

ROYAL AERO CLUB OF WESTERN AUSTRALIA

AND

HAWKVIEW HOLDINGS PTY LTD

**REVISED MURRAYFIELD AIRPARK
AND RESORT COMPLEX**

CONSULTATIVE ENVIRONMENTAL REVIEW

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CONSULTATIVE ENVIRONMENTAL REVIEW

JULY 1993

AN INVITATION TO COMMENT ON THIS CER

The Environmental Protection Authority (EPA) invites people to make a submission on this Consultative Environmental Review

The Royal Aero Club of WA (Inc) have proposed the development of an airpark and resort complex on Lots 11 and 12 Nambeelup Road, Nambeelup, within the Shire of Murray. In accordance with the Environmental Protection Act 1986, a Consultative Environmental Report (CER) has been prepared which describes these proposals and their likely effects on the environment. The CER is available for public review for 3 weeks from 2 August 1993 and finishing on 20 August 1993.

Comments from Government Agencies and from the public will assist the EPA to prepare an Assessment Report in which it will make a recommendation 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 confidentiality is requested, and may be quoted either in full or in part in each report.

Why not join a group?

If you prefer not to write your own comments, 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 or disagree with, or comment on, the general issues discussed in the CER 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 environmentally more acceptable.

When making comments on specific proposals in the CER:

- 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 section, chapter or recommendation in the CER;
- if you discuss different sections of the CER, keep them distinct and separate, so there is no confusion as to which section you are considering;
- attach any factual information you wish to provide and give details of the source. Make sure your information is accurate.

Remember to include:

- your name;
- address; and
- date.

The closing date for submissions is:

20 August 1993

Submissions should be addressed to:

The Chairman,
Environmental Protection Authority
1 Mount Street
PERTH WA 6000

Attention: Ms E Bunbury

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APPENDICES

1. INTRODUCTION

This Consultative Environmental Review (CER) presents an ammended proposal to expand the aerodrome at Nambeelup, Murrayfield within the Shire of Murray (Figure 1). Originally the proposal to expand the aerodrome was the subject of a Consultative Environmental Review released in December 1991. This was made available for public comment until 20 January 1992. The Environmental Protection Authority (EPA) subsequently completed assessment of the proposal in July 1992, and its report and recommendations were published as EPA Bulletin 657.

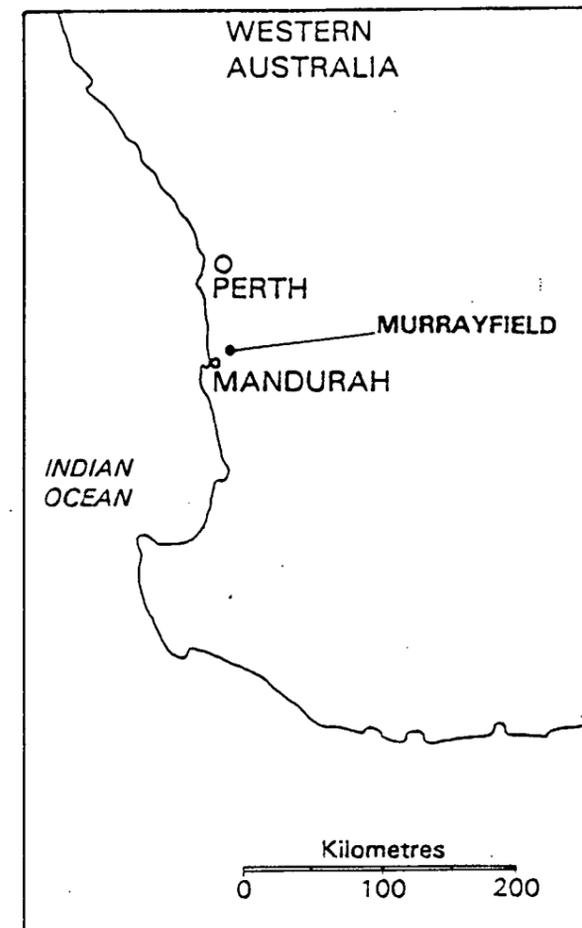
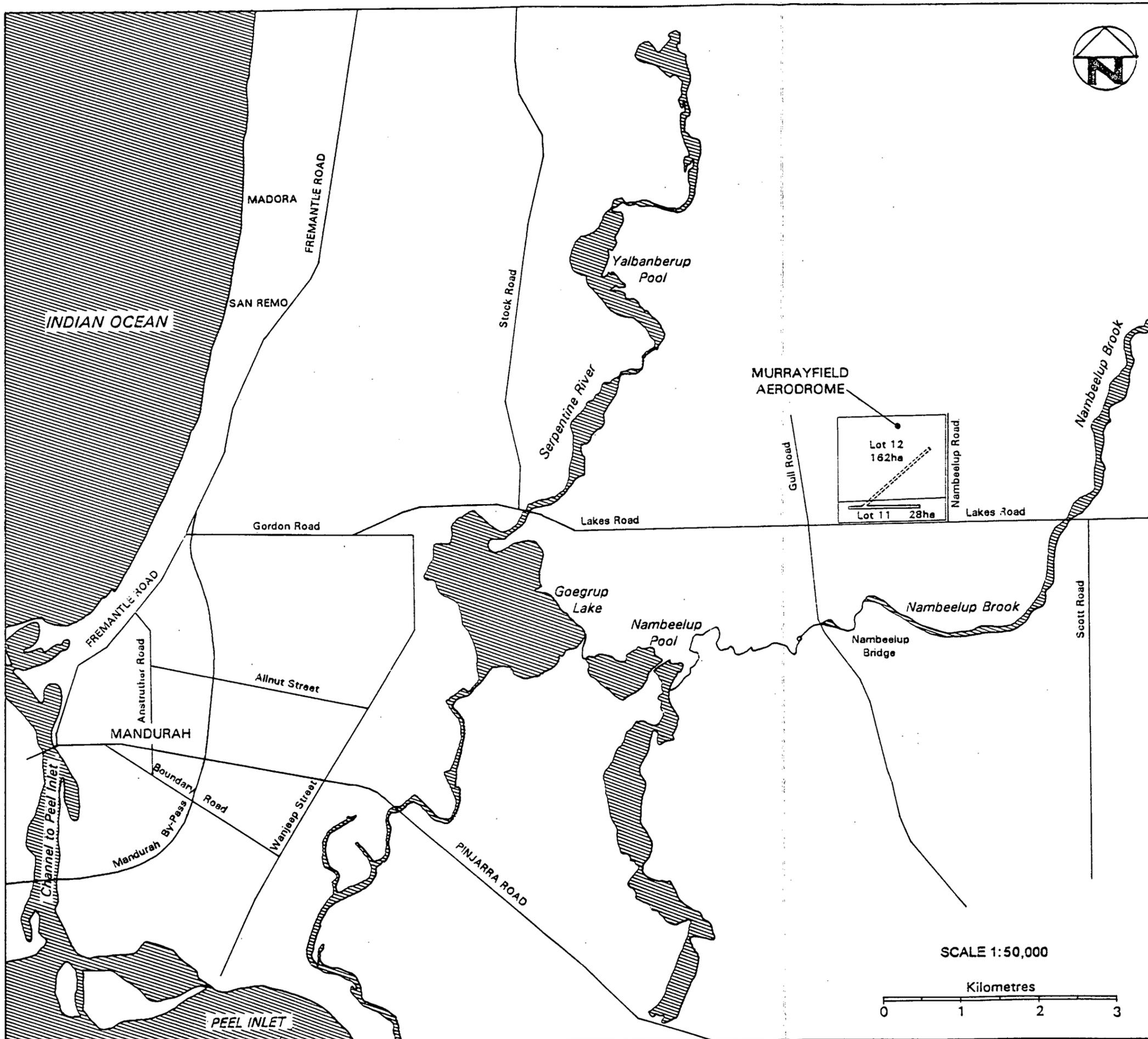
In its assessment of the proposal the EPA identified "the impact of noise from both the existing and proposed airstrips on the surrounding residences", as the key environmental issue associated with the project and concluded, "that the proposed airpark on Lots 11 and 12 Nambeelup Road, Nambeelup is environmentally unacceptable and should not proceed". Issues of secondary concern were also identified including odours, groundwater resources, nutrients and wetlands, however, these were considered to be manageable.

The EPA qualified their conclusions saying that, "The Environmental Protection Authority would reconsider the project if an alternative, better site could be found or an increased noise buffer were added to the proposal so that acceptable noise levels could be achieved.

The proponents, after consultation with Officers of the EPA, have reviewed the key issues described in the EPA Report and Recommendations on the project. They have researched alternative sites in the district and have concluded that the original site is the only one that meets the physical and operational criteria to enable the project to proceed. Consequently a new proposal incorporating increased noise buffers for the development has been submitted to the EPA in the form of this CER.

