Report of the DUST and EROSION in STOCK-HOLDING PADDOCKS Committee

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ERRATA

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SUMMARY

The Committee to investigate problems associated with Dust and Erosion in Stock-holding Paddocks ("DESP" Committee) was convened by the Department of Conservation and Environment in response to numerous complaints received from the public over the situation in the Midland area.

The Committee's terms of reference were :

> "to investigate and, if justified, recommend solutions to the problems of dust, odours, soil erosion, sand drift and water pollution associated with stock-holding paddocks mainly in the metropolitan area".

Early activity was concerned with defining the situation. In particular the Committee undertook to document public complaints, to identify the precise location of the problem, to define livestock industry practice, to carry out paddock inspections, to assess river contamination and to measure dust pollution arising from affected areas.

In brief, the above studies established that the dust and erosion problem was caused primarily by extremely high levels of stock concentration and trafficking. The problem has heightened in recent years due to increased numbers of animals being presented for sale, slaughter and export. The traditional stock and pasture management procedures used by the meat and livestock industry proved inadequate in this situation. Associated problems of carcass disposal and river pollution were also identified. The situation was aggravated by encroaching residential areas which gave voice to the deteriorating environmental surroundings.

The Committee considered that immediate action was warranted to arrest the current trend and provide guidelines for avoiding future problems. A range of possible solutions was formulated and each was considered. Options involving moving the livestock industry from the area were rejected on the basis of cost and practicality. The course finally adopted involves a range of procedures, some designed to reduce the effects of pollution on surrounding communities and others aimed at modifying existing meat and livestock industry practice to reduce dust and erosion. In the latter case some legislation was considered necessary to put effect to the recommendations.

In summary, the Committee's recommendations are : (refer Figure 23)

Helena River - Proposed Reservation

That the Helena River and its banks, as shown schematically in Figure 23 be recommended to the Metropolitan Region Planning Authority for inclusion within the Metropolitan Region Scheme as an appropriate reservation, in order to effectively control and improve the watercourse and river banks, and to eventually bring them into public ownership.

Helena River - Water Flow

That the Swan River Conservation Board maintain a watching brief on the condition of pools along the Helena River and negotiate with appropriate authorities to release water from the lower diversion dam as required for the purpose of flushing stagnant pools.

That all stormwater runoff from existing and proposed development in the area be diverted into the Helena River.

Treatment of Unsealed Roads

That early action be taken to seal all roads and stock routes in the study area but particularly those known as Stirling Crescent, Central Avenue, Whiteman Avenue and Robinson Road.

Protect Existing Trees

That action be taken to ensure that trees not effectively isolated from stock within the study area be caged with barriers of a suitable design to prevent damage to the trees.

Vegetative Buffer Zones

That trees and shrubs be planted as wind breaks to provide added protection from dust for residential areas adjacent to stock-holding paddocks in the study area. In particular plantings should proceed along the eastern boundary of Hazelmere and the southern side of Koongamia as detailed in Figure 23.

Carcass Disposal

That legislation concerned with the dumping of carcasses be revised to include allowance for prosecutions relevant to a single animal.

That facilities for disposal of carcasses at the Midland abattoir be expanded to cater for receiving dead stock from stock-holding paddocks with an appropriate service fee.

That the W.A. Meat Commission extend their current daily routine of picking up and disposing of dead animals from the sale yard area, to include dead stock along Whiteman Avenue, Central Avenue and Stirling Crescent. Where ownership can be established it is recommended that a charge be raised by the W.A. Meat Commission and the Swan Shire be advised so that any warnings or prosecutions can be undertaken.

Intensive Livestock Holding Systems

That the Department of Agriculture maintain effective liaison with both operators and shippers on the subject of intensive feed lot design, management systems, effluent disposal and operating costs with a view to effecting conversion to this system.

That the W.A. Meat Commission investigate and if feasible, establish a feed lot facility adjacent to the Middland abattoir for use at contract rates by operators wishing to hold stock prior to sale or slaughter.

That the Government make loan funds available at reasonable rates to legitimate operators and shippers for the purpose of establishing intensive feedlotting facilities.

Livestock Selling Systems

That the W.A. Meat Commission investigate the integration of livestock sales, delivery and slaughter schedules with a view to reducing the overflow of livestock into the Midland stock-holding paddocks.

Legislation to Control Dust

That paddocks associated with the holding or assembly of livestock in the study area be scheduled under the Clean Air Act, and the provisions of Section 23 to 35 apply for the above stock-holding paddocks.

In consultation between the Departments of Public Health and Agriculture that regulations be promulgated under Section 53 of the Act to define suitable guidelines for management of the paddocks and to determine appropriate dust tolerance levels.

That one or more officers of the Department of Agriculture be appointed inspectors under the Clean Air Act, as provided for in Section 22 of the Act, to assist Clean Air Inspectors of the Public Health Department to effectively administer the proposed regulations pertaining to stock-holding paddocks.

That all persons running stock in the area be informed of their responsibilities under the Acts but that prosecutions proceed only for continued infringement after adequate warning.

Future Development

That extensions to existing residential areas and also light industry, caravan parks, etc., particularly in the Hazelmere and Koongamia localities, be restricted in view of potential future conflicts between urban development and meat and livestock enterprises in the area.

R.J. Lightfoot
Chairman
D.E.S.P. Committee
April, 1977

1. INTRODUCTION

For many years complaints associated with sand drift, dust and odours from bare stock-holding paddocks in the Midland area have been received by a number of bodies including livestock companies, abattoirs, Shire Councils, and various Government Departments - particularly the Departments of Conservation and Environment, Health and Agriculture. Complaints from individual residents in the area are frequent, but petitions from several action-orientated groups such as P. & C. Associations, Progress Associations, and specific action orientated groups, sometimes with the backing of local parliamentary members have also featured prominently.

In response to complaints directed to the Department of Conservation and Environment, and following consultation with officers of the Department of Agriculture, a report outlining the nature of the problem was prepared by Mr. N. Orr (an officer of the former Department) on May 27, 1975.

The report noted :

> "The problem of dust and soil movement associated with the holding of large numbers of stock in paddocks prior to entry into local abattoirs or for 'on-the-hoof' shipment to overseas territories has shown a significant increase in recent years. This is reflected in the number of complaints received from the public sector.
>
> Although many interacting factors contribute to the problem, it is clear that a major influence is the expansion of the overseas 'on-the-hoof' market which requires the assembly and retention of

large numbers of sheep in paddocks for up to a period of one week prior to shipment.

It is anticipated that the overseas market for live animals will continue to increase. This would suggest, that unless positive action is taken to develop and implement control measures, the aforementioned problem could be expected to reach serious proportions".

The report, along with verbal submissions on soil erosion and livestock trafficking, by officers of the Department of Agriculture, was presented to the Environmental Protection Authority at a meeting on June 12, 1975.

The recommendation of the above report was that a 'Working Group' be formed to study the problem in detail and to make recommendations aimed at solving the problem. The EPA saw merit in this proposal and endorsed the convening of such a group by the Department of Conservation and Environment.

Formation of DESP Committee

The first meeting of the Working Group was held on July 28, 1975.

At this first meeting, it was resolved that the group be known as the 'DESP Committee' being the abbreviation of 'Dust and Erosion on Stock-holding Paddocks'.

Committee membership has varied throughout its operation and valuable contributions have been received from many different individuals and organisations.

The following people have contributed in the Committee.

Chairman - * R.J. Lightfoot, Department of Agriculture

Secretary - * N. Orr, Department of Conservation and Environment

* R.A. Powell, Department of Public Health

* D.H. Mathews, Town Planning Department.

* L. Jury, Australian Department of Primary Industry

* J.C. Grasby, Soil Conservation Service

* H.G.H. Roberts, Swan River Conservation Board

* H. Hummerston, W.A. Livestock Salesmans' Assoc.

* J.M. Malaxos, W.A. Livestock Salesmans' Assoc.

* H.W. Warden, W.A. Livestock Salesmans' Assoc

* W.L. Luckman, Shire of Swan.

I.S. Flack, W.A. Meat Commission

N. Zuvella, Town Planning Department

M.D. Poole, Town Planning Department

C. Georgeff, Councillor, Shire of Swan

N. Henry, W.A. Livestock Salesmans' Assoc.

B.M. Wilson, W.A. Meat Commission

P.R. Candy, W.A. Livestock Salesmans' Assoc.

G. Delaney, Crown Law Department

* Permanent Committee Members

The first meeting decided that the DESP Committee's terms of reference be defined as follows :

'To investigate and if justified, recommend solutions to the problems of dust, odours, soil erosion, sand drift and water pollution associated with stock-holding paddocks mainly in the metropolitan area'.

Whereas the immediate problem concerned the Midland stock-holding paddocks, the Committee felt that most recommendations arising would be relevant to other affected locations, both in the metropolitan areas (e.g. Coogee) and country centres (e.g. Esperance, Albany, Geraldton).

The Committee recognised the need for basic data pertinent to the problem before recommendations could be developed. A plan of action was prepared (see Figure 1) and with this in mind the DESP Committee set out to :

i) Document public complaints.

ii) Identify precisely the location and extent of problem areas, their classification and ownership.

iii) Document the livestock industry practice and livestock flow.

iv) Undertake a series of individual paddock inspections to assess the vegetative cover and soil stability with a view to identifying potential trouble areas.

v) Investigate the pollution hazards to water systems, in particular the Helena River.

vi) Measure the degree of dust pollution of the air in affected areas at appropriate times.

These aspects are reported in Section 2 of the Report. General considerations in relation to the formulation of solutions and the recommendations which follow are presented in Sections 3 and 4 respectively.

2. DEFINITION OF THE PROBLEM

2.1 Complaints from the Public

Residents in the Midland area, particularly those living in Hazelmere and East Guildford, have complained for many years of the discomfort they have experienced from dust, smells and soil movement emanating from severely eroded stock-holding paddocks.

Based on the number of individual complaints received by the Shire of Swan, the Departments of Conservation and Environment, Public Health and Agriculture together with submissions from Progress Associations, Parents and Citizens Associations and other action-orientated groups, the Committee estimated that at least 1,500 people have either expressed concern over the problem or have experienced discomfort.

Details of complaints are kept on file at Government Departments as noted above and are available to interested parties. A petition complaining of "the extreme dust pollution which is not only an inconvenience but also a health hazard in the Hazelmere, Guildford and surrounding areas" supported by approximately 350 signatures is presented as Figure 2.

2.2 The Study Area

At the instigation of the Committee a plan of the area was prepared to define the locations and extent of areas habitually used for holding livestock in the Midland region. This plan is presented as Figure 3.

The land comprises flat, open country within the rough triangle formed by the localities of Hazelmere, Maida Vale and Helena Valley. The major part of the Study Area is administered by the Swan Shire Council.

Parts of it are affected by noise from aircraft using the nearby Perth Airport, and the subject land is bisected by several State Energy Commission trunk electricity lines.

Although rural and low density in character, the land has been subdivided over the years into lots of generally four hectares, and portions infiltrated by mixed rural and urban uses, including skin drying sheds, offal-processing plants, greyhound and trotting tracks, a large rifle-range, a caravan park, sand pits, farms, and several small industries.

In the Metropolitan Region Scheme, operative since 1963, the land is zoned as "Rural"; this classification (also reflected in the more detailed Shire of Swan Town Planning Scheme) means that specified types of development not regarded as rural in character are prohibited.

Since acceptance of the Corridor Plan for Perth, three comprehensive planning studies have been commissioned by the Metropolitan Region Planning Authority. These studies -

which could partly effect the future of the Study Area - are currently in the course of preparation and therefore final recommendations were not available at the time the DESP Committee was sitting.

Although it was not the primary function of the DESP Committee to act in a town planning capacity, certain suggestions and recommendations relating to future land uses in the Study Area have been made; to this end recommendations are included in Section 4.3. (see page 43).

2.3 Livestock Industry Practice in the Midland Stock-holding Area

The stock-holding paddocks within the study area function as a temporary holding depot for both sheep and cattle. Their position in relation to livestock flow throughout the State is presented schematically in Figure 4.

Animals are held in the paddocks for three main reasons :

i) Holding prior to slaughter :

Livestock auctions are normally held in the Midland sale yards on Mondays, Tuesdays and Wednesdays of each week. From June to August, however, sheep sales may be restricted to Mondays and Wednesdays only. As the majority of stock are sold to be slaughtered in the adjacent abattoir, and because slaughtering continues throughout the full working five day week (Monday to Friday) livestock must frequently be held over for one or more days before slaughter can be handled.

This is especially so on Saturdays and Sundays when stock must be held over for Mondays kill. The holding paddocks therefore act as a buffer for the integration of sale and slaughter operations.

Most holding operations, as described above, are conducted by the Licensed Abattoir Operators. These companies (termed "operators") are licensed to kill stock at the Midland abattoir and are associated with the retail butchering, meat processing, packing and/or exporting trades. Although some 70 companies hold operating licenses, only a few of the larger concerns own or lease holding paddocks, and therefore routinely hold stock prior to slaughter. The smaller operators tend to buy stock and kill on a short term basis.

ii) Holding prior to live export :

The number of sheep (almost exclusively Merino wethers) exported live from Western Australia has increased dramatically in recent years as shown by the figures below :

Year (ending June 30)	No of live sheep exported (millions)
1950	0.09
1960	0.15
1970	0.30
1971	0.41
1972	0.67
1973	0.66
1974	0.71
1975	1.02
1976	1.34

Ship capacities vary, but most now carry some 20 to 30 thousand head per trip. Normal commercial practice is to purchase the wethers in groups of 200 to 500 usually direct from farms but sometimes supplemented by stock bought at auction. The sheep are then assembled at a convenient location as one flock (representing a ship load) for veterinary treatment and nutritional acclimatisation to shipboard rations prior to shipping (see Figure 9). This assembly operation normally takes from 7-14 days. The Midland stock-holding paddocks are one of the central points used for the pre-embarkation assembly of sheep being adjacent to both sale yards and rail transport facilities.

Of 1.34 million live sheep exported in 1976, the Committee estimates that approximately 0.4 million were assembled in the Midland holding paddocks.

iii) Holding prior to sale :

The major stock firms (Elders, Wesfarmers and Western Livestock) act as handling and selling agents for farmers who wish to sell stock at the Midland sale yards. Because selling is limited to certain days each week, stock, particularly those from distant locations, must occasionally be held over in the holding paddocks for one or more days before auction.

In addition to the above activities, some of the livestock marketed through the Midland sale yards are purchased by "dealers" and are then held for varying

periods prior to offering them for re-sale at a profit. A proportion of these animals are run on the Midland holding paddocks for short periods before re-sale. Although actual numbers are unknown, the trade is thought to be very small in relation to overall livestock numbers in the area.

Use of the Midland stock-holding paddocks by the Operators is a long established practice but stock throughput has been heavier in recent years associated with increased turnoff from the agricultural areas. An indication of this growth can be seen from data presented on number of stock sold at the Midland sale yards and numbers of animals slaughtered at the abattoir in Figures 5 and 6. With regard to sheep, the numbers slaughtered have increased from levels of approximately 0.3 to 0.5 million through the 1960's, up to 1.5 million in recent years. The statistics for both lambs and cattle show a similar pattern.

Numbers of sheep and lambs yarded for sale at Midland rose from 1.2 million in 1955 to over 3 million in 1972-73. However, over the past three years numbers have declined again, reflecting both increased "on farm" buying activity for live export delivered direct to the holding paddocks and direct consignment of lambs to the abattoir. In contrast, cattle numbers have continued to rise with parallel increased demand for agistment in the Midland holding paddocks.

Increased yardings, sales and slaughterings, particularly in recent years, reflect a change in the State's livestock population from one of rapid growth through the 1950's and 60's with minimum turnoff, to a steady state situation in the 1970's with considerably higher annual turnoff. As the rate of new land clearing diminished and farms achieved full stocking capacity the State's livestock population has stabilised with consequently larger annual drafts of excess animals being placed on the market. The Committee therefore envisages that annual livestock turnoff will remain at the current high rates for the foreseeable future. Of significance to this report, pressure on the holding paddocks is unlikely to decline.

As noted previously, the live sheep export industry has increased dramatically in recent years, this being associated with the expansion of the Middle East market. While some of this growth has been channelled through country ports, use of the Midland paddocks has still risen sharply, partly as a result of increased numbers and partly due to the relatively long holding time (7 to 14 days) required for assembly.

In order to explain DESP activities and improve liaison with the meat industry, all operators were invited to attend a Committee Meeting held on September 24, 1976 at the Midland abattoir. At this meeting it was agreed that the DESP Committee should send a questionnaire to all members of the industry directly associated with the holding paddocks.

Information obtained from the questionnaire was used to more clearly define livestock-holding practices and so assess more accurately the consequences of any proposals advanced to solve the problem. A sample of the questionnaire is presented as Figure 7. In outlining the purpose of the questionnaire, opportunity was taken to invite all interested parties to make a written submission to the Committee regarding any suggestions or proposals that would reduce the problems of dust and erosion in the holding paddocks. Although only 14 questionnaires were returned these included most of the large companies and therefore constituted a valued input to the Committee's definition activities. From responses received to the questionnaire the Committee estimates that in 1975/76 some 0.6 million sheep and approximately 30,000 cattle were held on a holding paddock area of approximately 1000 ha for periods varying from 1 to 20 days.

Individual submissions were received from :

Elder Smith Goldsbrough Mort Limited
Western Livestock Limited
W. Pope & Co. Pty. Ltd.
Clausen Steamship Co.
Westralian Farmers Cooperative Limited

These are appended as Figure 8.

2.4 Soils, Vegetation and Erosion

Inspections of the stock-holding paddocks were carried out by professional officers of the Soil Conservation Service in November 1975, March, June and November 1976, and February 1977.

