

**APPLICATION PURSUANT TO SECTION 75W  
OF THE ENVIRONMENTAL PLANNING  
AND ASSESSMENT ACT 1979**

**SHOALHAVEN STARCHES**

**PROPOSED MODIFICATION TO  
ETHANOL DISTILLERY TO INCREASE  
THE PROPORTION OF "BEVERAGE" GRADE  
ETHANOL PRODUCED,  
MODIFICATION TO THE SITING AND TYPE  
OF EVAPORATOR APPROVED UNDER MOD. 2  
AND ASSOCIATED WORKS  
PROJECT APPROVAL MP 06\_0228**

**LOT 1 DP 838753, LOT 241 DP 1130535  
AND LOT 143 DP 1069758  
BOLONG ROAD, BOMADERRY**

Prepared for  
**Shoalhaven Starches Pty Ltd**  
November 2016



Prepared by:

*COWMAN STODDART PTY LTD*

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OF THE ENVIRONMENTAL PLANNING AND ASSESSMENT ACT 1979

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SHOALHAVEN STARCHES EXPANSION PROJECT

Ref. 15/45

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**COWMAN STODDART PTY LTD**

**CERTIFICATION OF ENVIRONMENTAL ASSESSMENT**  
PREPARED PURSUANT TO PART 3A OF THE *ENVIRONMENTAL PLANNING*  
*AND ASSESSMENT ACT 1979*

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**ENVIRONMENTAL ASSESSMENT  
PREPARED BY**

Name: S. D. Richardson

Qualifications: M. Appl. Sc., B.T.P., Grad. Dip. Env. Mgt,  
CPP, MPIA

Address: Cowman Stoddart Pty Ltd  
31 Kinghorne Street  
NOWRA NSW 2541

in respect of

---

**PROJECT TO WHICH PART 3A APPLIES**

Proponent Name: Shoalhaven Starches Pty Ltd

Proponent Address: Bolong Road, Bomaderry

Land to be developed: Address Bolong Road, Bomaderry

Lot No., DP/MPS, Vol/Fol etc. Lot 1 DP 838753, Lot 241 DP 1130535,  
Lot 143 DP 1069758

Project Development: Shoalhaven Starches Expansion Project (MP 06\_0228)

Proposed Modification to Project: Proposed modifications to Project Approval  
(MP06\_0228) involving modification to ethanol distillery  
to enable an increase in the proportion of "beverage"  
grade ethanol produced at the site; The modification  
application will also seek the modification to the siting  
and type of evaporator as approved under Mod. 2; and  
associated works.

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**Environmental Assessment**

An Environmental Assessment is attached

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**Certification**

I certify that I have prepared this environmental  
assessment and to the best of our knowledge

- It has been prepared in accordance with Section  
75W of the *Environmental Planning and  
Assessment Act 1979*,
- The information contained in the Environmental  
Assessment is neither false nor misleading.

Signature:



Name:

S. D. Richardson

Date:

23 November 2016

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## **EXECUTIVE SUMMARY**

Shoalhaven Starches is a member of the Manildra Group of companies. The Manildra Group is a wholly Australian owned business and the largest processor of wheat in Australia. It manufactures a wide range of wheat based products for food and industrial markets both locally and internationally.

The Shoalhaven Starches factory located on Bolong Road, Bomaderry produces a range of products for the food, beverage, confectionary, paper and motor transport industries including: starch, gluten, glucose and ethanol.

Project Approval MP06\_0228 was granted by the Minister for Planning on the 28<sup>th</sup> January 2009 for the Shoalhaven Starches Expansion Project. This approval also encapsulated previous approvals for the site into one overall approval for the site (at that time).

The Shoalhaven Starches Expansion Project is a 'transitional Part 3A Project' for the purposes of Schedule 6A of the Environmental Planning & Assessment Act.

The Shoalhaven Starches Expansion Project sought to increase ethanol production at the Bomaderry plant in a staged manner from 126 million litres per year to 300 million litres per year. To accomplish the increase in ethanol production, this project required a series of plant upgrades and increase in throughput of raw materials, principally flour and grain. The Project included the following alterations and additions:

- The provision of an additional product dryer;
- Additional equipment and storage vessels for the ethanol plant including additional fermenters, additional cooling towers and molecular sieves;
- Upgrades to the Stillage Recovery Plant, including additional DDGS Dryers, Decanters, chemical storage and evaporators. This proposal also included the installation of a DDGS Pellet Plant;
- The establishment of a new packing plant, container loading area and rail spur line on the northern side of Bolong road.

As outlined above, the Project Approval also consolidated all previous approvals (up to that time) into the one Project Approval. For the purposes of this Modified Proposal this included the consolidation of the Pollution Reduction Program No. 7 Project (DA No. 223-7-2002).

With specific reference to this Modification Application the Department approved Mod. 2 for *Operation and Energy Efficiency Improvements* on the 29<sup>th</sup> January 2010. This modification approval included approval for the installation of an evaporator unit consisting of five (5) vessels with associated condenser, heat exchangers, pumps, piping valves and electrical equipment



adjacent to the existing distillery. This Modification Application will seek to modify the type and location of this previously approved evaporator on the site.

The objective of Shoalhaven Starches Expansion Project which was the subject of the Project Approval MP06\_0228 sought to increase ethanol production at the site to meet the expected increase in demand for ethanol arising from the NSW Government's mandate to increase the blending of ethanol in the total of volume of petrol sold in NSW towards an ethanol content of 10% by 2011.

Unfortunately the expected increase in demand for ethanol to meet the demand arising from this mandate has not occurred due largely from a failure of the mandate to be imposed on petroleum suppliers.

As a result Shoalhaven Starches have been investigating alternative markets for the ethanol that is and will be produced at their Bomaderry plant in accordance with the Project Approval. One such market is the "beverage" market where ethanol is further treated and purified to enable it to meet stringent beverage grade specifications and pass organoleptic testing requirements (ie. taste and odours) to enable it to be utilised in the production of alcoholic drinks.

Shoalhaven Starches therefore propose to undertake modifications to the existing ethanol distillation plant to enable production of up to 110 ML/year of beverage grade ethanol. This proposal will not involve an increase in overall ethanol production above the current approved 300 ML/year. Rather it will enable greater flexibility in the **type** of ethanol that is produced from the plant.

The anticipated capital cost associated with the proposed works will be \$40 million.

Shoalhaven Starches intend to undertake modifications to the existing Ethanol Distillery Plant to:

- Increase the proportion of beverage grade ethanol that is able to be produced on the site to 110 ML/year. This modification will include:
  - A new beverage grade ethanol plant (to be located where the decommissioned dimethyl ether plant is currently sited);
  - Three (3) additional ethanol storage tanks;
  - An emergency Iso-container storage area(for ethanol) (located to the east of the relocated evaporator);
  - Cooling water towers;
  - Electrical substation; and
  - Pipe bridges;

- Modify the type and location of the Water Balance Recovery Evaporator that has been previously approved under MOD 2 adjacent to the Ethanol Plant;
- It is also proposed to extend and provide an additional two rail sidings situated between the Shoalhaven Starches factory complex and the former Dairy Farmers complex adjacent to the existing repair siding. This work will require the demolition and removal of existing tanks and pipework in this location of the site. It is proposed to extend the existing siding and to construct a further adjacent siding with a minimum of 6 metre track centres.

The use of these 2 sidings will be for the purpose of performing rail wagon “periodical” maintenance such as wheel and axle exchanges, brake gear and coupling repairs. Given the Manildra Group only has flour, grain and container wagons in operation, the intent is to consolidate the wagon maintenance functionality to Shoalhaven Starches site at Bomaderry.

The application is made pursuant to Section 75W of the Environmental Planning & Assessment Act 1979.

The preparation of this Environmental Assessment has been undertaken following consultation with relevant Government agencies, including:

- The Department of Planning and Environment;
- Shoalhaven City Council;
- EPA;
- The Australian Department of Defence;
- Department of Primary Industry - Water

This Environmental Assessment has been prepared to address issues detailed in requirements.

The EA is supported by expert assessments addressing:

- Noise Impacts – the EA is supported by a Noise Impact Assessment prepared by Harwood Acoustics which includes recommendations to ensure that this proposal will achieve the noise design goals as outlined under the Environmental Protection Licence that applies to the site. Furthermore noise emission during the construction phase of the development will meet noise management levels set by the EPA’s relevant guidelines.
- Air Quality Impacts and including Odours – the EA is supported by an Air Quality Impact Assessment prepared by GHD. This assessment concludes that the modification proposal would result in an insignificant increase in odours. The predicted odour impacts as a result of the modification proposal will not change and it is highly unlikely that there will be an

increase in odour detected at sensitive receptors. GHD predicts no discernible increase in perceived odour impacts would be evident as a result of the proposed modification.

- Flooding Impacts – the EA is also supported by a report prepared by WMA Water which identifies the proposed works do not increase the 1% AEP flood level on lands outside those owned by Shoalhaven Starches.
- Preliminary Hazard Analysis (PHA) prepared by Pinnacle Risk Pty Ltd that assesses and compares the risks associated with the proposal and finds that such risks are acceptable when compared against the Department of Planning & Environment's risk criteria.
- Traffic and Car Parking Assessment prepared by ARC Traffic and Transport that identifies that there are no access, traffic or parking impacts associated with the proposal – either during operation or construction – that would significantly impact on the efficiency and/or safety of the local traffic environment or existing on-site operations. The trip generation of the proposal during construction would be extremely minor, while once operational the proposal is not expected to generate any additional trips to the local road network.
- Site Contamination. A Phase 1 Site Contamination Assessment has been undertaken by Coffey Geosciences for the site. This Assessment has identified specific areas of the site which require further management measures to be undertaken.
- An assessment has also been undertaken by Coffeys for the potential of the development site containing acid sulphate soils. This assessment has identified that soils at depths of 2 m below the proposed car park and 3 m in the central and western factory areas are considered to contain acid sulphate soils. This assessment recommends that should works involve excavation of soils from depths greater than 2 m, or that could result in de-watering that could result in a drop of the water table, then an Acid Sulphate Soil Management Plan be developed for the modification project.
- Coffeys have also undertaken an assessment that the works associated with this project would have on the stability of the banks of the Shoalhaven River and Abernethy's Creek. This assessment identifies that any new heavily loaded structures should be supported on deep piled foundations to rock and therefore should not add any additional load to the soils behind the river bank, including the sections of river bank protected by the existing rock revetment wall and sheet pile walls. Coffey's provide specific recommendations to ensure that the proposed works do not have an effect on the stability of the riverbanks for both the Shoalhaven River and Abernethy's Creek.

Following an assessment of the key issues associated with this proposal, this Environmental Assessment concludes that the proposal is suitable for the site and this locality.

The Minister's approval is sought for this modification application.

## **1.0 INTRODUCTION**

### **1.1 BACKGROUND TO SHOALHAVEN STARCHES**

This Environmental Assessment has been prepared to address the key environmental issues associated with a proposal by Shoalhaven Starches Pty Ltd to undertake modifications to the existing ethanol distillery on the site to increase the proportion of 'beverage' grade ethanol. To accommodate the works associated with the modifications to the distillery plant will also require the relocation and modification of a previously approved evaporator approved to be located in this part of the site.

Shoalhaven Starches is a member of the Manildra Group of companies. The Manildra Group is a wholly Australian owned business and the largest processor of wheat in Australia. It manufactures a wide range of wheat based products for food and industrial markets both locally and internationally.

The Shoalhaven Starches factory produces a range of products for the food, beverage, confectionary, paper and motor transport industries including: starch, gluten, glucose and ethanol. During these processes, treated waste water is produced and spray irrigated onto pastures of the Company's Environmental Farm, which comprises over 1000 ha of land situated to the north of the factory site.

In 2003, the Minister for Planning approved a development application (DA223) for the Company's Pollution Reduction Program No. 7. This approval included the extension of the company's irrigation of waste water onto additional farm lands and also enabled ethanol production at the plant to increase from 100 million litres per year to 126 million litres per year.

On the 4<sup>th</sup> October 2007 the then Minister for Planning issued Project Approval MP 07\_0021 for the establishment of a Flour Mill at the factory site. This project enabled the construction and operation of a new flour mill and two grain silos. The flour mill is currently approved to produce 400,000 tonnes of industrial grade flour a year for use within the Shoalhaven Starches factory. The flour mill is housed in a building on the southern boundary of the factory. The grain silos associated with this previous approval are located within the vicinity of this flour mill, and have capacity to store 3600 tonnes of wheat grain.

On the 28th January 2009 the Minister for Planning issued Project Approval MP 06\_0228 for the "Shoalhaven Starches Expansion Project" (SSEP).

The primary objective of the Shoalhaven Starches Expansion Project was to increase the Company's ethanol production capacity by upgrading the existing plant to meet the

expected increase in demand for ethanol arising from Federal and State Government policy initiatives to mandate the use of ethanol in fuel supplies.

As a result, the Manildra Group planned to increase its ethanol production capacity to meet the expected increase in demand for ethanol arising from these initiatives by upgrading the existing ethanol plant, located at the Shoalhaven Starches Plant at Bomaderry.

The Project Approval for the Shoalhaven Starches Expansion Project (SSEP), enabled Shoalhaven Starches subject to certain conditions to increase ethanol production in a staged manner at its Bomaderry Plant from the previous approved level of 126 million litres per year to 300 million litres per year.

In addition the Project Approval consolidated all previous approvals for the site, including MP 07\_0021 for the existing Flour Mill into the one Project Approval for the overall site.

To accomplish the increase in ethanol production, the Project Approval enabled Shoalhaven Starches to upgrade plant and increase throughput of raw materials, principally flour and grain. The following additions and alterations have been approved to the existing factory site as part of the Project Approval:

- the provision of an additional dryer for the starch/gluten plant;
- additional equipment and storage vessels for the ethanol plant including 3 additional fermenters, additional cooling towers and molecular sieves; and
- upgrades to the Stillage Recovery Plant including 6 additional Dried Distillers Grains Syrup (DDGS) dryers; 10 decanters; chemical storage and two evaporators. The proposal includes the installation of a DDGS Pelletiser Plant within this part of the site.

Since obtaining this Project Approval Shoalhaven Starches have acquired the former Dairy Farmers factory complex further to the east of the Company's factory site.

## **1.2 BACKGROUND TO PROJECT**

### ***Beverage Grade Ethanol Production***

The primary objective of Project Approval MP 06\_0228 was to increase ethanol production at the Bomaderry plant in a staged manner from 126 million litres per year to 300 million litres per year.

The ethanol produced at the Bomaderry Plant comprises grades ranging from fuel, industrial to a small percentage of "beverage" grade ethanol. As the name implies "beverage" grade ethanol is suitable for human consumption and is used in the production of alcoholic drinks.

The objective of Shoalhaven Starches Expansion Project which was the subject of the Project Approval MP06\_0228 sought to increase ethanol production at the site to meet the expected increase in demand for ethanol arising from the NSW Government's mandate to increase the blending of ethanol in the total of volume of petrol sold in NSW towards an ethanol content of 10% by 2011.

Unfortunately the expected increase in demand for ethanol to meet the demand arising from this mandate has not occurred due largely from a failure of the mandate to be imposed on petroleum suppliers.

As a result Shoalhaven Starches have been investigating alternative markets for the ethanol that is and will be produced at their Bomaderry plant in accordance with the Project Approval. One such market is the "beverage" market where ethanol is further treated and purified to enable it to meet stringent beverage grade specifications and pass organoleptic testing requirements (ie. taste and odours) to enable it to be utilised in the production of alcoholic drinks.

Shoalhaven Starches therefore propose to undertake modifications to the existing ethanol distillation plant to enable production of up to 110 ML/year of beverage grade ethanol. This proposal will not involve an increase in overall ethanol production above the current approved 300 ML/year. Rather it will enable greater flexibility in the **type** of ethanol that is produced from the plant. The anticipated capital cost associated with the proposed works will be \$40 million.

The proposed modification to the ethanol distillery plant will comprise the installation of 4 new columns, and associated equipment immediately to the east of the existing Ethanol Distillery Plant. The location of the new Beverage Grade Ethanol Plant currently contains an existing dimethyl ether (DME) plant which is to be demolished and removed in accordance with Development Consent DA 13/1713 granted by Shoalhaven City Council on the 15<sup>th</sup> July 2013.

In addition to the distillery modification there will be additional storage tanks within the existing ethanol storage area, an emergency ISO container storage area located to the east of the relocated evaporator, cooling water towers, electrical substation and pipe bridges. As outlined above it will be necessary to demolish the decommissioned DME plant and the fire pump station and water storage tanks.

The fire pump station and water storage will be replaced by the previously approved (Project Approval MP06\_0228) pump station and water storage on the northern side of Bolong Road.

### ***Modification to Ethanol Distillery Evaporator***

The Department issued approval to “Mod 2” which related to operational and energy efficiency improvements to the Ethanol Plant on the 29<sup>th</sup> January 2010. This modification approval included approval for the installation of an evaporator unit consisting of five (5) vessels with associated condenser, heat exchangers, pumps, piping valves and electrical equipment adjacent to the existing distillery. This evaporator was to be located between the ethanol plant and the Bolong Road frontage of the site. This Modification Application will seek to modify the type and location of this previously approved evaporator on the site.

The role of this evaporator was to increase the solids in the feed to the Ethanol Plant and thus reduce the amount of liquid that needed to be heated to evaporate the ethanol in the distillery. This had the benefit of improving energy efficiency for the Ethanol Plant operations.

Rather than installing the evaporator adjacent to the existing distillery it is now proposed to install the evaporator to the east of the factory site to the east of the existing Fermenters. The relocation is required due to:

- Rectifier column C4201 (Mod. 2) relocated from approved Mod. 2 location to the proposed area of the 1<sup>st</sup> effect evaporator (refer to drawing MN285-002). This was required due to the order of construction, and further detailed design which revealed the rectifier C4201 required to be operational prior to removal of the old beer column D10 to maintain required ethanol quality.
- The evaporators were originally proposed to utilise waste heat from the existing distillery processes, however as a result of the ethanol heat recovery project there is no longer sufficient waste heat available for use in the evaporators. Therefore the evaporators are no longer required to be located adjacent to the ethanol distillery.
- Relocation of the approved evaporators to the proposed area east of the evaporators provides easier construction in a non-hazardous area (no flammable materials) and does not require access to public areas (Bolong Road and Bolong Road footpath) during construction.

The proposed evaporator will comprise a five (5) vessel unit driven by a Mechanical Vapour Recompression (MVR) compressor. MVR recompresses all of the vapour from the vapour separator. The increased vapour pressure provides the energy to heat the incoming feed to the evaporator. MVR evaporation is very energy efficient. The proposed evaporator function is the same as the original approved evaporator.

### **1.3 THE PROPONENT**

Cowman Stoddart Pty Ltd has prepared this Environmental Assessment on behalf of Shoalhaven Starches Pty Ltd.

Proponent's name: Shoalhaven Starches Pty Ltd

Postal address: PO Box 123, Nowra 2541



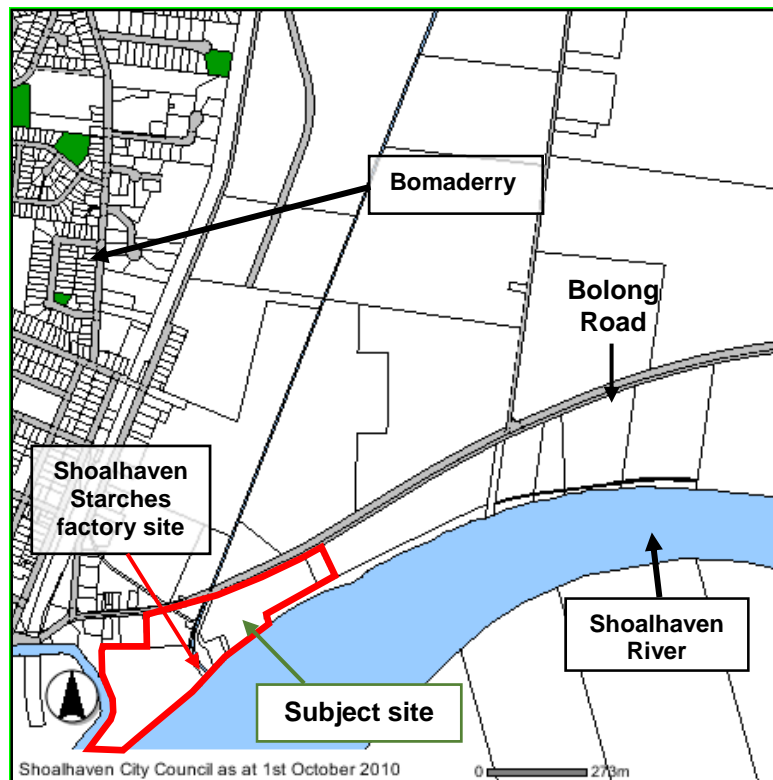
## 2.0 THE SITE AND SURROUNDING LOCALITY

### 2.1 LOCAL AND REGIONAL CONTEXT

The Shoalhaven Starches factory complex is situated on various allotments of land on Bolong Road, Bomaderry, within the City of Shoalhaven. The factory site is located on the southern side of Bolong Road on the northern bank of the Shoalhaven River. The Shoalhaven Starches site (excluding the former Dairy Farmers site) has an area of approximately 12.5 hectares.

The works associated with this modification proposal are to be situated on the southern side of the factory site on Lots 1 DP 838753, Lot 241 DP 1130535 and Lot 143 DP 1069758 Bolong Road Bomaderry.

**Figure 1** is a site locality plan.



**Figure 1: Site Locality Plan.**

The town of Bomaderry is located 0.5 km (approx.) to the west of the factory site, and the Nowra urban area is situated 2.0 km to the south west of the site. The “Riverview Road” area of the Nowra Township is situated approximately 1000 metres immediately opposite the factory site across the Shoalhaven River.

The village of Terara is situated approximately 1.5 kilometres to the south east of the site, across the Shoalhaven River. Burruga (Pig) Island is situated between the factory site and the village of Terara and is currently used for dairy cattle grazing.

There are a number of industrial land uses which have developed on the strip of land between Bolong Road and the Shoalhaven River. Industrial activities include a metal fabrication factory, the Shoalhaven Starches site and the Shoalhaven Paper Mill (Australian Papers). The industrial area is serviced by a privately owned spur railway line that runs from just north of the Nowra-Bomaderry station to the starches plant.

The state railway terminates at Bomaderry with a separate, privately owned spur line to the factory site. Shoalhaven City Council sewerage treatment works is situated between the railway line and the factory.

The Company also carries out irrigation activities on the Company's Environmental Farm located over 1000 hectares on the northern side of Bolong Road. This area is cleared grazing land and also contains spray irrigation lines and wet weather storage ponds). These wet weather storage ponds on the farm form part of the irrigation management system for the factory. The Environmental Farm stretches over a broad area of the northern floodplain of the Shoalhaven River stretching from Bolong Road in the south towards Jaspers Brush in the north. Apart from the Environmental Farm this broad area is mainly used for grazing (dairy cattle).

**Figures 2 and 3** are aerial photographs of the locality and the site respectively. The works associated with this modification are generally sited within the vicinity of the existing ethanol distillery and to the east of the existing factory site. To the east, west and north of the footprint of the proposed development is the Shoalhaven Starches factory site. The property has direct road frontage to Bolong Road to the north. The Shoalhaven River flows along the southern boundary of the factory site.

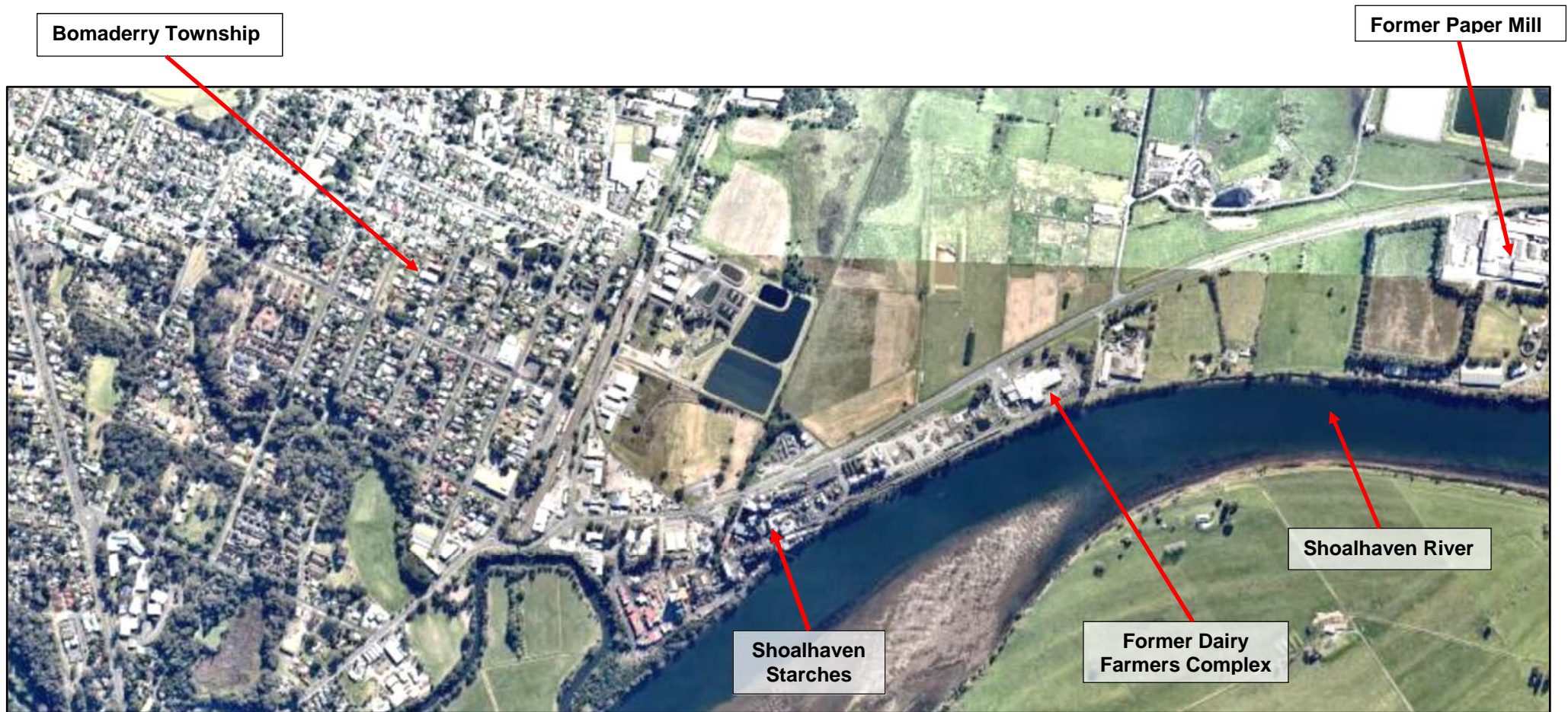
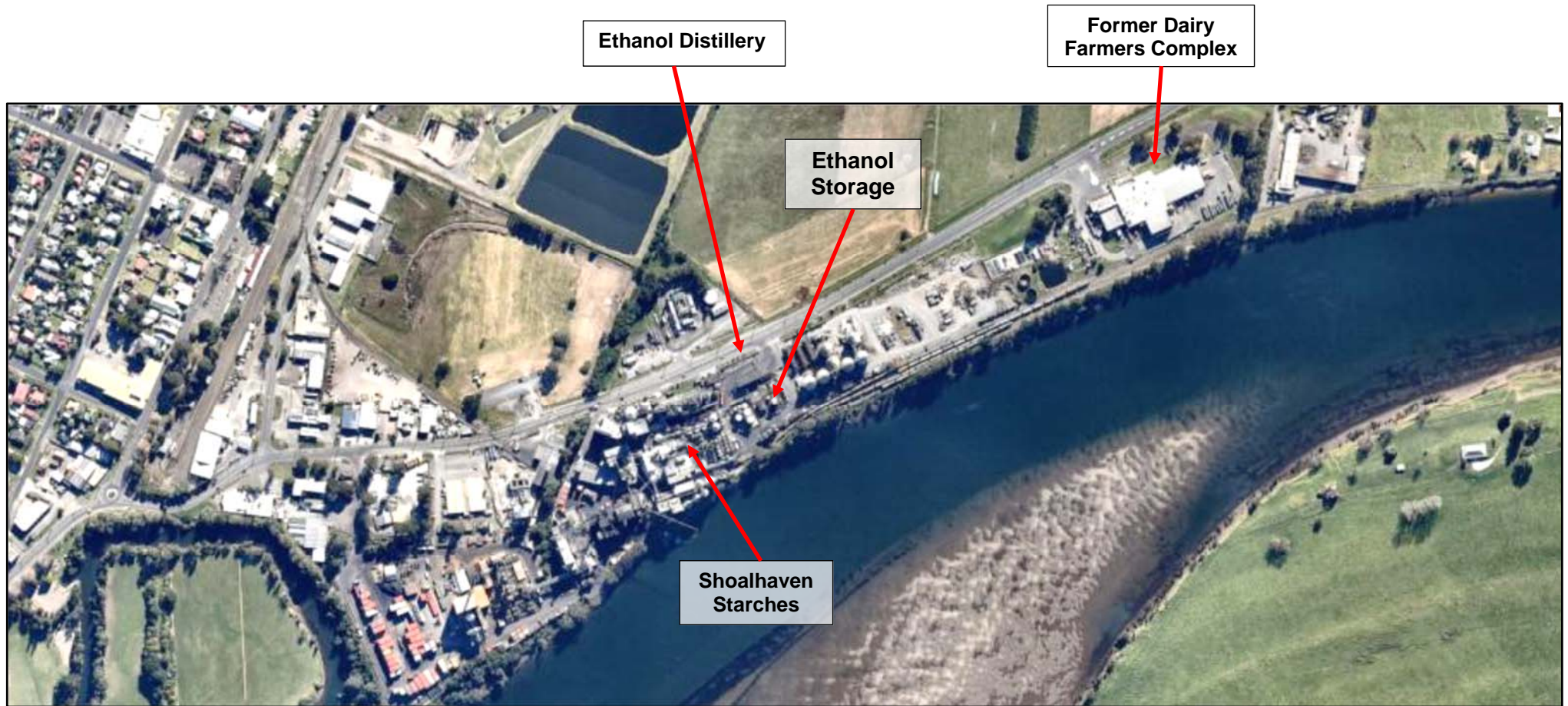


Figure 2: Aerial photograph of the locality.





**Figure 3: Aerial photograph of site.**

## **3.0 BACKGROUND**

### **3.1 PRODUCTION PROCESSES**

The production process at the Shoalhaven Starches plant has developed over a number of years. Originally the plant was primarily concerned with the production of starch and gluten from flour. However the Company has pursued a number of technological innovations particularly with respect to reducing the environmental impacts of the Company's operations. As a result Shoalhaven Starches has been moving towards a "closed" system of production. Essentially this entails the efficient use of end products to ensure wastage is reduced to a minimum.

The first step in the production process is the delivery of flour and grain, by rail, from the Company's flour mills at Manildra, Gunnedah and Narrandera. The trainloads are brought into the plant via the switching yard at Bomaderry.

The Company received approval from the Minister for Planning for the erection of a flour mill on site to enable the milling of part of the Company's flour requirements to be processed directly on the site. This flour mill has now been commissioned. The remainder of the Company's flour requirement will continue to be sourced from the Company's off-site flour mills.

Flour is transferred via storage to the "wet end" of the plant where fresh water is added. The subsequent mixing and separation process produces starch and gluten.

The gluten is dried to enable it to be packaged and distributed as a high protein food additive for human consumption. This product is then taken from the site after packaging for both local and export markets. Starch is used for fermentation and distillation to produce ethanol.

The starch that is separated from the flour is either dried or remains in liquid form. The dried and liquid starch is sold to the paper and food industries. The starch is used for food, cardboard, paper and other industrial purposes. Liquid starch is used in the ethanol production process.

Starch is also used in the production of syrups on the site. The syrups plant products include glucose and brewer's syrup. These are used for foods, chocolates, confectionery, beer, soft drinks and fruit juice. The syrups plant products can also be used in the ethanol process.

The waste products from the starch, gluten and syrup production processes are combined to feed the fermentation and distillation stage of ethanol production. The outputs are fuel,

industrial and beverage grade ethanol. Industrial grade ethanol is used in producing pharmaceuticals, printer's ink and methylated spirits.

Ethanol production results in some liquid and solid by-products, which are processed through the stillage recovery process plant (which was approved as part of PRP No. 7 in 2005). The solids in the stillage are recovered as DDGS (Dried Distillers Grains Syrup), dried and sold as a high protein cattle feed with the remaining water used for irrigation. The waste water resulting from the ethanol production is treated in the wastewater treatment plant and is re-used in the Starch Plant and the surplus is irrigated onto Shoalhaven Starches Environmental Farm to the north of Bolong Road. This farm land is used for fodder crops, pasture and cattle grazing.

## **3.2 OPERATING WORKFORCE**

### **3.2.1 Operations**

The existing factory operates 24 hours per day, 7 days a week, 365 days of the year.

### **3.2.2 Workforce**

The plant employs a total of 300 staff, covering all components of production - operators, administrative personnel and maintenance staff. Employee breakdown and hours of shifts are as follows:

A total of around 300 employees	Management, Technical & Administration	60
	Day Workers	65
	Shift Production (spread over 4 shifts)	175

#### Hours of Shifts

Plant:	6:00 am to 6:00 pm	- 88 employees	
	6:00 pm to 6:00 am	- 88 employees	
	Day – 7:00 am to 3:00 pm	but variable	75 employees, 60 Management, Technical & Administration
Farm:	5:00 am to 5:00 pm	- 3 employees	
	5:00 pm to 5:00 am	- 3 employees	
	7:00 am to 3:00 pm	- 3 employees	

Shift work at both the factory and farm is undertaken on a continuous roster basis.

## **3.3 RAW MATERIALS**

Raw material and energy components used in the Shoalhaven Starches processes are flour, electricity, wheat for milling; coal, natural gas, biogas, woodchips, fresh water and salt water.

Flour is delivered to the site by rail from the Company's mills at Manildra, Gunnedah and Narrandera each day of the week. The flour arrives into the plant by Company owned and hired stainless steel rail wagons. From the silos, the flour is moved into the plant by air as required. The approved flour consumption of the plant is 20,000 tonnes per week.

### **3.4 DEVELOPMENT AND APPROVAL HISTORY**

#### **3.4.1 Development History of Site Prior to Project Approval MP 06\_0228**

The Shoalhaven Starches wheat starch and gluten plant at Nowra was originally constructed in 1970. The Manildra flour mills, at Manildra, Narrandera and Gunnedah, supply the Shoalhaven Starches factory, which currently produces wheat starch, gluten, syrups and ethanol (industrial and fuel grades). The Shoalhaven Starches operation provides direct on-site employment for 300 employees. Through the use of contractors it also indirectly creates employment for many more people in the local and regional economies.

In order to address the issue of waste water disposal, in 1984 Shoalhaven Starches installed a spray irrigation system, using farmland it owned on the northern side of Bolong Road at Bomaderry.

In June 1991, two storage ponds were built (Ponds No. 1 and 2) resulting in the cessation of waste water discharge to the Shoalhaven River.

To further reduce product wastage, Shoalhaven Starches sought to use excess starch for the production of ethanol. Ethanol production began at the Shoalhaven site in June 1992.

In 1994, the NSW Government approved the installation of a larger ethanol distillery within the existing site. The new distillery and its associated facilities enabled production of ethanol to increase from 20 million litres per annum to a production capacity of 100 million litres per year.

Subsequent to this approval Shoalhaven City Council issued development consent for:

- a protein isolate plant and DDGS Dryer; and
- a sorghum grinding plant.

Shoalhaven City Council issued development approval for the construction of a wet weather storage pond (Pond No. 6) on the 27th April 2001. At present, with the completion of Pond No. 6, Shoalhaven Starches has a combined waste water storage capacity within the existing ponds of 925 ML. A further wet weather storage pond (Pond No. 7) was approved by the Minister for Planning on the 23 December 2002 and subsequently

modified by the approval by the Minister for Planning to form the anaerobic and aerobic parts of the wastewater treatment plant.

On the 1st June, 2001 the Minister for Urban Affairs & Planning, Dr Andrew Refshauge MP, declared both the Shoalhaven Starches factory and Environmental Farm as being State Significant Development for the purposes of the then Section 76A(7) of the Environmental Planning & Assessment Act.

In 2003 the Minister for Planning issued development consent (D223) for Shoalhaven Starches Pollution Reduction Program (PRP) No. 7. This approval enabled the implementation of the Company's Waste Water Management Strategy, and essentially sought to remove solids (suspended and soluble) from the Company's waste water, prior to its irrigation on the Environmental Farm.

This process, known as Stillage Recovery (to be further discussed in Section 4.1 of this report), essentially involved the; introduction of additional decanters; installation of an evaporation plant; and additional dryers, to remove solids from the waste water. It is the remaining solids in the waste water that when sprayed onto the Environmental Farm, or stored in the wet weather storage ponds, which had the potential to result in the generation of odours.

The recovery of the suspended and soluble solids from the waste water could not be undertaken by the dryers in this process, without firstly providing additional coarse solids. Additional coarse solids (grain) were required to be imported to the site.

As a consequence of the additional grain, the starch contained in the grain resulted in a need to increase ethanol production to 126 million litres per year. This increase in ethanol production required the installation of additional fermenters, associated cooling towers and molecular sieves.

