ERM

Public Environmental Review
For Western Australian Sports Centre Trust
June 1999

KWINANA INTERNATIONAL MOTORPLEX

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Public Environmental Review

Final Report

For:
Western Australian Sports Centre Trust

June 1999
299033

ERM Mitchell McCotter Pty Ltd. A.C.N. 002 773 248. A member of the Environmental Resources Management Group.

Report No. 299033 FINAL REPORT

This report was prepared in accordance with the scope of services set out in the contract between ERM Mitchell McCotter Pty Ltd (ERMMM) and the Client. To the best of our knowledge, the proposal presented herein accurately reflects the Client's intentions when the report was printed. However, the application of conditions of approval or impacts of unanticipated future events could modify the outcomes described in this document. In preparing the report, ERMMM used data, surveys, analyses, designs, plans and other information provided by the individuals and organisations referenced herein. While checks were undertaken to ensure that such materials were the correct and current versions of the materials provided, except as otherwise stated, ERMMM did not independently verify the accuracy or completeness of these information sources.

Approved by:	*Keryn James*
Position:	Project Director
Signed:	
Date:	*25 June 1999*

Prepared by:	*Emma Calvert*
Position:	Project Manager
Signed:	
Date:	*25 June 1999*

ERM Mitchell McCotter Quality System

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HAVE YOUR SAY

INVITATION TO MAKE A SUBMISSION

The Environmental Protection Authority (EPA) invites people to make a submission on this proposal.

This Public Environmental Review (PER), prepared in accordance with the *Environmental Protection Act, 1986,* describes the proposal to construct and operate a Motorplex facility in Kwinana and its likely affects on the environment. The proponent for this project is the Western Australian Sports Centre Trust.

This document is available for a four week public review period from 28 June, 1999 to 26 July, 1999.

Comments from Government agencies and the public will assist the EPA in preparing an Assessment Report which will make recommendations to Government.

WHY WRITE A SUBMISSION?

A submission is a way to provide information, express your opinion and put forward your suggested course of action which may include any alternative approaches. It is useful if you indicate any suggestions you have to improve the proposal. All submissions received by the EPA will be acknowledged. Submissions will be treated as public documents, unless provided and received in confidence, subject to the requirements of the Freedom of Information Act, and may be quoted in full or in part in the EPA's report.

WHY NOT JOIN A GROUP?

If you prefer not to write your own submission, it may be worthwhile joining with a group or other groups interested in making a submission on similar issues. Joint submissions may help to reduce the workload for an individual or group as well as increase the pool of ideas and information. If you form a small group (up to 10 people) please indicate all the names of the participants. If your group is larger, please indicate how many people your submission represents.

DEVELOPING A SUBMISSION

You may agree, disagree or comment on the general issues discussed in this document or the specific proposal. It helps if you give reasons for your conclusions, supported by relevant data. You may make an important contribution by suggesting ways to make the proposal more environmentally acceptable.

When making your submission:

- clearly state your point of view;
- indicate the source of your information or argument if this is applicable; and
- suggest recommendations, safeguards or alternatives.

POINTS TO KEEP IN MIND

By keeping the following points in mind, you will make it easier for your submission to be analysed:

- Attempt to list points so that the issues raised are clear. A summary of your submission is helpful.
- Refer each point to the appropriate chapter, section or recommendation in this document.
- If you discuss different sections of this document, keep them distinct and separate so there is no confusion as to which section you are considering.
- Attach any factual information you may wish to provide and give details of the source. Make sure your information is accurate.

Remember to include:

- your name;
- address;
- date; and
- whether you want your submission to be treated as confidential.

The closing date for submissions is 26 July, 1999.

Submissions should be addressed to:

Environmental Protection Authority

Westralia Square

141 St Georges Terrace

Perth WA 6000

Attention : Ms Xuan Nguyen

EXECUTIVE SUMMARY

ES.1 INTRODUCTION

The Western Australian Sports Centre Trust proposes to develop an International Motorplex facility at Kwinana. This facility will provide a new venue for the activities which currently occur at the Ravenswood International Raceway and Claremont Speedway. The new facility will include a speedway track and dragstrip and associated spectator and competitor facilities.

The site for the Motorplex is located in Kwinana between Thomas Road, Rockingham Road, Anketell Road and Abercrombie Road. The study area is approximately 70 hectares in size.

The construction and operation of the Motorplex facility will have a number of environmental and social impacts. In order to adequately address these issues and to obtain approval for the construction of the facility, preparation of an environmental review document is required. The Department of Environmental Protection (DEP) has set a level of assessment for this project at Public Environmental Review (PER).

The environmental factors identified by the DEP requiring consideration in this PER include:

- vegetation communities;
- declared rare and priority listed flora;
- specially protected (Threatened) Fauna;
- dust;
- odour;
- groundwater and surface water quality;
- solid and liquid wastes;
- noise;
- light spill;
- individual risk;

- road traffic;
- social surroundings; and
- visual amenity.

This PER provides a description of the existing environment, an outline of the potential environmental impacts and management measures and a list of the proponent's management commitments.

ES.2 THE PROPOSAL

The Motorplex facility will include a speedway track, dragstrip, pits, grandstand, catering facilities, administration buildings, car parking and public amenities. At a later date there is the potential for other activities to occur on the site including the Coastal Motocross circuit and the Cockburn International Raceway These activities would be subject to separate environmental assessment.

There are two distinct phases of the project; construction and operation. The construction of the facility is expected to commence in September, 1999 and is required to be completed by September, 2000. The facility is to commence operation in October 2000.

The facility is intended to be the home of drag and speedway racing for the foreseeable future. The racing season generally runs from October to April each year however some small street car events will continue to be held throughout winter. Full details of the number of events and the times these will be held are included in the PER.

ES.3 SITE SELECTION AND JUSTIFICATION

The State Government has been investigating sites for an international Motorplex facility since 1994. An International Motorplex Facility Implementation Committee (IMFIC) was established by Cabinet in 1994 to report on and recommend sites for use by the Ravenswood International Raceway and Claremont Speedway.

Eight sites, including the Alcoa site, have been considered for the International Motorplex since 1994. These include:

- Kewdale Freight Terminal;
- Gnangara Road - Callacabardie;
- Wanneroo - Barbagello Raceway;

- Henderson - Beeliar Regional Park;
- Forrestfield Marshalling Yards;
- Alcoa residue areas A, B and C;
- Rockingham Marshalling Yards; and
- Jandakot Botanic Park.

A comparison of the options was undertaken, with each option considered on the basis of transport, environment, planning, financial and operational criteria. Some of the options were excluded on the basis that they were required for other land uses in the long term and therefore could not be considered further. The Alcoa site was determined as the preferred option amongst the remaining, viable sites. This PER therefore addresses the potential impacts of construction and operation of the facility at the Alcoa site.

ES.4 EXISTING ENVIRONMENT

The topography of the study area is relatively flat, ranging in height from a maximum of 35 mAHD to a minimum of 12 mAHD. The site, on the whole, is not visible from the local road network and nearby residential areas of Medina and Hope Valley. The Kwinana Industrial Area occurs to the west of the study area and Alcoa's residue storage areas (RSAs) extends to the east. The site is bordered on three sides by major roads, isolating it from adjoining landscapes.

The study area is located predominantly within the Aloca residue storage area, which has largely been cleared of native vegetation. Remnant vegetation does however occur along the western boundary of the study area, adjacent to Rockingham Road. The south-western section of the study area falls within an area identified as containing regionally significant vegetation under the Draft Perth Bushplan, Site number 349.

No priority listed or declared rare flora species have been recorded on site, however two species may occur. No threatened fauna have been recorded from the study area.

The groundwater of the study area is highly alkaline and has been contaminated by Alcoa's operations and two landfill areas which occur upgradient of the study area. Alcoa are currently operating recovery bores to control the groundwater contamination plume and to collect the caustic for re-use in their refinery.

The study area does not contain any sites of Aboriginal or European heritage. However, it does fall within an area covered by two native title claims. This is currently being investigated by the Department of Land Administration (DOLA) and a heritage assessment will be undertaken.

ES.5 REVIEW OF ENVIRONMENTAL FACTORS

Although the proposed development has the potential to impact on the environment, the majority of impacts will be localised and can be effectively managed by implementing appropriate mitigation measures. The major exemption is noise where the predicted impacts are expected to exceed the Environmental Protection (Noise) Regulations. This is discussed in detail in the PER.

i. Vegetation Communities

Approximately 17 hectares of vegetation will be removed from the study area and a small part of proposed Bushplan Site 349 will be affected. This impact is not considered to be significant, and the following management measures will be implemented:

- retaining vegetation where possible;
- clearly marking the study area boundary to reduce disturbance of adjacent areas;
- reuse of mulched vegetation on site for natural seed generation;
- landscaping using native species; and
- continued liaison with the Ministry for Planning regarding the Bushplan site.

ii. Declared Rare and Priority Listed Flora

Habitat for two threatened flora species may be removed from the study area. However, as it is unknown whether such species occur, a reconnaissance survey during spring, targeting threatened flora is recommended.

iii. Specially Protected (Threatened) Fauna

No specially protected fauna were recorded in the study area. Vegetation clearing for the Motorplex facility will result in the localised loss of fauna habitat, however this is not expected to have a significant impact on the fauna species that may

inhabit the study area. Potential impacts will be minimised by confining disturbance to the construction area and landscaping using predominantly native flora species.

iv. Dust

Dust may be generated from:

- car parking activities;
- speedway race activities;
- dust plumes resulting from cars running onto the verge area; and
- wind erosion from disturbed land.

These impacts are not expected to be significant and will be minimised by implementing the following management measures:

- reducing exposed areas;
- use of paving or grass in all car parking areas;
- watering exposed areas for dust suppression; and
- ensuring that sand and clay used for construction and the speedway track have a large particle size.

v. Odour

Odour sources from the Motorplex facility may include:

- refuelling activities;
- products of combustion; and
- burning rubber from tyres.

The quantity and frequency of products of combustion are not expected to cause any undue odour annoyance therefore no odour management measures are required. Sensible housekeeping practices for refuelling activities and storage of fuels will however, be implemented

vi. Groundwater and Surface Water

The Motorplex will not impact on groundwater in the area. Shallow groundwater extracted for water reticulation for use on the Motorplex facility will be subject to approval from the Water & Rivers Commission. The current management of existing groundwater contamination will be continued. A contingency plan will be developed to respond to release of potential environmental contaminants.

Drainage from the natural or paved surface areas within the complex will be discharged into infiltration basins located outside the RSAs. Drainage from unpaved surfaces within the RSAs will be discharged into infiltration basins located within the RSAs. This will minimise any potential impacts of contaminated surface water penetrating into the groundwater.

vii. Solid and Liquid Waste

Waste materials generated on the site may include:

- oil and vehicle parts;
- wash-down waste;
- sewerage; and
- general rubbish.

To prevent any impacts from solid and liquid waste, the use, storage or generation of hazardous materials will be avoided or appropriately managed. Any liquid wastes on site will be collected in suitable sealed containers and recycled by a licensed contractor. Storage facilities will be provided to segregate other recyclable wastes. Putrescible wastes will be stored in sealed bins and collected weekly by a licensed contractor.

viii. Noise

The racing of drag and speedway vehicles will result in noise impacts. Noise levels have been mitigated as far as is practicable through the design of the Motorplex. This includes:

- constructing noise barriers around the site; and
- lowering ground levels of the tracks to below that of the surrounding area.

The predicted noise impacts for the Kwinana Motorplex will exceed the *Environmental Protection (Noise) Regulations 1997.* The proponent is seeking an exemption to the Regulations to allow the operation of the facility. This will require the preparation of a detailed Noise Management Plan which will include specification of hours of operations, restrictions on the number of major events as well as requirements for ongoing monitoring and implementation of a complaints handling procedure.

ix. Light Spill

Potential impacts of lighting may include light spill, impacts on residents and glare for drivers.

Lighting within the Motorplex facility has been developed such that there will be no light spill or glare impacts on residents or drivers. In addition, most lights along Rockingham Road will face east or east-south-east to minimise impacts on drivers. The lighting has also been designed to have no light spill impacts on nearby residents.

x. Individual Risk

The study area lies predominantly outside the 1994 one in a million risk contour and is unlikely to cross the five in a million risk contour. The 2020 one in a million risk contour passes through the study area and it is likely that the five in a million for 2020 also passes through the site. Management measures will include:

- liaison with local hazardous industries to ensure potential hazardous events were known and understood, and all measures were being taken to control the risk;
- developing a comprehensive Emergency Response Plan (ERP), including early warning from any site where an incident occurs;
- including safety features such a PA system into all areas of the complex and an FM radio broadcast system to allow communication with patrons while they are within their vehicles; and
- continuing the process of requiring a risk assessment for all new hazardous industries in the Kwinana area.

xi. Road Traffic

Spectators travelling to and from the Motorplex facility have the potential to increase congestion on the regional road system. Spectators exiting the facility following an event may create impacts on the internal road system. Management measures to

minimise these impacts are being developed by Connell Wagner. Strategies being considered include:

- modifying the number of lanes for exiting vehicles;
- creating an independent access route for emergency vehicles off Rockingham Road; and
- using appropriate intersection control methods to manage peak traffic flow.

xii. Visual Amenity

The potential impacts of the facility on visual amenity will be minimal. The facility will not be seen from the closest residential areas of Medina and Hope Valley. The development will largely be obscured from view by the natural topography and the modified topography proposed. Landscaping along the modified topography will further reduce potential impacts.

ES.6 LIST OF COMMITMENTS

Environmental management strategies and procedures have been developed to minimise environmental impacts and a number of formal commitments have been made by the proponent. These commitments are listed below.

1. The proponent will prepare and implement an Environmental Management System prior to the commissioning of the Motorplex.
2. The proponent will develop and implement a rehabilitation and landscape plan.
3. The proponent will conduct a flora survey targeting threatened flora species.
4. The proponent will ensure the study boundary is clearly marked prior to construction to minimise disturbance to adjacent vegetated areas.
5. The proponent will implement dust control measures during the construction of the facility in the event that strong winds and dry conditions make dust generation likely.
6. The proponent will undertake an Aboriginal heritage survey of the study area prior to commencing construction.
7. The proponent will develop a drainage strategy to ensure that the development does not interfere with ongoing groundwater contamination management within the RSAs.

8. The proponent will provide facilities to assist in recycling waste products.

9. The proponent will develop a contingency plan for accidental spills of hazardous chemicals.

10. A comprehensive Emergency Response Plan will be developed for the facility.

11. The proponent will develop a noise management plan to address the noise emission impacts.

12. The proponent will continue discussions with the DEP with regards to obtaining a ministerial exemption for noise emissions.

13. The proponent will establish a complaints handling procedure.

Chapter 1

INTRODUCTION

This chapter describes the background to the project and the planning and approvals framework for the Public Environmental Review (PER).

1.1 BACKGROUND TO PROPOSAL

An International Motorplex Facility Implementation Committee (IMFIC) was established by the State Government in 1994. This Committee was set up to identify and investigate sites for initially, Ravenswood International Raceway and then also Claremont Speedway. The Committee investigated eight sites and determined that the disused Alcoa residue storage area in Kwinana was the preferred site. A Project Control Group (PCG) was established in 1998 to co-ordinate the preparation of the detailed design and documentation required for the planning and environmental approvals process. Details of the IMFIC and PCG are provided at *Appendix A*.

1.2 OVERVIEW OF THE PROPOSAL

The proposal to construct an International Motorplex at Kwinana will provide a new venue for activities which currently occur at the Ravenswood International Speedway and the Claremont Speedway and associated community-based activities. The new facility will include a speedway track and dragstrip and associated facilities such as pits, grandstands, catering areas, carparking and public amenities. The facility will be managed by the Western Australian (WA) Sports Centre Trust; Ravenswood International Raceway and Claremont Speedway will be given a license to operate on the site.

The proposed site for the Motorplex is located in Kwinana between Thomas Road to the south, Rockingham Road to the west, Anketell Road to the north and Abercrombie Road to the east. *Figure 1.1* shows the regional location of the proposed site.

The construction and operation of the Motorplex facility will have a number of environmental and social impacts. In order to adequately address these issues and to obtain approval for the construction of the facility, preparation of an

Figure 1.1 SITE LOCATION

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environmental review document is required. The level of assessment for this project has been set at PER.

1.3 ENVIRONMENTAL REVIEW PROCESS

A PER is prepared for proposals which are considered to have major public interest or potential for significant environmental impacts (Environmental Protection Authority (EPA), 1993). This PER has been prepared to address the potential environmental and social impacts of the project in accordance with the guidelines issued by the EPA for the project. The study area for the PER is shown on *Figure 1.2.*

Guidelines for the preparation of the International Motorplex PER were issued on 30 April, 1999 and are included as *Appendix B.*

A significant amount of information relevant to the study area developed during previous investigations of the site and adjacent areas is available. The existing information was used as a basis for the preparation of the PER, supplemented with additional field and survey work where required.

The PER is a public document and will be subject to a four week public comment period. During this review period, government agencies, private organisations and the public are invited to make a submission on the proposal and forward it to the EPA. The EPA will then assess the proposal, taking into consideration the following:

- issues raised by the public;
- the Proponent's response to those issues;
- specialist advice from the Government agencies;
- the EPA's own research; and
- research undertaken by other expert agencies, if required.

The EPA will prepare a report outlining the environmental acceptability of the project and if the proposal is approved, the environmental conditions, if any, should be applied. This report is submitted to the Minister for the Environment. The report is also made available to the public. Appeals against the content of the report and its recommendations can be submitted to the Minister for Environment during a two week appeals period.

The final decision on whether a project may proceed will then be made by the Minister for the Environment.

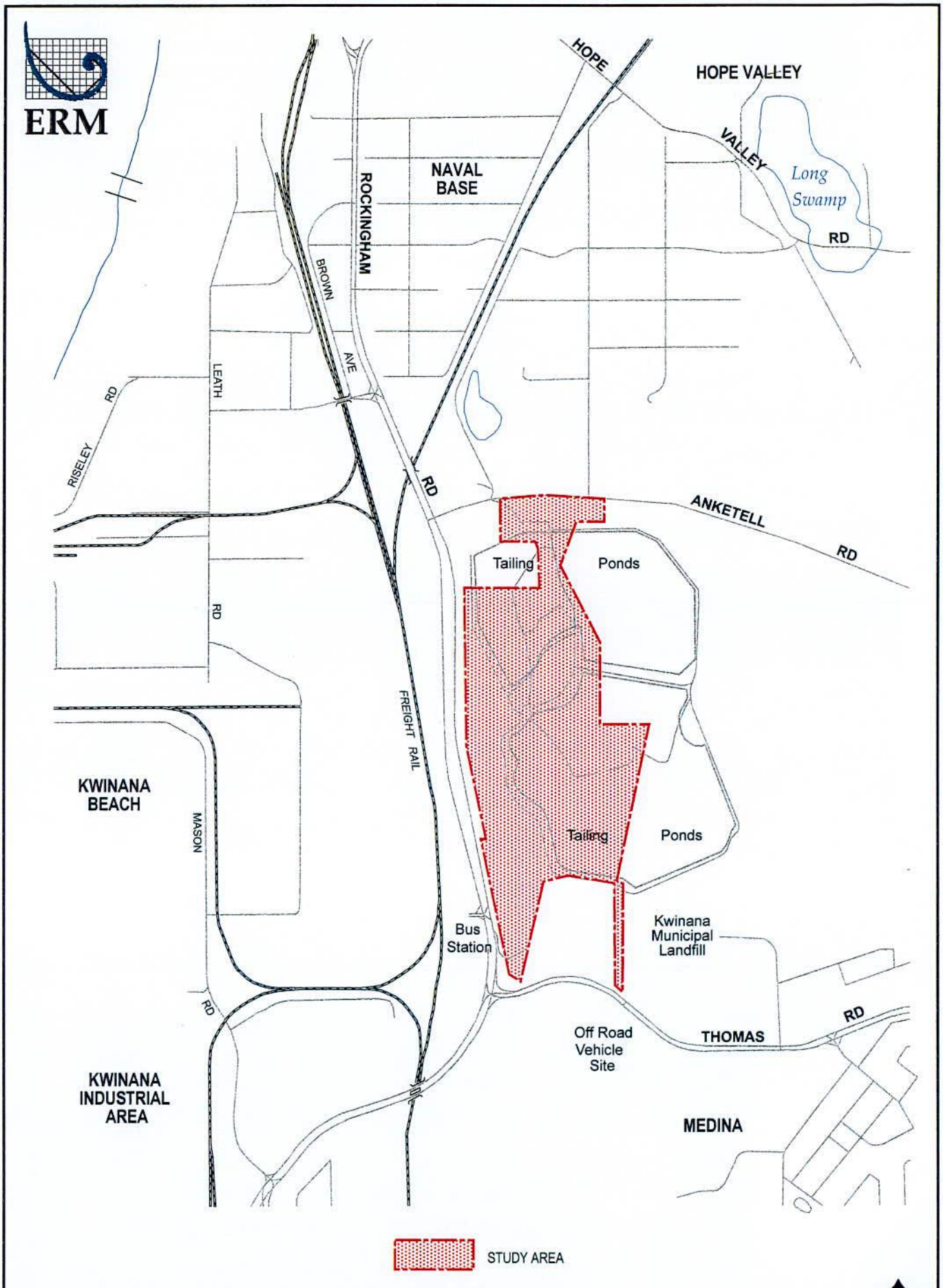

Figure 1.2 STUDY AREA

299033/Plan-24.fh7

1.4 RELEVANT LEGISLATION

In addition to obtaining approval from the Minister for the Environment, the Proponent will need to comply with relevant State legislation including:

- Environment Protection Act, 1986;
- Wildlife Conservation Act, 1950;
- Conservation and Land Management Act;
- Bushfires Act, 1954;
- Soils and Land Conservation Act, 1945;
- Native Title Act, 1993;
- Aboriginal Heritage Act, 1972-1984;
- Health Act, 1911;
- Occupational Health and Safety Act, 1984;
- Public Works Act, 1902;
- Town Planning and Development Act, 1928;
- Local Government Act, 1960;
- Main Roads Act, 1930;
- Metropolitan Region Town Planning Scheme Act, 1959; and
- WA Planning Commission Act, 1985.

1.5 KEY AGENCIES

A number of key agencies have been involved in the development of the proposal and have provided input into the environmental assessment and management of the proposal. These agencies include:

- WA Sports Centre Trust;
- Department of Environmental Protection (DEP);

- Ministry of Sports and Recreation;
- Department of Conservation and Land Management (CALM);
- Ministry For Planning (MfP);
- Water & Rivers Commission (WRC);
- Town of Kwinana;
- Aboriginal Affairs Department (AAD);
- WA Heritage Commission; and
- Department of Land Administration (DOLA).

1.6 PURPOSE AND STRUCTURE OF REPORT

This document has been prepared in accordance with the EPA guidelines issued for the project on 30 April, 1999 and in compliance with the requirements of the Western Australian *Environmental Protection Act, 1986*.

The objectives of the environmental review are to:

- describe the location of the proposed development in a regional and local context;
- describe all components of the proposal;
- describe the key characteristics of the receiving environment;
- describe the potential environmental impacts and acceptable management measures;
- outline the public consultation undertaken in relation to the project; and
- list the environmental commitments.

This environmental review document incorporates the results of the environmental impact study. It also provides a description of the proposed development, the existing environment, the potential impacts the development may have on the existing environment and provides recommendations for management and the proponents commitments.

The PER is presented in seven chapters as outlined below:

- Chapter 1 provides background to the project and describes the planning framework in which the PER has been prepared.
- Chapter 2 describes the proposal, its key characteristics, timing and staging.
- Chapter 3 provides background on the justification of the project and a description of all the alternative locations considered.
- Chapter 4 describes the existing environment including hydrology, geology, soils, fauna, flora, European and Aboriginal heritage and regional climate.
- Chapter 5 identifies the potential impacts and proposed management measures for each of the environmental factors included in the EPA guidelines for the proposal and the predicted outcome.
- Chapter 6 outlines the public consultation process undertaken for the project.
- Chapter 7 lists the environmental management commitments.

Chapter 2

THE PROPOSAL

This chapter describes the location of the proposal and its key characteristics including layout, hours of operation, timing and staging.

2.1 LOCATION

The International Motorplex is proposed to be located at the site of the disused Alcoa Residue Storage Areas (RSAs) (A, B & C). The site is bounded by Anketell Road to the north, Rockingham Road to the west, the Metropolitan Region Scheme (MRS) Parks and Recreation Reserve to the south and Abercrombie Road to the east. The study area is approximately 70 hectares in size however, only the western most portion of the site will be used for the motor sports activities.

The land uses around the proposed site include the Kwinana heavy industrial estate, the residential community at Hope Valley, the Town of Kwinana rubbish tip site located just north of Thomas Road and quarrying and residue disposal uses to the east. The townsite of Kwinana is located south-east of the proposed site with the closest residential suburb being Medina. These uses are shown on *Figure 2.1.* The proposed site has excellent access to the regional road network. The major access road will be onto Anketell Road, providing direct access to the Kwinana Freeway and Rockingham Road.

2.2 DESCRIPTION

2.2.1 *Proposal Details*

The International Motorplex Facility will provide for the events which are currently held at Ravenswood International Raceway and Claremont Speedway. This will include a number of activities:

- championship / street car drag races;
- championship speedway events;
- local speedway events; and
- community-based activities such as Driver Training.

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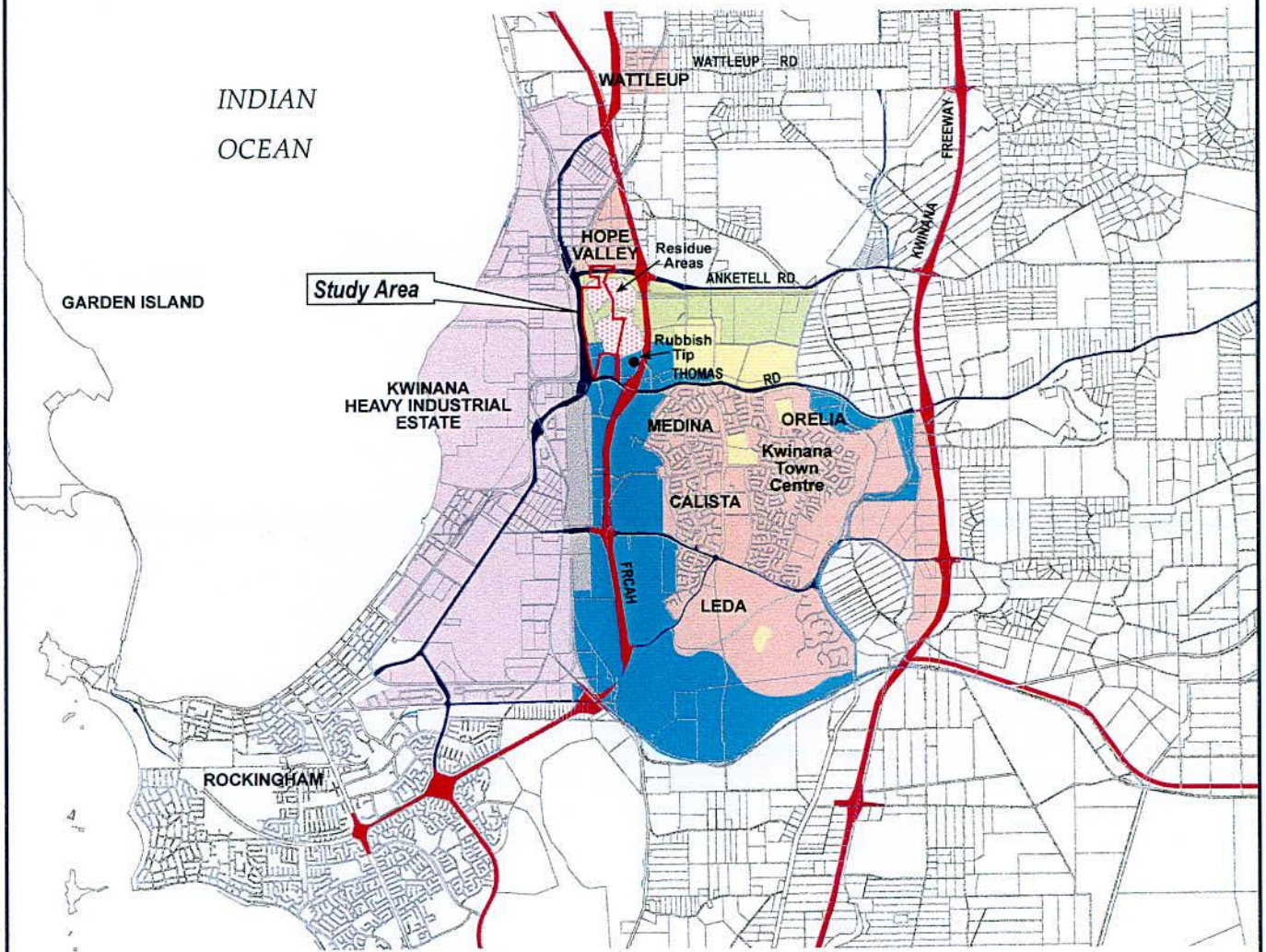


- Urban
- Industrial and Special Industrial
- Rural
- Regional Open Space (Existing and Proposed)
- Public Purposes
- Residue Storage Area
- Railways and Port Installations
- Controlled Access Highways
- Important Regional Roads

0 2 km

N

299033/Land Use.fh7

Figure 2.1 LAND USE CONTEXT

The raceway and the speedway will be located adjacent to each other and will share common facilities, as shown on *Figure 2.2*. These common facilities include:

- grandstand with corporate suites;
- pit and car assembly areas;
- car parking;
- vehicle access;
- patron facilities such as showers and toilets, food and drink stalls and merchandising outlets; and
- other facilities such as store rooms, medical centre and a first aid room.

Full details of the proposal components are included in *Appendix C*.

Figure 2.3 shows the proposed site plan overlaid onto the aerial photograph illustrating the extent of the proposed development.

2.2.2 *Hours of Operation*

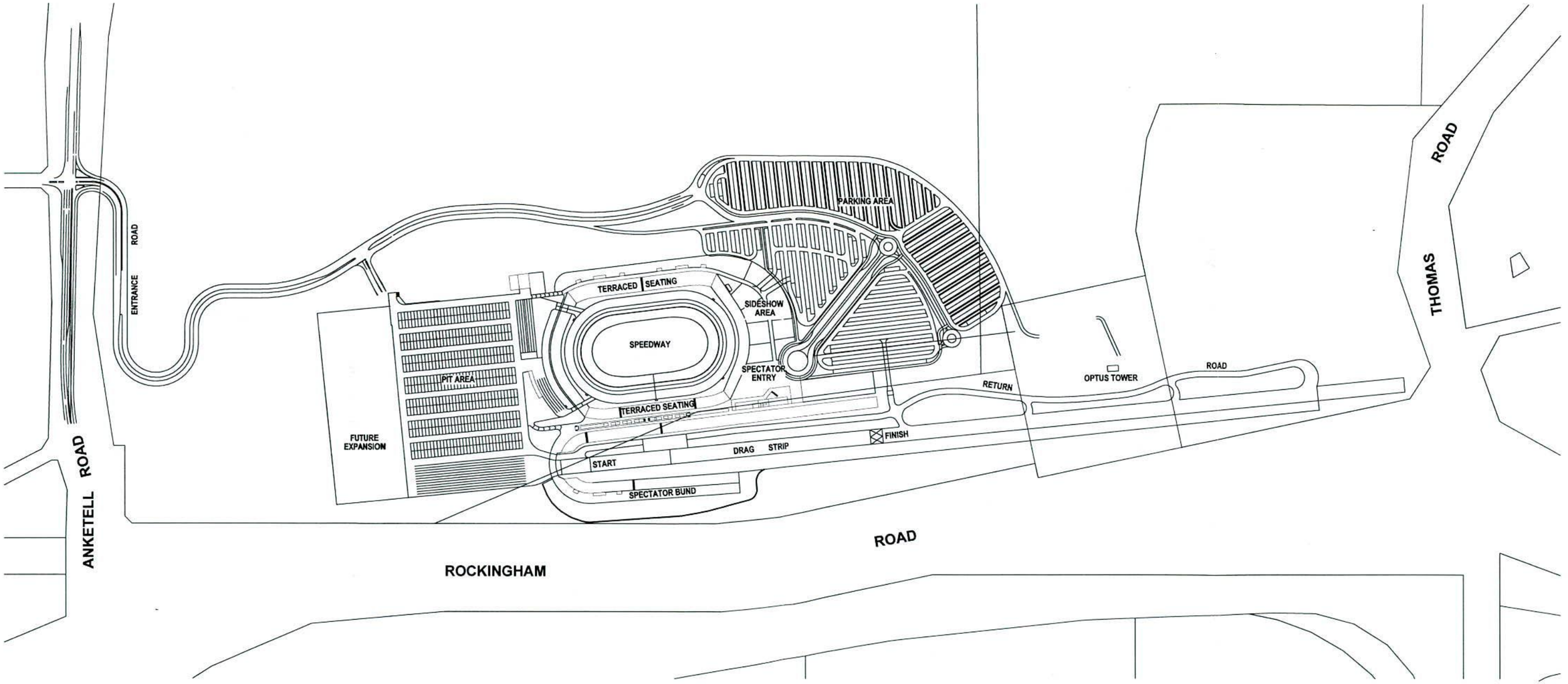
The race events undertaken at the Motorplex facility will vary greatly as shown in *Table 2.1*. There will be approximately 10 major Saturday drag racing events and 25 major Friday speedway events held between October and April. Smaller events will be held on some Wednesday's and Friday's. A high proportion of these events will involve the use of normal muffled street cars and therefore noise levels during these events will be much lower. This issue is discussed in detail in Chapter 5.

Some practice or media activities, which usually involve a small number of vehicles, may be held before the events. These practice events are normally required for safety reasons.

The majority of events for both drag racing and speedway are local events and involve participant and spectator crowds of between 1,000 and 6,000 people. It is only the championship events with feature races which will attract large crowds of between 10,000 and 15,000 people and there are, on average, four of these feature championship events in a season.

Table 2.1 demonstrates the type of events, the month, day and time these events are scheduled to occur and the likely spectator attendances for each event.

Although *Table 2.1* indicates that drag racing events run for ten and a half hours, the majority of spectators attend for the evening events which run for around five hours.



Source: van der MEER & associates, May 1999

0 100 m

Figure 2.2 MOTORPLEX FACILITY

Figure 2.3 PROPOSED SITE PLAN

Source: van der MEER & associates, Aerial Photo December, 1999

It is during the evening when the major events are run. Qualifying, practice and safety runs are undertaken during the afternoon.

Both Ravenswood International Raceway and Claremont Speedway have a number of administrative and operational staff who are employed on a full time basis. These staff will be based at offices located at the site during normal working hours, Monday to Friday. In addition, driver training courses for members of the community will be held at the site during all months of the year, days and evenings. This driver training involves the use of normal licensed road vehicles.

2.2.3 *Provision for Additional Facilities*

The Government has indicated a preference for the proposed Motorplex site to have the potential to accommodate other recreational uses, compatible with the raceway and speedway activities.

At a later date, it is possible that the Coastal Park motocross circuit and the Cockburn International Raceway, currently located in Henderson, could be relocated adjacent to the Motorplex. Details for this possible relocation are not known and would need to be considered further. Additional use proposals would be subject to a separate approvals process and are not dealt with further in this PER.

Other events such as musical concerts or festivals could take place within the facility. If noise impacts from these events are expected to be outside the scope of the noise regulations, then appropriate approval from the DEP for these events will need to be obtained by the concert convenor.

Table 2.1 MOTORPLEX EVENT DETAILS

Event/Activity	No. of Events/ Season	Month	Day of Event	Time and Duration	Attendance Levels Expected
Drag Racing					
Championship Event with a Feature Race	2	between October - April	Saturday	12.00-10.30pm	10,000-15,000
National Event with a Feature Race	4	between October - April	Saturday	12.00-10.30pm	6,000-8,000
National Open Event (without Feature Race)	4	between October - April	Saturday	12.00-10.30pm	3,000-6,000
Street Car Event (large)	10	between October - April*	Saturday Sunday	5.00-10.00pm 10.00-4.00pm	1,000-2,000
Street Car Event (small) (cars are muffled)	30	between October - April*	Wednesday	5.00-9.00pm	400-600
Drag Racing Practice for Safety Testing (prior to main events and involves a small number of vehicles)	8	between October - April	Wednesday / Thursday	5.00-8.00pm	100
Speedway					
Championship Event with Feature Race	2	between October - April	Friday	5.30-10.30pm	10,000-15,000
Championship Event (without Feature Race)	4	between October - April	Friday	5.30-10.30pm	6,000-8,000
Local Event	15	between October - April	Friday	5.30-10.30pm	3,000-6,000
Small Event	5	between October - April	Friday	5.30-10.30pm	1,000-3,000
Winter Speedway Event (Sportsman - amateurs)	7	April - October	Sunday	11.00-4.00pm	500-1,000
Practice Events	25	between October - April	Wednesday / Thursday	12.00-3.00pm	100
Other Activities					
Community-based Driver Training (involves muffled cars)	100	January-December	Monday-Sunday	8.00-10.00pm	20

* Some street car events may also be held from April to October

2.3 KEY CHARACTERISTICS

The proposal is to construct and operate an integrated Motorplex facility which has the capacity to provide for the activities which currently occur at Ravenswood International Raceway and Claremont Speedway. The key characteristics are outlined in *Table 2.2*.

Table 2.2 KEY CHARACTERISTICS

Element	Description
Life of Project	Construction : Sept 1999-Sept 2000. Operation : primarily October - April from October 2000 on an ongoing basis with minor use April to October.
Location of Proposal	Kwinana
Size of Project Area	Study area = 70 hectares. Grandstand area = 0.8 hectares.
List of Major Components	Drag racing track = 1,127 metres, running north-south parallel to Rockingham Road. Speedway = 2.8 hectares. Amenities and associated facilities. Car parking for 4,500 cars. Hardstand areas for pre and post race checking / maintenance and pit area. Refer *Figure 2.2* and *Appendix C* for details.
Solid & Liquid Waste Disposal	Litter and packaging collected weekly by contractor. Sewer - Reticulated mains. Oil/fuel drums/containers - disposed off site by car owners and recycling contractors.
Fuel Storage	Fuel (methanol, unleaded petrol, super petrol) brought onto site in fuel churns and fuel churns taken off site at end of event. No fuel is stored on site other than a small quantity (less than 1,000L) of diesel for tractors and machinery. This fuel is stored above ground and in accordance with statutory regulations.

2.4 TIMING AND STAGING OF PROJECT

There are two distinct phases of the project; construction and operation. The construction of the facility is expected to commence in September, 1999 and is required to be completed by end September, 2000. The construction will include earthworks, building construction and construction of an access road to the site from Anketell Road. There will also be an emergency access road to Rockingham Road.

The facility is intended to be the home of drag and speedway racing for the foreseeable future and is to be commissioned in October, 2000. The racing season generally runs from October to April each year however some small street car events will continue to be held throughout winter. These events attract small numbers of participants and spectators and involve mostly street cars and therefore will not constitute a significant noise impact.

Chapter 3

JUSTIFICATION AND ALTERNATIVES

This chapter provides the justification for the project, a description of alternative sites and the site selection process.

3.1 JUSTIFICATION AND OBJECTIVES OF THE PROPOSAL

The State Government has been investigating sites for an international motorsport facility since 1994. A committee was established by the Minister for Regional Development in 1994 to report on and recommend sites in the Peel Region for use by the Ravenswood International Raceway. This investigation was unsuccessful, and the Minister for Planning agreed to establish a taskforce to seek a site in the Metropolitan Region. Not long after the establishment of this taskforce, Claremont Speedway was given notice by the Royal Agricultural Society (RAS) that it would have to vacate the Claremont premises within two years. This was then extended for a further two years.

Therefore the demand for a new facility is generated by two primary factors:

- Claremont Speedway has had a lease with the RAS for the past 73 years. This lease now expires in April, 2000 and will not be renewed as the RAS has plans to redevelop the site - there is therefore a need to provide an alternative venue for the Speedway.

- Ravenswood International Raceway has been operating from Ravenswood for 30 years. In 1994 the State Planning Commission (SPC) determined that the operators would need to vacate the site before the whole of the Ravenswood townsite could be developed for residential purposes. It considered that there was a need to find a suitable long term venue for this activity. At that time the Minister for the Environment gave the use noise exemption, subject to conditions and gave the owners five years to find an alternative site.

The need to find venues for both activities means that it is appropriate to identify a site where both uses can be integrated, providing for cost efficiencies and synergies between the sports.

Therefore the objective of the proposal is to provide a suitable venue for Ravenswood International Raceway and Claremont Speedway which will enable these uses to operate over the long term with minimal impacts on adjacent communities.

It is also envisaged that other associated activities and uses could be located at the site. Some consideration has been given to the relocation of the Coastal Park Motocross and Cockburn International Raceway to the site however, the details of these uses have not been determined and therefore have not been assessed as part of this PER.

3.2 DESCRIPTION OF ALTERNATIVES

Eight different sites, including the Alcoa site, have been considered for the International Motorplex since 1994. The alternatives are shown on *Figure 3.1.*

The first four sites considered by the IMFIC included:

- Kewdale Freight Terminal;
- Gnangara Road - Callacabardie;
- Wanneroo - Barbagello Raceway; and
- Henderson - Beeliar Regional Park.

The Kewdale site was excluded from the assessment following a submission from the Department of Transport indicating that the site would be required for a future intermodal transport facility. As a result a new site, Forrestfield Marshalling Yards was considered by the Committee.

Forrestfield was rejected and several sites in the Kwinana area were assessed. These included the Alcoa residue areas A, B and C, Rockingham Marshalling Yards and a site in Jandakot Botanic Park. Of these, the Alcoa site was selected.

All of the sites, and the key issues relevant to each of the sites, are described briefly below.

i. Kewdale Freight Terminal

This site, located at the site of the Kewdale freight terminal, has been considered in some detail in terms of operational requirements and anticipated key impacts. Noise and planning assessments undertaken for the site indicate that it would have been

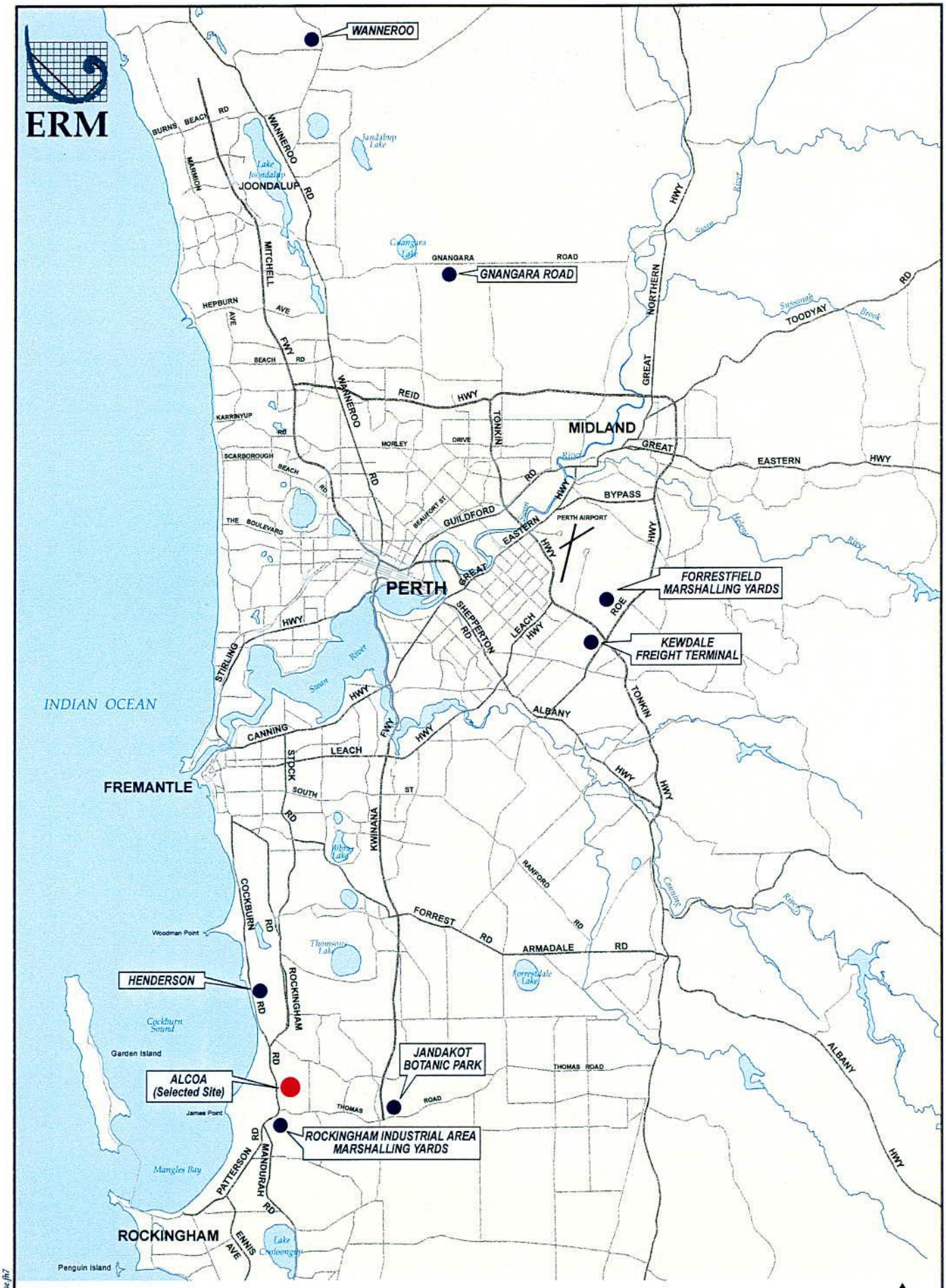


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Figure 3.1 ALTERNATIVE SITES

appropriate, however subsequent investigations undertaken on behalf of the Transport Committee of the Western Australian Planning Commission (WAPC) determined that the site should be retained for railway transport purposes, specifically an intermodal transport facility. On this basis, the site was excluded from any further assessment.

ii. Forrestfield Marshalling Yards

This site is located at the southern end of the Forrestfield marshalling yards abutting the Perth airport eastern boundary. It was selected because of its proximity to Perth Airport and the associated existing high noise levels in the area. Access to the freight terminals was seen as an advantage for the transport of national and international race cars. Road access to the site is reasonable however, public transport facilities in the area are poor.

At the time this option was considered, it was the subject of an MRS amendment to change the reserve from 'Railways' to 'Industrial' and to relocate Dundas Road to the centre of the site. Both of these amendments would result in restrictions to the use of the site for motor sports purposes, including a minimised site area and increased proximity to industrial and residential development. The latter issue was of particular concern and it was considered likely that the facility would have significant noise impacts on surrounding residential areas.

Other issues associated with the site included the cost of purchasing the site from Westrail, which was significant.

iii. Wanneroo - Barbagello Raceway

This site is located on land owned by CALM adjacent to the existing Barbagallo Raceway. In order to develop on this site there would have been a requirement to connect Wattle Road to Wanneroo Road and to upgrade Wanneroo Road to provide appropriate vehicle access. The estimated cost of the required road works was $15 million. Public transport provision for the site was considered to be very poor.

