

Riverina Oils and BioEnergy

Integrated Oilseed Processing Plant

VOLUME 1 Environmental Assessment

August 2010



Revision History

Revision	Revision Date	Authorised	
		Name/Position	Signature
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Certification

Submission of Environmental Assessment

prepared under the *Environmental Planning and Assessment Act 1979* Section 75F

EIS prepared by		
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In respect of	Integrated Oilseed Processing Plant	
Project application	Project Application 07_0146 - MOD 1	
Applicant name	Riverina Oils and Bio Energy Pty Ltd	
Applicant address	Riverina Oils and Bio Energy 50 Upper Heidelberg Rd Ivanhoe VIC 3079	
Land to be developed lot no., DP/MPS, vol/fol etc. Proposed project.	The proposed project is to be carried out on Lot 12 DP 1130519. The proposed project involves the construction and operation of an Integrated Oilseed Processing Plant north of Bomen, Wagga Wagga.	
Environmental Impact Assessment	An Environmental Impact Assessment is attached.	
Certification	I certify that I have prepared the contents of this Environmental Impact Assessment, which has been prepared in accordance with sections 72 and 73. The statement contains all available information that is relevant to the environmental assessment of the development to which the statement relates and to the best of my knowledge it is true in all material particulars and does not, by its presentation or omission of information, materially mislead.	
	Signature	Signature
		
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	23 August 2010	23 August 2010

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DICTIONARY

AADT	Annual Average Daily Traffic
ABARE	Australian Bureau of Agriculture and Resource Economics
AGO	Australian Greenhouse Office
AHD	Australian Height Datum
ANZECC	Australian and New Zealand Environment and Conservation Council
AS	Australian Standard
AWC	Available water capacity
bgs	Below ground surface
BOD	Biochemical Oxygen Demand
BTRE	Bureau of Transport and Regional Economics
cmol (+)/kg	centimoles of positive charge / per kilogram of soil
CO _{2-e}	Carbon dioxide equivalent
CSU	Charles Sturt University
dB(A)	Decibels (A scale)
DCP 2005	Wagga Wagga Development Control Plan 2005
DECCW	Department of Environment, Climate Change and Water
DoP	Department of Planning
DPI	Department of Primary Industries
dS/m	decisiemens per metre
EA	Environmental Assessment
EARs	Environmental Assessment Requirements
EASR	Environmental Assessment Scoping Report
EB	East Bomen
EC	Electrical Conductivity
ECEC	Effective Cation Exchange Capacity
ECNM	Environmental Construction Noise Manual
ECRTN	Environmental Criteria for Road Traffic Noise
EEC	Endangered Ecological Community
EIMP	Effluent Irrigation Management Plan
EPA Victoria	Victorian Environmental Protection Authority
EP&A Act	Environmental Planning and Assessment Act 1979
EPBC Act	Environment Protection and Biodiversity Conservation Act
EPL	Environment Protection Licence
ESD	Ecologically Sustainable Development
ESP	Exchangeable sodium percentage
ETP	Effluent Treatment Plant
FAME	Fatty Acid Methyl Esters
GJ	Gigajoules
ha	hectares
HIPAP No. 6	Hazardous Industry Planning Advisory Paper No.6
HLA ENSR	ENSR Australia Pty Ltd
IGAE	Intergovernmental Agreement on the Environment
INP	Industrial Noise Policy
IOPP	Integrated Oilseed Processing Plant
kg/hr	kilograms per hour
kL	kilolitre
kPa (g)	Kilopascal (gauge)
KTP	Key Threatening Process
kW/m ²	Kilowatts per metre square
LALC	Local Aboriginal Land Council
LEP 1991	Wagga Wagga Rural Local Environmental Plan 1991
LGA	Local Government Area
LOS	Level of Service
Major Projects SEPP	State Environmental Planning Policy 2005 – Major Projects
m ³ /hr	cubic metres per hour
mg/kg	Milligrams per kilogram
ML	Megalitre
MWH	Mega Watt Hours
Nm ³ /hr	normal cubic metres per hour
NPI	National Pollutant Inventory
NSW	New South Wales
OECD	Organisations for Economic Cooperation and Development
OU	odour units
P	Phosphorus

PHA	Preliminary Hazard Analysis
POEO Act	Protection of the Environment Operations Act 1997
ppm	parts per million
PVC	Polyvinyl chloride
RAAF	Royal Australian Air Force
RBL	Rating Background Level
RNE	Register of the National Estate
ROBE	Riverina Oils and Bio Energy Pty Ltd
RTA NSW	Roads and Traffic Authority
SAR	sodium absorption ratio
SEPP 11	State Environmental Planning Policy 11 – Traffic Generating Development
SEPP 33	State Environmental Planning Policy 33 – Hazardous and Offensive Development
SEPP 44	State Environmental Planning Policy 44 – Koala Habitat Protection
SHI	State Heritage Inventory
SKM	Sinclair Knight Merz
SoC	Statement of Commitments
SPL	Sound Pressure Level
t	Tonne
t CO2-e/kL	Tonnes of carbon dioxide equivalent per kilolitre
TMP	Traffic Management Plan
31TOU	The Odour Unit
tpd	tonnes per day
veh/hr	vehicles per hour
VOCs	Volatile Organic Compounds
WISDOM	Wagga Industrial Sustainable Development Opportunities Model
WWCC	Wagga Wagga City Council

EXECUTIVE SUMMARY

Riverina Oils and Bio Energy Pty Ltd (ROBE) engaged Lennon Salvestro Planning Pty Ltd, to prepare the revised Environmental Assessment (EA) for the proposed construction and operation of an Integrated Oilseed Processing Plant (IOPP). The original application was approved 04/11/2008. The original application proposed an Integrated Oilseed and Biodiesel Processing Plant; the biodiesel component of the plant has been removed in the revised environmental assessment for economic reasons.

The proposed development has been declared by the NSW Minister for Planning (the Minister) as a 'major project' under the provisions of the Environmental Planning and Assessment Act 1979 (EP&A Act) and State Environmental Planning Policy (Major Projects) 2005 (SEPP 2005), and is therefore subject to the provisions of Part 3A of the EP&A Act with the Minister being the approval authority. A project approval under section 75J of the EP&A Act is therefore being sought for the proposed IOPP.

The proposed site includes lot 12 DP 1130519. This lot is situated north east of Wagga Wagga in the south western Riverina region of New South Wales (NSW).



Figure 1: Site Location (Source: Spatial Information Exchange)

Approved Development

The approved development was for the proposed construction and operation of an Integrated Oilseed Processing and Biodiesel Plant (IOPBP), which included the processing of oilseeds for the production of biodiesel and co-products including vegetable protein meal, refined edible vegetable oil and refined glycerine.

The proposed development would have had a manufacturing capacity of 75 million litres (ML) of biodiesel. The development would also generate co-products through the integrated oilseed crushing plant in the volumes 109,500t of meal, 30,000t of refined vegetable oil and 8,460 t of crude glycerine. Manufacturing would have occurred via the PJ Project Engineers Private Limited of Bangalore India – PJPE Process.

The production of these products would occur in the following components which collectively comprised the IOPBP.

- Oilseed crushing plant
- Solvent extraction plant
- Meal Blending Shed
- Vegetable Oil Refinery
- Glycerine refining unit
- Biodiesel plant and
- Storage and Handling facilities.

Operation of the IOPBP would have resulted in the generation of wastewater which was to be treated on site and irrigated on adjoining effluent irrigation areas to the north and east of the IOPBP footprint.

The proposed IOPBP would operate 24 hours per day, 7 days per week and would provide employment for approximately 79 people.

The project would have required a construction period of up to 60 weeks, which would include site establishment, delivery of raw construction materials and plant and equipment, earthworks and grading, installation of amenities and services and construction of the IOPBP and ancillary structures. During the peak construction period, up to 300 construction personnel may have been on site.

Construction works would have been undertaken between the hours of 7.00 am and 6.00 pm Monday to Friday, and 7.00 am to 4.00 pm Saturday. No construction work would be carried out on Sundays or Public Holidays.

Description of the revised project

The revised project involves the construction and operation of an Integrated Oilseed Processing Plant (IOPP), which includes the processing of oilseeds for the production of vegetable protein meal and edible vegetable oil.

The project involves the construction and operation of a number of components which collectively comprise the IOPP, including:

- Oilseed crushing plant;
- Solvent extraction plant;
- Meal blending shed;
- Vegetable oil refinery; and
- Storage and handling facilities.

The proposed development would have a yearly manufacturing capacity through the integrated oilseed crushing plant of approximately 90,000 Tonne of vegetable protein meal, 66,000 Tonne of refined edible vegetable oil. Manufacturing will occur via the DESMET BALLESTRA Process.

Operation of the IOPP will still result in the generation of wastewater which is to be treated on site and irrigated on adjoining effluent irrigation areas located on adjacent land owned by RIVCO Group Pty Ltd land to the south east of the site. An agreement has been reached between ROBE

and RIVCO Group Pty Ltd which states that RIVCO Group Pty Ltd will accept the treated wastewater for use as irrigation water on their land.

The proposed IOPP would operate 24 hours per day, 7 days per week, and is anticipated to provide employment for up to 70 people.

The project would require a construction period of up to 60 weeks, which would include site establishment, delivery of raw construction materials and plant and equipment, earthworks and grading, installation of amenities and services and construction of the IOPBP and ancillary structures. During the peak construction period, up to 150 construction personnel may be on site.

The Effects of the proposed changes

The following table outlines the major differences between the original approved project and the revised project for which approval is being sought. Following the table a plan which compares the original layout with the revised layout is included which shows diagrammatically the change to the layout.

Following **table 1**, **figure 2** shows diagrammatically the comparison of the approved layout and the revised layout.

Table 1: Comparison of the Approved Plant and the Revised Plant

Component	Original Approval	Revised Application	Effect of change.
Removal of Biodiesel component of process due to economic reasons	The approved application included Biodiesel production	No Biodiesel production is proposed in the amended application.	A number of buildings on the original approval are no longer required as a result of this change to the project – these are detailed in section 1.1 below. Any environmental impacts associated with the biodiesel component are no longer a consideration.
The Process	The PJ Project Engineers Private Limited of Bangalore India – PJPE Process was the approved process for the plant	The DESMET BALLESTRA processes is now proposed to be used.	The DESMET BALLESTRA process has been adopted by ROBE for the production of vegetable oil and protein meal. Change in process has required a number of plant design and layout changes which will effect predominantly the bulk and scale of the buildings at the plant. A number of buildings have increased in height.
Oilseed unloading and Meal Filling	These two processes were originally separated	These two processes are now within close proximity of each other.	Reduction in costs to move the oilseed to the crushing unit
Oilseed Crushing Plant, Solvent Extraction Plant and The Vegetable Oil Refinery	These components were separated on the original layout	The components are now located near each other, in sequence	This will improve management of the three main processes, improve safety and reduce costs associated with piping and conveying between the three main plants.
Meal Blending Shed	Originally located in western portion of site	Removed from revised layout to be incorporated with the Meal	Savings in space on the site.

		Storage Shed	
Internal Road layout	The approved layout did not give appropriate consideration to the turning needs of B-Doubles. The original layout did not provide sufficient space for B- Doubles to access the site in a safe manner. The approved layout did not relate to the local transport and delivery regulations.	The revised layout is based on a simple main ring road to enhance the flow of delivery vehicles in a clockwise direction and good clear access for emergency vehicles. The revised internal road layout design was also revised with much consultation with local oilseed/meal handling consultants	The benefits of the revised layout is that delivery trucks can enter the site loaded with oilseed, unload their oilseed and then re-load with meal which forms an integral part of the operational logistics of the plant
Trahairs Road Intersection	The original approval included upgrades to the intersection of Trahairs Road with Byrnes road.	The improvements to the Trahairs Road/Byrnes Road intersection remains unchanged on the revised application.	NO CHANGE.
Weighbridge	The approved application included a single weighbridge. This design meant that B-Double vehicles would have to enter and leave the site twice if they were to leave loaded with meal. The original layout required numerous circumnavigations of the site.	The revised application includes two weighbridges. The revised layout requires the delivery vehicles enter and leave once only and only one circumnavigation of the main road loop would be required, thus reducing confusion.	The approved layout is more efficient and less confusing.
Packaging Building	The approved application included a packaging building	The amended application does not include a packaging building as the processed oil will be removed from the site via transport vehicles and packaged off site.	Additional space available on the site.
Building heights	The approved building heights were: Oilseed crushing unit – 8m Solvent Extraction Unit – 12m Meal Blending Shed – 10m Vegetable Oil Refinery – 12m Storage Silos (6) – 27.6m	The revised building heights are generally increased and are approximately: Oilseed crushing unit – 29 m Solvent Extraction Unit – 22.5 m Meal Blending Shed – 6m Vegetable Oil Refinery – 27m Storage Silos (4) – 20m	Greater visual impact of components of the plant. A revised visual impact assessment has been prepared to address this issue.

	Storage Tanks – 4.8 – 8.5m Day Bins – 14m Biodiesel Plant – 16m	Storage Tanks – 15m Gravity chute for silos – 27m	
Main Entrance	The main entrance to the site was requested to be off Trahairs Road in the original approval.	The main entrance to be located off Trahairs Road.	NO CHANGE.
Emergency vehicle entrance	Approved location to the northwest of the site off Byrnes Road	Revised application has this entrance in the same location (as was approved)	NO CHANGE
Hexane unloading	The approved location was in close proximity to the Solvent Extraction Unit	The revised layout also has this facility within close proximity to the Solvent Extraction Unit. Hexane storage will be underground.	NO CHANGE
Site Boundary			NO CHANGE
Vegetable Oil Filling	Originally located in the eastern section of the site and included glycerine filling.	The revised layout has this element moved to the southwest corner of the site and without the glycerine filling.	Minimal affect as a result of this change
Treated wastewater and stormwater dam	The approved project included a 27ML storage pond. The pond was previously used by the Wool Combing Facility and it was proposed to refurbish this dam to meet the necessary standards. The dam which was proposed to be used was heavily contaminated and leaked.	The revised application proposes to construct a new 40ML dam, within the site boundaries. The new effluent and stormwater storage pond will be built to the Project Approval and DECCW guidelines.	The construction of a new dam will ensure that ROBE will not encounter any unforeseen licensing problems or environmental problems that may arise from the rehabilitation of the existing dam which is currently controlled under RWC licence.
Irrigation Location	The approved area was located to the north of the site and was approximately 10ha in area. This area has since been found to be unsatisfactory for irrigation due to the high levels of salinity. This originally approved land for	ROBE and RIVCO Group Pty Ltd have since agreed on another parcel of land, which is approximately 25ha in area and located to the south east of the site on RIVCO Group Pty Ltd land. This parcel of land has been found to be highly suitable for irrigation	

	irrigation is owned by RIVCO Group Pty Ltd.	purposes. RIVCO Group Pty Ltd have signed an agreement to accept the treated wastewater/stormwater for irrigation purposes.	
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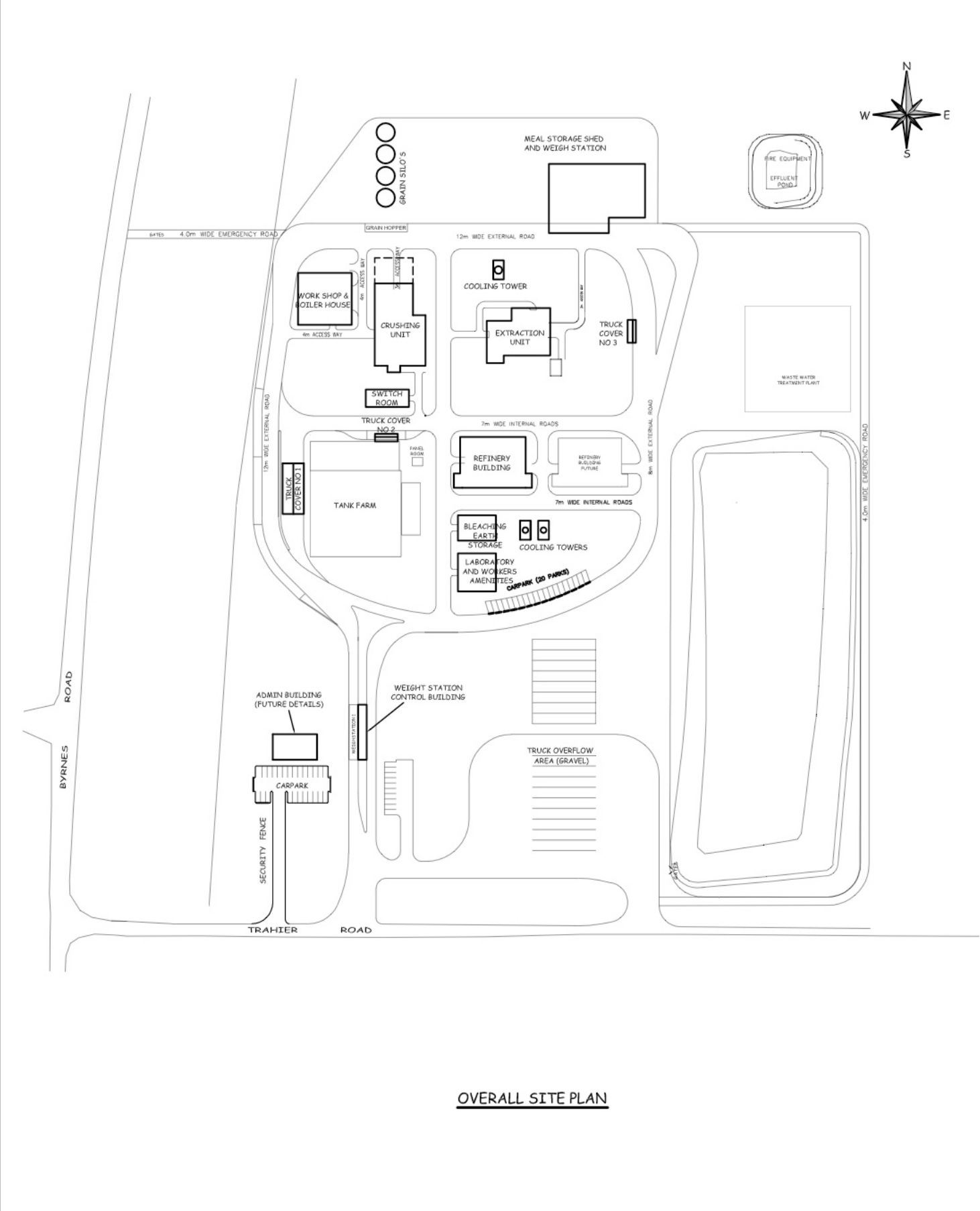
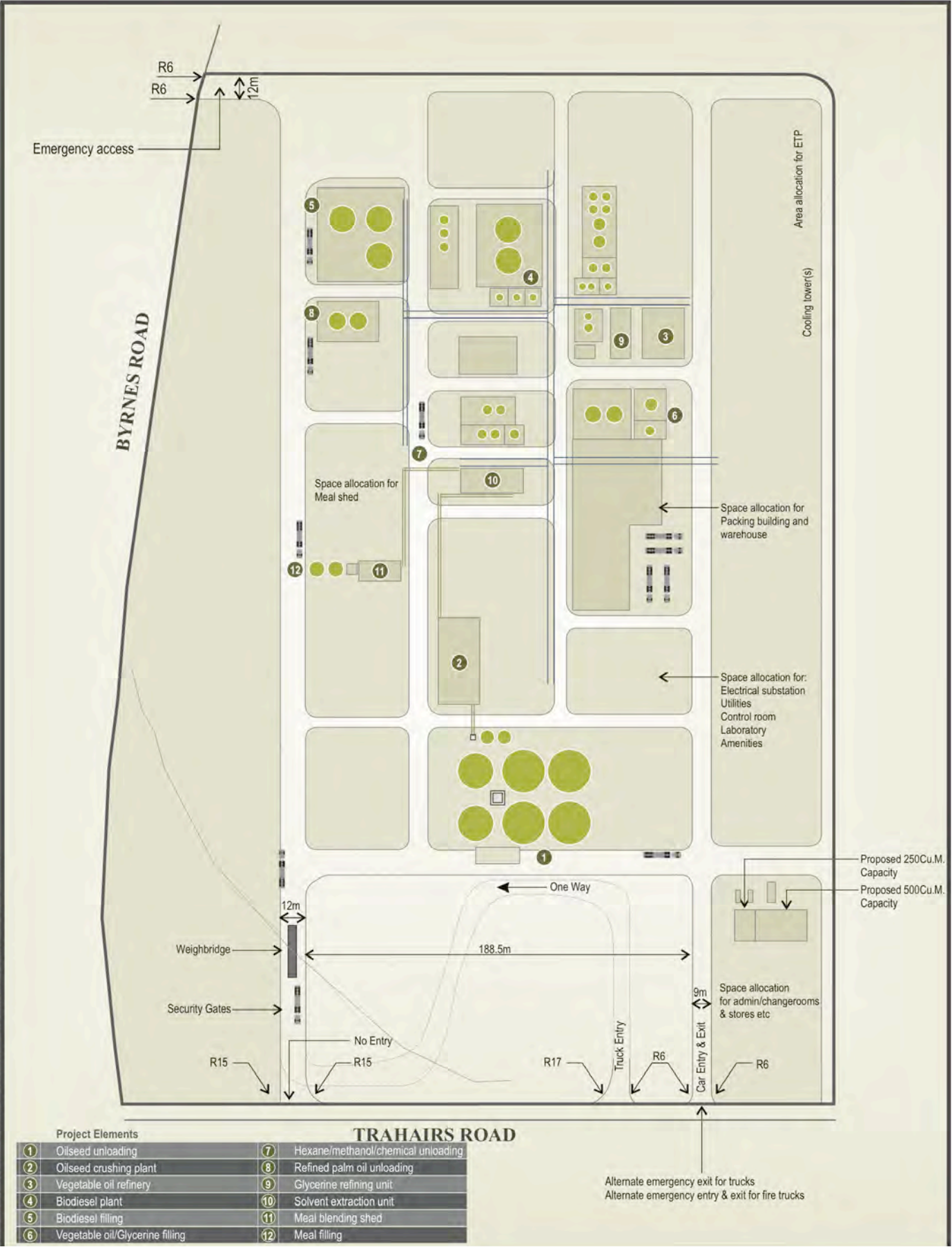


Figure 2: Comparison of Approved Plant and Revised Plant Layouts.

Statutory Approvals

The project is defined as a *rural industry* under the provisions of Clause 4 of the *Environmental Planning and Assessment Model Provisions 1980* (Model Provisions).

Development of the site is subject to the provisions of Wagga Wagga Rural Local Environmental Plan 1991 (LEP 1991) which identifies the zoning of the site as zone No. 1 (Rural). An assessment of the relevant matters of consideration was undertaken in this EA and concluded that the project is considered to comply with the requirements of LEP 1991.

The provisions of the Wagga Wagga Local Environmental Plan 2010 (described below as draft Wagga Wagga LEP 2008) also require consideration. Under this plan the subject site is zoned IN1 – General Industry. Under this zone the proposed IOPP is permitted.

The project requires approval under section 75J of the EP&A Act, an Environment Protection Licence (EPL) under the *Protection of the Environment Operations Act 1997*, and a Section 138 approval under the *Roads Act 1993*.

Impact Assessment and Management

Key environmental issues that required fresh consideration following the proposed changes to the process include:

- Odour and Air Quality
- Noise
- Traffic/Transport
- Soil and Water Management
- Waste Management
- Hazard Analysis
- Visual Impact

These issues have been examined in this environmental assessment. In order to present a complete picture of the impacts of the plant much of the material presented in the approved assessment has also been included.

Odour and Air Quality

The modeling in the odour assessment indicated that the odour concentration at the nearest residential receptor would be below the criterion of 50U (at the 99th percentile).

A qualitative assessment of potential impacts associated with the generation of dust and particulates and emissions of volatile organic compounds (VOCs) was undertaken. The EA recommends mitigation measures which are likely to minimise potential impacts associated with dust and particulates. VOC emissions are not likely to be significant and would be minimised by the design of the IOPP.

A greenhouse gas assessment was also undertaken. The assessment concluded that while this proposed facility will generate greenhouse gas emissions, the emissions would be significantly lower than if the same quantity of normal petroleum diesel was produced. This represents a significant and quantifiable environmental benefit.

Noise

The assessment assumed a conservative (minimum) background noise level at residential areas surrounding the development in order to establish noise criteria for the facility. Preliminary noise predictions were carried out based on noise levels of proposed plant and equipment supplied by the proponent using a simple single point noise model.

Results of noise predictions, for operation of the Project Site, indicate that compliance with the noise criteria set in accordance with the INP is likely for calm and adverse weather conditions.

Traffic and Transport

It is proposed that traffic generated from the IOPP would utilise Byrnes Road, which is a designated B Double route. The EA includes an assessment of the existing road network surrounding the site and the current traffic volumes and Level of Service (LOS) along Byrnes Road. During both construction and operation, the existing LOS is not likely to be adversely affected.

Soil Suitability

A soil suitability assessment of the proposed effluent irrigation area has been undertaken, and included a soil survey to confirm the geology and soil type of the area. The soils suitability of the site was assessed in accordance with the *Environmental Guidelines: Use of Effluent by Irrigation* (DEC, 2004). The subject soils have been found to be highly suitable to receive treated effluent for irrigation purposes.

Water

Surface Water

While there are no surface water bodies located on the site, potential impacts may be associated with runoff or sediment leaving the site and affecting the surface water bodies in the vicinity of the site. Potential impacts to surface water would be minimised through design measures incorporated into the construction and operational procedures.

Groundwater

A Groundwater Monitoring Plan (GMP) shall be established prior to the operation of the IOPP to provide ongoing assessment of the impacts associated with the pond and irrigation of effluent and to also enable detection of adverse impacts on the groundwater regime.

Waste Management

The project will result in the generation of both liquid and solid waste. Liquid wastes generated by the IOPP would be treated in an effluent treatment plant within the confines of the site. Wastewater generated would be irrigated on the proposed effluent irrigation areas, and managed in accordance with an Effluent Irrigation Management Plan (EIMP).

Solid waste generated on the site would include wastes from the oilseed crushing plant, vegetable oil refinery and effluent treatment plant. These wastes would be collected and utilised in fertilizer production where practical, and disposed of by a licensed waste contractor where no value is retained in the waste.

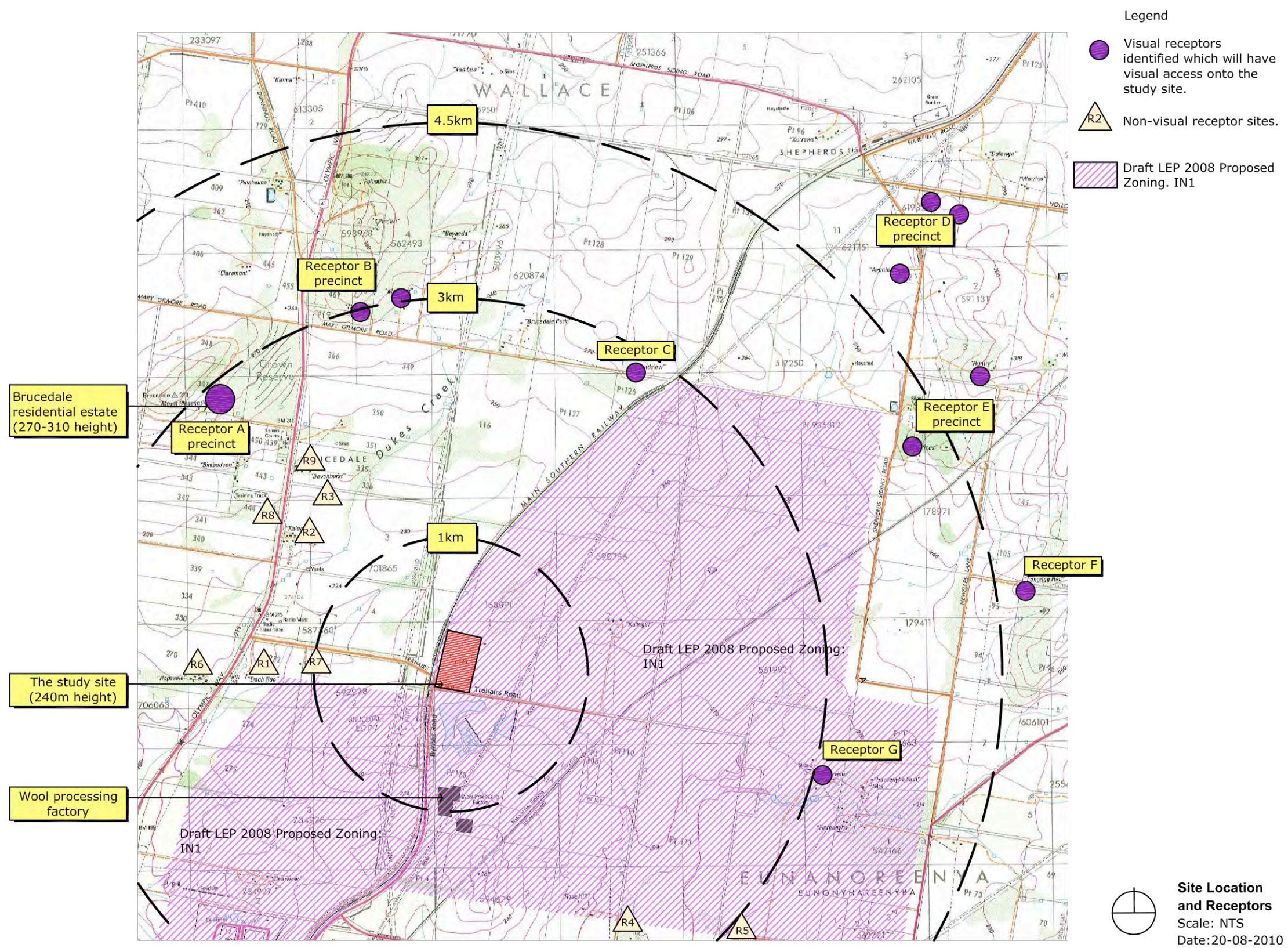
Hazards and Risk

A Preliminary Hazard Analysis (PHA) was undertaken. The PHA concluded that the risk criteria were not exceeded and the project is therefore permissible within the current land use zoning. The PHA recommended a number of safeguards to enhance the safety systems at the site and ensure the risks are maintained as low as reasonably practicable.

Visual Impact

As a result of the changes to the site layout a new visual impact assessment has been prepared for this environmental assessment. **Figure 3** shows the location of receptors of the site, including the visual receptors.

The visual impact assessment determined that due to the distance of the receptors from the site the visual amenity of residences will be predominantly preserved. However, mitigation measures are still recommended and included in the design of the project. These include limits on lighting and further landscaping (both on and off site), which will reduce the visual impact of the project on receptors.



Consultation

The EA has been prepared in accordance with the Environmental Assessment Requirements (EARs) issued by the Director-General as required by Clause 75F of the EP&A Act. Consultation has been undertaken with stakeholders and other relevant authorities as specified in the EARs.

Statement of Commitments

The proponent, ROBE, commits to undertake the environmental management and monitoring commitments outlined in the EA, and formalised in the Statement of Commitments provided in **Section 19**.

Project Justification

Justification for the project has been provided, having regard to biophysical, economic and social considerations together with the principles of Ecologically Sustainable Development (ESD).

1 INTRODUCTION

1.1 Background

This Environmental Assessment has been prepared following the ROBE Integrated Oilseed Processing and Biodiesel Facility (IOPBP), Director General's Requirements (Project Application 07_0146 - MOD 1), dated 28 October 2009 (refer **Appendix A**). The original project application was approved by The Department of Planning as Project Application 07_0146 in November 2008.

This revised Environmental Assessment aims to gain approval for the construction and operation of an Integrated Oilseed Processing Plant (IOPP) to be located at lot 12 DP 1130519 on Byrnes Road, Bomen. Riverina Oils and Bio Energy Pty Ltd (ROBE) engaged Lennon Salvestro Planning (LSP) to complete the assessment of the revised IOPP. This Environmental Assessment is the synthesis of the previous assessment and new information pertaining to the revised Integrated Oilseed Processing Plant (IOPP), which removes the biodiesel components of the plant.

The decision to remove the Bio-diesel production from the plant has had an impact on the layout of the site. The following processes have been removed from the original layout:

- Bio-Diesel Plant,
- Bio-Diesel Filling,
- Glycerine Filling,
- Refined Palm Oil Unloading and
- Glycerine Refining Unit.

The removal of these processes have freed up significant area within the site boundary to make the plant a more user friendly and safer environment with regards to storage, transportation and crushing processes.

This environmental assessment outlines the revised process, which will produce edible vegetable oil and vegetable protein meal from oilseed (safflower and canola). The revised DG requirements highlighted a number of key issues, which have been addressed in the EA, these are:

- Air Quality – **section 6** and **appendix D**;
- Noise and Vibration – **section 7** and **appendix E**;
- Soils and Water – **section 8 and 9** and **appendix F, G and H**;
- Traffic – **section 10**;
- Hazards and Risk – **section 11** and **appendix C**;
- Waste Management – **section 12**; and
- Visual – **section 13**.

In addition to the new sections of this report, other information from the original IOPBP assessment and development approval provides a complete document to allow full assessment of impacts of the revised and proposed plant.

1.2 Project Changes

A number of changes to the original project have resulted in the need to prepare a new environmental assessment. The main changes which have resulted in the greatest impact to the layout and operation of the plant are:

- Removal of the biodiesel production from the plant, for economic reasons;
- A change to the process to be used for the production of edible vegetable oil and protein meal from the PJPE Process to the DESMET BALLESTRA process;
- Changes to the land to be irrigated with the treated wastewater from the plant; and
- An associated increased visual impact of the plant resulting from changes to buildings.

The changes resulting from these changes are detailed in **table 1** above and are shown in **figure 1**.

The impacts resulting from the revised plant/process etc are detailed in the following sections of this Environmental Assessment.

1.3 Location

The proposed location for the project is approximately 10 km north of Wagga Wagga, NSW. Wagga Wagga is located along the banks of the Murrumbidgee River, approximately 45 km from the Hume Highway, which connects the town to Melbourne, Sydney and Canberra.

The proposed site is situated on the corner of Trahairs Road and Byrnes Road within the Wagga Wagga Local Government Area (LGA), and is known as 299 Trahairs Road. The site has an area of approximately 16.5 ha which comprises a footprint of some 7 ha for the IOPP with the remaining available land to the east and north to be used for effluent irrigation, as required. The site is located north of the Bomen Industrial Estate on land zoned 1 (Rural) under the Wagga Wagga Rural Local Environmental Plan 1991 (LEP 1991).

1.4 The Proponent

The proponent for the proposal is Riverina Oils and Bio Energy Pty Ltd (ROBE).

1.5 Environmental Assessment Process

The *Environmental Planning and Assessment Act 1979* (EP&A Act) and the *EP&A Regulation 2000* provide a framework for environmental planning in NSW.

Prior to a decision to proceed with a proposal that may have an impact on the environment, a detailed assessment of the likely impacts of the project must be undertaken. The proposed project has been declared by the Minister as a 'major project' under the provisions of the EP&A Act and *State Environmental Planning Policy (Major Projects) 2005* (SEPP 2005), and is therefore subject to the provisions of Part 3A of the EP&A Act with the Minister being the approval authority.

1.5.1 Major Projects

The proposal meets the criteria of a 'major project' under Group 3 of Schedule 1 of SEPP 2005.

Group 3 of Schedule 1 to SEPP 2005 identifies classes of development which include chemical, manufacturing and related industries, being:

'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)'

The proposed project involves the construction and operation of an integrated oilseed processing plant utilising some 165,000 tonnes of oilseed per annum as raw material. The proposal has a capital investment value in the order of \$47.5 million and therefore satisfies the relevant criteria to be determined under Part 3A of the EP&A Act.

A project approval under section 75J of the EP&A Act is therefore being sought for the proposed IOPP

1.5.2 Environmental Assessment Requirements

Under section 75F of the EP&A Act, an EA must be prepared in accordance with the Environmental Assessment Requirements (EARs) of the Director-General of the Department of Planning (DoP). The revised Director-General's EARs were requested in October 2009 and were issued on 28 October 2009. A copy is attached as **Appendix A** to this EA. This EA has been prepared in accordance with the EARs.

1.5.3 EA Exhibition

This EA has been prepared under Part 3A of the EP&A Act which specifically lists the matters to be addressed in the EA.

The EP&A Act requires that the EA be placed on exhibition for public review for a minimum period of 30 days.

1.6 Purpose of this Report

In accordance with Part 3A of the EP&A Act, this EA has been prepared pursuant to the Director-General's EARs and addresses the matters listed by the Director-General.

The purpose of this report is to assess the environmental effects of the revised proposal and to describe the measures that ROBE would take to minimise the impact of identified adverse environmental effects in order that the Minister for Planning can make an informed decision with regard to the proposal.

2 PROJECT DESCRIPTION

The project involves the construction and operation of an IOPP, which includes the processing of oilseeds for the production of edible vegetable oil and vegetable protein meal. Each of these products would be distributed from the IOPP and sold to regional and domestic markets.

The project involves the construction and operation of a number of components which collectively comprise the IOPP, including:

- Oilseed crushing plant;
- Solvent extraction plant;
- Vegetable oil refinery;
- Tank farm; and
- Storage and handling facilities.

The project would utilise approximately 165,000 tonnes (t) of oilseed, primarily canola and safflower seed as raw material, from which edible vegetable oil and vegetable protein meal would be produced. Annually, the project is estimated to produce up to 90,000 t of meal and 66,000 t of refined vegetable oil, which would be sold to regional and domestic markets. Operation of the IOPP would result in the generation of wastewater, which would be treated on site and irrigated on adjoining effluent irrigation areas to the southeast of the IOPP footprint. The proposed IOPP would operate 24 hours per day, 7 days per week, and is anticipated to provide direct employment for up to 70 people.

The project would require a construction period of up to 60 weeks, which would include site establishment, delivery of construction materials plant and equipment, earthworks and grading, installation of amenities and services and construction of the IOPP and ancillary structures. During the peak construction period, up to 150 construction personnel may be on site. Construction works would be undertaken between the hours of 7.00 am and 6.00 pm Monday to Friday, and 7.00 am to 4.00 pm Saturday. No construction work would be carried out on Sundays or Public Holidays.

2.1. Need for the Project

2.1.1 Purpose

The project involves the construction and operation of an Integrated Oilseed Processing Plant (IOPP) for the manufacture of edible vegetable oil using oilseed as raw material. The proposed IOPP would have the capacity to produce up to 90,000 t of vegetable protein meal and 66,000 t of refined edible vegetable oil per annum, which would be sold domestically.

The purpose of the project is to provide a range of agricultural produce including vegetable protein meal and refined vegetable oil, which can replace currently externally produced products and be sold domestically as a form of import substitution.

2.1.2 Demand for Agricultural Products

The project outputs, oilseed vegetable protein meal and edible vegetable oil, would provide a significant domestic source of products. This would allow the replacement of some imports with domestically produced goods. The import substitution of agricultural products, particularly in a regional economy such as Wagga Wagga would have significant economic benefits for both the local and regional economy.

Currently, there is a shortfall of typically 200,000 to 300,000 t per annum of oilseed vegetable protein meal in Australia, which primarily comprises Soyabean meal, of which over 90% is imported. Vegetable protein meal is currently used in agricultural industries as a source of feedstock. The project would result in the production of up to 90,000 t of vegetable protein meal per annum, which would assist to bridge this gap in supply and provide a substitution to replace meal imports from overseas.

The project would also result in the production of up to around 66,000 t of refined edible vegetable oil per annum, which would also be substituted for current imports. Safflower oil would provide a direct substitution for vegetable oil currently used in the production of margarine.

2.2. Alternatives to the Project

A number of alternatives were considered prior to application being made to construct the proposed plant at the Byrnes Rd/Trahairs Rd location.

2.2.1 Site selection Criteria

The site selection process for the proposed IOPP required consideration of a range of criteria to determine a suitable location for the project. Site selection criteria included the following:

- Proximity to a major regional centre;
- Proximity to major transport routes and access to designated B-Double routes;
- Proximity to suppliers of raw materials (namely canola and safflower);
- Adequate buffer distance to potential residential receivers;
- Availability of land for wastewater irrigation;
- Availability of existing and planned future supply of utilities such as electricity, gas and potable water;
- Proximity to compatible rural industrial land uses;
- Proximity to oilseed vegetable protein meal markets; and
- A supportive business development environment.

2.2.2 Alternative Site Locations

Four alternative site locations were identified for investigation for the proposed IOPP. These options were:

1. Development of a greenfield site in Geelong
2. Development of a greenfield site in Albury
3. Redevelopment of an existing site in Wagga Wagga
4. Development of a greenfield site in Wagga Wagga

Three options involving the development of greenfield sites were considered during the site selection process. Options 1, 2 and 4 involved the investigation of greenfield sites at Geelong, Albury and Wagga Wagga, respectively. Option 3 involved the redevelopment of an existing site located on Byrnes Road, Wagga Wagga, south of the preferred site. These alternatives are discussed in the table below.

Table 2: Review of Criteria of Four Alternative Sites

Advantages		Disadvantages	
Option 1 Development of a greenfield site in Geelong			
• Site located proximate to major centre, Melbourne. • Site serviced by major transport routes to Melbourne, regional Victoria and South Australia.		• Economic costs for the transportation of raw materials and product to and from the site. • No utilities currently exist at the site. • Connection of utilities by relevant providers was predicted to outweigh the economic advantages of the proposal at this site. • Lack of sufficient area proximate to the site for the treatment of wastewater for irrigation. • Transport of wastewater off site to appropriate facilities predicted to be expensive and therefore not economically viable.	
Option 2 Development of a greenfield site in Albury			
• Site located proximate to major regional centre, Albury. • Site serviced by major regional transport routes to Sydney and Melbourne.		• No utilities currently exist at the site. • Connection of utilities by relevant providers was predicted to outweigh the economic advantages of the proposal at this site.	
Option 3 Redevelopment of an existing site in Wagga Wagga			
• Site located close to major regional centre. • Productive redevelopment and use of an existing industrial site. • Land already has appropriate land use zoning. • Site centrally located to oilseed crop-growing regions. Safflower and canola crops are grown from southern Queensland, through NSW and southern portions of Western Australia.		• Redevelopment and modification of existing structures on the site would not be economically viable for the development of the project	
Option 4 Development of a greenfield site in Wagga Wagga			
• Site located at the corner of Byrnes and Trahairs Roads, north of Wagga Wagga. • Site proximate to markets both for raw materials as well as markets for the primary products of the proposed IOPP. • Site centrally located to oilseed crop-growing regions. Safflower and canola crops are grown from southern Queensland, through NSW and southern portions of Western Australia. • Site located proximate to existing industrial land uses with the nearest residential receiver some 1.6 km from the site. • Nearest residential receptor with a view to the site is 3 km. • Designated B-Double routes from regional and interstate transport routes already service the area. • While utility infrastructure is not currently on the site, agreements have been made with local utility service providers.		• Utility infrastructure is not currently on the site.	

Option 4, development of a greenfield site at the corner of Byrnes Road and Trahairs Road, north of Wagga Wagga was selected as the preferred option. The site was considered to be the most suitably located, and presented the most economically viable alternative.

2.2.3 Alternative Process Materials

The primary product for the production of edible vegetable oil is oilseed. A range of oilseeds were considered for processing in the proposed IOPP at the site. Oilseeds considered, and the respective advantages and disadvantages are discussed in the following table.

Table 3: Consideration of Oilseed Crop Alternatives

Oilseed	Advantages	Disadvantages
Canola	• Australia's largest oilseed crop, grown in various geographical regions. • Australia produces some 3 million tonnes per year. • An excellent "break crop" providing the opportunity to control a number of weeds. • Relatively high oil yield compared to soybean, sunflower, safflower and corn.	• High weed control costs during cultivation (Holtzapffel et al., 2007). • Potentially higher costs due to competition with cheaper imports
Safflower	• Grown in a wide geographic region in Australia. • Can be used successfully as break crops for cereal crops - opportunities to encourage the expansion of cropping areas. • Refined safflower oil can be directly substituted for vegetable oils currently used in food production such as margarine.	• Potentially higher costs due to competition with cheaper imports.
Palm Oil	• Highest oil yielding crop per hectare. • Relatively cheap in the market.	• Palm oil fully imported. • Labour intensive crop. • Limited area in Australia that meets climatic requirements.
Cotton Seed	• Major oilseed crop produced in Australia.	• Cultivation is highly water intensive. • Once seeds are crushed, oil needs to be refined almost immediately due to toxins in the seed, which may impact quality.
Sunflower	• Can be used successfully as break crop - may be opportunities to encourage the expansion of cropping areas (Holtzapffel et al., 2007).	• Grown in Queensland and Northern NSW, therefore increased transport costs. • Recent virus, tobacco streak, has reduced the production of sunflower in Australia.
Soyabean	• Can be used successfully as a break crop.	• Australia produces 1 million tonnes per year but is produced for meal rather than oil, as oil yield is only around 20%. • Suitable regions for growing soybeans are limited in Australia

Canola and safflower were selected as the primary oilseed products for processing in the proposed IOPP. Canola and safflower are cultivated in a wide geographic region in Australia, thereby minimising transport costs. Canola seed has a relatively high oil yield in comparison to other oilseed crops including safflower, soybean, sunflower, and corn.

Canola has developed into Australia's major oilseed crop and is grown in Western Australia (the largest producer), NSW (Central West and Southern Regions), Victoria and South Australia. The Riverina Region of NSW is a major canola growing area. Since 1991, Australia's canola production

has reduced reliance on imports of edible oil and has resulted in an export trade mainly to Japan and China. In Australia, safflower can be grown over a wider geographic region than most other oilseed crops. Safflower has been grown from Central Queensland down through Southern Queensland, all broadacre crop areas of New South Wales, Victoria and South Australia, and the wheat belt of Western Australia.

Farmers have derived both economic and agronomic benefits in having an oilseed in their crop rotation, including improved stabilisation of soils and subsoil amelioration, leading to increased nutrient and water uptake and disease suppression (Kirkegaard *et al.*, 1994). A major agronomic advantage of safflower is its large tap root system. Many crops such as wheat, oats, barley and canola have shallow rooted systems. The tap root system of the safflower has been recorded to a depth of 3 metres. The advantages of this root system are:

- Allows the species to access water and nutrients at levels other crops cannot reach;
- Minimises nitrates leaching into groundwater;
- Helps minimise waterlogging and salinity problems in irrigation areas (rice and cotton particularly) and areas prone to waterlogging;
- Helps minimise the development of hard pans in the soil; and
- Provides a disease break in the crop rotation system.

Safflower uses slightly less water (2.5 ML per ha) than other oilseeds and cereal crops but its ability to access water and nutrients at a deeper level than other crops is a significant advantage. Canola is a moderate user of water; about 2.8 ML per ha compared to rice utilising 14.1 ML per ha and cotton utilising 6.5 ML per ha (ABS, 2002/2003).

Meal obtained from processing canola seeds has become an important element in Australia's livestock feed regime as it has high protein content and is an ideal replacement for animal protein sources such as blood and bone, which are no longer used in livestock feed.

2.3. Project components

The major components of the project are:

- Seed preparation plant;
- Solvent extraction plant;
- Vegetable oil refinery;
- Tank farm; and
- Storage and handling facilities.

These are discussed in detail below. **Figure 4** shows the proposed layout of the site and shows the components of the plant.

The objective of the ROBE Plant project is to provide modern, minimalistic and functional buildings. The intention is to have a central theme of natural colours for the site buildings. The colour scheme is based around the Colourbond colours of Woodland Grey, Evening Haze and Dune. Below includes a brief outline of the buildings and their colour schemes, the diagrams are provided as thumbnails purely for the purpose of visualising the look of each building, where available 3D thumbnails are also provided; full details are provided on the plans of the buildings.



2.3.1 Process buildings

Seed Preparation Plant

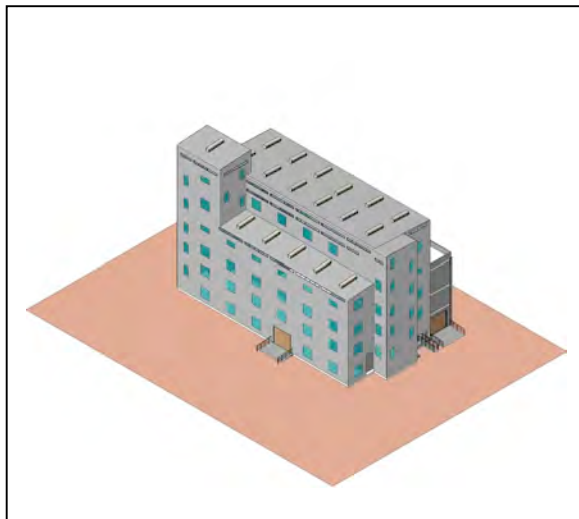
The seed preparation plant (oilseed crushing plant) will have a floor area approximately 39 m by 24m. The building will have 8 process floors with an approximate height of 29m to the rooftop.

Building finishes and colours

Roof – Colourbond roof sheeting, 'Dune'

Walls – Concrete painted with 'Dune' to match Colourbond wall sheeting.