The increase in ethanol production also resulted in an increase in waste water, which was required to be disposed on the environmental farm. In this regard this previous proposal also included an increase in waste water disposal area on the Environmental Farm.

The plant associated with this previous approval has now been substantially installed and commissioned.

Shoalhaven Starches have subsequently received the following development approvals:

- The establishment of a flour mill on the factory site. This proposal provides for the transportation of wheat directly to the site by train for processing into industrial grade flour for the use in the production of starch and gluten at the factory site.



- An application pursuant to Section 96 of the Environmental Planning & Assessment Act seeking to modify the development approval for the PRP No. 7 project to enable a DDGS Dryer to be installed in a slightly different location in the same building as previously approved; and the installation of an additional evaporator (a redundant piece of equipment located at the Company's Altona Plant in Victoria) to provide standby capacity for the existing evaporator plant when sections of the existing plant are out of service or cleaning.
- A Section 96 modification application for a standby fermenter tank to be installed on the site, to enable the existing fermenter tanks to be taken out of service for maintenance one at a time.

A full list of all approvals that apply to the Shoalhaven Starches site are detailed within Section 2.4 of the EA prepared by our firm, in relation to the Shoalhaven Starches Expansion Project (MP 06\_0228).

#### **3.4.2 Project Approval MP 06\_0228**

On the 28<sup>th</sup> January 2009 the then Minister for Planning, issued Project Approval MP 06\_0228 for the Shoalhaven Starches Expansion Project.

The primary objective of the Shoalhaven Starches Expansion Project was to increase the Company's ethanol production capacity to meet the expected increase in demand for ethanol primarily, arising from the NSW Government's mandate to increase ethanol content by volume in petrol in NSW from 2% to 6% from October 2011, by upgrading the existing ethanol plant.

The approval will, subject to certain conditions, enable Shoalhaven Starches to increase ethanol production in a staged manner at its Bomaderry Plant from 126 million litres per year to 300 million litres per year.

To accomplish the increase in ethanol production, the Project Approval enabled Shoalhaven Starches to upgrade plant and increase throughput of raw materials, principally comprising flour and grain.

The following additions and alterations have been approved to the existing factory site as part of this Project Approval:

- the provision of an additional dryer for the starch/gluten plant;
- additional equipment and storage vessels for the ethanol plant including 3 additional fermenters, additional cooling towers and molecular sieves;

- upgrades to the Stillage Recovery Plant including 6 additional Dried Distillers Grains Syrup (DDGS) dryers; 10 decanters; chemical storage and two evaporators. The proposal includes the installation of a DDGS Pelletiser Plant within this part of the site; and,
- the establishment of a new packing plant, container loading area and a rail spur line. The establishment of this facility on the northern side of Bolong Road will require the provision of an overhead bridge structure to allow product and safe pedestrian movement across Bolong Road.

In addition, as part of the Project Approval, Shoalhaven Starches will undertake comprehensive odour reduction measures for both the existing factory site and the works associated with the Expansion Project. In 2006, the Land and Environment Court required Shoalhaven Starches to engage a suitably qualified person to conduct a comprehensive environmental audit of the factory and Environmental Farm. This environmental audit was undertaken GHD Pty Ltd. The audit report includes a number of recommendations for the implementation of works to the existing site, some of which require development approval. These works were included within this Project Approval.

The Project Approval enables a staged implementation of the expansion project. Up to 200 million litres of ethanol will be able to be produced at the Bomaderry Plant and eventually increased up to 300 million litres.

The Project Approval also enables the biological treatment of waste waters from the factory site and the re-use of over half the treated waste water within the factory processes, with the remainder irrigated onto the Company's Environmental Farm.

The Project Approval also consolidated all previous approvals including Project Approval MP 07\_0021 (the Flour Mill) into the one Project Approval.

### **3.4.3 Approval History Following MP 06\_0228**

#### ***DA 10/1843 – Upgrade Vehicle Entrance (Former Dairy Farmers Factory Site)***

Project Approval MP 06\_0228 required vehicle access points to the Bomaderry site to be upgraded to the satisfaction of Council and the RMS.

The subsequent upgrading works included the construction of a concrete median along the centre of Bolong Road to the east of Abernethy's drain in such a manner that prevented vehicles travelling east along Bolong Road turning right into the central vehicle access point to the Shoalhaven Starches site and prevented vehicles turning right out from this access point and travelling east along Bolong Road.

These works also prevented vehicles turning right out from the BOC Carbon Dioxide Plant located opposite the Shoalhaven Starches site.

Shoalhaven Starches therefore sought approval from Shoalhaven City Council to upgrade the former Dairy Farmers site vehicular access and relocate the access to enable vehicles to enter Access Point 2 from the east. These works would also allow vehicles wishing to travel west from BOC Carbon Dioxide Plant to leave this site to first travel east; by allowing vehicles to travel to the former Dairy Farmers Factory Complex and using the upgraded access to turn around before travelling west along Bolong Road.

### ***RA 11/1002 Interim Packing Plant***

Following Project Approval MP 06\_0228 Shoalhaven Starches also obtained a separate development approval to use an existing factory building located at 22 Bolong Road (Lot 21 DP 100265) as an Interim Packing Plant from Shoalhaven City Council (RA 11/1002 dated 26<sup>th</sup> October 2011). This Interim Packing Plant operates in conjunction with the Company's existing Packing Plant which is located within the existing factory site.

As outlined in Section 3.5 above, Project Approval MP 06\_0228 made provision for a new Packing Plant to be located on land owned by the company on the northern side of Bolong Road.

Following the granting of MP 06\_0228 however the Manildra Group of Companies acquired the former Dairy Farmers factory site located at 220 Bolong Road. The Company has therefore been reconsidering the best location for the future Packing Plant.

In the interim period however the Flour Mill and a new product dryer were commissioned resulting in a subsequent increase in production of dried product from these new plants. Interim Packing Plant facilities were therefore required until the final location for the new packing plant is determined. It is intended that the Interim Packing Plant would operate on a temporary basis until a final location for the new Packing Plant is identified.

Shoalhaven Starches have held initial consultation with the Department of Planning & Environment with respect to submitting a separate modification application which will seek to relocate the approved Packing Plant (and dryer). Shoalhaven Starches are currently reviewing options for the final packing plant location. Once the new Packing Plant has been constructed, the need for the Interim Packing Plant will become superfluous and the development consent for the interim plant will be surrendered, and the use will cease.

### ***DA 11/1855 – Widening of Driveway***

A further development application (DA 11/1855) was submitted to Shoalhaven City Council on the 4<sup>th</sup> August 2011 seeking approval to widen the driveways serving 22 Bolong Road Bomaderry (ie. the site of the Interim Packing Plant) to accommodate semi-trailers. This development application was approved by Shoalhaven City Council on the 24<sup>th</sup> August 2011.

### ***DA 13/1713 – Demolition of Dimethyl Ether Plant***

On the 5<sup>th</sup> July 2013 Shoalhaven Starches submitted a development application to Shoalhaven City Council seeking the demolition of a Dimethyl Ether Plant on the site. This development application was approved by Shoalhaven City Council on the 15<sup>th</sup> July 2013.

### ***DA 14/2161 – Additional Two (2) Grain Silos***

On the 19<sup>th</sup> September 2014 Shoalhaven Starches submitted a development application to Shoalhaven City Council seeking development consent to erect two additional grain silos on the factory site within the vicinity of the existing Flour Mill. The purpose of these two additional grain silos will be to provide security of raw material storage and supply when there are closures of the Illawarra rail line serving the Shoalhaven Starches site enabling the factory operations to continue during rail line closures. Over recent years there have been occasions when there have been closures of the Illawarra rail line due to track construction work as well as a result of floods, storms and traffic accidents. During these closures the supply of grain and flour to the Shoalhaven Starches site has been interrupted. The additional grain silos associated with this application will provide a buffer for on-site storage and additional security of storage and supply should closures to the rail line occur in the future. At the time of preparing this EA Shoalhaven City Council has not determined this development application.

### ***Other Approvals***

There have been other approvals that have been issued by Shoalhaven City Council that associated with the Shoalhaven Starches operations, but which do not directly relate to the operations of Shoalhaven Starches including:

- DA 11/1936 – Algae Demonstration Plant for evaluation of algae production and processing for alternative fuel and CO<sub>2</sub> sequestration. Proponent – Algae Tec Pty Ltd at 220 Bolong Road (former Dairy Farmers factory site).
- DA 14/1327 – Alterations to existing building (former Dairy Farmers Factory Building) and re-use as a meat processing plant. Proponent – Candal Investments Pty Ltd at 220 Bolong Road (former Dairy Farmers factory site).

## 4.0 STATUTORY SITUATION

### 4.1 PART 3A OF THE EP&A ACT

The introduction of Part 3A to the Environmental Planning & Assessment Act 1979, and the introduction of *State Environmental Planning Policy (Major Development)* in 2005, brought about a change in the regime concerning the assessment of state significant development. Part 3A initially targeted the streamlining of the assessment of projects deemed to be of state significance, including critical infrastructure projects.

Following the 2011 election, the NSW Government implemented measures seeking to change the planning legislative and policy regime applicable to projects previously subject to Part 3A.

Under these legislation changes no new applications for any of the development that was previously identified as Part 3A in the Major Development SEPP will be accepted and assessed during this interim period.

The NSW Parliament subsequently passed amendments to the *Environmental Planning & Assessment Act 1979* (the EP&A Act). These amendments created an alternative assessment system which allows the NSW Government to assess and determine projects which are of State significance.

The amended EP&A Act establishes two separate assessment frameworks for either State Significant Infrastructure (SSI) or State Significant Development (SSD). Projects that fall under these two categories will be assessed by the Department of Planning and Infrastructure (the 'Department').

To this end, the Act largely returns to the situation before Part 3A where two separate assessment pathways were in place for projects to be assessed by the State, namely

- Linear public infrastructure projects such as railways, water supply systems, pipelines and transmission lines, or other development by a State agency which has a significant environmental effect; and
- Significant development types which require consent such as mines, chemical and manufacturing plants, warehousing and distribution facilities, hospitals and associated ancillary development.

The Act also introduces a number of changes to the operation and make-up of the Planning Assessment Commission (PAC) and Joint Regional Planning Panels (Regional Panels), seeking to provide additional transparency and greater local government input.

Supporting regulations and an associated new State Environmental Planning Policy (SEPP) have been introduced and come into effect from the 1<sup>st</sup> October 2011. These supporting provisions provide additional detail with respect to the classes and thresholds for development to be considered as State Significant.

*State Environmental Planning Policy (State and Regional Development) 2011* (otherwise known as the “State and Regional Development SEPP”), approximately halved the number of proposals dealt with by the State when compared with the former Part 3A system.

The *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation) has also been amended to update a number of procedural and administrative arrangements.

This is an interim assessment system which will be reviewed as part of the proposed overall review of the NSW planning system that the new NSW Government has also instigated.

The approved Shoalhaven Starches Expansion Project however is termed a *Transitional Part 3A Project* under the amended EP&A legislation.

These circumstances are clarified in Planning Circular PS 11-021 issued by the Department of Planning & Infrastructure on the 30<sup>th</sup> September 2011. This Circular confirms that Part 3A continues to apply to certain projects subject to transitional provisions identified in Schedule 6A of the Act.

Schedule 6A of the *EP&A Act* makes provisions for such projects. Essentially a *Transitional Part 3A Project* includes:

- (a) *an approved project (whether approved before or after the repeal of Part 3A),*
- (b) *a project for which environmental assessment requirements were notified or adopted before the repeal of Part 3A,*
- (c) *a project that is the subject of a Part 3A project application and that the regulations declare to be a transitional Part 3A project.*

As the Shoalhaven Starches Expansion Project was approved on the 28<sup>th</sup> January 2009 this project is considered a *Transitional 3A Project* for the purposes of this legislation.

Clause 3 of Schedule 6A provides for the continuation of Part 3A and Transitional Part 3A projects. Essentially it states that Part 3A continues to apply to and in respect of *Transitional Part 3A* projects. Clause 3 reads:

### **3 Continuation of Part 3A – transitional Part 3A projects**

- (1) *Part 3A continues to apply to and in respect of a transitional Part 3A project.*
- (2) *For that purpose:*
  - (a) *any State environmental planning policy or other instrument made under Part 3A, as in force on the repeal of that Part and as amended after that repeal, continues to apply to and in respect of a transitional Part 3A project, and*
  - (b) *declarations, orders, directions, determinations or other decisions with respect to a transitional Part 3A project continue to have effect and may continue to be made under Part 3A (including for the purpose of the application or continued application of Part 4 or 5 or other provisions of this Act in relation to the project).*
- (3) *The regulations may modify provisions of Part 3A (and the instruments or decisions referred to in subclause (2)) as they apply to a transitional Part 3A project.*
- (4) *The declaration of development as a project under Part 3A (or as a critical infrastructure project) is revoked if the development is not, or ceases to be, a transitional Part 3A project.*
- (5) *A transitional Part 3A project is not State significant development or State significant infrastructure.*
- (6) *This clause is subject to the other provisions of this Schedule.*

Given these circumstances Part 3A will continue to apply for the proposed Shoalhaven Starches Expansion Project.

Part 3A continues to apply to the Shoalhaven Starches Expansion Project. State Environmental Planning Policy (Major Projects) continues to support Part 3A of the Act.

Section 75W of the Environmental Planning & Assessment Act makes provision for the modification of Major Projects to which Part 3A applied and continues to apply.

#### **4.2 SECTION 75W AND MODIFICATION PROPOSALS**

Section 75W of the EPA Act relates to modifications to approvals issued by the Minister for Planning and states:

##### **75W Modification of Minister's approval**

- (1) *In this section:*

**Minister's approval** *means an approval to carry out a project under this Part, and includes an approval of a concept plan.*

***modification of approval*** means changing the terms of a Minister's approval, including:

- (a) *revoking or varying a condition of the approval or imposing an additional condition of the approval, and*
  - (b) *changing the terms of any determination made by the Minister under Division 3 in connection with the approval.*
- (2) *The proponent may request the Minister to modify the Minister's approval for a project. The Minister's approval for a modification is not required if the project as modified will be consistent with the existing approval under this Part.*
- (3) *The request for the Minister's approval is to be lodged with the Director-General. The Director-General may notify the proponent of environmental assessment requirements with respect to the proposed modification that the proponent must comply with before the matter will be considered by the Minister.*
- (4) *The Minister may modify the approval (with or without conditions) or disapprove of the modification.*
- (5) *The proponent of a project to which section 75K applies who is dissatisfied with the determination of a request under this section with respect to the project (or with the failure of the Minister to determine the request within 40 days after it is made) may, within the time prescribed by the regulations, appeal to the Court. The Court may determine any such appeal.*
- (6) *Subsection (5) does not apply to a request to modify:*
  - (a) *an approval granted by or as directed by the Court on appeal, or*
  - (b) *a determination made by the Minister under Division 3 in connection with the approval of a concept plan.*
- (7) *This section does not limit the circumstances in which the Minister may modify a determination made by the Minister under Division 3 in connection with the approval of a concept plan.*

This application is made pursuant to Section 75W of the EPA Act.

#### **4.3 LOCAL PLANNING PROVISIONS**

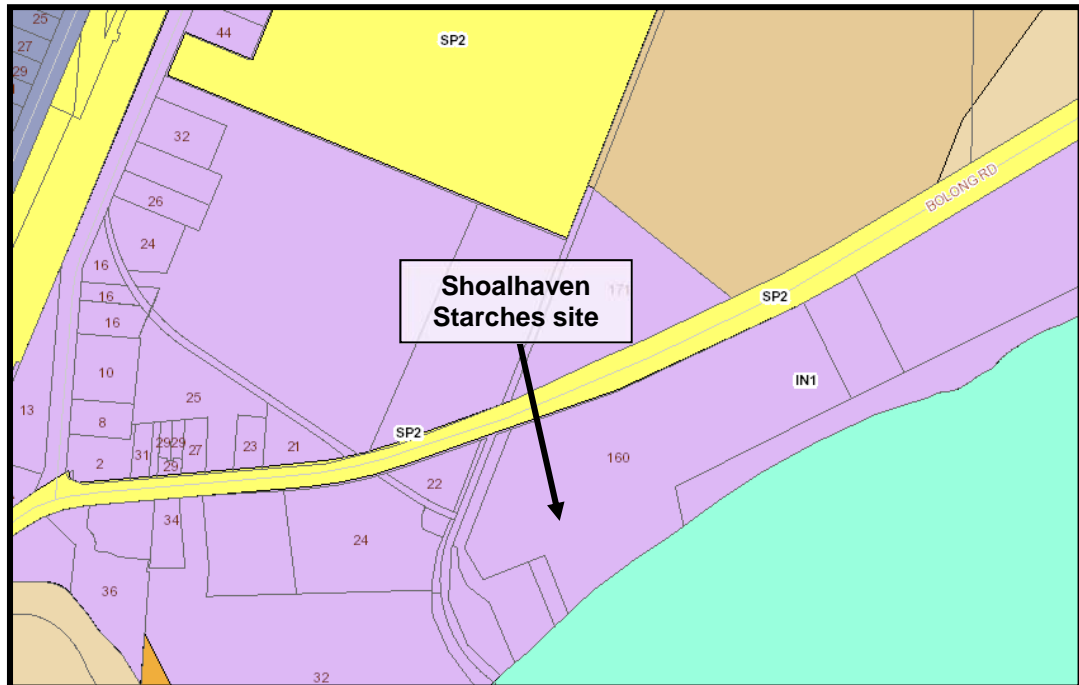
##### ***Shoalhaven Local Environmental Plan (SLEP) 2014***

The site is zoned IN1 (General Industrial) zone under the provisions of SLEP 2014 (refer **Figure 4**). The objectives of the IN1 zone are:

- *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.*
- *To support and protect industrial land for industrial uses.*



- To allow a diversity of activities that do not significantly conflict with the operation of existing or proposed development.
- To enable other land uses that provide facilities or services to meet the day to day needs of workers in the area.



**Figure 4: Zoning provisions applying under Shoalhaven LEP 2014.**

It is our view that the proposal is consistent with these objectives as the proposal involves alterations and additions to an existing industrial activity. Furthermore the proposal includes measures to minimise the effects of the proposal.

Industry is a permissible use within this zone. The proposal is permissible subject to Council's consent (see **Table 1** below).

**Table 1**

**Land Use Permissibility – IN1 Zone (Shoalhaven LEP 2014)**

<b>Permitted without consent</b>	Nil.
<b>Permitted with consent</b>	Bulky goods premises; Depots; Freight transport facilities; <b>General industries</b> ; Industrial training facilities; Kiosks; Light industries; Markets; Neighbourhood shops; Roads; Take away food and drink premises; Timber yards; Warehouse or distribution centres
<b>Prohibited</b>	Agriculture; Air transport facilities; Airstrips; Amusement centres; Animal boarding or training establishments; Camping grounds; Caravan parks; Cemeteries; Charter and tourism boating facilities; Child care centres; Correctional centres; Crematoria; Eco-tourist facilities; Educational establishments; Environmental

**Table 1 (continued)**

<i>Prohibited</i>	<i>continued</i>	facilities; Exhibition villages; Extractive industries; Farm buildings; Forestry; Function centres; Health services facilities; Highway service centres; Home-based childcare; Home businesses; Home occupations; Home occupations (sex services); Information and education facilities; Marinas; Mooring pens; Moorings; Office premises; Open cut mining; Places of public worship; Registered clubs; Residential accommodation; Respite day care centres; Restricted premises; Retail premises; Sex services premises; Tourist and visitor accommodation; Water recreation structures; Wharf or boating facilities.
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The SLEP 2014 also has a number of specific provisions that apply to the land. The implications that these provisions have in relation to this proposal are discussed in **Table 2** below:

**Table 2**  
**Shoalhaven LEP 2014 Provisions**

<b>SLEP 2014 Clause</b>	<b>Provisions</b>	<b>Comments</b>
<b>4.3 Height of Buildings</b>	<p>(1) <i>The objectives of this clause are as follows:</i></p> <p>(a) <i>to ensure that buildings are compatible with the height, bulk and scale of the existing and desired future character of a locality,</i></p> <p>(b) <i>to minimise visual impact, disruption of views, loss of privacy and loss of solar access to existing development,</i></p> <p>(c) <i>to ensure that the height of buildings on or in the vicinity of a heritage item or within a heritage conservation area respect heritage significance.</i></p> <p>(2) <i>The height of a building on any land is not to exceed the maximum height shown for the land on the Height of Buildings Map.</i></p> <p>(2A) <i>If the Height of Buildings Map does not show a maximum height for any land, the height of a building on the land is not to exceed 11 metres.</i></p>	<p>The proposal will involve the erection of a range of structures with heights above ground level ranging from 23.3 m to 46.0 m.</p> <p>Although there is no maximum height specified for the subject land part (2a) of Clause 4.3 of SLEP 2014 states no building is to be in excess of 11 metres.</p> <p>As such a submission for an exception to development standards under Clause 4.6 of the SLEP 2014 has been prepared and is attached under <b>Annexure 3</b>.</p>
<b>4.6 Exceptions to development standards</b>	<p>(1) <i>The objectives of this clause are as follows:</i></p> <p>(a) <i>to provide an appropriate degree of flexibility in applying certain development standards to particular development,</i></p> <p>(b) <i>to achieve better outcomes for and from development by allowing flexibility in particular circumstances.</i></p> <p>(2) <i>Development consent may, subject to this clause, be granted for development even though the development would contravene a development standard imposed by this or any other environmental planning instrument.</i></p>	<p>The proposal will involve the erection of a range of structures with heights above ground level ranging from 23.3 m to 46.0 m that will exceeds the 11 metre maximum as specified in (2A) of Clause 4.3 Height of Buildings of the SLEP 2014.</p> <p>The proposed development will be erected within the surrounds of the Shoalhaven Starches factory site.</p>

**Table 2 (continued)**

<b>SLEP 2014 Clause</b>	<b>Provisions</b>	<b>Comments</b>
4.6 continued	<p><i>However, this clause does not apply to a development standard that is expressly excluded from the operation of this clause.</i></p> <p>(3) <i>Development consent must not be granted for development that contravenes a development standard unless the consent authority has considered a written request from the applicant that seeks to justify the contravention of the development standard by demonstrating:</i></p> <p style="margin-left: 40px;">(a) <i>that compliance with the development standard is unreasonable or unnecessary in the circumstances of the case, and</i></p> <p style="margin-left: 40px;">(b) <i>that there are sufficient environmental planning grounds to justify contravening the development standard.</i></p> <p>(4) <i>Development consent must not be granted for development that contravenes a development standard unless:</i></p> <p style="margin-left: 40px;">(a) <i>the consent authority is satisfied that:</i></p> <p style="margin-left: 80px;">(i) <i>the applicant's written request has adequately addressed the matters required to be demonstrated by subclause (3), and</i></p> <p style="margin-left: 80px;">(ii) <i>the proposed development will be in the public interest because it is consistent with the objectives of the particular standard and the objectives for development within the zone in which the development is proposed to be carried out, and</i></p> <p style="margin-left: 40px;">(b) <i>the concurrence of the Director-General has been obtained.</i></p> <p>(5) <i>In deciding whether to grant concurrence, the Director-General must consider:</i></p> <p style="margin-left: 40px;">(a) <i>whether contravention of the development standard raises any matter of significance for State or regional environmental planning, and</i></p> <p style="margin-left: 40px;">(b) <i>the public benefit of maintaining the development standard, and</i></p> <p style="margin-left: 40px;">(c) <i>any other matters required to be taken into consideration by the Director-General before granting concurrence.</i></p> <p>(6) <i>Development consent must not be granted under this clause for a subdivision of land in Zone RU1 Primary Production, Zone RU2 Rural Landscape, Zone RU3 Forestry, Zone RU4 Primary Production Small Lots, Zone RU6 Transition, Zone R5 Large Lot Residential,</i></p>	<p>As the proposed works will be built within the existing industrial complex it is not expected that the new development will have an undue effect due to its height.</p> <p>A submission for an exception to development standards has been prepared and is attached to the SEE under <b>Annexure 3</b>.</p>

**Table 2 (continued)**

<b>SLEP 2014 Clause</b>	<b>Provisions</b>	<b>Comments</b>
4.6 continued	<p><i>Zone E2 Environmental Conservation, Zone E3 Environmental Management or Zone E4 Environmental Living if:</i></p> <p>(a) <i>the subdivision will result in 2 or more lots of less than the minimum area specified for such lots by a development standard, or</i></p> <p>(b) <i>the subdivision will result in at least one lot that is less than 90% of the minimum area specified for such a lot by a development standard.</i></p> <p><i>Note. When this Plan was made it did not include all of these zones.</i></p> <p>(7) <i>After determining a development application made pursuant to this clause, the consent authority must keep a record of its assessment of the factors required to be addressed in the applicant's written request referred to in subclause (3).</i></p> <p>(8) <i>This clause does not allow development consent to be granted for development that would contravene any of the following:</i></p> <p>(a) <i>a development standard for complying development,</i></p> <p>(b) <i>a development standard that arises, under the regulations under the Act, in connection with a commitment set out in a BASIX certificate for a building to which State Environmental Planning Policy (Building Sustainability Index: BASIX) 2004 applies or for the land on which such a building is situated,</i></p> <p>(c) <i>clause 5.4,</i></p> <p>(ca) <i>clause 6.1 or 6.2</i></p>	
5.5 Development within the coastal zone	<p>(1) <i>The objectives of this clause are as follows:</i></p> <p>(a) <i>to provide for the protection of the coastal environment of the State for the benefit of both present and future generations through promoting the principles of ecologically sustainable development,</i></p> <p>(b) <i>to implement the principles in the NSW Coastal Policy, and in particular to:</i></p> <p>(i) <i>protect, enhance, maintain and restore the coastal environment, its associated ecosystems, ecological processes and biological diversity and its water quality, and</i></p> <p>(ii) <i>protect and preserve the natural, cultural, recreational and economic attributes of the NSW coast, and</i></p>	<p>The subject land is located within the coastal zone.</p> <p>The proposal is not considered to adversely affect the coastal zone based on the following:</p> <ul style="list-style-type: none"> <li>• The proposal does not affect or impinge on public access to or along the coastal foreshore.</li> <li>• The proposed development is situated adjacent to existing industrial development and is considered to be suitable development given its type, location</li> </ul>

**Table 2 (continued)**

<b>SLEP 2014 Clause</b>	<b>Provisions</b>	<b>Comments</b>
5.5 continued	<p>(iii) provide opportunities for pedestrian public access to and along the coastal foreshore, and</p> <p>(iv) recognise and accommodate coastal processes and climate change, and</p> <p>(v) protect amenity and scenic quality, and</p> <p>(vi) protect and preserve rock platforms, beach environments and beach amenity, and</p> <p>(vii) protect and preserve native coastal vegetation, and</p> <p>(viii) protect and preserve the marine environment, and</p> <p>(ix) ensure that the type, bulk, scale and size of development is appropriate for the location and protects and improves the natural scenic quality of the surrounding area, and</p> <p>(x) ensure that decisions in relation to new development consider the broader and cumulative impacts on the catchment, and</p> <p>(xi) protect Aboriginal cultural places, values and customs, and</p> <p>(xii) protect and preserve items of heritage, archaeological or historical significance</p> <p>(2) Development consent must not be granted to development on land that is wholly or partly within the coastal zone unless the consent authority has considered:</p> <p>(a) existing public access to and along the coastal foreshore for pedestrians (including persons with a disability) with a view to:</p> <p>(i) maintaining existing public access and, where possible, improving that access, and</p> <p>(ii) identifying opportunities for new public access, and</p> <p>(b) the suitability of the proposed development, its relationship with the surrounding area and its impact on the natural scenic quality, taking into account:</p> <p>(i) the type of the proposed development and any associated land uses or activities (including</p>	<p>and design. The development is also consistent with the zoning objectives for the land.</p> <ul style="list-style-type: none"> <li>The development will not lead to overshadowing of foreshore areas. The site is situated on the northern side of the Shoalhaven River.</li> <li>The scenic qualities of the area will not diminish. Visual impact is further addressed in Section 7.2 of this EA.</li> </ul> <p>The proposal will not lead to adverse impacts on threatened fauna and flora.</p>

**Table 2 (continued)**

<b>SLEP 2014 Clause</b>	<b>Provisions</b>	<b>Comments</b>
5.5 continued	<p>compatibility of any land-based and water-based coastal activities), and</p> <p>(ii) the location, and</p> <p>(iii) the bulk, scale, size and overall built form design of any building or work involved, and</p> <p>(c) the impact of the proposed development on the amenity of the coastal foreshore including:</p> <p>(i) any significant overshadowing of the coastal foreshore, and</p> <p>(ii) any loss of views from a public place to the coastal foreshore, and</p> <p>(d) how the visual amenity and scenic qualities of the coast, including coastal headlands, can be protected, and</p> <p>(e) how biodiversity and ecosystems, including:</p> <p>(i) native coastal vegetation and existing wildlife corridors, and</p> <p>(ii) rock platforms, and</p> <p>(iii) water quality of coastal waterbodies, and</p> <p>(iv) native fauna and native flora, and their habitats, can be conserved, and</p> <p>(f) the cumulative impacts of the proposed development and other development on the coastal catchment.</p> <p>(3) Development consent must not be granted to development on land that is wholly or partly within the coastal zone unless the consent authority is satisfied that:</p> <p>(a) the proposed development will not impede or diminish, where practicable, the physical, land-based right of access of the public to or along the coastal foreshore, and</p> <p>(b) if effluent from the development is disposed of by a non-reticulated system, it will not have a negative effect on the water quality of the sea, or any beach, estuary, coastal lake, coastal creek or other similar body of water, or a rock platform, and</p> <p>(c) the proposed development will not discharge untreated stormwater into the sea, or any beach, estuary, coastal lake, coastal creek or other similar body of water, or a rock platform, and</p>	

**Table 2 (continued)**

<b>SLEP 2014 Clause</b>	<b>Provisions</b>	<b>Comments</b>
5.5 continued	<p>(d) the proposed development will not:</p> <ul style="list-style-type: none"> <li>(i) be significantly affected by coastal hazards, or</li> <li>(ii) have a significant impact on coastal hazards, or</li> <li>(iii) increase the risk of coastal hazards in relation to any other land.</li> </ul>	
5.10 Heritage Conservation	<p>(1) The objectives of this clause are:</p> <ul style="list-style-type: none"> <li>(a) to conserve the environmental heritage of Shoalhaven; and</li> <li>(b) to conserve the heritage significance of heritage items and heritage conservation areas including associated fabric, settings and views; and</li> <li>(c) to conserve archaeological sites; and</li> <li>(d) to conserve Aboriginal objects and Aboriginal places of heritage significance.</li> </ul> <p>(2) Development consent is required for any of the following:</p> <ul style="list-style-type: none"> <li>(a) demolishing or moving any of the following or altering the exterior of any of the following (including, in the case of a building, making changes to its detail, fabric, finish or appearance): <ul style="list-style-type: none"> <li>(i) a heritage item,</li> <li>(ii) an Aboriginal object</li> <li>(iii) a building, work, relic or tree within a heritage conservation area,</li> </ul> </li> <li>(b) altering a heritage item that is a building by making structural changes to its interior or by making changes to anything inside the item that is specified in Schedule 5 in relation to the item,</li> <li>(c) disturbing or excavating an archaeological site while knowing, or having reasonable cause to suspect, that the disturbance or excavation will or is likely to result in a relic being discovered, exposed, moved, damaged or destroyed,</li> <li>(d) disturbing or excavating an Aboriginal place of heritage significance,</li> <li>(e) erecting a building on land: <ul style="list-style-type: none"> <li>(i) on which a heritage item is located or that is within a heritage conservation area;</li> </ul> </li> </ul>	There are no heritage items within the subject land. And the subject site is not located within a heritage conservation area.

**Table 2 (continued)**

SLEP 2014 Clause	Provisions	Comments												
5.10 continued	<div><div>(ii) on which an Aboriginal object is located or that is within an Aboriginal place of heritage significance,</div><div>(f) subdividing land:<div><div>(i) on which a heritage item is located or that is within a heritage conservation area, or</div><div>(ii) on which an Aboriginal object is located or that is within an Aboriginal place of heritage significance.</div></div></div></div>													
7.1 Acid sulfate soils	<div><div>(1) The objective of this clause is to ensure that development does not disturb, expose or drain acid sulfate soils and cause environmental damage.</div><div>(2) Development consent is required for the carrying out of works described in the Table to this subclause on land shown on the Acid Sulfate Soils Map as being of the class specified for those works, except as provided by this clause.</div></div> <table><tr><th>Class of Land</th><th>Works</th></tr><tr><td>1</td><td>Any works.</td></tr><tr><td>2</td><td>Works below the natural ground surface. Works by which the watertable is likely to be lowered.</td></tr><tr><td>3</td><td>Works more than 1 metre below the natural ground surface. Works by which the watertable is likely to be lowered more than 1 metre below the natural ground surface.</td></tr><tr><td>4</td><td>Works more than 2 metres below the natural ground surface. Works by which the watertable is likely to be lowered more than 2 metres below the natural ground surface.</td></tr><tr><td>5</td><td>Works within 500 metres of adjacent Class 1, 2, 3 or 4 land that is below 5 metres Australian Height Datum by which the watertable is likely to be lowered below 1 metre Australian Height Datum on adjacent Class 1, 2, 3 or 4 land.</td></tr></table>	Class of Land	Works	1	Any works.	2	Works below the natural ground surface. Works by which the watertable is likely to be lowered.	3	Works more than 1 metre below the natural ground surface. Works by which the watertable is likely to be lowered more than 1 metre below the natural ground surface.	4	Works more than 2 metres below the natural ground surface. Works by which the watertable is likely to be lowered more than 2 metres below the natural ground surface.	5	Works within 500 metres of adjacent Class 1, 2, 3 or 4 land that is below 5 metres Australian Height Datum by which the watertable is likely to be lowered below 1 metre Australian Height Datum on adjacent Class 1, 2, 3 or 4 land.	Coffey Geosciences have undertaken an assessment of acid sulphate soils with respect to this modification proposal. ( <b>Annexure 9</b> ). This issue is further addressed in Section 8.9 of this EA.
Class of Land	Works													
1	Any works.													
2	Works below the natural ground surface. Works by which the watertable is likely to be lowered.													
3	Works more than 1 metre below the natural ground surface. Works by which the watertable is likely to be lowered more than 1 metre below the natural ground surface.													
4	Works more than 2 metres below the natural ground surface. Works by which the watertable is likely to be lowered more than 2 metres below the natural ground surface.													
5	Works within 500 metres of adjacent Class 1, 2, 3 or 4 land that is below 5 metres Australian Height Datum by which the watertable is likely to be lowered below 1 metre Australian Height Datum on adjacent Class 1, 2, 3 or 4 land.													