The operators of Claremont Speedway and Ravenswood Raceway had significant concerns about the long term commercial viability of this site. This was related to the low level of accessibility from central Perth (the main market for Speedway racing) and the southern suburbs to Mandurah (the main market for drag racing) and the absence of reasonable population levels to the north of the site.

iv. Jandakot Botanic Park

This site is located on the eastern side of the Kwinana Freeway near Thomas Road. Access to the site for private vehicles and public transport is generally good although improvements to the local road connections between the site and the Kwinana Freeway would be required. There are a number of Environmental Protection Policy (EPP) wetlands and regionally significant bushland which may be affected by the development and this was considered to be a major disadvantage.

The location of the Motorplex at the site may also inhibit urban development along the Kwinana Freeway corridor due to potential noise impacts. The other disadvantage of this site was its remoteness from speedway and raceway patrons and the concerns of the operators that the facility would have questionable viability at this site in the short to medium term.

v. Rockingham Marshalling Yards

This site, located parallel to Rockingham Road, was considered late in the assessment process after it was determined that the Forrestfield Marshalling Yards would not be viable. A preliminary assessment only was undertaken at this site and the key issues were identified as noise impacts, particularly given the proximity of the site to Medina and risk impacts. The potential for impacts on the regional open space adjacent to the site were also considered. From the preliminary assessment, these issues were considered to be worse than at the Alcoa site and therefore the site was not considered further. Other issues associated with the site were related to the availability to public transport facilities.

vi. Henderson - Beeliar Regional Park

The site in Henderson is located on Crown Reserve 39584 and some adjacent vacant Crown land, between Rockingham Road and Cockburn Road. It is zoned Parks and Recreation under the MRS and is within the proposed Beeliar Regional Park which will be consolidated when the Cockburn Road reserve is removed from this area. The Coastal Park Motocross track, Cockburn International Raceway for go-karts and a model aircraft association site are located adjacent to the area.

Development of the Motorplex facility in this location would have involved significant site works which may impact on the proposed Regional Park including Mt Brown and System 6 reserves. Noise impacts on the townsite of Wattleup would have been mitigated by the barrier presented by Mt Brown and would not have been significant.

vii. Gnangara Road - Callacabardie

This site is located on the south side of Gnangara Road, east of Landsdale, near the intersection of Beechboro Road North. The site is located on a Priority One Source Groundwater Protection Area (GWPA) and the WRC has indicated that the risk to the groundwater from the proposed uses would be unacceptable.

viii. Alcoa Residue Storage Areas A, B and C

This site has been described in detail in previous sections. It was considered on the basis that the potential existed to provide a beneficial use of the site, which, due to prior activities, has restricted options for future use. The advantages and disadvantages of this site are discussed in detail in Section 3.4.

3.3 COMPARISON OF OPTIONS

The process of selecting options for the International Motorplex was conducted over a period of time with new options being added during the process to ensure that all site possibilities were investigated. Some of the options have been rejected on the basis of a single "fatal flaw" for example, cost, environmental impacts or requirement for uses for other purposes. Each of the options was considered on the basis of transport, environmental, planning, financial and operational criteria. These included:

- Transport
  - access for cars
  - access for public transport
  - traffic generation and road capacity
  - costs for upgrading access
  - traffic management requirements

- Environmental
  - impacts on remnant vegetation
  - impacts on System 6 areas
  - impacts on heritage listed areas
  - potential impacts on groundwater resources
  - risk assessment
  - potential noise impacts

- Planning
  - relationship with other land uses (compatibility)
  - population around the site
  - distance to nearest residential area
  - land tenure
  - development facilitated by MRS zoning's
  - development facilitated by Town Planning Scheme zoning's
  - local government decisions required for development
  - approval timeframe
  - synergy with other uses in the area

- Financial
  - capital costs
  - infrastructure requirements and costs
  - total capital costs
  - annual returns

- Operational
  - ease of maintenance
  - distance to CBD
  - distance from centroid spectator locations

Based on this assessment it is clear that the Forrestfield and Wanneroo sites emerged as the preferred sites. However, both of these sites have major obstacles to their use for motor sport purposes. The Forrestfield site is required for industrial purposes and the use of the Wanneroo site would have required significant costly roadworks and is opposed by the future operators on the basis of commercial viability.

The Alcoa and Henderson sites were the next two preferred options. The Henderson option has been rejected on the basis that the impacts on the Beeliar Regional Park and associated bushland and System 6 areas were less acceptable than the potential impacts of the Alcoa site. Therefore the Alcoa site is the preferred option. The advantages and disadvantages of this site are discussed further in the following section.

3.4 IMPACTS OF THE ALCOA SITE

3.4.1 Transport and Access

The Alcoa site has excellent access to major road transport routes, in particular Kwinana Freeway. This will assist in ensuring participants and spectators are able to access the site with relative ease. For the majority of events there will be minimal traffic impacts on the local community however, for major events there are likely to be delays on Anketell Road as traffic exists the site. Public transport services to the area are currently limited. However, future infrastructure developments including the proposed rail link and transitway are unlikely to improve the public transport situation.

3.4.2 Economic Impacts

The residue storage areas have limited potential for other future uses. The only alternatives that have been proposed for the site are container storage or other light industrial purposes. The Government believes that the use of the area for regional recreational purposes is positive and will bring economic benefits to the region.

The potential economic benefits of the development have been quantified in a recent report (ERA, 1999). These benefits are summarised below.

i. Impacts on Output and Employment

The combined Motorplex operation is estimated to generate expenditure of $15.34 million annually across the various major activities.

Expenditure of this magnitude (on accommodation, food, fuel, parts, repairs, etc) generates flow on activity in those firms supplying services and goods for racing. Taking account of the flow-on effects associated with this level of expenditure results in an additional $13.61 million of output. The total impact of the operation is estimated to be around $28.95 million annually.

The combined Motorplex operation generates employment equivalent to around 179 persons based on the various major activities. This is estimated to be the full time equivalent employment required to produce the goods and services that go with the $15.34 million in annual expenditure.

Taking account of the flow-on effects associated with the project, this direct impact results in the creation of additional employment of 183 persons. In other words, the total employment impact of the operation is estimated to be around 363 jobs (full

time equivalents). As these are the estimated full time equivalents, the actual jobs may well be greater reflecting the existence of part time employment.

ii. Construction

The construction phase of the Motorplex facility is estimated to cost in excess $16 million. The construction of $16 million generates output flow on effects of around $23.7 million for a total impact of $40 million. The employment is estimated to be 279 with a flow on of 298 and a total of 577.

iii. Local Impacts

The extent to which the economic activity is captured locally in the Kwinana region is difficult to estimate without a full survey. However, two things can be noted.

First, the new facility will be an attraction for the various companies whose businesses depend on racing - manufacturers, etc. Second, the essential decision-makers - competitors - who direct this expenditure are already located primarily south of the river. Based on the competitor database, there is a significant proportion of competitors already located in the southern suburbs. For the Ravenswood competitors, 63% live south of the Swan River. Some 32% live in the South West Corridor and 11% live in the Kwinana-Rockingham area For the Claremont Speedway competitors, 49% live south of the river, 18% live in the South West Corridor and 11% are in the Kwinana-Rockingham area.

The level of expenditure associated with drag racing and speedway racing is of a level that generates significant jobs, estimated at around 180 direct and 183 indirect for a total of 363 full time equivalent jobs. The new facility will give competitors a locality to focus on for development work, etc. Over time, we would expect an increasing proportion of the racing expenditure to be oriented towards the Motorplex locality. This creates job opportunities in the area and will encourage some relocation of the firms linked to racing. Therefore, over time an increasing proportion of these jobs will likely be located in the area.

3.4.3 Environmental Impacts

There are a number of environmental issues associated with the site, however, the IMFIC considers that these could be managed. Previous use of the site for the residue storage has meant that little high quality vegetation remains on the site. A small portion of the site contained in the Draft Bushplan is however, affected. This is considered in detail in Chapter 5.

Ongoing management of groundwater at the site is recognised as a key issue and has also been addressed in Chapter 5. The Motorplex will not have an impact on the existing groundwater or surface water quality.

The key potential negative environmental issues are risk from industry and noise impacts on nearby residential areas. These issues were recognised by the IMFIC for all sites and have been addressed in Chapter 5.

3.4.4 Planning and Land Use

The location of the Motorplex at Kwinana provides the opportunity for Government to make use of a constrained site for public purposes. Notwithstanding this, the proximity of the site to existing residential areas, particularly Medina and Hope Valley, and the potential for impacts, was noted by the IMFIC. It should be recognised however, that all of the sites considered by the IMFIC had varying degrees of residential use in close proximity.

Chapter 4

EXISTING ENVIRONMENT

This chapter describes the existing environment in the study area including climate, geology and soils, surface water and groundwater, flora and vegetation, fauna, social surroundings and heritage.

4.1 REGIONAL CLIMATE

4.1.1 Climatic Conditions

The climatic conditions of the study area can be described as warm Mediterranean with cool wet winters and hot dry summers. The summer months are controlled by the low pressure heat troughs which develop southwards between the highs. Data on the average daily temperature and monthly rainfall was obtained from the Bureau of Meteorology and is summarised in *Table 4.1* below.

Table 4.1 AVERAGE TEMPERATURE AND RAINFALL DATA

Month	*Average Max Temp* ^0C	*Average Min Temp* ^0C	*Average Rainfall (mm)*
January	30.2	16.1	4.9
February	31.3	17.2	34.7
March	28.7	15.5	18.8
April	25.3	13.1	39.1
May	21.4	10.3	112.7
June	19.1	9.5	164.5
July	17.8	7.9	165.0
August	18.6	7.8	117.4
September	20.4	8.6	75.0
October	22.4	9.9	43.1
November	25.3	12.7	41.2
December	27.5	14.4	10.2
Average Annual	24.1	11.9	826.6

Source: Bureau of Meteorology, 1999 (Medina Research Centre)

Maximum temperatures reach the low to mid 40's over the summer months while minimum temperatures between -2 and 2 are reached during winter. The mean annual rainfall in Kwinana is about 827 millimetres. The area receives nearly 80 per cent of its annual rainfall during the winter months from May to September with only eight per cent falling during December to March.

The characteristic winds during the summer months consist of fresh easterly winds during the morning and strong south-westerlies during the afternoon. The south-westerlies are common to all seasons with the exception of winter.

4.2 GEOLOGY AND SOILS

The natural site elevations lie between 15 and 28 metres Australian Height Datum (AHD) and the land surface slopes towards the west. The current land contours are shown on *Figure 4.1.* A north-south trending limestone ridge controls local topography. The Alcoa RSAs are gently sloping with the current surfaces at elevations of approximately 22 mAHD.

4.2.1 Geology

The Motorplex site lies near the western margin of the on-shore portion of the Perth Basin. Shallow geological materials comprise sand and limestone of the superficial formations. The superficial formations are approximately 40 metres thick in the region of the site (Davidson, 1995).

The Tamala Limestone formation lies beneath the site and comprises creamy white to yellow, or light grey limestone dunes. It contains various proportions of quartz sand, fine to medium grained shell fragments and minor clayey lenses (Davidson, 1995). Surface materials comprise limestone pinnacles and sand derived from weathering of the limestone.

4.2.2 Soils

Soils in the Kwinana Region are developed on the sandy, quartzose and calcareous Tamala Limestone. Well-drained, sandy soils with low organic matter content occur throughout the study area. Silt and peaty soils occur near wetlands and low-lying areas. However, no wetlands occur near the study area.

Alcoa's RSAs which form the largest part of the study area were used to store residue from bauxite processing during the periods of 1962 to 1977 and 1995 to present. The location and extent of the RSAs are shown on *Figure 4.2.* The RSAs

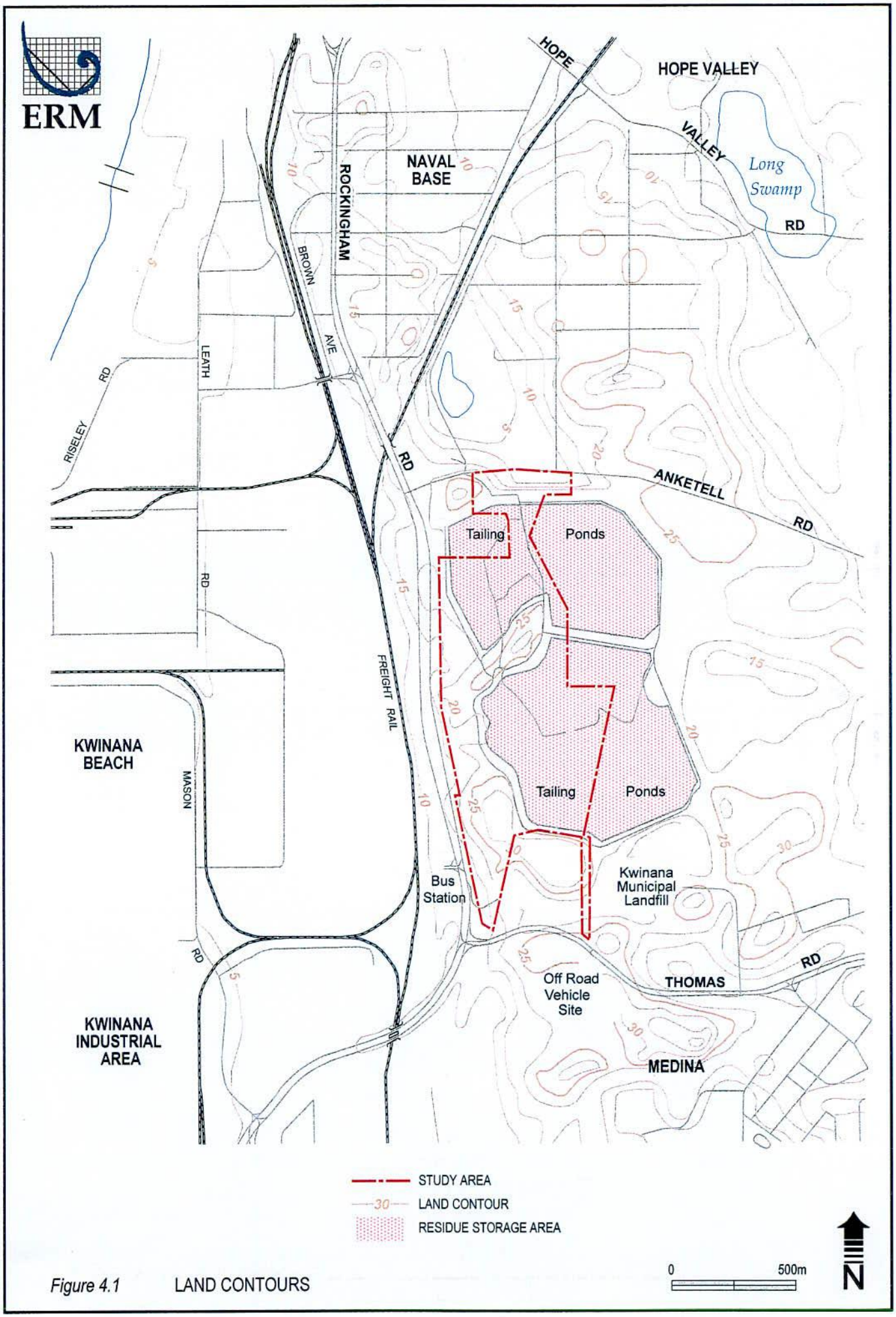

Figure 4.1 LAND CONTOURS

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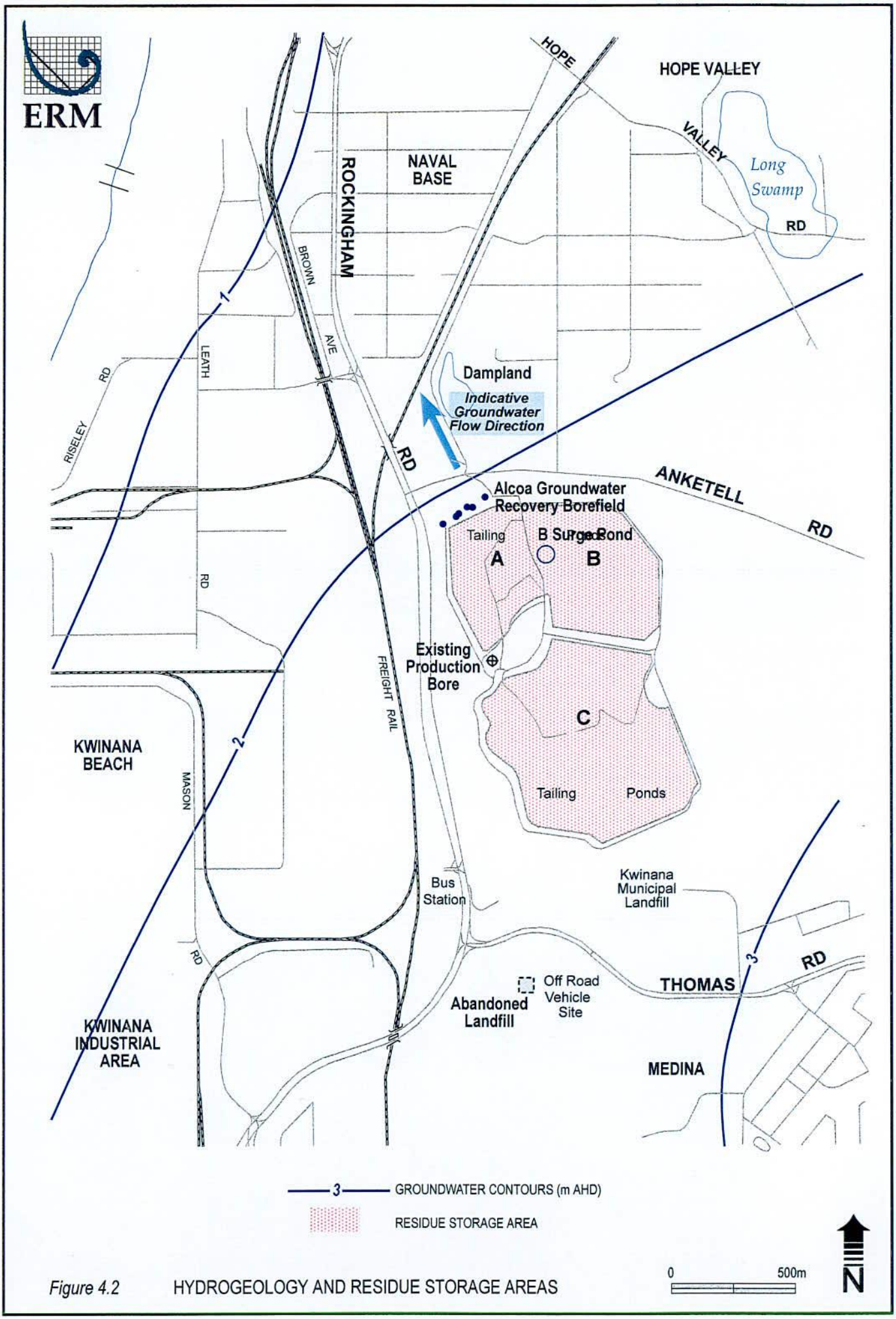

Figure 4.2 HYDROGEOLOGY AND RESIDUE STORAGE AREAS

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were constructed by cut to fill earthworks using the in-situ sand and lined with a 380 millimetre thick, low permeability compacted clay liner. The clay liner was covered by a sand layer around 600 millimetres thick, however a base drainage system was not provided (Alcoa, 1998).

The residue that was deposited between 1962 – 1977 was deposited with sand and silt size fractions combined in an alkaline slurry. The solid materials settled as sandy beaches or layers while the finer fractions formed lower density deposits towards the centre of the three separate areas, designated A, B and C in order of filling.

After an area was filled with residue the sand fraction was pushed in from the perimeter to cover the softer material, hence providing access for revegetation and deliquoring operations. A range of plants were established over ensuing years and supported animal grazing and other agricultural land use. Deliquoring systems were installed during the mid '70s and were effective in recovering around 50% of the entrained alkaline salts over the following 20 years.

Additional residue sands have been deposited on the areas over the past five years. The purpose of this was to improve surface shape and drainage to accommodate future land use such as light industry. This sand capping operation is planned to be completed over the next two years and can be scheduled in such a way as to fit in with the proposed development.

The Motorplex is to be constructed partially over the RSAs and the associated embankment walls as well as over the natural soils adjacent to the RSAs. The location of the facility in relation to the RSAs is shown in *Figure 4.3*.

4.3 SURFACE WATER AND GROUNDWATER

4.3.1 Surface Water

Surface drainage in the study area is notably absent (Hill *et al*, 1996) although the land surface slopes generally westerly from the Spearwood Dune ridge. Underlying soils comprise sand and limestone (Davidson, 1995) with a high infiltration capacity. The groundwater table is generally deep and surface water only occurs where ground elevations intersect the water table.

Wetlands occur at Long Swamp (approximately 1.5 kilometres north-east of the site) and a dampland 500 metres north of the site (Hill *et al*, 1996). The un-named dampland occupies 2.4 hectares and is classified as having Resource Enhancement value - its attributes are to be protected although it has been modified (Hill *et al*, 1996). These areas are shown on *Figure 4.2*. No EPP (Swan Coastal Plain Lakes)

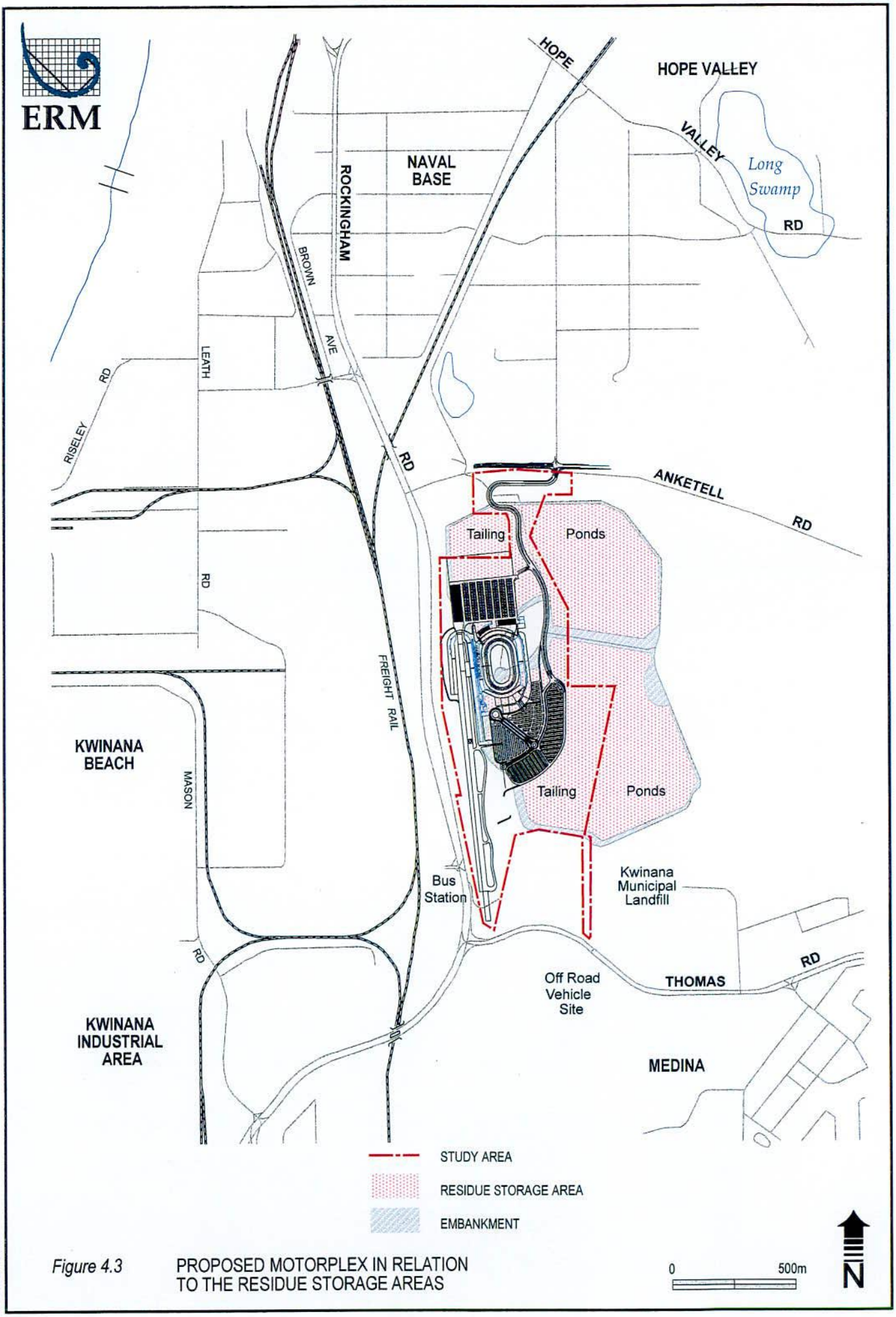

Figure 4.3 PROPOSED MOTORPLEX IN RELATION TO THE RESIDUE STORAGE AREAS

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listed conservation wetlands occur near or down-stream from the site (Hill *et al*, 1996).

Surface runoff discharging from the site is limited to runoff from the external slopes of the RSA bund walls. Runoff from the bund walls is expected to infiltrate into the sandy soil at the toe of the bund wall slope.

i. Residue Storage Areas

The RSAs cover a total area of approximately 92.2 hectares (Alcoa, 1998). The location of the RSAs and water management features are shown on *Figure 4.3*.

Water management of the RSAs (pers comm, Barry Piper, Alcoa, 1999) is summarised below:

- *rainfall and surface runoff infiltrate into a sand capping over the RSAs;*
- *subsurface drainage collection systems direct seepage to the "B Surge Pond" in RSA B;*
- *some good quality groundwater is pumped from below the RSAs to irrigate rehabilitation plantings and to maintain water levels in the B surge pond;*
- *residue dewatering (windmills) discharge is pumped to the B surge pond;*
- *groundwater from the recovery borefield is pumped to the B surge pond; and*
- *water from the B surge pond is pumped to the refinery for re-use.*

The B surge pond is lined with clay (pers comm, Barry Piper, Alcoa, 1999). It is used to store water from various sources prior to pumping to the refinery.

ii. Residue Area Water Levels

The residue storage areas were constructed in such a way that the bulk of the residue deposit above the clay seal is saturated. In other words there is an internal water table perched above the surrounding groundwater level. The entrained water is alkaline and has a pH of around 11 - 12. A system of buried, slotted drain pipes, draining by gravity to the B surge pond, controls the internal water table to between two and five metres below the finished surface and prevents it from rising to the point where it affects the surface vegetation or overtopping the perimeter clay seal and escaping to the external environment.

There is typically no surface runoff from the revegetated residue surface, but if it was to occur during intense rainfall runoff would be totally contained by the drainage system provided.

4.3.2 Groundwater

i. Natural Geology and Hydrogeology

The Kwinana International Motorplex is proposed to be constructed on a limestone ridge immediately east of Rockingham Road and on the adjacent decommissioned residue storage areas. The Tamala Limestone formation underlies the site (Davidson, 1995). The Tamala Limestone comprises sand, limestone and calcarenite with cavernous zones near the water table (Davidson, 1995). Sandy zones occur both within and beneath the limestone. Underlying the limestone is the South Perth shale formation which has low permeability and effectively defines the base of an unconfined surface aquifer.

The groundwater table is at approximately 1mAHD and is therefore around 10 to 20 metres below the current land surface (WRC, 1997). Groundwater flow is influenced by the presence of the lower permeability Safety Bay Sand formation to the west and is deflected in a north-westerly direction, eventually discharging into Cockburn Sound near Alcoa's refinery.

Natural groundwater salinity is fresh, varying from 250-500mg/L total dissolved solids (TDS) at the north and east of the RSAs to 500-1,000mg/L TDS to the south and west (Davidson, 1995).

ii. Impacts from Alcoa's Operations

Groundwater salinity in the areas has been impacted by Alcoa's operations. Salinities in the base of the Tamala Limestone aquifer range from background concentrations to over 3,000mg/L TDS at the northern edge of Area A (Haselgrove and Thomas, 1999). Groundwater pH ranges from background levels of about 8 up to 10 at the base of the Tamala Limestone aquifer at the same location. An alkaline plume occurs beneath the RSAs and extends to the north-north-west (Haselgrove and Thomas, 1999).

Alcoa operate six groundwater recovery bores to control the groundwater contamination plume (Alcoa, 1998). The locations of these bores are shown on *Figure 4.2*. They pump a combined 2,000kL/day of contaminated groundwater and the water is all utilised by the refinery (Alcoa, 1998). A slight increase in groundwater contamination has been detected at the recovery bores however Alcoa

believe that the plume is in control and private bores down gradient from the RSAs have not been affected (Alcoa, 1998).

iii. Impacts from Upgradient Landfills

Two landfill sites lie upgradient of the proposed Motorplex site; the active Kwinana Municipal Landfill and an abandoned municipal landfill. These sites are shown on *Figure 4.2*. Both are indicated as known or inferred point sources of groundwater contamination (WRC, 1997).

The Kwinana Municipal Landfill currently receives Class I and Class II wastes, inert and non-putrescible wastes, (pers. comm., Peter Hoare DEP 1999). The landfill received liquid septic wastes until 1989.

An abandoned landfill, located south of Thomas Road, received wastes between 1953 and 1955 and groundwater contamination is known to have occurred (pers. Comm. Mark Gow, WRC, 1999).

Small plumes of contaminated groundwater extend from both landfills (pers comm. Steve Appleyard, WRC, 1999). The groundwater flow direction is such that any contamination emanating from these landfills would move beneath Alcoa's residue areas and combine with the alkaline plume.

4.4 FLORA AND VEGETATION

4.4.1 Vegetation

The study area lies within the South-West Botanical Province in the Darling Botanical District (Beard, 1981). This district is further divided into subdistricts and the study area lies within the Drummond Subdistrict.

The study area contains vegetation from the Cottesloe Central-South vegetation facility as described by Heddle *et al* (1980). This facility consists of a mosaic of Tuart (*Eucalyptus gomphocephala)* woodland and open forest of Tuart - Jarrah (*E. marginata)* and Marri (*E. calophylla)* with a closed heath community occurring on the limestone outcrops. This facility occurs in a narrow coastal band between Yanchep and Mandurah.

During a half day field survey three vegetation communities were identified within the study area. These include:

- Jarrah/Banksia woodland;
- Banksia woodland; and
- Closed Heath.

The remnant vegetation occurs predominantly along the western edge of the site, adjacent to Rockingham Road. Areas to the centre and east of the site have largely been cleared of native vegetation. Several areas within the RSAs have recently been rehabilitated and contain a sporadic distribution of planted flora species.

The three remnant vegetation communities are described below and their distribution within the study area is shown in *Figure 4.4*.

i. Jarrah Banksia Woodland

This community is dominated by Jarrah (*Eucalyptus marginata*) and Coastal Banksia (*Banksia attenuata*) which reach a maximum height of 12 metres. The shrub layer is relatively dense and contains Parrot Bush (*Dryandra sessilis*), Yellow Buttercups (*Hibbertia hypercoides), Kunzea ericifolia, Spyridium globulosum,* Grasstree (*Xanthorrhoea preisii),* Zamia (*Macrozamia riedlei)* and Dwarf Sheoak *(Allocasuarina humilis).*

The ground cover was quite disturbed in sections of this community and there was evidence of rubbish dumping including car bodies, building rubble and household waste. However, a number of ground cover species were detected. These include Couch Honeypot (*Dryandra nivea),* Native Wisteria *(Hardenbergia comptoniana),* Semaphore Sedge (*Mesomelaena tetragona)* and *Conostylis sp.* Despite evidence of disturbance, very few weeds were observed. Weeds including introduced grasses such as Veldt Grass (*Ehrharta sp*) and Fountain Grass (*Pennisetum setaceum*) were predominantly confined to the sandy 4WD tracks and alongside Rockingham Road.

This community occurs along the limestone ridge within the central section of the study area and to the south of the telecommunications tower.

ii. Banksia Woodland

This community is dominated by Coastal Banksia (*Banksia attenuata*) to eight metres tall, with the occasional emergent Christmas Tree (*Nuytsia floribunda*). The low shrub understorey is relatively intact and contains a dense layer of Dwarf Sheoak (*Allocasuarina humilis*), Yellow Buttercups (*Hibbertia hypercoides),* Grass Tree

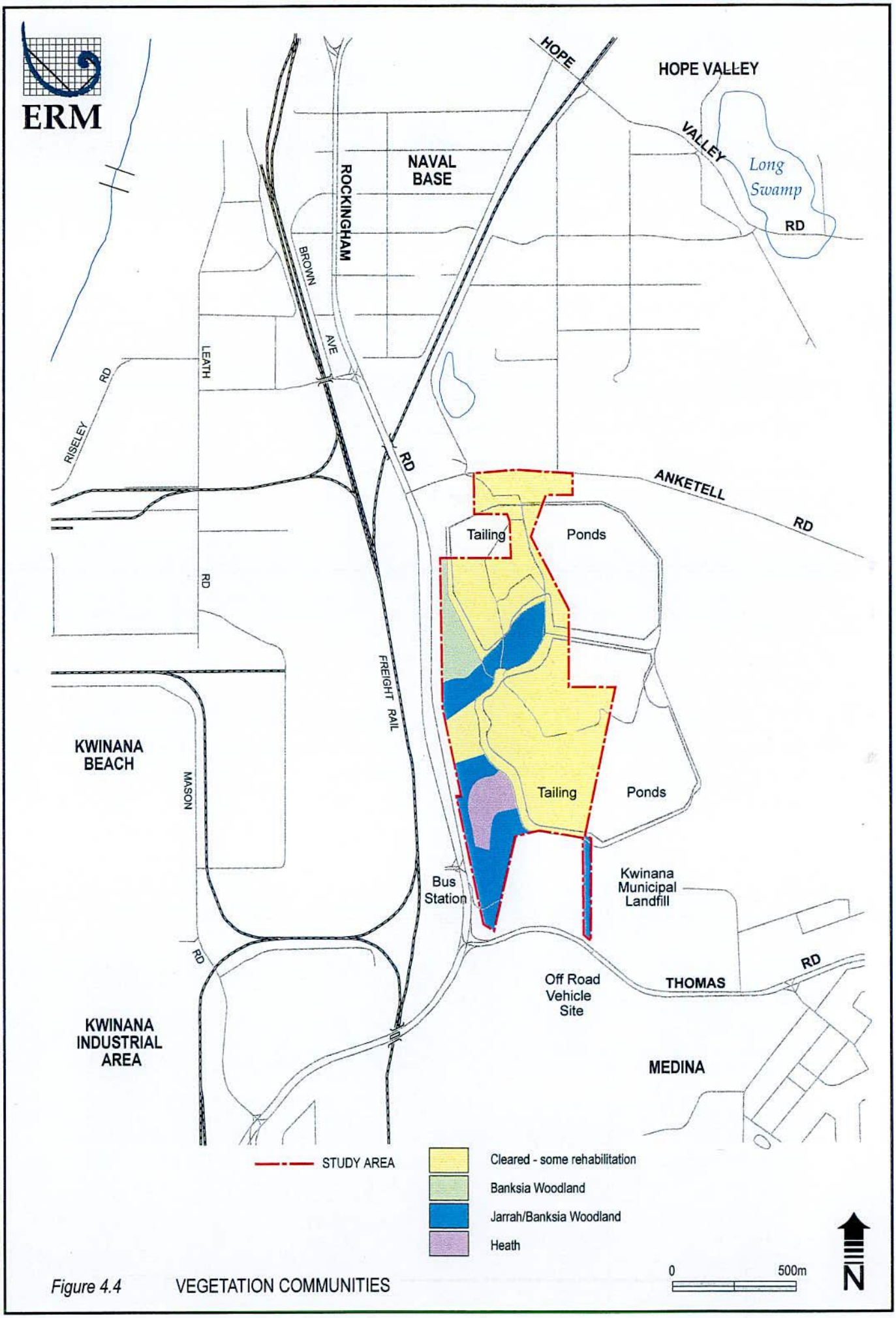

Figure 4.4 VEGETATION COMMUNITIES

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(*Xanthorrhoea preisii*), Prickly Moses (*Acacia pulchella*), *Melaleuca acerosa* and One-sided Bottlebrush (*Calothamnus quadrifidus*). The occasional Zamia (*Macrozamia reidlei*) and Parrot Bush (*Dryandra sessilis)* also occurs in this community.

The groundcover is fairly sparse but includes Semaphore Sedge (*Mesomelaena tetragona*) and Old Man's Beard (*Clematis microphylla*). The vegetation in this community was in a relatively good condition although has suffered low level of disturbance from weeds along the edges of tracks and Rockingham Road.

This community occurs alongside Rockingham Road towards the northern boundary of the study area.

iii. Closed Heath

A heath community occurs near the telecommunications tower towards the southern boundary of the study area. This community is dominated by Chenile Honey-myrtle (*Melaleuca huegelii*) and Parrot Bush (*Dryandra sessilis*) to a height of two metres. The dense understorey contains Yellow Buttercups (*Hibbertia hypercoides), Melaleuca acerosa* and Couch Honeypot (*Dryandra nivea*) with the occasional Grasstree (*Xanthorrhoea preissii*), Two-leaved Hakea (*Hakea trifurcata), Spyridium globulosum* and Dwarf Sheoak (*Allocasuarina humilis*).

The 4WD track which passes through this community from Rockingham Road to the transmission tower has resulted in some disturbance to this community and minor weed invasion along the edge of the track has occurred. Weeds have not encroached further into this community and therefore this community is considered to be in a relatively good condition.

4.4.2 Conservation Status

The vegetation communities described above are typical of the Cottesloe Central-South vegetation complex described by Beard (1981) and are common throughout the region. This vegetation complex is reserved within the Beeliar Regional Park, to the east of the study area and within the Perth Metropolitan Region, over 5,200 hectares is currently protected.

The vegetation of the study area resembles Community Types 21a, Central *Banksia attenuata - Eucalyptus marginata* woodlands as described by Gibson *et al* (1994). This community is considered to be well reserved and a low conservation risk (Gibson *et al* , 1994).

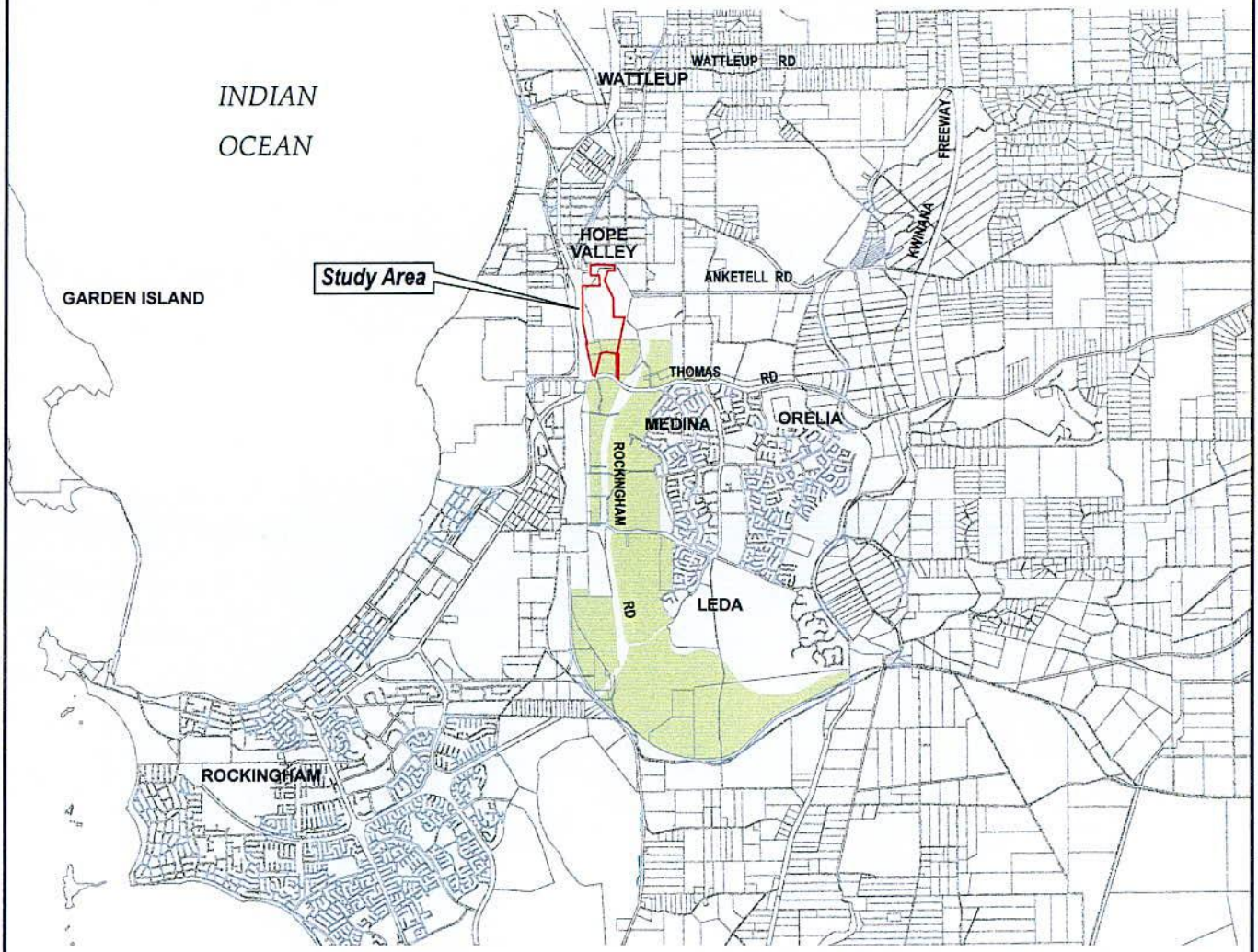
Part of the site has been identified as containing regionally significant bushland and has been recommended for conservation under the Perth's Bushplan. This site is identified as Leda and Adjacent Bushland Leda, Site No. 349 and covers an area of 1,257 hectares (Bushplan, 1998). The location of this site is shown in *Figure 4.5*. Approximately seven hectares of the most north-western section of the Bushplan site falls within the proposed Motorplex facility study area.

4.4.3 Threatened Flora

Records of threatened and declared rare flora species were obtained for the Kwinana area from the database held by CALM. The database did not identify any rare flora species as occurring within the study area, however a number of species have been recorded in the local vicinity. These species are listed in *Table 4.2*.

The Bushplan indicates that only one significant flora species, *Glischrocaryon aureum*, a perennial herb, is known to occur in the area. This species is not listed as rare nor as a priority species but is considered to be uncommon in the Perth metropolitan region. None of these species were identified in the study area during the site inspection.

No threatened ecological communities listed by CALM are known to occur within the study area.



Source: Bushplan (1998)

0 2 km

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Figure 4.5 BUSHPLAN SITE No. 349

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Table 4.2 DECLARED RARE AND PRIORITY LISTED FLORA

Botanical Name	Common Name	Conservation status	Recorded	Flowering period	Distinctive Features	Physiography	Associated species
Caladenia huegelii	King Spider Orchid	Threatened	This species has been recorded approximately 4.5 km east of the Thomas Road and Rockingham Road intersection (CALM database)	September to October	This orchid grows 50-70cm tall, and the distinctive flower is large greenish/cream with a maroon lip.	This species typically grows in deep sandy soil in wet depressions from just north of Perth to Margaret River	This species is typically associated with *Eucalyptus marginata* and Banksia spp.
Diuris micrantha	Dwarf Bee Orchid	Threatened	This species was recorded in bushland 1 km to the SE of the Thomas Road and Rockingham Road intersection(CALM database)	August to early October	This orchid has yellow flowers with reddish brown markings	This species typically grows in sandy clay soil, and wet depressions in scattered populations from Perth to Collie	This species is typically associated with Melaleuca spp., native sedges and scattered shrubs
Aponogeton hexatepalus		Priority 4	This species was recorded in bushland 4.5 km to the east of the Thomas Road and Rockingham Road intersection (CALM database)	August to September	A wetland perennial herb, flowers green to yellow	Inhabits clay based permanent swamps from Kenwick to the SW corner of WA.	-
Dodonaea hackettiana		Priority 4	This species was recorded in bushland 1 km to the SE of the Thomas Road and Rockingham Road intersection (EMRC, 1999)	July to October	Erect shrub up to 4.5 metre high. It is a dioecious species and has prominent 3-winged, yellow to red coloured fruit.	Inhabits areas with deep yellow sand below grey surface sand, often with outcropping limestone or associated wetlands. Endemic to the Perth region.	This species is commonly found in Tuart, Jarrah or Marri woodlands and on sand in *Eucalyptus rudis* or Jarrah-Banksia woodlands
Grevillea olivacea		Priority 4	This species was recorded in *Acacia saligna* woodland east of the Kwinana Alumina refinery, 4 km north of the Thomas Road and Rockingham Road intersection. (EMRC, 1999)	June to August	Red flowering grevillea	Inhabits coastal dunes, white sand and in Acacia scrubland.	This species is typically found in Banksia and Eucalypt woodland and in Acacia scrubland.

Notes: *Records obtained from CALM threatened flora database, 1999 with additional information obtained from EMRC, 1999.*
Species names follow Merchant et al.(1987).
Priority 4 indicates that this species is considered to be adequately surveyed and which, whilst being rare in Australia, is n ot currently threatened by any identifiable factors.

4.5 FAUNA AND FAUNA HABITATS

4.5.1 Fauna Habitat

A fauna habitat assessment was undertaken for the study area on 19 May, 1999. The aim of this survey was to identify the fauna habitats provided in the study area and determine whether the habitats present are suitable for threatened fauna species.

The field survey identified three vegetation communities, previously described in Section 4.4.1. These communities afford similar habitat elements for mammal, reptile and bird species. These habitat elements are discussed below.

The flowering canopy of the Jarrah/Banksia and Banksia woodlands communities provide a food source for nectivorous birds and arboreal mammals. The emergent Jarrah and Banksia would provide viewing perches for predatory birds and nesting sites for large woodland birds. The diverse shrub layer would provide a food resource and shelter sites for smaller nectivorous bird species. The dense shrub layer in all three vegetation communities would provide shelter for small mammals and reptiles and the soft sandy substrate would be suitable for burrowing species.

A number of fallen branches within the study area may provide shelter and basking sites for reptiles.

The study area is bordered by roads on three sides and the Alcoa residue areas to the east and is not linked directly to any other vegetated areas. The study area therefore does not form part of a fauna movement corridor for fauna travelling north-south or east-west.

4.5.2 Fauna

i. Fauna Present

During the site inspection several fauna species, or signs of their presence such as scats, tracks and scratchings, were observed.

