ENVIRONMENTAL ASSESSMENT

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

SHOALHAVEN STARCHES

PROPOSED ADDITIONAL NEW FLOUR MILL 'B' RELATING TO PROJECT APPROVAL MP06_0228

SHOALHAVEN STARCHES EXPANSION PROJECT

Prepared for

Shoalhaven Starches Pty Ltd

October 2016

Prepared by:

COWMAN STODDART PTY LTD

Town Planning, Agricultural & Environmental Consultants

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Ref. 14/67

Town Planning, Agricultural & Environmental Consultants

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CERTIFICATION OF ENVIRONMENTAL ASSESSMENT

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

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.	
Project Development:	Shoalhaven Starches Expansion Project (MP 06_0228)
Proposed Modification to Project:	Proposed modifications to Project Approval (MP06_0228) involving construction and operation of a new additional Flour Mill 'B'.

Environmental Assessment — An Environmental Assessment is attached

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: Stephen Richardson.

Name: S. D. Richardson

Date: 19th October 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.

On the 4th October 2007 the then Minister for Planning issued Project Approval MP 07_0021 for the establishment of a Flour Mill at the Shoalhaven Starches factory site. This project enabled the construction and operation of a new flour mill and two grain silos. The flour mill produced 265,000 tonnes of industrial grade flour a year for use within the Shoalhaven Starches factory. The flour mill is housed in a building within proximity of 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 6,000 tonnes of wheat grain. On the 1 March 2016, the Minister approved a modification application involving alterations to this existing flour mill which enabled its production capacity to increase to 400,000 tonnes of industrial grade flour per year.

In 2009 the Minister for Planning issued Project Approval for an application made by Shoalhaven Starches to increase its ethanol production capacity to meet the expected increase in demand for ethanol arising from the ethanol mandate by upgrading the 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 subject to certain conditions.

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.

12,300 tonnes per week of flour is approved to be transported to the site by rail for use in the production process at the site in conjunction with 7,700 tonnes per week of flour that is presently milled by the existing Flour Mill located on the site approved in 2007, and subsequently further modified in 2016.

Shoalhaven Starches propose to increase industrial grade flour production at the Bomaderry Plant. The proposed new Flour Mill will process 11,300 tonnes per week of grain producing

8,500 tonnes per week of flour. In conjunction with the flour already processed on the site, this will mean that 16,200 tonnes of flour will be able to be produced at the Bomaderry plant per week (or 842,400 tonnes per year), with the remaining 3,800 tonnes per week of flour being transported by rail to the site. The total flour processed on-site will be 20,000 tonnes per week in accordance with the site's current approval.

The establishment of an additional new Flour Mill at the Bomaderry site will enable subsequent spare capacity at the Company's Manildra Flour Mill to be devoted to the production of higher grade flour therefore increasing export opportunities for the Company.

To enable the new Flour Mill 'B' to be constructed the following actions will also be undertaken as part of this project:

- Deconstruct and dismantle the pipe bridge between the existing flour mill and the starch plant to make way for the new Flour Mill 'B'.
- Remove 7 existing silos. Six (6) of these silos will be relocated to the former Paper Mill site for storage. The remaining silo will be relocated adjacent to the DDG building for mill feed.
- Installation of a transfer pipeline for mill feed from the existing flour mill building to the new mill feed silo.
- Install a new flour transfer blowline to the starches plant on the existing pipe bridge.
- Install conveyors between the existing grain silos and intake system for the new Flour Mill Building 'B' building.
- Construct a new mill feed weighing system.

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.

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 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 Stephenson Environmental Management Australia (SEMA). This assessment identifies:

  - The maximum Total Suspected Particles (TSP) ground level concentration (GLC) is predicted to be significantly below the impact assessment criteria of 90 µg/m^3.

    Following implementation of the approved odour controls, the maximum worst case odour GLC is predicted to be between 2.2 ou and 3.2 ou, which potentially exceeds the regulatory impact assessment criteria of 2 ou.

    However, according to SEMA the following will further ameliorate this worst case predicted odour impact:

    - *The output of the Ethanol Upgrade odour impact model prepared by GHD did not report in two significant numbers. Therefore rather than a specific GLC, only a statistical range can be predicted for the worst case cumulative GLC. More accurate prediction of the cumulative odour impact to more than one significant number is not possible.*
    - *Worst case cumulative odour predictions assume that both the SEMA and GHD models used identical coordinates and time, and that ground level odour concentrations are additive.*
    - *Odour emissions from the proposed Flour Mill B can also be expected to have a similar, neutral hedonic tone to the existing mill because the proposed mill will be processing the same type of grain using equipment and processes similar to the existing mill. That is to say the odour emissions from the proposed flour mill would be regarded as neither pleasant nor unpleasant. The total odour emission rate for the proposed flour mill would not have a significant adverse incremental or cumulative odour impact at the Shoalhaven Starches factory site.*

- Flooding Impacts - the EA is also supported by a report prepared by WMA Water. This report indicates that any increase in the 1% AEP flood level as a result of the proposed works would be less than 0.01 m and would not extend beyond the land owned by Shoalhaven Starches.

- Preliminary Hazard Analysis (PHA) prepared by Pinnacle Risk Pty Ltd that assesses and compares the risks associated with the proposal against the Department of Planning's risk criteria and in summary finds:

  - The potential hazardous events associated with the new flour mill are dust explosions and smouldering fires. Given the nearest public land is approximately 110 m away and the river is 25 m away then no adverse off-site impacts are expected.

- All risk criteria outlined within HIPAP 4 is expected to be satisfied.
- The risk of propagation to neighbouring equipment is low given that potential dust explosions are either to be vented to atmosphere or of limited consequential impact and the potential fires are of a smouldering nature; and
- societal risk, environmental risk and transport risk are all considered to be broadly acceptable.

- 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.

  This assessment provides an outline of a Construction Traffic Management Plan that should be implemented for the construction phase.

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 construct an additional flour mill on the existing Shoalhaven Starches factory site at Lot 1 DP 838753 Bolong Road, Bomaderry.

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 4th 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. In 2016, the PAC approved (Mod. 8) alterations and extensions to this flour mill. 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 approximately 6,000 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 and Australian Paper Mill complexes further to the east of the Company's factory site.

1.2 BACKGROUND TO PROJECT

The Manildra Group has been in flour milling since 1952 when the first flour mill was purchased in the NSW country town of Manildra.

The Manildra Group owns and operates flour mills at four locations within New South Wales.

- Manildra;
- Gunnedah;

- Narrandera;
- The Bomaderry factory site.

The Manildra mills use state of the art equipment and technology to produce a full range of wheat flours and mixes for domestic and international markets. The Manildra Group has extensive milling capabilities with the Manildra mill ranking amongst the 10 largest mills in the world. The three mills actually compromise a total of six separate milling systems that allow the Company to produce an extensive range of flours, semolinas and specialty products.

The Company is vertically integrated with the majority of the flour produced at the Manildra mill being further processed at Manildra Group's main manufacturing facility at Bomaderry within the Shoalhaven local government area.

The Shoalhaven Starches Factory (which forms part of the Manildra Group of Companies) located on Bolong Road, Bomaderry produces a range of products for the food, beverage, confectionary and paper producing industries including: starch, glucose and ethanol.

In 2007, the NSW Government issued Project Approval for the construction of a Flour Mill on the Shoalhaven Starches factory site. This Flour Mill has now been constructed on site and is operating in accordance with this approval. Wheat is transported directly to the site by train and processed in the existing Flour Mill into industrial grade flour for use in the production of starch and gluten at the Bomaderry Plant.

At present flour used in the production process at the Bomaderry plant is supplied by the Company's flour mills at Manildra, Gunnedah, Narrandera as well as the existing flour mill located on the subject site. The train loads are brought to the plant via the switching yard at Bomaderry.

The husk (mill feed) material from the processing of this wheat will then be able to be used in the DDG dryers.

As a result the equivalent amount of flour and mill feed was no longer needed to be transported to the site.

The existing Flour Mill at the Bomaderry site is approved to process approximately 7,700 tonnes of industrial grade flour per week producing approximately 400,000 tonnes of industrial grade flour per annum for use in the Bomaderry Plant.

It is now proposed to construct an additional new Flour Mill to increase industrial grade flour production at the Bomaderry Plant. This will enable subsequent spare capacity at the Manildra Flour Mill to be devoted to the production of higher grade flour therefore increasing export opportunities for the Company.

The proposed new Flour Mill will process 11,300 tonnes per week of grain producing 8,500 tonnes per week of flour. In conjunction with the flour already processed on the site, this will mean that 16,200 tonnes of flour will be able to be produced at the Bomaderry plant per week (or 842,400 tonnes per year in total), reducing the amount of flour that is required to be transported to the site to 3,800 tonnes per week.

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 proposed new flour mill building is to be situated on the southern side of the factory site on Lot 1, DP 838753 at 160 Bolong Road. **Figure 1** is a site locality plan.

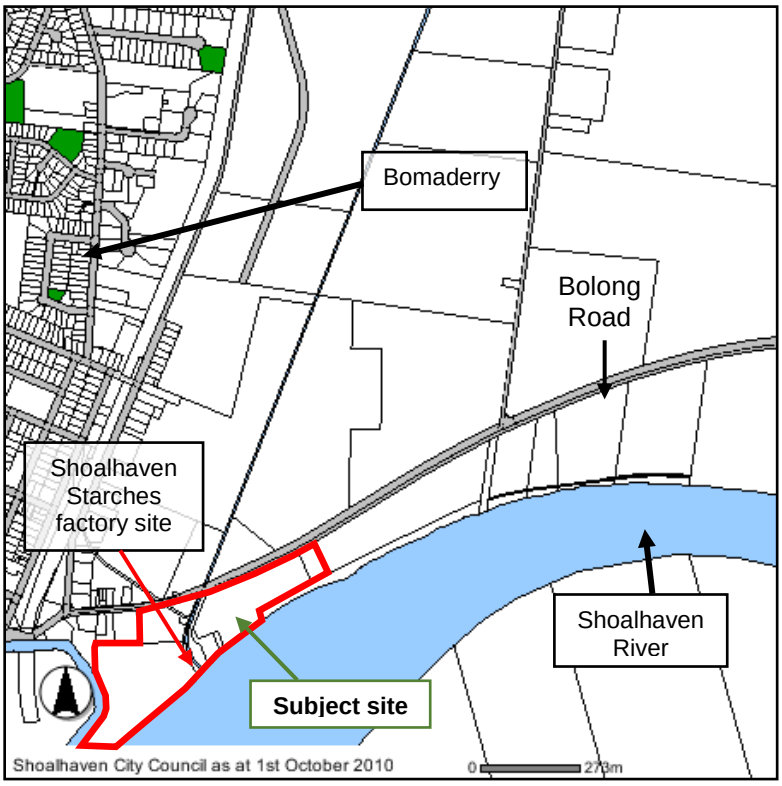

Figure 1: Site Locality Plan.

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. Burraga (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).

Figure 2 is an aerial photograph of the site. The proposed flour mill will be erected on the southern edge of the Shoalhaven Starches site adjacent and to the north side of the existing Flour Mill. 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.

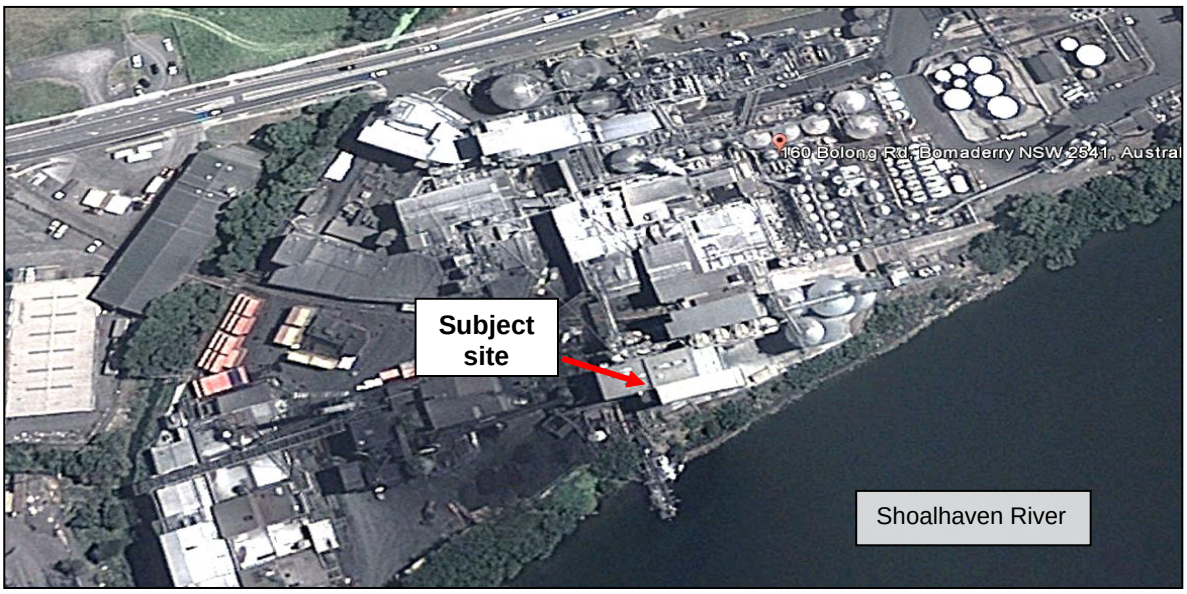

Figure 2: Aerial photograph of the site.

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 grain from silos located throughout NSW as well as flour, by rail, from the Company's flour mills at Manildra, Gunnedah and Narrandera. Flour is also produced on-site in the existing flour mill. 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 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 and industrial 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		66 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; wheat for milling; coal; biogas; wood chip; natural gas; fresh, reclaimed and raw 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.

Grain is delivered to the site by rail. The approved grain consumption is 6720 tonnes per week. The grain is "dumped" from the train into an underground hopper and conveyed by screw conveyors and bucket elevator into a silo.

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 28th 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.

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 Plan 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 26th 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 starch 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.

DA 11/1855 – Widening of Driveway

A further development application (DA 11/1855) was submitted to Shoalhaven City Council on the 4th 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 24th August 2011.

DA 13/1713 – Demolition of Dimethyl Ether Plant

On the 5th 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 15th July 2013.

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

On the 19th 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_2 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 1st October 2011. These supporting provisions provide additional detail with respect to the classes and thresholds for development to be considered as State Significant.

This new SEPP is called *State Environmental Planning Policy (State and Regional Development) 2011* and is known as the "State and Regional Development SEPP". This new SEPP approximately halves 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 30th 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 28th 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 3**). 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.*

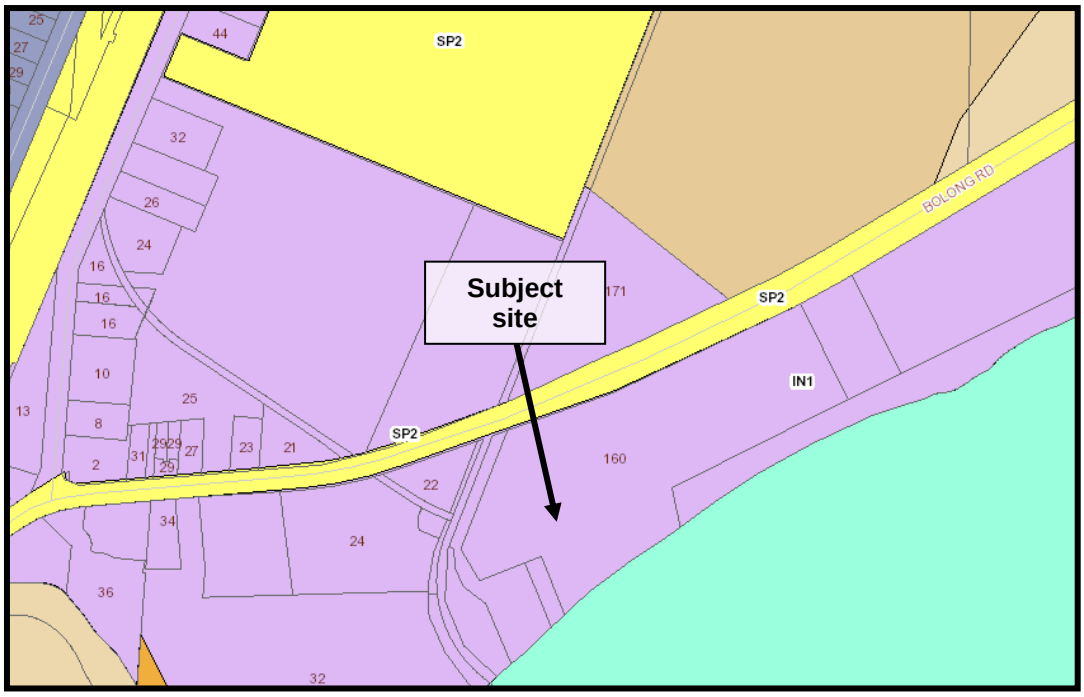

Figure 3: Zoning provisions applying under Shoalhaven LEP 2014.