**Table 2 (continued)**

<b>SLEP 2014 Clause</b>	<b>Provisions</b>	<b>Comments</b>
7.1 continued	<p>(3) <i>Development consent must not be granted under this clause for the carrying out of works unless an acid sulfate soils management plan has been prepared for the proposed works in accordance with the Acid Sulfate Soils Manual and has been provided to the consent authority.</i></p> <p>(4) <i>Despite subclause (2), development consent is not required under this clause for the carrying out of works if:</i></p> <p style="padding-left: 20px;">(a) <i>a preliminary assessment of the proposed works prepared in accordance with the Acid Sulfate Soils Manual indicates that an acid sulfate soils management plan is not required for the works, and</i></p> <p style="padding-left: 20px;">(b) <i>the preliminary assessment has been provided to the consent authority and the consent authority has confirmed the assessment by notice in writing to the person proposing to carry out the works.</i></p> <p>(5) <i>Despite subclause (2), development consent is not required under this clause for the carrying out of any of the following works by a public authority (including ancillary work such as excavation, construction of access ways or the supply of power):</i></p> <p style="padding-left: 20px;">(a) <i>emergency work, being the repair of the works of the public authority required to be carried out urgently because the works have been damaged, have ceased to function or pose a risk to the environment or to public health and safety,</i></p> <p style="padding-left: 20px;">(b) <i>routine management work, being the periodic inspection, cleaning, repair or replacement of the works of the public authority (other than work that involves the disturbance of more than 1 tonne of soil).</i></p> <p style="padding-left: 20px;">(c) <i>minor work, being work that costs less than \$20,000 (other than drainage work).</i></p> <p>(6) <i>Despite subclause (2), development consent is not required under this clause to carry out any works if:</i></p> <p style="padding-left: 20px;">(a) <i>the works involve the disturbance of less than 1 tonne of soil, and</i></p> <p style="padding-left: 20px;">(b) <i>the works are not likely to lower the watertable.</i></p>	<p>The detail of the ASSMP can be refined based on the likely volumes to be extracted. For small volumes a simple work plan may be sufficient. If possible, avoidance of disturbing the ASS is preferred.</p> <p>This issue is further addressed in Section 8.9 of this EA.</p>

**Table 2 (continued)**

<b>SLEP 2014 Clause</b>	<b>Provisions</b>	<b>Comments</b>
7.3 Flood Planning	<p>(1) <i>The objectives of this clause are as follows:</i></p> <ul style="list-style-type: none"> <li>(a) <i>to minimise the flood risk to life and property associated with the use of land,</i></li> <li>(b) <i>to allow development on land that is compatible with the land's flood hazard, taking into account projected changes as a result of climate change,</i></li> <li>(c) <i>to avoid significant adverse impacts on flood behaviour and the environment.</i></li> </ul> <p>(2) <i>This clause applies to:</i></p> <ul style="list-style-type: none"> <li>(a) <i>land identified as "Flood Planning Area" on the Flood Planning Area Map, and</i></li> <li>(b) <i>other land at or below the flood planning level.</i></li> </ul> <p>(3) <i>Development consent must not be granted to development on land to which this clause applies unless the consent authority is satisfied that the development:</i></p> <ul style="list-style-type: none"> <li>(a) <i>is compatible with the flood hazard of the land, and</i></li> <li>(b) <i>will not significantly adversely affect flood behaviour resulting in detrimental increases in the potential flood affectation of other development or properties, and</i></li> <li>(c) <i>incorporates appropriate measures to manage risk to life from flood, and</i></li> <li>(d) <i>will not significantly adversely affect the environment or cause avoidable erosion, siltation, destruction of riparian vegetation or a reduction in the stability of river banks or watercourses, and</i></li> <li>(e) <i>is not likely to result in unsustainable social and economic costs to the community as a consequence of flooding, and</i></li> <li>(f) <i>will not affect the safe occupation or evacuation of the land.</i></li> </ul> <p>(4) <i>A word or expression used in this clause has the same meaning as it has in the Floodplain Development Manual (ISBN 0 7347 5476 0) published by the NSW Government in April 2005, unless it is otherwise defined in this clause.</i></p> <p>(5) <i>In this clause:</i></p> <p><b>flood planning level</b> <i>means the level of a 1:100 ARI (average recurrent interval) flood event plus 0.5 metre freeboard.</i></p>	<p>The <i>Flood Planning Area Map</i> that accompanies the SLEP 2014 identifies the subject land as being flood prone land.</p> <p>The application is supported by a flood assessment undertaken by WMA Water (<b>Annexure 4</b>). This issue is discussed further in Section 8.4 of this EA.</p>

**Table 2 (continued)**

<b>SLEP 2014 Clause</b>	<b>Provisions</b>	<b>Comments</b>
7.4 Coastal Risk Planning	<p>(1) <i>The objectives of this clause are as follows:</i></p> <ul style="list-style-type: none"> <li>(a) <i>to avoid significant adverse impacts from coastal hazards,</i></li> <li>(b) <i>to ensure uses of land identified as coastal risk are compatible with the risks presented by coastal hazards,</i></li> <li>(c) <i>to enable the evacuation of land identified as coastal risk in an emergency,</i></li> <li>(d) <i>to avoid development that increases the severity of coastal hazards.</i></li> </ul> <p>(2) <i>This clause applies to the land identified as “Coastal Risk Planning Area” on the Coastal Risk Planning Map.</i></p> <p>(3) <i>Development consent must not be granted to development on land to which this clause applies unless the consent authority is satisfied that the development:</i></p> <ul style="list-style-type: none"> <li>(a) <i>will avoid, minimise or mitigate exposure to coastal processes, and</i></li> <li>(b) <i>is not likely to cause detrimental increases in coastal risks to other development or properties, and</i></li> <li>(c) <i>is not likely to alter coastal processes and the impacts of coastal hazards to the detriment of the environment, and</i></li> <li>(d) <i>incorporates appropriate measures to manage risk to life from coastal risks, and</i></li> <li>(e) <i>is likely to avoid or minimise adverse effects from the impact of coastal processes and the exposure to coastal hazards, and</i></li> <li>(f) <i>provides for the relocation, modification or removal of the development to adapt to the impact of coastal processes and coastal hazards, and</i></li> <li>(g) <i>has regard to the impacts of sea level rise.</i></li> </ul> <p>(4) <i>A word or expression used in this clause has the same meaning as it has in the NSW Coastal Planning Guideline: Adapting to Sea Level Rise (ISBN 978-1-74263-035-9) published by the NSW Government in August 2010, unless it is otherwise defined in this clause.</i></p> <p>(5) <i>In this clause:</i>  <b>coastal hazard</b> <i>has the same meaning as in the Coastal Protection Act 1979.</i></p>	<p>The <i>Coastal Risk Planning Map</i> that accompanies the SLEP 2014 does <u>not</u> identify the subject land as a “Coastal Risk Planning Area”.</p> <p>The provisions of this clause therefore do not apply to the subject site.</p>

**Table 2 (continued)**

<b>SLEP 2014 Clause</b>	<b>Provisions</b>	<b>Comments</b>
7.5 Terrestrial Biodiversity	<p>(1) <i>The objective of this clause is to maintain terrestrial biodiversity, by:</i></p> <ul style="list-style-type: none"> <li>(a) <i>protecting native flora and fauna,</i></li> <li>(b) <i>protecting the ecological processes necessary for their continued existence, and</i></li> <li>(c) <i>encouraging the recovery of native flora and fauna, and their habitats.</i></li> </ul> <p>(2) <i>This clause applies to land:</i></p> <ul style="list-style-type: none"> <li>(a) <i>identified as “Biodiversity—habitat corridor” or “Biodiversity—significant vegetation” on the Terrestrial Biodiversity Map, and</i></li> <li>(b) <i>situated within 40m of the bank (measured horizontally from the top of the bank) of a natural waterbody.</i></li> </ul> <p>(3) <i>Before determining a development application for development on land to which this clause applies, the consent authority must consider:</i></p> <ul style="list-style-type: none"> <li>(a) <i>whether the development is likely to have:</i> <ul style="list-style-type: none"> <li>(i) <i>any adverse impact on the condition, ecological value and significance of the fauna and flora on the land, and</i></li> <li>(ii) <i>any adverse impact on the importance of the vegetation on the land to the habitat and survival of native fauna, and</i></li> <li>(iii) <i>any potential to fragment, disturb or diminish the biodiversity structure, function and composition of the land, and</i></li> <li>(iv) <i>any adverse impact on the habitat elements providing connectivity on the land, and</i></li> </ul> </li> <li>(b) <i>any appropriate measures proposed to avoid, minimise or mitigate the impacts of the development.</i></li> </ul> <p>(4) <i>Development consent must not be granted to development on land to which this clause applies unless the consent authority is satisfied that:</i></p> <ul style="list-style-type: none"> <li>(a) <i>the development is designed, sited and will be managed to avoid any significant adverse environmental impact, or</i></li> <li>(b) <i>if that impact cannot be reasonably avoided by adopting feasible alternatives—the development is designed, sited and will be managed to minimise that impact, or</i></li> </ul>	<p>The <i>Terrestrial Biodiversity Map</i> that accompanies the SLEP 2014 does <u>not</u> identify the subject land as including areas of <i>Biodiversity - habitat corridor</i> and/or <i>Biodiversity - significant vegetation</i>.</p> <p>Given the nature of the site the proposal will not have any adverse impacts on the ecological value of the land.</p> <p>There is no vegetation of importance located on the land.</p>

**Table 2 (continued)**

<b>SLEP 2014 Clause</b>	<b>Provisions</b>	<b>Comments</b>
7.5 continued	<p>(c) if that impact cannot be minimised—the development will be managed to mitigate that impact.</p> <p>(5) For the purpose of this clause:  <b>bank</b> means the limit of the bed of a natural waterbody.  <b>bed</b>, of a natural waterbody, means the whole of the soil of the channel in which the waterbody flows, including the portion that is alternatively covered and left bare with an increase or diminution in the supply of water and that is adequate to contain the waterbody at its average or mean stage without reference to extraordinary freshets in the time of flood or to extreme droughts.</p>	
7.6 Riparian land and watercourses	<p>(1) The objective of this clause is to protect and maintain the following:</p> <ul style="list-style-type: none"> <li>(a) water quality within watercourses,</li> <li>(b) the stability of the bed and banks of watercourses,</li> <li>(c) aquatic and riparian habitats,</li> <li>(d) ecological processes within watercourses and riparian areas.</li> </ul> <p>(2) This clause applies to all of the following:</p> <ul style="list-style-type: none"> <li>(a) land identified as “Riparian Land” on the Riparian Lands and Watercourses Map,</li> <li>(b) land identified as “Watercourse Category 1”, “Watercourse Category 2” or “Watercourse Category 3” on that map,</li> <li>(c) all land that is within 50 metres of the top of the bank of each watercourse on land identified as “Watercourse Category 1”, “Watercourse Category 2” or “Watercourse Category 3” on that map.</li> </ul> <p>(3) Before determining a development application for development on land to which this clause applies, the consent authority must consider:</p> <ul style="list-style-type: none"> <li>(a) whether or not the development is likely to have any adverse impact on the following: <ul style="list-style-type: none"> <li>(i) the water quality and flows within the watercourse,</li> <li>(ii) aquatic and riparian species, habitats and ecosystems of the watercourse,</li> <li>(iii) the stability of the bed and banks of the watercourse,</li> <li>(iv) the free passage of fish and other aquatic organisms within or along the watercourse,</li> </ul> </li> </ul>	<p>The Riparian Lands and Watercourses Map that accompanies the SLEP 2014 identify a class 1 watercourse, (Shoalhaven River) adjacent to the subject site.</p> <p>The site is industrial land with no existing vegetation and is beyond the influence of normal fluvial geomorphic processes. The works will have no impact on water quality.</p> <p>As such the development will not have any adverse effect on water quality, flows within the watercourse, aquatic and riparian species or habitats and ecosystems of the watercourse.</p> <p>Coffey Geosciences have undertaken an assessment of the potential impacts associated with the development on riverbank stability for both the Shoalhaven River and Abernethy's Creek (<b>Annexure 9</b>). This is further discussed in Section 8.8 of this EA.</p>

**Table 2 (continued)**

<b>SLEP 2014 Clause</b>	<b>Provisions</b>	<b>Comments</b>
7.6 continued	<p>(v) any future rehabilitation of the watercourse and its riparian areas, and</p> <p>(b) whether or not the development is likely to increase water extraction from the watercourse, and</p> <p>(c) any appropriate measures proposed to avoid, minimise or mitigate the impacts of the development.</p> <p>(4) Development consent must not be granted to development on land to which this clause applies unless the consent authority is satisfied that:</p> <p>(a) the development is designed, sited and will be managed to avoid any significant adverse environmental impact, or</p> <p>(b) if that impact cannot be reasonably avoided—the development is designed, sited and will be managed to minimise that impact, or</p> <p>(c) if that impact cannot be minimised—the development will be managed to mitigate that impact.</p> <p>(5) For the purpose of this clause:</p> <p><b>bank</b> means the limit of the bed of a watercourse.</p> <p><b>bed</b>, of a watercourse, means the whole of the soil of the channel in which the watercourse flows, including the portion that is alternatively covered and left bare with an increase or diminution in the supply of water and that is adequate to contain the watercourse at its average or mean stage without reference to extraordinary freshets in the time of flood or to extreme droughts.</p>	
7.7 Landslide risk and other land degradation	<p>(1) The objective of this clause is to maintain soil resources and the diversity and stability of landscapes, including protecting land:</p> <p>(a) comprising steep slopes, and</p> <p>(b) susceptible to other forms of land degradation.</p> <p>(2) This clause applies to the following land:</p> <p>(a) land with a slope in excess of 20% (1:5), as measured from the contours of a 1:25,000 topographical map, and</p> <p>(b) land identified as “Sensitive Area” on the Natural Resource Sensitivity—Land Map.</p> <p>(3) Before determining a development application for development on land to which this clause applies, the consent authority must consider any potential adverse impact,</p>	The proposed works do not involve land with a slope in excess of 20% or areas identified as sensitive land. Under these circumstances the provisions of this clause will not apply to this proposal.

**Table 2 (continued)**

<b>SLEP 2014 Clause</b>	<b>Provisions</b>	<b>Comments</b>
7.7 continued	<p>either from, or as a result of, the development in relation to:</p> <p>(a) the geotechnical stability of the site, and</p> <p>(b) the probability of increased erosion or other land degradation processes.</p> <p>(4) Before granting consent to development on land to which this clause applies, the consent authority must be satisfied that:</p> <p>(a) the development is designed, sited and will be managed to avoid any significant adverse environmental impact, or</p> <p>(b) if that impact cannot be reasonably avoided—the development is designed, sited and will be managed to minimise that impact, or</p> <p>(c) if that impact cannot be minimised – the development will be managed to mitigate that impact.</p> <p>(5) In this clause, topographical map means the most current edition of a topographical map, produced by Land and Property Information, a division of the Department of Finance and Services, that identifies the Council's local government area and boundary.</p>	
7.8 Scenic protection	<p>(1) The objective of this clause is to protect the natural environmental and scenic amenity of land that is of high scenic value.</p> <p>(2) This clause applies to land identified as "Scenic Protection" on the Scenic Protection Area Map.</p> <p>(3) In deciding whether to grant development consent for development on land to which this clause applies, the consent authority must:</p> <p>(a) consider the visual impact of the development when viewed from a public place and be satisfied that the development will involve the taking of measures that will minimise any detrimental visual impact, and</p> <p>(b) consider the number, type and location of existing trees and shrubs that are to be retained and the extent of landscaping to be carried out on the site, and</p> <p>(c) consider the siting of the proposed buildings.</p>	<p>The subject land is <u>not</u> identified as being within a "Scenic Protection" area by Scenic Protection Area Mapping that accompanies the SLEP 2014.</p> <p>The provisions of this clause therefore do not apply to the subject site.</p> <p>However the development site is adjacent to the northern bank of the Shoalhaven River which is identified as being within a Scenic Protection area. The visual impact associated with this proposal is discussed in Section 8.5 of this EA.</p>
7.9 HMAS Albatross airspace operations	<p>(1) The objectives of this clause are as follows:</p> <p>(a) to provide for the effective and on-going operation of the HMAS Albatross Military Airfield by ensuring that such operation is not compromised by</p>	<p>The Department of Defence (DoD) were consulted with respect to this proposal (see <b>Annexure 1</b>). The DoD do</p>

**Table 2 (continued)**

<b>SLEP 2014 Clause</b>	<b>Provisions</b>	<b>Comments</b>
7.9 continued	<p><i>proposed development that penetrates the Limitation or Operations Surface for that airport,</i></p> <p><i>(b) to protect the community from undue risk from that operation.</i></p> <p><i>(2) If a development application is received and the consent authority is satisfied that the proposed development will penetrate the Limitation or Operations Surface, the consent authority must not grant development consent unless it has consulted with the relevant Commonwealth body about the application.</i></p> <p><i>(3) The consent authority may grant development consent for the development if the relevant Commonwealth body advises that:</i></p> <p><i>(a) the development will penetrate the Limitation or Operations Surface but it has no objection to its construction, or</i></p> <p><i>(b) the development will not penetrate the Limitation or Operations Surface.</i></p> <p><i>(4) The consent authority must not grant development consent for the development if the relevant Commonwealth body advises that the development will penetrate the Limitation or Operations Surface and should not be carried out.</i></p> <p><i>(5) In this clause:</i></p> <p><b>Limitation or Operations Surface</b> means the Obstacle Limitation Surface or the Procedures for Air Navigation Services Operations Surface as shown on the Obstacle Limitation Surface Map or the Procedures for Air Navigation Services Operations Surface Map for the HMAS Albatross Military Airfield.</p> <p><b>relevant Commonwealth body</b> means the body, under Commonwealth legislation, that is responsible for development approvals for development that penetrates the Limitation or Operations Surface for the HMAS Albatross Military Airfield.</p>	not raise any objections with this proposal.
7.15 Development in the vicinity of extractive industries and sewerage treatment plants	<p><i>(1) The objective of this clause is to protect the operational environment of certain industries operating on the land to which this clause applies.</i></p> <p><i>(2) This clause applies to land identified as "Extractive Industry" and "Sewage Treatment Plant" on the Buffers Map.</i></p> <p><i>(3) Development consent must not be granted to the carrying out of development on land to which this clause applies unless the consent authority has:</i></p>	<p>The Buffers Map that accompanies the SLEP 2014 identifies the subject land is located within the vicinity of a sewerage treatment plant.</p> <p>The SEE is supported by an Air Quality Modelling (<b>Annexure 5</b>) and a Noise Impact Assessment (<b>Annexure 6</b>) that make</p>



**Table 2 (continued)**

<b>SLEP 2014 Clause</b>	<b>Provisions</b>	<b>Comments</b>
	<p>(a) <i>made an assessment of the impact of noise, odour and other emissions from any industry carried out on that land, and</i></p> <p>(b) <i>considered the potential impact of noise, odour and other emissions associated with that industry on any activities that will be associated with the development, and</i></p> <p>(c) <i>considered any opportunities to relocate the development outside that land, and</i></p> <p>(d) <i>has considered whether the development would adversely affect the operational environment of that industry.</i></p>	recommendations for the development.

#### **4.4 PROTECTION OF THE ENVIRONMENT OPERATIONS ACT**

The existing Shoalhaven Starches factory site and Environmental Farm has an Environmental Protection Licence (EPL) under the Protection of the Environment Operations Act 1997 (POEO Act) (EPL No. 883). The licence imposes requirements in terms of:

- discharges to air, water and land;
- irrigation controls;
- management of irrigation;
- maintenance of irrigation reticulation;
- odour control.

If approved, the proposed modification will necessitate the terms/provisions of this licence to be also reviewed.

## 5.0 THE MODIFICATION PROPOSAL

### 5.1 BEVERAGE GRADE ETHANOL PRODUCTION

Shoalhaven Starches have received Project Approval to increase ethanol production at the Bomaderry plant in a staged manner from 126 million litres per year to 300 million litres per year.

The ethanol produced at the Bomaderry Plant comprises grades ranging from fuel, industrial to a small proportion of “beverage” grade ethanol. As the name implies “beverage” grade ethanol is suitable for human consumption and is used in the production of alcoholic drinks.

The objective of Shoalhaven Starches Expansion Project which was the subject of the Project Approval MP06\_0228 sought to increase ethanol production at the site to meet the expected increase in demand for ethanol arising from the NSW Government’s mandate to increase the blending of ethanol in the total of volume of petrol sold in NSW towards an ethanol content of 10% by 2011.

Unfortunately the expected increase in demand for ethanol to meet the demand arising from this mandate has not occurred due largely from a failure of the mandate to be imposed on petroleum suppliers.

As a result Shoalhaven Starches have been investigating alternative markets for the ethanol that is and will be produced at their Bomaderry plant in accordance with the Project Approval. One such market is the “beverage” market where ethanol is further treated and purified to enable it to meet stringent beverage grade specifications and pass organoleptic testing requirements (ie. taste and odours)) to enable it to be utilised in the production of alcoholic drinks.

Shoalhaven Starches therefore propose to undertake modifications to the existing ethanol distillation plant to enable an increase in production of up to 110 ML/year of beverage grade ethanol. This proposal will not involve an increase in overall ethanol production above the current approved 300 ML/year. Rather it will enable greater flexibility in the **type** of ethanol that is produced from the plant.

The anticipated capital cost associated with the proposed works will be \$40 million.

The proposed modification to the ethanol distillery plant will comprise the installation of 4 new columns (with heights above ground level of 46 metres, four “re-boiler” columns with heights above ground level of 23.5 metres, and associated equipment immediately to the east of the existing Ethanol Distillery Plant.

The location of the new Beverage Grade Ethanol Plant currently contains an existing dimethyl ether (DME) plant which is to be demolished and removed in accordance with Development Consent DA 13/1713 granted by Shoalhaven City Council on the 15<sup>th</sup> July 2013.

The proposal will also require the relocation of an approved beer column and side stripper column, from their approved location within the existing Ethanol Plant to a more central position within the Ethanol Distillery plant.

In addition to the modification to the Ethanol Distillery there will be additional storage tanks (ranging in capacity from between 400,000 litres to 1 million litres) within the existing ethanol storage area. These tanks will range in height from 19 to 24 metres.

In 2010 the Department issued approval to "Mod. 2" which related to operational and energy efficiency improvements to the Ethanol Plant on the 29<sup>th</sup> January 2010. This modification approval included approval for the installation of a Water Balance Recovery Evaporator unit consisting of five (5) vessels with associated condenser, heat exchangers, pumps, piping valves and electrical equipment adjacent to the existing distillery plant. This evaporator was to be sited between the frontage of the site and the Ethanol Distillery. This evaporator has not yet been constructed. The construction of the modification proposal will require the relocation of this approved Evaporator and its associated cooling towers and plant to a position to the east of the Ethanol Storage area.

An emergency ISO container storage area is also proposed to be located to the east of the relocated evaporator, cooling water towers, electrical substation and pipe bridge.

As outlined above it will be necessary to demolish the decommissioned DME plant and the fire pump station and water storage tanks.

The fire pump station and water storage will be replaced by the previously approved (Project Approval MP06\_0228) pump station and water storage on the northern side of Bolong Road.

Plans of the proposed modification are included as **Annexure 2** to this EA.

### ***Process Description***

The production of beverage grade ethanol (96.5 vol%) from raw ethanol (92 vol%) will be performed in a rectification process involving the following steps.

#### ***First Step: Purification Performed in the Hydroselection Column D530.***

Raw ethanol at 80°C is transferred from the rectifier columns to the hydroselection column, ie. a distillation column, via a vessel containing copper chips. Copper chips remove

impurities such as trace levels of mercaptans. Raw ethanol contains other impurities in low concentrations such as esters and aldehydes whose relative volatilities in ethanol increase when water is added. These are separated from the ethanol in the hydroselction column by having a high flow of water to the top of the column. The impurities are carried out the top of the column with the ethanol vapours and condensed. Any impurities bleed stream is transferred to the existing dehydration unit (molecular sieves). The hydroselction column bottoms will contain approximately 10-12% ethanol by volume and importantly, the majority of impurities have been removed.

The hydroselction column operates at vacuum conditions (0.6 bara).

*Second Step: Rectification Performed in Two Rectifications Columns D540 and D541.*

Purified ethanol at 10-12% from the hydroselction column feeds the two rectifications columns, i.e. D540 and D541, which operate in parallel. Approximately 70% of the flow enters D540 with the remainder entering D541. The main functions of the rectification columns are:

- To strip the 10-12% ethanol in the hydroselction column's bottoms stream to below 0.03% ethanol. This water stream is sent to the Manildra waste water treatment plant for processing;
- To concentrate the ethanol to obtain a concentration of at least 96.5 vol%; and
- To eliminate all of the residual heavy impurities.

D540 and D541 operate at different pressures to allow heat integration to be performed.

Some heads (impurities such as aldehydes and acetaldehydes) are concentrated on the top of the two rectification columns. Therefore, a small bleed stream of heads is sent to the existing dehydration unit.

The concentrated ethanol at the top of the columns D540 and D541 is at least 96.5 vol%.

*Third Step: Refining Performed in the Refining Column D550*

The ethanol from the 2 rectification columns D540 and D541 feeds the refining column D550.

The purpose of the refining column D550 is:

- To eliminate the last light impurities, ie. mainly methanol remaining in the ethanol coming from the rectification columns; and
- To improve the sensor quality of the final ethanol.

The beverage grade ethanol is obtained at the bottom of the refining column D550 and is transferred to the ethanol storage tanks.

Effluent from the process will flow to the Shoalhaven Starches waste water treatment plant for treatment.

The main materials of construction for the equipment items will be stainless steel and copper.

## **5.2 ETHANOL STORAGE – TANKS AND “ISO” CONTAINERS**

It is also proposed to install three additional storage tanks within the existing ethanol tank storage area. The tanks will be constructed from stainless steel with fixed roofs.

Two tanks will be 400 m<sup>3</sup> each and the third tank will be 1,000 m<sup>3</sup>. The smaller tanks will be 5.5 m diameter and 17 m high. The 1,000 m<sup>3</sup> tank will be 7.65 m diameter and 22 m high.

The two smaller tanks will be located within the existing Ethanol Recovery Area bund whilst the largest tank will be located in the existing Ethanol Storage Area bund with the existing bulk ethanol storage tanks. The two smaller tanks will operate as day tanks, ie. any ethanol product that does not meet specifications from the plant is diverted from these tanks to other existing tanks or processes rather than flow to the larger tank which will contain the beverage grade compliant ethanol product for customers.

The product beverage grade ethanol will be pumped into road tankers or ISO containers for delivery to the customers. There is an existing road tanker loading area for ethanol at the site which will be used for the bulk transfers. Two dedicated parallel loading arms will be installed for the new beverage grade ethanol. Overfill will be protected by the existing scully system for road tankers and a modified hatch for the Isocontainers (these do not have scully leads).

## **5.3 MODIFICATION TO ETHANOL DISTILLERY EVAPORATOR**

The Department issued approval to “Mod 2” which related to operational and energy efficiency improvements to the Ethanol Plant on the 29<sup>th</sup> January 2010. This modification approval included approval for the installation of a Water Balance Recovery Evaporator unit consisting of five (5) vessels with associated condenser, heat exchangers, pumps, piping valves and electrical equipment between the existing ethanol distillery and the frontage of the site with Bolong Road.

The evaporation process for the sugar syrup uses low pressure water vapour (under vacuum). The maximum operating pressure is atmospheric for process units (piping and

plate heat exchangers are under pressure on the cooling water supply side only). The sugar syrup is approximately 10 to 25% and is not a hazardous material.

This Modification Application will seek to modify the type and location of this previously approved evaporator on the site.

The role of this evaporator was to increase the solids in the feed to the Ethanol Plant and thus reducing the amount of liquid that needed to be heated to evaporate the ethanol in the distillery. This had the benefit of improving energy efficiency for the Ethanol Plant operations.

Rather than installing the evaporator adjacent to the existing distillery it is now proposed to install the evaporator to the east of the factory site to the east of the existing Fermenters. The relocation is required due to:

- Rectifier column C4201 (MOD 2) relocated from approved Mod. 2 location to the proposed area of the 1<sup>st</sup> effect evaporator (refer to drawing MN285-002). This was required due to the order of construction, and further detailed design which revealed the rectifier C4201 required to be operational prior to removal of the old beer column D10 to maintain required ethanol quality.
- The evaporators were originally proposed to utilise waste heat from the existing distillery processes, however as a result of the ethanol heat recovery project there is no longer sufficient waste heat available for use in the evaporators. Therefore the evaporators are no longer required to be located adjacent to the ethanol distillery.
- Relocation of the approved evaporators to the proposed area east of the evaporators provides easier construction in a non-hazardous area (no flammable materials) and does not require access to public areas (Bolong Rd and Bolong Rd footpath) during construction.

The proposed evaporator will comprise a five (5) vessel, four stage unit driven by a Mechanical Vapour Recompression (MVR) compressor. MVR recompresses all of the vapour from the vapour separator. The increased vapour pressure provides the energy to heat the incoming feed to the evaporator. MVR evaporation is very energy efficient. The proposed evaporator function is the same as the original approved evaporator.

#### **5.4 PROVISION OF ADDITIONAL RAIL SIDINGS**

It is also proposed to extend and provide an additional two rail sidings situated between the Shoalhaven Starches factory complex and the former Dairy Farmers complex adjacent to the existing repair siding. This work will require the demolition and removal of existing

tanks and pipework in this location of the site. It is proposed to extend the existing siding and to construct a further adjacent siding with a minimum of 6 metre track centres.

The use of these 2 sidings will be for the purpose of performing rail wagon “periodical” maintenance such as wheel and axle exchanges, brake gear and coupling repairs. Given the Manildra Group have flour, grain and container wagons in operation, the intent is to consolidate the wagon maintenance functionality to Shoalhaven Starches site at Bomaderry.

## **5.5 THE EXISTING GRAIN PLANT**

Waste product from the starch, gluten and syrup production processes at the factory are combined to feed the fermentation and distillation stage in the ethanol production process. The outputs of the process are fuel and industrial grade ethanol. The residue from the ethanol process is directed to stillage recovery plant, the reclaimed water from the stillage recovery plant is then treated in the wastewater plant and re-used in the factory and/or irrigated.

The distillery at Shoalhaven Starches is supplied feed material from starch from the starch plant.

The feed stream is fermented and distilled in the distillery. The product from the distillery is ethanol. The by-products from this process are the remaining grain husks and “unfermentables” from the feed stream; carried by water.

The coarse fibre from grain is used in the feed to the DDG dryers as part of the stillage recovery process to dry soluble solids recovered from wastewater by evaporation. If insufficient fibre is fed into the dryers, the moist syrup fed into the dryers cannot be adequately absorbed and the product becomes “sticky”. After a period the syrup sticks to the heating surface of the dryer resulting in a loss of drying capability.

There is therefore a need to mix grain fibre into the syrup to ensure that the mixture is sufficiently friable to enable the DDG Dryers to operate efficiently.

The proposal seeks to modify the Ethanol Distillery to produce up to 110 ML/year of beverage grade ethanol. This proposal will however not involve an increase in overall ethanol production above the current approved 300 ML/year. Rather it will enable greater flexibility in the **type** of ethanol that is produced from the plant. Under these circumstances it is not envisaged that this modification proposal will have any implications for the amount of feed material that will need to service the modified Ethanol Distillery.

## **5.6 THE STARCH PLANT**

The proposal will not impact upon the amount of flour transported to the site. Overall production rates will remain as approved. The total flour processed on site within the existing starch plant will not exceed the previously approved amount of 20,000 tonnes per week. No modifications are proposed for the starch plant.

## **5.7 WASTEWATER TREATMENT AND DISPOSAL**

### **5.7.1 Stillage Recovery**

The 2003 approval by the Minister of the Company's Pollution Reduction Program No. 7 introduced a Stillage Recovery process into the production process at the plant. The objective of stillage recovery seeks to improve the system for the removal of suspended and soluble solids within the Company's wastewater system.

This process includes the use of decanters, evaporators and DDG dryers.

Decanters are essentially mechanical separation devices which operate by centrifugal separation process that separates out the unfermented suspended solids in stillage, ie. the waste liquid left over from the distillation of ethanol.

Evaporators are designed to reduce the water content of "overflow" stillage (after it passes through the decanters). The evaporators operate by mechanical vapour recompression. The overflow from the decanters is fed into tubes within the evaporator and heated by steam. The liquid within the overflow is heated to a point where it evaporates and is separated from the remaining solids, which remain as syrup. The liquid (ie. condensate) is captured and directed to the environmental farm for processing in the Wastewater Treatment Plant for reuse in the factory and irrigation, ie. the reclaimed water.

"Mod. 2" which related to operational and energy efficiency improvements to the Ethanol Plant included approval for the installation of a Water Balance Recovery Evaporator unit consisting of five (5) vessels with associated condenser, heat exchangers, pumps, piping valves and electrical equipment adjacent to the existing ethanol distillery plant. As discussed in Section 5.3 rather than installing the evaporator adjacent to the existing distillery it is now proposed to install the evaporator to the east of the factory site to the east of the existing Fermenters.

The syrup product is directed to DDG dryers for further drying. The DDG dryer is essentially a casing in which a bundle of steam tubes are rotated at low speed. Evaporator concentrate (syrup) and decanter concentrate (wet insoluble solids) are fed into one end



of the casing and transferred through to the other end by shovels. Heat from the tubes removes moisture.

Dried DDG is removed from the barrel and conveyed to the storage room for further loading into trucks.

The proposal however will have no other implications for overall ethanol production on the site.

#### **5.7.2 Effluent Irrigation**

As outlined the total amount of flour processed at the site will not exceed the previously approved amount of 20,000 tonnes per week. It is not envisaged that there will be any increase in water consumption from the site. Consequently wastewater volumes required to be irrigated onto the Company's Environmental Farm will remain unchanged.

### **5.8 ENERGY AND UTILITIES**

#### ***Energy***

The existing plant has the capacity to produce 200 t/h of process steam. The boilers are fuelled by coal, natural gas, biogas and woodchip. The current operations however produce about 175 t/h.

The site currently uses approximately 31 MVA of electricity.

The Company also currently utilises 190 Terajoules of Natural Gas.

The total requirements for the plant resulting from the proposed Ethanol Distillery modification are estimated at additional 2 MVA of power.

#### ***Water Consumption***

In terms of water consumption, the existing operations (and including Mod. 8 alternations to the existing flour mill, and as a result of the proposed Flour Mill B Mod.) are as follows:

- Council Treated – 1,035,031 KL p.a;
- Council Raw – 1,309,641 KL p.a;
- Recycled RO – 2,203,036 KL p.a.

This modification proposal will result in the following changes to water consumption:

- Council Treated – 1,127,011 KL p.a;
- Council Raw – 1,747,641 KL p.a;
- Recycled RO – 2,203,036 KL p.a.

#### ***Stormwater***

**Annexure 10** to this EA are conceptual stormwater management plans for the proposal.

## 6.0 CONSULTATION

During the preparation of this EA consultation has been undertaken with:

- Department of Planning and Environment;
- EPA
- Department of Primary Industry (DPI) - Water
- Australian Department of Defence
- Shoalhaven City Council;

Shoalhaven Starches have consulted with staff from the Department of Planning & Environment with respect to this proposal. The Secretary of the Department of Planning has issued requirements for this EA. These requirements form **Annexure 1** to this EA.

Shoalhaven Starches staff have also discussed the proposed modification with representatives from Shoalhaven City Council and the EPA. Written consultation has been undertaken separately with the Australian Department of Defence and DPI - Water.

Responses from, the Australian Department of Defence, Shoalhaven City Council and DPI – Water are also included in **Annexure 1** to this EA.

Despite the EPA being consulted about the project in an email dated 2<sup>nd</sup> August, at the time of preparing this EA the EPA had not formally responded in writing to this consultation.

### ***Department of Planning & Environment***

The following is a summary of the matters raised by the Department to be addressed in this EA (refer **Table 3**).

**Table 3**  
**Department of Planning & Environment SEARs**

<b><i>DoPE Issue</i></b>	<b><i>Comments</i></b>
Noise;	Refer Section 8.2 of EA.
Air quality and odour;	Refer Section 8.3 of EA.
Traffic and access, including impacts on Bolong Road, nearby intersections and the adequacy of internal access roads to service the modified development;	Refer Section 8.6 of EA.
Car parking;	Refer Section 8.6 of EA.
Hazard and risk;	Refer Section 8.1 of EA.
Visual impacts; and	Refer Section 8.5 of EA.
Flooding and impacts on the integrity of the bank of the Shoalhaven River and Abernathy's Creek;	Refer Section 8.4 of EA.
Contamination (including acid sulfate soils).	Refer Section 8.7 of EA.

**Table 3 (continued)**

<b>DoPE Issue</b>	<b>Comments</b>
<p>A detailed description of the proposed modification including:</p> <ul style="list-style-type: none"> <li>• a current aerial photo of the site / site layout plan.</li> <li>• site location plan identifying nearest residences, watercourses, other industry and any other key features; and</li> <li>• need/justification for the proposed development.</li> <li>• Details of any changes to production volumes compared with approved volumes.</li> </ul>	<p>Refer Section 5.0 of EA.</p> <p>Refer <b>Figures 2 &amp; 3</b> of EA.</p> <p>Refer <b>Annexure 2</b> of EA.</p> <p>Refer Section 5.0 of EA.</p> <p>Refer Section 5.0 of EA.</p>

### **Shoalhaven City Council**

The following matters have been raised by Shoalhaven City Council as matters that should be addressed in the EA (refer **Table 4**):

**Table 4**  
**Issues Raised by Shoalhaven City Council**

<b>SCC Issue</b>	<b>Comments</b>
<p>1. <u>Traffic/Access</u>: The application will need to be supported by a Traffic Impact Assessment (TIA) to enable Council to understand how the proposal will operate and assess impacts/additional works that may be required. The TIA should include, but not be limited to, the following:</p> <ul style="list-style-type: none"> <li>a. Turning path plans for all manoeuvring required in and out of the site (e.g. the container loading and unloading area and any other areas where vehicle movements are expected);</li> <li>b. Vehicle numbers requiring access in and out of the various access point and the impacts that such traffic movements would have on the existing access points (i.e. all changes to vehicle access patterns and volumes need to be detailed and assessed accordingly);</li> <li>c. An assessment of whether such access points to the site will be sufficient to accommodate traffic generated by the modified proposal (e.g. are they currently operating as designed) and any intersection treatment/ up grading of the access point and associated concept designs demonstrating compliance with relevant standards. This including details on any signage required;</li> <li>d. An assessment of available sight distances at the access points to be used;</li> </ul>	<p>Refer Section 8.6 of EA.</p>

**Table 4 (continued)**

<b>SCC Issue</b>	<b>Comments</b>
<p>e. An assessment of the available width of the internal service road providing access to the container storage/loading/unloading area (section that runs parallel to Bolong Road), its ability to allow two-way heavy vehicle movement simultaneously; and</p> <p>f. Council's Traffic Section has advised that the access to the container storage/loading/unloading area was also only accepted on a trial basis by RMS and council, and if safety issues regarding the access could not be resolved then a roundabout at the access was to be considered. This issue should be considered/addressed.</p>	
<p>2. <u>Flood</u>: The application will need to be supported by an updated Flood Assessment that details the potential impacts that the proposed works will have on flood waters within the locality, outline proposed mitigation measures, provide an updated flood emergency plan, and will need to provide information to demonstrate that the proposed modifications/new works can withstand the forces of flood waters, debris and buoyancy forces up to the 0.2% AEP flood event.</p>	Refer Section 8.4 of EA.
<p>3. <u>Shoalhaven Water</u>: The application will need to provide a detailed water use analysis which shows current water use (raw and treated) and projected water use following the modification.</p>	Refer Section 5.7 of EA.
<p>4. <u>Stormwater</u>: The application will need to be supported by a concept stormwater plan. This should show/detail how and where the stormwater from the new works will be disposed of/discharged to.</p>	Refer <b>Annexure 10</b> of EA.
<p>5. <u>Design</u>: The provided design appears to conflict with the approved but not yet constructed car park (60 car spaces required by Mod 3). As such a plan showing the new proposal relative to this approved car parking area should be provided. If there is a conflict this car parking area should be relocated with updated plans being submitted with the modification request.</p>	Refer <b>Annexure 2</b> of EA.
<p>6. <u>Roads and Maritime Services (RMS)</u>: Council has had a brief discussion with RMS where it has been advised that they would like to be consulted as part of the applications assessment process. It is therefore recommended that a discussion be had with RMS prior to the lodgement of the application.</p>	Separate consultation has been undertaken between the traffic consultants for this project ARC and the RMS as well as Council. Refer Section 8.6 of EA.

