3.2 *PROPOSED ETHANOL PRODUCTION PROCESS*

The following sections provide a detailed description of the ethanol production process.

The production of ethanol involves the receival and storage of grain, milling of the grain to flour followed by a cooking, fermentation and distillation process.

Grain Receival and Storage

The ethanol production facility will be capable of processing a range of cereal grains (corn, wheat, barley and sorghum), which are grown in the Central West region of NSW. The facility will require, at full capacity approximately 600,000 tonnes of grain each year from wheat, barley and corn.

Grain will be received principally via semi-trailers and B-double trucks however; there is also the potential for grain to be delivered by rail. Trucks will enter the site and drive onto a weighbridge, where the gross weight will be recorded. At the weighbridge grain samples will be taken for quality control purposes. Once sampled and weighed the vehicle will proceed to one of two unloading areas where the grain will be stored waiting production. The two unloading areas are as follows:

- a grain receival platform at the grain storage building, where the grain will be discharged into a collection hopper and conveyed to the storage silos; and

- a grain storage area, which will consist of up to 10 separate grain piles approximately 30m wide, 200m long and up to 20m high. The piles will be constrained within a containment area and once formed; each storage bunker will be covered with plastic tarpaulin to protect the grain from rain and wind.

Once the grain truck is unloaded the vehicle will return to the weighbridge and then exit the site via Micabil Road.

Grain Retrieval

The ethanol production process requires a constant supply of grain. For the production of 200 million litres/year of ethanol the daily demand for grain is about 1,600 tonne or 67 tonne per hour.

Grain will be supplied to the ethanol plant from a 'shift silo'. Retrieval of the grain for feed to the shift silo will occur in two ways:

- Retrieval from the bunker storage area. This will involve picking up the grain using a front-end loader and feeding it into a mobile dump hopper placed over a belt conveyor. The belt conveyor feeds the grain to the main feed conveyor and on to a screening station. The screening station will include a dust collecting and filtering system to eliminate dust emission from the facility. The grain will then be elevated to the shift silo; and

- Retrieval from the grain storage silo. The grain will be conveyed from the bottom of the storage silo via a screw feeder and elevator to a smaller shift silo. This system will also include dust extraction and filtering facilities to eliminate dust emissions.

Milling and Slurry Preparation

As part of the production process the grain needs to be milled and then mixed into slurry. The process is set out below:

- Grain from the shift silo will be gravity discharged to the grain mills.

- The milling system will include a dust collection system, which will extract dust by vacuum from appropriate points in the circuit. The dust will be directed to a bag filter, which will collect the dust and return it to the mill discharge conveyor.

- A monitored weight of milled grain flour will be conveyed to a pug mixer. The pug mixer enables the addition of 'slops mix' for maintaining proper slurry density.

- The pug mixer directs the slurry mix to a mixing tank where additional slops or process water can be added to make up the correct slurry density and percent solids.

- The mix tank contains two-discharge pumps (operating and spare) to pump the mixed slurry preparation (mash) to the feed storage tank for liquefaction.

Chemical Preparation

A specific area in the enclosed liquefaction and saccrification building has been designed to receive and prepare a range of chemicals used as part of the ethanol production process. The area consists of a series of small mixing tanks fitted with access platforms, mixing agitators if required, dosing delivery pumps and pipe work. The pipe work delivers the chemical mix to the required process stage.

The packaged chemicals will be fed by forklift or manually from the bag or container into the mixing tank.

Liquefaction Stage

Liquefaction is the process of converting insoluble starch in the mash to a soluble starch mix by enzyme reaction at an elevated slurry temperature. The enzyme mix, which is prepared in the chemical preparation area, is metered as a liquid into the pug mill and the mash storage tank (or pre-liquefaction tank).

The mash is strained and heated, and then pumped to the liquefaction tank for the processing of the insoluble starch. The reaction occurs in sealed, insulated, agitated tanks inside the preparation building and takes up to 4 hours depending upon grain type. The reaction at this point does not generate any emissions.

From the liquefaction tank the mash is pumped to the pre – saccharification tank via mash coolers, which lower the slurry temperature to about 60 degrees Celsius.

Saccharification Stage

Saccharification is the enzymatic conversion of the soluble starch to glucose. The reaction occurs in the pre-saccharification tank and continues in the pre fermentor and the fermentor tanks. The reaction requires the addition of another enzyme mix, which is metered as a liquid into the pre-saccharification tank. As with the liquefaction stage, the reaction occurs in sealed, insulated, agitated tanks inside the preparation building and does not generate any emissions.

From the pre-saccharification tank the mash is pumped to one of three pre–fermentor tanks via mash coolers.

Fermentation Stage

Fermentation is the conversion of glucose to ethanol and carbon dioxide by the action of yeast. The mash from the pre-saccharification tank is pumped to one of three pre–fermentor tanks where propagated yeast and other chemicals that promote and sustain the reaction are added prior to pumping to the fermentor tank. Fermentation is a batch process with each fermentation tank being filled, emptied and cleaned in series. There will be up to 12 fermentation tanks and each will have a cycle time of about 45 to 55 hours each.

Each tank is filled with mash containing yeast and nutrient, allowed to react for the required time to achieve maximum conversion of sugars to ethanol and then emptied to a beer well. The empty tank is then cleaned by the addition of steam and caustic soda. Once cleaned the tank is filled again for the next cycle. This process occurs continuously by using all six fermentor tanks in series.

The fermentor tanks will be stainless steel construction and sealed with a sloping floor to allow discharge of all slurry by gravity feed.

The reaction produces carbon dioxide, which is vented to a wet scrubber (which effectively cleans the carbon dioxide). The cleaned, scrubbed carbon dioxide gas is emitted to atmosphere while the scrubber water is recycled back to the front of the process.

The beer well acts as a buffer tank to receive the reacted ethanol and mash mix for feed to the distillation stage.

Distillation, Evaporation and Dehydration Stage

Distillation involves boiling off the ethanol from the fermented slurry mix with steam to produce a hydrous ethanol product containing 95 per cent ethanol and 5 per cent water.

Two boilers will produce the steam requirement for the facility. On site storage of LPG will be provided for the operation.

The distillation process involves pumping slurry from the beer well in the fermentation area to the mash distillation column. The column operates under a vacuum at a temperature up to 125 degrees Celsius. The column will be approximately 3.5 metres in diameter and 12 metres high, constructed of stainless steel and will contain a number of heating trays to distribute the heat into the slurry and gas mixture.

The hydrous ethanol can either be dehydrated (water removed) to a fuel ethanol or purified by further distillation to an industrial ethanol or purified even further to a potable ethanol. The ethanol products are then pumped to the ethanol storage area.

The by-product of distillation is slurry containing all unfermentable products - principally water and distiller's grain.