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)

Permitted without consent	Nil.
Permitted with consent	Bulky goods premises; Depots; Freight transport facilities; **General industries**; Industrial training facilities; Kiosks; Light industries; Markets; Neighbourhood shops; Roads; Take away food and drink premises; Timber yards; Warehouse or distribution centres
Prohibited	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)

Prohibited continued	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.

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 3** below:

Table 2

Shoalhaven LEP 2014 Provisions

SLEP 2014 Clause	***Provisions***	***Comments***
4.3 Height of Buildings	*(1) The objectives of this clause are as follows:* *(a) to ensure that buildings are compatible with the height, bulk and scale of the existing and desired future character of a locality,* *(b) to minimise visual impact, disruption of views, loss of privacy and loss of solar access to existing development,* *(c) 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.* *(2) 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.* *(2A) 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.*	The proposed flour mill will have a maximum height of 39.5 metres. 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. 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 **Annexure 4**.
4.6 Exceptions to development standards	*(1) The objectives of this clause are as follows:* *(a) to provide an appropriate degree of flexibility in applying certain development standards to particular development,* *(b) to achieve better outcomes for and from development by allowing flexibility in particular circumstances.* *(2) 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.*	The height of the proposed Flour Mill exceeds the 11 metre maximum as specified in (2A) of Clause 4.3 Height of Buildings of the SLEP 2014. The proposed development will be erected within the surrounds of the Shoalhaven Starches factory site. As the proposed Flour Mill will be built within the existing

Table 2 (continued)

SLEP 2014 Clause	*Provisions*	*Comments*
4.6 continued	*However, this clause does not apply to a development standard that is expressly excluded from the operation of this clause.* *(3) 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:* *(a) that compliance with the development standard is unreasonable or unnecessary in the circumstances of the case, and* *(b) that there are sufficient environmental planning grounds to justify contravening the development standard.* *(4) Development consent must not be granted for development that contravenes a development standard unless:* *(a) the consent authority is satisfied that:* *(i) the applicant's written request has adequately addressed the matters required to be demonstrated by subclause (3), and* *(ii) 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* *(b) the concurrence of the Director-General has been obtained.* *(5) In deciding whether to grant concurrence, the Director-General must consider:* *(a) whether contravention of the development standard raises any matter of significance for State or regional environmental planning, and* *(b) the public benefit of maintaining the development standard, and* *(c) any other matters required to be taken into consideration by the Director-General before granting concurrence.* *(6) 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, Zone E2 Environmental Conservation, Zone E3 Environmental Management or Zone E4 Environmental Living if:*	industrial complex it is not expected that the new development will have an undue effect due to its height. A submission for an exception to development standards has been prepared and is attached to the SEE under **Annexure 4**.

Table 2 (continued)

SLEP 2014 Clause	*Provisions*	*Comments*
4.6 continued	*(a) the subdivision will result in 2 or more lots of less than the minimum area specified for such lots by a development standard, or* *(b) 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.* *Note. When this Plan was made it did not include all of these zones.* *(7) 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).* *(8) This clause does not allow development consent to be granted for development that would contravene any of the following:* *(a) a development standard for complying development,* *(b) 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,* *(c) clause 5.4,* *(ca) clause 6.1 or 6.2*	
5.5 Development within the coastal zone	*(1) The objectives of this clause are as follows:* *(a) 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,* *(b) to implement the principles in the NSW Coastal Policy, and in particular to:* *(i) protect, enhance, maintain and restore the coastal environment, its associated ecosystems, ecological processes and biological diversity and its water quality, and* *(ii) protect and preserve the natural, cultural, recreational and economic attributes of the NSW coast, and* *(iii) provide opportunities for pedestrian public access to and along the coastal foreshore, and*	The subject land is located within the coastal zone. The proposal is not considered to adversely affect the coastal zone based on the following: • The proposal does not affect or impinge on public access to or along the coastal foreshore. • The proposed development is situated adjacent to existing industrial development and is considered to be suitable development given its type, location and design. The development is also

Table 2 (continued)

SLEP 2014 Clause	*Provisions*	*Comments*
5.5 continued	*(iv) recognise and accommodate coastal processes and climate change, and* *(v) protect amenity and scenic quality, and* *(vi) protect and preserve rock platforms, beach environments and beach amenity, and* *(vii) protect and preserve native coastal vegetation, and* *(viii) protect and preserve the marine environment, and* *(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* *(x) ensure that decisions in relation to new development consider the broader and cumulative impacts on the catchment, and* *(xi) protect Aboriginal cultural places, values and customs, and* *(xii) protect and preserve items of heritage, archaeological or historical significance* *(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:* *(a) existing public access to and along the coastal foreshore for pedestrians (including persons with a disability) with a view to:* *(i) maintaining existing public access and, where possible, improving that access, and* *(ii) identifying opportunities for new public access, and* *(b) the suitability of the proposed development, its relationship with the surrounding area and its impact on the natural scenic quality, taking into account:* *(i) the type of the proposed development and any associated land uses or activities (including compatibility of any land-based and water-based coastal activities), and* *(ii) the location, and*	consistent with the zoning objectives for the land. • The development will not lead to overshadowing of foreshore areas. The site is situated on the northern side of the Shoalhaven River. • The scenic qualities of the area will not diminish. Visual impact is further addressed in Section 7.2 of this EA. • The proposal will not lead to adverse impacts on threatened fauna and flora.

Table 2 (continued)

SLEP 2014 Clause	*Provisions*	*Comments*
5.5 continued	*(iii) the bulk, scale, size and overall built form design of any building or work involved, and* *(c) the impact of the proposed development on the amenity of the coastal foreshore including:* *(i) any significant overshadowing of the coastal foreshore, and* *(ii) any loss of views from a public place to the coastal foreshore, and* *(d) how the visual amenity and scenic qualities of the coast, including coastal headlands, can be protected, and* *(e) how biodiversity and ecosystems, including:* *(i) native coastal vegetation and existing wildlife corridors, and* *(ii) rock platforms, and* *(iii) water quality of coastal waterbodies, and* *(iv) native fauna and native flora, and their habitats, can be conserved, and* *(f) the cumulative impacts of the proposed development and other development on the coastal catchment.* *(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:* *(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* *(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* *(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* *(d) the proposed development will not:* *(i) be significantly affected by coastal hazards, or*	

Table 2 (continued)

SLEP 2014 Clause	*Provisions*	*Comments*
5.5 continued	*(ii) have a significant impact on coastal hazards, or* *(iii) increase the risk of coastal hazards in relation to any other land.*	
5.10 Heritage Conservation	*(1) The objectives of this clause are:* *(a) to conserve the environmental heritage of Shoalhaven; and* *(b) to conserve the heritage significance of heritage items and heritage conservation areas including associated fabric, settings and views; and* *(c) to conserve archaeological sites; and* *(d) to conserve Aboriginal objects and Aboriginal places of heritage significance.* *(2) Development consent is required for any of the following:* *(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):* *(i) a heritage item,* *(ii) an Aboriginal object* *(iii) a building, work, relic or tree within a heritage conservation area,* *(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,* *(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,* *(d) disturbing or excavating an Aboriginal place of heritage significance,* *(e) erecting a building on land:* *(i) on which a heritage item is located or that is within a heritage conservation area;* *(ii) on which an Aboriginal object is located or that is within an Aboriginal place of heritage significance,* *(f) subdividing land:* *(i) on which a heritage item is located or that is within a heritage conservation area, or*	There are no heritage items within the subject land. And the subject site is not located within a heritage conservation area.

Table 2 (continued)

<table>
<tr><th>SLEP 2014 Clause</th><th>Provisions</th><th>Comments</th></tr>
<tr><td>5.10 continued</td><td>(ii) on which an Aboriginal object is located or that is within an Aboriginal place of heritage significance.</td><td></td></tr>
<tr><td>7.1 Acid sulfate soils</td><td>(1) The objective of this clause is to ensure that development does not disturb, expose or drain acid sulfate soils and cause environmental damage.
(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.
<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>
(3) 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.
(4) Despite subclause (2), development consent is not required under this clause for the carrying out of works if:</td><td>Mapping supporting the SLEP 2013 identifies the subject land as being affected by Class 3 and 4 land.
Geotechnical reports undertaken by Coffey Geotechnics have been undertaken in the past for the subject site. This assessment included an assessment of ASS soils.
Coffey advised that acid sulphate soils exist at depths greater than 3 m at the site. At shallower depths, there is a low risk that acid sulphate soils are present.
Coffey have previously noted that if the proposed development involves excavation of soils from depths greater than 3 m at the site, an Acid Sulphate Soils Management Plan (ASSMP) should be developed beforehand.
An ASSMP will present the approach and methodology of acid sulphate 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.</td></tr>
</table>

Table 2 (continued)

SLEP 2014 Clause	*Provisions*	*Comments*
7.1 continued	*(a) 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* *(b) 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.* *(5) 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):* *(a) 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,* *(b) 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).* *(c) minor work, being work that costs less than $20,000 (other than drainage work).* *(6) Despite subclause (2), development consent is not required under this clause to carry out any works if:* *(a) the works involve the disturbance of less than 1 tonne of soil, and* *(b) the works are not likely to lower the watertable.*	This issue is further addressed in Section 8.8 of this EA.
7.3 Flood Planning	*(1) The objectives of this clause are as follows:* *(a) to minimise the flood risk to life and property associated with the use of land,* *(b) 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,* *(c) to avoid significant adverse impacts on flood behaviour and the environment.* *(2) This clause applies to:* *(a) land identified as "Flood Planning Area" on the Flood Planning Area Map, and*	The *Flood Planning Area Map* that accompanies the SLEP 2014 identifies the subject land as being flood prone land. The application is supported by a flood assessment undertaken by WMA Water (**Annexure 5**). This issue is discussed further in Section 8.4 of this EA.

Table 2 (continued)

SLEP 2014 Clause	*Provisions*	*Comments*
7.3 continued	*(b) other land at or below the flood planning level.* *(3) Development consent must not be granted to development on land to which this clause applies unless the consent authority is satisfied that the development:* *(a) is compatible with the flood hazard of the land, and* *(b) will not significantly adversely affect flood behaviour resulting in detrimental increases in the potential flood affectation of other development or properties, and* *(c) incorporates appropriate measures to manage risk to life from flood, and* *(d) 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* *(e) is not likely to result in unsustainable social and economic costs to the community as a consequence of flooding, and* *(f) will not affect the safe occupation or evacuation of the land.* *(4) 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.* *(5) In this clause:* ***flood planning level** means the level of a 1:100 ARI (average recurrent interval) flood event plus 0.5 metre freeboard.*	
7.4 Coastal Risk Planning	*(1) The objectives of this clause are as follows:* *(a) to avoid significant adverse impacts from coastal hazards,* *(b) to ensure uses of land identified as coastal risk are compatible with the risks presented by coastal hazards,* *(c) to enable the evacuation of land identified as coastal risk in an emergency,* *(d) to avoid development that increases the severity of coastal hazards.* *(2) This clause applies to the land identified as "Coastal Risk Planning Area" on the Coastal Risk Planning Map.*	The *Coastal Risk Planning Map* that accompanies the SLEP 2014 does <u>not</u> identify the subject land as a "*Coastal Risk Planning Area"*. The provisions of this clause therefore do not apply to the subject site.

Table 2 (continued)

SLEP 2014 Clause	*Provisions*	*Comments*
7.4 continued	*(3) Development consent must not be granted to development on land to which this clause applies unless the consent authority is satisfied that the development:* *(a) will avoid, minimise or mitigate exposure to coastal processes, and* *(b) is not likely to cause detrimental increases in coastal risks to other development or properties, and* *(c) is not likely to alter coastal processes and the impacts of coastal hazards to the detriment of the environment, and* *(d) incorporates appropriate measures to manage risk to life from coastal risks, and* *(e) is likely to avoid or minimise adverse effects from the impact of coastal processes and the exposure to coastal hazards, and* *(f) provides for the relocation, modification or removal of the development to adapt to the impact of coastal processes and coastal hazards, and* *(g) has regard to the impacts of sea level rise.* *(4) 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.* *(5) In this clause:* ***coastal hazard** has the same meaning as in the Coastal Protection Act 1979.*	
7.5 Terrestrial Biodiversity	*(1) The objective of this clause is to maintain terrestrial biodiversity, by:* *(a) protecting native flora and fauna,* *(b) protecting the ecological processes necessary for their continued existence, and* *(c) encouraging the recovery of native flora and fauna, and their habitats.* *(2) This clause applies to land:* *(a) identified as "Biodiversity—habitat corridor" or "Biodiversity—significant vegetation" on the Terrestrial Biodiversity Map, and* *(b) situated within 40m of the bank (measured horizontally from the top of the bank) of a natural waterbody.*	The *Terrestrial Biodiversity Map* that accompanies the SLEP 2014 does <u>not</u> identify the subject land as including areas of *Biodiversity - habitat corridor* and/or *Biodiversity - significant vegetation*. Given the nature of the site the proposal will not have any adverse impacts on the ecological value of the land. There is no vegetation of importance located on the land.

Table 2 (continued)

SLEP 2014 Clause	*Provisions*	*Comments*
7.5 continued	*(3) Before determining a development application for development on land to which this clause applies, the consent authority must consider:* *(a) whether the development is likely to have:* *(i) any adverse impact on the condition, ecological value and significance of the fauna and flora on the land, and* *(ii) any adverse impact on the importance of the vegetation on the land to the habitat and survival of native fauna, and* *(iii) any potential to fragment, disturb or diminish the biodiversity structure, function and composition of the land, and* *(iv) any adverse impact on the habitat elements providing connectivity on the land, and* *(b) any appropriate measures proposed to avoid, minimise or mitigate the impacts of the development.* *(4) Development consent must not be granted to development on land to which this clause applies unless the consent authority is satisfied that:* *(a) the development is designed, sited and will be managed to avoid any significant adverse environmental impact, or* *(b) 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* *(c) if that impact cannot be minimised—the development will be managed to mitigate that impact.* *(5) For the purpose of this clause:* ***bank** means the limit of the bed of a natural waterbody.* ***bed,** 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.*	

Table 2 (continued)

SLEP 2014 Clause	*Provisions*	*Comments*
7.6 Riparian land and watercourses	*(1) The objective of this clause is to protect and maintain the following:* *(a) water quality within watercourses,* *(b) the stability of the bed and banks of watercourses,* *(c) aquatic and riparian habitats,* *(d) ecological processes within watercourses and riparian areas.* *(2) This clause applies to all of the following:* *(a) land identified as "Riparian Land" on the Riparian Lands and Watercourses Map,* *(b) land identified as "Watercourse Category 1", "Watercourse Category 2" or "Watercourse Category 3" on that map,* *(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.* *(3) Before determining a development application for development on land to which this clause applies, the consent authority must consider:* *(a) whether or not the development is likely to have any adverse impact on the following:* *(i) the water quality and flows within the watercourse,* *(ii) aquatic and riparian species, habitats and ecosystems of the watercourse,* *(iii) the stability of the bed and banks of the watercourse,* *(iv) the free passage of fish and other aquatic organisms within or along the watercourse,* *(v) any future rehabilitation of the watercourse and its riparian areas, and* *(b) whether or not the development is likely to increase water extraction from the watercourse, and* *(c) any appropriate measures proposed to avoid, minimise or mitigate the impacts of the development.* *(4) Development consent must not be granted to development on land to which this clause applies unless the consent authority is satisfied that:* *(a) the development is designed, sited and will be managed to avoid any significant adverse environmental impact, or*	The *Riparian Lands and Watercourses Map* that accompanies the SLEP 2014 identify a class 1 watercourse, (Shoalhaven River) adjacent to the subject site. 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. 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.