### **NSW Office of Water**

In an email dated 2<sup>nd</sup> August 2016 the Office of Water provided the following comments:

*DPI Water notes your advice that some of the proposed modifications are to be located within 40 metres of the Shoalhaven River. It is also noted that despite being on waterfront land, the proposed modifications are all contained within the existing development footprint and/or landward of existing infrastructure ie the rail lines. As such, there are no additional encroachments by the proposed modifications towards the Shoalhaven River bank which would be undesirable.*

*I would expect that any new structures will have suitable foundations down to bedrock but given issues with the stability of the Shoalhaven river bank adjacent the Shoalhaven Starches facility in recent years, I would suggest that that due consideration be given to assessing any impacts of the proposed modifications/infrastructure on the integrity of the Shoalhaven river bank.*

#### Comment

Issues pertaining to riverbank stability are addressed in Section 8.8 of this EA.

### **Australian Department of Defence**

In correspondence dated 15<sup>th</sup> August the Australian Department of Defence outlined:

- The need for the Department of Defence to maintain accurate information about tall structures, and specifically in relation to structures that involve:
  - 30 metres or more above ground level within 30 kilometres of an aerodrome; or
  - 45 metres or more above ground level elsewhere.

The proposal involves structures that meet the above criteria. Under these circumstances Defence requests that the Applicant provide Airservices Australia with “as constructed” details of the proposed structures.

In addition Defence request that should LED obstruction lighting be provided that the frequency range of the LED light emitted fall within the wavelengths of 655 to 930 nanometres, thus being visible to person using night vision devices.

#### Comments

Shoalhaven Starches notes the above comments. This issue is also discussed in Section 4.3 of this EA.

## **7.0 RISK ASSESSMENT OF POTENTIAL ENVIRONMENTAL IMPACTS**

The purpose of this section of the EA is to provide a risk assessment of the potential environmental impacts associated with the project. This section (**Table 5**) compares the potential impacts from the proposed modification against the approved project. The comparison uses the key environmental impacts assessed in the EA and summarises the relative change in environmental impacts associated with the proposed modification.

**Table 5**  
**Risk Assessment**

<i><b>Issue</b></i>	<i><b>Relative Change in Environmental Impact</b></i>	<i><b>Additional Management or Mitigation Measures Required</b></i>	<i><b>Significance of Issue with this Modification Proposal</b></i>
Air Quality (including Odour) Assessment	<p>One of the primary issues that was addressed in the original EA for the Shoalhaven Starches Expansion Project concerned the need for a comprehensive odour assessment and reduction as part of the project.</p> <p>GHD Pty Ltd have been engaged by Shoalhaven Starches to undertake an Air Quality Impact Assessment (AQIA) with respect to this Modification Proposal. A copy of GHD's assessment is included as <b>Annexure 5</b> to this EA.</p> <p>GHD identified two minor odour sources, the washing column D500 which is located on the vacuum column, and cooling towers.</p> <p>An insignificant increase of 0.06% was observed in the site OER due to the modification. The predicted odour impacts as a result of the proposal will not change and it is highly unlikely there will be an increase in odour detected at sensitive receptors.</p> <p>As a result, GHD predict that no discernible increase in perceived odour impacts would be evident as a result of the proposed modifications to the plant.</p>	The AQIA prepared by GHD does not identify the need for any additional management or mitigation measures.	Air quality impacts are further addressed in Section 8.3 of this EA.
Greenhouse Gas Emissions	Greenhouse gas emissions from the modification proposal would be predominantly associated with the electrical energy required for the operation of the plant, equipment and lighting. The proposal would not alter the total volume or tonnage of raw material transported to the site by train as it would merely substitute wheat deliveries in place of existing flour/mill mix deliveries. Consequently this potential emission source is considered to be negligible. The modification proposal would also not utilise steam during the process, and would not directly combust gas or any other fuels. Electricity would be used on site to operate lighting and equipment.	No additional management or mitigation measures proposed.	This was not a key issue identified by the SEARs for this project.

**Table 5 (continued)**

<i><b>Issue</b></i>	<i><b>Relative Change in Environmental Impact</b></i>	<i><b>Additional Management or Mitigation Measures Required</b></i>	<i><b>Significance of Issue with this Modification Proposal</b></i>
Wastewater Treatment	<p><b>Water Discharges</b></p> <p>The Shoalhaven Starches Factory and Environmental Farm are licensed premises under the Protection of the Environment Operations Act. Wastewater discharges from the site are licensed by the DEC (EPL 883).</p> <p>The plant has a licensed outfall into the Shoalhaven River. The outfall point is a 50 cm diameter metal pipe discharging at the end of an existing jetty. It also has a cooling water discharge comprising a 50 cm diameter pipe which discharges onto a gabion spillway.</p> <p>Under the terms of the Company's EPL water waste streams associated with the plant include:</p> <ul style="list-style-type: none"> <li>• river water passed through the boiler condensers and the primary side of the heat exchangers;</li> <li>• boiler water treatment plant regeneration waters; and</li> <li>• pH adjusted glucose plant ion exchange unit regeneration waters.</li> </ul> <p>All these must be discharged from the cooling water discharges.</p> <p>The limiting conditions in relation to these discharges include:</p> <ul style="list-style-type: none"> <li>• The volume of water discharged from the cooling water discharges must not exceed 100,000 kilolitres per day.</li> <li>• The waste waters discharged at both points shall not exceed a temperature of 32°C.</li> </ul> <p>This Modification Proposal will not involve any changes to these discharges waters.</p>	No additional management or mitigation measures proposed.	Not a key issue.



**Table 5 (continued)**

<i><b>Issue</b></i>	<i><b>Relative Change in Environmental Impact</b></i>	<i><b>Additional Management or Mitigation Measures Required</b></i>	<i><b>Significance of Issue with this Modification Proposal</b></i>
	<p><b>Site Stormwater Management</b>  <i>Existing Site Stormwater Management System</i>            Shoalhaven Starches existing site stormwater management system is divided into three zones. The zones are:</p> <ul style="list-style-type: none"> <li>• eastern portion of the site – all site stormwater is collected and pumped to the WWTP. During heavy rainfall events stormwater is passed through a first flush pit to remove gross solids and pollutants prior to discharge to the Shoalhaven River;</li> <li>• central portion of the site – all site stormwater is collected in pits and drainage channels and conveyed to the Environmental Farm WWTP. No stormwater from this zone is discharged to the Shoalhaven River; and</li> <li>• the Western portion of the site – all stormwater is collected and passed through a first flush system prior to discharge to the Shoalhaven River.</li> </ul>		<p>Not a key issue.            Refer <b>Annexure 10</b>.</p>
Effluent Irrigation and Storage	<p>The total flour processed on the site as a result of this proposal will not exceed the previously approved amount of 20,000 tpw. Consequently wastewater volumes will remain unchanged.</p> <p>The treatment and management of wastewater from the site is therefore not envisaged to be a key issue that will need consideration as part of the Environmental Assessment.</p> <p>No change in environmental impacts from that originally identified in EA.</p>	No additional management or mitigation measures proposed.	Not a key issue.

**Table 5 (continued)**

<i><b>Issue</b></i>	<i><b>Relative Change in Environmental Impact</b></i>	<i><b>Additional Management or Mitigation Measures Required</b></i>	<i><b>Significance of Issue with this Modification Proposal</b></i>
Site Contamination, Acid Sulphate Soils and Riverbank Stability	<p><b>Site Contamination</b></p> <p>The assessment by Coffeys identified the following potential contamination issues arising from historical and current activities undertaken at the site, in context to the proposed industrial development:</p> <ul style="list-style-type: none"> <li>• Localised petroleum hydrocarbon contamination adjacent the railway line to the south of the proposed ISO container storage area and railway siding.</li> <li>• Bonded Asbestos Containing Material (ACM) was noted in former topsoil beneath fill in the proposed cooling tower, evaporator and ISO container storage area, and bonded ACM was noted on the ground surface in the southern area of the former Dairy Farmers property, near the proposed railway siding.</li> <li>• Elevated zinc, anthracene and phosphorous concentrations within water situated in former treatment ponds.</li> </ul>	<p>To address the potentially unacceptable contamination issues in the remaining areas, Coffey recommends that the following additional assessment, management and remedial measures are implemented:</p> <ul style="list-style-type: none"> <li>• <i>Implementation of a management plan to manage risks to known asbestos impacts;</i></li> <li>• <i>The residual water within the treatment ponds will need adequate management prior to redevelopment. Manildra may want to further explore the applicability of irrigating this water on their adjacent environmental farm as long it meets their existing license conditions and they are allowed to transport it across.</i></li> <li>• <i>With respect to asbestos contamination in soil could be remediated through excavation and offsite disposal. The handling of asbestos impacted soil requires the preparation of an asbestos removal plan and licensed contractor. Following completion of removal activities, a clearance certificate would be issued by a suitably qualified asbestos consultant. Such work should be carried out by</i></li> </ul>	<p>Site Contamination is addressed further in Section 8.7 of this EA.</p>

**Table 5 (continued)**

<i>Issue</i>	<i>Relative Change in Environmental Impact</i>	<i>Additional Management or Mitigation Measures Required</i>	<i>Significance of Issue with this Modification Proposal</i>
		<p><i>appropriately qualified and licensed contractors in accordance with all relevant codes of practice and standards such as the National Occupational Health and Safety Commission (2005): Code of Practice for the Safe Removal of Asbestos (2nd Ed)[NOHSC:2002(2005).</i></p> <p><i>Alternatively, the asbestos impacts could be managed on site through onsite capping and containment. This could involve capping with a layer of 'clean' fill (with the inclusion of a warning layer) or capping with a pavement. This option may have practical implications as it would require increasing site levels and may not be costs effective. On site management would also require preparation of a site management plan that would need to be followed during and post construction for the life of the site, notation of the contamination such as on the planning certificate under Section 149 of the Environmental Planning and Assessment Act (1979) and/or Section 88B of the Conveyancing Act 1919 and the local Council would need to be consulted to see if they would accept such an option.</i></p>	

**Table 5 (continued)**

<b>Issue</b>	<b>Relative Change in Environmental Impact</b>	<b>Additional Management or Mitigation Measures Required</b>	<b>Significance of Issue with this Modification Proposal</b>
		<p><i>In the interim, the potential risks to site workers due to asbestos impact (both above and below ground) should be incorporated in existing management plans (alternatively a management plan should be developed). The management plan should outline how these asbestos impacts can be managed so the risk to site workers is reduced to an acceptable level.</i></p> <ul style="list-style-type: none"> <li><i>The ground surface in the south of Lot 143 area should be inspected by a competent person for the presence of ACM materials. If present, these materials should be removed in accordance with relevant NSW legislation.</i></li> <li><i>As direct assessment of all areas was not possible during this work, we recommend that observations be made during the demolition of the any existing plant for evidence of contamination. For example during removal of the diesel Above Ground Storage Tank (AST) near the proposed ethanol plant area.</i></li> </ul>	
	<p><b>Acid Sulphate Soils</b></p> <p>Based on previous investigations soils beneath depths of 2 m in the proposed car park, undertaken by Coffeys and 3 m in the central and western factory areas, are considered to be acid sulfate soils. At shallower depths, there is a low risk that acid sulfate soils are present,</p>	<p>Should the proposed development involve excavation of soils from depths greater than 2 m at the site, and/or dewatering that could result in a drop in the water table, this could also impact acid sulfate soils, then an</p>	<p>Acid Sulphate Soils are addressed in Section 8.8 of this EA.</p>

**Table 5 (continued)**

<i><b>Issue</b></i>	<i><b>Relative Change in Environmental Impact</b></i>	<i><b>Additional Management or Mitigation Measures Required</b></i>	<i><b>Significance of Issue with this Modification Proposal</b></i>
	however this may be influenced by the presence of fill within the site. Should dark grey, high plasticity estuarine clays be encountered in the current site at depths shallower than 3m, these soils should be considered potential acid sulfate soils unless otherwise tested.	acid sulfate management plan (ASSMP) should be developed and actioned. An ASSMP will present the approach and methodology of acid sulfate soil management at the site during the construction phase of the project which is to be followed by Shoalhaven Starches and/or their subcontractors.  The ASSMP should be prepared in accordance with the relevant sections of the 1998 ASS Manual prepared by ASSMAC. The detail of the ASSMP can be refined based on the likely volumes to be extracted. For small volumes a simple work plan may be sufficient. If possible, avoidance of disturbing the ASS is preferred.	
	<b><i>Riverbank Stability</i></b> Based on the proposed layout plan provided, the positions of the new structures and storage areas are relatively remote from the northern bank of the Shoalhaven River. According to Coffeys, any new heavily loaded structures should be supported on deep piled foundations to rock and therefore should not add any additional load to the soils behind the river bank, including the sections of river bank protected by the existing rock revetment wall and steel sheet pile walls.	<b><i>Riverbank Stability</i></b> In summary, according to Coffeys, the proposed structures and storage areas for the ethanol plant expansion should have no effect on the stability of the current river bank and banks of Abernethy's Creek provided the following general recommendations are complied with: <ul style="list-style-type: none"> <li>• All heavily loaded structures should be supported on deep foundation systems to rock so that no additional loads are applied to the soil mass close to the banks;</li> </ul>	Riverbank Stability is addressed in Section 8.9.2 of this EA.

**Table 5 (continued)**

<i>Issue</i>	<i>Relative Change in Environmental Impact</i>	<i>Additional Management or Mitigation Measures Required</i>	<i>Significance of Issue with this Modification Proposal</i>
		<ul style="list-style-type: none"> <li>• Cranes or other large temporary surface loads such as building materials should not be located within 10m of the river bank or within 5m of the Abernethy's Creek bank, unless a specific assessment of the crane loads and ground condition is carried out;</li> <li>• Construction activities that involve significant ground vibration such as pile driving should be avoided in close proximity to the river and Abernethy's Creek.</li> </ul>	
Noise	<p>Shoalhaven Starches are licensed under the POEOP Act (Environment Protection Licence No. 883) which sets noise limits for the operation of the overall factory complex. Noise goals have been designed for the site to ensure existing noise levels are not increased by additional plant. The noise goals for any new plant are 10 dBA below the EPL noise limits and range between 28 and 32 dBA depending upon the residential receptor location.</p> <p>The EA is supported by a Noise Impact Assessment prepared by Harwood Acoustics Pty Ltd. A copy of this assessment is included in <b>Annexure 6</b> to this EA. Noise Impacts are further addressed in Section 8.2 of this EA.</p> <p>Harwood Acoustics conclude in summary that noise emission from the modification proposal will comply with the design noise goal limits imposed on the overall Shoalhaven Starches factory complex by the EPL for the site providing noise control recommendations proposed by Harwood Acoustics are implemented.</p>	<p>The Noise Impact Assessment prepared by Harwood Acoustics makes the following recommendations in relation to this modification proposal:</p> <p><b>“Sound Level Design Goals</b></p> <p><i>Cooling Towers</i></p> <p><i>The cooling towers should have an individual sound power level of (<math>L_w</math>) <b>87 dBA</b> each (assumes six (6) will be installed).</i></p> <p><i>Evaporators</i></p> <p><i>The plant and equipment associated with the evaporators should not exceed a combined sound power level (<math>L_w</math>) of <b>90 dBA</b>.</i></p> <p><i>This equates to a sound pressure level of 73 dBA when measured at a distance of 3 metres from the evaporators for all noise producing</i></p>	<p>This issue has been identified by the SEARs.</p> <p>Noise impacts are further addressed in Section 8.2 of this EA.</p>

**Table 5 (continued)**

<b>Issue</b>	<b>Relative Change in Environmental Impact</b>	<b>Additional Management or Mitigation Measures Required</b>	<b>Significance of Issue with this Modification Proposal</b>
		<p>components of the evaporators combined.</p> <p><i>Beverage Grade Ethanol Plant</i></p> <p>The plant and equipment associated with the beverage grade ethanol plant should not exceed a combined sound power level (<math>L_w</math>) of <b>90 dBA</b>.</p> <p>This equates to a sound pressure level of 73 dBA when measured at a distance of 3 metres from the plant for all noise producing components combined.</p> <p>Once the noise level of the individual components of the evaporators and beverage grade ethanol plant are known, localised acoustical treatment can be designed to ensure the above design noise goals are met, if required.</p> <p>This may include silencers, specially selected flow valves or localised acoustical screening or enclosures.</p> <p><b>Construction Noise</b></p> <p>The Project Approval prescribes allowable operation hours for construction activities in Clause 11 and Clause 13, which states:-</p> <p>“During construction, the Proponent shall prepare and implement all reasonable and feasible measures to minimise the construction noise impacts of the project.”</p>	

**Table 5 (continued)**

<b>Issue</b>	<b>Relative Change in Environmental Impact</b>	<b>Additional Management or Mitigation Measures Required</b>	<b>Significance of Issue with this Modification Proposal</b>
		<p><i>It can be seen from Table 6 that the construction noise management levels are likely to be met at each receptor location during general construction activity, with the exception of piling. During piling (if required) there is potential for the noise management levels to be exceeded on some occasions. This is not considered a significant exceedance during day time hours for short and sporadic duration.</i></p> <p><i>However, a Construction Noise Management Plan may be provided in accordance with NSW EPA's Interim Construction Noise Guideline and to satisfy Condition 13 of the Project Approval.</i></p> <p><i>Construction noise mitigation measures are included in the Construction Safety &amp; Environmental Management Plan prepared by Shoalhaven Starches."</i></p>	
Transport & Traffic	<p>The SEARs for this project have identified that a traffic assessment is required to be undertaken in relation to this proposed modification. The EA is supported by a traffic impact assessment prepared by Anton Reisch Consulting (ARC) (<b>Annexure 8</b>).</p> <p>ARC conclude that the modification proposal is acceptable in regard to access, traffic and parking considerations. In summary:</p> <ul style="list-style-type: none"> <li>All vehicle access will be provided to existing access points to Bolong Road</li> </ul>	<p>The Traffic Assessment prepared by ARC makes the following recommendations:</p> <ul style="list-style-type: none"> <li><i>That the intersection of Bolong Road &amp; Dairy Driveway be upgraded with reference to the Concept Layout Plan and further to a Council approval of final design plans.</i></li> <li><i>That the Services Driveway continue to provide for emergency</i></li> </ul>	Traffic issues are further addressed in Section 8.6 of this EA.



**Table 5 (continued)**

<b>Issue</b>	<b>Relative Change in Environmental Impact</b>	<b>Additional Management or Mitigation Measures Required</b>	<b>Significance of Issue with this Modification Proposal</b>
	<ul style="list-style-type: none"> <li>The Modification provides for the further upgrade of the intersection of Bolong Road and the former Dairy Farmers Driveway to address existing design issues as identified by Council, to the satisfaction of Council. As agreed with Council, the Modification will remove the warrant for a left turn auxiliary lane, Bolong Road to former Dairy Farmers Driveway, as previously identified further to the construction of a Car Park on the former Dairy Farmers site.</li> <li>The Modification will result primarily in a redistribution of vehicle trips to the local road network rather than increases in vehicle trips to the local road network.</li> <li>The performance of all key intersections further to the Modification would remain good, with all intersections operating with minor delays and queues, and retaining significant spare capacity. As importantly, sensitivity testing of higher Bolong Road through movements indicates that the intersections would operate at the same general levels of service as identified in past assessments of (subsequently) approved modifications.</li> <li>The required staff car parking previously proposed in the Dairy Car Park will be relocated to the BOC Site, with an additional 60 parking spaces to be constructed to provide compliance with SSEP Approval.</li> <li>The construction of the proposed Modification infrastructure would have no significant impact on the operation of the local road network, generating minimal and temporary traffic flows to existing access points, and providing for all construction parking off-street.</li> </ul>	<p><i>emergency only access, with all vehicle trips associated with existing and future operations in the eastern part of the Starches Site to utilise the proposed new access road via Dairy Driveway.</i></p> <ul style="list-style-type: none"> <li><i>That all new parking spaces and parking aisles be designed with reference to AS 2890.1.</i></li> <li><i>That an appropriate Construction Traffic Management Plan be prepared to govern the construction of the proposed Modification infrastructure.</i></li> </ul>	

**Table 5 (continued)**

<b>Issue</b>	<b>Relative Change in Environmental Impact</b>	<b>Additional Management or Mitigation Measures Required</b>	<b>Significance of Issue with this Modification Proposal</b>
Hazards	<p>The SEARs for this project have identified that a Preliminary Hazard Analysis (PHA) is required to be undertaken in relation to this proposed modification which in effect updates the existing PHA with the new processes and additional equipment.</p> <p>Pinnacle Risk Management have been engaged to undertake a PHA in relation to this project.</p> <p>The risks associated with the proposed modifications have been assessed by Pinnacle and have been found to be acceptable when compared against the DoP risk criteria.</p> <p>Pinnacle also conclude that societal risk, area cumulative risk and environmental risk are also acceptable.</p> <p>According to Pinnacle the primary reasons for the low risk levels from the modifications are that significant levels of radiant heat from potential fires are contained on-site and the likelihood of catastrophic equipment failures leading to off-site impact from flash fires and explosions is acceptably low.</p>	<p>Pinnacle make The following recommendations. These do not include the process safety recommendations that were made during the HAZOP for the distillery.</p> <ol style="list-style-type: none"> <li><i>1. Provide means for a person to safely escape from elevated platforms should a fire occur.</i></li> <li><i>2. The control room structural integrity and emergency egress routes should be reviewed for adequacy in the event of a distillery pool fire.</i></li> <li><i>3. Ensure that the ethanol vapours from a road tanker when it is being filled are adequately contained.</i></li> </ol>	<p>This issue has been identified by DGRs as Key Issue.</p> <p>A PHA has been prepared for the Modification Proposal by Pinnacle Risk Pty Ltd and forms <b>Annexure 7</b> to this EA.</p>
Flooding	<p>The SEARs for this project have identified that a flood assessment is required to be undertaken in relation to this proposed modification.</p> <p>The EA is supported by a flood assessment prepared by WMA Water (<b>Annexure 4</b>).</p> <p>The proposed works do slightly decrease the amount of floodwaters from entering the northern floodplain across the river bank. Thus immediately upstream of the proposed works there is a slight increase in peak level. Though this increase in level is within the confines of land owned by Shoalhaven Starches. The potential impact of the proposed works is much reduced as they</p>	No additional management or mitigation measures proposed	<p>This is a key Issue identified by this SEARs. Flooding is further addressed in Section 8.4 of this EA.</p>

**Table 5 (continued)**

<b>Issue</b>	<b>Relative Change in Environmental Impact</b>	<b>Additional Management or Mitigation Measures Required</b>	<b>Significance of Issue with this Modification Proposal</b>
	<p>are sheltered behind existing buildings and structures that already inhibit the flow path.</p> <p>Downstream of the proposed works on the northern side of Bolong Road near the Bomaderry sewage treatment plant there is a reduction in peak level of up to 30mm. This occurs because the proposed works reduce slightly the amount of flood waters crossing Bolong Road and thus flood levels are slightly lowered.</p> <p>In conclusion WMA indicate that the proposed works do not increase the 1% AEP flood level on lands outside those owned by Shoalhaven Starches. Consequently it was not considered necessary to consider the cumulative effects of the proposed works as there is no significant incremental increase (greater than 0.015m) as a result of these works.</p>		
Waste Management	<p>The proposed modification to the Ethanol Distillery will not alter the way waste is managed on the site.</p> <p>No change in environmental impacts from that originally identified in EA.</p>	No additional management or mitigation measures proposed	Not a key issue.
Visual Impact	<p>The works associated with this modification, will be situated within the vicinity of existing industrial development of a similar scale to that which is proposed. Furthermore the appearance, scale and height of the development will be similar to existing structures located on the site.</p>	No additional management or mitigation measures proposed	<p>This is a key Issue identified by this EA.</p> <p>The visual impacts associated with this proposal are addressed in Section 8.5 of this EA.</p>
Flora and Fauna	<p>The proposed works associated with this modification will all be located within the factory site which is devoid of vegetation. The original Flora and Fauna Assessment carried out by Kevin Mills &amp; Associates for the Expansion Project did not identify any specific ecological constraints with this part of the site. The proposed</p>	No additional management or mitigation measures proposed.	Not a key issue.

**Table 5 (continued)**

<i><b>Issue</b></i>	<i><b>Relative Change in Environmental Impact</b></i>	<i><b>Additional Management or Mitigation Measures Required</b></i>	<i><b>Significance of Issue with this Modification Proposal</b></i>
	modification will not require any additional vegetation to be disturbed. No change in environmental impacts from that originally identified in EA.		
Heritage and Archaeological Issues	The proposed works associated with this modification will be located within the factory site which was not previously identified by the EA for the Shoalhaven Expansion Project as an area subject to either Aboriginal or European cultural heritage significance. The original Aboriginal Archaeological Assessment that supported the EA prepared by South East Archaeology did not identify any constraints with respect to this part of the site or this project. The proposed modifications will have no additional impact in terms of indigenous or non-indigenous heritage. No change in environmental impacts from that originally identified in EA.	No additional management or mitigation measures proposed.	Not a key issue.

Following the above risk assessment of the potential environmental impacts of the proposed modification the key issues for assessment (and including that identified by the DGRs for this project) are:

- Preliminary hazard analysis;
- Noise impacts;
- Air quality (and including odour) impacts;
- Flooding;
- Visual impact;
- Traffic;
- Acid sulphate soils;
- Riverbank stability;
- Site contamination.

## 8.0 KEY ISSUES

### 8.1 PRELIMINARY HAZARD ANALYSIS

This Modification Application is supported by a Preliminary Hazard Analysis prepared by Pinnacle Risk Management Pty Ltd (“Pinnacle”). A copy of this PHA forms **Annexure 7** to this EA. This section of the EA is based upon the findings of this assessment.

Pinnacle assesses the credible, potential hazardous events and corresponding risks associated with the Shoalhaven Starches proposed modifications to the ethanol distillery with the potential for off-site impacts only.

As the proposal changes the amounts of the different types of ethanol produced at the site but not the net volume then according to Pinnacle there is no net change in transport from the site. Therefore, transport is not reviewed by Pinnacle in detail.

In accordance with the approach recommended by the DoP in HIPAP 6 the underlying methodology adopted by Pinnacle is risk-based, that is, the risk of a particular potentially hazardous event is assessed as the outcome of its consequences and likelihood.

The PHA was conducted as follows:

- Initially, the proposed modifications and their location were reviewed to identify credible, potential hazardous events, their causes and consequences. Proposed safeguards were also included in this review;
- As the potential hazardous events are located at a significant distance from other sensitive land users, the consequences of each potential hazardous event were estimated to determine if there are any possible unacceptable off-site impacts;
- Included in the analysis is the risk of propagation between the proposed equipment and the adjacent processes; and
- If adverse off-site impacts could occur, assess the risk levels to check if they are within the criteria in HIPAP 4.

#### ***Hazard Identification***

##### *Hazardous Materials*

The hazardous materials involved with the modifications according to Pinnacle are:

- Ethanol;
- Ethanol streams containing impurities;
- Cooling tower dosing chemicals; and
- Packaged products such as starch.

#### Ethanol including the Impurities:

Ethanol is a Dangerous Good Class 3 flammable liquid. It is soluble in water.

Ethanol's flammability limits are LEL (lower explosive limit) 3.5% and UEL (upper explosive limit) 19%. The control measures regarding safe handling and storage of ethanol are similar to other Class 3 materials, eg. elimination of ignition sources, including static. It burns with a near colourless flame. The vapour is heavier than air and can accumulate in low points. Explosions of confined vapours are possible. Ethanol combustion produces carbon dioxide and carbon monoxide. Fires involving ethanol are normally extinguished with alcohol resistant foam.

The impurities in the ethanol, eg. the fusel oils, are at low concentrations only. The main issue with these impurities is odour which is why they need to be removed from the beverage grade ethanol.

#### Cooling Tower Dosing Chemicals:

It is proposed to use the same cooling water dosing chemicals that are currently used at the site. It is expected that the storage volumes will be relatively small, ie. drums to IBC's (intermediate bulk containers), and these will be stored within dedicated bunds to avoid any losses of containment impacting the environment or people. The dosing chemicals are to be located adjacent to the proposed cooling tower. Given the relatively small volumes and that all containers will be separately bunded then no further analysis of these materials is warranted.

#### ***Potential Hazardous Incidents Review***

In accordance with the requirements of *Guidelines for Hazard Analysis*, it is necessary to identify hazardous events associated with the facility's operations. As recommended in HIPAP 6, the PHA focuses on *"atypical and abnormal events and conditions. It is not intended to apply to continuous or normal operating emissions to air or water"*.

In keeping with the principles of risk assessments, credible, hazardous events with the potential for off-site effects have been identified. That is, "slips, trips and falls" type events are not included nor are non-credible situations such as an aircraft crash occurring at the same time as an earthquake.

The identified credible, significant incidents (in particular, with the potential for off-site impacts) for the proposed modifications are summarised in the Hazard Identification Word Diagram as identified in the PHA.

## ***Risk Analysis***

In accordance with HIPAP 6 Pinnacle indicate that the chosen analysis technique should be commensurate with the nature of the risks involved. Risk analysis could be qualitative, semi-quantitative or quantitative.

The typical risk analysis methodology attempts to take account of all credible hazardous situations that may arise from the operation of processing plants, etc.

Having identified all credible, significant incidents, risk analysis requires the following general approach for individual incidents:

$$\text{Risk} = \text{Likelihood} \times \text{Consequence}$$

The risks from all individual potential events are then summated to get cumulative risk.

For QRA (quantitative risk analysis) and hazard analysis, the consequences of an incident are calculated using standard correlations and probit-type methods which assess the effect of fire radiation, explosion overpressure and toxicity to an individual, depending on the type of hazard.

The approach adopted by Pinnacle to assess the risk of the identified hazardous events is scenario based risk assessment. The reason for this approach is the distances from the proposed modifications to residential and other sensitive land users are large and hence it is unlikely that any significant consequential impacts, eg. due to radiant heat from fires, from the facility will have any significant contribution to off-site risk.

The risk criteria applying to developments in NSW are summarised in **Table 6**.

**Table 6**  
**Risk Criteria, New Plants**

<b><i>Description</i></b>	<b><i>Risk Criteria</i></b>
Fatality risk to sensitive uses, including hospitals, schools, aged care	0.5 x 10 <sup>-6</sup> per year
Fatality risk to residential and hotels	1 x 10 <sup>-6</sup> per year
Fatality risk to commercial areas, including offices, retail centres, warehouses	5 x 10 <sup>-6</sup> per year
Fatality risk to sporting complexes and active open spaces	10 x 10 <sup>-6</sup> per year
Fatality risk to be contained within the boundary of an industrial site	50 x 10 <sup>-6</sup> per year
Injury risk – incident heat flux radiation at residential areas should not exceed 4.7 kW/m <sup>2</sup> at frequencies of more than 50 chances in a million per year or incident explosion overpressure at residential areas should not exceed 7 kPa at frequencies of more than 50 chances in a million per year	50 x 10 <sup>-6</sup> per year



**Table 6 (continued)**

<i><b>Description</b></i>	<i><b>Risk Criteria</b></i>
Toxic exposure - Toxic concentrations in residential areas which would be seriously injurious to sensitive members of the community following a relatively short period of exposure	10 x 10 <sup>-6</sup> per year
Toxic exposure - Toxic concentrations in residential areas which should cause irritation to eyes or throat, coughing or other acute physiological responses in sensitive members of the community	50 x 10 <sup>-6</sup> per year
Propagation due to Fire and Explosion – exceed radiant heat levels of 23 kW/m <sup>2</sup> or explosion overpressures of 14 kPa in adjacent industrial facilities	50 x 10 <sup>-6</sup> per year

As discussed above, the consequences of the potential hazardous events are initially analysed to determine if any events have the potential to contribute to the above-listed criteria and hence worthy of further analysis.

### ***Pool Fire Incidents***

#### ***Fires Consequence Analysis***

The credible hazardous events associated with the proposed modifications are largely according to Pinnacle pool fires due to potential losses of containment being ignited. A discussion on burndown rates and surface emissive powers (SEP) is given below.

#### ***Burndown Rates:***

For burning liquid pools, heat is transferred to the liquid via conduction, radiation and from the pool rim.

Wind can also affect the burning rate (experiments have shown both an increase and decrease in burning rates due to the effects wind) but also can affect flame stability (and hence average flame emissive power). Therefore, average reported values for burndown rates are used in this study.

For very large pool fires with diameters greater than 5 to 10 m, there is some evidence of a decrease in burning rate.

Experimental data for the ethanol burndown rate is 1 mm/min.

The burning rate is used in the determination of flame height. Normally, the higher the burning rate, the higher the estimated flame height.

#### ***Surface Emissive Power:***

Surface emissive power can be either derived by calculation or by experimentation. Unfortunately, experimental values for surface emissive powers are limited.

When calculated, the results can be overly conservative, particularly for large diameter fires, as it is assumed that the entire flame is at the same surface emissive power. This is not the case for large diameter fires as air entrainment to the centre of the flame is limited and hence inefficient combustion occurs.

For ethanol, a literature search indicates the following data:

SEPs of 50 kW/m<sup>2</sup> for large fires (pool diameter => 25 m) and 60 kW/m<sup>2</sup> for pool fires less than 25 m in diameter appear reasonable.

For assessment of the effects of radiant heat, it is generally assumed that if a person is subjected to 4.7 kW/m<sup>2</sup> of radiant heat and they can take cover within approximately 20 seconds then no serious injury, and hence fatality, is expected. However, exposure to a radiant heat level of 12.6 kW/m<sup>2</sup> can result in fatality for some people for limited exposure durations. Therefore, for the larger spills, appropriate emergency response actions are required to minimise the potential for harm to people. This should include moving people away from such releases to a safe distance.

Given that the 12.6 kW/m<sup>2</sup> contour remains on site for all ethanol pool fire scenarios and the large separation distance to the nearest residential area (approximately 500 m) then the following risk criteria according to Pinnacle are satisfied:

- The risk criteria for fatality and injury in residential area; and
- The risk criterion for fatality in neighbouring industrial and commercial facilities as well as open spaces.

The risk of propagation due to fires to neighbouring industrial areas (ie. exceeding 23 kW/m<sup>2</sup>) is not expected given this contour remains on site. Therefore, the criterion of 50 x 10<sup>-6</sup>/year for industrial propagation risk for exceeding 23 kW/m<sup>2</sup> is satisfied for fire events.

Given the limited off-site radiant heat impact as above, no further risk analysis of the identified ethanol pool fire scenarios is warranted according to Pinnacle as compliance with the DoPE criteria has been demonstrated.

### ***Jet Fires***

The majority of the ethanol process operates at a partial vacuum. Therefore, should a leak occur, air will be drawn into the process. If a source of ignition was present then a confined explosion would occur. This is an unlikely event as there are no normal sources of ignition within the equipment.

Once the partial vacuum is lost then the process will not continue to operate as per the design intent. The energy sources to generate the ethanol product are lost, e.g. the overheads from one column provides the reboiler duty for another column.

As the first rectification column is the only ethanol vapour process that operates above atmospheric pressure then leaks in vessels and piping may result in a jet fire (if ignited). The first rectifier operates at 1.1 barg at the top of the column (where the highest concentration of ethanol exists). The bottom of this column contains mostly water and impurities (spent feints) and only 0.03% ethanol, ie. it is not flammable.

A jet fire for a 50 mm hole is modelled in this study to determine if adverse off-site impacts can occur. If a catastrophic pipe failure was to occur then the column pressure would be lost and the process would be unable to continue to operate. Therefore, a catastrophic pipe break is not modelled.

Pinnacle have undertaken an analysis of a potential jet fire from the first rectification column. The ethanol pressure is taken as 1.1 barg at 98 C. Whilst the top of the column is approximately 29 m above ground level, the concentrated ethanol vapour is piped close to ground level. Therefore, jet fires can occur close to ground level and impact people.

The distance from the first rectification column to Bolong Road is approximately 21 m. For a vertical jet fire, the radiant heat flux is estimated to be 1 kW/m<sup>2</sup> at this location (it will be less for a horizontal jet fire). According to Pinnacle this low level of radiant heat, no adverse off-site impact from a potential ethanol vapour jet fire is expected. Therefore, no further analysis of jet fires from the distillery is performed.

### ***Flash Fires and Vapour Explosions***

#### ***Flash Fires and Vapour Explosions - Distillery***

Delayed ignition of ethanol vapour from the first rectification column can result in a flash fire or a vapour cloud explosion if confined).

There are two credible cases for a flash fire:

1. Release from a 50 mm hole with delayed ignition; and
2. Catastrophic equipment failure with a release of the ethanol vapour within the first rectification column and overhead piping.

According to Pinnacle ALOHA predicts the LEL may reach up to 18 m away from the point of release. As this is less than the distance to the site boundary (21 m), then no adverse off-site impact from a potential ethanol flash fire is expected from a continuous release

from a 50 mm hole or smaller. Therefore, no further analysis of jet fires from holes in piping or equipment in the distillery is performed.