Colour aerial photography was taken in March 1976 to assist in the assessment of potential problem areas.

In summary the inspections revealed that soils immediately adjacent to the Helena River consist in the main of brown silty clay-loams. South of the river, sandy soils predominate in association with swamp and ridge formations. Gravels occur on properties south of the Rifle Range, whilst paddocks north of the river and east of Bellevue are mainly clay and clay-loams.

When bare of vegetation and cut up by stock hooves all soil types in the area were capable of giving rise to air-borne dust in windy conditions. The lighter soils also form sand drifts which blow onto fencelines and across roads (see Figure 10).

During the winter months and when carrying relatively few stock all soils in the area grow some vegetation. The clays and loams produce a mixed pasture type including many legumes, grasses and weeds, and this is capable of dense growth. The sandy soils support a much sparser pasture often consisting largely of grass and lupins. All vegetation types, whether green or dry, can prevent dust and erosion if only lightly grazed to prevent baring of paddocks during the summer months.

At the November 1975 inspection, most of the paddock areas were adequately covered with dry vegetation and therefore protected from wind. Even at that time, however, there were small areas of bare soil on all soil types. These occurred adjacent to yards and often associated with sand ridges but were also

observed in some of the intensively used smaller paddocks between Stirling Crescent and the river.

At the March inspection the area of bare soil had increased in almost all paddocks. The affected areas noted in November had expanded and several paddocks were completely denuded of pasture (see Figures 11, 12, 15, 16). Sand drift had occurred at one site associated with yarding and unloading facilities.

Coloured aerial photography taken at this time illustrated paddock conditions when least ground cover was present. White sand patches are prominent as are some bare brown clay-loam river paddocks. Black and White aerial photos taken in 1969, 1970, 1972 and 1975 confirmed that soils which were poorly covered or bare of vegetation in 1976 had been similarly affected in previous years.

At the June inspection, the small paddocks north of Stirling Crescent, various sand patches in most of the central paddocks and some of the paddocks along the river towards Koongamia were bare of pasture (see Figures 9, 11 & 12). The remainder were showing new green growth following early winter rains.

At each inspection it was observed that unsealed roads used as stock-routes had little or no vegetative cover. During dry weather the soils were loose and light winds raised dust clouds. As such they were a constant source of air pollution irrespective of conditions in adjacent paddocks.

A high incidence of dead or dying trees associated with "ringbarking" by stock was apparent in most paddocks used intensively for holding purposes. This effect is clearly seen in Figures 9 and 14. In some paddocks an effort had been made to protect trees by erecting wire cages, or wrapping wire, around the trunks.

The sequence of pasture growth, characterised by increasing density through winter and spring, then drying and becoming less bulky as summer and autumn progress is the normal seasonal pattern throughout most of South Western Australia. In farming situations livestock owners are able to maintain vegetative ground cover and prevent soil erosion by carefully relating stock numbers and therefore grazing pressure to the quantity of pasture on offer.

The major difference between commercial farming practice and the situation in the Midland area is the extremely high concentration in and constant trafficking of animals through the stock-holding paddocks. It was apparent that even with well established pastures at the end of the growing season, open range grazing at extremely high stocking rates, as practised in the Midland paddocks, inevitably results in extensive areas of bare and potentially troublesome soil throughout the summer and autumn months.

It was concluded that due to sustained high levels of grazing pressure, the methods of soil erosion control applicable to normal farm situations in Western Australia would not be effective in the Midland stock-holding paddocks.

2.5 Pollution of the Helena River

The Swan River Conservation Board makes regular inspections along the Helena River between Great Eastern Highway and Scott Street Bridge, a distance of about 5 km (see Figure 3). Reports arising from these inspections together with on-site study by members of the Committee reveal that since the building of the Mundaring Weir, the Flow of the Helena River has been severely depleted. In more recent years a second dam (the Lower Diversion Weir) constructed downstream of the main weir has further reduced the volume of water moving through the study area. Certain ground waters downstream from the abattoirs feed into the main channel and maintain a slight flow. However, during the summer months problems occur when strong easterly winds blow over bare paddocks causing fouling of the water. In the winter months the flow is sufficient to cater for any normal irregularity.

The segment of the river between Great Eastern Highway and Hazelmere Bridge has of recent years been fairly free of pollution. Although paddocks surround the river, large numbers of stock are not regularly held in this area and consequently the incidence of wind blown particles (stock feeds, soil, excreta, etc.) or carcasses found in the waterway is minimal.

In the section between Hazelmere Bridge and Midland Road Bridge stock are held in greater numbers with consequent increase in the occurrence of pollution problems (see Figures 11 and 13). Parts of the river are, however, inaccessible to stock because of high banks and increased density of trees.

In the section Midland Road Bridge to Scott Street Bridge, most pollution occurs, this being associated with the large numbers of stock normally held in the area. The country has little protection from prevailing winds resulting in frequent contamination through wind-blown dust, stock feeds and excreta. Carcasses are often found in the river pools which consequently become foul and malodorous.

2.6 Air Pollution

Airborne dust from sources such as gravel roads, and from normal farming operations in paddocks, orchards and vineyards is not regarded as a nuisance by a rural community. There is little evidence to suggest that dust from these sources constitutes a health hazard. The dust particles are usually large, non-siliceous in nature, and retained in the upper respiratory tract. Eye irritation is possible, but not commonly regarded as a health hazard. In contrast urban residents tend to regard dust from these sources as a nuisance and usually become vociferous in their complaints.

There are no ambient air quality standards for community dust in Australia. The National Health and Medical Research Council has recommended long term goals for gaseous pollutants, and also has recommended methods and equipment for the measurement of these pollutants. Particulate matter, i.e. atmospheric dust, should be measured by the Reference Method for the Determination of Suspended Particulates in the Atmosphere (High Volume Method) as published in the U.S.A. Federal Register. In conjunction with this reference method are published national primary and secondary ambient air quality standards for all the United States. National primary air quality

standards define levels of air quality which the Administrator judges are necessary, with an adequate margin of safety, to protect the public health. National secondary ambient air quality standards define levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant. Such ambient air quality criteria was derived from information pertaining to cities, with particulates from industrial sources, motor vehicles, and high density living, being constantly emitted into the atmosphere. Emissions from diesel engines, lead from motor cars, can contribute towards adverse health effects. Air management strategies in the United States are based on controlling air quality by the necessary pro-rata reduction in emissions. Their ultimate goal is the secondary standards.

The national primary ambient air quality standard for particulate matter determined by the high volume reference method is :

(a) The annual geometric mean should not exceed 75 $\mu g/m^3$ (microgram/cubic metre).

(b) The maximum 24 hour concentration must not exceed 260 $\mu g/m^3$ more than once per year.

The national secondary ambient air quality standard for particulate matter measured by the reference method is :

(a) The annual geometric mean should not exceed 60 $\mu g/m^3$.

(b) The maximum 24 hour concentration must not exceed 150 $\mu g/m^3$ more than once per year.

The DESP Committee agreed that Mr. J.C. Grasby and Mr. R. Powell should visit the area surrounding the stock-holding paddocks and decide on the most significant area to monitor for dust, considering soil erosion and proximity to residential areas. It was agreed that Hazelmere represented a significant area and sampling in the vicinity of West Parade and Bushmead Road was of a high priority. Additionally if significant stock were held in the Helena Valley near Clayton and Samson Roads further sampling at that site would be attempted.

During the period February 19, 1976 to April 6, 1976, thirteen high volume samples of varying time duration were taken in the Hazelmere area. The results of this sampling are shown in Figure 17. Stock movements were recorded and dust levels are grouped according to stock movements in Figure 18. For comparison ambient dust measurements taken in Perth and country areas are shown in Figure 19.

The conclusion reached was that dust levels during periods when stock movement was noted are significantly higher than during periods when the paddocks were known to be vacant or where little movement of stock was noted.

Rainfall during the sampling period was minimal. Less than 5 millimetres were recorded on February 24 and 28 millimetres were recorded on March 1.

During the period December 13, 1976 until February 18, 1977 further high volume sampling was conducted in the Hazelmere

area. The results of this sampling are shown in Figure 20. In the early hours of the morning of Tuesday, February 1, 1977 strong easterly winds caused a severe dust nuisance in the Hazelmere area, and residents complained of the nuisance to the local authority.

Strong easterly winds in the early hours of the morning of Sunday February 13, 1977 again created a dust nuisance and Mr. Powell visited the area during that morning and obtained photographs of the dust in several homes. A high volume sampler was set up on the residential property known as 1 Wingate Avenue, Hazelmere and continuous monitoring conducted until 8.00 a.m. on Friday February 18, 1977. The results of this intensive monitoring are shown in Figure 21, with photographs in Figure 22.

In the early hours of Sunday, February 20, 1977 strong easterly winds were responsible for, what was claimed to be, the most severe dust nuisance ever experienced in Hazelmere. The local Member of Parliament, Mr. J. Skidmore, Mr. Luckman of the Shire of Swan and Mr. Powell of the Public Health Department were called to the scene. A television studio and daily paper were contacted by the residents, and later visited the site. Home owners were almost in tears, and in many instances the dust was several millimetres thick on verandahs, on washing machines and in laundries. Inside the homes, a film of dust coloured most white surfaces, so that when any article was removed, its image was left in white relief on a grey background (see photographs, Figure 22).

Although both the U.S.A. primary and secondary ambient air quality standards were exceeded on numerous occasions during the period February 9 until February 18, 1977 complaints of dust were not voiced by the residents of Wingate Avenue. However, it is the opinion of Officers of the Public Health Department that dust levels during this period, although minimal, relative to dust levels encountered in Hazelmere during a "strong easterly", would cause complaint in the inner metropolitan area.

During the period the area was kept under surveillance, it appeared that stock numbers were kept low in the summer of 1975/76. This was not the case in January and February, 1977 when herds of cattle were frequently located in adjacent paddocks (see Figure 11), to the east of Hazelmere.

3. ALTERNATIVE SOLUTIONS

Having assessed the nature and magnitude of the problem as outlined in Section 2 the Committee considered the feasibility of a number of alternative solutions. These are briefly discussed hereunder and when considered together with the results of field investigations and inputs from the meat and livestock industry they provide background to the Committee's recommendations presented in Section 4.

In considering the question of solutions to problems associated with the Midland stock-holding paddocks the Committee recognised two basic alternative approaches.

These were :

i) Stop commercial stock-holding operations in the area thereby removing the primary cause of dust and erosion.

or

ii) Allow the industry to remain but institute controls and/or procedures to reduce the incidence of environmental problems.

A brief resume of the Committee's deliberations, particularly with regard to alternative (i), and the reasoning which led to the recommendations presented in Section 4 follows.

In considering alternative (i) a proposal to stop commercial stock-holding operations the Committee noted that action could be taken either :

Directly - through legislation to prohibit or curtail nominated livestock activities in the area e.g. assembly of sheep for shipping and/or holding of livestock prior to slaughter at the Midland abattoir.

or

Indirectly - through relocation of facilities upon which the stock holding operations depend, e.g. move Midland abattoir and/or close Midland sale yards.

Direct action, while theoretically effective in solving the immediate problem, was seen to be associated with the following problems :

- The need for new legislation.
- The necessity for an effective inspectorial and regulatory procedure to enforce such legislation.
- Considerable disruption to trade and commerce in the meat and livestock industries - at least in the short term - with possible effects on export earnings.
- Need for increased expenditure and capitalisation by stock firms, operators and shippers to resite holding facilities.
- Political conflict through possible accusations of discrimination against specific business groups.
- Possibility of reduced livestock input and therefore killings and profitability at the Midland abattoir.
- Need for expanded "on site" holding and/or to increase abattoir stock-holding capacity.

For these reasons the proposal of direct legislative action to prohibit commercial stock-holding activity in the area was rejected.

In relation to possible indirect action a number of propositions were examined. Basically these involved relocating the Midland abattoir to a truly rural environment (accepting that this would as a consequence close the Midland sale yards).

The Committee noted that relocating the Midland abattoir could provide an effective solution to the environmental problem, both in terms of pollution arising from the stock-holding paddocks and that emanating from the abattoir itself. Other advantages noted include the possibility of implementing more efficient treatment processes and favourable effects of decentralising the abattoir, associated industry and livestock sales.

The abattoir is clearly the central focus of all ancilliary livestock concerns in the area. In its absence the Midland sale yards would lose their strategic advantage and selling at that centre would no longer be a continuing proposition. Loss of the Midland sheep sales would in turn reduce the value of the Midland holding paddocks as an assembly point for the live export trade. Holding of stock by the licensed abattoir operators would also be curtailed in the absence of adjacent killing facilities.

However, major consequences of relocating the abattoir would be :

. Direct costs associated with building the new abattoir - estimated to be in excess of $30 million.

. Greatly reduced trade and business activity in the Midland town with associated effects on housing, land values, etc.

. Increased costs to private industry in establishing new holding facilities, in building up alternative livestock selling centres and to resite ancilliary industries (skin sheds, offal processing plants).

. Possible transfer of the environmental problem in space and time, if basic systems remain as present.

For these reasons the proposal was rejected.

An alternative indirect approach to reducing stock numbers in the holding paddocks was a proposal to close the Midland sale yards, but leave the abattoir

at its present location. The Committee considered that such action would, if coupled with an effective system for direct delivery to the abattoir and expanded "on site" holding facilities (feed lot/lairage), considerably reduce overflow of livestock into the holding paddocks.

Loss of the sale yards would also reduce the value of the Bushmead area for assembly of export sheep, as noted earlier. It seems likely that the net effect would be increased reliance on country selling centres and a considerable reduction in the numbers of sheep and cattle being held at Midland with consequent reduction in erosion and dust levels.

However, factors to be considered if such a plan were implemented are :

- Need for new legislation to prohibit livestock sales at Midland.

- Political conflicts with groups (both farmers and industry) wishing to retain the Midland sales.

- Need for increased expenditure and capitalisation by stock firms and operators to resite Midland-based staff and expand country selling facilities.

- Need for expanded lairage and stock-holding facilities associated with the abattoir to cater for a direct delivery system.

- Increased reliance on programming and transport for direct delivery of stock to abattoir.

For the above reasons successful implementation of the proposal is unlikely, however, the Committee saw merit in action aimed at gradually reducing - rather than stopping - selling activity. Any progress made

towards a system of direct delivery to abattoir with expanded lairage will reduce the number of stock required to be held in the holding paddocks. Accordingly, appropriate recommendations designed to foster the development of a direct delivery system, namely the expansion of country selling centres and the construction of new abattoir holding facilities, are presented in Section 4 of the Report.

Because of the broad economic and political consequences of proposals for major change, most of the Committee's deliberations were concerned with formulating recommendations based on the assumption that, at least for the foreseeable future, the meat and livestock industry would continue to operate in the Midland area. The recommendations were therefore concerned with improved managerial systems coupled with some controls on stocking to reduce the incidence of environmental problems. These recommendations are presented in Section 4 of the Report, which follows.

4. RECOMMENDATIONS

In formulating recommendations to overcome environmental problems associated with dust and erosion in the Midland stock-holding area it has been established that the present situation is caused by overgrazing and baring of soil on rural holdings.

The Committee notes that this is a direct consequence of existing meat and livestock industry practices and management systems which in some cases have evolved over many years.

The recommendations have therefore been framed under two broad classifications. In both instances, short and long term applications are apparent.

First, there are recommendations designed to ameliorate the dust and odours or their effects on surrounding urban communities without affecting the basic livestock management systems currently in operation. Such recommendations are relatively acceptable to the livestock industry but leave responsibility for action to State and Local Government at a cost usually met by the community at large.

Secondly, the Committee has proposed some recommendations intended to change current industry practice and so avoid overstocking and baring of paddocks. Such recommendations, while undoubtedly most effective in striking at the base of the problem, place responsibility for action on various industry groups at their cost. They are therefore less acceptable to industry and if implemented may necessitate some form of legislation to enforce their intention.

Finally it must be made clear that the Committee is conscious of the enormous value of the meat and live sheep export industry to the welfare of Western Australia. The recommendations have, we believe, been framed in keeping with the best long term interests of these industries in association with the well being of adjacent urban communities.

4.1 Recommendations designed to reduce environmental problems without changing current livestock management practices.

4.1.1 Helena River - Proposed Reservation and Fencing

Many of the privately owned paddocks in the Midland stock-holding area straddle the Helena River. Title searches indicate that, in most instances, the allotments include both river banks. Although some

portions of the river have been fenced, in many areas stock are able to gain access to the river from one or both banks and it has been observed that portions of the river are used as stock routes. As a result destruction of natural vegetation has occurred.

In both the Metropolitan Region Scheme and the Swan Council Town Planning Scheme, the general area including river and paddocks is classified as 'Rural Zone'. The main purpose of this classification is to conserve the rural environment by prohibiting specified urban uses. Some land adjacent to the Midland abattoir and the Westrail workshops, abutting the north side of the river is zoned as Industrial.

The Committee, after careful consideration and consultation with appropriate authorities, now recommends a 'tighter' form of control to protect the Helena River and its environs. It considers the best way of achieving this would be the reservation of the river banks as a formal amendment to the Metropolitan Region Scheme and the Local Authority Town Planning Scheme.

Classification of the Helena watercourse as a reservation within the Metropolitan Region Scheme, including an appropriate strip of land on either side - from Swan Street to Samson Road - would bring a significant stretch of the river under MRPA or statutory control with eventual public ownership. The inclusion of the land as a reserve in the Metropolitan Region Scheme would not necessarily

indicate early acquisition - this would no doubt take place over a period of years - but would serve notice on the individual owners of the MRPA's intention ultimately to acquire, as and when finances permitted. Even after acquisition occurred, it should be possible for owners to lease back some sections of the land from the controlling authority - thus disruption to stock companies would be minimized.