Doors and Trims - Sandbank



Solvent Extraction Plant

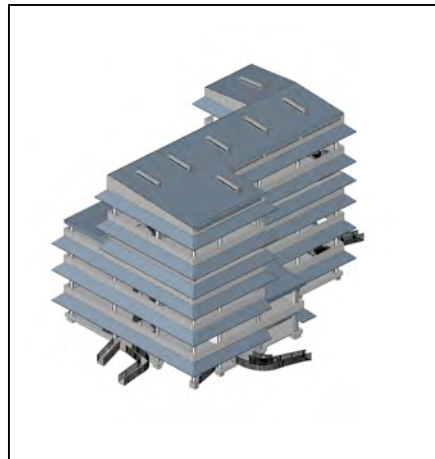
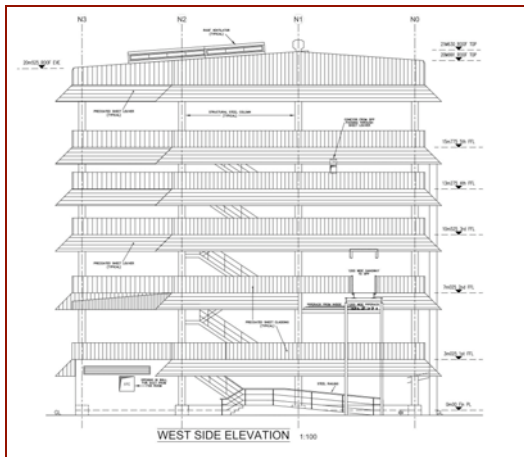
The solvent extraction building will have a floor area approximately 30m by 26 m. The building will have 6 process floors, with a height of approximately 22.5 m to the rooftop.

Building finishes and colours

Roof – Colourbond roof sheeting, 'Dune'

Walls – Colourbond wall sheeting, 'Dune'

Doors and trims – Sandbank



Vegetable Oil Refinery

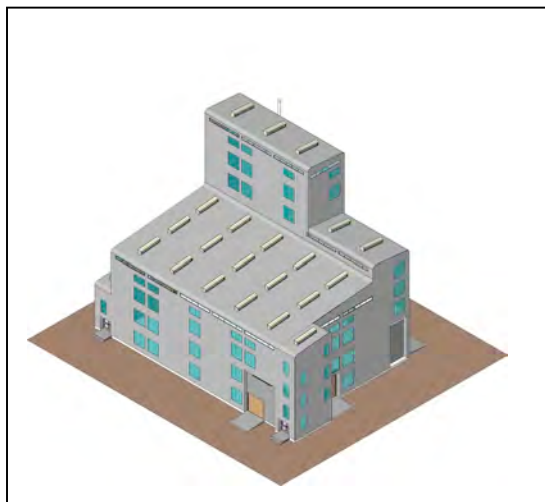
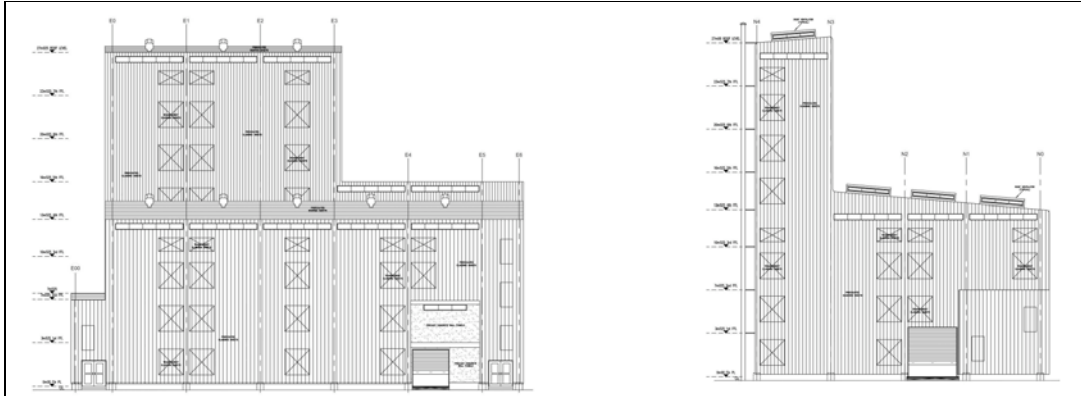
The vegetable oil refinery building will have a floor area approximately 24m x 37m. The building will have 7 process floors, with a height of approximately 27 m to the rooftop.

Building finishes and colours

Roof – Colourbond roof sheeting, 'Dune'

Walls – Colourbond wall sheeting, 'Dune'

Doors and trims – Sandbank



2.3.2 Storage and Handling Facilities

Meal Storage Shed

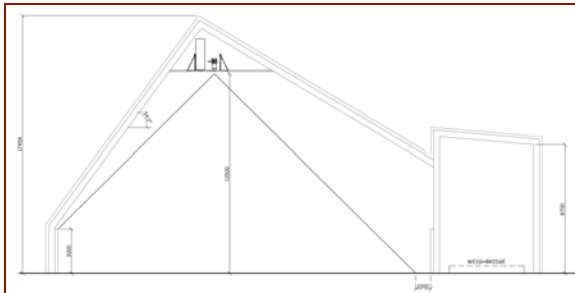
The Meal Storage Shed is proposed as detailed below. This building will have a floor area approximately 50m x 25m. The height of the building is approximately 17.5 m.

Building finishes and colours

Roof – Colourbond roof sheeting, 'Dune'

Walls – Concrete tilt up panels 2.4m high, with Colourbond wall sheeting in "Dune" over & external columns to the side.

Doors and trims - Sandbank



Tank Farm

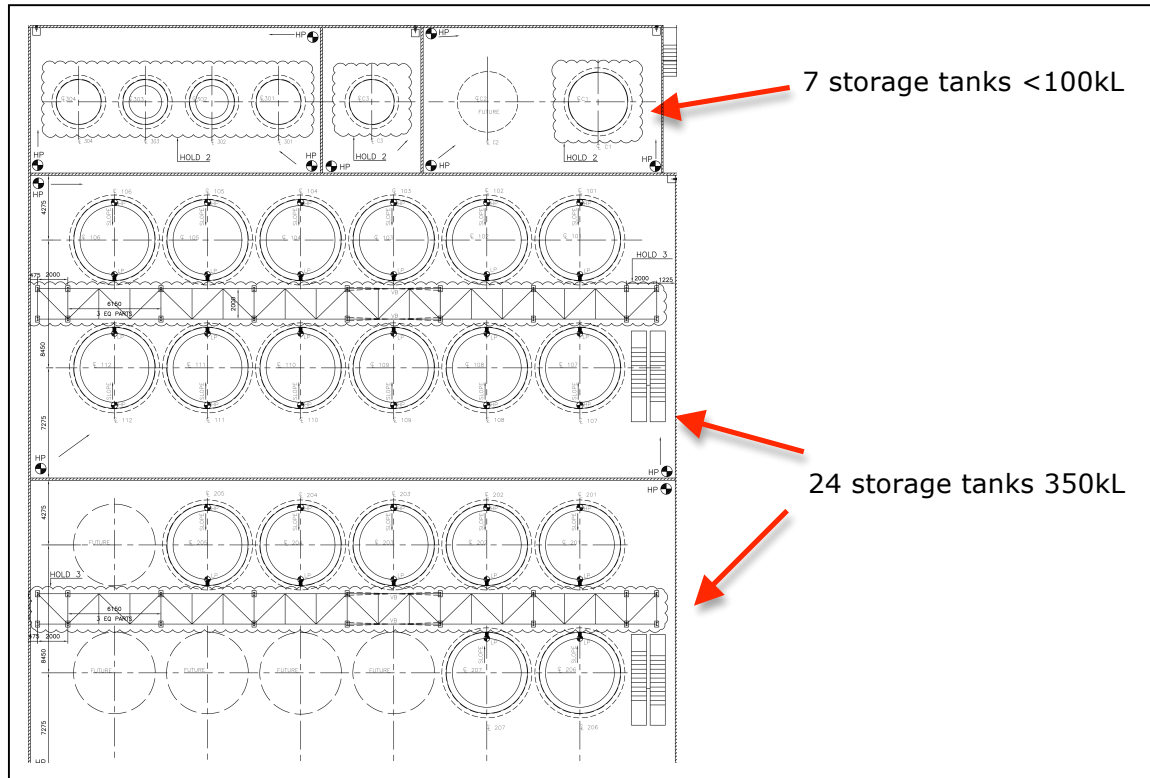
The tank farm consists of:

- Up to 24 350kL storage tanks (max height 16m)
- 7 <100kL tanks.

Building finishes and colours

The tanks will be constructed of stainless steel. The finish on the steel will be a non-reflective matt finish.

The following drawing provides a schematic plan of the layout of the tank farm.



Bleach Store

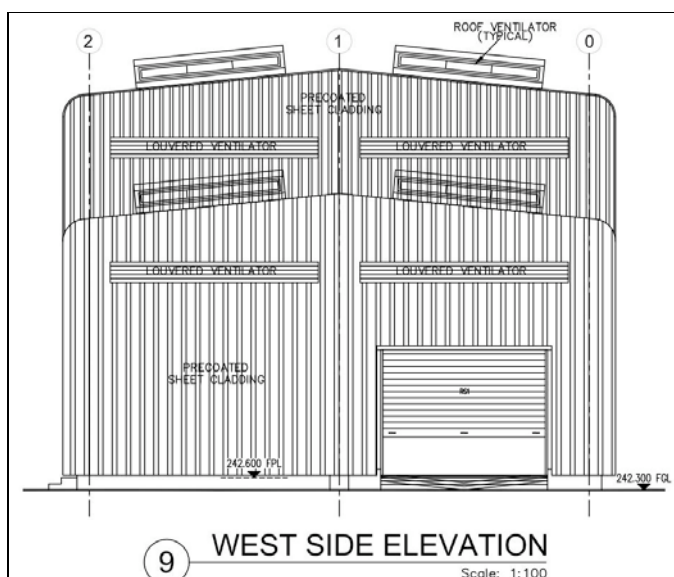
The Bleaching Earth Store is intended as a typical industrial shed. Two thirds of the shed is a single process floor, with the remainder being higher to house a mezzanine floor. This building has a floor area approximately 18.5m x 12.6m.

Building finishes and colours

Roof – Colourbond roof sheeting 'Dune'

Walls - Colourbond sheeting 'Dune'

Doors and trims – Sandbank



2.3.3 Ancillary buildings and structures

Weigh Station Control Building

The Weight Station Control Building, as the access point to the site, will provide a link between the Administration Building and the industrial-style buildings within the site. This building has a floor area approximately 4m x 20m.

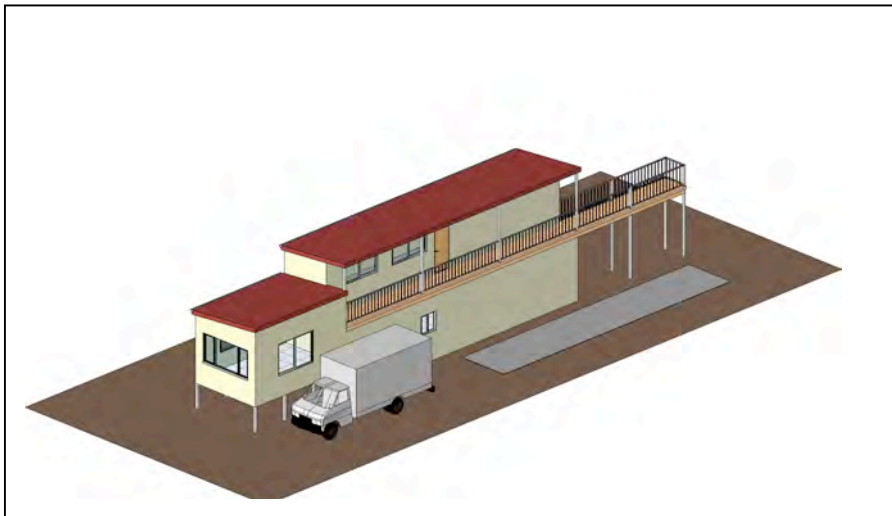
Building finishes and colours

Roof – Colourbond roof sheeting, 'Woodland Grey', pitched roof.

Walls – Cladding system to be confirmed (options below)

- Hebel power panels finished in 'Mitex Suede'
- Timber cladding in colour similar to 'Colourbond Evening Haze' or
- Colourbond sheeting 'Evening Haze'

Doors and trims - Sandbank



Laboratory and Workers Amenities Building

The building will provide offices and amenities for workers on-site. The Laboratory and Workers Amenities Building will have a front porch to provide weather cover to the front doors. This building has a floor area approximately 18 x 18 metres.

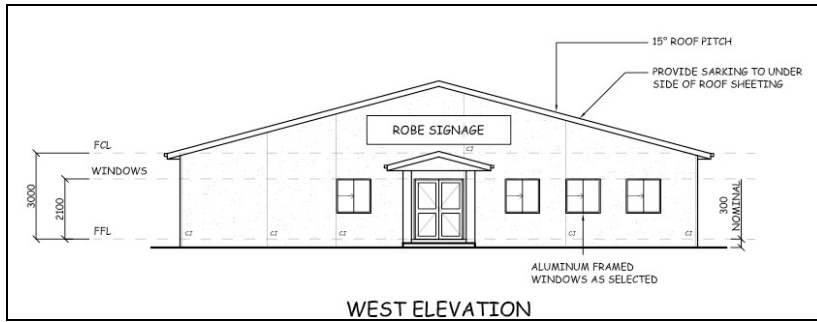
Building finishes and colours

Roof – Colourbond roof sheeting, 'Woodland Grey', pitched truss roof

External Walls – Hebel power panels finished in 'Mitex Suede'.

Doors and trims - Aluminium framed doors and windows, colour as selected by developer.

Internal Walls – Painted plasterboard, timber or steel stud framing.



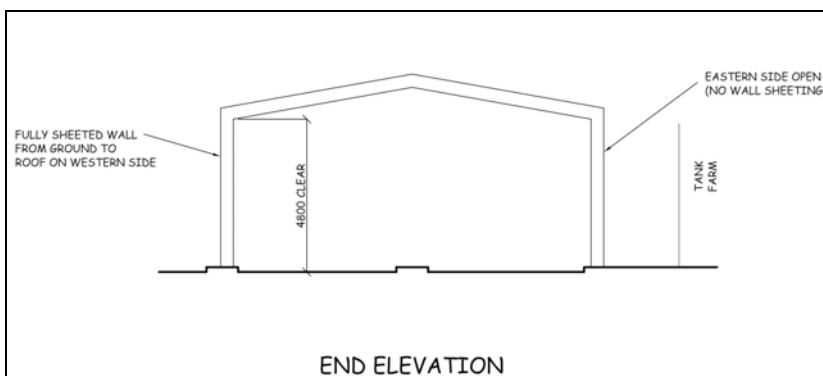
Truck Cover No 1.

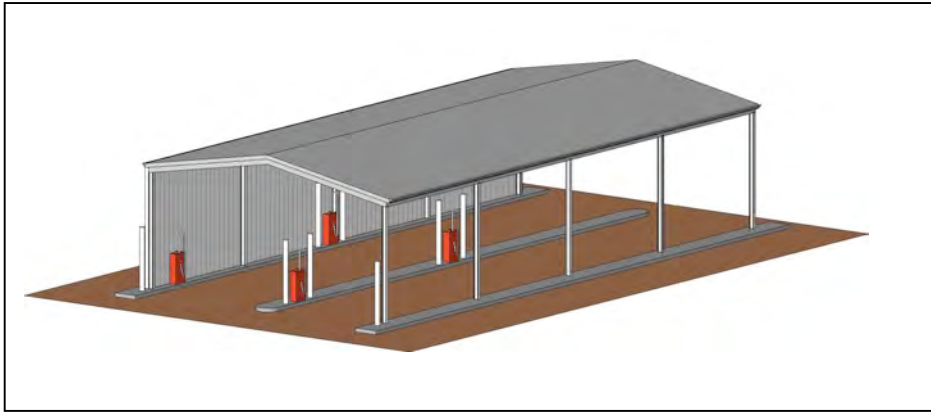
This structure provides a covered area for the trucks to drive under for loading oils, protecting the bunded area from excessive water ingress. This cover is 10m wide x 24m long, and 6m high. The western wall will be sheeted to the ground.

Building finishes and colours

Roof – Colourbond roof sheeting 'Dune'

Walls - Colourbond sheeting 'Dune'





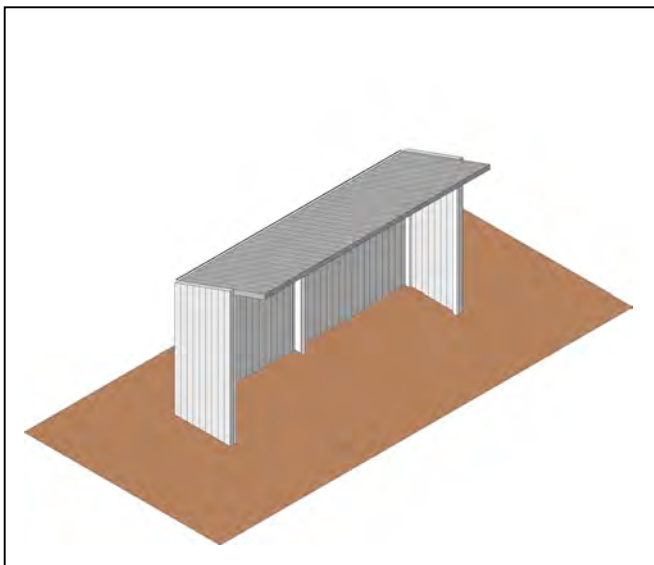
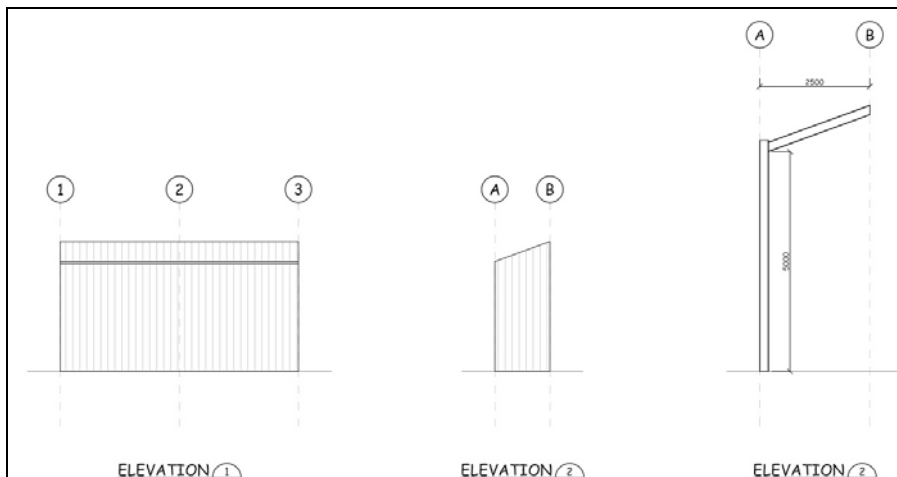
Truck Cover No 2 & No 3.

These structures are steel cantilevered awnings similar to the elevation shown below. Dimensions are 2.5m wide x 10.8m long, heights between 5.5m & 5.9m.

Building finishes and colours

Roof – Colourbond roof sheeting 'Dune'

Walls - Colourbond sheeting 'Dune'



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Building finishes and colours

Walls – Cladding system to be confirmed (options below)

- ## Doors and Trims – Sandbank



3430 WIDE x 4800 HIGH ROLLER DOOR

3430 WIDE x 4800 HIGH ROLLER DOOR

BOILER HOUSE (CONCRETE)

DRUM

13000

STACK

DA SLAB (CONCRETE)

DA

800 WIDE BENCH

W2

W1

FEMALE W/C

MALE (CONCRETE)

BASIN

HALL

800 WIDE BENCH

800 WIDE BENCH

WORKSHOP (CONCRETE)

WELDING BAY

SANITARY (3.5m LONG) 2 TONNE

3430 WIDE x 4800 HIGH ROLLER DOOR

12000

FUTURE WALL

STORE ROOM (CONCRETE)

MEZZANINE OVER

8000

8200

CO2

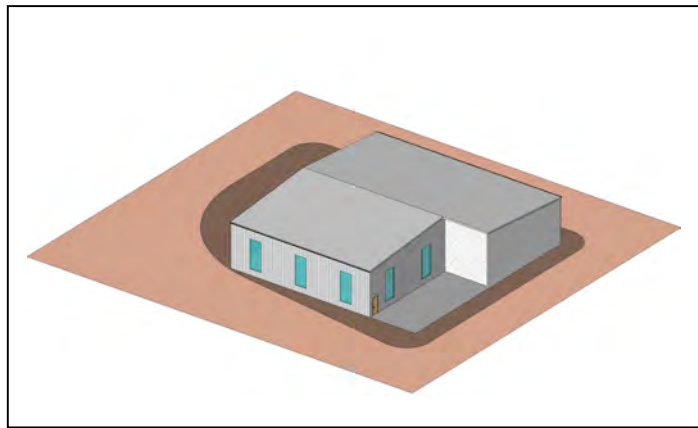
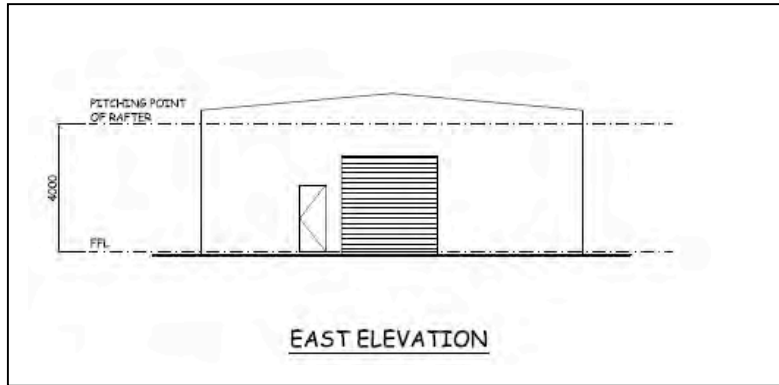
The workshop will have a floor area of approximately 153m².

Building finishes and colours

Roof – Colourbond roof sheeting, 'Dune'

Walls – Concrete tilt up panels painted with 'Dune' to match roof.

Doors and trims - roller doors will be in 'Woodland grey'.



Boiler House

The Boiler House will have a single floor and will have a floor area of approximately 243m².

Building finishes and colours

Roof – Colourbond roof sheeting, 'Dune'

Walls – Colourbond wall sheeting, 'Dune'

Doors and trims - Sandbank

(Future) Administration Building

The future Administration Building will be built with a similar construction style and colour scheme to the Laboratory and Workers Amenities Building

2.3.4 Wastewater Storage and Irrigation

A new 40ML dam will be constructed on site to store wastewater from the plant prior to distribution to RIVCO Group Pty Ltd for use as irrigation water. The new dam will be

constructed to the east of the process buildings. The dam will be constructed with welded 2.5mm PVC liner.

The new dam will have a sufficient volume to allow storage of up to 2 months of effluent, which can be utilised during periods when it is not possible to use the wastewater for irrigation purposes due to wet weather or crop requirements.

Irrigation will occur on neighbouring land owned by RIVCO Group Pty Ltd. RIVCO Group Pty Ltd have agreed to accept the wastewater to irrigate a 25 ha parcel of land, which is used to grow a variety of crops. The responsibility of scheduling and monitoring of the irrigation will be that of RIVCO Group Pty Ltd as per the water agreement.

2.4. Project stages

The project will be undertaken in a number of stages, as outlined below:

1. Site establishment and preparation – Approval has been granted for this stage of works;
2. Construction of IOPP and ancillary structures;
3. Landscaping; and
4. Operation

3 PROCESS DESCRIPTION

3.1 Introduction

The process which ROBE Pty Ltd intends to produce edible oils and meal with is provided by Desmet Bellestra. The following section outlines the process, for canola and safflower oilseeds, in brief, breaking it down into sections according to the major buildings to be located on the site. A full description of the process is included as **Appendix B**, as provided by Desmet Bellestra, **figure 5** presents a flow chart outlining the steps involved in the process.

3.2 Seed Preparation Plant (SPP)

Oilseed preparation will take place in the Oilseed Crushing Plant (refer to section 2.3.1 above). There are a number of processes which will occur in the oilseed crushing plant which will prepare the seed for further processing, ensuring the efficiency of the overall process.

The major functions involved in this first stage of the process to recover oil from the seed, including:

- Weighing, cleaning and destoning
- Pre-heating and conditioning
- Flaking
- Cooking
- Pressing
- Oil clarification and
- Cake Cooling

In brief, the seeds are transferred from silos to the oilseed crushing plant where they are cleaned, pre heated and crushed (flaked). The crushed seeds release some oil (referred to as first press crude oil), which is filtered and pumped directly to the crude oil buffer storage tanks. The remaining oil cake (pulp or rich meal) is conveyed to the extraction plant for further processing.

3.3 Solvent Extraction Plant

Solvent extraction consists of four main process functions:

- Physical removal of the oil from the seed
- Distillation – to remove the solvent from the oil
- Delsolventising-toasting of the de-oiled seed
- Recovery of the solvent, to be recycled.

In brief, the oil cake is received from the SPP. Hexane (the solvent) is washed through the cake, which dissolves the oil from the cake. The hexane and oil mix (now referred to as miscella) is flashed (distilled) by the evaporation process over a number of stages. The hexane is removed in vapour form from the miscella through distillation, then condensed, collected and pumped back to the hexane tank for reuse.

Hexane free oil is pumped to the crude oil buffer storage tanks. The remaining dried fibre is now referred to as meal. The meal is further processed and then conveyed to storage.

Hexane is a volatile liquid. During handling and processing some quantities of hexane are lost to the product and the environment. Where losses can be described as:

- hexane content in the waste water: < 30 ppm
- hexane outlet of stack: < 40 mg/m³
- hexane in meal: < 500 ppm
- hexane in solvent extracted crude oil: < 1000 ppm

Hexane is expected to exist entirely in the vapour phase in the ambient air, with an expected half-life of 2.8 days.

Hexane will biodegrade but will not bioconcentrate. Hexane is not considered a class 1 or class 2 ozone depleter and is not considered a hazardous air pollutant (by the US Clean Air Act). Hexane is not considered a hazardous substance, priority pollutant or toxic pollutant under the US Clean Air Act. No National Australian environmental guidelines exist for hexane (National Pollutant Inventory).

3.4 Refinery

The final stage in the process to produce edible oil is the refining process. The refining process involves a number of process functions, namely:

- Filtering
- Dewatering
- De-odorising
- Colouring and
- Storage

The oil is taken from the crude oil buffer storage tanks and fed in to the refinery where it goes through filtration (degumming) to remove small particles that it may still contain. Following filtration the oil is dewatered to remove all traces of water, prior to being de-odorised and coloured to make the final product more consistent with market demand.

Once the oil has passed through the refining process it is pumped into storage tanks ready for distribution.

500 TPD - CANOLA & SAFFLOWER SEED or 350 TPD SOYBEAN
WAGGA WAGGA, NSW, AUSTRALIA
Principle Block Diagram



4 STATUTORY PROVISIONS

NB. The following material (chapter 4) with the exception of sections 4.2.3, 4.2.4 and 4.2.5 was produced by ENSR/AECOM in 2008 when the initial application was made, it has been altered by Lennon Salvestro Planning to reflect the new direction that the project will take and newly introduced legislation.

4.1 State Planning Provisions

There are three state environmental planning policies (SEPPs) relevant to the proposed project as discussed below.

4.1.1 State Environmental Planning Policy 2005 – Major Development

The Major Development SEPP identifies classes of development which are defined as 'major projects' under Part 3A of the EP&A Act. Clause 10(1)(f) of Schedule 1 includes:

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 oils, fuels, gas, petrochemicals or precursors.

The IOPP project proposes to produce some 90,000 tonnes of meal and 66,000 tonnes of refined vegetable oil requiring around 165 000 tonnes of oil seed as raw material. The project is expected to have a capital investment value in the order of \$47.5 million. A clause 6(1) ministerial opinion, identifying that the proposal meets the criteria for consideration under Part 3A of the EP&A Act, was issued to the proponent on 31 October 2007.

4.1.2 State Environmental Planning Policy 33 – Hazardous and Offensive Development

A review of the Dangerous Goods stored and handled at the site indicated that a Preliminary Hazard Analysis (PHA) of the proposal would be required under the provisions of SEPP 33. The PHA undertaken for the site (see **Appendix C**) utilised the methodology recommended in the DoP guidelines *Multi Level Risk Assessment* (DUAP, 1997a) and *Hazardous Industry Planning Advisory Paper No.6 Guidelines for Hazard Analysis* (DUAP, 1997b) (HIPAP No. 6).

The PHA concluded that the risk criteria are not exceeded and the IOPP is not considered potentially hazardous or offensive and is therefore permissible within the current land zoning.

A number of recommendations were made in order to enhance the safety systems at the site and ensure low risk maintenance. These are discussed in detail in **Section 11**, and include:

- fit explosion panels to all silos and bins storing materials that could generate combustible dusts;
- develop a plant shut down procedure;
- install corrosive spill kits;
- conduct a fire safety study;
- provide a foam storage and foam generation attachments to fire; and
- construct a first flush retention pond to control all stormwater from plant areas, roadways and open yard areas.

The proposed project would provide and commit to these recommendations.

4.1.3 State Environmental Planning Policy (Infrastructure) 2007

The previous Environmental Assessment made reference to SEPP 11 – Traffic generating Development, this has been repealed and replaced with SEPP Infrastructure.

Clause 104 Traffic-generating development applies to the proposal. This clause provides the opportunity for the RTA to be made aware of the development and make recommendations with regards to traffic matters prior to the consent authority making the determination.

Commercial and Industrial Premises are included in Schedule 3 of the SEPP. The proposed development consists of multiple buildings and structures, none of which individually exceed 4,000 m². Notwithstanding this, the RTA and WWCC have been consulted during preparation of the EA. Traffic implications are discussed in detail in **Section 10** of this EA.

4.1.4 Protection of the Environment Operations Act, 1997

The *Protection of the Environment Operations Act, 1997* (POEO Act) prohibits any person from causing pollution of waters or air, and provides penalties for pollution offences relating to water, air and noise.

The POEO Act provides a regulatory framework for the licensing of all activities listed in Schedule 1 of the Act that have the potential to impact on the environment.

The following activities are included in Schedule 1 and are relevant to the proposed project:

Agricultural produce industries that process 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

Chemical storage facilities that store or package chemical substances in containers, bulk storage facilities, stockpiles or dumps with a total storage capacity exceeding..... 2,000 tonnes of any chemical substances.

The proposed IOPP, with an annual production capacity of some 90,000 tonnes of meal and 66,000 tonnes of refined vegetable oil, using oil seed of canola and safflower, would mill more than 30,000 t of produce per year and may require chemical storage facilities in excess of 2,000 t of chemical substances. Therefore, an Environment Protection Licence (EPL) to be issued by the DECCW would be required under section 42 of the POEO Act.

A site wastewater treatment plant is proposed where treated effluent is irrigated by of spray irrigation to an adjacent area. The effluent disposal would be undertaken in accordance with the DECCW *Environmental Guidelines: Use of Effluent Irrigation*, as discussed in detail in **Section 12**. Approval for the irrigation area would be issued as part of the EPL conditions.

4.1.5 Roads Act 1993

The proposed project involves the connection of a new site entrance and internal road to the existing public road, (Byrnes Road) operated by the WWCC. The entrance to the site would be constructed to a standard to accommodate truck turning movements, including B-Doubles. Additional upgrades to the intersection of Trahairs and Byrnes Road are proposed as part of the Statement of Commitments (SoC) (see **Section 19**). Any works on or over a public road or connection to a public road require consent from the appropriate roads authority under section 138 of the *Roads Act 1993*.

The works proposed under the amended project with respect to the connections to the public road system remain unchanged. The proposed changes relate to the internal road layout and vehicle movement areas, which will facilitate the new plant layout.

4.2 Local Planning Provisions

The project is defined as a *rural industry* under the provisions of Clause 4 of the *Environmental Planning and Assessment Model Provisions 1980* (Model Provisions) being development which involves the:

'handling, treating, processing or packing of primary products and includes the servicing in a workshop of plant or equipment used for rural purposes in the locality'.

The proposed IOPP would handle and process primary products in the form of canola and safflower oilseed to produce edible vegetable oil and vegetable protein meal.

4.2.1 Wagga Wagga Rural Local Environmental Plan 1991

Development of the site is subject to the provisions of Wagga Wagga Rural Local Environmental Plan 1991 (LEP 1991) which identifies the zoning of the site as zone No. 1 (Rural). The relevant objectives of this zone as applied to the proposed development include:

..to promote the proper management and utilisation of resources by any one or more of the following:

- a) protecting, enhancing and conserving -
 - i) agricultural land in a manner which sustains its efficient and effective agricultural production potential;.....**
- b) preventing the unjustified development of prime crop and pasture land for purposes other than agriculture;.....*
- e) minimising the cost to the community of -
 - i) fragmented and isolated development of rural land; and*
 - ii) providing, extending and maintaining public amenities and services; and.....**
- h) encouraging the establishment of rural industries within the area to which the plan applies.*

The IOPP proposal is consistent with these objectives of the No 1 (Rural) zone by:

- not impacting upon the sustainable use of agriculture land and encouraging further agricultural production in the locality to supply oilseed for production use;
- developing on land identified as having a potential future rural industry focus rather than prime agricultural land;
- locating on a site that is currently serviced by arterial transport routes and existing utility services; and
- being a rural industry.

The land use table provision for Zone No. 1 (Rural), under clause 9 of LEP 1991, identifies that the proposed development is permissible with consent.

Clause 10 of LEP 1991 provides matters for consideration in assessing an application for development on land in the No 1 (Rural) Zone. Those relevant to the proposal include:

(1) the effect of the carrying out of that development on

- (a) the present use of the land, the potential use of the land for the purposes of agriculture and the potential of any land which is prime crop and pasture land for sustained agricultural production;*
- (b) vegetation, timber production, land capability (including soil resources and soil stability), water resources (including the quality and stability of water courses and ground water storage and riparian rights);.....*
- (d) the protection of localities of significance for nature conservation or of high scenic or recreational value, and places and buildings of archaeological or heritage significance, including Aboriginal relics and places;*
- (e) the cost of providing, extending and maintaining public amenities and services to the development;*

(2) the relationship of the development to development on adjoining land or on other land in the locality.

The relevant matters for consideration have been addressed in this EA and, in summary, conclude the following:

- Grazing and cropping would be limited to the effluent irrigation area proposed for the site. Surrounding grazing and cropping viability would not be diminished by the proposal;
- Local agricultural crop and pasture production and viability will be supported by the proposed development;
- There is no significant vegetation on site to be impacted by the proposal;
- The proposal will not limit or impede land capability:
 - Soil stability will be maintained and enhanced;
 - Risk to soil contamination will be minimised through environmental management practices and design;
 - Surface runoff will be collected on site;
 - On site wastewater storage will be managed in a way to prevent future impacts on groundwater and negate the current potential for contamination of groundwater;
 - Proposed irrigation will be undertaken in accordance with the requirements of the DECCW's *Environmental Guidelines: Use of Effluent by Irrigation* (DEC, 2004); and
 - Water usage for production will be supplied and controlled by Riverina Water County Council.
- There are no known places / items of conservation, archaeological or heritage significance on the site. Additional studies (see **Section 14**) have further confirmed minimal or no impact to nearby or potential places of significance;
- There is no impact on recreational or high scenic values in the locality;
- There are no additional costs to the community for the extension of services and utilities to the proposed development or as a result of the development. While water, electricity and communication utilities do not currently exist on site, the proponent has received supply proposals from Riverina Water County Council and Country Energy for the supply of utilities with costs to be borne by the proponent. Road upgrades for the Trahairs and Byrnes Road intersections will also be funded by the proponent; and additional load on existing road infrastructure is considered acceptable for the existing collector and arterial road network; and
- The proposed IOPP is consistent with future objective of the locality which has been identified as a potential expansion area for industrial activity by the Wagga Industrial Sustainable Development Opportunities Model (WISDOM).

Given the above findings, the proposed development is considered to comply with the requirements of LEP 1991.

4.2.2 Wagga Wagga Development Control Plan 2005

Wagga Wagga Development Control Plan 2005 (DCP 2005) has divided the Rural Zone, as established in LEP 1991, into a number of sub zones, with specific development controls for each sub zone. The proposed development is located within the 1a General (Rural Living Area) sub zone and is therefore subject to the controls set out in Part B2 of DCP 2005. This sub zone primarily applies to broadacre rural areas.

The objective of this sub zone is:

'To protect and preserve prime crop and pasture land and to set aside land for general farming purposes.'

The existing site does not support prime cropland and contains other land uses including industrial facilities. The proposed IOPP will support the preservation of cropland in the wider area / region as a supply source for the production facility, as well as providing on site improved pasture and crops irrigated by effluent.

Clause 14.6.5 of DCP 2005 identifies that the proposal is located within the WISDOM study Bomen Industrial Candidate Area. The intention is to progressively introduce development controls over the subject area to ensure sustainable industrial activity. Those controls are yet to be defined. The existing provision is aimed at ensuring new development will not have an adverse

environmental effect or create conflict between land uses in the locality. The proposed IOPP is consistent with the vision for sustainable industrial activity in the locality.

Clause 14.5.18 of DCP 2005 identifies that the development in the subzone should promote a high standard of visual amenity in all areas of the city through the preservation of hillscares, backdrops, skylines and existing stands of trees. Visual amenity issues are discussed in **Section 13** of this report. In summary, it is concluded that the proposed IOPP will not diminish the visual amenity values of the locality. The proposed structures will be located on land with minimal slope and will not restrict views. While the highest structure is some 33.6 m (elevator tower) the development will be characterised by a complex arrangement of buildings, silos and tanks of varying heights and form, providing visual interest, typical of an industrial precinct.

Landscaping would be provided along the property boundary to mitigate local visual impacts associated with the proposal, in accordance with a Landscape Management Plan, and where possible, existing trees would be retained. The road corridor will be enhanced by tree planting.

Clause 25 of DCP 2005 provides car parking requirements for development and adopts the RTA's *Guide to Traffic Generating Developments* (RTA, 2002) as a means of evaluating adequacy of vehicle/pedestrian access and parking provisions. A substantial area of some 20,500 m² has been allocated on site for the provision of parking for trucks. The parking spaces will be designed and landscaped in accordance with Australian Standard 2890.1 and 2890.2 and comply with RTA guidelines.

4.2.3 Draft Wagga Wagga Local Environmental Plan 2008

Under the provisions of the Draft Wagga Wagga Local Environmental Plan 2008 the subject site is zoned IN1 – General Industrial (refer to **Figure 6**), the objectives of the zone are as follows:

- *To provide a wide range of industrial and warehouse land uses.*
- *To encourage employment opportunities.*
- *To minimise any adverse effect of industry on other land uses.*

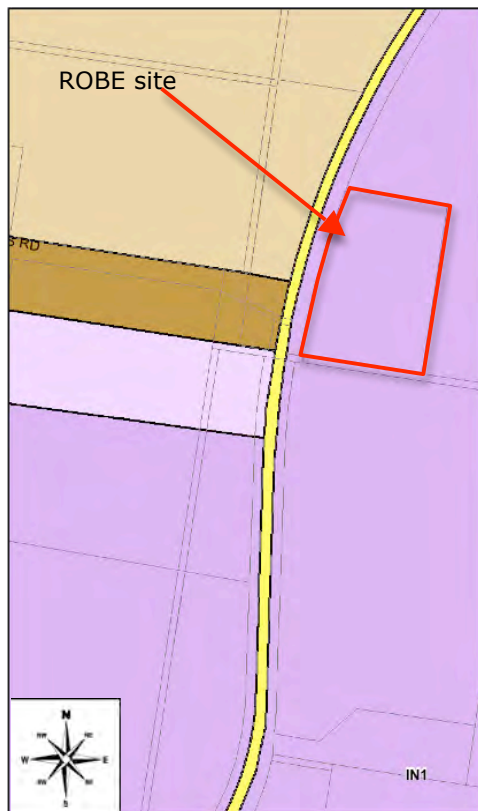


Figure 6: DWWLEP 2008 Zoning Map

In response to the objectives of the zone the IOPP will provide a new industrial use, which doesn't currently exist within the city. It will provide up to 150 employment opportunities during the construction phase with ongoing employment opportunities for 70 staff once the plant is operational. The proposal is appropriately placed within the Bomen Industrial Area, which has been set aside by WWCC for industrial purposes, thereby minimising the any potential impact on other land uses.

While all industry is encouraged the Bomen area is expected to attract large lot industrial developments. Major buildings will be set in what is effectively a rural landscape.

The proposed IOPP is permitted with consent in this zone.

4.2.4 Draft Wagga Wagga Development Control Plan 2010.

Section 2 of the Draft Wagga Wagga Development Control Plan 2010 applies to the proposed IOPP. The relevant sections of the chapter are:

- 2.1 – Site Analysis – with aim of achieving good design, as part of the overall planning process for the IOPP the site was analysed in the first instance and site characteristics have been fully utilised by designers when planning the site for the proposed use.
- 2.2 – Vehicle Access and movements – full consideration has been afforded to the site and adjoining road network to ensure that safety both on and off site are maintained at all times. Road design is appropriate for the development and surrounding road network.
- 2.3 – Off site parking – off site parking has been provided to accommodate all workers of the proposed IOPP.
- 2.4 – Landscaping – a landscaping plan has been formulated for the site and for sensitive receptors of the proposal.
- 2.5 – signs – signage for the site complies with the provisions of SEPP 64.
- 2.6 – Safety and security – the site shall be secured in accordance with Best Practice for sites deemed "Potentially Hazardous".
- 2.7 – Changing the landform – cut and fill – details of site works have been provided

Section 11 relates to Industrial development and therefore applies to the proposed IOPP, the industrial development design principles are:

- *P1 Development is to be suited to its site in terms of the nature of the use, relationship to adjoining uses and availability of land for industrial development.*
- *P2 Development should be consistent with the principles of Industrial ecology.*

In reference to P1 the proposed IOPP is well suited to its site in that it is to be situated within the Bomen Industrial area, a large scale site which has been set aside by WWCC for industrial purposes. It will utilise the existing infrastructure in the Bomen area included the road network. In reference to P2 this development is consistent with the principles of industrial ecology, being centrally located to its source materials (i.e. canola and safflower) the costs to the environment can be minimised.

4.2.5 Bomen Masterplan

The Bomen Masterplan has been prepared by WWCC to help drive development in the Bomen area of the city. This plan presents a number of precincts within the Bomen area, which maximize the features of the site and give consideration to surrounding, non-industrial landuses. The subject site is located in part Industrial part Rail Dependent Industrial precincts of the area, as shown in **Figure 7**. The subject land is within the proposed Bomen Industrial Park.

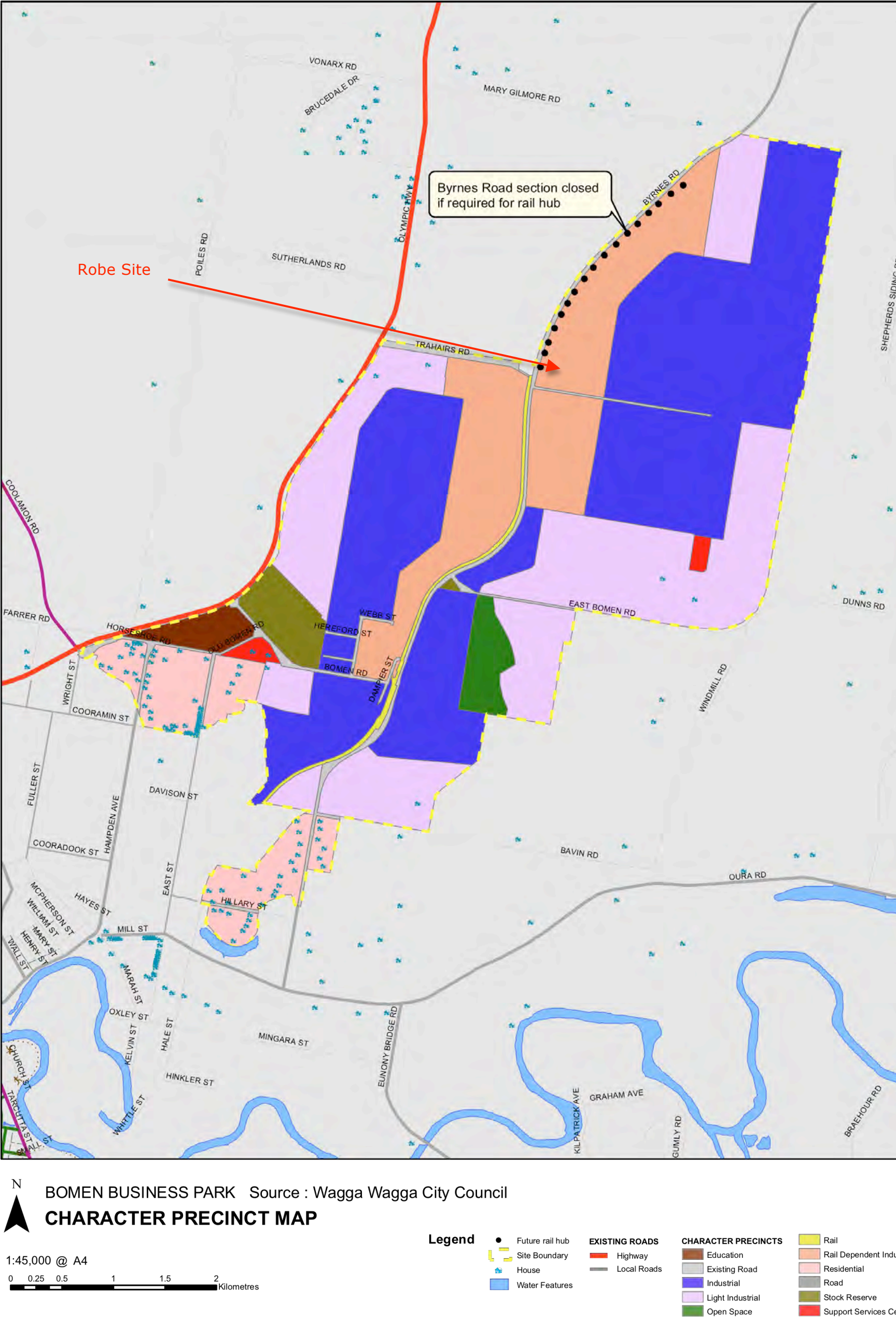


Figure 7: Character Precinct Map (Source: WWCC)

4.3 Approvals Summary

There are three approvals required for the proposed project, being:

- Project approval under section 75J of the EP&A Act;
- EPL under the POEO Act; and
- Section 138 approval under the Roads Act 1993.

5 ISSUES AND PRIORITIES

NB. The following material (chapter 5) was produced by ENSR/AECOM in 2008 when the initial application was made; it has been altered by Lennon Salvestro Planning to reflect the new direction that the project will take and newly introduced legislation.

5.1 Issue Identification

A preliminary assessment of environmental issues associated with the project was undertaken for the Environmental Assessment Scoping Report (EASR) prepared in respect of the project. Key environmental issues identified in the EASR included:

- Hazard and Risk;
- Water Quality;
- Geology and Soils;
- Waste Management;
- Air Quality;
- Noise;
- Resource Implications;
- Traffic and Transport;
- Social and Economic;
- Heritage;
- Biological;
- Land Use; and
- Visual.

5.2 Prioritisation of Issues

5.2.1 Approach

The prioritisation of issues for the proposed project was based on the need to recognise that a higher degree of assessment is required for the issues with the highest severity and greatest consequences. **Table 4** shows the issues prioritisation matrix used to identify priorities. Each issue was given a ranking between one and three for the severity of effects and the perceived consequences of those effects if left unmanaged. These two numbers were added together to provide a numerical ranking for the issue that was used to categorise each issue into high, medium and low priorities.

Table 4: Issues Prioritisation Matrix

Severity of Effects	Consequence of Unmanaged Effects		
	3 High	2 Medium	1 Low
1 Low	4 (Medium)	3 (Low)	2 (Low)
2 Medium	5 (High)	4 (Medium)	3 (Low)
3 High	6 (High)	5 (High)	4 (Medium)

5.2.2 Assessment

The prioritisation of environmental issues related to the proposed project is shown in **Table 5**. This assessment aims to allow the prioritisation of issues for assessment and does not consider the application of mitigation measures to manage environmental effects. In all cases, appropriate and proven mitigation measures, chosen based upon the experience of regulators and other similar projects, would be used to minimise potential impacts. These measures would be described in detail in the EA prepared for the proposed project.

The allocation of risk is based upon the following considerations:

Severity of Risk

Low: localised implications; imperceptible or short term cumulative impacts.
 Medium: regional implications; modest or medium term cumulation of impacts.
 High: inter-regional implications: serious or long term cumulation of impacts.

Consequences of Unmanaged Effects

Low: minor environmental change; offsets readily available.
 Medium: moderate adverse environmental change; offsets available.
 High: important adverse environmental change, offsets not readily available.