The distiller's grain is extracted as a mash cake by centrifuging and then the cake is transferred to the mash storage silo. The liquid by-product is transferred to a slops tank where approximately 60 per cent is returned to liquefaction for addition to the milled grain flour at the start of the process. The remaining 40 per cent, which is in liquid form (thin slops) is processed in the evaporation circuit to thicken the product to a more concentrate form (syrup), then it is pumped to a syrup collection tank. The syrup, which is about 30 per cent solids, is then pumped to a syrup storage silo for storage prior to dispatch to market.

In the case of fuel ethanol production, vapour and liquid from the top of the rectifier distillation column is superheated and transferred to molecular sieve vessels, which remove any water from the ethanol product. The dehydrated ethanol product is then cooled, filtered and transferred to the ethanol storage area.

In the case of industrial and potable ethanol production, vapour and liquid from the top of the exhaust column is transferred to the further smaller distillation columns where impurities are distilled off from the hydrous ethanol mix. The industrial ethanol produced from the purification columns is then filtered and transferred to the ethanol storage area.

The potable ethanol is also cooled and transferred to the ethanol storage area to uncontaminated vessels used exclusively for potable product. The storage and handling is to food grade hygiene levels in order to accommodate the end use requirements of the product.

Distillers Grain Storage and Dispatch

The distiller's grain cake is conveyed to a cake storage silo or concrete holding bunker. Distiller's cake is loaded from the bottom of the cake silo directly into the transport vehicles, or loaded from the concrete bunker into a screw conveyor, which then loads the vehicles.

The distiller's grain syrup is pumped from the syrup storage silo to the load point on the syrup transport vehicle or to the cake truck feed screw conveyor where it is mixed with the cake and fed into the WDGS transport truck.

Ethanol Storage and Dispatch

The cooled ethanol from dehydration will flow to one of three shift storage ethanol receiver tanks in the storage area. After passing relevant quality tests the ethanol receiver tanks contents are transferred to the product storage tanks. This system is replicated for both industrial and potable ethanol.

For the production of fuel grade ethanol only, denaturant from the denaturant storage tank is metered continuously into the pure ethanol stream during transfer to the main storage tank to yield a finished product containing 5% denaturant.

The product storage tanks are sized to provide 14 days of storage of fuel ethanol at full flow rate (200 ML/yr) and 3 days of storage for industrial and potable ethanol. The denaturant tank is sized to hold sufficient denaturant to cover 10 days ethanol production.

All storage tanks are vented through a vent pipe fitted with an in-line flame arrester and a breather vent valve.

Ethanol product will be transported to market via road-train, B-double trucks and rail.

3.3 *PROPOSED PLANTATION*

Australian Ethanol Limited intends to establish an effluent irrigated timber plantation, approximately 40 hectares in area, in the east of the site to create a carbon sink via carbon sequestration, and to dispose of plant effluent water not recycled back into the process chain. The potential location of the plantation is shown on *Figure 2.*

The plantation will be established using salt-tolerant hybrid hardwood species suitable to the site and will be determined prior to construction. Options include a hybrid between *Eucalyptus camaldulensis* (River Red Gum) and *Eucalyptus grandis* (Flooded Gum), and *E. camaldulensis* and *E. globulus* (Blue gum). These hybrids have been developed especially for saline areas and combine the salt and stress tolerance of the *Eucalyptus camaldulensis* with the growth potential and wood property traits of *Eucalyptus grandis* and *Eucalyptus globulus.* This hardwood will be a substantial future timber resource as well as providing carbon sequestration.

The plantation forming part of the ethanol facility provides 3 key opportunities.

- The carbon sequestration potential of the forestry plantations. One of the key emissions as a result of the ethanol production process is carbon dioxide. The Kyoto protocol identifies that reforestation is one way to provide carbon sequestration.

- The opportunity to reuse effluent produced by the ethanol production facility for irrigation of the plantations.

- The potential to create a substantial future timber resource for the Condobolin area.

A buffer will be provided between the plantations and the surrounding site boundaries and between the plantations and adjoining native vegetation. This boundary will allow for access, and provide a buffer between plantation and native forest areas.

3.4 *PROPOSED WATER RECYCLING*

A significant component of the development of the ethanol facility at Condobolin is the reuse of the majority of wastewater produced by the facility. The effluent from the ethanol production facility will be treated as per statutory requirements prior to being held in a storage dam. Effluent will either be recycled back into the process for reuse in the ethanol production plant, or treated and used to irrigate the onsite timber plantations.

Investigations will be undertaken of the proposed site, as part of the environmental assessment, to determine the capability of the land to support an effluent-irrigated timber plantation based on its climate, topography, and ability to provide adequate buffer distances from local waterways and public access areas. The investigations will form part of the EAR to accompany the project application and would specifically address the following issues:

- effluent quality;
- land suitability for irrigation of effluent;
- wet weather storage requirements;
- potential for impacts on downstream ground and surface waters; and
- any mitigation measures.

An irrigation schedule and monitoring program would also be determined before any irrigation with reclaimed water occurs. The irrigation schedule would be prepared in accordance with the Department of Environment and Conservation (DEC) *Environmental Guidelines: Use of Effluent by Irrigation*. The guidelines outline the beneficial use of effluent and how it can be accomplished in an ecologically sustainable and socially responsible way. Further details of the statutory conditions that would need to be considered related to reclaimed water quality are listed in *Chapter 4*.

In addition the *2005 State of the Environment Report* for Lachlan Shire Council identifies that water reuse in Condobolin is a potentially viable alternative to the large volumes of water currently released into the Lachlan River.

4 STATUTORY CONTEXT

4.1 STATE ENVIRONMENTAL PLANNING INSTRUMENTS

4.1.1 Environmental Planning and Assessment Act 1979

The proposed development will be assessed in accordance with the *Environmental Planning and Assessment Act 1979* (EP&A Act) and the *Environmental Planning and Assessment Regulation 2000.*

The EP&A Act has recently been amended to include Part 3A which provides a streamlined assessment and approval process for development that is defined as a Major Project. Clause 75(b), Part 3A of the EP&A Act states that:

> *"(1) This Part applies to the carrying out of development that is declared under this section to be a project to which this Part applies:*
>
> *(1)(a) by a State Environmental Planning Policy,"*

The proposal is referred to as a Major Project in State Environmental Planning Policy (Major Projects) 2005 (SEPP MP). The requirements of a 'Major Project' under Part 3A therefore apply to the site. The application of this SEPP is discussed later in this section.

Under Part 3A environmental planning instruments (EPIs) (other than State environmental planning policies) do not apply to a 'Major Project' as delineated in Clause 75(R). A discussion of the State Environmental Planning Policies (SEPPs) applicable to the proposed development follows.