The most significant amendment of the original proposal is the resiting of the proposed runway (05/23) to provide a greater separation distance from adjacent properties. The proponents propose to purchase properties in the adjacent Nambeelup Park Estate, in the event that the owners wish to sell their properties, so as to provide a further buffer. In addition the local authority is to provide for a buffer zone surrounding the airpark by allowing only activities that are compatable with the aerodrome to establish in close proximity. The Royal Aero Club of Western Australia (RACWA) has made further commitments regarding the issues of noise and its management. A noise management and noise abatement program has been developed and the proponents are committed to its implementation.

The revised proposal has been presented to the Local Government Authority, the South-West Regional Development Authority and Peel Region Officer, the Department of Planning & Urban Development (DPUD), and the Homeswest Project Officer for the Amarillo development project.



MURRAYFIELD AERODROME
REGIONAL LOCATION

FIGURE 1

As a result of the relocation of the proposed runway and the further environmental commitments that relate to noise and its management the proponent considers that the proposal would be environmentally acceptable and thus meet the requirements of the EPA.

2. PROPOSAL

2.1 Introduction

The revised Murrayfield Airpark and resort proposal is conceptually unchanged from the original proposal presented in December 1991. However, the movement of the proposed runway approximately 30m to the east of the previous alignment significantly changes the impact of noise on the surrounding residences (Figure 2).

A noise management and abatement program which will include the restriction of the use of the existing runway (09/27) to emergencies only, will further reduce the impact of noise on properties to the west of the development. The proponent proposes to expand the buffer zone between it and neighbours by purchasing adjacent lots. In addition, planning authorities are prepared to restrict the types of land uses that are established in the vicinity so as to provide a further buffer to sensitive land uses.

The remainder of the proposal remains as described in the original CER on the project. Consequently readers should refer to this document regarding the detailed proposals and environmental issues associated with the resort and golf course.

2.1 The Aerodrome

The development incorporates the existing airstrip (Runway 09/27) which has been used for commercial and private operations since 1980. It will consist of a privately owned aerodrome designed for General Aviation Light Aircraft for use by Members of the RACWA, Hawkview Holdings shareholders and lessees, and community aviation services. Such community services will include Police Department, Health Department, Department of Conservation and Land Management, and the Royal Flying Doctor Service.

2.2 The Airpark

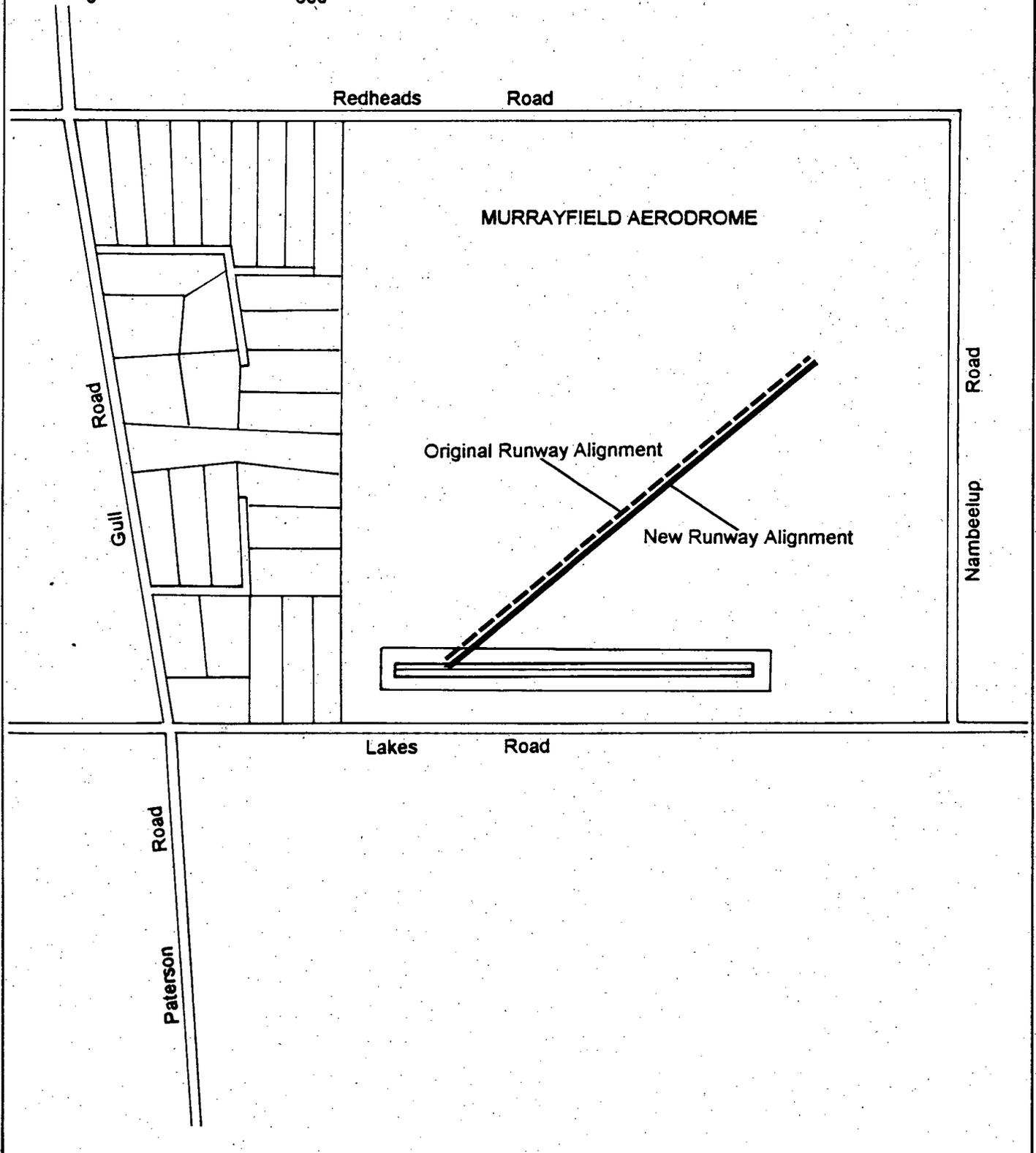
The Airpark will incorporate integrated aerodrome and aviation facilities including an Aerospace Foundation Exhibition for public educational and display purposes, an Aviation Museum, RACWA operations and maintenance facilities, and members facilities. It will also incorporate ground training facilities for secondary and tertiary aeronautic students and for pilots to Senior Commercial License level.

Aircraft owners will have the opportunity of utilising aircraft parking areas or leasing a hanger site located on the southern side of the Airpark development.

The general public will have controlled access to the vehicle parking areas, viewing areas, and associated facilities.

2.3 Aerodrome Operations and Public Consultation

The operation of the aerodrome will conform to Civil Aviation Authority (CAA) regulations and be managed by the RACWA. As a result of the experience at Jandakot the



ALAN TINGAY & ASSOCIATES

MURRAYFIELD AERODROME PROPOSED RUNWAY, RELOCATED ALIGNMENT

FIGURE 2

Club has a policy of encouraging good relations with the local community and this is already being demonstrated by operational procedures designed to minimise disturbances to neighbours. Active public liaison is also being carried out at Murrayfield.

Concerned residents in the Nambelup Park Kennel Zone have been contacted on a personal basis and the response has been favourable in all cases with the exception of 2 residents who have indicated their opposition to the proposal on principle. Consequently the proponent believes that the proposal can be implemented with the support of the vast majority of neighbours.

When the project is implemented there will be restrictions on training operations so as to control noise impacts. Monitoring will be implemented to ensure that the noise management and noise abatement programs are effective. Where deficiencies in the programs are discovered the plans will be revised to achieve the desired result.

The proponents undertake to form an advisory community group representative of residents and land owners in the Nambelup-Murrayfield precinct to monitor community attitudes and expectations resulting from the operations of the airpark.

2.4 Regional Development

The future use of land on which the Murrayfield Airpark and Resort would be built is designated as Public Utility in the South-West Corridor Structure Plan Review, working paper No. 8 published by DPUD.

A review of a previous 1980 paper and the Murray Shire Council Policy document Shire of Murray Local Rural Strategy (Appendix A) provides for industrial, commercial and large size rural zoning around the Murrayfield site. These landuses are compatible with the operation of an aerodrome and will provide additional buffer zones surrounding the proposed development. This policy document restricts future subdivisions in the area and commits the Shire to maintaining a rural use policy.

The location of the proposed Perth-Mandurah Freeway will be 3km to the west of the site. Lakes Road will be an off-road from the freeway and a major arterial road to the North Dandalup/Keysbrook/North Pinjarra districts. Thus the location will be well serviced by a major arterial road running past its boundary.

The proponents note that the Homeswest Project Officer considers that employment opportunities for residents in the proposed Amarillo Park urban development, located 2km to the north of the site, would be enhanced as a result of the Airpark and Resort development proceeding.

