Land disposal of solvent extracted wool scouring process muds for agro-forestry at Amarillo Farm, north-east of Mandurah

AWP Holdings Ltd

Report and recommendations of the Environmental Protection Authority

Environmental Protection Authority
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Summary and recommendation

AWP Holdings Limited operates a solvent wool scouring plant at Miguel Road, Spearwood, Western Australia. One of its wastes is mud resulting from agricultural dirt scoured from the wool. The composition of the mud is grit, organic matter, salt with traces of heavy metals and pesticides, particularly the insecticide diazinon. The proponent proposes to carry out a year's trial on disposing of the mud by injecting it into the subsoil on land at Amarillo Farm. The property straddles the lower reaches of the Serpentine River north of Mandurah and is in the catchment of the eutrophic Peel-Harvey catchment.

The land will be used for agro-forestry such as a tree plantation and grazing where possible. The plantation may lower the groundwater slightly and hence reduce surface salinity, take up nutrients, reduce soil erosion, and provide shaded pastures. During the trial the proponent has undertaken that the area would be monitored to the satisfaction of the Environmental Protection Authority.

A Consultative Environmental Review (CER) was referred to the Environmental Protection Authority in August 1990. During the assessment period the proponent's consultant discussed the environmental issues with several government agencies including the Environmental Protection Authority.

The Environmental Protection Authority has assessed the potential environmental impacts of the proposal described in the CER, and utilising additional information supplied by the proponent and several Government agencies.

In consultation with the Authority's officers the proponent has developed a comprehensive list of commitments covering all quantifiable environmental issues raised during the assessment (Appendix 1).

Whilst there is no major potential environmental problem with this proposal, monitoring the soil and groundwater for nutrients, salt and insecticides would be a priority. The proponent has addressed this issue by making a commitment to monitor the trial to the satisfaction of the Environmental Protection Authority.

The Environmental Protection Authority considers the trial project to be environmentally acceptable subject to the proponent being required to fulfil the commitments given.

Recommendation 1

The Environmental Protection Authority concludes that the proposal, as described in the Consultative Environmental Review and modified by the proponent in response to questions raised during the assessment, is environmentally acceptable and recommends that the proposal could proceed over a 12 month period subject to the commitments given by the proponent (listed in Appendix 1 of this report).

The commitments given by the proponent cover the following aspects:

- the method of disposal of solid waste into the soil, as outlined in the CER;
- agro-forestry and pasture management practices to be developed in consultation with the Department of Agriculture and the Department of Conservation and Land Management;
- baseline and monitoring studies to the satisfaction of the Environmental Protection Authority;
- remedial action to the satisfaction of the Environmental Protection Authority if waste management procedures fail;
- rehabilitation and decommissioning of the site to the satisfaction of the Environmental Protection Authority;
- reporting of monitoring and analytical data to the Environmental Protection Authority; and
- any transfer of ownership to be approved by the Minister for the Environment.

1. Introduction

AWP Holdings Limited operates a solvent wool scouring plant at Miguel Road, Spearwood. One of its wastes is mud resulting from agricultural dirt scoured from the wool. The composition of the mud is: total solids 39%; non-filtrable residue 25%; total organic carbon 5%; sodium chloride 1.3%; potassium sulphate 7%; total nitrogen 1%; total phosphorus 320 mg/kg and traces of heavy metals. Pesticides are also present, notably the insecticide diazinon, but only in trace amounts.

The proponent proposes to carry out a year's trial of disposing of the mud by injecting it into the soil on land at Amarillo Farm (Figure 1). The area straddles the lower reaches of the Serpentine River north of Mandurah and is in the catchment of the eutrophic Peel-Harvey catchment. Concurrently, with mud application, the proponent will commence agro-forestry. If monitoring shows that no environmental impact occurs from the trial, the project will be further assessed by the Environmental Protection Authority as long term proposal.

Agro-forestry may result in lowering the groundwater and reducing surface salinity, would store nutrient in the soil thereby reducing losses into the Peel-Harvey system, reduce soil erosion, increase soil quality and provide shaded pastures.