Table 5: Prioritisation of Environmental Issues

Issue	Severity	Consequence	Priority
Aspect: Hazard and Risk			
Exposure of surrounding land uses/population to risks and hazards	2	2	4 (Medium)
Exposure of employees to risks and hazards	2	2	4 (Medium)
Aspect: Water Quality			
Degradation of surface water quality during construction	2	2	4 (Medium)
Degradation of groundwater quality during construction	2	2	4 (Medium)
Salinity impacts arising from raising of the water table (i.e. irrigation)	1	2	3 (Low)
Contamination of surface and ground water resulting from accidental spills and leakages	2	2	4 (Medium)
Consumption of potable water resources during construction	1	1	2 (Low)
Consumption of potable water resources during operation	1	1	2 (Low)
Aspect: Geology and Soils			
Erosion and sedimentation during construction	2	2	4 (Medium)
Spread of contaminants off-site during construction/operation	2	2	4 (Medium)
Aspect: Waste Management			
Potential contamination of land and water as a result of inappropriate handling of waste	2	2	4 (Medium)
Aspect: Air Quality			
Construction related impacts on air quality	1	2	3 (Low)
Emissions to the atmosphere with the potential to result in degradation of air quality in the local area (including odour)	2	3	5 (High)
Community concern regarding degradation of air quality	2	2	4 (Medium)
Emissions of greenhouse gases due to the proposed development	2	2	4 (Medium)
Aspect: Visual			
Impacts of development on visual landscape	2	1	3 (Low)
Visual impact on nearby residents	2	1	3 (Low)
Aspect: Noise and Vibration			
Temporary noise nuisance to surrounding area	1	2	3 (Low)

Issue	Severity	Consequence	Priority
during construction			
Aspect: Biological Effects			
Loss of habitat due to clearing	1	1	2 (Low)
Reduction in biodiversity due to loss of habitat for native species	1	1	2 (Low)
Impact upon threatened species	1	1	2 (Low)
Aspect: Resource Implications			
Demand upon community resources	1	1	2 (Low)
Demand upon natural resources	1	2	3 (Low)
Demand upon transport resources.	2	2	4 (Medium)
Aspect: Traffic and Transportation			
Increase in traffic on local road network during construction	2	2	4 (Medium)
Increase in traffic on local road network during operation	2	2	4 (Medium)
Aspect: Social and Economic			
Impacts upon amenity such as noise, visual, etc	1	2	3 (Low)
Impacts upon demand for community resources	1	1	2 (Low)
Job creation during construction	1	1	2 (Low)
Job creation during operation	1	1	2 (Low)
Aspect: Heritage			
Damage or removal of Aboriginal artifacts or places	1	2	3 (Low)
Detrimental impact upon items of non-indigenous heritage significance	1	1	2 (Low)
Aspect: Land Use			
Inappropriate use of land	1	2	3 (Low)
Incompatibility of land use with surrounding environment	1	2	3 (Low)
Community perception on land use implications	2	2	4 (Medium)

Table 6 identifies that the prioritisation of environmental issues, and therefore the focus of assessment for the proposed project should be as follows:

Table 6: Prioritisation of Environmental Issues

Low	Medium	High
• Water Quality (consumption of potable water) • Air Quality (construction impacts) • Visual • Noise and Vibration Biological Effects • Resource Implications (community and natural resources) • Social and Economic Heritage • Land Use (inappropriate use and incompatibility)	• Hazard and Risk • Water Quality • Geology and Soils • Waste Management • Air Quality (community concern) • Resource Implications (transport resources) • Traffic and Transportation • Land Use (community perception) • Air Quality (greenhouse gases)	• Air Quality (Emissions)

6 ODOUR AND AIR QUALITY

6.1 Introduction

The original odour impact assessment for the proposed IOPP was conducted by Heggies Pty Ltd to determine the potential impact of the plant on surrounding residential development, this assessment has since been reviewed for the purposes of the revised EA. The Odour Impact Assessment is provided as **Appendix D**.

6.2 Odour Assessment Methodology

A quantitative odour assessment was undertaken, with predicted odour concentrations compared against acceptability criteria published by the NSW Department of Environment, Climate Change and Water (DECCW). Specific attention was paid to the odour concentrations predicted at various potentially sensitive receptor sites which predominantly comprises neighbouring residential properties.

A review of residences in the area surrounding the project site was conducted and in all nine receptors were identified. **Table 7** lists these receptors and their direction and distance from the subject site, while **figure 8** shows their location with respect to the subject site.

Table 7: Sensitive Receptor Locations

Receptor ID	Location (m, MGA)		Distance (km) / Direction From Project Site (Boundary)
	Easting	Northing	
R1	537585	6121770	1.58 / SW
R2	537987	6122859	1.64/ NW
R3	538143	6123261	1.85/NNW
R4	540370	6119797	2.02 / SE
R5	540689	6119582	2.36 / SE
R6	537255	6121720	1.92/SW
R7	538084	6121875	1.07 / W
R8	537766	6123112	1.88 / NW
R9	538247	6123804	1.97 / NNW

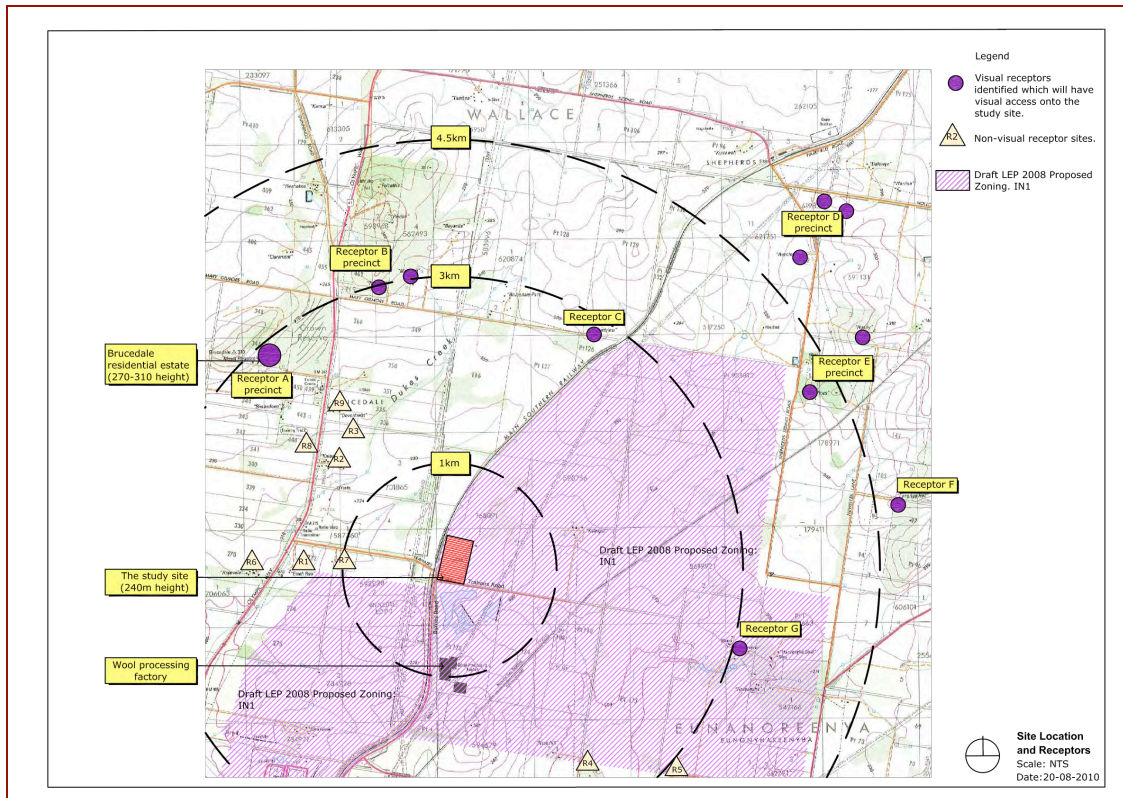


Figure 8: Sensitive Receptor Locations
(see also figure 3)

The Project Site and surrounding residences are located in generally flat, low-lying terrain. A relatively sharp increase in terrain occurs to the east of the Project Site, while a more gradual increase occurs to the southeast.

The Project Site is located at an approximate elevation of between 230 and 240 m AHD, on land that increases gradually to the east. The majority of sensitive receptor locations (see **Table 6.1**), with the exception of R8 and R9, are located at an elevation at or above that of the Project Site.

6.3 Odour Criteria

6.3.1 Odour Assessment Criteria for Complex Mixtures of Odorous Air Pollutants

Impacts from odorous air contaminants are more often nuisance related rather than health related. In general odour performance goals are intended to guide decisions on odour management, and are not intended to achieve a 'no odour' result.

Odour detection is a subjective sensory property, the odour threshold is the theoretical minimum concentration that produces an olfactory response or sensation. It defines one odour unit per cubic metre (OU/m³). An odour goal of less than 1 OU/m³ would, theoretically, result in no odour impact being experienced.

Based on available literature the level at which an odour is perceived as a nuisance can range between 2 OU/m³ and 10 OU/m³ depending on a combination of the following factors:

- **Odour Quality:** whether an odour results from a pure compound or from a mixture of compounds. Pure compounds tend to have a higher threshold (lower offensiveness) than a mixture of compounds.
- **Population sensitivity:** any given population contains individuals with a range of sensitivities to odour. The larger a population, the greater the number of sensitive individuals it contains.

- **Background level:** whether a given odour source, because of its location, is likely to contribute to a cumulative odour impact. In areas with more closely located sources it may be necessary to apply a lower threshold to prevent offensive odour.
- **Public expectation:** whether a given community is tolerant of a particular type of odour and does not find it offensive, even at relatively high concentrations. For example, background agricultural odours may not be considered offensive until a higher threshold is reached than for odours from a landfill facility.
- **Source characteristics:** whether the odour is emitted from a stack (point source) or from an area (diffuse source). Generally, the components of point source emissions can be identified and treated more easily than diffuse sources. Emissions from point sources can be more easily controlled using control equipment. Point sources tend to be located in urban areas, while diffuse sources are more often located in rural locations.
- **Health Effects:** whether a particular odour is likely to be associated with adverse health effects. In general, odours from agricultural activities are less likely to present a health risk than emissions from industrial facilities.

The NSW DECCW recommends within the *Technical Framework: Assessment and Management of Odour from Stationary Sources in New South Wales* (hereafter, "the Approved Methods") that, as design goal, no individual be exposed to ambient odour levels of greater than 7 OU/m³. This is expressed as the 99th percentile value, as a nose response time average (approximately one second).

DECCW in the Approved Methods provide an equation to determine the appropriate impact assessment criteria to be used for complex mixtures of odorous pollutants, as:

$$\text{Impact assessment criterion (OU)} = (\log_{10}(\text{population}) - 4.5) / -0.6$$

Table 8 provides the assessment criteria for various population densities, as outlined in the Approved Methods.

Table 8: DECCW Impact Assessment Criteria for Complex Mixtures of Odorous Air Pollutants (nose-response-time average 99th percentile)

Population of Affected Community	Impact Assessment Criteria for Complex Mixtures of Odours (OU)
Urban area (≥ 2000)	2.0
~300	3.0
~125	4.0
~30	5.0
~10	6.0
Single residence (≤ 2)	7.0

Source: The Approved Methods (DECC, 2005)

The Approved Methods states that the impact assessment criteria for complex mixtures of odorous air pollutants must be applied as follows:

At the nearest existing or likely future off-site sensitive receptor.

The incremental impact (predicted impact due to the pollutant source alone) must be reported in units consistent with the impact assessment criteria (OU), as peak concentrations (i.e. approximately 1 second average) and as the:

- 100th percentile of dispersion model predictions for Level 1 impact assessments, or
- 99th percentile of dispersion model predictions for Level 2 impact assessments.

6.3.2 Project Specific Odour Impact Assessment Criteria

For the purposes of this assessment and based on the number of dwellings in the vicinity of the project and an assumed average population of three people or more per dwelling, it is expected

that an odour impact assessment criteria of 5 OU (expressed as the 99th percentile for a nose response average, i.e. 1-second, average) would need to be met.

6.4 Odour Sources and Emissions Data

The release of odoriferous compounds is likely to happen while crushing canola, which is the initial process of conditioning and pre-pressing the seed and then while solvent extracting the remaining oil in the cake. The emissions of H₂S from the various processes are combined within each process building prior to emission to atmosphere. There is one combined vent for the seed preparation plant (SPP) and one for the solvent extraction plant (SEP).

These combined emissions are passed through a wet scrubbing system before being released into the atmosphere.

6.4.1 Seed Preparation Plant

When the seeds are received in the seed preparation plant, they are first cleaned of any foreign materials. The next preparation step consists of producing flakes, which is a shape that makes the oil cells accessible for extraction. The flaking efficiency is enhanced by pre-heating the clean seeds prior to the flaking process. The flakes are then cooked and dried; cooking further weakens the cells walls and reduces the viscosity of the oil, while drying improves the gripping and the pressure buildup inside the press. In the press, oil is pressed out and the remaining solids form a cake that is sent to the solvent extraction.

6.4.2 Solvent Extraction Plant

The solvent extraction plant will be housed in a steel structure. The processing units in the plant are maintained under slight negative pressure to prevent the escape of hexane and minimise risk of fire. This process also ensures that there are no fugitive or point source odour releases from the solvent extraction. The air stream from the mineral adsorption solvent contains H₂S, which is an odorous compound. The primary extraction system extracts air from the mineral oil adsorption solvent recovery system where the air displaced from the equipment and the air leakage into the system are scrubbed in a mineral oil scrubbing unit. Ancillary processing units generally generate a low odour in air stream.

6.5 Modelling

The meteorology of the study area was examined to enable characterisation of dispersion meteorology.

Pollutant dispersion modeling was undertaken using the Ausplume Gaussian Plume Dispersion Model software developed by EPA Victoria (Version 6.0).

Meteorological Modelling

Meteorological modeling used The Air Pollution Model (TAPM) meteorological model (Version 3) to simulate meteorology of the area in the absence of meteorological observations.

6.6 Odour Assessment Results

Table 9 shows the results of the Ausplume prediction for the maximum odour concentrations at each of the nearest discrete receptors.

Table 9: Predicted 99th Percentile Odour Concentrations at Nearest Residences - Proposed operations.

Receptor ID	Predicted Odour Concentration (OU/m ³)	Odour Performance Goal (OU/m ³)
R1	0.5	5.0
R2	0.6	5.0
R3	1.0	5.0
R4	0.1	5.0
R5	0.1	5.0
R6	0.1	5.0
R7	0.1	5.0
R8	0.5	5.0
R9	0.3	5.0

These results indicate that the 99th percentile predicted odour concentration is below the odour performance goal of 5.0 OU/M³ at the nearest residential receptors.

NB. The following material (section 6.7 – 6.10) was produced by ENSR/AECOM in 2008 when the initial application was made, it has been altered by Lennon Salvestro Planning to reflect the new direction that the project will take and newly introduced legislation.

6.7 Dust and Particulates

The proposed IOPP is not expected to generate significant volumes of dust and particulates during the construction and operation. However, activities as a result of the proposed development have the potential to create adverse impacts due to dust generation. These activities are listed below and have been split into construction and operational phases of the development.

Potential construction impacts include:

- Dust generation from on site construction activities, such as grading and clearing of land as well as excavation of the wastewater storage pond; and
- Dust generation from traffic movements associated with the construction.

Potential operational impacts include:

- Dust generation from traffic movements associated with the operation of the IOPP.

To reduce and minimise potential impacts, management measures during the construction and operational phases would be implemented. These are outlined below.

- A Construction Environmental Management Plan would be prepared prior to construction and would address dust suppression in the form of an Erosion and Sediment Control Plan;
- The amount of soil exposed at any one time during construction will be minimised where possible;
- During construction trucks transporting material onto site (if required) would be covered during transportation;
- During construction, if stockpiling of material is required, the stockpiles would be regularly wetted down to minimise dust generation and kept low in height and surface area as stockpile shape influences dust generation;
- Dust suppression included in the design of plant and equipment such as the use of closed conveyers to transport oilseed, a dust collection cyclone separator and aspiration fan and a reverse pulsejet cleaned bag filter;
- All plant and equipment would be well maintained and operated in a proper and efficient manner;
- Dust generating activities would be avoided in dry and windy conditions; and

- Revegetation of appropriate areas as soon as practical.

6.8 Volatile Organic Compounds

Volatile Organic Compounds (VOCs) will be discharged from a number of points on the site. The two major emissions will be due to the burning of natural gas fuel and due to the filling of the hexane tanks.

- Natural Gas – The National Pollutant Inventory (NPI) Emission Estimation Techniques Manual for combustion in boilers has a factor for the emission of VOC of 88 kg/106m³ of gas burnt. This plant will use 540,000 GJ of natural gas per year, which equates to 14.03 x 106m³ of gas. At the emission figure given, this equates to 1,234 kg VOC per year.
- Venting of Hexane and Methanol Tanks – The frequency of filling of methanol tanks will be about 0.5 per month. Hexane delivery will be limited to about three times per year,

Hexane tank refill systems will be fitted with water traps through which vapour laden air must pass before discharge. This is a safety requirement to limit the possibility of explosion and would reduce emissions considerably. The emissions of VOCs due to these events will be small and not expected to create a significant impact to air quality.

6.9 Pollutants of Potential Concern

Nitrogen Dioxide

Nitrogen dioxide (NO₂) is a brownish gas with a pungent odour. It exists in the atmosphere in equilibrium with nitric oxide. The mixture of these two gases is commonly referred to as nitrogen oxides (NO_x). NO_x is a product of combustion processes. In urban areas, motor vehicles and industrial combustion processes are the major sources of ambient NO_x. NO₂ can cause damage to the human respiratory tract, increasing a person's susceptibility to respiratory infections and asthma. NO₂ can also cause damage to plants, especially in the presence of other pollutants such as ozone (O₃) and Sulphur dioxide (SO₂). NO_x are also primary ingredients in the reactions that lead to photochemical smog formation.

Sulphur Dioxide

Sulphur dioxide (SO₂) is a colourless gas with a sharp, irritating odour. It is formed in combustion processes through burning fossil fuel containing sulphur, in petroleum refining and smelting mineral ores. SO₂ may be oxidised in the atmosphere to form sulphuric acid, which contributes to acid rain. SO₂ affects human health by causing respiratory tract infections. People with pre-existing respiratory conditions such as asthma are most sensitive to SO₂ exposure. The simultaneous presence of airborne particulate matter can compound these effects. SO₂ and its aerosols can also damage vegetation and some materials.

6.9.1 Results and Discussion

In view of the fact that no stack testing has been conducted on the facility, the Combustion Database (CD), developed by the Victorian Environmental Protection Authority (Vic EPA) was used to calculate emission rates for NO_x and SO₂ from the bio-diesel facility. The input values used in the CD are shown in **Table 10**.

Table 10: The Combustion Database Input Values

Parameter	Value
Year	2007/08
Fuel type	Natural gas
Boiler type	0.09 – 29 MW, wall-fired
Fuel quantity (GJ/yr)	377,650

No dispersion modelling was undertaken in this study to estimate the likely GLC (Ground Level Concentration) of NO_x and SO₂. However, to allow an estimate for the GLC of NO_x and SO₂, odour modelling results taken from the Odour Impact Assessment Study (OIAS) of the oil seed crushing and processing operation were used to develop a ratio between the modelled stack odour emission concentrations and the maximum reported odour GLC (shown in the OIAS as the 6 OU performance criterion) was examined. This analysis allows the determination of the degree of dilution likely between when the stack gas leaves the stack and when it comes into contact with the ground at the performance criterion. The ratio was used to predict the GLC of NO_x and SO₂ by reducing the known stack emission concentrations of NO_x and SO₂ (Refer **Table 11**). These estimated GLCs are indicative of AUSPLUME dispersion modelling GLC results from the oil seed crushing stack (which was assumed to emit all combustion flue gases).

Table 11: Pollutant Emission Information

Parameter		Pollutant	
		NO _x	SO ₂
Emission rate ¹ (g/s)		0.54	0.0029
Volumetric flow rate ² (m ³ /s)		5.77	5.77
Stack emission concentration (µg/m ³)		93587	503
Stack odour emission concentration (OU)		43,481	
Emission concentration reduction factor ²		0.000138	
Estimated 1 hour average GLC (µg/m ³)		12.89	0.069
GLC assessment criteria ⁴ (µg/m ³)	10 minute	nac	712
	24 hour	nac	570
	1 hour	2463	228
	Annual	623	60

¹ Stack emission rates calculated using The Combustion Database v. 2.4, developed by the Vic EPA.

² Based on odour sampling and modelling of the oil seed crushing stack completed by The Odour Unit.

³ NO₂ guideline level used for comparison against NO_x concentration values.

⁴ DEC (2005) assessment criteria used.

nac – no assessment criteria available.

Due to the low predicted emission concentrations and predicted GLC's, the level of SO₂ predicted to be generated by the IOPP facility is not expected to contribute significantly to acid rain generation. Due to the relative isolation of this facility and the predicted low levels of NO_x produced by this facility, a study into the potential for the generation of photochemical smog is not considered to be warranted.

In addition to the modeling conducted by Heggies regarding NO₂ and SO₂, ROBE have purchased equipment to ensure the release to atmosphere of H₂S is within the limitations described in the "Protection of the Environment Operations (clean air) regulation 2002" and further equipment to treat discharges in order to reduce potential nuisance odours that might remain in the airborne discharge that is within the limits described in the regulations.

6.10 Greenhouse Gases

6.10.1 Construction

HLA ENSR understands that the equipment likely to generate greenhouse gases (GHG) during the construction phase of the IOPP includes:

- Scraper;
- Bulldozer;

- Compactor;
- Dump Truck;
- Generator;
- Transit Mixer;
- Concrete Boom Pump;
- Delivery Truck; and
- Crane.

The calculation methods for determining greenhouse gas emissions were sourced from the Australian Government Department of Climate Change publication National Greenhouse Accounts (NGA) Factors, January 2008. Table 3, of the workbook was used to estimate the total GHG emissions from the IOPBP (refer **Table 12**).

Table 12: Greenhouse Gas Assessment (Construction Phase)

GHG Source	Source Description	Fuel Consumption (KL) ¹	Full Fuel Cycle Emission Factor (t CO ₂ -e/kL)	GHG Emission (t CO ₂ -e/yr)
Scraper	Cat 651E motor scraper	219	2.9	635
Bulldozer	1996 komatsu D375A-3	185		536
Compactor ²	80cc single cylinder air cooled four-stroke motorcycle engine	4		11
Dump Truck	Dump truck (8 x 4)	48		138
Generator	Champion™ Series, 13 kW 60 Hz. Model GFSP-1	829		2405
Transit Mixer	aggregate truck 42 tonne capacity	69		200
Concrete Boom Pump	Assumed to be equivalent to crane fuel consumption	45		130
Delivery Truck	Trailer truck (4 x 2)	48		138
Crane	20 tonne lift capacity	45		130
Total				4323

1 Estimated that equipment will be operating a total of 2640 hours/equipment (60 weeks, 5.5 days, 8 hours/day).

2 As no fuel consumption details available for compactors, a motor bike fuel consumption rate was used and should be considered indicative for a compactor only.

3 The GHG assessment is based on estimated equipment sizes and capacities

Given the total emissions from the Australian transport sector during 1999 were 81,140,000 t CO₂-e/yr, the construction phase of the IOPBP is not considered to be a significant contributor of GHG emissions.

6.10.2 Operation

The calculation methods for determining greenhouse gas emissions were sourced from the Australian Greenhouse Office publication *AGO Factors and Methods Workbook* (DEH, 2008). The workbook defines the types of emission and their emission factor types as:

- **Direct (or point source) emission factors** – Emissions produced from sources within the boundary of an organisation and as a result of that organisation's activities; and
 - Direct (or point source) emission factors (scope 1).
- **Indirect emission factors** – Emissions generated in the wider economy as a consequence of an organisation's activities but which are physically produced by the activities of another organisation.

- Indirect emission factors (scope 2); and
- Various emission factors (scope 3).

Operations likely to generate greenhouse gases (GHG) at the IOPP facility (as defined by the three scopes) include:

- **Scope 1** - Natural gas consumption as part of the oil seed crushing and processing operation;
- **Scope 2** - Electricity to run site processes and within administration buildings; and
- **Scope 3** - Employees commuting to and from work and trucks delivering oilseed for manufacture.

The 'full fuel cycle emission factor' was used from Tables 2, 3 and 5 of the workbook to estimate the total GHG emissions from the IOPP facility including emissions released for the entire fuel production and consumption chain (refer **Table 13**).

Table 13: Greenhouse Gas Emission Results

GHG Source	Scope Number	Fuel Consumption	Full Fuel Cycle Emission Factor	GHG Emission (t CO _{2-e} /yr)
Natural gas ¹	1 and 3	377650 GL	65.5 (t CO _{2-e} /GJ)	24,737
Electricity ²	2 and 3	19,000,000 kWh	1.06 (tCO _{2-e} /kWh)	20,140
Commuting employees ³	1 and 3	26.7 kL	2.5 (tCO _{2-e} /kL)	67
Oilseed delivery via trucks ⁴	1 and 3	3,481 kL	2.9 (tCO _{2-e} /kL)	10,095
Total				55,039

¹ Natural Gas fuel consumption based on information supplied by ROBE

² Electricity consumption based on information supplied by Country Energy

³ Assumed 82 Employees drive a typical petrol driven car 6km each way for 5 days/week and 48 weeks/year

⁴ Assumed 165,000 t of grain transported per year using typical 40t capacity diesel trucks, with a 1000km maximum freight distance.

Given the total emission from the Australian transport sub-sector during 1999 were 73,900,000 t CO_{2-e}/yr, this facility is not considered a significant contributor of GHG emissions.

During the operation of the IOPP, ROBE would prepare and implement an Energy Savings Action Plan for the project, which would be prepared in accordance with the requirements of DWE and the *Guidelines for Energy Savings Action Plans* (DEUS 2005) in order to maximise energy efficiency associated with the IOPP. The Energy Savings Action Plan would include details of greenhouse gas abatement measures and energy efficiency measures for the operation of the proposed IOPP.

7 NOISE

7.1 Introduction

A Noise Impact Assessment was conducted by Heggies Pty Ltd, to assess the impact of the proposed development on the surrounding residences, the report is attached as **Appendix E**.

This chapter provides a summary of that report.

7.2 Methodology

The noise assessment was prepared with reference to Australian Standard AS1055: 1997 *Description and Measurement of Environmental Noise* Parts 1, 2 and 3 and in accordance with the Department of Environment, Climate Change and Water (DECCW) *NSW Industrial Noise Policy* (INP) and *NSW Interim Construction Noise Guideline July 2009*. Where issues relating to noise were not addressed in the INP, such as sleep disturbance, reference was made to the *NSW Environmental Noise Control Manual* (ENCM). Traffic generated by the operation was assessed with reference to the *Environmental Criteria for Road Traffic Noise* (ECRTN).

7.2.1 Sensitive receptors

A review of residences in the area surrounding the project site was conducted and in all nine receptors were identified. **Table 14** lists these receptors and their direction and distance from the subject site, while **figure 9** shows their location with respect to the subject site.

Table 14: Surrounding Sensitive Receptor Locations

Receptor ID	Location (m, MGA)		Distance (km) / Direction From Project Site (Boundary)
	Easting	Northing	
R1	537585	6121770	1.58 / SW
R2	537987	6122859	1.64 / NW
R3	538143	6123261	1.85 / NNW
R4	540370	6119797	2.02 / SE
R5	540689	6119582	2.36 / SE
R6	537255	6121720	1.92 / SW
R7	538084	6121875	1.07 / W
R8	537766	6123112	1.88 / NW
R9	538247	6123804	1.97 / NNW

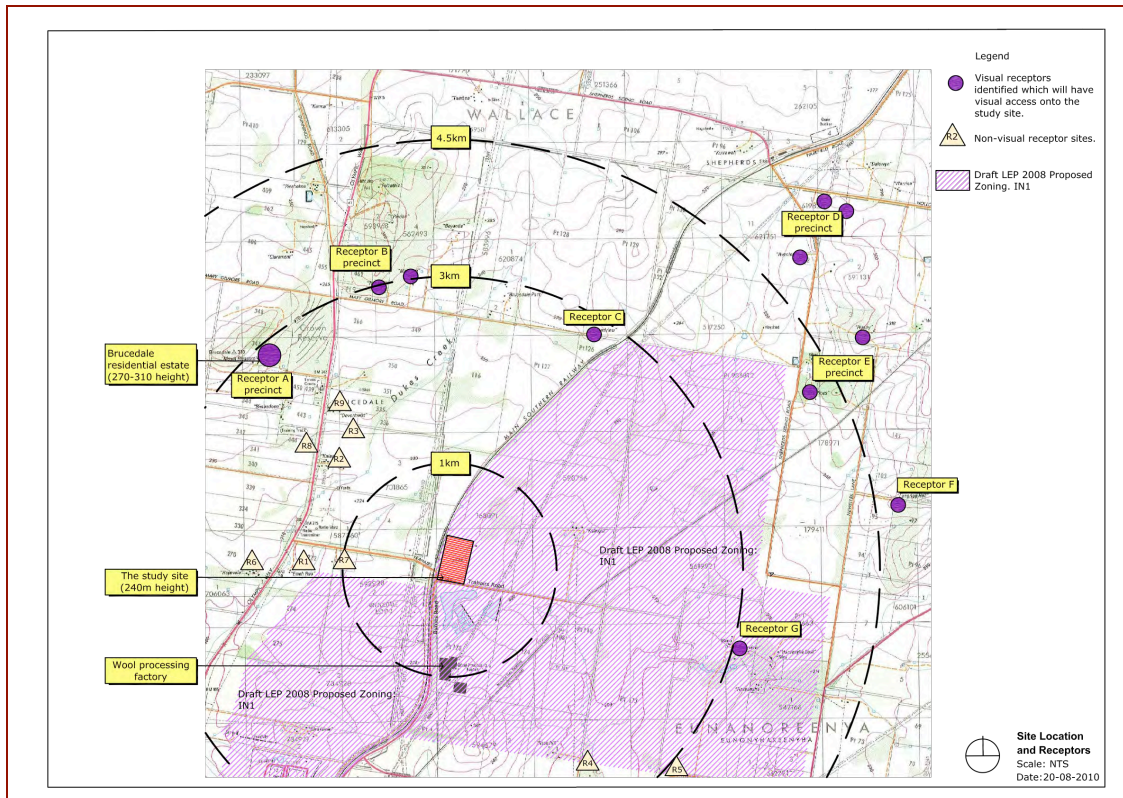


Figure 9: Sensitive Receptor Locations
(See also figure 3)

7.2.2 Criteria Assessed

A number of criteria were assessed in the course of the assessment, including:

- **Intrusiveness** – the intrusiveness criterion means the equivalent continuous background noise level (L_{Aeq}) should not be more than five decibels above the measured background level (L_{A90});
- **Amenity** – the assessment of amenity is based on noise criteria specific to land use and associated activities. The criteria relate to industrial type activities and do not include road, rail or community noise.

Table 15 (extracted from INP) outlines a number of amenity criteria from Industrial Noise sources. If the noise level from existing industries approach the criterion then any new industries must be designed so that the cumulative effect does not produce levels which exceed the criteria.

Table 15: Amenity Criteria - Recommended L_{Aeq} Noise Levels from Industrial Noise Sources

Type of Receiver	Indicative Noise Amenity Area	Time of Day	Recommended L _{Aeq} (Period) Noise Level (dBA)	
			Acceptable	Recommended Maximum
Residence	Rural	Day	50	55
		Evening	45	50
		Night	40	45
	Suburban	Day	55	60
		Evening	45	50
		Night	40	45
	Urban	Day	60	65
		Evening	50	55
		Night	45	50
School classrooms - internal	All	Noisiest 1 hour period when in use	35	40
Hospital wards - internal	All	Noisiest 1 hour period	35	40
			50	55
Place of worship - internal	All	When in use	40	45
Area specifically reserved for passive recreation (eg National Park)	All	When in use	50	55
Active recreation area (eg school playground, golf course)	All	When in use	55	60
Commercial premises	All	When in use	65	70
Industrial premises	All	When in use	70	75
Note: Daytime 7.00 am to 6.00 pm; Evening 6.00 pm to 10.00 pm; Night-time 10.00 pm to 7.00 am, On Sundays and Public Holidays, Daytime 8.00 am - 6.00 pm; Evening 6.00 pm - 10.00 pm; Night-time 10.00 pm - 8.00 am. The L _{Aeq} index corresponds to the level of noise equivalent to the energy average of noise levels occurring over a measurement period.				

Table 16 (extracted from INP) shows the modifications required to reach acceptable Noise Level (ANL) to account for existing levels of industrial noise.

Table 16: Modification to Acceptable Noise Level (ANL)* to Account for Existing Levels of Industrial Noise

Total Existing LAeq noise level from Industrial Noise Sources	Maximum LAeq Noise Level for Noise from New Sources Alone, dBA
≥ Acceptable noise level plus 2 dBA	If existing noise level is <i>likely to decrease</i> in future acceptable noise level minus 10 dBA If existing noise level is <i>unlikely to decrease</i> in future existing noise level minus 10 dBA
Acceptable noise level plus 1 dBA	Acceptable noise level minus 8 dBA
Acceptable noise level	Acceptable noise level minus 8 dBA
Acceptable noise level minus 1 dBA	Acceptable noise level minus 6 dBA
Acceptable noise level minus 2 dBA	Acceptable noise level minus 4 dBA
Acceptable noise level minus 3 dBA	Acceptable noise level minus 3 dBA
Acceptable noise level minus 4 dBA	Acceptable noise level minus 2 dBA
Acceptable noise level minus 5 dBA	Acceptable noise level minus 2 dBA
Acceptable noise level minus 6 dBA	Acceptable noise level minus 1 dBA
< Acceptable noise level minus 6 dBA	Acceptable noise level

* ANL = recommended acceptable LAeq noise level for the specific receiver, area and time of day from **Table 2**

- **Sleep Disturbance** – Criteria used for assessing sleep arousal has been assessed using the guidelines set out in the ENCM Chapter19-3. To avoid the likelihood of sleep disturbance the ENCM recommends that the $L_{A1(1Minute)}$ noise level of the source under consideration should not exceed the background noise level (L_{A90}) by more than 15dBA when measured outside the bedroom window of a receiver during the night time hours (10pm to 7am);
- **Construction Noise** – The DECCW released interim Construction Noise Guidelines in July 2009, which sets out noise management levels in relation to construction type activities for residential receivers and how they should be applied. The guidelines suggest restrictions on the hours of construction that apply to activities generating noise at residences above the 'highly affected' noise management level. **Table 17** summarises these levels; and
- **Road Traffic Noise** - The Environment Protection Authority released the "Environmental Criteria for Road Traffic Noise" in May 1999. The policy sets out noise criteria applicable to different road classifications for the purpose of defining traffic noise impacts.

Table 17: Interim Construction Noise Guideline Noise at Residences

Time of day	Management level LAeq(15minute)	How to apply
Recommended standard hours Monday to Friday 7am to 6pm Saturday 8am to 1pm No work Sundays or public holidays	Noise Affected RBL + 10 dB	The noise affected level represents the point above which there may be some community reaction to noise. - Where the predicted or measured LAeq (15 min) is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level. - The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.
	Highly noise affected 75 dBA	The highly noise affected level represents the point above which there may be strong community reaction to noise. - Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restricting the hours that the very noisy activities can occur, taking into account: - times identified by the community when they are less sensitive to noise (such as before and after school for works near schools, or mid-morning or mid-afternoon for works near residences) - if the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.
Outside recommended standard hours	Noise Affected RBL + 5 dB	A strong justification would typically be required for works outside the recommended standard hours. - The proponent should apply all feasible and reasonable work practices to meet the noise affected level. - Where all feasible and reasonable practices have been applied and noise is more than 5 dB(A) above the noise affected level, the proponent should negotiate with the community.

7.3 Existing Environment

7.3.1 Background Noise Levels

Heggies did not take a measure of the existing background noise, rather they assumed a minimum background rating level (RBL) of 30 dBA, in accordance with the INP.

7.3.2 Meteorological Impacts on Noise Levels

Wind

Wind can lead to increased noise levels at receivers when it is light and stable and blows from the direction of the noise source. As the wind speed increases the noise of the wind will obscure the noise from the source.

Wind needs to be given consideration when it blows from the noise source to receivers at speeds of up to 3 m/s for more than 30% of the time in any season. The following three tables were sourced from weather data from the Wagga Wagga weather Station and show the frequency of

winds up to 3m/s for daytime, evening and nighttime. Those figures shown in bold print are those that exceed the 30% threshold.

Table 18: Seasonal Frequency of Occurrence of Wind Speed Intervals – Daytime

Period	Calm	Wind Direction	0.5 - 2 m/s	2 - 3 m/s	0.5 - 3 m/s
Summer	18.9%	NE±45°	12.5%	7.2%	19.7%
Autumn	23.0%	W±45°	19.4%	9.5%	28.9%
Winter	20.1%	E±45°	17.4%	14.4%	31.8%
Spring	8.6%	W±45°	7.4%	5.9%	13.3%

Table 19: Seasonal Frequency of Occurrence of Wind Speed Intervals – Evening

Period	Calm	Wind Direction	0.5 - 2 m/s	2 - 3 m/s	0.5 - 3 m/s
Summer	14.4%	SW±45°	14.0%	10.6%	24.6%
Autumn	26.6%	WSW±45°	21.7%	15.2%	37.0%
Winter	27.4%	ESE±45°	14.5%	10.1%	24.6%
Spring	9.9%	SW±45°	8.1%	11.3%	19.4%

Table 20: Seasonal Frequency of Occurrence of Wind Speed Intervals – Night

Period	Calm	Wind Direction	0.5 - 2 m/s	2 - 3 m/s	0.5 - 3 m/s
Summer	20.6%	ENE±45	22.0%	15.1%	37.0%
Autumn	30.8%	E±45	16.2%	18.2%	34.4%
Winter	32.5%	E±45	20.3%	17.8%	38.0%
Spring	15.9%	ESE±45	8.5%	16.6%	25.2%

Temperature Inversion

When they occur temperature inversions have the ability to increase noise levels by focusing sound waves. Temperature inversions occur predominantly at night during the winter months. For a temperature inversion to be considered a significant characteristic of the area it needs to occur for approximately 30% of the total nighttime during winter, or about two nights per week.

Meteorological data reveals that this criterion is reached in Wagga Wagga and as such the occurrence of temperature inversions was considered in the noise assessment.

7.3 Noise Goals

The following series of tables shows the noise goals that were formulated based on assumptions made for background noise in the vicinity of the subject site.

Table 21: Project Specific Noise Criteria

Location	Period	Intrusiveness Criteria LAeq(15minute)	Amenity Criteria LAeq(Period)
R1 to R9	Day	35 dBA	50 dBA
	Evening	35 dBA	45 dBA
	Night	35 dBA	40 dBA

Table 22: Sleep Disturbance Goals

Location	Period	Sleep Disturbance Criteria LA1(1minute)
R1 to R9	Night	45 dBA

Table 23: Construction Noise Goals

Residential Location	Period	Noise Goal LAeq(15minute)	
		Noise Affected	Highly Noise Affected
R1 to R9	Day	40 dBA (RBL+10)	75 dBA
	Evening	35 dBA (RBL+5)	NA
	Night	35 dBA (RBL+5)	NA

Table 24: Traffic Noise Goals

Type of Development	Descriptor	Traffic Noise Goal
Land use developments with the potential to create additional traffic on a sub-arterial road	LAeq(15hour) daytime	60 dBA*
	LAeq(9hour) night-time	55 dBA*
Land use developments with the potential to create additional traffic on a collector	LAeq(1hour) daytime	60 dBA*
	LAeq(1hour) night-time	55 dBA*

* In all cases (where criteria are already exceeded, or where existing noise levels are within 2 dBA of the criterion), traffic arising from the development should not lead to an increase in existing noise levels of more than 2 dBA.

7.4 Potential Noise Impacts

7.4.1 Operational Noise

Computer modeling was used to predict noise emissions from the project site. The following two tables show the meteorological parameters that were used for noise prediction (**Table 25**) and the operational scenario modeled during each period (**Table 26**).

Table 25: Meteorological Parameters for Noise Predictions

	Temperature	Humidity	Wind Speed	Wind Direction (degrees from north)	Temperature Gradient
Calm (All periods)	20°C	65%	0 to 0.5 m/s	N/A	N/A
Day period	20°C	65%	3m/s	90°	
Evening period	15°C	65%	3 m/s	248°	N/A
Night period	10 °C	90%	2 m/s	90°	3 °C/100m
Night period	10 °C	90%	3 m/s	90°	3 °C/100m

Table 26: Operational Scenario Considered in Noise Model

Type of Equipment	Period of Operation			Sound Power Level (dBA)
	Day 7am to 6 pm	Evening 6 pm to 10pm	Night 10 pm to 7am	
Bucket Elevator (Grain Silos to Crushing Unit)	✓	✓	✓	93 dBA
Crushing Unit (SPP)	✓	✓	✓	110 dBA
Extraction Plant (SEP)	✓	✓	✓	110 dBA
Refinery	✓	✓	✓	104 dBA
Front End Loader (Meal Storage Shed)	✓	✓	x	102 dBA
Product Truck loading	✓ (2)	✓ (2)	x	99 dBA (each)
Product Truck manoeuvre	✓ (2)	✓ (2)	x	99 dBA (each)
Induced Draft Fans Boiler House & Cooling Tower (SEPP + SPP)	✓ (3)	✓ (3)	✓ (3)	96 dBA (each)

Note: A tick indicates that the equipment is in operation during the relevant period. A cross indicates that the equipment is not in operation during the relevant period. Where there is a number in brackets following a tick, this represents the number of items of equipment that have been considered in the noise model during the relevant period. The client informed Heggies that under normal circumstances product receipt and dispatch will not occur before 7:00 am. All plant and equipment sound power levels were derived from information supplied by the client.

Predicted noise levels for the Project site are presented in the **Table 27**. These figures were derived for calm and prevailing weather conditions. **Figures 10** and **11** show the noise contours for calm and prevailing weather conditions.



Figure 10: Noise contours - Calm conditions



Figure 11: Noise Contours - Prevailing conditions

Table 27: Predicted Operational Noise Levels

Location	Period	Predicted Noise Level LAeq(15minute)			Project Specific Noise Criteria LAeq(15minute)
		Calm	Wind 3m/s	Inversion 3°C/100 m with drainage flow 2m/s	
R1	Day	<30 dBA	30 dBA	n/a	35 dBA
	Evening	<30 dBA	<30 dBA	n/a	
	Night	<30 dBA	30 dBA	31 dBA	
R2	Day	<30 dBA	31 dBA	n/a	35 dBA
	Evening	<30 dBA	<30 dBA	n/a	
	Night	<30 dBA	30 dBA	32 dBA	
R3	Day	Day	<30 dBA	<30 dBA	35 dBA
	Evening	Evening	<30 dBA	<30 dBA	
	Night	Night	<30 dBA	<30 dBA	
R4	Day	<30 dBA	<30 dBA	n/a	35 dBA
	Evening	<30 dBA	<30 dBA	n/a	
	Night	<30 dBA	<30 dBA	<30 dBA	
R5	Day	<30 dBA	<30 dBA	n/a	35 dBA
	Evening	<30 dBA	<30 dBA	n/a	
	Night	<30 dBA	<30 dBA	<30 dBA	
R6	Day	<30 dBA	<30 dBA	n/a	35 dBA
	Evening	<30 dBA	<30 dBA	n/a	
	Night	<30 dBA	<30 dBA	<30 dBA	
R7	Day	<30 dBA	34 dBA	n/a	35 dBA
	Evening	<30 dBA	<30 dBA	n/a	
	Night	<30 dBA	34 dBA	35 dBA	
R8	Day	<30 dBA	30 dBA	n/a	35 dBA
	Evening	<30 dBA	<30 dBA	n/a	
	Night	<30 dBA	<30 dBA	30 dBA	
R9	Day	Day	<30 dBA	<30 dBA	35 dBA
	Evening	Evening	<30 dBA	<30 dBA	
	Night	Night	<30 dBA	<30 dBA	

Noise predictions shown in **table 27**, indicate that noise emissions from the Project site would comply with the project specific noise criteria for operation during day, evening and night for calm and prevailing conditions.

7.4.2 Sleep Disturbance

Heggies concluded that given the relative constant nature of the subject noise source (it is noted that the front end loader or delivery trucks do not operate in the night period) it is not likely that sleep disturbance will occur as a result of operation at the Project Site.

7.4.3 Construction Noise

A list of plant and equipment that has been assumed for construction activity at the Project Site is shown in **Table 28**.

Table 28: Construction Plant and Equipment

Plant and Equipment	Sound Power Level (LAeq)
D10 Dozer	109 dBA
Air Compressor	91 dBA
Agitator Truck	111 dBA
Delivery Truck	106 dBA
Rock Breaker	109 dBA
Crane	103 dBA
Concrete Boom Pump	100 dBA
Excavator	105 dBA
Hammering	98 dBA
Angle Grinder	102 dBA

Source: Heggies database

The results of construction noise predictions, for daytime only, are shown in **Table 29**. These results indicate that construction noise emissions from the site will comply with the construction noise goals.

Table 29: Construction Noise Predictions

Residential Location	Period	Predicted Noise Level LAeq(15minute)	Noise Goal LAeq(15minute)	
			Noise Affected	Highly Noise Affected
R1	Day	<30	40 dBA	75 dBA
R2	Day	<30	40 dBA	75 dBA
R3	Day	<30	40 dBA	75 dBA
R4	Day	<30	40 dBA	75 dBA
R5	Day	<30	40 dBA	75 dBA
R6	Day	<30	40 dBA	75 dBA
R7	Day	<30	40 dBA	75 dBA
R8	Day	<30	40 dBA	75 dBA
R9	Day	<30	40 dBA	75 dBA

7.4.4 Traffic Noise

It is expected that approximately 35 additional heavy vehicle movements will be generated by operation of the plant.

Peak hourly traffic movements are expected to occur between 6.00am and 7.00am as staff arrive for the day shift and trucks arrive at the site for loading after 7.00am.

Transport to and from the site will have an insignificant impact along Byrnes Road and Bomen Road, as there are no residential receivers on the route from the site to the Olympic Highway.

AADT (1997) traffic data from the RTA for the Olympic Highway indicate a traffic flow of approximately 7904 vehicle movements per day. The additional traffic movements proposed from the Project Site would result in an insignificant change in traffic flow on the Olympic Highway given the existing traffic volume.

It is predicted that the additional daily traffic of up to approximately 35 heavy vehicles for the proposed plant will result in a negligible change to the existing road traffic noise level generated from the Olympic Highway and therefore likely to meet the requirements of the ECRTN.

7.5 Noise Conclusion

The Noise Assessment prepared by Heggies Pty Ltd demonstrated that the predicted noise levels from the site using a conservative (minimum) background noise level at residential areas surrounding the site will not exceed the goals set for the project.

Operational noise predictions will comply with INP criteria in both calm and prevailing conditions. Construction noise is predicted to comply with DECCW guidelines and traffic generated by the operation is predicted to meet the requirements of the ECRTN.

8 SOIL SUITABILITY

The proposed IOPP will produce approximately 125 Megalitres (ML) of wastewater each year. This wastewater will be stored in an onsite dam and used to irrigate crops, including lucerne, pasture, wheat and canola on approximately 25 ha of land adjoining the site, as shown in the following figure, extracted from the Soil Suitability Report (**appendix F**) and the Soil and Water Management Plan prepared by D McMahon for the site (refer **appendix G**). This chapter will assess the suitability of that land to receiving the wastewater.