3. ASSESSMENT OF ALTERNATIVE SITE LOCATIONS

3.1 Introduction

The proponents have reviewed potential sites that could serve as alternatives to the Murrayfield site in accordance with the recommendations of the EPA. This review has involved sites in the Peel Region within the general boundaries of the Darling Scarp and the Indian Ocean, and Serpentine and Waroona Shires. The review resulted in the conclusion that the Murrayfield aerodrome site on Lakes Road, Nambeelup is the only site in the region that will satisfy the criteria. The following criteria were considered during the evaluation of alternative sites:

- Operational requirements for an Approved Landing Area (ALA) according to Civil Aviation Regulations (CAR), these include aspects of the physical environment and geography,
- Proximity to a light aircraft training area,
- Access to established aviation support industry, and
- Facilities and location of existing and proposed urban planning and development.

The following is a discussion on each of the above criteria.

3.2 Operational Requirements

The CAA has specific requirements for Approved Landing Areas and inspects aerodromes on a regular basis to ensure that the physical characteristics and operational requirements satisfy the relevant regulations. Potential sites were considered to the south, east and north of the Murrayfield site and it was found that environmental factors or surrounding landuses would eliminate most as alternatives.

The high incidence of wetlands in the region, the location of SEC power lines and the influences and effect of the Darling Scarp on flying operations were major limiting factors on most alternate sites. The siting of planned Special Rural Use developments was another factor in eliminating potential sites.

3.3 Proximity to a Light Aircraft Training Area

The CAA designates aircraft training areas for the specific purpose of use by aircraft employed in the training of pilots. The proposed Murrayfield aerodrome site is within the Jandakot training area and this has been operational for over 20 years. Siting of the aerodrome facility at the Murrayfield site removes the necessity to extend or create an additional training area as would be required if alternative sites were to be utilised.

3.4 Access to Established Aviation Support Industry

Aviation support industries are concentrated around the 2 major airports in the metropolitan area, Perth and Jandakot, and it is important for aircraft owners to have ready access to these facilities. Jandakot is approximately 20 minutes flying time from Murrayfield which means that major maintenance programs can easily be undertaken at Jandakot.

3.5 Facilities and Location of Existing and Proposed Urban Planning and Development

The proponents have reviewed existing urban developments, locations and sites as well as those proposed in the strategies being developed by DPUD, the Murray Shire and the City of Mandurah. These developments preclude the establishment of an aerodrome within much of the region.

The Homeswest Amarillo Park development was considered and after consultation with planning and project officers it was agreed that Murrayfield would be well separated physically from Armarillo and that it will offer economic and recreational benefits to future residents such as employment and public amenity.

The proposed developments and land use strategies indicate that the proposed site is well located for easy vehicle access with the Perth/Bunbury freeway being within 2km of the site. Lakes Road will become a major arterial road off the freeway and thus will offer excellent access to the region.

4. ASSESSMENT OF THE ACOUSTIC ENVIRONMENTAL IMPACT

4.1 Resiting of the Primary Runway

The resiting of the proposed primary runway (05/23) to the east by about 30m will achieve acceptable noise levels in the recently established Nambeelup Park, Kennel Zone. The resiting will result in conformance with the requirements of Australian Standard 2021-1985, SPCC ENCM (LA max and LA eq standards), ANEF (ANEC) recommendations for land use planning, and the standards and criteria proposed by the EPA for future environmental assessment regarding acoustic emissions.

Independent measurements of sound and analysis of aircraft operations during normal and abnormal operations were conducted from a hypothetical runway located approximately 30m to the east of the original site. In all 99.8% of operational situations were measured. The sound measurements were taken in open space on Lot 57 which would be the property closest to operations on both the proposed primary (05/23) and secondary runway (09/27). The results of this analysis are reported in Appendix B.

The analysis indicates that sound levels from operations on runway 05/23 will meet all the above mentioned standards and criteria.

4.2 Noise Management and Noise Abatement Strategies

4.2.1 Buffer Zone

The RACWA has purchased Lot 56 Lakes Road, and commits to retaining it as a buffer between the proposed airpark and residents of the Kennel Estate. The RACWA also holds an option to purchase Lot 55 for the purpose of extending the buffer zone should this be required. The proponents are willing to negotiate with the owners of Lot 51, 52, 53 and 54 for options to purchase the properties according to agreed commercial principles should the owners wish to sell their property in the future (Figure 3).

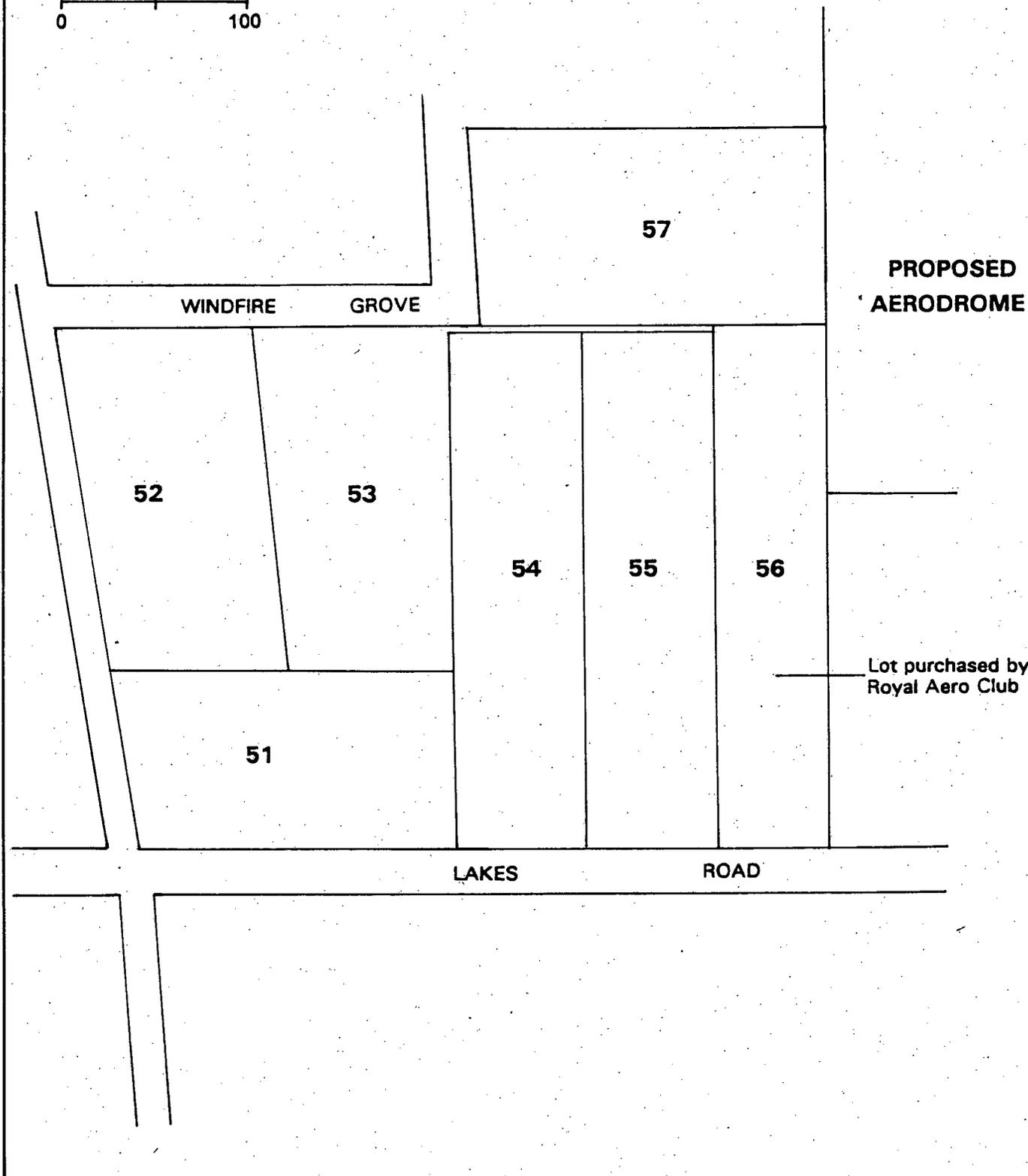
The proponents undertake to incorporate noise control features in the construction of existing and future residences according to AS2021-1985 as appropriate.

4.2.2 Aerodrome Operations - Primary and Secondary Runways

A statistical analysis of 25 years of meteorological records for the district provide the forecast for operations of the proposed aerodrome.

The ANEC (ANEF) contours for the aerodrome have been recalculated in accordance with the proposed noise management and noise abatement strategies and the resiting of the primary runway (05/23) to the east taken into account. The consequent displacement of the noise threshold of the runway results in only a small area of Lot 55 falling within the ANEF 20 contour. As previously mentioned, the RACWA holds an option to purchase this property.

The analysis of the meteorological records indicates that the primary runway (05/23) will be utilised for 81% of the operations and the secondary runway (09/27) for 12% of



operations. Flying operations would not be possible for the remaining 7% of the time due to unfavourable meteorological conditions.