These species are listed in *Table 4.3.*

Table 4.3 FAUNA OBSERVED IN THE STUDY AREA

Common Name	Scientific Name	Method Of Detection
Birds		
Grey Fantail	*Rhipidura fuliginosa*	Observed
Australian Kestrel	*Falco cenchroides*	Observed
Laughing Dove	*Streptopelia senegalensis*	Observed
Ring-necked Parrot	*Platycercus zonatius*	Observed
Magpie Lark	*Grallina cyanoleuca*	Observed
Australian Magpie	*Cracticus tibicen*	Observed
Australian Raven	*Corvus coronoides*	Observed
Mammals		
Rabbit	*Oryctolagus cuniculus*	Scats/scratchings
Quenda	*Isoodon obesulus*	Observed
Feral Cat	*Felis catus*	Observed

Notes : Species names follow Strahan (1995) and Schodde and Tidemann (1997).

The low number of fauna observed during the sites inspection was most likely attributed to the prevailing weather conditions. This included rain and wind squalls.

ii. Threatened Species

The threatened fauna species records were obtained from CALM for the Kwinana area. These records identified one threatened fauna species, one specially protected species and two priority listed species as occurring in the region. These are:

- Carnaby's Cockatoo (*Calyptohynchus latirostris*), listed under Schedule 1 (Threatened) of the *Wildlife Conservation Act, 1950*. This species is known to be a seasonal visitor to the Swan Coastal Plain, foraging within Banksia woodlands (CALM database, 1999).

- Peregrine Falcon (*Falco peregrinus*); listed as a Schedule 4 species (Specially Protected) of the *Wildlife Conservation Act, 1950*. This species is an occasional visitor to open woodland areas (CALM database, 1999);

- Quenda (*Isoodon obesulus fusciventer*) listed as a Priority 4 species. This species shelters within low dense heath vegetation and has been recorded in the suburbs of Kwinana, Hope Valley and Medina (CALM database, 1999); and

- Western Brush Wallaby (*Macropus irma*) listed as a Priority 4 species. This species may still occur in low numbers within areas containing dense vegetation.

The Carnaby's Cockatoo and Peregrine Falcon are highly mobile birds utilising a large home range. These species would only be occasional visitors to the area. It is possible that Brush Wallaby occurs in the study area due to the presence of suitable habitat, however, no evidence of this species utilising the study area was detected during the site inspection.

The Quenda was observed in the Banksia woodland community of the study area during the site inspection, after being disturbed from its burrow. Skeletal material retrieved from the study area was later identified as belonging to a bandicoot species. The bandicoot is known to utilise a home range of up to seven hectares (Strahan, 1995). The study area, which is approximately 70 hectares in size, could therefore support a population of up to ten individuals. However, as less than half of the study area contains remnant vegetation, the population of Bandicoots is likely to be less than 10.

4.6 SOCIAL SURROUNDINGS

4.6.1 Land Use and Zonings

i. MRS Zonings

Under the MRS, the majority of the study area is zoned Rural. The southern portion of the study area is zoned as Parks and Recreation. A corridor zoned for the Fremantle-Rockingham Controlled Access Highway (FRCAH) occurs to the east of the study area while roads identified in the MRS as Important Regional Roads form the northern, western and southern boundaries of the study area.

Land to the west of the study area is zoned as Industrial and Special Industrial while land to the north is predominantly zoned Rural with an area to the north-west zoned Industrial and Special Industrial. Beyond the FRCAH to the east of the study area lies a small area of land zoned for Public Purposes. The MRS zones are shown on *Figure 4.6*.

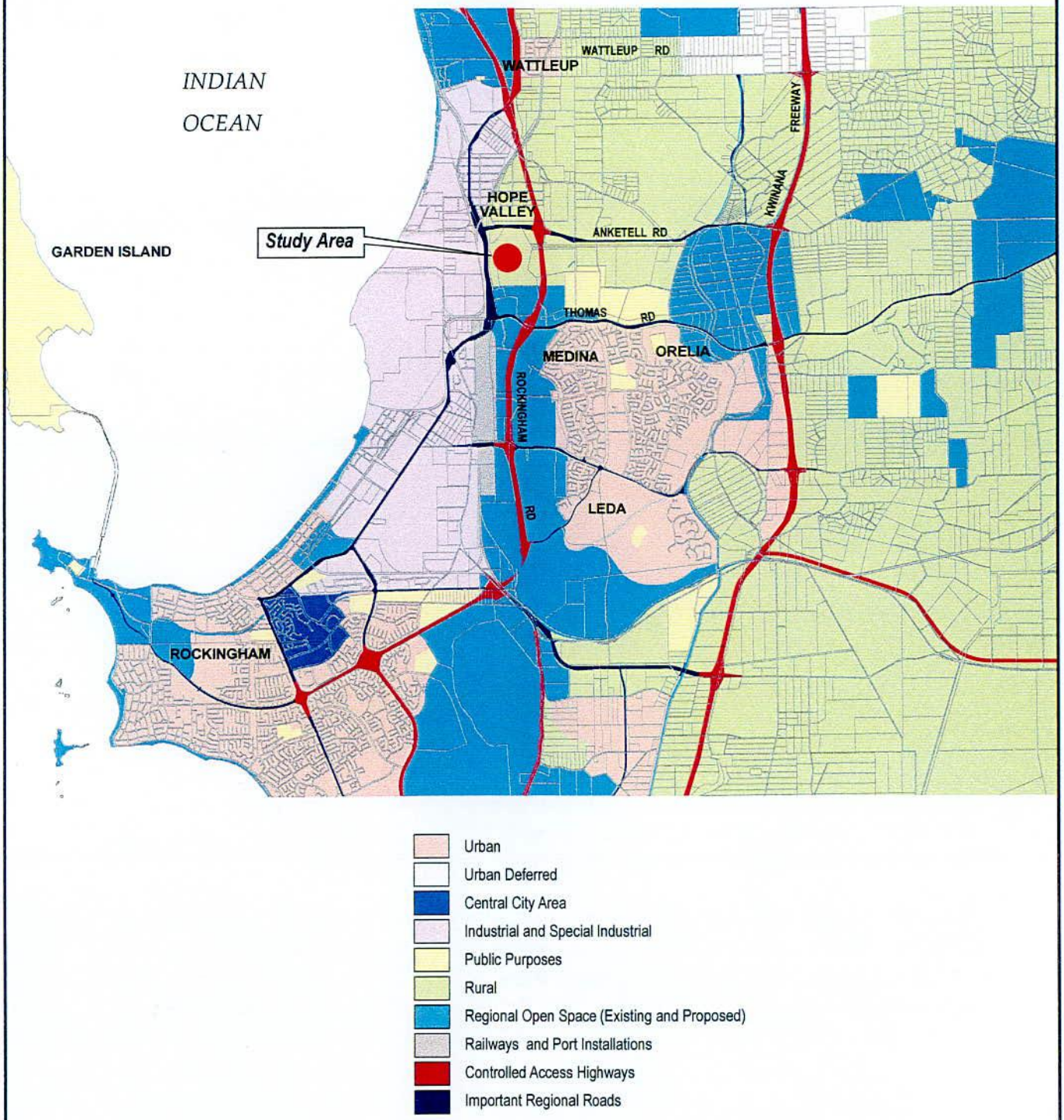

Figure 4.6 METROPOLITAN REGION SCHEME ZONING

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ii. Town of Kwinana Town Planning Scheme No. 2

Under the Kwinana Town Planning Scheme No 2 (1992), the study area is also zoned predominantly rural with the southern section zoned Parks and Recreation as per the MRS zone boundaries. The zoning's under the Town Planning Scheme (TPS) differ slightly from the MRS zones. A thin band along the eastern edge of Rockingham Road is zoned Parks, Recreation and Drainage (Local) under the TPS where as this section is zoned as Parks and Rural under the MRS. The TPS does however identify the FRCAH to the east of the study area and the Railway Reserves to the west.

iii. Land Use

The land uses around the proposed site include the Kwinana heavy industrial estate, the residential community at Hope Valley, the Town of Kwinana rubbish tip site located just north of Thomas Road and quarrying and residue disposal uses to the east. The townsite of Kwinana is located south-east of the proposed site with the closest residential suburbs being Medina and Calista.

4.6.2 Visual Amenity

The study area consists of a varied landscape including the flat topography of the Alcoa RSAs, the prominent limestone ridge running through the study area and the remnant vegetation along the Rockingham Road reserve.

The topography of the study area ranges from a maximum height of 35 AHD where the transmission tower is located and a minimum height of 12 AHD at Rockingham Road. A prominent limestone ridge runs in a north-east to south-west direction in the central section of the study area. This ridge reaches a maximum height of 32 AHD. The contours of the study area are shown on *Figure 4.1*.

The site is largely obscured from the local road network and the townsites of Hope Valley and Kwinana. A series of small dunes along Rockingham Road will assist in minimising visual impacts on road users. There is also a small rise alongside Anketell Road in the vicinity of the study area, obscuring the view to the RSAs.

The site overlooks the industrial area of Kwinana to the west and south, the RSAs to the east and undeveloped industrial land to the north-west. The site is bordered by regional roads to the north, west and south, isolating the site from adjoining landscapes. A transmission tower exists on the top of a small rise near the southern extremity of the study area.

The closest residential areas are the townsites of Hope Valley and the suburb of Medina which are approximately one and two kilometres respectively from the centre of the study area.

4.7 HERITAGE

4.7.1 Aboriginal Heritage

To identify the presence of any Aboriginal sites within the study area, a search of the sites register held at the AAD for records within the Kwinana area was undertaken. This search identified the presence of two sites in the vicinity of the site. These include the Chalk Hill Camps on the southern side of Thomas Road and an artefact scatter to the north of Anketell Road (AAD Database, 1999). These sites will not be directly affected by the construction or operation of the facility.

A detailed heritage assessment of the study area is currently being undertaken as part of the Native Title investigations.

4.7.2 Native Title

Records of Native Title claims held by DOLA were obtained for the project. The study area was found to fall within two native title claims. These were:

- WC 98/58 Gnaala Karla Booja. The contacts for this claim include Mr Michael and others; and
- WC 95/86 Ballaruks. The contact for this claim is Christopher (Clarey) Bodney.

These claimants have been notified of the intention to construct a Motorplex facility within the study area. DOLA is currently undertaking negotiations with the Aboriginal community in accordance with the procedures outlined in the *Public Works Act, 1902*.

4.7.3 European Heritage

A desktop assessment for records of European Heritage sites within the study area was undertaken. This included consultation with the WA Heritage Commission, Australian Heritage Commission, National Trust (WA) and the Town of Kwinana. A review of the information received from these organisations indicates that no sites of heritage value have been recorded within the study area. The closest sites occur

to the north of Anketell Road and include the Hope Valley Area (central) and Postans Cottage. These areas were included on both the Town of Kwinana's Municipal Inventory and the WA Heritage Commission's registers but will not be affected by the proposal.

4.8 SUMMARY

This chapter describes the existing environment of the study area and its immediate surrounds. The information provided above indicates that the study area has been substantially modified by current industrial activities both within and adjacent to the study area. The study area is predominantly cleared of native vegetation and the majority of the site has been used for residue storage. Groundwater quality in the local area has been degraded by surrounding industrial activities. No sites of European or Aboriginal heritage have been recorded in the study area. The site is located in proximity to a number of district residential areas, including Kwinana and Hope Valley.

Chapter 5

REVIEW OF ENVIRONMENTAL FACTORS

This chapter describes the EPA objectives, predicted impacts and proposed management measures for each of the factors included in the EPA Guidelines.

5.1 INTRODUCTION

This chapter outlines the potential environmental and social impacts and management techniques associated with the construction and operation of the proposed Motorplex facility. The key environmental factors identified by the DEP are:

- Biophysical :
  - Terrestrial Flora and Vegetation; and
  - Terrestrial Fauna.
- Pollution Management :
  - Air, including dust and odour;
  - Ground and surface water quality;
  - Solid and Liquid wastes;
  - Noise and Vibration; and
  - Light Spill.
- Social Surroundings :
  - Individual Risk;
  - Road Traffic;
  - Social Surroundings; and
  - Visual Amenity.

The environmental factor considered to be of most significance to the proposed Motorplex facility development is noise and vibration. All the above environmental factors are discussed in the following sections.

5.2 ENVIRONMENTAL MANAGEMENT SYSTEM

The Western Australian Sports Centre Trust is committed to managing the Motorplex facility in accordance with best practice Environmental Management and will develop a formal Environmental Management System (EMS). This EMS will be developed as an integrated system which addresses safety, quality and environmental issues. The EMS will be completed prior to commissioning of the Motorplex.

5.3 BIOPHYSICAL ENVIRONMENTAL FACTORS

5.3.1 Vegetation Communities

i. EPA Objective

The EPA's objectives for vegetation communities are to:

- *maintain the abundance, species diversity, geographic distribution and productivity of vegetation communities; and*
- *ensure that regionally significant flora and vegetation communities are protected in accordance with the principles of Perth's Bushplan.*

ii. Applicable Assessment Standard or Procedure

The *Urban Bushland Strategy* produced by the Western Australian Government (1995) ensures that bushland within the urban area is given proper recognition and provides the framework for which regionally and locally significant vegetation can be identified. Perth's Bushplan is another Government endorsed document, prepared as a commitment to the 1996 National Strategy for the Conservation of Australia's Biological Diversity, which seeks to establish a representative system of protecting urban bushland areas.

The assessment of impacts of the development on regionally significant vegetation communities has been undertaken in accordance with these documents.

iii. Impact Assessment

The proposed development will result in the removal or disturbance of approximately 17 hectares of remnant vegetation from the Cottesloe Central and South vegetation complex. Currently, around 12,360 hectares of this vegetation complex remains within the Swan Coastal Plain (Perth's Bushplan, 1998). Nearly 42 per cent (5,190 hectares) of this vegetation complex is protected (Perth's Bushplan, 1998). Removing 17 hectares of this vegetation complex will not significantly reduce the abundance or distribution of this vegetation complex within the Swan Coastal Plain.

Approximately seven hectares of vegetation within the study area falls within Perth's Bushplan Site No. 349. This Bushplan site is 1,257 hectares in size and contains vegetation from a number of vegetation complexes, including Cottesloe Central and South (Perth's Bushplan , 1998). The study area includes the north-west corner of Site 349. The proposed development will remove 0.5 per cent of the total area contained within Site 349. This is not considered to be a significant reduction.

No impacts on vegetation adjacent to the study area are expected as the study area is bordered by roads to the north, west and south and by the existing Alcoa RSAs to the east.

iv. Management Measures

To ensure potential impacts of the Motorplex facility are minimised and where space and construction techniques permit, remnant native vegetation present in the study area will be retained. The area of vegetation to be cleared will be limited to the construction area only.

Areas outside the immediate construction area will be clearly marked using survey tags or paint or by erecting a temporary fence. This will reduce the area required to be rehabilitated following construction and will allow the natural vegetation to be incorporated into the landscaping proposed for the facility.

Cleared vegetation will be mulched and reused on site for landscaping to provide a natural seed source to facilitate rehabilitation in disturbed or landscaped areas. The existing vegetation is relatively weed free and would therefore provide a clean, cheap seed source.

Areas disturbed during construction will be rehabilitated using native flora species. Landscaping within the facility will also consist predominantly of native flora species.

Negotiations with the MfP are currently in progress to determine the most appropriate action with regards to the portion of the study area contained within Perth's Bushplan Site No. 349. As part of the negotiations, protection of a similar sized area of vegetation as compensation for removing part of the Bushplan site will be considered.

To ensure that activities associated with construction and operation of the Motorplex do not disturb the remaining sections of Bushplan Site 349, the boundary of the study area at this location will be clearly identified using survey tags, paint or erecting a temporary fence.

v. Predicted Outcome

The proposed development will have no significant impacts on vegetation communities. Negotiations with the MfP will however, be necessary to obtain permission to remove vegetation from the area currently included in Bushplan Site No. 349.

5.3.2 *Declared Rare and Priority Listed Flora*

i. EPA Objective

The EPA's objective for declared rare and priority listed flora is to:

- *protect declared rare and priority listed flora, consistent with the provisions of the Wildlife Conservation Act, 1950.*

ii. Applicable Assessment Standard or Procedure

The preservation of declared rare flora is covered by the *Wildlife Conservation Act, 1950.* CALM also maintain a list of Priority flora species which needs to be considered in the assessment process.

iii. Impact Assessment

As stated in the previous section, the proposed development will result in the removal or disturbance of a maximum of 17 hectares of vegetation. No records of declared rare or priority listed flora are contained on the CALM database for this area and no such species were identified during the field survey. It is recognised however, that suitable habitat for two of the species known to occur in the local vicinity, *Caledenia huegelii* and *Dodonaea hackettiana,* exists within the study area.

As mentioned in the previous section, similar habitat to that found within the study area is contained in conservation areas such as Beeliar Regional Park and Bushplan Site No. 349. Removing vegetation from the study area will not result in a significant loss of suitable habitat for these species.

iv. Management Measures

No populations of declared rare flora (DRF) or priority listed flora have been recorded in the study area, however it is considered possible that one threatened species and one priority listed species may occur. It is recommended that a flora survey targeting these species be undertaken during spring, when these species flower, to determine whether they occur in the study area.

If any populations of DRF are discovered within the study area during construction, operations should cease and advice from CALM should be obtained regarding appropriate actions to be taken.

v. Predicted Outcome

The proponent will conduct a flora survey during Spring to determine whether any threatened or priority listed species occur within the study area. No significant impacts on rare flora are however anticipated.

5.3.3 Specially Protected Fauna

i. EPA Objective

The EPA's object for threatened or priority listed fauna is to:

- *protect specially protected (threatened and priority) fauna consistent with the provisions of the Wildlife Conservation Act, 1950.*

ii. Applicable Assessment Standard or Procedure

Requirements for the preservation and conservation of native fauna species are included in the *Wildlife Conservation Act, 1950.* Australia is also a signatory on a number of international treaties including the migratory bird agreements between Australian, China and Japan, the International Convention of Biodiversity and the National Strategy for the Conservation of Australia's Biological Diversity.

iii. Impact Assessment

A number of specially protected fauna have been recorded from the region and the Quenda was observed within the study area during recent field investigations. The proposed development will result in the removal of up to 17 hectares of vegetation from the study area, reducing the fauna habitat available in the local area. The potential impact of this is however expected to be minimal due to the presence of large continuous vegetated areas to the east and south of the study area.

The two fauna species listed on the *Wildlife Conservation Act, 1950* which have been recorded in the region, are both highly mobile species and, would only be occasional visitors to the study area. The loss of 17 hectares of bushland from the large foraging areas required by these species is not expected to be significant.

Of the two priority species recorded in the vicinity, the Quenda is known to utilise the habitat provided in the study area. This species has recently been removed from the threatened species list and is now a Priority four species (a species which has been adequately surveyed and is not currently threatened by any identifiable factors).

The Quenda is usually a solitary species and can utilise an area of up to seven hectares as a home range (Strahan, 1995). Although home ranges can overlap, the 17 hectares of vegetation within the study area would be able to support only a few individuals.

Due to the small size of the vegetated area within the study area and the presence of larger areas of suitable habitat to the south and east of the site, removal of habitat from the study area will not have a significant impact on this species.

iv. Management Measures

The loss and reduction of fauna habitat from the study area can be managed by implementing the following management measures:

- minimise the area of vegetation to be cleared;
- vegetated areas not required to be cleared should be flagged to avoid disturbance during construction; and
- areas disturbed will be rehabilitated using native flora species. Landscaped areas will also consist predominantly of native flora species.

v. Predicted Outcome

The proposed development will have no significant impacts on specially protected fauna species.

5.4 POLLUTION MANAGEMENT FACTORS

5.4.1 Dust

An assessment of the impacts of dust from construction and operation of the proposed Motorplex facility was undertaken by ERM. The impact assessment report is provided in *Appendix D* and a summary of its findings is provided in the following section.

i. EPA Objective

The EPA objective for dust and particulates is to:

- *ensure that the dust levels generated by the proposal do not adversely impact upon the welfare and amenity or cause health problems by meeting statutory requirements and acceptable standards; and*
- *ensure that the dust levels from the adjacent residue areas do not adversely impact on the health and amenity of spectators.*

ii. Applicable Assessment Standard or Procedure

Ambient air quality throughout Australia is the subject of *The National Environment Protection Council (Ambient Air Quality) Measure 1998* (NEPM). This is a Commonwealth initiative to achieve nominated standards of air quality within ten years. Progress towards achievement of these goals is assessed by air quality measurements at locations in the regional airshed. Measurement and concentration goals are based on critical exposure times for health impacts and are thus different for various pollutants.

Table 5.1 details selected NEPM Ambient Air Quality Criteria.

Table 5.1 NEPM AMBIENT AIR QUALITY

Pollutant	Source	Averaging Period 1	Maximum Concentration	Allowable Exceedances
Carbon monoxide	NEPM	8 hours	9 ppm	1 day per year
Nitrogen dioxide	NEPM	1 hour	0.125 ppm	1 day per year
		1 year	0.03 ppm	none
Sulphur dioxide	NEPM	1 hour	0.20 ppm	1 day per year
		1 day	0.08 ppm	1 day per year
		1 year	0.02 ppm	none
PM_{10} particulates	NEPM	24 hours	150 $\mu g/m^3$	5 days per year
		Annual	50 $\mu g/m^3$	5 days per year

Notes: The measured concentrations are to be averaged for each hour of the day. The 8-hour average is a rolling average of those one hour averages. The 1 day average is a calendar day average.

Concentration criteria for long term annual averages and short-term 24-hour periods are considered. Two size ranges were addressed:

- total suspended particulate matter (TSP) or particles less than 50 microns (one millionth of a metre); and
- particles smaller than 10 microns (PM_{10}).

PM_{10} particle concentrations and $PM_{2.5}$ are of interest because they can reach the lower parts of the respiratory system and may have health impacts as well as amenity impacts. Most PM_{10} and $PM_{2.5}$ particles are caused by combustion from motor vehicles, bushfires and industrial processes. Some particles are generated by evaporation of sea spray and from vegetation. Dust generated through construction activity generally consists of coarser particles which have amenity rather than health impacts.

The short term air quality assessment criteria adopted for dust is based on United States Environmental Protection Agency (US EPA) standards adopted by the New South Wales Environmental Protection Authority (NSW EPA). This standard requires that a 24 hour concentration of 150$\mu g/m^3$ for PM_{10} should not be exceeded more than once per year.

The long term air quality assessment criteria adopted for dust is based on National Health and Medical Research Council of Australia (NHMRC) recommendations of a maximum annual concentration of 90 $\mu g/m^3$ total suspended particulates in a residential environment. For particles smaller than 10 microns, the US EPA standard of 50 $\mu g/m^3$ annual average has been adopted by the NSW EPA.

The Kwinana Industrial Area is Western Australia's major heavy industrial site. Resource extraction is one of the major long-term land uses in the area, and there are a number of leases in different parts of the region. Future use of the land is one of the key factors which underpins land use options in the area. As a result the Kwinana Regional Strategy established a buffer area based on air quality considerations. The Kwinana EPP (Atmospheric Waste), commonly referred to as the Kwinana EPP buffer has been established to maintain acceptable air quality around the Kwinana Industrial Area. The policy identifies three land use areas:

- Area A – contains heavy industry;
- Area B – is a buffer area surrounding industry, plus outlying land zoned for industrial use; and
- Area C – land used predominantly for rural and residential purposes.

The proposed development is situated within buffer areas B and C.

The policy, through associated regulations, sets objectives for each of these areas for concentrations of sulphur dioxide and particulate in the air. Recent monitoring results have shown that air quality standards for sulphur dioxide and particulate for the Kwinana EPP buffer are currently being met, and there has been an improvement in air quality within the buffer. Industry bodies would therefore require maintaining the availability of the air shed for further industrial development.

iii. Potential Impacts

An assessment of the air quality impacts of the proposed development was undertaken considering the local surrounding land use, knowledge of the proposed facility and existing air quality concentrations in the area. The potential impacts are outlined below.

a. Dust Combustion Processes

Dust from combustion engines is basically comprised of agglomerated carbon particles formed in the combustion region due to lack of oxygen. It is these particles that are possibly the most harmful, including dust particles from diesel emissions.

According to discussions with national and international regulatory authorities or agencies race-cars are not significant sources of emissions compared to normal on highway vehicles and other sources, and are therefore not regulated. Because race cars are utilised for discrete periods of time and the number of cars and distance travelled is usually minimal, emissions are generally low and disperse quickly. Also,

race cars cannot be directly compared to on-highway vehicles because they use different engine designs and fuels which should maximise power and efficiency and reduce emissions.

The quantity of all emissions generated is not expected to cause any undue annoyance for spectators and minimal local impact. Also, the size and air space available for dispersion will further reduce the effects of any resulting emissions.

b. Dust Mechanical Processes

Dust sources identified during race events will include:

- car parking activities;
- race activities on unpaved circuit (speedway only);
- dust plumes resulting in cars running into the verge area; and
- wind erosion from disturbed land.

When a vehicle travels on an unpaved road, the force of the wheels in the road surfaces causes pulverisation of the surface material. Particles are lifted and dropped from the rolling wheels, and the road surface is exposed to strong air currents in turbulent shear with the surface. The turbulent wake behind the vehicle continues to act on the road after the vehicle has passed. The quantity of dust emissions from a given road varies linearly with the volume of traffic. Field investigations have shown that emissions depend on the condition of the road and the associated traffic flow.

Much work in the US has been performed to ascertain the generation of dust attributed to different road situations. All the work to date has indicted that dust quantities will vary significantly with moisture content of the soil, silt size (particles smaller than 75 μm in diameter) and, the weight and frequency of the car. As the particle size and moisture content of the material increases the likelihood of dust emissions being generated will decrease.

Particle size range of the sand material on the speedway track is expected to be between 100 and 150μm and the track is expected to be continually watered. As a result dust emissions are not expected to cause any undue annoyance for spectators and minimal local impact. Also, the size and air space available for dispersion will further reduce the effects of any resulting emissions.

Denuding areas of vegetation for construction of the proposed Motorplex facility will result in destabilising the sandy soils and may lead to erosion. This has the potential to give rise to dust impacts during construction. These impacts will be

localised and can be effectively managed by implementing appropriate management measures.

iv. Management Measures

A wide variety of options exist to control emissions from unpaved (US EPA) roads. Available options span broad ranges in terms of cost, efficiency and practicability. In the case of the Motorplex facility there are several options available for dust suppression. These include:

- ensure all exposed areas around the track are minimal;
- ensure car parking areas are either paved or grassed;
- ensure all sand and sand clay particles on the speedway track have large particle size ranges (above 100 µm); and
- spraying water on all exposed surfaces to reduce dust emissions.

Further reduction in potential dust generation will be achieved by covering all exposed areas with vegetation.

v. Predicted Outcome

In relation to the NEPM Air Quality goals the proposed centre is not expected to exceed the criteria.

5.4.2 *Odour*

An assessment of the impacts of odour from operation of the proposed Motorplex facility was undertaken by ERM. The assessment report is provide in *Appendix D* and a summary of its findings is provided in the following section.

i. EPA Objective

The EPA's objective for odour is to:

- *ensure that odour emissions, both individually and cumulatively, meet appropriate criteria and do not cause a nuisance or human health problem; and*
- *use all reasonable and practicable measures to minimise the discharge of odours.*

ii. Applicable Assessment Standard or Procedure

No assessment criteria for odour currently exists in Western Australia, however the DEP are in the process of developing such criteria.

Presently, odour strength is measured under laboratory conditions by taking field samples of potentially odorous air, diluting these samples with clean air (if the sample is significantly odorous), and subsequently subjecting the samples to a qualified panel of people. The number of dilutions of the sample with clean air to reach the threshold of detection by panel members is recorded in a procedure known as 'dynamic olfactometry'. This procedure yields a measure of odour strength in 'odour units'. This is consistent with the Queensland odour criteria which the WA EPA has adopted as an interim approach to odour assessment.

In the *Amendment to the State Environment Protection Policy (The Air Environment)* (Victorian EPA, No. S 45, 6 June 1988), an odour unit is defined as:

> *"the dimensionless ratio of the volume which the sample would occupy when diluted, to, the odour threshold to the volume of the sample."*

An odour study will usually incorporate the following steps:

- estimate background odour concentrations;
- predict, using an approved model, the value of the combined ambient odour concentrations (aoc's) from the facility using existing data;
- prediction of the aoc's at potentially sensitive receptors; and
- compare to legislative preferred odour goals.

iii. Impact Assessment

Odour sources identified during race events include:

- fuel refilling activities;
- products of combustion; and
- rubber burning from rubber tyres (drag strip).

As fuel tanks are re-fuelled during race days the vapours contained in the fuel tank headspace are expelled as the tank is filled. Most races will involve a single refuelling period and the quantities are expected to be minimal for safety and weight

saving. The frequency and the quantity of re-fuelling is not expected to cause any undue odour annoyance.

Quantity and frequency of products of combustion are not expected to cause any undue odour annoyance.

It is expected that odour from rubber burning (associated with wheel spinning) will cause localised odour increases but the frequency and available headspace for dispersion will minimise the area impacts.

iv. Management Measures

It is not expected that odour management methods, such as vapour recovery systems, will be required for the facility, as impacts will be minimal. Although it is prudent to ensure that good housekeeping practices are employed. It is likely that potential minor odour impacts can be attributed to re-fuelling operations and storage, fuel or hydrocarbon spills, drag strip practices and putrescible waste management practices for food and scrap disposal. Guidelines are available for the management of each of these areas and will be used where practical.

v. Predicted Outcome

Impacts from odour as a result of the proposed development are expected to be minimal. As long as good house keeping practices are employed for activities such as re-fuelling and the handling, storage and disposal of putrescible waste, odour related impacts will be insignificant.

As odour complaints have not been received for any events that have taken place at venues similar to this centre, it is expected that the Kwinana Motorplex will comply with the EPA criteria for odour.

5.4.3 Groundwater Quality

Objectives and management measures are proposed to protect groundwater resources and in doing so protect the ephemeral surface water quality.

i. EPA Objective

The EPA objectives are to:

- *Ensure that the facility does not interfere with the existing management of groundwater quality from the bauxite residue area, and that any dewatering required for the facility is properly managed; and*
- *Ensure that the proponent implements sound design and management practice to avoid contamination of surface and groundwater from the operations.*

Both of these objectives also relate to protection of surface water quality.

ii. Applicable Assessment Standard or Procedure

Interference of the Motorplex on Alcoa's groundwater management activities is assessed by review of both Alcoa's existing and proposed operations and the proposed Motorplex operations.

Proposed dewatering activities are not regulated but are assessed by compliance with the WRC's Draft Water Quality Protection Note: *Dewatering of Construction Sites*. The Note provides guidelines that serve to protect groundwater quality.

Protection of groundwater from contamination are assessed by review of proposed activities and functions of the Motorplex.

iii. Impact Assessment

Alkaline liquor perched within the RSAs is mostly isolated from the shallow groundwater although leakage occurs. Protection of the liquor from further contamination is required to ensure that Alcoa's operations are not impacted.

Ongoing management of existing and potential future groundwater contamination from Alcoa's operations will be managed by Alcoa for a period to be agreed with the WA Government.

a. Engineering Works

Proposed engineering works relating to Alcoa's RSAs include excavation of a small volume of residue for the speedway circuit. Subsequent reinstatement of the clay embankment seal will be required. Excavated residue material will be disposed of in an appropriate landfill facility.

There may be a small potential for loss of alkaline water to the environment during construction, depending on the extent of earthworks. Proper dewatering of the residue prior to any construction or excavation beneath the level of alkaline liquor within the RSAs would negate the risk of impact.

The possibility that Alcoa's residue liquor or groundwater monitoring borefield will be affected cannot be assessed at this stage although some monitoring bores are likely to be removed. It may be possible to reinstate access to existing or replacement piezometers, depending on operational issues.

b. Dewatering

Dewatering is not likely to be required during excavation works into the RSAs. However, should dewatering be required, alkaline discharge would be directed to the B Surge Pond.

c. Drainage Disposal

Drainage disposal into infiltration basins is based on the following main principles (Sean Sandford, van der Meer, 1999):

- drainage from residue areas will be disposed of into infiltration basins within the residue areas;
- drainage from clean soil, made surfaces and natural soils will be disposed of via infiltration basins into the natural soils; and
- infiltration basins serving areas with potential sources of hydrocarbons (parking areas, pit areas, vehicle service and washdown areas, dragstrip) will be fitted with appropriate contaminant separation facilities.

If required, residue would be relocated or capped such that the site drainage can be divided into residue drainage areas and natural or clean fill areas.

The total volume of stormwater infiltrating the residue, and subsequently the B surge pond will be marginally greater than the current situation.

Any overflow from infiltration basins during extreme rainfall events would be contained within the RSAs and would ultimately infiltrate the residue and drain to the B surge pond.

d. Groundwater Supply

The Motorplex will require application of approximately 70kL/week of water for track conditioning during the September to March season. It is proposed to utilise shallow groundwater, either from an existing bore or by installing a new bore.

Operation of an existing bore at a duty of approximately 1,000kL/week has no impact on Alcoa's groundwater recovery operations. Any additional groundwater supply would need to be approved by the WRC and would need to be located near or west of the existing supply bore (within the proposed Speedway track) to avoid drawing in alkaline groundwater.

e. Hazardous Materials and Wastes

Storage and handling of hazardous materials such as fuels, oil and solvents have the potential to impact groundwater quality through inappropriate handling or disposal practices. Accidental or routine releases of hazardous materials or wastes have the potential to degrade the quality of stormwater runoff. Subsequent disposal of impacted stormwater would have the potential to impact the environment.

Fuel is brought on-site in 20L containers by individual competitors. Bulk fuel storage on-site would be limited to up to 1,000L of diesel to be stored in an approved, licensed facility. Fuel tanks in most race vehicles are double-contained for personal safety reasons. There is thus negligible opportunity for significant hydrocarbon spills within the Motorplex. Runoff from areas where fuel is handled (the pit areas) will be drained to an infiltration basin. The runoff would be treated with a gravity separator to remove hydrocarbons prior to discharge.

The thickness (over 25 metres, Haselgrove and Thomas, 1999) of residue and its low permeability clay basal liner would assist in mitigating any potential impacts on groundwater quality resulting from surface or shallow subsurface releases of hazardous substances in the RSAs. Groundwater outside the RSAs is more vulnerable to contamination. It is considered unlikely that negative impacts on groundwater quality will result from operation of the Motorplex under normal and foreseeable conditions.

f. Groundwater Receptors

Potential groundwater receptors downgradient of the site include:

- an un-named dampland;
- Cockburn Sound; and
- licensed and unlicensed groundwater users.

There are approximately 22 registered bores in the general (north-westerly) down-gradient direction from and within 1.5 kilometres of the RSAs. Recovery and monitoring bores installed by Alcoa are not considered. No impacts on the groundwater users from the construction or operation of the Motorplex are anticipated.

There are no surface water pathways from the study area to any of the receptors identified above.

iv. Management Measures

Management of existing and potential future groundwater contamination from Alcoa's operations would be conducted by Alcoa for a period to be agreed with the WA Government.

Reinstatement of the clay liner enclosing the residue will be required should any excavation works disturb the clay liner.

Any excavated residue that cannot be accommodated on-site will be disposed in an appropriate licensed landfill facility.

Impacts on Alcoa's groundwater management activities would include possible damage of residue liquor and/or groundwater monitoring or production bores. Replacement of affected bores and provision of long term access for monitoring purposes may be necessary.

Surface drainage from areas where fuels and oils are handled or decanted will be directed into infiltration basins within the RSAs. Floating hydrocarbons and sediment will be trapped and recovered from runoff entering the infiltration basins. These impacts could be further minimised by bunding or roofing the areas where fuels and oils are handled.

Stormwater drainage from RSAs will be discharged into infiltration basins within the RSAs. Drainage from made surfaces and natural soils will generally be disposed of into infiltration basins located outside the RSAs.

Surface contours will be established or maintained such that overflow of infiltration basins within the RSAs does not discharge to the environment or operational areas.

Groundwater exploration and bore construction for the Motorplex groundwater supply would be subject to the approval of the WRC. Any newly constructed bores will be located and managed such that there is no negative impact on Alcoa's groundwater management operations.

All fuel and chemical storage areas will be managed such that there is no risk of accidental leakage that may enter the environment. All fuel and chemical storage areas will be appropriately licensed and will include appropriate bunding and shelter to negate the generation of contaminated runoff.

Waste materials will be disposed of or recycled off-site. Temporary on-site waste storage arrangements will mitigate the potential for surface water or groundwater impact from waste storage areas. Sealed waste skips or bunded tanks will be used to hold solid and liquid wastes respectively.

A contingency plan will be developed to respond to releases of potential environmental contaminants from the Motorplex operations

A drainage management plan will be prepared for construction works (including dewatering) and long term operation of the Motorplex to ensure protection of groundwater and surface water.

v. Predicted Outcome

The proposed operations would have no significant impact on local groundwater quality. The impact on Alcoa's groundwater management activities will need to be discussed and agreed between Alcoa and the State Government.

5.4.4 *Surface Water Quality*

i. EPA Objective

The EPA objectives are to:

- *Ensure that the facility does not interfere with the existing management of groundwater quality from the bauxite residue area, and that any dewatering required for the facility is properly managed; and*
- *Ensure that the proponent implements sound design and management practice to avoid contamination of surface and groundwater from the operations.*

Both of these objectives also relate to protection of groundwater quality.

ii. Applicable Assessment Standard or Procedure

Proposed dewatering activities are not regulated but are assessed by compliance with the WRC's Draft Water Quality Protection Note: *"Dewatering of Construction Sites"*. The Note provides guidelines that serve to protect surface water quality.

Protection of surface water from contamination is assessed by review of proposed activities and functions of the Motorplex.

iii. Impact Assessment

Surface water on the site does not occur due to the high infiltration capacity of the sandy soil. Shallow aquifers are directly recharged after significant rainfall. Small volumes of runoff may be generated from the RSA surfaces. Drainage within the RSAs directs runoff ultimately to the B surge pond and subsequent recycling in Alcoa's refinery. Runoff generated from the outer surfaces of the embankment walls infiltrates directly into the sandy soils.

Runoff generated from paved surfaces outside the RSAs will be discharged into the groundwater via surface infiltration or infiltration basins.

Consideration of the potential surface water impacts is therefore included in the groundwater assessment outlined in Section 5.4.3.

The impact assessment for groundwater (Section 5.4.3.*iii*) incorporates the potential impacts on surface water from the Motorplex.

iv. Management Measures

A detailed drainage strategy will be prepared to address potential impacts on surface water and groundwater as described in Section 5.4.3. Management measures proposed for the protection of groundwater (Section 5.4.3.*iv*) incorporate measures to protect the quality of any surface water generated from the site.

v. Predicted Outcome

Proposed surface water management measures would effectively negate any potential negative impact on surface water quality.

5.4.5 *Solid and Liquid Wastes*

i. EPA Objective

The EPA objectives are to:

- *Ensure that wastes are contained and isolated from ground and surface water surrounds and treatment or collection does not result in long term impacts on the environment; and*
- *Ensure wastes are managed in accordance with the waste management hierarchy, that is, avoid, minimise, recycle, treat and dispose.*

ii. Applicable Assessment Standard or Procedure

The DEP (Gordon Houston, WMD) require that wastes are dealt with according to the waste management hierarchy (above). Practices to avoid the risk of water, soil or air contamination are recommended.

iii. Impact Assessment

Waste materials and issues that would be generated on site include:

- waste oil, vehicle parts and repair wastes;
- wash-down wastes;
- sewerage;
- general wastes; and
- waste segregation.

a. Waste Oil, Vehicle Parts and Repair Wastes

Waste materials generated by competitors, including fuels and oils, are brought in and removed from site by the competitors. Vehicle parts from track collisions are removed by the vehicle owner or are stored on-site before disposal by the Motorplex operators. Provision for waste oil recycling will be provided to competitors to ensure proper disposal.

b. Wash-Down Wastes

Wash-down areas will generate sediment, waste-water and traces of floating hydrocarbons. Sediment would be re-used on the Speedway track. Waste-water would be discharged to infiltration basins within the RSAs. The hydrocarbons would be recovered by an oil-water separator and removed from site by contractor.

c. Sewage

The site is proposed to be connected to deep sewer, therefore disposal of sewerage would not present any environmental concern.

d. General Wastes

General wastes would be stored in covered skips prior to periodical removal by a contractor. Any liquid wastes would be stored undercover in a bunded area prior to periodical removal and proper disposal or recycling by a contractor.

Spectator and other wastes would be removed from site each Monday following weekend events.

e. Waste Segregation

Waste materials would be segregated into the following streams:

- putrescible wastes;
- aluminium cans and other aluminium products; and
- waste oils and hazardous materials.

iv. Management Measures

The following management measures are proposed:

- use, storage or generation of hazardous materials will be avoided where possible;
- use, storage or generation of hazardous materials will be minimised where it cannot be avoided;
- waste oil and other liquid wastes will be collected in suitable sealed and bunded containers and will be recycled by a licensed contractor;
- storage facilities will be provided to segregate other recyclable wastes;

- suitable access and facilities to assist in recycling of wastes will be provided; and

- putrescible wastes will be stored in sealed bins and emptied early in the week following events.

v. Predicted Outcome

Wastes generated on the site can be managed to comply with the EPA Objectives.

5.4.6 Noise and Vibration

A noise and vibration assessment was undertaken by ERM for this project. A copy of the detailed noise impact assessment report is provided in *Appendix E*. The following sections are a summary of that report.

i. EPA Objective

The EPA's objective for noise and vibration is to:

- *ensure that noise impacts emanating from the proposed raceway comply with statutory requirements and acceptable standards.*

ii. Applicable Assessment Standard or Procedure

Noise is managed under the Environmental Protection (Noise) Regulations 1997, which come under the Environmental Protection Act 1986. The Regulations prescribe assigned noise levels at noise sensitive premises, for example residential uses, dependent on:

- the land uses within the vicinity of the noise sensitive premises (the influencing factor);

- the duration of time for which the noise is present; and

- the time of day or night when the noise occurs.

The assigned noise levels are specified in terms of an L_{amax}, (maximum noise level), an L_{A1}, (noise level exceeded for 1% of the time) or L_{A10} (noise level exceeded for 10% of the time). The assigned levels applicable to a particular proposal is dependent upon the duration of the noise event over a representative time period.

Where noise levels are found to exceed the regulations, an exemption under either the Regulations or the Act must be approved for the proposal to proceed.

iii. Impact Assessment

Racing of drag and speedway vehicles will result in noise impacts. The length of time each vehicle races varies considerably and this can be matched to the three assigned noise levels stated in the Regulations.

The closest residential areas to the Motorplex include Medina to the south and Hope Valley and Wattleup to the north. As a result of their location within the Kwinana air quality buffer zone, premises in Hope Valley and Wattleup will attract an influencing factor of approximately 9 dB, in accordance with the Regulations. Noise sensitive premises in Medina may also attract an influencing factor but conservatively the influencing factor could be zero in some areas.

This gives the following assigned noise levels for the Motorplex, assuming night-time operation:

- Medina
  - L_{Amax} 55 dB(A)
  - L_{A1} 45 dB(A)
  - L_{A10} 35 dB(A)
- Hope Valley/Wattleup
  - L_{Amax} 64 dB(A)
  - L_{A1} 54 dB(A)
  - L_{A10} 44 dB(A)

Predicted noise levels vary with the influence of the wind direction. The most common wind direction for the Kwinana/Rockingham area, during the racing season of October through to April, is from the south. Predicted noise levels under these meteorological conditions together with the relevant assigned noise levels are presented in *Tables 5.2* to *5.5*. For comparison purposes, sound pressure levels of some typical noise sources are presented below:

- Low flying jet aircraft 85 to 100 dB(A)
- 10 metres from a truck travelling down a road 75 to 85 dB(A)

- Light aircraft taking off or landing — 70 to 75 dB(A)
- 10 metres from a car travelling down a road — 60 to 70 dB(A)
- Typical office noise — 45 to 60 dB(A)
- General background levels — 35 to 45 dB(A)

Table 5.2 MEDINA – MOST COMMON WIND CONDITION

Race Vehicle Type	Predicted Noise Level	Percentage of Time Over a Four Hour Period	Assigned Noise Level
Top Fuel Dragster	72 dB(A)	0.17%	55 dB(A)
Top Comp	56 dB(A)	0.89%	55 dB(A)
Super Gas	48 dB(A)	8.14%	45 dB(A)
Speedway	48 dB(A)	21%	35 dB(A)

Notes: *Noise predictions have been prepared using the most common and worst case meteorological conditions. In the case of Medina, these are different. For Hope Valley and Wattleup the worst case and most common wind conditions are the same.*

Table 5.3 MEDINA – WORST CASE WIND CONDITION

Race Vehicle Type	Predicted Noise Level	Percentage of Time Over a Four Hour Period	Assigned Noise Level
Top Fuel Dragster	88 dB(A)	0.17%	55 dB(A)
Top Comp	72 dB(A)	0.89%	55 dB(A)
Super Gas	62 dB(A)	8.14%	45 dB(A)
Speedway	62 dB(A)	21%	35 dB(A)

Notes: *Noise predictions have been prepared using the most common and worst case meteorological conditions. In the case of Medina, these are different. For Hope Valley and Wattleup the worst case and most common wind conditions are the same.*

Table 5.4 HOPE VALLEY – MOST COMMON AND WORST CASE WIND CONDITION

Race Vehicle Type	Predicted Noise Level	Percentage of Time Over a Four Hour Period	Assigned Noise Level
Top Fuel Dragster	97 dB(A)	0.17%	64 dB(A)
Top Comp	81 dB(A)	0.89%	64 dB(A)
Super Gas	72 dB(A)	8.14%	54 dB(A)
Speedway	74 dB(A)	21%	44 dB(A)

Notes: Noise predictions have been prepared using the most common and worst case meteorological conditions. In the case of Medina, these are different. For Hope Valley and Wattleup the worst case and most common wind conditions are the same.

Table 5.5 WATTLEUP – MOST COMMON AND WORST CASE WIND CONDITION

Race Vehicle Type	Predicted Noise Level	Percentage of Time Over a Four Hour Period	Assigned Noise Level
Top Fuel Dragster	78 dB(A)	0.17%	64 dB(A)
Top Comp	66 dB(A)	0.89%	64 dB(A)
Super Gas	58 dB(A)	8.14%	54 dB(A)
Speedway	58 dB(A)	21%	44 dB(A)

Notes: Noise predictions have been prepared using the most common and worst case meteorological conditions. In the case of Medina, these are different. For Hope Valley and Wattleup the worst case and most common wind conditions are the same.

The results show that noise levels resulting from racing activities at the Motorplex site will exceed the Environmental Protection (Noise) Regulations 1997.

In respect to vibration, due to the distances involved and the fact that vehicles will be driven on rubber tires, vibration will not be perceptible at the residential areas.

iv. Management Measures

Noise levels have been mitigated as far as is practicable through the design of the Motorplex. Design initiatives have included large noise barriers around both the drag racing strip and the speedway track, as well as lowering the ground levels of the tracks to below the ground level of the surrounding area. In addition the public address system will be appropriately designed to ensure that noise from this source is at, or below, background levels at the nearest residences.