The Committee foresees several benefits to be derived from this acquisition program. Public ownership or reservation in a town planning scheme of the river and fencing of the land would :

i) enable more effective control of land use adjacent to the water course and river banks, thus preventing or minimizing

   - harmful surface run-off entering the river system from stock paddocks and industrial land close to the river;

   - pollution of the river by dead stock;

   - erosion and damage to vegetation by entry of stock.

ii) facilitate planting of trees and regeneration of river bank vegetation, where this is deficient, thus improving the landscape aesthetically and helping to control dust and other air borne material;

iii) facilitate entry for de-snagging the Helena River when necessary.

Recommendation

The Helena River and its banks, as shown schematically in Figure 23 be recommended to the Metropolitan Region Planning Authority for inclusion within the Metropolitan Region Scheme as an appropriate reservation, in order to effectively control and improve the watercourse and river banks, and to eventually bring them into public ownership.

The above recommendation was formally proposed (Mathews/Roberts) moved and passed (8 for, 2 against) at the 9th Meeting on 3rd March, 1977. Messrs. Malaxos and Warden, representing the W.A. Livestock Salesmans' Association (WALSA) opposed the recommendation. In view of this conflict and to ensure that all views were adequately presented, the meeting agreed that WALSA present a minority report on this aspect of the Committee's findings. Accordingly their submission is appended as Figure 24 of this report.

4.1.2 Maintain Water Flow - Helena River

The Committee notes that during the late summer and autumn months all flow of water in the Helena River between Scott Street Bridge and Midland Road stops. The series of pools that remain on occasions become fouled by wandering stock, carcasses (see Figure 15) and wind blown material resulting in stagnation and foul odours (see Section 2.5, p. 16-17).

In relation to this problem, the Public Works Department have referred to possible use of water from the lower diversion dam of the Mundaring Weir. This dam catches

water during the dry season from a number of brooks downstream of the main weir. Water is pumped during winter, back into Mundaring Weir. Over previous summers, and in response to complaints from river property owners, water has been released from the diversion dam for flushing the Helena River to remove stagnant water below the dam.

The Committee draws attention to calculated maximum flood levels supplied by the M.W.S. which show Great Eastern Highway 4.2 metres, Swan Street 4.6 metres, and Scott Street 15.0 metres, and supports proposals by the Shire of Swan regarding dredging the Helena River to Archer Street so this section of the river can revert to tidal conditions.

Recommendation

That the Swan River Conservation Board maintain a watching brief on the condition of pools along the Helena River and negotiate with appropriate authorities to release water from the lower diversion dam as required for the purpose of flushing stagnant pools.

That all stormwater runoff from existing and proposed development in the area be diverted into the Helena River.

4.1.3 Treat Unsealed Roads

A component of the overall dust nuisance comes from the unsealed gravel and sand roads when used for either motor transport or droving of stock.

The Committee believes that urgent action should be taken to treat all unsealed roads within the study area, in particular those detailed in Figure 3. Treatment may constitute

either permanent sealing with asphalt or temporary sealing at strategic intervals with surfacants. The former would be most satisfactory, in the long term, for roads used primarily by vehicles. In the case of stock routes, however, temporary sealing may be preferred as treatment should be full width, from fence to fence, and slippery surfaces must be avoided.

Recommendation

That early action be taken to seal all roads and stock routes in the study area but particularly those known as Stirling Crescent, Central Avenue, Whiteman Avenue and Robinson Road.

4.1.4 Protect Existing Trees

Inspection of the Midland stock-holding paddocks reveals that in many areas trees are dead or dying as a result of "ring barking" by stock. Examples are shown in Figures 9 and 14. In some paddocks action has been taken to protect trees by caging them with wire barriers (see Figure 25).

The Committee recognises that in addition to aesthetic considerations and providing shade for stock, natural vegetation assists in reducing wind speed within the paddocks and therefore, dust and erosion arising from bared areas.

Further, the Committee notes that Section 41 of the Soil Conservation Act is relevant to the present situation. Under the provisions of this Act the Minister may, for the purpose of soil conservation or erosion mitigation, serve an order on the occupier of any land to ensure that trees are not destroyed or injured.

Recommendation

That action be taken to ensure that trees not effectively isolated from stock within the study area be caged with barriers of a suitable design to prevent damage to the trees.

4.1.5 Establish Vegetative Buffer Zones

The Committee notes the potential effectiveness of trees and shrubs planted as windbreaks to reduce wind speed and control dust in the study area. Examples of this approach are illustrated in Figure 26. It is argued that despite the effectiveness of other recommendations presented herein the planting of vegetative buffer zones is warranted to protect residential areas from dust caused by breakdowns in livestock management or unusual seasonal conditions.

The principal factors governing the efficiency of trees acting as windbreaks are :

Density : Standard texts recommend belts of trees and shrubs of medium density and uniform structure from the ground to the crown.

Width : At least three rows of trees are required. The actual width then depends on the species chosen and their spacing according to soil type and site.

Height : There is a close relationship between the height of a windbreak and the distance over which a reduction in wind speed can be measured. On level ground a significant effect rarely extends beyond fifteen to twenty times tree height downwind. The

maximum effect ranges between 1½ to 5 times the height.

Considering these points a system of strategically oriented windbreaks comprising species that grow densely to 10m in height when planted in belts 15-20m wide and spaced 250m apart would reduce wind velocity significantly over the whole locality.

Whilst the above system would be ideal, it is regarded as impractical on logistic and financial grounds at least in the short term. Accordingly the Committee recommends that first priority be given to alleviating the problem in the immediate vicinities of Hazelmere and Koongamia.

In particular the new road proposed to skirt the eastern boundary of Hazelmere (see Figure 3) warrants immediate attention. In the event that actual construction of the road will not proceed for a number of years, the Committee recommends that resumption of the route, fencing and planting of windbreaks should nevertheless commence as soon as possible. A large range of tree and shrub species as detailed in Figure 27 are suited to this locality.

Recommendation

That trees and shrubs be planted as windbreaks to provide added protection from dust for residential areas adjacent to stock-holding paddocks in the study area. In particular plantings should proceed along the eastern boundary of Hazelmere and the western side of Koongamia as detailed in Figure 23.

4.1.6 Remove Carcasses

Investigations by the Committee have revealed that the presence of dead and rotting stock

in the study area is regarded by local residents as one of the most objectionable facets of the industry (see Figures 13 and 15). Dead animals are commonly found both on private land within the various paddocks and on public property along the stock lanes and road verges. As the result of discussions with the W.A. Livestock Salemans' Association, the W.A. Meat Commission and the Shire of Swan the following points are noted :

i) Dead stock in private paddocks

The disposal of carcasses found within individual stock-holding paddocks is clearly the responsibility of the owner or lessee (as applicable). Supervision of this activity and prosecution in the event of non-compliance is carried out by Health Inspectors of the Swan Shire Council. The Committee sees no cause to change this relationship but notes that existing legislation under the Health Act, Sections 181 and 182 is inadequate in effecting prosecution when a single animal, as opposed to an "accumulation", is concerned.

It is apparent that operators have difficulty in disposing of carcasses due to lack of appropriate facilities. Limited facilities already exist at the Midland abattoir and a new by-products plant which could be made available for this purpose, is planned.

ii) Dead animals left along stock routes and roads

Carcasses left on public land in the abattoir vicinity constitute a major problem. Ownership of such stock is often not readily established by Health Inspectors or other responsible bodies.

Recommendations

- That legislation concerned with the dumping of carcasses be revised to include allowance for prosecutions relevant to a single animal.

- That facilities for disposal of carcasses at the Midland abattoir be expanded to cater for receiving dead stock from stock-holding paddocks with an appropriate service fee.

- That the W.A. Meat Commission extend their current daily routine of picking up and disposing of dead animals from the sale yard area, to include dead stock along Whiteman Avenue, Central Avenue and Stirling Crescent. Where ownership can be established it is recommended that a charge be raised by the W.A. Meat Commission and the Swan Shire advised so that any warnings or prosecutions can be undertaken.

4.2 Recommendations designed to reduce environmental problems by modifying existing livestock management practices

4.2.1 Convert from extensive to intensive livestock-holding systems

The Committee notes that while operators and

shippers continue to hold stock in an "open range" system on bare paddocks throughout the dry season (see Figures 9 and 12), a serious potential for dust likely to affect adjacent urban communities will remain. It also notes that alternative management systems based on "feed-lotting" with stock held at high concentrations are available and that these could largely solve current environmental problems. Initiatives in this direction already adopted by industry include covered feed lots on slatted flooring located along Stirling Crescent. More recently a soil watering system (see Figure 8) has been installed for handling live sheep exported by the Clausen Steamship Co. It is also noted that intensive feed lots have been established for assembly of live sheep prior to shipping in both South Australia and Victoria.

Universal adoption of feed lot systems to handle all commercial livestock in the area is unlikely, at least in the short term, due to high capital costs. The Committee believes, however, that this alternative will become more attractive as increasing pressure by local residents, and State and Local Government reduces opportunities for continuing current open range practices.

Recommendations

- The Department of Agriculture maintain effective liaison with both operators and shippers on the subject of intensive feed-lot design, management systems, effluent disposal and operating costs with a view to effecting conversion to this system.

- The W.A. Meat Commission investigate and if feasible, establish a feed lot facility adjacent to the Midland abattoir for use at contract rates by operators wishing to hold stock prior to sale or slaughter.

- The Government make loan funds available at reasonable interest rates to legitimate operators and shippers for the purpose of establishing intensive feedlotting facilities.

4.2.2 Changes to the livestock selling system

Control of overgrazing on the Midland stock-holding paddocks by the Licenced Abattoir Operators is hampered by existing industry practices concerning the sale of stock. The timing and size of livestock auctions at Midland (Monday/Tuesday/Wednesday), killing on week days only at the abattoir and limited lairage invariably result in considerable overflow of animals to the Midland paddocks. The Committee considers that a reduction in this overflow could be achieved by more closely integrating live-stock sale, receival and slaughter schedules particularly if coupled with expanded lairage space and additional feed lots services as noted in Section 4.2.1.

In addition, a reduction in the frequency and size of Midland livestock auctions in favour of a more decentralised system of stock selling at major country centres together with direct delivery to abattoir would greatly reduce current overstocking in the study area.

The Committee notes distinct advantages to both producers and associated industry through decentralisation by expanding existing country sales and/or developing new sales. This would offer farmers greater freedom both in offering and withdrawing stock from sale, and would automatically reduce the number of stock being offered through the Midland yards to the ultimate reduction of the environmental problem. Decentralisation of the livestock selling system could be achieved by reducing Midland sheep sales to one day per week, increase Katanning sales from one to two days per week and establish weekly sheep sales at Moora and Northam to handle sheep from the north and eastern areas.

Recommendation

That the W.A. Meat Commission investigate the integration of livestock sales, delivery and slaughter schedules with a view to reducing the overflow of livestock into the Midland stock-holding paddocks.

4.2.3 Legislation to control dust and erosion due to overgrazing by stock

The Committee considers that the recommendations presented in Sections 4.1.1 to 4.2.2 above will, if put into effect, greatly assist in reducing environmental hazards of dust and erosion associated with the meat and livestock industry in the Midland area. However there still remains a need for livestock holders to avoid dust pollution by either reducing grazing pressure to maintain ground cover, or by instituting management systems as outlined in 4.2.1. To achieve this aim the Committee advocates that relevant legislation be effected to establish realistic guidelines for management of the stock-holding

paddocks, and an effective mechanism for prosecution should continued violation of acceptable grazing practice occur.

In view of the above and after due consideration, the Committee proposes that paddocks used for the holding or assembly of livestock be scheduled under the Clean Air Act. While applying immediately to the study area the Committee envisages that stock-holding paddocks at other centres throughout the State may need to be scheduled should they present a similar environmental hazard.

The Clean Air Act provides for the scheduling of industries or processes that have a potential for producing air pollution, and when they are scheduled they are subjected to a licencing system. The licence must be renewed each twelve months and renewal of a licence may be conditional to certain special requirements that the Air Pollution Control Council considers necessary to reduce air pollution. Conditions can be added to a clean air licence at any time if the Council considers it necessary.

Scheduled premises are required to conduct their processes in a mann er which eliminates or minimises air pollution by the best practicable means. "Practicable" is defined in the Act as having due regard to existing technology and local conditions, i.e. current practice in New York is not necessarily practicable in Perth, W.A.

The Scientific Advisory Committee advises the Council on technical matters. Inspectors appointed under the Clean Air Act report to the Senior Engineer, who reports directly to the Committee and Council.

Under Section 53 of the Clean Air Act, regulations can be made to control industries in general, or specific industries, e.g. for concrete works and cement product manufacturing works. The regulations also provide for the exemption of any premises, unconditionally, from any specified provisions of the regulations.

Exemptions from the requirements of the Act can be given by the Air Pollution Control Council. It is suggested, that at the discretion of the Council, small stock-holding paddocks, not the source of any odour or dust nuisance, be exempted from the requirements of the Clean Air Act. However, at any time if the situation alters, such exemption can be immediately revoked.

Under Section 53 of the Act, regulations can be prepared to define the types of control procedures to be adopted and to define appropriate standards of air impurities.

With regard to the stock-holding paddocks it is recommended that through consultation between the Departments of Public Health and Agriculture appropriate management guidelines be prepared. The principle of such guidelines would be to point out that paddocks must be managed to avoid dust pollution by either :

- Seeding, cultivating, top dressing and stocking so as to maintain vegetative ground cover throughout the summer-autumn months.

- Installing sprinkler or ground water irrigation to maintain soil surface moisture at a level that will prevent wind blown dust.

- Constructing feedlot facilities.

- Adopting any other management system that prevents dust likely to affect residential areas arising from the paddocks.

In association with the above it is recommended that the Air Pollution Control Council determine appropriate dust tolerance levels to assist in the assessment of paddock management by occupiers of scheduled paddocks.

Recommendations

- That paddocks associated with the holding or assembly of livestock in the study area be scheduled under the Clean Air Act, and the provisions of Section 23 to 35 apply for the above stock-holding paddocks.

- That in consultation between the Departments of Public Health and Agriculture regulations be promulgated, under Section 53 of the Act to define suitable guidelines for management of the paddocks and to determine appropriate dust tolerance levels.

- That one or more Officers of the Department of Agriculture be appointed inspectors under the Clean Air Act, as provided for in Section 22 of the Act to assist Clean Air Inspectors of the Public Health Department to effectively administer the proposed regulations pertaining to stock-holding paddocks.

- That all persons running stock in the area be informed of their responsibilities under the Acts but that prosecutions proceed only for continued infringement after adequate warning.

4.3 Prevention of Future Problems

The Committee has discussed, at some length, the Hazelmere-Bellevue area with regard to the future of the stock-holding paddocks. In the "Plan for the Metropolitan Region, 1955" Gordon Stephenson and Alistair Hepburn commented that "... as long as the abattoir and sale yards remain at Midland Junction - and the Plan does not envisage their removal - holding paddocks such as these will be needed, and must be extended to meet the needs of the growing metropolitan market. Further land subdivision in the area of the holding paddocks should not be envisaged .....".

With more efficient management procedures and the possible adoption of other measures now recommended, it is the Committee's belief that there is no need to extend the holding paddocks area, either as a buffer area for the dissipation of dust and odours or for the purposes of accommodating livestock.

The Committee is aware that since the Government's acceptance of the Corridor Plan for Perth, the Metropolitan Region Planning Authority has commenced an examination of this section of the Perth Metropolitan Region through three current studies; the Foothills Study, the Eastern Corridor Study and a general review of the Rural Zone throughout the Metropolitan Region.

The Corridor Plan includes a proposal that Midland will become a future sub-regional centre, with its implied dominance of urban growth. However, the Corridor Plan also proposes that current areas of non-urban land use should be maintained and encouraged.

The Committee strongly recommends that extensions to existing residential areas and also light industry, caravan parks, etc., particularly in the Hazelmere and Koongamia localities, be restricted in view of potential future conflicts between urban development and meat and livestock enterprises in the area.

FIGURE 1 Terms of reference of the DESP Committee and course of action

Figure 1

DESP Committee
(Dust and Erosion on Stockholding Paddocks)

Terms of Reference

To investigate and, if justified, recommend solutions to the problems of dust odours, soil erosion, sand drift and water pollution associated with stockholding paddocks mainly in the Metropolitan area.

PHASE I DEFINITION

Define the nature and magnitude of the problem

- Documentation of complaints
- Visual inspection , erosion drift and plant cover
- Monitor dust
- Statistics (sheep sold, agisted, slaughtered)
- Aerial photographs x years
- Other suggestions

PHASE 2 DECISION

Immediate Action Required	No Immediate Action but recommendations for future planning	No Action Required

PHASE III RECOMMENDATIONS

Possible solutions:

* Control grazing access
* Supply management scheme
* Prohibit agistment of livestock in Midland area
* Stop Midland sheep sales
* Close down Midland abattoir

Achieved by:

- voluntary action
- rezoning of land
- government regulation
- Act of Parliament

Consequences:

- increased reliance on stock transport system
- increased consignment of stock direct to abattoir
- increased use of country agistment and abattoir
- conversion to intensive feed lot system
- new country abattoirs - decentralization

FIGURE 2 Petition from residents in the Midland area to the Department of Conservation and Environment.

Department of Conservation and Environment,
"BP House"
1 Mount Street,
PERTH. W.A. 6000

Figure 2

We, the undersigned, petition against the extreme dust pollution which is not only an inconvenience, but also a health hazard in the Hazelmere/Guildford and surrounding areas.