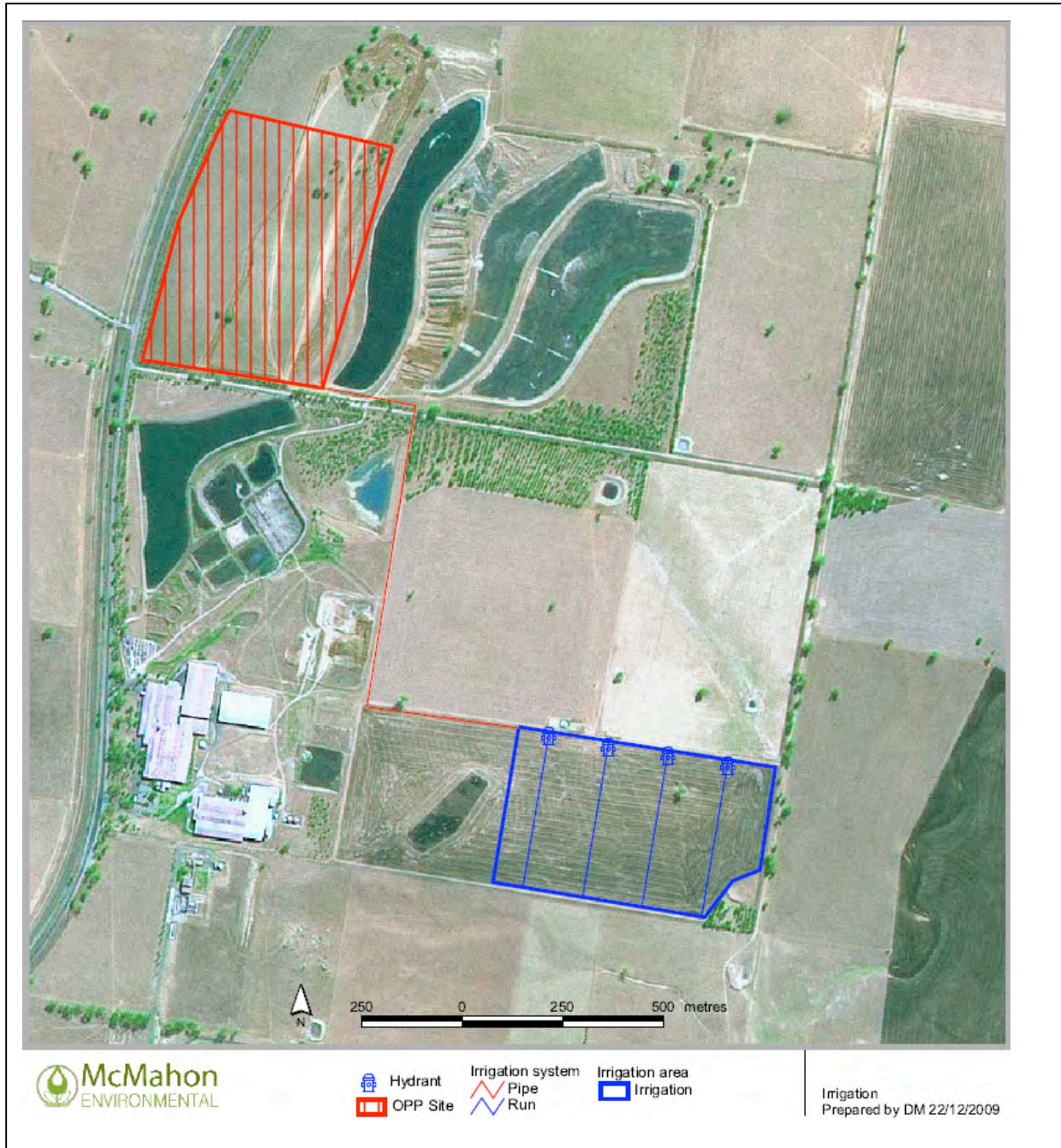


Figure 12: Site Plan Including Location of Proposed Irrigation Area

8.1 Soil Landscapes

Descriptions of soil landscapes were obtained from the Department of Land and Water Conservation (1997) *Soil Landscapes of the Wagga Wagga 1:100,000 Sheet*. The Soil Landscape units identified within the study area are illustrated on **Figure 13**.

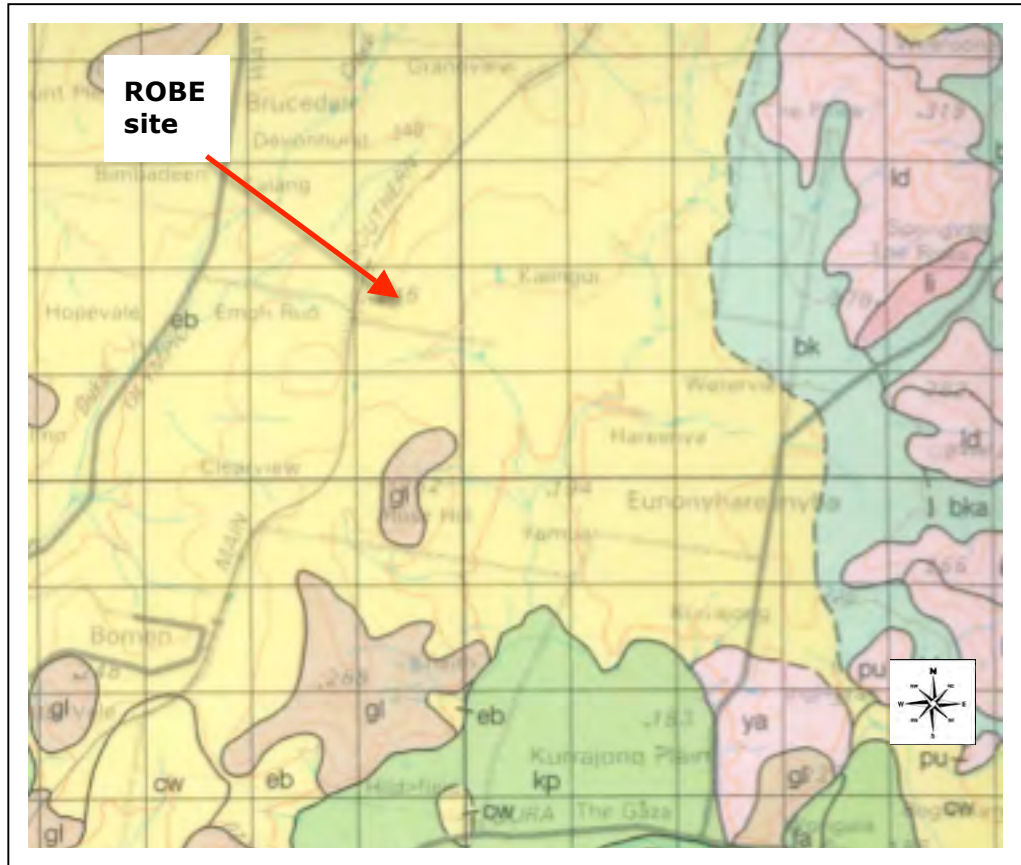


Figure 13: Soil Landscapes of Subject Site (Source: DLWC Soil Landscape Sheet)

8.1.1 East Bomen Soil Landscape (EB)

Location and Background

The East Bomen Soil Landscape (eb) covers the entire study area and proposed irrigation area. Regionally it has a distribution from areas north of the Murrumbidgee Floodplain to the regions near Yarragundry-Collingullie and a small area south of Uranquinty.

The underlying geology comprises Silurian aged granites, mainly Wantabadgery Granodiorite and Collingullie Granite, with occasional Burrandana Granite. The topography comprises undulating rises and minor low hills with slope gradients mostly 3-10%. The landform generally consists of crests and ridges, long waning slopes and shallow drainage lines. The vegetation of this soil unit is largely cleared, with the exception of some residual areas of tall woodland in Crown reserves and along a few roads. Common tree species include white box, grey box and yellow box and white cypress pine. Understory plants include tussock grass, kangaroo grass, plains grass, spear grass and wallaby grass.

Predominant land uses include cropping for wheat with minor barley and cereal rye, and grazing on both stubble and improved pastures.

Dominant Soil Materials

The *Soil Landscapes of the Wagga Wagga 1:100,000 Sheet* (DLWC, 1997) describe the soils of the East Bomen soil landscape group as comprising shallow to moderately deep (40-150cm) Eutrophic Red Dermosols on crests and ridges; deep (80-200cm) Eutrophic Red Dermosols on slopes; and moderately deep (80-150cm) Eutrophic Brown Dermosols in drainage lines. The East Bomen soil landscape typically incorporates the following dominant soil materials and their qualities:

eb1 – Dull Loam (topsoil-A1 horizon). Dark to dull, sandy loam to clay loam, massive; field pH 5.0-5.5.

eb2- Reddish light clay (B1 horizon). Reddish brown, light clay, massive; field pH 6.0-6.5.

eb3-Reddish brown light clay (subsoil-B21 horizon). Bright reddish brown to reddish brown, light clay to medium clay, massive to strong pedal; field pH 6.0-7.5.

eb4-Yellowish light medium clay (subsoil-B22 horizon). Dull yellow orange to yellowish brown, light medium clay, moderate to strong pedal; field pH 6.0-7.0.

eb5-Bright sandy light clay (subsoil-BC horizon). Orange to bright yellowish, brown coarse sandy light clay, moderately pedal; field pH 6.0-8.0.

Landscape Limitations

Landscape limitations are soil properties, which may restrict urban or rural development and potentially the proposed development plans for an integrated oilseed processing plant. Limitations of topsoils and subsoils in this Soil Landscape are shown in **Table 30**.

Table 30: Landscape Limitations

Topsoil/subsoil	Limitation
eb1	Moderately acid
	Low wet bearing strength (localised)
	Salinity (localised)
	Low fertility
	Sodicity (localised)
	Hardsetting (localised)
eb2	Salinity (localised)
	Sodicity (localised)
	Low fertility
	Low wet bearing strength (localised)
eb3	Low fertility
	Sodicity
eb4	Low fertility
	Low wet bearing strength
eb5	Low fertility
	Low wet bearing strength

Fertility

Fertility of all soil materials is low. The soils of this unit are strong to slightly acid. Nutrient status is generally very low in topsoils and subsoils.

Land Degradation and Erosion

Up to 15cm of soil can be lost to sheet erosion in intensively cultivated regions where soil structure decline also occurs, resulting in hard setting surface. Minor gully erosion occurs along a few drainage lines. Isolated salinisation has occurred locally in one or two drainage flats (north eastern margin of the mapping area).

8.2 Soil Analytical Results

A soil survey of the proposed receiving site (on RIVCO Group Pty Ltd land) was conducted in June 2010. Eighteen samples were taken over the site, from the locations are shown in **figure 14**.



Figure 14: Soil Sampling Locations

DEC NSW (2004) (now DECCW) Environmental Guidelines for Use of Effluent by Irrigation outline the typical soil characteristics for effluent irrigation systems, this guide will be used for identifying soil limitations and selecting appropriate amelioration measures to ensure environmental impacts of using wastewater for irrigation are minimised. The following table presents those guidelines.

Site landscape is a gently to very gently inclined simple slope running in a west to east direction. The local relief is approximately 20 metres with an approximate gradient of 3%. There are no incised or formed drainage lines present. Soils are deep (>150 cm), sandy loam to fine sandy loam topsoils (10 to 20 cm) overlying a silty clay to sandy clay loam.

The soils belong to the **Dermosol** soil classification and are defined as lacking strong texture contrast between the A and B horizons and with a structured B horizon. Dermosols are also classified as **Red and Yellow Podzolic Soils** and **Red Earths**. They are derived from the granitic parent material which is naturally acidic and rich in silt and aeolian dust (parna).

The profiles mainly consist of three horizons:

1. A darker fine sandy loam organic surface layer (A horizon);
2. A structured subsurface horizon (B horizons);
3. Clayey and silty subsoil that is characterised by the accumulation of amorphous organic and/or mineral compounds and some mottling, (C horizon).

The soil is deep, friable, porous and non-cracking that is currently well-drained and aerated, brittle when dry, but soft and smeary when wet. Field tests showed that the soils do not swell and disperse, but the subsoils are generally low in organic matter. In general, a combination of soil depth, slope, very low salinity, open porosity, fine friable subsoil structure, physically

unrestricted roots and water penetration, large water holding capacity, good drainage, aeration, water and heat transmission, workability and trafficability, are some of the many advantages of these soils. These favourable properties make them highly suitable for the intended use, and the soils do not require physical amelioration before irrigation.

Table 31: Typical Soil Characteristics for Effluent Irrigation Systems

Property	Limitation			Restrictive Feature
	Nil or Slight	Moderate	Severe ¹	
Exchangeable sodium percentage (0–40 cm)	0–5	5–10 ²	> 10	structural degradation and waterlogging
Exchangeable sodium percentage (40–100 cm)	< 10	>10	—	structural degradation and waterlogging
Salinity measured as electrical conductivity (EC _e) (dS/m at 0–70 cm)	< 2	2–4	> 4 ³	excess salt may restrict plant growth
Salinity measured as electrical conductivity (EC _e) (dS/m at 70–100 cm)	< 4	4–8	> 8 ³	excess salt may restrict plant growth, potential seasonal groundwater rise
Depth to top of seasonal high water table (metres)	> 3 ⁴	0.5–3 ⁴	< 0.5	poor aeration, restricts plant growth, risk to groundwater ⁵
Depth to bedrock or hardpan (metres)	> 1	0.5–1	< 0.5	restricts plant growth, excess runoff, waterlogging
Saturated hydraulic conductivity (Ks, mm/h, 0–100 cm)	20–80	5–20 ⁶ or >80 ⁶	<5	excess runoff, waterlogging, poor infiltration
Available water capacity (AWC, mm/m)	> 100	< 100 ⁶	—	little plant-available water in reserve, risk to groundwater
Soil pH _{CaCl2} (surface layer)	> 6–7.5	3.5 ⁷ –6.0 > 7.5	< 3.5	reduces optimum plant growth
Effective cation exchange capacity (ECEC, cmol (+)/kg, average 0–40 cm)	> 15	3–15 ⁶	< 3	unable to hold plant nutrients
Emerson aggregate test (0–100cm)	4, 5, 6, 7, 8	2, 3	1	Poor structure
Phosphorus (P) sorption (kg/ha at total 0–100 cm)	high ⁹	moderate ⁹	Low	unable to immobilise any excess phosphorus

Source: Based on Hardie and Hird (1998). See also NSW Department of Primary Industries (2004)

Notes:

1. Sites with these properties are unlikely to be suitable for irrigation of some or all effluent products.
2. Application of gypsum or lime may be required to maintain long-term site suitability.
3. Some high EC soils containing calcium 'salts' are not necessarily considered 'severe'.
4. Where unable to excavate to 3m, local knowledge and absence of indications of water table to the depth of sampling (1m) should be used.
5. Criteria are set primarily for assessing site suitability for plant growth. Presence of a shallow soil water table may indicate soil conditions that favour movement of nutrients and contaminants into groundwater. In such cases, careful consideration should be given to quality and potential impacts on groundwater.
6. Careful irrigation scheduling and good irrigation practices will be required to maintain site sustainability.
7. Soil pH may need to be increased to improve plant growth. Where effluent is alkaline or lime is available, opportunities exist to raise pH. If acid sulfate soil is present, site-specific specialist advice should be obtained.
8. Soil may become more sodic with effluent irrigation. In some cases, however, this soil property may be ameliorated with addition of a calcium source.
9. Soils with medium to high phosphorus sorption capacity can adsorb excess phosphorus not taken up by plants. The effectiveness of this depends not only on the sorption capacity but also, the depth and permeability of the soil. A nutrient budget must be undertaken.

The following table displays the results of the analytical tests of the soils collected from the proposed irrigation site.

Table 32: Analytical Data Obtained from Soil Analysis

A 0-10	Top	Middle	Bottom	Mean
Aluminium meq/100g	0.28	0.06	0.08	0.14
Calcium meq/100g	2.29	2.14	3.19	2.54
EAT	5	3(1)	3(1)	n/a
EC uS/cm	297	301	317	305
Magnesium meq/100g	0.74	0.59	0.87	0.73
Total Nitrogen mg/kg	924	898	940	921
Phosphrous Buffer Index	41.2	71.7	57.9	56.9
pH CaCl2	4.9	4.4	4.7	4.7
Phosphorus Available mg/kg	27.6	25.6	25.6	26.3
Total Phosphorus mg/kg	116	146	145	136
pH H2O	4.8	4.4	4.7	4.6
Potassium meq/100g	0.71	0.66	1.08	0.82
Sodium meq/100g	0.11	0.03	0.02	0.05
Total Kjeldahl Nitrogen mg/kg	924	898	940	921
Cation Exchange Capacity	4.13	3.48	5.24	4.28
ESP	2.7	0.9	0.4	1.3
B 10-30	Top	Middle	Bottom	Mean
Aluminium meq/100g	0.44	0.22	0.05	0.24
Calcium meq/100g	4.3	3.06	7.4	4.9
EC uS/cm	407	347	509	421
Magnesium meq/100g	1.73	1.13	3.49	2.12
pH CaCl2	4.5	4.3	5.4	4.73
pH H2O	4.6	4.4	5.4	4.8
Potassium meq/100g	0.68	0.7	1.24	0.87
Sodium meq/100g	0.3	0.05	0.02	0.12
CEC	7.45	5.16	12.2	8.3
ESP	4.0	1.0	0.2	1.7
C 30-60	Top	Middle	Bottom	Mean
Aluminium meq/100g	0.38	0.1	0.09	0.19
Calcium meq/100g	5.3	5.48	9.06	6.6
EC uS/cm	432	436	568	479
Magnesium meq/100g	4.21	3.58	3.98	3.92
pH CaCl2	4.6	4.6	5.2	4.80
pH H2O	4.7	4.7	5.3	4.9
Potassium meq/100g	0.56	0.56	1.04	0.72
Sodium meq/100g	0.27	0.21	0.07	0.18
CEC	10.72	9.93	14.24	11.6
ESP	2.5	2.1	0.5	1.7
D 60-100	Top	Middle	Bottom	Mean
Aluminium meq/100g	0.07	0.04	0.16	0.09
Calcium meq/100g	7	5.83	7.53	6.8
EC uS/cm	686	501	610	599
Magnesium meq/100g	6.2	5.19	4.95	5.45
pH CaCl2	4.5	4.7	4.9	4.70
pH H2O	4.6	4.8	4.9	4.8
Potassium meq/100g	0.9	1.06	1.22	1.06
Sodium meq/100g	0.28	0.37	0.14	0.26
CEC	14.45	12.49	14	13.6
ESP	1.9	3.0	1.0	2.0

Review of this dataset reveals that the soils on the proposed receiving site are highly suitable for irrigation when compared to the DECCW guidelines in **table 32** above. The following is a summary of the soils compared to the DECCW Guidelines.

Table 33: Comparison of Soil Data with DECCW Guidelines

Property	Comments
Exchangeable sodium percentage (0–40 cm)	ESP in the A & B horizons returned results of below 5. The highest reading was 4 at a depth of 10-30cm in the upper slope.
Exchangeable sodium percentage (40–100 cm)	All ESP results in the C horizon and below are below 5. The highest result was an ESP of 3 at a depth of 60 to 100cm in the middle slope.
Salinity measured as electrical conductivity (EC) (dS/m at 0–70 cm)	Soil salinity in the A & B horizons were all less <0.57 dS/m.
Salinity measured as electrical conductivity (EC) (dS/m at 70–100 cm)	Soil salinity in the sub soil below the C horizon were <0.69 dS/m.
Depth to top of seasonal high water table (metres)	No free groundwater was encountered during excavation.
Depth to bedrock or hardpan (metres)	No bedrock or hardpans were experienced during excavation.
Saturated hydraulic conductivity (Ks, mm/h, 0-100 cm)	Ks overall is classed as "moderately permeable" with no problems associated with infiltration, water logging or excessive runoff.
Available water capacity (AWC, mm/m)	AWC is calculated to be ~120mm/m indicating good AWC for plants.
Soil pH _{CaCl2} (surface layer)	Soil pH is very strongly acid and the application of lime is recommended.
Effective cation exchange capacity (ECEC, cmol (+)/kg, average 0–40 cm)	CEC in the A & B horizons ranged from 3.5 to 14.2 which is typical of the soils of the locale.
Emerson aggregate test (0–100cm)	Topsoil samples returned results that are 'unlikely to be sodic'
Phosphorus (P) sorption (kg/ha at total 0–100 cm)	Phosphorus Sorption ranges from low to moderate in the topsoil tested. Owing to the predicted low phosphorus load in the wastewater this is not considered a limitation. Soil generally in the locale has an inherent low phosphorus sorption capacity.

Table 33 shows the suitability of the soils at the proposed irrigation site to receive treated effluent. The pH of the soils were generally found to be low (i.e highly acidic) however, treatment with lime will overcome any issues that may be associated with acidic soils. Additionally, the phosphorus sorption capacity of the soils was found to generally be low to moderate, however, in light of the characteristics of the treated effluent (i.e. having a low phosphorus concentration) this is not viewed as a limitation to the use of this area of land (further details on the characteristics of the treated effluent are provided in **section 12** of the EA).

8.3 Soil Conclusions and Recommendations

The site has been assessed following the DEC (2004) guidelines endorsed by NSW DECCW. Based on the reported results for the site all sample locations were found to be appropriate for effluent irrigation. Appropriate management and monitoring of irrigation activities following the Soil and Water Management Plan will ensure that the site remains suitable for irrigation purposes.

9 WATER

NB. The following material (chapter 9.1) was produced by ENSR/AECOM in 2008 when the initial application was made, it has been altered by Lennon Salvestro Planning to reflect the new direction that the project will take and newly introduced legislation.

9.1 Surface Water

The site lies within the Murrumbidgee Catchment Management Area of which the Murrumbidgee River is the main stream. The source of the Murrumbidgee River is in the Fiery Ranges of the Snowy Mountains. From here it flows 1,600 km westward to its confluence with the Murray River near Balranald. The Murrumbidgee River passes through Wagga Wagga, approximately 10 km south of the site. The Murrumbidgee River is a regulated system with a number of large dams and weirs having been constructed along its length. It is the water source for a number of uses including irrigation, aquaculture, industry, domestic and environmental flows.

The Wagga Wagga catchment area is predominantly situated on a large drainage basin comprising heavy clay soils, with only a small catchment discharge point (Wagga Wagga and Urban Salinity, n.d.).

Surface water quality has been affected by extensive clearing and other land management practices in the catchment, leading to increased turbidity, nutrient levels, bacterial pollution and pesticide levels (EPA, 1995).

The site is situated on a high crop of land, where originally the eastern section of the block drained naturally to the Byrnes Road Reserve, the southern section of the site to the Trahairs road reserve, the north and eastern to land lock, where currently RIVCO Group Pty Ltd collect and transfer water to other irrigation dams by pumping. There are no streams running through or bordering the site.

Trahairs Road, up to the main entrance of the proposed IOPP will continue to drain to Byrnes Road reserve, while past the proposed IOPP development main entrance drains directly to RIVCO Group Pty Ltd land at control points along the length of Trahairs Road.

9.1.1 Present Users

The Murrumbidgee River is the major water supply for a number of different uses including:

- Major populations centres, such as Wagga Wagga;
- Large irrigated agricultural and irrigated pastoral developments;
- Aquaculture; and
- Industry.

The Murrumbidgee River is a regulated system and water delivery to users is the responsibility of the State Water Corporation. The allocations include water for environmental flows.

9.1.2 Wetlands

The EPBC Protected Matters Search Tool identified one Ramsar Wetland, the Fivebough and Tuckerbil Swamps, in the same catchment as the site. The wetland is in the Murrumbidgee catchment; however, it is located over 135 km from the site. There are no wetlands of national significance located in the vicinity of the site.

9.1.3 Droughts and Flooding

The Murrumbidgee River has flooded a number of times since European occupation, affecting areas of development on the northern and southern floodplains.

Droughts have also been a feature of the region, particularly in recent years. As at October 2007, the Wagga Wagga area was identified as an area suffering drought conditions (Department of Primary Industries, 2007). As the Murrumbidgee River is a regulated system, water is allocated according to availability. Domestic and basic rights supplies are given first priority, followed by core environmental needs and then irrigation and industry. Such conditions are expected to result in a reduction in water quality if drought conditions continue (Department of Primary Industries, 2007a).

A proposed 40 megalitre storage facility for Treated Effluent has a dam wall at the 237m level. The Murrumbidgee River South of Byrnes Road intersection with Gundagai Road has a normal running level at approximately 185m level, therefore no threat to direct cross contamination of the river by flooding exists.

9.1.4 Potential Impacts

There are no natural surface water bodies located on the site and as such, potential impacts would be associated with runoff or sediment leaving the site and affecting the surface water bodies in the vicinity of the site.

Potential impacts during construction are associated with earthworks and stockpiling. These activities may cause:

- Increased turbidity of surface waters resulting from erosion and sediment laden runoff as a result of earthworks and construction traffic;
- Increased turbidity of surface waters as a result of water and wind erosion of stockpiles and access roads; and
- Contamination of surface waters as a result of accidental spillage of fuel from drilling rigs, support vehicles and passenger vehicles.

Potential impacts during operation may include:

- Contamination of surface water caused by off site release of wastewater, runoff or overflow from proposed storage dam; and
- Contamination of surface waters as a result of accidental spillage of fuel from rigs, support vehicles and passenger vehicles.

9.1.5 Environmental Safeguards

Potential impacts to surface water would be minimised through design measures incorporated into the construction and operational procedures. The following measures would be implemented during the construction phase:

- Sediment and erosion control measures, such as sediment fences, are to be installed between the construction area and surface water bodies where the drainage is towards the surface water body;
- Erosion and sediment control measures are to be detailed in a Construction Environmental Management Plan;
- All stockpiles are to remain covered, where possible; and
- Spill kits are to be made available to construction vehicles so that accidental leaks and spills can be readily cleaned.

The facility has been designed so that all stormwater and wastewater would be contained, treated and/or irrigated. The following measures would be implemented to minimise impacts to surface water quality during operation of the facility:

- A first flush retention pond with a minimum freeboard capacity of 170m³ would be installed to contain stormwater from structures, roadways and open yard areas. The hardstand areas, excluding the truck parking area to the south of the site, would be designed to drain to this retention pond;

- The retention pond will be equipped with a first flush system diverting initial waters collected in any single rain event to the WWTP. The detention pond will retain a minimum 170m³ freeboard capacity, capable of being contained to the pond by closing the discharge valve in the event of a site fire.
- Process wastewater would be treated in the wastewater treatment system after which it would be irrigated;
- The Irrigation Management Plan has determined the size of the treated effluent storage facility to allow for storage of treated effluent at times where irrigation to land is not required.
- To prevent the wastewater storage dam being filled to capacity the following management strategy will apply;
 1. RIVCO Group Pty Ltd – is committed by water license agreement to receive all treated effluent the IOPP produces to a maximum of 125 megalitres per annum,
 2. RIVCO Group Pty Ltd will have the 1st call responsibility under the water license agreement being prepared to take the water for storage to one of their own suitable storage dams for short term storage,
 3. RIVCO Group Pty Ltd will have opportunity to sell the water resource to alternate storage and or user,
 4. ROBE will have opportunity to sell the water resource to an alternate storage facility or user,
 5. Finally, the plant will shut down until wastewater can be accepted.
- Areas containing storage tanks, oil dispatch area, chemical unloading and hexane unloading shall be bunded.

9.1.6 Residual Impacts

Given the successful implementation of the environmental safeguards, the potential for uncontrolled release of contaminated water is limited. Furthermore, the distance of surface water bodies from the Site makes it unlikely that contaminated water from the proposed facility would affect them.

9.1.7 Surface Water Conclusion

Given the successful implementation of the environmental safeguards and the distance of surface water bodies from the Site, there is very limited potential for the proposed works to have a significant impact on surface water.

9.2 Groundwater

9.2.1 Introduction

In the Soil and Water management Plan for the development McMahon (included as **appendix G**) considered activities that could impact groundwater quality, two main activities were raised:

- Irrigation and
- Wastewater storage.

The proposed integrated oilseed processing plant includes the construction of a storage dam for wastewater from the plant. The location of the dam is shown in **figure 15** (see also **Figure 4**). The capacity of the dam is approximately 40ML. To minimise impacts on groundwater the pond will be constructed with

- a PVC plastic liner in place,
- a leakage detection system and
- solid waste storage areas with impermeable pads, that are located in controlled drainage areas on the site.

Dam Liners offer a cost-effective way to eliminate reservoir and dam water loss. The installation of a UV-stable membrane lining system not only resolves unwanted water leakage (from cracks and/or porous soil) – it can also prevent chemicals from leeching into a reservoir from the ground

water basin. Also commonly used in situations where the liquid contained is deleterious to the ground water, dam liners can prevent unwanted seepage and pollution. In addition to deployment within existing storage structures, dam liners are also an effective, low-cost way to create new, waterproof reservoir bodies.

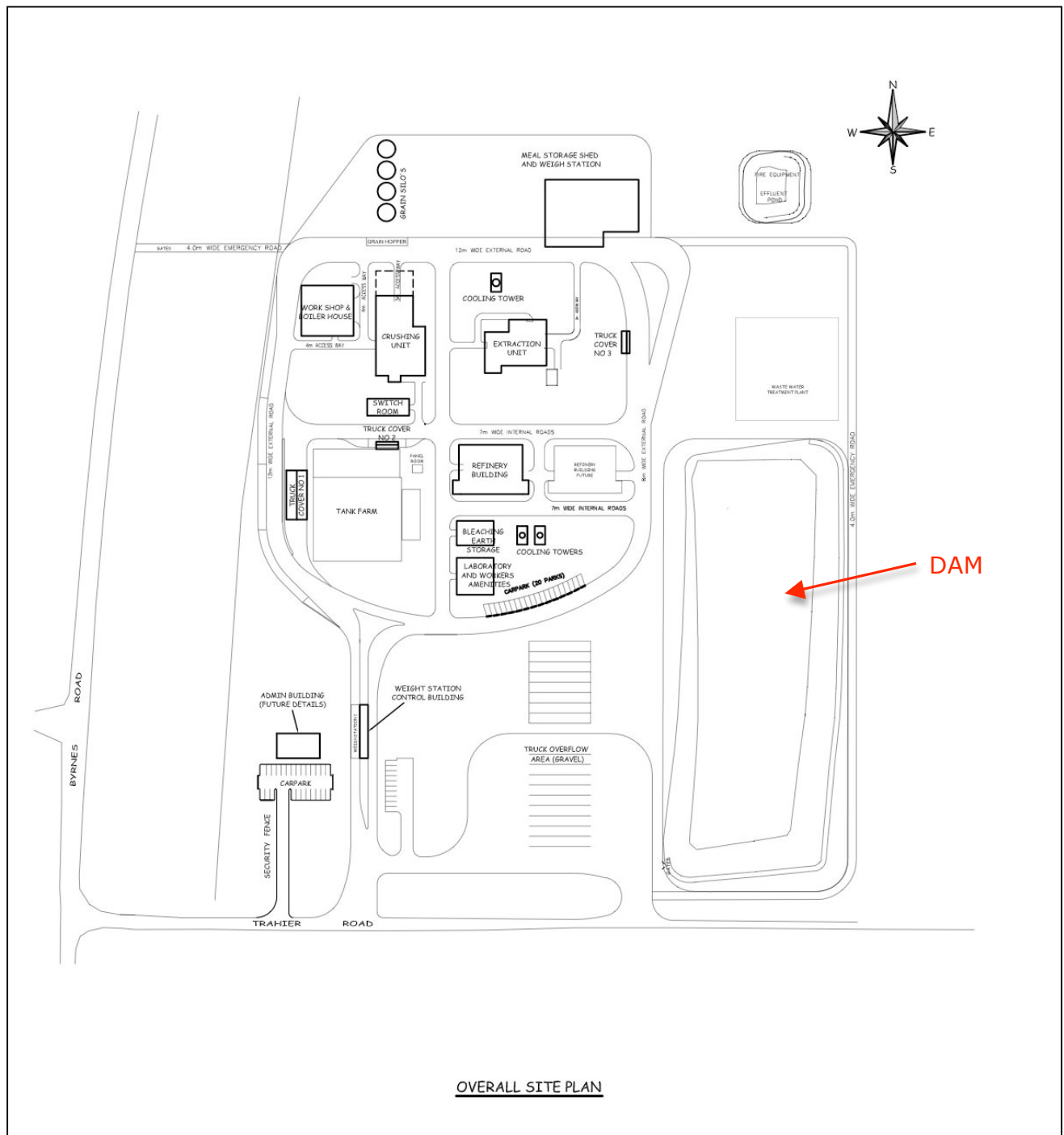


Figure 15: Site Plan Including the Proposed Wastewater Storage Dam (east of plant)

9.2.2 Background Geology and Hydrogeology

Geology and Soils

The geology underlying the site is dominated by the Silurian granites, predominantly Wantabadgery Granodiorite and Collingullie Granite (Adamson and Loudon, *Wagga Wagga*

1:250,000 Geological Series Sheet S1-55-15, 1st ed. 1966). Thick clay sequences are present overlying the granite, with significant Aeolian clay on sideslopes and in drainage depressions.

During previous investigations in the locality of the subject site (CSIRO, 1990; Coffey Partners, 1992) soils comprising superficial sandy loams over plastic silty to sandy clays were encountered to depths of approximately 6 metres. Fine gravels consistent with weathered granitic bedrock (saprolite) were encountered in clay materials from approximately 3 metres below grade. Variably weathered bedrock could occur to depths of approximately 40 metres below grade.

Eutrophic red and brown dermosols are known to occur throughout the region to depths of between 0.4 and 2.0 metres (McKane and Chen, *Wagga Wagga* 1:100,000 Soil Landscape Series Sheet 8327, Department of Land and Water Conservation 1997).

Regional Hydrogeology

The Wagga Wagga catchment area is predominantly situated on a large drainage basin comprising heavy clay soils, with only a small catchment discharge point. The combination of geographical and geological features prevents groundwater from easily migrating away from the area, resulting in waterlogging and increased salinity, affecting both urban and agricultural environments (Wagga Wagga City Council, 2007).

There are three regional hydrogeological units of the Wagga Wagga area, including the Ordovician metasediments, the Silurian granites and Tertiary and Quaternary alluvium (CSIRO, 2001). Groundwater yields within the metasediments typically range between 0.3 and 0.5 L/s, with higher yields experienced where well-fractured zones are intersected. Bores constructed within granites have typically been unsuccessful, although yields of up to 0.2 L/s have been recorded. Yields from alluvium production bores are up to 200 L/s. The depth of the water table in the Wagga Wagga area varies, but has been recorded at less than 2 m in areas where salinity has affected urban infrastructure and vegetation (CSIRO, 2001).

Local Hydrogeology

Historical reports have identified the presence of two aquifers beneath the site including:

- A shallow, or perched aquifer is present at approximately two (2) metres depth; and
- A deeper aquifer is present between four (4) and 13 metres below the surface.

Little data are available regarding shallow groundwater flow directions prior to excavation and use of the ponds, however groundwater is expected to have flowed in an easterly direction from the recharge areas on the elevated ground towards lower ground along the watercourses.

Falling head permeability tests conducted in the vicinity of the subject site indicated lateral infiltration rates of approximately 0.15 m/d in sandy clay and 0.0012 m/d to 0.0018 m/d in clay with minor sand content.

In addition to groundwater within the weathered granite zone, groundwater is likely to flow through fractures within the underlying granite bedrock, with variable flow rates depending on the local interconnectivity of fractures.

9.2.3 Background Surface Water, Topography and Drainage

The topography in the vicinity of the site is generally flat with an elevation of approximately 245 metres (*Wagga Wagga* 8327-1-N 1:25,000 Topographic Map, 2nd ed. NSW Department of Lands 1991).

The site is located within the Wagga Wagga catchment area, located along the Murrumbidgee River. The proposed location for the processing plant is approximately 7 km north of the Murrumbidgee River. A number of minor tributaries and drainage lines are located in the vicinity of the site and suggest a southerly drainage direction in the event of storms or spills.

Rainfall

Wagga Wagga has an annual mean rainfall of 572 mm and median rainfall of 575 mm, distributed fairly equally over the full 12 months.

Maximum temperatures in summer are warm, averaging between 29°C and 32°C. The winters are cool to cold with overnight minimums averaging 3°C and daily maximums climbing to only 12°C to 14°C on average.

Mean monthly rainfall over the period 2000 to 2006 is presented in **Table 34** and **Figure 16**.

Table 34: Monthly Rainfall - Wagga Wagga (Weather Station 072510)

Month	2000	2001	2002	2003	2004	2005	2006
Jan	62.8	22.8	3.6	7	22.8	13.2	69.4
Feb	26.6	86.4	139.8	58.6	9.4	46.8	1.8
Mar	26	56.6	24	1.6	0	6.6	10.6
Apr	61.6	31.2	25	9.2	15.4	14.6	17.4
May	71.8	8	30.2	28.4	40.8	4.6	4.6
Jun	55	62.8	50.8	69.4	73.4	69	39.4
Jul	56.4	31.6	14.4	60.2	38	65	49.2
Aug	92.4	47.6	32.4	67.2	66.8	56.4	7.6
Sep	46.8	39.2	36	26	53.6	85	20
Oct	102	86.8	0.6	55.4	26	77.6	3.8
Nov	32.4	12	12.2	28	87.6	44.8	34
Dec	19.6	3.2	7.8	39.2	60.6	29.4	9.4
Reported Annual	653.4	488.2	376.8	450.2	494.4	513	267.2

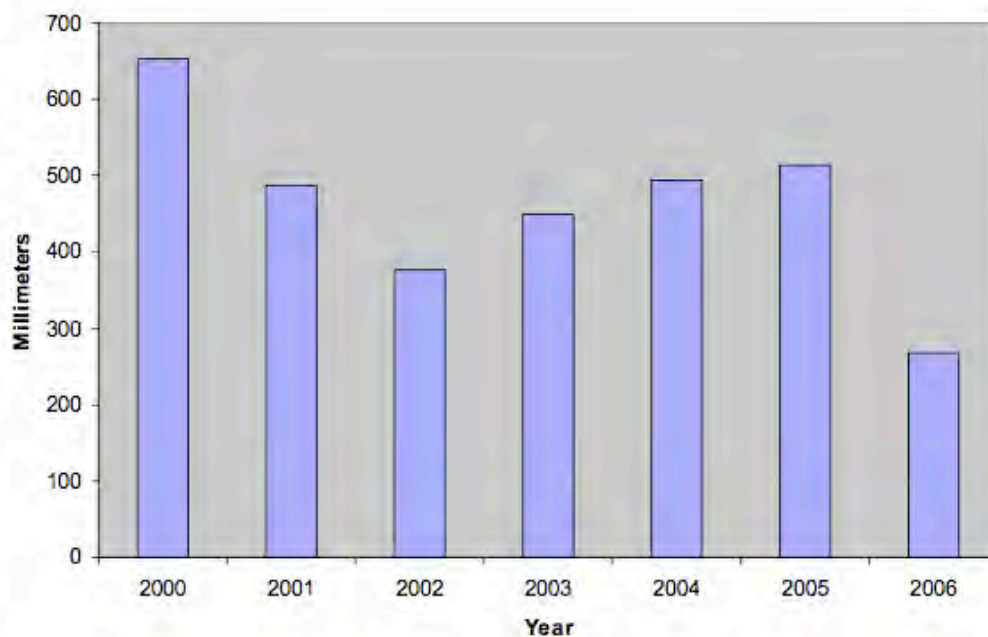


Figure 16: Graphical representation of Annual Rainfall 1999 - 2006

9.2.4 Existing Groundwater Bores

A DECCW (formerly Department of Water and Energy and Department of Natural Resources) licensed groundwater bores search was undertaken to determine existing groundwater users in the vicinity of the proposed site. The results of this search are shown in **Table 35**.

Table 35: Licensed Groundwater Bores

Groundwater Bore ID	Authorised Purpose	Distance from Study Area
GW010925	Domestic Stock	1 km north west
GW400117	Monitoring Bore	
GW400118	Monitoring Bore	
GW400116	Monitoring Bore	
GW400918	Monitoring Bore	
GW400115	Monitoring Bore	
GW400114	Monitoring Bore	
GW400093	Monitoring Bore	
GW400122	Monitoring Bore	
GW400092	Monitoring Bore	
GW400121	Monitoring Bore	
GW010900	Domestic Stock	2 km west
GW400926	Monitoring Bore	
GW400119	Monitoring Bore	
GW402564	Monitoring Bore	
GW402565	Monitoring Bore	
GW024160	Domestic Stock	2 km south east
GW045371	Domestic Stock	2 km north west
GW402563	Monitoring Bore	
GW401827	Domestic Irrigation	2 km west
GW037631	Domestic Stock	2.25 km west
GW019939	Domestic Farming Irrigation Stock	2.25 km north east
GW022006	Stock	2.5 km east

Groundwater bores used for irrigation or stock purposes are generally not located within 2 km of the Study Area. Data from these bores can provide the baseline data on the existing condition of groundwater in the study area. **Figure 17** shows the location of bores in the vicinity of the subject site.

9.2.5 Monitoring Bore Network

In addition to the licensed bores listed in **table 35** above there are an additional 39 monitoring bores located on the adjacent Riverina Wool Combing site, where the wastewater will be irrigated.

Of these bores 10 paired bores are located up-gradient from the proposed irrigation area, these range in depth between 1.8 and 11.05m below ground level, these bores will form part of the monitoring network. It is noted that the piezometric depth of these bores varied between <2 metres and <11 metres in the period 2006 to 2008.

As a result of the dry conditions experienced in the area over the past years and the subsequent decline in groundwater levels, many of the monitoring wells on-site are now dry. Currently all monitoring wells located within the shallow aquifer ('a' series) are dry, indicating that the perched aquifer no longer exists, or has lowered to such a level that it is now combined with the deeper aquifer.

9.2.6 Groundwater Level Monitoring

Groundwater levels at the site have been monitored regularly since 1997 and indicate an overall decline in groundwater levels in all monitoring wells across the site. This is expected to be attributed to the drought conditions experienced in the area during this time.

At the time of writing the original assessment, most of the monitoring wells located within the shallow aquifer were dry, with the exception of 2 wells located within and adjacent to an irrigated Lucerne paddock and the presence of water within the shallow aquifer east of the site may be attributed to different geology or ongoing irrigation of these paddocks.

The average annual standing water levels reported for the shallow wells were more erratic, indicating the shallow aquifer may be more influenced more by surface activities and the use intermittent use of the evaporation ponds rather than rainfall events. However, it is noted that some wells displayed higher standing water levels during years of increased rainfall.

Standing water levels within the deeper aquifer generally followed trends in regional rainfall patterns, indicating that the deeper aquifer is influenced more by regional rainfall patterns rather than use of the evaporation ponds.

A review of water level data indicates that groundwater flow direction of the deeper aquifer in the vicinity of the evaporation ponds is generally in an east to south-easterly direction (refer to **Appendix H**). Contour plots were produced for periods when the ponds were in use and when they weren't in use. They showed little difference in groundwater flow direction during and after use of the evaporation ponds or from season to season.

Reduced production at the Wool Combing Facility began in 2005-2006 and the majority of the evaporation ponds ran at very low levels during 2006, which reflects the reduced production throughout the plant and good evaporation rates during an extended period of low rainfall. This reduction in surface water appears to have slightly increased the rate of groundwater level decline in some wells, indicating that there may be a connection between the ponds and the groundwater table.

However, the overall climatic conditions appear to have a far greater influence on groundwater levels at the site.

It was noted in the report by Charles Sturt University (2006) titled *Soil and Irrigation Monitoring Report* that no irrigation of nearby paddocks was undertaken in 2005-2006. This may also be a contributing factor in the increased rate of decline in water levels over this period.

Groundwater level monitoring data indicate that in 2006 there was approximately four (4) metres difference in water levels between the shallow and deep aquifers in the vicinity of the ponds and up to seven (7) metres difference in water level in the irrigation paddock. In addition, annual trends between the shallow and deep aquifers appear to differ in some wells.

9.2.7 Groundwater Quality Monitoring

Groundwater quality is protected in NSW by the Protection of the Environment Operations Act 1997 and the Water Management Act 2000. Identification of the receiving environment or the likely beneficial use of the water is essential for selection of the most applicable criteria.

The Murrumbidgee River is the dominant surface water feature within the area, although it lies some 7 km south of the site. The Murrumbidgee River has previously been extensively used for local irrigation and stock purposes.

Groundwater analytical results presented in the 2004 and 2006 annual environmental reports were assessed against the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC 2000) for Primary Industries (Irrigation) Water. Trigger levels represent the best current estimates of the concentrations of chemicals that should have no significant adverse effects on the aquatic ecosystem. Where trigger levels are not provided, an assessment of the variation between the years was undertaken.

The groundwater quality impact assessment criteria are provided in **Table 36**.

Table 36: Groundwater Quality Assessment

Indicator	Irrigation Criteria
pH	<6.5 and >8.5
Conductivity (EC)	No criteria available
Total Dissolved Solids (TDS)	13,000 mg/L
Sodium (Na)	460 mg/L
Potassium (K)	No criteria available
Calcium (Ca)	1000 mg/L
Magnesium (Mg)	No criteria available
Chloride (Cl)	700 mg/L
Bicarbonate (HCO ₃)	No criteria available
Nitrate (NO ₃)	400 mg/L
Sulfate (SO ₄)	1000 mg/ L
Hardness	350 mg/L as CaCO ₃

The groundwater analytical results indicate that groundwater is neutral to alkaline and is considered brackish in nature. The analytical results indicate the water is generally suitable for irrigation purposes, although some monitoring wells reported calcium carbonate concentrations in excess of the assessment criteria, indicating the water is very hard. There was little variation between results reported for 2004 when the ponds were in use on the adjoining land, and when the ponds were no longer in use (2006).

The following chemical analytes and depth to groundwater will be monitored annually for the site:

- pH
- Electrical conductivity
- Total Nitrogen
- Total Phosphorus
- SAR
- Potassium
- Sodium
- Magnesium
- Calcium

9.2.8 Impact Assessment

The groundwater will be continually assessed with impact assessment criteria being based on groundwater height and/or quality and specific benchmarks. The following potential impacts could occur as a result of the development:

- Infiltration of Effluent;
- Changes in Groundwater Level and Flow Direction;
- Changes to Water Quality;
- Impacts to neighbouring properties; and
- Aquifer connectivity.

Aitken Rowe Testing Laboratories completed a geotechnical evaluation of the development site as part of the original assessment (included as appendix in the original assessment). The evaluation determined that the permeability of clays (compacted to 95% standard maximum dry density) underlying the site were in the order of 1.0×10^{-9} m/sec. The report also stated, 'based on the test results, visual inspection of the material and subsurface profile as discussed above, the underlying clays are considered impermeable'.

Some infiltration of effluent may occur in the vicinity of the irrigation area, although this should be minimised by the underlying clay soils.

If groundwater height is measured to within 3 metres of the surface level or an average rise of 20cm per year is recorded over a five year period a full groundwater study will be carried out to determine the cause, this will be done in consultation with DECCW.

If groundwater quality, assessed using **table 36** above, changes either outside of the criteria listed or, where trigger levels are not given, based on annual variations from baseline levels then a full groundwater study will be conducted to determine the cause of the changes, again in consultation with DECCW.

9.2.9 Management of Impacts

Changes in Groundwater Levels and Flow Direction

A new pond will be purpose built for the wastewater from the development, which will be lined with welded Waste Water 2.5mm PVC dam liner. This lining will prevent infiltration of effluent into the underlying shallow perched aquifer.

Should significant increases in groundwater levels be recorded it may indicate a failure of the dam liner and require repair.

Irrigation monitoring will be undertaken to ensure application of treated effluent to crops is consistent with crop requirements.

Changes in Water Quality

The new lined effluent pond will prevent infiltration of effluent into the underlying shallow perched aquifer and therefore there will be no impact to the groundwater quality the result of storing this treated effluent. Routine groundwater monitoring will be undertaken to ensure the integrity of the dam liner, and efficiency of the irrigation method.

Installation of Additional Monitoring Wells

The installation of additional/replacement monitoring wells is recommended prior to the operation of the proposed development for the purpose of assessing potential groundwater impacts associated with the development. Recommended additional wells include:

- One shallow and one deep monitoring well located up-hydraulic gradient of the pond;
- Two shallow and two deep monitoring wells located on the eastern side of the pond (down-hydraulic gradient);
- One shallow and one deep monitoring well located east (up-hydraulic gradient) of the area to be irrigated and the site; and

- One shallow and one deep monitoring well located west (down-hydraulic gradient) of the area to be irrigated.

Figure 18 shows the location of three proposed monitoring wells, labelled A, B and C.

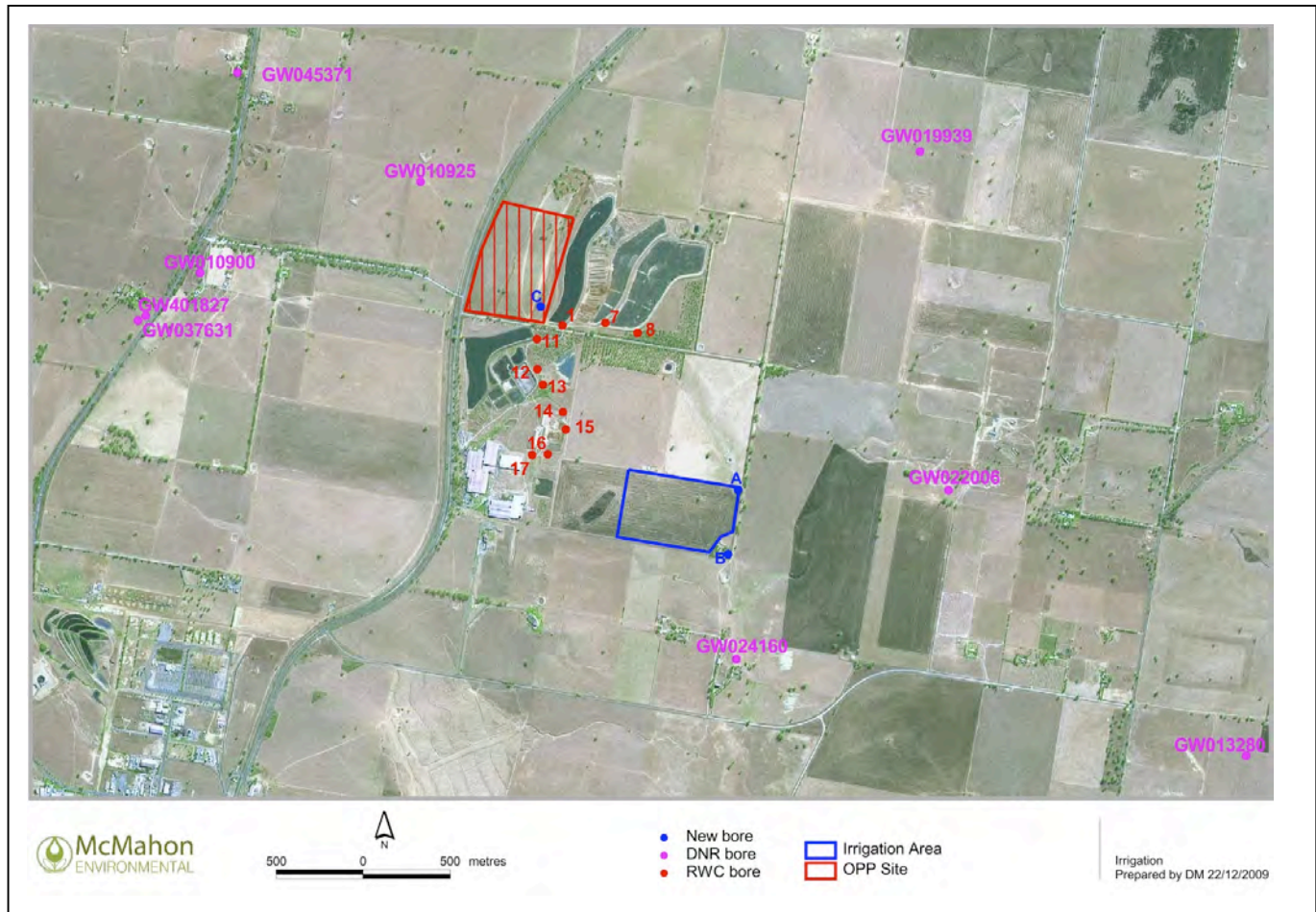


Figure 18: Groundwater Monitoring Wells

Groundwater Monitoring Plan

A Groundwater Monitoring Plan (GMP) will be developed and implemented prior to the operation of the proposed development. The GMP will include:

- Recommendations for the installation of additional monitoring wells including construction details;
- Development of a groundwater monitoring schedule including sampling methodology and timetable; and
- Preparation of a consolidated Groundwater Management Plan to be implemented during operation of the proposed development.