Pursuant to section 75U of the EP&A Act authorisation for a Part 3A application are not required under the Heritage Act 1977, National Parks and Wildlife Act 1974, Native Vegetation Act 2003, Rivers and Foreshore Improvement Act 1948 and Rural Fires Act 1997.

4.1.2 State Environmental Planning Policy (Major Projects) 2005

State Environmental Planning Policy (Major Projects) 2005 (SEPP MP) identifies development to which the project assessment and approval process of Part 3A of the EP&A Act applies. Under clause 6 of SEPP MP 2005, Part 3A of the EP&A Act applies to projects listed in Schedule 1 of SEPP MP, which includes:

10 Chemical, manufacturing and related industries:

(1) Development that employs 100 or more people or with a capital investment value of more than $20 million for the purpose of the manufacture or reprocessing of the following (excluding labelling or packaging):

(f) oils, fuels, gas, petrochemicals or precursors

As the proposed ethanol production facility at Condobolin will have a capital investment value in excess of $30 million, the project satisfies the relevant criteria set out in SEPP MP and Part 3A of the Act applies.

A project application will therefore be lodged under Part 3A for project approval pursuant to clause 75E of the Act. The policy establishes the Minister for Planning as the determining authority for any development classified as a 'Major Project'.

4.1.3 State Environmental Planning Policy No. 11 – Traffic Generating Developments

State Environmental Planning Policy No. 11 – Traffic Generating Developments (SEPP 11) aims to ensure that the NSW Roads and Traffic Authority (RTA) is made aware of and given the opportunity to make representations in respect of developments such as liquid fuel depots.

Under Clause 7 of SEPP 11 the Minister is required to forward a copy of the application to the RTA and cannot determine the application until it has received representation.

4.1.4 State Environmental Planning Policy No 33 -Hazardous and Offensive Development

State Environmental Planning Policy No. 33 – Hazardous and Offensive Development (SEPP 33) seeks to require development consent for hazardous or offensive development proposed to be carried out and to ensure that in determining whether a development is a hazardous or offensive industry, any measures proposed to be employed to reduce the impact of the development are taken into account.

SEPP 33 defines a "potentially offensive industry" as *"a development for the purposes of an industry which, if the development were to operate without employing any measures (including, for example, isolation from existing or likely future development on other land) to reduce or minimise its impact in the locality or on the existing or likely future development on other land, would emit a polluting discharge (including for example, noise) in a manner which would have a significant adverse impact in the locality or on the existing or likely future development on other land, and includes an offensive industry and an offensive storage establishment."*

The proposed ethanol production facility may be considered a 'potentially offensive industry' under SEPP 33 and in accordance with clause 12, a preliminary hazard analysis will be prepared as part of the EAR.

4.1.5 Protection of the Environment Operations Act 1997

The *Protection of the Environment Operations Act 1997* (POEO Act) provides an integrated system of licensing for polluting industries. Schedule 1 of the POEO Act identifies types of development that require an environment protection licence.

Under Schedule 1 of the POEO Act the site will require an Environmental Protection Licence for activities involving "*agricultural produce (including dairy products, seeds, fruit, vegetables or other plant material) and that crush, juice, grind, gin, mill or separate more than 30,000 tonnes of produce per year*" and "*that store or package chemical substances in containers, bulk storage facilities, stockpiles or dumps with a total storage capacity exceeding: (3) 2,000 tonnes of any chemical substances.*"

4.1.6 Water Act 1912

The *Water Act 1912* is administered by DNR and under this Act a licence is required if water is extracted from a creek or if any waterways are proposed to be realigned.

The proposal will require the extraction of approximately 8ML of water per day from the Lachlan River via the construction of a pumping station and pipeline on site. A 'high security' licence under the *Water Act 1912* will be required for this activity.

4.1.7 Water Management Act 2000

The *Water Management Act 2000* (WM Act) incorporates the provisions of various acts relating to the management of surface and ground water in NSW, and provides a single statute for the regulation of water use and works that affect surface and ground water, both marine and fresh.

Parts of the WM Act commenced on 1 January 2001. However provisions relating to the new water access licensing and water approvals systems were delayed until water sharing plans and public registers for licences and approvals where developed. Since 1 July 2004 the new licensing and approval system has been in effect in the areas of NSW covered by 31 operational water sharing plans.

The *Water Sharing Plan for the Lachlan Regulated River Water Source 2003* falls under Section 50 of the WM ACT. The *Water Sharing Plan for the Lachlan Regulated River Water Source 2003* applies to all waters contained within the Lachlan Regulated River Water Source (including the Lachlan River). The vision for the Plan is 'to achieve a healthy Lachlan River that provides a dynamic and sustainable environment for native plants and animals, that is enjoyed and valued by the community and that is managed for the socio-economic interest of the people of the Lachlan catchment'.

The vision for this Plan '*is to achieve a healthy Lachlan River that provides a dynamic and sustainable environment for native plants and animals, that is enjoyed and valued by the community and that is managed for the socio-economic interest of the people of the Lachlan catchment'*.

The Plan proposes to do this through monitoring of environmental indicators as well as undertaking strategies for maintaining the water quality of the River including monitoring, licensing and rules for access and extraction. The proposed extraction of 8ML per day from the Lachlan River for the proposed facility will be assessed in the EAR against the share components of regulated river (high security) access licences authorised to extract water from this water source.

4.1.8 Roads Act 1993

Under section 138 of the *Roads Act 1993* consent from the Roads and Traffic Authority of NSW (RTA) is required to erect a structure or carry out a work, in, on or over a public road or connect a road (whether public or private) to a classified road. A consent may not be given with respect to a classified road except with the concurrence of the RTA.

The entrance to the site from Micabil Road will require upgrading and the provision of truck turning lanes. Micabil Road is a regional road under the care and control of Council such that an approval/concurrence from the RTA will not be required for this work.

4.2 LOCAL ENVIRONMENTAL PLANNING INSTRUMENTS

4.2.1 *Lachlan Local Environmental Plan 1991*

Pursuant to Section 75J(3) of the EP&A Act the Minister cannot approve the carrying out of a project that would be wholly prohibited under an environmental planning instrument. Under the Lachlan Local Environmental Plan 1991 (LEP 1991), the site and its surrounds are zoned Rural 1(a). The proposed project is defined as an 'agricultural produce industry', being a rural industry involving the handling, treating, processing or packing of produce from agriculture (including dairy products, seeds, fruit, vegetables or other plant material), and includes flour mills, cotton seed oil plants, cotton gins, feed mills, cheese and butter factories, and juicing or canning plants, under the Standard Instrument (Local Environmental Plans) Order 2006.

In the Rural 1(a) zone agricultural produce industries are permissible with development consent.

The general aims of this plan are to encourage the proper management, development and conservation of natural and manmade resources within the Shire.