The Noise Management and Noise Abatement Strategies require that aircraft departures on runway 27 will be restricted to emergency use only. However, noise was measured during normal take off from runway 27 and the recorded sound levels were found to be within acceptable levels for all standards.

The Noise Management and Noise Abatement Strategies will be incorporated in the Aerodrome Operations manual which is required to meet Civil Aviation Requirements and be approved by the CAA. The RACWA has entered into a legal contract with Hawkview Holdings to manage and operate the aerodrome according to the Civil Aviation Requirements and the CAA approved aerodrome operations manual for a period of 40 years from 1990 with options to extend the term of the contract.

The proponent commits to operating the airpark in such a manner so as to conform with the Australian standards and acoustic levels.

4.2.3 Commitments

The proponent has made a total of 9 additional commitments that relate to noise production, its management, and public consultation. These are presented in Section 6 together with the commitments made in the original CER. The proponent considers that these commitments when carried out will allow the aerodrome to operate in conformance with the relevant regulations and guidelines.

5. CONCLUSION

The proponent has substantially altered the original location of the proposed aerodrome runway to minimise the potential noise impact on adjacent residents. Measurements taken by officers of the EPA and modelling by the CAA show that the new runway will conform to all the accepted draft criteria currently used by the EPA. Consequently the proponent believes that the proposal, as now revised, is environmentally acceptable and should proceed.

6. COMMITMENTS

Commitments represent the proponents solutions to potential environmental problems posed by the development. Essentially they are promises by the proponent regarding the way in which certain aspects of the proposal will be carried out.

The RACWA and Hawkview Pty Ltd commit to carrying out the following commitments:

General

1. The proponents will ensure that all commitments and environmental conditions will be heeded and wherever necessary enforced by the lessees, management agencies and subcontractors involved in the construction and operation of the proposal.

Pre-Construction

2. The proponents will prepare a nutrient and irrigation management program prior to commencement of construction of the golf course and resort which will include the following:
 - fertiliser management types of fertiliser used, frequency of application (based on soil and tissue testing),
 - soil amendment details under fertilised and effluent irrigated area,
 - irrigation management (relating to the rational use of water for irrigation),
 - drainage management, and
 - monitoring and as a consequence of findings, changes in management activities.

The above will be implemented during the operation of the airpark and resort to the satisfaction of the EPA and the Waterways Commission.

Post Construction

3. Design and carry out a monitoring program to monitor groundwater levels, water levels in selected wetlands, and water quality parameter during the resorts operation to the satisfaction of the EPA and WAWA.
4. Install and operate a sewage treatment plant that will remove phosphorus from sewage to a concentration of 2mg/L. The resulting effluent will be used for irrigation and solid waste will be disposed of off-site to the satisfaction of the EPA and the Health Department.
5. Operate a policy of priority use of runways to reduce the level of noise experienced by residents to the satisfaction of the Shire of Murray.

-
6. Perform any engine tests between the hours of 0700 and 1800 within a purpose build enclosure designed to reduce the noise generated to acceptable levels with regard to nearby residents to the satisfaction of the Shire of Murray.
 7. Store aviation fuel in above ground tanks which are fully bunded with a capacity in excess of the quantity of fuel stores, to the satisfaction of the Department of Mines.

During Construction

8. The proponents will, during construction and operation of the resort, maintain the existing functions of all wetlands that are to be retained on site. This will be achieved by preventing physical interference with or destruction of the wetlands, by nutrient management, and by not permitting any surface drainage or effluents that originate from the aerodrome complex or resort discharging into any wetlands. This will be done to the satisfaction of the EPA.
9. Maintain wherever possible, the remnant vegetation on the site and embark on a planting program in which indigenous trees and shrubs together with other plants will be planted throughout the development area. This will be done to the satisfaction of the EPA.
10. Ensure that construction activities that have the potential to create unacceptable levels of noise at nearby residences will only be carried out between 0700 and 1800 hours Monday through Saturday. This will be done to the satisfaction of the Shire of Murray.
11. Control dust during and after the construction phase should it be determined that dust levels are high enough to cause inconvenience to neighbouring residents. Dust control will principally be controlled by the use of water carts and will be done to the satisfaction of the Shire of Murray.
12. Install structures such as interceptor pits and oil traps to prevent the spread of fuel that could be spilt from refuelling areas. This will be done to the satisfaction of the EPA.

ADDITIONAL COMMITMENTS

Noise Control During Operation of Aerodrome

Hours of operation

13. No aircraft involved in flying circuit training will land at, or take off from, Murrayfield Airpark between the hours of 10.00pm and 7.00am on any day.
14. Runway 27 will not be used for take offs except where such take offs are associated with the provision of emergency services such as Royal Flying Doctor Service or Police emergency flights and are made in weather conditions which preclude the use of other runways.

-
15. The RACWA will ensure that less than 1% of take offs from the Murrayfield Airpark occur between 10.00pm and 7.00am. The time base for the determination of this percentage will be any consecutive ninety days.

Training Circuits

16. Use of, and the impact caused by, flying training circuits where a turn to the west following a take off from runway 05 shall be reviewed by the RACWA following a request of the EPA. The Club anticipates such a request for review will only be made by the EPA where it has received, from residents of the Nambeelup area, sustainable complaints regarding noise emissions from aircraft.

Planning Considerations

17. The RACWA will negotiate to purchase all residential properties potentially effected (i.e. cannot comply with Commitments 6 and 7) by aircraft noise where the current owners wish to sell.

Noise Levels

18. Aircraft operations from Murrayfield Airpark will be managed by the RACWA such that noise emissions, as measured at any residential premises in occupation by any occupier who has not, in writing, indicated that higher noise levels are acceptable, do not exceed 60 dB LDN.
19. Aircraft operations from Murrayfield Airpark will be managed by the RACWA such that noise emissions due to the operation of any aircraft being used for training purposes, as measured at any residential premises in occupation by an occupier who has not, in writing, indicated that higher noise levels are acceptable, do not exceed 65 dB LA (slow) maximum.

Monitoring

20. The RACWA will install, maintain in proper working order, and operate, a noise monitoring system which provides hourly statistical data, the data necessary to determine LDN levels and the ability to record, on magnetic tape, those noise sources which exceed 65 dB LA (slow) for more than 15 seconds. This monitor will be established in the Nambeelup area at a residential premises acceptable to the owner of the premises, the RACWA and the EPA.

Community Liaison

21. The RACWA will form an advisory community group representative of residents and land owners in the Nambeelup-Murrayfield precinct to monitor community attitudes and expectations regarding operation of the aerodrome.

APPENDIX A

APPENDIX A

Extract from Shire of Murray "Local Rural Strategy".

"A Strategy to guide the future use and development of rural land in the Shire of Murray",
December 1992.

Prepared for Shire of Murray by Environmental Capability, Natural Resource Consultants
PO Box 117, Subiaco WA 6008.

5.3.3 Planning Precinct No. 3 - Murrayfield -Wandalup

Description:

Bassendean dunes and sandplain country to the south of Amarillo precinct (1) and north of Nambeelup Brook. It is bounded to the west by the proposed Kinnup-Dandalup UWPCA and east by the flood prone areas of Serpentine River and the proposed Perth-Bunbury highway.

Existing Land Uses:

Rural grazing, kennel zone (Nambeelup Park) piggery (Wandalup Farms) abattoir (currently not in operation) air strip (with proposed extensions and associated resort development).

Principal Objectives:

Long Term: Encourage the development of suitable industrial and other land uses to service and provide employment opportunities for Mandurah and Amarillo (if developed).

Short Term: Maintain existing rural land uses (grazing and animal industries) subject to minimisation of environmental impacts, in order to preserve planning options pending possible future development of adjacent Amarillo.

Planning Considerations:

Possible long term potential for light industry, agricultural industries or service industries (providing employment opportunities for Amarillo, if developed) particularly since it is outside the proposed UWPCA.

Any further industrial development within the precinct will be contingent upon the provision of adequate buffer distances from existing residences to control noise, odours and other air emissions to EPA standards.

If approved, Murrayfield resort represents a "theme" development likely to be sustained by short term visitors to Shire but also provides a facility to service the needs of flyers in the Mandurah-Murray area. The adjacent precinct (2) is subject to System 6 Conservation Recommendation M108 and nutrient losses to Serpentine River and the associated wetlands, from any noxious agricultural industries, need to be strictly controlled and

monitored. (A gauging station downstream from Wandalup Farms is currently monitored for nutrients).

If, in the long term, Amarillo becomes an urban centre, land could be required for drainage purposes and Gull/Paterson Road would assume greater importance as linkage to Pinjarra.

Lakes Road is a major east-west connection between SE and SW Corridors and will provide a linkage to the future Perth-Bunbury Highway. Some areas west of Hull Road and south of Fowlers Road are subject to flooding (1:100 year).