As an exemption will be required, a noise management plan will need to be prepared. Typically a noise management plan will include:

- specified finishing times for events;
- monitoring of noise levels;
- restrictions on numbers of major events;
- advertising the program of events to affected residents; and
- implementation of a complaints handling system.

v. Predicted Outcome

With the noise mitigation measures incorporated in the design of the Motorplex, the noise levels are predicted to exceed the Environmental Protection (Noise) Regulations 1997, at times when vehicles are racing.

5.4.7 *Light Spill*

i. EPA Objective

The EPA's objective for light is:

- *to manage potential impacts from light spill and comply with acceptable standards.*

ii. Applicable Assessment Standard or Procedure

The guidelines prepared for the assessment require consideration of any potential impacts of light overspill on residential areas and management of these impacts where required.

The EPA does not have any specific criteria or guidelines for the assessment of light spill, however, Australian Standard AS 4282 - 1997 for the 'Control of the obtrusive effects of outdoor lighting' provides some guidance.

iii. Impact Assessment

AS 4282 indicates the levels which should be achieved in particular areas, at different times of the day. This can be measured in three ways:

- to take account of light spill (E_v);
- intensity of the lights if they can be seen directly by residents; and
- light glare for drivers.

The latter two items are not considered to be an issue. The lights will be sufficiently low enough and distant enough and oriented directly away from the highway not to affect drivers. The lights are distant enough from residential areas not to have an impact. The nearest residences at Hope Valley are approximately one kilometre from the northern pit areas at the site and the nearest residences at Medina are approximately two kilometres from the southern end of the dragway.

In addition, the topography of the area between the proposed site and Medina contains a number of high points which are approximately 10 metres higher that the average levels of the site. This will ensure that residents in Medina will not see the lights of the facility at all.

Most of the lights parallel to Rockingham Road will be facing due east or east-south-east so therefore will not have an impact on the industrial areas to the west or drivers on Rockingham Road, Thomas Road or Anketell Road.

The values for light spill as specified in AS4282 are shown in *Table 5.6*.

Table 5.6 MAXIMUM VALUE FOR LIGHT LEVELS AS MEASURED BY E_v

Conditions[1]	Recommended Max Values		
	In commercial areas or at boundary of commercial/residential	Residential Areas	
		Light Surrounds	Dark Surrounds
Pre-curfew[2]	25 lux	10 lux	10 lux
Curfew Hours[2]	4 lux	2 lux	1 lux

Source: AS4282

Notes:
1. *Light levels are measured on the basis of the illuminance in the vertical plane (E_v) parallel to the relevant boundary at a height commensurate with a residential dwelling or commercial building.*
2. *Pre-curfew refers to the hours before a pre-determined cutoff point for operation. The Motorplex curfew has not been set but is likely to be 10.30pm or 11.00pm.*

The lighting for the Motorplex is specified as part of the overall design documentation for the site. The lighting engineers, Connell Wagner, have advised that the levels are being designed such that:

- at a distance of 50 metres from the start of the quarter mile of the drag racing track, the light levels will be 10 lux; and
- at a distance of 20 metres from the quarter mile and the end of the drag strip, the light levels will be 10 lux (pers. comm. David Goodwin, Connell Wagner).

Therefore there will be no light spill impacts on nearby residents or commercial areas.

iv. Predicted Outcome

The light requirements of the Motorplex will be designed to ensure that light spill is minimised and will not have impacts on residents at Hope Valley or Kwinana. No additional management measures are required.

5.5 SOCIAL SURROUNDINGS FACTORS

5.5.1 Individual Risk

i. EPA Objective

The EPA objective for Individual Risk is:

- *Ensure that the risk to spectators from the adjacent industry is managed to meet the EPA's criteria for individual fatality risk and the Department of Minerals and Energy's (DME) requirements in respect of public safety.*

ii. Applicable Assessment Standard or Procedure

Individual risk has been evaluated in all hazardous industries built in Kwinana since 1985. The current EPA interim criteria for individual risk (EPA, 1998) are:

- A risk level in residential zones of one-in-a-million per year (1×10^{-6}) or less, is so small as to be acceptable to the EPA;

- A risk level in '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 (0.5×10^{-6} to 1×10^{-6}) or less is so small as to be acceptable to the EPA;

- Risk levels from industrial facilities should not exceed a target of fifty-in-a-million per year (50×10^{-6}) at the site boundary for each individual industry, and the cumulative risk imposed upon an industry should not exceed a target of one-hundred-in-a-million per year (100×10^{-6});

- A risk level for any non-industrial activity located in buffer zones between industrial facilities and residential zones of ten-in-a-million per year (10×10^{-6}) or less is so small as to be acceptable to the EPA; and

- A risk level for commercial developments, including offices, retail centres and showrooms activity located in buffer zones between industrial facilities and residential zones of five-in-a-million per year (5×10^{-6}) or less, is so small as to be acceptable to the EPA.

This interim criteria will be finalised after July 1999. The DEP advises that the Motorplex would fall into the category of a commercial development located in buffer zones. The maximum permissible fatality risk is therefore five-in-a-million per year according to the current criteria.

iii. Impact Assessment

The cumulative individual risk from all activities within the Kwinana Industrial Area has been assessed in previous studies. In 1995 a study was completed by AEA Technology that developed the cumulative individual risk for the Kwinana area. The report included the cumulative risk in 1994 and a prediction of the individual risk in 2020. The study was updated in 1998 to produce a new estimate of the individual risk in 2020 (AEA Technology, 1998). The results of the studies, showing the cumulative individual risk, are shown in *Figure 5.1* (Actual, 1994 - WA Planning Commission, 1999) and *Figure 5.2* (Predicted, 2020 - WA Planning Commission, 1999).

The results for 1994 show that the majority of the proposed site is outside the 1×10^{-6} contour (ie. the individual risk is less than one-in-a-million) with a small section at the end of the drag strip crossing the contour. The 5×10^{-6} contour was not included in the published figures as this level of individual risk was only introduced into the criteria in 1998. However, inspection of the figures indicates that it is highly unlikely that the 5×10^{-6} contour will cross the site boundary. This indicates that the proposed location is in a zone that is acceptable for commercial activities according to the criteria for the current industry.

Figure 5.1 INDIVIDUAL FATALITY RISK CONTOURS 1994 (ALL ACTIVITIES)

299033/SocRs1.fh7

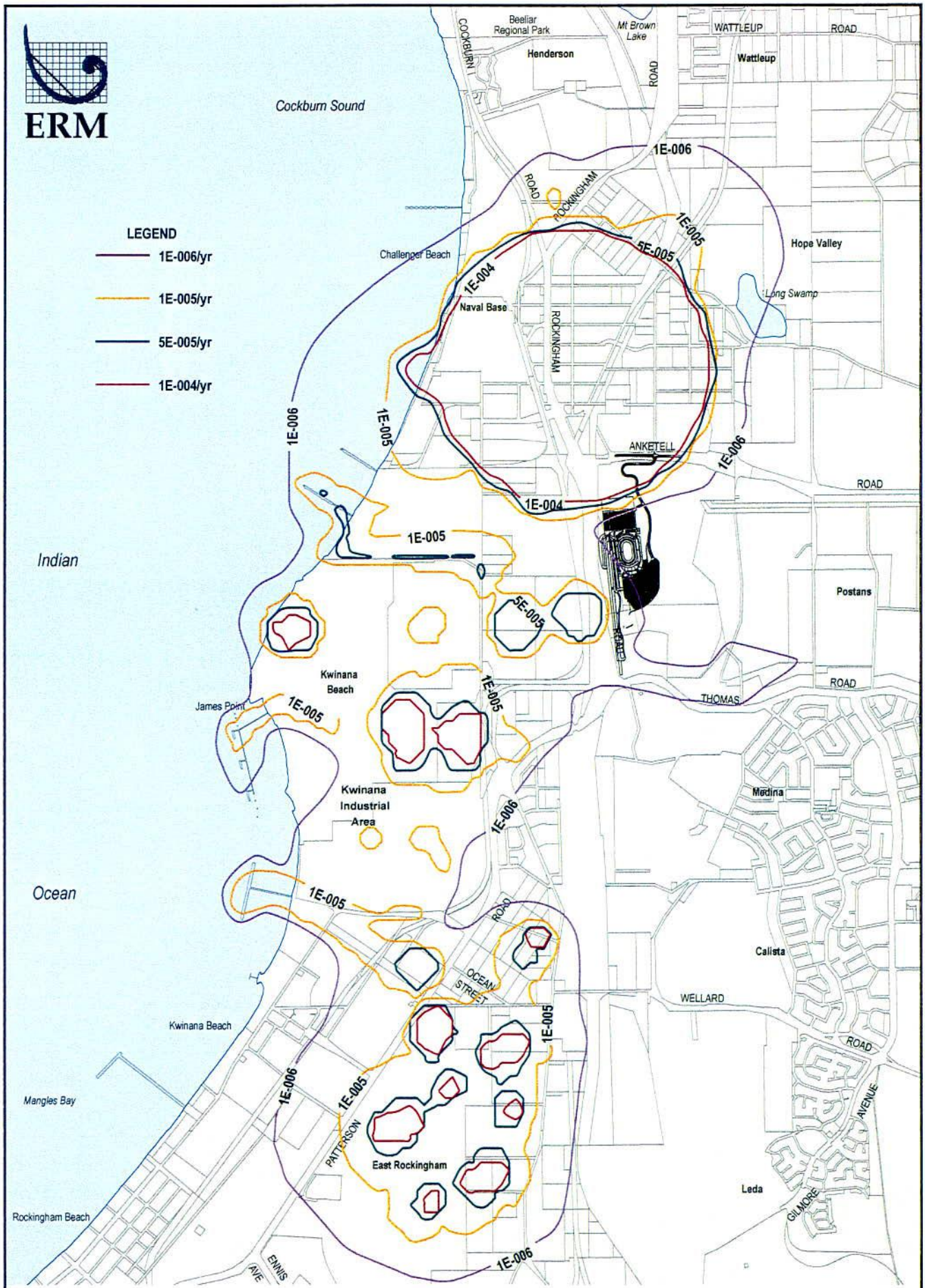


Figure 5.2 INDIVIDUAL FATALITY RISK CONTOURS 2020 (FULL DEVELOPMENT SCENARIO)

299033/SocRis2.fh7

For the predicted 2020 cumulative risk, the 1×10^{-6} contour passes through the centre of the proposed site and the 10×10^{-6} contour touches the western boundary of the proposed site. The 5×10^{-6} contour would therefore pass through the site. This indicates that the predicted individual risk in 2020 is above the maximum permissible according to the current EPA criteria for commercial developments. However, the 2020 individual risk contours are a prediction and the actual case in 2020 may be significantly different. Careful control of the development around the proposed site would be required to ensure that the EPA individual risk criteria are not exceeded. In particular, the postulated industrial development on the western side of the Motorplex site would result in the criteria being exceeded.

It should also be noted that the individual risk criteria is based on a commercial development rather than a sports complex. This means a more stringent individual risk criteria has been applied than would be used for other "non-industrial" developments.

iv. Management Measures

Management measures would involve continuing the process of requiring an assessment of the risk posed by all new hazardous industries in the Kwinana area. Any industry that produces risk that affects the boundary of the proposed site would also be required to assess the effect on the cumulative risk at the proposed site. The operator of the Motorplex facility would be required to liaise with local hazardous industries to ensure potential hazardous events were known and understood, and all measures were being taken to control the risk. A comprehensive Emergency Response Plan (ERP), including early warning from any site where an incident occurs, would need to be developed. The surrounding hazardous sites ERPs would need to be updated to include the Motorplex.

The Motorplex facility will include safety features such a PA system to all areas of the complex and an FM radio broadcast system to allow communication with patrons while they are within their vehicles. This will allow control of traffic flow and updates on preferred escape routes to departing vehicles. The entry and exit to the carpark has been design for smooth and prompt exit with a minimum of three lanes exiting to Anketell Road.

v. Predicted Outcome

The proposed development meets the applicable individual risk criteria for the level of industrial developments in the Kwinana Industrial Area in 1994. However, continued assessment will be required to ensure that future industry does not cause the individual risk levels to become unacceptable. This may potentially restrict future development of hazardous industries in the vicinity of the Motorplex.

5.5.2 *Road Traffic*

i. EPA Objective

The EPA's objective for road traffic is to:

- *ensure that the increase in traffic activities resulting from the project does not adversely impact on the social surroundings.*

ii. Applicable Assessment Standard or Procedure

There are no formally documented traffic impact assessment standards or procedures set out by the local Council or the MfP. The investigation and reporting requirements are determined on a case by case basis.

This is typically accomplished in discussions between the consulting traffic engineers, the property developer, the local council and the MfP. The scope of work undertaken by Connell Wagner for the traffic component of the Motorplex is described below:

- review vehicle access requirements into and out of the site and provide appropriate traffic design;
- provide a traffic and pedestrian management strategy for the site to provide an efficient and safe level of service;
- provide an appropriate car park layout and design;
- undertake liaison with relevant authorities in terms of transportation issues; and
- provide an appropriate traffic design for the internal road system.

iii. Impact Assessment

A report titled *"International Motor Sport Complex, Kwinana: Traffic and Parking Impact Assessment"* was prepared by Connell Wagner (dated 25 May 1999). The following sections are a summary of the Connell Wagner report.

The report discusses the following background issues and potential traffic impacts generated by the development. It provides:

- a description of the surrounding road system, identification of the function of the roads and identification of the responsible traffic authorities for the various roads;
- a quantification of the peak traffic generation from the site, the destinations for traffic exiting the site at the completion of events, and the need for adequate lane capacity and safe intersections onto the regional road system;
- a quantification of the peak parking demand and the need for an efficient internal circulation system; and
- a discussion of the necessity to provide for suitable emergency vehicle access to the site.

The potential traffic issues are discussed in turn below.

1. Regional Road System

Anketell Road is a two lane road under the control of the local authority and the MfP.

Rockingham Road and Thomas Road are dual carriageway four lane roads under the control of Main Roads Western Australia (Main Roads).

The future Fremantle to Rockingham Highway Interchange at Anketell Road is situated to the east of the development site.

Main Roads have advised that funds have been allocated to install traffic signals at the intersection of Anketell Road and Rockingham Road.

2. Local Roads

Abercrombie Road is a two lane rural road connecting Thomas Road to Anketell Road and Hope Valley Road in the north.

The Rubbish Tip and Quarry Access Road connects to Thomas Road to the south of the site.

Armstrong Road serves the industrial estate across Anketell Road. It passes through the Hope Valley residential area and connects to Hope Valley Road which connects in turn to Rockingham Road. Armstrong Road currently forms a T-junction with Anketell Road and operates under priority control.

3. Peak Traffic Generation and Distribution Pattern

Table 5.7 shows the predicted vehicle numbers and the routes used to exit the site for two spectator scenarios. The spectator scenarios include:

- Scenario A a total of 4,500 spectator vehicles; and
- Scenario B: a total of 2,000 spectator vehicles.

The traffic data for each scenario is divided into Northbound and Southbound destination categories.

Table 5.7 PREDICTED VEHICLE NUMBERS

Scenario	No of spectator vehicles	Northern Exit (assumes 90 % will travel north)	Southern Exit (assumes 10% will travel south)	
		To Kwinana Freeway (east)	To Rockingham Road (west)	To Thomas Road
Scenario A	4,500	3,150	900	450
Scenario B	2,000	1,400	400	200

To adequately disperse the predicted vehicle numbers from the site (within one hour), for Scenario A, five exit lanes are required and for Scenario B, three exit lanes are required.

4. Peak Parking Demand

Peak parking demand is directly linked to the derived traffic generation figure. In effect, the parking area is assumed to be fully occupied with the 4500 spectator vehicles (Scenario A) or the 2000 spectator vehicles (Scenario B).

5. Emergency Vehicle Access

Due to the very high traffic management task at the end of events and the likelihood of congestion as vehicles discharge from the site, emergency vehicle access has been identified as an important issue.

iv. Management Measures

The report by Connell Wagner adopts the following general strategies for dealing with the traffic impacts associated with the development:

- identify the number of accesses and the number of traffic lanes necessary to cater for the two scenarios of spectator traffic exiting the site at the termination of events;
- find access locations onto the nearby regional road system which provide adequate sight distance and spacing relative to other access points;
- identify appropriate intersection control methods to manage the peak traffic conditions as spectators exit the development;
- design a high capacity internal circulation system to link the parking area to the regional road system; and
- identify possible independent access routes for emergency vehicles.

a. Access Constraints

Direct access to Rockingham Road will not be allowed by Main Roads except for emergency vehicle access. Furthermore, the use of a southern access to Thomas Road was abandoned on the basis of 'residential impacts related to local traffic concerns'. As a result, Anketell Road is the sole regional road providing direct site access.

b. Proposed Access Arrangements

The proposed primary access onto Anketell Road is located 100 metres west of Armstrong Road. This position provides the best sight distance and results in a staggered T-junction configuration with Armstrong Road. The staggered T-junction configuration provides the following benefits:

- less complex and thus safer access manoeuvres onto/from Anketell Road;
- less likelihood that signals will be required to safely control traffic conflicts; and
- less likelihood of Motorplex traffic filtering through Hope Valley (via Armstrong Road and Hope Valley Road enroute to Rockingham Road).

The proposed main access intersection geometry provides:

- dual right turn lanes from the main access road onto Anketell Road;
- a left turn slip and acceleration lane from the main access road onto Anketell Road;
- a right turn lane from Anketell Road onto the main access road; and
- a deceleration and left turn lane from Anketell Road onto the main access road.

The secondary access onto Anketell Road is restricted to 'left in/left out' movements and is located between the main access and Rockingham Road. The distance to Rockingham Road from the secondary access is approximately 250 metres. The secondary access is intended to facilitate travel to Rockingham Road by avoiding vehicle queues near the main access junction with Anketell Road.

At the Rockingham Road/Anketell Road intersection it is proposed to construct:

- two turn lanes to cater for right turns from Anketell Road to Rockingham Road; and
- a dedicated left turn lane from Anketell Road to Rockingham Road.

To enhance operations at the two accesses and the improved Rockingham Road intersection, improvements are proposed for Anketell Road. An upgrade to a divided four lane standard is proposed for the section from the Rockingham/Anketell Road intersection to approximately 500 metres to the east of the main access. This represents improvements to nearly one kilometre of Anketell Road.

Finally, Main Roads has indicated that it will allow emergency vehicle access to Rockingham Road from the 'pit area' of the Motorplex. This advice is conditional that the emergency exit will be fenced and be provided with a locked gate.

c. Traffic Management Measures

The Connell Wagner report indicates that traffic marshalls will be required at peak traffic periods both within the site (to facilitate movement between parking areas and the accesses on Anketell Road) and at the access junctions with Anketell Road (to manage traffic conflicts with non-site traffic on Anketell Road).

Although the report briefly mentions the use of variable message signs along Anketell Road to help moderate travel speeds during congested periods, it does not

refer to efforts to direct non-site traffic away from Anketell Road. This strategy could prove beneficial in reducing traffic impacts and should be considered as part of the traffic management planning before the larger events.

Communication via radio, print media, and via transportable variable message signs near Kwinana Freeway and on Rockingham Road may be useful. The use of signs within the site advising of delays via the various exit routes (eg. Rockingham Road versus Anketell Road/Kwinana Freeway) may also be viable.

v. Predicted Outcome

Although the site is very well situated relative to the regional road system, constraints on access to Rockingham Road and Thomas Road have limited site access possibilities.

The proposed accesses onto Anketell Road, the improvements to the Rockingham Road/ Anketell Road intersection and improvements to Anketell Road provide the highest practicable road capacity configuration. Despite this high traffic capacity, it is predicted that long delays (up to 1.5 hours) will be experienced exiting the site at the end of high capacity events (ie. 4500 spectators). Anketell Road will also experience high levels of traffic congestion for these limited periods and non-site traffic will thus also be inconvenienced at these times. It is likely that some congestion will also develop on Rockingham Road in the vicinity of the Anketell signalised intersection.

Traffic related social amenity (for local residents) should benefit from the access constraints placed upon the site as well as from design features built into the access configuration on Anketell Road. The main local traffic impacts which need to be monitored relate to the Hope Valley residential area. Some barriers to access via Armstrong Road may need to be devised if Motorplex related through traffic problems develop.

5.5.3 Visual Amenity

i. EPA Objective

The EPA's objective for visual amenity is to:

- *ensure the visual amenity of the area is not unduly affected by implementation of the raceway.*

ii. Applicable Assessment Standard or Procedure

At present, Western Australia has no guidelines, standards or regulations for assessing visual impacts for proposed developments. It is however, recognised that visual impact is considered to be an important factor to the local community. The potential for the development to impact on the visual amenity of the area has therefore been assessed and is outlined below.

iii. Impact Assessment

The current land topography of the study area and its surrounds prevents the facility being viewed from the nearby towns of Hope Valley or Medina. Glimpses of the proposed development would however be possible from sections of Rockingham Road and Thomas Road.

To assist with the visual assessment, several visual images of the proposed Motorplex were prepared. A number of photos were taken of the study area from the surrounding road network. The locations from which the views were taken are shown on *Figure 5.3*. The series of images shown on *Figures 5.4* to *5.7* indicate the view before and after development from four locations around the study area.

Figures 5.4 and *5.5* taken from Thomas Road, show that the development associates with the Motorplex facility can hardly be seen from these locations. The visual impact from Thomas Road is therefore expected to be minimised. Development associated with the facility will however clearly be seen from Rockingham Road as shown in *Figures 5.6* and *5.7*.

As shown on *Figures 5.4, 5.6* and *5.7*, the light poles alongside the dragstrip will rise well above the topography of the study area. These structures are not however considered to be out of character with the surrounding visual landscape. Smoke stacks from the Kwinana Industrial Area to the west of the study area and the telecommunications tower in the southern section of the study area, rise well above the natural topography of the region. The visual impacts of these structures is therefore not considered to be significant.

The only other component of the proposed development which will be visible from the surrounding road system in the spectator bund adjacent to the northern end of the dragstrip as shown in *Figures 5.6* and *5.7*. The bund will however be revegetated and is therefore not considered to cause a significant visual impact.

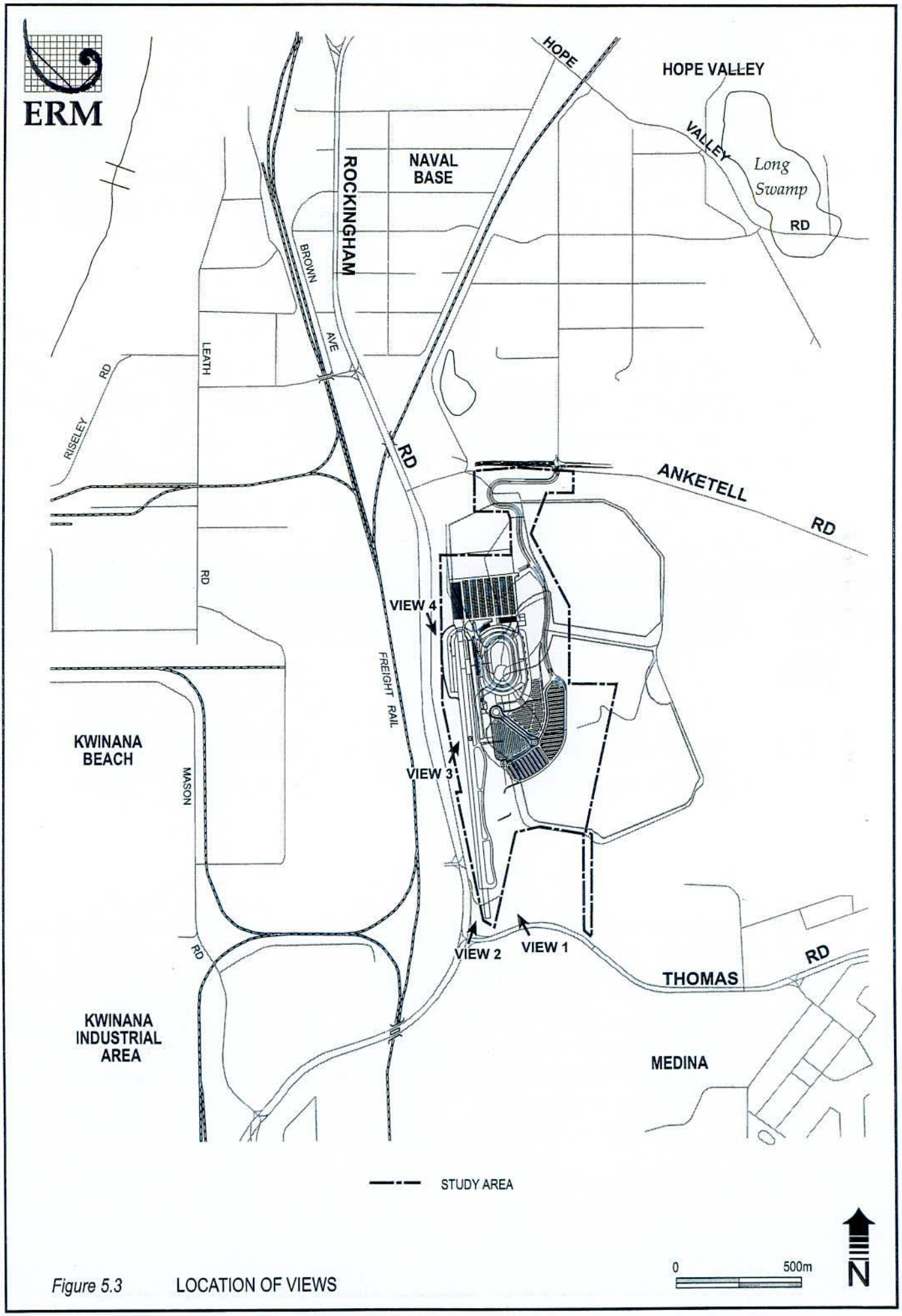


Figure 5.3 LOCATION OF VIEWS

ERM

BEFORE

AFTER

Figure 5.4 VISUAL IMAGES - VIEW 1

ERM

BEFORE

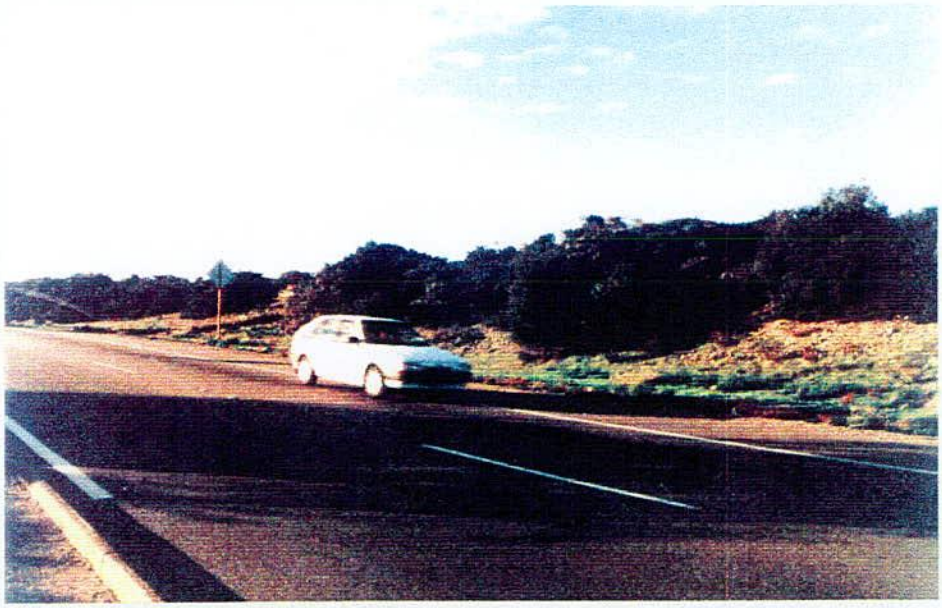
AFTER

299033/Images.ft7

Figure 5.5 VISUAL IMAGES - VIEW 2

ERM

BEFORE



AFTER

Figure 5.6 VISUAL IMAGES - VIEW 3

ERM

BEFORE

AFTER

Figure 5.7 VISUAL IMAGES - VIEW 4

iv. Management Measures

To minimise the potential visual impact of the facility, the following management measure will be implemented:

- ensure that the bunds proposed along the regional roads, particularly along Rockingham Road, obscure the view of the drag strip and associated facilities from traffic travelling south along this road;
- revegetate the bunds along Rockingham Road to minimise visual impacts and to further obscure the proposed facility; and
- plant native trees along Rockingham and Thomas roads to further obscure the proposed facility from travellers along these adjacent roads.

v. Predicted Outcome

The potential impact of the proposed development on visual amenity will not be significant and can be effectively managed by implementing the management measures described above. The visual amenity of the area will not be unduly affected by the construction and operation of the proposed Motorplex facility.

5.6 SUMMARY

The Western Australian Sports Centre Trust is seeking approval to construct a Motorplex facility at Kwinana. Although the development has the potential to impact on the environment, the majority of impacts will be localised and can be effectively managed by implementing the measures outlined in this chapter. *Table 5.8* provides a summary of this information. Specifically, it identifies the EPA's objective for each environmental factor, present status of the receiving environment, potential impact, proposed management measure and the predicted outcome.

Noise levels from the development will exceed the Regulations. The proponent is seeking an exemption to the Regulations to allow the operation of drag racing and Speedway. These activities currently operate under exemptions at the Ravenswood International Raceway and the Claremont Speedway.

Table 5.8 ENVIRONMENTAL FACTORS AND MANAGEMENT

Environmental Factor	EPA Objective	Existing Environment	Potential Impact	Proposed Management	Predicted Outcome
Vegetation Communities	*Maintain the abundance, species diversity, geographic distribution and productivity of vegetation communities* *Ensure that regionally significant flora and vegetation communities are protected in accordance with the principles of Perth's Bushplan*	Only 17 hectares of the study area is vegetated	Vegetation will be removed from the study area. A small area of proposed Bushplan Site 349 will be affected. No significant impacts expected.	Retain vegetation where possible Clearly mark the study area boundary to reduce disturbance of adjacent areas Reuse of mulched vegetation on site for natural seed generation Landscaping using native species Negotiate with MfP with regards to the Bushplan site	No unacceptable impacts anticipated.
Declared Rare or Priority Listed Flora	*Protect declared rare and priority listed flora, consistent with the provisions of the Wildlife Conservation Act, 1950*	No priority listed or declared rare flora species have been recorded on site, however two species may occur	Habitat for two threatened flora species may be removed Habitat removed will not be significant	Conduct a flora survey targeting the two threatened flora species during spring	No unacceptable impacts are anticipated.
Specially Protected Fauna	*Protect specially protected (threatened and priority) fauna consistent with the provisions of the Wildlife Conservation Act, 1950*	No threatened fauna have been recorded from the study area. One priority listed species is known to occur	Vegetation clearing for the Motorplex facility will result in the localised loss of fauna habitat. This loss is not expected to significantly impact fauna species of the study area. Habitat for the Quenda will be lost	Minimise area of vegetation to be cleared Clearly mark vegetated areas to be retained Landscape using predominantly native flora species	No unacceptable impacts are anticipated

Table 5.8 ENVIRONMENTAL FACTORS AND MANAGEMENT

Environmental Factor	EPA Objective	Existing Environment	Potential Impact	Proposed Management	Predicted Outcome
Dust	*Ensure that the dust levels generated by the proposal do not adversely impact upon the welfare and amenity or cause health problems by meeting statutory requirements and acceptable standards* *Ensure that the salt levels from the adjacent residue areas do not adversely impact on the health and amenity of spectators*	The study area is located adjacent to the Kwinana heavy industrial area. Dust is generated from industries in the area	Dust may be generated from: • car parking activities • speedway race activities • dust plumes resulting from cars running onto the verge area • wind erosion from disturbed land Minimal impacts from dust are however anticipated	Redusing exposed areas Use of paving or grass in all car parking areas Watering exposed areas for dust suppression Ensuring sand and clay used for construction and on the speedway track have a large particle size	No unacceptable impacts are anticipated
Odour	*Ensure that odour emissions, both individually and cumulatively, meet appropriate criteria and do not cause an environmental or human health problem* *Use all reasonable and practicable measures to minimise the discharge of odours*	The study area is located adjacent to the Kwinana heavy industrial area. Odour is generated from industries in the area	Odour sources from the Motorplex facility may include: • refuelling activities • products of combustion • burning rubber from tyres Quantity and frequency of products of combustion are not expected to cause any undue odour annoyance	It is not expected that odour management measures are required, as impacts will be minimal Sensible housekeeping practices for refuelling activities and storage of fuels will be implemented	No unacceptable impacts are anticipated

Table 5.8 ENVIRONMENTAL FACTORS AND MANAGEMENT

Environmental Factor	EPA Objective	Existing Environment	Potential Impact	Proposed Management	Predicted Outcome
Ground Water	*Ensure that the facility does not interfere with the existing management of groundwater quality from the bauxite residue area, and that any dewatering required for the facility is properly managed* *Ensure that the proponent implements sound design and management practice to avoid contamination of surface and groundwater from the operations*	Groundwater is contaminated from surrounding land uses and the residue disposal area. Contamination is however confined and clean groundwater exists in the study area	Motorplex complex will not impact on groundwater in the area Shallow groundwater will be extracted for water reticulation	The current management of existing groundwater contamination will be ongoing Extracting groundwater for use on the Motorplex facility will be subject to approval from the WRC A contingency plan will be developed to respond to release of potential environmental contaminants	No unacceptable impacts are anticipated
Surface Water	*Ensure that the facility does not interfere with the existing management of groundwater quality from the bauxite residue area, and that any dewatering required for the facility is properly managed* *Ensure that the proponent implements sound design and management practice to avoid contamination of surface and groundwater from the operations*	Very little surface runoff currently exists within the study area	Surface water impact would be limited to overflow of infiltration basins located outside the RSAs Accidental spill of hazardous materials has the potential to degrade the quality of surface water runoff	Drainage from natural or paved surface areas will be discharged into infiltration basins located outside the RSAs Drainage from unpaved surfaces within the RSAs will be discharged into infiltration basins located within the RSAs Washdown facilities will allow for removal of floating oils and grease A contingency plan will be developed to respond to release of potential environmental contaminants	No unacceptable impacts are anticipated

Table 5.8 ENVIRONMENTAL FACTORS AND MANAGEMENT

Environmental Factor	EPA Objective	Existing Environment	Potential Impact	Proposed Management	Predicted Outcome
Solid and Liquid Wastes	*Ensure that wastes are contained and isolated from ground and surface water surrounds and treatment or collection does not result in long term impacts on the environment* *Ensure wastes are managed in accordance with the waste management hierarchy, that is, avoid, minimise, recycle, treat and dispose*	The study area is located adjacent to the Kwinana heavy industrial area and partially within Alcoa's RSA	Waste materials generated on the site may include: • oil and vehicle parts; • wash-down waste; • sewerage; and • general rubbish.	Use, storage or generation of hazardous materials will be avoided or minimised Liquid wastes will be collected in suitable sealed containers and recycled by a licensed contractor The site will be deep sewered Storage facilities will be provided to segregate other recyclable wastes Putrescible wastes will be stored in sealed bins and collected weekly by a licensed contractor	No unacceptable impacts are anticipated
Noise and Vibration	*Ensure that noise impacts emanating from the proposed raceway comply with statutory requirements and acceptable standards*	The study area is located adjacent to the Kwinana heavy industrial area and at least one kilometre from the nearest residential area.	The racing of drag and speedway vehicles will result in noise impacts.	Noise levels have been mitigated as far as is practicable through the design of the Motorplex. This includes: • constructing noise barriers around the site; • lowering ground levels of the tracks to below that of the surrounding area; and • careful selection and orientation of the public address system A noise management plan will be prepared. This will include details in hours of operation, restrictions to number of major events, noise level monitoring, and implementation of a complaints handling procedure.	The noise levels are expected to exceed the Environmental Protection (Noise) Regulations 1997 for short periods of time when vehicles are racing. The proponent is seeking an exemption to the Regulations to allow the operation of the facility

Table 5.8 ENVIRONMENTAL FACTORS AND MANAGEMENT

Environmental Factor	EPA Objective	Existing Environment	Potential Impact	Proposed Management	Predicted Outcome
Light Spill	*Manage potential impacts from light spill and comply with acceptable standards*	The study area is located adjacent to the Kwinana heavy industrial area and at least one kilometre from the nearest residential area	Potential impacts of lighting may include light spill; impact to residents and glare for drivers. Lighting within the Motorplex facility has been developed such that there will be no light spill or glare impacts on residents or drivers.	Most lights along Rockingham Road will face east or east-south-east therefore to minimise impacts on drivers along Rockingham, Thomas or Anketell roads. Lighting has been designed to have no light spill impacts on nearby residents.	No unacceptable impacts are anticipated
Individual Risk	*Ensure that risk to spectators from the adjacent industry is managed to meet the EPAs criteria for individual fatality risk and the DME's requirements in respect of public safety*	The study area is located adjacent to the Kwinana heavy industrial area and at least one kilometre from the nearest residential area	The study area lies predominantly outside the 1994 one in a million risk contour and is unlikely to cross the five in a million risk contour. The 2020 one in a million risk contour passes through the study area and it is likely that the five in a million also passes through the site.	The operator of the Motorplex facility will be required to liaise with local hazardous industries to ensure potential hazardous events were known and understood, and all measures were being taken to control the risk. A comprehensive Emergency Response Plan would need to be developed. Safety features such a PA system and an FM radio broadcast system to allow communication with patrons while they are within their vehicles will need to be included inthe facility.	The proposed development meets the applicable individual risk criteria for the level of industry in 1994. Future development of hazardous industries in the vicinity of the Motorplex facility.

Table 5.8 ENVIRONMENTAL FACTORS AND MANAGEMENT

Environmental Factor	EPA Objective	Existing Environment	Potential Impact	Proposed Management	Predicted Outcome
Road Traffic	*Ensure that the increase in traffic activities resulting from the project does not adversely impact on the social surroundings*	The study area is bordered by three regional roads including Rockingham Road, Thomas Road and Anketell Road	Spectators travelling to and from the Motorplex facility has the potential to increase congestion on the regional road system Spectators exiting the facility following an event may create impacts on the internal road system	Management measures are being developed by Connell Wagner. Strategies being considered include: • modifying the number of lanes for exiting • creating independent access route for emergency vehicles off Rockingham Road • using appropriate intersection control methods to manage peak traffic flow	No unacceptable impacts are anticipated
Visual Amenity	*Ensure the visual amenity of the area is not be unduly affected by implementation of the raceway*	The study area is located adjacent to the Kwinana heavy industrial area and partially within Alcoa's RSA	Visual impact will be minimal The facility will not be seen from the closest residential areas of Medina and Hope Valley The development will largely be obscured from view by the proposed bund construction	Topography along regional roads will be raised to obscure view from the adjacent road system Landscaping along the modified topography will further reduce potential impacts	No unacceptable impacts are anticipated

Chapter 6

PUBLIC CONSULTATION

6.1 EPA REQUIREMENTS

6.1.1 *Objectives*

The EPA objectives for social surroundings are to :

- *ensure that the community is adequately informed on the potential environmental impacts on the social amenity of the area and how these will be managed; and*
- *ensure that appropriate mechanisms are established to address any community concerns regarding environmental impacts arising from operation of the facility.*

6.1.2 *Requirements*

The EPA Guidelines for the project set down a requirement for a community information program which provides details about potential environmental impacts, particularly noise. Requirements for the establishment of a mechanism to respond to community concerns and the involvement of the Town of Kwinana in developing the information program were also specified.

6.2 CONSULTATION PROGRAM

6.2.1 *Proposed Consultation Program*

A community information program was developed following the release of the EPA Guidelines on 30 April 1999. The information program has commenced and will continue on through the public comment period for the PER. The activities included in the program are as follows:

- information brochures containing details of the proposal, impacts and management measures to be distributed to local residents in June and prior to the closing of the public comment period for the PER;

- public display in the Kwinana shopping centre for the duration of the public comment period;
- development of a physical model for the public display;
- preparation of visual simulation images to illustrate impacts on the amenity of the area; and
- individual briefings for the Town of Kwinana, local members of Parliament and community groups.

6.2.2 *Consultation Already Undertaken*

The proponent has already undertaken a number of consultation activities. These include two meetings with the Hope Valley Residents association and a meeting with the Alcoa Consultative Community Group. Plans of the proposed Motorplex facility were also displayed at a recent car show at the Claremont Speedway.

The key issues raised from the consultation undertaken to date are all associated with noise impacts.

6.3 FUTURE MECHANISMS FOR COMMUNITY LIAISON

The requirement for mechanisms to deal with ongoing community concerns which may arise following the commencement of Motorplex operations at the site is recognised. The proponent will undertake two key activities in response to this factor:

- convene a Community Liaison Group (CLG); and
- establish a complaints handling procedure.

i. Community Liaison Group

A CLG will be convened by the operators of the site, Ravenswood International Raceway and Claremont Speedway. It is proposed to be comprised of representatives from:

- the Town of Kwinana;
- residents of Medina and Calista;

- residents of Hope Valley;
- Kwinana Industrial Area; and
- Alcoa Community Consultative Committee.

The purpose of the CLG would be to advise the operators of any issues relating to the operation of the Motorplex which are or have the potential to have impacts on surrounding land uses. The CLG would be reviewed at the end of each season to determine the appropriateness of membership, purpose and the need for continued operation.

ii. Complaints Handling Procedure

An Australian Standard (AS4269-1995) for complaints handling was developed in 1995. The standard is aimed at providing a guide to best practice in complaints handling and can be used by those receiving or making complaints. The standard contains a number of essential elements for effective complaints handling which have been used to develop the management strategies for complaints for the Motorplex. These include the need for:

- a commitment from the responsible agency to an efficient and fair resolution of complaints;
- fairness to both the complainant and the agency against which the complaint is made;
- adequate resourcing to handle complaints;
- the complaints handling process to be well publicised and visible and accessible to all;
- the provision of assistance to complainants in formulating complaints;
- quick and courteous response to complaints;
- complaints to be dealt with at no charge;
- a process that provides for the determination and implementation of remedies;
- appropriate recording of complaints, and a process for identifying recurring complaints;

- appropriate reporting on the operation of complaints handling process against documented performance standards; and
- regular reviews to ensure efficiency and effectiveness.

The management strategies outlined below are aimed at meeting these best practice guidelines.

The procedure for lodging complaints will be as follows:

- the complainant will be encouraged to call or write to the Operations Manager at the Motorplex. A phone 'hot line' will be established for the purpose of lodging complaints;
- relevant agencies including the DEP and Town of Kwinana may also refer complaints to the Operations Manager;
- complaints will be recorded in the manner outlined below and considered by the operators; and
- the operators will respond to the complaint within 14 days of the complaint being lodged.

The operators will establish a complaints data base at the Motorplex office. This data base will make provision for the following:

- source of complaint (ie. DEP, member of public, local government);
- name and contact details of person making complaint;
- date complaint recorded;
- nature of complaint (including key issue of concern and specific details of any incident);
- initial response to person making complaint;
- details of any meeting between complainant and the operators; and
- outcome of complaint.

There will be no charge for lodging complaints.

The complaints procedure will be promoted as follows:

- the operators will advertise contact details, including the name of the person responsible for recording complaints; and
- the operators will advise the Town of Kwinana and the DEP of these details.

The operators will be responsible for responding to all complaints.

Complainants will be advised that where they believe their complaints have not been adequately resolved by the complaints procedure, they can direct complaints to the WA Sports Centre Trust.

Where the complaints process is considered to be inefficient or unfair by Ravenswood Raceway or Claremont Speedway, the WA Sports Centre Trust will review the complaints procedure and implement alternative or additional mechanisms.

The operators are committed to ensuring that drag racing and speedway can be undertaken with the minimum negative impacts on surrounding residents. If individuals or groups believe they are being unreasonably impacted by any of the issues identified in the PER, they are encouraged to notify the operators who will endeavour to mitigate the problem.

Chapter 7

ENVIRONMENTAL MANAGEMENT COMMITMENTS

Environmental management strategies and procedures have been developed to minimise environmental impacts and a number of formal commitments have been made by the proponent. These commitments will be implemented to the satisfaction of the DEP. A summary of commitments and responsibilities is included in *Table 7.1.*

Table 7.1 SUMMARY OF PROPONENTS COMMITMENTS

Commitment No.	Commitment	Objective	Action	Timing	To Whose Satisfaction	Compliance Criteria
1	The proponent will prepare and implement an Environmental Management System prior to the commissioning of the Motorplex.	To ensure sound environmental management of the Motorplex operations	Develop the EMS	Prior to operation	DEP	Meet the requirements of ISO 14001
2	The proponent will develop and implement a rehabilitation and landscape plan.	To ensure that regionally significant vegetation and flora are protected in accordance with the principles of Bushplan	Prepare the Rehabilitation and Landscape plan	Prior to construction	DEP	Acceptance of plans
3	The proponent will conduct a flora survey targeting threatened flora species.	To determine whether any threatened flora species occurs in the study area	Conduct the field survey	During Spring - prior to construction	DEP	Survey completed and results forwarded to the DEP
4	The proponent will ensure the study area boundary is clearly marked.	To minimise disturbance of adjacent vegetated areas, particularly Bushplan Site no 349	Clearl mark study area boundary	Prior to construction	DEP	Compliance with Works approval conditions
5	The proponent will implement dust control measures during the construction of the facility in the event that strong winds and dry conditions make dust generation likely.	To control any dust generation as a result of construction activities	Apply water spray where required	During Construction as required	DEP	Compliance with Works approval conditions

Table 7.1 SUMMARY OF PROPONENTS COMMITMENTS

Commitment No.	Commitment	Objective	Action	Timing	To Whose Satisfaction	Compliance Criteria
6	The proponent will undertake an Aboriginal heritage survey of the study area prior to commencing construction.	To determine if any significant Aboriginal heritage sites occur in the study area	Commission a consultant to undertake the Aboriginal heritage assessment	Prior to construction	AAD and DEP	Compliance with the *Aboriginal Heritage Act, 1972*
7	The proponent will develop a drainage strategy to ensure that the development does not interfere with ongoing groundwater contamination management within the RSAs.	To ensure the spread of existing groundwater contamination is controlled	Liaise with Alcoa and DRD Develop a drainage strategy	Prior to construction	DEP and WRC	Compliance with Government Agreement.
8	The proponent will provide facilities to assist in recycling waste products.	To comply with the EPA objective	Include recycling policies in the EMS	Ongoing	DEP	Compliance with the DEPs waste management hierarchy
9	The proponent will develop a contingency plan for accidental spills of hazardous chemicals.	To avoid contaminating ground and surface water	Prepare contingency plan as part of the EMS	Prior to operation	DEP	Compliance with DEP requirements
10	The proponent, in conjunction with the operators of the facility, will develop a comprehensive Emergency Response Plan.	To minimise the individual risk to patrons at the Motorplex	Prepare a comprehensive emergency response plan	Prior to operation	DEP	Compliance with DEP requirements

Table 7.1 SUMMARY OF PROPONENTS COMMITMENTS

Commitment No.	Commitment	Objective	Action	Timing	To Whose Satisfaction	Compliance Criteria
11	The proponent will develop a noise management plan to address the noise emission impacts.	To effectively manage noise impacts	Prepare noise management plan	Prior to operation	DEP	Accepted by the DEP
12	The proponent will continue discussions with the DEP with regards to obtaining a ministerial exemption for noise emissions.	To effectively manage noise impacts	Liaise with the DEP	Prior to operation	DEP	Compliance with the DEP exemption conditions.
13	The proponent will establish a complaints handling procedure.	To provide the general community with a means of registering complaints	Establish a telephone number and advertise it locally	Prior to operation	DEP	Telephone number established and advertised.