NAME	ADDRESS	SIGNATURE
HELMRICH	19 Robertson St	
A & S Byrne	21 Robertson St	
K. CATTON	26 Robertson St	
T. CATTON	26 Robertson St	
I. SUCUR	24 ROBRTSON ST.	
MIRA SUCUR	-11- -11- -11-	
S L KINGSTON	20B ROBERTSON ST.	
R G KINGSTON	" " " "	
J P SLOSS	18 ROBERTSON ST	
A LINFORD	16 ROBERTSON RD	
P. LINFORD	16 ROBERTSON RD.	
B ARCHER	136 Bushmead Rd	
C ARCHER	136 Bushmead Rd	
A. M. Collins.	134 Swan St	
R. F. Collins	134 Swan St.	
G. Collins.	134 Swan St.	
T. Danks	130 Swan St	
DANKS.	" "	
M Jeliszewski	6 James Ave	
H gallop	10 James ave Hazelmere	
H GALLOP	10 James Ave Hazelmere	
R. L. WATSON	9 James Ave Hazelmere	
E. M. WATSON	9 James ave Hazelmere.	
Ken Watson.	9 James ave Hazelmere	
L. G. WATSON	9 JAMES AVE HAZELMERE	
Neville Watson	" " "	
Pamela Watson	" " "	
W. REINHARDT	20 Wynne st. Hazelmere	
J. FLETCHER	35 " " "	
K. FLETCHER	✓ ✓ " "	
D. Butler	39 Wynne St Hazelmere	
S. BUTLER	" " "	

Department of Conservation and Environment,
"BP House"
1 Mount Street,
PERTH. W.A. 6000.

We, the undersigned, petition against the extreme dust pollution which is not only an inconvenience, but also a health hazard in the Hazelmere/Guildford and surrounding areas.

NAME	ADDRESS	SIGNATURE
Jean Hartley	28 West Pde Hazelmere	Jean Hartley
A E Pace	24 West Parade Hazelmere	A E Pace
B. Pace	24 " " "	B. Pace
E. Tobin	12 Hazelmere Cres, Hazelmere	E. Tobin
L. N. TOBIN	" " " "	[signature]
B. K MARSHALL	10, HAZELMERE CRESCENT	B Marshall
E. L MARSHALL	" " "	E Marshall
P. Morris	15 JAMES AVENUE	P. Morris
B.J. MORRIS	15 " "	B J Morris
E.D. PETTIT	6 Hazelmere Crescent Hazelmere	[signature]
R.D. Pettit	" " " "	R Pettit
N.M. Pettit	" " " "	N.M. Pettit
R. Lander.	2 Hazelmere Crescent Hazelmere	R Lander
M Lander	2 Hazelmere Crescent, Hazelmere	M Lander
J.A. LAMERS	144 BUSH MEAD RD. HAZELMERE	J Lamers
G P. LAMERS.	" " " "	G Lamers
J.W. HARTLEY.	28 WEST PARADE HAZELMERE.	J.W. Hartley
H.D. JOHNSON	7 WINGATE AVENUE HAZELMERE	H Johnson
M.J. NESBITT	13 Wingate Ave., Hazelmere.	M Nesbitt
W. Kasatkin	123 HAZELMERE CIRCLE HAZELMERE	Kasatkin
A Kasatkin	" " "	A Kasatkin
G Worth	122 Central Ave Bushmead	G J Worth
H Worth	" " "	H C Worth
O'Loughlin J	L132 Central Ave Hazelmere 6055	[signature]
E O'Loughlin	" " " " "	E O'Loughlin
I.M [illegible]	LOT 97 BUSHMEAD RD	HAZELMERE [signature]
M.E. BONIFACE	4 MARY ST HAZELMERE	[signature]
V.R. Boniface	4 Mary St Hazelmere	V.R. Boniface
R.V.J. LEWIS	3 Mary St Hazelmere	Raymond V Lewis
C.N. LEWIS.	3 Mary St. Hazelmere.	C. N. Lewis
G Watts.	138 Bushmead Rd Hazelmere.	G. Watts.
B TOPPING	138 Bushmead Rd. Hazelmere,	B. Topping
A J WATTS	138 Bushmead Rd Hazelmere	A.J. Watts.

(8)

Department of Conservation and Environment,
"BP House"
1 Mount Street,
PERTH. W.A. 6000

We, the undersigned, petition against the extreme dust pollution which is not only an inconvenience, but also a health hazard in the Hazelmere/Guildford and surrounding areas.

NAME	ADDRESS	SIGNATURE
Jean Mc Lella Dawson	9. Mary St Hazelmere	J McL Dawson
Bruce K. Dawson	9 Mary St Hazelmere	Bruce K. Dawson
P. Hanna	11 MARY ST HAZELMERE.	P. Hanna.
B.L. Hanna	11. MARY ST. HAZELMERE	B. L. Hanna
A. Del Nero	7 MARY ST. HAZELMERE	A. del Nero
M.E DEL NERO	— — — —	M E. del Nero
L.M. Runeckles	15 Mary St.	
I. Runeckles	15 Mary St "	I Runeckles
R.J Connoly	25a Mary St Hazelmere	R Connoy
C Howie	25a Mary St Hazelmere	C Howie
C Runeckles	25B MARY ST Hazelmere	C Runeckles
S.T. Lang	28 Mary St Hazelmere	S.T. Lang
L E Lang	28 Mary St. Hazlemere.	L E Lang
P Lang.	28 MARY ST HAZELMERE	P Lang.
P. Hartshorne	28 Mary St Hazelmere	P Hartshorne
A. Fedorow	24 Mary ST Hazelmere	A. Fedorow
R. ARGENTIERI	22 Mary St Hazelmere	R. Argentieri
K. HIGGINS	16 MARY ST HAZELMERE	K. Higgins
S. Higgins	14 MARY ST HAZELMERE	S Higgins
L Butler	14 MARY ST HAZELMERE	L Butler
F. E. BUTLER.	12 Mary St Hazelmere	F. E. Butler.
S STACEY	6 Mary St. Hazelmere	S Stacey
M. PATERNITI	21 WEST PDE HAZELMERE	M Paterniti
A PATERNITI	21 WEST PDE HAZELMERE	A Paterniti
N SANTINI	21 WEST PDE HAZELMERE	N Santini
Rick Kaden.	1 Wingate AVE Mazelmere.	R Kaden.
F. LINCOLN	138 Buckmead RD Hazelmere	F Lincoln
L. BLACK.	9. ROBERTSON ST, HAZELMERE.	L. Black.
J. BLACK.	— " —	J. Black.
E SANGELL		E Sangell
B. Loughton	17 Robertson St	Hazelmere
R Loughton	17 Robertson St	Hazelmere

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NAME	ADDRESS	SIGNATURE
L Tilson	3 christina St Hazelmere	Lyall A Tilson
M.J. FOX	155 BUSHMEAD RD HAZELMERE	M. J. Fox
M GRANT	140 BUSHMEAD RD HAZELMERE	M Grant
P. Humble.	153 Bushmead Rd Hazelmere	P Humble.
S. HUMBLE	153 BUSHMEAD RD HAZELMERE	S.A Humble
P. O'Brien	149 Bushmead Rd Hazelmere	N.H O'Brien
J. Dickman	143 Bushmead Rd Hazelmere	J. C. Dickman
J Mewitt	139 Bushmead Rd Hazelmere	J. Mewitt
Mrs M HYDE	137 Bushmead Rd Hazelmere	M Hyde.
M. C HYDE	" " " "	J Hyde
C. Goodwin	4 Stirling Crescent Hazelmere	C. Goodwin
A J Goodwin	" " " "	A. J Goodwin.
JOY LOWNDES	1A WINGATE AVE HAZELMERE	J Lowndes.
Gary Dickman	143 Bushmead Rd Hazelmere	G. D. Dickman
J.H. Broadwood	141 Bushmead Rd Hazelmere	J.H Broadwood
P.E Broadwood.	" " " "	P Broadwood
Nellie Rendell	151 Bushmead Rd. Hazelmere	
Edith Kolo	5 Christina St Hazelmere	E. Kolo
Hugo Kolo	5 Christina St Hazelmere	H Kolo
J.A. Robson.	1 West Pde., Hazelmere 6055.	J.A. Robson.
L.J. Robson	1 West Pde Hazelmere	L.J. Robson.
L J Best	5 West Pde.	L J Best.
B E Best	5 West Pde Hazelmere	B Best
M. HUGHES	7, West Pde Hazelmere	M. Hughes
S Wilson	7 West Pde Hazelmere	S Wilson
F W Barnett	9 West Parade Hazelmere	F W Barnett
L. B. BARNETT	" " " "	L B Barnett
J. Koloi	11. West Parade Hazelmere	J. Koloi
G Bird	15 West Parade Hazelmere	G Bird
B Elliott	17 West Parade Hazelmere	B Elliott
Ailsa Elliott	17 WEST PARADE HAZELMERE	A Elliott
MARIA STILLITANO	19 WEST PARADE HAZELMERE	M Stellitano.
N Agnew	23 Robertson Rd Hazelmere	N Agnew

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NAME	ADDRESS	SIGNATURE
P Savaroli	3 Wingate ave Hazelmere	P Savari
D.G. Nyten	5 Wingate Ave Hazelmere	D.G. Nyten
F. Johnson	7 Wingate ave Hazelmere	[illegible] Johnson
E.J. Gillan	19 Thorpe St Morley	E.H.J. Gillan
J. Gillan	19 Thorpe St Morley	J. Gillan
W.J. Gillan	11 Wingate ave, Hazelmere	J. Gillan
E. Gillan	11 Wingate Ave Hazelmere	E. Gillan
S. Higgins	15 Wingate Av. Hazelmere	S. Higgins
D Eacott	14 Wingate Ave Hazelmere	D J Eacott
L.B. Chamberlain	10 Wingate Ave Hazelmere	L.B. Chamberlain
D Chamberlain	10 Wingate Ave Hazelmere	D.M. Chamberlain
J M WALLIS	8 " " "	J M Wallis
I J WALLIS	8 " " "	I.J. Wallis
J. A Jecks	6 " " "	J. A Jecks.
K. C. Jecks	6 " " "	Kevin Jecks
M. Hanson.	2 Wingate Ave, Hazelmere.	M. Hanson.
K. Livingstone	161 Bushmead Rd Hazelmere	K. Livingstone
J. Gray	159 BUSHMEAD RD HAZELMERE	J. Gray
W GRAY	" " "	W Gray
J Heald	157 " " "	J Heald
P. Livingstone	161 Bushmead Rd Hazelmere	J.P. Livingstone
W. Koelen	1 Wingate Ave Hazelmere	[illegible] Koelen
G. Martin	7 Christina St Hazelmere	G. Martin.
M.E. Martin	" " " "	M. E. Martin.
G F Bell	6 Christina St Hazelmere	G F Bell
I WILLIAMS	8 CHRISTINA ST Hazelmere	[illegible]
W. Williams	8 CHRISTINA ST HAZELMERE	W Williams
M.G. Tilley	10 Christina St Hazelmere	[illegible]
D.J. Maiklem	12 Christina St Hazelmere	D.J. Maiklem
M. Maiklem	12 Christina St Hazelmere	M. Maiklem
A.E. Gosling	14 Christina St Hazelmere	A.E. Gosling
N.J. Gosling	14 Christina St Hazelmere	N.J. Gosling

Department of Conservation and Environment,
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We, the undersigned, petition against the extreme dust pollution which is not only an inconvenience, but also a health hazard in the Hazelmere/Guildford and surrounding areas.

NAME	ADDRESS	SIGNATURE
C. Adriaanse	165 Bushmead Rd. Hazelmere	C. Adriaanse
C.A. Adriaanse	" "	C.A. Adriaanse
J. PILEGGI	163 Bushmead Road Hazelmere	J. Pileggi
V. PILEGGI	" " " "	V. Pileggi
T. HEWSON	2 Wingate Ave. Hazelmere	T. Hewson
R. LOWNDES	1A WINGATE AVE HAZELMERE	R. Lowndes
R.G. WALKER	WINGATE AVE HAZELMERE	R.G. Walker
A. Sewell	12 Wingate Ave Hazelmere	A. Sewell
J. Dunphy	2 ERIC ST. HAZELMERE.	J. Dunphy
K. DUNPHY	" " "	K. Dunphy
K. Dean	" " "	Kevin J. Dean
P. DUNPHY	" " "	Paul Dunphy
R. Russell (Mrs.)	4 Eric St. Hazelmere	R. Russell
David William Russell	4 Eric St Hazelmere	D.W. Russell
R Russell	" " " "	R Russell
W.P HENNA	6 STIRLING CRES H/MERE	W.P. Henna
Helene	6 STIRLING CRES H/MERE	Helene
C.A. KEARON	20 Christina St. H/mere.	C.A. Kearon
RGT Kearon	20 Christina St H/mere	R.G.T. Kearon
V. GAIDELEVICIUS	10 STIRLING CRES HAZELMERE	V. Gaidelevicius
IVAN STAL	11 CHRISTINA ST, HAZELMERE	I. Stal
A. STAL	11 CHRISTINA ST, HAZELMERE	A. Stal
A. Williams	18 Christina St Hazelmere	A. Williams
P. Williams	" " "	P. Williams
T. Williams	" " "	T. Williams
J. Williams	18 Christina St, Hazelmere	J. Williams
M Russell	9 Christina St Hazelmere	Russell
H Russell	9 Christine St Hazelmere	H. Russell
G. NODGES	7 Christina St. Hazelmere	G. Hodges
E. Hodges	" " " "	E. Hodges
L Hodges	" " " "	L. Hodges
Don Russell	9 Christine Street Hazelmere	D. Russell
Wynn Eacott	14 Wingate ave Hazelmere	W. Eacott

Department of Conservation and Environment,
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We, the undersigned, petition against the extreme dust pollution which is not only an inconvenience, but also a health hazard in the Hazelmere/Guildford and surrounding areas.

NAME	ADDRESS	SIGNATURE
R. PRENTICE	3. Quebec St West Midland	R. Prentice
P PRENTICE	3 Quebec st west Midland	P Prentice
el Demani	5 Quebec St. West. Midland	
Wilson	4 Quebec St West Midland	W Wilson
J Corrigan	4 Quebec st west midland	
A Corrigan	QUEBEC ST. WEST MIDLAND	
C Forbes	2 Quebec st west Midland	C Forbes
J.C. FORBES	2 QUEBEC ST, WEST MIDLAND	J.C. Forbes.
F. A OFFLER	2A " " " "	
B Munroe	2A Quebec St " "	B Munroe
V. NIELSEN	1 Quebec St West Midland	V.E. Nielsen
E NIELSEN	1 " " " "	E Nielsen
B J Hegney	7 Montreal Rd W. Midland	B J Hegney
M. Hegney	" " " "	M. Hegney
S. GALBRAITH	9. Montreal Rd. West Midland.	S Galbraith
R.W. CROSS	15 MONTREAL RD W. MIDLAND	
L. CLAVOTA	11 Anchor St W. Midland	L Clavota
M. CLAVOTA	" " " "	M. Clavota
V. CLAVOTA	" " " "	V. Clavota
A M TAGLIAFERRI	2 HOLMESDALE R. W. MIDLAND	A.M. Tagliaferri
A.M TAGLIAFERRI.	2 Holmesdale Rd West midland	A m Tagliaferri
L.E REID	5 Montreal Rd W. Midland	L. E Reid
T. READ	" " "	T. Read
E.H. MALONE	6 Montreal Rd W. Midland	E. Malone
A.J. MALONE	" " "	C J Malone
M.A. CROTTY	10 Montreal Rd W. Midland	M A Crotty
H. PHILBRICK	12 Montreal Rd W. Midland	H. Philbrick
AP. PARKER	11 Montreal Rd W Midland	A Parker.
I PARKER	11 Montreal R W Midland	I. Parker.
K. BERMINGHAM	" " "	K Bermingham
T. MOORE	5 Chatham St W. Midland	T Moore
P. MOORE	" "	Pauline Moore

Department of Conservation and Environment,
"BP House"
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We, the undersigned, petition against the extreme dust pollution which is not only an inconvenience, but also a health hazard in the Hazelmere/Guildford and surrounding areas.