Contingency Measures.

In the event of the site experiencing unsatisfactory impact on groundwater that cannot be resolved by altering irrigation and crop management then;

- additional/alternative irrigation land will be sought
- Additional investment to water treatment technologies will be required to allow an increased portion of effluent to be re-used for process water.

10 TRAFFIC AND TRANSPORT

NB. The following material (chapter 10) was produced by ENSR/AECOM in 2008 when the initial application was made, it has been altered by Lennon Salvestro Planning to reflect the new direction that the project will take and newly introduced legislation.

10.1 Existing Transport Network

The proposed site is located on the corner of Byrnes Road and Trahairs Road, Wagga Wagga, approximately 10 km north of the city centre. Both Byrnes Road and Trahairs Road are local council roads.

Byrnes Road forms a northeast-southwest route from Wagga Wagga to Junee. Byrnes Road in the vicinity of the site is a two-lane two-way rural road with a wide shoulder (>2 m) and a speed limit of 100 km per hour (km/hr) north of East Bomen Road, reducing to 80 km/hr between Oura Road and East Bomen Road. Byrnes Road is a designated B-Double route between Wagga Wagga city centre and the LGA boundary. Byrnes Road intersects Trahairs Road at grade. Trahairs Road is a two lane two way unsealed local road, which provides local access to properties adjoining properties.

Primary transport routes in the vicinity of the site are the Olympic Highway and the Sturt Highway. The Olympic Highway runs parallel to Byrnes Road and provides a route between Cowra and Albury via Wagga Wagga. The Olympic Highway is a classified road, known as Main Road 78 (MR78), and is a two lane two way sealed road with a speed limit of 100 km/h. The Sturt Highway is located south of the site, and connects Adelaide to Victoria and NSW, and is known as State Highway 14.

The Bomen Industrial Estate is located 3 km to the south of the proposed site, along Bomen Road. Bomen Road provides a route for traffic, including B-Doubles, between Byrnes Road and the Olympic Highway.

10.2 Existing Traffic Volumes

The RTA publishes data on average daily flows on major roads, which provides an indication of typical traffic conditions surrounding the proposed site. Annual Average Daily Traffic (AADT) counts collected from RTA count stations, as well as daily traffic counts conducted by Wagga Wagga City Council for the surrounding road network are presented in **Table 37**. The traffic count locations identified in **Table 37** are shown in **Figure 19**.

Table 37: AADT and Daily Traffic Counts for Existing Road Network

Count Station	Road	Count Location	2000	2001	2003	2005
WWCC1*	Byrnes Road	Bavin Street	-	-	-	3,058
WWCC2*	Byrnes Road	North of Dampier Road	-	2,022	-	-
WWCC3*	Byrnes Road	North of Trahairs Road	-	1,630	-	-
95.137 [#]	Olympic Highway (MR78)	Coolamon Road, 7.3km north of MR240	3,456	-	3,308	-

* Daily traffic count obtained from Wagga Wagga City Council

[#] AADT data obtained from Traffic Volume Data for South West Region 2003 (RTA, 2004)

The most recent daily traffic count data was recorded in 2005 and obtained from WWCC for the traffic count station located at Byrnes Road at Bavin Street (WWCC1) as shown in **Figure 19**. This traffic count station is located south of the site in the vicinity of the Bomen Industrial Estate, which has numerous industrial activities including sales yards, Buckmans Laboratories and Southern Oil Refinery. Therefore, traffic volumes recorded at WWCC1 are likely to be higher than actual and predicted traffic volumes at the proposed site.

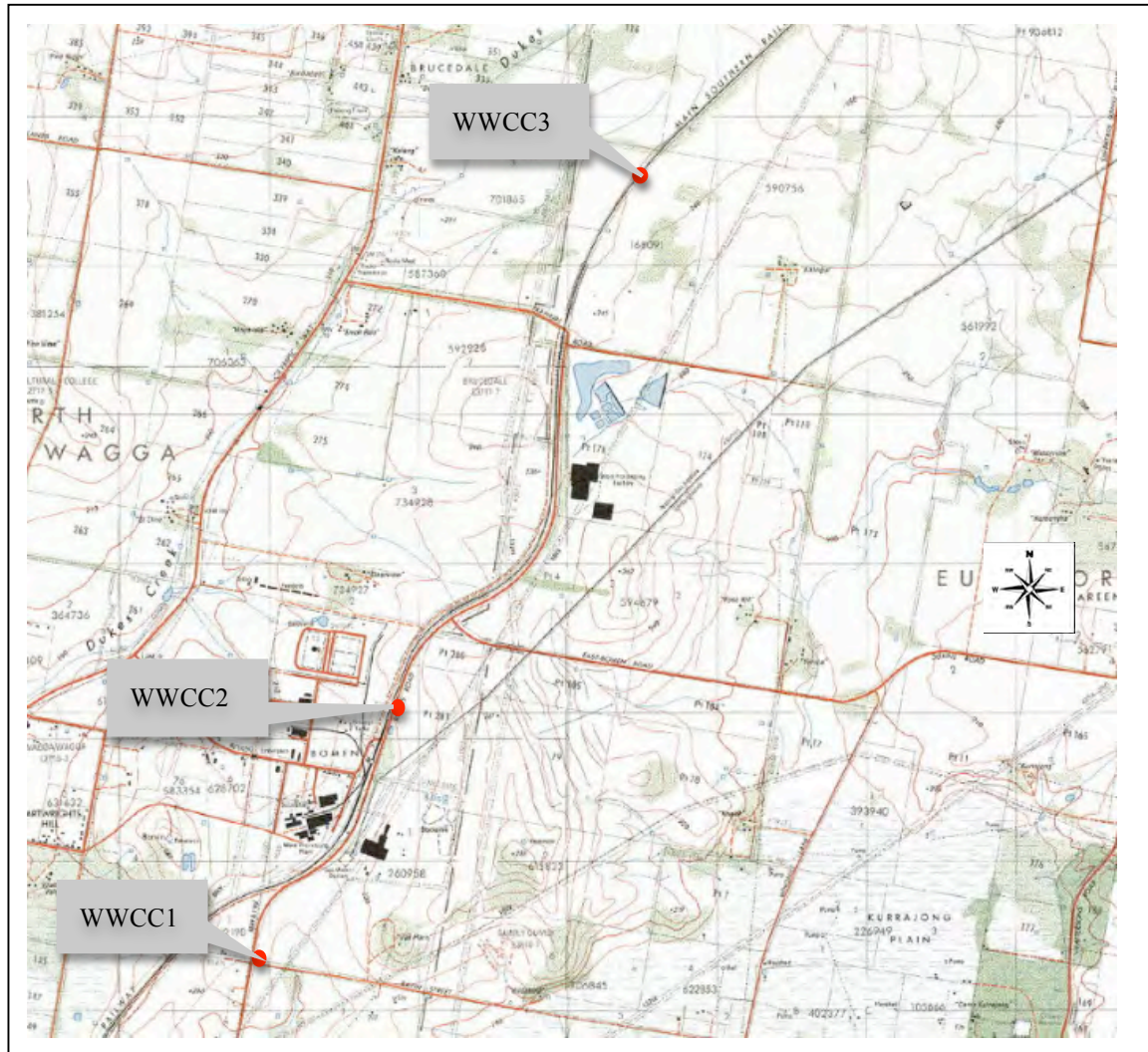


Figure 19: AADT and Daily Traffic Count Locations

The traffic count at Bavin Street was undertaken for a period of one week; 11 October to 18 October, 2005, with the calculated morning peak between 8.00 am and 9.00 am with an average of 256 vehicles, and between 4.00 pm and 5.00 pm with an average of 288 vehicles. In the absence of recent traffic counts close to the site, daily traffic count data at the intersection of Byrnes Road with Bavin Road, which is likely to be higher than at the site, was used to provide a conservative assessment of existing traffic volumes in the area.

10.3 Level of Service

An assessment of current level of service (LOS) for Byrnes Road, Bomen was undertaken using the RTA's *Guide to Traffic Generating Developments* (RTA, 2002). The LOS provides an indication of the traffic efficiency. When considering a development proposal, the objective is to maintain the existing LOS. The LOS is used as the performance standard. This is a qualitative assessment of the quantitative effect of factors such as speed, volume of traffic, geometric features, traffic interruptions, delays and freedom to maneuver. There are six LOS, as described below, from AUSTROADS *Guide to Traffic Engineering Practice – Part 2: Roadway Capacity* (AUSTROADS, 1988).

- **Level of Service A.** A condition of free flow in which individual drivers are virtually unaffected by the presence of others in the traffic stream. Freedom to select desired speeds and to maneuver within the traffic stream is extremely high, and the general level of comfort and convenience provided is excellent.

- **Level of Service B.** This level is in the zone of stable flow and drivers still have reasonable freedom to select their desired speed and to maneuver within the traffic stream, although the general level of comfort and convenience is little less than that of the level of Service A.
- **Level of Service C.** This service level is also in the zone of stable flow, but most drivers are restricted to some extent in their freedom to select their desired speed and to maneuver within the traffic stream. The general level of comfort and convenience declines noticeably at this level.
- **Level of Service D.** This level is close to the limit of stable flow but is approaching unstable flow. All drivers are severely restricted in their freedom to select their desired speed and to maneuver within the traffic stream. The general level of comfort and convenience is poor, and small increases in traffic flow will generally cause operational problems.
- **Level of Service E.** This occurs when traffic volumes are at or close to capacity and there is virtually no freedom to select desired speeds or to maneuver within the traffic stream. Flow is unstable and minor disturbances within the traffic stream will cause a traffic-jam.
- **Level of Service F.** This service level is in the zone of forced flow. With it, the amount of traffic approaching the point under consideration exceeds that which can pass it. Flow break-down occurs and queuing and delays result.

The above descriptions characterise levels of service for uninterrupted flow conditions, i.e. no interruption to traffic occurs because of factors external to the traffic stream, such as intersection controls.

The LOS for Byrnes Road has been estimated using the most recent traffic count data available (2005), adding additional traffic predictions from a traffic assessment prepared in 2005 for a development proposal, and applying a growth rate of 10%. The estimated daily traffic count, average peak hour traffic count and estimated LOS are shown in **Table 38** below. For conservative assessment purposes, the peak traffic volume per hour was estimated to be 10 % of the daily traffic count. In addition, a highly conservative growth rate of 10% has been assumed since 2005.

Table 38: Current Level of Service for Byrnes Road, Wagga Wagga

Daily traffic count Byrnes Rd at Bavin St (2005)	Additional traffic movements on Byrnes Rd*	Daily traffic count plus additional traffic movements and 10% growth rate#	Average peak hour traffic (veh/hr) (10% of AADT)
3,106	100	3,527	353

* Additional traffic volume associated with proposed Lead Battery Recycling Facility, Wagga Wagga. Environmental Impact Statement prepared by Kellogg Brown & Root Pty Ltd, May 2005.

As shown in **Table 38**, a peak hour traffic volume of 353 veh/hr has been assumed for this assessment. Based on the estimated AADT and average peak hour traffic, Byrnes Road is designed to be operating at a current LOS B with an estimated capacity of 560 veh/hr. Therefore, Byrnes Road is considered to be operating with spare capacity.

10.4 Site Access and Proposed Transportation Routes

Site access would be provided by an access point located on Trahairs Road via the intersection with Byrnes Road.

Access to the proposed site from the north is from the Olympic Highway via Bomen Road, and via Bomen Road or East-Bomen Road and along Byrnes Road from the south.

Transport routes likely to be used by vehicles travelling to and from the site have been determined based on the existing surrounding road network, and are shown on **Figure 20** and described below:

- From north and south – vehicles travelling to and from the site would be expected to travel via the Olympic Highway and Bomen Road. B-Double access is via Bomen Road; and
- From east and west – vehicles travelling along the Sturt Highway would travel via the Sturt Highway and the Olympic Highway, and access the site via Bomen Road. An alternate B-Double access to the site for vehicles travelling along the Sturt Highway from the east via Eunony Bridge Road and Oura Road. However, this is to be utilised as a secondary access route.

For the purposes of this assessment, a 50% split of traffic travelling north and south along the Olympic Highway to and from the site has been assumed. Additional traffic generation along the Olympic Highway is not anticipated to be significant, given the proximity to Bomen Industrial Estate and the proportion of heavy vehicle traffic currently utilising the Olympic Highway.



Figure 20: Transport Routes

(NB the dotted line labeled Alternate B-double route is no longer considered feasible by WWCC and will not proceed)

10.5 Traffic Generation

For the purposes of this assessment, traffic generation has been estimated assuming a worst-case scenario of both daily vehicle movements and vehicle movements per hour, which can be applied to all hours across the operating hours of the IOPP.

10.5.1 Site Establishment and Construction

The site establishment and construction period is anticipated to take approximately 60 weeks. The main traffic-generating activities that would occur during the site establishment and construction period include:

- Delivery of raw construction materials and construction plant equipment to the site;
- Clearance of vegetation, earthworks and grading of the site;
- Civil and grading works;
- Construction of amenities and access roads; and
- Construction of main processing plants and storage facilities.

Construction would be undertaken between the hours of 7.00 am and 6.00 pm Monday to Friday, and 7.00 am to 4.00 pm Saturday. There is expected to be a maximum of 150 construction personnel on the site at any one time during the peak construction period when the bulk of construction activities would occur. Plant and equipment used during construction would be delivered at the commencement of construction works and remain on site for the duration of the construction period. For the purposes of this assessment, it has been assumed that employees would travel to the site in the hour preceding and immediately following their shift.

10.5.2 Operation

The proposed IOPP would operate 24 hours per day, seven days per week. Traffic generation during operation of the proposed IOPP would comprise light vehicle movements associated with staff travelling to and from the site, and heavy vehicle movements associated with delivery of seed and other raw materials, and dispatch of products and by-products from the IOPP operations.

Operations on the site would be broken into a number of shifts and, as a result, the majority of traffic movements would occur in the hour preceding and immediately following their shift. Approximately 16 employees would be on a 7.00 am to 3.00 pm roster, five (5) days a week. The remaining 36 employees would work a rotating roster of shifts from 7.00 am to 7.00 pm and 7.00 pm to 7.00 am, seven (7) days per week. A summary of employees on site during each shift is provided in **Table 39**.

Table 39: Employees On Site During Operation and Associated Vehicle Movements

Shift	Start	Finish	No of Employees	Daily Traffic Movements Generated
Weekday	7am	3pm	16	32
Rotating Shifts (seven days per week)				
Day	7am	7pm	12	24
Night	7pm	7am	12	24
Total				80

Table 39 indicates that the maximum number of vehicle movements would occur between 6 am and 7 am on weekdays, with a total of 28 movements.

The receipt and dispatch of products to and from the site would result in the generation of heavy vehicle movements. A summary of the predicted heavy vehicle movements is contained in **Table 40**. Deliveries and dispatches to and from the site are anticipated to be spread evenly throughout the day.

Table 40: Heavy Vehicle Movements Associated with Operation

Material	Heavy Vehicle Movements	
	Monthly	Average Daily Movements
Deliveries		
Seed stocks	516.58	17.22
Hexane	0.71	0.02
Bleaching Earth	4.62	0.15
Activated Carbon	2.50	0.08
Phosphoric Acid	1.25	0.04
Citric Acid	1.88	0.06
Caustic Lye	21.43	0.71
Dispatch		
Meal	323.09	10.77
Oil - Crude	7.07	0.24
Oil Refined	219.37	7.31
By Products		
Fatty Acids	3.13	0.10
Gums and Soap Stocks	11.25	0.38
WWTP Caustic Residue	5.07	0.17
Total – one way allowance		37.26
Total – two way allowance		74.53

Table 40 indicates that the average daily maximum heavy vehicle movements associated with the operation of the IOPP would be 75 movements per day, spread between 6.00 am and 7.00 pm. For the purposes of this assessment, it has been assumed that during peak delivery times, 20% of the total deliveries would occur in a one hour peak period during the day.

10.6 Potential Impacts

An assessment of the traffic generation during both the construction and operation of the IOPP has been undertaken by comparing traffic generation on the site with existing capacity associated with the existing LOS of Byrnes Road, and is discussed below.

10.6.1 Site Establishment and Construction

An assessment of the traffic generation during the construction period has been undertaken by comparing traffic generation on the site with existing capacity associated with the existing LOS of Byrnes Road. The existing LOS for Byrnes Road is LOS B, which provides stable flow with reasonable freedom for drivers to select their desired speed and to maneuvers within the traffic stream.

Table 41: Byrnes Road Peak Hour Traffic Generation – Construction

Existing LOS	Existing peak Hourly Volume	Proposed Peak Hourly Traffic Generation	Predicted Peak Hourly Volume	Predicted LOS
B	353	150	503	C

Table 41 indicates that the construction of the proposed IOPP may result in a LOS C during the peak construction period. However, it should also be noted that the peak traffic generation associated with construction traffic is likely to occur between 6.00 am and 7.00 am, which does not correspond with the recorded peak hour along Byrnes Road.

Traffic counts along Byrnes Road undertaken by WWCC at count station WWCC1 indicated that the average weekday traffic volume along Byrnes Road south of the proposed site between 6.00 am and 7.00 am was 167 vehicles. Therefore, during the peak construction period, the additional 150 vehicles associated with construction personnel would result in approximately 230 vehicles between 6.00 am and 7.00 am, which is equivalent to a LOS B. Therefore traffic generated during construction is not anticipated to result in a significant impact to the surrounding road network.

10.6.2 Operation

An assessment of the traffic generation during operation of the proposed IOPP has been undertaken by comparing traffic generation on the site with existing capacity associated with the existing LOS B of Byrnes Road.

Table 42: Byrnes Road Peak Hour Traffic Generation – Operation

Existing LOS	Existing Peak Hourly Volume	Peak Hourly Proposed Traffic Generation		Predicted Peak Hourly Volume	Predicted LOS
		Light	Heavy		
B	353	28	18	399	B

Table 42 indicates that, assuming a worst-case scenario with 28 light vehicle movements and 20% of heavy vehicle movements occurring in the same one hour period, the LOS for Byrnes Road is not likely to be significantly affected. It should also be noted that the peak traffic generation associated with operational traffic is likely to occur between 6.00 am and 7.00 am, which does not correspond with the recorded peak hour along Byrnes Road. The proposed operation of the IOPP is therefore not considered to result in a significant impact to the surrounding road network.

10.6.3 Parking and Internal Layout

The internal road design and layout would incorporate a one-way circulation road around the internal perimeter of the site. The one-way circulation road has been designed to maintain a 10 m road width providing adequate turning for a 26 m B-Double. Truck turnaround bays have been designed to accommodate a 26 m B-Double at a speed of 5 km/hr, with a minimum practical turning radius of 13 m.

During construction, on site parking would be established during the site establishment period, and maintained for the duration of works. During operation, on site parking would be provided on the southern portion of the site for employees. Trucks would be prohibited from parking in both Byrnes and Trahairs Roads where suitable off street parking is provided by the development.

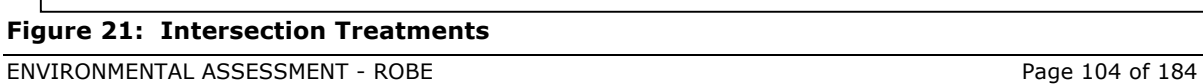
The internal parking and layout design would be in accordance with AS 2890.1 and AS2890.2.

10.7 Intersection Upgrade

The proposed development would require a road and intersection upgrade at Trahairs Road and Byrnes Road. Trahairs Road would be widened and sealed in accordance with Austroads Rural Road Design: A Guide to the Geometric Design of Rural Roads (Austroads, 2003) to accommodate the types and volumes of vehicles expected as part of the IOPP.

The at-grade intersection at Byrnes Road and Trahairs Roads would be upgraded in accordance with Austroads Rural Road Design: A Guide to the Geometric Design of Rural Roads (Austroads, 2003) and Austroads Guide to Traffic Engineering Practice – Part5: Intersections at Grade (Austroads, 2005), and in consultation with the relevant traffic authority.

The preferred intersection upgrade involves the construction of a channelised intersection identified as type CH in Austroads, 2005, where conflicting travels paths are separated by painted medians. The proposed intersection is shown in **Figure 21**. Auxiliary lanes would be included as part of the intersection design for acceleration and deceleration, due to the 100 km/h speed limit along Byrnes Road, and the potential for heavy vehicles maneuvers to be conducted at the intersection. The intersection design would incorporate a channelised right turn (type CHR) to provide a protected right turn into Trahairs Road.



ENVIRONMENTAL ASSESSMENT - ROBE

10.8 Environmental Safeguards

The construction and operation of the proposed IOPP is not anticipated to significantly impact the LOS of the surrounding road network. In order to minimise potential impacts associated with construction and operational traffic, a Traffic Management Plan (TMP) would be developed. Within the TMP, a Transport Code of Conduct would be developed and would outline and manage the transportation routes to the site for heavy vehicles and B-doubles. The TMP would also include:

- Heavy vehicle access to the site;
- Deliveries and dispatch of products;
- Heavy vehicle parking;
- Internal speed limits; and
- Use of truck turnaround areas.

The proposal would require the upgrade of the intersection at Byrnes Road and Trahairs Road, and Trahairs Road would also be widened and sealed in accordance with relevant standards and guidelines. Consultation with the relevant traffic authority would be undertaken during the detailed design phase of the proposed upgrade. Relevant permits from the RTA to undertake the works would also be sought.

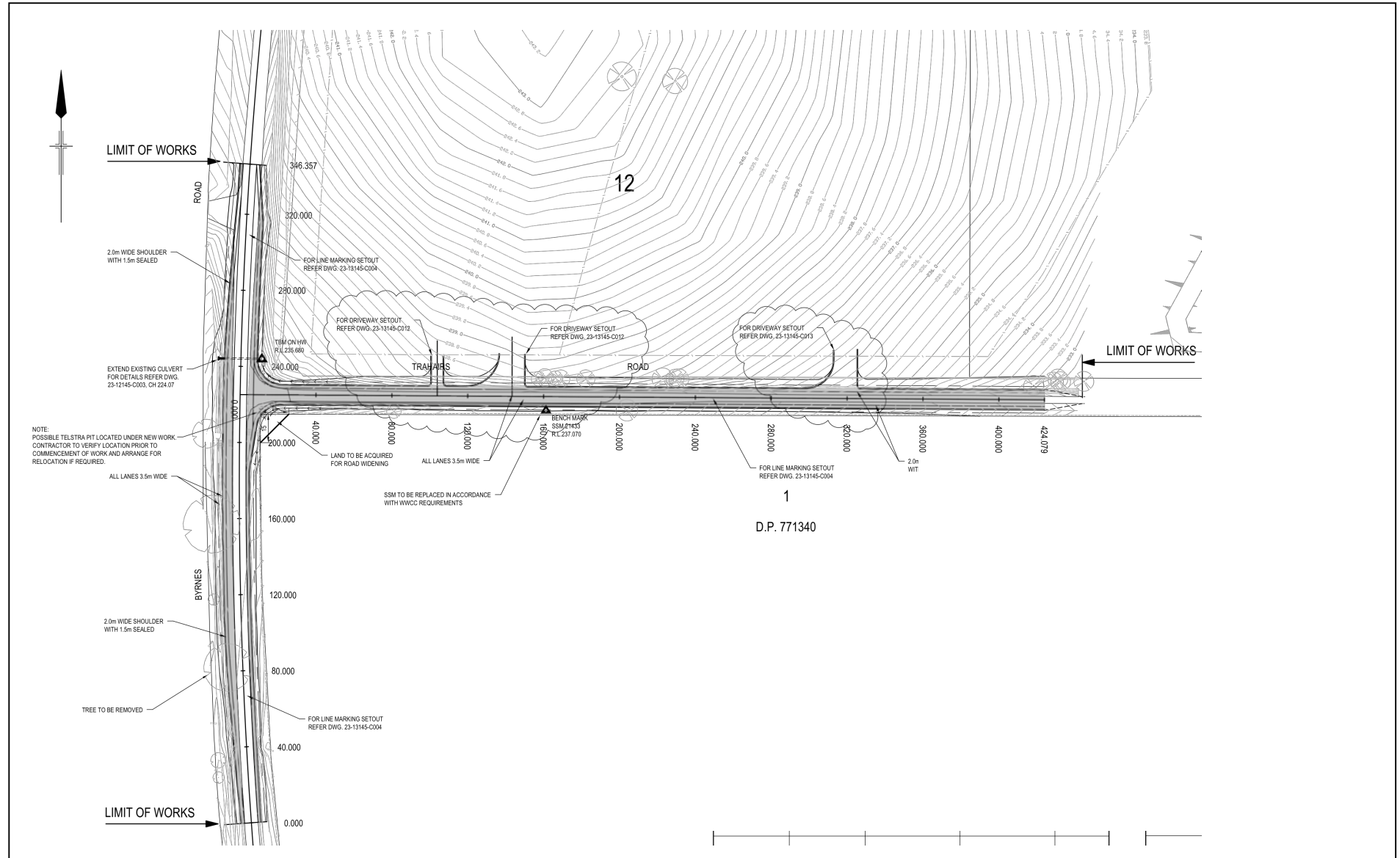
10.9 Residual Impacts

The proposed development would result in increased traffic movements along Byrnes Road, and the surrounding road network, however the existing LOS is not expected to be adversely affected. The proposed site is in the vicinity of an industrial area, the Bomen Industrial Estate, and the surrounding road network currently experiences higher volumes of heavy vehicles.

10.10 Traffic Conclusion

The proposed development would result in increased traffic movements both during construction and operation of the IOPP. While the existing LOS is not anticipated to be affected by the proposed development, an intersection upgrade at Byrnes and Trahairs Road would be undertaken as well as an upgrade of Trahairs Road to provide access to the site. The proposed intersection and road upgrade would be undertaken in accordance with the relevant guidelines and standards, and in consultation with the relevant traffic authority.

The proposed development is therefore not anticipated to result in a significant impact to the surrounding road network.



11 HAZARDS AND RISK

11.1 Introduction

The project would involve the storage and handling of Dangerous Goods in quantities that may exceed the threshold levels listed in SEPP 33. Under the provisions of SEPP 33 and in accordance with the EARs, a Preliminary Hazard Analysis (PHA) was prepared, by Sinclair Knight Merz (SKM) in accordance with *Hazardous Industry Planning Advisory Paper No.6* (DUAP, 1997b), to demonstrate that the plant is only potentially hazardous and/or offensive and not actually offensive. The PHA is provided in **Appendix C**. This chapter will summarise the findings of the PHA.

11.2 Methodology

The methodology used for the study was that prescribed in Multi-Level Risk Assessment and HIPAP No.6. A summary of the methodology used in the study is as follows:

- **Hazard Analysis** – review site operations and identify hazards with the potential to impact offsite and carry forward identified hazards for consequence analysis.
- **Consequence Analysis** – assess the consequence of those incidents carried forward for consequence analysis to identify whether incidents result in offsite impact that exceeds published risk criteria, and carry these incidents forward for frequency analysis.
- **Frequency Analysis** – assess the frequency of incidents identified by the consequence analysis to impact offsite and carry results forward for risk analysis.
- **Risk Analysis** – those incidents carried forward from the frequency analysis are assessed for fatality risk. The results are compared to published criteria and, where identified to exceed criteria, are subjected to risk review & reduction.
- **Risk Review and Reduction** – those incidents identified to exceed risk criteria are reviewed for major risk contributors. Risk reduction is then sought and risks reassessed. The process is continued until risks are below acceptable criteria.

11.3 Brief Description of the Process

The facility will be located about 10 km north of the township of Wagga Wagga, NSW. The land is zoned No.1 Rural in LEP 1991. It is understood that the surrounding land uses are proposed for future industrial land uses and a current industrial site is located to the south and east of the plant, the Wool Combing Facility.

The proposed IOPP will crush canola and safflower seeds to produce oil that will be used to manufacture the edible oil and meal. Seeds will be delivered to the site and stored in silos. The seed will then be crushed and the oil extracted, with the crushed seed product being subjected to a solvent extraction operation that will remove the remaining oil from the seed. The oil will then be filtered, refined and dried to remove moisture content.

11.4 Hazard Analysis

The hazard analysis followed four steps, namely hazard identification, consequence analysis, probability and frequency estimations and finally a quantitative risk assessment.

11.4.1 Hazard Identification

An important part of the PHA is identifying the nature of materials stored onsite. This process allows an understanding of the potential issues that could manifest themselves as a result of stored materials, for example the storage and transfer of flammable liquids presents a potential fire and explosion hazard.

As part of the Oilseed processing it is necessary to store Dangerous Goods on site. A list of the Dangerous Goods stored on the site is included in **Table 43**.

Table 43: Dangerous Goods Stored

Proper Chemical Name	Type of Storage	Class	PG	Hazchem Code	Quantity Stored (total)
Hexane	Underground tanks (2)*	3	II	3[Y]E	144 m ³
Vegetable Oil	Aboveground tanks (36)*	C1 /C2	N/A	N/A	3,232 m ³
Phosphoric Acid	Aboveground tank (1)*	8	II	2R	26 m ³
Caustic Soda (Sodium Hydroxide Solution – 30 %)	Aboveground tank (1)*	8	II	2R	26 m ³

* indicated number of tanks.

The potential hazards of these dangerous goods are included in **table 44**. **Table 45** provides a comprehensive list of hazards that have been identified as having a potential impact on the site and a selection of Major Accident Events (MAE's) for those hazards.

Table 44: Hazardous Nature of Materials

MATERIAL / QTY	HEALTH HAZARDS & PHYSICAL PROPERTIES	ENVIRONMENTAL HAZARDS	SAFEGUARDS
Combustible Liquid – Seed Oil Seed Oil (based on Mineral Oil) or	Class C1 Combustible Liquid. Density Range – 0.7 - 0.85 Flammable limits in air 1.2 – 6 % v/v. Combustion products: mainly CO – chemical asphyxiant, SOX, NOX. Seed-Oil (Chemical name – Fatty Acid Esters) is a combustible liquid with a flash point greater than 60.5oC but less than 150 deg C are classified as C1. Under these circumstances, the liquid does not flash (vaporise) readily at ambient temperature, hence, vapour clouds do not form and flash fires, at ambient temperature do not occur. Localised heating and minor vapour generation may result in ignition and pool fire which may escalate to larger incidents.	Dangerous to aquatic life in high concentrations. Aquatic Toxicity: 204 mg/l/24 hr juvenile American Shad/TLM/salt water. Fouling substance if spilled into waterways such as the sea, lakes and rivers. May contaminate groundwater if seeped into the soil	Oil Spills collected within the primary oil storage pit or bund of 110% oil capacity (A secondary oil collection system or retention pond will also be provided). Comprehensive emergency plan and procedures provided for the site. MSDS held for all materials. Emergency Spill kits provided. Annual fire and evacuation training to be conducted.
Hexane (2 tanks – 144kL total)	Class 3 Pg Group II - Flammable liquid which has a flash point less than 23 deg C and hence may vaporise at ambient temperature resulting in localised vapour cloud, local flash fire potential and liquid pool fires. Vapours are irritating to the eyes and upper respiratory tract, may cause headaches, nausea and could have an anaesthetic effect. CNS depressant. TWA suggested is 50ppm. LEL - UEL 1.0 – 7.5 % Reacts violently with oxidising substances.	Negligible soluble in water, mainly a fire / explosion hazard.	Double walled tanks (Manufactured by Enviroguard) to be used for hexane storage. Underground tanks to be compliant with AS 1692 or equivalent. Comprehensive emergency plan and procedures provided for the site. MSDS held for all materials. Emergency Spill kits provided. Annual fire and evacuation training to be conducted.
Combustible Liquid – Vegetable Oils (and	Class C2 - combustible liquids, with a flash point in excess of 150 deg C. Oils do not flash readily	Dangerous to aquatic life in high concentrations. Aquatic Toxicity: 204 mg/l/24 hr juvenile American Shad/TLM/salt water.	Oil Spills will be collected within the primary oil storage pit or bund (A secondary oil

MATERIAL / QTY	HEALTH HAZARDS & PHYSICAL PROPERTIES	ENVIRONMENTAL HAZARDS	SAFEGUARDS
other oils)	unless heated above 150 deg C, hence, at ambient temperature flash fires and pool fires are unlikely. (Note: In process temperatures may be elevated above flash point and hence behave as a flammable liquid)	Fouling substance if spilled into waterways such as the sea, lakes and rivers. May contaminate groundwater if seeped into the soil	collection system or retention pond will also be provided). Comprehensive emergency plan and procedures provided for the site. MSDS held for all materials. Emergency Spill kits provided. Annual fire and evacuation training to be conducted.
Corrosive liquids / Phosphoric Acid (26 kL)	Phosphoric Acids are classified as corrosive liquids. Corrosive liquids could impact the biophysical environment if released beyond the confinement systems at the plant. Contact with people could result in necrosis of the skin and other soft tissue. Vapours could impact the mucous membranes.	Acids and alkalis can cause burns, avoid contact with skin or eyes. PPE required. All products are miscible in water. Decomposition under fire conditions liberates toxic fumes.	Aboveground GRP tanks within separate bunded compounds. Comprehensive emergency plan and procedures provided for the site. MSDS held for all materials. Emergency Spill kits provided. Annual fire and evacuation training to be conducted.
Corrosive liquids / Sodium hydroxide (26 kL)	Sodium hydroxide, in solution – 30 % is classified as a corrosive liquid (alkali). Like the acid corrosives, alkali corrosives can also impact the biophysical environment, if released beyond the confinement systems at the plant. Contact with people could also result in necrosis of the skin and other soft tissue. Vapours could impact mucous membranes.	Acids and alkalis can cause burns, avoid contact with skin or eyes. PPE required. All products are miscible in water. Decomposition under fire conditions liberates toxic fumes. Fumes may include chlorinated compounds or oxides of sulphur.	Aboveground GRP tanks within separate bunded compounds. Comprehensive emergency plan and procedures provided for the site. MSDS held for all materials. Emergency Spill kits provided. Annual fire and evacuation training to be conducted.

Table 45: General Hazard Identification Table and Selected MAEs

Facility / Event	Cause /	Possible Results / Consequence	Safeguards Employed
Seed storage silos and meal storage bins / Dust explosion	- Dust generation in the seed storage silos and transfer equipment during silo filling - Dust generation in the meal storage bins and transfer systems	- Ignition of dust - Explosion and potential damage to plant - Missiles and projectiles – impact to personnel & injury/ fatality	- Ignition sources controlled in the silos (i.e. hazardous area classification of silos) - Seed dusts are low ST value (ST1 - low explosibility and impact) - Canola and Safflower seeds are high in oil content with low dust generation potential - Silos are sealed to minimise potential for ignition of dust from an external source - Explosion relief systems (e.g. explosion panels or bursting discs) are be fitted to those silo's where combustible/ explosive dusts with explosion panels. Explosion relief systems are to be designed in accordance with NFPA68 (Ref.15).
Road tanker loading bays / Transfer hose failure, ignition and pool fire	- Tanker impacts pipework adjacent to the bay - Tanker drive away whilst connected - Flexible hose failure (leak/rupture) - Operator error – incorrect connection of flexible hose (connection fails)	- Release of flammable/ combustible liquid into the loading bay - Potential spill and impact to the environment	- Loading bay area is bunded to contain spills ("speed-hump" style bund) - Road tanker unloading/loading operation is monitored by tanker drivers and plant operators during the full transfer operations - Delivery and despatch trucks are fitted with drive away protection to prevent drivers leaving the site whilst the truck is connected to the delivery/loading pipework (via the flexible hose) - Hoses are inspected and tested in accordance with the requirements of the ADG7 – Australian dangerous Goods Code #7 (Ref.12) - Pipework is installed behind protective bund walls to prevent truck impact on entering and leaving the bays

Facility / Event	Cause /	Possible Results / Consequence	Safeguards Employed
Liquid transfer via pipeline throughout the plant / Pipeline leak & pool fire	- Pipeline leak due to corrosion, overpressure, poor construction (welding), external interference	- Leak of liquid to environment - Ignition of leak and fire at leak point	- Pipeline will be fully welded steel along the full length (no flanges creating leak sources) - Pipeline will be non-destructively tested by hydrostatic pressure on completion of construction & prior to commissioning - Pipeline will be designed to withstand full pump "dead-head" with a conservative factor of safety (i.e. no rupture) - Pipelines will be installed above ground and will be fully visible for regular inspection
Tank Farm / Tank fire	- Overfill of tank during tank filling - Spill of flammable/ combustible liquid into the bund	- Potential offsite release, environmental impact	- All flammable & combustible liquid storages are bunded, no offsite release - Tanks are monitored during filling using level instrumentation (level in tanks repeated in the site control room) - All tanks are fitted with high level instruments and alarms (audible & visual in the site control room) - Visual inspection and checking of tank/bund area is performed during the transfer/filling operation

Facility / Event	Cause /	Possible Results / Consequence	Safeguards Employed
Tank Farm / Bund Fire	- Overfill of tank during tank filling - Spill of flammable/ combustible liquid into the bund - Ignition and bund fire	- Potential on and offsite heat radiation impact to surrounding areas - Potential for fire growth into adjacent areas	- Fire main (complying with AS2419-Ref.11), fire pumps (complying with NFPA20 – Ref.13) and fire water tank / retention pond. - Fire hydrants and hose reels close to the storage - Foam generation equipment will be available at the site for use by the Fire Brigades - Fire contained to bund – bund capacity exceeds largest tank in bund (in accordance with the requirements of AS1940 – Ref.6) - Majority of materials on site are combustible liquids stored at ambient temperature (low ignition potential) - Control of ignition sources in the process area. Areas will be classified as a hazardous area in accordance with Australian Standards where oils behave as class 2 combustibles – e.g. AS2430 (Ref.7) & AS60079 (Ref.8) - All tanks will be regularly inspected for potential leaks and corrosion impact; in the unlikely event of water build up in the tanks it will be drained regularly to prevent internal corrosion potential. - Tank level monitoring will be conducted at all times to identify potential rapid tank level loss indicating potential leaks
Tank Farm (those tanks containing flammable liquids) Vapour space ignition leading to explosion and tank fire	- Ignition of Flammable liquid in the tank	- Tank explosion and tank roof fire - Explosion overpressure and/or Heat radiation impact to surrounding area	- Flammable liquid tanks are all fitted with nitrogen blankets to eliminate the potential for vapour build up in the ullage space of the tank - All tanks will be fully vented with anti-flash gauze on vents to prevent ignition from entering the tank via the vent - All electrical equipment in the tank will be suitably specified for the specific hazardous area in which it will be installed

Facility / Event	Cause /	Possible Results / Consequence	Safeguards Employed
Tank farm Pump seal failure , leakage and fire	- Pipework, valve or flange leak - Pump seal leak	- Release of fuel to bunded area (i.e. pump bund) - Potential to impact environment if release escapes offsite	- Pipework between tanks and pumps is bunded and leaks will be contained within the tanks bunded area - Pump seals are double mechanical type to minimise the potential for leak - Pump area is bunded to contain spills - Pipework between pumps and flexible hose is located in a spill containment to prevent spills offsite - Pump operation is only conducted when site is staffed and pump/filling operations can be continually monitored
Road tanker unloading/ Acid spill	- Delivery tanker impacts pipework adjacent to the bay - Delivery tanker drive away whilst connected - Flexible hose failure (leak/rupture) - Operator error – incorrect connection of flexible hose (connection fails)	- Release of corrosive liquid into the loading bay - Potential spill and impact to the environment	- Loading bay area is bunded to contain spills (“speed-hump” style bund) - Road tanker unloading/loading operation is monitored by tanker drivers and plant operators during the full transfer operations - Delivery and despatch trucks are fitted with drive away protection to prevent drivers leaving the site whilst the truck is connected to the delivery/loading pipework (via the flexible hose) - Hoses are inspected and tested in accordance with the requirements of the ADG (Ref.12) - Pipework is installed behind protective bund walls to prevent truck impact on entering and leaving the bays
Tank Farm Acid spill	- Overfill of tank during tank filling - Spill of corrosive liquid into the bund	- Potential offsite release, environmental impact	- All corrosive liquid storages are bunded, no offsite release - Tanks are monitored during filling using level instrumentation (level in tanks repeated in the site control room) - All tank are fitted with high level instruments and alarms (audible & visual in the site control room) - Visual inspection and checking of tank/bund area is performed during the transfer/filling operation

11.5 Consequence Analysis

The following incidents were carried forward by SKM from the hazard identification stage of the study for consequence analysis.

Table 46: Events for Consequence Analysis

Event #	Event	Description
1	Dust Explosion	Canola / Safflower and meal grain storage silos
2	RTkr Pool Fire	Flammable liquid leak at the delivery bay, ignition and pool fire in the bunded area of the delivery bay;
3	Tks 301-303 Bund Fire	Full bund fire in the combustible liquids storage tank bunds 301-303.
4	Tank C2 Bund	Full bund fire in the combustible liquids storage tank bunds Tank C2.
5	Tank C1 Bund	Full bund fire in the combustible liquids storage tank bunds Tank C1.
6	Tks 101-212 Bund Fire	Full bund fire in the combustible liquids storage tank bunds 101-212.
7	Plant Fire – Crushing Unit	Plant fire in the Seed crushing plant resulting in full fire in the crushing building
8	Plant Fire – Extraction Unit	Plant fire in the extraction plant resulting in full fire in the oil extraction building
9	Plant Fire – Oil refining Unit	Plant fire in the oil refinery plant resulting in full fire in the oil refinery building

The following sections provide a summary of each incident, which was considered separately.

11.5.1 Dust Explosion

Canola / Safflower and meal handling and deposition in silos may also generate dust that could reach a combustible mixture. Ignition of this dust could also cause significant explosion, plant damage and injury/fatality both on and offsite.

SKM recommended that all silos and bins storing materials that could generate combustible dusts (i.e. seeds and meals) are provided with explosion venting systems (in accordance with NFPA 68)

Based on the assumption that this recommendation would be accepted, the impact from an ignition in a silo or bin (storing materials that could generate combustible dust) would be localised around the discharge point of the panel on the silo/bin. There would be no impact offsite or to adjacent plant and equipment as the impact of the explosion relief would be directed to open areas. This incident has therefore not been carried forward for further analysis as the effects at the boundary are considered negligible.

11.5.2 Road Tanker Loading/Unloading Fire

In the event of a release of flammable or combustible liquid during a transfer operation, the liquid would pool in the transfer area "bund" and if ignited would result in a pool fire in the containment

bund / kerb. The distance to heat flux is provided in **Table 47** below. Details of heat radiation effects and modeling can be found on appendices B and C of the PHA.

Table 47: Road Tanker Unloading Pool Fire

Plant	Area (m ²)	Pool Diameter	Distance (m) to Heat Flux kW/m ²			
			35	25	12.6	4.7
Road Tkr Unloading	75	13.60	12	15	22	35

The distance from the road tanker unloading area (oil) is around 65m, hence the heat flux at the boundary will be lower (estimated to be around 2 kW/m²) than the max desirable heat flux of 4.7 kW/m².

11.5.3 Bund Fires

Flammable and combustible liquids are stored in tanks in banded areas. Bund fires can occur if pooled flammable/combustible liquids are ignited. Liquids could pool as a result of a tank leak. **Table 48** summarises the results of analysis of bund fires for each of the tank farms, the detailed analysis can be found in appendix C of the PHA. **Figure 23** shows the heat radiation contours at 4.7kW/m².

Table 48: Full Bund Fires

Plant	Area (m ²)	Pool Diameter	Distance (m) to Heat Flux kW/m ²				Distance to Boundary (m)
			35	25	12.6	4.7	
Tanks 301-303 Bund	150	19.23	17	20	31	52	80
Tank C2 Bund	40	9.93	9	11	16	27	95
Tank C1 Bund	40	9.93	9	11	16	27	100
Tanks 101-212 Bund	1600	62.80	55	67	100	170	90
Tanks 101-212 Bund Note: (1)	800	30	26	32	50	80	90

Using the heat radiation criteria at the site boundary of 4.7 kW/m² (Ref.4 of NSW Department of Planning published heat radiation impact criteria (HIPAP) No 4.), it can be seen from **Figure 23**, that a fire involving the entire tank bund (comprising tanks 101-212) whilst of low probability results in excessive heat flux levels at the boundary.

Note (1) - Hence, it is recommended that sub-bunds be employed to limit the potential size of the bund fire to approximately half to ensure resultant heat fluxes of 4.7 kW/m² do not extend beyond the Byrnes Rd Boundary.

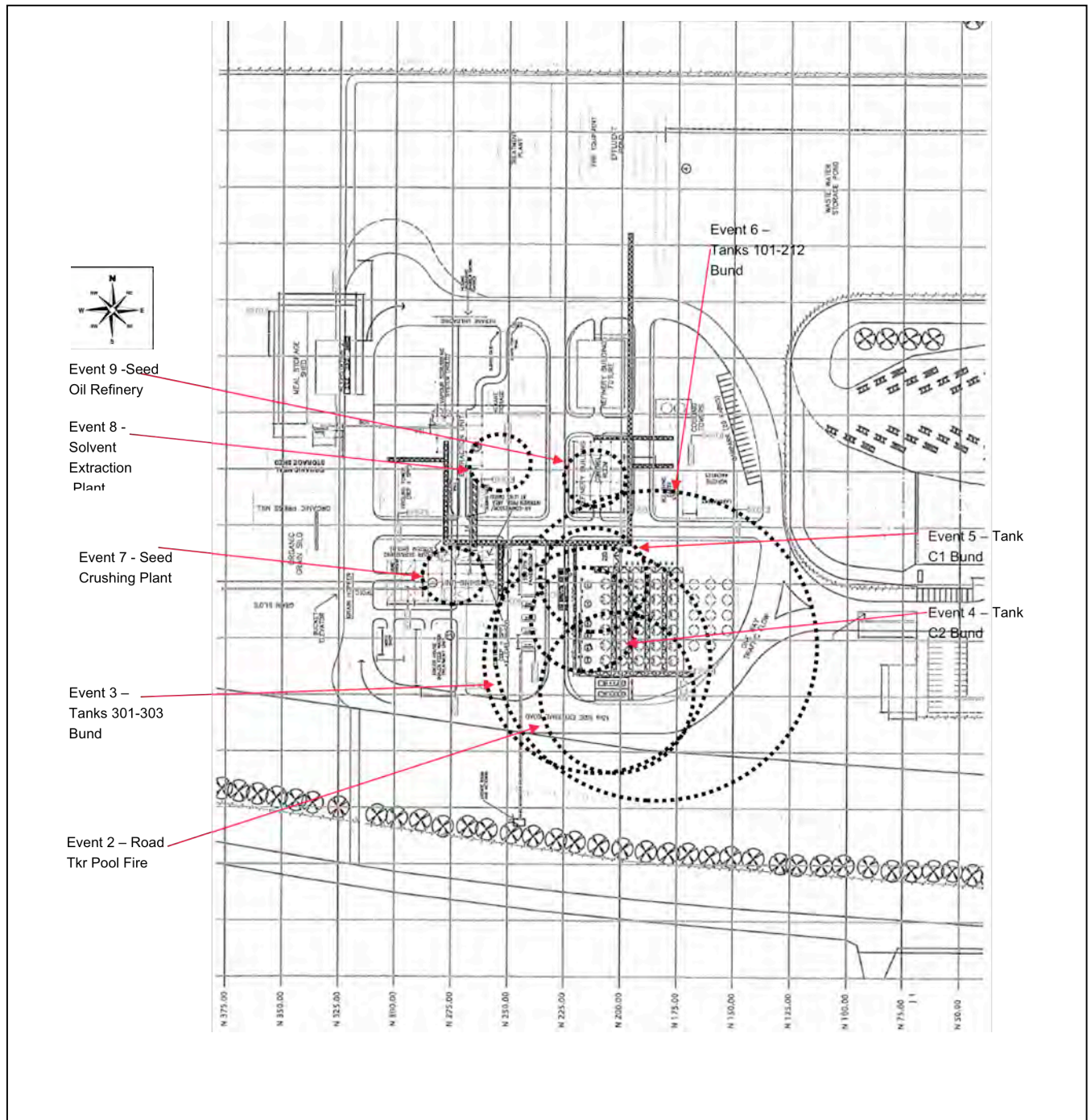


Figure 23: Heat Radiation Contours (4.7 kW/m²)

11.5.4 Plant Fires

Flammable and combustible liquids are processed within plant areas at the site. In the event of a process equipment leak and release of flammable or combustible liquid the materials would collect in the bund of the plant forming a pool.