The environmental assessment will take into consideration the objectives of the zone Rural 1 (a) of the LEP 1991, which in part include:

"(a) to allow development for purposes that are:

(i) appropriate in a rural location, and

(ii) sympathetic with the environmental characteristics of the land and the costs of providing public services and amenities;

(d) to conserve prime crop and pasture land by ensuring that:

(i) it is not unnecessarily converted to non-agricultural purposes,

(e) to protect and conserve:

(i) soil suitability by controlling development in accordance with soil capability…

(v) water resources for use in the public interest…

(vii) places and buildings of archaeological or heritage significance and aboriginal relics and places…

(f) to minimise the cost to the community of:…

(ii) providing, extending and maintaining public infrastructure and services."

4.3 SUMMARY OF PERMITS, LICENCES AND APPROVALS

The following permits, licences and approvals will be sought for the proposed construction and operation of the ethanol production facility:

- project approval will be sought from the Minister for Planning;
- an Environment Protection Licence will be sought from the Department of Conservation (DEC), specifically the Environmental Protection Authority (EPA); and
- 'high security' water licence will be sought from DNR under the *Water Act 1912*.

5 ENVIRONMENTAL ASSESSMENT

5.1 GEOLOGY SOILS AND LANDFORM

5.1.1 Condobolin Topography

Information from the *Condobolin 8331-1 & IV 1:50 000 Topographic Series Sheet (1st Edition),* identifies that the site is located approximately 180 metres above the Australian Height Datum (AHD). The immediate surrounding local topography gradually slopes to the east.

A section 149 (2) and (5) certificate from Lachlan Shire Council for the site did not report any information on flood levels for the site. Council reported that the site may be on flood prone land however, no assessment of flood liability has been made for the site or surrounding area. Council reported that they have recently (in the previous few weeks) initiated a flood plain study of the area and that at present no flood levels or other related information was available.

As such a preliminary assessment of flood flows and levels will be undertaken as part of the EAR through hydrological and hydraulic modeling. This will give an estimate of flood levels which would need to be confirmed through calibration of computer models with known flood events for the area.

5.1.2 Condobolin Geology and Soil Landscapes

According to the *Condobolin 1:100 000 Geological Series Sheet 8331 (1st Edition)*, the geological unit at the site is Cza, which comprises Tertiary inactive alluvial plains. Mineral deposits of gold, aggregate and sand have been recorded in the locality.

As identified in the *Lachlan Shire Council State of Environment Report 2004*, the predominate soil types found in the area include red earth, brown soils, lithosols (gravely soils), clays and yellow and red solodic soils, along drainage lines. The makeup of this soil landscape in the region means that soil has generally low chemical fertility. The combination of gravel, lithosols and clay means that the there is high erosion hazard but there may be a high infiltration of water in drier periods. The Condobolin area may be affected by dry land salinity.

Further assessment of soil quality may be required as part of the surface/groundwater assessment. No further specific soil investigations are required as part of the EAR.

5.2 *SURFACE WATER*

The site is located within the Lachlan Catchment Area. The Lachlan Catchment is located in central western New South Wales, flanked by the Macquarie and Bogan catchments to the north, Darling to the west, Murrumbidgee to the south and the Sydney/Shoalhaven Basin to the east.

The Lachlan catchment covers an area of approximately 84,700 square kilometres, supports a population greater than 100,000 people and produces 14 per cent of the agricultural production of New South Wales. `

The Lachlan River rises near gunning and terminates in the great Cumbung Swamp near Oxley, 1,450 river kilometres to the west. Major tributaries of the Lachlan include the Abercrombie, Boorowa, Belubula and Crookwell Rivers.

The Lachlan River lies approximately 1km to the south of the site and is the most significant surface body of water in close proximity to the site. The Lachlan River is also an important and significant regional water resource and supplies the Greater Lachlan Shire.

In addition Gum Bend Lake is located approximately 500 m south of the site. Gum Bend Lake is a small artificial waterway created for boating, swimming and water skiing, surrounded by 40 ha of landscaped grounds for recreational purposes.

The following structures are proposed as part of the project:

- A new run-off catchment dam adjacent to the production buildings which will store run-off from the buildings and hard surface areas.

- A new larger process water dam, with a capacity of up to 100 ML, adjacent to the production buildings. This dam will store water to be used in the ethanol production process.

- A new effluent storage dam located adjacent to the process water storage dam. This dam will have a capacity of approximately 30 ML and will be used to store effluent waste water from the facility, which will also be used to irrigate the plantations.

Water will be pumped from the Lachlan River via a 'high security' water licence sought from DNR under the *Water Act 1912* and in accordance with the *Water Sharing Plan for the Lachlan Regulated River Water Source 2003*. Further investigations into the reliability and harvestable water rights associated with the project will be undertaken as part of the EAR. A water balance with regards to irrigation of the plantation will be undertaken as part of the EAR.

In addition, an assessment of surface water quality, wastewater and erosion and sediment control will be undertaken as part of the EAR to determine appropriate strategies to manage these resources.

5.3 GROUNDWATER

Data supplied in the NSW Department of Infrastructure, Planning and Natural Resources, *State of the Environment Report 2004* indicated the following in relation to groundwater in the Lachlan region:

- groundwater within the Lachlan River catchment is suitable for some domestic, agricultural and limited industrial uses, although some groundwater from low yield systems is suitable for drinking;
- the low to moderate groundwater vulnerability rating for upland areas in the Lachlan basin suggest that future landuse changes or development should undertake groundwater investigations;
- groundwater pumping from the Lachlan subsystem impacts on flows in the streams in areas with a direct hydraulic connection between the aquifer and the watercourses;
- water management planning in the Lachlan catchment generally needs to consider both the surface water and groundwater resources as a single resource;
- virtually no data is available for groundwater quality in the Lachlan groundwater subsystems or associated Central West Highlands areas of the Lachlan catchment. Local groundwater flow systems have a high salinity hazard, and there is potential for inflow of saline groundwater in the Lachlan subsystem from adjacent highland areas (Ife and Skelt 2004);
- regional groundwater flow in the area is expected to be towards the Lachlan River, which would form a groundwater divide for the shallow geological units. The groundwater below the site is therefore expected to flow in a southerly direction towards the Lachlan River; and
- the underlying geology and soils have variable permeability and therefore, groundwater is vulnerable to pollution.

The main pollution risks to the groundwater from the proposed ethanol facility are identified as being:

- spills and leaks onto the ground surface due to incidents associated with the plant operation;
- leaks from underground infrastructure installed at the plant; and
- impacts to surface and groundwater associated with storage and operation of the irrigation system.

The *Department of Environment and Conservation (DEC) Environmental Guidelines: Use of Effluent by Irrigation*, states how effluent irrigation areas and systems should be located, designed, constructed and operated so that the current or future beneficial uses of groundwater do not diminish as a result of contamination by the effluent or runoff from the irrigation scheme or changing water tables.