Relatively little remnant vegetation currently within precinct. Generally poorer quality agricultural land. The higher areas of Bassendean dunes are susceptible to wind erosion if cleared and overgrazed. All soils have low ability to retain nutrients from either fertilisers, domestic or industrial effluent. Some areas are used for sand extraction (SPC 1990). A 330kv transmission line corridor extends along the precincts eastern boundary.

Development Guidelines:

No further subdivision of rural land beyond the 40ha minimum to preserve planning options relating to future of Amarillo.

Proposals to rezone land for light service or agricultural industries to be considered but subject to the provision of adequate buffers between existing residences and the future Perth-Bunbury Highway, Nambeelup Park and Serpentine River. The effect of such development on the potential urbanisation of Amarillo will also need to be considered.

Future Planning Needs:

Structure planning for Amarillo should address the implications for this adjacent precinct.

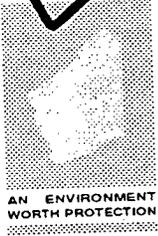
Extract from 5.3.4 Planning Precinct No. 4 Nambeelup Development Guidelines

Paragraph 2

Encourage vegetation retention and replanting to reduce drainage and nutrient losses and to create a broad (but sporadic) vegetation buffer to separate future potential urban and/or industrial activities within Precinct 1 (Amarillo) and 3 (Murrayfield/Wandalup) from Ravenswood (Precinct 7) to the south and Rural-Dandulup (Precinct 11) to the east.

APPENDIX B

EPA



POLLUTION CONTROL DIVISION

MEASURED NOISE LEVELS FROM TAKE OFF ON RUNWAY 27 AND TAKE OFFS ON PROPOSED RUNWAY 23

MURRAYFIELD AIRPARK

22 FEBRUARY 1993

INTRODUCTION

This report records the results of noise measurements made as a Cessna 172 single engined aircraft took off from runway 27 and simulated take offs from the proposed runway 23 at Murrayfield on the afternoon of 22 February 1993. The aircraft was flown by Mr John Douglas, the Chief Flying Instructor of the Royal Aero Club of WA.

MEASUREMENT PROCEDURE

Noise emissions during each take off were recorded at a rural residential premises in Windfire Grove Nambeelup using a Bruel and Kjaer type 2231 sound level meter and a Nagra IV-SJ magnetic tape recorder. The location of the measurement site is shown in Figure 6. The measuring instruments were subjected to a field performance check using a Bruel and Kjaer type 2230 acoustic calibrator prior to, and at the completion of, the measurement period. The calibrator signal was also recorded on the magnetic tape to provide a sensitivity reference for subsequent processing of the recorded data. These checks showed that no permanent drift in either the field or subsequent processing instrumentation occurred during the measurement and subsequent processing periods.

Noise levels were measured with the microphone located 1.2 metres above the ground plane, and well away from any reflecting surfaces other than the ground plane. Wind velocity and direction during the measurement period were around 5 metres /second and 300 degrees respectively.

The tape recordings were replayed, using the same Nagra IV-SJ tape recorder, a Bruel and Kjaer type 2607 measuring amplifier a Rion SA-25 one-third octave band real time frequency analyser and a Rion LR-04 level recorder, to produce the charts which form Figures 1 to 5 of this report.

NOISE MEASUREMENT RESULTS

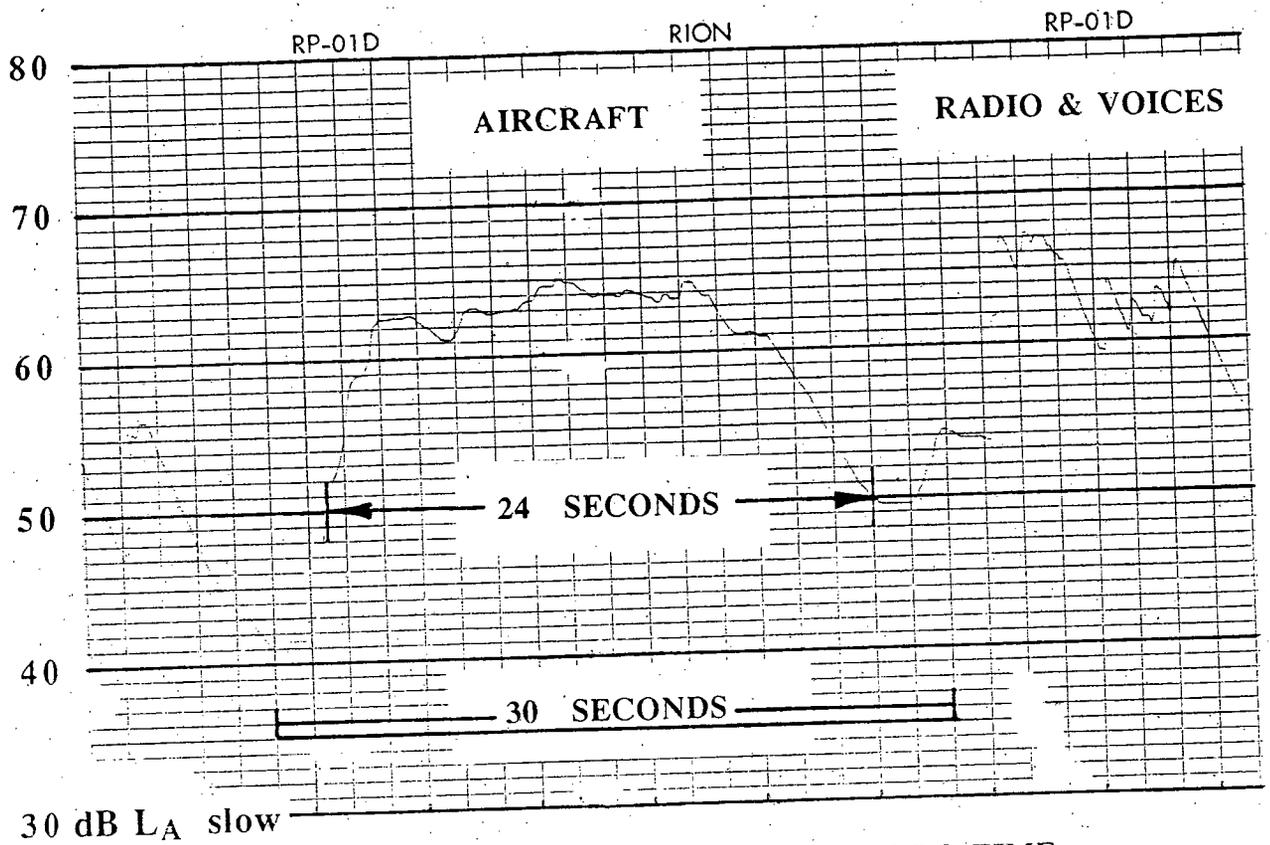
The results of the measurements are shown in Figures 1 to 5 of this report. The observed maximum noise levels and the time period for which each flight exceeded 50 dB LA are also given in the table on the following page.

Aircraft take off parameters Aircraft type - Cessna 172	Maximum observed noise level dB LA	Time for which noise level exceeded 50 dB LA	Relevant figure number
Normal take off from runway 27	65	24 seconds	Figure 1
Simulated normal take off from runway 23	64	26 seconds	Figure 2
Simulated lift off just before end of runway 23	65	21 seconds	Figure 3
Simulated "touch and go" as used for approach and departure training	64	20 seconds	Figure 4
Simulated full length run and full power lift off at end of runway 23	63	26 seconds	Figure 5