Table 2 (continued)

SLEP 2014 Clause	*Provisions*	*Comments*
7.6 continued	*(b) if that impact cannot be reasonably avoided—the development is designed, sited and will be managed to minimise that impact, or* *(c) if that impact cannot be minimised—the development will be managed to mitigate that impact.* *(5) For the purpose of this clause:* ***bank** means the limit of the bed of a watercourse.* ***bed**, 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.*	
7.7 Landslide risk and other land degradation	*(1) The objective of this clause is to maintain soil resources and the diversity and stability of landscapes, including protecting land:* *(a) comprising steep slopes, and* *(b) susceptible to other forms of land degradation.* *(2) This clause applies to the following land:* *(a) land with a slope in excess of 20% (1:5), as measured from the contours of a 1:25,000 topographical map, and* *(b) land identified as "Sensitive Area" on the Natural Resource Sensitivity—Land Map.* *(3) Before determining a development application for development on land to which this clause applies, the consent authority must consider any potential adverse impact, either from, or as a result of, the development in relation to:* *(a) the geotechnical stability of the site, and* *(b) the probability of increased erosion or other land degradation processes.* *(4) Before granting consent to development on land to which this clause applies, the consent authority must be satisfied that:* *(a) the development is designed, sited and will be managed to avoid any significant adverse environmental impact, or* *(b) if that impact cannot be reasonably avoided—the development is designed, sited and will be managed to minimise that impact, or*	

Table 2 (continued)

SLEP 2014 Clause	*Provisions*	*Comments*
7.7 continued	*(c) if that impact cannot be minimised – the development will be managed to mitigate that impact.* *(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.*	
7.8 Scenic protection	*(1) The objective of this clause is to protect the natural environmental and scenic amenity of land that is of high scenic value.* *(2) This clause applies to land identified as "Scenic Protection" on the Scenic Protection Area Map.* *(3) In deciding whether to grant development consent for development on land to which this clause applies, the consent authority must:* *(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* *(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* *(c) consider the siting of the proposed buildings.*	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. The provisions of this clause therefore do not apply to the subject site. 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.
7.9 HMAS Albatross Airspace Operations	*(1) The objectives of this clause are as follows:* *(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 proposed development that penetrates the Limitation or Operations Surface for that airport,* *(b) to protect the community from undue risk from that operation.* *(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.* *(3) The consent authority may grant development consent for the development if the relevant Commonwealth body advises that:* *(a) the development will penetrate the Limitation or Operations Surface but it has no objection to its construction, or*	The Department of Defence were consulted with respect to this proposal (see **Annexure 1**). At the time of preparing this EA a response had not been forthcoming from the Department.

Table 2 (continued)

SLEP 2014 Clause	*Provisions*	*Comments*
	(b) the development will not penetrate the Limitation or Operations Surface. *(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.* *(5) In this clause:* ***Limitation or Operations Surface** 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.* ***relevant Commonwealth body** 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.*	
7.15 Development in the vicinity of extractive industries and sewerage treatment plants	*(1) The objective of this clause is to protect the operational environment of certain industries operating on the land to which this clause applies.* *(2) This clause applies to land identified as "Extractive Industry" and "Sewage Treatment Plant" on the Buffers Map.* *(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:* *(a) made an assessment of the impact of noise, odour and other emissions from any industry carried out on that land, and* *(b) 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* *(c) considered any opportunities to relocate the development outside that land, and* *(d) has considered whether the development would adversely affect the operational environment of that industry.*	The Buffers M*ap* that accompanies the SLEP 2014 identifies the subject land is located within the vicinity of a sewerage treatment plant. The SEE is supported by an Air Quality Modelling (**Annexure 6**) and a Noise Impact that make recommendations for the development. Noise impact Assessment (**Annexure 7**).

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 INTRODUCTION

The proposal will seek approval for the construction and operation of an additional Flour Mill on the existing Shoalhaven Starches factory site at Lot 1 DP 838753 Bolong Road, Bomaderry.

5.2 PROJECT DESCRIPTION

The proposed Flour Mill will involve the construction of a building with a plan area of about 400 m^2. This building will be constructed using *Kingspan'* Architectural Wall Panelling or equivalent and will have a height above ground level of 39.5 metres. This will approximately match the height of the existing adjacent structures. The Flour Mill is proposed to be sited immediately adjoining and to the north of the existing Flour Mill.

To enable the new Flour Mill 'B' to be constructed the following actions will be required to be carried out:

- Deconstruct and dismantle the pipe bridge between the existing flour mill and the starch plant to make way for the new Flour Mill 'B'.
- Remove 7 existing silos. Six (6) of these silos will be relocated to the former Paper Mill site for storage. The remaining silo will be relocated adjacent to the adjacent to the DDG building for mill feed.
- Installation of a transfer pipeline for mill feed from the existing flour mill building to the new mill feed silo.
- Install a new flour transfer blowline to the starches plant on the existing pipe bridge.
- Install conveyors between the existing grain silos and intake system for the new Flour Mill Building 'B' building.
- Construct a new mill feed weighing system.

The proposed new Flour Mill will process 11,300 tonnes per week of grain producing 8,500 tonnes per week of flour. The proposed new additional Flour Mill will therefore produce an additional 442,000 tonnes per annum. In conjunction with the flour already processed on the site, this will mean that 16,200 tonnes of flour will be able to be produced at the Bomaderry plant per week (or 842,400 tonnes per year), with 3,800 tonnes of flour being transported by rail to the site.

Wheat would be delivered to the site five times per week in rail hopper cars nominally of 60 tonne capacity. Each train would deliver approximately 3,200 tonnes of wheat. The

additional wagons used to receive wheat will be offset by a reduction in rail wagons used to receive flour. The proposal would not alter the current number or frequency of train movements to the site.

Wheat delivered to the site by train would discharge through a grid below the hopper outlet, and would be transported via drag chains and a bucket elevator system into two silos each of 1600 tonne capacity.

Wheat would be taken from the raw wheat silos, weighed and then passed through various cleaning operations as follows:

- sieves for the removal of impurities larger or smaller than wheat;
- gravity separators for the removal of heavy impurities such as stone;
- magnetic separators for the removal of ferrous metal impurities; and
- aspirators, using air currents, for the removal of lighter impurities.

The moisture content of wheat received at the site would typically be in the range of 8% - 10%, which is too dry for milling. Water would therefore be added to the wheat in a carefully controlled manner to increase the moisture content of the grain to around 15%. The dampened wheat would then be stored in a conditioning or tempering bin where it would be allowed to remain for a period of time (normally up to 24 hours) to allow the added moisture to be fully absorbed into the grain.

The new conditioning silos (tempering bins) will have a capacity of 600 m^3 each. There will comprise four of the silos immediately to the west of the new Flour Mill.

Conditioning of grain would be necessary to:

- assist in the separation of the component parts of the grain by toughening the bran to ensure a clean separation of the endosperm from the bran and germ; and
- allow the reduction rollers to grind the endosperm into flour with minimum power consumption, and ensure accurate and easy sifting by the sieving machines.

When the grain is at the optimum milling condition it would be taken from the conditioning bins and passed through final scouring, weighing and separation stages before being passed to the mill.

Milling would be carried out on roller mills which would mill the grain into progressively finer fractions. Each milling process would be followed by coarse sieving to separate large flakes of bran and chunks of endosperm, which would then be passed to the next milling cycle. The finer starchy material would be passed over a series of progressively finer

sieves to remove any flour, and to grade the remaining particles into various sizes for further grinding.

Flours from the various grinding operations would be collected and blended together before passing through final treatment and weighing operations to bulk storage bins. Flour would be taken from these bins for use in existing site production processes.

The coarse particles left at the end of the reduction system, known as pollard, and the bran from the end of the break system, would be combined into a single by-product (DDG) for sale as animal feed.

All air extracted from the mill would be passed through bag houses prior to being discharged to the atmosphere.

Pneumatic conveying will be used extensively to transport product throughout the mill. The air blower will be mounted in an acoustic enclosure.
The proposal would be powered by electrical energy, would not require any additional gas supply, and would use compressed air only for instrument use.

Annexure 2 includes a flow diagram delineating how the proposed Flour Mill fits into the overall Shoalhaven Starches production process. **Annexure 3** includes plan details of the proposed new Flour Mill.

5.3 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 directed to the site's Waste Water Treatment Plant.

The distillery at Shoalhaven Starches is supplied feed material from waste starch from the starch plant which 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 (called 'stillage'), carried by water.

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 processing of wheat in the proposed new additional Flour Mill will also create husk material (in effect the waste material from the milled wheat grains) from the milled wheat. This husk material or "mill feed" will be able to be used with the grain fibre in the DDG dryers.

5.4 THE STARCH PLANT

The proposal will enable a reduction in the amount of flour transported to the site, as up to 67% of the flour used to produce the starch and gluten will be able to be processed on 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 from the proposed and existing Flour Mills on the site, as well as that transported to the site by rail.

As the proposal merely relates to a change in the manner by which flour is supplied to the production process, no modifications are proposed for the starch plant.

5.5 ETHANOL PLANT

The ethanol plant utilises waste from the starch, gluten and syrups components of the plant to feed fermentation and distillation of ethanol production. In effect the ethanol production comprises an integral component of the Company's waste treatment process. As this proposal does not seek to increase overall production rates at the site; and as the proposal will not result in any net increase in wastewaters processed on the site; the proposal will have no impact on the existing ethanol plant and its associated processes.

5.6 WASTEWATER TREATMENT AND DISPOSAL

5.6.1 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 irrigation, ie. the reclaimed water.

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 wheat processed at the Flour Mill will produce flour and residue husk material or "mill feed". The mill feed produced on site will be able to be fed into the DDG dryers in place of mill feed transported by rail.

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

5.6.2 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. Whilst there will be a minor increase in water consumption from the site associated with the conditioning of the wheat; this will result in the commensurate amount of moisture in the flour produced on-site compared to the amount of moisture that would have been found in the flour that is currently transported to the site. The moisture required to condition the wheat will therefore not result in increases in wastewaters through the process. Consequently wastewater volumes required to be irrigated onto the Company's Environmental Farm will remain unchanged following the establishment of a flour mill on the site.

5.7 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 Flour Mill are estimated at additional 1.5 MVA of power.

Water Consumption

In terms of water consumption, the existing operations (and including Mod 8 alternations to the existing flour mill):

- Council Treated – 993,899 KL p.a;
- Council Raw – 1, 309, 641 KL p.a;
- Recycled RO – 2, 203, 036 KL p.a.

As a result of the Flour Mill B proposal it is expected that water consumption will be 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.

Stormwater

Annexure 11 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;
- the EPA;
- The 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.

Responses from the EPA, the Australian Department of Defence and Shoalhaven City Council are also included in **Annexure 1** to 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 3**) 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 3

Risk Assessment

Issue	***Relative Change in Environmental Impact***	***Additional Management or Mitigation Measures Required***	***Significance of Issue with this Modification Proposal***
Air Quality (including Odour) Assessment	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. Stephenson Environmental Management Australia (SEMA) have been engaged by Shoalhaven Starches to undertaken an Air Quality Impact Assessment (AQIA) with respect to this Modification Proposal. A copy of SEMA's assessment is included as **Annexure 6** to this EA.	This AQIA prepared by SEMA addresses the cumulative impacts of the approved ethanol expansion project development and the proposed new flour mill and finds: *The maximum TSP ground level concentration (GLC) is predicted to be 0.01 µg/m^3, which is significantly below the impact assessment criteria of 90 µg/m^3.* *The worst case predictions from this assessment indicate, with the the proposed Flour Mill B, there may be an increase in odour concentrations from the Shoalhaven Starches factory site.* *Following implementation of the approved odour controls, the maximum worst case odour GLC is predicted to be between 2.2 ou and 3.2 ou, which potentially exceeds the regulatory impact assessment criteria of 2 ou.* *However, the following will further ameliorate this worst case predicted odour impact:*	Air quality impacts are further addressed in Section 8.3 of this EA.

Table 3 (continued)

Issue	*Relative Change in Environmental Impact*	*Additional Management or Mitigation Measures Required*	*Significance of Issue with this Modification Proposal*
		• *The output of the Ethanol Upgrade odour impact model prepared by GHD did not report in two significant numbers. Therefore rather than specific GLC, a statistical range can be predicted for the worst case cumulative GLC. More accurate prediction of the cumulative odour impact to more than one significant number is not possible.* • *Worst case cumulative odour predictions assume that both the SEMA and GHD models used identical coordinates and time, and that ground level odour concentrations are additive.* • *Odour emissions from the proposed Flour Mill B can also be expected to have a similar, neutral hedonic tone to the existing mill because the proposed mill will be processing the same type of grain using equipment and processes similar to the existing mill. That is to say the odour emissions from the proposed flour mill would be regarded as neither pleasant nor unpleasant. The total odour emission rate for the proposed flour mill would not have a significant adverse incremental or cumulative odour impact at the Shoalhaven Starches factory site.* No additional management or mitigation measures are recommended.	

Table 3 (continued)

Issue	*Relative Change in Environmental Impact*	*Additional Management or Mitigation Measures Required*	*Significance of Issue with this Modification Proposal*
Greenhouse Gas Emissions	Greenhouse gas emissions from the proposed new Flour Mill 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 proposed new mill 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.
Wastewater Treatment	***Water Discharges*** 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). 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. Under the terms of the Company's EPL water waste streams associated with the plant include: • river water passed through the boiler condensers and the primary side of the heat exchangers; • boiler water treatment plant regeneration waters; and	No additional management or mitigation measures proposed.	Not a key issue.

Table 3 (continued)

Issue	*Relative Change in Environmental Impact*	*Additional Management or Mitigation Measures Required*	*Significance of Issue with this Modification Proposal*
	• pH adjusted glucose plant ion exchange unit regeneration waters. All these must be discharged from the cooling water discharges. The limiting conditions in relation to these discharges include: • The volume of water discharged from the cooling water discharges must not exceed 100,000 kilolitres per day. • The waste waters discharged at both points shall not exceed a temperature of 32°C. The Flour Mill proposal will not involve any changes to these discharges waters. ***Site Stormwater Management*** *Existing Site Stormwater Management System* Shoalhaven Starches existing site stormwater management system is divided into three zones. The zones are: • eastern portion of the site – all site stormwater is collected are 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; • central portion of the site – all site stormwater is collected in pits and drainage channels and conveyed to the Environmental Farm's Waste Water Treatment Plant. No stormwater from this zone is discharged to the Shoalhaven River; and		

Table 3 (continued)

Issue	*Relative Change in Environmental Impact*	*Additional Management or Mitigation Measures Required*	*Significance of Issue with this Modification Proposal*
	• the western portion of the site – all stormwater is collected and passed through a first-flush system prior to discharge to the Shoalhaven River. *Construction Stormwater Management* The proposed Flour Mill development would be located entirely within the central portion of the site, and consequently all construction runoff generated at the site during construction works would be conveyed to the Environmental Farm for treatment. No runoff or stormwater would be discharged to the Shoalhaven River. Erosion and sediment controls should be designed for the proposals such that construction runoff is contained on site and not discharged to the river. *Operational Stormwater Management* The proposed works would not alter the existing site stormwater management system, and consequently all stormwater generated by the proposed Flour Mill during the operational phase would be discharged to the Environmental Farm. The proposed Flour Mill would also not increase the volume of stormwater generated from this area of the site during operation as the area is currently all surfaced with bitumen.		
Effluent Irrigation and Storage	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.	No additional management or mitigation measures proposed.	Not a key issue.

Table 3 (continued)

Issue	*Relative Change in Environmental Impact*	*Additional Management or Mitigation Measures Required*	*Significance of Issue with this Modification Proposal*
	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. No change in environmental impacts from that originally identified in EA.		
Site Contamination, Acid Sulphate Soils and Riverbank Stability	***Site Contamination*** Based on the site history, two potentially contaminating activities were identified within the site comprising: • Potential presence of fill soils (of unknown origin and quality), and • Chemical storage. Fill soils have been tested in the past nearby the current development site. Concentrations of contaminants were less than adopted guideline criteria. Based on the assumption that fill soil types are likely to be similar within the site, it is considered unlikely that fill soils are contaminated. The site is currently paved, with stormwater drainage, which would limit infiltration of potential contaminants into underlying groundwater and soil. The potential for widespread contamination in soil and groundwater from the use of the types of chemicals identified in the site history and walkover is considered low. Previous soil sampling and analysis in the general vicinity supports this. Based on the review of previous information, supplemented with additional site history and site observations, it is considered unlikely that contamination is present in this area that would pose an unacceptable risk to current or future site users with respect to the proposed industrial land use.	***Site Contamination*** Should evidence of contamination be identified during construction stages, a suitably qualified environmental practitioner should be engaged to assess the potential for risk to human health or environment and provide advice on proper management. Soil assessment would be required for any excess construction spoil requiring offsite disposal or reuse.	Site Contamination is addressed further in Section 8.7 of this EA.