In the event of ignition, a pool fire would form, resulting in a full plant fire in the worst case. **Table 49** summarises the results of this analysis and **figure 23** (above) shows the radiation contours at 4.7kW/m².

Table 49: Full Plant Fires

Plant	Area (m ²)	Pool Diameter	Distance (m) to Heat Flux kW/m ²				Distance to Boundary (m)
			35	25	12.6	4.7	
Seed Crushing Unit 1	5	3.51	3	4	6	10	100
Solvent Extraction Unit 2	10	4.96	4	5.5	8	15	150
Oil Refinery Bld	11	5.21	4	5.5	8	15	140

Using the heat radiation criteria at the site boundary of 4.7 kW/m² (Ref.4), it can be seen from **Figure 23**, that plant fire events are contained onsite when viewed against the NSW DoP requirement that heat flux levels not exceed 4.7 kW/m² at the boundary.

11.5.5 Summary of Consequence Analysis

It can be seen from figure 12.2 that none of the potential plant fire incidents exceed the 4.7kW/m² criteria (provided the main bund for the oil tanks 101-212 is provided with 2 sub-bunds of equal size).

11.6 Frequency Analysis

The next step in the Analysis was to conduct a frequency analysis which determines the likelihood of the potential events occurring. **Table 50** shows the generalised Probability/Frequency data for the potential events considered most relevant to the analysis. The data is expressed on a per annum basis, with the of road tanker unloading which is expressed as 4×10^{-8} per hour. Based on truck movements and filling rates of around 300 litres/minute (20 m³ / hr) it is estimated that transfer operations amount to 528 hrs/yr/hose; hence the failure rate/yr is estimated to be 2.1×10^{-5} /yr.

The reference sources for all data used are also given in the table.

Table 50: Generalised Probability Data

Event	Item	Failure Possibility	Reference
Bund Fires	Storage	4.2×10^{-6} /yr	Covo Study
	Road Tanker Area (hose failure)	4×10^{-8} /hr	Covo Study
Tank Fires	Bulk Liquid Tanks	1.4×10^{-6} /yr	R. Montano
	Floating Roof	1.4×10^{-5} /yr	
	Fixed Roof		
Warehouse Fire	Raw Material	4.6×10^{-4} /yr	NSW ABS (1982-83)
Centrifugal Pumps	Casing failure	3.8×10^{-6} /yr	USAEC
	Shaft failure	1×10^{-4} /yr	
	Seal failure	1×10^{-2} /yr	

11.7 Risk Analysis

The final step in the analysis was to combine the event frequencies and consequence distances (effects) to provide the risk levels at the boundary of the site.

Table 11.9 provides the overall risk evaluation. It summarises the events, event probability, probability of fatality, and risk levels at the boundary. The parameters as provided in the table are defined as follows:

Event – the event is taken from the risk identification table, and is comprised of an office fire.

Base Frequency $\times 10^{-6}$ – is the failure frequency of each event.

PF (E) – is the probability of fatality to a person on the boundary from the event. Due to the fact that those external to the office would take shelter or emergency action the probability of fatality is estimated at less than 1.0. For the purpose of this study, the following probability of fatalities are estimated (for detailed computations refer to Appendix D - Probit Computations);

- Event 2 – PF(E) = 0
- Event 3 – PF(E) = 0
- Event 6 – PF(E) = 1.0

Risk $\times 10^{-6}$ – is the product of the frequency $\times$ probability of injury/fatality and is defined as the risk of exposure from the event.

Fatality Injury – is the hazard distance to fatality from the fire, in this case typically deemed to be the distance to 4.7 kW/m²,

CF-Risk – is the cumulative addition of the individual risk results.

Table 51: Overall Risk Evaluation

EVENT # / Item	Base Freq ($\times 10^{-6}$ per annum)	Pf(E)	Individual Risk $\times 10^{-6}$ At Boundary adjacent to Byrnes Rd	Effect Zone / Fatality Radius
2. Road Tkr Pool fire	21	0	0	35
3. Tanks 301-303 Bund fire	4	0	0	52
6. Tanks 101-212 Bund fire	4	1.0	4	80
TOTAL RISK LEVEL at BOUNDARY			4	

The risk levels expected at the boundary of the site are around 4×10^{-6} pa. Such risk levels are considered acceptable (Ref: NSW DEPT. OF PLANNING Risk Criteria at Boundary of site = 50×10^{-6} p.a. for industrial land use) under the NSW Department of Planning guidelines (Reference 11).

11.8 Fire Prevention and Protection Measures

Sinclair Knight Merz also gave consideration to fire prevention and protection measures, which should be employed on the site, full details of this analysis can be found in **Appendix C - PHA**. In their analysis SKM considered process safeguards that have been included at the site to minimise the potential for impact as a result of incidents or to manage or mitigate incident impacts. These measures include:

- Spillage containment – all tanks to be constructed with spillage containment and all process areas designed to contain spillages
- Ignition control – all tanks, intermediate receivers and equipment containing flammable or combustible materials to be blanketed with nitrogen (inert atmosphere) to prevent potential for build up of flammable vapour.

Four fire protection systems to be installed on the site are detailed (full details can be found in **Appendix C**):

- Fire detection systems to be fitted;
- First Attack Fire protection systems installed throughout the plant;
- Fire Main to be fitted to the site
- Fire Water Supply with a minimum of four hours of water to be supplied.

SKM made two recommendations with regards to containment of firewater and runoff, as follows:

- SKM recommended that ROBE obtain a foam generation attachment for the fire hoses (one for each plant area where flammable & combustible liquids are stored and handled) and maintain a storage of at least 20 L of foam concentrate adjacent to the location where a foam generating attachment is held.
- SKM recommended that a first flush retention pond (detention tank) be constructed at the ROBE site with a minimum freeboard capacity of 162 m³, so that in the event of a fire, contaminated firewater may be retained even though the pond could contain some water. The first flush retention pond should contain all storm water from plant areas, roadways and open yard areas.

A fire consultant will be engaged by the proponent to complete a full fire study for the plant. This will be completed in consultation with the NSW RFS and NSW Fire Department.

11.9 Hazard and Risk Conclusion

SKM carried out a review of Hazardous Industry Planning Advisory paper No.4, Risk Criteria for Land use Safety Planning (Ref.4) for the proposed IOPP. The paper indicates that heat radiation from fires at potentially hazardous facilities should not exceed 4.7kW/m². None of the postulated incidents for the proposed IOPP exceed this level beyond the site boundary.

Risk levels were also computed at the site boundary (along Byrnes Road) to the tank farm and processing units. The risk levels expected at the boundary of the site are approximately 4×10^{-6} , which is considered acceptable.

SKM concluded that the risk criteria levels at the boundary of the site do not exceed the risk criteria published by NSW Department of Planning, and therefore the ROBE plant, as proposed, is not considered potentially hazardous or offensive and is therefore permissible within the current land zoning.

12 WASTE MANAGEMENT

12.1 Overview

The proposed IOPP would produce liquid and solid wastes during operation. Solid wastes generated during operation would be stored and disposed off site by a licensed contractor. Liquid waste from the effluent treatment plant would be treated to a level suitable for irrigation purposes, and temporarily stored in a wastewater storage dam, prior to being irrigated on adjacent land.

A Soil and Water Management Plan (refer **Appendix G**) was prepared for this EA to determine the suitability of the wastewater and the proposed effluent irrigation area for the disposal of wastewater generated during operation of the IOPP. Waste generation and management are discussed below.

12.2 Waste Generation

12.2.1 Liquid Waste

Liquid wastes and effluent generated by the IOPP would include the following:

- Liquid waste from processing plants;
- Laboratory waste;
- Wastewater from equipment cleaning and floor wash down from various parts of the site including protected bunded areas; and
- Wastewater generated during boiler blow down, cooling tower blow down and from the water filtration plant.

A storm water detention pond will receive water from the developed road network, and roof top drainage. The detention pond will be equipped with a first flush system diverting initial waters collected in any single rain event to the WWTP. The detention pond will retain a minimum 170m³ freeboard capacity, capable of being contained to the pond by closing the discharge valve in the event of a site fire.

The total quantity of wastewater from the proposed IOPP would be some 125 Megalitres per year. An analysis of liquid waste from the proposed IOPP is included in the Soil Suitability Report provided in **Appendix F**. Following treatment the wastewater will be classified as medium strength effluent under the DECCW guidelines, as a result of the TDS value of <1,000 mg/L. The following tables provide the characteristics of the treated effluent from the wastewater treatment plant and the DECCW criteria for classification of effluent.

Although this classification exceeds the aim of the wastewater treatment system to have low strength effluent ongoing improvements will be made to the treatment process that lower the level to <600mg/L. This effluent complies with the relevant DECCW guidelines as outlined in **appendix F**.

Table 52: Treated Effluent Characteristics from the Wastewater Treatment Plant

Parameter	Value
Flow	349m ³ /day
pH	6 to 8.5
BOD	<30mg/L
COD	<90mg/L
TDS	<700mg/L
SS	<30mg/L
Oil & Grease	<5mg/L
Total Nitrogen	<50mg/L
Total Phosphorus	<10mg/L

Table 53: DECCW Classification of Effluent Based on Average Concentration

Constituent	Low mg/L	Medium mg/L	High mg/L
BOD	<50	40-1,500	>1,500
Total Nitrogen	<50	50-100	>100
Total Phosphorus	<10	10-20	>20
Total Dissolved Solids	<600	600-1,000	>1,000-2,500

Liquid waste generated on site would be diverted from respective areas and collected and stored in an effluent detention tank, which would be treated as required in the effluent treatment plant.

Treated effluent would be disposed of by spray irrigation on the proposed effluent irrigation areas, on the adjoining Wool Combing site, shown on **Figure 24**. Irrigation would be managed in accordance with an Effluent Irrigation Management Plan (EIMP). The EIMP would be prepared and operated as required by the DECCW's Environmental Guidelines: Use of Effluent by Irrigation (DEC, 2004).



Figure 24: Site Plan Including Proposed Irrigation Area (Source: SMWP, D McMahon)

12.2.2 Solid Waste

Operation of the proposed IOPP would result in the generation of solid wastes from the oilseed crushing plant, vegetable oil refinery, and biosolids from both the effluent treatment plant and water filtration plant. Solid wastes generated by the IOPP would be collected, stored and disposed of off site by a licensed waste contractor.

12.3 Site Suitability for Treated Effluent Irrigation

Treated effluent waste from the effluent treatment plant would be disposed of by spray irrigation on proposed effluent irrigation area, on the adjoining Riverina Wool Combing site, shown on **Figure 24**. Irrigation would be managed in accordance with an Effluent Irrigation Management Plan (EIMP). The EIMP would be prepared and operated as required by the DECCW's *Environmental Guidelines: Use of Effluent by Irrigation* (DEC, 2004). The attached Soil and Water Management Plan (McMahon) outlines the irrigation and crop system which could be used, including an expected water regime for various crops that could be planted on the proposed irrigation area.

The irrigated area would be used to grow crops of mixed grasses suitable for hay, and would not be used for grazing. The suitability of the effluent irrigation area in respect of soils, water, organics and nutrients is discussed below.

Detailed soil studies have determined that the proposed irrigation area is suitable to receive effluent irrigation. A series of monitoring programs will be put in place to assess that the site and irrigation is meeting the required suitability criteria. Programs to be put in place include:

- Irrigation scheduling and monitoring – to be conducted to determine the efficiency of irrigation – with the aim of achieving maximum efficiency in the system. Daily scheduling will take into account:
 - Weather conditions;
 - Soil moisture;
 - Crop performance; and
 - Available irrigation resource.
- Soil monitoring in accordance with DECCW guidelines;
- Wastewater monitoring (monthly monitoring for volume and constituents)
- Plant tissue monitoring (annual monitoring)
- Nutrient and salt balance calculations – to ensure that plants are effectively using nutrients applied.

12.4 Irrigation System

12.4.1 Proposed Treated Effluent Irrigation Area

The proposed effluent irrigation area is approximately 25 ha, and is located on land adjoining the site, owned by RIVCO Group Pty Ltd. The proposed effluent irrigation areas are shown on **Figure 24**. Effluent irrigation will be managed in such a way to minimise potential impacts, the following measures will be put in place:

- Effluent will only be used to irrigate defined areas;
- Effluent irrigation will not lead to surface runoff;
- Spray from the effluent irrigation will not drift beyond the defined area;
- Tail water dam shall be constructed to collect any water runoff from the effluent irrigation area in any rain event; and
- Warning notices will be erected which identify the area under effluent irrigation.

12.4.2 Storage Pond

A 40 ML storage pond shall be constructed as part of the irrigation system to meet DECCW requirements of retaining all wastewater on site at least up to a 90% wet year. A new pond will be purpose built for the wastewater generated from the development, which will be lined in accordance with appropriate standards with welded 2.5mm poly liner. This lining will prevent infiltration of effluent into the underlying shallow perched aquifer. The location of the new storage pond is shown in **figure 15**. The proposed new dam will provide storage space for 2 months of treated effluent from the IOPP.

12.4.3 Treatment and Storage

The storage dam would be monitored and managed by ROBE in conjunction with the RIVCO Group Pty Ltd Farm Manager to ensure capacity is maintained and sufficient suitable cropped area is available to receive treated effluent. The storage provided on site would allow storage of 40ML of wastewater. Any settleable solids reduce the capacity of both the tail water pond and storage pond. The following measures would be included as part of the WMP to manage the ponds:

- Infrastructure such as banks and walls would be maintained and inspected at least once per month;
- Solids would be removed as much as practicable from the incoming wastewater; and
- Ponds would be desludged once the volume is reduced by 30%, where sludge would be removed, dried on site and be suitable for composting.

In the event of the dam reaching full capacity (i.e. during long (over 2 months) wet periods when irrigation is not possible) the following measures will be put in place:

1. RIVCO Group Pty Ltd – the neighbour committed by contract to receive the treated effluent, will have the 1st call responsibility under the water license agreement to take the treated effluent for storage to one of their own storage dams,
2. RIVCO Group Pty Ltd will have opportunity to sell the resource to alternate storage and user,
3. ROBE will have opportunity to sell the treated effluent,
4. ROBE will negotiate with a WWCC treatment facility to receive daily IOPP treated effluent inflows
5. Finally the plant will shut down until treated effluent can be accepted.

ROBE will be responsible for ensuring that the wastewater is treated to sufficient standards and will store the treated effluent in accordance with the requirements of the Water Management Plan.

12.4.4 Control System

The control system for the irrigation would be designed to minimise risks of environmental pollution, which may be caused, by poor design, human error, weather conditions, or faulty equipment. The application of irrigation water would be controlled manually by the RIVCO Group Pty Ltd Farm Manager. As receivers of the wastewater RIVCO Group Pty Ltd will be responsible for the irrigation system.

12.4.5 Reticulation System

New pipeline routes will be established for reticulation of treated effluent water across parts of the proposed irrigation land from the pump house at the treated effluent storage dam.

The pipelines and mainlines would consist of 150 mm, 100 mm PVC Class 9 pipe work and 150 mm PVC Class 12 pipe work. Treated effluent to be irrigated would be drawn from the effluent storage dam through a suction line by electric powered centrifugal pumps fitted with anti-siphon valves that prevent siphoning of the irrigant water and loss of pressure from the pumps.

12.4.6 Scheduling

Scheduling of irrigation would be closely supervised by a Farm Manager under the ultimate responsibility of the Environmental Engineer or consultant, and irrigation would occur only on the selected area in any year in accordance with an irrigation schedule to sustainably manage the irrigation. RIVCO Group Pty Ltd will be responsible for the irrigation system and ensuring that the Irrigation Management Plan is appropriate to the needs of the crops being grown.

Treated effluent water would be irrigated primarily during the hotter months, with irrigation in the colder months being based on rainfall and regular observation of the irrigation area. Detailed irrigation scheduling would be included in the Effluent Irrigation Management Plan (EIMP), which would be prepared and implemented prior to operation. The EIMP will be prepared jointly with RIVCO Group Pty Ltd, as receivers of the wastewater stream. The EIMP would include monitoring of irrigation for salinity prior to irrigation.

12.5 Environmental Safeguards

In order to minimise potential impacts associated with the generation of waste from the proposed IOPP, the following environmental safeguards and mitigation measures would be implemented:

- Solid and liquid wastes requiring removal from the site would be collected and disposed of by an appropriately licensed waste contractor;
- The 40 ML effluent storage dam shall be constructed to the requirements of DECCW, which would include constructing the dam with an in situ permeability of 10^{-9} m/s and with at least 900 mm of compacted clay or alternatively lined with a welded 2.5mm poly liner underlying the dam;
- A detailed EIMP would be prepared and implemented prior to operation to ensure that wastewater irrigation is appropriately managed;
- Effluent irrigation activities would be only undertaken on soils considered suitable for that purpose, as identified in the Soil and Water Management Plan (**Appendix G**); and
- Monitoring of wastewater and soil within the irrigation area would be undertaken in accordance with DECCW requirements.

12.6 Waste Management Conclusion

The proposal would result in the generation of both solid and liquid wastes during operation of the proposed IOPP. While solid wastes would be disposed off site via a licensed contractor, it is proposed to dispose of treated effluent from the site through irrigation of land adjoining the site.

A Soil and Water Management Plan was prepared to determine the suitability of the proposed effluent irrigation area for disposal of wastewater. As discussed in the sections above, these assessments are yet to show whether the soil is suitable to receive the treated effluent, however should it be determined that the chosen site is unsuitable then an alternative site will be located on RIVCO Group Pty Ltd's holdings, as they have agreed to accept this waste stream.

13 VISUAL IMPACT ASSESSMENT

13.1 Introduction

This visual impact assessment (VIA) is a combined synthesis and review of the previous VIA completed by AECOM /ENSR for the original proposal and a new assessment based on the changes to the original layout and elevations of the proposed buildings. In this second assessment the view catchment has been broadened to consider receptors further afield but which have views through to the site and will view the proposed development. The proposed facility configuration and design have changed since the proponent has engaged a new technology provider to the processing aspects of the plant. While the overall height of the facility is similar to the original proposal, rather than there being one group of silo's representing the tallest element of the plant (27 metres), there are now a group of structures that are proposed to be constructed to heights of around 28 metres. These structures and their configuration satisfy the requirements of the processing technology provider – Desmet Bellestra.

13.2 Existing Visual Environment

There are a number of key elements considered to contribute to the visual character of the site and its surrounding environment, including landform, vegetation and land use.

The site is situated in a rural area generally characterised by open pasture with scattered native trees. The general visual landscape is described as a typical Riverina pastoral landscape with gentle hills sloping down to the Murrumbidgee floodplain (Wagga Wagga Council/NSW State and Regional Development, 2005 WISDOM). The topography of the area is undulating with elevations in the local area ranging from 210 to 310 m above sea level. Key features in the broader visual environment include a major north-south ridge dividing the area, the floodplain and the existing industrialized precinct at Bomen (Wagga Wagga Council/NSW State and Regional Development, 2005 WISDOM).

The subject site sits at an elevation of approximately 240 m above sea level. The nearby Bomen Industrial Estate also sits at around 240 m above sea level along with Byrnes Road to the west of the site (KBR, 2005). The highest point in the local area is to the north-west of the site, being the residential suburb of Brucedale. Residents within this suburb situated on Mt Pleasant sit at an elevation of between 270 and 310 m above sea level. These elevated areas have panoramic views across the pastoral landscape and across to the site and neighbouring woolcombing development (see Bomen Photo Sheet 2).

Locally, the visual landscape is typified by cleared agricultural cropping or grazing land with scattered rural residences. A number of substantial industrial and rural industrial buildings feature prominently in the wider landscape including the Wool Combing Facility (see Photo Sheet 1), Renewed Metal Technologies, Buckman Laboratories and other operations within the Bomen Industrial Estate.

The vegetative character of the site and relationship to Trahairs and Byrnes Roads can be visually appreciated in **photo sheet 1**.

Other key features in the local visual environment include the Main Southern Railway Line and Byrnes Road to the west of the site and the ponds associated with the Wool Combing Facility to the south and east.



Image 1: Trahairs Road
Existing vegetation screen to Trahairs Road and the site boundary



Image 2: Byrnes Road
Existing vegetation screen to Byrnes Road and the site boundary.



Image 3: Wool processing factory.
The study site is adjacent to the already visually prominent industrial buildings.



Image 4: Byrnes Road
Existing vegetation screen to Byrnes Road and the site boundary.

Photo sheet 1.
Date: 12-07-2010

13.3 Visual Assessment Methodology

The area in which the development is visible may be described as the visual catchment and is dependent upon a number of features including topography, distance and screening.

The visual catchment with respect to the proposed development was determined through the following methodology:

- A review of topographic maps of the local area;
- A site visit and survey of the surrounding area to determine views through to the site;
- Identification of potential visual receptors;
- Survey of existing views from identified potential receptors;
- Survey of existing screening features such as vegetation or other buildings and structures; and
- Consideration of plant specifications provided by the proponent.
- Consideration of the clauses within the Local Environmental Plan which seeks for consideration of impacts of development on adjoining or nearby lands.

Based upon a review of these factors, key visual receptors from the previous VIA were included identified and six further receptors or view shed precincts were also identified for further analysis.

In the original assessment, topographic data, along with observations and photographic representations of these view sheds were used to input to a computer modeling program known as Vertical Mapper to produce a visibility map and point to point visibility analysis. Local topography was mapped and view shed analyses run to determine the development of the project in relation to surrounding receivers. This analysis enabled the potential visual impacts of the proposal to be identified and assessed.

13.4 Changes to original layout and elevations

The original development approved by DOP (07_0146 – 4 November 2008) included a biodiesel plant and associated buildings. The amended development no longer includes this aspect of the process. As such there are changes to the layout of the plant and elevations, these changes need to be reviewed from the viewpoint of visual receptors of the site.

Figures 25 and 26 show the original layout of the site and elevations, respectively. Project elements 4 and 5 on **figure 25** relate directly to the biodiesel component of the original project, these elements are no longer required. These buildings and associated structures would have been in the foreground for receptors sited to the north of the proposed facility, however, as shown on the elevations of the site these elements of the plant were not the dominant ones, with tanks located further to the south dominating views.

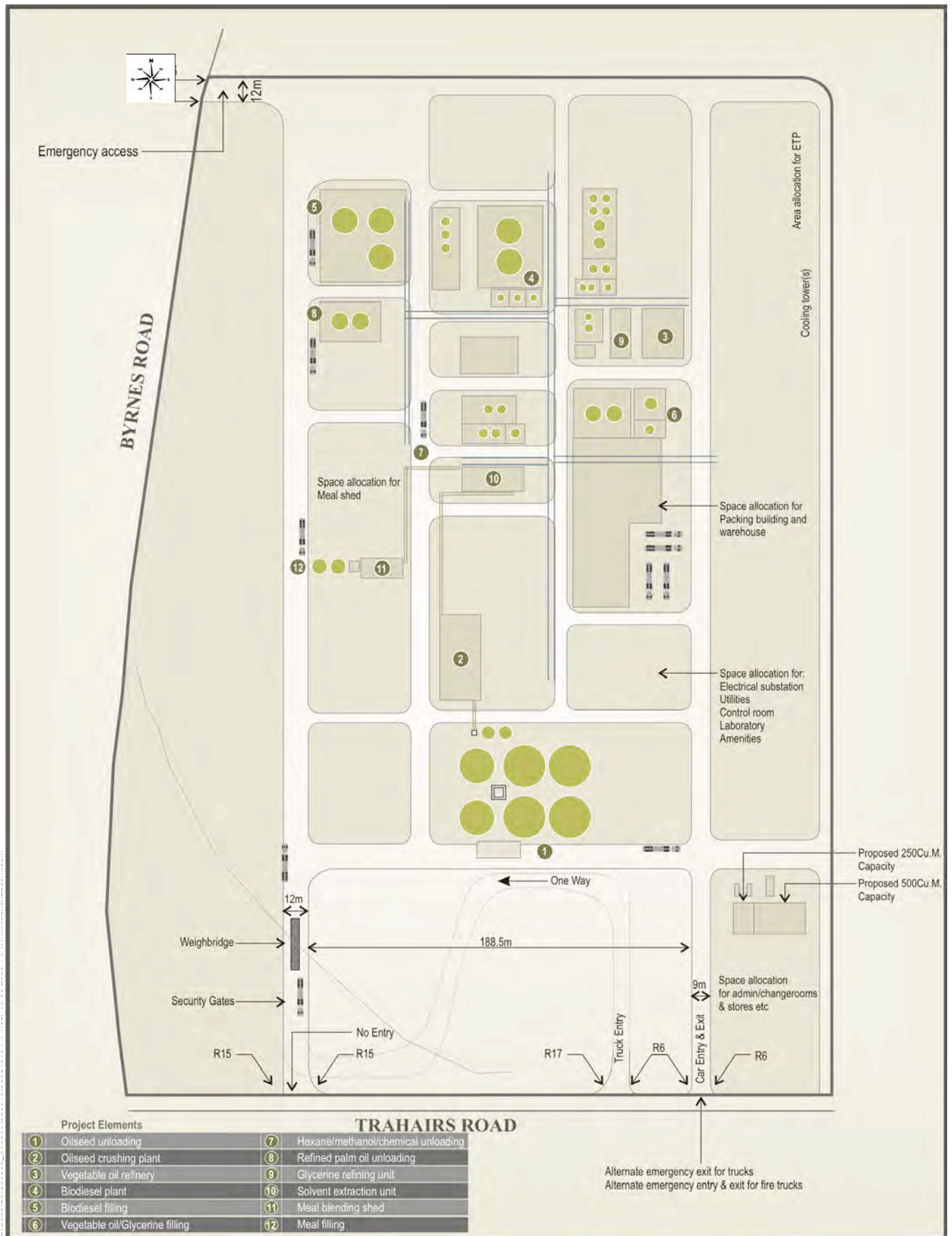


Figure 25: Original Layout of the Plant

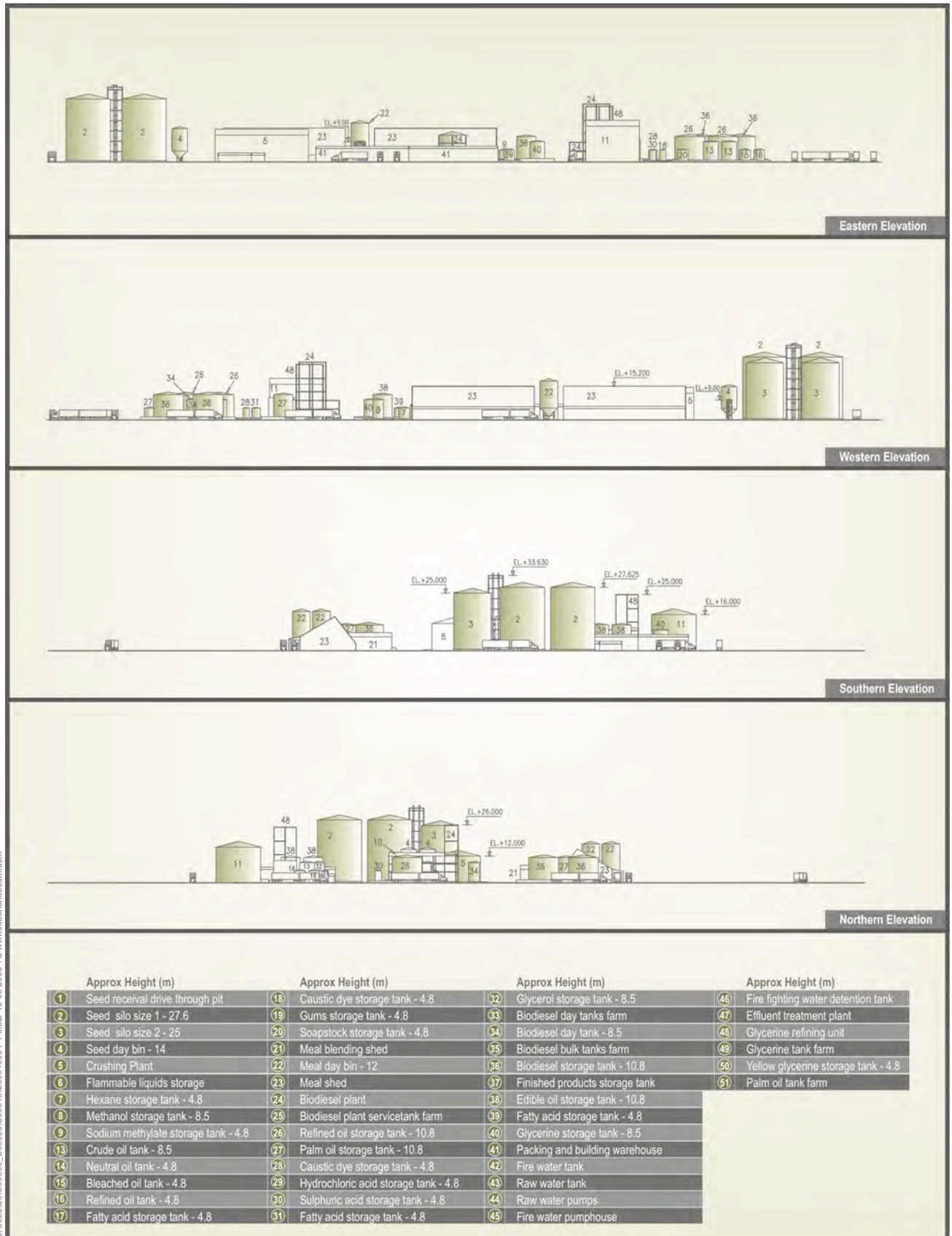


Figure 26: Original Elevations of the Plant

The original visual impact assessment reviewed the relative heights of components of the plant; the assessment included the following table outlining the heights of the major components of the project.

Table 54: Relative Heights of Original Project Elements

Plant / Building	Approximate Height (m)
Oilseed crushing plant	8
Solvent extraction plant	12
Meal blending shed	10
Vegetable Oil refinery	12
Biodiesel plant	16
Storage silos (6)	27.6
Day bins	14
Storage tanks	Between 4.8 & 8.5

As these figures show the most prominent aspect of the original plant was the storage silos, which were clustered in a group of six silos at approximately 28m high. **Figure 27** shows the new layout of the plant without the biodiesel component, while **figure 28** presents the amended elevation plan for the development.

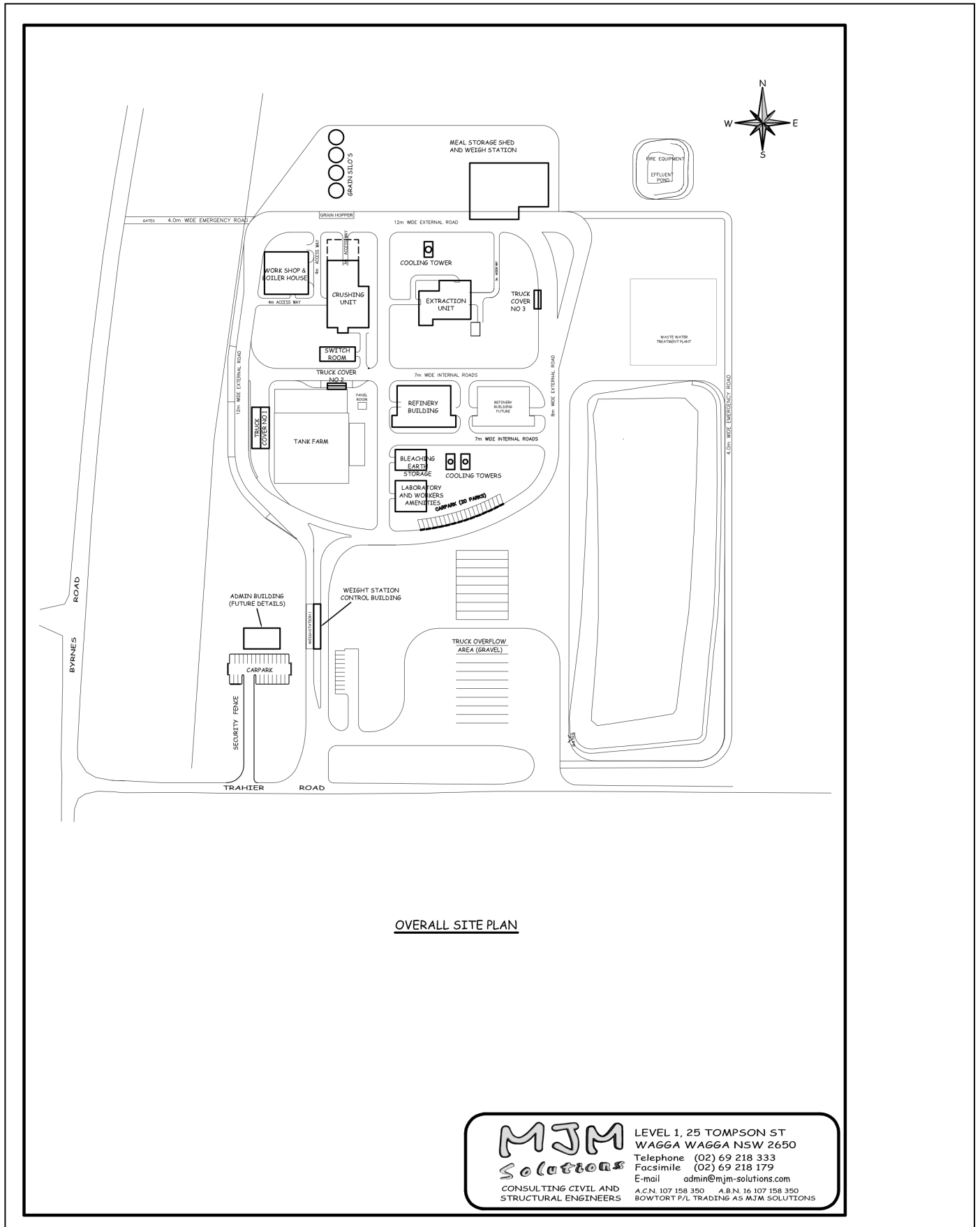


**Figure 27: Amended Plant Layout (without the Biodiesel component)
 (see also figure 4)**

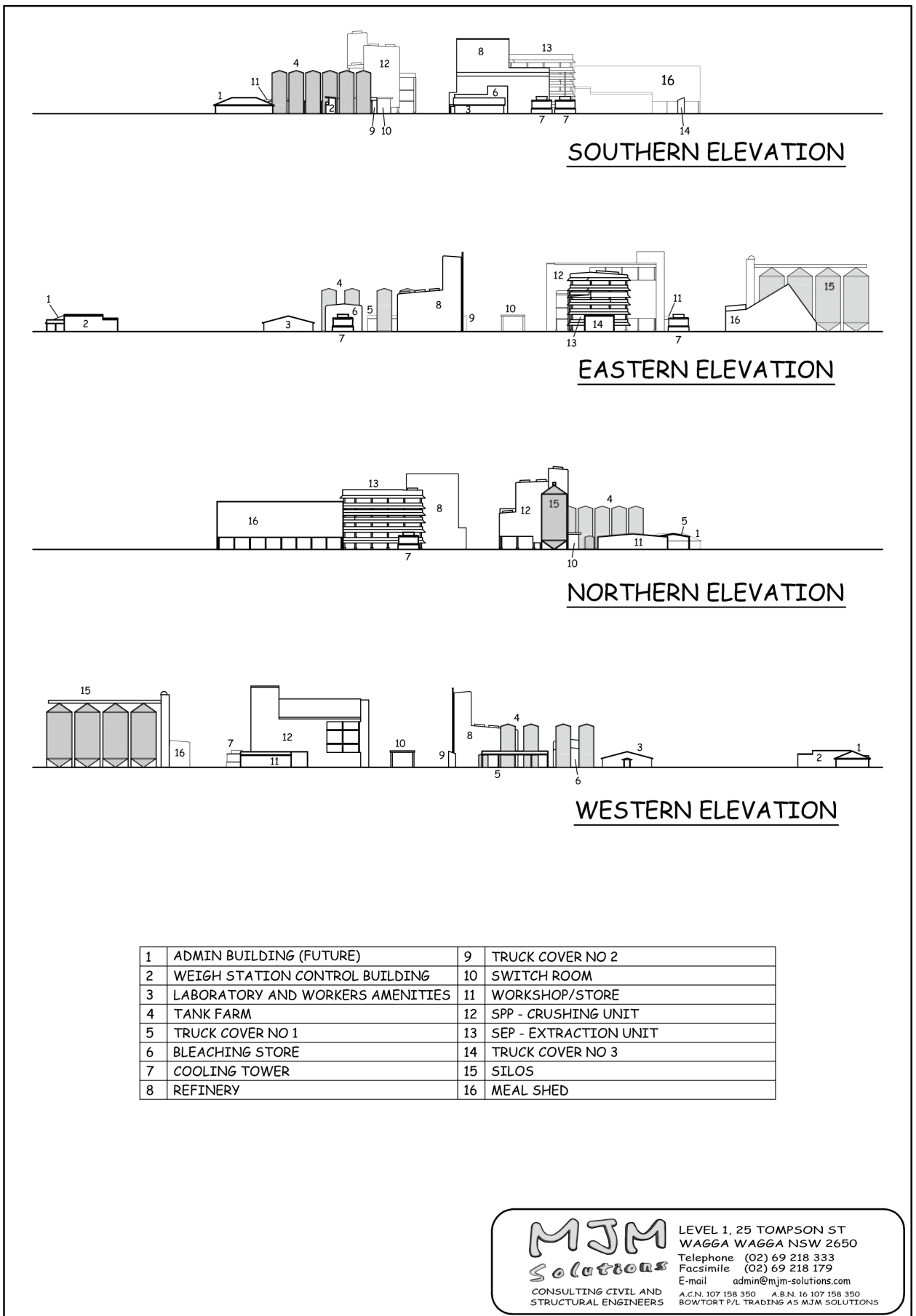


Figure 28: Amended Elevations for the IOPP (without the Biodiesel component)

The following table outlines the relative heights of the project components since the removal of the Biodiesel component of the plant.

Table 55: Revised Heights of Plant Components

Plant / Building	Approximate Height (m)
Oilseed crushing plant	29
Solvent extraction plant	22.5
Meal blending shed	6
Vegetable Oil refinery	27
Storage silos (4)	20
Gravity chute for silos	27
Storage tanks (19)	15

The changes in the heights of the proposed facility is a reflection of the proponents choice of a new technology provider and their subsequent process requirements for the plant.

Colours chosen for the plant elements are outlined in section 2.3 above. All colours and materials to be used will be of a non-reflective nature and have been chosen to blend in with the existing landscape for the dominant climatic period (i.e. dry). Colours chosen include woodland grey, dune and sandbank.

Exterior lighting would be designed to minimise light spill, and would be generally in accordance with *Australian Standard 4282-1997 Control of the Obtrusive Effects of Outdoor Lighting*, notwithstanding functional and safety requirements.

13.5 Site Context and Character

The context of the site and the area's distinctive qualities are very much characterised by its existence on the edge of the rural-industrial area. Development to the south of the site includes broad acre industrial uses with large-scale buildings spread out over much larger land holdings. To the north, east and west of the site the character of the landscape is more rural with cropping and grazing activities on largely cleared undulating lands. This context and character however is set to change due to the consistent strategic efforts to expand the Bomen industrial area to the north, east and west.

13.6 Strategic Planning Implications on Future Character

For over 20 years the Bomen area has been strategically incorporated as a future growth area for industrial development. This has been reflected in several strategic plans outlined below:

Wisdom 1991

The NSW Department of Business and Regional Development and Wagga Wagga City Council commissioned this study to develop a model approach to assist the establishment of new industry in suitable locations in regional NSW. The pilot area chosen was Bomen. W.I.S.D.O.M stands for Wagga Wagga's Industrial Sustainable Development Opportunities Model.

Amongst other objectives the Wisdom study was initiated to provide a framework for a standardised Environmental Impact Statement, which meets many of the requirements of agencies and minimizes the need for industry to undertake generic local investigations. It was also established to pre-emptively encourage ecological sustainability of the Bomen Study area by producing a document which assists with consistent and comprehensive environmental management by all stakeholders.

As part of the Environmental Audit within the study a community survey was carried out and over 50% of the participants felt that the Bomen area was suitable for more industrial development. Seven "ideal" standards of industrial development were developed from the survey and ranked in priority order. The 6th standard was unobtrusive building design; the seventh was landscaping to hide the buildings. The survey findings were later discussed and accepted by a further 100 people at a community meeting. Managing conflicts including visual, noise, wastewater and odours were found to be the most critical environmental issues by the audit.

Stakeholders and the community were widely consulted during the Wisdom study process and the expectation has been for industrial development in the area for over 20 years.

This 'WISDOM Study' Document is accompanied by another Document, called the 'WISDOM Model'

In preparing the WISDOM study of the Bomen Area a number of maps were produced, The General Suitability Mapping Overlay (GISMO) which could be used by Council when considering where and what type of industry to attract to the area. GISMO involved giving consideration to a range of pre-determined land characteristics. Maps were produced for each individual characteristic leading ultimately to the production of an overall map of the area which included all of the maps overlayed to determine the most suitable areas for different types of industry.

The GISMO maps would negate the requirement for further future studies of the Bomen area, with the assumption being made that all of the necessary data had already been collected to allow informed decisions regarding the location of industry in Bomen to be made.

A GISMO map was prepared addressing the visual quality of the Bomen Wisdom study area and this map demonstrates the natural and man-made qualities of the area including remnant bushland, view corridors, landmarks and ridgelines. The subject site has been marked to enable appreciation of how the site sits within this context. The site being perched on a ridge affords views across to it from both the east and west but not from the south or southwest due to landform and elevation.



Figure 29: WISDOM Visual Quality Map

Vision 21 2002

The Wagga Wagga Vision 21 document of 2002 detailed the fact that the city has progressed beyond the regional service centre role. Due to its strategic location it now supports many and varied industries particularly in sectors such as transport, defence, tertiary education, and agriculture based value adding, research and production. The manufacturing base is also expanding with over one third of the Riverina's manufacturing turnover occurring in Wagga Wagga.

There is no specific reference to the Bomen area within the Vision 21 document.

Spatial Plan 2007

The Wagga Wagga City Spatial Plan nominates the Bomen Economic Activity Zone as a critical long-term employment area. It suggests that planning controls be amended to facilitate ongoing diversification from agricultural industry to wider manufacturing/ distribution logistics base. The subject site is within this nominated area.

Bomen Masterplan 2009

Prepared in 2008 the Bomen Masterplan aimed to provide a masterplan for the future development of the "Bomen Business Park", which includes land within the Bomen area, and includes the proposed ROBE site. The masterplan will be used to drive development in Bomen over the next several years.

This plan presents a number of precincts within the Bomen area, which maximize the features of the site and give consideration to surrounding, non-industrial landuses. The subject site is located in part Industrial, part Rail Dependent Industrial precincts of the area, as shown in **Figure 30**. The subject land is within the proposed Bomen Industrial Park, which will extend further north and east over time.

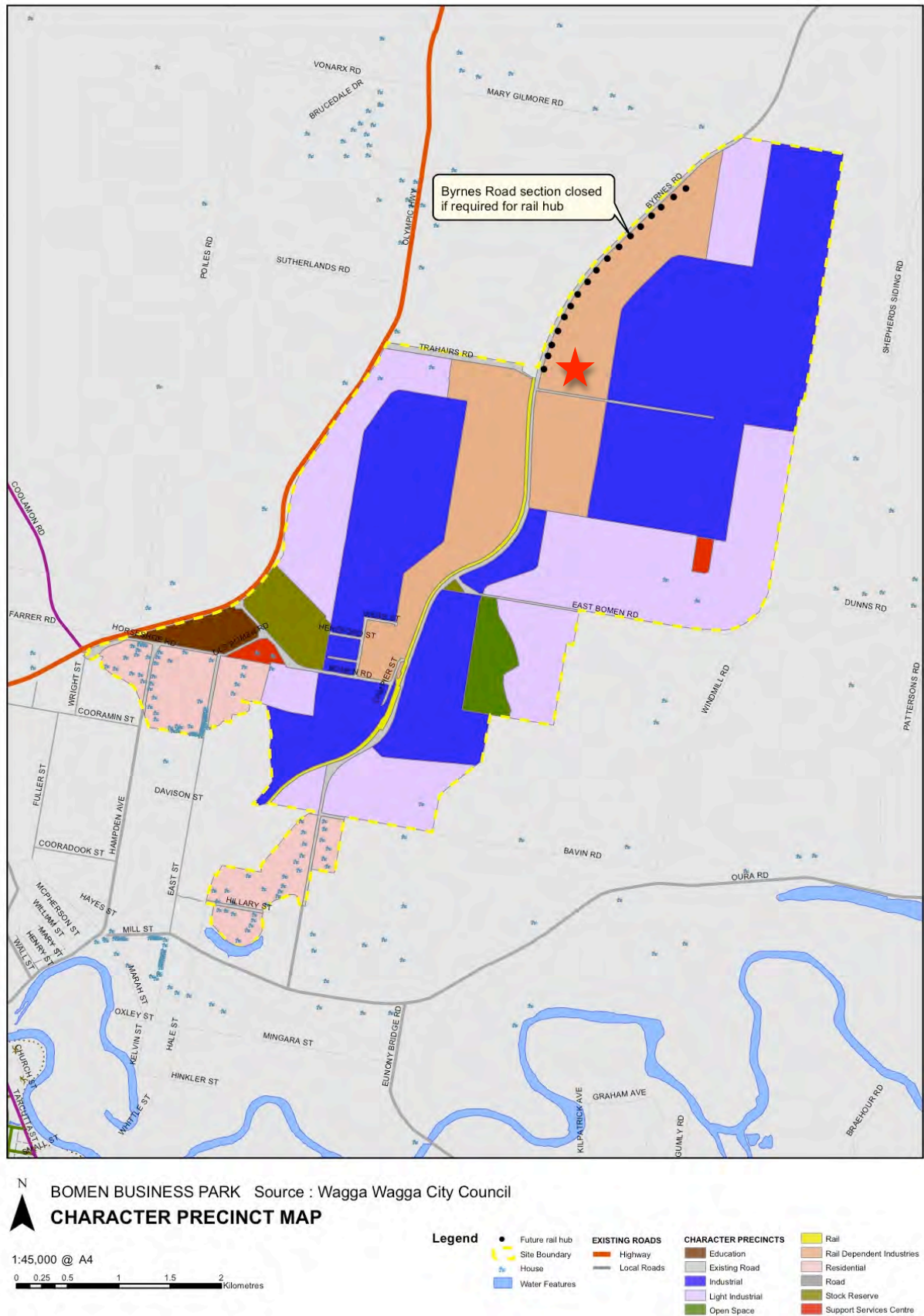


Figure 30: Bomen Masterplan Precincts

Draft WW LEP 2008

Under the provisions of the Draft Wagga Wagga Local Environmental Plan 2008 the subject site is zoned IN1 – General Industrial (refer to **Figure 31**), the objectives of the zone are as follows:

- To provide a wide range of industrial and warehouse land uses.
- To encourage employment opportunities.
- To minimise any adverse effect of industry on other land uses.

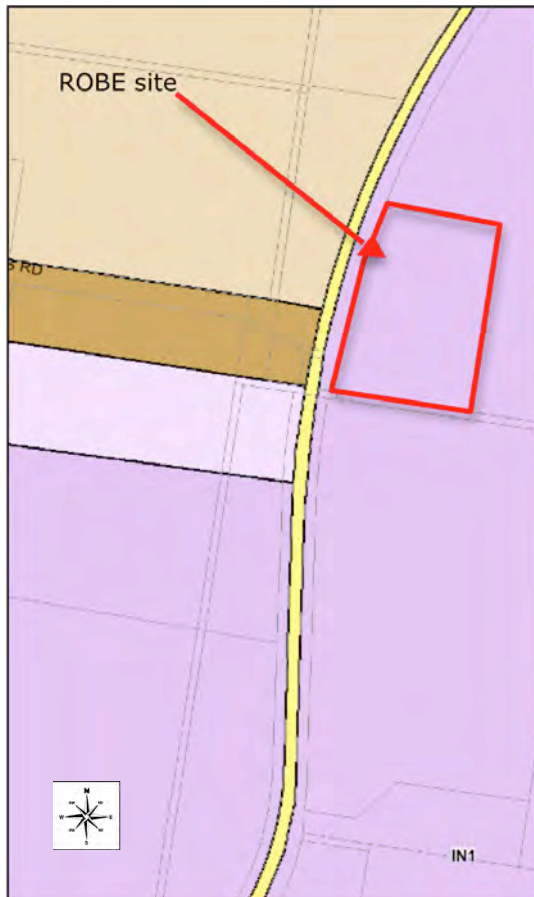


Figure 31: Draft Wagga Wagga LEP 2008 Zoning Map for Site

13.7 Statutory Considerations

Clause 10 of LEP 1991 provides matters for consideration in assessing an application for development on land in the No 1 (Rural) Zone. Those relevant to the VIA include:

(2) the relationship of the development to development on adjoining land or on other land in the locality.