R L Langford
Senior Pollution Officer
Pollution Control Division

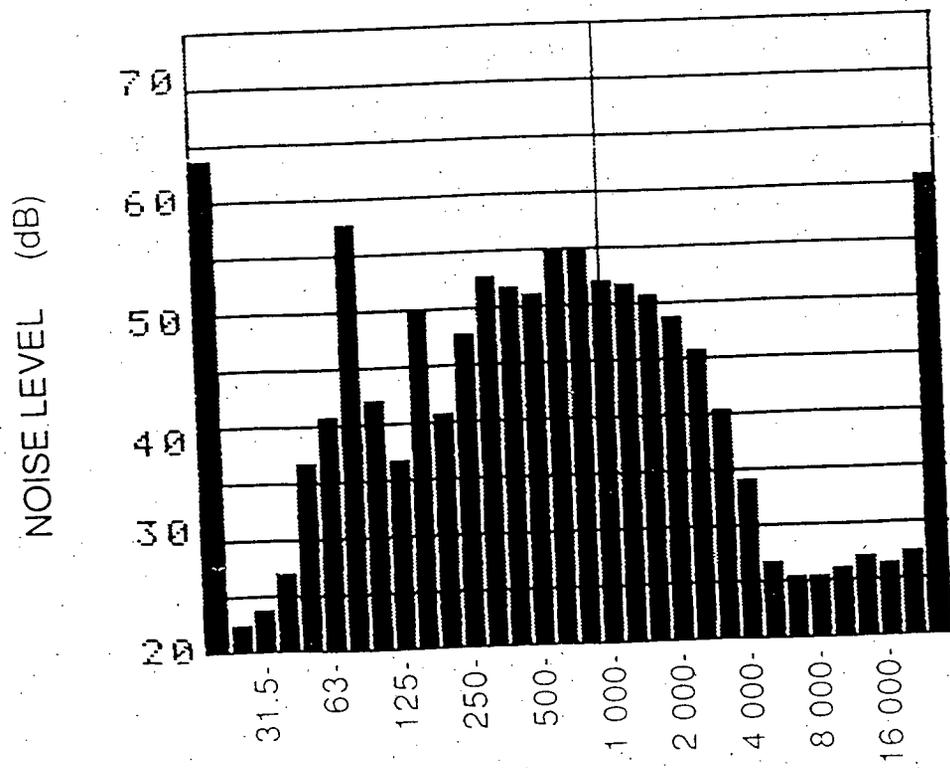
26 March 1993

FIGURE 1: NORMAL TAKE OFF BY CESSNA 172 FROM RUNWAY 27



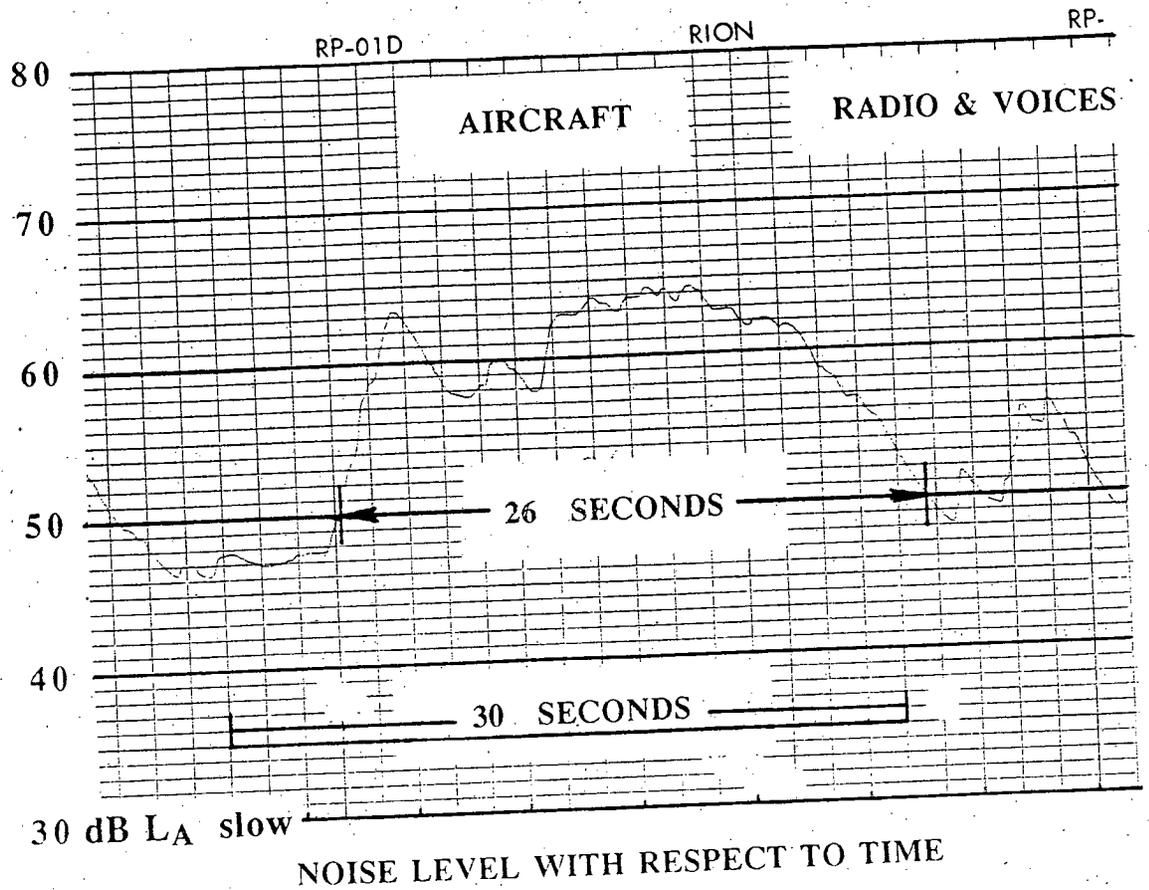
NOISE LEVEL WITH RESPECT TO TIME

ONE THIRD OCTAVE BAND FREQUENCY SPECTRUM



ONE-THIRD OCTAVE BAND CENTRE FREQUENCY (HERTZ)

FIGURE 2: SIMULATED NORMAL TAKE OFF BY CESSNA 172 FROM RUNWAY 23



ONE THIRD OCTAVE BAND FREQUENCY SPECTRUM

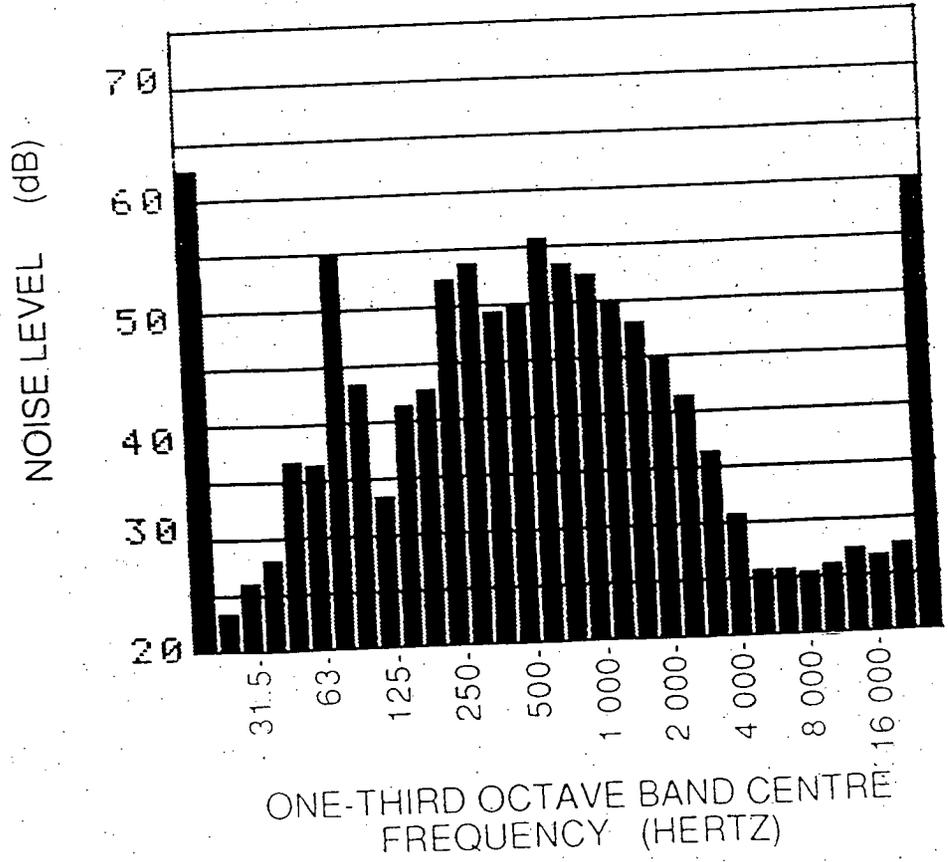
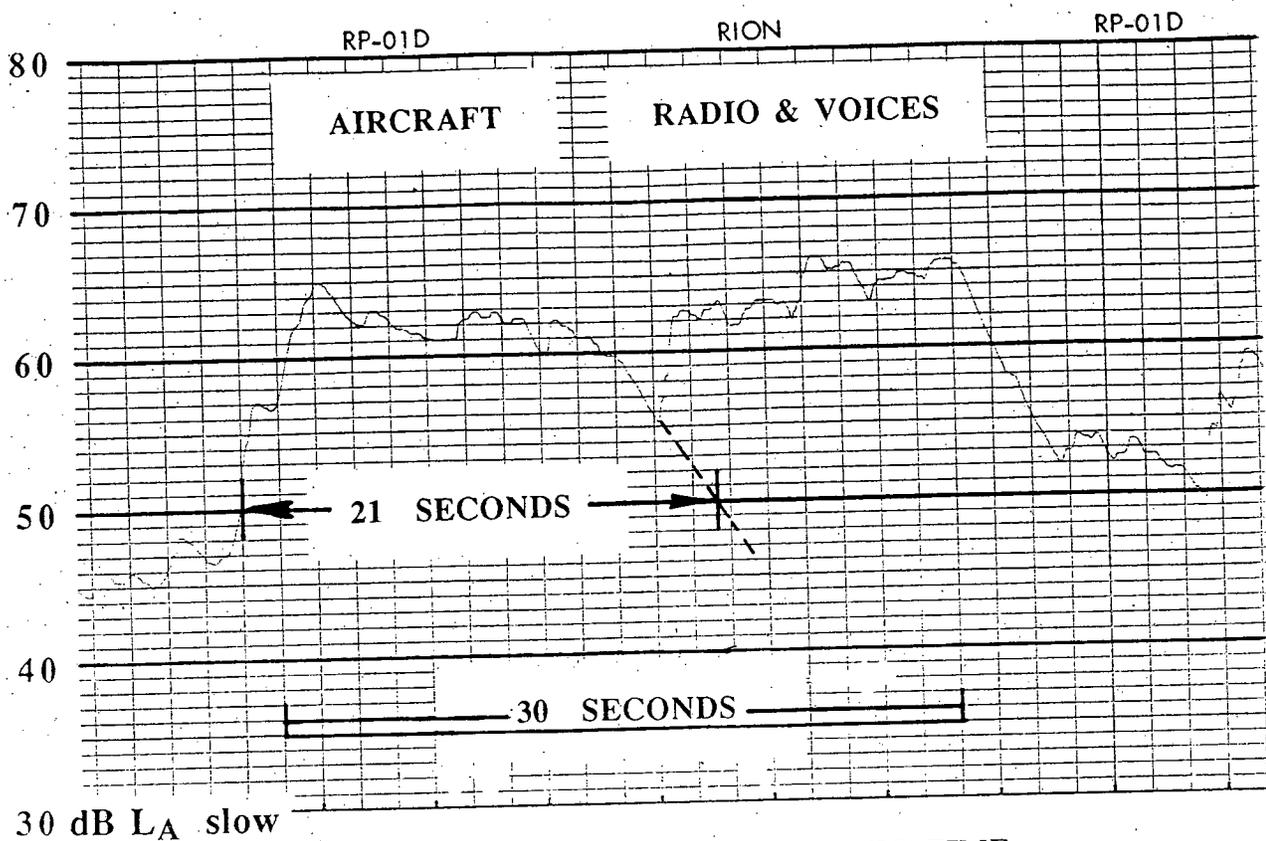