A Consultative Environmental Review (CER) was referred to the Environmental Protection Authority in August 1990.

In its assessment, the Environmental Protection Authority assessed the potential environmental impacts of the proposal as described in the CER, and utilised additional information supplied by the proponent and other Government agencies.

2. Description of the proposal

2.1 Outline of the operation

The AWP wool scouring plant at Spearwood uses a dual solvent-extraction process, the solvents being hexane and iso-propyl alcohol (IPA). The final effluent from the IPA extraction line is termed "mud". It is dark brown in colour, and contains materials removed from the wool which are water soluble. These include the normal dirt, salts and a small amount of grease from the sheep's wool.

The mud is normally discharged from the plant at a total solids level of about 40% by weight. It is proposed that the mud be used as a soil conditioner for agricultural land, where agro-forestry is practised. The mud contains organic nitrogen, some phosphorus, and traces of elements such as potassium which would improve soil fertility.

2.2 Proposal

Amarillo Farm is 4500 ha in area. It is proposed to mechanically inject the mud to approximately 10 cm deep at maximum application rate of 10 tonnes/ha over less than 1000 ha. The land used for application would depend on the season as the watertable fluctuates between seasons. This method of injection or "land farming" is a standard procedure for the land application of organic waste sludges in Europe and North America. The application would be for a trial period of one year during which extensive monitoring would take place to ensure against any environmental impact.

If the trial is successful and approved by the Environmental Protection Authority as a method of long term disposal, the proponent will practice agro-forestry on suitable parts of the property, especially the lower lying areas. Agro-forestry practices will assist in controlling the salinity, nutrient and salt balance of the soil and groundwater. Plant species will be selected on the advice of the Western Australian Department of Agriculture and the Department of Conservation and Land Management. Trees will be planted in rows separated by 15-20 m to give a final tree density of full grown trees of about 75/ha. Where agro-forestry is unsuitable, application to existing pasture is proposed. The final delineation of such application areas will be undertaken in consultation with the Department of Conservation and Land Management and the Western Australian Department of Agriculture.