Table 3 (continued)

Issue	*Relative Change in Environmental Impact*	*Additional Management or Mitigation Measures Required*	*Significance of Issue with this Modification Proposal*
	Acid Sulphate Soils Based on previous investigations soils beneath depths of 3m in this general area of the site are considered to be acid sulphate soils. At shallower depths, there is a low risk that acid sulphate 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 3m, these soils should be considered potential acid sulphate soils unless otherwise tested.	***Acid Sulphate Soils*** Should the proposed development involve excavation of soils from depths greater than 3m at the site, and/or dewatering that could result in a drop in the water table, this could also impact acid sulphate soils, then an acid sulphate management plan (ASSMP) should be developed and actioned. An ASSMP will present the approach and methodology of acid sulphate 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.	Acid Sulphate Soils are addressed in Section 8.8 of this EA.
	Riverbank Stability The northern bank of the Shoalhaven River is located about 20m to the south of the proposed new flour mill site. Following signs of instability in the river bank, a rock revetment wall was constructed along this section of the river bank in 2008. Survey monitoring of the revetment	***Riverbank Stability*** As the revetment wall overlies deep alluvial soils, changes to the river bed profile and erosion along the toe of the revetment wall in the future could according result in movement of the wall and subsequent	Riverbank Stability is addressed in Section 8.9.2 of this EA.

Table 3 (continued)

Issue	*Relative Change in Environmental Impact*	*Additional Management or Mitigation Measures Required*	*Significance of Issue with this Modification Proposal*
	wall and adjacent river bed was commenced soon after construction. Monitoring data was obtained from 10 fixed survey markers embedded on 2 October 2008 in the revetment boulders along 5 cross sections at regular intervals on the wall. Allen Price and Associates (APA) installed the survey markers and carried out survey readings on five different occasions since installation. The river bank below the revetment wall was also surveyed using a boat in line with the fixed markers to provide 5 cross-sections extending some 20m into the river. The latest survey readings were taken on 28 September 2016. As part of this monitoring Coffey analysed and assessed settlement and/or lateral movement along the river bank and any changes in the river bed profile at the above site. As advised by the Surveyor, readings taken on 7 January 2009 are used as reference data. • The maximum recorded vertical movements during the monitoring period 21/7/2014 to 28/9/2016 ranged from 3mm to 19mm. For the section of the wall where the maximum vertical movement was observed (survey marker 53S). This indicates that the recorded movement is localised in the upper portion of the wall and the entire section of the wall is not moving at the same rate; • The total recorded lateral movements between 28/09/2015 and 28/09/2016, no lateral movement was recorded. Previously, since monitoring began, lateral movement ranged from 0mm to 12mm. The estimated rates of lateral movements range from 0mm/yr to 2.2mm/yr;	deterioration of the bank behind the revetment wall. A principal geotechnical engineer from Coffey's has observed the current surface conditions over the rock revetment wall along the river bank about 20m to the south of the proposed flour mill. The river level at the time of Coffey's observations was above the toe of the wall. The wall appeared to be largely intact except for some displacement of some of the large boulders over a section of the toe of the wall. Sections of the geogrid supporting the toe of the wall have been exposed and random growth of coral trees has occurred in the rock wall. The condition of the river bed adjacent to the toe of the revetment wall below the water line has not been assessed.	

	• The accuracy for the survey as advised by the Surveyor is +/- 5mm.Taking the accuracy of the survey data into account, river bank changes, settlement and/or lateral movement along the revetment wall appears insignificant at this stage.		

Table 3 (continued)

Issue	*Relative Change in Environmental Impact*	*Additional Management or Mitigation Measures Required*	*Significance of Issue with this Modification Proposal*
		• Cranes or other large temporary surface loads such as building materials should not be located within 15m of the river bank. • Significant vibration of the ground such as pile driving should be avoided. As the nearby rock revetment wall is showing signs of deterioration Coffey recommend that maintenance be carried out to reinstate the toe where displacement of rocks has occurred and that ongoing survey monitoring of the wall and the adjacent river bed be carried out to assess movement	
Noise	Shoalhaven Starches are licensed under the POEO 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. The EA is supported by a Noise Impact Assessment prepared by Harwood Acoustics. A copy of this assessment is included in **Annexure 7** to this EA. Noise Impacts are further addressed in Section 8.2 of this EA. Harwood Acoustics conclude in summary that 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.	The Noise Impact Assessment prepared by Harwood Acoustics makes the following recommendations in terms of the construction of the proposed Flour Mill: ***Construction of Flour Mill Building*** *Walls* The walls of the Flour Mill B building should have a minimum weighted sound reduction index (Rw) 24. In this instance calculations are based on *'Kingspan'* Architectural Wall Panelling system *AWP 80*. *Roof / Ceiling* The roof and ceiling of the flour mill building should have a minimum weighted sound reduction index (Rw) 23. In this instance calculations are based on *'Kingspan'* Architectural Roof Panelling system *'K-Dek (KS 1000 KD)'.'*.	This issue has been identified by the SEARs. Noise impacts are further addressed in Section 8.2 of this EA.

Table 3 (continued)

Issue	*Relative Change in Environmental Impact*	*Additional Management or Mitigation Measures Required*	*Significance of Issue with this Modification Proposal*
		Ventilation Penetrations There should be no acoustically untreated penetrations in the walls or roof. Any doors to the building must remain closed at all times the plant is in operation. If natural ventilation is required, sections of the northern wall only may be fitted with acoustic louvres. The required insertion loss of acoustic louvres will depend on the maximum surface area of louvered sections required to facilitate adequate ventilation. As an example, based on a maximum 20 m^2 of louvered sections on each of the floors, other than the top floor, acoustic louvres should have minimum insertion losses shown in Table 7 of the Environmental Noise Assessment. A larger area may result in a higher required insertion loss and consequently a deeper blade depth. A final assessment should be made prior to the issue of a Construction Certificate once the location and size of any openings for ventilation are finalised. ***External Mechanical Plant*** *Roof Mounted Fans* It is proposed to install a selection of nine (9) exhaust fans of varying capacity which will discharge to the roof of the building and each fan will be fitted with a silencer.	

		However, selections of fan make and model have not been finalised at this stage. Calculations in Section 5.2 of the Environmental Noise Assessment assume similar fan types to those recently installed during an upgrade to the existing flour mill, ranging in capacity from approximately 3000 to 8000 l/s with reported sound power levels ranging from 100 to 119 dBA. In order for the noise goals to be met at the closest residential receptors to Flour Mill B, we recommend the following:- • the level of noise emission from each individual fan (maximum 9) should not exceed a sound pressure level of 65 dBA (L10, 15 minute) when measured at a distance of 3 metres from the discharge silencer; • this can be achieved by fitting silencers to the discharge side of each of the fans and as an example, predictions shown in Table 4 are based on the minimum insertion losses shown in Table 8 of the Environmental Noise Assessment.	

Table 3 (continued)

Issue	*Relative Change in Environmental Impact*	*Additional Management or Mitigation Measures Required*	*Significance of Issue with this Modification Proposal*
		The specific selection, location and height of any externally located mechanical plant is not yet finalised. The location of any external noise producing plant may be such that there is no line of sight to the receptors at Location 2. However, it is possible that there may be line of sight to this receptor location from external mechanical plant. In the event that there is, acoustical screening is likely to be required to reduce the level of noise emission from external mechanical plant to within acceptable limits at Location 2 only. The type and final location of external mechanical plant will determine the extent to which acoustical screening is required. A final assessment will be required prior to the installation of all fans to ensure the minimum noise reduction is achieved and the correct silencers selected, once selections are finalised. *Additional External Mechanical Plant* In addition to the roof mounted exhaust fans, new external mechanical plant is likely to be located beneath the mill feed silos at ground level and include small motors, bucket elevators, etc, as detailed in Table 3 of the Environmental Noise Assessment. The specific selection, location and height of any new externally located mechanical plant is not yet finalised.	

		There is potential for there to be line of sight from the new mill feed plant to Location 2. In this event, localised acoustical treatment may be required to reduce the level of noise emission from external mechanical plant to within acceptable limits at Location 2 only. The type and final location of external mechanical plant will determine the extent to which acoustical treatment is required, prior to commissioning. Acoustical treatment is unlikely to be extensive, as an example, predictions shown in Table 4 of the Environmental Noise Assessment assume a sound barrier screen erected no further than 3 metres to the south of any item of plant to a minimum height of 1.5 metres above the highest item of mechanical plant.	
Transport & Traffic	The SEARs for this project have identified that a traffic assessment is required to be undertaken in relation to this proposed modification. As outlined in Section 5.2 one of the objectives that underpin this proposal is to propose to free up the production capacity of the Manildra Flour Mill to enable an increase in production of premium grade flour by constructing the new flour mill at the subject site that would produce industrial grade flour. At present industrial grade flour is supplied to the subject site by flour produced at the Manildra Flour Mill which is delivered to the subject site by rail; as well as by the existing flour mill located on the site which processes wheat grain also delivered to the site by rail.	During the construction of the existing flour mill on site, specialist construction staff were transported to and from the site daily by mini-bus, and it is expected that staff for this project would travel in an identical manner. Allowing for a small number of ancillary light vehicle trips on a daily basis, the daily generation of the construction phase is estimated to be no more than 20 [light and heavy] vehicle trips per day. In the existing peak periods – which could coincide with the construction arrival and departure peaks of staff and some of heavy vehicle trips [though unlikely given early	Traffic issues are further addressed in Section 8.6 of this EA.

Table 3 (continued)

Issue	*Relative Change in Environmental Impact*	*Additional Management or Mitigation Measures Required*	*Significance of Issue with this Modification Proposal*
	The proposal will not change existing heavy vehicle movements to and from the site; the proposal will involve an increase in tonnage of raw materials that will be required to be transported to the site by rail. This does not mean that additional train trips will be generated across Bolong Road to the site, but only that existing trains will be able to carry capacity loads as opposed to the under capacity loads they currently carry. Similarly, the capacity of the Shoalhaven Starches operations – and specifically product carrying heavy vehicle generation - would not be increased by the proposal; while additional grain would be stored on-site, the output of the Shoalhaven Starches site (in accordance with past approvals and traffic assessments) would remain unchanged. Once constructed and operational, the proposal would not generate any additional staff or [product carrying] heavy vehicle trips, but rather simply form part of the existing flour mill operations at the site. As discussed above, nor would the Proposal increase train movements to/from the site. In summary, once operational the proposal would have no impact on the operation of the local traffic environment or on existing on-site operations. The only period during which the proposal would generate additional vehicle trips to the local road network would be during construction. The construction phase is estimated to occur over some 3 months, and require: - • Up to 20 construction staff on-site daily • Up to 5 construction material carrying heavy vehicles per day	construction start times] - the peak hour generation of the construction phase is estimated to generate no more than 4 vehicle trips per hour. The construction phase will have little if any significant impact on the local road network simply as a factor of the minimal generation and short duration of the construction phase. At key intersections to the west and north-west, the construction phase would generate perhaps 4 additional vehicles per hour, a level of generation that would in no way affect key intersection performance indicators. At the intersection of Bolong Road & AP3 where the construction trips are concentrated, SIDRA analysis indicates that the additional trips have no impact on peak 2018 operations, with existing [minor] delays, 95%ile queue lengths and capacity barely affected. Not surprisingly, the same LoS is reported in both the AM and PM further to the introduction of Proposal trips. In summary, the trip generation of the construction phase of the Proposal would have no impact on the local traffic environment or on existing on-site operations. <u>Construction Management</u> Notwithstanding the above, it remains the case that the construction phase will need to be governed by an appropriate set of management procedures.	

Table 3 (continued)

Issue	*Relative Change in Environmental Impact*	*Additional Management or Mitigation Measures Required*	*Significance of Issue with this Modification Proposal*
	Construction Access All access to the construction area will be via AP3, which loops to the rear of the subject site and provides direct and immediate access to the proposed location of the proposed flour mill (adjacent to the existing Flour Mill). This is same access path previously used for the construction of the existing Flour Mill. At the intersection of Bolong Road, the majority of staff trips, and all heavy vehicle trips, are expected to travel to/from the west.		
Hazards	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.	The PHA, and in particular Table 1, prepared by Pinnacle Risk includes a range of recommendations made by in relation to this Modification Application.	This issue has been identified by DGRs as Key Issue. A PHA has been prepared for the Modification Proposal by Pinnacle Risk Pty Ltd and forms **Annexure 8** to this EA.
Flooding	The SEARs for this project have identified that a flood assessment is required to be undertaken in relation to this proposed modification. The EA is supported by a flood assessment prepared by WMA Water (**Annexure 5**). This assessment concludes that any increase in the 1% AEP flood level as a result of this proposal would be less than 0.01 m and would not extend beyond land owned by Shoalhaven Starches.	No additional management or mitigation measures proposed	This is a key Issue identified by this SEARs. Flooding is further addressed in Section 8.4 of this EA.
Waste Management	The proposed additional flour mill will not alter the way waste is managed on the site. No change in environmental impacts from that originally identified in EA.	No additional management or mitigation measures proposed	Not a key issue.

Table 3 (continued)

Issue	*Relative Change in Environmental Impact*	*Additional Management or Mitigation Measures Required*	*Significance of Issue with this Modification Proposal*
Visual Impact	The proposed flour mill will be located to the north and adjacent to the existing flour mill, and will be surrounded by 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.		This is a key Issue identified by this EA (although the DGRs did not identify this issue as being significant). The visual impacts associated with this proposal are addressed in Section 8.5 of this EA.
Flora and Fauna	The proposed new flour mill will all be located within the factory site which is devoid of vegetation. The original Flora and Fauna Assessment carried out by Kevin Mills & Associates for the Expansion Project did not identify any specific ecological constraints with this part of the site. The proposed new flour mill will not require any additional vegetation to be disturbed. No change in environmental impacts from that originally identified in EA.	No additional management or mitigation measures proposed.	Not a key issue.
Heritage and Archaeological Issues	The proposed new flour mill 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 new flour mill 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 8** to this EA. This section of the EA is based upon the findings of this assessment.

Pinnacle assessed the credible, potential hazardous events and corresponding risks associated with the proposed new flour mill with the potential for off-site impacts only.

As the net volume of flour product from the site does not change as part of this project then off-site transport risk is not addressed further.

In accordance with the approach recommended by the Department of Planning & Infrastructure *Hazardous Industry Planning Advisory Paper No. 6 – Hazard Analysis (HIPAP 6)* the underlying methodology adopted by Pinnacle in the PHA 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 has been conducted by Pinnacle as follows:

- Initially, the new flour mill and its location was 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 is 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

Wheat

Dust from wheat can be formed by activities such as loading / unloading, filling a silo, milling and pneumatic conveying. According to Pinnacle this is a potentially explosive dust when critical parameters exist, eg. particle size less than 500 micron and moisture content less than 30%.

Ignition sources include:

- Smouldering, self-heating or burning dust;
- Open flames, eg. welding, hot work, cutting and matches;

- Hot surfaces, eg. hot bearings, dryers, incandescent materials and heaters;
- Lightning;
- Heat from mechanical impact or friction; and
- Electrical discharges and arcs.

Kst is a measure of a dust's explosibility classification and is a measure of the maximum rate of pressure rise, ie. the higher the Kst value, the greater the explosive energy. For grain dust, the Kst value is typically between 0 and 200 bar m/s. These are deemed potentially weak explosions although according to Pinnacle previous incidents involving grain dust explosions have led to fatalities.

Whilst grains are combustible when exposed to strong ignition sources, eg. open flames, they typically burn as a smouldering type of fire and therefore do not pose significant radiant heat hazards. Smouldering grains, however, can be a precursor to dust explosions as the hot grains can provide the ignition energy to cause a dust cloud to deflagrate.

Grain dust is a respiratory sensitiser. This means it can trigger an allergic reaction in the respiratory system. Once this reaction has taken place, further exposure to the substance, even to very small amounts, may produce symptoms (Ref 6). The possible ill-health outcomes are:

- Rhinitis (runny or stuffy nose);
- Coughing and breathing difficulties;
- Asthma (attacks of coughing, wheezing and chest tightness);
- Chronic bronchitis (cough and phlegm production usually in winter months);
- Chronic obstructive pulmonary disease (a longer-term illness that makes breathing progressively difficult and includes chronic bronchitis and chronic asthma);
- Extrinsic allergic alveolitis, for example farmer's lung (fever, cough, increasing shortness of breath, muscle / joint pains and weight loss); and
- Organic dust toxic syndrome, for example grain fever (a sudden onset, short-lived, 'flu-like' illness with fever and often associated with cough and chest discomfort).

The above health effects are more likely for people with significant exposure to grain dust on-site but not off-site due to the controls to prevent fugitive emissions.

Potential Hazardous Incidents Review

In accordance with the requirements of *Guidelines for Hazard Analysis* Pinnacle identified hazardous events associated with the facility's operations. As recommended in HIPAP 6, the PHA carried out by Pinnacle 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 by Pinnacle. 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 proposal are summarised in the Table 1 of the PHA carried out by Pinnacle. These potential events were determined during a hazardous event identification workshop involving project, design, technical, operations and maintenance personnel.