An assessment on groundwater vulnerability to the proposed irrigation scheme will be undertaken to ensure that the proposed reuse of effluent on the plantations will not result in significant groundwater impacts. In addition an assessment will be undertaken to determine the risks to groundwater from operation of the facility. These assessments will form part of the EAR.

5.4 AIR QUALITY AND ODOUR

The emissions to the atmosphere expected from the proposed plant include:

- dust from the milling operations;
- carbon dioxide and residual gases including ethanol and other volatiles from the fermentation stage;
- carbon dioxide and residual gases including ethanol and other volatiles from the distillation, evaporation and dehydration stage, with the potential for some of these to be odorous; and
- odour associated with headspace emissions from the ethanol storage and disposal stage.

The nearest rural dwelling is located approximately 50 metres to the east of the site boundary. The next nearest rural residential dwellings are located approximately 750 metres east of the site and approximately 1.5 kilometres east of the proposed plant. In order to reduce any odour issues the facility will be designed based on best practice to ensure that the facility's air emissions are minimised.

A comprehensive air emissions assessment report will be prepared for the proposed plant, which will meet both the USEPA standards and NSW DEC guidelines

The NSW EPA's *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW* (2005) lists the statutory methods that are to be used to model and assess emissions of air pollutants from stationary sources in NSW. It is referred to in Part 4: Emission of Air Impurities from Activities and Plant of the *Protection of the Environment Operations (Clean Air) Regulation 2002*. An air quality assessment for the proposed project will be undertaken as part of the EAR in accordance with these methods.

The potential odour impacts of the proposed plant will be assessed in accordance with the NSW EPA's draft policy *Assessment and Management of Odour from Stationary Sources in NSW*, which outlines the legislation that applies to odour assessment and management and recommends a policy framework for dealing with odour issues.

5.5 NOISE

The nearest rural dwelling residential receptor is located approximately 50 metres to the east of the site boundary and approximately 750 metres from the proposed plant. The next nearest rural residential dwellings are located approximately 750 metres east of the site and approximately 1.5 kilometres east of the proposed plant.

5.5.1 *Operational Noise*

Australian Ethanol Limited intends for all reasonable measures to be taken to prevent noise emissions for the proposed project. The likely noise generating activities from the proposed facility include:

- trucks accessing and egressing the site;
- staff vehicles accessing and egressing the site;
- milling of grain (using two rotary hammer mills) in an enclosed building as part of the milling and slurry preparation process; and
- external conveyors used throughout the process.

5.5.2 *Construction Noise*

Noise impacts expected to occur during the construction phase of the proposed development include the following:

- heavy and light transport truck (in/out) in transit;
- clearing and grading;
- earthwork concrete preparation;
- aggregate processing;
- foundation grouting and positioning of large structures (e.g. building walls);
- facility construction; and
- trenching and earthwork.

5.5.3 Acoustic Assessment

An acoustic report will be prepared for the proposed plant to assess the likely impacts of potential noise sources on the nearest adjoining residences. Noise sensitivity models will be assessed against the following criteria:

Construction Noise Criteria

The NSW EPA acknowledges that noise from construction sites is unavoidable and mitigation is often limited. The EPA's current view is that noise limits will not be set for most construction sites, but expect that all reasonable and feasible noise mitigation is applied. Construction noise is explicitly excluded from the EPA's Industrial Noise Policy (INP) (2000). The assessment criteria for construction noise set out in the Environmental Noise Control Manual ENCM (EPA, 1994) will be used.

Operational Industrial Noise Criteria

The NSW Government INP stipulates guidelines for assessment of noise from the operation of industrial facilities. The INP was specifically developed to provide a comprehensive assessment technique that complies with the *POEO Act*. Assessment criteria depend on the existing environment of areas potentially affected by the proposed development and will include both residential intrusiveness and residential amenity criteria.

The proposed facility will operate on a 24 hour basis and as such the acoustic assessment will take both 'day' and 'night' time criteria into account.

Sleep Disturbance

As the proposed facility will operate 24 hours per day, transient noise sources such as reversing alarms will be assessed for the potential to disturb the sleep of nearby residents. The EPA's Environmental Noise Control Manual indicates that to prevent sleep disturbance, the $L_{1\ 1min}$ noise level from an intrusive source should not exceed the background noise level by more than 15dB.

However, this criterion does not take account of more recent research on the effects on sleep of road traffic noise. The EPA's Environmental Criteria for Road Traffic Noise policy indicates that maximum noise levels below 50 - 55dB (A) within residences are unlikely to cause awakening reactions. If bedroom windows are open, this corresponds to an external maximum noise level of approximately 60 - 65 dB (A) at a residence.

In our experience, adopting the more stringent Noise Control Manual criterion for the facility would be desirable in the first instance, and if exceedances are predicted, the EPA's more recent Road Traffic Noise criteria may be applicable.

5.6 TRAFFIC AND TRANSPORT

5.6.1 Surrounding Road Network

Trucks accessing and egressing the site will do so from Micabil Road which adjoins the southern boundary of the site. Micabil Road is a sealed single-carriageway road with one lane in each direction which is suitable for road-trains and has a speed limit of 100 kph. The surrounding road network consists of:

- Micabil Road is accessed from the Lachlan Valley Way and Parkes Road which are the major roads into Condobolin from the east;
- Lachlan Valley Way which may be accessed from either Newell Highway from the south which leads to Parkes and Dubbo;
- Mid-Western Highway from the south which leads to Griffith and Hay to the west, and Cowra and Bathurst to the east; and
- Nymagee Condobolin Road to the north of the site is a lesser road connecting to either the Mitchell Highway which travels north to Nyngan and Bourke, or the Barrier Highway which travels west to Nyngan, Cobar and Broken Hill.

Both the Newell Highway and Mid Western Highway are major transport routes in the region.

Traffic in the area generally comprises local traffic between the towns and rural areas, and highway trucks and road-trains transporting goods and materials throughout the region.

5.6.2 Vehicle Movements

The total number of vehicle movements to and from the ethanol facility is estimated to be 100-200 per day.

It is estimated that traffic movements along Micabil Road will increase substantially as a result of deliveries to and from the site during operation of the facility, comprising:

- grain transport in;
- ethanol product out;
- wet distillers grains and syrup sales out;
- denaturant (petrol) deliveries;
- LPG deliveries;
- chemicals and miscellaneous deliveries; and
- light vehicles (staff cars).

An assessment of the impact of traffic and transport associated with the development and operation of the ethanol facility will be undertaken as part of the EAR.