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APPENDICES

Appendix A

INTERNATIONAL MOTORPLEX FACILITY IMPLEMENTATION COMMITTEE AND PROJECT CONTROL GROUP

A.1 IMPLEMENTATION COMMITTEE MEMBERSHIP

Chairman	Hon. Graham Kierath, MLA - Minister for Planning and Heritage
Committee Members	Ministry for Planning WA Sports Centre Trust Contract and Management Services Treasury Alcoa Ministry of Sport and Recreation Town of Kwinana Office of the Minister for Planning

A.2 PROJECT CONTROL GROUP

Chairperson	CAMS
Members	Adams & Associates CAMS Ministry for Planning Ravenswood International Raceway Claremont Speedway WA Sports Centre Trust Australian Pacific Projects

Appendix B

EPA GUIDELINES

Environmental Protection Authority
Guidelines

MOTOR SPORTS FACILITY, KWINANA

Assessment Number 1261

Part A	Specific Guidelines for the preparation of the Public Environmental Review
Part B	Generic Guidelines for the preparation of an environmental review document

Attachment 1	Example of the invitation to make a submission
Attachment 2	Advertising the environmental review
Attachment 3	Project location map

These guidelines are provided for the preparation of the proponent's environmental review document. The specific environmental factors to be addressed are identified in Part A. The generic guidelines for the format of an environmental review document are provided in Part B.

The environmental review document must address all elements of Part 'A' and Part 'B' of these guidelines prior to approval being given to commence the public review.

Part A: Specific Guidelines for the preparation of the Public Environmental Review

1. The proposal

The Western Australian Sports Centre Trust intends to develop an international motor sports facility along Rockingham Road at Kwinana. The proposed project area is indicated on the attached plan (Attachment 3).

The site which stretches between Anketell Road and Thomas Road is intended to incorporate both the relocated Claremont Speedway and also the Ravenswood International Raceway (drag car racing). At a later date it is envisaged that the Coastal Park Motor Cross and the Cockburn International Raceway will be relocated to this site.

The main speedway events are expected to be held in the evenings on weekends. Other smaller events could operate during the daytime on weekends. The facilities will be able to accommodate up to 15 000 spectators at each of the drag strip and the speedway events spectator areas, which are located adjacent to each other. Access to the facilities will be from Anketell Road and car parking will be provided over the old bauxite residue disposal areas.

The proposal will raise the issue of societal risk noting that the proposed development would be located close to the Kwinana Industrial area where major hazard facilities are located.

The EPA has provided guidance to proponents in relation to acceptable criteria for off-site individual risk (Interim Guidance Statement No. 2, July 1998). These criteria have been applied consistently to the assessment of industrial plant proposals over the past decade.

Societal risk has been considered previously by the EPA in relation to plant expansions in the Kwinana area and this has resulted in previous studies of societal risk being undertaken for the area.

The current motor sports facility proposal will bring large numbers of people for short periods of time close to the industrial area with it associated risk. The EPA understands that during the public comment period of the EPA assessment process, the proponent will make available to the public a document addressing the issue of societal risk, including emergency response. This document will be available to the Government for consideration along with the report of the EPA.

Could the project officer be supplied with an electronic copy of the document for use on Macintosh, Microsoft Word Version 6, and any scanned figures. Where possible, figures should be reproducible in a black and white format.

2. Environmental factors relevant to this proposal

At this preliminary stage, the Environmental Protection Authority (EPA) believes the relevant environmental factors, objectives and work required is as detailed in the table below:

FACTOR	SITE SPECIFIC FACTOR	EPA OBJECTIVE	WORK REQUIRED FOR ENVIRONMENTAL REVIEW
BIOPHYSICAL			
Terrestrial Flora	Vegetation communities	• Maintain the abundance, species diversity, geographical distribution and productivity of vegetation communities. • Ensure that regionally significant flora and vegetation communities are protected in accordance with the principles of Perth's Bushplan.	Undertake a suitable field survey to determine vegetation communities on the facility site. As part of the site is listed on Perth Bushplan, the proponent should liaise with the Department of Environmental Protection and Ministry for Planning regarding existing survey information and the extent of additional surveys necessary. Provide details of potential impacts from the proposal and how they will be addressed.
	Declared Rare and Priority Flora	• Protect Declared Rare and Priority Flora, consistent with the provisions of the Wildlife Conservation Act 1950.	Undertake a suitable field survey to determine the presence of Declared Rare and Priority Flora. Provide details of potential impacts from proposal and how they will be addressed.
Terrestrial Fauna	Specially Protected (Threatened) Fauna	• Protect Specially Protected (Threatened and Priority) Fauna, consistent with the provisions of the Wildlife Conservation Act 1950.	Undertake a suitable field survey to determine the existing abundance, species diversity and geographic distribution of terrestrial fauna including Specially Protected Fauna. Provide details of potential impacts from the proposal and how they will be addressed.

POLLUTION MANAGEMENT			
Air	Particulates / Dust	• Ensure that the dust levels generated by the proposal do not adversely impact upon welfare and amenity or cause health problems by meeting statutory requirements and acceptable standards. • Ensure that the dust levels from the adjacent residue areas do not adversely impact on the health or amenity of spectators.	Provide details of dust and particulate emission sources. Provide details of any potential impacts and how they will be addressed.
	Odour	• Ensure that odour emissions, both individually and cumulatively, meet appropriate criteria and do not cause a nuisance or human health problem; and • Use all reasonable and practicable measures to minimise the discharge of odours.	Provide details of odorous emissions. Demonstrate that there are no potentially significant offsite odours.
Water	Groundwater, Surface water quality	• Ensure that the facility does not interfere with the existing management of groundwater quality from the bauxite residue area, and that any dewatering required for the facility is properly managed. • Ensure that the proponent implements sound design and management practice to avoid contamination of surface and groundwater from the operations.	Provide details of how management of existing groundwater quality from the residue area will be addressed in the design of the facility. Provide details of any dewatering required and how this will be managed. Details of chemical storage and management on site should be included. Details of the control of surface water run off should be included.
Land	Solid and liquid wastes	• Ensure that wastes are contained and isolated from ground and surface water surrounds and treatment or collection does not result in long term impacts on the natural environment. • Ensure wastes are managed in accordance with the waste management hierarchy, ie. avoid, minimise, recycle, treat and dispose.	Provide details of all liquid and solid wastes that will be produced by the proposal and how they will be disposed of, and any potential impacts and how they will be addressed.
Non-chemical Emissions	Noise Vibration	• Ensure that noise impacts emanating from the proposed raceway comply with statutory requirements and acceptable standards.	Provide details of noise emissions and timing for various events. Undertake modelling to determine noise levels and impacts in the surrounding industrial and residential area, in accordance with Guidance Statement No 8 'Environmental Noise'. Provide details of any potential impacts, mitigation measures and how they will be managed.

	Light	• Manage potential impacts from light overspill and comply with acceptable standards.	Provide details of any potential impacts of light overspill on residential areas and how they will be addressed.
SOCIAL SURROUNDINGS			
Social	Individual Risk	• Ensure that risk to spectators from the adjacent industry is managed to meet the EPA's criteria for individual fatality risk and the DME's requirements in respect of public safety.	Provide details of any potential hazards and risks to the spectators and demonstrate they will meet the EPA's criteria for individual risk.
	Road traffic	• Ensure that the increase in traffic activities resulting from the project does not adversely impact on the social surroundings.	Provide details of how road traffic will be managed to maintain appropriate levels of service and public amenity.
	Social Surroundings	• Ensure that the community is adequately informed on the potential environmental impacts on the social amenity of the area and how these will be managed. • Ensure that appropriate mechanisms are established to address any community concerns regarding environmental impacts arising from operation of the facility.	Undertake a community information programme, with the objective of informing the community about the proposed motor sports facility and expected noise emissions from the site, emission controls and management of potential environmental impacts. As part of the outcomes of the programme, establish appropriate mechanisms to respond to community concerns as they arise. The EPA expects the proponent to obtain input from the Town of Kwinana in developing the programme.
Aesthetic	Visual amenity	• Ensure the visual amenity of the area is not be unduly affected by implementation of the raceway.	Provide details of any potential impacts on the visual amenity of the various project areas resulting from the construction and operation of plant components and required infrastructure and how they will be addressed.

These factors should be addressed within the environmental review document for the public to consider and make comment to the EPA. The EPA expects to address these factors in its report to the Minister for the Environment.

The EPA expects the proponent to take due care in ensuring any other relevant environmental factors which may be of interest to the public are addressed.

3. Availability of the environmental review

3.1 Copies for distribution free of charge

Supplied to DEP:

- Library/Information Centre.....9
- EPA members.....6
- Officers of the DEP (Perth, Kwinana).....6

Distributed by the proponent to:

Government departments	• Ministry for Planning .....3 • Department of Resources Development.....2 • Health Department.....1 • Department of Minerals and Energy .....1 • Department of Conservation and Land Management .....1 • LandCorp 1
Local government authorities	• Kwinana Town Council .....2 • Rockingham City Council.....2 • Cockburn City Council 2
Libraries	• J S Battye Library .....3 • The Environment Centre.....2 • Kwinana Town Library.....4 • Rockingham City Library .....2 • Cockburn City Library.....2
Other	• Conservation Council of WA .....1 • Kwinana Watchdog Group.....1 • Com-Net.....1 • CORK .....1 • Alcoa.....2 • Residue Planning Liaison Group (RPLG).....2

3.2 Available for public viewing

- J S Battye Library;
- Kwinana Town Library, Rockingham City Library, Cockburn City Library; and
- Department of Environmental Protection Library.

Part B: Generic Guidelines for the preparation of an environmental review document

1. Overview

All environmental reviews have the objective of protecting the environment. Environmental impact assessment is deliberately a public process in order to obtain broad ranging advice. The review requires the proponent to describe:

- the proposal;
- receiving environment;
- potential impacts of the proposal on factors of the environment; and
- proposed management strategies to ensure those environmental factors are appropriately protected.

Throughout the assessment process it is the objective of the Environmental Protection Authority (EPA) to help the proponent to improve the proposal so the environment is protected. The DEP will co-ordinate, on behalf of the EPA, relevant government agencies and the public in providing advice about environmental matters during the assessment of the environmental review for this proposal.

The primary purpose of the environmental review is to provide information on the proposal within the local and regional framework to the EPA, with the aim of emphasising how the proposal may impact the relevant environmental factors and how those impacts may be mitigated and managed.

The language used in the body of the environmental review should be kept simple and concise, considering the audience includes non-technical people, and any extensive, technical detail should either be referenced or appended to the environmental review. It should be noted that the environmental review will form the legal basis of the Minister for the Environment's approval of the proposal and therefore the environmental review should include a description of all the main and ancillary components of the proposal, including options where relevant.

Information used to reach conclusions should be properly referenced, including personal communications. Such information should not be misleading or presented in a way that could be construed to mislead readers. Assessments of the significance of an impact should be soundly based rather than unsubstantiated opinion, and each assessment should lead to a discussion of the management of the environmental factor.

2. Objectives of the environmental review

The objectives of the environmental review are to:

- place this proposal in the context of the local and regional environment;
- adequately describe all components of the proposal, so that the Minister for the Environment can consider approval of a well-defined project;
- provide the basis of the proponent's environmental management program, which shows that the environmental impacts resulting from the proposal, including cumulative impact, can be acceptably managed; and

- communicate clearly with the public (including government agencies), so that the EPA can obtain informed public comment to assist in providing advice to government.

3. Environmental management

The EPA expects the proponent to commit to an environmental management system appropriate to the scale and impacts of the proposal including provisions for performance review and a commitment to continuous improvement. The system may be integrated with quality and health and safety systems and should include the following elements:

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

A description of the proposed environmental management system should be included in the environmental review documentation. If appropriate, the documentation can be incorporated into a formal environmental management system (such as AS/NZS ISO 14001). Public accountability should be incorporated into the approach on environmental management.

The environmental management program (EMP) is the key document of an environmental management system that should be adequately defined in an environmental review document. The EMP should provide plans to manage the relevant environmental factors, define the performance objectives, describe the resources to be used, outline the operational procedures and outline the monitoring and reporting procedures which would demonstrate the achievement of the objectives.

4. Format of the environmental review document

The environmental review should be provided to the DEP officer for comment. At this stage the document should have all figures produced in the final format and colours.

Following approval to release the review for public comment, the final document should also be provided to the DEP in an electronic format.

The proponent is requested to supply the project officer with an electronic copy of the environmental review document for use on Macintosh, Microsoft Word Version 6, and any scanned figures. Where possible, figures should be reproducible in a black and white format.

5. Contents of the environmental review document

The contents of the environmental review should include an executive summary, introduction and at least the following:

5.1 The proposal

A comprehensive description of the proposal including its location (address and certificate of title details where relevant) is required.

Justification and alternatives

- justification and objectives for the proposed development;
- the legal framework, including existing zoning and environmental approvals, and decision making authorities and involved agencies; and
- consideration of alternative options.

Key characteristics

The Minister's statement will bind the proponent to implementing the proposal in accordance with any technical specifications and key characteristics[1] in the environmental review document. It is important therefore, that the level of technical detail in the environmental review, while sufficient for environmental assessment, does not bind the proponent in areas where the project is likely to change in ways that have no environmental significance.

Include a description of the components of the proposal, including the nature and extent of works proposed. This information must be summarised in the form of a table as follows:

[1] Changes to the key characteristics of the proposal following final approval, would require assessment of the change and can be treated as non-substantial and approved by the Minister, if the environmental impacts are not significant. If the change is significant, it would require assessment under section 38 or section 46. Changes to other aspects of the proposal are generally inconsequential and can be implemented without further assessment. It is prudent to consult with the Department of Environmental Protection about changes to the proposal.

Table 1: Key characteristics (example only)

Element	Description
Life of project (mine production)	< 5 years (continual operation)
Size of ore body	682 000 tonnes (upper limit)
Area of disturbance (including access)	100 hectares
List of major components • pit • waste dump • infrastructure (water supply, roads, etc)	refer plans, specifications, charts section immediately below for details of map requirements
Ore mining rate • maximum	 • 200 000 tonnes per year
Solid waste materials • maximum	 • 800,000 tonnes per year
Water supply • source • maximum hourly requirement • maximum annual requirement	 • XYZ borefield, ABC aquifer • 180 cubic metres • 1 000 000 cubic metres
Fuel storage capacity and quantity used	litres; litres per year
Heavy mineral concentrate transport • truck movements (maximum)	 • 75 return truck loads per week

Plans, Specifications, Charts

Adequately dimensioned plans showing clearly the location and elements of the proposal which are significant from the point of view of environmental protection, should be included. The location and dimensions (for progressive stages of development, if relevant) of plant, amenities buildings, accessways, stockpile areas, dredge areas, waste product disposal and treatment areas, all dams and water storage areas, mining areas, storage areas including fuel storage, landscaped areas etc.

Only those elements of plans, specifications and charts that are significant from the point of view of environmental protection are of relevance here.

Figures that should always be included are:

- a map showing the proposal in the local context - an overlay of the proposal on a base map of the main environmental constraints;
- a map showing the proposal in the regional context; and, if appropriate,
- a process chart / mass balance diagram showing inputs, outputs and waste streams.

The plan/s should include contours, a north arrow, a scale bar, a legend, grid co-ordinates, the source of the data, and a title. If the data is overlaid on an aerial photo then the date of the aerial photo should be shown.

Other logistics

- timing and staging of project; and
- ownership and liability for waste during transport, disposal operations and long-term disposal (where appropriate to the proposal).

5.2 Environmental factors

The environmental review should focus on the relevant environmental factors for the proposal, and these should be agreed in consultation with the EPA and DEP and relevant public and government agencies. Preliminary environmental factors identified for the proposal are shown in Part A of these guidelines.

Further environmental factors may be identified during the preparation of the environmental review, therefore on-going consultation with the EPA, DEP and other relevant agencies is recommended. The DEP can advise the proponent on the recommended EPA objective for any new environmental factors raised. Minor matters which can be readily managed as part of normal operations for the existing operations or similar projects may be briefly described.

Items that should be discussed under each environmental factor are:

- a clear definition of the area of assessment for this factor;
- the EPA objective for this factor;
- a description of what is being affected - why this factor is relevant to the proposal;
- a description of how this factor is being affected by the proposal - the predicted extent of impact;
- a description of where this factor fits into the broader environmental / ecological context (only if relevant - this may not be applicable to all factors);
- a straightforward description or explanation of any relevant standards / regulations / policy;
- environmental evaluation - does the proposal meet the EPA's objective as defined above;
- if not, environmental management proposed to ensure the EPA's objective is met;
- predicted outcome.

The proponent should provide a summary table of the above information for all environmental factors, under the three categories of biophysical, pollution management and social surroundings:

Table 2: Environmental factors and management (example only)

Environ-mental Factor	EPA Objective	Existing environment	Potential impact	Environ-mental management	Predicted outcome
BIOPHYSICAL					
vegetation community types 3b and 20b	Maintain the abundance, species diversity, geographic distribution and productivity of vegetation community types 3b and 20b	Reserve 34587 contains 45 Ha of community type 20b and 34 Ha of community type 3b	Proposal avoids all areas of community types 20b and 3b	Surrounding area will be fully rehabilitated following construction	Community types 20b and 3b will remain untouched Area surrounding will be revegetated with seed stock of 20b and 3b community types
POLLUTION MANAGEMENT					
Dust	Ensure that the dust levels generated by the proposal do not adversely impact upon welfare and amenity or cause health problems by meeting statutory requirements and acceptable standards	Light industrial area - three other dust producing industries in close vicinity Nearest residential area is 800 metres	Proposal may generate dust on two days of each working week.	Dust Control Plan will be implemented	Dust can be managed to meet EPA's objective
SOCIAL SURROUNDINGS					
Visual amenity	Visual amenity of the area adjacent to the project should not be unduly affected by the proposal	Area already built-up	This proposal will contribute negligibly to the overall visual amenity of the area	Main building will be in 'forest colours' and screening trees will be planted on road	Proposal will blend well with existing visual amenity and the EPA's objective can be met

5.3 Environmental management commitments

The implementation of the key characteristics of the proposal and the environmental management commitments made by the proponent become legally enforceable under the conditions of environmental approval issued in the statement by the Minister for the Environment. All the auditable environmental management commitments should be consolidated in the public review document in a list (usually in an Appendix). This list is attached to the Minister's statement and becomes part of the conditions of approval.

The proponent's compliance with the consolidated environmental management commitments will be audited by the DEP, so they must be expressed in a way which enables them to be audited.

A commitment needs to contain most (if not all) of the following elements to be auditable:

- who (eg. the proponent)

- will do what (eg. prepare a plan, take action)
- why (to meet an environmental objective)
- where/how (detail the action and where it applies)
- when (in which phase, eg. before construction starts)
- to what standard (recognised standard or agency to be satisfied)
- on advice from (agency to be consulted).

The proponent may make other 'commitments', which address less significant or non-environmental matters, to show an intention to good general management of the project. Such 'commitments' (or management strategies/policies) would not be included in the consolidated list of environmental management commitments appended to the statement.

Continuous improvement during the implementation of the consolidated commitments may necessitate changes whilst ensuring the environmental objective is still achieved; these can be made in updates to the environmental management plan. Modified and/or additional proponent commitments arising from the fulfilment of environmental conditions will be audited by the DEP and should follow the accepted format.

Once the proposal is approved under a statement of conditions, any proposed modifications or additional commitments should be referred to the EPA for consideration of the environmental impacts. Such changes to the consolidated list of commitments would normally be dealt with through the audit process; however, if significant impacts are involved, the proposed changes may constitute a change to the proposal which would require assessment.

Examples of the preferred format for typical commitments are shown in the following table:

Table 3: Summary of proponent's commitments (example only)

Who/What Commitment	When plan prepared Timing	Why Objective	How/Where Action	Whose advice expert consulted	Evidence Standard Compliance criteria
1. The Proponent will develop and implement a rehabilitation plan	before construction commences	to protect the abundance, species diversity, geographic distribution and productivity of the vegetation community types 3b and 20b (fig 3.1, EMP)	by limiting construction to 10 Ha of Reserve 34587 and rehabilitating the area	on advice of CALM.	similarity rating of rehab'd area consistent with vegetation community types 3b and 20b.
2. The Proponent will prepare and implement a dust control plan	before the start of construction	to minimise dust generation and impact on nearby land owners	by measures such as watering roads and monitoring wind direction	preparation of the plan on advice of DEP.	1000mg/m3 (EPA Dust Control Criteria)

Commitments should preferably be written in tabular format, preferably with some specification of ways in which the commitment can be measured, or how compliance can be demonstrated.

Draft commitments, whether in textual or tabular format, which are not in a format that can be audited will not be accepted by DEP assessment officers for public review documentation. Proponents will be assisted to revise inadequate commitments.

5.4 Public consultation

A description should be provided of the public participation and consultation activities undertaken by the proponent in preparing the environmental review. It should describe the activities undertaken, the dates, the groups/individuals involved and the objectives of the activities. Cross reference should be made with the description of environmental management of the factors which should clearly indicate how community concerns have been addressed. Those concerns which are dealt with outside the EPA process can be noted and referenced.

5.5 Other information

Additional detail and description of the proposal, if provided, should go in a separate section.

Attachment 1

The first page of the proponent's environmental review document must be the following invitation to make a submission, with the parts in square brackets amended to apply to each specific proposal. Its purpose is to explain what submissions are used for and to detail why and how to make a submission.

Invitation to make a submission

The Environmental Protection Authority (EPA) invites people to make a submission on this proposal.

[the proponent] proposes [the rezoning of land and the development of a Marina Complex in the City of Bunbury]. In accordance with the Environmental Protection Act, a [PER] has been prepared which describes this proposal and its likely effects on the environment. The [PER] is available for a public review period of [8] weeks from **[date]** closing on **[date]**.

Comments from government agencies and from the public will help the EPA to prepare an assessment report in which it will make recommendations to government.

Why write a submission?

A submission is a way to provide information, express your opinion and put forward your suggested course of action - including any alternative approach. It is useful if you indicate any suggestions you have to improve the proposal.

All submissions received by the EPA will be acknowledged. Submissions will be treated as public documents unless provided and received in confidence subject to the requirements of the Freedom of Information Act, and may be quoted in full or in part in the EPA's report.

Why not join a group?

If you prefer not to write your own comments, it may be worthwhile joining with a group interested in making a submission on similar issues. Joint submissions may help to reduce the workload for an individual or group, as well as increase the pool of ideas and information. If you form a small group (up to 10 people) please indicate all the names of the participants. If your group is larger, please indicate how many people your submission represents.

Developing a submission

You may agree or disagree with, or comment on, the general issues discussed in the [PER] or the specific proposals. It helps if you give reasons for your conclusions, supported by relevant data. You may make an important contribution by suggesting ways to make the proposal more environmentally acceptable.

When making comments on specific elements of the [PER]:

- clearly state your point of view;
- indicate the source of your information or argument if this is applicable;
- suggest recommendations, safeguards or alternatives.

Points to keep in mind

By keeping the following points in mind, you will make it easier for your submission to be analysed:

- attempt to list points so that issues raised are clear. A summary of your submission is helpful;
- refer each point to the appropriate section, chapter or recommendation in the [PER];
- if you discuss different sections of the [PER], keep them distinct and separate, so there is no confusion as to which section you are considering;
- attach any factual information you may wish to provide and give details of the source. Make sure your information is accurate.

Remember to include:

- your name;
- address;
- date; and
- whether you want your submission to be confidential.

The closing date for submissions is: **[date]**

Submissions should be addressed to:

The Environmental Protection Authority
Westralia Square
141 St George's Terrace
PERTH WA 6000

Attention: **[Project Officer name]**

Attachment 2

Advertising the environmental review

The proponent is responsible for advertising the release and arranging the availability of the environmental review document in accordance with the following guidelines:

Format and content

The format and content of the advertisement should be approved by the DEP before appearing in the media. For joint State-Commonwealth assessments, the Commonwealth also has to approve the advertisement. The advertisement should be consistent with the attached example.

Note that the DEP officer's name should appear in the advertisement.

Size

The size of the advertisement should be two newspaper columns (about 10 cm) wide by about 14 cm long. Dimensions less than these would be difficult to read.

Location

The approved advertisement should, for CER's, appear in the news section of the main local newspaper and, for PER's and ERMP's, appear in the news section of the main daily paper's ("The West Australian") Saturday edition, and in the news section of the main local paper at the commencement of the public review period and again two weeks prior to the closure of the public review period.

Timing

Within the guidelines already given, it is the proponent's prerogative to set the time of release, although the DEP should be informed. The advertisement should not go out before the report is actually available, or the review period may need to be extended.

Example of the newspaper advertisement

SCM CHEMICALS LTD

Consultative Environmental Review

EXTENSION TO DALYELLUP RESIDUE DISPOSAL PROGRAM

(Public Review Period: **[date]** to **[date]**)

SCM Chemicals Ltd is planning to extend the company's existing residue disposal program at Dalyellup, south of Bunbury, from March 1992 to March 1993.

A Consultative Environmental Review (CER) has been prepared by the company to examine the environmental effects associated with the proposed development, in accordance with Western Australian Government procedures. The CER describes the proposal, examines the likely environmental effects and the proposed environmental management procedures.

SCM has prepared a project summary which is available free of charge from the company's office on Old Coast Road, Australind.

Copies of the CER may be purchased for $5 from:

SCM Chemicals Ltd
Old Coast Road
AUSTRALIND WA 6230
Telephone: (08) 9467 2356

Copies of the complete Consultative Environmental Review will be available for examination at:

- Environmental Protection Authority
  Library Information Centre
  8th Floor, Westralia Square
  38 Mounts Bay Road
  PERTH WA 6000
- Environmental Protection Authority
  65 Wittenoom Street
  BUNBURY WA 6230
- City of Bunbury public libraries
- Shire of Capel libraries
- Shire of Harvey library (Australind)
- Shire of Dardanup (Eaton)

Submissions on this proposal are invited by **[closing date]**. Please address your submission to:

Chairman
Environmental Protection Authority
8th Floor, Westralia Square
38 Mounts Bay Road
PERTH WA 6000
Attention: **[Project Officer name]**

If you have any questions on how to make a submission, please ring the project officer, **[Project Officer name]**, on (08) 9222 7xxx.

Appendix C

PROPOSAL COMPONENTS

PROJECT BRIEF

SITE

The site is the former Alcoa site bounded by Rockingham Road, Anketell Road and Thomas Road in Kwinana. A location plan is included in Chapter 4.

PROPOSED FACILITIES

The following information details the functional requirements for the project.

GENERAL

It is proposed to construct the drag racing track and the speedway circuit adjacent with common support facilities such as:

- Corporate Boxes
- Pit and car assembly
- Car parking
- Patron facilities

An indicative Layout Plan is included as Figure 5.1 and a aerial perspective is attached.

It is not intended that both the drag racing and speedway motor sports would occur concurrently and each has been designed to be functionally fit for purpose.

Each of the facilities will be suitable for television production and able to be used for other purposes (eg pop concerts, arena events, driver training etc).

Consideration is also to be given to use of the facility by other motor sports.

SPECIFIC DESIGN REQUIREMENTS

Specific design requirements for individual areas of the proposed complex are:

COMBINED DRAG RACING AND SPEEDWAY AREAS

COMMON FACILITIES

A control spine building of two levels, situated between the speedway and dragstrip facilities.

The lower level will contain kitchen facilities, food and merchandising outlets and toilets.

The upper floor will contain corporate boxes, race control and commentary, and toilets.

Disabled access to the upper level is via a lift which also services catering requirements.

MAIN ENTRANCE

- The main entrance is to consist of:
- Administration Building;
- A Function Room
- Spectator ticket office, computerised with credit facilities and security centre;
- Covered turnstile entry;
- Video security system to monitor spectator, pit, boundary fences and car park areas;
- Children's playground; and
- Area suitable for sideshow rides and amusements.

AUDIO / VIDEO

- Audio public address system; and
- Large outdoor video screen and edit system for closed circuit TV for spectators (mobile between Drag Racing, Speedway and other areas of the Motorplex). This item is subject to a value analysis and is not included in the current scope of work.

PIT AREA

- Pit area combined Drag Racing / Speedway bitumen plus grassed areas
- Vehicle weighing and scrutineering area (approx. 18 x 10m) under cover;
- 1 x weigh bridge (approx. 0 – 5,000kg);
- 2 x Scrutineers rooms (approx. 50m2);
- 1 x shed for machinery and vehicle workshop and storage;
- Fuel storage area for machinery;
- Compressed air circulation system;
- Space for vehicle transporters; and
- Access to workshops.
- Pit Gate entrance and ticket office.

SPEEDWAY SPECIFIC AREAS

- Car speedway track is a clay mix and has 50m radius ends and 100m straights and is 25 m wide which gives an inside perimeter of 514m and an outside perimeter of 614m. Car track = approx. 15,000m2;
- Motor Cycle Track is a sand / clay mix and is located immediately inside the car track and is 10m wide giving an area of approx. 4,850m2;
- Water reticulation system for dirt tracks;
- Lighting (TV standard) and sub mains;
- Lighting, emergency in case of power failure during race;
- Concrete primary safety barrier 1.2m high, 200mm thick;
- Catch fence with 5 x 15mm diameter steel cables;
- Debris fence 50mm x 50mm mesh, 5m high painted flat black;
- Poles for catch and debris fences;
- Wash down bays for cars to be cleaned at the finish of each race;
- Concrete secondary safety barrier located 5m behind primary safety barrier;
- Timing equipment and lap scoreboard;
- Terraced concrete or grass mound (Spectators and sound bund);
- Toilets for mound area to cater for spectators;
- Food outlets on mound; and
- Merchandise outlets on mound

DRAG RACING SPECIFIC AREAS

- Staging lanes area 150m x 40m;
- Concrete start pad area 150mx 20m;
- Drag strip 900m x 20m;
- Vehicle return road 1100m x 10m;
- Rescue vehicle road – ambulance, fire and recovery – 500m x 10m;
- Concrete primary safety barrier 900mm each side at 1m high, 200mm thick;
- Concrete secondary safety barrier 500mm each side at 1.2m high, 150mm thick;
- Chain link fences at top of mound (500m) plus other internal spectator fences (600m);
- Lighting (TV standard) and sub mains;
- Lighting, emergency in case power failure during race;
- Timing and scoreboard for each lane
- Sound wall with pedestrian walkway over track behind start line 80m x 8m – 640m2;
- Terraced concrete or grass mound (spectators and sound bund);
- Toilets for mounds;
- Food outlets for mounds; and
- General Site Works

GENERAL SITE PREPARATION;

- General landscaping;
- Site services within site;
- Site fencing;
- Spectator car parking for 2,500 cars on bitumen and grass - plus overflow parking on grass for 2,000 cars;
- Lighting for spectator parking area to cover approx. 12.5ha; and
- General lighting on pathways.

Appendix D

DUST AND ODOUR ASSESSMENT

D1. POLLUTION MANAGEMENT FACTORS

D1.1 Dust

This chapter provides an assessment of the air quality impacts of the operation of the proposed Kwinana International Motorplex. Local impacts are discussed in terms of dust and odour impacts and related to limits in NSW Air Quality Regulations.

i. EPA Objective

The EPA objective for Dust and particulates is to:

- *ensure that the dust levels generated by the proposal do not adversely impact upon the welfare and amenity or cause health problems by meeting statutory requirements and acceptable standards; and*

- *ensure that the dust levels from the adjacent residue areas do not adversely impact on the health and amenity of spectators.*

ii. Applicable Assessment Standard or Procedure

Ambient air quality throughout Australia is the subject of *The National Environment Protection Council (Ambient Air Quality) Measure 1998* (NEPM). This is a Commonwealth initiative to achieve nominated standards of air quality within ten years. All states and territories have adopted the ten-year air quality goals for pollutants specified in Schedule 2 of NEPM.

Progress towards achievement of these goals is assessed by air quality measurements at locations in the regional airshed. Measurement and concentration goals are based on critical exposure times for health impacts and are thus different for various pollutants. *Table D.1* details selected NEPM Ambient Air Quality Criteria.

Table D.1 NEPM AMBIENT AIR QUALITY

Pollutant	Source	Averaging Period [1]	Maximum Concentration	Allowable Exceedances
Carbon monoxide	NEPM	8 hours	9 ppm	1 day per year
Nitrogen dioxide	NEPM	1 hour	0.125 ppm	1 day per year
		1 year	0.03 ppm	none
Sulphur dioxide	NEPM	1 hour	0.20 ppm	1 day per year
		1 day	0.08 ppm	1 day per year
		1 year	0.02 ppm	none
PM_{10} particulates	NEPM	24 hours	150 $\mu g/m^3$	5 days per year
		Annual	50 $\mu g/m^3$	5 days per year

Notes: The measured concentrations are to be averaged for each hour of the day. The 8-hour average is a rolling average of those one hour averages. The 1 day average is a calendar day average.

a. Dust

Atmospheric suspended matter comprises a wide range of materials including dust, combustion particles and pollens. The size of the particles affects the significance as air contaminants. Particles less than 10 microns in diameter (PM_{10}) can deposit in the lower airways of the lung while particles above 10 microns do not reach the critical areas within the lung but can cause irritation and aesthetic nuisance.

Concentration criteria for long term annual averages and short-term 24-hour periods are considered. Two size ranges were addressed:

- total suspended particulate matter (TSP) or particles less than 50 microns (one millionth of a metre); and
- particles smaller than 10 microns (PM_{10}).

PM_{10} particle concentrations and $PM_{2.5}$ are of interest because they can reach the lower parts of the respiratory system and may have health impacts as well as amenity impacts. Most PM_{10} and $PM_{2.5}$ particles are caused by combustion from motor vehicles, bushfires and industrial processes. Some particles are generated by evaporation of sea spray and from vegetation. Dust generated through construction activity generally consists of coarser particles which have amenity rather than health impacts.

The short term air quality assessment criteria adopted for dust is based on United States Environmental Protection Agency (USEPA) standards adopted by the New South Wales Environmental Protection Authority (NSW EPA). This standard

requires that a 24 hour concentration of 150μg/m^3 for PM_{10} should not be exceeded more than once per year.

The long term air quality assessment criteria adopted for dust is based on National Health and Medical Research Council of Australia (NHMRC) recommendations of a maximum annual concentration of 90 μg/m^3 total suspended particulates in a residential environment. For particles smaller than 10 microns, the USEPA standard of 50 μg/m^3 annual average has been adopted by the NSW EPA.

Dust from combustion engines, are basically agglomerated carbon particles formed in the combustion region due to lack of oxygen. It is these particles that are possibly the most harmful including dust particles from diesel emissions.

b. Lead

The majority of lead in the atmosphere originates from vehicle emissions using super grade (leaded) petrol. In the past high concentrations of lead have been measured in high density traffic areas. Recently the lead content of fuel has been reduced from 0.84 to 0.2 grams per litre in an attempt to reduce ambient lead levels. At present over half of the cars on the road use unleaded petrol and it is believed that leaded fuel will eventually be phased out. As lead levels are and should continue to reduce , lead is not used as an indicator of the future in this report.

c. Nitrogen Dioxide

Nitrogen dioxide is a pungent acidic gas which is corrosive and strongly oxidising. It is produced in high temperature combustion of fuels by oxidation of nitrogen. Motor vehicles produce the majority of nitrogen oxides (NO_x). The other major sources are residential and commercial use of gas, industrial boilers and forest fires.

Most of the nitrogen oxides emitted from motor vehicles are in the form of nitric oxide (NO) which reacts with other gases in the atmosphere to produce nitrogen dioxide (NO_2) Nitrogen dioxide is the focus of the NEPM due to the associated health effects. Because the fraction of NO_2 emitted by motor vehicles is highly dependent on the internal combustion engine configuration, emission factors are presented as NO_x.

Nitrogen oxides are also involved in chemical reactions in the atmosphere leading to the production of photochemical smog.

d. Volatile Organic Compounds

Volatile Organic Compounds (VOCs) are organic chemicals. All organic compounds contain carbon, and organic chemicals are the basic chemicals found in all living things and in all products derived from living things. Many organic compounds we use do not occur in nature, but were synthesised by chemists in laboratories. Volatile chemicals produce vapours easily. At room temperature vapours readily escape from volatile liquid chemicals.

VOCs include gasoline, industrial chemicals such as benzene, solvents such as toluene and xylene, and perchlorethylene (principal dry cleaning solvent). VOCs are released from burning fuel, such as gasoline, wood, coal, natural gas and from solvents, paints, glues, and other products used at home or work. Vehicle emissions are an important source of VOCs. Many VOCs are hazardous air pollutants; for example, benzene is a known cancer causing agent.

VOC's result from partially burned fuel in the combustion chamber of motor vehicles due to poor air and fuel mixing.

e. Carbon Monoxide

Carbon monoxide is present naturally in the atmosphere typically at 0.01 to 0.02 parts per million (ppm). It is a colour-less, odour-less and taste-less gas. The majority of carbon monoxide is generated from motor vehicles. Domestic heating, industrial boilers and natural occurrences such as forest fires are other sources of carbon monoxide.

Carbon monoxide is produced as an intermediate to the formation of carbon dioxide in internal combustion engines and occurs mainly due to inefficient combustion.

f. Sulphur Dioxide

Sulphur dioxide is a colour-less, pungent and irritating gas. It is readily dissolved in water to form sulphuric acid. In countries that use fuels with high sulphur levels sulphate particles can form in the atmosphere forming a majority of the particles measured as PM_{10}. In Australia the majority of liquid fuels are comparably low in sulphur content and as a result only a small portion of sulphur dioxide emissions in the metropolitan areas are due to motor vehicles. Sulphur dioxide is produced during combustion of sulphur containing fossil fuels.

g. Carbon Dioxide

Carbon Dioxide (CO_2) is the principal greenhouse gas emitted as a result of human activity (eg., burning of coal, oil, and natural gas). CO_2 can cause burns, frostbite, and blindness if an area is exposed to it in solid or liquid form. If inhaled, it can cause asphyxiation in high concentrations, causing an increase in the breathing rate, unconsciousness, and death.

h. Ozone

Ozone (O_3) is a gas that has similar components to oxygen. Oxygen consists of two oxygen atoms; ozone consists of three. Ozone in the upper atmosphere, where it occurs naturally in what is known as the ozone layer, shields the Earth from the sun's dangerous ultraviolet rays. However, at ground level where it is a pollutant with highly toxic effects, ozone damages human health, the environment, crops, and a wide range of natural and artificial materials. Ground-level ozone can irritate the respiratory tract, cause chest pain, persistent cough, an inability to take a deep breath, and an increased susceptibility to lung infection. Ozone can damage trees and plants and reduce visibility.

Ground-level ozone comes from the breakdown (oxidation) of volatile organic compounds found in solvents. It is also a product of reactions between chemicals that are produced by burning coal, gasoline, other fuels, and chemicals found in paints and hair sprays. Oxidation occurs readily during hot weather. Vehicles and industries are major sources of ground-level ozone.

An assessment of the air quality impacts of the proposed facility was undertaken considering the local surrounding land use, knowledge of the proposed Motor Sports facility and existing air quality concentrations in the area.

a. Track Layout

The Western Australian Sports Centre Trust intends to develop an international motor sports facility along Rockingham Road at Kwinana. The site which stretches between Anketell Road and Thomas Road, is intended to incorporate both the relocated Claremont Speedway and the Ravenswood International Raceway (drag car racing).

The main speedway events are expected to be held in the evenings on weekends. The facility can accommodate up to 15,000 spectators at each of the drag strip and speedway events. Access to the facilities will be from the Anketell Road and car parking will be provided over the old bauxite disposal areas.

b. Existing Air Quality - Surrounding Land Use

The Kwinana Industrial Area is Western Australia's major heavy industrial site. Resource extraction is one of the major long-term land uses in the area, and there are a number of leases in different parts of the region. Future use of the land is one of the key factors which underpins land use options in the area. As a result the Kwinana Regional Strategy established a buffer area based on air quality considerations. The Kwinana Environmental Protection (Atmospheric Waste) Policy, commonly referred to as the Kwinana EPP buffer has been established to maintain acceptable air quality around the Kwinana Industrial Area.

The policy identifies three land use areas:

- Area A – contains heavy industry;
- Area B – is a buffer area surrounding industry, plus outlying land zoned for industrial use; and
- Area C – land used predominantly for rural and residential purposes.

The proposed development situates within buffer areas B and C.

The policy, through associated regulations, sets objectives for each of these areas for concentrations of sulphur dioxide and particulate in the air. Recent monitoring results have shown that air quality standards for sulphur dioxide and particulate for the Kwinana EPP buffer are currently being met, and there has been an improvement in air quality within the buffer. Industry bodies would therefore require maintaining the availability of the air shed for further industrial development.

The following tables details Schedule 1 and Schedule 2 of the Kwinana EPP.

Table D.2 AMBIENT AIR QUALITY STANDARDS AND AMBIENT AIR QUALITY LIMITS - SULPHUR DIOXIDE

Item	Area	Standard (µg/m3)	Limit (µg/m3)	Averaging Period
1	Area A	700	1,400	1 hour
2	Area A	200	365	24 hours
3	Area A	60	80	1 year
4	Area B	500	1,000	1 hour
5	Area B	150	200	24 hours
6	Area B	50	60	1 year
7	Area C	350	700	1 hour
8	Area C	125	200	24 hours
9	Area C	50	60	1 year

Table D.3 AMBIENT AIR QUALITY STANDARDS AND AMBIENT AIR QUALITY LIMITS – TOTAL SUSPENDED PARTICULATES

Item	Area	Standard (µg/m3)	Limit (µg/m3)	Averaging Period
1	Policy Area	-	1,000	15 minutes
2	Area A	150	260	24 hours
3	Area B	90	260	24 hours
4	Area C	90	150	24 hours

iii. Impact Assessment

a. Dust Combustion Processes

Dust from combustion engines, are basically agglomerated carbon particles formed in the combustion region due to lack of oxygen. It is these particles that are possibly the most harmful.

According to discussions with national and international regulatory authorities or agencies race-cars are not significant sources of emissions compared to normal on highway vehicles and other sources, and are therefore not regulated. Because race cars are utilised for discrete periods of time and the number of cars and distance travelled is usually minimal, emissions are generally low and disperse quickly. Also, race cars cannot be directly compared to on-highway vehicles because they use

different engine designs and fuels which should maximise power and efficiency and reduce emissions.

Table D.4 below details the emission factors (Small and Kazimi) for PM_{10} and other gases and are used to estimate the quantities of combustion products expected from a normal race event. The emission factors are for highway vehicles and are expected to be higher than a typical well-tuned race car and the results are therefore conservatively high. Note that no emission factor value exists for odour. Odour arises from a combination of various emissions and is difficult to quantify as one discrete value. We can expect that each of the gaseous combustion products will contribute to the surrounding odour.

Table D.4 CORRECTED EMISSION FACTORS CARS (G/KM)

Pollutant	Emission Rate (g/km) Small, (EPA Vic)	Emission Rate (g/km) Kazimi, (EPA Vic)	Aust. Greenhouse (g/km)
Carbon monoxide	8.07	12	-
VOC	2.33	0.9	-
Nitrogen oxides	0.78	1.1	-
Sulphur oxides	0.023	Not Listed	-
PM_{10}	0.0068	0.03	-
CO_2	-	-	199

Table D.5 below details expected emissions from a typical race event of 20 and 50 laps at 1.5 kilometres per lap.

Table D.5 EMISSIONS CARS (T/YR)

Pollutant	Rate Range (g/km)	20 Lap Race Emission (grams/race) based on 30 km Race	50 Lap Race Emission (t/yr) based on 75 kms Race
Carbon monoxide	8.07 – 12	242 to 360	605 to 900
VOC	2.33 – 0.9	27 to 70	68 to 175
Nitrogen oxides	0.78 - 1.1	33 to 23	59 to 83
Sulphur oxides	0.023	0.70	1.7
PM_{10}	0.0068 – 0.03	0.204 to 0.9	0.5 to 2.25
CO_2	199	5970	14,925

The quantity of all emissions generated is not expected to cause any undue annoyance for spectators and minimal local impact. Also, the size and air space available for dispersion will further reduce the effects of any resulting emissions.

b. Dust Mechanical Processes

Dust sources identified during race events will include:

- car parking activities;
- race activities on unpaved circuit (speedway only);
- dust plumes resulting in cars running off into the verge area; and
- wind erosion from disturbed land.

When a vehicle travels on a speedway road, the force of the wheels in the road surfaces causes pulverisation of the surface material. Particles are lifted and dropped from the rolling wheels, and the road surface is exposed to strong air currents in turbulent shear with the surface. The turbulent wake behind the vehicle continues to act on the road after the vehicle has passed. The quantity of dust emissions from a given road varies linearly with the volume of traffic. Field investigations have shown that emissions depend on the condition of the road and the associated traffic flow.

Much work in the United States has been performed to ascertain the generation of dust attributed to different road situations. All the work to date has indicted that dust quantities will vary significantly with moisture content of the soil, silt size (particles smaller than 75 µm in diameter) and, the weight and frequency of the car. As the particle size and moisture content of the material increases the likelihood of dust emissions being generated will decrease.

The following empirical expression may be used to estimate the quantity in grams of size specific particulate emissions from unpaved roads per vehicle kilometre travelled (VKT).

$$E = \frac{k(s/12)^a (W/3)^b}{(M/0.2)^c} \times 281.9$$

where k,a,b and c are constants
E = emission factor (g/VKT)
s = surface material silt content (%)
W = mean vehicle weight (tonnes)
M = surface material moisture content (%)

Particle size range of the sand material on the track is expected to be between 100 and 150µm and the track is expected to be continually watered. As a result dust emissions are not expected to cause any undue annoyance for spectators and minimal local impact. Also, the size and air space available for dispersion will

further reduce the effects of any resulting emissions. Further reduction in potential dust generation will be achieved by covering all exposed areas with vegetation.

iv. Management Measures

A wide variety of options exist to control emissions from unpaved (USEPA) roads. Available options span broad ranges in terms of cost, efficiency and practicability. In the case of the Motor Sports Centre there are several options available for dust suppression:

- ensure all exposed areas around the track are minimal;
- ensure car parking areas are either paved or grassed;
- ensure all sand and sand clay particles on the tracks have large particle size ranges (above 100 µm); and
- use watering or chemical suppressants on all exposed surfaces to reduce dust emissions.

a. Existing Speedway and Race Tracks

Through discussions with the responsible councils and organising bodies such as the Confederated Association of Motor Sports (CAMS) for existing racetracks such as Philip Island, Sandown and Calder Racetracks the most common environmental impact associated with the sport does not include dust and odour. A code of Practice called the "Track Operators Safety Guide" is used to ensure that dust generation is minimal by vegetating exposed soil and all verge areas are maintained. There is no specific guideline for the control of odour generation.