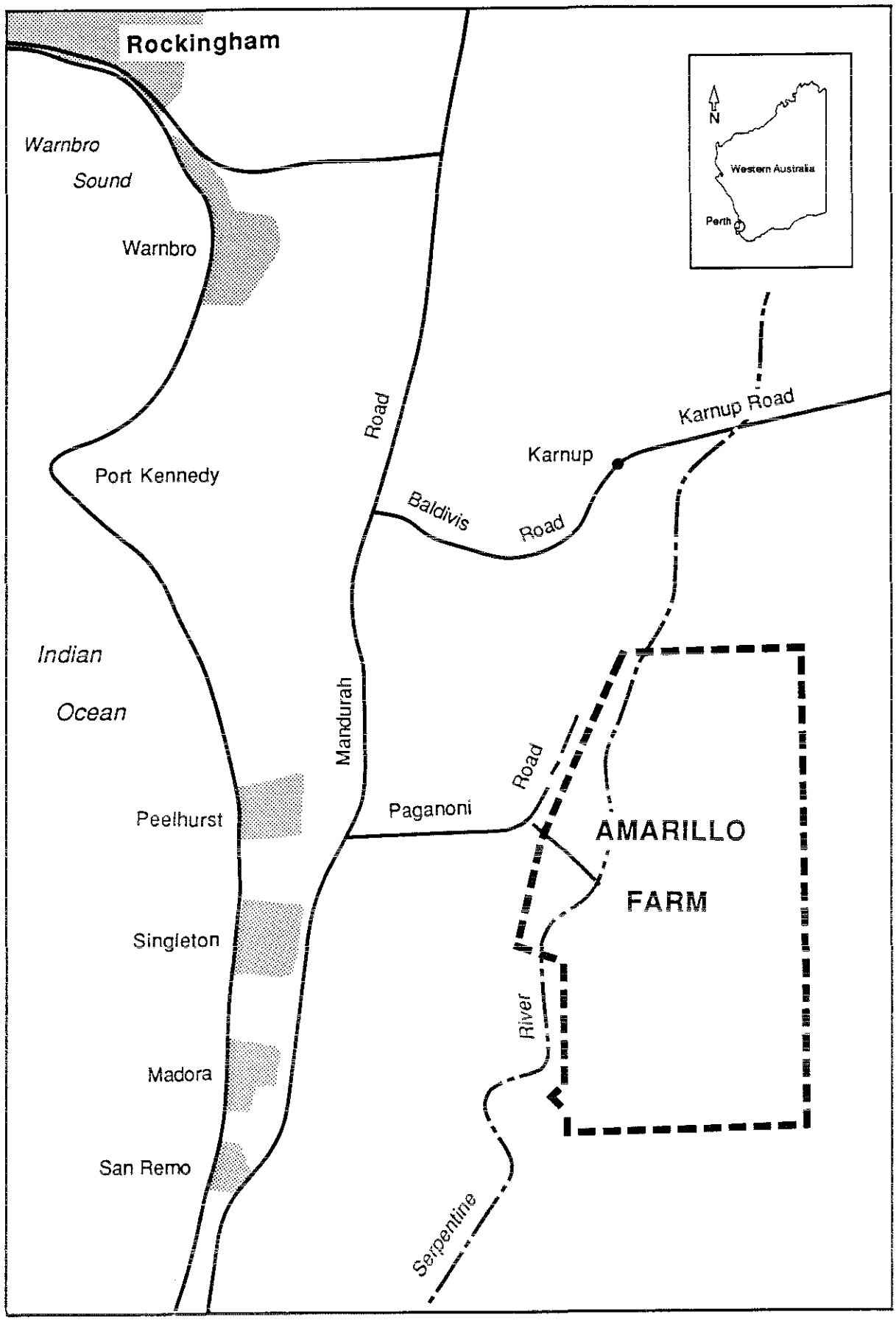

Figure 1: Location map

2.3 Site description

Amarillo Farm is located north east of Mandurah within the coastal plain catchment of the Peel-Harvey Estuary. Soils are Bassendean Sands with little ability to retain water or nutrients. The Serpentine river runs through the farm. Mud application would improve soil water balance, organic content and soil structure. This in turn would stabilise the soil, and decrease soil erosion. Additionally, the muds would contribute low levels of nitrogen and phosphorus in the organic form which would act as a slow release fertiliser. Hence, the plant nutrients would not be immediately leached into groundwater and receiving surface waters. It would also reduce the need to apply quick release fertiliser to the pastures on the property.

3. Potential environmental impacts

The proponent believes that all potential environmental impacts are covered by suitable commitments (Appendix 1).

3.1 Nutrients, salinity and pesticides

Whilst the mud contains nutrients at relatively low levels, the critical factor is their leachability to the groundwater. The proponent has explained in the CER that leaching of nutrients would be slow because they are bound up in the organic material which breaks down slowly. Consequently, the rate of release of the nutrients would be adequately offset by the use of agro-forestry for nutrient uptake.

The salinity of the groundwater under the site varies greatly with some bores having higher salinity than the slightly saline waters of the Serpentine River. The use of the land for agro-forestry may lower the groundwater table thus drawing down the saline water and ensuring that the salt in the soil did not impact on the land use. Additionally, the growth of trees, especially salt resistant species would have a salt requirement and would also be resistant to any slightly elevated soil salt levels. For pasture, it is noted, that the mud containing low levels of salt will be injected beneath the soil surface thus having minimal impact on pasture. It is proposed to use moderately salt-tolerant pasture species to ensure against any impact of salt on pasture.

The pesticides present in the mud come from other farms which use them to control insects and pests of either the pastures or the sheep themselves. The only pesticide present at levels worth noting is diazinon. This is an insecticide used to control blowflies on sheep. As the land application of the mud is sub-surface and the levels are low, there is little likelihood of any measurable impact.

The proponent has made a commitment to monitor all environmental aspects of the trial to the satisfaction of the Environmental Protection Authority and to implement remedial action to the satisfaction of the Environmental Protection Authority if any undesirable impacts are detected.