5.7 VISUAL IMPACTS

5.7.1 Existing Landscape

The immediate visual catchment of the site is defined by Micabil Road and the Orange-Broken Hill Railway to the south and various agricultural plots to the north and west as well as a rural residential property approximately 500 metres to the east. The site is also partially visible from Gum Bend Lake located 500 metres to the south. The general area is flat rural agricultural land characterised by cropping and grazing and sparse rural development.

The majority of the property is rural agricultural land with stands of trees visible along the boundaries of the property and smaller vegetation clusters located in patches throughout the remainder of the property. An existing metal shed of approximate dimensions 10x20 m^2 is located on the northern boundary of the site towards the middle of the property. Immediately surrounding the shed is some small scale farming equipment. Access to the site is via Micabil Road on the southern boundary of the site.

Surrounding properties are characterised by primarily agricultural uses with residential dwellings set in lawned gardens with pockets of dense vegetation. A number of grain storage silos and bunkers characterise the local area, the nearest being adjacent to Micabil Road and the railway line approximately 2.5 kilometres to the east of the site.

5.7.2 Proposed Landscape

Expected visual elements of the ethanol facility include the following items, landforms and activities:

- the plant and associated infrastructure as described in more detail in *Section 2.1.2* located near the western boundary of the site;
- a grain storage building which will be the tallest structure on site with maximum height of 35 metres;
- grain storage bunkers will be located adjacent to the main buildings;
- various smaller buildings associated with the production facility;
- various sealed roads, for access to and from the facility to deliver/receive goods and supplies;
- the forest plantation in the east of the site;
- a larger process water dam, with a capacity of up to 100 ML, to the north-east of the production buildings; and
- an effluent storage dam in the south-eastern portion of the site near the proposed plantation area. This dam will have a capacity of approximately 30 ML and will be used to store effluent waste water from the facility.

5.7.3 Potential Visual Impacts

Following inspections of the site and surrounds a number of locations were identified as potentially sensitive viewer locations. These include rural properties adjacent to the site. Two sensitive locations are identified as follows:

- Viewer Location 1: Rural dwelling approximately 50m east of the eastern boundary of the site; and
- Viewer Location 2: Recreational users at the Gum Bend Lake approximately 500 metres to the south of the site.

Views of the buildings and dams from these locations will generally be screened by the proposed plantations in the east and south of the site. Retention of the original vegetation wherever possible will also be included in the facility design to minimise potential impacts on the visual amenity of the locality.

Moderate visual impacts are expected to occur during the construction of the facility and establishment of the plantations. The following mitigation measures will be implemented to further minimise the extent of impacts upon visual amenity for the proposed construction works:

- plant and equipment will be kept to designated areas; and
- stockpiling will be carried out within the areas specified, i.e. no stockpiling outside of designated areas;
- the contractor will maintain the site in an orderly manner and will minimise the spread of materials stockpiles, waste and vehicle parking.

Moderate visual impacts are expected to be present following the construction of the site however the number of sensitive visual receptors is few.

The following mitigation measures will be implemented to further minimise the extent of impacts upon visual amenity for the operation of the proposed works:

- clearing of vegetation will be kept to a minimum, with trees along the boundaries of the site maintained wherever possible and in particular along the eastern boundary of the site where the most sensitive receptor is located; and
- additional planting and maintenance of trees is proposed in the view shed of the operation to the east of the site.

Other factors that are expected to limit the visual impacts of the proposed plant include:

- the proposed silos and grain storage bunkers will be similar to those on nearby properties and throughout the Central West Region; and
- the plantation is proposed to be along the eastern portion of the site in view of the most sensitive receptor.

Due to the above the proposal is expected to have a low visual impact on the surrounding area. A brief visual analysis will be completed as part of the EAR.

5.8 HERITAGE

5.8.1 European Heritage

A preliminary search of the relevant heritage registers for the Lachlan local government area was undertaken that included the Australian Heritage Database (including the Commonwealth Heritage List the National Heritage List and the Register of the National Estate), the Australian Heritage Places Inventory, the Heritage Office Department of Planning State Heritage List and the State Heritage Register. The Lachlan Local Environmental Plan (LEP) 1991 was also searched for heritage items in the local area.

A total of 34 historic heritage items were identified in these searches. While many of these are located in the general vicinity of Condobolin, none were recorded as being located on or adjacent to the site.

No further investigation of European heritage is proposed as part of the EAR.

5.8.2 Aboriginal Heritage

The Lachlan LEP 1991 was searched for indigenous places. The Lachlan LEP lists four indigenous places in the Shire, more than 5 kilometres from the site (Lachlan Shire Council, 2005).

The Department of Environment and Conservation (DEC) Aboriginal Heritage Information Management System (AHIMS) was searched within a 5 kilometre radius around the proposed facility, and revealed 26 Aboriginal sites, consisting predominantly of stone artefact scatters and scarred trees. An Aboriginal burial ground exists more than three kilometres to the south of the site. No Aboriginal sites have been previously recorded on or near to the property.

Figure 4 identifies Aboriginal sites located within a 5 kilometre radius of the site. The nearest Aboriginal site to the proposed facility is a stone artefact scatter (43-1-0027) located 780 metres to the south on the banks of the Lachlan River.

As the site has been cleared and ploughed for cropping throughout the past 100 years, the site is unlikely to have retained any Aboriginal heritage significance. As there have been a number of sites recorded within the locality, an Aboriginal Heritage assessment involving consultation with the local Aboriginal community and a site survey will be undertaken as part of the EAR.