NAME	ADDRESS	SIGNATURE
Mrs. R. J. D. Lewis	5 Swan St. Guildford	M. J. Lewis
Mrs L. Harris	4 Swan St Guildford	L. Harris
[illegible]	49 Burdwood Circus Bicton	[illegible]
B Shorter	8 Martha St Guilford	B Shorter
E M Jones	4 Martha St	E M Jones
J. Hale	7. ALMOND ST. GUILDFORD.	J. Hale
Miss G. Lewis	5 Swan St E. Guildford	G. Lewis
E M Pearce	6 Swan St East Guildford	E M Pearce
[illegible]	9 Swan St. East Guildford	[illegible]
[illegible]	9 Martha St Guilford	
[illegible]	15 James St. Guildford	
F. Schoer	85 Amherst Road W. Midland	F. Schoer.
M. Allen	70 East St. Guildford	
R. Pyper	18 Kidman Cres. Sth Guildford	R. Pyper
M. WILSON	" " " "	M. Wilson
D. M. Oubred	63 East St. E. Guildford	D. M. Oubred
J. Mollica	124 Swan St Hazelmere	J. Mollica
M MACPHERSON	6 Helena St GUILDFORD	M MacPherson
R Grimes	60 East St Guildford	R Grimes
J. Park	26 " " "	J. Park
Christine Quinn	134 Queens Rd, Sth. Guildford	C. Quinn
JOHN HULME	44 EAST ST GUILDFORD	John Hulme
K HAMMOND	46 EAST ST GUILDFORD	[illegible]
H Gardner	1 Helena St Guildford	H Gardner
J POPE	24 HELENA ST GUILDFORD	J Pope

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NAME	ADDRESS	SIGNATURE
Vicki Sloss	18 ROBERTSON ST. HAZELMERE	V. Sloss
JOAN VAN HERWAARDE	25 Wynne ST Hazelmere	J VanHerwaarde
Dawn Yukich	6 Wynne St. Hazelmere.	D Yukich
Yvonne Mc Fugan	15 Wynne St Hazelmere	Y. Mcfugan
P. Rowe	13 Wynne St, Hazelmere.	P Rowe
M. O'Rourke	11 Wynne St, Hazelmere	M. O'Rourke.
L. Fontana	7. WYNNE St Hazelmere	Lucy Fontana
YUKICH. A.	6 Wynne St. Hazelmere	A Yukich
G Grimic	10 Wynne St Hazelmere	G Grimic
M. W. GRIMIC	10 Wynne St Hazelmere	M Grimic
E Kolodinski	9 Wynne St Hazelmere	E Kolodinski
Cordelia Gardiner	18B WYNNE ST. HAZELMERE.	C Gardiner
E. Wilkinson	16A Wynne St Hazelmere	E. Wilkinson
M. Mladenovich	16 Wynne St Hazelmere	M Mladenovich
Cathy Lintott	21 Wynne St Hazelmere	Cathy Lintott.
DAVE LINTOTT	21 Wynne St Hazelmere	D Lintott
T. HOLMES	23 Wynne St. Hazelmere	T Holmes
J TURNER	31 Wynne St Hazelmere	J Turner
B. Cooper.	33. Wynne St Hazelmere	B. Cooper.
A Rowe	13 Wynne St. Hazelmere	A Rowe
B. Mitchell.	7 James Ave. Hazelmere.	B. Mitchell.
M. Mitchell	7 James Ave Hazelmere	M. Mitchell
K. MITCHELL	7 James Ave Hazelmere	K. Mitchell.
L.P. Davis	Park Farm Guildford	L Davis
A L. RUMMING.	26 Wynne Street. Hazelmere.	A. L Running.
P.A. Running (MR.)	" " " "	P.A. Running
C THOMAS.	22 WYNNE ST HAZELMERE	C Thomas
R. Kingston	LOT 56 WEST RDE HAZELMERE	R Kingston
B. Kingston	LOT 56 WEST RDE HAZELMERE	B Kingston

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We, the undersigned, petition against the extreme dust pollution which is not only an inconvenience, but also a health hazard in the Hazelmere/Guildford and surrounding areas.

NAME	ADDRESS	SIGNATURE
JANET JONES	LOT 4, TALBOT RD., HAZELMERE	J Jones.
DAVID JONES	LOT 4, TALBOT RD, HAZELMERE	p.p. D Jones
Lorraine Mallica	124 Swan St. Hazelmere	L. Mallica
Lini Mallica	124 Swan St. Hazelmere	L. Mallica
Linda de Jong	126, Swan St. Hazelmere	L de Jong
Bill de Jong	126, Swan St. Hazelmere	Bill de Jong
Gareth Jones.	122 Swan St Hazelmere	G Jones.
Dianne Jones.	122 Swan St Hazelmere	D. L. Jones.

FIGURE 3 Plan of the Hazelmere, Midland, Bellevue area showing the study area and sites of sand drifts and other dust sources.

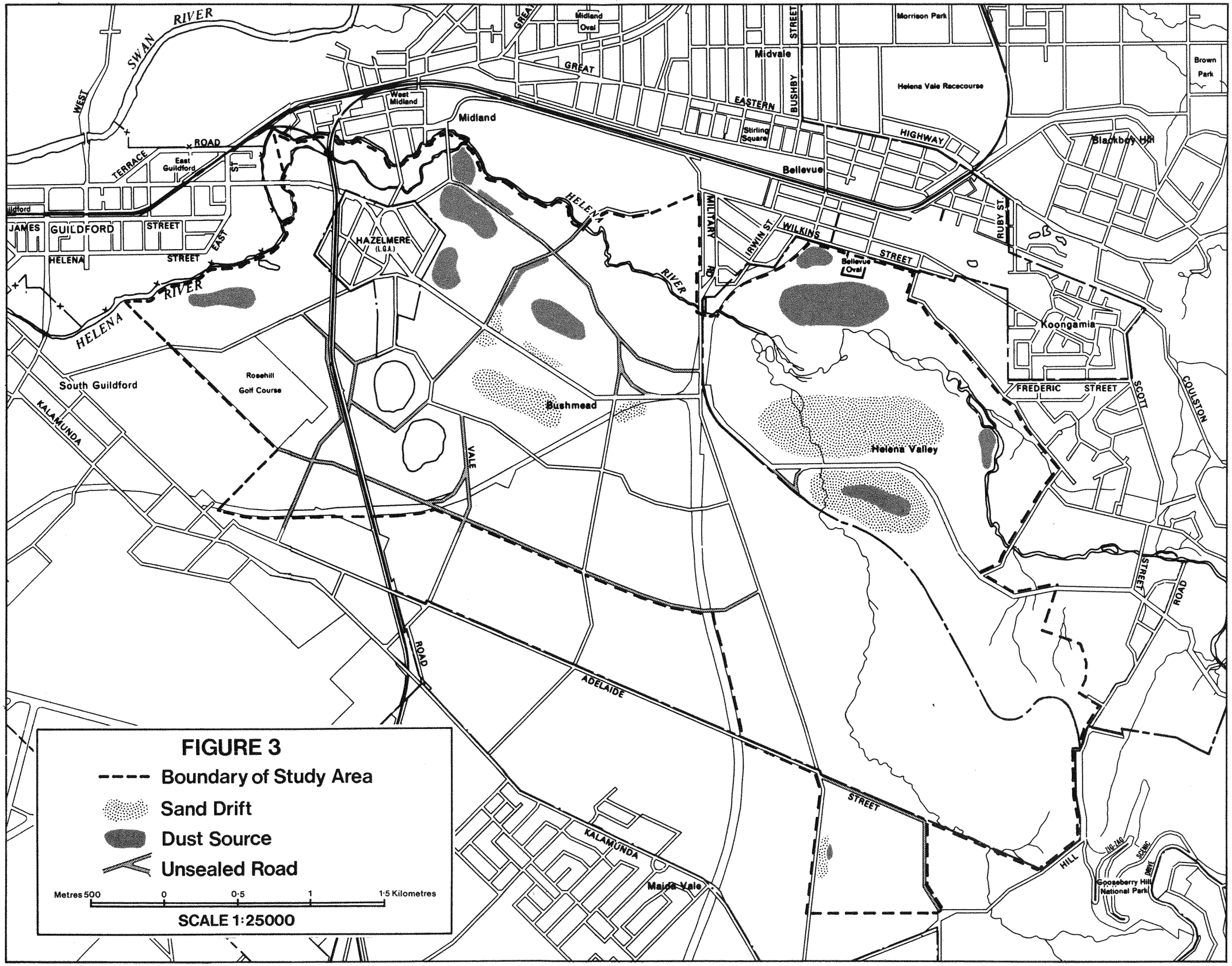

SWAN RIVER
WEST
ROAD
TERRACE
East Guildford
GUILDFORD
STREET
JAMES
HELENA
STREET
EAST
HELENA RIVER
HELENA RIVER
West Midland
Midland
HAZELMERE
(L.G.A.)
GREAT
Midland Oval
EASTERN
HIGHWAY
Midvale
BUSHBY
STREET
Morrison Park
Helena Vale Racecourse
Brown Park
Stirling Square
Bellevue
Blackboy Hill
MILITARY RD
IRWIN ST
WILKINS
STREET
Bellevue Oval
RUBY ST.
Koongamia
FREDERIC
STREET
SCOTT
COULSTON
South Guildford
Rosehill
Golf Course
KALAMUNDA
Bushmead
VALE
Helena Valley
ROAD
ADELAIDE
STREET
KALAMUNDA
Maida Vale
HILL
ZIG-ZAG
SCENIC
DRIVE
Gooseberry Hill
National Park
STREET
ROAD
FIGURE 3
Boundary of Study Area
Sand Drift
Dust Source
Unsealed Road
Metres 500
0
0·5
1
1·5 Kilometres
SCALE 1:25000

FIGURE 4 Estimated sheep movements in W.A. in 1975.

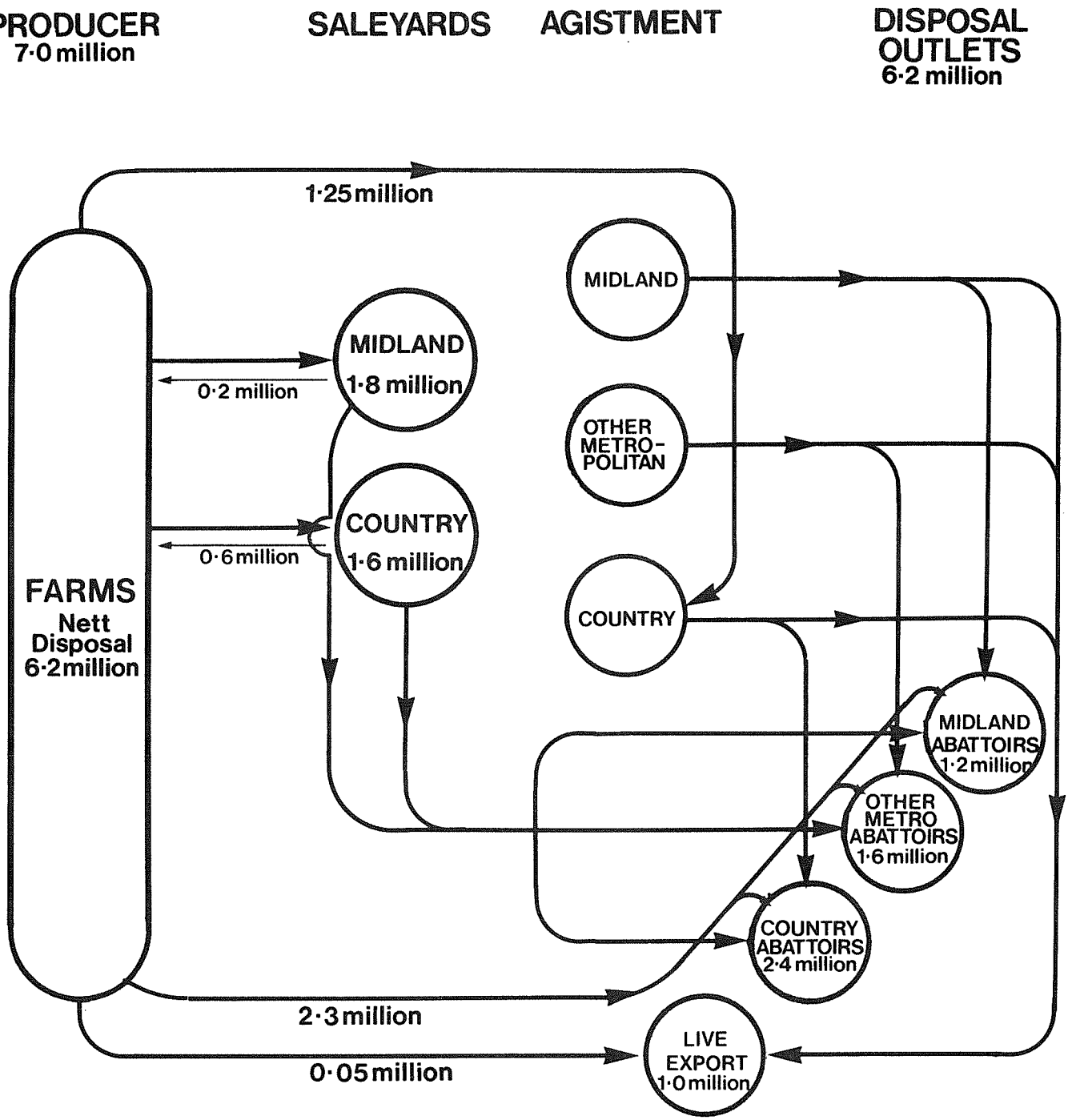


FIGURE 4 ESTIMATED SHEEP MOVEMENTS - 1975 W.A.

FIGURE 5 Number of stock slaughtered.
Midland Abattoir 1955-1976.

FIGURE 6 Number of Livestock sold.
Midland Saleyards 1955-1976

FIGURE 5

NUMBER OF STOCK SLAUGHTERED

Midland Abattoir, 1955-1976

Year ended 30 June	Cattle and Calves No. (1000's)	% of State kill	Sheep No. (1000's)	% of State kill	Lambs No. (1000's)	% of State kill
1955	60	33	258	27*	202	-
56	65	34	270	28*	228	-
57	66	34	311	29*	247	-
58	75	34	352	33*	271	-
59	90	36	480	33*	308	-
60	84	35	580	32	367	43
61	66	31	573	34	355	37
62	76	32	414	28	438	43
63	108	35	541	34	378	44
64	126	34	354	28	360	42
65	112	34	293	23	323	41
66	92	29	484	29	354	41
67	85	28	426	25	356	40
68	81	24	554	28	382	33
69	82	22	650	27	434	30
70	90	22	964	31	359	26
71	62	18	808	28	384	26
72	67	17	1530	37	588	31
73	120	26	1503	35	458	34
74	111	23	559	21	414	33
75	129	24	743	25	509	38
76	202	26	1115	26	712	41

*Sheep and lambs combined prior to 1960

FIGURE 6

NO. OF LIVESTOCK SOLD

Midland Saleyards 1955-1976

Year Ended 30th June	Cattle (1000's)	Sheep and Lambs (1000's)
1955	69	1174
56	69	1168
57	69	1384
58	80	1359
59	93	1633
60	78	1738
61	70	1758
62	84	1876
63	116	1804
64	140	1475
65	138	1550
66	126	1853
67	108	1921
68	118	2292
69	134	2499
70	144	2731
71	117	2587
72	126	3507
73	164	3815
74	168	2287
75	177	1635
76	177	1635

FIGURE 7 Letter and questionnaire sent to members of the meat industry.

FIGURE 7

Department of Agriculture – Western Australia

Jarrah Road,
South Perth 6151

Area Code 09
Telephone 367 0111
Telegrams AGDEP Perth
Telex AA93304
Please address all letters to the Director of Agriculture

Your Ref
Our Ref
Enquiries Mr
Date

Dear

MIDLAND STOCK HOLDING PADDOCKS

ENVIRONMENTAL PROBLEMS OF DUST, SMELL AND EROSION

A working group, known as the "DESP" Committee has been formed under the auspices of the Department of Conservation and Environment. The Committee is charged to make recommendations on overcoming the problems of Dust and Erosion on Stock-holding Paddocks, initially in the Midland area. A circular outlining the formation membership and functions of the committee to date is attached.

A committee meeting was held on 24th September, 1976 at the Midland Abattoirs to discuss the matter with members of the meat and livestock industry. At this it was agreed that the DESP Committee should send a questionnaire to all members of the industry directly associated with the stock-holding paddocks. Information obtained from the questionnaire would be used to clearly define current livestock-holding practices and so assess more accurately the consequences of any proposals advanced to solve the problem.

A questionnaire is enclosed. Your cooperation in answering each of the questions, as it applies to your enterprise, is cordially requested. I would stress that all information provided in this way will be treated by the Committee as strictly confidential. The data will, however, be used to compile overall statistics on total stock numbers and the pattern of livestock flow between farm, sale yard, abattoir and/or ship for inclusion in the final report.

In addition to requesting your cooperation with the questionnaire, I would like to take this opportunity to personally invite your company to make a written submission to the Committee. We would very much appreciate any suggestions or proposals (short and/or long term) that would reduce or eliminate the problems of dust, odours and erosion from the Midland stock-holding paddocks to the overall benefit of the Western Australian livestock industry.

As time is limited may I request that the questionnaire, together with any written submissions, be received at this office by Friday, November 19, 1976. Should you have any queries please phone me on 67 0111 ext. 527.

Thanking you in anticipation.

Yours faithfully,

(R.J. Lightfoot)
CHAIRMAN
DESP COMMITTEE

Department of Agriculture – Western Australia

Jarrah Road,
South Perth 6151

Area Code 09
Telephone 367 0111
Telegrams AGDEP Perth
Telex AA93304
Please address all letters to the Director of Agriculture

Your Ref
Our Ref
Enquiries Mr
Date

QUESTIONNAIRE

Request By
"DESP" COMMITTEE
for

Information on Livestock Management in the Midland Stock-Holding Areas

1. Background

From:

Company:

Address:

Major functions of Company relevant to the meat/livestock industry:

2. Land holdings - Midland stock-holding area (1975/76 Financial year)

Parcel of land held	Location/Address	Area (acres)	No of months used for stock-holding during 1975/76 Financial Year
Freehold			
Leasehold			
Other			

3. Total Receivals of Livestock into Paddocks (1975/76 Financial Year)

		Sheep (No)	Cattle (No)
i) Received direct from farm.	road:		
	rail/drove:		
ii) From Midland sale yards.	road:		
	drove:		
iii) From Country sale yards.	road:		
	rail/drove:		
iv) From elsewhere	road:		
	rail/drove:		
Total Receivals (1975/76)		=====	=====

v) Approx. distribution of stock receivals (1975/76)

	Jan	Feb	March	April	May	Ju	Jy	Aug	Sep	Oct	No	Dec
Sheep (No or %)												
Cattle (No or %)												

4. Stock Management in Holding Paddocks

i) Please state reasons for your Company holding livestock in Midland paddocks.

ii) Length of time livestock held in paddocks

	Sheep	Cattle
Minimum (days)		
Maximum (days)		
Approx. average (days)		

iii) Feeding

State method of feeding (e.g. trail, troughs, racks)		
Type of feed (e.g. hay, grain, pellets)		
Approx. quantity of feed provided (lb/h/day)		

iv) Shearing

Approx. percentage of all sheep receivals shorn while in paddocks (1975/76) _____%

v) Mortality

Approx percentage deaths while in paddocks	_____%	_____%
Method of carcass disposal		

5. Disposal of Livestock from Paddocks (1975/76 Financial Year)

		Sheep (No)	Cattle (No)
i) to Midland sale yard	road:		
	drove:		
ii) to Country sale yards	road:		
	drove/rail:		
iii) to Abattoirs			
Midland	road:		
	drove:		
Robbs	road:		
	drove/rail:		
Country (including Linley Valley Tip Top, Wooraloo, etc)	road:		
	drove/rail:		
iv) to ship	road:		
	drove/rail:		
v) elsewhere	road:		
	drove/rail:		
Total Disposals (1975/76)		====	====

6. Projected use of Midland stock-holding paddocks by your Company over the next 5 years:

	Sheep	Cattle
Increase		
No change		
Decrease		

(please tick above as appropriate)

If a change in use is foreseen please outline reasons why.