For catastrophic piping and column failures, the quantity of ethanol that can be released and form a flammable cloud is estimated to be 423 kg.

According to Pinnacle the catastrophic release likelihood is estimated as follows:

$$\begin{aligned}\text{Release likelihood} &= \text{Piping failure} + \text{column failure} + \text{condenser failure} \\ &= (0.1 \times 10^{-7}/\text{m.yr} \times 40 \text{ m}) + (2 \times 1 \times 10^{-6}/\text{yr}) \\ &= 2.4 \times 10^{-6}/\text{yr}\end{aligned}$$

Given a probability of ignition for the vapour cloud of 0.07 or less the likelihood of the ethanol vapour cloud forming a flash fire or an explosion is:

$$\begin{aligned}\text{Flash Fire / Explosion Likelihood} &= 2.4 \times 10^{-6}/\text{yr} \times 0.07 \\ &= 1.7 \times 10^{-7}/\text{yr}\end{aligned}$$

The probability for weather / wind conditions should also be taken into account, however, as the above value is less than all the Department of Planning HIPAP 4 criteria then the risk of this event is acceptable and no further analysis is warranted.

#### Vapour Explosions due to Tank Overfills

There are two notable incidents involving releases of flammable liquids that have resulted in unconfined vapour explosions as follows:

- One of the most recent incidents occurred at the fuel storage facility at Buncefield, UK. In the early hours of Sunday 11th December 2005, a number of explosions occurred at Buncefield Oil Storage Depot, Hemel Hempstead, Hertfordshire. At least one of the initial explosions was of massive proportions and there was a large fire, which engulfed a high proportion of the site. Over 40 people were injured; fortunately there were no fatalities. The explosion was the result of a large loss of containment of flammable liquid.
- Another similar incident occurred at the Texaco Newark storage facility, January 7 (ie. during winter again), 1983. The tanks involved here had little level protective instrumentation; tank level was primarily achieved via frequent dipping with subsequent checklist completion. The material was super unleaded gasoline. During a transfer operation, one tank overflowed at approximately midnight and a vapour cloud formed. It travelled approximately 300 metres towards an incinerator (most likely source of ignition given eye-witness reports) and then exploded. There was one fatality and twenty four people injured.

Issues in common with two events are:

- Overflow from height, spraying of the flammable liquid causing a mist;
- Cold ambient temperatures (Buncefield approximately -2 deg Cel, similarly for Newark);
- Low wind speeds (eg. Buncefield - Pasquill stability class F);
- Rolling mist (eg. Buncefield - 5 to 7 metres high mist with confinement, i.e. between buildings and amongst trees);
- Delayed ignition; and
- Large amounts lost - Buncefield approximately 300 tes and Newark approximately 450 tes.

The following, summarised recommendations are from the Buncefield Safety Task Group's investigation. Comment is included on their applicability to the Shoalhaven Starches ethanol tank storage area.

- The overall systems for tank filling control need to be of high integrity, with sufficient independence to ensure timely and safe shutdown to prevent tank overflow and the overall systems for tank filling control meet AS 61511. *This will be achieved via tank differential pressure level monitoring with alarm, independent local level monitoring and an independent high level trip which stops the ethanol feed to the new tanks.*
- Management systems for maintenance of equipment and systems to ensure their continuing integrity in operation. *Shoalhaven Starches have a safety management system which includes equipment item maintenance, including instrumentation testing, requirements. This system will be modified to suit the project requirements.*
- Fire-safe shut-off valves should be used and remotely operated shut-off valves (ROSOVs) should be installed on tank outlets. *Shoalhaven Starches plan to use fire-safe valves and install ROSOVs on the tanks inlet and outlet lines.*
- Bunds are to be leak tight and the bund compliant with AS1940. *These recommendations are consistent with the Shoalhaven Starches bund designs. The existing bunds integrity will be checked and fixed if necessary during the project.*
- Site-specific planning of firewater management and control measures should be undertaken. *Firewater containment is afforded by the tank bunds and on-site waste water containment facilities. Beyond these measures, further emergency response is required.*
- Procedures exist for defining roles, responsibilities and competence, staffing and shift work arrangements (eg. managing fatigue), shift handover, organisational change and

management of contractors, performance evaluation and process safety performance measurement including procedures for investigation of incidents and near misses, and auditing. *Shoalhaven Starches have a safety management system which includes these requirements. This system will be modified to suit the project requirements.*

- Emergency procedures exist inclusive of firefighting requirements. *Shoalhaven Starches have an emergency response plan for their site which will be modified for the project.*

In summary, unconfined vapour cloud explosions resulting from the spillage of a hydrocarbon at ambient temperature and below its boiling point are rare. If enough hydrocarbon is spilt, particularly from height with low wind speeds to minimise dilution, then a vapour cloud is possible.

Given the measures proposed at the Shoalhaven Starches site, the expected likelihoods for these types of events are still expected by Pinnacle to be rare and therefore do not pose significant off-site risks.

### ***Cumulative and Propagation Risk***

Given that significant levels of radiant heat from potential pool fires remain on-site and that the likelihood of a catastrophic failure leading to a flash fire or explosion is acceptably low then according to Pinnacle it is reasonable to conclude that the modified development does not make a significant contribution to the existing cumulative risk in the area.

Of the on-site risk propagation events, the main concern is the impact on the control room from potential pool fires in the distillery. During the HAZOP for the distillery, it was recommended to drain the distillery bund floor to a remote impoundment basin (or similar) to avoid ethanol pooling and hence a sustained fire. This recommendation is not reproduced in by Pinnacle. However, the control room structural integrity and emergency egress routes should be reviewed for adequacy in the event of a distillery pool fire.

Propagation from bund fires to adjacent equipment is possible. Bund fire likelihoods are approximately  $1 \times 10^{-5}/\text{yr}$  and hence are normally acceptable provided good practice is achieved. For this site, compliance with the Australian Standards will be done.

### ***Societal Risk***

The criteria in HIPAP 4 for individual risk do not necessarily reflect the overall risk associated with any proposal. In some cases, for instance, where the 1 pmpy contour approaches closely to residential areas or sensitive land uses, the potential may exist for

multiple fatalities as the result of a single accident. One attempt to make comparative assessments of such cases involves the calculation of societal risk.

Societal risk results are usually presented as F-N curves, which show the frequency of events (F) resulting in N or more fatalities. To determine societal risk, it is necessary to quantify the population within each zone of risk surrounding a facility. By combining the results for different risk levels, a societal risk curve can be produced.

According to Pinnacle the modified Shoalhaven Starches site, the risk of off-site fatality mostly is below the HIPAP 4 risk criteria. As the nearest house is approximately 500 m away, the concept of societal risk applying to populated areas is therefore not applicable for this project.

### ***Risk to the Biophysical Environment***

The main concern for risk to the biophysical environment is generally with effects on whole systems or populations. For this site, it is suitably located away from residential areas. However, due to the nature of the activities, there are operations, eg. product transfers and road tanker filling, where losses of containment can potentially impact the environment.

For the proposed modifications, there are no solid or gaseous effluents that could significantly impact the environment.

Spills of ethanol from the process equipment, tanks, adjacent piping and road tanker filling bay are to be contained in the bunds and sumps. The bunded areas are to be sized to contain the entire contents of the single tank so that a total loss of contents does not spill over the bund, plus an allowance for rainwater, fire water, hosing down etc. Should the proposed secondary containment fail, Shoalhaven Starches have a drainage system that collects and transfers all waste liquids to their treatment plant at their farm on the north side of Bolong Road. Any major on-site spills can be contained here.

Whereas any adverse effect on the environment is obviously undesirable, the results of this study show that the risk of losses of containment is broadly acceptable.

### ***Conclusion and Recommendations***

The risks associated with the proposed modifications at the Shoalhaven Starches Bomaderry site have been assessed and compared by Pinnacle against the DoP risk criteria.

The results are as follows in **Table 7** and show compliance with all risk criteria.

**Table 7**  
**Results**

<i><b>Description</b></i>	<i><b>Risk Criteria</b></i>	<i><b>Risk Acceptable?</b></i>
Fatality risk to sensitive uses, including hospitals, schools, aged care	$0.5 \times 10^{-6}$ per year	Yes
Fatality risk to residential and hotels	$1 \times 10^{-6}$ per year	Yes
Fatality risk to commercial areas, including offices, retail centres, warehouses	$5 \times 10^{-6}$ per year	Yes
Fatality risk to sporting complexes and active open spaces	$10 \times 10^{-6}$ per year	Yes
Fatality risk to be contained within the boundary of an industrial site	$50 \times 10^{-6}$ per year	Yes
Injury risk – incident heat flux radiation at residential areas should not exceed $4.7 \text{ kW/m}^2$ at frequencies of more than 50 chances in a million per year or incident explosion overpressure at residential areas should not exceed 7 kPa at frequencies of more than 50 chances in a million per year	$50 \times 10^{-6}$ per year	Yes
Toxic exposure - Toxic concentrations in residential areas which would be seriously injurious to sensitive members of the community following a relatively short period of exposure	$10 \times 10^{-6}$ per year	Yes
Toxic exposure - Toxic concentrations in residential areas which should cause irritation to eyes or throat, coughing or other acute physiological responses in sensitive members of the community	$50 \times 10^{-6}$ per year	Yes
Propagation due to Fire and Explosion – exceed radiant heat levels of $23 \text{ kW/m}^2$ or explosion overpressures of 14 kPa in adjacent industrial facilities	$50 \times 10^{-6}$ per year	Yes

Societal risk, area cumulative risk and environmental risk is also concluded to be acceptable.

The primary reasons for the low risk levels from the modifications are that significant levels of radiant heat from potential fires are contained on-site and the likelihood of catastrophic equipment failures leading to off-site impact from flash fires and explosions is acceptably low.

The following recommendations are made by Pinnacle. These do not include the process safety recommendations that were made during the HAZOP for the distillery.

1. *Provide means for a person to safely escape from elevated platforms should a fire occur.*



2. *The control room structural integrity and emergency egress routes should be reviewed for adequacy in the event of a distillery pool fire.*
3. *Ensure that the ethanol vapours from a road tanker when it is being filled are adequately contained.*

## **8.2 NOISE IMPACTS**

The area surrounding Shoalhaven Starches is a mix of commercial, industrial and residential premises with vacant land, owned by the Manildra Group, to the north.

The nearest residential locations to the complex are as follows:

- Location 1 – Nobblers Lane, Terara approximately 1450 metres to the south east;
- Location 2 – Riverview Road, Nowra approximately 1125 metres to the south west;
- Location 3 – Meroo Street, Bomaderry approximately 630 metres to the north west;
- Location 4 – Coomea Street, Bomaderry approximately 700 metres to the north west.

The above locations are listed in the order shown in the Environmental Protection Licence for the site.

This Modification Application is supported by a Noise Impact Assessment prepared by Harwood Acoustics. A copy of the Noise Impact Assessment prepared by Harwood Acoustics forms **Annexure 6** to this EA. This section of the EA is based upon the findings of this assessment.

### **8.2.1 Acoustic Criteria**

#### ***NSW Department of Planning and Environment***

##### ***Existing Project Approval***

Project Approval for Application No. 06\_0228, provided by the Minister for Planning, dated January 2009, Schedule 2, Condition 2, 'Terms of Approval' states:

*"The proponent shall carry out the project generally in accordance with the:*

- a) EA and associated site plans (see Appendix 2);*
- b) Statement of commitments; and*
- c) Conditions of this approval."*

The original Project Approval incorporates noise mitigation measures recommended in the 'Acoustical Assessment, Proposed Ethanol Upgrade, Shoalhaven Starches' – prepared by The Acoustic Group Pty Ltd, ref 38.3849.R52:ZJM, dated 26 June 2008. This document forms part of the EA and statement of commitments and it is implicit that

the noise control recommendations within this document are required to be implemented as part of the Project Approval.

Schedule 3, Conditions 11 to 14 inclusive of the Project Approval, also refer to noise emission and are summarised as follows:

Condition 11 relates to restricted hours of construction activities. Condition 12 reiterates the noise limits contained with Environment Protection Licence 883. Condition 13 requires that all feasible and reasonable noise mitigation measures must be implemented during the construction phase of the project. Condition 14 required the preparation of a noise management plan.

#### *Existing Project Approval*

In response to a request for information relating to noise emission from the proposed modification, the NSW Department of Planning and Environment requires an assessment of the potential for noise impact.

#### **Environment Protection Licence 883**

Shoalhaven Starches operates under Environment Protection Licence 883 issued by the NSW Office of Environment and Heritage.

Section L5 'Noise Limits' of this licence states:

*"L5.1 the  $L_{A10}$  (15min) sound pressure level contribution generated from the premises must not exceed the following levels when measured at or near the boundary of any residential premises:*

- a) 38 dBA at locations in Terara on the south side of the Shoalhaven River;*
- b) 38 dBA at locations in Nowra on the south side of the Shoalhaven River;*
- c) 42 dBA at locations in Meroo Street, Bomaderry;*
- d) 40 dBA at other locations in Bomaderry."*

These noise limits apply to the overall operation of the Shoalhaven Starches complex.

The Shoalhaven Starches complex, neighbouring properties and nearby residential locations are shown on the attached site plan in **Figure 5**.



**Figure 4: Location of closest receptors to subject site as per EPL (Harwood Acoustics).**

### ***Shoalhaven Starches Noise Management Plan***

The Project Approval for the Shoalhaven Starches Expansion Project required the preparation of a Noise Management Plan to address and manage noise emissions from the Expansion Project.

The Shoalhaven Starches Noise Management Plan originally prepared 31 October 2009 and revised 7 September 2010 addresses, among other things, acoustic criteria relating to the Shoalhaven Starches complex and any new developments associated with the expansion project. Section 3 of the plan lists noise limits from the Environmental Protection Licence as shown in Section 4.1 above and states:

*“Compliance testing conducted on a regular basis on behalf of the Mill [Shoalhaven Starches complex] has found noise emission from the premises satisfies the EPA criteria as a result of works on the Shoalhaven Starches site. In order to ensure that there is no increase in noise emission from the subject premises, with respect to the noise criteria nominated by the EPA in License Condition 6.3 [now 5.1], the design goal for such additional plant should be at least 10 dB below the criteria nominated by the EPA.”*

### **EPA Construction Noise Guideline**

The NSW EPA published the *Interim Construction Noise Guideline* in July 2009. While some noise from construction sites is inevitable, the aim of the Guideline is to protect the majority of residences and other sensitive land uses from noise pollution most of the time.

The Guideline presents two ways of assessing construction noise impacts; the quantitative method and the qualitative method.

The quantitative method is generally suited to longer term construction projects and involves predicting noise levels from the construction phase and comparing them with noise management levels given in the guideline.

The qualitative method for assessing construction noise is a simplified way to identify the cause of potential noise impacts and may be used for short-term works, such as repair and maintenance projects of short duration.

In this instance the entire construction phase may take several months although significant noise producing aspects, such as piling, if required, will last a total of approximately two weeks. Consideration is given to the potential for noise impact from construction activities on residential receptors in Section 6 of this report.

Table 2 in Section 4 of the Guideline sets out noise management levels at affected residences and how they are to be applied during normal construction hours. The noise management level is derived from the rating background level (RBL) plus 10 dB in accordance with the Guideline. This level is considered to be the 'noise affected level' which represents the point above which there may be some community reaction to noise.

Harwood Acoustics has carried out numerous noise surveys in Nowra, Bomaderry and Terara and has found daytime background noise levels range between 33 and 40 dBA depending on the location, as shown in **Table 8** below.

**Table 8**  
**Rating Background Levels**

<b>Noise Measurement Location</b>	<b>Time Period</b>	<b>Rating Background Level</b>
135 Terara Road, Terara March 2012	Day (7 am to 6 pm)	<b>33 dBA</b>
55 Terara Road, Nowra February 2015	Day (7 am to 6 pm)	<b>36 dBA</b>
Cambewarra Rd, Bomaderry July 2010	Day (7 am to 6 pm)	<b>40 dBA</b>
Shoalhaven Village Caravan Park, Nowra March 2012	Day (7 am to 6 pm)	<b>40 dBA</b>

For the purpose of determining the potential for community reaction to noise emission from construction activities, previously measured background noise levels in the vicinity of each receptor location have been used to determine the noise management levels as shown in **Table 9** below.

**Table 9**  
**L<sub>eq</sub> Noise Management Levels from Construction Activities**

<b>Receptor Location</b>	<b>Noise Management Level</b>	<b>How to Apply</b>
Location 1 (Terara)	<b>43 dBA</b> (33 + 10)	<p>The noise affected level represents the point above which there may be some community reaction to noise.</p> <ul style="list-style-type: none"> <li>Where the predicted or measured L<sub>Aeq</sub> (15 min) noise level is greater than the noise affected level, the proponent should apply all feasible and reasonable* work practices to meet the noise affected level.</li> <li>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.</li> </ul>
Location 2 (Nowra)	<b>50 dBA</b> (40 + 10)	
Locations 3 & 4 (Bomaderry)	<b>48 dBA</b> (38 + 10)	
	<b>Highly noise affected</b> <b>75 dB(A)</b>	<p>The highly noise affected level represents the point above which there may be strong community reaction to noise.</p> <ul style="list-style-type: none"> <li>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: <ol style="list-style-type: none"> <li>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)</li> <li>if the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.</li> </ol> </li> </ul>

### **Project Specific Noise Criteria**

When all the above factors are considered, Harwood Acoustics indicate the most stringent noise criteria for the proposed modifications are as follows:

Operational Phase (Environment Protection Licence noise limits less 10 dB) -

- 28 dBA (L10, 15 minute) at locations in Terara on the south side of the Shoalhaven River;
- 28 dBA (L10, 15 minute) at locations in Nowra on the south side of the Shoalhaven River;
- 32 dBA (L10, 15 minute) at locations in Meroo Street, Bomaderry;

- 30 dBA (L10, 15 minute) at other locations in Bomaderry.

#### Construction Phase Noise Management Levels

- 43 dBA (Leq, 15 minute) at locations in Terara;
- 48 dBA (Leq, 15 minute) at locations in Bomaderry; and
- 50 BA (Leq, 15 minute) at locations in Nowra.

The residential criteria apply at the most-affected point on or within the residential property boundary or, if that is more than 30 metres from the residence, at the most-affected point within 30 metres of the residence. For upper floors, the noise is assessed outside the nearest window.

### 8.2.2 Ethanol Plant Modification Noise Emission

#### ***Plant and Equipment Source Noise Levels***

The main sources of noise associated with the modification proposal, according to Harwood Acoustics, will be the cooling towers, evaporators, pumps, motors and valves associated with the beverage grade ethanol plant and the intermittent forklift truck operating in the new emergency ISO container yard.

**Table 10** below provides a schedule of overall 'A' frequency weighted sound power levels, in decibels re: 1 pW, of noise sources associated with proposed modification. These are derived from manufacturer's data, previously measured noise levels of indicative plant and equipment and the author's data base of similar items of plant and equipment.

**Table 10**  
**L<sub>10</sub> Sound Power Levels – Plant and Equipment**

<b><i>Description</i></b>	<b><i>L<sub>10, 15 minute</sub> Sound Power Level (dBA)</i></b>
Cooling Towers x 1 (Low Noise – Baltimore)	<b>87</b>
32 tonne forklift movement	<b>104</b>
Evaporators (combined)	<b>90</b>
Beverage Grade Ethanol Plant (combined)	<b>90</b>
Syrup Tank	<b>80</b>
Substation	<b>64</b>

## **Noise Level Predictions**

### Modelling Equations

For all outdoor noise sources, the external noise level at each receptor has been calculated by Harwood Acoustics from the formula:

$$L_{eq} = L_w + Dc - A$$

Where:

$L_w$  is the sound power level of the noise source;

$Dc$  is directivity correction; and

$A$  is the attenuation that occurs during the propagation from source to receiver.

The term  $A$  in the equation includes attenuation from geometric divergence (distance loss), atmospheric absorption, ground absorption, barrier effects and miscellaneous other effects.

This model derives from the International Standard ISO 9613-2 (1996(E)) '*Acoustic – Attenuation of sound during propagation outdoors Part 2 General method of calculation*'.

The method described in the Standard is general in the sense that it may be applied to a wide variety of noise sources, and covers the major mechanism of sound attenuation. The method allows for propagation conditions with the wind blowing from the source to the receiver.

The modification also includes the construction of two new rail sidings adjacent to the existing rail sidings near to the former Dairy Farmers site as well as the construction of two new car parking areas on the northern side of Bolong Road, the decommissioning of an existing pump house and the replacement of these with a previously approved pump house.

The rail sidings will be used for scheduled maintenance of the locomotives and stock (carriages / wagons) and will allow for a greater capacity of stationary wagons to be stored in this area. There will be no new noise producing aspects associated with the rail sidings.

Similarly, with the car parking areas and replacement of pump motors, there will be no noise producing aspects associated with these components of the proposal that are not currently part of existing operations at Shoalhaven Starches facility.

### Predicted Noise Levels

Predicted noise levels at each receptor location are shown in **Table 11** below.

**Table 11**  
**Predicted Noise Levels at Receptor Locations**

<i>Description</i>	<i>Predicted Noise Level L<sub>10, 15 minute</sub> (dBA) at Receptor Location</i>			
	<i>Location 1</i>	<i>Location 2</i>	<i>Location 3</i>	<i>Location 4</i>
Cooling towers	21	24	24	22
Forklift	22	24	23	26
Evaporators	16	19	20	22
Beverage Grade Ethanol Plant	< 15	< 5	16	20
Syrup Tank	< 10	15	< 10	< 10
Substation	< 10	< 10	< 10	< 10
Combined	26	27	28	29
Design Noise Goal (L <sub>10, 15 minute</sub> )	28	28	32	30
Complies	✓	✓	✓	✓

The calculations and predictions in **Table 11** consider distance loss to each receptor as well as the following:

- Recommendations with regard to maximum allowable sound levels are achieved and adhered to;
- Barrier attenuation from existing site structures for various items of plant and equipment;
- Manufacturer's sound power levels are achieved; and
- Ground absorption to receptor R1 only.

It can be seen from the predicted noise levels in **Table 11** that the design noise goals for this proposal can be met without the need for additional noise controls, this is providing that the assumed power levels for individual plant and equipment are achieved.

### ***Construction Noise Emission***

The construction works will consist of piling, pouring of concrete slabs for the cooling towers, evaporators, substation and road base for the emergency ISO container yard, construction of the rail sidings and the erection and installation of the ethanol plant and equipment.

**Table 12** below shows a schedule of sound power levels for typical construction equipment.



**Table 12**  
**Construction Equipment – L<sub>eq</sub> Sound Power Levels**

<i>Description</i>	<i>L<sub>eq</sub> Sound Power Level (dBA)</i>
Piling Rig	118
Mobile Crane (Diesel)	110
30 Tonne Excavator (with rail attachments)	110
Concrete Truck / Pump	105
Traxcavator	100
Dump Truck	110
Grinder	105
Power Saw	101

**Table 13** below shows the predicted level of potential noise emission from construction activities at each of the receptor locations.

**Table 13**  
**Predicted Noise Levels at Receptor Locations – Construction Phase**

<i>Description</i>	<i>Predicted Noise Level L<sub>eq, 15 minute</sub> (dBA) at Receptor Locations</i>			
	<i>Location 1</i>	<i>Location 2</i>	<i>Location 3</i>	<i>Location 4</i>
Construction Activity*	40 – 46	41 – 47	45 – 51	44 – 50
Acceptable Noise Limit (L <sub>eq, 15 minute</sub> )	43	50	48	48
Complies	No + 6 dB (during piling)	Yes	No + 3 dB (during piling)	No + 2 dB (during piling)

\* Range provided with and without piling activity.

### 8.2.3 Recommended Noise Controls

Based upon the noise modelling and predictions prepared by Harwood Acoustics the noise design goals can be met without the need for additional noise controls. This is providing that maximum allowable sound levels for individual items of plant are achieved.

#### ***Sound Level Design Goals***

##### *Cooling Towers*

The cooling towers should have an individual sound power level of (L<sub>w</sub>) **87 dBA** each (assumes six (6) will be installed).

### Evaporators

The plant and equipment associated with the evaporators should not exceed a combined sound power level ( $L_w$ ) of **90 dBA**.

This equates to a sound pressure level of 73 dBA when measured at a distance of 3 metres from the evaporators for all noise producing components of the evaporators combined.

### Beverage Grade Ethanol Plant

The plant and equipment associated with the beverage grade ethanol plant should not exceed a combined sound power level ( $L_w$ ) of **90 dBA**.

This equates to a sound pressure level of 73 dBA when measured at a distance of 3 metres from the plant for all noise producing components combined.

Once the noise level of the individual components of the evaporators and beverage grade ethanol plant are known, localised acoustical treatment can be designed to ensure the above design noise goals are met, if required.

This may include silencers, specially selected flow valves or localised acoustical screening or enclosures.

### **Construction Noise**

The Project Approval prescribes allowable operation hours for construction activities in Clause 11 and Clause 13, which states:

*“During construction, the Proponent shall prepare and implement all reasonable and feasible measures to minimise the construction noise impacts of the project.”*

It can be seen from **Table 13** that the construction noise management levels are likely to be met at each receptor location during general construction activity, with the exception of piling. During piling (if required) there is potential for the noise management levels to be exceeded on some occasions. This is not considered a significant exceedance during day time hours for short and sporadic duration.

However, a Construction Noise Management Plan may be provided in accordance with NSW EPA's Interim Construction Noise Guideline and to satisfy Condition 13 of the Project Approval.

Construction noise mitigation measures are included in the Construction Safety & Environmental Management Plan prepared by Shoalhaven Starches.

The Noise Impact Assessment prepared by Harwood Acoustics concludes:

*An assessment of the potential noise impact from the proposed construction and operation of modifications to the ethanol distillery plant, associated cooling towers, emergency container yard and rail sidings at Shoalhaven Starches on Bolong Road, Bomaderry, NSW has been undertaken.*

*Calculations show that the level of noise emission from the modification to this approved proposal will be within the noise design goals derived from Environment Protection Licence 883 noise limits at each receptor location providing noise control recommendations made in Section 6 of this report are implemented and adhered to.*

*The level of noise emission from the construction phase of the project will be within the noise management levels set by the NSW EPA's Interim Construction Noise Guideline.*

### 8.3 AIR QUALITY (INCLUDING ODOUR IMPACTS)

This Modification Application is supported by an Air Quality Impact Assessment (AQIA) prepared by GHD Pty Ltd ("GHD"). A copy of GHD's assessment forms **Annexure 5** to this EA. This section of the EA is based upon the findings of this assessment.

#### 8.3.1 Odour emissions

A review of the modifications has been undertaken by GHD to establish which components are relevant to the odour assessment.

The beverage grade ethanol plant has the potential to produce odours. According to GHD the Technical Appendix entitled "*For the supply of: Process design package of a rectification unit to produce extra neutral alcohol at 96.5 % vol from raw alcohol at 92 % vol*" states that there is one gas emission from the washing column D500 which is located on the vacuum column. This is VOC (non-condensable) and is expected to be emitted at less than 0.3 kg/h. The total air emission from the D500 has a flow rate of 70 kg/h.

In order to determine the potential odour from this source existing measurements at the site were reviewed by GHD. An odour sample was taken of emission point D6: Incondensable gases vent, and Shoalhaven Starches advised this should have a similar odour character to the washing column release. An OER of 24,000 ou.m<sup>3</sup>/min was measured based on a flowrate of 1.2 m<sup>3</sup>/min.

The flow rate of the new washing column vent will be 70 kg/h of air saturated in water (0.07 m<sup>3</sup>/h assuming a density of 1000 kg per m<sup>3</sup>) (Technip Technical specification X500 – Vacuum package). This equates to 0.001166 m<sup>3</sup>/min of air flow which would have a similar odour character and level to the measured D6 vent. The corresponding OER based on this flowrate is 23.3 ou.m<sup>3</sup>/min (~ 0.4 ou.m<sup>3</sup>/s).

This low OER of 23.3 ou.m<sup>3</sup>/min according to GHD represents the closed system being used with most of the odorous VOCs being removed upstream via a series of condensers and scrubbers.

The previously approved but not yet constructed evaporator will be moved as part of the beverage grade ethanol plant modification. The evaporator is not expected to be a significant source of odour and has not been included in previous odour assessments at the site.

The proposed tanks to be located in the ethanol recovery area and storage area are also, according to GHD, not a significant odour source. Existing tanks have not been identified as odour sources in previous investigations at the site.

Cooling towers have been identified as a potential odour source. Previous odour measurements were conducted of cooling towers on-site and found to have an OER of 10,320 ou.m<sup>3</sup>/min (172 ou.m<sup>3</sup>/s). Additional cooling towers have been included in the site emissions inventory in Section 0 below.

### **8.3.2 Emissions inventory**

The most recent odour assessment at the site was conducted in May 2016 for a modification to the approved DDG Dryers, Cooling Towers and Biofilters (GHD, 2016). This assessment included odour modelling to assess the following changes at the site:

- 4 distiller's dried grain (DDG) dryers;
- A minor modification to footprint of the four DDG dryers;
- Relocation of the cooling towers in the DDG Plant;
- The addition of two biofilters to cope with the increased number of DDG Dryers.

The total site emissions with the above changes are presented in **Table 14**. Note the additional odour expected from this proposed modification to the ethanol distillery plant is not included in the table below. The total site OER is used to compare the expected odour emissions from the proposed modification against previous odour assessments at the site.

**Table 14**  
**Summary of Major Odour Sources – Existing and Approved Scenarios**

<b>Source</b>	<b>Source ID</b>	<b>Source type (according to NSW approved)</b>	<b>Total OER – measured (or scaled) OUm<sup>3</sup>/s</b>	<b>% of total OER</b>
Combined boiler stack for 5/6 boilers	BOILR5	Tall wake free point	49,270	16.8%
Pellet Plant exhaust stack	PPES	Tall wake free point	48,800	16.7%
Yeast propagators 4 and 5 (combined)	E15Y4 & E15Y5	Wake-affected point	28,330	9.7%
No. 3 Gluten Dryer	S03	Wake-affected point	22,690	7.7%
No. 4 Gluten Dryer	S04	Wake-affected point	14,930	5.1%
Ethanol recovery scrubber discharge	ERESC	Wake-affected point	12,830	4.4%
No. 6 Gluten Dryer	GD6	Wake-affected point	12,570	4.3%
No 7 Gluten Dryer	GD7	Wake-affected point	9,550	3.3%
Fermenters 10-16	FERM	Volume	7,160	2.4%
No 5 Starch Dryer	8	Wake-affected point	6,800	2.3%
No 1 Gluten Dryer	S02	Wake-affected point	6,430	2.2%
Effluent treatment area (environment farm)	SOBAS, POND1-6	Area	6,140	2.1%
All other sources (40 total)*	Miscellaneous	Miscellaneous	67,410	23.0%
<b>Total</b>			<b>292,910</b>	<b>100</b>

\* Includes the new cooling tower, milo feed silo and two biofilters from the May 2016 odour assessment.

The proposed modification to the Ethanol Distillery (including cooling tower) will add an additional 172.4 ou.m<sup>3</sup>/s to the total site OER, which is an approximate 0.06% increase from the existing approved site. This will bring the predicted total OER up to 293,082 ou.m<sup>3</sup>/s.

Due to such an insignificant predicted increase in site OER (0.06%), according to GHD, additional odour dispersion modelling is not needed. There would be no noticeable change in predicted odour experienced at the nearby sensitive receivers compared to the May 2016 assessment.

For the purpose of comparison, four scenarios are provided in **Table 15** below as follows:

- Scenario C ethanol expansion (2008);
- Scenario 1 was the addition of DDG 4 and the buildings (May 2016);

- Scenario 2 was the addition of DDG dryers 5 to 7 (May 2016);
- Scenario 3 is the additional odour from the proposed modification to the ethanol distillery plant.

**Table 15**  
**Total site wide emissions**

Modelled Scenario	Description		Total OER – OU.m³/s
Comparison to previous assessments			
C	2008 AQ assessment – factory odour Stage 1 plus upgrade (scenario C): after control  *does not include environmental farm sources		207,897 (factory + upgrade) 192,147 (boilers and scrubber)  <b>TOTAL – 328,252</b>
-	Odour audit – existing sources July 2015	EPA sources	127,590
		All existing sources, at 300 ML	243,790
May 2016 assessment – Proposed modification to DDG dryers, cooling towers and biofilters			
Existing and Approved	Existing and approved operations (Baseline scenario) – 300 ML		<b>291,350</b> total
Scenario 1	Proposed operations (Scenario 1)		<b>291,690</b>
Scenario 2	Proposed operations (Scenario 2)		<b>292,910</b>
Percentage increase in total OER from approved/existing scenario to Scenario 2			0.5%
This assessment – Proposed modification for ethanol distillery plant (including cooling tower)			
Scenario 3	Proposed operations (Scenario 3)		<b>293,082</b>
Percentage increase in total OER from scenario 2 to Scenario 3			0.06%

According to GHD significant dust emissions including total suspended particulates (TSP) and particulates 10 microns or less (PM<sub>10</sub>) are not expected to arise from operation of the proposal. Shoalhaven Starches have existing dust controls in place to manage dust emissions at the site and impacts from the proposal are not expected at nearby sensitive receptors.

### 8.3.3 Predicted odour levels

The predicted odour levels based on scenario 2 for existing and approved operations at the plant from the May 2016 odour impact assessment are shown in **Table 16**. A predicted increase of less than 0.1% from the distillery plant modification will not have any noticeable

impact on the predicted odour levels at surrounding sensitive receptors. The predicted odour levels modelled for Scenario 2 represent a worst-case scenario in terms of site odour levels and the levels predicted at Receptors 1 to 4 are not expected to change as a result of this proposal.

**Table 16**  
**Predicted Peak (99th percentile, short term averaged) Odour Impact**  
**at Nearby Receptors**

<i>Receptor</i>	<i>Range (m)</i>	<i>To nearest odour source</i>	<i>Direction</i>	<i>Odour criterion</i>	<i>Odour impact, OU, 99<sup>th</sup> percentile, nose-response time Scenario 2</i>
R1 Bomaderry	150	Packing Plant	W	6	6.4
R2 North Nowra	1300	Factory	SW	3	3.0
R3 Nowra	700	Factory	S	5	6.3
R4 Terara	1300	Factory	SE	5	6.0

### 8.3.2 Air Quality Assessment Conclusion

GHD was engaged to conduct a review of potential odour impacts from a proposed modification to the Ethanol Distillery Plant. GHD assessment concludes with respect to this modification proposal:

*“...Two minor odour sources were identified in this assessment, the washing column D500 which is located on the vacuum column, and cooling towers.*

*An insignificant increase of 0.06% was observed in the site OER due to the modification. The predicted odour impacts as a result of the proposal will not change and it is highly unlikely there will be an increase in odour detected at sensitive receptors.*

*As a result, it is predicted that no discernible increase in perceived odour impacts would be evident as a result of the proposed modifications to the plant.”*

## 8.4 FLOODING

This Modification Application is supported by a flood assessment prepared by WMA Water (WMA). A copy of WMA’s report forms **Annexure 4** to this EA. This section of the EA is based upon the findings of this assessment.

## **Hydraulic Impact Assessment**

### **Background**

The proposed works associated with this modification proposal are surrounded by an extensive array of existing plant and buildings. Thus the flow path of floodwaters from the Shoalhaven River over the river bank and northwards towards Bolong Road, through the lands to be occupied by the proposed works, is already significantly impeded.

The construction of any works on the floodplain will cause a loss of temporary floodplain storage and a loss of hydraulic conveyance. The resulting increase in flood levels will depend upon the magnitude of these losses. Given that not all the proposed works are on the ground (ie. above the 1% AEP flood level or even the PMF) and the floodplain storage area of the Shoalhaven River floodplain is of the order of 100 km<sup>2</sup>, the loss of temporary floodplain storage due to the proposed works is minimal.

The loss of hydraulic conveyance depends on the extent of the restriction to a flowpath caused by the works. Prior to construction of the Shoalhaven Starches, Dairy Farmers and Paper Mill plants at Bomaderry there would have been significant flow towards Bolong Road during a flood, as there is across any river bank. However, since approximately 1960 the ongoing construction of the three plants has restricted the flow paths.

Whilst the individual impacts (construction of a single silo) may be small the cumulative increases from several developments may be significant. Therefore, the proposed works as part of this assessment need to be assessed in the context of the incremental impact as well as the total cumulative impacts of all development within the immediate area. It is not possible to itemise all of the developments on the floodplain and their effects since white settlement. For the purposes of reporting the nominal starting date for the assessment of cumulative effects is 1990. This date was agreed previously (refer Webb McKeown & Associates October 2000 report titled *Further Development within the Manildra Starches Plant off Bolong Road, Bomaderry - Hydraulic Assessment*) and approximately corresponds to the floodplain development status at the time when the current Council design flood level information was established (1990 *Lower Shoalhaven River Flood Study*).

### **Hydraulic Modelling**

According to WMA, hydraulic or flood modelling typically involves the setting up and calibration of two computer models. A hydrologic model that converts the rainfall to runoff and a hydraulic model that includes inflow from the hydrologic model, as well as ocean boundaries, which determines peak flood levels and velocities based on hydraulic



formulae. Both models are calibrated to historical data, including historical flood levels and river flow gaugings, to ensure that they can replicate the historical events and are then used to determine design flood events. These are events that have a known probability of occurrence, such as the 1% Annual Exceedance Probability (AEP) event.