3.2 Monitoring

To confirm that the mud application is having the desired beneficial effects and is not causing an environmental impact, the proponent has proposed an extensive soil, surface water and groundwater quality monitoring programme. Additionally, the proponent has made a commitment to submit the monitoring programme to the Environmental Protection Authority prior to land application and have it approved.

The proponent suggests that the monitoring programme should include the following components:

Soil - salinity, pH, nutrient status (N, P, K), water stable aggregates, pore water quality (conductivity, TDS, Na, K, Cl, Mg, Ca, CO_3, NO_3, PO_4, Cl);

Groundwater - salinity (conductivity, TDS, Na, Cl, Mg, Ca, CO_3), pH, nutrients (N, P, K);

Surface water - salinity (conductivity, TDS, Na, Cl, Mg, Ca, CO_3), nutrients (N, P, K).

Importantly, the proponent has made a commitment to develop and carry out the programme to the satisfaction of the Environmental Protection Authority.

4. Environmental impacts and management identified by the Environmental Protection Authority

4.1 General introduction

In considering the CER, the Environmental Protection Authority gave particular consideration to the issues of nutrient application, salinity and trace pesticides. Specific emphasis was placed on the proponent's commitment to carry out and monitor the trial, and to rehabilitate any detected environmental impacts. The proponent has explained the proposal in detail and has addressed all issues both by explanation and commitments (Appendix 1) to the satisfaction of the Environmental Protection Authority, hence problems are not anticipated.

Should the Minister for the Environment wish to approve this proposal, that approval should be conditional on the proponent adhering to these commitments. The commitments would thereby become legally binding on the proponent.

Recommendation 1

The Environmental Protection Authority concludes that the proposal, as described in the Consultative Environmental Review and modified by the proponent in response to questions raised during the assessment, is environmentally acceptable and recommends that the proposal could proceed over a 12 month period subject to the commitments given by the proponent (listed in Appendix 1 of this report).

The commitments given by the proponent cover the following aspects:

- the method of disposal of solid waste into the soil, as outlined in the CER;
- agro-forestry and pasture management practices to be developed in consultation with the Department of Agriculture and the Department of Conservation and Land Management;
- baseline and monitoring studies to the satisfaction of the Environmental Protection Authority;
- remedial action to the satisfaction of the Environmental Protection Authority if waste management procedures fail;
- rehabilitation and decommissioning of the site to the satisfaction of the Environmental Protection Authority;
- reporting of monitoring and analytical data to the Environmental Protection Authority, and
- any transfer of ownership to be approved by the Minister for the Environment.

The Environmental Protection Authority notes that during the detailed implementation of proposals, it is often necessary or desirable to make minor and non-substantial changes to the design and specification which have been examined as part of the Authority's assessment. The Environmental Protection Authority believes that subsequent statutory approvals for this proposal could make provision for such changes, where it can be shown that the changes are not likely to have a significant effect on the environment.

4.2 Nutrients, salinity and pesticides

During the assessment the Environmental Protection Authority sought expert comment from several government agencies including the Department of Agriculture on the issues of nutrients in the Peel-Harvey system, salinity in agro-forestry land use and trace levels of pesticides (insecticide) in soil.

The levels of nutrients, as stated in the CER are low and in the organic form are less readily leached. Consequently, plant nutrient uptake by pasture or trees should be sufficient to stop leaching of the additional nutrients to the catchment area. Additionally, as plant growth reaches a maximum, the rate of nutrient uptake may exceed application. If the plant material is removed from the site either by feed or

timber, there should be no environmental impact on the surrounding area. The proponent has committed to referring the final tree planting plan to the Environmental Protection Authority for approval before any mud is applied.

The issue of salt contamination of the soil and groundwater should not be a problem. The adjacent Serpentine River has elevated levels of salt as does some of the groundwater under the site. Given the method of sub-surface application proposed for the mud, it is unlikely that salt in the mud will affect the proposed salt resistant species. Additionally, whilst the proposed density of trees will not depress the water table greatly, it will ensure that salt will not move upward in the soil profile. The tree plantation will also have a natural demand on some of the salt available in the sub-surface soil.