Risk Analysis

The assessment of risks to both the public as well as to operating personnel around the proposal requires an analysis technique 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:

Risk = Likelihood x Consequence

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

For QRA 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.

Pinnacle, however, adopted a scenario based risk assessment to assess the risk of the identified hazardous events. The reasons for this approach were:

1. *The distance from the new mill to residential and other sensitive land users is large and hence it is unlikely that any significant consequential impacts, e.g. due to radiant heat from fires, from the facility will have any significant contribution to off-site risk;*

2. *The new mill is identical in principle to the existing mill; and*

Dust Explosions

An analysis of the equipment where potential dust explosions could occur as identified by Pinnacle is summarised below.

- Baghouse filters with the associated bins / hoppers / silos. Dust explosions are to be either vented via the fan housings or explosion vents (the larger volume filters are fitted with explosion vents);

- Bucket elevators and drag chain conveyors. Dust explosions are vented via explosion vents (note: low conveyor speeds will be used to minimise the risk of ignition and belt tracking with limit switches will be installed as well);
- Hammer mill, rollers and impact detachers. These are to be designed to contain dust explosions;
- Silos, hoppers, bins, cyclones, separators and sifters. These are to be designed to IECEX standards; and
- Aspiration and pneumatic conveying systems. These are to be designed to IECEX standards.

According to Pinnacle the damage radius of a dust explosion is usually limited to the building (or equipment item) in which it occurs and to a very short range outside. This is supported by the historical incidents involving dust explosions where the majority of fatalities involve on-site personnel.

The majority of dust explosion incidents resulted in no fatalities. For the incidents where fatalities occurred, these were to on-site personnel. Again, the greater risk for fatality or injury for dust explosions is to on-site personnel.

The maximum explosion overpressures at a distance D (m) from a vent or point of release is given by (Ref 8):

$$P_{blast} = (P_{max} \times C1 \times C2) / D$$

where: P_{blast} is the overpressure (or peak blast pressure) at a distance D from the vent, kPag

P_{max} is the pressure within the vessel when the vent opens or the rupture pressure of the vessel (if no vent installed), kPag

C1 = 10^((-0.26/A) + 0.49)

A = vent area, m^2

C2 = 1 m

D = distance away from the vent, m

According to Pinnacle the rupture pressure of weak structures such as silos is typically less than 90 kPag.

To estimate the possible maximum horizontal flame length from a vented dust explosion, the following equation is used:

Flame Length = 10 x V1/3 (m)

where: V is the volume of the vessel, m^3.

However, no flame length has ever been measured greater than 30 m (even for large volumes) so this should be taken as the upper limit. Other studies according to Pinnacle also show that effects of thermal radiation from the fireball is limited to close to the fireball's surface given the short duration.

Importantly, the proposed explosion vents must therefore be directed to a safe location to avoid injury to personnel or propagation to other adjacent equipment.

According to Pinnacle given the estimated impact distances and the distances to off-site areas from the proposal no significant off-site impacts are expected from explosion overpressures or radiant heat from flames. Therefore, the relevant risk criteria will be satisfied for potential dust explosions within equipment.

Building Explosions

It is possible that dust explosions could occur in the new mill building, eg. deposited dust is not removed due to failure of the housekeeping program. This hazard exists at the site now for the existing flour mill.

The primary means to prevent this event according to Pinnacle is to design for containment. This is the basis for the design of the existing flour mill and will be similarly for the new flour mill.

Should losses of containment of combustible dust occur then controls such as housekeeping, hazardous zoning and permits to work are required. These are important measures to lower the risk of dust explosions within the existing and new buildings. As this hazard exists now on-site then the existing safety management systems for prevention of confined dust explosions within the existing building needs to be implemented to the new building. No further safeguarding is recommended by Pinnacle for this scenario.

Dust Explosion Safeguarding

For equipment processing a potentially explosive dust, it is generally not possible to always ensure the concentration of the dust is below the lower explosive limit. Rather, safeguarding is required to prevent and/or control the potential explosions.

There are no mandatory standards or regulations according to Pinnacle that dictate the design criteria and features for equipment where dust explosions can occur. However, the main means for safeguarding against dust explosions are as follows.

Dust Free Process

Inherently safer options include operating with the materials being wet rather than dry, i.e. preventing dust formation. Not all processes are suited to this option though, eg. wheat grains, as self-heating can occur and degradation of the grain can occur. For a mill, this is not an option according to Pinnacle.

Dust Control

According to Pinnacle measures to control dust and avoiding the explosive range include:

- Avoid large volumes as much as possible, eg. to avoid equipment items running empty;

- Avoid dust formation by limiting the free-fall;
- Remove the dust at the point of production rather than convey it along ducts where it can accumulate;
- Buildings which contain plant handling flammable dusts should be designed to minimise the accumulation of dust deposits and to facilitate cleaning; and
- Regular housekeeping to avoid dust build-up.

Control of Ignition Sources

According to Pinnacle measures used to control ignition sources which could give rise to dust explosions include:

- Avoid direct fired equipment;
- Bonding and earthing for static dissipation;
- Permits to work, training and auditing;
- Regular housekeeping to avoid dusts overheating, e.g. on hot surfaces;
- Hazardous area determination with compliant electrics and instruments;
- Preventative maintenance on equipment to minimise the probability of fault conditions;
- Use appropriate electrical equipment and wiring methods;
- Control smoking, open flames, and sparks;
- Avoid the possibility of a thermite reaction, eg. aluminium reacting with iron oxide;
- Use separator devices to remove foreign materials capable of igniting combustibles from process materials; and
- Separate heated surfaces and heating systems from dusts.

Inerting

The suspension of a flammable dust in air may be rendered non-explosive by the addition of an inert gas. The main gases used for inerting of dust handling equipment are nitrogen, carbon dioxide, flue gas and inert gas from a generator, e.g. argon or helium.

Inerting by adding an inert dust is another means to prevent dust explosions. This is mainly done in mining, eg. coal dust is mixed with ground stone to render the coal dust non-explosive.

Explosion Containment

One option for dealing with a dust explosion according to Pinnacle is total containment, ie. design the equipment to withstand the maximum generated pressure. For dust explosions, the maximum generated pressures are quoted as 7 to 12 barg for atmospheric processes or up to 12 times the initial pressure in the equipment item. Hence, if the equipment has a design pressure equal to or exceeding these values then the explosion will be contained with no flames being emitted. Grinding mills are an example of such equipment items which may be made strong enough to withstand a dust explosion.

Explosion Isolation

The two basic methods for explosion isolation are:

- Automatic isolation, eg. a pressure sensor will send a signal to a fast closing valve to shut and isolation the equipment item or pipe; and
- Material chokes such as rotary valves, screw conveyors with baffle plates and/or part of the helix removed to prevent the conveyor emptying on no feed flow, and self-actuating float valves.

Explosion Suppression

Typically an increase in operating pressure is detected (e.g. pressure rises to 5 kPag) which then results in a suppressant being injected into the equipment item to suppress the flame. By suppressing the flame early, the pressure rise is limited. Suppressants include dry powder and water.

Explosion Venting

Explosion venting is an effective and economic way to provide protection against dust explosions, according to Pinnacle, however, it is only suitable if there is a safe discharge for the material being vented. For equipment within a building, ducting the vent to outside should be done provided it is short, eg. less than 10 m (detonations can occur in pipes of 10 to 30 m in length). Otherwise, flameless vents can be used as proposed.

Equipment Separation

It is possible that an explosion from one equipment item or building could propagate to another. This could be via secondary explosions due to dust lifting and forming a cloud or from projectiles embedding into thin-walled equipment and hence being a point of ignition due to heat. If layout considerations permit, adequately separately higher risk process items or buildings is an inherently safe option.

According to Pinnacle in practice the assessment of dust explosion hazards is bound to be subjective because the problem is too complex for quantitative analytical methods to yield an indisputable answer. Therefore, the acceptable safeguards for any given design will vary from company to company.

According to the PHA by Pinnacle most of the dust explosion hazards in the grain, feed and flour industry can be eliminated by soft means such as training, motivation, improving the organisation, good housekeeping and proper maintenance. All of these safeguards, according to Pinnacle are in-place at Shoalhaven Starches.

When these are combined with the additional measures proposed for the new equipment then further risk reduction is achieved. These additional measures according to Pinnacle include all equipment handling potentially explosive dust is to be designed to IECEX standards including rotary valves for seals, explosion vents (flameless to be used as much as possible), spark arrestors, interlocks, metal trap to minimise the risk of ignitions in the mills, equipment bonding and earthing, minimisation of horizontal surfaces in the buildings where dust can collect, screw feeders to contain plugs to prevent flame propagation and hazardous area zoning with the electrics and instruments to suit the requirements.

Fires

According to Pinnacle it is possible to ignite the combustible material involved in the process, eg. grain, if a strong ignition source is present.

Fires have occurred previously with these types of processes and are typically of a smouldering nature given the moisture content of the material and confinement within silos and other equipment. The moisture content is typically 10 to 12%. Fires involving flammable or combustible powder are according to Pinnacle not believed to place the public at risk but could be a threat to employees.

Given that the new mill is approximately 110 m away from Bolong Road according to Pinnacle the risk criteria will be satisfied.

Aircraft Impact and Other External Events

Previous risk assessments according to Pinnacle have shown that the likelihood of an aircraft crash is acceptably low within Australia. Typical frequencies associated with aircraft crashes are:

- Scheduled aircraft 1 x 10^{-8}/year; and
- Unscheduled aircraft 4 x 10^{-7}/year.

The likelihood of this type of event is acceptably low for a site of this size and location.

Other external events that may lead to propagation of incidents on any site include:

- Subsidence landslide;
- Burst dam vermin/insect infestation;
- Storm and high winds forest fire;
- Storm surge rising water courses;
- Earthquake storm water runoff;
- Breach of security lightning;
- Tidal waves.

These events were reviewed by Pinnacle and none of them were found to pose any significant risk to the proposal given the proposed safeguards. Flooding can occur at this site, however, the structural design for the new mill building and tempering silos includes allowances for this hazard.

Cumulative Risk

The PHA demonstrates that the proposed changes to the Shoalhaven Starches site will have negligible impact on the cumulative risk results for the local area as the significant radiant heat levels and explosion overpressures are local to the equipment.

Therefore according to Pinnacle it is reasonable to conclude that the development does not make a significant contribution to the existing cumulative risk in the area.

A review of the potential propagation risks both from and to the new mill was conducted by Pinnacle.

There is only one explosion vent that vents externally to the building. This vent points north, is located along the new mill building's northern wall and is 35.4 m above grade. According to Pinnacle the estimated flame length is approximately 21 m.

The only structure this could potentially impact is the No. 3 Gluten Dryer building wall (approximately 17 m away). As this building is only 17 m high, ie. below the elevation of the new explosion vent, the risk of propagation from this short duration event is low.

For this externally vented explosion vent, the distance to 7 kPa is less than 10 m. Therefore, according to Pinnacle propagation due to explosion overpressures is not expected.

The potential smouldering fires in the wheat handling areas do not pose significant propagation risks given the plant layout, eg. losses of containment from the new tempering bins.

Should the combustible dust containment systems fail in the existing or new mills and the safety management systems, eg. equipment not rated to the hazardous zones, also fail then ignition can occur with a dust explosion within either building. This could cause damage to the adjacent building. According to Pinnacle, building dust explosions in mills is a known hazard and both hardware (eg. design for containment and electrics and instruments rated for hazardous zones) and safety management systems (eg. housekeeping) are required to lower the risk to an acceptable level. These measures are planned to be used in both mills to keep this propagation risk at an acceptable level.

Societal Risk

The abovementioned criteria 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 according to Pinnacle 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 the PHA carried out by Pinnacle in relation to this proposal, the risk of fatality does not extend significantly from the equipment and is therefore well away from the residential areas. The concept of societal risk applying to residential population or other off-site receptors is therefore not applicable for the new mill.

Risk to the Biophysical Environment

The main concern for risk to the biophysical environment is generally with effects on whole systems or populations.

As there are no Dangerous Goods associated with the new mill, significant environmental impact is not expected. Whilst fires can also effect the environment due to combustion products, these events are low likelihood given the history of these types of processes. Importantly, any spilt material will be contained in the area or via the environmental farm.

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

According to Pinnacle no incident scenarios were identified where the risk of whole systems or populations being affected by a release to the atmosphere, waterways or soil is intolerable.

Transport Risk

There are no Dangerous Goods involved with the new mill and no changes to the site transport requirements. Therefore, transport risk has not changed and according to Pinnacle is deemed broadly acceptable.

The PHA carried out by Pinnacle makes the following conclusions and recommendations in relation to this proposal:

> *"In summary:*
>
> - *The potential hazardous events associated with the new flour mill are dust explosions and smouldering fires. Given the nearest public land is approximately 110 m away and the river is 25 m away then no adverse off-site impacts are expected;*
> - *All risk criteria in HIPAP 4 is expected to be satisfied for this development;*
> - *The risk of propagation to neighbouring equipment is low given that the potential dust explosions are either to be vented to atmosphere or of limited consequential impact and the potential fires are of a smouldering nature; and*

- *Societal risk, environmental risk and transport risk are all considered to be broadly acceptable.*

The recommendations included in the Hazardous Event Word Diagram (Table 1 in this report) will require addressing as part of the design for the new flour mill.

There are no other recommendations from the assessment performed in this PHA."

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 1400 metres to the south east;
- Location 2 – Riverview Road, Nowra approximately 1000 metres to the south west;
- Location 3 – Meroo Street, Bomaderry approximately 640 metres to the north west;
- Location 4 – Coomea Street, Bomaderry approximately 750metres to the north west.

The above locations are listed in the order shown in the Environmental Protection Licence (No. 883) 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 7** to this EA. This section of the EA is based upon the findings of this assessment.

8.2.1 Acoustic Criteria

NSW EPA's Industrial Noise Policy 2000

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 4**.

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

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."*

Construction Noise Criteria

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 4** below.

Table 4

Rating Background Levels

Noise Measurement Location	*Time Period*	*Rating Background Level*
135 Terara Road, Terara March 2012	Day (7:00 am to 6:00 pm)	**33 dBA**
55 Terara Road, Nowra February 2015	Day (7:00 am to 6:00 pm)	**36 dBA**
Cambewarra Road Bomaderry 2010	Day (7.00am to 6.-00 pm)	**40 dBA**
Shoalhaven Village Caravan Park, Nowra - March 2012	Day (7:00 am to 6:00 pm)	**40 dBA**

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 5** below.

Table 5

L_{eq} Noise Management Levels from Construction Activities

Receptor Location	*Noise Management Level*	*How to Apply*
Location 1 (Terara)	**43 dBA** (33 + 10)	The noise affected level represents the point above which there may be some community reaction to noise. ▪ Where the predicted or measured $L_{Aeq\ (15\ min)}$ 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. ▪ 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.
Location 2 (Nowra)	**50 dBA** (40 + 10)	
Locations 3 & 4 (Bomaderry)	**48 dBA** (38 + 10)	
	Highly noise affected 75 dB(A)	The highly noise affected level represents the point above which there may be strong community reaction to noise. ▪ Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restricting the hours that the very noisy activities can occur, taking into account:

Table 5 (continued)

Receptor Location	*Noise Management Level*	*How to Apply*
		1. 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) 2. if the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.

Project Specific Noise Criteria

When all the above factors are considered, Harwood Acoustics indicate the most stringent noise criteria for the proposed flour mill 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 Flour Mill B Operational Noise Emission

Mechanical Plant and Equipment Source Noise Levels

The main sources of noise associated with the operation of the Flour Mill B will be the plant and equipment located within the new building, roof top exhaust fans and other external plant. Harwood Acoustics has conducted several noise surveys at the Shoalhaven Starches' complex including noise measurements of similar plant and equipment within the existing flour mill.

Table 6 below provides a schedule of the octave band and overall 'A' frequency weighted sound power levels, in decibels re: 1 pW, of noise sources associated with the new mill.

Table 6

L_{10} Sound Power Levels – Flour Mill B

Mechanical Plant	***$L_{10,\ 15\ minute}$ Sound Power Level (dBA)***
Internal Plant	
Roller Mills [1]	104
Sifters [1]	94
Small motors / screw feeds [1]	87
Blower Motor [2]	85
Roof top exhaust fans (9 off)	
Circa 3000 l/s[3]	100
Circa 8000 l/s[3]	119
External Plant and Equipment	
Transfer System Motors [1]	98
Bucket Elevators [1]	94
Temper Bin Motors [1]	96

1. *Derived from Harwood Acoustic's noise measurements of similar existing plant and equipment;*
2. *Derived from Harwood Acoustic's noise measurements of similar existing plant and equipment adjusted to manufacturer's specifications.*
3. *Derived from manufacturer's data of fans associated with the existing flour mill.*

Noise Level Predictions

Table 7 below shows the predicted noise level at each of the receptor locations from the operation of the new flour mill.