The CELLS model of the Shoalhaven River (established as part of the 1990 *Lower Shoalhaven River Flood Study*) represented the channel and floodplain as a series of interconnected cells, termed either river or floodplain cells. The river cells were connected by cross sections and the floodplain cells connected by weirs. Approximately 100 cells were used in the Shoalhaven River model with some cells over 4 km<sup>2</sup> in area. The CELLS model is termed a one dimensional (1D) branched model in that it cannot account for flow in other than the one direction but has “branches” which allow flow to extend across the floodplain. The model used both field survey for weirs as well as bathymetric survey for the river cross sections at approximately 1 to 2 kilometre spacing.

The CELLS model is an unsteady flow model in that it modelled the full flood event (rising and falling water levels) and not just the peak and included ocean tidal hydrographs at both entrances, namely the Shoalhaven Heads and Crookhaven River, and some six flow hydrographs from the WBNM hydrologic model.

Since 1990 there have been significant advancements in the field of hydraulic modelling, though in hydrologic modelling there has been significantly less advancements and the WBNM model used previously is still used today.

The main advancements in hydraulic modelling are through the use of more complex computer software (TUFLOW) that allows the river and floodplain to be discretised into a grid. This is typically 15 m by 15 m on large rivers and up to 2 m by 2 m on small urban catchments. These models are termed 2 Dimensional (2D) in that they determine the flow direction between grid cells producing vector velocities. These models are thus able to more accurately define the topography and in turn can more accurately represent the hydraulic effects of even a small development on a large floodplain.

### ***Hydraulic Modelling Process***

The hydraulic effects (change in flood levels, flows or velocities) of the proposed works at the Shoalhaven Starches and Dairy Farmers plants at Bomaderry were analysed by WMA using the TUFLOW hydraulic model established for the Shoalhaven Starches 2013 *Shoalhaven River Flood Study*. This model was calibrated to match the historical flood level data for the 1974, 1975, 1978 and 1988 floods and used to provide updated design flood levels for the Shoalhaven River downstream of Nowra.

The modelling process was to compare the peak flood levels in each grid cell for the *Existing* and *Proposed* scenarios. The *Existing* scenario represents the floodplain as at October 2016 and includes the recent applications by Shoalhaven Starches for modifications to their plant.

The *Proposed* scenario reflects the floodplain as at October 2016 but including the construction of the proposed works. The comparison between the *Existing* and *Proposed* scenarios is termed a flood impact map.

More frequent events, smaller than the 1% AEP, have not been modelled as the northern river bank of the Shoalhaven River is not overtopped to any significant extent until an event larger than the 5% AEP. Thus in these small more frequent events there would be nil impact on peak flood levels. Larger events than the 1% AEP will occur but these events are obviously extremely rare and are not used for flood related planning determinations by Councils except when their failure has potential catastrophic consequences (such as dam failure).

### ***Hydraulic Modelling Results***

According to WMA the proposed works do slightly decrease the amount of floodwaters from entering the northern floodplain across the river bank. Thus immediately upstream of the proposed works there is a slight increase in peak level. This increase in level however is within the confines of land owned by Shoalhaven Starches. The potential impact of the proposed works is much reduced as they are sheltered behind existing buildings and structures that already inhibit the flow path.

Downstream of the proposed works on the northern side of Bolong Road near the Bomaderry sewage treatment plant there is a reduction in peak level of up to 30 mm. This occurs because the proposed works reduce slightly the amount of flood waters crossing Bolong Road and thus flood levels are slightly lowered.

WMA conclude:

*“... the proposed works do not increase the 1% AEP flood level on lands outside those owned by Shoalhaven Starches. Consequently it was not considered necessary to consider the cumulative effects of the proposed works as there is no significant incremental increase (greater than 0.015m) as a result of these works.”*

## **8.5 VISUAL IMPACTS**

The Shoalhaven Starches Factory Site is located on Bolong Road, one of the main gateway entrances to the Nowra/Bomaderry urban areas, and a significant tourist route along this section of the South Coast.

### ***The Scenic Character and Environment***

The Shoalhaven Starches factory site is situated on Bolong Road, the gateway to Bomaderry, within an area currently containing a mixture of rural and industrial land uses. These different land uses contrast with each other and result in a mixed visual character.

The rural areas, much of which comprises the Shoalhaven Starches Environmental Farm, are generally flat to gently undulating and planted with pasture grasses. These areas have a typical rural/agricultural character, common throughout the region. To the north and forming a background to the rural landscape are the timbered slopes of the Cambewarra escarpment.

The Shoalhaven Starches factory complex is characterised by typical industrial structures with an overall bulk and scale that dominates the surrounding locality. The site, despite being partially screened by vegetation along Bolong Road, the Shoalhaven River and Abernethy's Creek visually dominates the locality. The development is particularly exposed to view along Bolong Road. This view reveals some of the internal structures within the site including recovery and storage tanks, car park, fermentation tanks and the Ethanol Plant. Overall the appearance of the site is typical of an industrial facility of this nature.

The most relevant vantage points from where the overall factory site is visible would include:

The Princes Highway – views of the existing factory site are possible from selected locations along the Princes Highway north of Bomaderry, travelling in both a northerly and southerly direction. Whilst the factory site is visible in the landscape, its overall visual impact is reduced by virtue of the distance between the plant; the intermittent nature of the views; a rise in topography which screens the site from view; and vegetation.

Burruga (Pig) Island – Burruga Island is situated in the middle of the Shoalhaven River and provides the closest vantage point to the southern boundary of the site. The island however is privately owned and not accessible to the public. Vegetation screening along the riverbank adjacent to the site also reduces the visibility of the existing buildings and structures.

Bolong Road – Bolong Road runs along the frontage of the site. Views of the factory are possible when travelling in both an easterly or westerly direction. Some attempts have been made to provide some tree planting along the boundaries to “soften” the appearance of the development. The existing building forms and structures are however clearly visible to motorists travelling along this stretch of Bolong Road.

Nowra Bridge – The Nowra Bridge crosses the Shoalhaven River and provides limited opportunities for views of the factory site. The dominant visual elements from the bridge are the river, vegetation along the riverbanks and the escarpment. The visual impact of the factory site is reduced by distance as well as the bridge structure which permits only glimpses of the site.

Bomaderry urban area – The existing plant is visible from a number of locations within the eastern outskirts of Bomaderry. Bomaderry is slightly elevated and some locations within the urban area do have extensive views of the site.

Terara – Distant views of the Plant are possible from a number of vantage points in and around the village of Terara on the southern bank of the River. The visual impact of the site however is reduced by distance, the intervening landform of Burruga (Pig) Island and the vegetated riverbanks.

Riverview Road – Views of the site are available from residential development on the southern bank of the Shoalhaven River. Vegetation along both the northern and southern banks of the river partially screen the site from view.

Cambewarra Lookout – Cambewarra lookout is a popular tourist lookout providing panoramic views over the Shoalhaven floodplain and estuary. Shoalhaven Starches, like the other significant industrial sites, is visible from the lookout.

### ***Visual Impact of Proposal***

The proposed modifications to the Ethanol Distillery will involve the erection of structures with similar heights to existing facilities on the site. The “Beverage Grade” Ethanol Plant will include columns with a height above ground level of 46 metres; and “re-boiler” columns with a height of 23.5 metres. The additional ethanol storage tanks will have heights between 19 and 23 metres; while the relocated evaporator will include structures with a height of around 23 metres.

The proposed works associated with this modification are situated within proximity of existing plant associated with the Ethanol Distillery, and are of a similar character and scale of development to that which exist on the site.

The Starches plant comprises a range of different buildings and building heights. Viewed from the north, the view of the new wet end dryer however dominates this view. This dryer has a height above ground level of 43 m.

The boiler house to the west is another substantial building development and includes a stack with a height of 53 m. The flour uploader has a height above ground level of 34.5 m.

The visual impact of these works from the identified vantage points (refer **Figure 6**) is described as follows:

**The Princes Highway**

The Shoalhaven Starches factory is mainly visible from a section of the Princes Highway between Boxsells Lane and Devitts Lane, Jaspers Brush (refer **Plate 1**). Due to the configuration of the highway and the siting of the factory, only southbound vehicles view the site. Vantage points along this section of the highway are 4.5 to 5.0 km from the site. The site becomes less exposed and is eventually obscured by a rise in topography further south of Boxsells Lane.

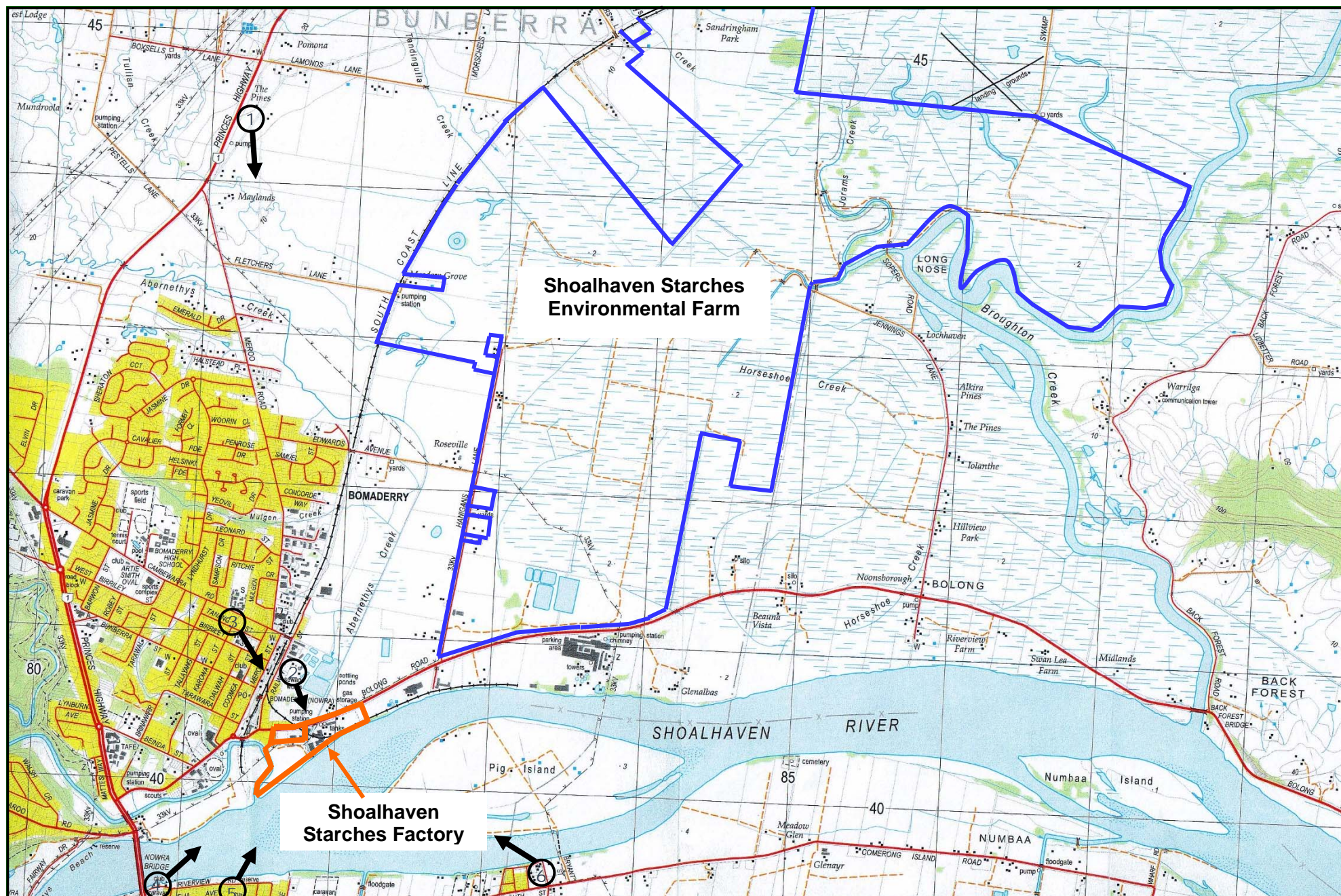
Given the distance from these vantage points the factory site is only barely visible. The rising topography upon which Bomaderry is sited screens the western portion of the site, as does intervening vegetation.

Given the distance of these views, and the screening of the site attributed to terrain and vegetation it is considered the developments associated with this project will not adversely impact on views from these vantage points.



**Plate 1:** View of Shoalhaven Starches Factory from Princes Highway (within vicinity of Boxsells Lane). Factory stack barely visible from this vantage point.





**Figure 6: Vantage Points for Plates.**



### Bolong Road

The existing factory site is clearly visible from Bolong Road by vehicles approaching from the east, and along the frontage of the site refer (**Plate 2**).

Works associated with the new Beverage Ethanol Plant will mainly involve structures of a similar bulk and scale as existing structures within this part of the site.



**Plate 2:** View of Shoalhaven Starches factory site from Bolong Road.

### Bomaderry Urban Area

The township of Bomaderry is slightly elevated and some locations within this urban area have extensive views of the site (refer **Plate 3**).

In light of the prevailing scale of existing development within the Shoalhaven Starches site the proposed modification works will be visible from this vantage point but will in context of existing similar types of structures.



**Plate 3:** View of Shoalhaven Starches factory site from corner of Meroo Road and Cambewarra Road, Bomaderry.

#### Nowra Bridge

The view from Nowra Bridge to the east is mainly dominated by the river, riparian vegetation and the floodplain (refer **Plate 4**).



**Plate 4:** View of Shoalhaven Starches factory site from Nowra Bridge over the Shoalhaven River.



The site is largely obscured by riverside vegetation. The top of the proposed columns associated with the Beverage Plant will be visible and will protrude above the canopy of the vegetation along the river, as does the existing flour mill, boiler house and starch plant. Although it is likely some of the proposed works will intrude into the existing skyline created by the existing factory, it will not be out of context in terms of the existing factory development when viewed from this vantage point.

#### Riverview Road

The main vantage point from where the proposed works could be visible will be from residences along Riverview Road directly south of the site (refer **Plate 5**). This view is from a distance of about 750 metres. Riverside vegetation along both the northern and southern banks of the river softens much of the site from view. The proposed works are generally situated on the northern side of the site and therefore somewhat obscured by existing development on the site.



**Plate 5:** View of Shoalhaven Starches factory site from Riverview Road area.

#### Terara

The village of Terara is approximately 1.5 kilometres from the factory. The view of the Shoalhaven Starches factory site as seen from the banks of the Shoalhaven River adjacent to the village of Terara is shown in **Plate 6**.



**Plate 6:** View of Shoalhaven Starches factory site from village of Terara.

The existing ethanol distiller is not clearly visible from this vantage point due to it being situated on the northern side of the site and obscured by development located between it and the river. Some of the columns of the proposed Beverage Plant may rise above the existing skyline and become visible. . From this vantage point however, the proposal will be viewed as part of the existing factory complex, and will be viewed within this context.

#### Cambewarra Lookout

Cambewarra Lookout is situated about 7 km to the northwest of the site. Views from the lookout are from an elevation over 620 m ASL, and encompass the Shoalhaven River floodplain and the coast including Jervis Bay. Whilst the factory site is visible from this vantage point, due to scale of the view, it would be extremely difficult to make out the works associated with the project from this vantage point.

Overall it is considered that the proposed works will not create a significant adverse visual impact due, principally due to the scale of the proposed works being generally consistent with that of the prevailing development. There are however measures which Shoalhaven Starches could undertake to minimise the visual impact of the proposal. Where appropriate and possible, the proposed modifications should be constructed of similar materials as those previously used on the site and be of a non-reflective nature. Colours should blend with existing structures on the site to ensure visual harmony. Consideration should be given to incorporating a cladding colour if possible which will match existing development on the site.

## 8.6 TRAFFIC AND PARKING

This Modification Application is supported by a traffic and car parking assessment prepared by ARC Traffic & Transport (ARC). In undertaking their assessment ARC has referenced their previous assessments that have been undertaken in relation to the Shoalhaven Starches site. This assessment has reviewed the potential construction and operational aspects of the proposal, and provides recommendations by which potential impacts can be minimised if not entirely ameliorated. A copy of ARC's report forms **Annexure 8** to this EA. This section of the EA is based upon the findings of this assessment.

### ***Existing Access and Traffic Operations***

The Shoalhaven Starches site, former Dairy Farmers site and BOC Plant site provide a number of access points to Bolong Road. According to ARC other access driveways (to the Shoalhaven Starches site, Packaging Plant and Interim Packaging Plant) would not be affected by this modification proposal.

#### *Bolong Road and Dairy Driveway*

##### *Existing Design*

The intersection of Bolong Road and former Dairy Farmers driveway has been extensively upgraded in recent years. The primary upgrades – which include a channelised right turn lane Bolong Road to former Dairy Farmers driveway; a large internal apron area within the former Dairy Farmers driveway to provide for U-Turning vehicles; and an acceleration lane former Dairy Farmers driveway to Bolong Road – were specifically designed to accommodate the U-Turn demand for vehicles accessing the Gluten Driveway from the west. It is also noted that parts of the upgrade were designed with consideration of the previous design speed in Bolong Road (100 km/h) whereas the intersection now lies within a 60 km/h zone.

While the current modification proposal is forecast to generate only very minor additional daily and peak hour trips to this, the relocation of the former Dairy Farmers car park will result in a reduction in traffic flows from those previously forecast.

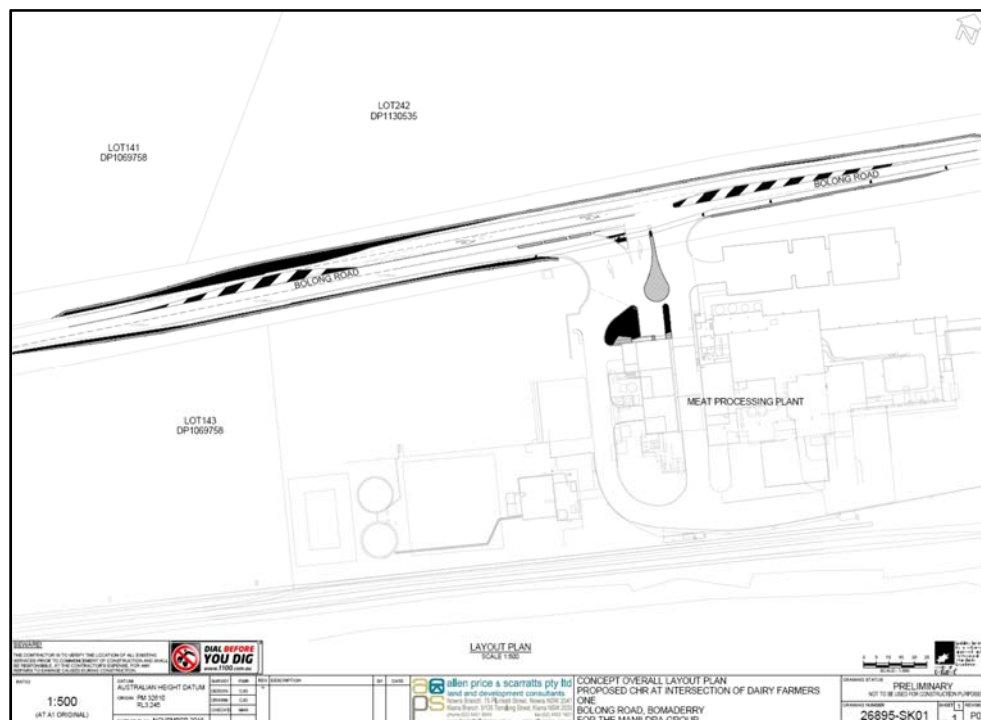
##### *Existing Design Issues*

Further to the proposed development of the former Dairy Farmer's car park – and with additional consideration of the forecast approved Meat Plant operations – the Access Review undertaken by ARC determined that warrants for an auxiliary left turn would be met, albeit marginally. However according to ARC that further to the Modification (which

would relocate the former Dairy Farmers car park) the auxiliary left turn lane Bolong Road to the former Dairy Farmers site will not be ‘warranted’”

Conversely Council have advised that the intersection upgrades have not been completed to an appropriate standard. In this regard, Council has specifically noted issues in regard to the width of verges adjacent to the intersection; provision for cyclists on the southern side of Bolong Road through the intersection; lane widths; and general marking, signage and lighting ‘deficiencies’. Based on discussions between ARC and Council, these issues do not relate to the general (traffic) operations of the intersection, but to general design and – by association – safety.

Shoalhaven Starches has acknowledged these issues, and in consultation with Council are currently finalising additional upgrades of the intersection to provide all required infrastructure at the intersection in accordance with Council requirements. In this regard, a Concept Layout Plan has been prepared by Allen Price & Scarratts (7<sup>th</sup> November 2016) which is reproduced below (**Figure 7**).



**Figure 7: Bolong Road and Dairy Driveway Concept Layout Plan (Figure 2.1.1)**  
Source: Allen Price & Scarratts

This Concept Layout Plan has subsequently been provided to Council for comment. Mr Scott Wells (on behalf of Council, email, 7<sup>th</sup> November 2016) has confirmed that it is *accepted that the above described works will address the current outstanding safety*

issues (relating to the original works undertaken by Shoalhaven Starches) with those works specifically including:

- *Works will be undertaken to upgrade the right turn lane to CHR standard (AUSTROADS for 80kph design environment)*
- *Works will be undertaken to address the minimum required shoulder width on the northern side of Bolong Road (2m sealed)*
- *Works will be undertaken to address the minimum required shoulder width on the southern side of Bolong Road (2m sealed)*
- *Works will be undertaken to address cyclist safety on the southern side of Bolong Road “through” the Dairy Farmers access including widening the “gap” in the median to the minimum required width (1.5m) and marking of cyclist logos to reinforce that route for cyclists*

In addition, Mr Wells has made the following comment in regard to the previously conditioned auxiliary left turn lane Bolong Road to Dairy Driveway:

*It would appear that the left turn lane (movement east>south) into the Dairy Farmers access has been deleted on the basis of less traffic movements. This is ok based on the current lesser traffic movements, however should movements be increased associated with any future development activity that may be reviewed.*

Further to the provision of an upgraded intersection compliant with the design criteria noted by Mr Wells (above), according to ARC it is apparent that the intersection will provide a design acceptable to Council, and should necessarily therefore be implemented further to Council approval of final design plans.

#### **Bolong Road & Ethanol Driveway**

##### *Existing Design*

This access intersection provides a channelised right turn lane to Ethanol Driveway from Bolong Road west, and a basic left treatment to Ethanol Driveway from Bolong Road east. All movements are provided for at the intersection, though the Ethanol Driveway currently generates very few vehicle trips to/from the east.

According to ARC the modification proposal would have no impact on operational daily and/or peak hour traffic flows at this intersection, essentially replacing some tanker trucks with ISO container carrying trucks with no anticipated increase in overall truck volumes. There would be minor levels of additional trip generation during the construction of the Beverage Grade Ethanol Plant but these would be temporary only.

### *Existing Design Issues*

The Access Review undertaken by ARC included a number of recommendations which sought to improve the efficiency and safety of the intersection further to the identification of design and operations issues by Council, ARC and Shoalhaven Starches.

The primary issue identified the observed use of the intersection for U-Turns by trucks arriving from the west accessing the Starches Site Gluten Driveway immediately adjacent to and east of Abernathy's Creek. As part of previous SSEP approvals, access to the Gluten Driveway from Bolong Road has been restricted to left in/left out only by a central median and barrier fence (in Bolong Road) so as to remove the impact of vehicles turning right to Gluten Driveway from the west in a section of Bolong Road too narrow to provide for passing (eastbound) movements.

This access restriction was accompanied by the significant upgrades to the intersection of Bolong Road and the former Dairy Farmers driveway (and to internal driveway infrastructure) to provide for vehicles previously turning right to Gluten Driveway to instead travel east to the former Dairy Farmers driveway, complete a turn within the former Dairy Farmers driveway, and then depart to the west and enter Gluten Driveway via a left turn.

Rather than utilising the former Dairy Farmers driveway for these movements, the Access Review identified that some trucks were utilising the intersection of Bolong Road and the Ethanol Driveway for this turning movement, ie. that trucks were turning right to Ethanol Driveway from Bolong Road, then completing a U-Turn within the Ethanol Driveway and returning to the west.

In response, the Access Review recommended that an internal median and barrier fence/bollards be provided within the Ethanol Driveway to effectively prohibit the use of Ethanol Driveway for truck U-Turn movements, while retaining access for all approved Ethanol Driveway movements.

These recommended upgrade works have recently been completed by Manildra, as shown in **Plate 7**.





**Plate 7:** Ethanol Driveway median island upgrade.

In addition, the Access Review identified issues in regard to the narrow 'Service Driveway' running parallel to Bolong Road between Ethanol Driveway and the Starches Site eastern services areas (where much of the proposed Modification infrastructure will be provided). According to ARC that Services Driveway does not meet (width) requirements for two-way traffic, and further that appropriate turning paths for trucks to/from the Services Driveway are not available.

In response, the Access Review recommended that all access to the Shoalhaven Starches site eastern services area currently provided by Services Driveway be instead provided via the intersection of Bolong Road & Dairy Driveway, ie. via a new internal access road linking the former Dairy Farmers driveway with the eastern services area, effectively allowing for the closure of Services Driveway for anything other than emergency access.

These recommended upgrade works have recently been completed by Shoalhaven Starches including the installation of an electric security gate which prevents all but emergency access to Services Driveway (as shown in **Plate 8**), and the provision of an informal travel path from the former Dairy Farmers driveway to the eastern services area. This travel path will be formalised as part of the modification proposal to provide all access to the newly proposed Eastern infrastructure via the Dairy Driveway.



**Plate 8:** Services driveway security gate.

#### *Bolong Road and BOC*

This access intersection provides a left turn deceleration lane from the west (Bolong Road to BOC Driveway) while the Bolong Road median adjacent to the BOC Driveway restricts movements to left in/left out only; as such, vehicles departing to the west utilise the former Dairy Farmers driveway U-Turn facility, while (the very low number of) vehicles arriving from the east would use either one of the Starches Site access driveways (east of Abernathy's Creek) or local intersections to return to the BOC Site.

Further to the Modification, this intersection would generate additional trips associated with the relocation of staff parking to the BOC Site from the previously approved Dairy Car Park.

#### *Additional Site Intersections*

Additional Shoalhaven Starches driveway intersections to Bolong Road include: -

- Interim Packing Plant access driveway
- Starches Site Car Park access driveway
- Western Driveway, which providing primary access to the Starches Site
- Administration Driveway

According to ARC this modification is not expected to have any significant impact on the operation of any of these intersections. Simply, this modification will result in very minor



additional/redistributed traffic generation during the peak periods, and (at each of these driveways) those additional/redistributed trips would manifest as through trips rather than turning movements.

### ***Traffic Flows***

#### ***Site Traffic Flows***

ARC has commissioned numerous survey of broader traffic flows for the Shoalhaven Starches site over many years, which have then been utilised in detailed assessments. In regard to the key intersections relating to this modification proposal, 'current' (ie. flows based on all approvals) Shoalhaven Starches flows are available for the Ethanol Driveway and the former Dairy Farmers driveway, and have most recently been reported in the Packaging Plant TIA. These flows have been used for the assessment of base recreational peak flow conditions (for 2018 and 2028), noting that these flows include the higher trip generation of the Dairy Site given that they include the forecast generation of the former Dairy Farmers car park.

Based on observations made by ARC and with reference to the available parking infrastructure on the BOC Site, the trip generation of the BOC Site would be relatively minor during peak periods, and certainly significantly lower than flows at the other Shoalhaven Starches driveways. An estimate of peak period flows has been provided by ARC for the assessment.

#### ***Bolong Road Traffic Data***

Further to the commission of traffic surveys at the Shoalhaven Starches site and former Dairy Farmers site over many years, and in consultation with Council, ARC has over time developed peak hour (through movement) traffic flows in Bolong Road that reflect 120th Highest Hour (or 'recreational peak') conditions.

Importantly – and as referenced in recent assessments (for now approved Modifications) - ARC has specifically considered the redistribution of trips from Bolong Road further to the staged upgrades of the Princes Highway being undertaken by the RMS, a redistribution that is currently underway further to the recent opening of the Gerringong Bypass section of the Princes Highway.

The upgrade of the Princes Highway between Gerringong and Bomaderry has been considered in three primary projects – the Gerringong Bypass Project (completed); the Foxground & Berry Bypass Project (due for completion in 2018); and the Berry to Bomaderry Upgrade Project (detailed planning currently being finalised).

As these projects have developed, the RMS estimate of the number of trips that will 'transfer' from the Sandtrack (currently approximately 45% of through trips between Bomaderry and Gerringong and vice versa) to the Princes Highway (currently approximately 55% of through trips between Bomaderry and Gerringong and vice versa) has also developed.

Current RMS modelling concludes that the transfer from the Sandtrack to the upgraded Princes Highway will be very significant. Taking into account other factors (such as general background traffic growth) the future traffic flows to the Princes Highway and to the Sandtrack (and indeed specifically to Bolong Road at Meroo Road, ie. immediately west of the Starches Site) are provided in **Table 17** below.

**Table 17**  
**Princes Highway Upgrade Future Flow Estimates**

Ref.	Route   Direction	Location	AADT											
			2013			2019			2029			2039		
			Base Year			Construction   Opening			Opening +10			Design - Do Something		
			Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total
Princes Highway														
A	south of Berry	southbound	5,139	1,019	6,158	8,187	1,212	9,399	11,386	1,614	13,000	14,254	2,020	16,274
B		northbound	5,449	950	6,399	9,039	1,130	10,168	12,571	1,504	14,075	15,737	1,883	17,620
-		two-way	10,588	1,970	12,557	17,225	2,342	19,568	23,958	3,118	27,076	29,990	3,903	33,893
C	north of Meroo Rd	southbound	5,378	1,052	6,430	8,904	1,248	10,152	12,629	1,649	14,278	15,778	2,054	17,832
D		northbound	5,686	961	6,647	9,772	1,140	10,912	13,871	1,506	15,377	17,334	1,876	19,210
-		two-way	11,065	2,013	13,077	18,676	2,388	21,064	26,501	3,155	29,655	33,112	3,930	37,042
E	south of Abernethys Lane	southbound	4,897	926	5,823	8,345	1,102	9,447	11,941	1,469	13,410	14,960	1,841	16,801
F		northbound	5,207	840	6,047	9,215	1,000	10,215	13,185	1,333	14,518	16,519	1,669	18,189
-		two-way	10,104	1,766	11,870	17,560	2,102	19,662	25,126	2,802	27,928	31,479	3,510	34,990
S10	Meroo Road Interchange	southbound off ramp	599	155	754	695	180	876	857	222	1,079	1,018	264	1,282
N10		northbound on ramp	598	151	749	694	176	870	855	216	1,072	1,016	257	1,273
S11		southbound on ramp	117	30	147	136	34	171	168	42	210	199	50	250
N11		northbound off ramp	119	30	148	138	35	172	170	43	212	201	51	252
Local Roads														
G	Meroo Road - south of Princes Highway	southbound	718	186	903	834	216	1,049	1,027	266	1,293	1,220	316	1,536
H		northbound	715	181	896	831	210	1,041	1,023	259	1,282	1,216	307	1,523
-		two-way	1,433	367	1,799	1,664	426	2,090	2,050	525	2,575	2,436	623	3,059
I	Sandtrack - north of Meroo Road	southbound	4,544	467	5,011	2,304	551	2,855	2,688	724	3,412	3,339	899	4,238
J		northbound	4,404	386	4,790	2,432	455	2,887	2,837	599	3,435	3,524	744	4,267
-		two-way	8,948	853	9,801	4,736	1,006	5,742	5,525	1,323	6,848	6,862	1,643	8,505

*Source: Princes Highway Upgrade – Berry to Bomaderry Technical paper: Traffic and Transport 2013 AECOM Australia*

In real terms, these forecasts according to ARC indicate that following the completion of the Princes Highway upgrades, the 2019 AADT in Bolong Road will represent less than 60% of the 2013 AADT, reducing from a 2013 AADT of some 9,800 vehicle trips per day (vpd) to a 2019 AADT of only 5,742 vpd. Even with background growth continuing after 2019, the 2029 AADT is estimated to represent only 70% of the 2013 AADT; and the 2039 AADT some 87% of 2013 AADT.

Notwithstanding these forecasts, in discussions with ARC, Council has suggested that their modelling of the sub-regional road network indicates that the redistribution of trips

(from the Sandtrack to the Princes Highway) will not be as significant as indicated (and inherently validated) in the RMS modelling. Council has specifically cited existing congestion through Bomaderry and at the Nowra Bridge crossing as factors which would result in a higher percentage of trips (than indicated in the RMS modelling) remaining via the Sandtrack, though it is noted that RMS planning of an upgrade of the Shoalhaven River crossings (which would alleviate much of this congestion) is currently well advanced.

Based on all available information, according to ARC there is no doubt that traffic flows in Bolong Road will be significantly reduced following the completion of the Princes Highway upgrades, and that reductions have likely commenced further to the opening of the Gerringong Bypass.

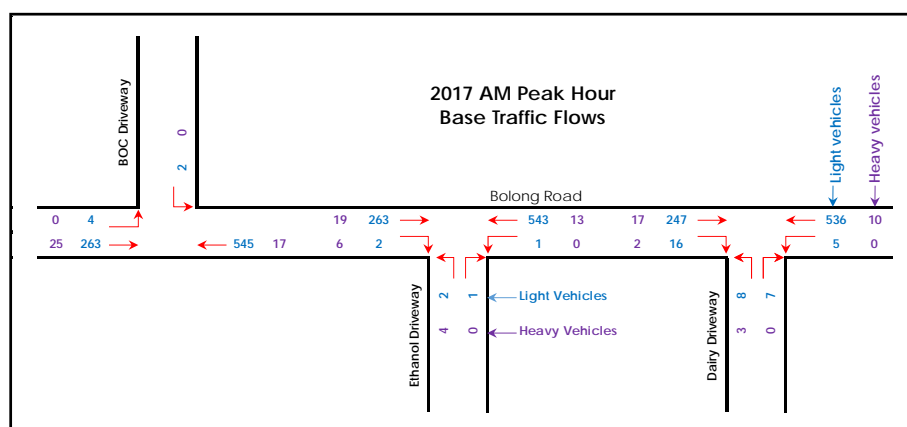
Notwithstanding, to provide some sensitivity in the assessment (based on the Council's position) ARC has prepared base year 2017 Bolong Road through flows – ie. the base year where the proposed modification infrastructure is expected to be constructed and become operational – which represent a proportional reduction of 10% from 2013 AADT flows, ie. accounting for the current redistribution further only to the Gerringong Bypass. With reference to the RMS forecasts, it is noted that these flows are expected to be the highest through flows in Bolong Road through approximately 2039.

A forecast year of 2027 has also been assessed, based on a 70% redistribution by 2019 with an annual increase of 1.5% (as determined in the Princes Highway Upgrade – Berry to Bomaderry Technical paper: Traffic and Transport) through to 2027.

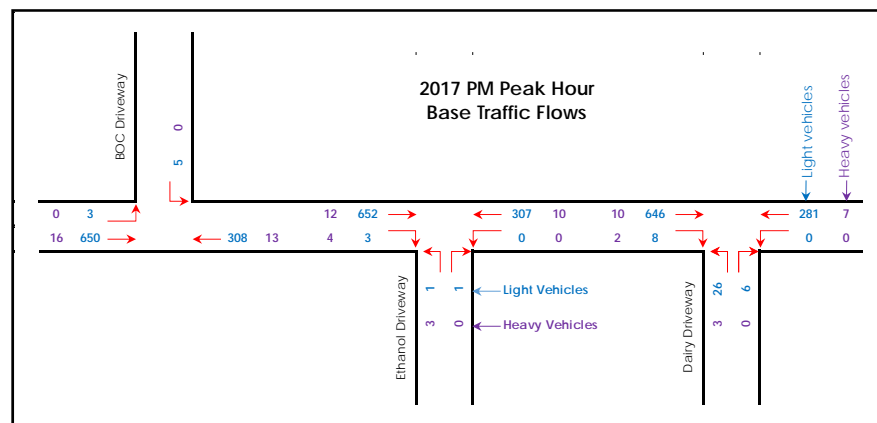
ARC has also conducted sensitivity testing which assumes little if any redistribution of trips from the current split to the Princes Highway and Bolong Road.

#### Assessment Traffic Flows

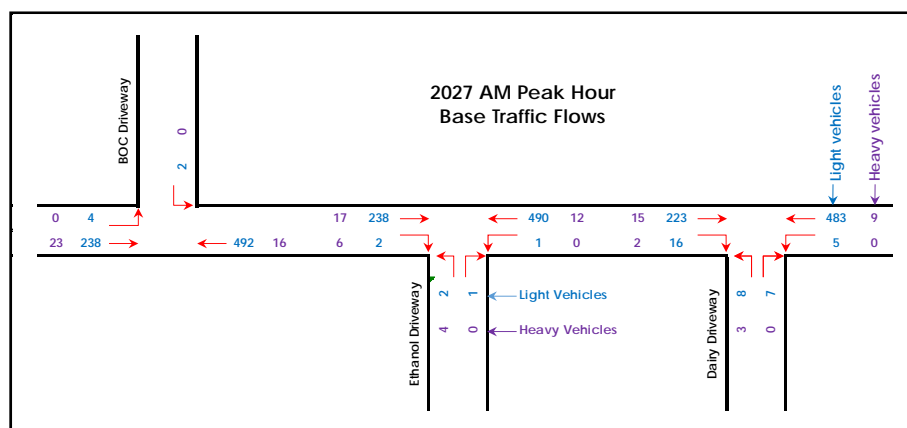
**Figures 8 to 11** provide base recreational peak hour traffic flows for the key intersections for both a base year (2018) and forecast year (2028).