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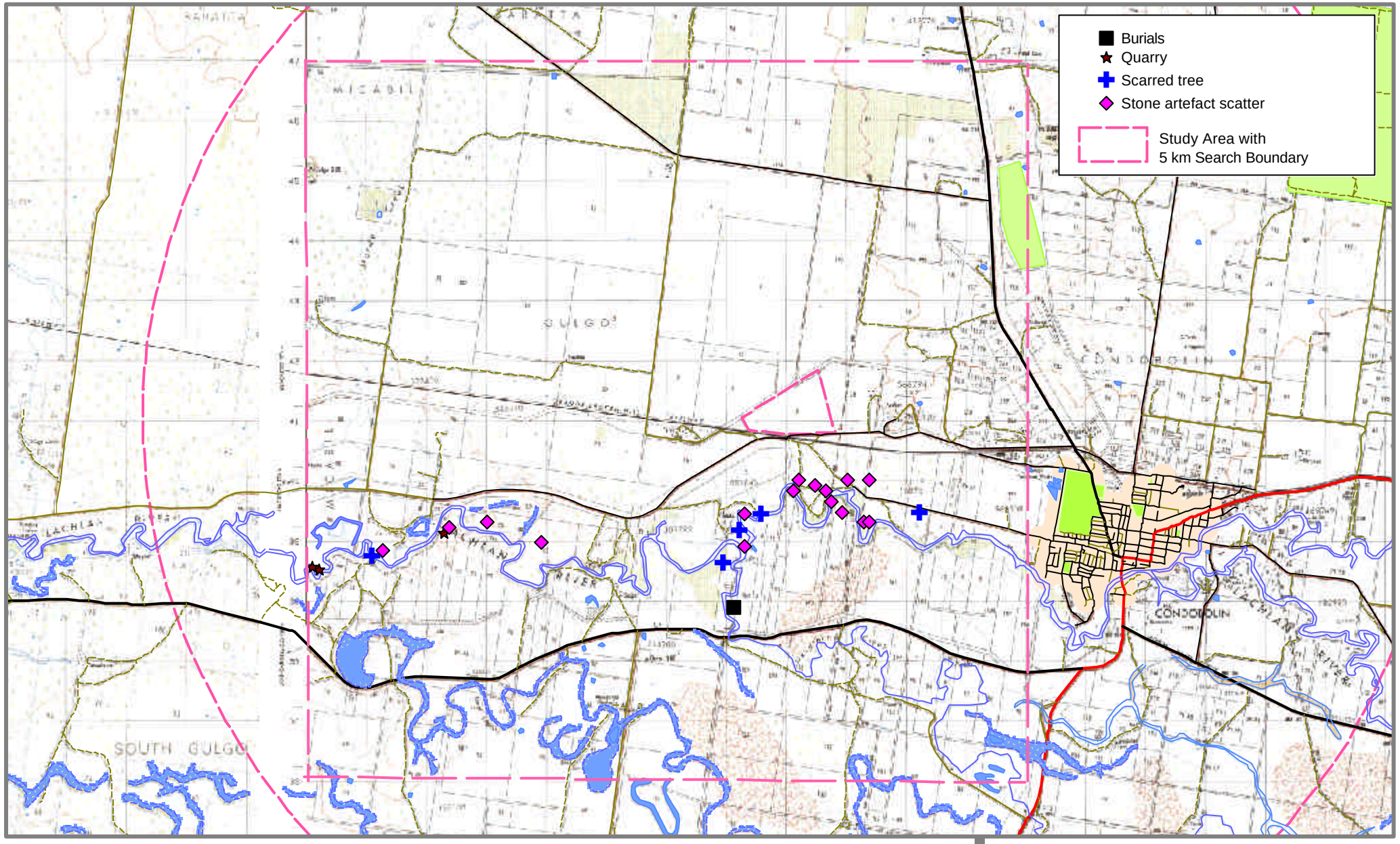

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Figure 4

Location of Aboriginal Sites (registered on AHIMS Database) within 5 km of Study Area

5.9 ECOLOGY

Preliminary background literature reviews and database searches were undertaken to obtain information on flora and fauna species and vegetation communities likely to occur on the site or surrounding area. This included searches for threatened species listed under the *Threatened Species Conservation Act (*TSC Act*)* 1995 and Commonwealth EPBC Act previously recorded in the locality within a 10 km radius of the site. Sources of information included the following:

- DEC Wildlife Atlas Database; and
- DEH online search for Matters of National Environmental Significance (NES).

The database searches indicated 6 threatened fauna species, 7 threatened flora species and 5 Commonwealth listed migratory species that have the potential to occur within a 10km radius of the site. Species identified under the TS Act are listed in *Figure 5*.

The DEH and DEC online database indicated that the following three EECs have been reported to have habitat available within 10 kilometres of the site:

- *White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland*-critically endangered (EPBC Act; TSC Act)*;*
- *Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South western Slopes* (TSC Act)*; and*
- *Fuzzy Box Woodland on alluvial Soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions* (TSC Act).

Historic land use for agricultural cropping and the current land use for agricultural storage have greatly modified the indigenous vegetation of the site. The current biological values are considered to be low.

An assessment of the potential impacts of the proposed project on the identified significant species will be completed as part of the EAR.

G:\GIS\Minor Projects\0051752\Fig5 Threatened Species Cond.WOR 24 07 2006 Environmental Resources Management Australia Pty Ltd