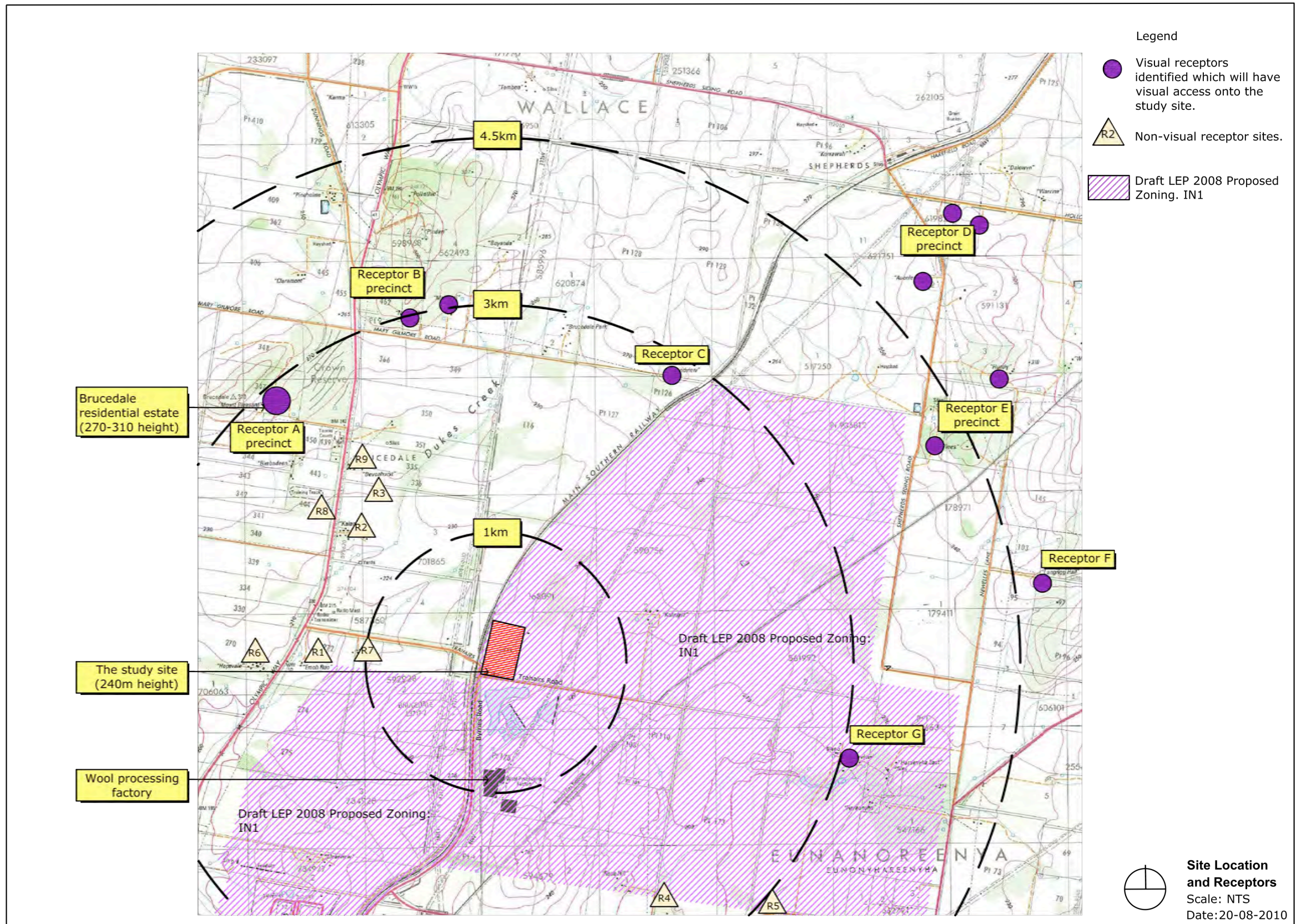
This clause has been considered when assessing the visual impact of the development.

13.8 Visibility Assessment

Due to existing screen planting on the site boundaries the site is only partially visible from adjoining roads including Byrnes and Trahairs Roads. Views from the Olympic Highway further west are largely screened due to topography and existing vegetation. Intermittent views of the site are also available from the railway line. Relatively more distant views of the site (over 3km removed) occur from residences to the north, west and east of the site. The site is not visible from the Bomen Industrial Estate.

Seven receptors and/or precincts were identified from desktop analysis to be requiring further investigation. These receptors are identified in the following Visual Impact Assessment Map. The original EIS receptors are also nominated on this plan.

Upon a site visit and physical analysis, three of these seven receptors (C, E and G) were considered to be unaffected and did not require additional consideration.



The four receptors from the original VIA are included, however it is noted that the VIA determined that three of these could not view the site due to topography and existing screening. For this second assessment the view shed survey extended beyond 2 km and six more receptors or receptor precincts were nominated for further analysis which was reduced to four after site visits discounted two sites from being impacted by the proposal. Some visual perspectives of the site and landscape from various vantage points are included in Photo Sheet 2.

The receptors are outlined below:

- Receptor Precinct A (Brucedale rural residential areas) from original VIA. Photo Sheet 1
- Receptor Precinct B – Two elevated dwellings orientated towards the site with clear views through to the northern and partial western elevation of the development from various points on the properties. Photo Sheet 2 views from Shepherds Siding Road.
- Receptor C Grand View – receptor site level with development site. Residence however not orientated towards site. No further investigation required.
- Receptor precinct D Elevated dwellings over 4.5 km to the north of the site.
- Receptor precinct E Elevated dwellings to the northeast. Views largely screened by mature pines and eucalypts at these properties. No further investigation required.
- Receptor F Langrigg Hall – clear views from front garden of residence through to site. Residence orientated towards site. See Photo Sheet 3.
- Receptor G – Waterview located on the plain. Homestead not orientated towards site and outbuildings blocking views through to site. No further investigation required.



Image 5 - Receptor D Precinct: Shepherds Siding Road
Approximately 4.5km from the study site. Distant industrial site views of existing Wool processing plant.



Image 6 - Receptor E Precinct: Shepherds Siding Road
Approximately 4.5km from the study site. Distant industrial site views of existing Wool processing plant.



Image 7 - Receptor A: Brucedale residential estate:
This site has the most significant visual access into the development site. Viewshed dominated by the existing wool processing plant (270-310 height above seal level)

Photo sheet 2.
Date: 12-07-2010

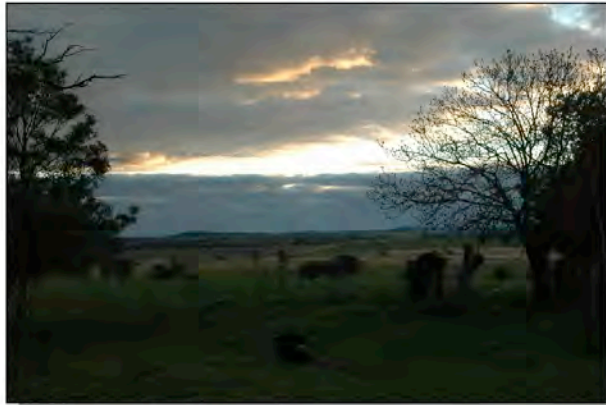


Image 8: Langrigg Hall Homestead

View from front garden of homestead through to site. View only partially blocked by garden plantings. This site would benefit from Homestead garden landscaping to screen views as well as landscape barrier plantings to the east of the development site.



Image 9: Wollundry Olives Homestead.

View from front garden of Wollundry Olives Homestead. Most direct views to the site from the house are screened from plantings in the garden.



Image 10: Wollundry Olives Homestead.



Image 11: Wollundry Olives Homestead.

Photo sheet 3.
Date: 12-07-2010

13.9 Visual Impact Assessment

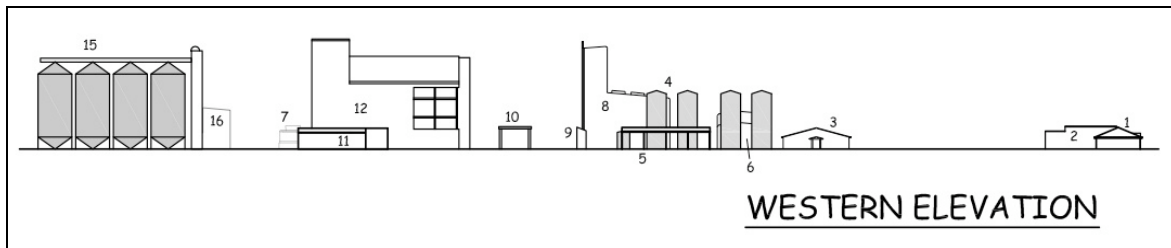
Drawing on the findings of the previous VIA, the current visibility assessment along with strategic planning initiatives being pursued the visual impacts were considered and are analysed below.

13.10 Impacts on Receptors

13.10.1 Receptor Precinct A

Brucedale rural residential estate exists on Mt Pleasant with an elevation of 270 – 310 metres. The subject site exists to the south east of Brucedale at a height of 240 metres. Due to the elevated nature of Brucedale there are several vantage points within the subdivision with clear views through to the site.

Trees and vegetation on Mt Pleasant screen much of the view from many residences but there are some clear and uninterrupted views across the landscape to the site. The Western elevation to the facility will be visible. The dominant buildings that will be seen include the refinery, the seed preparation plant, the silos and tank farm. See Photo Sheet 1.



The Byrnes Road frontage to the site is already well vegetated and the wide road reserve between the carriageway and the railway line is also well planted out with tube stock that will further assist in partial visual screening of the development from both the rail line and the Brucedale precinct. The site layout is quite setback from the Byrnes Road frontage with a proportion of the buildings being built off the ridgeline to the east which will reduce overall development heights and views from the Brucedale area. Mature trees that exist on Mt Pleasant however will be the best screen solution.



Figure 32: Byrnes Road Vegetation

The bulk of the development will be similar to that of the adjacent Woolcombing plant and similar in that the site cover is less than 0.5:1. However, there will be substantially more height to the proposed buildings than that of the majority of the Woolcombing Complex, which will result in a different scale than what presently exists in the immediate view shed from Brucedale.

The ridgelines in the distant eastern horizon are from 320 up to 490 metres AHD and will still be apparent above the tallest buildings. This will help absorb the development into the scene without it dominating the skyline. The fact that there will be a grouping of buildings of different shapes and sizes will also provide an interest and a break up to the development that differs from for example the expansive blank walls of woolcombing.

Mitigation Measures

No specific mitigation measures are suggested beyond further plantings within the existing landscape buffer to the west of the site and including the care, maintenance and replacement of screen trees on the western side of the development site.

13.10.2 Receptor B

Views across to the site will be visible from the two residences on Mary Gilmore Road (Wollundry Olives and Nunkeri). Both residences are orientated towards the south and have a clear view through to the site from various points of their front garden and residence.

The Wollundry Grove residence has mature mid sized eucalypt trees in its garden that assist substantially with blocking direct views to the site from much of the residence.

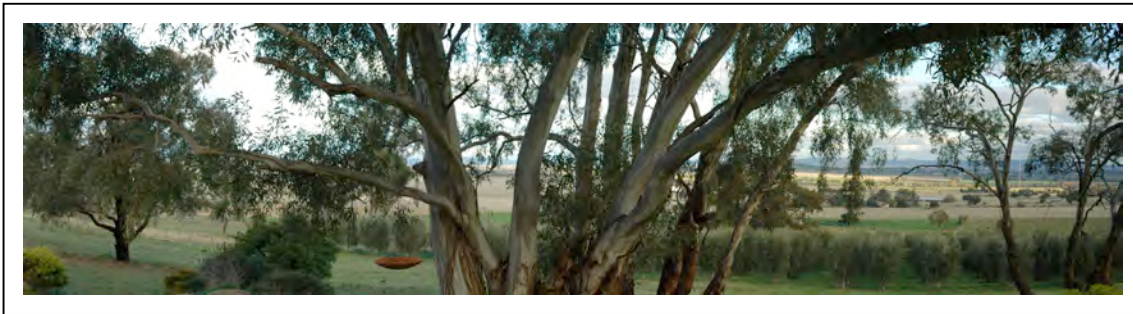


Figure 33: Wollundry Grove - views to site

The Wollundry Grove residents were present when the receptor was attended and did not have any concerns about the development and its visual impact.

The outlook from these two dwellings will be of the northern elevation and the full extent of the plant will not be clearly visible from either of these points.

A montage has been created to give an impression of the bulk and scale of the development as viewed from the front garden of the Wollundry Olive Grove residence. It is noted that a vantage point through existing vegetation was not found from the dwelling itself.



Montage A: View of site and Development from the garden of Wollundry Olive Grove Residence

Mitigation Measures

No specific mitigation measures are suggested beyond the care, maintenance and replacement of existing screen trees on the site as well as the establishment of a landscape buffer strip to the northern boundary of the site.

13.10.3 Receptor C

Receptor C – Grandview is a small original workers cottage that exists to the north of the rail line. Mature trees, tanks and outbuildings shield the view towards the site and the rail line is also elevated which also acts as a shield. This receptor may gain some views through to parts of the site but will not have full view due to the existing buildings, trees and railway infrastructure. It was considered impacts were negligible and this receptor did not require any further consideration.

13.10.4 Receptor Precinct D

The three residences in receptor precinct D are over 4.5 km from the site, however due to elevation (270 – 290 metres) there will be points on the property from the dwellings themselves where the narrower northern elevation of plant will be visible and will stand on the horizon.

The residence Avonleigh is the lowest in this precinct at 270 metres and is orientated more towards the west. Pictures towards the site were taken from the garden and outside the house, however existing trees well shielded the site from view.



Figure 34: Views from Avonleigh. B views to south

The residence situated at rural address 431 along Holloways Road was orientated more to the west and the residence was heavily screen planted with views to the site already well screened.



Figure 35: Screening around 431 Holloways Road

The residence Harefield Olive Grove appears to be recently built and is elevated and orientated directly towards the site with BBQ facilities and pool in this location.

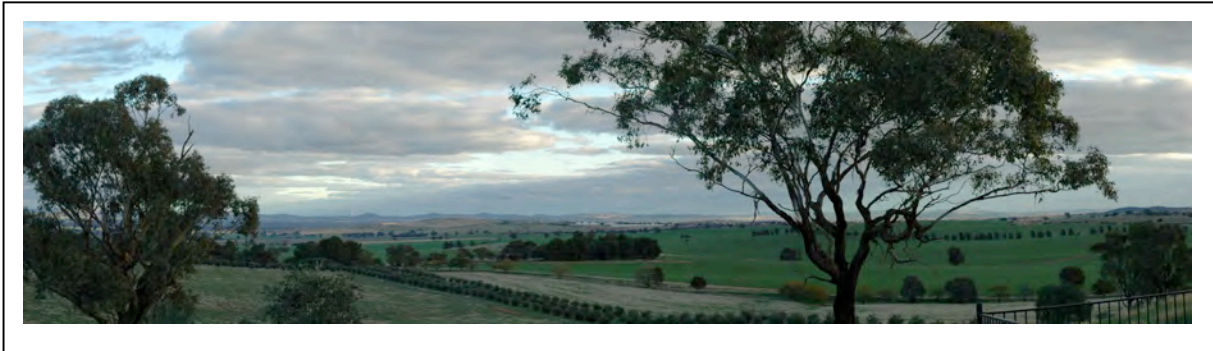


Figure 36: View from Harefield Olive Grove Verandah to site

Mitigation Measures

A landscaped buffer area is proposed to the northern boundary of the site to facilitate a reduction in the visual impact of the development. It should be noted that a large proportion of the landscape between these receptors and the site is also planned for industrial development in the future and the effect of this development site will be less as the industrial infrastructure expands around it in time.

13.10.5 Receptor Precinct E

Receptor precinct E includes the two residences Huntly and The Pines. Both residences are heavily screened with Pine trees and are not considered to be impacted by the proposal.

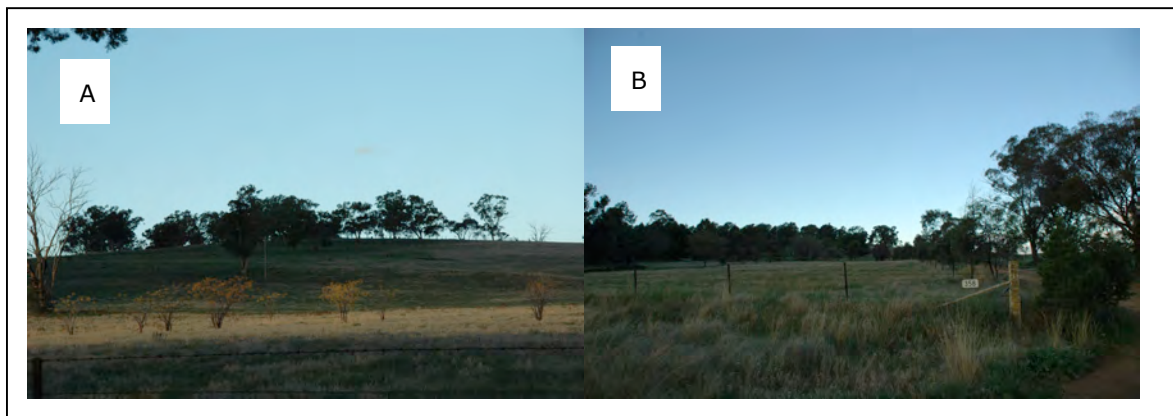


Figure 37: Views from Huntley (A) and The Pines (B)

13.10.6 Receptor F

Langrigg Hall is a residence that exists almost directly east of the subject site at an elevation of 145 metres. The house is oriented towards the west. Some trees exist on the boundary of the house yard, which shield some of the view to the site, however there are sections that are clear and the full eastern elevation will be visible. The owners of this residence were present when the property was attended and expressed concern over the impact of the view to the enjoyment of their dwelling and garden.



Figure 38: Views from Langrigg Hall to site

Mitigation Measures

A Landscaping buffer strip was considered to the eastern boundary to the site, however, for a number of reasons this was not pursued. The reasons included:

- the sheer distances of the receptors to the east of the site,
- the location of a large dam to the boundary of the development site, and needing to keep the integrity of that dam in place, and
- the fact that more industrial development will, over time, exist to the east of the site making it unnecessary to form and edge here.

It is suggested that some landscape treatment at the receptor would be most beneficial in reducing the impact of this view. This landscaping could be located in the main gap of the house garden boundary and would be the responsibility of the proponent to establish and maintain for a period in consultation with the owners.

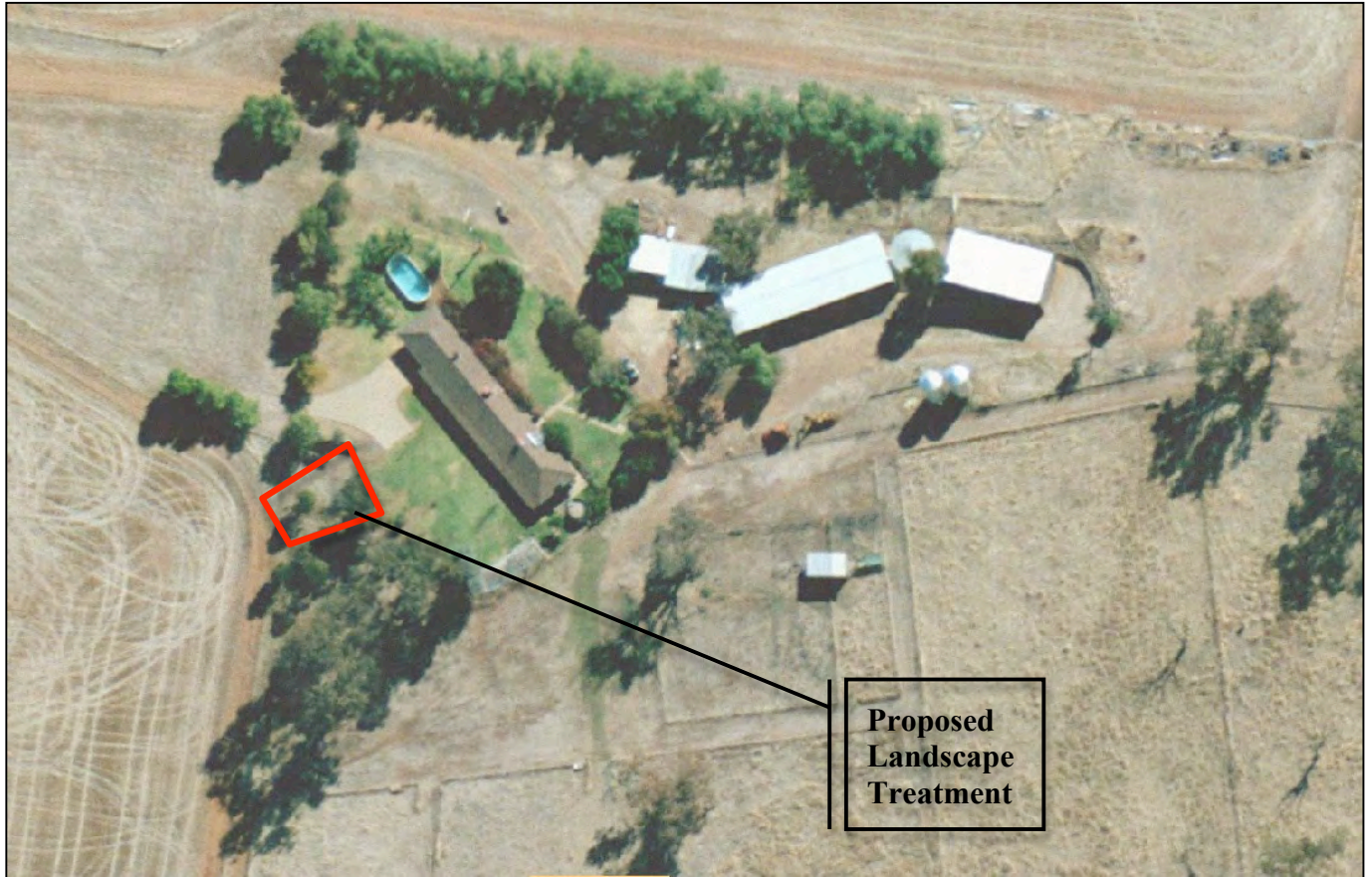


Figure 39: Landscape Treatment to Langrigg Hall

A montage has been developed to give an indication of the view from this receptor through to the site and is attached.



Montage B – View of site and Development from Langrigg Hall to demonstrate bulk and scale

13.10.7 Receptor G

Waterview homestead exists at 210 metres and is orientated north south. The residence has garage and utility rooms to its western end and beyond the house between it and the site exists farm sheds, stables and a tank, which adequately screen views up to the site from the dwelling.

The house further west Hareenyha East exists in a similar orientation with a blank wall facing the direction of the site.



Figure 40: Waterview Homestead

Mitigation Measures

No specific mitigation measures are suggested for these receptors.

13.11 Conclusion

The Visual Impact Assessment has determined that the existing site is located on a ridge and will be viewed particularly from the north, east and west, however receptors are well removed from the site and views to the development will be from a distance.

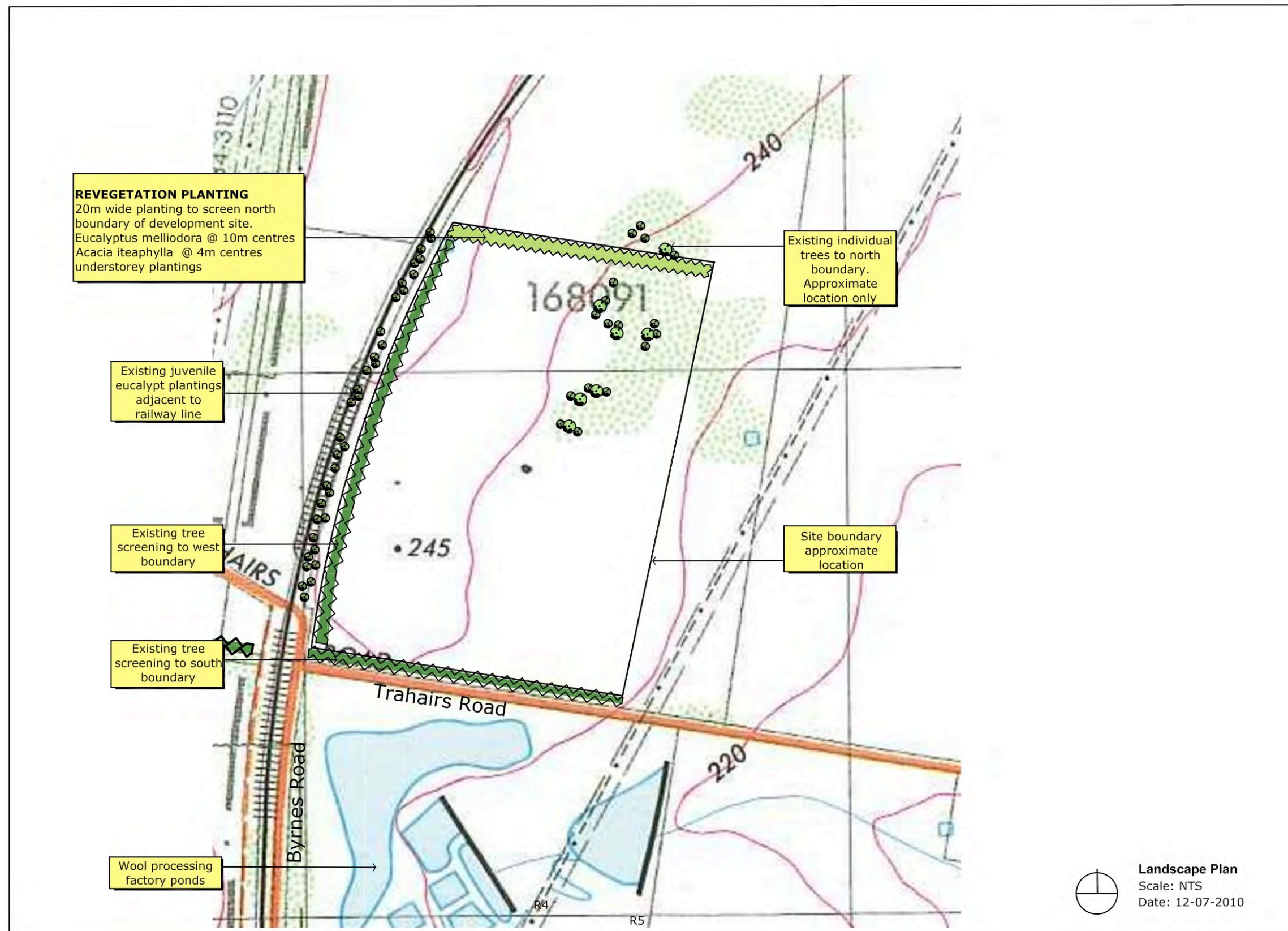
A number of existing landscape features are nominated as positively impacting the screening of the development. These include:

- Existing screen planting to the west and north of the site
- Existing juvenile plantings between Byrnes Road and the Railway line
- Staggering of development footprint to the east of the ridge top
- Existing mature trees and remnant trees between the site and receptors screening views through to the site.

The strategic planning for the area must be considered as the impact of this site over time will be reduced by further industrial development in the precinct. Notwithstanding this strategic direction, upon assessment of the visual impacts of the development these do not substantially alter the amenity of the identified receptors and mitigation measures will further improve visual amenity.

Mitigation measures suggested include:

- Maintenance of and additional plantings to existing landscape buffers to the west and south of the site.
- Landscape buffer plantings to the north of the site
- Landscaping treatments to Langrigg Hall site
- Expectation that materials and colours will be non reflective and easily absorbed into the landscape,
- Minimal lighting within the site set to ensure no off site impacts occur.



14 HERITAGE

NB. The following material (chapter 14) was produced by ENSR/AECOM in 2008 when the initial application was made, it has been altered by Lennon Salvestro Planning to reflect the new direction that the project will take and newly introduced legislation.

14.1 Introduction

HLA ENSR undertook an assessment of Aboriginal heritage at the site during November 2007. The assessment included identification of heritage items / sites / places, potential impacts to heritage and appropriate mitigation measures or constraints associated with the proposed activity. The assessment was undertaken in accordance with the DECCW *Cultural Heritage Standards and Guidelines Kit* (1997) and *Interim Community Consultation Requirements for Applicants* (2004).

A summary of the assessment is provided below and the full report is provided in **Appendix I**.

14.2 Existing Environment

The site is characterised by extensive agricultural activities and a heavily modified landscape. Specifically, vegetation consisted of sparse low lying wheat fields (allowing excellent visibility) and occasional trees. The soil profile was a mixture (through ploughing) of truncated orange clay (of geological origin) and a brown clayey loam. Geology located within the site included evidence of granite, slate, fine sandstone and quartz. The site is located some distance from any water sources or areas of obvious Aboriginal occupation or use.

HLA ENSR undertook a site search of the site and its surrounds (50 x 50 km), using the then DECC AHIMS on 2 October 2007. The search investigated and identified 45 previously documented sites.

Of the 45 sites overall, they can be broken down as follows:

- Isolated finds = six (6);
- Scarred tree = two (2);
- Midden = one (1);
- Open camp site (artefact scatters) = 14;
- Quarry = one (1); and
- Undefined site = 21 (while the site types were omitted in relation to these sites, the specific AHIMS codes suggest they were dominated by a mixture of scarred / carved trees and/or artifactual in nature).

Several points of similarity of most sites around the Wagga Wagga region include the high percentage of quartz, the small (1 - 3cm) size range of most artifacts and the general low artifact density. Based on the cleared status of the site and the likely agricultural practices which have occurred since European settlement, it is highly unlikely that sites such as bora rings, stone arrangements and carved trees would have survived to the present day (all of which are uncommon in the existing sites outlined above anyway).

Based on previous studies within the area and the AHIMS search of a 50 km² grid surrounding the site, a number of factors can be identified when considering archaeological site distribution, specifically:

- The archaeological record in this area is dominated by artifact scatters and isolated finds, and to a lesser extent scarred trees. Raw materials within this sites are usually dominated by quartz with lesser components of chert, silcrete and quartzite;
- Large sites tend to be located on alluvial flats or creek valleys, while smaller sites occur on ridge tops or mountainous settings;
- Several studies note that site distribution is dominated by the presence of extensive and/or permanent water resources. Hence, areas surrounding the Murrumbidgee are considered likely locations for archaeological site occurrence;
- Several studies have found that existing activities, specifically agriculture, can have a large negative effect in site identification of preservation; and

- No AHIMS sites are in the vicinity of the site.

During the site investigation, the effective coverage of the site was excellent due to the sparse vegetation cover. The investigation revealed complete disturbance through agricultural practices and dam creation. No areas of the site were considered to have escaped some form of disturbance from human activities in this area. Hence, landscape integrity and archaeological potential is considered very low. No Aboriginal sites or potential sites were identified as part of the site investigation. Shane Little of the Wagga Wagga LALC was present during the site investigation and did not identify any specific concerns or requirements in relation to the proposed project.

14.2.1 European Heritage

A search of the Register of the National Estate (RNE) indicated that there are 21 historic places within a 20 km radius of the site. These places occur in the township of Wagga Wagga. A search of the State Heritage Inventory (SHI) indicated there are four (4) items listed under the NSW Heritage Act 1977 that occur in the Wagga Wagga LGA. The SHI also showed there are 19 items listed by local government or state agencies in the Wagga Wagga LGA. The majority of items are located in the township of Wagga Wagga. Two (2) items are located in the township of Bomen, which is approximately 2.5 km from the site. The impact of the proposed project on these items is considered to be low. Therefore, a detailed assessment on the potential impacts to items of non-indigenous heritage was not undertaken.

14.3 Potential Impacts

Based on the current known heritage issues within the site, there are unlikely to be any impacts from the proposed development. The actions which have the potential to result in an impact on Aboriginal objects or Aboriginal sites include the surface and subsurface impacts through the installation of the proposed plant and associated infrastructure. These activities are likely to completely destroy the areas encompassed within transect 1 - 6, through the need for levelling and filling prior to the installation of the IOPP and associated infrastructure. However, as there are currently no known Aboriginal sites, there are no potential impacts to Aboriginal heritage.

14.4 Mitigation Measures

In the event that previously undiscovered Aboriginal objects (or potential Aboriginal objects) are discovered during construction, the following measures should be implemented to minimise potential impacts:

- In the event that previously undiscovered Aboriginal objects (or potential Aboriginal objects) are discovered during construction, all works in the vicinity of the find would cease and the IOPP Environmental Representative would be informed to determine the subsequent course of action. The IOPP Environmental Representative would, if required, notify a heritage professional to obtain advice on how to proceed. Works would not recommence until any heritage requirements identified through this process have been met; and
- Should suspected skeletal material be uncovered during the course of any site works or through subsidence landscape modification, all works must cease and the DECCW, the NSW Police and the NSW Coroners office contacted immediately, regardless of any existing environmental approvals; and
- All contractors who work within the confines of the Study Area should be made aware of the General Recommendations above, and advised of the importance and protection of Aboriginal Objects/Sites by State legislation. All contractors should be advised of the need to stop work and contact the IOPP Environmental Representative should Aboriginal Objects/Sites be identified during construction.

Currently, there are no apparent constraints to development in relation to Aboriginal heritage.

14.5 Heritage Conclusion

Based on the physical inspection, it is unlikely archaeological sites would be located within the Study Area, due to its distance from any notable water source.

In relation to the physical inspection, due to the extensive agricultural activities, exposure and visibility of the ground was excellent, and it seems unlikely any archaeological material may have been missed through coverage restrictions. As stated elsewhere, the effective coverage further identified the lack of an *in situ* soil profile across the Study Area, and hence the absence of any subsurface archaeological potential (which requires a soil profile).

While a number of general conditions in relation to Aboriginal heritage have been presented in **Section 14.4** above, there are no specific Aboriginal heritage constraints upon the development due to the absence of any surface or subsurface archaeological materials being identified.

15 FLORA AND FAUNA

NB. The following material (chapter 15) was produced by ENSR/AECOM in 2008 when the initial application was made, it has been altered by Lennon Salvestro Planning to reflect the new direction that the project will take and newly introduced legislation.

15.1 Introduction

An ecological assessment was undertaken (**Appendix J**) to identify potential impacts to ecological factors such as threatened species, threatened populations, endangered ecological communities (EECs) and whether the proposed works would constitute a key threatening process. Where potential impacts were identified, mitigation measures have been recommended.

The assessment included a desktop study during which existing information regarding the site was examined. This included searches of state and Commonwealth databases and an examination of previous reports undertaken for areas in the vicinity of the site. A one day field investigation was undertaken on 15th November 2007.

15.2 Existing Environment

15.2.1 Introduction

The site is highly modified with the majority having been cleared of a canopy and shrub species. The groundcover comprises planted crops with interspersed weeds. As such, the remaining vegetation comprises isolated paddock trees with a modified non-native groundcover, rather than viable ecological communities. A fenced area with an approximate width of 2 m containing planted trees runs along the boundary of the site with Byrnes Road and Trahairs Road. Approximately 50 head of cattle are present on the site. Extensive earthworks have been undertaken to the east of the site to form ponds for the adjacent Wool Facility. This area comprises bare soil with some isolated paddock trees along the boundary with the site.

15.2.2 Ecological Communities

The trees at the site comprise some of the characteristic species of White Box Yellow Box Blakely's Red Gum Woodland (Box-Gum Woodland), an endangered ecological community (EEC) under the TSC Act. As such, the vegetation community that existed prior to clearing is likely to have comprised Box-Gum Woodland. This community is similar to a critically EEC listed under the EPBC Act, the White Box- Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland. The Identification Guidelines for Endangered Ecological Communities: White Box Yellow Box Blakely's Red Gum Woodland (Box-Gum Woodland) were used to determine whether the vegetation at the site constitutes an EEC. While it is likely that the vegetation at the site once comprised Box-Gum Woodland, the degraded nature of the vegetation means that this is no longer the case.

15.2.3 Flora

The database searches identified four threatened species that have been recorded in a 20 km x 20 km search area, or which have the potential to occur within the search area. The preferred habitat of these species does not occur at the site, due to its highly modified state or due to a lack of key features of the species' preferred habitat. The remaining native vegetation at the site comprises isolated paddock trees and scattered trees of varying maturity. The following species are present:

- *Eucalyptus blakelyi* (Blakely's Red Gum);
- *E. melliodora* (Yellow Box);
- *E. albens* (White Box);
- *E. dealbata* (Tumbledown Gum);

- *E. macrocarpa* (Grey Box);
- *Brachychiton populneus* (Kurrajong); and
- *Calitris glaucophylla* (White Cypress Pine).

The majority of the native trees at the site occur outside the building footprint. Two isolated paddock trees fall within the building footprint (see **Figure 41**). A tree removal application has been lodged with Wagga Wagga City Council to gain permission for the removal of one of these trees, as indicated.

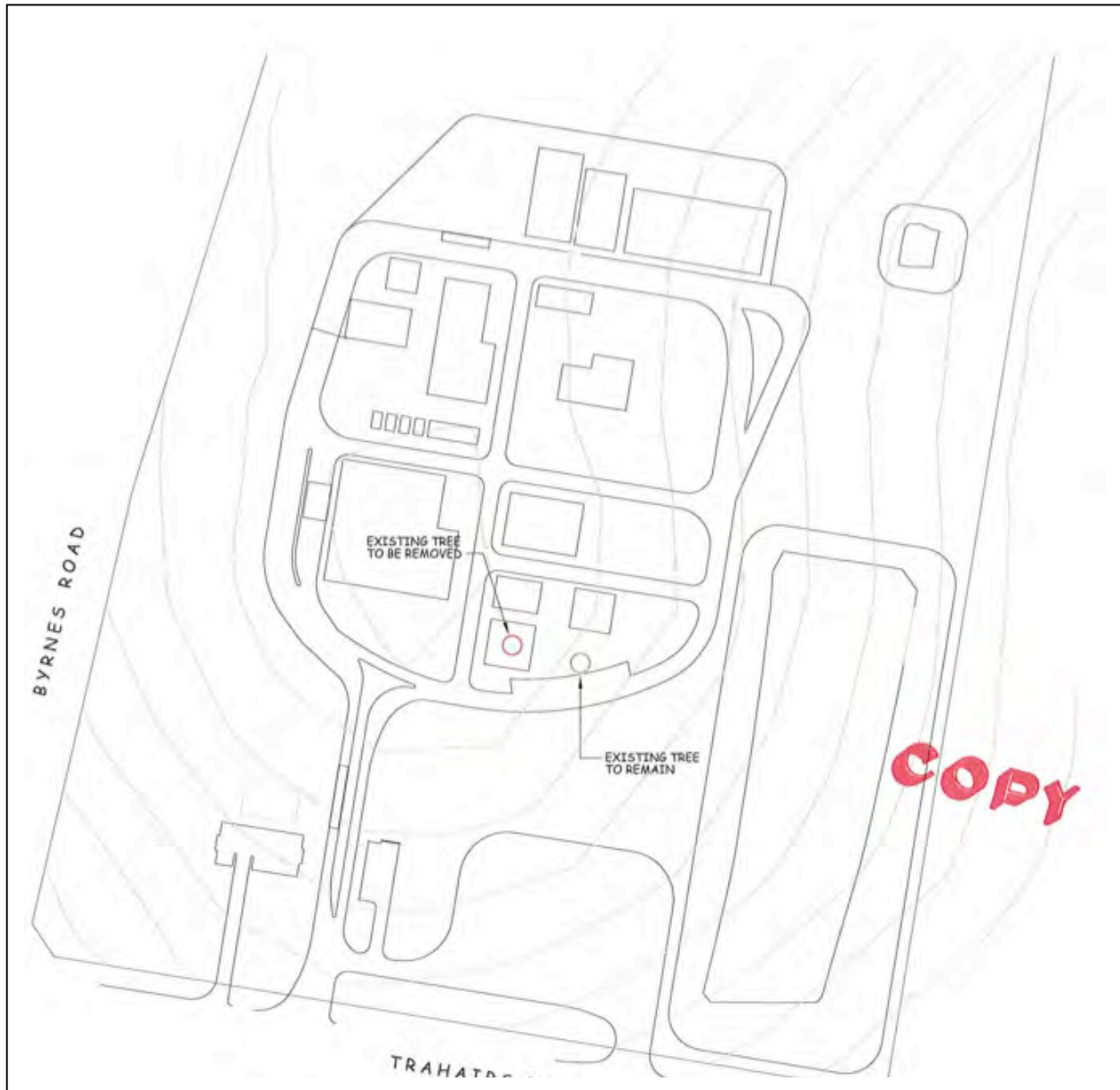


Figure 41: Location of Two Trees Within Building Footprint

15.2.4 Fauna and Fauna Habitat

The majority of the site has been cleared and only provides limited habitat value for native fauna. The remaining trees provide habitat for bird species and common species such as the Galah and Magpie were observed using them. Key habitat features are largely absent from the site with very few hollow bearing trees and scattered fallen logs. The fallen logs provide habitat for snakes and lizards. The surrounding grasslands, while not comprising native species, provide habitat for species such as snakes, grass birds and kangaroos, which were observed at the site.

The remaining vegetation is not connected to other areas of native vegetation and as such, does not hold connectivity or corridor values. Its isolation means that it is less likely to provide habitat for native species. It is unlikely to support viable populations of native species; however, mobile species such as birds would use the remaining trees for shelter and foraging.

The database searches identified 21 threatened species that have been recorded in a 20 km x 20 km search area, or which have the potential to occur within the search area. This included four ray-finned fishes, one amphibian, 10 birds and six mammals. Three of these species have the potential to use the trees at the site:

- *Cacatua leadbeateri* (Major Mitchell's Cockatoo);
- *Polytelis swainsonii* (Superb Parrot); and
- *Nyctophilus timoriensis* (Eastern Long-eared Bat).

An assessment of significance was undertaken for these three species and found that the proposed works are not likely to have a significant impact on these species.

15.2.5 Key Threatening Processes

Key Threatening Processes (KTPs) are processes that threaten, or could threaten, the survival or evolutionary development of species, populations or ecological communities. Clearing of native vegetation is a KTP that has already occurred extensively at the site. As the site is already largely cleared of vegetation, only minimal further clearing is required. Other KTPs that may be occurring in the area are:

- Competition and grazing by the feral European rabbit;
- Predation by feral cats; and
- Predation by the European Red Fox.

Evidence of feral cats and the feral European rabbit was observed at the site. The feral cat, feral European rabbit and European Red Fox have also been recorded within a 20 km x 20 km search area centred on the site.

The proposed works do not constitute a Key Threatening Processes (KTP) and are unlikely to increase the impact of an existing KTP.

15.2.6 SEPP 44 Koala Habitat Protection

State Environmental Planning Policy 44 – Koala Habitat Protection (SEPP 44) aims to encourage conservation and management of koala habitat. The schedules of SEPP 44 provide a list of koala feed tree species and a list of local government areas (LGAs) in which koala habitat occurs. It defines core habitat value as areas which contain a resident koala population and potential koala habitat as areas in which the tree species listed in Schedule 2 comprise at least 15% of the total number of trees in the upper or lower strata of the tree component.

The Wagga Wagga LGA is listed in Schedule 1 of SEPP 44. Of the species listed in Schedule 2 of the policy, *Eucalyptus albens* (White Box) occurs at the site; however, it does not comprise at least 15% of the total number of trees in the upper or lower strata of the tree component. Furthermore, Koalas have not been recorded within a 20 km x 20 km search area centred on the site. As such, the site does not contain potential or core koala habitat.

15.2.7 Introduced Species

The database searches identified 80 introduced flora species that have been recorded in a 20 km x 20 km search area centred on the site, some of which are declared noxious weeds in Wagga Wagga. Noxious weeds are required to be controlled by landowners or occupiers of land under the *Noxious Weeds Act 1993*. *Echium plantagineum* (Patterson's Curse) is a noxious weed that occurs throughout the site. It is in the Category 4 control class for which the following controls should be undertaken:

The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority.

(Department of Primary Industries, 2005)

Wagga Wagga City Council is the local control authority and has developed the *Class 4 Noxious Weed Control Management Plan 2006 – 2011*. This document outlines the control measures to be undertaken by property owners for Patterson's Curse.

The database searches identified 10 introduced fauna species that have been recorded in a 20 km x 20 km search area centred on the site, including seven birds and three mammals.

15.3 Potential Impacts

The proposed works have been sited to avoid the majority of the remaining native vegetation at the site. Two isolated paddock trees are located within the building footprint and one of these trees would be cleared. These trees do not contain hollows. Due to the isolation of these trees, they are not considered to retain conservation significance and as such, the removal would not represent a significant impact to the overall ecological values of the site.

Wastewater irrigation is proposed to occur to the south east of the site on adjoining land owned by RIVCO Group Pty Ltd. This irrigation has the potential to raise the water table and increase the level of salts/minerals in the soil. Changes to the soil and water table can alter the ecological processes existing at the site and potentially lead to issues such as salinity, which can affect the remaining native vegetation at the site.

15.4 Mitigation measures

To help avoid and minimise the potential impacts on flora and fauna, the following mitigation and rehabilitation measures are recommended:

- Felled trees should be left *in situ* for at least 24 hours to allow fauna species to relocate. Ensure qualified personnel are on hand to check hollows for wildlife and relocate them;
- If any wildlife is inadvertently injured, an accredited veterinarian (and through them possibly a wildlife care group) should be contacted;
- Monitoring for weed infestations should occur during construction and operation so that appropriate control measures can be applied. Measures to control Patterson's Curse should be implemented in accordance with the *Class 4 Noxious Weed Control Management Plan 2006 – 2011*;
- Landscaping should incorporate species endemic to the area; and
- An Irrigation Management Plan should be developed to ensure the irrigation works do not alter the existing soil and groundwater conditions at the site, thus ensuring the remaining native trees and soil structure are not affected by the irrigation works.

15.5 Flora and Fauna Conclusion

Given the successful implementation of the mitigation recommendations, the ecological assessment has found that there is very limited potential for the proposed works to have a significant impact on threatened ecological communities, important fauna habitats or movement corridors or potentially present threatened flora or fauna species or populations. The key recommended actions are to control weeds (in particular Patterson's Curse) and to develop an Irrigation Management Plan.

16 SOCIAL AND ECONOMIC

NB. The following material (chapter 16) was produced by ENSR/AECOM in 2008 when the initial application was made, it has been altered by Lennon Salvestro Planning to reflect the new direction that the project will take and newly introduced legislation.

16.1 Overview

A social and economic assessment of the project has been undertaken and includes an assessment of the potential economic impacts of the proposed development including the economic costs and benefits of construction and operation of the proposed IOPP on the local and wider economic environment.

An assessment of the potential social impact of the project including the effect of the project on people, and more specifically, the impact the proposed development would have on the way people live and work, the character, cohesion and demography of the community, and its customs and values.

Industrial developments have the potential to:

- create uncertainty about the future development of an area;
- sever a community or reduce community cohesion or the ability to interact;
- remove or reduce community facilities or services;
- change vehicle access patterns;
- affect visual amenity and change the character of an area through changes to the landscape;
- affect amenity through other factors such as noise, odour, dust, traffic, litter, vermin;
- change the level of security; and
- displace individuals and therefore create hardships.

Industrial developments also have a range of potential benefits with positive social impacts, including employment generation, construction and upgrading of local infrastructure and services, and capital investment in regional areas resulting in multiplier effects to the local and regional economy, which has social benefits for receiving communities.

Social impacts may be categorised as quantitative, such as the likely effects on future population growth and employment, or qualitative, which may include community perceptions toward a proposal, environmental concerns and effect on cohesion.

This section examines the likely social and economic impacts and where impacts are identified, recommendations are made to mitigate potential impacts on social and economic profiles. This assessment also considers technical aspects of the EA, which could impact individuals and communities, including noise (**Section 7**), air quality (**Section 6**), traffic generation (**Section 10**) and visual impacts (**Section 13**).

16.2 Social and Economic Profile

Wagga Wagga is a regional city of some 60,000 people. Recent population figures released by the Australian Bureau of Statistics (ABS) indicated a 1.1% increase in the Wagga Wagga LGA population between 2001 and 2006. The ABS reported that the 2004 unemployment was 5%, which is below the 2004 national average unemployment rate of 5.8%.

Industries in the Riverina region are primarily based on agriculture, food processing, manufacturing, forestry and wood processing, transport and logistics, education and research and public sector industries. This includes large institutions such as Charles Sturt University and the Kapooka Military Area, both located in Wagga Wagga. The region's tourism industry is valued at \$500 million per annum.

Gross regional product is in excess of \$4.5 billion, with primary production comprising approximately one quarter of this amount (Riverina Regional Development Board n.d.).