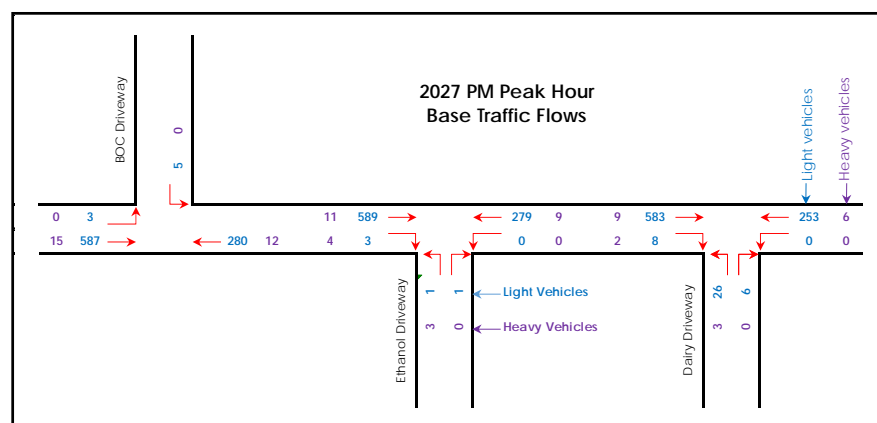
**Figure 8: 2017 AM Peak Base Traffic Flows (Figure 2.6.1)**



**Figure 9: 2017 PM Peak Base Traffic Flows (Figure 2.6.2)**



**Figure 10: 2027 AM Peak Base Traffic Flows Figure 2.6.3**



**Figure 11: 2027 PM Peak Base Traffic Flows (Figure 2.6.4)**

## **Existing Intersection Operations**

### SIDRA Intersection Modelling

The operations of the key access intersection discussed above have been determined by ARC using the SIDRA intersection model (Version 7.0). SIDRA reports key intersection performance indicators including:

- **Level of Service**

Level of service is a basic performance indicator assigned to an intersection based on average delay. For signalised and roundabout intersections, level of service is based on the average delay to all vehicles, while at priority controlled intersections level of service is based on the worst approach delay.

- **Degree of Saturation**

Degree of Saturation is defined as the ratio of demand (arrival) flow to capacity. A degree of saturation above 1.0 represent over-saturated conditions (demand flows exceed capacity) and degrees of saturation below 1.0 represent under-saturated conditions (demand flows are below capacity). The capacity of the movement with the highest degree of saturation is reported.

- **Delay**

Delay represents the difference between interrupted and uninterrupted travel times through an intersection, and is measured in seconds per vehicle in this assessment. Delays include queued vehicles accelerating and decelerating from/to the intersection stop, as well as general delays to all vehicles travelling through the intersection. With reference to the LoS criteria above, the average intersection delay for signals and roundabouts represents an average of delays to all vehicles on all approaches, while for priority intersections the average delay for the worst approach is used.

- **Queue Length**

Queue length is the number of vehicles waiting at the stop line, and in this assessment is based on the 95th percentile back of queue length in metres. It is measured as the number of queued vehicles per traffic lane at the start of the green period (signals) or queued vehicles in each 'gap acceptance cycle' for roundabouts and priority intersections (i.e. the longest period in which no vehicles from the minor movement can enter the opposing primary flow).

### Base Traffic Flows Intersection Operations

The results of the SIDRA analysis are provided in **Tables 18** and **19** below; again, it is noted that these 'base' operations include all trips provided for to/from the key access intersections further to all current Shoalhaven Starches site and the former Dairy Farmers site approvals, as well as the flow estimates at the BOC Site.

**Table 18**

**2017 Base Traffic Flows Intersection Operations (Table 2.7.2.1)**

2017 Traffic Flows Intersection Operations	Level of Service		Average Delay (s)		Worst Delay (s)		Degree of Saturation		Queue Length (m)	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Bolong Road & Dairy Driveway	A	A	0.4	0.2	9.8	12.1	0.301	0.358	0.7	0.5
Bolong Road & Ethanol Driveway	A	B	0.2	0.2	14.4	17.9	0.305	0.363	0.7	0.4
Bolong Road & BOC Driveway	A	A	0.1	0.1	5.6	5.6	0.309	0.365	0.0	0.2

**Table 19**

**2027 Base Traffic Flows Intersection Operations (Table 2.7.2.2)**

2027 Traffic Flows Intersection Operations	Level of Service		Average Delay (s)		Worst Delay (s)		Degree of Saturation		Queue Length (m)	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Bolong Road & Dairy Driveway	A	A	0.4	0.2	9.4	9.7	0.272	0.323	0.6	0.4
Bolong Road & Ethanol Driveway	A	B	0.2	0.2	12.8	15.3	0.276	0.328	0.6	0.3
Bolong Road & BOC Driveway	A	A	0.1	0.1	5.6	5.6	0.280	0.330	0.0	0.2

With reference to the table above, all the key access intersections operate at a good level of service - with minimal delays or queue lengths, and significant spare capacity – in both 2017 and the forecast year 2027.

ARC has also conducted sensitivity testing of the operations of these key intersections further to there being no significant change in the distribution of trips (between the Princes Highway and Bolong Road/The Sandtrack) further to the Princes Highway upgrades. This sensitivity testing indicates that the intersections of Bolong Road with both the former Dairy Farmers Driveway and with Ethanol Driveway would operate at a slightly lower Level of Service (B). Critically though, these (potential higher future) levels of service were identified in past modification assessments (which did not consider the Princes Highway upgrades) and – given the subsequent approval of those past modifications – must inherently be considered acceptable.

### ***Rail Operations***

Shoalhaven Starches uses rail for the majority of transport operations, including incoming raw materials and outgoing product. This has very significant benefits in reducing vehicle

trip generation, and specifically heavy vehicle trip generation; it is estimated that existing rail movements equate to the generation of some 100 heavy vehicle trips per day.

This Modification Proposal will not result in any increase in rail movements over those provided for under the SSEP approval.

### ***The Modification Proposal***

#### **Access**

All access to the various infrastructure sites will remain via existing intersections to Bolong Road.

#### ***Bolong Road and Dairy Driveway***

The (very minor) additional operational access demands to the proposed Eastern infrastructure will be via the intersection of Bolong Road and former Dairy Farmers driveway, and then via an internal driveway (as provided for in the previous former Dairy Farmers car park approval). No access to the Eastern infrastructure area will be provided by Services Driveway.

#### ***Bolong Road and Ethanol Driveway***

The modification proposal would not change the existing access demands at Ethanol Driveway, noting that the modification proposal would essentially replace a proportion of (existing and approved) ethanol tanker truck movements with ISO container trucks, which have the same turning path requirements.

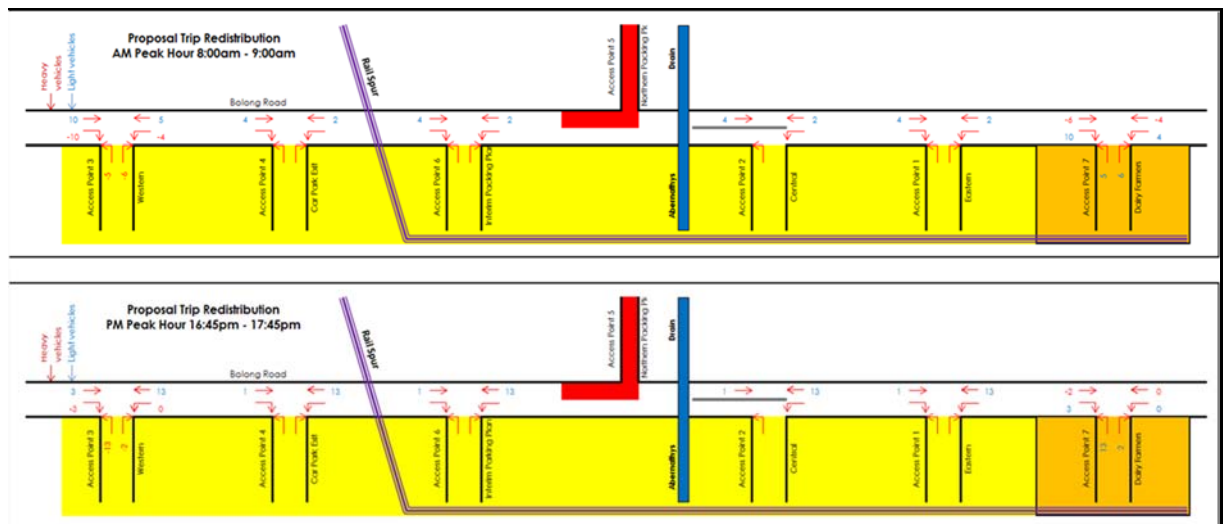
#### ***Bolong Road and BOC Driveway***

All access to the proposed BOC Site staff car park will be via the intersection of Bolong Road & BOC Driveway.

#### **Operational Trip Generation and Distribution**

#### ***Bolong Road and former Dairy Farmers Driveway***

Further to the modification proposal, the former Dairy Farmers site will no longer attract trips associated with the previously approved former Dairy Farmers car park, with those trips instead being redistributed to the BOC Site. The assignment of trips to the former Dairy Farmers car park was detailed in Figure 2.2 of the Dairy Car Park TIA (**Figure 12**) below:



**Figure 12: Former Dairy Farmers Car Park Trip Redistribution (Figure 3.3.1)**  
Source: Dairy Car Park TIA

These trips will instead be redistributed to/from the BOC Site. As such, at the intersection of Bolong Road and the former Dairy Farmers Driveway, these trips would in the future present as westbound through trips (arrival trips from the east)

- Eastbound through trips (departure trips to the east);
- Right turn trips, Bolong Road to Dairy Site (departures trips to the west);
- Arrival trips from the west would not travel through the intersection.

In addition to these redistributed staff (car park) trips, the new infrastructure is expected to generate a very minor level of daily trips associated with maintenance; and occasional trips associated with the emergency ISO container storage area. In total, it is estimated that no more than 10 trips per day would be generated by these operations, or perhaps 1 vehicle trip in a peak hour. These additional trips would be generated almost exclusively to/from the west.

Finally, and discussed between ARC and Council, the trip generation of the Meat Plant has been significantly lower than originally estimated in the Meat Plant TIA, primarily a function of lower than (forecast) capacity operations. While the (peak capacity) trips assigned in the Meat Plant TIA to the intersection (and to the adjacent intersections) have not been removed from the analysis below, consideration of current conditions would suggest even further reductions to the turning movements at the intersection from those assessed in sections below.



### *Bolong Road and Ethanol Driveway*

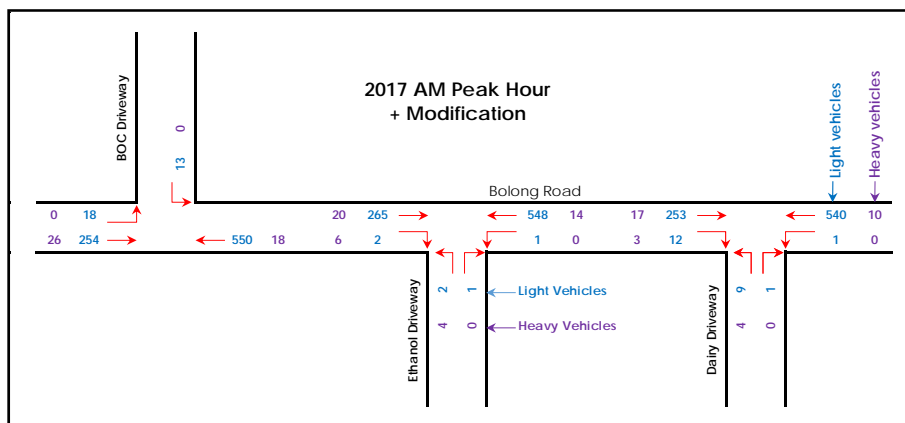
According to ARC no additional operational trips are expected to be generated to the Ethanol Driveway as a result of this modification proposal, although there would be minor changes in through flows (along Bolong Road) as a result of the changed distribution paths to/from the staff parking to be provided on the BOC Site. According to ARC the modification proposal provides for a proportion of existing and approved ethanol tanker trucks to in the future carry ISO containers instead, with no net increase in movements forecast.

### *Bolong Road and BOC Driveway*

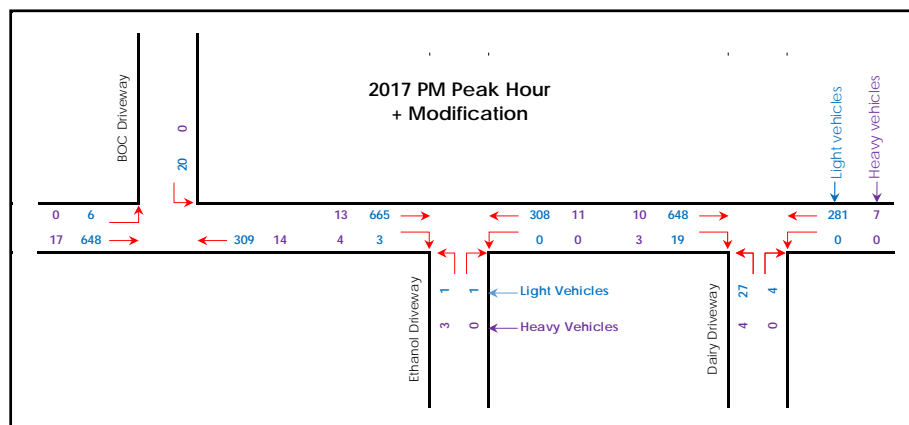
The trips redistributed from the former Dairy Farmers car park (**Figure 12** above) will instead be generated to/from the BOC Site. For arrivals from the east, it is expected that vehicles will complete a turn either at one of the Shoalhaven Starches site driveways or in Railway Street, while departure trips to the east would be direct to Bolong Road. Arrival trips from the west would also be direct from Bolong Road, while departure trips to the west would turn right to Dairy Site from Bolong Road, complete a turn using the on-site turn facility, and then depart to Bolong Road.

### ***Trip Assignment***

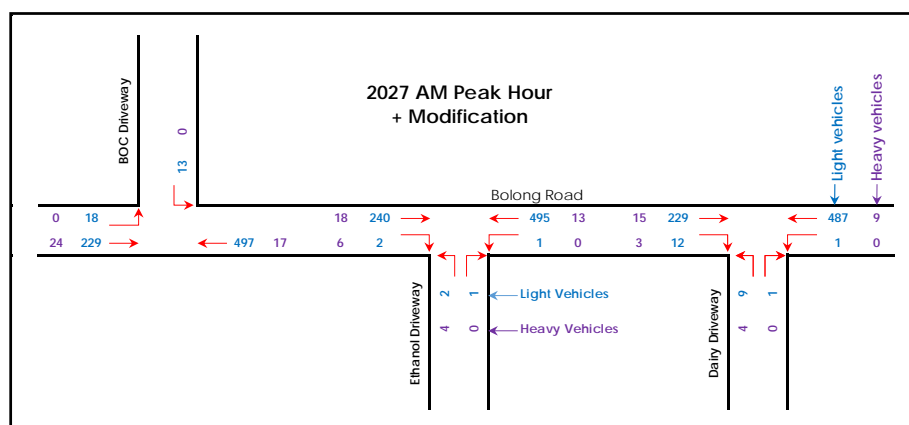
According to ARC the future total flows at the key intersections are detailed in **Figures 13** to **16** below for both 2017 and for the forecast year 2027.



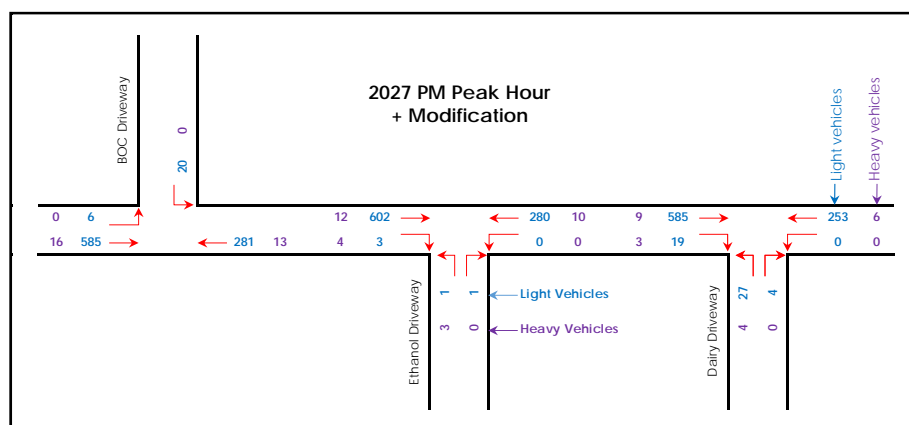
**Figure 13: 2017 AM Peak Hour Future Traffic Flows (Figure 3.3.4.1).**



**Figure 14: 2017 PM Peak Hour Future Traffic Flows (Figure 3.3.4.2).**



**Figure 15: 2027 AM Peak Hour Future Traffic Flows (Figure 3.3.4.3).**



**Figure 16: 2027 PM Peak Hour Total Future Flows (Figure 3.3.4.4).**

## ***Operation Intersection Performance***

### **Intersection Performance**

In order to determine the future operations of the key intersections following the modification proposal, ARC has re-examined the operations of these intersections using SIDRA. The results of this assessment are provided in the **Tables 20** and **21** below.

**Table 20**

**2017 Future Traffic Flows Intersection Operations (Table 3.4.1.1)**

2017 Future Traffic Flows Intersection Operations	Level of Service		Average Delay (s)		Worst Delay (s)		Degree of Saturation		Queue Length (m)	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Bolong Road & Dairy Driveway	A	A	0.2	0.3	10.3	12.3	0.301	0.359	0.6	0.6
Bolong Road & Ethanol Driveway	B	B	0.2	0.2	14.6	18.4	0.309	0.371	0.7	0.4
Bolong Road & BOC Driveway	A	A	0.2	0.1	5.6	5.6	0.313	0.365	0.3	0.7

**Table 21**

**2027 Future Traffic Flows Intersection Operations (Table 3.4.1.2)**

2027 Future Traffic Flows Intersection Operations	Level of Service		Average Delay (s)		Worst Delay (s)		Degree of Saturation		Queue Length (m)	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Bolong Road & Dairy Driveway	A	A	0.2	0.3	9.8	9.9	0.271	0.324	0.6	0.6
Bolong Road & Ethanol Driveway	A	B	0.2	0.2	12.9	15.8	0.279	0.336	0.6	0.3
Bolong Road & BOC Driveway	A	A	0.2	0.1	5.6	5.6	0.283	0.330	0.3	0.6

With reference to the above tables, the modification proposal would have little if any impact on the operation of the key intersections, all of which would continue to operate at a good level of service with significant spare capacity, and very minor delays and queue lengths.

ARC has conducted sensitivity testing of the future operations of these key intersections further to there being no significant change in the distribution of trips (between the Princes Highway and Bolong Road/The Sandtrack) further to the Princes Highway upgrades. This sensitivity testing indicates that the intersections of Bolong Road with both former Dairy Farmers driveway and Ethanol Driveway would operate at a lower Level of Service (B) under such conditions, noting that the reduction in traffic flows to the critical right turn movement former Dairy Farmers driveway to Bolong Road (further to the relocation of the former Dairy Farmers car park) actually reduces delays at this intersection (from those previously determined and approved).

Again, these (potential higher future) levels of service are not different to those identified in past modification assessments (which did not consider the Princes Highway upgrades) and – given the subsequent approval of those past modifications, and the fact that the

modification proposal would not reduce the performance of these intersections from those previously determined levels of service – must inherently be considered acceptable.

#### Intersection Infrastructure

The intersection of Bolong Road & Ethanol Driveway and Bolong Road & BOC Driveway are both provided with auxiliary infrastructure which, within the urban speed environment, will appropriately provide for the additional and redistributed trips associated with the Modification.

Importantly, and as agreed in discussions between ARC and Council the modification proposal will actually reduce the previously determined requirement for an auxiliary left turn lane, Bolong Road to the former Dairy Farmers driveway. The redistribution of previously determined trips to the former Dairy Farmers car park from the east (as through trips rather than left turn trips) reduces the left turn demand to former Dairy Farmers driveway to very minimal (and indeed virtually non-existent in the peak periods) flows, flows which would not trigger the Austroads GRD4A warrants for the provision of an AUL.

It is noted further that the existing Meat Plant generates little if any trips to this movement in the peak periods, such that even based on the capacity operations of the Meat Plant (as assessed in the Meat Plant TIA) this warrant would not be triggered. As noted by Council, any future capacity increases (above those assessed in the Meat Plant TIA) or future former Dairy Farmers site projects which increase trip generation would require an additional assessment of warrants for this lane.

Finally, and with specific regard to the additional information requests provided by Council, ARC state:

- The modification proposal will utilise existing access points to Bolong Road. The sight distance provision at these intersections have been inherently approved (given that these intersections have been approved and constructed) but nonetheless provide appropriate sight distance based on the adjacent vehicle speeds in Bolong Road.
- The modification proposal will utilise heavy vehicles with identical maximum turning paths as those currently utilised at the key intersections, the appropriate turning paths for which have been specifically considered in the (approved and constructed) design of these intersections.

## **Staff Parking**

### Parking Requirement

The approved former Dairy Farmers car park was provided in specific response to Condition 31(b) of the Project Approval which states:

31. *The Proponent shall ...*

- b) construct at least 60 new parking spaces on the factory site to the south of Bolong Road within 12 months of this approval*

### Parking Provision

The modification proposal seeks to relocate the parking spaces from the approved former Dairy Farmers car park to the BOC Site. The modification proposal will provide a total of a minimum 60 new parking spaces on the BOC Site, which will be provided on hardstand material, with all aisles and parking spaces to be appropriately delineated (either line marked or with discs) in accordance with the requirements of AS 2890.1.

## **Construction Traffic**

The only period during which the Modification is expected to generate any (relatively) significant number of additional vehicle trips would be during construction of the proposed Modification infrastructure.

### Construction Schedule and Requirements

The construction of the Eastern infrastructure is estimated to occur over some 6 months, and would require:

- Up to 10 construction staff on-site daily;
- Up to 5 construction material carrying heavy vehicles per day.

The construction of the works associated with the Ethanol Plant is estimated to occur over some 6 months (which includes the time required for the demolition of existing structures on the Beverage Grade Ethanol Plant site), and would require: -

- Up to 10 construction staff on-site daily;
- Up to 5 construction material carrying heavy vehicles per day.

The construction of the new staff car park on the BOC Site is estimated to occur over some 4 weeks, and would require:

- Up to 5 construction staff on-site daily
- Up to 2 construction material carrying heavy vehicles per day

The potential exists for these construction projects to occur simultaneously.

### Construction Access

All construction vehicle access to the eastern infrastructure construction area will be via the intersection of Bolong Road and the former Dairy Farmers driveway, noting that temporary staff and heavy vehicle parking will be provided within the area provided for the future ISO container storage works area, which would not be operational until after the construction works are completed.

All construction heavy vehicle access to the Beverage Grade Ethanol Plant construction area will be via the intersection of Bolong Road and Ethanol Driveway; these vehicles would travel through the existing security gates and then 'around' to the construction area, which will be appropriately separated from existing operational areas. All construction staff vehicle access will be via the intersection of Bolong Road and the former Dairy Farmers Driveway, noting that parking for these staff would also be provided within the future ISO container storage area.

All construction vehicle access to the BOC Site (car park) construction works area will be via the intersection of Bolong Road and BOC Driveway, noting that a mix of existing (unused) and temporary parking will be provided for these construction staff within the BOC Site during the construction period.

It is anticipated that the majority of construction staff vehicle trips, and all construction heavy vehicle trips, would be to/from the west.

### Construction Traffic Generation

As has been the case for previous construction projects, specialist construction staff completing the primary infrastructure works on the Shoalhaven Starches site will be transported to and from the site daily by mini-bus (from Wollongong). Allowing for a small number of ancillary light vehicle trips on a daily basis, the daily generation of the eastern and central construction works is estimated to be no more than 25 - 30 (total light and heavy) vehicle trips per day. In the existing peak periods, the trip generation of the eastern and central construction works is estimated to be no more than 3 - 4 vehicle trips per hour.

The minor BOC Site car park construction works are expected to generate up to 15 vehicle trips per day (noting that these construction staff are more likely to arrive in separate vehicles). In the existing peak periods, the trip generation of the primary construction works is estimated to be no more than 1 - 2 vehicle trips per hour.

### Construction Traffic Impacts

It is ARC's opinion that the construction period will have little if any significant impact on the local road network simply as a factor of the minimal generation and duration of the construction phase.

Essentially, traffic flows at the key intersections during the construction phase would be little different to those forecast during the future operational phase and as such have the same (minimal) impact on the operation of the key intersections, ie. each of the key intersections would continue to operate at a good level of service through the construction period.

### Construction Management

Notwithstanding the above, according to ARC it remains that the case that the construction phase will need to be governed by an appropriate set of management procedures.

In relation to access, traffic and parking requirements during the construction phase, ARC recommends the following initiatives, which essentially mirror the Construction Traffic Management Plan (CTMP) prepared by ARC for the construction requirements of past Shoalhaven Starches projects, including those most recently adopted for the construction of the Packaging Plant:

- All parking for construction staff and construction heavy vehicles must be contained within an appropriately secure on-site environment so as not to impact or be impacted by existing Shoalhaven Starches operations; or on the off-site traffic environment.
- While it is not anticipated that Restricted Access Vehicles (RAVs) will be required as part of the construction task, it is nonetheless the case that any such vehicles would be required to utilise the existing approved RAV route between the Dairy Driveway and the Princes Highway via Bolong Road; access for such vehicles via Railway Avenue is not permitted.
- Construction work hours are generally between 6:00am/7:00am and 5:00pm/6:00pm Monday to Friday, with an earlier finish time on Saturdays and no work on Sundays. Construction hours are most often established to minimise amenity impacts on neighbouring residential areas, and will require finalisation further to consultation with the DP&E and Council.

### **Conclusions and Recommendations**

The Traffic Impact Assessment prepared by ARC concludes with respect to this modification proposal:

*Following a detailed and independent assessment of the potential access, traffic and parking conditions associated with the Modification, ARC has concluded that the Modification is acceptable in regard to access, traffic and parking considerations. In summary: -*

- *All vehicle access will be provided to existing access points to Bolong Road.*
- *The Modification provides for the further upgrade of the intersection of Bolong Road & Dairy Driveway to address existing design issues as identified by Council, to the satisfaction of Council. As agreed with Council, the Modification will remove the warrant for a left turn auxiliary lane, Bolong Road to Dairy Driveway, as previously identified further to the construction of a Dairy Car Park.*
- *The Modification will result primarily in a redistribution of vehicle trips to the local road network rather than increases in vehicle trips to the local road network.*
- *The performance of all key intersections further to the Modification would remain good, with all intersections operating with minor delays and queues, and retaining significant spare capacity. As importantly, sensitivity testing of higher Bolong Road through movements indicates that the intersections would operate at the same general levels of service as identified in past assessments of (subsequently) approved modifications.*
- *The required staff car parking previously proposed in the Dairy Car Park will be relocated to the BOC Site, with an additional 60 parking spaces to be constructed to provide compliance with SSEP Approval.*
- *The construction of the proposed Modification infrastructure would have no significant impact on the operation of the local road network, generating minimal and temporary traffic flows to existing access points, and providing for all construction parking off-street.*

Further to the above, ARC makes the following recommendations:

- *That the intersection of Bolong Road & Dairy Driveway be upgraded with reference to the Concept Layout Plan and further to a Council approval of final design plans.*
- *That the Services Driveway continue to provide for emergency only access, with all vehicle trips associated with existing and future operations in the eastern part of the Starches Site to utilise the proposed new access road via Dairy Driveway.*
- *That all new parking spaces and parking aisles be designed with reference to AS 2890.1.*
- *That an appropriate Construction Traffic Management Plan be prepared to govern the construction of the proposed Modification infrastructure.*



## 8.7 SITE CONTAMINATION

This Modification Application is supported by a Geotechnical and Preliminary Environmental Report prepared by Coffey Geotechnics (“Coffey’s”). This assessment has reviewed issues pertaining to site contamination, acid sulphate soils, as well as geotechnical including riverbank stability issues. A copy of Coffey’s report forms **Annexure 9** to this EA. This section of the EA is based upon the findings of this assessment.

This assessment undertaken by Coffey’s was based upon:

- A site visit by a Coffey engineer to observe potential sources of contamination.
- Undertaking a desk study and site history review, review of previous relevant environmental reports available to Coffey, interviews with people familiar with the history of the site; and review of contaminated land records information in the public register maintained by NSW EPA;
- Reporting including presenting the results of the fieldwork, identifying potential Areas of Environmental Concern (AECs) and Contaminants of Potential Concern (COPCs) and making conclusions and recommendations.

### 8.7.1 Review of NSW EPA Records

#### ***Contaminated Land Database***

A search of the NSW OEH Contaminated Land Record<sup>1</sup> was carried out by Coffey’s on the 17 August 2016. The contaminated land public record is a searchable database of:

- Actions taken by the EPA under sections 15, 17, 19, 21, 23, 26 or 28 of the Contaminated Land Management Act 1997 (CLM Act).
- Actions taken by the EPA under section 35 or 36 of the Environmentally Hazardous Chemicals Act 1985 (EHC Act). (Note: Some notices under section 35 of the EHC Act 1985 were issued by the State Pollution Control Commission, which was the NSW government agency responsible for managing contaminated sites before the EPA was established in 1992.)
- Site audit statements provided to the EPA under section 52 of the CLM Act on sites subject to an enforce declaration or order.

The search noted no records or listings for the site, or within 1 km of the site.

### ***Protection of the Environment Operations (POEO) Database***

A search of the NSW DECC Public Register of the Protection of the Environment Operations (POEO) Act 1997 was carried out by Coffey's on 17 August 2016. The POEO public record is a searchable database

- Environment protection licences;
- Applications for new licences and to transfer or vary existing licences;
- Environment protection and noise control notices;
- Convictions in prosecutions under the POEO Act and the results of civil proceedings;
- Licence review information. Submissions regarding licence review can be made at any time; and
- Exemptions from the provisions of the POEO Act or regulations.

The search noted that there are several licenses (and variations of existing licenses) for the Main Factory processing site (and adjacent effluent disposal and treatment sites) dating from 2000. The licenses relate to the following scheduled activities:

- Agricultural Processing;
- Chemical Production and Storage; and
- Chemical Industries or Works - other.

Several licenses state the need for several compliance monitoring points (including effluent disposal, stormwater discharge and air monitoring), which are installed across the general Main Factory area. In addition, soil and groundwater in effluent disposal areas were required to be monitored for a range of nutrients (including nitrate, phosphorous and organic matter). Based on Coffey's previous experience working on the greater site (which includes Main Factory), the majority of these licenses relate to areas outside of the current site, and relate to processes that are unlikely to result in significant contamination issues relevant to the industrial land use setting.

Other than license conditions, the only other document made available was an audit compliance report on requirements to prepare a pollution incident response management plan. The audit did not assess whether Manildra had conformed to other conditions in the license permits.

BOC Gas Plant (situated adjacent the proposed car parking areas) has a current EPL license (license number 11164) relating to chemical production and storage of a carbon dioxide processing plant and associated activities. Wastes produced by this plant are

discharged to Shoalhaven Starches' effluent pipeline located near Bolong Road, to the south west of the BOC plant (potentially within the proposed car park area).

There were no further POEO licenses within 500m of the site.

### ***Review of Previous Environmental Reports***

Several environmental and geotechnical reports have been undertaken at the Main Plant facility (and surrounding areas) since 2008. Three contamination assessments (Coffey 2008, Coffey 2009 and Coffey 2015) were undertaken in the vicinity of the Main Factory. A summary of relevant information from the reports is provided below:

#### ***Coffey 2008 Preliminary Environmental Site Assessment***

Proposed ethanol expansion upgrade works were proposed in 2007 across the Main Factory. A preliminary environmental site assessment was undertaken to assess the potential for soil contamination and check for acid sulfate soils to be present within the portion of the plant to be redeveloped. The 2007 assessment area encompassed the Main Manildra Factory, however did not extend as far east to include the proposed container storage, evaporator, cooling tower and substation areas.

Anecdotal evidence from site interviews carried out by Coffey's revealed the following information:

- Prior to 1950s, the area was predominantly used for rural grazing purposes; circa 1950s.
- A Horlicks Factory (processing drink products, cheese and gluten), occupying the central plant areas, was constructed.
- In the 1970s, the site operated as the Shoalhaven Starches facility;
- Up until 1993-1994 the majority of the eastern portion of the Manildra plant (which covers the majority of the site) was primarily vacant grazing land, at which point it became paved car parking areas.
- The gas plant (adjacent the proposed car parking areas) was constructed between 1993 and 2002.
- From 2007 the ethanol fermenting tanks were constructed.
- A dangerous goods license search undertaken by Workcover (now SafeWork NSW) on 22 August 2007. A list showed that multiple tanks were licensed in an area referred to as 'Area 2', which encompassed the ethanol fermentation, recovery and storage area that is adjacent where the proposed Tanks 1, 2 and 8 will be installed. These licensed tanks included:

- A large 2.9 ML ethanol above ground tank;
- Ten above ground tanks ranging from 1.8 kL to 5 kL in size. Two of these tanks stored petrol, and the remainder stored methyl isobutyl ketone, butanols, propyl alcohol, n-propyl acetate and methanol.
- An underground tank (either 30 kL or 100 kL in size), licensed to store Dimethylether. The exact locations of these tanks are not shown.

An earlier site plan (dated 1997) and cross sections identified the following:

- Several existing ASTs in the vicinity of the proposed tanks 1, 2 and 8 locations. These existing ASTs stored either ethanol or methanol and were stored within a bunded area.
- A diesel fuel tank (site observations undertaken by Coffey suggest an AST) was situated to the south of the fire pump house, approximately 10m to the northeast of the proposed ethanol plant.
- The proposed ethanol plant is situated adjacent to a building labelled 'control room' and 'ethanol distillation plant'.

Soil sampling was carried out across the Main Factory using boreholes and test pits

Two test pits and two boreholes were undertaken in the proposed car parking areas. Remaining sampling locations were situated at least 20 m from other proposed development areas.

Soil sampling in the central and eastern portions of the Main Factory recorded fill soils ranging from 0.4 m to 0.75 m, comprising silty sands and some gravel). In the proposed car parking area, fill soils (clayey silts with some blue metal gravels) were encountered to depths between 0.4 m and 0.6 m. Fill soils across both areas were not indicative of ASS. Underlying soils comprised of alluvial and estuarine silts with varying proportions of clay and sand.

The results of the soil sampling indicated that at the locations tested, concentrations of potential contaminants of concern did not suggest soil contamination, it was noted that the presence of infrastructure and buildings restricted access, and as such relatively localised contamination could exist from previous activities and potential spillages. Samples collected from the fill in the proposed car parking areas were analysed for heavy metals, petroleum hydrocarbons (Total Recoverable Hydrocarbons (TRH), polycyclic aromatic hydrocarbons (PAH) and benzene, toluene, ethylbenzene and total xylenes (BTEX)) and pesticides. Concentrations were less than adopted criteria for the proposed industrial/commercial land use.

Acid sulfate soil (ASS) testing in the central plant area suggested that acid sulfate soils were unlikely to be present in the upper 2 m. ASS testing in the proposed car parking area suggested that actual ASS could be present from 1 m.

#### Coffey 2015 Contamination Assessment

A starches product dryer was proposed to be constructed in Lot 143 in 2014. A contamination assessment (Coffey, 2015) was undertaken to assess the potential for soil contamination and check for acid sulfate soils to be present in this lot, which includes the location of the proposed cooling towers, evaporators, substation, ISO container storage areas and railway siding.

The site history search indicated that this portion of the site was used for rural agricultural purposes. A building was present on the site (in the vicinity of the proposed cooling tower/container storage area) in 1961, and was demolished between 1979 and 1993. Lot 143 was acquired by Dairy Farmers in the 1970s, although the western portion of Lot 143 was generally vacant until being used for storage by Shoalhaven Starches (since 2012). Two treatment ponds were constructed in the south-eastern corner of Lot 143 sometime between 1984 and 1993. A former treatment pond (to the immediate west of the existing treatment ponds) was backfilled prior to 2013.

A site walkover in the western portion of Lot 143 indicated that the site was generally covered by gravel hardstand and occupied by various pieces of unused equipment, empty 1000 L plastic containers and drums, portable shipping containers, sheds, stockpiles of timber and railway sections and a concrete slab. Four drums (labelled as Diesel Engine Oil) and a 1000 L plastic container containing waste oil were observed approximately 20 m to the east of the proposed ISO container storage area. Some localised oil staining was observed near the waste oil container.

A former effluent treatment facility (including the treatment ponds) was observed in the south-eastern corner of the site. The plant comprised of two treatment ponds, two circular concrete aeration tanks (approximately 15 m diameter) and several smaller storage tanks and associated pipework. One pond ('Pond 1') was concrete lined and the second pond ('Pond 2') had earthen embankments. The depth of Pond 1 and Pond 2 were estimated to be 3 m bgs and 6 m bgs, respectively. Some water was observed, with algal growth, at the base of the ponds. A small brick building (labelled 'control room') is situated between the ponds. Pipework was observed to enter this building.