7. Do you have any suggestions on ways of overcoming the problems of dust, smell and erosion in the Midland stock-holding paddocks.

Signed _____ Date _____

Please return by November 19, 1976 to :

Dr. R.J. Lightfoot,
Chairman, DESP Committee
Department of Agriculture, South Perth, W.A. 6151.

FIGURE 8 SUBMISSIONS FROM:

Elder Smith Goldsbrough Mort Limited

Western Livestock Limited

W. Pope and Co. Pty. Ltd.

Clausen Steamship Co.

Westralian Farmers Co-operative Limited

Figure 8

ELDER SMITH GOLDSBROUGH MORT LIMITED
(INC. IN SOUTH AUST.)

ELDER HOUSE, 111 ST. GEORGES TERRACE, PERTH, WESTERN AUSTRALIA

POSTAL ADDRESS
BOX D163, G.P.O.
PERTH, W.A. 6001
TELEPHONE: 210141
TELEX: 92006
TELEGRAMS TO ELDERSGM

IN REPLY PLEASE QUOTE

. AWB:MSS

11 NOV 76

MR R J LIGHTFOOT
CHAIRMAN OF THE COMMITTEE TO INVESTIGATE
DUST & EROSION ON STOCK-HOLDING PADDOCKS
(DESP COMMITTEE)
JARRAH ROAD
SOUTH PERTH W A 6151

Dear Mr Lightfoot

DEVELOPMENTS FOR ELDER'S HOLDING PADDOCKS

At a meeting attended by your Committee and parties who use the Midland Junction Abattoirs and surrounding holding paddocks, it was suggested that recommendations be made for the future control of the dust and associated problems which occur in the area.

The Company is extremely conscious of this industry problem and there is a continuing programme of up-grading of the paddock facilities which are briefly outlined in this letter.

The original purpose for the establishment of these holding paddocks was to allow stock consigned by our pastoral and far distant clients to rest and freshen up prior to sale.

With the advent of live sheep exports to Singapore and later to the Middle East, they became a necessity for the assembly of these sheep.

For the Middle East trade it is necessary to pre-feed, draft off rejects and inoculate the stock prior to loading on ship. The holding paddocks, because they afforded these facilities and because of their proximity to the rail head, were a logical choice.

They also form part of an essential service to the meat industry by providing the trade with holding facilities, thereby enabling the purchase of stock for slaughter on a continual basis, thus assuring the abattoirs of a regular throughput and so stabilising employment.

As the export of live sheep increased, so did the use of the paddocks. Foreseeing a future problem of erosion, the Company embarked on an improvement programme in an endeavour to arrest it.

Some of the measures taken and proposed for the future are as follows:-

Major trees in the paddocks have been protected with wire netting to prevent the stock from ringbarking them.

The Helena river which runs through the paddocks is progressively being fenced off to deny stock access to it, thus preserving the banks, avoid pugging the water holes and removing the risk of pollution from this source.

Buffer zones have been created around portion of the perimeter of the paddocks by subdividing small areas and keeping them well covered with pasture by controlled grazing. This is a continuing programme.

Trees have been and will continue to be planted strategically around the perimeter of the paddocks.

The main receival road at Bellevue Paddocks used by livestock transport vehicles has been bituminised and the receival areas have been upgraded with road base metal. The Swan Sire Council have been approached to bituminise Robinson Road (approximately 100 metres) which is extensively used by stock transports using the Wilkins St., access.

Road base metal has also been used in gateways to assembly points and stock concentration points to eliminate erosion of these areas.

A sprinkler system has been installed in the major sheepyards to wet the soil before working sheep and so assist dust control. A similar measure is proposed for the "Valley Farm" property, subject to the locating of a suitable source of water.

A major irrigation system has been installed at Bellevue North Paddocks to cover approximately 70 acres of the land under intensive use. This area includes the stock route from the paddocks to the Midland Rail.

By way of experiment, stock will be concentrated in small paddocks which will be spelled in rotation and re-watered when stock are removed for shipping.

Areas susceptible to wind erosion will be fenced off, sown to pasture and control grazed, as part of this programme.

Plans for the use and maintenance of the paddocks will be continually reviewed by the Company in an endeavour to overcome any further soil erosion problems which may occur.

Yours sincerely

A W Buttrose
Manager for Western Australia

Figure 8.2

WESTERN LIVESTOCK LIMITED

STOCK AND STATION AGENTS

Wool • Livestock • Land • Travel • Merchandise • Insurance • Grain

WESTERN LIVESTOCK CENTRE, STAFFORD ST., MIDLAND, WESTERN AUSTRALIA

All Correspondence to:—P.O. Box 194, Midland, Western Australia, 6056

Wool Dept., Spearwood:—Postal Address: P.O. Box 667, Fremantle, W.A. 6160. Tel. 98 2011

Telephone: 74 1222
Telex: AA 93946
Telegrams & Cables
'LIVESTOCK' MIDLAND

EEV:JF

23rd November, 1976

Dr. R.J. Lightfoot,
Department of Agriculture,
Jarrah Road,
SOUTH PERTH W.A. 6151

Dear Sir,

DUST AND EROSION MEETING

Excuse our delay in forwarding our submission on dust and erosion on stock-holding paddocks. I believe we have little more to add than what was submitted by our counterparts. In respect to our particular paddocks we are using sound management to eleviate sand drifts and water pollution.

We are monitering the dust and make every effort to minimise the input during the summer periods.

Yours faithfully,
WESTERN LIVESTOCK LIMITED

E.E. VICKERS - MANAGER
LIVESTOCK DEPARTMENT

Figure 8.3

W. POPE & CO. PTY. LTD.

MEAT EXPORTERS

REGISTERED OFFICE:
128 CHARLES STREET, PERTH
WESTERN AUSTRALIA 6000
POSTAL ADDRESS
G.P.O. BOX G 451 PERTH 6001
TELEGRAPHIC CODE ADDRESS: "POPEPAK"
TELEX AA93561
TELEPHONE 28 6144

Mr. R.J. Lightfoot,
Chairman,
DESP Committee,
Department of Agriculture,
Jarrah Road,
SOUTH PERTH W.A. 6151

8th November, 1976

Dear Sir,

In reply to your correspondence 5th November, 1976 reference, Midland Stock Holding Paddocks.

Our livestock paddocks are used on a sale to sale basis and our numbers to paddock are varied on the every day capacity of the Midland Junction Abattoir lairage.

The paddocks are of urgent necessity to us as the saleyards must be cleared of stock after each sale.

I take this opportunity to explain that our paddocks (Lot 15 portion of Swan location 16) in Stirling Crescent are on hard clay ground and if you make inspection you will see that there is no problem in these paddocks from dust pollution. the ground is so hard that it defies the penetration of a mechanical pot hole digger.

We use these paddocks during the season November through to May and our organisation which employs a staff of 350 is completely dependant upon them.

We purchase cattle on a daily basis from country sales - private purchase on farms and the Midland Junction sale yards, our agistment on these paddocks would represent approximately 5% of our weekly kill which flucuates between 1000 and 3000 head of cattle.

∴ We would have between 50 and 150 head of cattle on hard ground agistment.

Sincerely,

W. POPE
Managing Director

Figure 8.4

CLAUSEN STEAMSHIP CO. (AUSTRALIA) PTY. LTD.

WORLD-WIDE LIVESTOCK CARRIERS

TELEPHONE: (092) 35 6499
TELEX: 93277
CABLES: "CLAUSENSHIP" PERTH W.A.

OFFICE ADDRESS: "FREMANTLE PORT AUTHORITY BUILDING"
1 CLIFF STREET, FREMANTLE, W.A. 6160

POSTAL ADDRESS: P.O. BOX 605, FREMANTLE, W.A. 6160

15th February 1977

Mr. R.J. Lightfoot,
D.E.S.P. Committee,
c/o Department of Agriculture,
Jarrah Road,
SOUTH PERTH,
W.A. 6151.

Dear Mr. Lightfoot,

In support of our telephone conversation of last week re dust abatement in intensive sheep holding areas.

Our concern in regard to dust has always primarily been for the sake of the sheep's wellfare. However, we are now aware that with the advent of urban development creeping closer to our facilities that we must look carefully at the dust situation from the point of view of creating a public nuisance. The yards for drafting and innoculation have always been watered by sprinkler systems to lessen the danger of pink eye infection. In the last twelve months in our paddocks leased from Elders G.M. and in conjunction with Elders large irrigation sprinkler systems have been installed in our most used portion of the paddocks and have already visibly reduced the dust nuisance.

Obviously our care in keeping some cover on our paddocks has still proved to be the cheapest and best form of dust prevention. With the industry so competitive the large expenses incurred in elaborate sprinkler systems, which of course would be ideal, make it impracticle.

We wish you to know that any ideas coming forth from your committee, worthy of implementation, will be considered at all times.

Yours sincerely,
CLAUSEN STEAMSHIP CO. (AUSTRALIA) PTY. LTD.

J.J. McL. Stewart

JJMcLS/mb

Noted ff. 16/2/77.

Figure 8.5

G.P.O. BOX M978 WESTERN AUSTRALIA, 6001
TELEPHONE: 21 0191 (13 LINES)
CABLES AND TELEGRAMS "WESFARMERS"
TELEX: 92005

WESFARMERS

WESTRALIAN FARMERS CO-OPERATIVE LIMITED
569 WELLINGTON STREET, PERTH

REPORT TO D.E.S.P. COMMITTEE FROM WESFARMERS

Since the major problems in the study area became apparent, Wesfarmers have taken the following steps to alleviate these problems.

1. Concentrated on exporting the bulk of live sheep shipments through the ports of Bunbury, Esperance and Albany.

2. Reduced the number of stock for slaughter - sheep and cattle being paddocked in the study area and the majority of these are now held adjacent to our Abattoir at Wooroloo.

3. The export Company, Austiran, through which most of our live sheep exports are made, have acquired a large grazing property in the Darkan area, where the bulk of our sheep purchased for live export are held pending shipment through the Port of Bunbury.

4. The sheep formerly paddocked in the Midland area for export to Singapore for periods of up to five days (approx. 1500 every five weeks), are now being drawn to some extent from the Darkan property. At this stage, no more than 500 sheep would be paddocked in this area over a period of no more than five days.

We believe these positive steps have virtually eliminated the dust and erosion problems from our Midland holding paddocks. However, we intend to take the following steps to further alleviate the problem.

1. Extend existing yards on Bushmead Road for the lot feeding of cattle, pending sale or export.

2. Extend tree planting programme to embrace roadside areas to further break down wind and dust pollution.

H.W. WARDEN
LIVESTOCK MANAGER

5/5/77

Noted [illegible] 3/5/77.
- [illegible] into report.

PRINCIPAL SUBSIDIARIES: GASCOYNE TRADING PTY. LTD., MASTERS DAIRY LTD., WESFARMERS STORES PTY. LTD., WESFARMERS KLEENHEAT GAS PTY. LTD., WESTRALIAN FARMERS TRANSPORT LTD.

FIGURE 9 Holding Paddock - Helena Valley Road. Sheep being assembled as a ship-load prior to live export.

Note bare paddock, feeding-out hay, ringbarking and death of trees.

FIGURE 10 Holding Paddock - Helena Valley Road. Note bare soil and sand drift.

Figure 9

Figure 10

FIGURE 11 Holding paddock Central Avenue.
Cattle assembled prior to slaughter.
Bare paddock has the potential to cause dust hazards and sand drift problems.
Ringbarking of trees by stock has occurred.

FIGURE 12 Holding paddock - Central Avenue.
Bare overgrazed paddocks have the potential to cause dust problems.

Figure 11

Figure 12

FIGURE 13 Holding Paddock - Stirling Crescent. Note erosion in bare paddock and sheep carcass on road verge.

FIGURE 14 Holding Paddock - Helena Valley Road. Note severe ringbarking by stock resulting in death of some trees.

Figure 13

Figure 14

FIGURE 15 Holding paddock - Stirling Crescent.
Severe soil erosion has taken place as a result of high density stocking.
Note the sheep carcasses in the paddock.

FIGURE 16 Holding paddock - Bushmead Road.
Cattle held prior to slaughter.
This paddock was a major source of dust in February, 1977.

Figure 15

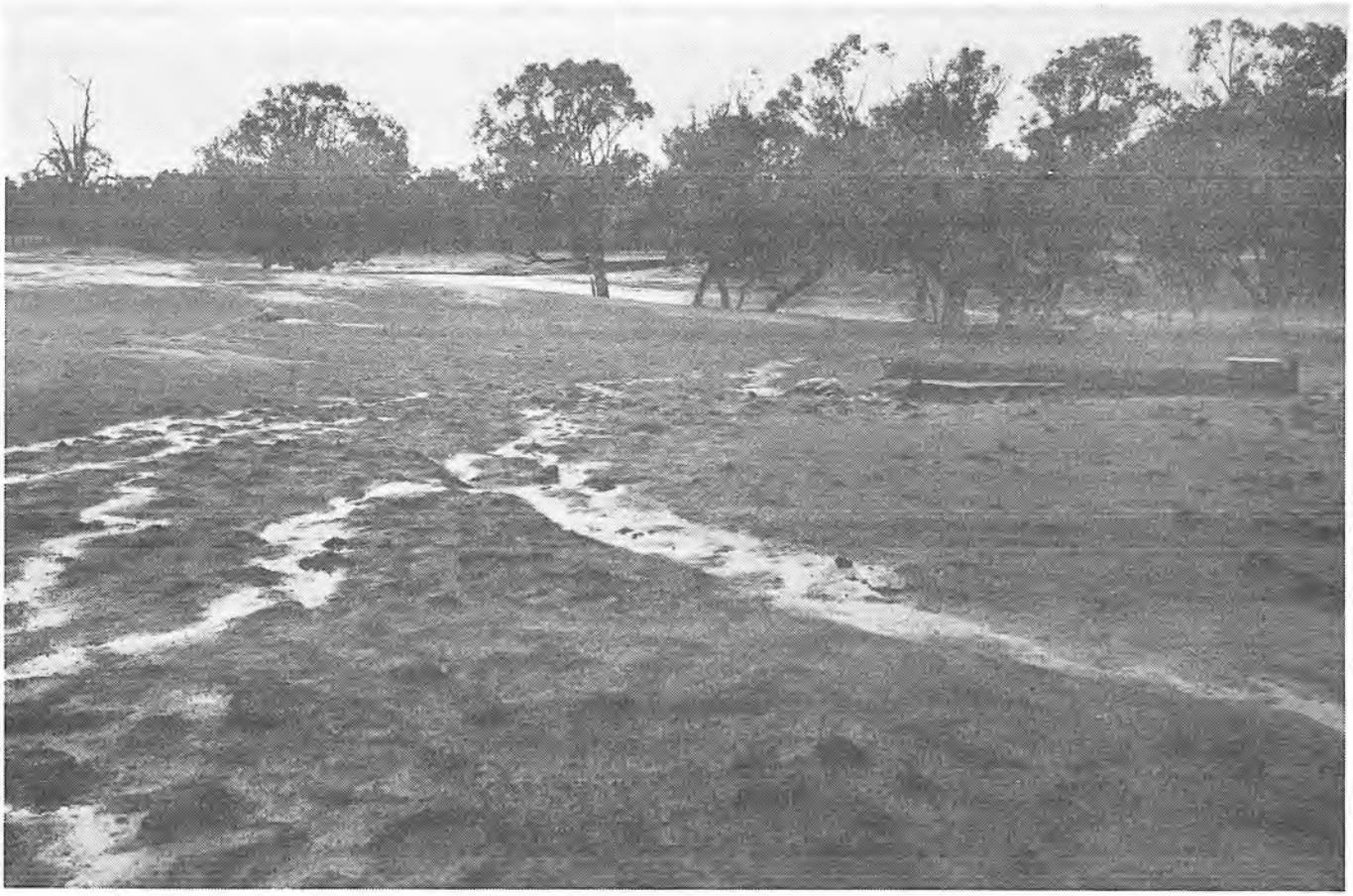


Figure 16

FIGURE 17 Table showing atmospheric dust measurements in samples in the Hazelmere area.
19 February - 6 April 1976

Figure 17

Atmospheric Dust : Hazelmere Locality

Sample		Position	Wind		Dust in Air (Micrograms per Cubic Metre)	Observations
Time	Date		Direction	Speed (km/hr)		
0854-1254	19.2.1976	Wingate & West	E	30	256	Sheep and cattle in paddocks up wind.
1327-1527	19.2.1976	West Parade & Robertson Rd.	E - SE	15 - 20	91	Very little sheep and cattle movement up wind.
1240-1540	20.2.1976	Hazelmere Cres. & West Parade	W - SW	15 - 20	215	Minimal dust from cattle movement, mostly from passing traffic.
1110-1340	27.2.1976	Bushmead Road	NE - E	Weak	263	Visible dust coming from stock movements.
1242-1512	5.3.1976	West Parade & Robertson Rd.	S	Calm to 14 Gusts	52	Little movement of stock and dust from passing traffic not affecting results.
1005-1335	15.3.1976	Christine & Wingate	SE	6 - 12	104	Cattle movement and wind blown dust observed up wind.
1005-1205	16.3.1976	Midland Road	NE - SE	Calm to 8	110	Dust generated from stock movements but not widespread.
0852-1122	18.3.1976	Eric & Wingate	E - SE	15 - 24	260	Dust due to stock movements and erosion.
1210-1420	18.3.1976	Midland Road	E - SE	16 - 22	236	Dust due to stock movements and erosion.
0918-1118	23.3.1976	Stirling Cres.	N	8 - 10 Gusts to 16	81	Little stock activity.
1327-1527	23.3.1976	Stirling Cres.	NW - NE	4 - 6 Gusts to 20	341	Dust due to stock, trucks and wind erosion.
1303-1503	26.3.1976	Bellevue Oval	S - SW	10 - 14 Gusts to 20	292	Dust from sheep and wind erosion.
1005-1205	6.4.1976	Christine & Wingate	E - SE	6 - 12 Gusts to 18	311	Dust clouds from stock and wind erosion.