Discussion with the appropriate regulatory authorities have also indicated that complaints have not been recorded for any of the events that have taken place at the above Motor Sport Centres regarding odour or dust generation during race meetings.

v. Predicted Outcome

The Kwinana Motor Sports Centre is to be situated in an area comprising of a buffer zone for the surrounding industry and land used predominantly for rural and residential purposes. Due to the nature of the facility all emissions arising from the centre are expected to occur episodically. These impacts arise from the combustion processes of the racing cars and through mechanical processes outlined earlier.

Emissions arising from combustion processes have been quantified for a typical race event. The quantity of these emissions is expected to have an insignificant impact on the surrounding area, in particular when considering the episodic nature of the

impacts. Dusts arising from mechanical processes are of a size and nature, which inhibits emissions. Due to the expected particle size (100 - 150µm) and implementation of the proposed management measures it is expected that emissions emanating from this source are also likely to be insignificant.

In relation to the NEPM Air Quality goals the proposed centre is not expected to exceed the criteria.

D.1.2 Odour

i. EPA Objective

The EPA's objective for odour is to:

- *ensure that odour emissions, both individually and cumulatively, meet appropriate criteria and do not cause a nuisance or human health problem; and*
- *use all reasonable and practicable measures to minimise the discharge of odours.*

ii. Applicable Assessment Standard or Procedure

The NSW EPA recommends that:

the predicted incremental increase in odour levels at the nearest off-site sensitive receptor, which is located in a residential area shall not exceed the background odour levels by more than two ou50R (odour units 50 per cent recognition threshold):

- the predicted incremental increase in odour levels at the nearest off-site sensitive receptor, which is located in an industrial or rural area shall not exceed the background odour levels by more than 7 ou50R; and
- ambient odour concentrations (aoc's) at the nearest off-site sensitive receptors must be complied with 99.0 per cent of the time, using site representative hourly average meteorological data of at least one year's duration.

Presently, odour strength is measured under laboratory conditions by taking field samples of potentially odorous air, diluting these samples with clean air (if the sample is significantly odorous), and subsequently subjecting the samples to a qualified panel of people. The number of dilutions of the sample with clean air to reach the threshold of detection by panel members is recorded in a procedure known as 'dynamic olfactometry'. This procedure yields a measure of odour strength in

'odour units'. This is consistent with the Queensland odour criteria which the Western Australian EPA have adopted as an interim approach to odour assessment.

In the *Amendment to the State Environment Protection Policy (The Air Environment)* (Vic EPA, No. S 45, 6 June 1988), an odour unit is defined as:

> *"the dimensionless ratio of the volume which the sample would occupy when diluted, to, the odour threshold to the volume of the sample."*

An odour study will usually incorporate the following steps:

- estimate background odour concentrations;
- predict, using an approved model, the value of the combined ambient odour concentrations (aoc's) from the facility using existing data;
- predict of the aoc's at potentially sensitive receptors; and
- compare to legislative preferred odour goals.

iii. Impact Assessment

Odour sources identified during race events include:

- fuel refilling activities;
- products of combustion; and
- rubber burning from rubber tyres (drag strip).

As fuel tanks are re-fuelled during race days the vapours contained in the fuel tank headspace are expelled as the tank is filled. Most races will involve a single refuelling period and the quantities are expected to be minimal for safety and weight saving. The frequency and the quantity of re-fuelling is not expected to cause any undue odour annoyance.

Quantity and frequency of products of combustion are not expected to cause any undue odour annoyance. Refer to *Table D.2* above.

It is expected that odour from rubber burning (associated with wheel spinning) will cause localised odour increases but the frequency and available headspace for dispersion will minimise the area impacts.

iv. Management Measures

It is not expected that odour management methods will be required for the facility, as impacts will be minimal. Although it is prudent to ensure that good housekeeping practices are employed. It is likely that potential minor odour impacts can be

attributed to re-fuelling operations and storage, fuel or hydrocarbon spills, drag strip practices and putrescible waste management practices for food and scrap disposal. Guidelines are available for the management of each of these areas and will be used where practical.

v. Predicted Outcome

Impacts from odour as a result of the proposed Kwinana Motor Sports Centre are expected to be minimal. As long as good house keeping practices are employed for activities such as re-fuelling and the handling, storage and disposal of putrescible waste, odour related impacts will be insignificant. As odour complaints have not been received for any events that have taken place at venues similar to this centre, it is expected that the Kwinana Motor Sports Centre will comply with the EPA criteria for odour.

Appendix E

NOISE AND VIBRATION ASSESSMENT

KWINANA INTERNATIONAL MOTORPLEX

Noise Assessment

Final Report

For:
WESTERN AUSTRALIA SPORTS CENTRE TRUST

June 1999
299033

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Page No.

Approved by:	*Keryn James*
Position:	Project Director
Signed:	
Date:	*25 June 1999*

ERM Mitchell McCotter Quality System

EXECUTIVE SUMMARY

INTRODUCTION

Noise levels resulting from the operation of the proposed Motorplex have been predicted to residences located in the areas of Medina, Hope Valley and Wattleup as part of the Public Environmental Review (PER). This report presents in detail the results of the noise assessment. The Executive Summary presents an overview of the results of the noise assessment in a non-technical format.

FACTORS AFFECTING NOISE LEVELS

There are two major variables that need to be taken into consideration when assessing the noise impacts upon nearby residences. These are wind direction and the type of vehicles racing.

The influence of wind direction is straight forward. When the wind is travelling from the noise source (or Motorplex) to the receiver (or residence) this is classified as a positive wind and the noise levels at the residence will be much louder than if the wind is travelling from the residence towards the Motorplex site (a negative wind). For the Kwinana/Rockingham areas the wind direction during the evening, over the racing season of October to April, is nearly always from the south (88%) and should, therefore, be considered as the most common scenario. The result is that residences in Hope Valley and Wattleup will mainly be subjected to positive winds and the residences in Medina will mainly be subjected to negative winds.

The types of vehicles associated with drag racing and speedway have different noise characteristics which affect the way in which the noise propagates over distance. This characteristics are taken into consideration in the prediction modelling.

EVALUATION OF ENVIRONMENTAL NOISE IMPACTS

Potential Noise Sources

i. PA

Noise levels at residences due to the operation of the public address (PA) system will depend strongly on the design of the system, including number of speakers, directionality and orientation. With appropriate design, noise from this source should be controllable to less than 35 dB(A) at residences, and would generally not be audible.

ii. Drag Racing

In respect to drag racing events, the loudest vehicles will be the Top Fuel and Mini Jet drag racing vehicles. These are exhibition type vehicles and will be present at six racing meetings in any one season. During a major drag racing event, these vehicles race three times, with each race, including the warm up, lasting approximately 10 to 15 seconds. This equates to approximately 30 to 45 seconds of noise during a meeting or 0.25% of any four hour period[1]. It should be noted that from measurements conducted at drag racing meetings, the Mini Jets are generally a little quieter than the Top Fuel vehicles, however, for this exercise we have assumed that they are the same.

The Top Comp vehicles are the fastest of the general drag racing vehicles and will race, on average, 16 times during the evening of a major meeting. This equates to 240 seconds of racing or approximately 1.3% of any four hour period. The remaining vehicles include Super Stock, Super Street and Motorcycles which have been assumed to be equally as loud although, in reality, the Super Street and Motorcycles are generally quieter. The combination of these vehicles will race on average 103 times during the evening of a major meeting which equates to 23 minutes of racing or approximately 7.7% of any four hour period.

Charts relating the predicted noise levels with the time in which the noise will be present in a four hour period are presented in *Figures 1 to 3*. The predictions are to Medina, Hope Valley and Wattleup and assume the most common (southerly) wind[2]. As a reference, sound pressure levels of some typical noise sources are presented below:

❑ Low flying jet aircraft	85 to 100 dB(A)
❑ 10 metres from a truck travelling down a road	75 to 85 dB(A)
❑ Light aircraft taking off or landing	70 to 75 dB(A)
❑ 10 metres from a car travelling down a road	60 to 70 dB(A)
❑ Typical office noise	45 to 60 dB(A)
❑ General background levels	35 to 45 dB(A)

[1] Four hours is the maximum representative time period allowed in the Environmental Protection (Noise) Regulation, 1997.

[2] Predicted noise levels have been generated under worst case and most common wind conditions. For Medina, these are different, however for Wattleup and Hope Valley the worst case and most common conditions are the same.

Figure 1

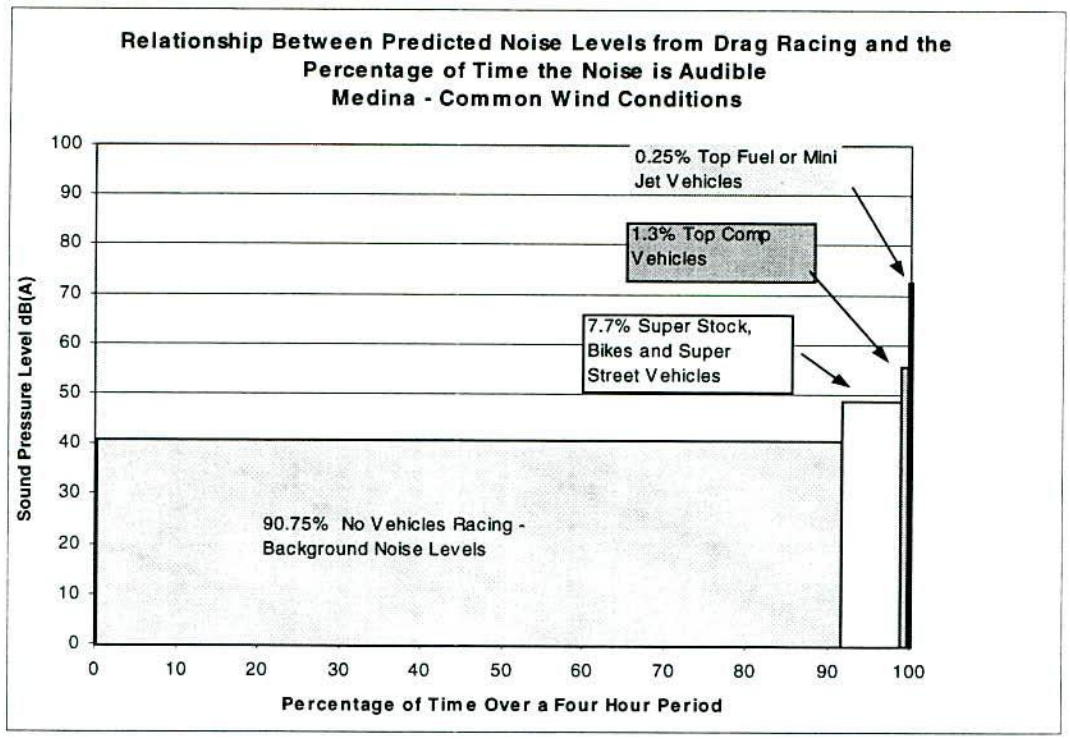


Figure 2

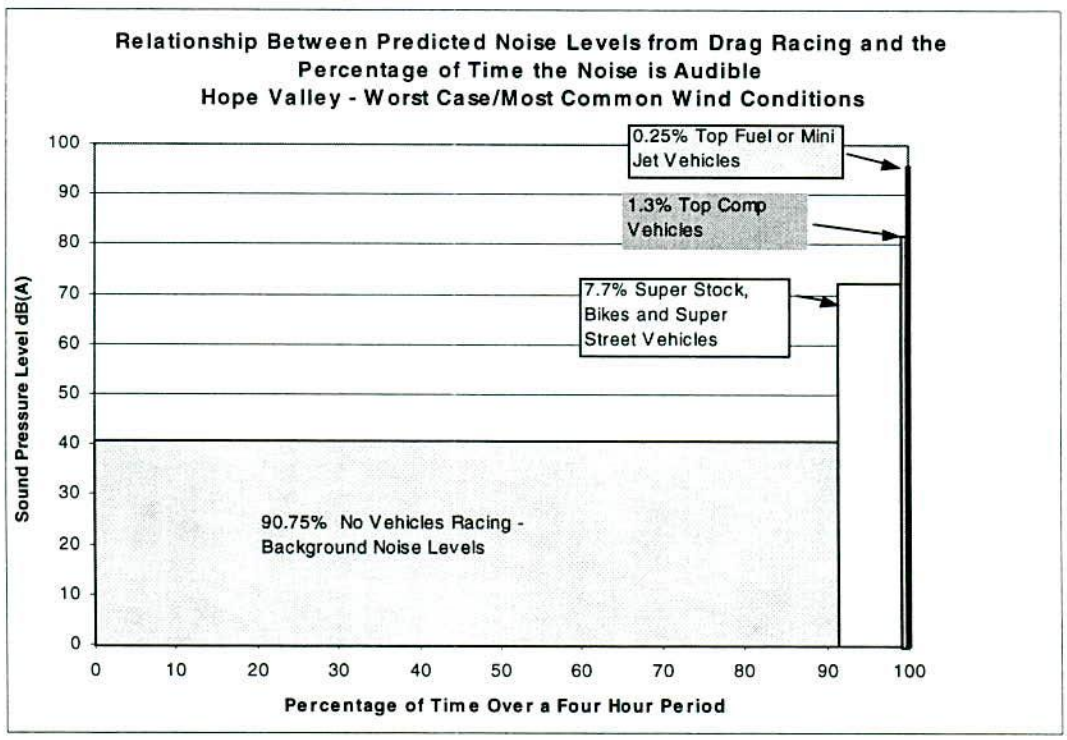
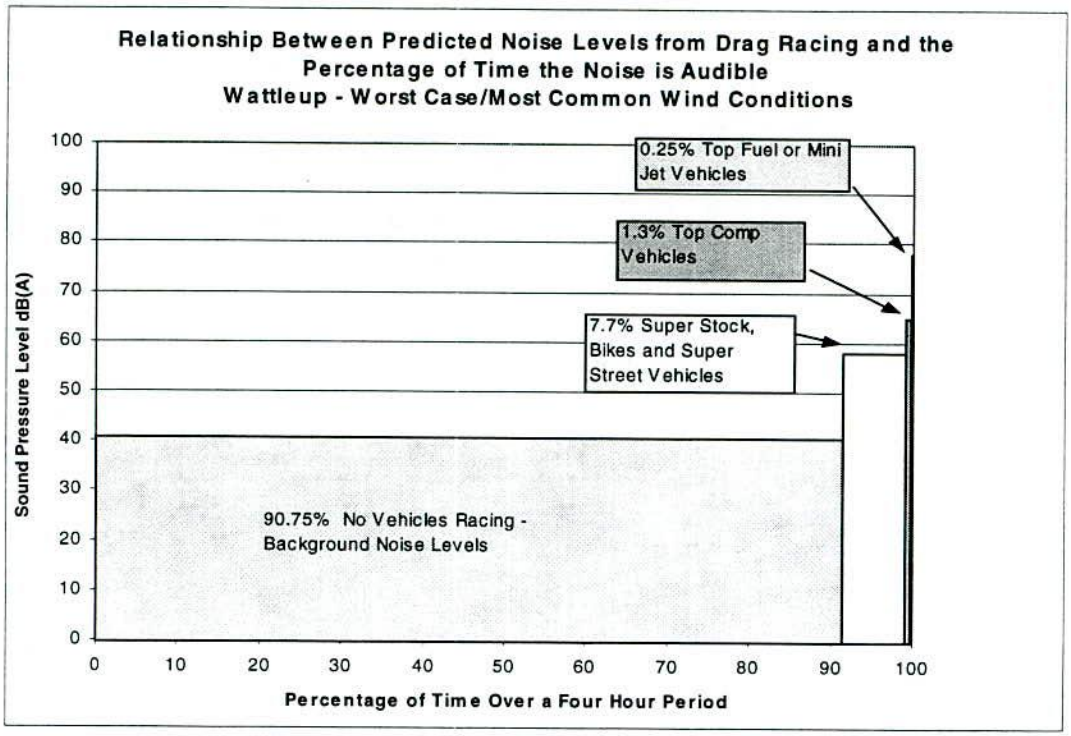


Figure 3



iii. Speedway Racing

In respect to a major speedway race meetings, racing will occur for approximately 21% of the time. Although there are, generally, six types of race vehicles associated with a meeting, we have assumed that all speedway vehicles have equal noise characteristics. Charts relating the predicted noise levels for speedway vehicles with the time in which the noise will be present in a four hour period are presented in *Figures 4 to 6.* The predictions are to the key residential areas and assume a southerly wind.

Figure 4

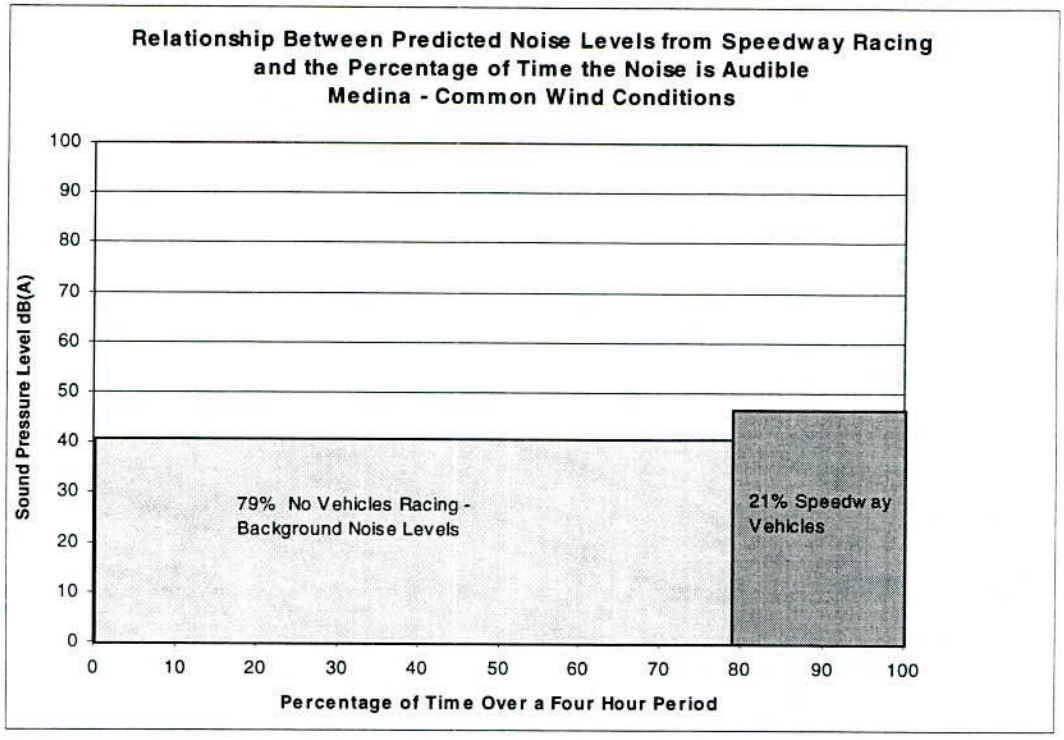


Figure 5

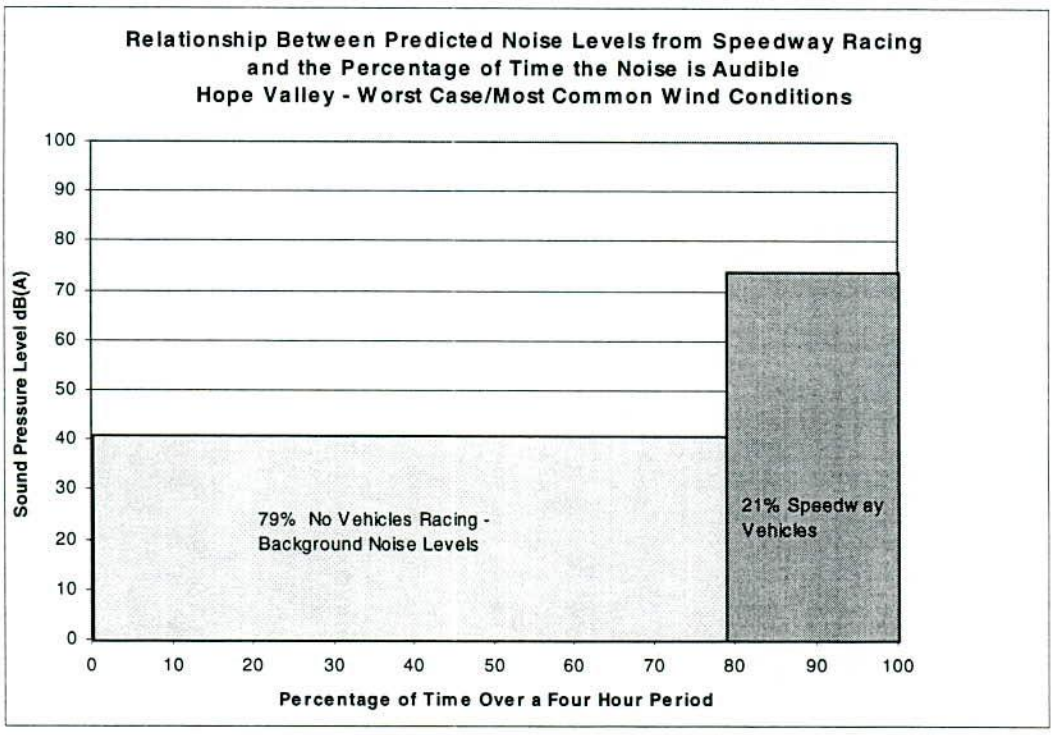
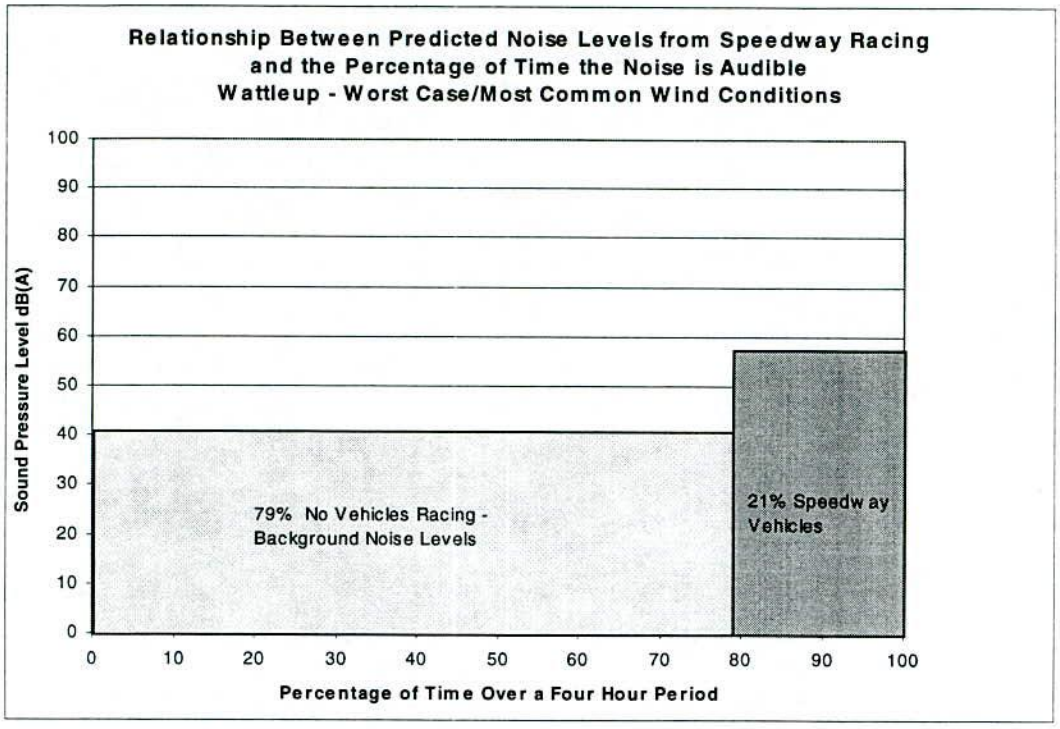


Figure 6



iv. Allowable Noise Levels

Based on the duration of each of the noise events the allowable noise levels determined from the Regulations are as follows:

- Medina
  - Exhibition Vehicles — Allowable Noise Level 55 dB(A)
  - Top Comp Vehicles — Allowable Noise Level 45 dB(A)
  - Super Stock, Bikes and Super Comp Vehicles — Allowable Noise Level 45 dB(A)
  - Speedway Vehicles — Allowable Noise Level 35 dB(A)

- Hope Valley/Wattleup

  - Exhibition Vehicles — Allowable Noise Level 64 dB(A)
  - Top Comp Vehicles — Allowable Noise Level 54 dB(A)
  - Super Stock, Bikes and Super Comp Vehicles — Allowable Noise Level 54 dB(A)
  - Speedway Vehicles — Allowable Noise Level 44 dB(A)

The results show that for the majority of the time a race meeting is being held, the noise from the Motorplex will not be audible. However, during times when vehicles are actually racing, the allowable levels under the Environmental Protection (Noise) Regulations will be exceeded. The proposed Motorplex will, therefore, require an exemption and the development of a noise management plan where operating conditions can be set to minimise the noise impacts.

DISTRIBUTION OF NOISE LEVELS

The frequency at which noise events occur over a race meeting also requires consideration when assessing the noise impacts. *Figures 7* to *12* provide simplified charts of predicted noise levels against time, over a 30 minute duration. The charts were developed from actual measurements of racing at Claremont Speedway and Ravenswood International Raceway. The predicted noise levels are to the key residential areas and assume a southerly wind.

Figure 7

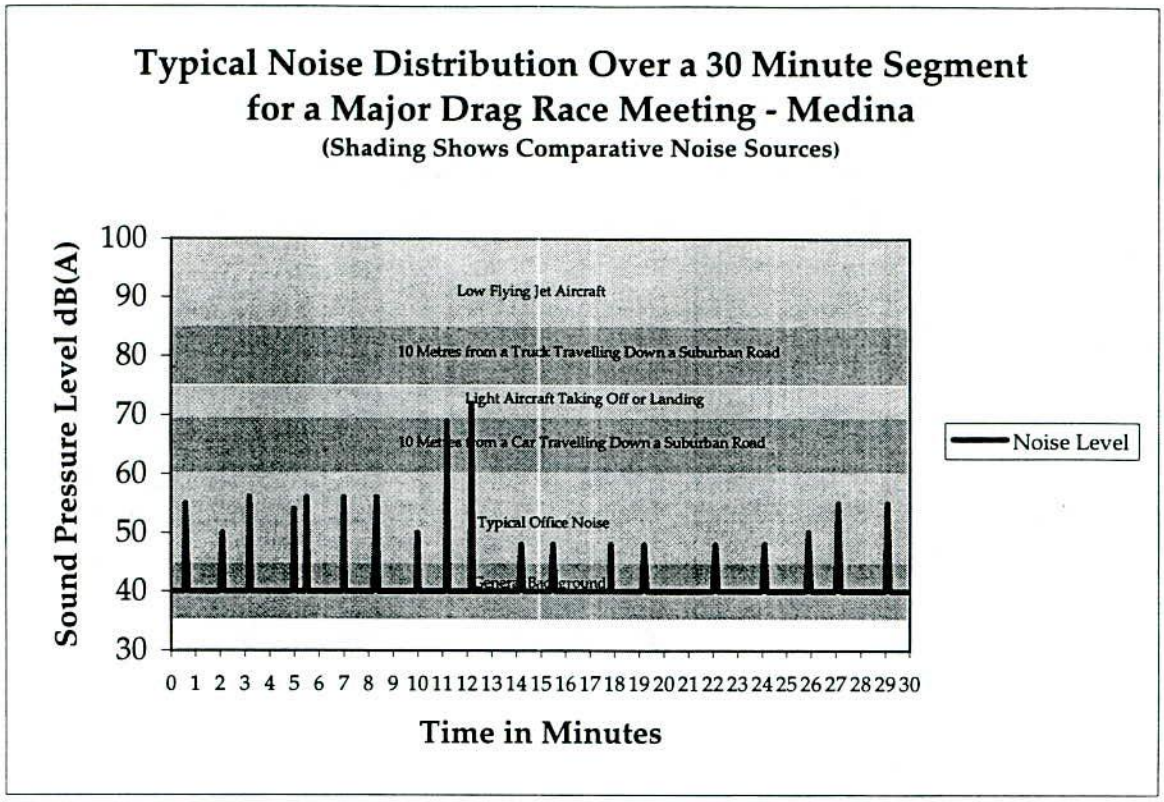


Figure 8

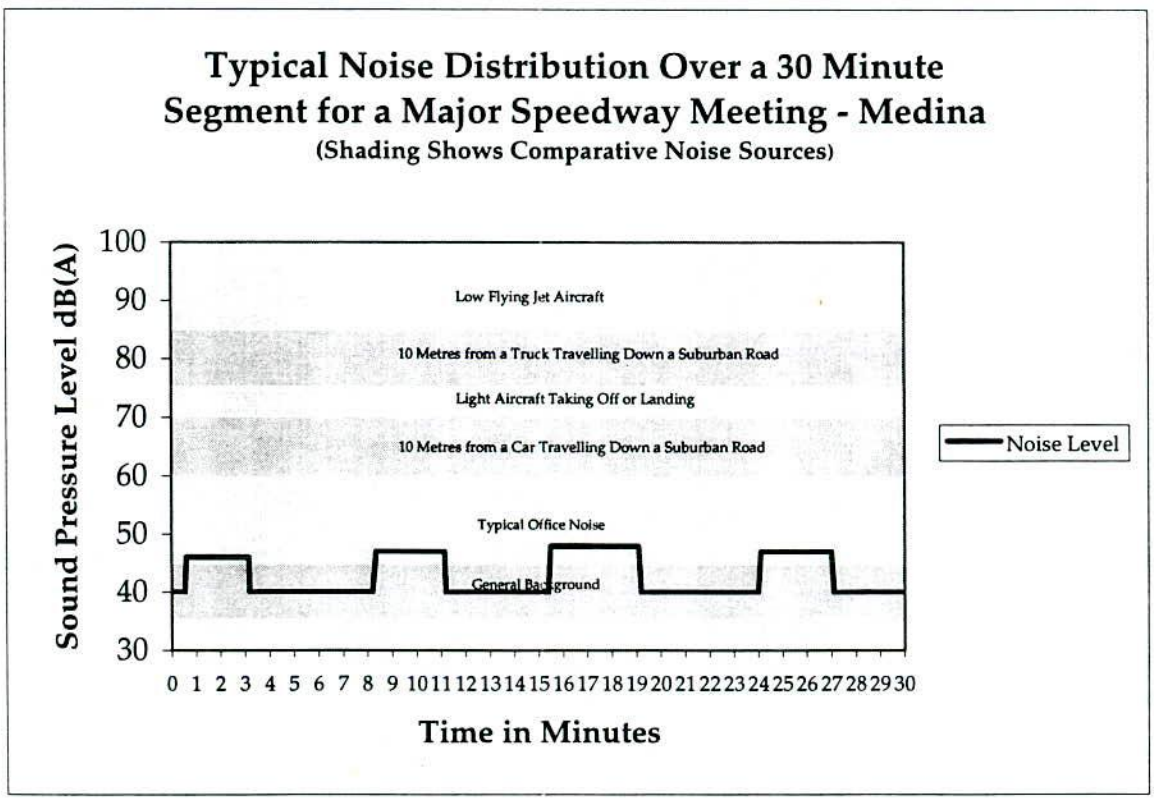


Figure 9

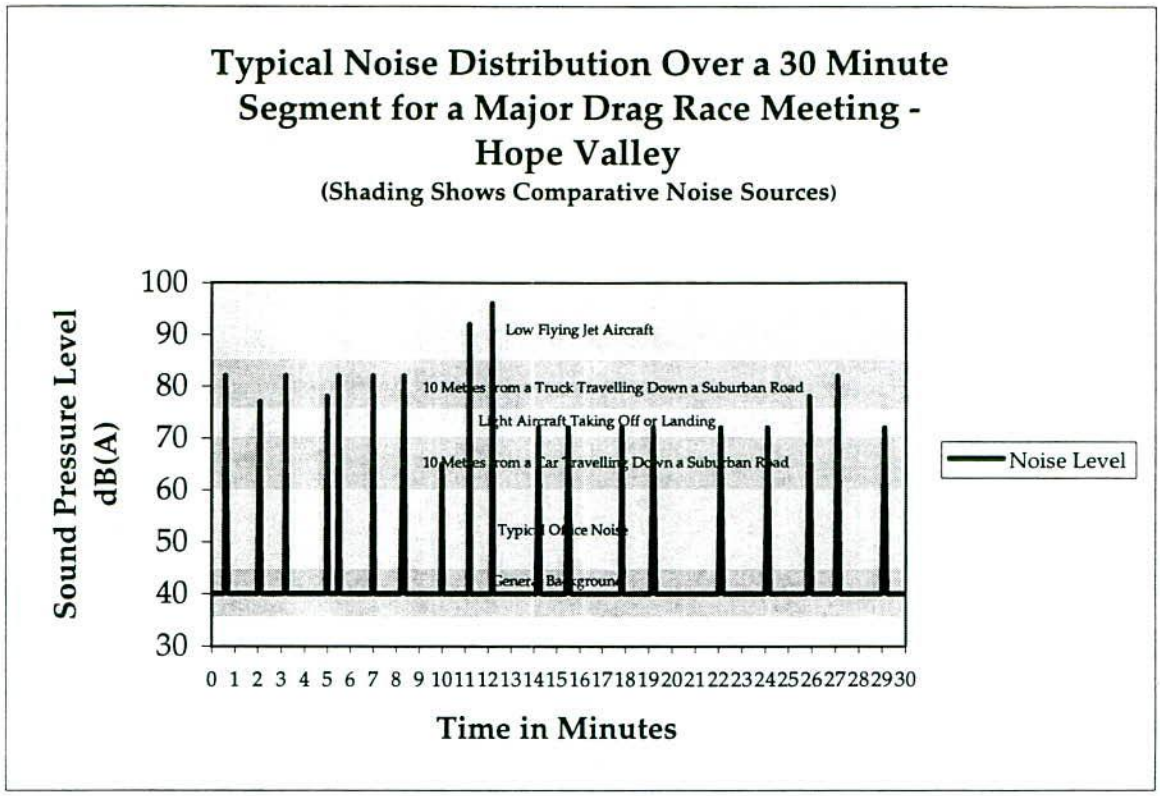


Figure 10

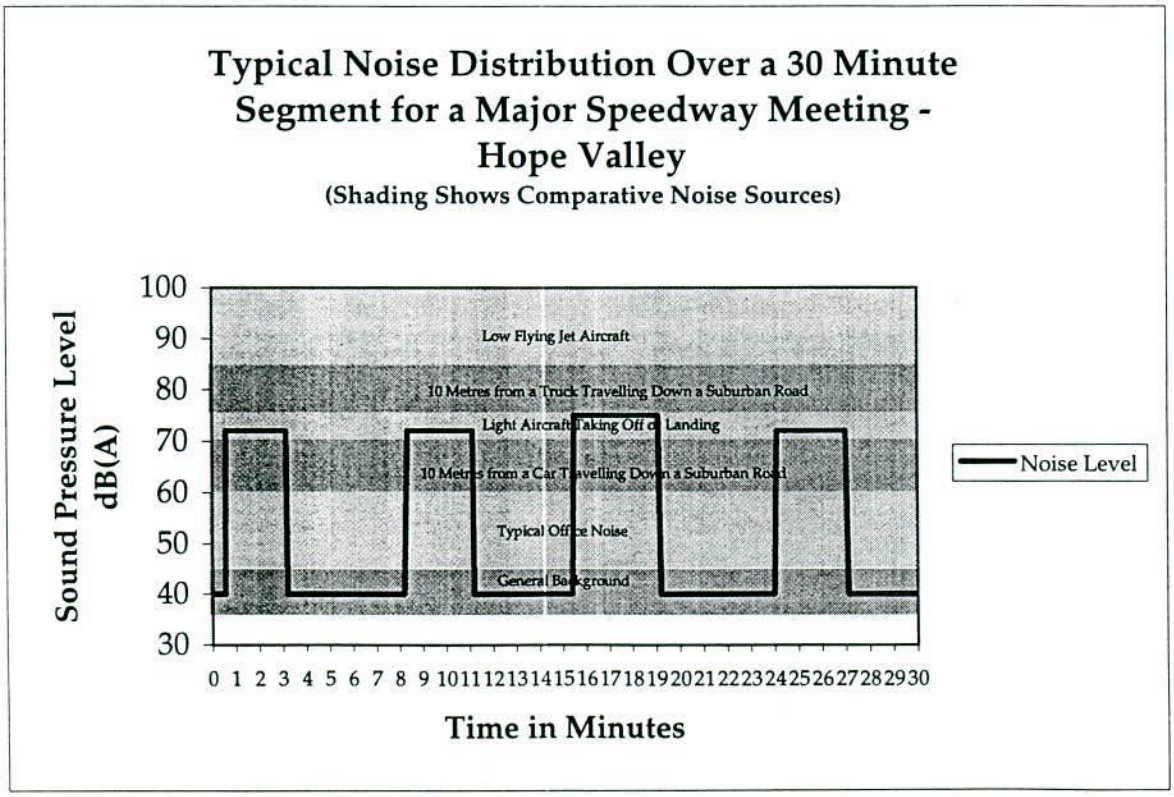


Figure 11

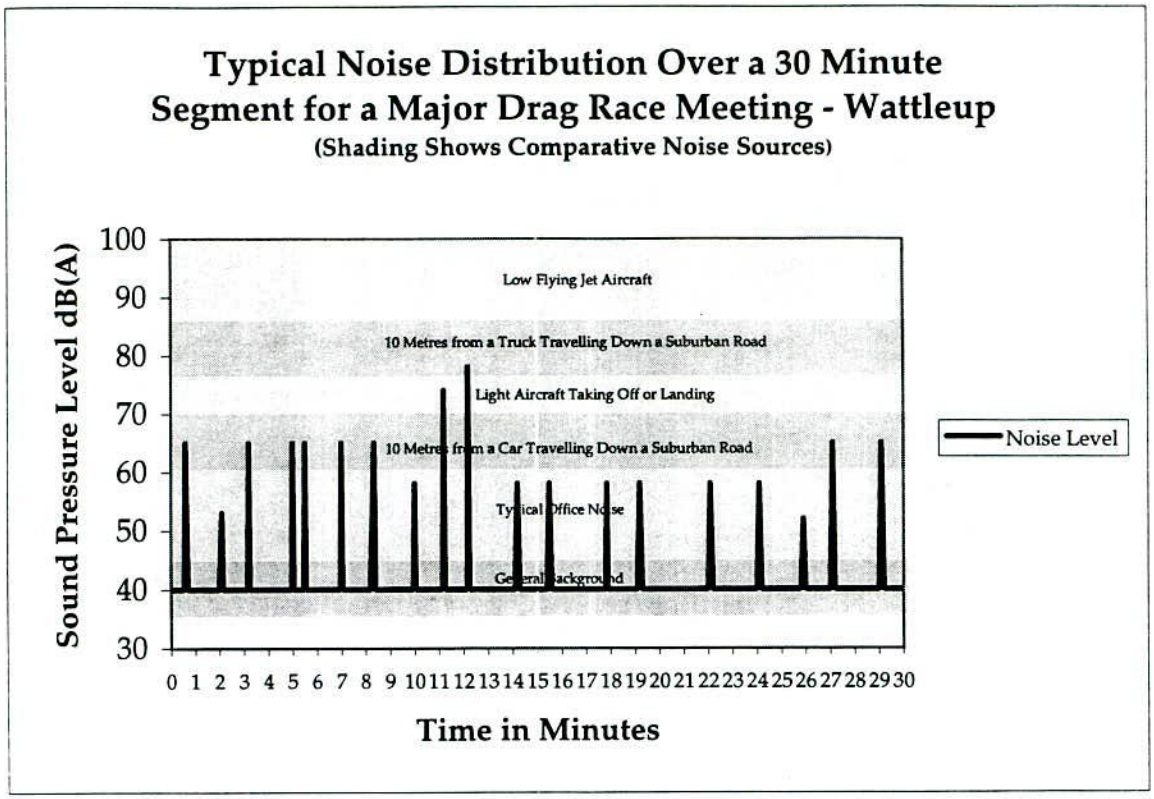
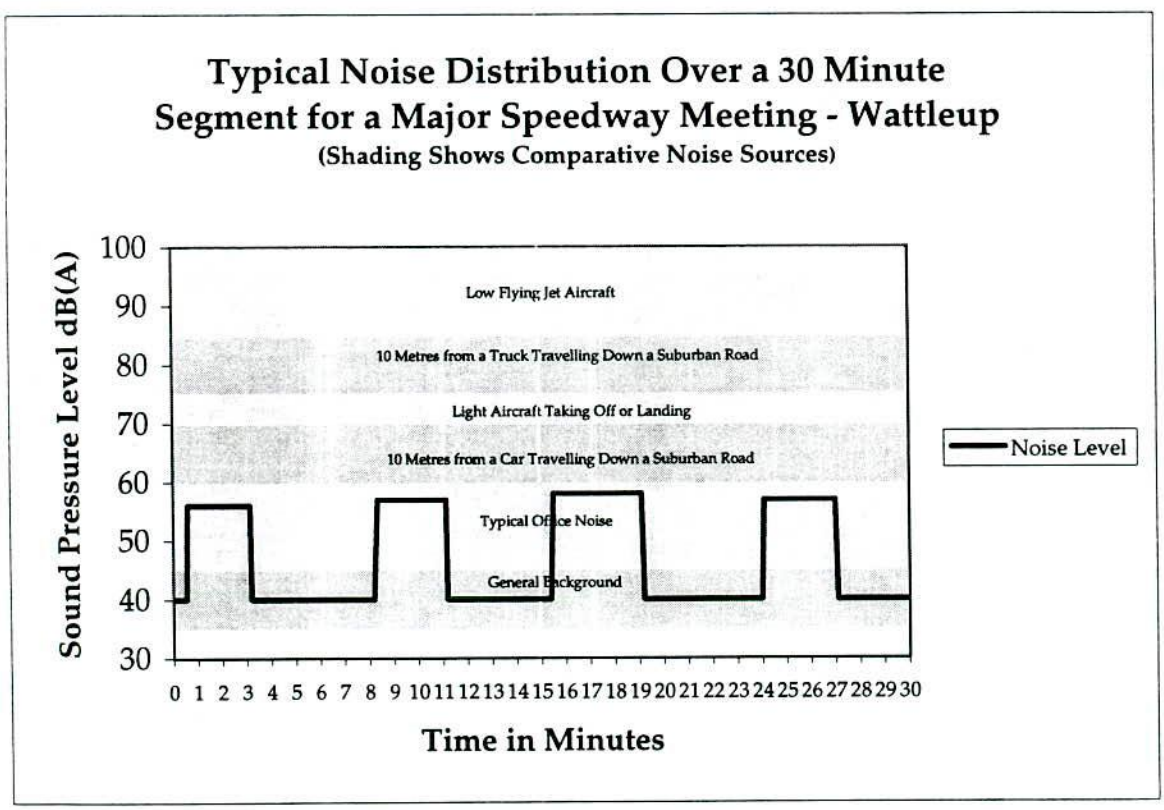


Figure 12



Chapter 1

INTRODUCTION

This report has been prepared to assess the environmental noise levels to nearby residences from drag racing and speedway events held at a proposed International Motorplex. The proposed site for the Motorplex is located in Kwinana between Thomas Road to the south, Rockingham Road to the west, Anketell Road to the north and Abercrombie Road to the east.

The results are presented in a format that illustrates the distribution of noise levels and the relationship between the predicted noise levels and the percentage of time the noise will be audible over a representative time period of four hours.

In addition to the above, noise contour lines, representing the maximum noise level from each type of race vehicle under southerly and northerly wind conditions, have been superimposed over a map of the surrounding area.

The predicted noise levels are compared against the relevant Western Australian noise criteria, the *Environmental Protection (Noise) Regulations 1997* (the Regulations), and noise management measures are recommended.

Chapter 2

CURRENT EXEMPTIONS

2.1 CLAREMONT SPEEDWAY

The noise from Claremont Speedway was, until recently, controlled by the *Noise Abatement (Royal Showgrounds, Claremont) Regulations 1976*. These regulations specified the maximum allowable noise level of racing vehicles, when measured at a specified distance from the vehicle, whilst it was being driven around the track. With the proclamation of the *Environmental Protection (Noise) Regulations 1997*, the *Noise Abatement (Royal Showgrounds, Claremont) Regulations 1976* was revoked and a ministerial exemption is under development. This ministerial exemption is expected to be similar to the original regulation, in that noise will be controlled by ensuring that vehicles do not exceed a maximum noise level whilst being driven around the track.

2.2 RAVENSWOOD INTERNATIONAL RACEWAY

Noise from Ravenswood International Raceway is controlled under an Environmental Protection Act, Section 6 Ministerial Exemption, gazetted in October 1994. The Exemption stipulates:

- the times during which racing events can occur; and
- the maximum noise level allowed at residences greater than 1,000 metres from the track.

It is a requirement that noise from one event per season is monitored by an approved person and a report of the results presented to the Department of Environmental Protection (DEP). The current exemption expires in 1999, however, this is due to be renewed to enable the operation of the Raceway until the time of its relocation.

Chapter 3

NOISE LEVEL CRITERIA

3.1 CURRENT LEGISLATION

The legislation prescribing allowable noise levels at noise sensitive, commercial and industrial premises is the *Environmental Protection (Noise) Regulations 1997*. For noise sensitive premises, the assigned level is dependant upon the land uses within the near vicinity of the noise sensitive premises (the influencing factor), the duration of time for which the noise is present and the time of day or night when the noise occurs. For commercial and industrial premises an assigned level is set irrespective of the surrounding land uses.

The table presented in the Regulations, from which assigned noise levels are determined, is reproduced in *Table 3.1* below.

Table 3.1 ASSIGNED NOISE LEVELS

	Assigned Level			
	Time of Day	**L_{A10}**	**L_{A1}**	**$L_{A max}$**
Noise Sensitive Premises	0700 – 1900 hours Monday to Saturday	45 dB(A) + influencing factor	55 dB(A) + influencing factor	65 dB(A) + influencing factor
	0900 – 1900 hours Sunday & Public Hols	40 dB(A) + influencing factor	50 dB(A) + influencing factor	65 dB(A) + influencing factor
	1900 – 2200 hours All Days	40 dB(A) + influencing factor	50 dB(A) + influencing factor	55 dB(A) + influencing factor
	2200 – 0700 hours Monday to Saturday	35 dB(A) + influencing factor	45 dB(A) + influencing factor	55 dB(A) + influencing factor
	2200 - 0900 hours Sunday & Public Hols	35 dB(A) + influencing factor	45 dB(A) + influencing factor	55 dB(A) + influencing factor
Commercial Premises	All Hours	60 dB(A)	75 dB(A)	80 dB(A)
Industrial Premises	All Hours	65 dB(A)	80 dB(A)	90 dB(A)

3.2 INFLUENCING FACTOR

The influencing factor referred to in *Table 3.1* is calculated according to the type of land use within two concentric circles, of radii 100 metres and 450 metres, centred at the noise sensitive premises. Noise sensitive premises within the near vicinity of the proposed Motorsports Complex are located in Medina, Hope Valley and Wattleup.