Three stockpiles (comprising ballast, concrete and fill soils respectively) with approximate volumes ranging between 5 m<sup>3</sup> and 100 m<sup>3</sup> were observed in the central southern portion

of Lot 143 to the west of the concrete aeration tanks. Visually, the stockpiles did not appear to contain foreign materials or asbestos containing materials.

Areas around the footprint of the former building in the southwestern side of the lot (due to potential weathering of hazardous materials), storage of chemicals, areas adjacent the railway siding and fill material were identified as areas of environmental concern (AECs). Soil samples (comprising test pits and surface samples) targeted these areas. The following contamination issues were identified:

- Localised TRH F3 and F4 petroleum hydrocarbon contamination was identified adjacent the railway spur and waste oil IBC container, exceeding adopted human health guidelines for commercial land use via direct contact (although it is less than adopted criteria for intrusive maintenance workers). The latter contamination source is outside the current proposed development area and is not considered to have an impact on the current development. The inferred lateral extent of the near surface contamination adjacent the railway line (based on 'step out' surface samples collected) is likely to be 5 m; and
- Bonded ACM was noted in former topsoil beneath fill in the area where a former structure was once located. A bonded ACM fragment was also observed near the stockpile area in the central southern portion of Lot 143.
- Concentrations of anthracene, phosphorous and zinc, exceeding trigger values for protection of marine water aquatic ecosystems, were identified in water samples in Pond 1 and/or Pond 2. The zinc and anthracene exceedances are marginally above the trigger levels, noting that the trigger level for anthracene is of low reliability. The phosphorous concentrations exceed the marine water ecosystem trigger values, however are less than the irrigation trigger levels. As there does not seem to be non-conformance issued by the NSW EPA during operation of the treatment works, widespread phosphorous leaching from the ponds to the river is considered unlikely.

Furthermore, alluvial soils can have inherently high levels of available phosphorous (Lawrie, 2000), which would suggest that phosphorous rich groundwater discharges to the river across a larger area in the agricultural Bomaderry/Bolong region.

- Nickel concentrations above these trigger values were also identified in a groundwater well (CBH4) downgradient of Pond 1. The source of this exceedance is unknown and could be indicative of regional groundwater quality. The exceeding concentrations detected however are marginally above the trigger levels. Taking into consideration the dilution effects of Shoalhaven River adjacent the site, these elevated concentrations are unlikely to adversely impact the receiving waters.

Coffey recommended the following to address the above contamination issues:

- The residual water within the treatment ponds will need adequate management prior to redevelopment. Manildra may want to further explore the applicability of irrigating this water on their adjacent environmental farm as long it meets their license conditions and they are allowed to transport it across.
- Manildra should improve general housekeeping in the short term prior redevelopment to prevent further or wider spread contamination occurring (eg. through preventing further hydrocarbon spills). Areas with existing contamination should also be noted to prevent inadvertent access and/or spreading of these soils to other areas.
- The ground surface in the southern area of Lot 143 area should be inspected by a competent person for the presence of ACM materials. If present, these materials should be removed in accordance with relevant NSW legislation.
- With respect to asbestos contamination in soil, this could be remediated through excavation and offsite disposal. Alternatively, the asbestos impacts could be managed on site through onsite capping and containment. This could involve capping with a layer of 'clean' fill (with the inclusion of a warning layer) or capping with a pavement. This option may have practical implications as it would require increasing site levels and may not be cost effective. On-site management would also require preparation of a site management plan that would need to be followed during and post construction for the life of the site, notation of the contamination such as on the planning certificate under Section 149 of the Environmental Planning and Assessment Act (1979) and/or Section 88B of the Conveyancing Act 1919.
- The above remedial and management procedures should be further detailed in a Remediation Action Plan (RAP) or similar work plan, which should be prepared prior to intrusive construction works occurring on-site.

The results of acid sulfate soil testing undertaken across Lot 143 suggested that acid sulfate soils are likely to be encountered at depths greater than 4 m at the site.

### ***Site Interview Information***

Information on the site history was obtained by Coffey's by interviewing Mr John Studdert, the Environmental Coordinator at the site. Mr Studdert indicated that there had not been significant spills of chemicals, as far as he was aware, in the proposed construction areas. In addition, the existing bunds in the ethanol recovery and storage areas had not been breached.

Chemicals stored in these areas of the site are generally either cleaning products (mostly biodegradable), or relatively benign processing or by-product chemicals such as Dimethylether or ethanol. The Main Manildra Factory has a drainage and filtration system to prevent widespread runoff to surrounding land such as the Shoalhaven River.

### ***Summary of site history***

The following is a summary of the site history:

- General land use in the proposed development areas was agricultural (dairy grazing) prior to the mid-20th century.
- Prior to the Manildra Plant, the overall plant was used as a Horlicks factory, producing gluten and cheese. Manildra took ownership of the site circa late 1960s. Prior to this, the general area was likely to be used for dairy farming.
- As shown in the photograph 13 below, the proposed construction areas in the Manildra Plant were situated in farming land, outside of the main plant area buildings prior to the 1970s.
- Historical aerial photography indicated several buildings (likely to be farmhouses) were situated in the proposed evaporator/substation/container storage area prior to 1961, and appear to have been demolished between 1979 and 1993. This portion of the site operated as part of a Dairy Co-op from the early 1970s, which included cattle grazing activities in this area.
- BOC gas plant was constructed adjacent the proposed car park area between 1994 and 2004.
- Since 2012, the proposed compressor/ISO container storage area/evaporator area has been used for storage of miscellaneous equipment and parts.
- The available site history information has not identified evidence of the use of underground tanks or boilers within the proposed development areas; and
- Based on anecdotal evidence, historical reports and visual observations there does not appear to have been significant spills in any of the proposed development sites (noting the comment below relating to data gaps).

Based on the available site history information, the size of the site and the proposed development there is not considered to be significant site history gaps within the Main Manildra Plant areas that would affect the results of this assessment.



### ***Discussion and Recommendations***

Based on the site history, the following potentially contaminating activities were identified by Coffey's across the proposed development sites that are relevant to this modification:

- AEC 1 – Potential presence of fill soils (of unknown origin and quality);
- AEC 2 – Presence of potential asbestos containing materials on the ground surface in Lot 143, the and beneath the ground surface in the proposed evaporator/substation/storage area;
- AEC 3 – Maintenance activities and storage of chemicals in the proposed storage/cooling tower/substation area;
- AEC 4 – Historical and current chemical storage;
- AEC 5 – Leaks adjacent the existing railway siding in Lot 143.

Further details of these AECs, relevant to the proposed construction areas, are presented below.

#### ***AEC 1 – Potential present of fill soils (of unknown quality and origin)***

Fill soils were identified across the sites in previous Coffey reports. Based on observations made in these investigations, supplemented with analytical data of samples collected in the fill, we assess there to be a low likelihood of contamination being present that would result in a potentially unacceptable risk to the proposed site users. During earthworks, should evidence of potential contamination be encountered, works should cease and advice sought from a suitably qualified environmental practitioner.

The source of the asbestos noted beneath gravel hardstanding in the proposed ISO storage/evaporator area is likely to be from weathering / destruction of former buildings present in this area of the site (as discussed in AEC 2 below).

#### ***AEC 2 – Asbestos present on the ground surface (or in soil) from current or former buildings***

A bonded ACM fragment (ie. fibro) was observed on the ground surface in the southern area of the site (near SS23, as shown in Figure 3). The source of the fibro is unknown, and was removed during the course of sampling. This area should be inspected for the presence of other bonded ACM materials on the ground surface.

Bonded ACM was identified in former topsoil material (situated beneath gravel fill at approximately 0.2 m bgs) located beneath the proposed substation and cooling towers (in Lot 143). The previous site history search identified two clusters of residential (farmhouse) dwellings that were located in the southern and southwestern part of Lot 143, in addition

to four other smaller structures present elsewhere in this Lot. These buildings may have contained hazardous materials (such as asbestos eaves and lead based paint). These buildings were removed prior to 1993. Due to the inherent irregular distribution of ACM in the subsurface and the number of ACM finds, it would appear that adequate asbestos removal was not carried out during building demolition in this area. This area of the site will therefore require remediation/management as part of the proposed development.

*AEC 3 – Maintenance activities, railway line and storage in the proposed storage/cooling tower/substation area*

The western area of Lot 143 is used for storage of various items, including pipework, chemical containers, general storage and empty IBC containers. In the previous 2014 Coffey assessment, petroleum hydrocarbon contamination was identified within a likely extent of 5m of the railway line, and it likely to be limited to near surface soils. Manildra has informed Coffey that development in this area will be limited to laying of hardstanding. There may be a potentially unacceptable risk to construction workers during earthworks should they come into contact with the petroleum hydrocarbon contamination.

Maintenance activities observed in Lot 143 during the site walkover appear to be relatively minor (eg. welding with hand tools), therefore potential contamination in this area is unlikely to be present.

Manildra should ensure that appropriate housekeeping and site management procedures are adopted to ensure that surface soils in this area are not contaminated.

*AEC 4 – chemical storage across the proposed development area*

Multiple relatively large above ground storage tanks and structures were observed in the vicinity of the proposed ethanol tanks in the central and western Manildra plant. Based on site history information, these tanks have typically stored relatively benign chemicals (from a contamination perspective), such as syrups, esters, water and ethanol products. Anecdotal information indicates that there has not been large scale leakages or ruptures from these storage containers, and surrounding bunds (where present) appeared to be in good condition with no visual apparent staining observed.

Above ground storage tanks containing diesel were observed near the proposed ethanol plant.

Coffey understands the purposes of these tanks is to power adjacent pumps during emergency situations. The tanks are situated within a self bunded steel framework, and no visual or olfactory evidence of leakages were noted. Minor levels of chemical storage (cumulatively less than 100 L) were noted in the current pump room.

Based on the site history information, the good standard of housekeeping in the central plant area, and the relatively low quantity of harmful chemicals stored, it is considered unlikely that this AEC would present a potentially unacceptable contamination risk to receptors within the Main Manildra

Factory area. This assumes that tanks to be removed are done in a safe, controlled manner and spillages during this process are avoided.

#### *AEC 5 – Railway siding to the south of Lot 143*

A railway siding is present along the southern boundary of Lot 143. Multiple surface samples were collected as part of the Coffey 2015 investigation either within the ballast on the railway tracks or on the ground surface adjacent the railway line.

Observations of possible hydrocarbon spillages were observed near the tracks at two locations during sampling. Two samples (SS8 and SS19) collected at these locations recorded TRH F3 concentrations exceeding HSLs, and TRH F2 to F4 concentrations exceeding management limits. Silica gel clean up analysis recorded TRH F2 to F4 similar to initial results, which suggests the hydrocarbons are of petroleum origin (rather than of non-petroleum origin). Petroleum hydrocarbon contamination is probably sourced from leakages from trains and carriages that use this siding. Contaminant distribution is likely to be sporadic and relatively localised around the railway siding.

If this area of the site were to be upgraded as part of the redevelopment, then these soils should be adequately managed. If the siding is to remain, then limited access to this area is likely as there are other physical health risks from being on a rail line. Access to this area is more likely for maintenance workers. The concentrations did not exceed investigation levels for protection of maintenance workers.

#### *Risk to the environment*

According to Coffey's given the long history of industrial use in the proposed development areas, there is likely to be localised exceedances of ecological investigation levels. In the context of continuing industrial use of the area, we do not consider terrestrial ecological receptors to be relevant in this land use context.

Nickel and/or anthracene concentrations were recorded to exceed marine water ecosystem protection trigger levels in wells in the proposed ISO container storage and railway siding area in the Main Plant in a 2015 assessment. The source of these exceedances was unknown and could be indicative of regional groundwater quality. At the time Coffey reported the exceeding concentrations detected were marginally above the trigger levels. Furthermore, the trigger level for anthracene is of low reliability. Taking

into consideration the dilution effects of Shoalhaven River adjacent the site, these elevated concentrations are unlikely to adversely impact the receiving waters.

Concentrations of anthracene, phosphorous and zinc, exceeding trigger values for protection of marine water aquatic ecosystems, were identified by Coffey's in water samples in Pond 1 and/or Pond 2. This pond will be backfilled as part of the development, and existing water is likely to be pumped out for disposal. The zinc and anthracene exceedances are marginally above the trigger levels, noting that the trigger level for anthracene is of low reliability. The phosphorous concentrations exceed the marine water ecosystem trigger values, however are less than the irrigation trigger levels. As there does not seem to be non-conformance issued by the NSW EPA during operation of the treatment works, widespread phosphorous leaching from the ponds to the river is considered unlikely.

Furthermore, alluvial soils can have inherently high levels of available phosphorous (Lawrie, 2000), which would suggest that phosphorous rich groundwater discharges to the river across a larger area in the agricultural Bomaderry/Bolong region.

Based on a review of the previous information, Coffey's assessed that there is a low likelihood of a potentially unacceptable risk to future site users (maintenance and construction workers) due to contamination in the remaining areas of the site assessed as part of this report.

With respect to asbestos contamination in soil Coffey's indicate this could be remediated through excavation and offsite disposal. The handling of asbestos impacted soil requires the preparation of an asbestos removal plan and licensed contractor. Following completion of removal activities, a clearance certificate would be issued by a suitably qualified asbestos consultant. Such work should be carried out by appropriately qualified and licensed contractors in accordance with all relevant codes of practice and standards such as the *National Occupational Health and Safety Commission (2005): Code of Practice for the Safe Removal of Asbestos (2nd Ed)*[NOHSC:2002(2005)].

Alternatively, the asbestos impacts could be managed, according to Coffey's, on site through onsite capping and containment. This could involve capping with a layer of 'clean' fill (with the inclusion of a warning layer) or capping with a pavement. This option may have practical implications as it would require increasing site levels and may not be costs effective. On-site management would also require preparation of a site management plan that would need to be followed during and post construction for the life of the site, notation of the contamination such as on the planning certificate under Section 149 of the Environmental Planning and Assessment Act (1979) and/or Section 88B of the

Conveyancing Act 1919 and the local Council would need to be consulted to see if they would accept such an option.

In the interim, the potential risks to site workers due to asbestos impact (both above and below ground) should be incorporated in existing management plans (alternatively a management plan should be developed). The management plan should outline how these asbestos impacts can be managed so the risk to site workers is reduced to an acceptable level.

## **8.8 GEOTECHNICAL AND RIVERBANK STABILITY**

As referred to in Sections 8.7 and 8.8 above the Geotechnical and Preliminary Environmental Report prepared by Coffey Geotechnics ("Coffey's") and which forms **Annexure 9** to this EA also included a geotechnical assessment including an assessment of riverbank stability. A copy of Coffey's report forms **Annexure 9** to this EA. This section of the EA is based upon the findings of this assessment.

### **8.8.1 Local Geology and Hydrogeology**

According to the 1:100,000 Kiama Soil Landscape Series Sheet (9028, First Edition), produced by the Department of Conservation and Land Management NSW (1993) indicates that the site is located on Shoalhaven Soils. These soils are described as moderately deep Prairie Soils on levees, Red Earths and Yellow and Red Podzolic Soils on terraces and Alluvial Soils and Gleyed Podzolic soils on the floodplains.

According to the 1:250,000 Wollongong Geological Series Sheet (S1 56-9, First Edition) prepared by the NSW Department of Mines (1952) indicates the site is likely to be underlain by Quaternary Alluvium, gravel, swamp deposits and sand dunes.

Previous investigations by Coffey's (2008, 2009 and 2014) in the Main Factory area indicated the presence of fill ranging between 0.5 m to 2.5 m depths, generally comprising of silty sand/ sandy silt/gravelly sand or bedding sands. Generally, deeper fill soils were encountered to the south of the site, towards the river embankment. The fill is underlain by alluvium (clayey silt/ silty sand) or estuarine soils (dark grey silty clay) to depths generally greater than 5m below ground surface.

Online licensed groundwater bore searches undertaken by Coffey's during previous investigations have identified several licensed monitoring bores within a 500 m radius of the sites. These reports indicated that there are no licensed groundwater bores used for potable or stock watering use in downgradient areas of the site.

Based on observations made of the local area, surrounding topography, and proximity of the nearby Shoalhaven River, groundwater is expected to be located at a depth of between 2 m and 3 m bgs and flow to the south towards the river.

#### ***Geotechnical Review and Site Observations***

A Principal Geotechnical Engineer from Coffey's visited the site on 24 August 2016 to observe the site surface conditions along the northern bank of the Shoalhaven River and banks of Abernethy's Creek and in the vicinity of the proposed structures within the main plant area of Manildra's Shoalhaven Starches. There was no evidence of any progressive or ongoing erosion or collapse of the river or creek banks in the vicinity of the proposed new structures. Previous erosion and local collapse of the river bank occurred during flood events in 2013 and 2015.

Coffey has also reviewed monitoring of ground movement over various sections of the river bank in close proximity to the main plant and the internal railway to the east of the plant. Monitoring methods include downhole inclinometers at six locations, survey monitoring of the rock revetment wall close to the flour mill, and survey monitoring of the tops of the steel sheet piles installed along the sections river bank close to the railway. The sheet piles were installed where local failure of the river bank occurred following high rainfall and flooding events over the past five years.

#### ***Effects of Proposed New Structures and Storage Areas on River Bank Stability and Stability of Abernethy's Creek Banks***

Based on the proposed layout plan provided, the positions of the new structures and storage areas are relatively remote from the northern bank of the Shoalhaven River; Coffey's indicate that any new heavily loaded structures should be supported on deep piled foundations to rock and therefore should not add any additional load to the soils behind the river bank, including the sections of river bank protected by the existing rock revetment wall and steel sheet pile walls.

In summary, according to Coffey's, the proposed structures and storage areas for the ethanol plant modification should have no effect on the stability of the current river bank and banks of Abernethy's Creek provided the following general recommendations are complied with:

- All heavily loaded structures should be supported on deep foundation systems to rock so that no additional loads are applied to the soil mass close to the banks;

- Cranes or other large temporary surface loads such as building materials should not be located within 10m of the river bank or within 5m of the Abernethy's Creek bank, unless a specific assessment of the crane loads and ground condition is carried out;
- Construction activities that involve significant ground vibration such as pile driving should be avoided in close proximity to the river and Abernethy's Creek.

## **8.9 ACID SULPHATE SOILS**

### ***Acid sulfate soil occurrence***

ASS is naturally occurring soil and sediment containing iron sulfides which when exposed to oxygen can generate sulfuric acid. According to the Burrier/Berry 1:25,000 Acid Sulfate Soil Risk Map (1997) Edition 2, prepared by the Department of Land and Water Conservation (DLWC), the site is mapped to be within an area with a low probability of ASS occurrence being described as elevated alluvial plains and levees. ASS, if present, is considered to be greater than 2 m below the ground surface. The map shows areas immediately to the south of the site within the river, as being estuarine bottom sediments with a high probability of ASS occurrence.

Previous assessments by Coffey's (2008, 2009 and 2014) and GHD (2015) indicate that acid sulfate soils are likely to exist at depths greater than 2 m to 4 m in the proposed development areas.

Based on previous investigations soils beneath depths of 2 m in the proposed car park, and 3 m in the central and western Main Manildra Factory areas, are considered to be acid sulfate soils. At shallower depths, there is a low risk that acid sulfate soils are present, however this may be influenced by the presence of fill within the site. Should dark grey, high plasticity estuarine clays be encountered in the current site at depths shallower than 3 m, these soils should be considered potential acid sulfate soils unless otherwise tested.

Should the proposed development involve excavation of soils from depths greater than 2 m at the site, and/or dewatering that could result in a drop in the water table, this could also impact acid sulfate soils, then according to Coffey's an acid sulfate management plan (ASSMP) should be developed and actioned. An ASSMP will present the approach and methodology of acid sulfate soil management at the site during the construction phase of the project which is to be followed by Manildra and/or their subcontractors.

The ASSMP should be prepared in accordance with the relevant sections of the 1998 ASS Manual prepared by ASSMAC. The detail of the ASSMP can be refined based on the likely volumes to be extracted. For small volumes a simple work plan may be sufficient. If possible, avoidance of disturbing the ASS is preferred.

## 9.0 STATEMENT OF ADDITIONAL COMMITMENTS

Section 8.0 of the EA for the Shoalhaven Starches Expansion Project prepared by our firm provides a Statement of Commitments agreed to by Shoalhaven Starches Pty Ltd outlining environmental management, mitigation and monitoring measures to be implemented to minimise potential impacts associated with the Shoalhaven Expansion Project and having regard to the findings of the EA.

The only additional commitments arising from this modification proposal include the following:

### 9.1 PRELIMINARY HAZARD ANALYSIS

**Table 22** outlines recommended additional management procedures and design considerations that Shoalhaven Starches commits to implementing and incorporating into practices that would prevent and / or minimise risk scenarios from occurring.

**Table 22**  
**Preliminary Hazard Analysis**

<i>Preliminary Hazard Analysis</i>
Shoalhaven Starches commits to implementing the recommendations of the PHA prepared by Pinnacle Risk as follows: <ol style="list-style-type: none"><li><i>1. Provide means for a person to safely escape from elevated platforms should a fire occur.</i></li><li><i>2. The control room structural integrity and emergency egress routes should be reviewed for adequacy in the event of a distillery pool fire.</i></li><li><i>3. Ensure that the ethanol vapours from a road tanker when it is being filled are adequately contained.</i></li></ol> These do not include the process safety recommendations that were made during the HAZOP for the distillery.

### 9.2 NOISE

**Table 23** outlines the recommended additional noise mitigation measures and design considerations that Shoalhaven Starches commits to implementing and incorporating into the design, construction and operation of the proposed modifications.



**Table 23**  
**Noise Mitigation Measures**

<b><i>Measures and Design Considerations</i></b>
<p>Shoalhaven Starches commits to implementing the recommendations of the Noise Impact Assessment prepared by Harwood Acoustics for this modification proposal as follows:</p> <p><b><u>Sound Level Design Goals</u></b></p> <p><b><u>Cooling Towers</u></b></p> <p>The cooling towers should have an individual sound power level of (<math>L_w</math>) <b>87 dBA</b> each (assumes six (6) will be installed).</p> <p><b><u>Evaporators</u></b></p> <p>The plant and equipment associated with the evaporators should not exceed a combined sound power level (<math>L_w</math>) of <b>90 dBA</b>.</p> <p>This equates to a sound pressure level of 73 dBA when measured at a distance of 3 metres from the evaporators for all noise producing components of the evaporators combined.</p> <p><b><u>Beverage Grade Ethanol Plant</u></b></p> <p>The plant and equipment associated with the beverage grade ethanol plant should not exceed a combined sound power level (<math>L_w</math>) of <b>90 dBA</b>.</p> <p>This equates to a sound pressure level of 73 dBA when measured at a distance of 3 metres from the plant for all noise producing components combined.</p> <p>Once the noise level of the individual components of the evaporators and beverage grade ethanol plant are known, localised acoustical treatment can be designed to ensure the above design noise goals are met, if required.</p> <p>This may include silencers, specially selected flow valves or localised acoustical screening or enclosures.</p> <p><b><u>Construction Noise</u></b></p> <p>The Project Approval prescribes allowable operation hours for construction activities in Clause 11 and Clause 13, which states:-</p> <p style="padding-left: 40px;"><i>“During construction, the Proponent shall prepare and implement all reasonable and feasible measures to minimise the construction noise impacts of the project.”</i></p> <p>The construction noise management levels are likely to be met at each receptor location during general construction activity, with the exception of piling. During piling (if required) there is potential for the noise management levels to be exceeded on some occasions. This is not considered a significant exceedance during day time hours for short and sporadic duration.</p> <p>However, a Construction Noise Management Plan may be provided in accordance with NSW EPA’s Interim Construction Noise Guideline and to satisfy Condition 13 of the Project Approval.</p> <p>Construction noise mitigation measures are included in the Construction Safety &amp; Environmental Management Plan prepared by Shoalhaven Starches.</p>

### 9.3 VISUAL IMPACT

As outlined in Section 8.5 of this EA it is our view that the proposed works will not create a significant adverse visual impact due principally to the location of the proposed works within the vicinity of existing structures of a similar height, bulk and scale as those works which are proposed. Shoalhaven Starches however commit to the following additional measures as outlined in **Table 24** to assist in screening and further minimising visual impacts arising from the proposed works.

**Table 24**  
**Visual Impact**

<i>Measures</i>
Shoalhaven Starches commits to where appropriate and possible, the proposed works associated with this modification should be constructed of similar materials as those previously used on the site and be of a non-reflective nature. Colours should blend with existing structures on the site to ensure visual harmony. Consideration should be given to incorporating a cladding colour if possible which will match existing development on the site.

#### 9.4 TRAFFIC

Shoalhaven Starches commit to the following additional measures as outlined in **Table 25** to assist in minimising traffic impacts arising from the proposed modification.

**Table 25**  
**Traffic Impacts**

<i>Measures</i>
<p>Shoalhaven Starches commits to the following recommendations of the traffic impact assessment prepared by ARC:</p> <ul style="list-style-type: none"><li>• <i>That the intersection of Bolong Road &amp; Dairy Driveway be upgraded with reference to the Concept Layout Plan and further to a Council approval of final design plans.</i></li><li>• <i>That the Services Driveway continue to provide for emergency only access, with all vehicle trips associated with existing and future operations in the eastern part of the Starches Site to utilise the proposed new access road via Dairy Driveway.</i></li><li>• <i>That all new parking spaces and parking aisles be designed with reference to <u>AS 2890.1</u>.</i></li><li>• <i>That an appropriate Construction Traffic Management Plan be prepared to govern the construction of the proposed Modification infrastructure.</i></li></ul>

#### 9.5 SITE CONTAMINATION

**Table 26** outlines recommended additional management procedures that Shoalhaven Starches commits to implementing and incorporating into practices to address potential site contamination.

**Table 26**  
**Site Contamination**

<i>Management Procedures</i>
<p>To address the potentially unacceptable contamination issues in the remaining areas, Shoalhaven Starches commits to the following additional assessment, management and remedial measures are implemented:</p> <ul style="list-style-type: none"> <li>• Implementation of an management plan to manage risks to known asbestos impacts;</li> <li>• The residual water within the treatment ponds will need adequate management prior to redevelopment. Manildra may want to further explore the applicability of irrigating this water on their adjacent environmental farm as long it meets their existing license conditions and they are allowed to transport it across;</li> <li>• With respect to asbestos contamination in soil could be remediated through excavation and offsite disposal. The handling of asbestos impacted soil requires the preparation of an asbestos removal plan and licensed contractor. Following completion of removal activities, a clearance certificate would be issued by a suitably qualified asbestos consultant. Such work should be carried out by appropriately qualified and licensed contractors in accordance with all relevant codes of practice and standards such as the <i>National Occupational Health and Safety Commission (2005): Code of Practice for the Safe Removal of Asbestos (2nd Ed)</i>[NOHSC:2002(2005).</li> </ul> <p>Alternatively, the asbestos impacts could be managed on site through onsite capping and containment. This could involve capping with a layer of 'clean' fill (with the inclusion of a warning layer) or capping with a pavement. This option may have practical implications as it would require increasing site levels and may not be costs effective. On site management would also require preparation of a site management plan that would need to be followed during and post construction for the life of the site, notation of the contamination such as on the planning certificate under Section 149 of the Environmental Planning and Assessment Act (1979) and/or Section 88B of the Conveyancing Act 1919 and the local Council would need to be consulted to see if they would accept such an option.</p> <p>In the interim, the potential risks to site workers due to asbestos impact (both above and below ground) should be incorporated in existing management plans (alternatively a management plan should be developed). The management plan should outline how these asbestos impacts can be managed so the risk to site workers is reduced to an acceptable level.</p> <ul style="list-style-type: none"> <li>• The ground surface in the south of Lot 143 area should be inspected by a competent person for the presence of ACM materials. If present, these materials should be removed in accordance with relevant NSW legislation.</li> <li>• As direct assessment of all areas was not possible during this work, we recommend that observations be made during the demolition of the any existing plant for evidence of contamination. For example during removal of the diesel Above Ground Storage Tank (AST) near the proposed ethanol plant area.</li> </ul>

## 9.6 ACID SULPHATE SOILS

**Table 27** outlines recommended additional management procedures that Shoalhaven Starches commits to implementing and incorporating into practices to address potential acid sulphate soils.

**Table 27**  
**Potential Acid Sulphate Soils**

<b>Management Procedures</b>
<p>Should the proposed development involve excavation of soils from depths greater than 2 m at the site, and/or dewatering that could result in a drop in the water table, Shoalhaven Starches commits to formulating an acid sulfate management plan (ASSMP) and actioned. An ASSMP will present the approach and methodology of acid sulfate soil management at the site during the construction phase of the project which is to be followed by Manildra and/or their subcontractors.</p> <p>The ASSMP would be prepared in accordance with the relevant sections of the 1998 ASS Manual prepared by ASSMAC. The detail of the ASSMP can be refined based on the likely volumes to be extracted. For small volumes a simple work plan may be sufficient. If possible, avoidance of disturbing the ASS is preferred.</p>

## 9.7 GEOTECHNICAL AND RIVERBANK STABILITY

**Table 28** outlines recommended additional management procedures that Shoalhaven Starches commits to implementing and incorporating into practices to address geotechnical and riverbank stability issues.

**Table 28**  
**Geotechnical and Riverbank Stability**

<b>Management Procedures</b>
<p>Shoalhaven Starches commits to the following general recommendations made by Coffey's:</p> <ul style="list-style-type: none"> <li>• <i>All heavily loaded structures should be supported on deep foundation systems to rock so that no additional loads are applied to the soil mass close to the banks;</i></li> <li>• <i>Cranes or other large temporary surface loads such as building materials should not be located within 10m of the river bank or within 5m of the Abernethy's Creek bank, unless a specific assessment of the crane loads and ground condition is carried out;</i></li> <li>• <i>Construction activities that involve significant ground vibration such as pile driving should be avoided in close proximity to the river and Abernethy's Creek.</i></li> </ul>

## 10.0 CONCLUSION

In 2009 the Minister for Planning issued Project Approval for an application made by Shoalhaven Starches to increase its ethanol production capacity at its existing ethanol plant located at the Shoalhaven Starches Plant at Bomaderry. This Project Approval enables Shoalhaven Starches to increase its ethanol production in a staged manner at its Bomaderry Plant from the current approved 126 million litres per year to 300 million litres per year.

The Project Approval also consolidated all previous approvals including Project Approval MP 07\_0021 (the Flour Mill) into the one Project Approval.

Following the Minister's determination Shoalhaven Starches have been implementing and commissioning works in accordance with this approval.

The Shoalhaven Starches Expansion Project sought to increase ethanol production at the Bomaderry plant in a staged manner from 126 million litres per year to 300 million litres per year. To accomplish the increase in ethanol production, this project required a series of plant upgrades and increase in throughput of raw materials, principally flour and grain.

The objective of Shoalhaven Starches Expansion Project which was the subject of the Project Approval MP 06\_0228 sought to increase ethanol production at the site to meet the expected increase in demand for ethanol arising from the NSW Government's mandate to increase the blending of ethanol in the total of volume of petrol sold in NSW towards an ethanol content of 10% by 2011.

Unfortunately the expected increase in demand for ethanol to meet the demand arising from this mandate has not occurred due largely from a failure of the mandate to be imposed on petroleum suppliers.

As a result Shoalhaven Starches have been investigating alternative markets for the ethanol that is and will be produced at their Bomaderry plant in accordance with the Project Approval. One such market is the "beverage" market where ethanol is further treated and purified to enable it to meet stringent beverage grade specifications and pass organoleptic testing requirements (ie. taste and odours) to enable it to be utilised in the production of alcoholic drinks.

Shoalhaven Starches propose to undertake modifications to the existing ethanol distillery to produce up to 110 ML/year of beverage grade ethanol. This proposal will not involve an increase in overall ethanol production above the current approved 300 ML/year. Rather it will enable greater flexibility in the **type** of ethanol that is produced from the plant. The anticipated capital cost associated with the proposed works will be \$40 million.

Shoalhaven Starches intend to undertake modifications to the existing Ethanol Distillery Plant to:

- Increase the proportion of beverage grade ethanol that is able to be produced on the site to 110 ML/year. This modification will include:
  - A new beverage grade ethanol plant (to be located where the decommissioned dimethyl ether plant is currently sited);
  - Three (3) additional ethanol storage tanks;
  - An emergency Iso-container storage area (for ethanol) (located to the east of the relocated evaporator);
  - Cooling water towers;
  - Electrical substation; and
  - Pipe bridges; and
- Modify the type and location of the Water Balance Recovery Evaporator that has been previously approved under Mod. 2 adjacent to the Ethanol Plant.
- It is also proposed to extend and provide an additional two rail sidings situated between the Shoalhaven Starches factory complex and the former Dairy Farmers complex adjacent to the existing repair siding. This work will require the demolition and removal of existing tanks and pipework in this location of the site. It is proposed to extend the existing siding and to construct a further adjacent siding with a minimum of 6 metre track centres.

The use of these 2 sidings will be for the purpose of performing rail wagon “periodical” maintenance such as wheel and axle exchanges, brake gear and coupling repairs. Given the Manildra Group has flour, grain and container wagons in operation, the intent is to consolidate the wagon maintenance functionality to Shoalhaven Starches site at Bomaderry.

The application is made pursuant to Section 75W of the Environmental Planning & Assessment Act 1979.

The preparation of this Environmental Assessment has been undertaken following consultation with relevant Government agencies, including:

- The Department of Planning and Environment;
- Shoalhaven City Council;
- EPA;

- The Australian Department of Defence;
- Department of Primary Industry – Water.

This Environmental Assessment has been prepared to address issues detailed in requirements outlined by the above agencies.

The EA is supported by expert assessments addressing:

- Noise Impacts – the EA is supported by a Noise Impact Assessment prepared by Harwood Acoustics which includes recommendations to ensure that this proposal will achieve the noise limits as outlined under the Environmental Protection Licence that applies to the site. Furthermore noise emission during the construction phase of the development will meet noise management levels set by the EPA's relevant guidelines.
- Air Quality Impacts and including Odours – the EA is supported by an Air Quality Impact Assessment prepared by GHD. This assessment predicts no discernible increase in perceived odour impacts as a result of the proposed modifications to the plant.
- Flooding Impacts - the EA is also supported by a report prepared by WMA Water which identifies the proposed works do not increase the 1% AEP flood level on lands outside those owned by Shoalhaven Starches.
- Preliminary Hazard Analysis (PHA) prepared by Pinnacle Risk Pty Ltd that assesses and compares the risks associated with the proposal and finds that such risks are acceptable when compared against the Department of Planning & Environment's risk criteria.
- Traffic and Car Parking Assessment prepared by ARC Traffic and Transport that identifies that there are no access, traffic or parking impacts associated with the proposal – either during operation or construction – that would significantly impact on the efficiency and/or safety of the local traffic environment or existing on-site operations. The trip generation of the proposal during construction would be extremely minor, while once operational the proposal is not expected to generate any additional trips to the local road network.
- Site Contamination. A Phase 1 Site Contamination Assessment has been undertaken by Coffey Geosciences for the site. This Assessment has identified specific areas of the site which require further management measures to be undertaken.
- An Assessment has also been undertaken by Coffey's for the potential of the development site containing acid sulphate soils. This assessment has identified that soils at depths of 2 m below the proposed car park and 3 m in the central and western factory areas are considered to contain acid sulphate soils. This assessment recommends that should works involve excavation of soils from depths greater than 2 m, or that could result in de-watering

that could result in a drop of the water table, then an Acid Sulphate Soil Management Plan be developed for the project.

- Coffey's have also undertaken an assessment that works associated with this project would have on the stability of the banks of the Shoalhaven River and Abernethy's Creek. This assessment identifies that any new heavily loaded structures should be supported on deep piled foundations to rock and therefore should not add any additional load to the soils behind the river bank, including the sections of river bank protected by the existing rock revetment wall and sheet pile walls. Coffey's provide specific recommendations to ensure that the proposed works do not have an effect on the stability of the riverbanks for both the Shoalhaven River and Abernethy's Creek.

Following an assessment of the key issues associated with this proposal, this Environmental Assessment concludes that the proposal is suitable for the site and this locality.

The Minister's approval is sought for this modification application.

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## **ANNEXURE 1**

**Requirements for EA**

**issued by**

**Secretary of the Department of Planning  
and Other Government Agencies**

**ANNEXURE 2**

**Plan Details**

**of Proposed Modification**

## **ANNEXURE 3**

**Submission under Clause 4.6  
of Shoalhaven LEP 2014**

**prepared by**

**Cowman Stoddart Pty Ltd**

## **ANNEXURE 4**

### **Flood Assessment**

**prepared by**

**Webb McKeown & Associates**

## **ANNEXURE 5**

**Air Quality Impact Assessment**

**prepared by**

**GHD Pty Ltd**

## **ANNEXURE 6**

**Noise Impact Assessment**

**prepared by**

**Harwood Acoustics Pty Ltd**

## **ANNEXURE 7**

**Preliminary Hazard Analysis**

**prepared by**

**Pinnacle Risk Management**

## **ANNEXURE 8**

**Traffic and Car Parking Assessment**

**prepared by**

**ARC Traffic & Transport**



# ANNEXURE 9

## **ANNEXURE 9**

### **Geotechnical and Preliminary Environmental Report**

**prepared by  
Coffey Geotechnics**

## **ANNEXURE 10**

**Stormwater Management Plan**

**prepared by**

**Allen Price & Associates**