Table 7

Predicted Noise Levels at Receptor Locations – New Flour Mill B

Description	***Predicted Noise Level $L_{10,\ 15\ minute}$ (dBA) at Receptor Location***			
	Location 1	***Location 2***	***Location 3***	***Location 4***
Flour Mill B building	< 15	25	28	27
External plant	< 15	22	19	17
Roof top fans	21	23	27	27
Combined	22	26	31	30
Design Noise Goal ($L_{10,\ 15\ minute}$)	28	28	32	30
Complies	✓	✓	✓	✓

8.2.3 Construction Noise Emission

The construction process will involve removal / relocation of existing structures, pouring of concrete slabs, erection and fit out of the buildings and silos and installation of the plant within the building.

Table 8 below shows a schedule of sound power levels for typical construction equipment.

Table 8

Construction Equipment – L_{eq} Sound Power Levels

Description	***L_{eq} Sound Power Level (dBA)***
Piling Rig	118
Mobile Crane (Diesel)	110
30 Tonne Excavator	110
Concrete Truck / Pump	105
Grinder	105
Power Saw	101

Table 9 below shows the predicted level of potential noise emission from construction activities at each of the receptor locations.

Table 9

Predicted Noise Levels at Receptor Locations – Construction Phase

Description	***Predicted Noise Level $L_{eq,\ 15\ minute}$ (dBA) at Receptor Locations***			
	Location 1	***Location 2***	***Location 3***	***Location 4***
Construction Activity*	<20	26	31	29
Acceptable Noise Limit ($L_{eq,\ 15\ minute}$)	43	50	48	48
Complies	✓	✓	✓	✓

** Includes piling activity.*

It can be seen from **Table 9** that the construction noise management levels will be met at each receptor location during the construction phase. However, a construction noise management plan may be required prior to the commencement of any site works to ensure best practices are employed in accordance with NSW EPA's *Interim Construction Noise Guideline.*

8.2.4 Noise Control Recommendations

Construction of Flour Mill Building

Walls

The walls of the Flour Mill B building should have a minimum weighted sound reduction index (R_w) 24. In this instance calculations are based on '*Kingspan'* Architectural Wall Panelling system *AWP 80.*

Roof / Ceiling

The roof and ceiling of the flour mill building should have a minimum weighted sound reduction index (R_w) 23. In this instance calculations are based on *'Kingspan'* Architectural Roof Panelling System *'K-Dek (KS 1000 KD)'*.

Ventilation Penetrations

There should be no acoustically untreated penetrations in the walls or roof. Any doors to the building must remain closed at all times the plant is in operation.

If natural ventilation is required, sections of the northern and eastern walls only may be fitted with acoustic louvres.

The required insertion loss of acoustic louvres will depend on the maximum surface area of louvered sections required to facilitate adequate ventilation.

As an example, based on a maximum 20 m^2 of louvered sections on each of the floors, other than the top floor, acoustic louvres should have minimum insertion losses shown in **Table 10** below:

Table 10

Example Acoustic Louvre Sound Transmission Loss

Description	***Minimum Insertion Loss (dB) at Octave Band Centre Frequencies (Hz)***							
	63	***125***	***250***	***500***	***1k***	***2k***	***4k***	***8k***
Acoustic Louvre*	5	10	14	22	27	25	21	17

**Based on Fantech SBL2 louvre.*

A larger area may result in a higher required insertion loss and consequently a deeper blade depth. A final assessment should be made prior to the issue of a Construction Certificate once the location and size of any openings for ventilation are finalised.

External Mechanical Plant

Roof Mounted Fans

It is proposed to install a selection of nine (9) exhaust fans of varying capacity which will discharge to the roof of the building and each fan will be fitted with a silencer. However, selections of fan make and model have not been finalised at this stage.

Calculations in Section 5.2 of the noise assessment assume similar fan types to those recently installed during an upgrade to the existing flour mill, ranging in capacity from approximately 3000 to 8000 l/s with reported sound power levels ranging from 100 to 119 dBA.

In order for the noise goals to be met at the closest residential receptors to Flour Mill B, Harwood Acoustics recommend the following:

- the level of noise emission from each individual fan (maximum 9) should not exceed a sound pressure level of 65 dBA (L10, 15 minute) when measured at a distance of 3 metres from the discharge silencer;
- this can be achieved by fitting silencers to the discharge side of each of the fans and as an example, predictions shown in **Table 7** are based on the minimum insertion losses shown in **Table 11** below.

Table 11

Example Discharge Silencers for Roof Mounted Fans
Insertion Loss Data Description

Description	***Minimum Insertion Loss (dB) at Octave Band Centre Frequencies (Hz)***							
	63	125	250	500	1k	2k	4k	8k
Fan circa 8000 l/s (4 off) Silencer – NAP Silentflo H45/300	14	23	41	50	52	35	22	20
Fan circa 3000 l/s (5 off) Silencer – NAP Silentflo H45/120	4	11	17	25	24	17	15	10

A final assessment will be required prior to the installation of all fans to ensure the minimum noise reduction is achieved and the correct silencers selected, once selections are finalised.

Additional External Mechanical Plant

In addition to the roof mounted exhaust fans, new external mechanical plant is likely to be located beneath the mill feed silos at ground level and include small motors, bucket elevators, etc, as detailed in **Table 6**.

The specific selection, location and height of any new externally located mechanical plant is not yet finalised. There is potential for there to be line of sight from the new mill feed plant to Location 2.

In this event, localised acoustical treatment may be required to reduce the level of noise emission from external mechanical plant to within acceptable limits at Location 2 only.

The type and final location of external mechanical plant will determine the extent to which acoustical treatment is required, prior to commissioning.

Acoustical treatment is unlikely to be extensive, as an example, predictions shown in **Table 7** assume a sound barrier screen erected no further than 3 metres to the south of any item of plant to a minimum height of 1.5 metres above the highest item of mechanical plant.

The Noise Impact Assessment prepared by Harwood Acoustics concludes:

> *An assessment of the potential noise impact from the proposed construction and operation of a Flour Mill B at Shoalhaven Starches on Bolong Road, Bomaderry, NSW has been undertaken.*
>
> *Calculations show that the level of noise emission from the operation of Flour Mill B 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 Stephenson Environmental Management Australia (SEMA). A copy of SEMA's AQIA forms **Annexure 6** to this EA. This section of the EA is based upon the findings of this assessment.

8.3.1 Impact Assessment Criteria

8.3.1.1 Odour Impact Assessment Criteria

The *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (AMMAAP) according to SEMA provides a ground level concentration (GLC) impact assessment criterion for a number of potential air emissions, and states that dispersion modelling undertaken should assess the modelling predictions against the GLCs to determine if the predicted impact from the emissions exceeds the criteria.

The Impact Assessment Criteria (IAC) for complex mixtures of odours have been designed to take into account the range of sensitivity to odours within the community and to provide additional protection for individuals with a heightened response to odours. This is achieved by using a statistical approach dependent upon population size. As the population density increases, the proportion of sensitive individuals is also likely to increase, indicating that more stringent criteria are necessary in these situations.

The GLC assessment criteria for the complex odour compound emissions considered in the modelling are shown in **Table 12**. The predicted odour impact due to the pollutant source must be reported in units consistent with the IAC as peak concentrations (ie. approximately 1 second average).

The odour criterion that has been selected by SEMA for use in this assessment, to determine the maximum odour GLC concentration from the proposed flour mill, is the 2.0 odour units (ou) criterion for the 100th percentile of predicted odour concentrations, which indicates that 100 percent of all odour predictions would fall below this concentration. This criterion has been chosen because there are residential areas in the vicinity of the Shoalhaven Starches site, such that the population density of the area surrounding the facility as a whole is in excess of 2000 people.

Table 12

Impact Assessment Criteria for Complex Odourous Air Pollutants

Population of Affected Community	***Impact Assessment Criteria (ou)***
Urban (> 2000 and/or schools and hospitals)	2.0
~ 500	3.0
~ 125	4.0
~ 30	5.0
~ 10	6.0
~single rural residence (<= 2)	7.0

Key: ou = odour unit; > = greater than; < = less than.

8.3.1.2 Adjustment for Peak-to-Mean Ratios

AMMAAP notes that the evaluation of odour impacts requires the estimation of short or peak concentrations on the time scale of less than one second. The dispersion modelling predictions are valid for one-hour ground level concentrations or longer. Therefore the dispersion model, such as AUSPLUME, needs to supplemented to accurately simulate atmospheric dispersion of odours and the instantaneous perception of odours by the human nose.

AMMAAP Table 6.1, reproduced in **Table 13** below, provides EPA recommended one-second to one-hour (P/M60) peak-to-mean ratios for estimating concentrations for different source types, stabilities and distances. It is important to note that these emission factors are for idealised situations for one source in flat terrain where the receptor is located along the centreline of the single plume and do not consider fluctuations away from the plume centre line, terrain influences or plume interactions from multiple sources.

AMMAAP further requires that the P/M60 ratio for wake-affected point sources be applied to the proposed flour mill stack to determine the maximum permissible stack concentration. Therefore, according to SEMA maximum permissible stack source emission rate will need to be multiplied by 2.3 when checking for compliance with the ambient odour GLC criterion.

Table 13

Peak-to-Mean Factors

(Table 4-2 Peak-to Mean Factors)

Table 6.1: Factors for estimating peak concentrations in flat terrain (Katestone Scientific 1995 and 1998)

Source type	Pasquill–Gifford stability class	Near-field P/M60*	Far-field P/M60*
Area	A, B, C, D	2.5	2.3
	E, F	2.3	1.9
Line	A–F	6	6
Surface wake-free point	A, B, C	12	4
	D, E, F	25	7
Tall wake-free point	A, B, C	17	3
	D, E, F	35	6
Wake-affected point	A–F	2.3	2.3
Volume	A–F	2.3	2.3

* Ratio of peak 1-second average concentrations to mean 1-hour average concentrations

8.3.1.3 Particle Impact Assessment Criteria

The AMMAAP criterion for Total Suspended Particulate Matter is outlined in **Table 14**.

Table 14

Impact Assessment Criteria for Total Suspended Solids

Pollutant	*Averaging Period*	*Impact Assessment Criteria (µg/m³)*	*Source*
TSP	**Annual**	**90**	**NHMRC (1996)**

Key: TSP = Total suspended particulate matter
µg/m³ = micrograms per cubic metre
NHMRC = National Health and Medical Research Council

8.3.2 Impact Assessment Predictions

The impact assessment predictions of the AQIA prepared by SEMA indicate that:

- The worst case predicted odour GLC impact from the proposed Flour Mill B is 1.8 ou at the southern boundary of the site . Refer **Tables 15** and **16**, and **Figure 5**.
- The annual average worst case predicted TSP GLC for the proposed flour mill is 0.01 µg/m^3. Refer **Table 17** and **Figure 6**.

Table 15

Cumulative Worst Case Odour GLC

Parameter	Averaging Time	SEMA 2016	GHD 2008				Impact Assessment Criteria
		Proposed Flour Mill B and Mill Feed Silo	Total Factory excluding Proposed Flour Mill				
Odour *southern boundary*	1 second: *using peak-to-mean ratio*	1.8 ou	5 ou *Stage 3*	10 ou *Stage 2*	25 ou *Stage 1*	100 ou *Existing*	2.0 ou
Odour *Bomaderry*		0.7 ou	2 ou *Stage 3*	3 ou *Stage 2*	6 ou *Stage 1*	40 ou *Existing*	

Key:
GLC = Ground Level Concentration
ou = odour units

Table 16

Combined Worst Case Odour GLC at Discrete Receptor Locations

Location	Averaging Time	Number of Receptors	Worst Case GLC	Impact Assessment
Northern Boundary	1 second: *using peak-to-mean ratio*	9	0.8 ou	2.0 ou
Southern Boundary		9	1.8 ou	
50 Coomea St, Bomaderry		6	0.7 ou	
Western Boundary		1	0.6 ou	
29 Meroo St, Bomaderry		3	0.6 ou	
Eastern Boundary		1	0.6 ou	
59 Meroo St, Bomaderry		1	0.6 ou	
Cr Tarawara & Meroo Sts, Bomaderry		1	0.5 ou	

Key:
GLC = Ground Level Concentration
ou = odour units

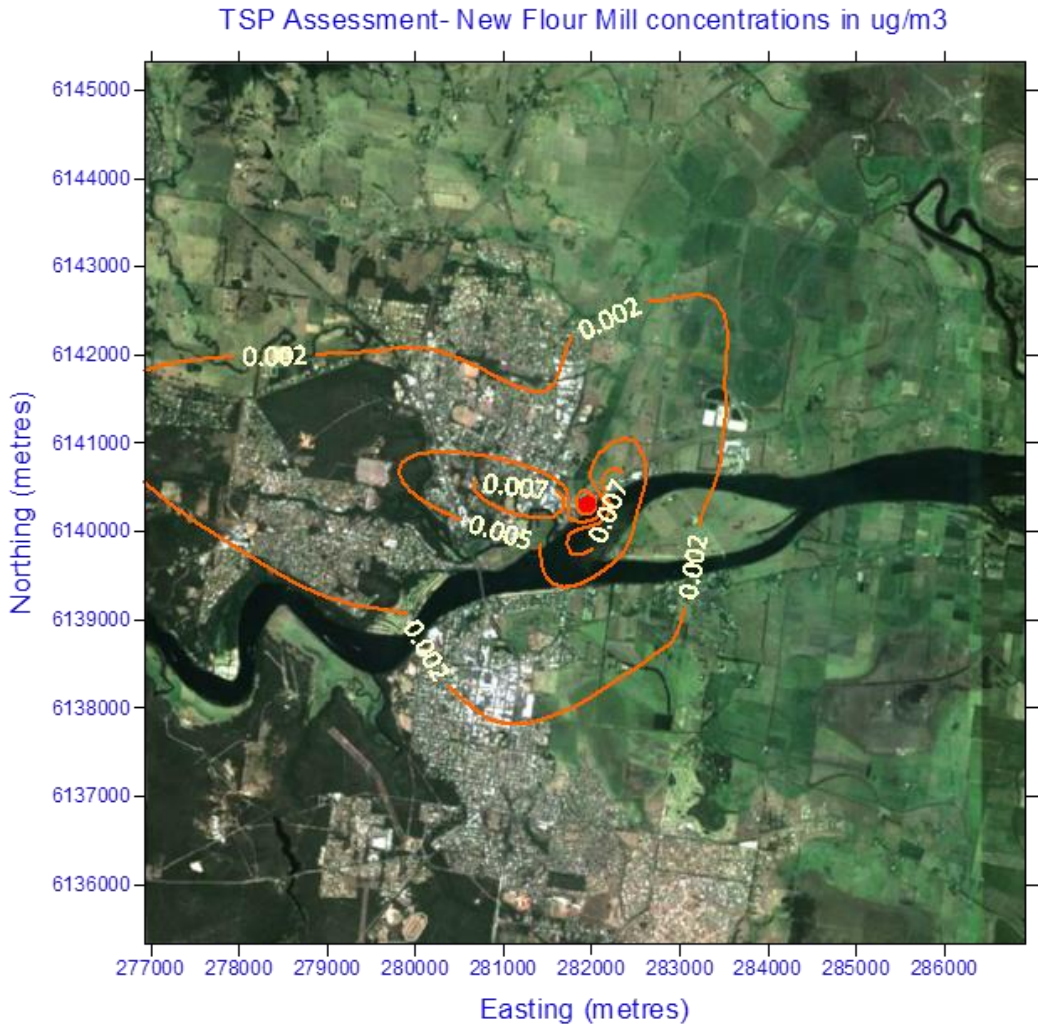

Figure 5: Predicted TSP Concentration, proposed Flour Mill 'B'.