FIGURE 3: SIMULATED LIFT OFF BY CESSNA 172 JUST BEFORE END OF RUNWAY 23



NOISE LEVEL WITH RESPECT TO TIME

ONE THIRD OCTAVE BAND FREQUENCY SPECTRUM

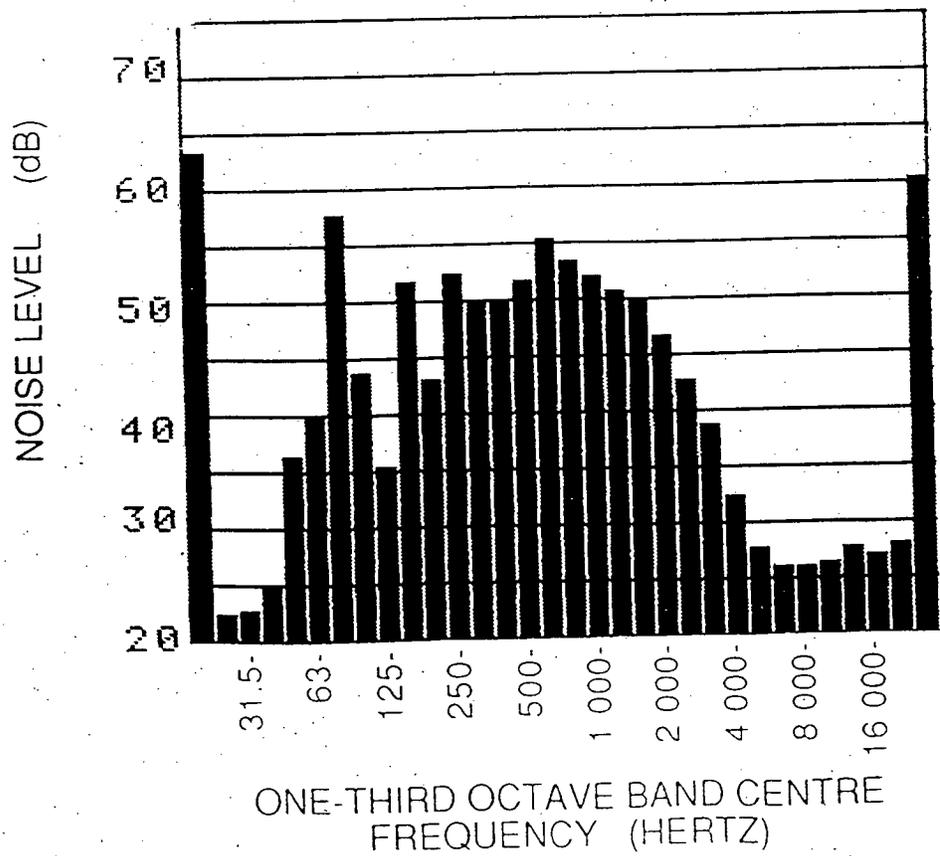
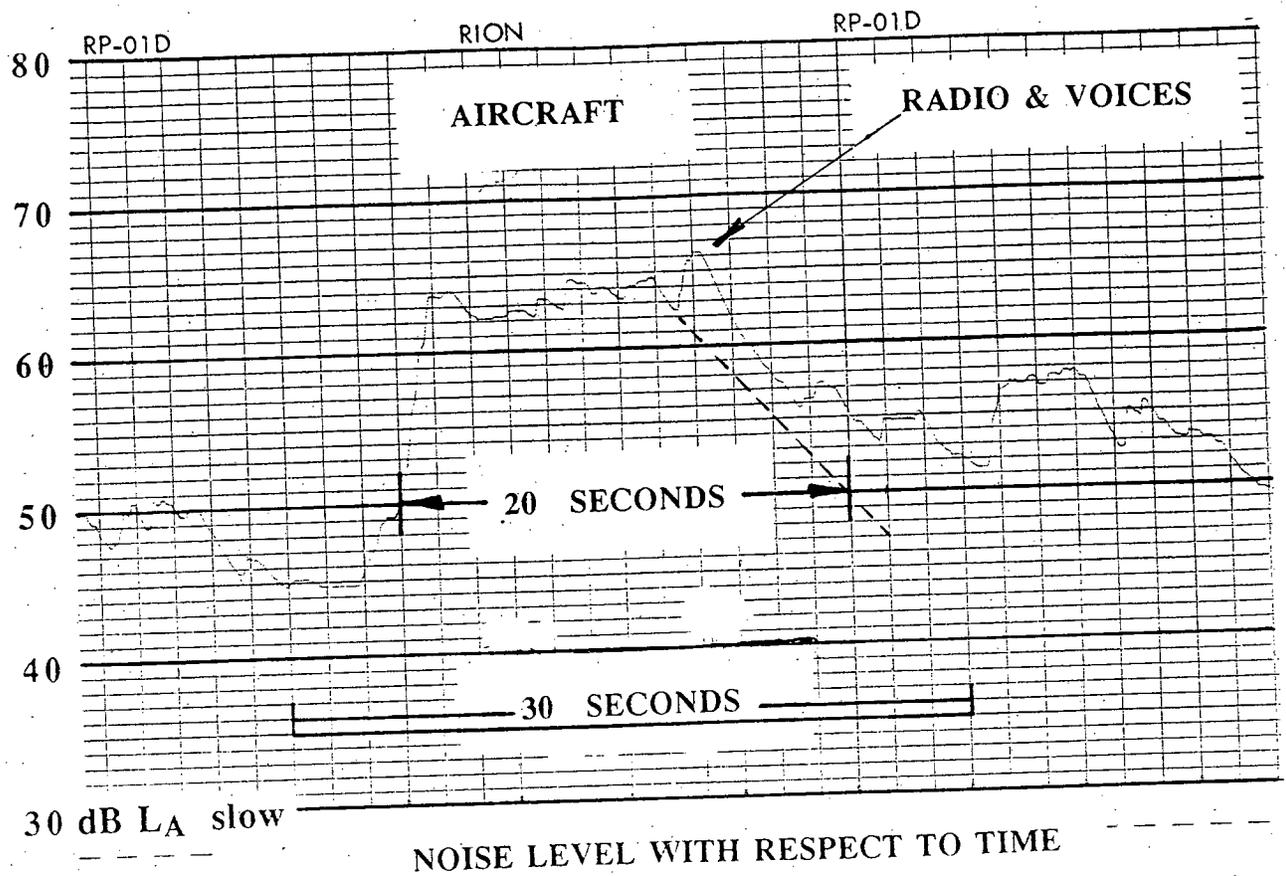