It was determined, from analysis of the land use zones described in the Town of Kwinana and Cockburn Town Planning Scheme No. 2 (District Scheme), that there were a number of premises that, under normal circumstances, would attract an influencing factor of zero. However, Schedule 3 of the Regulations states that, for noise sensitive premises within the Kwinana air quality buffer zone, all land is to be considered as commercial. Therefore, premises within this buffer zone, namely in Hope Valley and Wattleup, would attract an influencing factor of approximately 9 dB. Medina is outside the Kwinana air quality buffer zone and while some noise sensitive premises will attract a significant influencing factor, due to their close proximity to the buffer zone, in the worst case condition a zero influencing factor will apply. As a conservative assessment no influencing factor was considered for premises within Medina.

It should be noted that Schedule 3 of the Regulations is currently under review by the DEP and advice from the DEP is that the influencing factor may be reduced.

3.3 ASSIGNED NOISE LEVELS

The relevant assigned noise level to noise sensitive premises, whether it be an L_{A10}, L_{A1} or an L_{Amax} is dependent upon the percentage of time in which the noise is present over a representative time period. For race meetings, the representative time period under the Regulations would be four hours. Using data from a typical major racing event (WA Grand Finals for drag racing and USA v WA for speedway) the percentage of time each vehicle type is actually racing has been calculated and is presented in *Table 3.2* and *Table 3.3*.

It has been assumed that the percentage of time determined over the race time period is representative of the percentage of time over the four hour representative time period under the Regulations. This would be considered as a conservative approach.

Table 3.2 RACE TIMES AT RAVENSWOOD RACEWAY EVENT WA GRAND FINALS - 2/4/99

Vehicle Type	Number of Vehicles Competing	Number of Races	Average Time per Race (secs) incl. Burnouts	Total Race Time (secs)	% of Total Time	Cumul -ative %	Relevant Noise Level
Top Fuel Dragsters	2	3	15	45	0.25	0.25	L_{max}
Top Competition Eliminator	14	16	15	240	1.3	1.55	L_{A1}
Super Stock	42	43	15	645	3.58	5.13	L_{A1}
Motorcycles	30	33	10	330	1.83	6.96	L_{A1}
Super Street Eliminator	27	27	15	405	2.25	9.21	L_{A1}

Notes: *1. It has been assumed that that the burnouts for each vehicle occur separately thus the total race time can be considered a conservative estimation.*

2. Super Stock, Motorcycles and Super Street have been assumed to have the same noise emissions

3. Mini Jets are assumed to have the same noise emissions as Top Fuel Dragsters. This can be confirmed from historical measurements at Ravenswood Raceway.

4. Elimination Start Time 6pm Event Finish 11pm.

Table 3.3 RACE TIMES AT CLAREMONT SPEEDWAY - USA v WA SPEEDWEEK - 1/1/99

Vehicle Type	Number of Vehicles Competing	Number of Races	Total Race Time (secs)	% of Total Time	Cumul -ative %	Relevant Noise Level
Sprint Cars	28	10	1734	13.02	13.02	L_{10}
Super 6 Sedans	12	4	474	3.56	16.58	L_{10}
Modified Sedans	25	4	600	4.50	21.08	L_{10}

Notes: *1. All vehicles have been assumed to have the same noise emissions*

2. Event Start Time 7pm Event Finish 10.40pm

3.4 ASSIGNED NOISE LEVELS UNDER THE REGULATIONS

As the race events generally run past 10pm, the most critical assigned noise levels at noise sensitive premises, for each class of vehicle, occur during the night-time period. These assigned levels are described in *Table 3.4.*

Table 3.4 ASSIGNED NOISE LEVELS

Vehicle Type	Critical Assigned Noise Level	Noise Sensitive	Commercial Premises	Industrial Premises
Medina				
Top Fuel	L_{max}	55 dB(A)	80 dB(A)	90 dB(A)
Top Comp	L_{A1}	45 dB(A)	75 dB(A)	80 dB(A)
Super Gas	L_{A1}	45 dB(A)	75 dB(A)	80 dB(A)
Sprintcars	L_{A10}	35 dB(A)	60 dB(A)	65 dB(A)
Hope Valley/Wattleup				
Top Fuel	L_{max}	64 dB(A)	80 dB(A)	90 dB(A)
Top Comp	L_{A1}	54 dB(A)	75 dB(A)	80 dB(A)
Super Gas	L_{A1}	54 dB(A)	75 dB(A)	80 dB(A)
Sprintcars	L_{A10}	44 dB(A)	60 dB(A)	65 dB(A)

3.5 ADJUSTMENTS

Adjustments to noise levels are required where the noise source exhibits either tonal, impulsive or modulating characteristics. This is addressed in *Section 5.2.*

Chapter 4

NOISE ASSESSMENT METHODOLOGY

4.1 INTRODUCTION

The methodology used for this noise assessment follows the recommendations detailed in the Environmental Protection Authority's (EPA) Draft Guidance No. 8 - *Environmental Noise*. Detailed below is a description of the methodology and assumptions used.

4.2 NOISE LEVEL PREDICTION MODEL

Noise levels from the proposed Motorplex were calculated using the noise prediction computer program Environmental Noise Model (ENM). Results from the ENM model are accepted by all Australian environmental authorities, including the DEP. ENM takes into consideration the frequency spectrum and directivity of noise sources, barrier attenuation, air absorption, influence of meteorological conditions and the topography of the surrounding area.

4.3 NOISE SOURCES

The noise levels have been predicted considering three noise sources from the drag racing events and one from the speedway. The noise sources are:

- Drag Racing
  - Top Fuel Vehicles;
  - Top Comp Vehicles; and
  - Super Stock, Motorcycles and Super Street Vehicles.
- Speedway
  - Sprintcars.

These are discussed in the following sections.

i. Drag Racing

The sound power data used for predictions of noise levels associated with drag racing, was derived from on-site measurements at Ravenswood International Raceway and from technical papers presented at recent conferences. The predicted noise levels have been validated against noise levels measured at residences adjacent Ravenswood International Raceway. The sound power levels used are presented below in *Table 4.1, 4.2* and *4.3.*

Table 4.1 SOUND POWER LEVELS USED FOR TOP FUEL VEHICLES

One Third Octave Frequency (Hz) Sound Power Levels (dB)										
31.5	*63*	*125*	*250*	*500*	*1k*	*2k*	*4k*	*8k*	*16k*	*O/A*
165	159	156	171	159	157	157	151	147	141	
164	164	168	163	160	157	153	149	145	139	168 dB(A)
160	157	168	159	156	157	153	147	144	135	

Table 4.2 SOUND POWER LEVELS USED FOR TOP COMP VEHICLES

One Third Octave Frequency (Hz) Sound Power Levels (dB)										
31.5	*63*	*125*	*250*	*500*	*1k*	*2k*	*4k*	*8k*	*16k*	*O/A*
109	137	138	130	142	141	132	116	65	69	
104	136	131	131	146	138	127	98	66	71	148 dB(A)
100	133	144	134	143	136	121	98	67	74	

Table 4.3 SOUND POWER LEVELS USED FOR SUPER STOCK VEHICLES

One Third Octave Frequency (Hz) Sound Power Levels (dB)										
31.5	*63*	*125*	*250*	*500*	*1k*	*2k*	*4k*	*8k*	*16k*	*O/A*
109	133	121	119	139	132	126	110	65	69	
98	123	127	123	136	129	121	99	66	71	140dB(A)
100	118	135	123	135	128	114	100	67	74	

It should be noted that noise levels from Top Fuel vehicles are comparable to the noise levels expected from Mini Jet Cars, which are the alternative Exhibition Events run at the raceway.

ii. Speedway

The data used for the Speedway racing was derived from the DEP report number EN 18/97. The noise levels represent a group of 16 Sprintcars, tightly packed, and would be considered the highest noise levels that would occur during the event. The sound power levels used are presented below in *Table 4.4*.

Table 4.4 SOUND POWER LEVELS USED FOR SPRINTCAR VEHICLES

Centre Octave Frequency (Hz) Sound Power Levels (dB)										
31.5	*63*	*125*	*250*	*500*	*1k*	*2k*	*4k*	*8k*	*16k*	*O/A*
125	136	145	145	141	135	130	126	120	110	142 dB(A)

4.4 METEOROLOGICAL CONDITIONS

Meteorological conditions, in particular the wind direction and temperature profile, have a significant effect on the propagation of sound over distance. A positive wind (from the source to the receiver) together with a temperature inversion can generally be considered as the worst case scenario, whereby a negative wind is considered the best case scenario. This is detailed in the EPA Draft Guidance No. 8 (EPA, 1998). The noise levels have been modelled for the areas of Medina, Wattleup and Hope Valley under the following night-time meteorological scenario.

- Wind Speed 3 m/s
- Temperature Inversion Lapse Rate 2°C/100m
- Temperature 15°C
- Humidity 50%

Notes: 1. The night-time meteorological scenario specified in the EPA Draft Guidance No. 8 yielded higher predicted noise levels than the day time meteorological scenario.

4.5 GROUND TOPOGRAPHY AND BARRIER EFFECTS

Ground topography of the area was obtained in 3-dimensional digital format, from the Department of Lands and Administration. The ground type used in the noise model was specified as "Rural" which relates to undeveloped sparsely built up outskirts of towns and suburbs.

The design of the Motorplex has been incorporated in the model. This includes specific noise barrier locations and heights and relative levels of the racing tracks. This information was obtained from the design drawing A-SK-12/B: titled "Amphitheatre Concept – Main Facilities Layout: Plan and Sections", dated 27.04.99. This design drawing closely correlates with *Figure 2.2* presented in the PER.

Chapter 5

RESULTS

5.1 INTRODUCTION

As detailed in *Section 4.4*, the meteorological conditions, and in particular the wind direction, has significant effects on the noise level that would be experienced at the receiver points. Analysis of wind roses for the Kwinana/Rockingham area (*Appendix A)* show that, during the racing season of October through to March, the wind direction is predominantly from the south and that wind from the north would be a rare occurrence. Based on this analysis, the results are presented for both the most common and the worst-case wind scenarios for the Medina, Hope Valley and Wattleup areas. It should be noted that the most common and worst case wind conditions coincide for the Hope Valley and Wattleup areas.

5.2 ASSESSMENT AGAINST THE REGULATIONS

Tables 5.1 to *5.4* present the predicted noise levels for the worst case premises in Medina, Hope Valley and Wattleup. The results are compared to the assigned noise levels, determined in accordance with the *Environmental Protection (Noise) Regulations 1997*.

Table 5.1 MEDINA – MOST COMMON WIND CONDITION

Race Vehicle Type	Predicted Noise Level	Percentage of Time Over a Four Hour Period	Assigned Noise Level
Top Fuel Dragster	72 dB(A)	0.17%	55 dB(A)
Top Comp	56 dB(A)	0.89%	55 dB(A)
Super Gas	48 dB(A)	8.14%	45 dB(A)
Speedway	48 dB(A)	21%	35 dB(A)

Notes: *Noise predictions have been prepared using the most common and worst case meteorological conditions. In the case of Medina, these are different. For Hope Valley and Wattleup the worst case and most common wind conditions are the same.*

Table 5.2 MEDINA – WORST CASE WIND CONDITION

Race Vehicle Type	Predicted Noise Level	Percentage of Time Over a Four Hour Period	Assigned Noise Level
Top Fuel Dragster	88 dB(A)	0.17%	55 dB(A)
Top Comp	72 dB(A)	0.89%	55 dB(A)
Super Gas	62 dB(A)	8.14%	45 dB(A)
Speedway	62 dB(A)	21%	35 dB(A)

Notes: *Noise predictions have been prepared using the most common and worst case meteorological conditions. In the case of Medina, these are different. For Hope Valley and Wattleup the worst case and most common wind conditions are the same.*

Table 5.3 HOPE VALLEY – MOST COMMON AND WORST CASE WIND CONDITION

Race Vehicle Type	Predicted Noise Level	Percentage of Time Over a Four Hour Period	Assigned Noise Level
Top Fuel Dragster	97 dB(A)	0.17%	64 dB(A)
Top Comp	81 dB(A)	0.89%	64 dB(A)
Super Gas	72 dB(A)	8.14%	54 dB(A)
Speedway	74 dB(A)	21%	44 dB(A)

Notes: *Noise predictions have been prepared using the most common and worst case meteorological conditions. In the case of Medina, these are different. For Hope Valley and Wattleup the worst case and most common wind conditions are the same.*

Table 5.4 WATTLEUP – MOST COMMON AND WORST CASE WIND CONDITION

Race Vehicle Type	Predicted Noise Level	Percentage of Time Over a Four Hour Period	Assigned Noise Level
Top Fuel Dragster	78 dB(A)	0.17%	64 dB(A)
Top Comp	66 dB(A)	0.89%	64 dB(A)
Super Gas	58 dB(A)	8.14%	54 dB(A)
Speedway	58 dB(A)	21%	44 dB(A)

Notes: Noise predictions have been prepared using the most common and worst case meteorological conditions. In the case of Medina, these are different. For Hope Valley and Wattleup the worst case and most common wind conditions are the same.

The sound power level spectra shown in *Tables 4.1* to *4.3* would be judged tonal under the current Regulations and, as such, a 5 dB adjustment to noise levels may apply. However, the tonality is not prominent, and under the more quantitative procedure outlined in Australian Standard AS 1055-1984 *'Acoustics - Description and Measurement of Environmental Noise'*, the tonal correction would amount to 1 to 2 dB. The prominence of tonality would be expected to be lower for noise spectra at residences. Although one third octave spectra for Sprintcars are not available, a similar level of tonality would be expected in this case. Further analysis of measured data from vehicles may be required to clarify whether or not tonal characteristics are evident.

5.3 ASSESSMENT OF THE ENVIRONMENTAL NOISE IMPACT

Assuming that the public address system is designed so as not to impact upon residential areas, the noise associated with the Motorplex will only be audible at times when the vehicles are actually racing. In respect to drag races, the racing procedure generally comprises of the vehicles heating the tyres, commonly known as 'the burnout', which consists of a burst of noise lasting approximately five seconds, followed by the actual race, which again lasts for five seconds. There is then a wait while the vehicle proceeds to the end of the drag strip and the next race vehicles position themselves on the starting line. This results in a noise profile similar to that presented in *Figures 5.1 to 5.3* with each of the figures representing predicted noise levels to the three key residential areas.

Figure 5.1

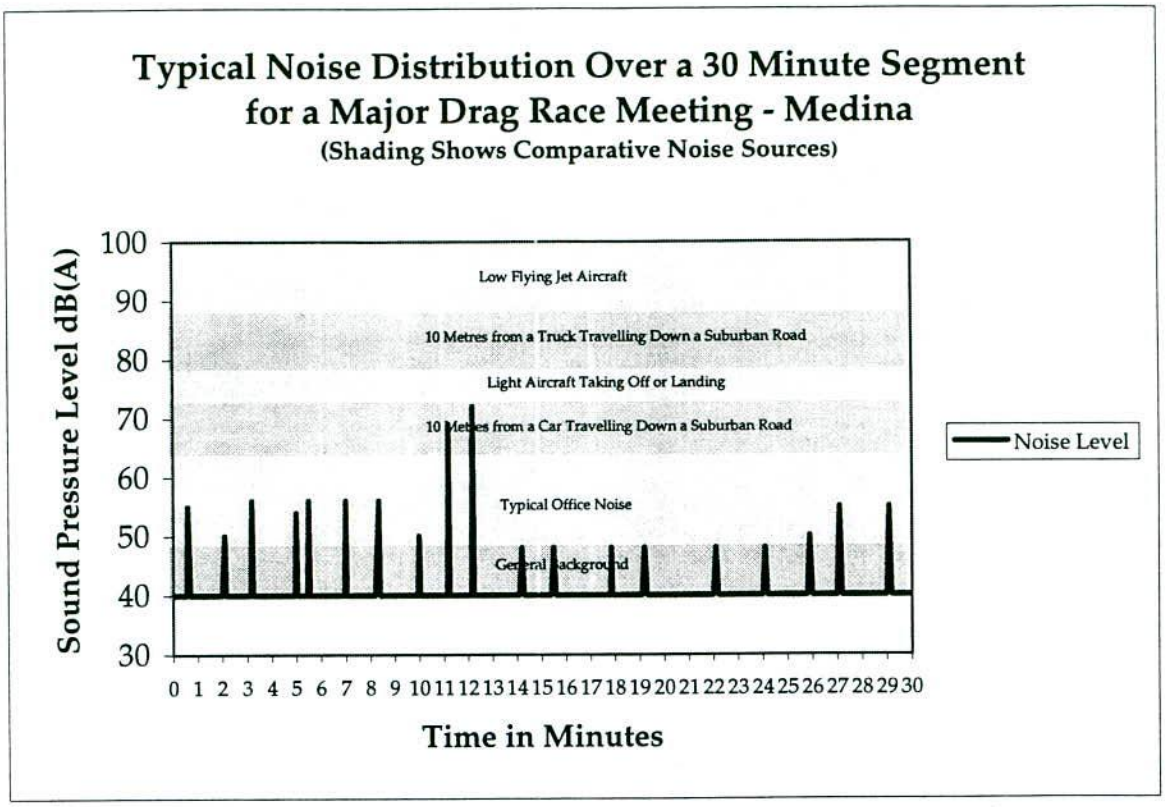


Figure 5.2

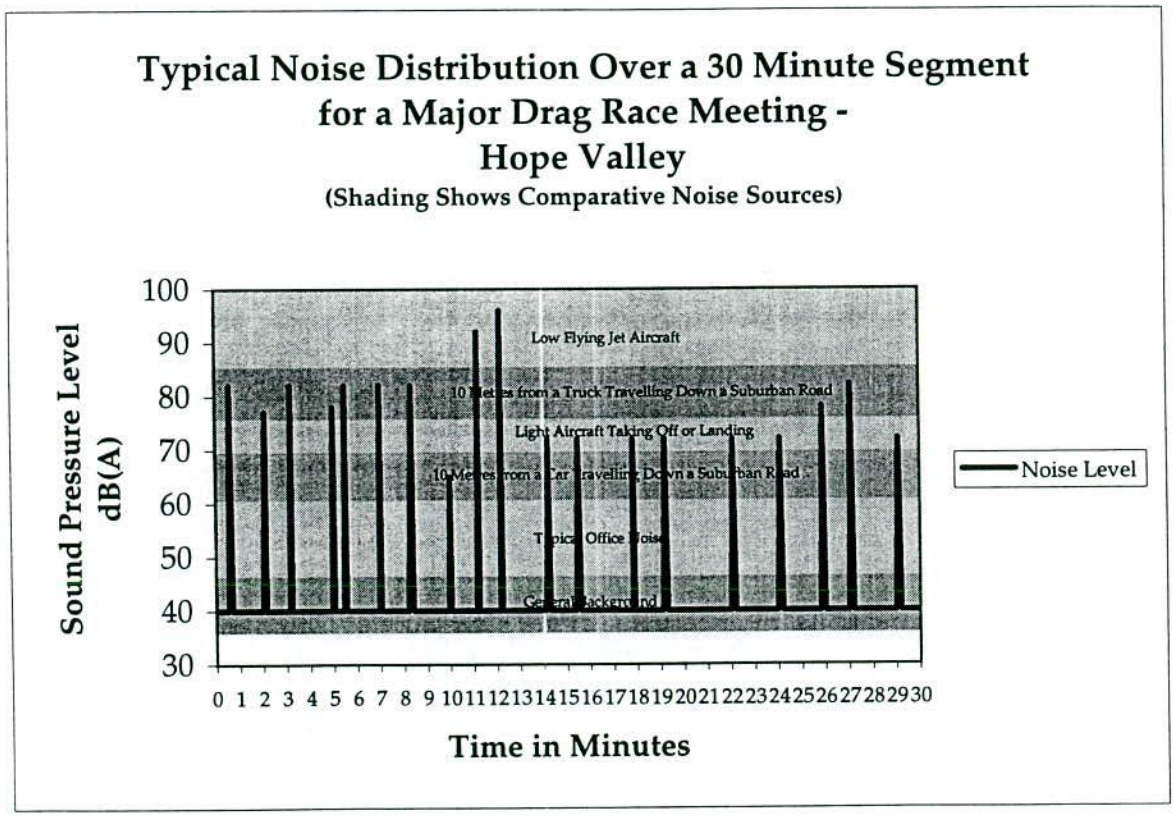
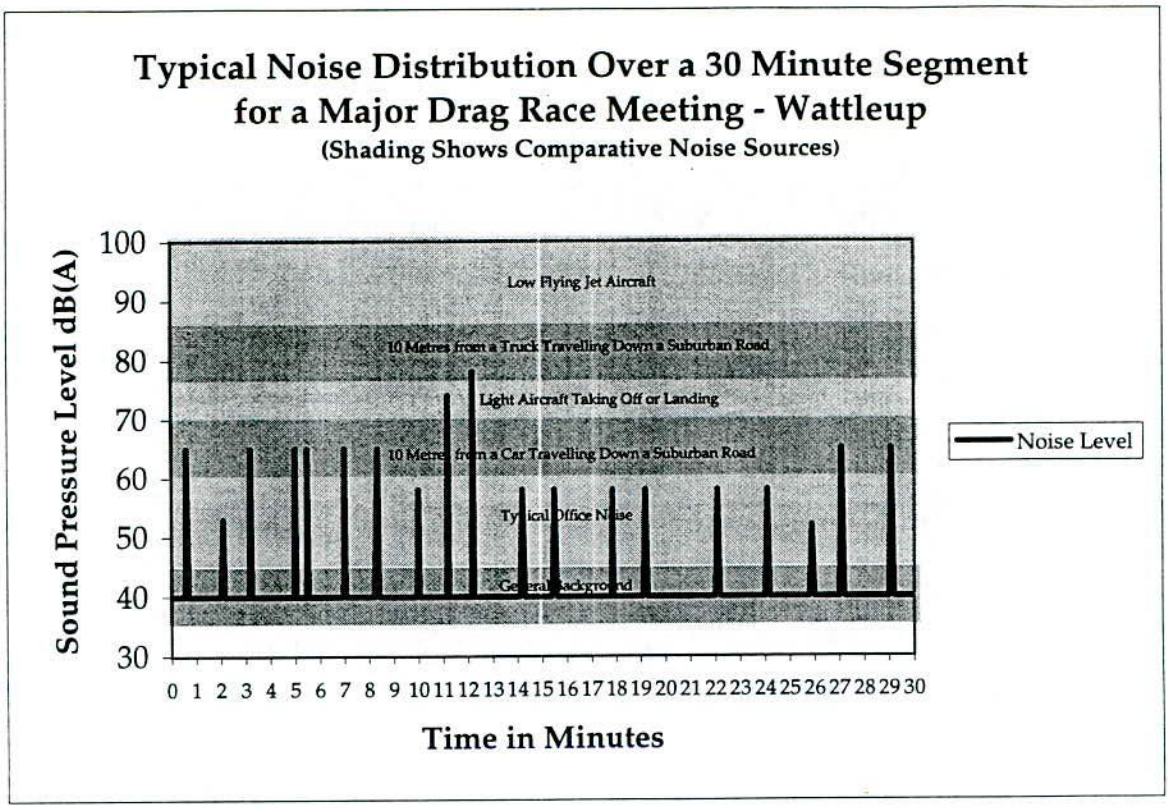


Figure 5.3



For speedway, the racing usually lasts for approximately three minutes with a gap between races while the vehicles in the next event take up their positions. This results in a noise profile similar to that presented in *Figures 5.4 to 5.6*, again, each figure representing predicted noise levels to the three key residential areas.

Figure 5.4

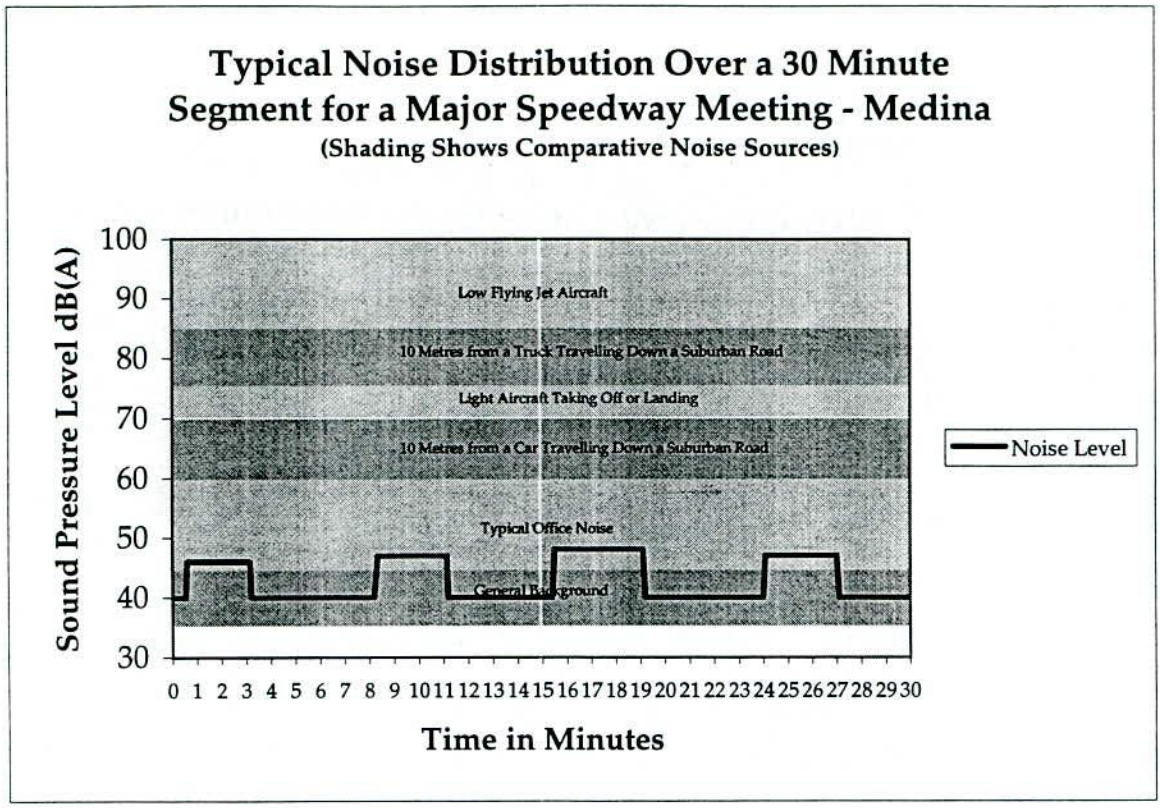


Figure 5.5

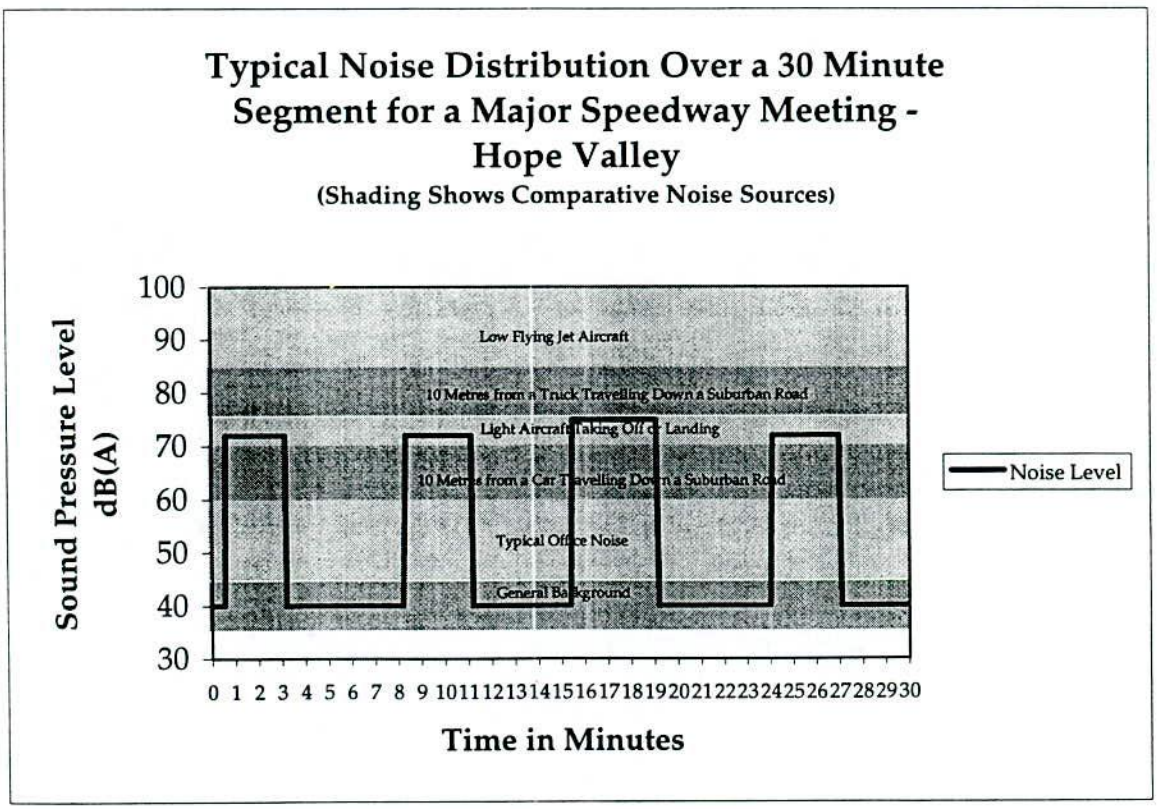
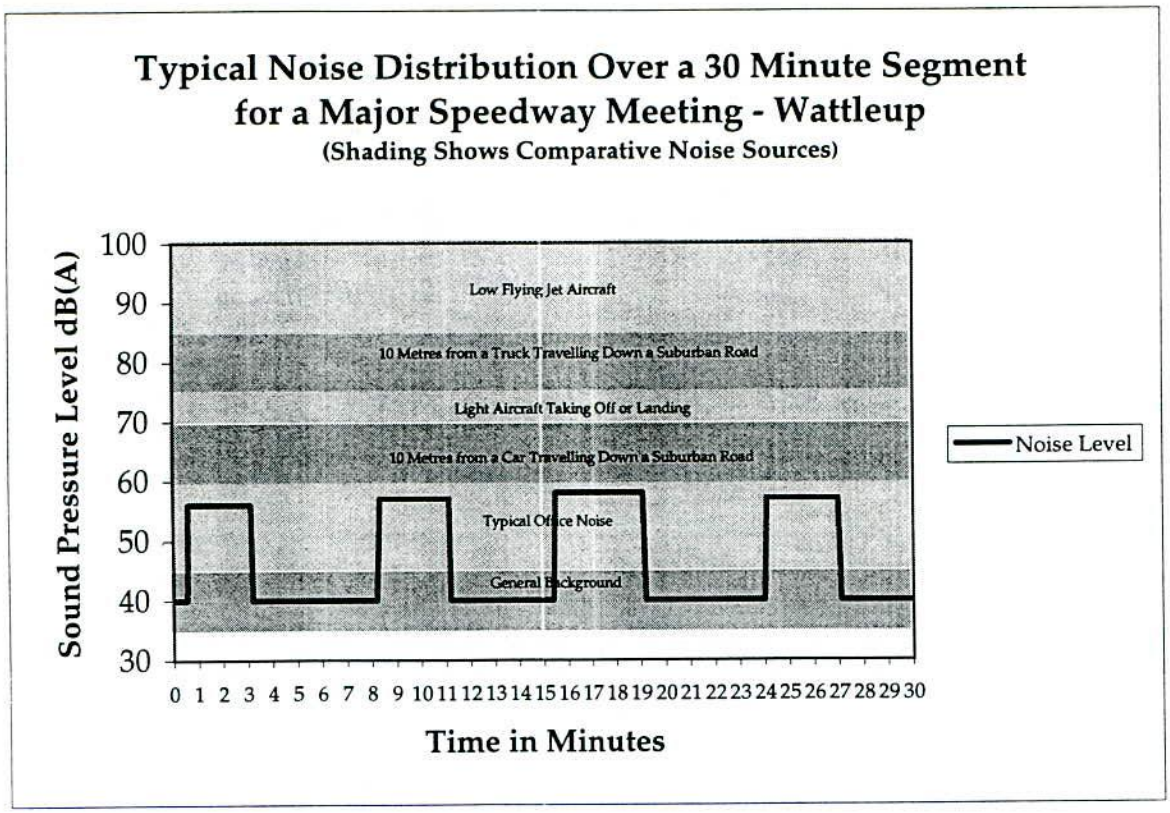


Figure 5.6



As the bursts of noise from the Motorplex are over a relatively short period of time with longer time periods in between races, the percentage of time the noise from each vehicle is audible over a four hour time period is likely to be fairly small.

This is reflected in the assigned noise levels allowed for each vehicle type, as presented in *Section 4.4*. The relationship between the percentage of time each vehicle will be audible, as detailed in *Tables 4.2* and *4.3*, and the predicted noise level at each of the key residential areas, under wost case and most common wind conditions, has been presented graphically in *Figures 5.7* to *5.14*.

Figure 5.7

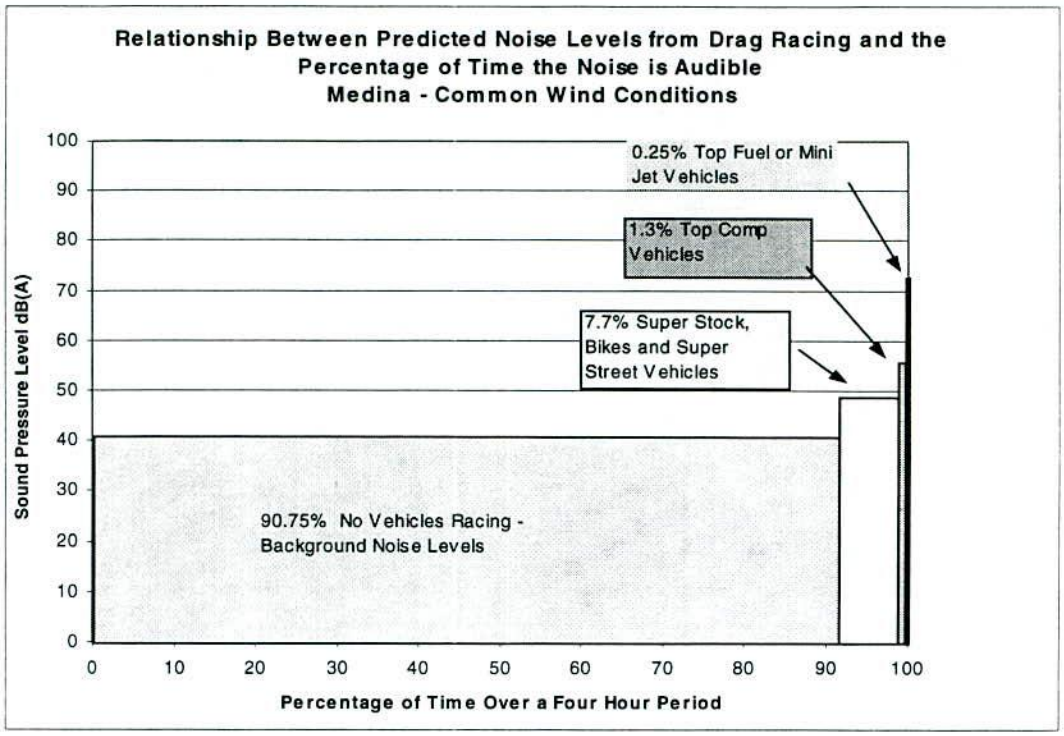


Figure 5.8

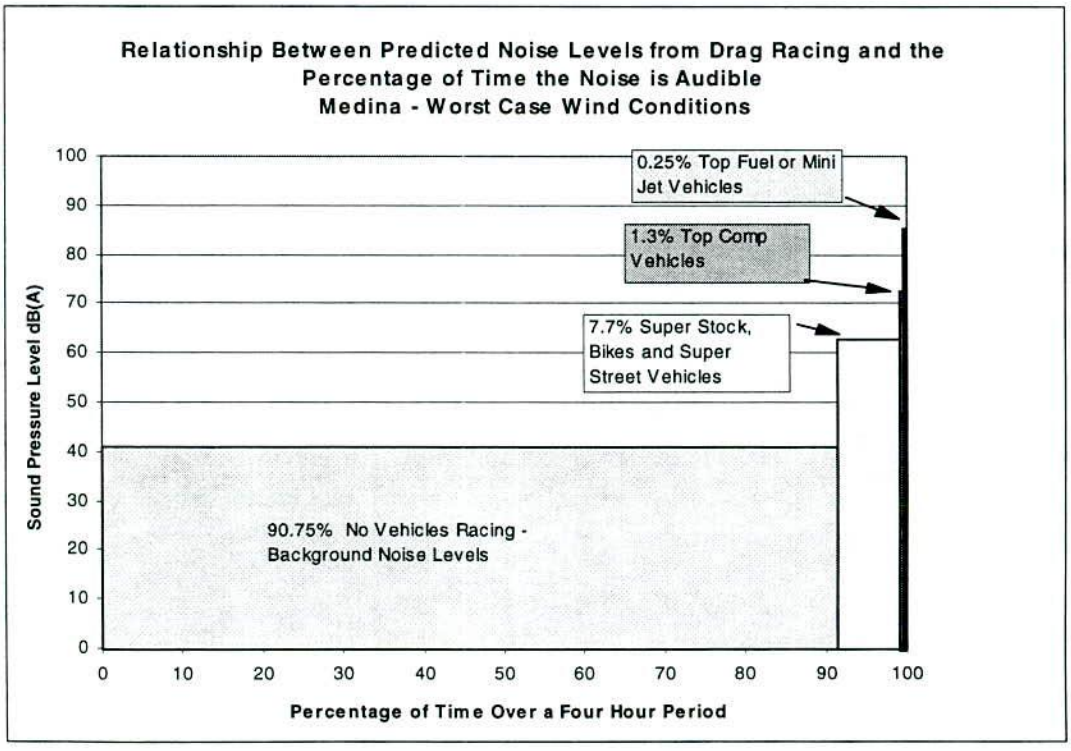


Figure 5.9

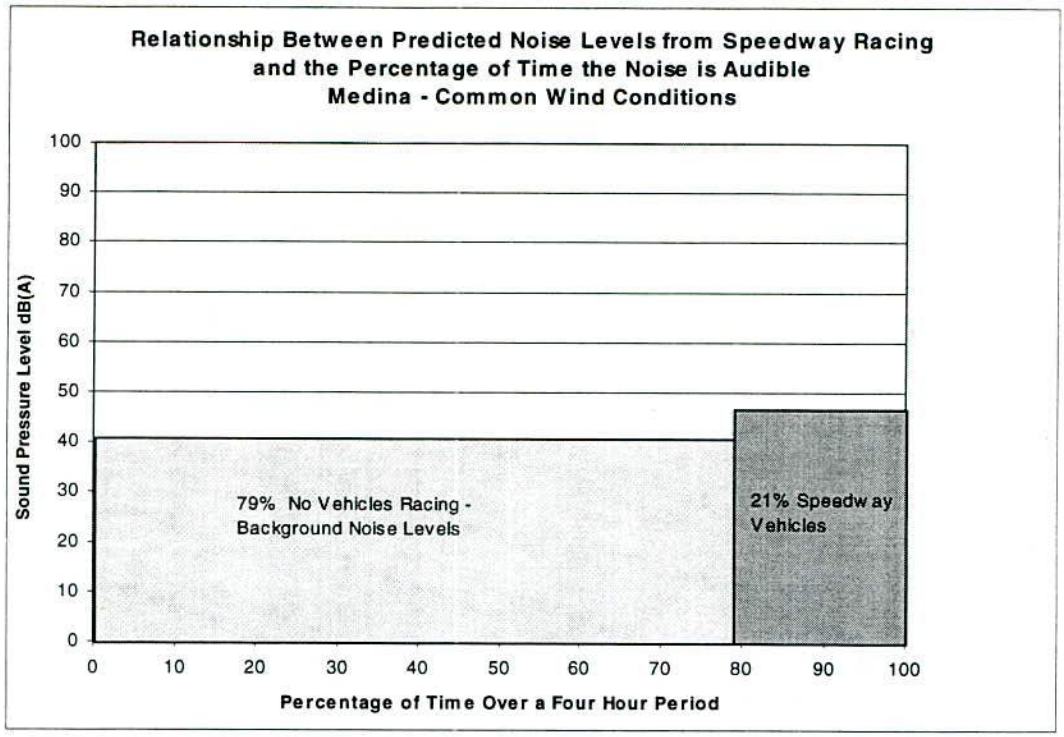


Figure 5.10

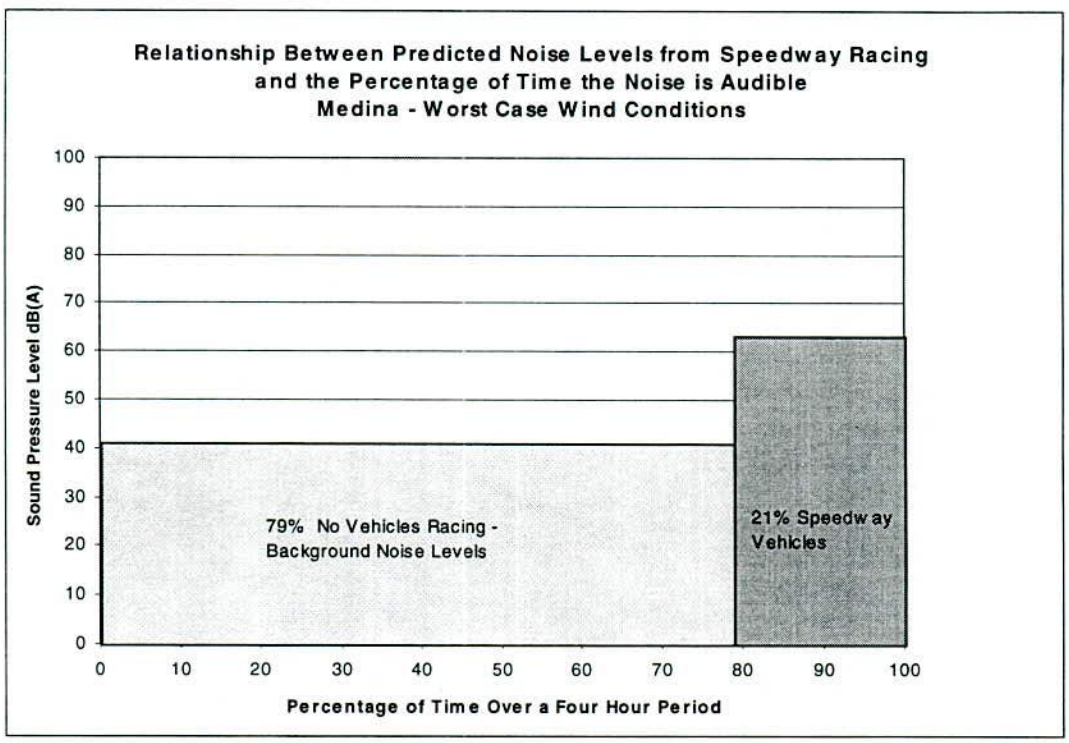


Figure 5.11

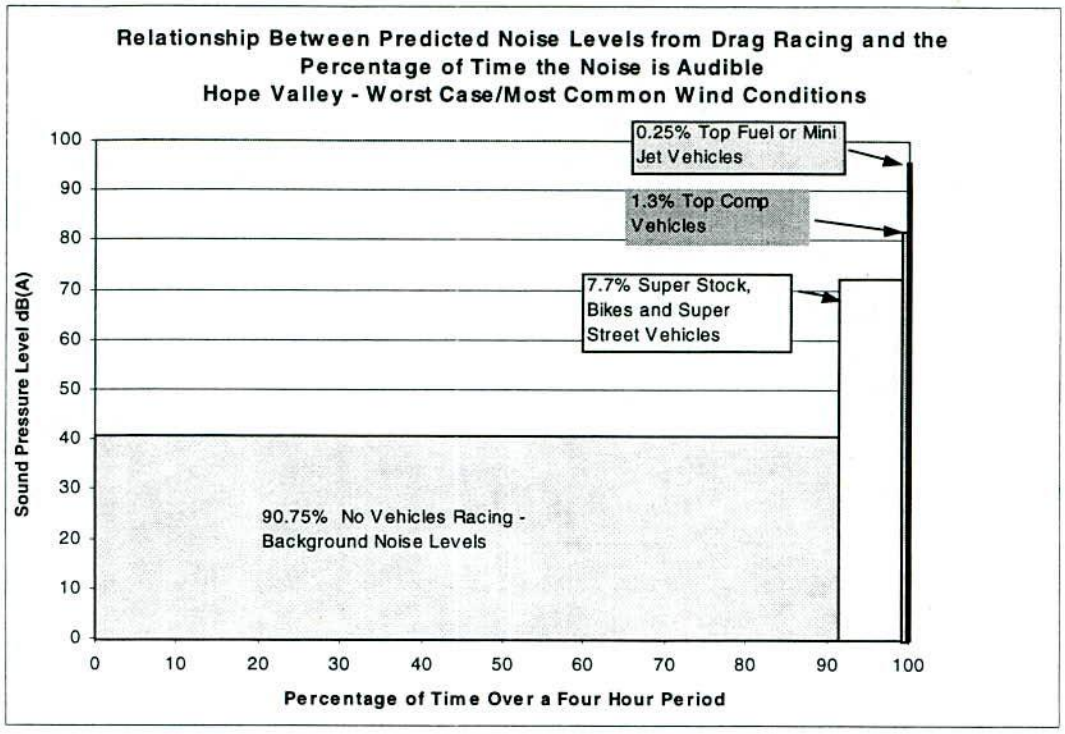


Figure 5.12

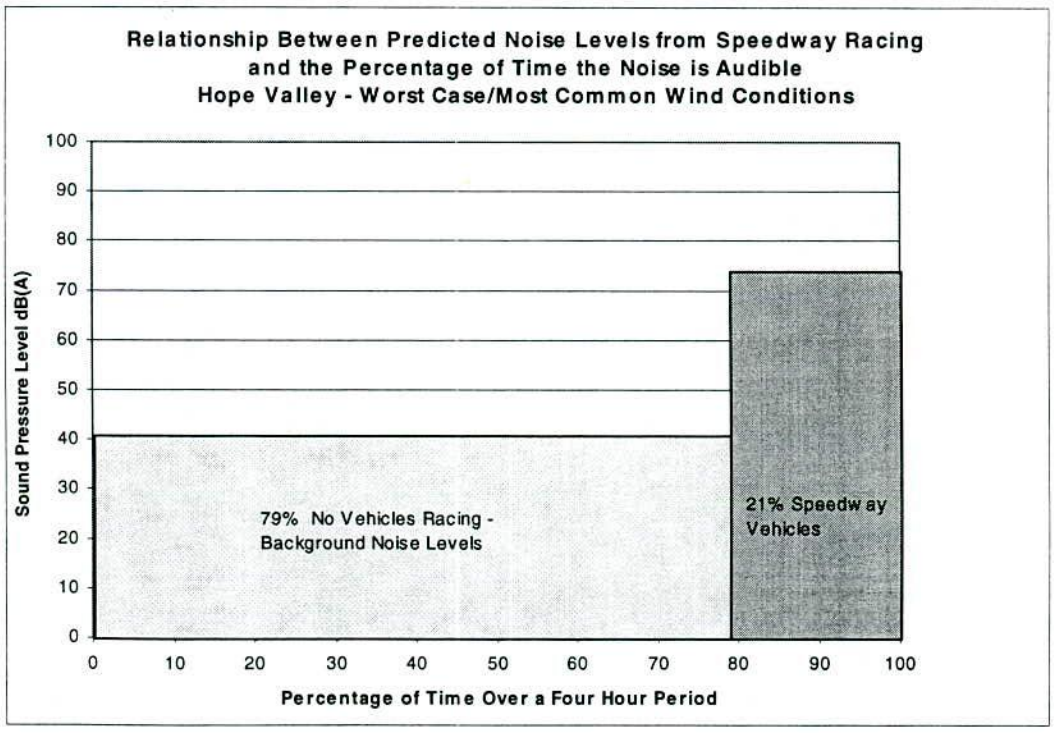


Figure 5.13

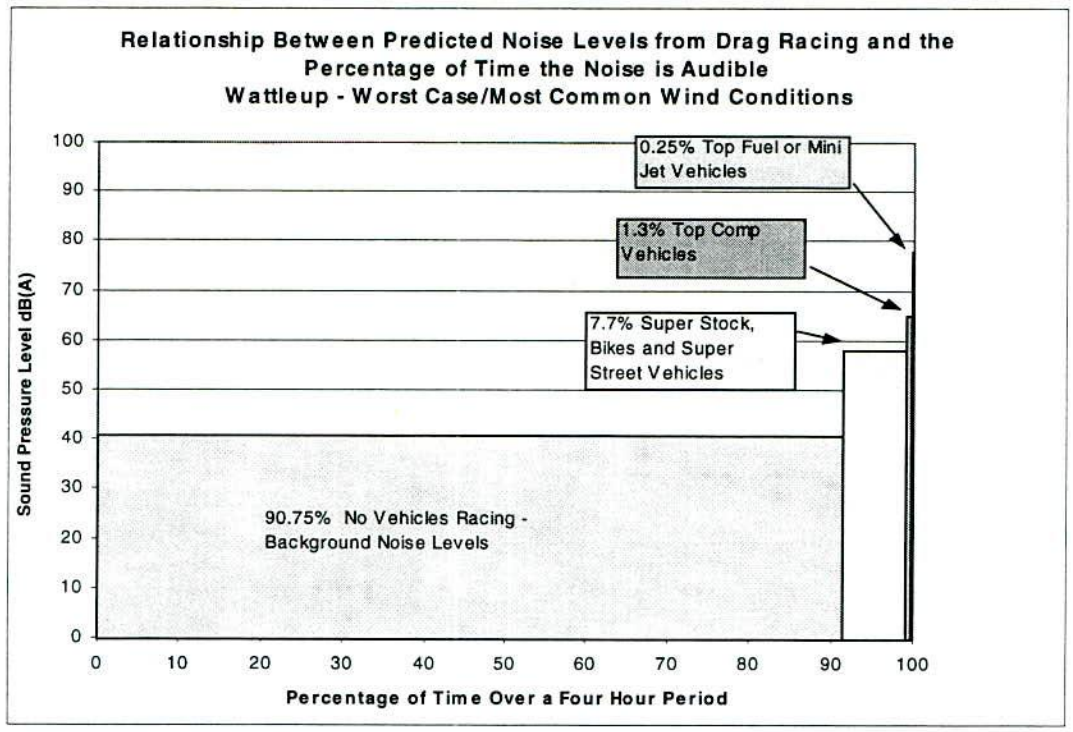
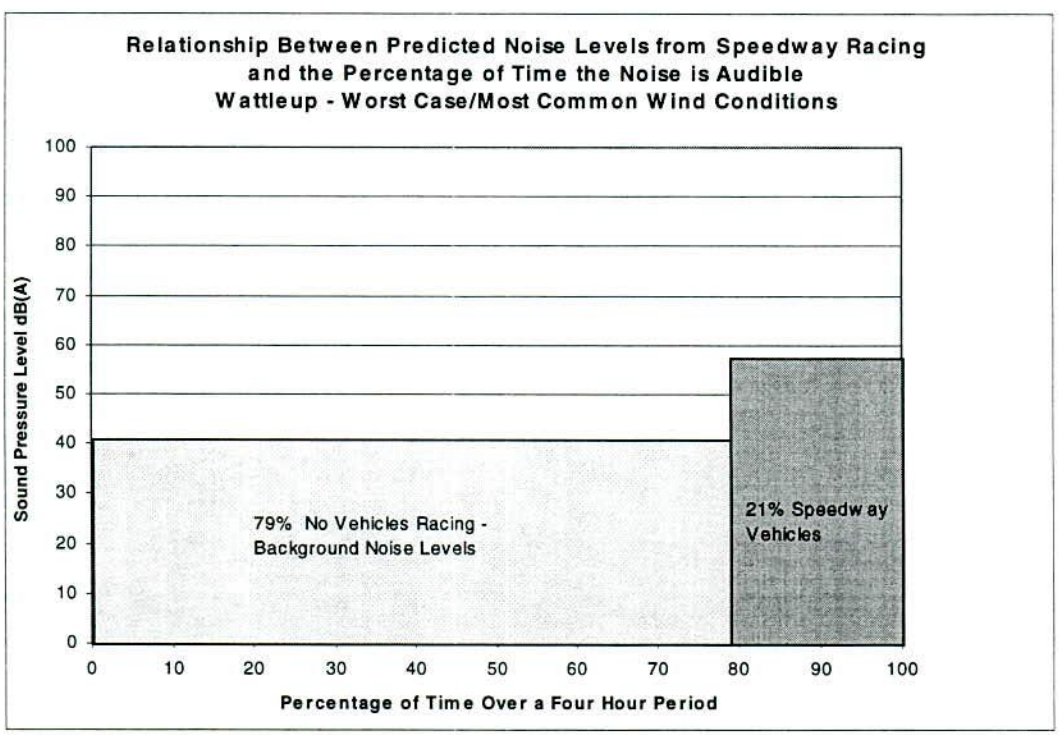


Figure 5.14



5.4 NOISE CONTOUR MAPS

The discussion relating to noise impacts has concentrated on the three key residential areas of Medina, Wattleup and Hope Valley. Consideration should also be given to other residential areas in the vicinity of the proposed Motorplex, as well as the noise to industrial premises in the near vicinity. The impacts to these receivers can be assessed from the noise contour maps that have been developed for each type of race vehicle under the most common and worst case wind conditions. When assessing the noise impacts, consideration should be given to the frequency and duration of the noise events as detailed in *Section 5.3*. The contour maps, *Figures 5.15 to 5.22* show predicted noise levels in A-weighted decibels (dB(A)) superimposed over a map of the study area.