Table 17

Cumulative Worse Case Particulate GLC

Parameter	Averaging Time	SEMA 2015	GHD 2008	Impact Assessment Criteria
		Proposed Flour Mill	Total Factory excluding Proposed Flour Mill	
TSP	Annual	0.01 µg/m³	2 µg/m³ **	90 µg/m³
PM_{10}		0.01 µg/m³*	1 µg/m³**	30 µg/m³

Key

TSP	=	Total Suspended Particles
PM_{10}	=	Particulate matter less than 10 microns
µg/m³	=	micrograms per cubic metre
*	=	assume all TSP <10 µm Bomaderry

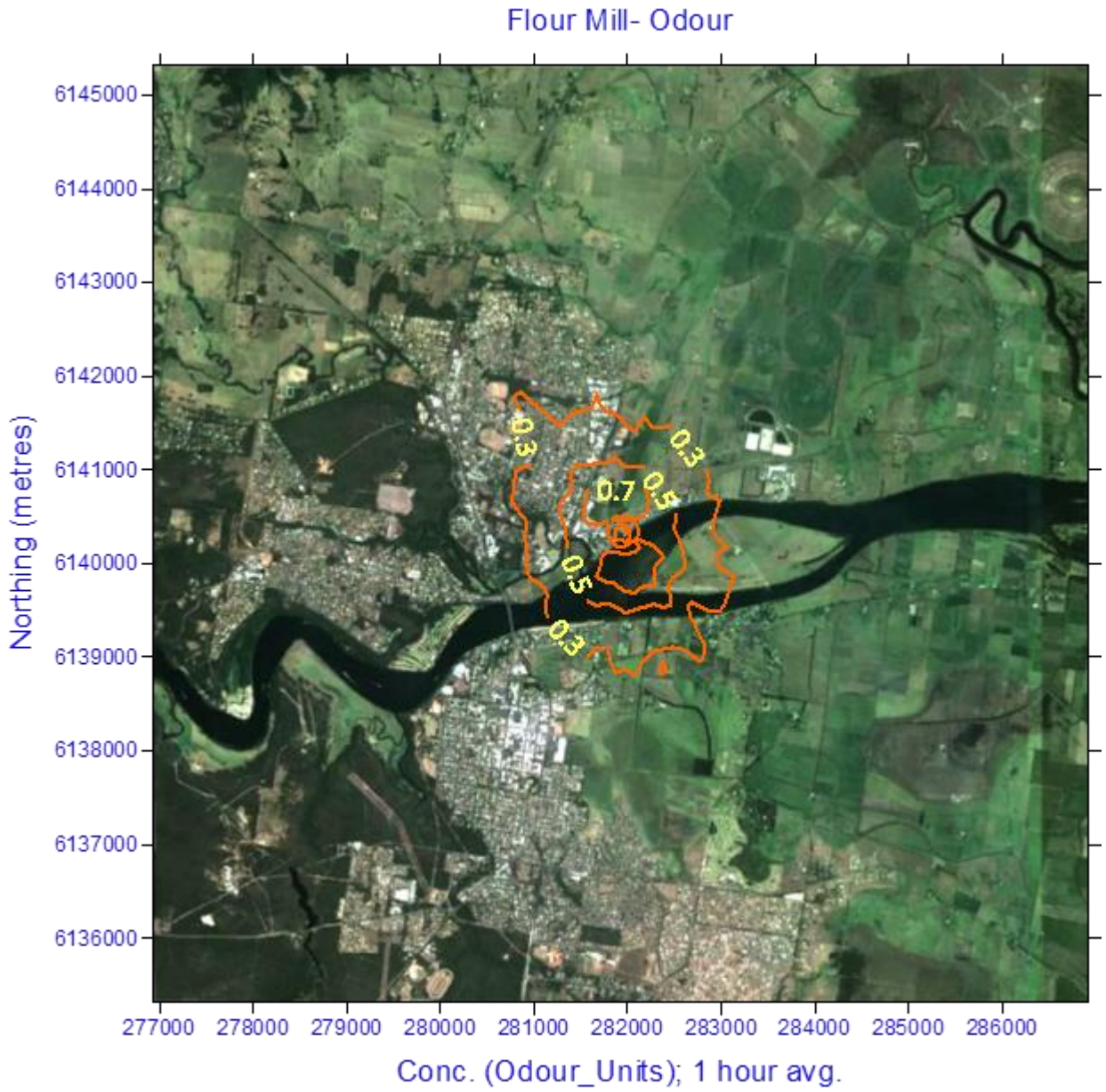

Figure 6: Predicted Odour Concentration, proposed Flour Mill 'B'.

8.3.3 Proposed Flour Mill B Odour Impacts

Based on available data and measurement results, SEMA estimates that, with the existing level of odour control, the proposed Flour Mill B will emit 5, 637 ou.m^3/s of odour into the atmosphere, which is 0.9% of total odour emissions from the Shoalhaven Starches factory site at Bomaderry.

8.3.4 GHD 2008 Predicted Odour Impacts

The GHD 2008 air quality assessment estimated the total odour emissions from the Shoalhaven Starches factory (not including the proposed new flour mill) before the implementation of odour controls to be 604,811 odour units per cubic metre per second (ou.m^3/s).

The 2008 total factory predicted odour impacts at the Shoalhaven Starches boundary were:

- 100 ou with existing controls;
- 25 ou with Stage 1 controls ;
- 10 ou with Stage 2 controls;
- 5 ou with Stage 3 controls.

The 2008 total factory predicted odour impacts at Bomaderry were:

- 40 ou with existing controls;
- 6 ou with Stage 1 controls;
- 3 ou with Stage 2 controls;
- 2 ou with Stage 3 controls.

8.3.5 Predicted Cumulative Odour Impacts

Predicted cumulative odour impacts from the entire Shoalhaven Starches factory complex, including the proposed Flour Mill B, was estimated by SEMA by adding the predicted worst case odour GLCs for the existing factory plus the predicted worst case odour GLCs for the proposed Flour Mill B and Mill Feed Silo.

This approach assumes that:

- Both the SEMA and GHD models worst case odour GLC were predicted for identical coordinates and time; and
- Ground level odour concentrations are additive.

Furthermore, the output of the Ethanol Upgrade odour impact model prepared by GHD did not report in two significant numbers. Therefore rather than a specific GLC, only a statistical range can be predicted for the worst case cumulative GLC. More accurate prediction of the cumulative odour impact to more than one significant number according to SEMA is not possible.

Worst case predictions indicate there may be an increase in odour concentrations from the Shoalhaven Starches factory complex due to the cumulative impact of the proposed Flour Mill B and other factory emissions. These cumulative worst case odour impacts could be in range of 2.2 to 3.2 ou, which may exceed the IAC of 2 ou but is less than the GHD 2008 predictions for Bomaderry of 6 ou with Stage 1 controls in place and 3 ou with Stage 2 controls.

Following implementation of Stage 2 odour controls, the proposed Flour Mill B appears to have an apparent relatively larger contribution to the factory's cumulative odour impact. However, this is an artefact caused by the significant decrease in overall odour emissions from the factory site after the implementation of all three stages of odour control nominated in 2008 (GHD).

GHD, 2008, estimated total factory odour emissions would be reduced to 155,393 ou.m^3/s after Stage 2 odour control completion. Odour emissions from the proposed Flour Mill B are predicted to be 5,637 ou.m^3/s; (that is, 3.5% of total odour emissions from the factory site after implementation of Stage 2 odour control).

8.3.6 Hedonic Tone

The odour analysis by ORLA of existing flour mill emissions indicated a neutral hedonic tone of zero. Hedonic Tone is measured on a scale of plus ten through zero to minus ten. Therefore an odour with a hedonic tone of zero would be considered neither pleasant nor unpleasant. Odour emissions from the proposed flour mill, processing similar grain and operating equipment and processes as the existing mill, can also be expected to have a similar, neutral hedonic tone.

8.3.7 Cumulative TSP Impacts

According to SEMA the proposed flour mill is not considered to make a significant contribution to the factory's total cumulative impact for TSP.

GHD estimated the total TSP emissions from the Shoalhaven Starches factory site would be 13.3 g/s. Based on available data and measurement results, SEMA estimates the proposed Flour Mill B will emit 0.0054 g/s of TSP into the atmosphere, which is 0.03% of total TSP emissions from the Shoalhaven Starches factory site.

The AQIA prepared by SEMA concludes that:

> *"…the cumulative impacts of the approved ethanol expansion project development and the proposed new flour mill at the Shoalhaven Starches factory site at Bomaderry, New South Wales will be as follows:*
>
> *The maximum TSP ground level concentration (GLC) is predicted to be 0.01 µg/m^3, which is significantly below the impact assessment criteria of 90 µg/m^3.*
>
> *The worst case predictions from this assessment indicate, with the additional operation of the proposed Flour Mill B, there may be an increase in odour concentrations from the Shoalhaven Starches factory site.*
>
> *Following implementation of the approved odour controls, the maximum worst case odour GLC is predicted to be between 2.2 ou and 3.2 ou, which potentially exceeds the regulatory impact assessment criteria of 2 ou.*
>
> *However, the following will further ameliorate this worst case predicted odour impact:*

- *The output of the Ethanol Upgrade odour impact model prepared by GHD did not report in two significant numbers. Therefore rather than a specific GLC, only a statistical range can be predicted for the worst case cumulative GLC. More accurate prediction of the cumulative odour impact to more than one significant number is not possible.*
- *Worst case cumulative odour predictions assume that both the SEMA and GHD models used identical coordinates and time, and that ground level odour concentrations are additive.*
- *Odour emissions from the proposed Flour Mill B can also be expected to have a similar, neutral hedonic tone to the existing mill because the proposed mill will be processing the same type of grain using equipment and processes similar to the existing mill. That is to say the odour emissions from the proposed flour mill would be regarded as neither pleasant nor unpleasant. The total odour emission rate for the proposed flour mill would not have a significant adverse incremental or cumulative odour impact at the Shoalhaven Starches factory site.*

8.4 FLOODING

This Modification Application is supported by a flood assessment prepared by Webb McKeown & Associates (WMA). A copy of WMA's report forms **Annexure 5** to this EA. This section of the EA is based upon the findings of this assessment.

WMA have obtained flood certificate from Shoalhaven City Council which advises that the site is inundated in the 1% AEP event and is described as part High Hazard and Floodway. The projected sea level rise estimates due to climate change will not increase the 1% AEP flood level at this site as it is too far upstream from the ocean.

According to WMA the position of the proposed flour mill is 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 towards Bolong Road is already significantly impeded.

The construction of any works on the floodplain will according to WMA 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 the proposed plant is partially on piers and the floodplain storage area of the Shoalhaven River floodplain is of the order of 100 km^2 the loss of temporary floodplain storage due to the works is too small to be evaluated.

The loss of hydraulic conveyance depends on the extent of the restriction to a flow path caused by the works. Prior to construction of the Shoalhaven Starches plant at Bomaderry there would have been significant flow through the site during a flood, as there is across any river bank.

However, since approximately 1960 the ongoing construction of the plant has effectively blocked the flow path through the site. This issue has been investigated by WMA in their October 2000 report titled "*Further Development within the Manildra starches Plant off Bolong Road, Bomaderry - Hydraulic Assessment*".

In summary an agreement was reached that any future development within the intensively built-up area, would not require hydraulic modelling to quantify the hydraulic impacts and cumulative effects.

Since publication of that report in 2000 a TUFLOW hydraulic model has been set up by Shoalhaven Starches in order to assess the hydraulic impact of any future works. This model is much more detailed than the CELLS model available in 2000 however according the WMA the proposal and surrounding existing plant is still considered too complex to be accurately assessed using the TUFLOW hydraulic model. One of the main issues is that large parts of the plant are on piers and it is not possible to accurately reflect each of these structures using the TUFLOW model.

In conclusion WMA consider that any increase in the 1% AEP flood level as a result of the proposed works would be less than 0.01 m and would not extend beyond the land owned by Shoalhaven Starches.

The proposal also includes the use of the former Paper Mill site, further east of the Shoalhaven Starches factory site for the storage of 6 silos, relocated to enable the construction of the Flour Mill B building.

Each development on the floodplain has the potential to cause an impact upon flood levels. The potential impacts of works within the floodplain on hydraulic characteristics are twofold - firstly a loss of temporary floodplain storage volume and secondly a loss of flow area. It is the loss of flow area which produces the greatest impact, as the area of floodplain storage lost due to all works since 1990, represents approximately less than 1% of the total available floodplain storage area for the northern floodplain (say 3000+ hectares). However, according to WMA, the proposed storage location for the silos is surrounded on the north side by the Paper Mill plant which already heavily restricts the flow of escaping floodwaters from the Shoalhaven River travelling northward.

The hydraulic effects (change in flood levels, flows or velocities) of the proposed 6 silo storage area (approximately 30m by 19m) at the Paper Mill 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.

According to WMA the use of this part of the Paper Mill site for the storage of the six silos will result in no change in design flood levels.

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 City Council Heritage Study 1995 – 1998 prepared by Peter Freeman Pty Ltd in association with JRC Planning Services identified the rural landscapes north of the Shoalhaven River as the Berry-Bolong Pastoral Landscape. This Study described this area as:

> *"North of the Shoalhaven River the area is dominated by the close relationship between the Princes Highway (formalised by Berry in 1857/1858) and the railway (1893) which were instrumental in determining the location of new homesteads on Berry estate lands which resulted from drainage schemes implemented by Sir John Hay. In the foothills to the north-west, and towards Cambewarra, settlement patterns were in the main determined by the impact of Free Selection after 1861. Sub-zones include the Cambewarra-Tapitallee area, Bellawongarah and the catchment areas of Broughton Creek north of Berry. The latter are focused around communities which developed outside the Berry Estate: Cambewarra, Tapitallee, Bundewallah, Woodhill and Broughton Vale. The scale and character are dependent on the distribution of small dairy farms, with internal and external boundaries created by modified and natural vegetation (River Oaks), roads, creeks and property boundaries.*
>
> *Continuing dairy farms has contributed to the survival of the underlying late nineteenth and early twentieth century landscape patterns."*

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.

Burraga (Pig) Island – Burraga 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 Burraga (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 new flour mill will have a footprint with dimensions of 30.335 m by 21.27 m, comprising an area of about 400 m^2. The proposed flour mill building will rise to a height of 39.5 m.

Much of the proposed new flour mill will be sandwiched between the existing flour mill to the south; existing flour uploader to the east; the Starch plant to the south; and the boiler house to the west.

The existing flour mill has a similar footprint to the proposed new flour mill both in terms of dimensions and area. The existing flour mill however has a maximum height above ground level of 28 metres. As a result approximately 11.5 metres of the proposed new flour mill will be visible to the south above the existing flour mill.

The Starches plant which is located immediately to the north of the proposed new flour mill 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 proposed new flour mill will not be highly visible when the site is viewed from Bolong Road.

The boiler house to the west is another substantial building development and includes a stack with a height of 53 m. The flour uploader immediately to the east has a height above ground level of 34.5 m. The proposed new flour mill will therefore be of a similar scale and height as these adjacent developments.

The visual impact of these works from the identified vantage points (refer **Figure 7**) 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.

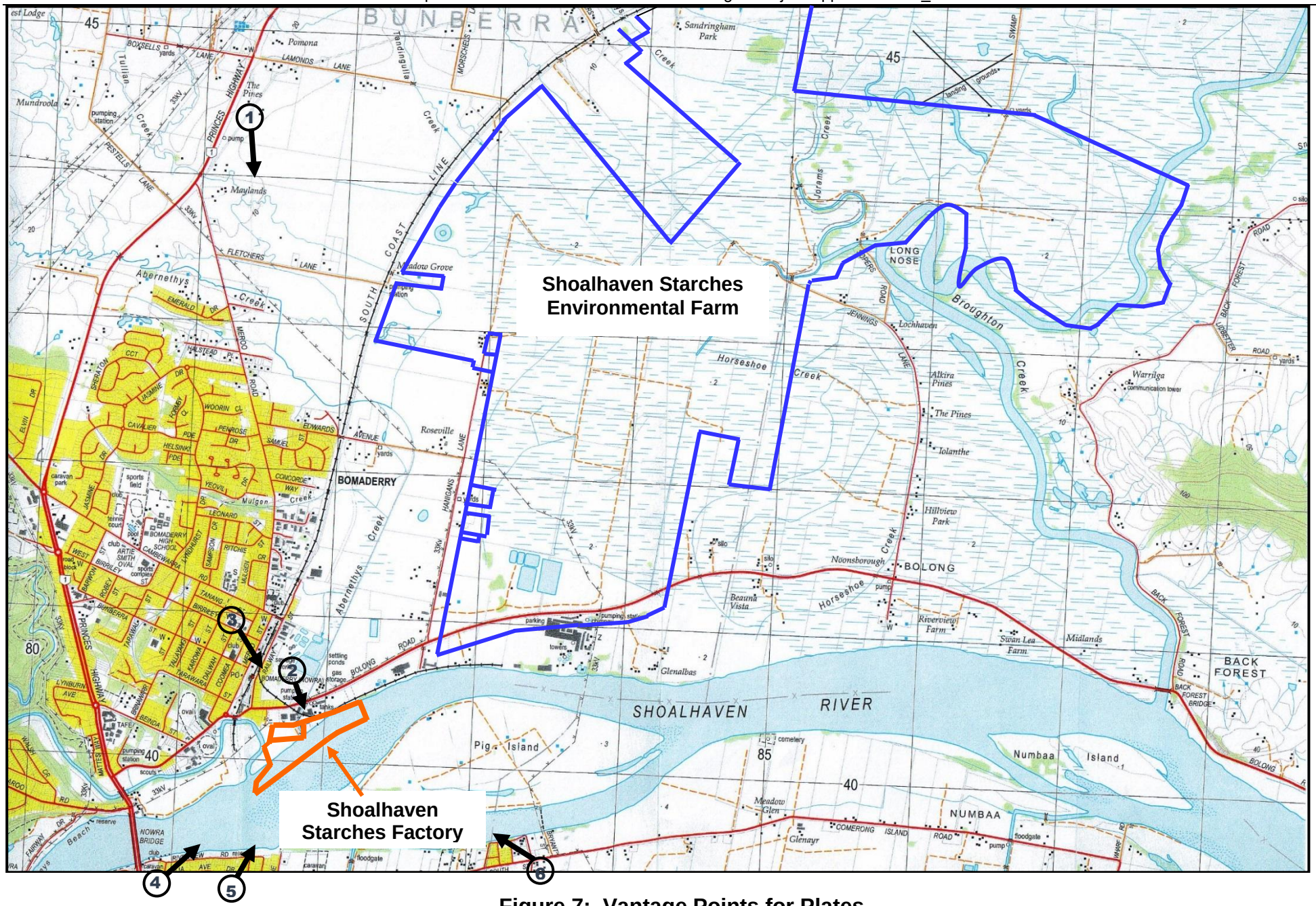

Figure 7: Vantage Points for Plates.