FIGURE 4: SIMULATED "TOUCH AND GO" APPROACH ON RUNWAY 23 BY CESSNA 172



ONE THIRD OCTAVE BAND FREQUENCY SPECTRUM

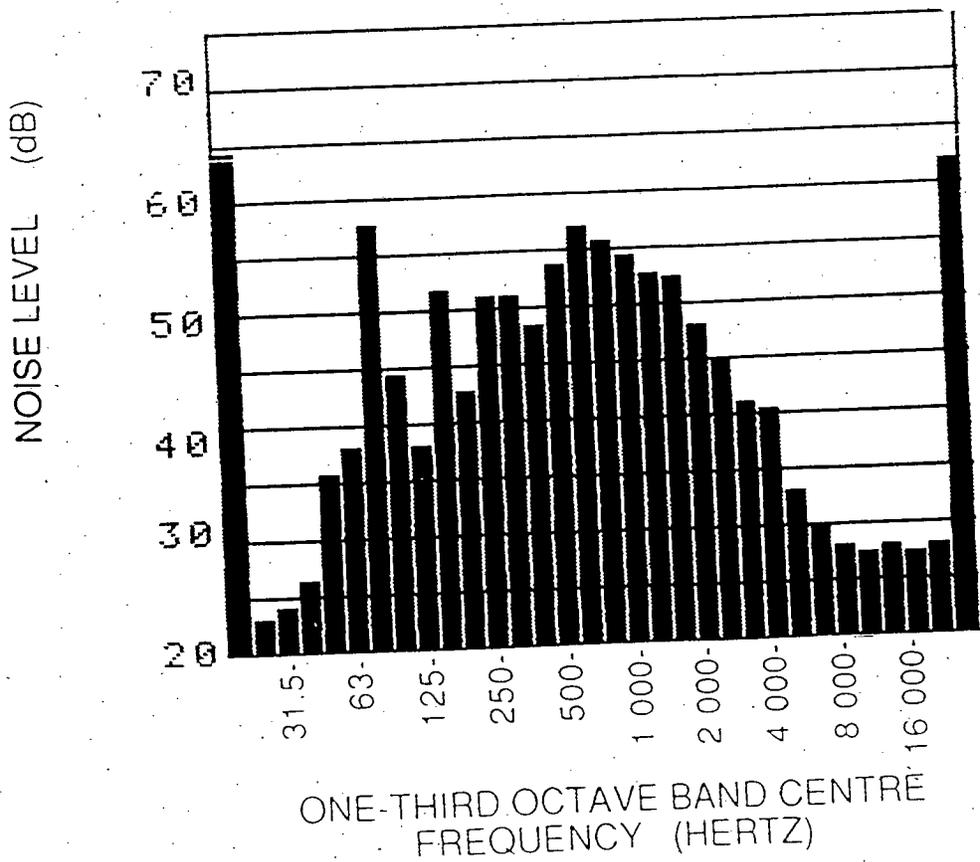
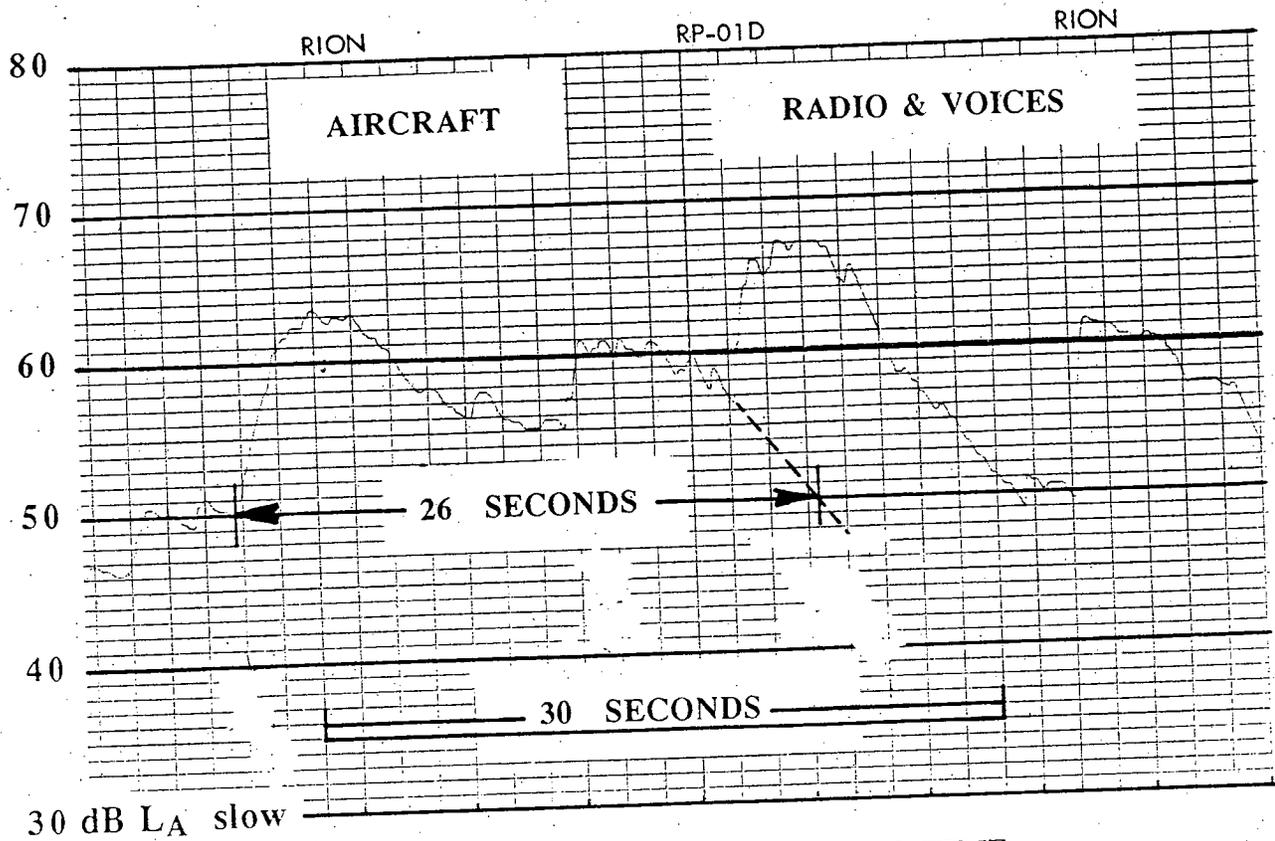
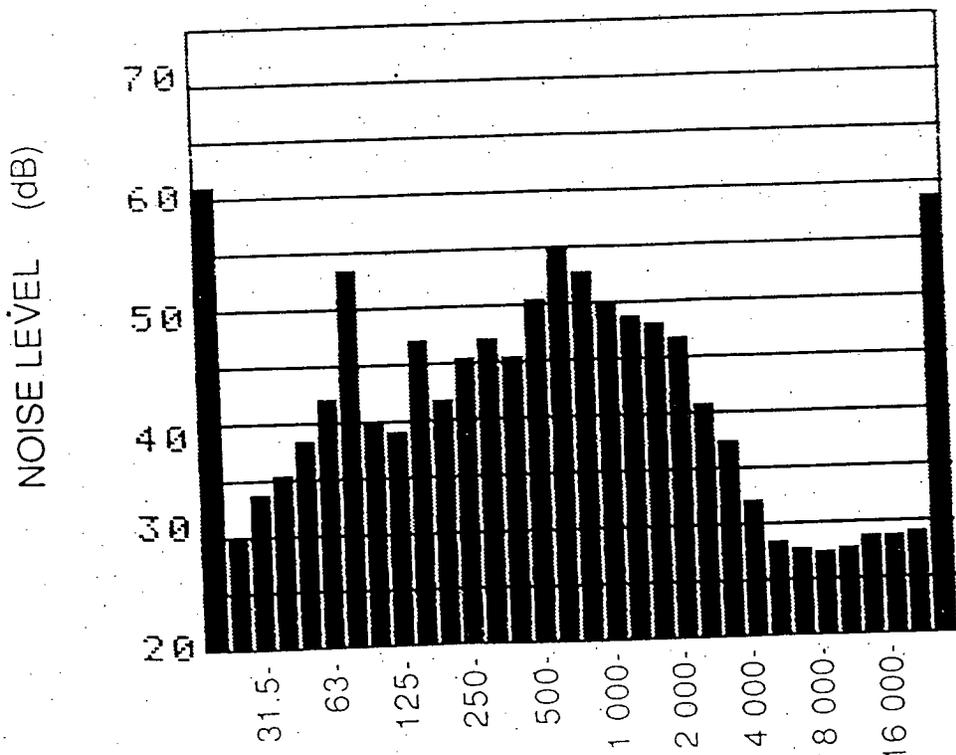


FIGURE 5: SIMULATED FULL LENGTH RUN AND FULL POWER LIFT OFF AT END OF RUNWAY 23 BY CESSNA 172



NOISE LEVEL WITH RESPECT TO TIME

ONE THIRD OCTAVE BAND FREQUENCY SPECTRUM



ONE-THIRD OCTAVE BAND CENTRE FREQUENCY (HERTZ)

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