The only pesticide detected in the mud at significantly elevated levels (though still present in only trace quantities) was the insecticide diazinon. Given that the mud containing the insecticide will be injected below the surface of the soil and its application rate is low, it is unlikely to pose any threat to the insect ecology. It is noted that this insecticide is biodegradable and is used in much higher concentrations on farms to control insects on sheep.

4.3 Area of application and monitoring

Final details of the area for mud application to the land are yet to be approved. However, the Environmental Protection Authority notes that two of the criteria for land application will be height above the water table so that mud is not injected into waterlogged soils and distance from the river to ensure a buffer against any environmental impact on the Serpentine River.

The proponent is committed to a monitoring programme which will be to the satisfaction of the Environmental Protection Authority. The Environmental Protection Authority notes that the parameters arsenic and diazinon are missing from its proposed list of parameters to be monitored. The proposed monitoring programme can be altered to the Environmental Protection Authority's satisfaction when it is formally submitted prior to the proposal proceeding.

4.4 Transport routes

The issue of transport routes has been raised during assessment. The Environmental Protection Authority does not consider the mud to be hazardous and hence does not consider the transport of the mud to be an environmental issue. The increase in truck numbers is not expected to produce an unacceptable environmental impact.

5. Conclusions

Based on the information supplied in the CER and additional information supplied by the proponent during the assessment, the Environmental Protection Authority has concluded that the proposed trial could proceed subject to the commitments given by the proponent (Appendix 1) and the Authority's recommendation in this report.

The concept of the proposal has been thought out well and is technically sound. It follows similar sludge disposal practices carried out elsewhere around the world. Given the proponent's commitments to management, monitoring and correction of any detected environmental impacts, there should be no adverse environmental impact on the site or its surrounds as a result of this one year trial.

Appendix 1

List of proponent's environmental management commitments

List of proponent's environmental management commitments

The proponent has provided the following commitments in the CER and in response to questions raised:

General commitments

1 The proponent will adhere to the proposal as assessed by the Environmental Protection Authority and will fulfil the commitments made below.

2 All aspects of the trial disposal of mud will be carried out to the satisfaction of the Environmental Protection Authority.

Transport routes

3 Whilst the mud to be applied on the land is not hazardous, the proponent will supply to interested parties road routes to be used to convey the mud from Spearwood to the Amarillo Farm.

Environmental management and monitoring

4 Prior to mud application to the soil, the proponent will submit and subsequently implement a monitoring and management programme to the satisfaction of the Environmental Protection Authority.

This programme will include:

a initial baseline sampling period to determine whether impacts are presently occurring;

b parameters to be measured;

c sampling sites and times;

d reporting times to the Environmental Protection Authority;

e a commitment to modify the environmental management programme , if necessary, to reduce the impact of pollution, to the satisfaction of the Environmental Protection Authority.

5 All samples taken in the monitoring programme will be analysed in a laboratory acceptable to the Environmental Protection Authority.

Tree planting and pasture management

6 The proponent will submit a tree planting and pasture management plan to the Environmental Protection Authority, and will not apply mud to the soil prior to receiving written approval for the plan from the Environmental Protection Authority.

Remedial action

7 The proponent will take immediate remedial action to the satisfaction of the Environmental Protection Authority should an unacceptable environmental impact be identified.

Decommissioning

8 The proponent will be responsible for decommissioning and rehabilitating the site, to the satisfaction of the Environmental Protection Authority.

9 The proponent will, at least six months prior to decommissioning, prepare a site decommissioning and rehabilitation plan to the satisfaction of the Environmental Protection Authority.

10 The proponent will not transfer ownership, control or management of the trial proposal, without prior consultation and arrangements being made which are to the satisfaction of the Environmental Protection Authority and the Minister for the Environment.