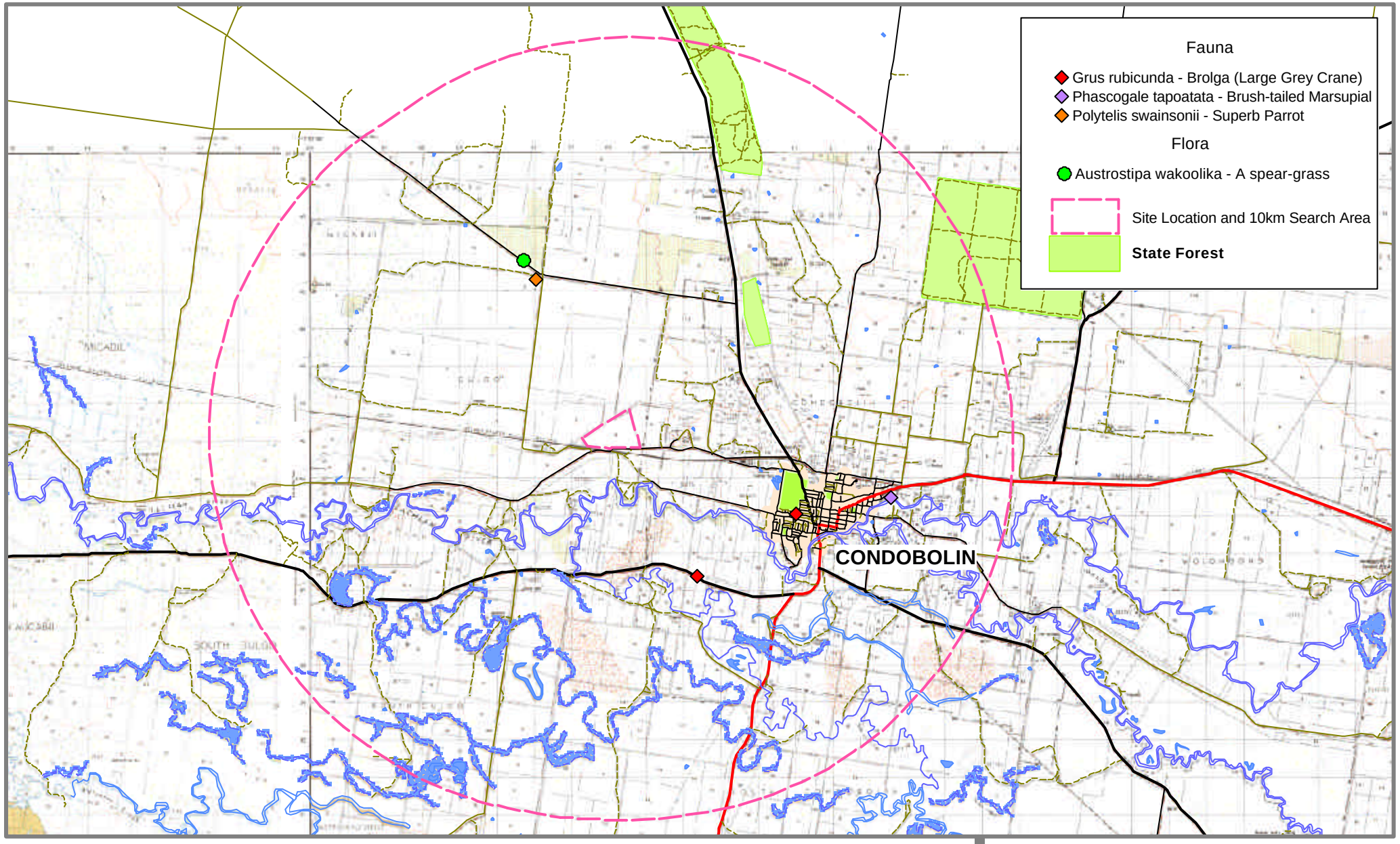

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Figure 5

Threatened Species Previously Recorded within 10km of Condobolin Site

Preliminary Environmental Assessment for
Proposed Ethanal Production Facility: Condobolin

5.10 INFRASTRUCTURE

The proposed development is serviced with all necessary infrastructure.

- Potable and process water will be pumped directly from the Lachlan River to the site via construction of a new pumping station on its banks and a pipeline from the Lachlan River via Gum Bend Lake to the site. The pipeline will follow an existing travelling stock route and would need to be augmented from two inches to four inches to be able to supply the amount of water needed for the production facility.

- Process water will be provided for the plant by the same pipeline. The plant will require approximately 8ML per day. Process water will be pumped to a holding dam on-site, from which it will be used to fire the boiler, and for the process plant. The majority of process water is expected to be recycled back onto the production process via treated effluent reuse.

- A 'high security' water licence will be applied for the plant from DNR. This will ensure an adequate supply of water for the production process and may at a later stage be converted to an industrial licence.

- Country Energy supplies electricity to the region.

- The natural gas network can be augmented to service the site.

- The site is connected to the local telecommunications network.

- Reticulated sewerage is not currently available to the site and is not required by the plant.

An assessment of the capacity necessary for the project for each of the above infrastructure requirements will be completed as part of the EAR.

5.11 HAZARDS AND RISKS

The proposed project will involve the production and storage of flammable substances including 10ML of ethanol, 400,000L petrol fuel and potentially LPG. The potential risks posed by these activities along with the proposed mitigation measures and emergency response protocols will be addressed in the EAR.

As the proposed project may be considered a 'potentially offensive industry' under SEPP 33, a preliminary hazard analysis will also be prepared as part of the EAR.

5.12 SOCIO-ECONOMIC IMPACTS

Socio-economic benefits of the proposal include direct and indirect employment of local staff contractors, increased demand for locally grown grain (wheat, barley, corn) and a supply of wet distiller's grain as feed to farmers in the region. Approximately 40 full-time staff will be employed during the operation of the proposed plant. There will also be continued economic multiplier effects to local and regional businesses and industries over the longer term. The proposal will not reduce rural lands to an extent which would compromise local agricultural activity or production and will instead provide a valuable feed source for the intensive agriculture feedlots in the region.

Potential negative socio-economic impacts associated with the proposed ethanol production facility may relate to the acoustic amenity, water and air quality which without mitigation measures could have the potential to affect nearby residents and regional resources. Changed traffic conditions are expected in the local area during the operation of the plant and trucks entering and leaving the site may have an impact on nearby residents. These potential impacts will be addressed in the land use, acoustic and traffic assessments completed as part of the EAR.

Community consultation will be undertaken during the preparation of the EAR, targeting key community groups in Condobolin and the surrounding area and is likely to involve the following components:

- preparation of information newsletters that will be distributed to key community groups and adjacent residents to provide information and updates relevant to the project and invite comment; and
- organisation of a community information session to provide information and field questions from the local community.

If significant issues are raised, targeted consultation with relevant groups or residents would be conducted.

5.13 ECOLOGICALLY SUSTAINABLE DEVELOPMENT

Australia's National Strategy for Ecologically Sustainable Development (NSESD) 1992 (NSESD) defines ecologically sustainable development (ESD) as:

> *"using, conserving and enhancing the community's resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased".*

Bio-fuels, such as ethanol, produced from cereal grains, wood or sugarcane can be a greenhouse-neutral, renewable energy source for use in transport vehicles, stationary engines, and small electricity generators. Ethanol also lowers vehicle exhaust emissions that are ozone damaging, degrade air quality and represent a threat to human health.

Bio-fuels have the potential to be greenhouse-gas neutral (depending on the feedstock), as atmospheric carbon is recycled into biomass through the carbon cycle. The proposed production of ethanol for Australia therefore has the potential to be environmentally sustainable.

An ethanol industry in Australia may reduce the reliance on imported fuels, improve domestic fuel productivity, reduce reliance on fossil fuels and create local employment.

The four principles of ESD as they relate to the proposed activity will be addressed within the environmental assessment. These principles include:

i. Conservation of Biological Diversity and Ecological Integrity- addresses the need to maintain ecosystem diversity, species diversity and genetic diversity within species.

ii. The Precautionary Principle - that where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.

iii. Intergenerational Equity and Intragenerational Equity (between generations) - the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations. Intra-generational equity (within generations) requires that the economic and social benefits of development be distributed appropriately among all members of the community.

iv. Improved Valuation and Pricing of Environmental Resources - refers to the need to include environmental factors in the valuation of assets and services.

These principles have been paraphrased from the *Protection of the Environment Administration Act 1991*.

6 *CONCLUSION*

Australian Ethanol Limited propose to establish an ethanol production facility at Condobolin in the Central West region of NSW with a production capacity of 200ML/year of ethanol products.

The development of an ethanol production facility with associated plantations will result in an environmentally sustainable development that utilises local produce and will have significant economic flow on effects to the Central West Region.

The proposed hardwood plantations, the re-use of effluent to irrigate the plantations, and the sale of wet distiller's grain all demonstrate the environmentally sustainable approach incorporated into the project.

The proposed facility will be carefully sited in the western portion of the site to ensure minimal amenity impacts on the rural dwelling to the east as a result of noise, air emissions, traffic and/or visual appearance.

This report sets out the proposed project, provides an overview of potential key issues and outlines the approach to the assessment of the issues in the EAR.

In summary the key environmental considerations identified in this preliminary assessment for the proposed facility at Condobolin are:

- surface and groundwater quality;
- air quality and odour;
- noise; and
- traffic and transport.

These issues will therefore be addressed in greater detail in the EAR. The potential impacts of the proposed facility on ecological, visual and infrastructure issues will be briefly addressed in the EAR.

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