Agricultural production in the Murrumbidgee Catchment equates to 25% of fruit and vegetable production in NSW. Irrigated agriculture has an annual production of approximately \$200 million worth of rice, \$60 million worth of vegetables, \$80 million worth of grapes and \$150 million worth of fruits. Dry land agriculture is also a major contributor to the Murrumbidgee Catchment economy with an annual production of approximately \$110 million worth of sheep meat, \$240 million worth of wool, \$273 million worth of beef and \$790 million worth of cropping (Murrumbidgee Catchment Management Authority, 2006).

WWCC has developed a number of programs in order to stimulate economic growth within the city of Wagga Wagga and surrounding region. WWCC developed a strategy known as Acceler8_Wagga Wagga in consultation with key business leaders. This strategic plan has now been in place for four years and identifies eight key strategies to facilitate the economic growth of the city. In recent years there has been private sector investment in excess of \$50 million in new or expanding businesses. This growth created almost 170 new jobs. Developments which have since received development consent and which are about to commence construction will add a further \$61 million capital expenditure and a further 125 new jobs once these new businesses commence operation (Business Wagga Wagga, 2007).

Charles Sturt University (CSU) is located within the city of Wagga Wagga, promoting the Education sector is another significant growth centre for the city. As a result of the recent establishment of a new School of Veterinary Science, the development of the new National Wine and Grape Industry Centre and the establishment of the new EH Graham Centre for Agricultural Innovation there have been 20-30 new professional positions created at the Wagga Wagga Campus of CSU. With the expansion of these educational facilities, CSU is expected to create a further 40-60 positions in the next couple of years (Business Wagga Wagga).

The recent expansion of the RAAF Base Wagga Wagga saw 85 staff relocate to Wagga Wagga with their families. They are responsible for the training of up to 1,000 RAAF recruits per annum whose training was previously delivered at RAAF Edinburgh in South Australia. There are graduations for up to 60 recruits every 2 – 4 weeks, attracting their families to the region.

In terms of proposed developments in the hospitality industry, development consent is pending for a proposed new \$35 million hotel development on the heritage Murrumbidgee Flour Mill site which also proposes specialty retail and supermarkets. If this development is completed it is expected to create a further 250 jobs in the future.

In addition, a number of international companies are represented in Wagga Wagga, including Cargill Beef, Chargeurs (Riverina Woolcombing, located south of the proposed site), and Buckman Laboratories. These companies, together with other Japanese and Korean interests in the region ensure a regular stream of international business representatives visit the city (Business Wagga Wagga, 2007).

16.3 Social Impact

The social impacts of the proposal have been considered in terms of the social characteristics of the area, available statistical data and a qualitative assessment of how many people may be impacted by the proposed IOPP.

A number of residential receptors have been identified in close proximity to the proposed site, which could potentially be affected impacts to amenity during the construction and operation of the IOPP. The location of these residences is shown **on Figure 2.1**.

Potential social impacts during the construction period are likely to be associated with amenity impacts resulting from traffic and noise. These issues have been addressed in **Sections 10 and 7**. The noise impacts in **Section 7** concluded that the project is unlikely to cause disturbance at the nearest residential receiver during prevailing or calm weather conditions. The traffic and transport assessment in **Section 10** concluded that, while the proposed development would result in increased traffic movements along Byrnes Road, and the surrounding road network, peak construction traffic movements would not generally coincide with recorded peak traffic movements along Byrnes Road. Therefore the surrounding road network is not likely to be adversely affected. Furthermore, traffic and noise impacts associated with the construction period would be of a temporary nature. Some potential exists for visual impacts to be experienced

during the construction period, however impacts would be temporary, and are not anticipated to represent a significant constraint.

The creation of employment opportunities would be the primary social benefit of the construction and operation of the proposed IOPP. Some 150 construction personnel would be required during the peak construction period, in areas such as earthmoving, transport, construction, concrete batching and site management. The construction period is estimated to be approximately 60 weeks.

During operation, potential impacts to the social amenity of the area may include noise and traffic. The noise impacts in **Section 7** concluded that the project is unlikely to cause disturbance at the nearest residential receiver. The traffic and transport assessment in **Section 10** concluded that, while the proposed development would result in increased traffic movements along Byrnes Road and the surrounding road network, the existing LOS is not expected to be adversely affected. Approximately 70 full time positions would be generated during operation of the IOPP. Employees would be sourced from the local and regional area where possible, which is considered to be a beneficial impact of the project.

16.4 Economic Impact

16.4.1 Local and regional Economy

The construction and operation of the proposed IOPP is likely to have a beneficial impact on the local and regional economy, primarily as a result of employment generation. This has been discussed in **Section 16.3** above in relation to social impact. Generation of employment would have multiplier effects from income expenditure, as local businesses would benefit from providing goods and services to the IOPP and its employees.

The local and regional economic benefits of the proposed IOPP also align with WWCC's strategy to stimulate and develop economic growth in the City of Wagga Wagga.

The products associated with the IOPP, such as meal and vegetable oil are used locally and regionally in a variety of industries, such as meal for feedlots, and food grade vegetable oils for local distribution. The opportunity for these industries to source products locally will reduce transport costs providing a net economic benefit.

16.5 Social and Economic Conclusion

The proposed IOPP is considered to have beneficial impacts in terms of generation of employment opportunities, which would have both social and economic benefits for the local and regional economy. While there is some potential for temporary impacts to the social environment in respect of, noise, traffic and visual amenity during and post construction, potential impacts would be temporary, and are not considered to significantly affect the community.

17 LAND USE

NB. The following material (chapter 17) was produced by ENSR/AECOM in 2008 when the initial application was made, it has been altered by Lennon Salvestro Planning to reflect the new direction that the project will take and newly introduced legislation.

17.1 Introduction

The proposal comprises the construction and operation of an IOPP on land zoned 1 (Rural) under Wagga Wagga LEP 1991 (LEP 1991). The proposal is defined as a 'rural industry' under LEP 1991, which is a permissible use with consent within the zone. The proposed site is currently used for cropping and the irrigation of wastewater associated with the Wool Combing Facility to the south of the site. Surrounding land use is largely agricultural with some rural industry and scattered rural residential land uses.

The key issues surrounding land use in relation to the proposed development are considered to be:

- The loss of agricultural land resulting from the redevelopment of the site for the construction and operation of the IOPP; and
- The compatibility of the proposed IOPP with existing and future land uses in the surrounding area.

17.2 Existing Environment

The subject site is located within the Wagga Wagga LGA, approximately 460 km south west of Sydney in the Riverina region of NSW. Wagga Wagga LGA includes the City of Wagga Wagga along with a number of rural villages and has a population of approximately 58,000 across an area of 4824 square kilometres. The City of Wagga Wagga is a major regional centre servicing a population catchment of some 132,000.

The subject site is currently used for agricultural purposes. More specifically, the site is used for cropping and the irrigation of wastewater associated with a wool combing operation also owned by the Proponent, located some 750 m to the south of the site. Since the downgrading of operations at the wool combing facility some four years ago, the subject site along with the sedimentation ponds immediately east of the site have become redundant for the purposes of wastewater disposal and the Proponent is now seeking the redevelopment of the site for the purposes of the IOPP.

Land immediately surrounding the subject site is mainly used for irrigated cropping, with the wider area generally rural in character supporting a mix of largely agricultural and rural industrial uses. Rural industrial operations in the surrounding area include significant businesses such as Buckman Laboratories, Southern Oil Refinery and the Riverina Wool Combing Facility. The nearest industrial operations are the Wool Combing Facility and Bomen Industrial Estate, located approximately 750 m and 3 km to the south respectively. The nearest residential property is located some 1.65 km to the west of the site.

Land use in the surrounding area more specifically includes:

- **North** – Agricultural land immediately adjoins the site to the north, currently used for irrigated crops. Further north (some 4 to 5 km) is a residential subdivision, located in Brucedale, which has approximately fifteen (15) small rural residential lots.
- **South** – The Riverina Wool Combing Facility (also owned by the landowner of the site for the proposed development) adjoins the site to the south consisting of a number of large sheds, evaporation and sedimentation ponds and irrigation areas. Further south (some 3 km) is the Bomen Industrial Estate comprising a mix of industrial and rural industrial operators including a recently approved Lead Battery Recycling Facility. Bomen Industrial Estate is the primary industrial area in the LGA supporting a variety of businesses including manufacturing and food processing. This area is subject to rapid growth with many existing businesses planning to expand and new operators expected to

move into the area.

- **East** – Land directly to the east of the site accommodates a number of large sedimentation ponds associated with the Wool Combing Facility.
- **West** – Harry Transport Infrastructure is located to the west of the site along with the Main Southern Railway and Byrnes Road. Scattered rural residential properties are located further west towards the Olympic Highway. As stated above, the residential suburb of Brucedale is located some 4 to 5 km to the northwest of the site.

17.3 Potential Impacts

The potential land use impacts of the proposed development are centred around the loss of agricultural land and the compatibility of the proposed IOPP with existing and future land use both in a strategic planning sense and in terms of more direct impacts upon amenity.

17.3.1 Loss of Agricultural Land

The proposed development will result in the use of land currently zoned for agricultural purposes for a non-agricultural use through the redevelopment of the site for the purposes of the IOPP.

The objectives of the 1 Rural zone (within which the site is located) include:

- (a) *protecting, enhancing and conserving –*
 - (i) *agricultural land in a manner which sustains its efficient and effective agricultural production potential;*
- (b) *preventing the unjustified development of prime crop and pasture land for purposes other than agriculture;*
- (c) *providing land for future urban development, for future rural residential development and for future development for other non-agricultural purposes in accordance with the need for that development;*
- (d) *encouraging the establishment of rural industries within the area to which the plan applies.*

As mentioned above, the subject site was previously used for some cropping and wastewater irrigation associated with the nearby wool combing facility. The site is not therefore used primarily for agriculture, but rather for ancillary uses associated with an established rural industry. Further, the rural capability of the East Bomen soil landscape group typically exhibit slight to moderate limitations (associated with crests and major drainage depressions) for cultivation associated with sheet erosion and soil structure decline, which may restrict the productive potential of the land (Chen et al, 1997). As such, the site is not considered to be prime agricultural land of the sort, which would require protection in accordance with the objectives of the zone.

The proposed IOPP will utilise a significant amount of locally and regionally produced canola and safflower and will result in the creation of some 79 local jobs, with subsequent economic and social benefits for the local community.

Under the provisions of the Draft Wagga Wagga Local Environmental Plan 2008 the subject site is zoned IN1 – General Industrial (refer to **Figure 4.1**), the objectives of the zone are as follows:

- *To provide a wide range of industrial and warehouse land uses.*
- *To encourage employment opportunities.*
- *To minimise any adverse effect of industry on other land uses.*

In response to the objectives of the zone the IOPP will provide a new industrial use, which doesn't currently exist within the city. It will provide up to 150 employment opportunities during the construction phase with ongoing employment opportunities for 70 staff once the plant is operational. The proposal is appropriately placed within the Bomen Industrial Area, which has been set aside by WWCC for industrial purposes, thereby minimising the any potential impact on other land uses.

While all industry is encouraged the Bomen area is expected to attract large lot industrial developments. Major buildings will be set in what is effectively a rural landscape.

Further, Wagga Wagga City Council, in its brief for the preparation of an Industrial Lands Strategy for the LGA (Wagga Wagga Council, 2005), acknowledges that the existing land bank within the LGA for 'multi- hectare' industrial sites is not generally compatible with industry due to the undulating landform. Therefore, it is unlikely that the Proponent could find a suitable site elsewhere in the LGA already zoned for industrial use. In consideration of the value of the proposed development in terms of supporting and growing local industry and providing for employment generation to strengthen the local and regional economy, the use of the site for purposes other than agriculture is in this case considered to be justified.

Additionally the Bomen Masterplan was prepared by Wagga Wagga City Council in 2009, which has established a number of precincts in the Bomen Area to be used for a variety of industrial purposes. The site chosen by ROBE as the location for it's plant is designated as part industrial and part rail dependent land, as shown in **figure 4.2**.

17.3.2 Compatibility of Proposed Development with Existing and Future Land Use

Section 17.3.1 discusses existing land use in the general area, which is dominated, by agricultural and rural industrial land uses. The proposed IOPP would integrate well with these land uses and complement the future planned expansion of industrial and rural industrial operations within the nearby Bomen Industrial Estate.

As stated in Section 14.6.5 of the DCP, the proposed development is located within the WISDOM study Bomen Industrial Candidate Area. The intention is to progressively introduce development controls over the subject area to ensure sustainable industrial activity. The Draft Bomen Masterplan takes this a step further by designating areas for industrial development within the Bomen Business Park.

The existing provision is aimed at ensuring new development will not have an adverse environmental effect or create conflict between land uses in the locality. The proposed IOPP is consistent with the vision for sustainable industrial activity.

The proposed development does not directly contribute towards the general or specific objectives of the Special Uses zone; however, Section 18.6 of the DCP provides special provisions for Bomen Industrial Estate, Cartwrights Hill Residential Area and Bomen Industrial Candidate Area within which the site lies. The aim of these special provisions is to ensure that new development in the area does not have an adverse environmental effect or create a conflict between residents and industries locating in this area.

A detailed environmental assessment of the proposal has been carried out and forms the subject of this report. Based upon the results of specialist studies undertaken, significant environmental impacts are not expected as a result of the proposed development. With regard to key amenity issues such as noise, traffic, air quality and visual impact, the proposed development will not have a significant adverse impact upon residents in the surrounding area and is therefore unlikely to result in landuse conflict.

The nearest residential development to the site is some 1.65 km to the west, with other scattered rural residential properties located to the north-west and south-east. The significant distance to these more sensitive receivers minimises the potential for adverse impacts upon amenity as a result of the proposed development. The impacts of the proposal upon surrounding residences in terms of noise, traffic and visual have been assessed as part of this EA and are discussed in detail in **Sections 7, 10 and 13**. The key conclusions of these assessments were:

- Results indicate that for operation of the facility, with proper management and mitigation of plant and equipment to be used on the site, compliance with the noise criteria set in accordance with the INP, is likely. Noise from construction of the biodiesel plant is unlikely to cause disturbance at the nearest affected residential receiver.
- The proposed development would result in increased traffic movements both during construction and operation of the IOPP. An intersection upgrade at Byrnes Road and

Trahairst Road would be undertaken as well as an upgrade of Trahairst Road to provide access to the site. Provided that these mitigating works are undertaken the proposed development is not anticipated to result in a significant impact to the surrounding road network.

- The proposed IOPP will result in a number of significant buildings and structures being placed on a largely cleared site. This group of buildings and structures which will be visible from certain surrounding areas. Existing views to the site from residential receptors are however partially obscured and the prominence of existing industrial and rural industrial development in the existing visual landscape further reduces the potential visual impact of the proposal on identified receptors. Mitigation measures have been built into the project during the design phase, such as site selection (distance from receptors) and plant design and layout. Further mitigation measures such as landscaping and vegetative screening will be implemented to ensure that the proposed plant does not detract significantly from the visual amenity of the area.

Based upon the conclusions of detailed assessments with regard to the key amenity issues, the potential impacts of the proposed development upon surrounding residential receivers are considered to be minimal. Further, in consideration of existing and proposed land use zoning and outcomes of discussions with Wagga Wagga City Council, the proposed IOPP is considered to be generally in line with future land use planning in the local area.

17.4 Mitigation Measures

The subject site has been carefully chosen based upon a combination of attributes, which makes it particularly suitable for the proposed development, maximising benefits to the local community whilst minimising impacts upon surrounding land uses. Site selection criteria included:

- Proximity to a major regional centre – Wagga Wagga, NSW;
- Proximity to major transport routes and access to designated B-Double routes;
- Proximity to suppliers of raw materials – canola and safflower;
- Proximity to areas in which demand for the product is high – the agricultural industry;
- Buffer distance to potential residential receivers – 1.65 km to nearest residential receiver;
- Availability of land for wastewater irrigation – adjacent available pastoral land;
- Availability of existing and planned future supply of utilities such as electricity and water; and
- Proximity to compatible rural industrial land uses such as Bomen Industrial Estate.

The careful selection of the site based upon the above criteria inherently reduces the impact of the proposal upon surrounding land uses. In relation to the potential amenity impacts of the proposal, these issues are covered elsewhere in this EA therefore there are no safeguards proposed to manage these impacts in terms of land use. A suite of specific mitigation measures will be implemented to ensure that the noise, visual and traffic impacts of the proposal are minimised. Further details on these mitigation measures are provided in **Section 19** of this EA.

17.5 Land Use Conclusions

The proposal will not result in the loss of prime agricultural land and stands to provide substantial benefits in economic and social terms for the local and wider regional community. The proposed redevelopment of the site for the purposes of the IOPP is considered to be generally consistent with the objectives of the Rural 1 zone, as well as the relevant objectives and guidelines of DCP 2005. The potential economic and social benefits of the proposed development are considered to outweigh the relatively minor negative impacts of the proposal in terms of amenity and the loss of land currently zoned for agricultural purposes.

18 CONSULTATION

In response to proposed changes to the process and plant revised Director-General's Requirements were issued. Project Application 07_0146 – MOD 1 requirements were received dated 28 October 2009.

18.1 NSW Formal Procedures

This EA has been prepared in accordance with Part 3A of the EP&A Act and its Regulation. Part 3A of the EP&A Act ensures that the potential environmental effects of a proposal are properly assessed and considered in the decision making process.

In preparing this EA, the Director-General's EARs have been addressed as required by Clause 75F of the EP&A Act. The key matters raised by the Director-General for consideration in the EA are outlined in **Table 56** below, together with the relevant section of the EA, which addresses that matter. A full copy of the revised Director-General's EARs for the project is provided in **Appendix A**.

Table 56: Director-General's Environmental Assessment Requirements (Project Application)

Key Matters	Reference in EA
Air Quality	
- A comprehensive air quality assessment focusing on odour, particulate emissions, vapour (including volatile compounds) and other emissions from the plans; and - Potential impacts on private properties	Section 6 Appendix D
Noise and vibration	
- Construction, operation and traffic noise, and - Potential impacts on private properties	Section 7 Appendix E
Soils and Water	
- A water balance for the site detailing water sources, water consumption, water recycling, the quantity and quality of waste water streams; - The impact of any water and wastewater release or irrigation from the site on surface and groundwater; - Demonstrate that wastewater reuse and storage is sustainable in relation to hydraulic, nutrient, salt, organic loadings, soil structure and wastewater irrigation; - Details of monitoring and mitigation measures to minimise impacts on surface and groundwater; - Soil contamination; - Details of any potential issues with surrounding landholders and water licence holders; and - Proposed erosion and sediment controls (during construction) and the proposed stormwater management system (during operations).	Sections 8 & 9 Appendix F, G and H
Hazards and Risk	
Including a Preliminary Hazard Analysis (PHA) in accordance with <i>Hazardous Industry Planning Advisory Paper No. 6 – Guidelines for Hazard Analysis and Multi-Level Risk Assessment</i> and details of fire/emergency measures and procedures	Section 11 Appendix C
Waste Management	
Including the quantity and classification of all liquid and solid waste to be generated at the site and how this waste would be handled, processed and if necessary, disposed of. Details of the measures to retain and/or dispose/remove material from the site and details of contingencies should these option(s) become unavailable must be provided	Section 12
Visual	
Including lighting impacts	Section 13
Consultation	
During the preparation of the Environmental Assessment, you should consult with the relevant local, State or Commonwealth government authorities, service providers, community groups or	Section 18.2

Key Matters	Reference in EA
affected landowners. The consultation process and issues raised must be described in the Environmental Assessment. In particular you should consult with: • Department of Environment, Climate Change and Water; • NSW Roads and Traffic Authority; • NSW Rural Fire Service; and • Wagga Wagga City Council.	

Additional information as outlined in the original EARs (Project Application 07_1046) has been included in the EA for completion.

18.2 Consultation with Stakeholders and Other Relevant Authorities

The proponent has undertaken consultation with key local and state Government agencies as specified in the EARs during the preliminary design phase and preparation of this EA. The purpose of this consultation has been to provide an overview of the project and to seek input into matters they would like to see addressed in the EA.

Table 57 outlines the responses from agencies during the consultation process, this table consists of the information obtained during the preparation of the original assessment under Project Application 07_1046. These agency responses remain unchanged as a result of the proposed changes to the IOPP. New responses were received from DECCW and NSW RFS, which suggested that this was the case. The Response from the Bomen Action Group is affected by the changes to the plant layout and a fresh Visual Assessment was conducted (**Section 13**) which gives consideration to the issues raised by this group. The proponent commits to minimise the visual impact to each resident. A list of the residents that are visually affected by the proposed IOPP is included as **Appendix K**.

Table 57: Agency Responses

Agency	Matters for Consideration	Reference in EA
DECCW (includes comments from the former DECC and DWE)	Flora and Fauna • Assess impacts on critical habitats (including riparian habitat and groundwater dependent ecosystems), threatened species, populations, ecological communities and native vegetation. Heritage • Undertake an assessment of impacts to Aboriginal heritage. Odour • Undertake an assessment of impacts associated with odour, particulate emissions, vapour (including volatile compounds) and other emissions from the plant. Soils, Groundwater, Geology and Wastewater: • Review available groundwater information; • Assess the geology in the immediate vicinity of the dams; • Review water quality information against irrigation and ANZECC guidelines; • Collate standing water level data (AHD); • Determine groundwater flow directions; Perform a trend analysis on the water level data; • Prepare hydrographs;	Section 15 Appendix J Section 14 Appendix I Section 6 Appendix D Sections 8, 9 & 12 Appendix F, G & H

Agency	Matters for Consideration	Reference in EA
	• Prepare contour maps if there is enough water level information; • Undertake a comparison of the groundwater quality background level to the area in the vicinity of the ponds. This would include geology of the area surrounding the site; • Confirm the presence / absence of groundwater mound and identification of source(s) if present; and • Also, if there are any issues, mitigation measures and proposed monitoring program should also be included.	
NSW RTA	Traffic and Transport: • The proposed access arrangement associated with the proposed development; • The daily and peak movements likely to be generated by the proposed development; • Trip distribution to / from the proposed development; • Any intersection treatments that will be required on Byrnes Road. In this regard, reference should be made to <i>Austroads - Intersections at Grade</i>; and • The swept path plan of the longest vehicle entering and exiting the subject site shall be submitted and the plan is to demonstrate that the swept path is in accordance with Austroads.	Section 10
WWCC	Visual • Visual impacts from Brucedale. Land Use • Land use impacts for the area. Traffic • Impacts to traffic on Byrnes Road.	Section 13 Section 17 Section 10
NSW RFS	Hazard and Risk • Assess the Hazard and Risk associated with fire at the IOPP.	Section 11 Appendix C
Riverina Water County Council	• No assessment is required. Assessment related to access to water is to be undertaken through a separate process.	N/A
DPI	• Have reviewed the EASR and have no particular assessment requirements for the EA.	N/A
Bomen Action Group	Visual • Lighting should be designed to maximise efficiency and to minimise impacts to visual amenity of nearby residential receivers and motorists along Byrnes Road. • A draft copy of the original EA was provided to the Bomen Action Group for comments to be provided.	N/A

The Aboriginal Heritage Assessment undertaken as part of this EA also involved consultation with the Wagga Wagga Local Aboriginal Land Council (LALC). Results of this consultation are summarised in the Aboriginal Cultural Heritage Assessment discussed in **Section 14** of this EA and included as **Appendix I**.

19 STATEMENT OF COMMITMENTS

19.1 Introduction

In accordance with the EA requirements under Part 3A of the EP&A Act, the following Statement of Commitments (SoC) is provided. The SoC sets out ROBE's environmental commitments and details on the environmental management and monitoring of the proposed project during its construction and operational activities.

19.2 Statement of Commitments

The SoC prepared in respect of the proposed construction and operation of the IOPP has been compiled on an issues basis and is informed by the environmental risk analysis and impact assessment undertaken as part of this EA. The SoC has been written in a format, which can be incorporated into project approval issued to act as the conditions of that approval.

Table 58: Statement of Commitments

Issue	Commitment
General	The proponent shall prepare and implement the following management plans for the project: • A Construction Environmental Management Plan (CEMP) and Operational Environmental Management Plan, which incorporate an Erosion and Sediment Control Plan; • Preparation of a detailed Effluent Irrigation Management Plan (EIMP); • A Traffic Management Plan (TMP) shall be prepared prior to site establishment and construction. The TMP shall incorporate a Transport Code of Conduct, which would outline and manage the transportation routes to the site for heavy vehicles and B-doubles. The TMP would also include: ○ Heavy vehicle access to the site; ○ Deliveries and dispatch of products; ○ Heavy vehicle parking; ○ Internal speed limits; and ○ Use of truck turnaround areas. • Landscape Management Plan detailing requirements for roadside landscaping and planting to minimise distant views and enhance near views from Byrnes Road and Trahairs Roads, including monitoring and maintenance of landscaping; • An Energy Savings Action Plan in accordance with the requirements of DECCW and the <i>Guidelines for Energy Savings Action Plans</i> (DEUS 2005). The Energy Savings Action Plan would include details of greenhouse gas abatement measures and energy efficiency measures for the operation of the proposed IOPP; • A Procurement Plan for palm oil shall be implemented prior to commencement of operation which must: ○ Identify environmentally and socially responsible feedstock materials; ○ Include procedures for the sourcing of such feedstock; ○ Include evidence of legal sourcing of feedstock; and

Issue	Commitment
	Contain procedures for regular review of suppliers.
Odour and Air Quality	The proponent shall ensure the design and operation of the IOPP minimises the potential release of fugitive odour emissions
	The proponent shall take all practicable measures to ensure that air emissions during the construction and operation of the project are within relevant air quality and odour criteria and guidelines
	The proponent shall ensure that the CEMP includes an Erosion and Sediment Control Plan to minimise dust generation from the site
	The proponent shall prepare and implement an Energy Savings Action Plan for the project, which would be prepared in accordance with the requirements of DECCW and the <i>Guidelines for Energy Savings Action Plans</i> (DEUS 2005) in order to maximise energy efficiency associated with the IOPP. The Energy Savings Action Plan would include details of greenhouse gas abatement measures and energy efficiency measures for the operation of the proposed IOPP.
Hazard and Risk	The proponent shall develop a plant operating procedure documenting procedures for the shut down of operations and removal of flammable liquids in the event that nitrogen generation equipment at the plant fails
	The proponent shall ensure that corrosive materials spill kits are installed throughout areas of the IOPP where corrosive materials are stored, handled and used at the site
	The proponent shall engage an appropriately qualified consultant to undertake a fire safety study to determine locations at the site where fire water cooling would be required to minimise the potential for a fire incident, and implement recommendations of the report
	The proponent shall ensure that fire hoses on the site are fitted with a foam generation attachment at each plant area where flammable and combustible liquids are stored and handled. A storage of at least 20 L of foam concentrate shall be maintained at locations where a foam generating attachment is held
	The proponent shall implement all practicable measures to contain firewater on the site and ensure that the water management system maintains a minimum freeboard capacity of 162 m3. The first flush retention pond shall contain all stormwater from plant areas, roadways and open yard areas
Surface Water Quality	The proponent shall implement all practicable measures to minimise soil erosion and discharge of sediments from the site. The Erosion and Sediment Control Plan prepared as part of the CEMP shall ensure: - Sediment and erosion control measures, such as sediment fences, are installed and maintained, with particular attention where the drainage is towards a surface water body; - Stockpiles are stabilised and remain covered and appropriate sediment and erosion control measures are installed down slope of all stockpiles; and - Spill kits are made available to construction vehicles so that accidental leaks and spills can be controlled.
	Areas containing storage tanks shall be fully bunded to contain accidental spills
Soil Suitability	The proponent shall commit to irrigate to suitable land, in accordance with the Soil suitability report and Soil and Water management Plan (Appendix F & G) undertaken for this EA and detailed in the EIMP
Groundwater	A Groundwater Monitoring Plan (GMP) will be developed and

Issue	Commitment
	implemented prior to the operation of the proposed development. The GMP will include: • Recommendations for the installation of additional monitoring wells including construction details; • Development of a groundwater monitoring schedule including sampling methodology and timetable; and • Preparation of a consolidated Groundwater Management Plan to be implemented during operation of the proposed development.
Waste Management	The proponent shall implement all practicable measures to minimise the generation of waste from the proposed IOPP
	Wastes requiring removal from the site shall be collected and disposed of by an appropriately licensed waste contractor
	Wastewater to be reused following treatment shall be stored in the 40 ML effluent storage dam, which shall be refurbished to the requirements of DECCW. This would include constructing the dam with a PVC liner.
	Effluent irrigation shall be appropriately managed in accordance with the EIMP
	Effluent irrigation activities shall be only undertaken on soils considered suitable for that purpose, as identified in the Soil Suitability Report and Soil and Water Management Plan (Appendix F & G) and detailed in the EIMP
	Monitoring of wastewater and soil within the irrigation area shall be undertaken in accordance with DECCW requirements, as outlined in the Soil and Water Management Plan (Appendix G)
Traffic and Transport	The proponent shall ensure that construction and operational traffic is managed in accordance with the TMP
	The proponent shall consult with the relevant traffic authority to obtain a s138 permit under the Roads Act 1993 to undertake an upgrade of the intersection at Byrnes Road and Trahairs Road, and to widen and seal Trahairs Road in accordance with relevant standards and guidelines
Visual	The proponent shall prepare a Landscape Management Plan, which would consider local endemic species and accommodate future land uses and receptors in the area
	The proponent shall ensure that landscaping is undertaken in accordance with the Landscape Management Plan
	Exterior lighting would be designed to minimise light spill, and would be generally in accordance with Australian Standard 4282-1997 Control of the Obtrusive Effects of Outdoor Lighting, notwithstanding functional and safety requirements
Noise	Regular noise monitoring, including attended monitoring, will be undertaken during operations at surrounding receivers to determine noise levels generated by the project. If exceedances are detected during monitoring, amelioration measures will be investigated by ROBE to ensure that noise criteria are met
Heritage	The proponent shall ensure that in the event that Aboriginal objects are identified during works on site, works in the vicinity of the find would cease and the IOPP Environmental Representative would notify a heritage professional to obtain advice on how to proceed. Works would not recommence until heritage requirements identified through this process have been met

Issue	Commitment
	Should suspected skeletal material be uncovered during the course of any site works or through subsidence landscape modification, all works must cease and the DECCW, the NSW Police and the NSW Coroners office contacted immediately, regardless of any existing environmental approvals Contractors shall be made aware of the above recommendations, and advised of their responsibilities in relation to the protection of Aboriginal objects and sites under state legislation
Flora and Fauna	The proponent shall ensure that all practicable measures are implemented to minimise the potential impacts on flora and fauna, including: • Felled trees shall remain in situ for at least 24 hours to allow fauna species to relocate; • Qualified personnel shall be on hand to check trees hollows for wildlife and assist with relocation, if required; and • Should wildlife be inadvertently injured, an accredited veterinarian (and through them possibly a wildlife care group) shall be contacted. The proponent shall undertake weed monitoring during construction and operation to control weed infestations and apply appropriate control measures, if required. Measures to control Patterson's Curse shall be implemented in accordance with the Class 4 Noxious Weed Control Management Plan 2006 – 2011 The Landscape Management Plan shall incorporate species endemic to the area The proponent shall monitor the effluent irrigation area in accordance with the EIMP to ensure the irrigation works do not alter the existing soil and groundwater conditions at the site, thus ensuring the remaining native trees and soil structure are not affected by the irrigation works

20 PROJECT JUSTIFICATION

20.1 Justification

Schedule 2 of the EP&A Regulation and the Director General's EARs issued for this project require justification for the project to be provided, having regard to biophysical, economic and social considerations together with the principles of Ecologically Sustainable Development (ESD). The assessment of the proposal undertaken in this EA has incorporated biophysical, economic and social considerations, which are discussed below.

20.2 Biophysical

Potential biophysical impacts of the proposal assessed in this EA include:

- Water quality (**Chapter 9**);
- Geology and soils (**Chapter 8**);
- Waste management (effluent irrigation) (**Chapter 12 and 8**);
- Air quality (**Chapter 6**);
- Noise (**Chapter 7**) and
- Ecology (**Chapter 15**).

Water quality impacts resulting from the proposed development were assessed in respect of potential impacts to surface and groundwater quality. This EA concluded that the proposal would not result in significant impacts to water quality, following the implementation of environmental safeguards and mitigation measures.

A Soil Suitability Assessment and Irrigation Assessment was undertaken, they shown in the Soil Suitability Report, (**Appendix F**) to assess potential impacts on the soil landscape and underlying geology as a result of irrigation of treated wastewater on the effluent irrigation area. While limitations were identified at some sample locations, all other reported results, including those within the proposed effluent irrigation area, indicated the soils at the locations analysed presented nil to slight or moderate limitations for effluent irrigation.

Potential impacts to air quality were assessed in terms of potential odour, dust, VOCs and greenhouse gas emissions from the site. The odour impact assessment indicated that at the closest receptors to the site the odour concentration is below the odour performance goal. Potential dust impacts are not anticipated to be significant with the implementation of appropriate safeguards, and VOC emissions are considered to be minimal and unlikely to result in potential impacts.

The greenhouse gas assessment identified that during both the construction and operation phases of the IOPP the GHG emissions would be minimal. Concentrations are considered insignificant when compared to the performance of the transport sector as a whole.

Preliminary noise predictions were carried out based on noise levels of proposed plant and equipment supplied by the proponent using a simple single point noise model. Adjustments to the equipment noise levels were assumed to reflect for the proposed degree of enclosure of the noise sources. Worst case noise enhancing weather conditions were assumed and results indicated that during the construction and operation phases of the IOPP the predicted noise would not exceed the goals set for the project.

The assessment of potential impacts on the biophysical elements of the environment resulting from the proposed development has concluded that, provided recommended environmental safeguards and mitigation measures are implemented, the proposed development is unlikely to have a significant impact on the biophysical environment.

The project is therefore justifiable in terms of the biophysical elements of the environment

20.3 Economic

The economic impacts of the proposed development are considered be beneficial to both the local and regional economy, largely related to the generation of local employment opportunities. Potential limitations which may impact the economic viability of the proposed IOPP are primarily associated with the availability and price of oilseed, in particular canola.

The domestic production of meal generated during the oilseed crushing process and edible vegetable oil, which are largely imported, may result in reductions in dependence on imported meal and vegetable oil. Furthermore, domestic production will also strengthen rural and agricultural economies.

Given these benefits, the proposed development is justifiable on economic grounds.

20.4 Social

Potential social impacts of the proposal have been assessed in **Chapter 16** of this EA and include consideration of the following issues:

- Traffic and transport (**Chapter 10**);
- Noise (**Chapter 7**);
- Visual (**Chapter 13**); and
- Economic (**Chapter 16**)

Other social and cultural and issues assessed as part of the project include impacts on land use, heritage and hazard and risk.

A number of these issues are associated with impacts to the amenity of the surrounding area as a result of the proposed project. In respect of traffic and transport, noise and visual impacts, each of the respective sections addressing these issues concluded that provided mitigation measures were implemented, the project would not result in significant impacts. Economic impacts of the proposal are anticipated to be beneficial in terms of generation of employment opportunities, as discussed in **Section 20.3** above.

In respect of hazards and risk, a PHA was undertaken to determine the level of risk posed by the proposed IOPP. The PHA concluded that the development did not pose an unacceptable risk to the surrounding environment.

The proposal is therefore not considered to have significant adverse impacts with respect to the social impacts of the community. The project is therefore justifiable on social grounds.

20.5 Ecologically Sustainable Development

The term ESD was introduced by the Commonwealth Government in June 1990, defined 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. (ref: Ecologically Sustainable Development: A Commonwealth Discussion Paper)

ESD Working Groups were subsequently established and involved representatives of government, industry, environment, union, welfare and consumer groups. The ESD Working Groups developed a series of policy directions and recommendations, which provided the foundation for development of the *National Strategy for Ecologically Sustainable Development*.

The *National Strategy for Ecologically Sustainable Development* was endorsed by the Council of Australian Governments in December 1992. In addition, the *Intergovernmental Agreement on the Environment* (IGAE) was signed in 1992 by Federal and State Governments, Territories and the Australian Local Government Association, promoting intergovernmental cooperation.

ESD is a concept now firmly entrenched in NSW environmental legislation and government policy. The concept of ESD has been given legal definition in NSW by the *Protection of the*

Environment Administration Act 1991 (NSW). Section 6(1)(a) of that Act requires the NSW DEC (formerly EPA) which was established by the Act, in its role in protecting, restoring and enhancing the quality of the environment in NSW, to have regard to the need to maintain ESD requiring the effective integration of economic and environmental considerations in decision making processes.

Schedule 2 of the EP&A Regulation clearly establishes four guiding principles to assist in achieving ESD, as follows:

- **The precautionary principle** – namely, that if 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.
- **Inter-generational equity** – namely, that the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations.
- **Conservation of biological diversity and ecological integrity** – namely, that conservation of biological diversity and ecological integrity should be a fundamental consideration.
- **Improved valuation and pricing of environmental resources** – namely, that environmental factors should be included in the valuation of assets and services, such as polluter pays, full life cycle costing, and utilising incentive structures/market mechanisms to meet environmental goals.

The EPBC Act also identifies a fifth principle for consideration in environmental impact, namely:

Decision making processes should effectively integrate both long term and short term economic, environmental, social and equitable considerations.

These five principles are interrelated and need to be considered both individually and collectively as part of determining whether or not a project would be consistent with the principles of ESD in Australia.

20.5.1 Precautionary Principle

This EA has considered the proposed development in terms of potential impacts to the environment, and in particular, the extent to which potential impacts pose a significant risk to the environment. Specialist impact assessments have been undertaken in areas where potential impacts were uncertain or unable to be quantified otherwise.

The design of plant and equipment associated with the IOPP would optimise destruction of potential contaminants to soil, water and atmosphere. Environmental safeguards and mitigation measures recommended in this EA have been developed in accordance with current and accepted best management practice to achieve a neutral or beneficial effect on the environment.

20.5.2 Intergenerational Equity

The principle of 'intergenerational equity' requires that decisions made by the present generation would not result in a degradation of the environment for future generations.

The proposed development would require the consumption of fossil fuels for the construction and operation of the IOPP, with subsequent implications in terms of greenhouse gases and climate change impacts. These are further discussed in **Section 20.6**. Other potential impacts which have the capacity to potentially affect the health, diversity or productivity of the environment have been assessed as part of this EA. Environmental safeguards identified for specific issues, and the Statement of Commitments in **Chapter 19** of this EA form a fundamental part of the project to ensure that the environment is maintained or improved from its current state.

20.5.3 Biological Diversity and Ecological Integrity

The principle of 'biological diversity and ecological integrity' requires a full and diverse range of plant and animal species to be maintained and conserved.

Consideration of the impacts of the proposed project on ecology has been undertaken as part of development of the project through environmental investigations. An ecological assessment was undertaken as part of the EA (**Appendix I**), which concluded that the proposed project would not significantly impact upon any threatened species or ecological communities.

The ecological assessment found that there to be very limited potential for the proposed works to have a significant impact on threatened ecological communities, important fauna habitats or movement corridors or potentially present threatened flora or fauna species or populations. In order to maintain biological diversity and ecological integrity on surrounding areas, the assessment recommended that weed control and effluent irrigation management are key management priorities for the perpetual management of the site.

The oilseed used during production in the IOPP would be sourced from existing agricultural land, therefore biological diversity and ecological integrity are not likely to be impacted by the supply of oilseed.

20.5.4 Valuation and Pricing of Environmental Resources

The IGAE and POEO Act require improved valuation, pricing and incentive mechanisms to be included in policy making and program implementation. In the context of environmental assessment and management, this would translate to environmental factors being considered in the valuation of assets and services.

Integration of environmental and economic goals is a key principle of ESD, which can be measured undertaking a cost-benefit analysis, that is, by measuring the costs of proceeding with a project against the benefits arising from the project.

Given the different values placed on the environment, and the various components of an environment, it is difficult to assign a monetary value against the environmental costs and benefits associated with the project. Given this, the approach adopted for this project is the management of environmental impacts through appropriate safeguards, and to include the cost of implementing recommended safeguards, including the cost associated with providing compensatory habitat on site, in the total cost of the project.

Relevant to the consideration of the valuation and pricing of environmental resources are the impact assessment and alternative options, which have been developed during planning of the proposed project.

The value of the environment is also managed through the legislative process by imposing financial penalties or requirements to rehabilitate on persons responsible for polluting the environment.

ROBE would implement the safeguards and monitoring requirements outlined in this EA to minimise environmental impacts caused by the proposed project, and to minimise the potential for pollution to occur.

20.5.5 Decision Making Process

The proposed project requires approval under Part 3A of the EP&A Act 1979. In addition, an Environment Protection Licence would be required under the POEO Act, as described in **Chapter 4** of this EA.

An assessment of the short, medium and long term impacts of the proposed project, taking into account the principles of ESD is described in this EA. The Statement of Commitments, provided in **Chapter 19**, forms the environmental mitigation, management and monitoring requirements for the project and its proposed operations.

The project approval process prescribed under Part 3A of the EP&A Act and subsequent environmental management frameworks ensure that decision making and monitoring of the project would be undertaken in an integrated manner, having regard to relevant issues associated with the project within its context.

20.6 Climate Change and Greenhouse Effect

The Greenhouse Effect involves certain gases, known as greenhouse gases, capturing heat radiated from the earth and re-radiating heat back to the earth. The thermal balance that is known to control earth's climate is maintained by this mechanism, and is influenced by the steadily increasing concentrations of certain greenhouse gases such as CO₂, with other greenhouse gases including methane, ozone (O₃), NO_x and Chloro-Fluorocarbons (CFCs).

A greenhouse gas assessment was undertaken for the proposed development and is provided in **Chapter 6**. The assessment concluded that proposal would not contribute significantly to GHG emissions. While the proposed facility would result in the generation of greenhouse gas emissions, the emissions is significantly lower than those produced by the transport sector as a whole.

20.7 Consequences of Not Proceeding

The proposed construction and operation of the IOPP has significant benefits associated with capital investment in the Wagga Wagga local government area, which would result in significant benefit in terms of local and regional employment opportunities. Economic benefits are also associated with the domestic production of an alternative fuel source, as well as environmental benefits associated with the use of biodiesel as a replacement for fossil fuels. Should the project not proceed, these benefits would not be able to be realised.

20.8 Conclusion

The proposal involves the construction and operation of an IOPP, for the production of Edible vegetable oil and vegetable protein meal, which would be sold in the domestic market as a replacement for currently imported products.

Potential impacts associated with the proposal have been discussed throughout this EA, and where potential impacts have been identified, mitigation measures and environmental safeguards have been recommended to minimise these impacts. In all cases assessed in this EA, potential impacts are considered to be acceptable provided appropriate mitigation measures are implemented.

As discussed in **Sections 20.2, 20.3 and 20.4** above, the proposal is considered justifiable on biophysical, economic and social grounds, and is considered to be consistent with the principles of ESD.

21 REFERENCES

- Australian Oilseeds Federation (2010) *Australia's Oils – Nature's Finest*. http://www.australianoilseeds.com/australian_oils_natures_finest.
- AUSTROADS. 1998. *Guide to Traffic Engineering Practice – Part 2: Roadway Capacity*. AUSTROADS, Sydney.
- AUSTROADS. 2003. *Rural Road Design: A Guide to the Geometric Design of Rural Roads*. AUSTROADS, Sydney.
- AUSTROADS. 2005. *Guide to Traffic Engineering Practice – Part5: Intersections at Grade*. AUSTROADS, Sydney.
- Chen, X.Y. and Mckane, D.J. (1997). *Soil Landscapes of the Wagga Wagga 1:100 000 Sheet Report*. Department of Land and Water Conservation Sydney.
- Commonwealth of Australia. 2004. *Energy White Paper: Securing Australia's Energy Future*. Commonwealth of Australia, Canberra.
- Commonwealth of Australia. 2006. *Appropriateness of the 350 Million Litre Biofuels Target*. Commonwealth of Australia, Canberra.
- Dennis E Toohey and Associates. 2003. *Pre Feasibility Study into Biodiesel Opportunity*. Unpublished report for the Pratt Water Murrumbidgee Valley Water Efficiency Feasibility Project.
- DEC, 2004. *Environmental Guidelines: Use of Effluent by Irrigation*. Department of Environment and Conservation, Sydney.
- DEC, 2005. *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales*. Department of Environment and Conservation, Sydney.
- DEC, 2005. *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales*, New South Wales Department of Environment and Conservation, Sydney, Australia.
- DEH, 2006. *AGO Factors and Methods Workbook*. Australian Greenhouse Office, Department of Environment and Heritage, Commonwealth of Australia, Canberra.
- Department of Primary Industries (NSW). 2005. *Weed Definitions and FAQs*, Available from: <http://www.dpi.nsw.gov.au/agriculture/pests-weeds/weeds/definition#noxious> (Accessed 12.11.07).
- Department of Primary Industries (NSW). 2007. *Areas of NSW Suffering Drought Conditions as at October 2007*, Available from <http://www.agric.nsw.gov.au/reader/drt-area-200710-large.gif> (Accessed 12.11.07).
- Department of Primary Industries (NSW). 2007a. *Water contingency planning for the Murray and Murrumbidgee valleys – frequently asked questions*. Department of Primary Industries.
- DUAP, 1997a. *Multi Level Risk Assessment*. Department of Urban Affairs and Planning, Sydney. DUAP, 1997b. *Hazardous Industry Planning Advisory Paper No.6 Guidelines for Hazard Analysis*.
- Department of Urban Affairs and Planning, Sydney. DUAP, 1997c. *Hazardous Industry Planning Advisory paper No.4 Risk Criteria for Land Use Safety Planning*. Department of Urban Affairs and Planning, Sydney.
- ENSR Australia Pty Ltd (HLA ENSR) (March 2008) *Environmental Assessment – Integrated Oilseed Processing and Biodiesel Plant. Volume 1 - Environmental Assessment & Volume 2 – Appendices*.

ENSR Australia Pty Ltd (HLA ENSR) (December 2007). Qualitative Air Quality Impact Assessment Pinkenba / Eagle Farm Neighbourhood Plan.

Environment Protection Authority (EPA) (NSW). 1995. *Murrumbidgee River Catchment in State of the Environment 1995*. Environment Protection Authority, Sydney.

EPA (NSW). 1999. *Environmental Criteria for Road Traffic Noise*. EPA, Sydney. EPA (NSW). 2000. *NSW Industrial Noise Policy*. EPA, Sydney.

Holtzapffel R., Johnson H. and Mewett O., 2007, *GM oilseed crops and the Australian oilseed industry*, Australian Government Bureau of Rural Sciences, Canberra.

Kellogg Brown and Root Pty Ltd. 2005. *Lead Battery Recycling Facility, Wagga Wagga: Environmental Impact Statement*. Unpublished report for Renewed Metal Technologies Pty Ltd, Sydney.

Kirkegaard, J. A., Gardener, P. A., Angus, J. F. and Koetz, E. 1994. Effect of *Brassica* Break Crops on the Growth and Yield of Wheat. *Aust. J. Agric. Res.* 45: 529-545.

Knights S. E., (2007) *Safflower: potential & world adaptability*. SE Knights Consulting, Horsham.

Murrumbidgee Catchment Management Authority. 2006. *Murrumbidgee Catchment Management Authority*, Available from: <http://www.murrumbidgee.cma.nsw.gov.au/> (Accessed 12.11.07).

National Pollutant Inventory, (February 1999). Emission Estimation Technique Manual for Combustion in Boilers.

OGTR, 2002. The biology and ecology of canola (*Brassica napus*). Office of the Gene Technology Regulator, Department of Health and Ageing, Canberra.

Riverina Regional Development Board n.d. *The Riverina*, Available from: <http://www.rrdb.com.au/home.asp> (Accessed 12.11.07).

Roads and Traffic Authority (RTA) (NSW). 2004. *Traffic Volume Data for South West Region 2003*. RTA, Sydney.

RTA. 2002. *Guide to Traffic Generating Developments*. Roads and Traffic Authority, Sydney.

Robson, M., Fowler, S., Lampkin, N., Leifert, C., Leitch, M., Robinson, D., Watson, C., and Litterick, A. The agronomic and economic potential of break crops for ley/arable rotations in temperate organic agriculture http://www.ncl.ac.uk/tcoa/files/breakcrops_orgagr.pdf

The Odour Unit (TOU), (November 2007). Odour Impact Assessment Study, Riverina Oils and Bioenergy Pty Ltd, Integrated Oilseed Processing and Biodiesel Plant, Wagga Wagga NSW, Draft Report.

Victorian Environmental Protection Authority, (August 2004). The Combustion Database v.2.4. Wagga Wagga City Council. 2005. *Consultant Brief: Preparation of the Wagga Wagga Industrial Lands Strategy*. Wagga Wagga City Council, Wagga Wagga.

Wagga Wagga and Urban Salinity. n.d. Available from http://www.wagga.nsw.gov.au/resources/documents/Community_Problem_Section_2a_Wagga_Salt.pdf (Accessed 12.11.07).

Wagga Wagga Industrial Sustainable Development Opportunities Model (WISDOM). N.d. *WISDOM Study Model*. Wagga Wagga City Council and NSW State and Regional Development.