FIGURE 18 Table showing atmospheric dust levels related to stock movements in the Hazelmere locality.

FIGURE 19 Table showing atmospheric dust levels measured in Claremont, Perth City and Port Hedland for comparison with values at Hazelmere.

FIGURE 18

ATMOSPHERIC DUST - HAZELMERE LOCALITY

Conditions	Dust µg/cu Metre	Description
Background	52-91	Very little sheep and cattle movement, and minimum influence from other obvious sources.
Normal	104-215	Minimal dust from stock but dust from traffic sources etc.
Stock and erosion dust	236-341	Dust mainly due to stock movement and erosion.

FIGURE 19

ATMOSPHERIC DUST LEVELS AT HEZELMERE AND OTHER AREAS OF W.A.

Claremont	at end of 90 day dry spell - March, 1975	121	$\mu g/m^3$
	range April-June 1975 following rain	10-37	$\mu g/m^3$
Perth City	June, 1976 during dry spell	59-117	$\mu g/m^3$
Port Hedland	Business centre - November-December, 1975	39-530	$\mu g/m^3$

FIGURE 20 Table showing atmospheric dust in high volume samples taken in the Hazelmere locality 13 December 1976 - 18 February 1977.

Atmospheric Dust : Hazelmere Locality

Sample		Position	Wind		Dust in Air (Micrograms per Cubic Metre)	Observations
Time	Date		Direction	Speed (km/hr)		
0945-1345	13.12.1976	Bushmead Road & West Parade	S - W	6 - 10 Gusts to 14	79	Very little cattle activity upwind. No dust clouds observed due to erosion.
1245-1645	14.12.1976	Hazelmere Cres. & West Parade	S/W	10 - 15 Gusts to 25	153	Visible dust coming from cattle movement, wind erosion. Vehicles using unsealed roads
0922-1322	30.12.1976	Wynne & Robertson	S - S/W	12 - 16	30	Minimal dust clouds observed due to sheep and cattle movement.
2000-0800	9. 2.1977 10. 2.1977	Rear 1 Wingate Avenue	S - S/W	Calm - 9	226	Large light dust haze due to cattle activity.
0800-2000	10. 2.1977	Rear 1 Wingate Avenue	S - S/SW	Calm - 18	296	Very little cattle activity.
2000-0800	10. 2.1977 11. 2.1977	Rear 1 Wingate Avenue	S/W	29	115	Large dust clouds due to cattle movement. Wind erosion, clouds obscuring trees in paddocks.
0800-2000	11. 2.1977	Rear 1 Wingate Avenue	S	25	285	Dust due to cattle, trucks and erosion.
2000-0800	11. 2.1977 12. 2.1977	Rear 1 Wingate Avenue	ENE	7	183	Small dust clouds due to cattle movement.
0800-2000	12. 2.1977	Rear 1 Wingate Avenue	S	13	140	Little cattle activity.
2000-0800	12. 2.1977 13. 2.1977	Rear 1 Wingate Avenue	NNE	2	142	Several small dust clouds due to cattle movement.
0800-2000	13. 2.1977	Rear 1 Wingate Avenue	S/SW	7	119	Conditions Calm.
2000-0800	13. 2.1977 14. 2.1977	Rear 1 Wingate Avenue	ENE	15	857	Enormous dust clouds due to cattle movement. Wind erosion and trucks on unsealed roads.
0800-2000	14. 2.1977	Rear 1 Wingate Avenue	S/SW	15	278	Dust due to stock movements.
2000-0800	14. 2.1977 15. 2.1977	Rear 1 Wingate Avenue	S/SE	2	201	Dust due to stock movements.
0800-2000	15. 2.1977	Rear 1 Wingate Avenue	S/SW	9	301	Dust due to stock movements.
2000-0800	15. 2.1977 16. 2.1977	Rear 1 Wingate Avenue	Calm	Calm	284	Wind slight Easterly component creating light dust haze from cattle activity.
0800-2000	16. 2.1977	Rear 1 Wingate Avenue	S/W	15	274	Dust due to stock movements.
2000-0800	16. 2.1977 17. 2.1977	Rear 1 Wingate Avenue	S/SE	9	192	Wind becoming turbulent creating large dust clouds. Difficult to see trees in distance, dust clouds emanating from erosion and cattle movement.
0800-2000	17. 2.1977	Rear 1 Wingate Avenue	S/E	31	497	Large dust clouds emanating from wind erosion, cattle movement, dust clouds obscuring paddocks, experienced dust particles hitting face and penetrating eyes.
2000-0800	17. 2.1977 18. 2.1977	Rear 1 Wingate Avenue	E	11	505	Large clouds emanating from erosion and cattle movement.

FIGURE 21 Measurement of dust levels from a residential property in Hazelmere (refer section 2.6) 13 February - 18 February 1977.

FIGURE 2 1

REFER SECTION 2.6
DUST LEVELS MEASURED
AT HAZELMERE

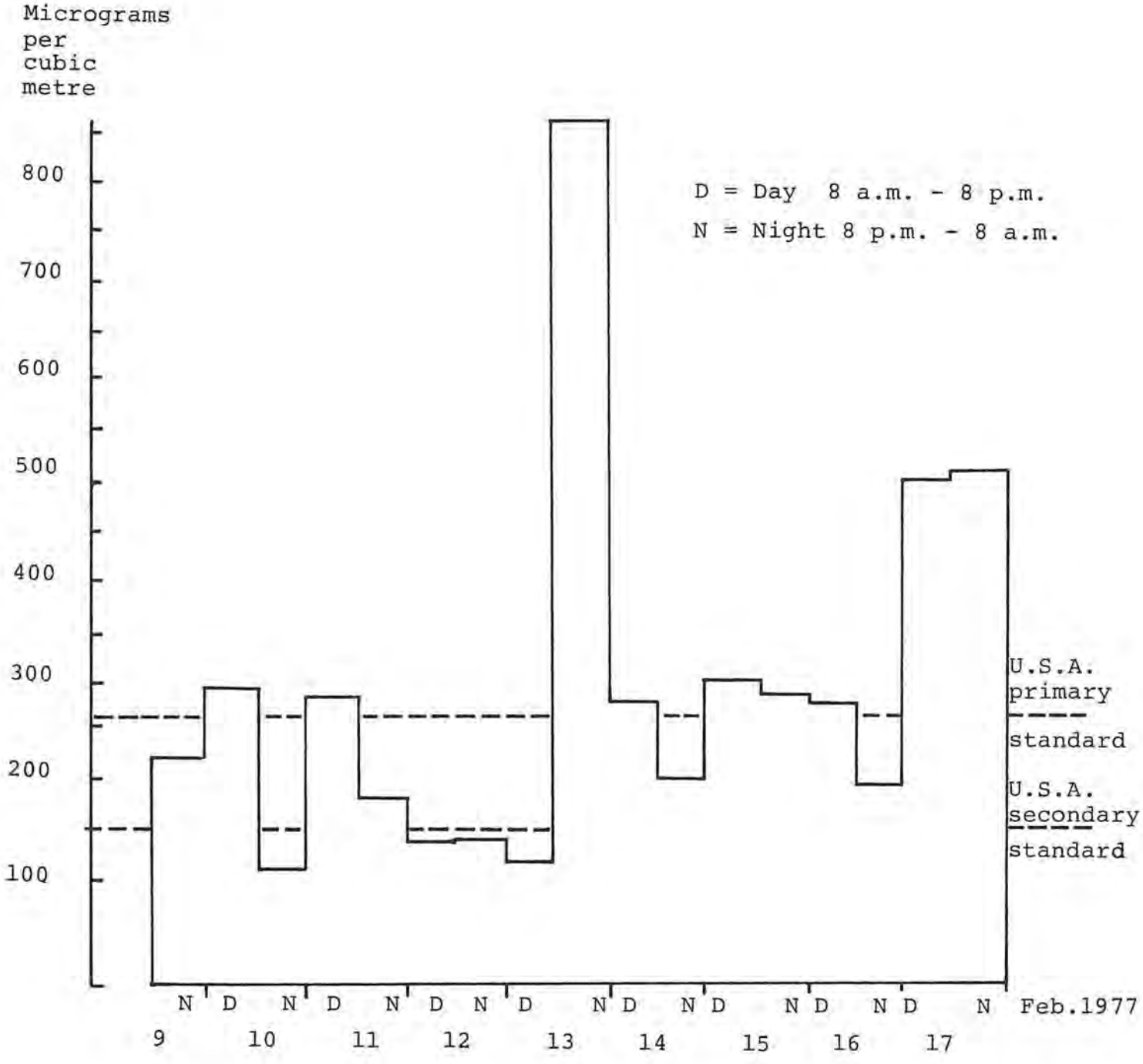
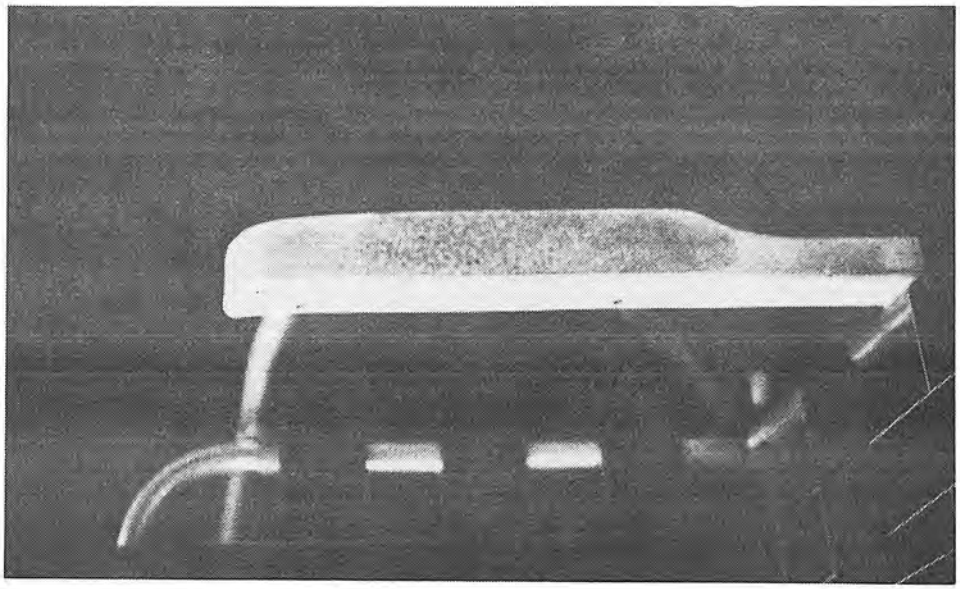
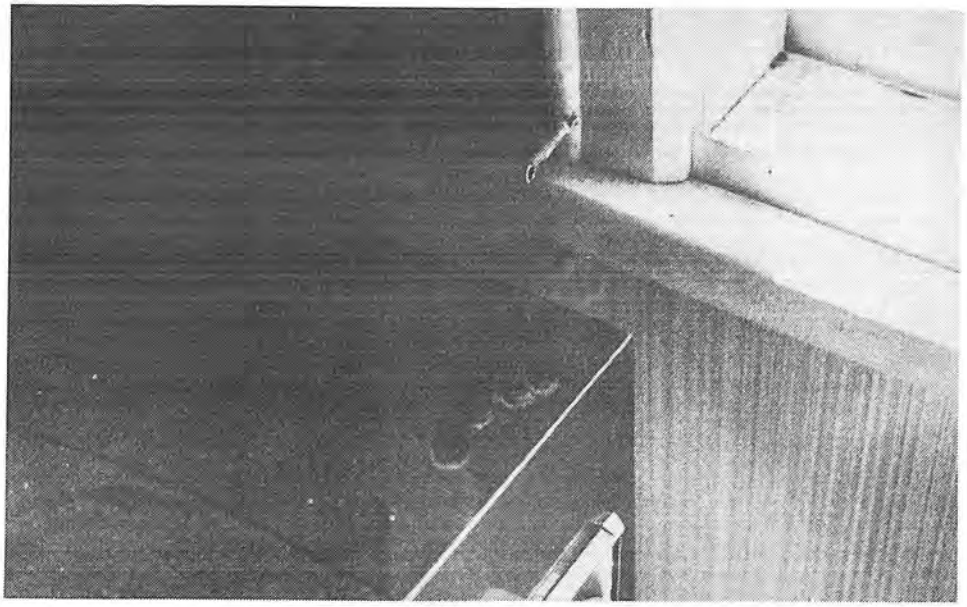


FIGURE 22 Dust from holding paddocks in residential property in Hazelmere
5 February 1977

Chair on patio





Lounge room

Lounge window

FIGURE 23 Plan of the study area showing recommended dust control measures.

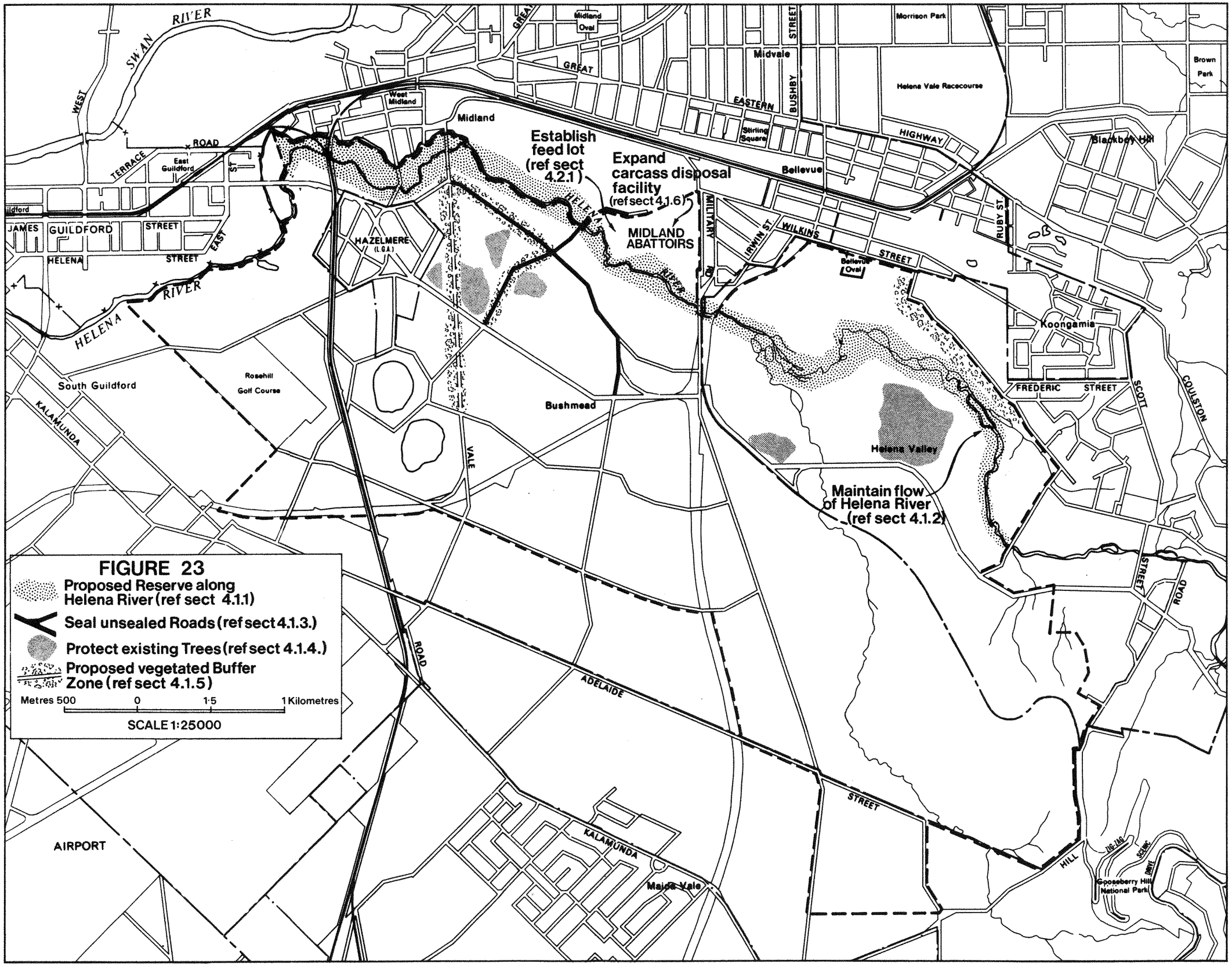

Establish feed lot (ref sect 4.2.1)
Expand carcass disposal facility (ref sect 4.1.6)
MIDLAND ABATTOIRS
Maintain flow of Helena River (ref sect 4.1.2)
SWAN RIVER
HELENA RIVER
GREAT EASTERN HIGHWAY
WEST TERRACE ROAD
GUILDFORD
JAMES STREET
HELENA STREET
EAST STREET
HAZELMERE (L.G.A.)
Midland
West Midland
Midland Oval
Midvale
Morrison Park
Helena Vale Racecourse
Brown Park
Blackboy Hill
Bellevue
Stirling Square
BUSHBY STREET
MILITARY RD
IRWIN ST.
WILKINS STREET
RUBY ST
Bellevue Oval
Koongamia
FREDERIC STREET
SCOTT
COULSTON
Helena Valley
Bushmead
VALE
South Guildford
KALAMUNDA
Rosehill Golf Course
ROAD
ADELAIDE
STREET
AIRPORT
KALAMUNDA
Maida Vale
HILL
Gooseberry Hill National Park
FIGURE 23
Proposed Reserve along Helena River (ref sect 4.1.1)
Seal unsealed Roads (ref sect 4.1.3.)
Protect existing Trees (ref sect 4.1.4.)
Proposed vegetated Buffer Zone (ref sect 4.1.5)
Metres 500 0 1·5 1 Kilometres
SCALE 1:25000

FIGURE 24 Minority report in opposition to recommendation 4.1.1 presented by W.A. Livestock Salesman's Association.

