best serve perhaps 70% of tonnage shipped

* trucking would still be required by Cable Sands and to a lesser extent, other companies and hence rail does not offer a solution to some intensive trucking activities

* the road link to the Outer Harbour would still be required and there would be a potential land-use conflict between planned developments and trucking unless the proposal noise abatement proposals are implemented, regardless of whether rail was used

* considerable space would be lost for the dual requirement for a road and rail corridor to the Outer Harbour

* it is seriously doubted whether Westrail could provide adequate cartage capacity to provide peak loadings required by an industry (not merely a single customer) when as much as 5-10% of annual exports have been loaded onto ships within days per shipping schedules.

The nature of the Mineral Sands Industry is vastly different to say the alumina industry, where there is the opportunity to schedule regular unit train operations to dedicated products.

5. The Westrail document claims to have a socially more acceptable form of transport. This needs to be re-considered in view of the above observations where rail cannot ever hope to displace road transport entirely.

5.1 In particular though, we take exception to the image created in terms of public safety.

The Westrail case is no doubt correct when taken on aggregate State statistics. They are invalid when the local Mineral Sands Industry is considered.

Our road cartage contractor has never been involved in a fatality nor near fatality in nearly 20 years of operations involving ten of millions of kilometres travelled. Even Westrail does not have such a record. In fact, based on statistics for this Industry in the South West, rail has a higher safety risk than road cartage.

This question of safety has once before been taken up with Westrail through the Minister for Transport. It is therefore, in our view, totally misleading to ignore this in relation to this Industry in this Westrail report.

5.2 Shipping is not controlled by the exporters. Loading can occur at any time of the day or night and on any week day. There is the potential to have a dual noise issue from rail and road.

5.3 The Westrail document indicates a rail link could be established with a single level crossing with the easement located alongside a less significant Casuarina Drive development. This would effectively cut off the planned residential precinct from Koombana Bay more effectively than any road way.

For safety, there would have to be numerous specifically designated pedestrian/bicycle pathway crossings which will inhibit free access from this residential area.

CONCLUSIONS

1. The Westrail submission to retain a rail link to the Outer Harbour is based on flawed and incorrect assumptions and data.

2. Exports through Bunbury's Outer Harbour are likely to remain relatively static and over a 10-15 year time span, most likely decline. This is totally contrary to the scenario Westrail proposes.

3. The document provides only a shallow analysis on the question of cost viability. Issues raised in this review have been made known to Westrail in the past.

4. Rail is almost never likely to replace road transport on the basis of cost effectiveness. It is too inflexible and not suited to short haul operations.

5. Under the most optimistic scenario, rail may take perhaps 60-70% of the tonnage through Bunbury's Outer Harbour away from road transport. Road access past the Marlston Hill re-development would still be required.

6. The social benefits of rail promoted in the Westrail document must be questioned on the basis a mixed carting of product by rail and road would be required. In particular, the public safety issue as presented for this Industry is simply incorrect and inappropriate.

7. We are not qualified to judge the merits of Westrail's case in the planning context. We believe though that there is no basis to meet the request to retain an easement to the Outer Harbour as a 'customer service basis either now or in the medium-long term.

8. It is most disappointing to see such a document produced after 1-2 years work completed on future planning for Bunbury's Outer Harbour area in which Westrail was a participant and agreed to the provisions included in the Marlston Hill Structure Plan.