5.5 SUBJECTIVE RESPONSE TO NOISE FROM THE MOTORPLEX

Research relating noise levels to the physical and psychological response in humans has been extensively used in the development of international standards and noise level criteria. Generally, this research considers the equivalent (or average - L_{eq}) noise level, over a period of a day or night, from noise sources that are present on a regular basis. Noise sources that have a similar distribution profile to racing, ie. short bursts of noise, would include rail or aircraft movements.

To maintain a consistent approach, the average noise levels from Speedway and Drag Racing at the Motorplex has been calculated over a four hour period. The results are different for each of the key residential areas and are as follows:

i. *Medina*

Drag Racing L_{Aeq} 48 dB(A)

Speedway L_{Aeq} 43 dB(A)

ii. *Hope Valley*

Drag Racing L_{Aeq} 72 dB(A)

Speedway L_{Aeq} 66 dB(A)

iii. *Wattleup*

Drag Racing L_{Aeq} 54 dB(A)

Speedway L_{Aeq} 51 dB(A)

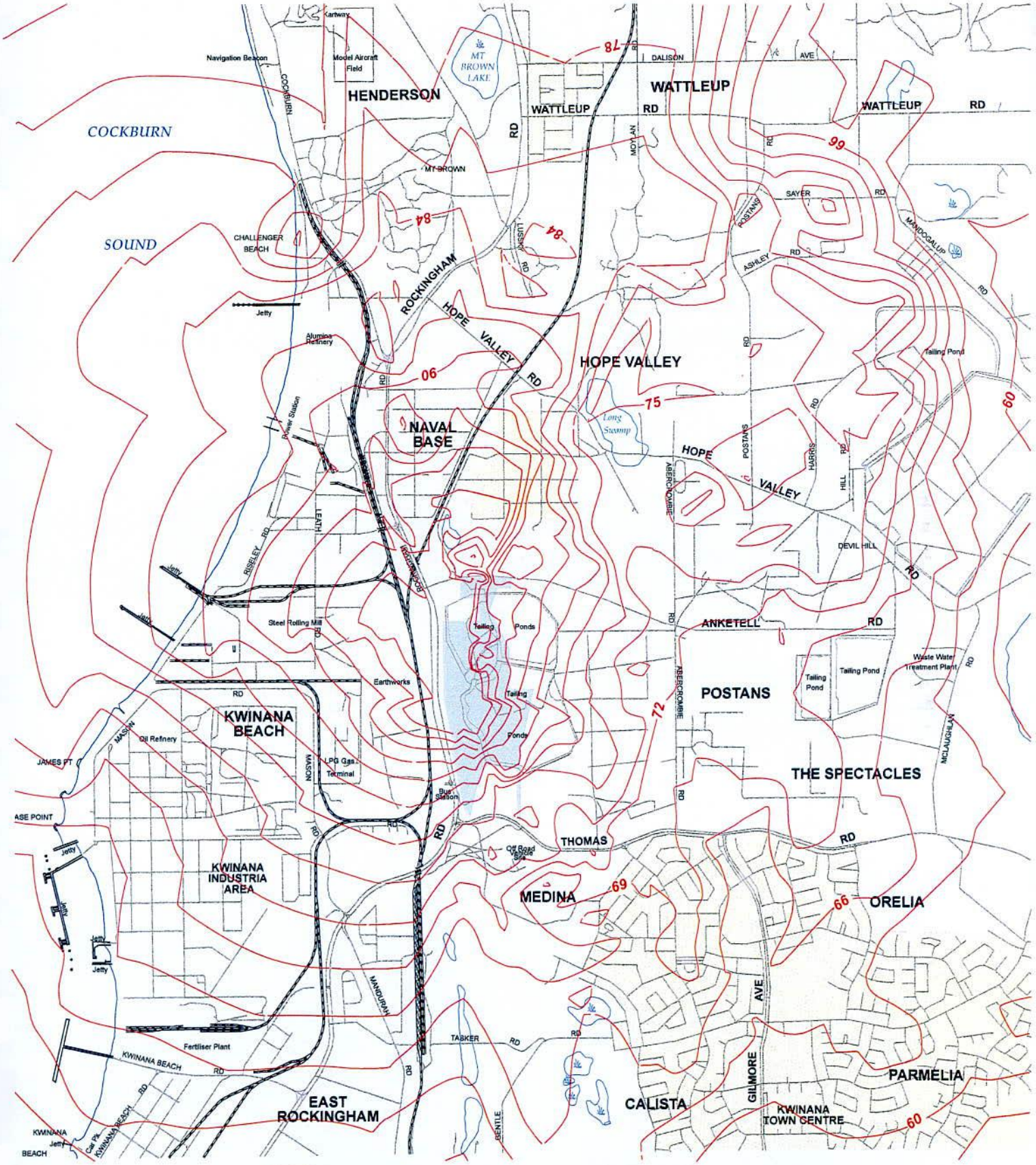


Figure 5.15 Predicted Maximum Noise Levels resulting from Top Fuel Vehicles under south (common) wind conditions.
Noise Levels will be present for approximately 25 seconds in a four hour period.

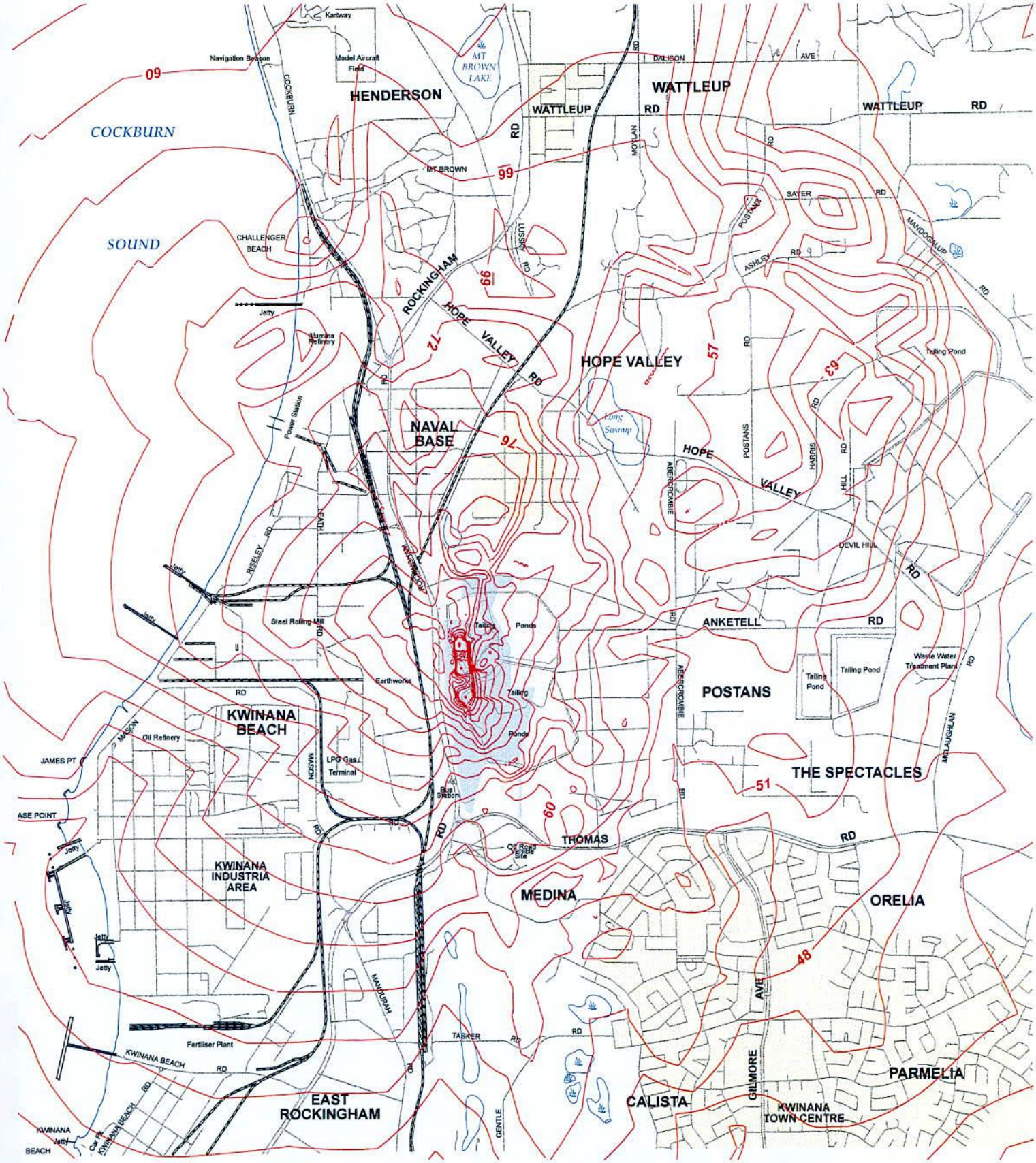


Figure 5.16 Predicted Maximum Noise Levels resulting from Top Comp Vehicles under south (common) wind conditions.
Noise Levels will be present for approximately 2 minutes in a four hour period.

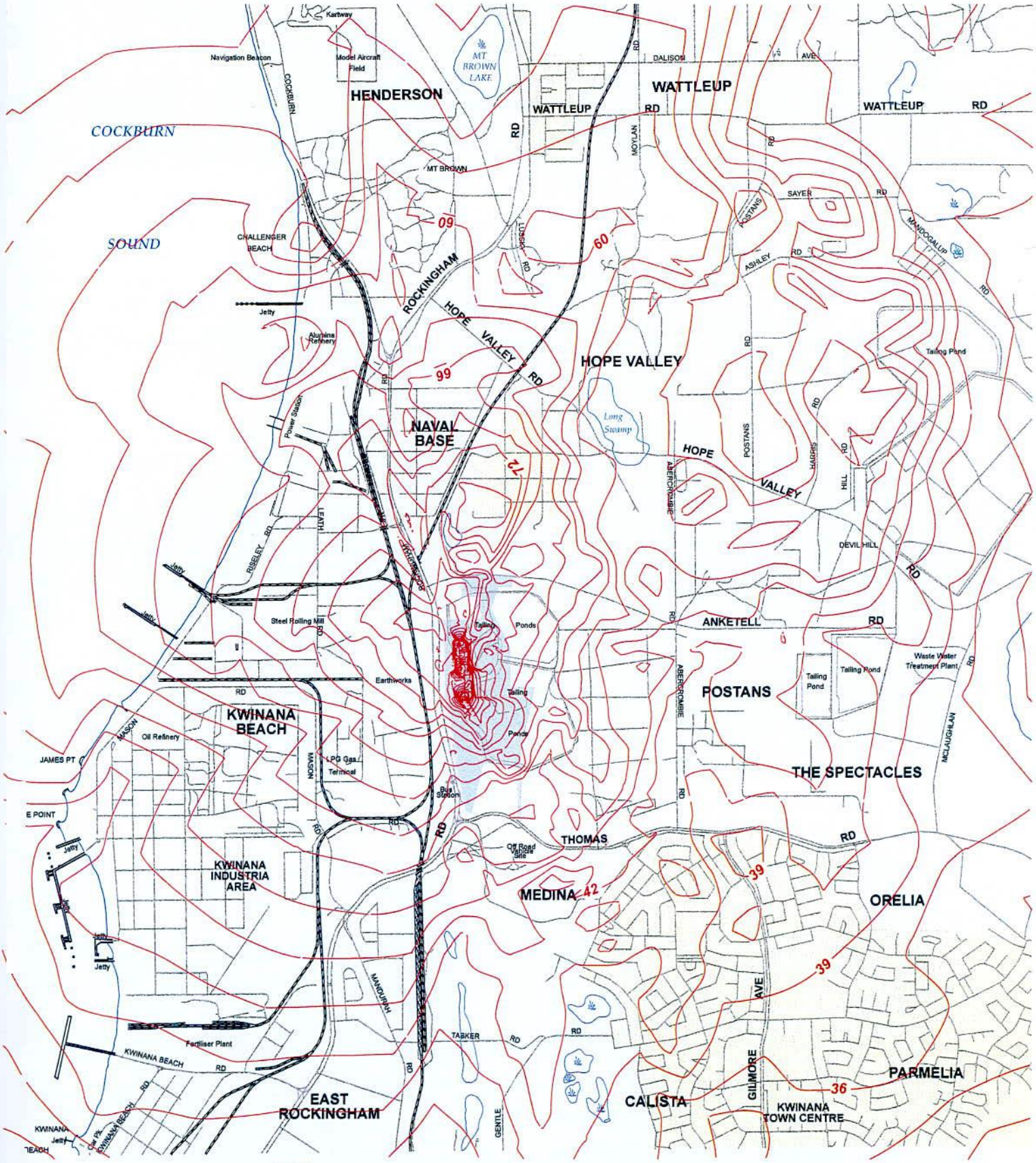


Figure 5.17 Predicted Maximum Noise Levels resulting from Super Stock Vehicles under south (common) wind conditions.
Noise Levels will be present for approximately 20 minutes in a four hour period.

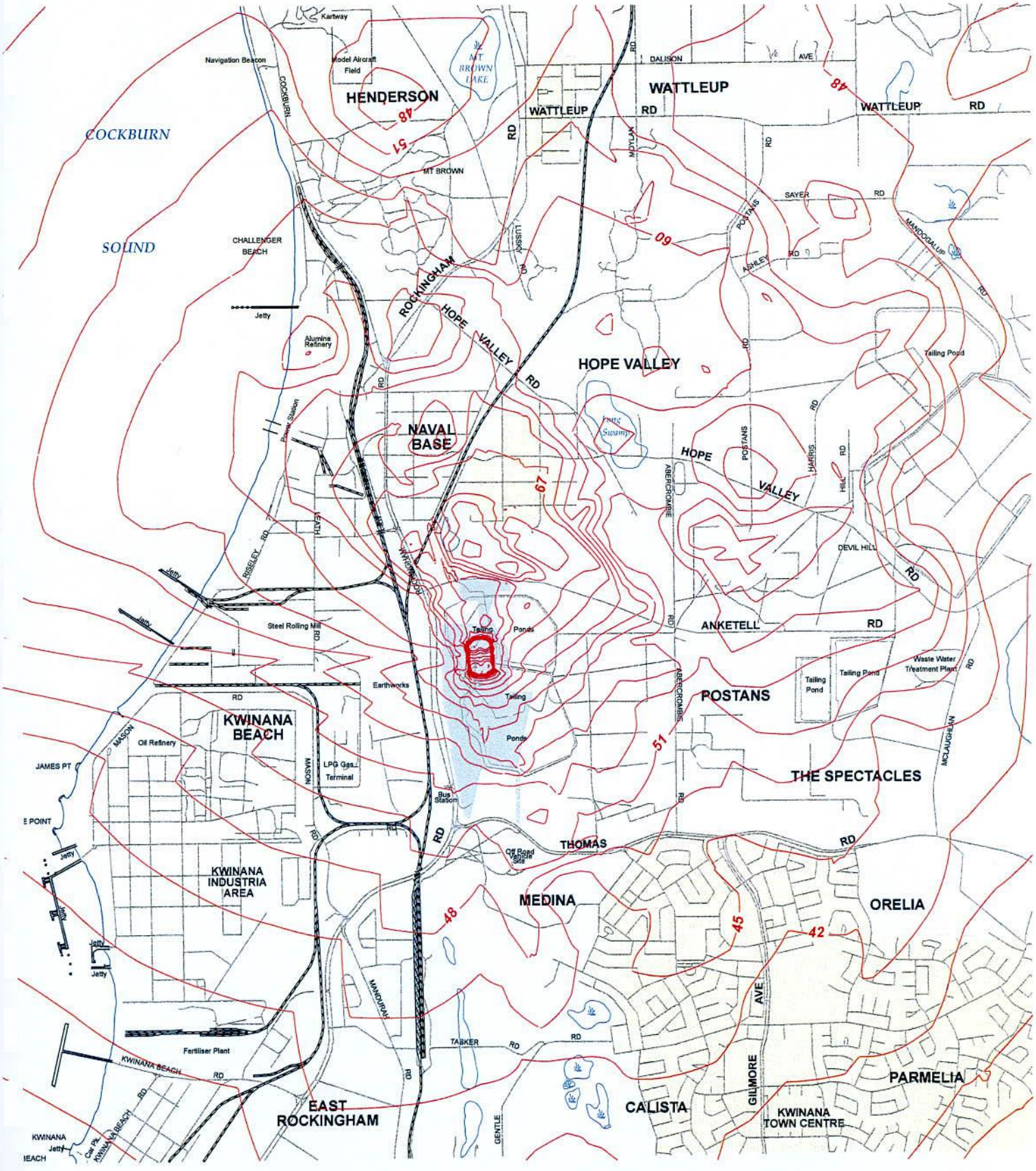


Figure 5.18 Predicted Maximum Noise Levels resulting from Speedway Vehicles under south (common) wind conditions.
Noise Levels will be present for approximately 50 minutes in a four hour period.

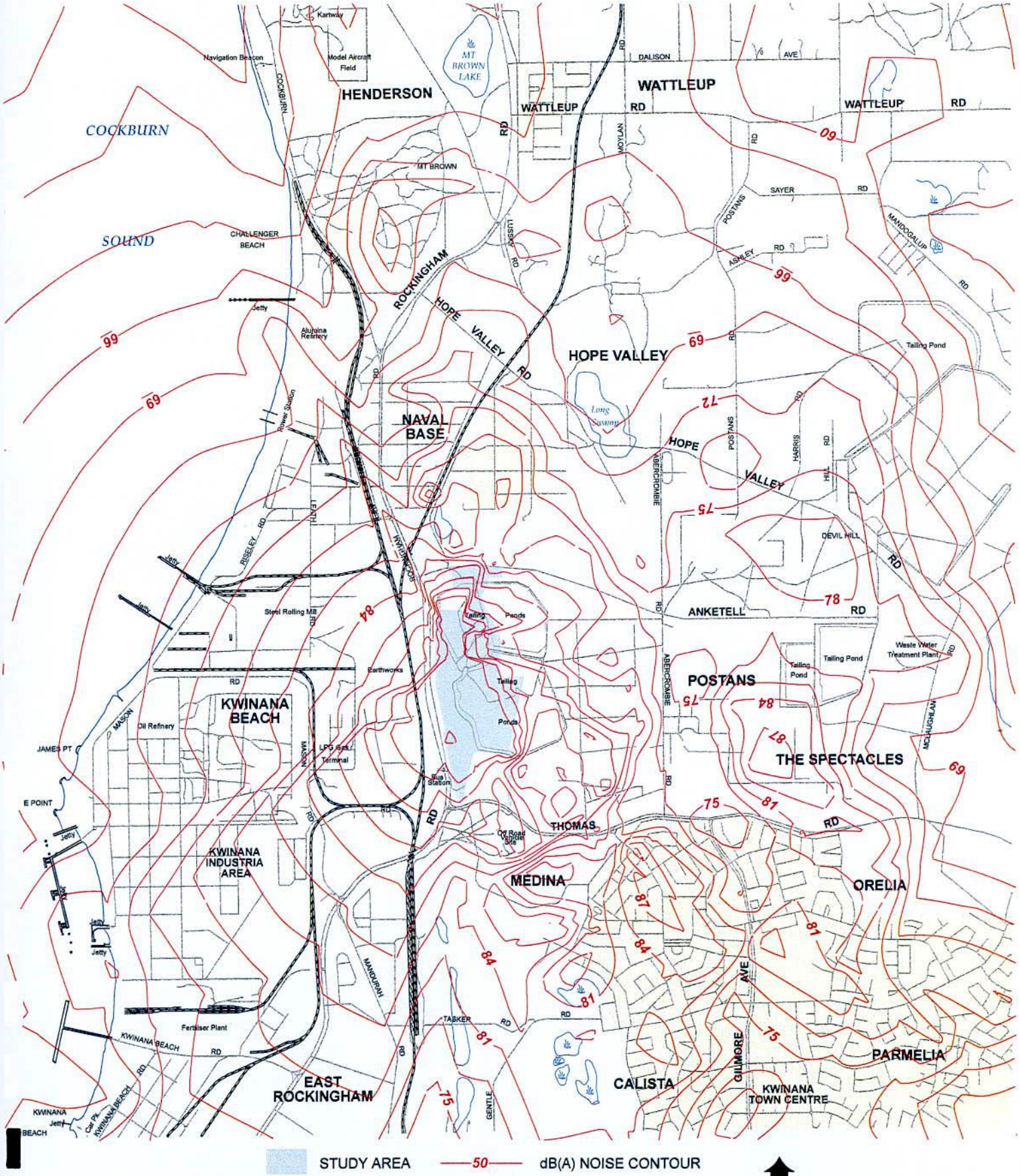


Figure 5.19 Predicted Maximum Noise Levels resulting from Top Fuel Vehicles under north wind conditions.
Noise Levels will be present for approximately 25 seconds in a four hour period.

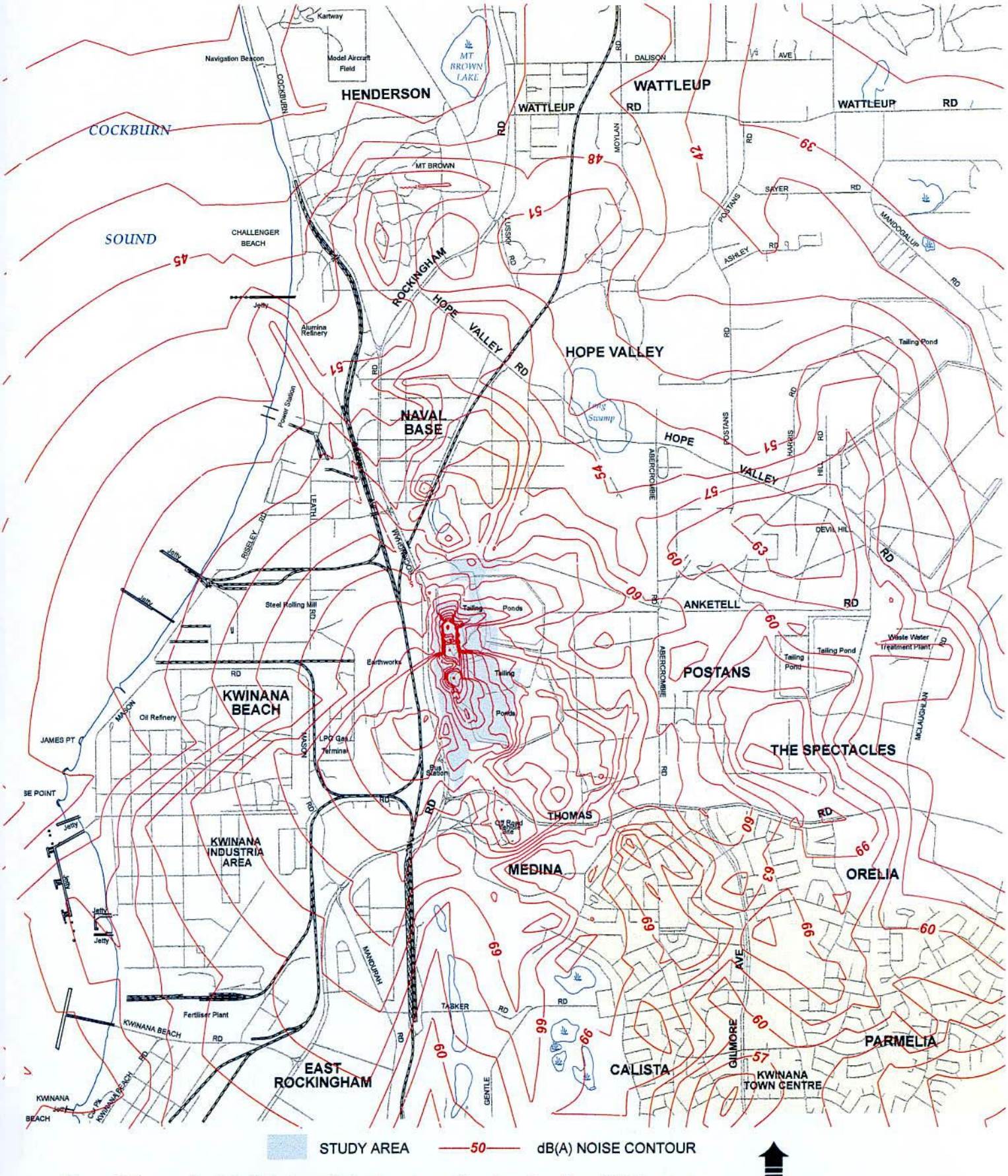


Figure 5.20 Predicted Maximum Noise Levels resulting from Top Comp Vehicles under north wind conditions.
Noise Levels will be present for approximately 2 minutes in a four hour period.

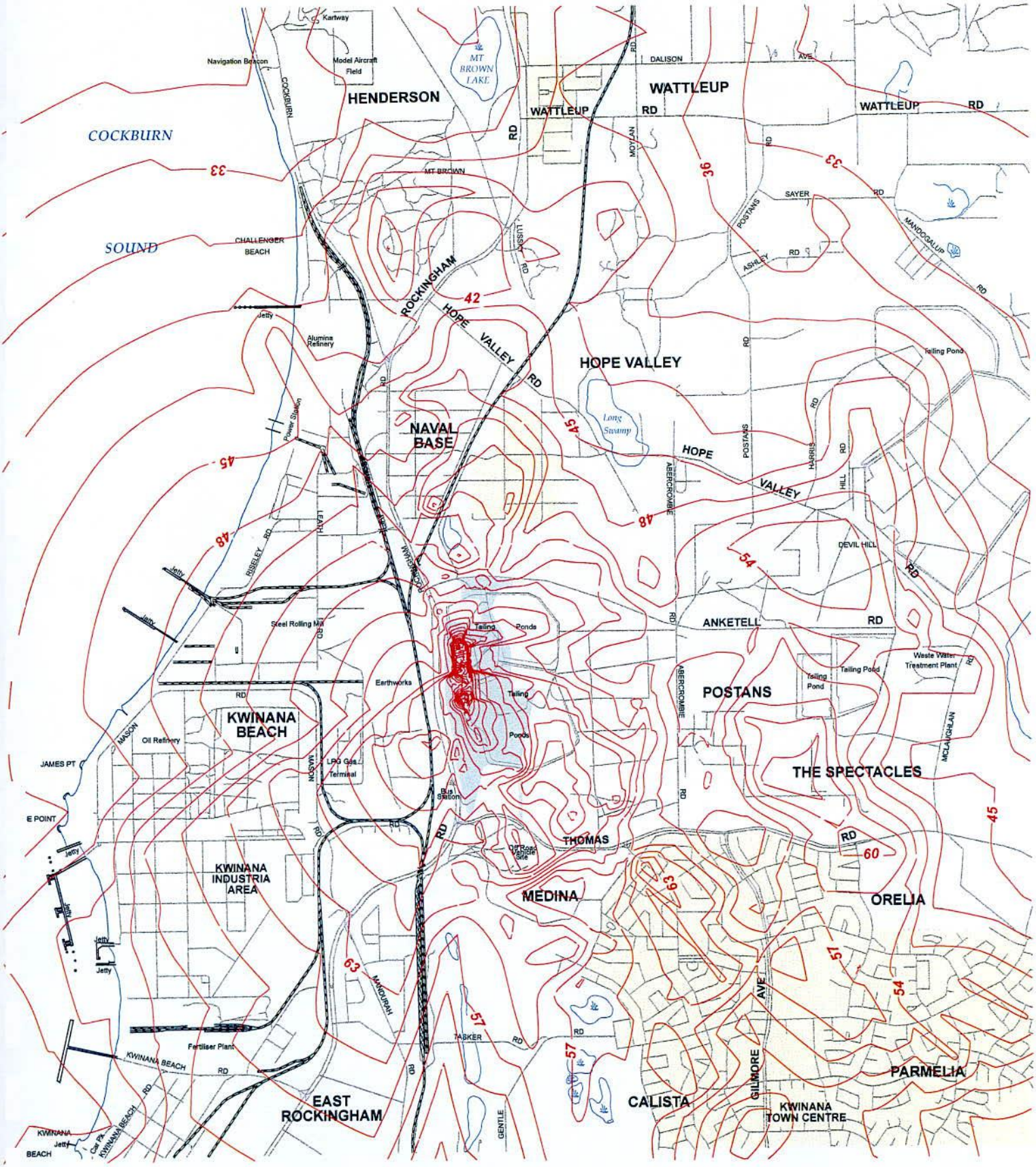


Figure 5.21 Predicted Maximum Noise Levels resulting from Super Stock Vehicles under north wind conditions.
Noise Levels will be present for approximately 20 minutes in a four hour period.

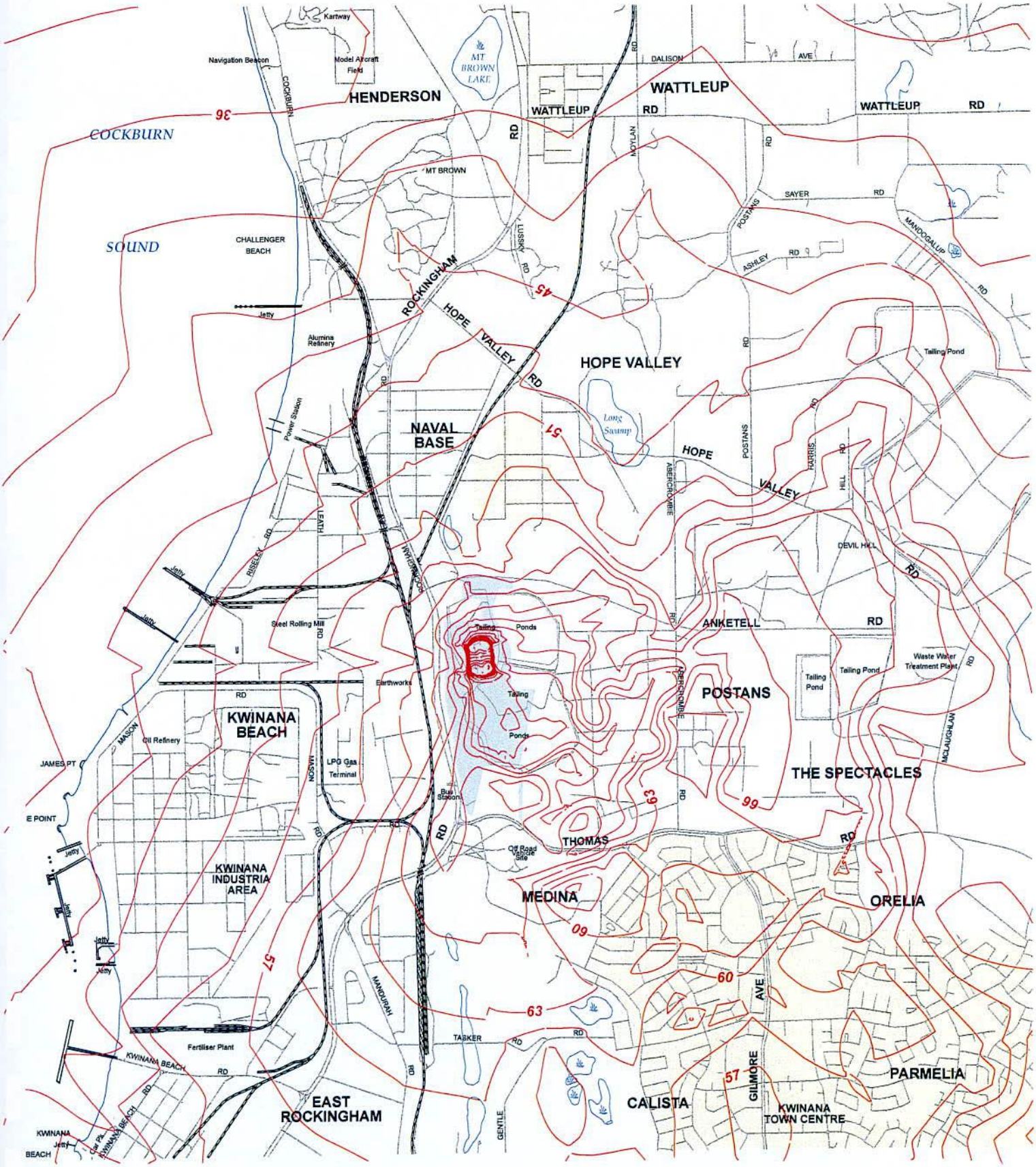
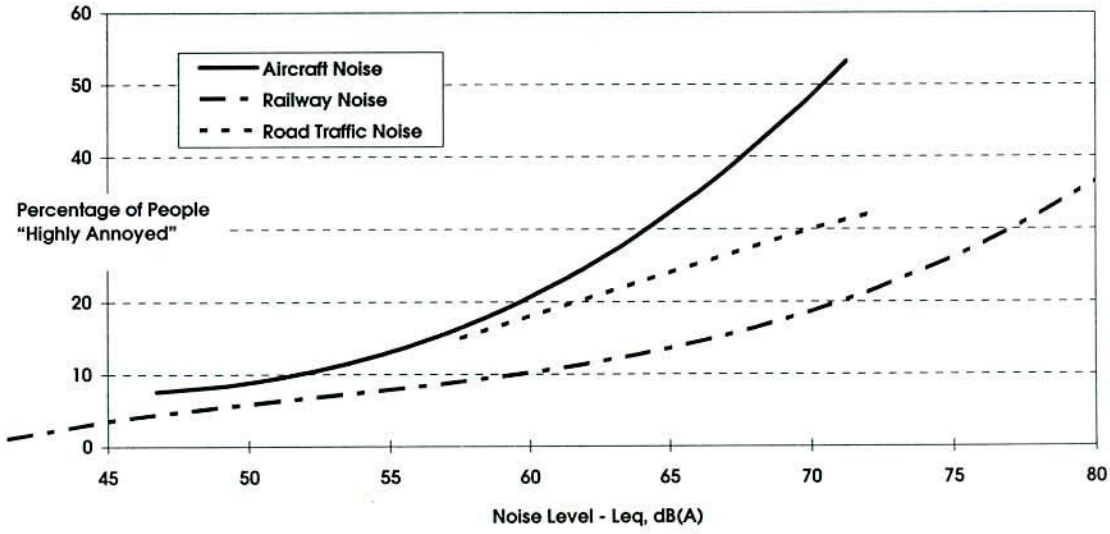


Figure 5.22 Predicted Maximum Noise Levels resulting from Speedway Vehicles under north wind conditions.
Noise Levels will be present for approximately 50 minutes in a four hour period.

The L_{Aeq} noise level from a source can be related to the overall reaction to the noise, using data from social surveys. As indicated in *Figure 5.23*, which is based generally on data from Australian studies, the proportion of people "highly annoyed" by a noise depends significantly on the type of noise. In general, noise level criteria for those noise sources represented in *Figure 5.23* are typically set at the point where approximately 10 per cent of people would be highly annoyed - that is, an L_{Aeq} of approximately 50 to 60 dB(A). This represents a trade-off between noise impacts and the perceived benefits of these noise sources to the community.

It should be noted that the L_{Aeq} levels in *Figure 5.23* are calculated over an entire year, and are therefore not directly comparable to the values calculated above for a four-hour race meeting. However, some indication of the likely level of community reaction may be gained by comparing the calculated levels with the range of reaction shown in the figure.

Figure 5.23 PERCENTAGE OF PEOPLE "HIGHLY ANNOYED" BY VARIOUS NOISES



Chapter 6

CONCLUSION

The results show that for the most common wind conditions, the noise levels associated with the operation of the Motorplex will exceed the assigned noise levels under the Environmental Protection (Noise) Regulations 1997. Of the three key residential areas considered, the most affected would be Hope Valley, where the predicted noise levels exceed the Regulations by between 17 dB(A) and 33 dB(A).

Consideration should be given to the frequency and duration of the noise events. The noise has been shown to occur on frequent occasions throughout a race meetings, however, only for very short periods of time. The overall percentage of time noise events was likely to occur was shown to be less than 10 % for drag racing and less than 21 % for speedway.

For this proposal to proceed, it is likely that the development of a noise management plan, where operating conditions and monitoring can be specified, would need to be developed to minimise the noise impacts.

Chapter 7

NOISE MANAGEMENT

Noise levels have been mitigated as far as is practicable through the structural design of the Motorplex. Design initiatives have included large noise barriers around both the drag racing strip and the speedway track, as well as lowering the ground levels of the tracks to below the ground level of the surrounding area. However, even with these noise mitigation measures, it can be seen that the predicted environmental noise levels resulting from the proposed Motorsport Complex, will exceed the *Environmental Protection (Noise) Regulations 1997*, at the nearest noise sensitive premises. Under these circumstances the proposed Motorplex will require the development of a noise management plan where operating conditions can be set to minimise the noise impacts.

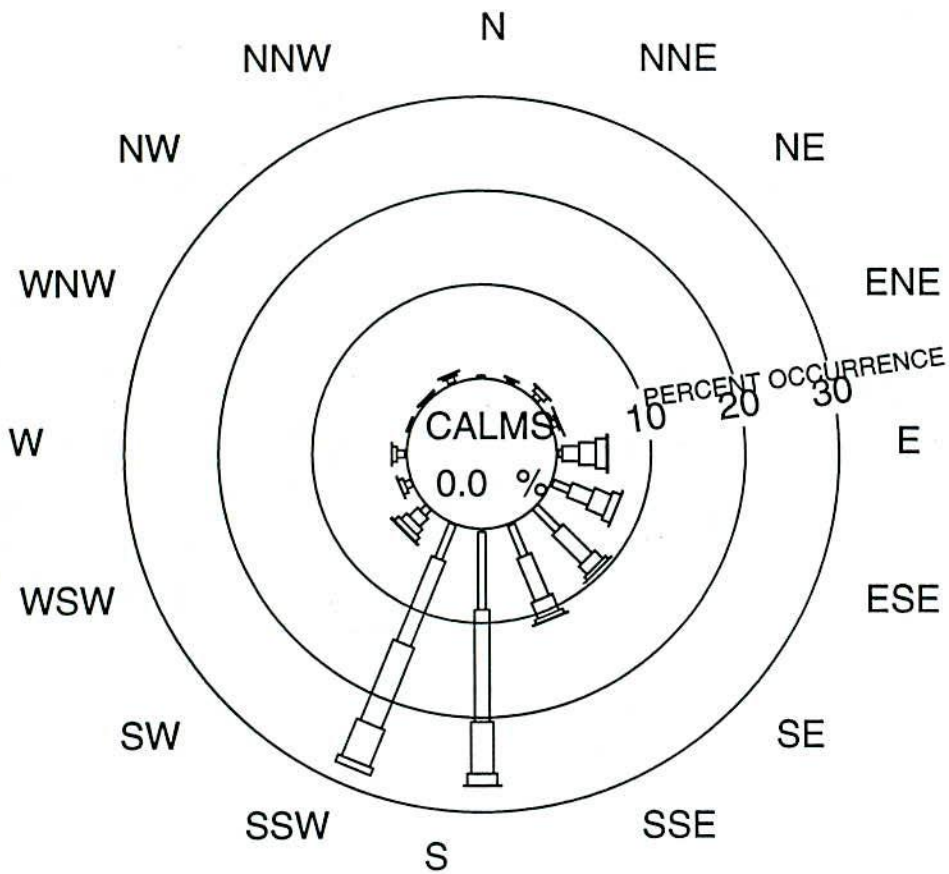
Typical noise management conditions include:

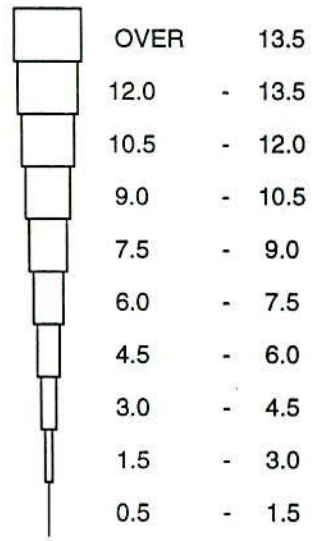
- specified finishing times for events;
- monitoring of noise levels;
- restrictions on numbers of major events;
- advertising the program of events to affected residents; and
- implementation of a complaints handling system.

APPENDICES

Appendix A

WIND ROSES FOR MEDINA/ROCKINGHAM AREA





WIND ROSE FOR Hope Valley A.Q.M.S.
DATA PERIOD: 01/11/1998 TO 31/03/1999 FOR DAILY TIME RANGES OF 1900 TO 2300 HOURS
SAMPLING TIME: 10 MINUTES
DATA RECOVERY: 97.4%