Long term proposal

11 As this proposal is for a trial period of one year, the proponent will, if it believes that the trial is successful, submit a long term proposal to the Environmental Protection Authority for assessment before further mud application takes place.

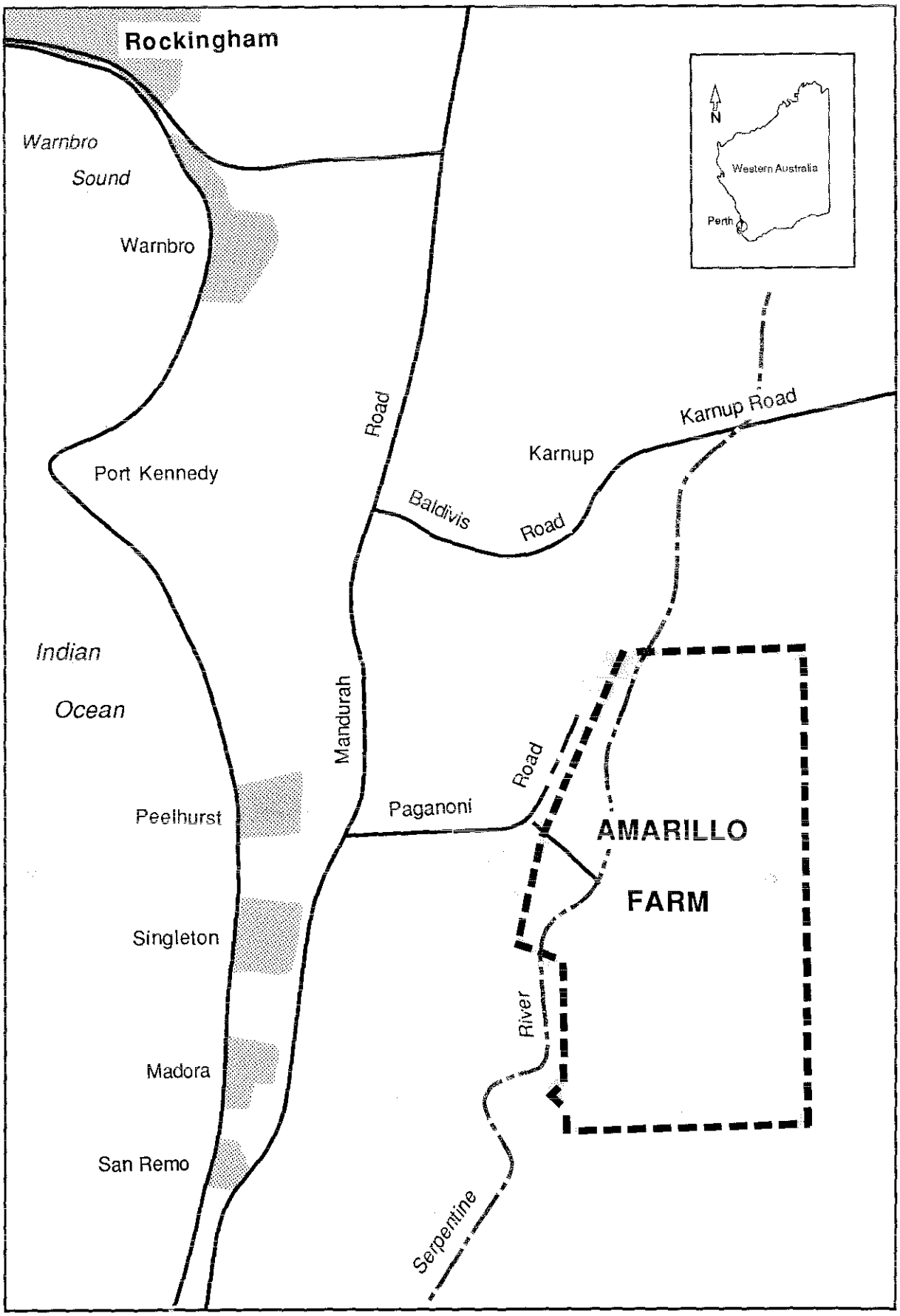

Figure 1: Location map