Figure 24

ELDER SMITH GOLDSBROUGH MORT LIMITED

(INC. IN SOUTH AUST.)

ELDER HOUSE. 113 ST. GEORGE'S TERRACE. PERTH. WESTERN AUSTRALIA

POSTAL ADDRESS:
BOX D163, G.P.O.
PERTH, W.A. 6001
TELEPHONE 21 0141
CABLES TO ELDERSGM
TELEX: 92006 -
TELEGRAMS TO ELDERSGM

IN REPLY PLEASE QUOTE
JMM:AR

21 March 1977

The Manager
Conservation & Environment Department
'BP House'
1 Mount Street
PERTH 6000

ATTENTION: MR NORMAN ORR

Dear Sir

Attached please find the West Australian Livestock Salesmen Association recommendation concerning 4.1.1. Proposed Reservation and Fencing.

Yours faithfully

J M MALAXOS
Manager Fat Stock

Figure 24.1

4.1.1. HELENA RIVER - PROPOSED RESERVATION AND FENCING

The D.E.S.P. Report includes a recommendation under the above heading that the Helena River and its banks as detailed in figure ? (map T.P.D.1.0155) be rezoned as "parks and recreation reserve" by appropriate amendments to relevant town planning schemes. The members of the WA Livestock Salesmen's Association, who have given their full support to the D.E.S.P. Committee throughout the period of their investigations, are opposed to this recommendation.

Members of the WALSA are confident that this particular problem can be controlled by the owners of land who are affected. It is considered that pressure can be exerted on all holders of land adjacent to the river through the Clean Air Act and Local Government Health Acts to contain the dust and erosion problem which has been reported in the area from time to time. Therefore, any acquisition of the land adjacent to the river constitutes an unecessary cost factor to government and an intrusion on the rights and liberties of the present owners.

The reasons given public ownership or reservation in a town planning scheme are detailed as:-

1. Control of surface run-off, pollution by dead stock, erosion and damage to vegetation by entry of stock.

2. To facilitate a programme for planting of trees.

3. Necessity to facilitate entry to the river for de-snagging purpose.

Members of the WALSA who have attended the D.E.S.P. Meetings have reported that relief from these problems can be achieved without cost to government by fencing of the Helena River by the responsible land owners, and by maintenance programmes on paddocks where livestock are held, in the following form:-

1. Where paddocks are heavily stocked levy banks to be located in gulley areas. In turn this will prevent polution of the river by run-off of surface waters.

2. Fencing of the river will prevent the entry of stock for watering purpose and the earlier pollution from dead bodies. Erosion and damage to vegetation and trees by entry of livestock will be eliminated and natural pasture and vegetation will resume normal growth. If found necessary, a grass regeneration programme can be implemented within the fenced areas of the river.

3. A programme of tree planting has already been recommended by the Committee elsewhere in this report, and the river bank area constitutes a natural part of this programme. There is already a large number of trees along the river banks, but where it is considered necessary to improve the landscape from an aesthetic viewpoint, an additional tree planting programme may be implemented.

There has already been a recognition of the problem by some members of the WALSA who have commenced a programme to fence out the Helena River where it traverses their paddocks. Planning of these fences already permits entry for de-snagging purpose.

It is the opinion of members of the WALSA that if this area is rezoned as "parks and recreation reserve" it will cause an increased problem to the adjacent landholders for the following reasons:

1. A general public nuisance will be created by vandals and other unauthorised persons damaging fences and opening inner fence gates where stock are grazing.

Figure 24.2

2. During the summer months a dangerous fire hazard will be created.

3. A small native population is already located in a semi-permanent camp on public land adjacent to the river. Creation of additional parkland will increase this problem.

4. Movement by people and vehicles causes livestock to become disturbed and creates unnecessary movement in paddocks, thereby aggravating the possibility of dust and erosion. Opening the area to the general public will increase the problem.

Within the WALSA Members have already taken steps which are detailed elsewhere in the report to control dust and erosion. With one unfortunate exception, there has been a marked improvement during the present summer, but the particular problem has been resolved by the Member concerned.

The action which has been taken clearly demonstrates that the overall problem of dust and erosion in the Helena Valley area can be minimised through co-ordinated action between government and local government bodies and private enterprise without the necessity for additional cost and expense to the government by rezoning of land within the area. Members of the WALSA, therefore, do not support that this particular recommendation be implemented. They do support:-

1. That where owners of land adjacent to the Helena River from Swan Street to Sampson Road, use that land for paddocking livestock, it be compulsory to fence the river to prevent the entry of livestock. Such fencing be planned to enable access to the river by the Swan River Conservation Board for desnagging purpose and other control.

2. That as part of the D.E.S.P. Committee's recommended programme for tree planting, the Helena Riverbanks within the Swan Street and Sampson Road boundaries be included.

PERTH : CWM:YL
18 MAR 77

FIGURE 25 Wire cage placed around tree to prevent ringbarking by stock.

Figure 25

FIGURE 26 Examples of trees planted as vegetative windbreaks to control dust erosion.

Figure 26

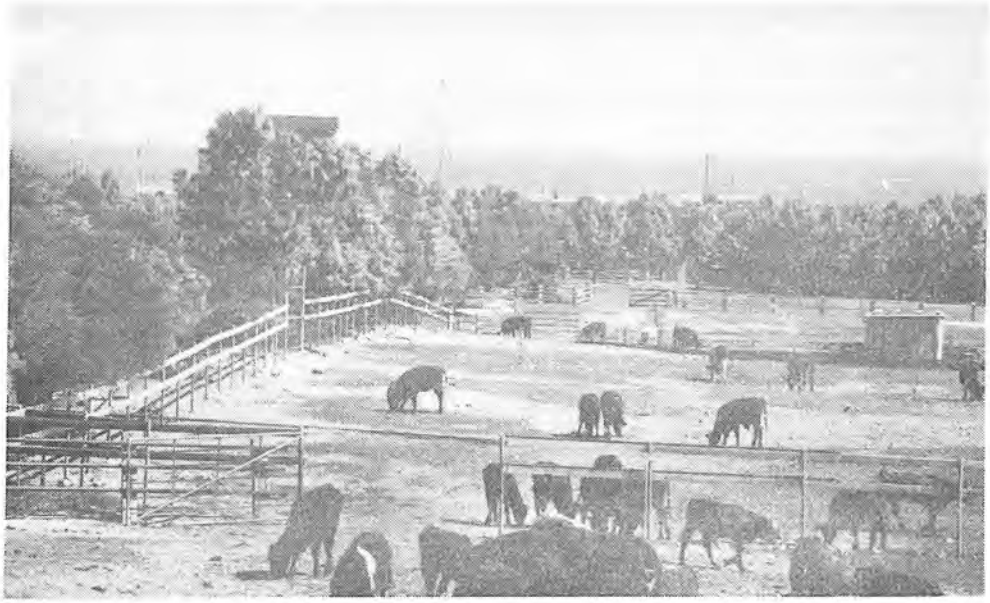


FIGURE 27 Pamphlet No.39/76 Western Australian Department of Agriculture titled "Plants for Windbreaks". Methods of planting and suitable plant species are described.

Farmnote

MAY 1976

AGDEX 283
10

Plants for Windbreaks

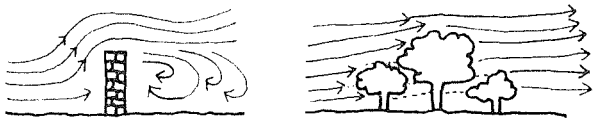
by W. Heggers, Floriculturist

No. 39/76

In exposed areas, windbreaks reduce erosion, evaporation, and damage to sensitive plants.

Ornamental trees and shrubs can make a good attractive windbreak, although where space is limited, fences or narrow rows of plants such as maize, sweet corn or elephant grass may be more suitable to reduce wind.

Windbreaks of plants allow enough wind to pass through to avoid turbulence on the lee side, unlike a solid barrier such as some fences.



Plants suitable for windbreaks should be relatively free from pests and disease, drought tolerant, adaptable to a range of soils and growing conditions,and require minimum care such as pruning, staking, watering or fertilising. Plants should be chosen for their size and height as well as their appearance.

Plant spacing

In the first few years while trees or shrubs are small, rows of maize or sweet corn can give immediate protection.

Allow a 4 to 5 metre strip of land for planting a windbreak. The distance between trees depends on the moisture available. When the larger trees are irrigated from nearby sprinklers or a trickle system, they can be as close as 5 metres apart, and smaller trees or shrubs can then be planted between them, 1.5 metres apart.

Irregular spacing and mixing species provides a more natural looking windbreak, and if some plants die they may not need replacing.

Establishment

For rapid growth, plant in early winter as soon as the ground is well soaked, giving plants the chance to become established before the summer heat.

If buying plants, do not choose advanced container-grown plants which may be root bound. Root bound plants can have poor anchorage and reduced ability to take up water and nutrients.

Prepare the planting hole with a layer of well rotted manure or compost covered with a thin layer of topsoil to avoid direct root contact with the manure. The planting hole should then be about the same depth as the soil in the container. Two complete, slow release fertiliser tablets should also be placed in the hole to provide nutrients for the first two years of establishment.

Water the young plants well before removing them from their containers, to reduce root disturbance. After removing the plant from its container and burying its roots, water it thoroughly to compact the soil around the roots, and leave a shallow depression around the plant to collect water. Applying a thick layer of organic mulch will further ensure good vigour.

Care of windbreaks

Staking and pruning should not be necessary. The only necessary treatment might be an occasional root pruning by digging or dragging a deep tyne through the soil near the base of the windbreak. This prevents the roots growing into cultivated areas.

Plants for windbreaks on the coastal sandplain.

Eucalyptus crucis, Silver Mallee, 5 to 6 m high, 4 m wide, hardy decorative silvery-blue foliage tree, insignificant flowers. Stems and bark resemble those of *E. caesia*

Eucalyptus eremophila, Tall Sand Mallee, 4 to 6 m high, 4 m wide, cream to yellow occasionally red or pink showy flower clusters, upright bushy habit, foliage to ground level, drought resistant.

Eucalyptus lehmannii, Bushy Yate, 5 to 7 m high, 4 to 5 m wide. Spreading bushy globular form, leaves to ground clusters of greenish flowers, adaptable to most soil types.

Eucalyptus leucoxylon, White Ironbark, 6 to 8 metreso 8 m high, 5 m wide, bushy variable spreading crown, smooth bark, small pendulous leaves, good windbreak with ornamental deep pink-red flowers.

Eucalyptus macranda, Long-flowered Marlock, 4 to 6 m high, 3 m wide, outstanding ornamental and windbreak, open spreading crown, drought and salt tolerant, attractive foliage and flowers.

Eucalyptus platypus var. *heterophylla*, Coastal Moort, 4 to 5 m high, 4 m wide. Compact bushy mallee, thrives on light sandy soils, tolerates harsh conditions, ideal windbreak, small creamy flowers.

Eucalyptus sargentii, Salt River Gum, 8 to 10 m high, 5 to 6 m wide. Bushy globular crown, vigorous early grower, excellent small windbreak tree, highly salt tolerant, best on low lying areas.

Eucalyptus tetragona, Tallerack, 5 metres high, 3 metres wide, fairly open spreading to sprawling mallee, thick oval attractive leaves, showy white flower clusters, needs good drainage.

Melaleuca armillaris, Bracelet Honey Myrtle, 3 to 5 m high, 3 m wide, hardy fast growing large shrub, fine dark green foliage, small bottle brush white flowers, adaptable to moist soils, good windbreak.

Melaleuca lanceolata, Rottnest Teatree, 5 to 8 m high, 3 m wide, fine dull green foliage, small white flowers, very tough large shrub, dense spreading rounded crown, well suited for coastal areas.

Melaleuca hypercifolia, Red Honey Myrtle, 2 to 3 m high, 2 m wide. Shapely shrub, broad green leaves, weeping habit, orange-red bottle brush flowers, suited for offset planting behind taller windbreak.

Melaleuca quinquenervia, Cajeput, 6 to 10 m high, 3 to 5 m wide, excellent windbreak with smaller trees planted offset,

(see over)

broad leaf, white bottle brush flowers twice a year, paper bark, suited for most soils.

Melaleuca diosmifolia, 2 to 3 m high, 3 m wide, dense spreading shrub, small oblong leaves, yellow-green bottlebrush flowers, would be good low windbreak or good for offset planting with *M. quinquenervia.*

Acacia saligna, Weeping Wattle, 5 to 7 m high, 4 m wide, rapid growing dense large shrub, variable long leaves, short sprays of bright yellow flowers, useful windbreak for coastal areas.

Acacia cyclops, Red-eyed Acacia, 2 to 3 m high, 3 m wide, very hardy coastal windbreak, long deep green leaves, pale yellow flower heads, fast growing, bright red around seeds.

Acacia longifolia, Sydney Golden Wattle, 4 to 5 m high, 4 m wide, very fast growing large shrub, long rigid green leaves, pale yellow rod like flowers, excellent hardy windbreak.

Callistemon speciosus, Albany Bottlebrush, 2 to 3 m high, 2 m wide, erect shrub, thick long leaves, 10 cm long red bottlebrush flowers, make good low windbreak, needs summer watering.

Callistemon viminalis (prolific), Weeping Bottlebrush, 4 to 6 m high, 4 m wide, compact form attractive fast growing small tree, masses of large red bottlebrush flowers, narrow pale green leaves.

Callistemon viminalis var. *compacta,* Captain Cook Bottlebrush, 2 m high, 1.5 m wide, masses of scarlet bottlebrush flowers, ideal low windbreak, or for planting offset with taller trees.

Calothamnus validus, Net Bush, 2 m high, 2 m wide, attractive claw shaped red flowers, good ornamental or low windbreak, hardy adaptable species, needs good drainage.

Calothamnus quadrifidus, Common Net Bush, 2 m high, 3 m wide, dome shaped shrub, long bright green needle-like leaves, numerous bright red one-sided brush-like flowers, low windbreak.

Callitris pressii, . Rottnest Island Pine, 5 to 7 m high, 3 m wide, slender cypress pine, light fresh green foliage, often used as windbreak in Metropolitan gardens, for windy coastal situations.

Comprosma baueri, Mirror Bush, 4 m high, 3 m wide, shiny polished green leaves, withstands salt and wind near coastline, would form good low windbreak, needs some watering.

Kunzea baxteri, Baxter's Kunzea, 2 to 3 m high, 2 m wide, popular fast growing ornamental shrub, colourful display of gold-tipped bottlebrush scarlet flowers, hardy dense fine foliage.

Westringia fruticosa, Native Rosemary, 1.5 to 2 m high, 2 m wide, compact hardy, densely branched shrub, small grey leaves silvery underneath, masses of small white flowers, good low windbreak.

Leptospermum laevigatum, Coastal Teatree, 4 to 5 m high, 3 to 4 m wide. Commonly grown large bushy shrub, greyish-green elliptical leaves, white flowers, fast growing, for coastal areas.

Metrosideros excelsa, New Zealand Christmas Bush, 6 to 7 m high, 4 m wide, hardy dense shrub, small dark green leaves, a good windbreak. A variegated form is smaller with red brush-like flowers.

Myoporum adscendens, Boobialla, 5 to 6 m high, 5 m wide, large fast growing shrub, excellent hardy windbreak, may be too large for most gardens, unless ample space is available, drought resistant.

Grevillea rosmarinifolia, Rosemary Grevillea, 2 m high, 2 m wide, fast growing compact bush, dark green narrow foliage, very hardy suitable for many positions, low windbreak, well drained soil.

Grevillea hookerana, Toothbrush Grevillea, 2 to 3 m high, 3 m wide, rigid horizontal branched, slightly open habit, decorative finely divided foliage, red tooth brush flowers, hardy, good drainage.

Tamarix articulata, Athel Tree, 5 to 6 m high, 3 m wide, fine cypress-like dull green foliage, very tough, salt and wind resistant tree, quick growing, easily propagated from cuttings.