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 flour mill sited to the east of Abernethy's Creek will mainly involve structures of a similar bulk and scale as existing structures within this part of the site.

The proposed flour mill will largely be screened from view along Bolong Road by virtue of existing development sited along the Bolong Road frontage, and in particular the existing Starches Plant. In these circumstances these structures create forms similar to existing industrial structures within the vicinity.

Plate 2: View of Shoalhaven Starches factory site from Bolong Road. Note Flour Mill B site largely shielded from view by existing development.

Bomaderry Urban Area

The township of Bomaderry is slightly elevated and some locations within this urban area have extensive views of the site (refer **Plate3**).

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

In light of the prevailing scale of existing development located to the north of the proposed flour mill within the Shoalhaven Starches site it is unlikely that the proposed new flour mill will be significantly visible from this vantage point. In this way the vista from this vantage point will not be significantly altered.

Nowra Bridge

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

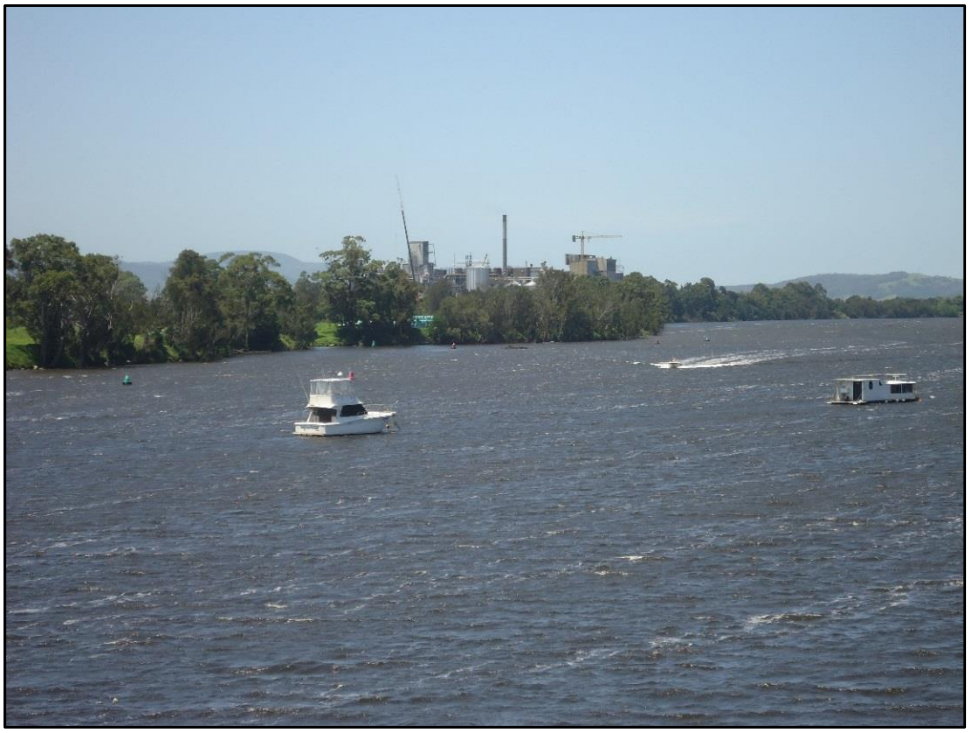

Plate 4: View of Shoalhaven Starches factory site from Nowra Bridge over the Shoalhaven River.

The site is largely obscured by riverside vegetation. The top of the proposed new flour mill will protrude above the canopy of the vegetation along the river, as does the existing flour mill, boiler house and starch plant. The proposed new flour mill will only be slightly visible above riverside vegetation. The proposed new flour mill will be sited generally within the overall "silhouette" of the existing factory complex. Although it is likely to 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 new flour mill will 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.

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

The existing flour mill and flour uploader are already visible from this vantage point. The proposed flour mill will protrude slightly above the existing flour mill and flour uploader from this vantage point. From this vantage point however, the proposal will be viewed as part of the existing factory complex, and will be viewed within this context.

It is noted there are 'gaps' in the vegetation along the riverbank to the south of the site, and the proposed development may be visible through these 'gaps'. There is, therefore, scope for supplementary landscaping and revegetation to take place along the riverbank adjoining the factory site to help soften or obscure views of the site, particularly from this vantage point. This was addressed as part of the Project Approval for the Expansion Project.

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 flour mill and flour uploader are already visible from this vantage point. The proposed flour mill will protrude slightly above the existing flour mill and flour uploader from this vantage point. 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, to the existing industrial development that will largely shield the proposed flour mill form view. There are however measures which Shoalhaven Starches could undertake to minimise the visual impact of the proposal. Where appropriate and

possible, the proposed flour mill 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 minimise if not entirely ameliorated. A copy of ARC's report forms **Annexure 9** to this EA. This section of the EA is based upon the findings of this assessment.

8.6.1 The Existing Situation

Access

Access to the subject site is provided via numerous access driveways, all to Bolong Road. The trips generated by the proposal would be confined to a single access point – the Western Access Point, also referred to in previous ARC assessments as Access Point 3 (**AP3**), immediately west of the small Cleary Brothers site on Bolong Road. AP3 is the subject of the assessment provided by ARC.

Traffic Operations

Following consultation with Shoalhaven City Council, ARC has over numerous years prepared traffic generation forecasts for Bolong Road and the numerous intersections that apply to the subject site and which reflect peak traffic flows for this site, and 120th Highest Hour traffic flows in Bolong Road.

Most recently, ARC identified "Base" 2018 flows in the March 2014 Shoalhaven Starches Access Review (**Access Review**); while the Access Review focused on flows at the Ethanol Driveway and former Dairy Farmers site to the east. Flows at all of the subject site's access points were determined as part of the background assessment. These flows were also referenced in the more recent report by ARC (August 2014) relating to a new Grain Silo on the Shoalhaven Starches site, also accessed via AP3.

These flows provided in **Figure 9** were also referenced in the recent reports by ARC (subsequently approved by the DP&E) for modification projects at the Moorehouse site (within the Shoalhaven Starches site) and Packing Plant.

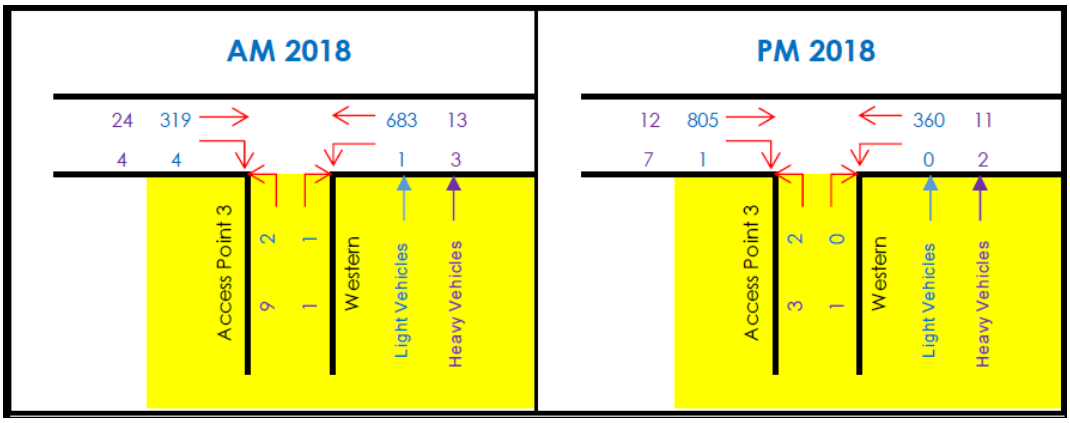

Figure 9: 2018 Flows Intersection Bolong Road and Access Point 3

ARC notes that after 2018, the progressive opening of Princes Highway Upgrade stages would lead to a significant reduction in vehicle trips (principally between Gerringong and Nowra) using Bolong Road and the "Sandtrack"; notwithstanding, SIDRA analysis of the intersection under a peak traffic load (2018) indicates that the intersection will operate at a good Level of Service (**LoS**) through 2018 (LoS "A" in the AM and LoS "B" in the PM), with minimal average and worst delays (to the movements from AP3) and significant spare capacity.

Traffic Associated with the Proposal

As outlined in Section 5.2, one of the objectives that underpin this proposal is to propose to free up the production capacity of the Manildra Flour Mill to enable an increase in production of premium grade flour by constructing the new flour mill at the subject site that would produce industrial grade flour. At present industrial grade flour is supplied to the subject site by flour produced at the Manildra Flour Mill which is delivered to the subject site by rail; as well as by the existing flour mill located on the Shoalhaven Starches site which processes wheat grain also delivered to the site by rail.

The proposal will not change existing heavy vehicle movements to and from the site; the proposal will however involve an increase in tonnage of raw materials that will be required to be transported to the site by rail.

Importantly, though, this does not mean that additional train trips will be generated across Bolong Road to the site, but only that existing trains will be able to carry capacity loads as opposed to the under capacity loads they currently carry. Similarly, the capacity of the Shoalhaven Starches operations – and specifically product carrying heavy vehicle

generation – would not be increased by the proposal; while additional grain would be stored on-site, the output of the Shoalhaven Starches site (in accordance with past approvals and traffic assessments) would remain unchanged.

Operational Traffic Generation

Once constructed and operational, the proposal would not generate any additional staff or [product carrying] heavy vehicle trips, but rather simply form part of the existing flour mill operations at the site. As discussed above, nor would the proposal increase train movements to/from the site.

In summary, once operational the proposal would have no impact on the operation of the local traffic environment or on existing on-site operations.

Construction

The only period during which the proposal would generate additional vehicle trips to the local road network would be during construction.

2.3.1 Construction Schedule and Requirements

The construction phase is estimated to occur over some 3 months, and require:

- Up to 20 construction staff on-site daily;
- Up to 5 construction material carrying heavy vehicles per day.

Construction Access

All access to the construction area will be via the Western Driveway, which loops to the rear of the subject site and provides direct and immediate access to the proposed location of the proposed Flour Mill B (adjacent to the existing Flour Mill A). This is same access path previously used for the construction of the existing Flour Mill A.

At the intersection of Bolong Road, the majority of staff trips, and all heavy vehicle trips, are expected to travel to/from the west.

Construction Traffic Generation

During the construction of the existing Flour Mill A on site, specialist construction staff were transported to and from the site daily by mini-bus, and it is expected that staff for this project would travel in an identical manner. Allowing for a small number of ancillary light vehicle trips on a daily basis, the daily generation of the construction phase is estimated to be no more than 20 [light and heavy] vehicle trips per day. In the existing peak periods, the peak hour generation of the construction phase is estimated to generate no more than 4 vehicle trips per hour.

Construction Traffic Impacts

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

At key intersections to the west of the Western Driveway, the construction phase would generate perhaps 4 additional vehicles per hour, a level of generation that would in no way affect key intersection performance indicators. At the intersection of Bolong Road and the Western Driveway where the construction trips are concentrated, SIDRA analysis indicates that the additional trips have no impact on peak 2018 operations, with existing [minor] delays, 95%ile queue lengths and capacity essentially unchanged from the existing 2018 operations. Not surprisingly, the same LoS is reported in both the AM and PM further to the introduction of proposal trips.

In summary, the trip generation of the construction phase of the proposal would have no impact on the local traffic environment or on existing on-site operations.

Construction Management

Notwithstanding the above, it remains 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 SS Site projects:

- *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 SS Site operations; or on the off-site traffic environment. In this regard, it is proposed that all construction staff parking be provided for in the approved temporary construction parking area located on the northern side of Bolong Road, which is readily accessible to the SS site, noting the existing pedestrian paths on both sides of Bolong Road and the pedestrian refuge in Bolong Road.*

- *While it is not anticipated that Restricted Access Vehicles (**RAV**s) 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 Western Driveway and the Princes Highway via Bolong Road; access for such vehicles via the Railway Avenue bridge is not acceptable.*

- *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 Council.

The Traffic and Parking Assessment carried out by ARC makes the following conclusions:

"Further to our assessment, ARC has determined that there would be no significant access or traffic impacts arising from the Modification. Specifically:-

- *Once operational, the Modification would not result in any increases in staff or heavy vehicle trip generation above SSEP approved limits.*
- *Once operational, the Modification would not result in any increases in rail movements, but rather utilise available capacity within existing trains servicing the SS Site.*
- *The Modification would generate a small number of construction vehicle trips during a short construction period, which would be generated exclusively to and from the Western Driveway. These additional trips would have no impact on the operation of the intersection of Bolong Road and Western Driveway, nor on the broader local road network.*
- *An appropriate Construction Traffic Management Plan would be in place to appropriately manage on and off site access and parking requirements during the construction period.*

As detailed from the outset, it is our opinion that this Modification has essentially no bearing on the outstanding issues as determined by Council at the Ethanol, Dairy Farmers and Paper Mill driveways to the east of the Western Driveway. Notwithstanding, and as discussed with both Manildra and Council, it is in the opinion of ARC essential that these issues be examined and resolved in a collaborative manner as part of the future Ethanol Distillery Modification to ensure that these intersections/driveways – all of which will be integral to the Ethanol Distillery Modification – are appropriately assessed and, where required, upgraded/augmented to the satisfaction of Council and the RMS."

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 10** 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 Record1 was carried out on the 6 February 2015. 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 Sections 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 in-force declaration or order.

The search noted two listings within 500 m of the site. These include:

- A former Shell fuel depot situated at 44 Railway Street, Bomaderry (located approximately 450 m to the northwest of the site). This site is currently under assessment by the NSW EPA to determine if a remediation order is required.
- RailCorp land situated at Lot 2 Meroo St, Bomaderry (located approximately 450 m to the northwest of the site). This site is currently under assessment by the NSW EPA to determine if a remediation order is required.

Based on the distance of the above properties to the site and the relatively lower permeability alluvial clayey soils that are situated across the local Bomaderry area, it is unlikely that soil and groundwater contamination, at concentrations presenting a potentially unacceptable risk to proposed site users, would migrate towards 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 19972 was carried out on 7 October 2016. The POEO public record is a searchable database of:

- 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 Shoalhaven Starches processing site (and adjacent effluent disposal and treatment sites) dating from 2000. A list of license numbers is proved in Appendix A. 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, water discharge and air monitoring), which are installed across the general Shoalhaven Starches plant 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 Manildra site (which includes Shoalhaven Starches plant), the majority of these 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 Shoalhaven Starches had conformed to other conditions in the license permits.

There are several licenses held for the Paper Mill site, however considering the low level of disturbance involved in the proposed development in this area, the contents of these licenses are not considered relevant for the purposes of the current investigation.

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

8.7.2 Review of previous environmental reports

Coffey has undertaken several environmental and geotechnical reports at the Shoalhaven Starches facility (and surrounding areas) since 2002. Three preliminary contamination assessments (Coffey 2007, 2014 and 2015) were undertaken within the proposed footprint (and areas to the immediate south) of the proposed Flour Mill B and are of most relevance. One additional report (Coffey 2008) also has some relevance as they provide historical information for the general area (including the proposed Mill Feed site) and general soil and groundwater quality. A summary of relevant information from the reports is provided below:

Coffey 2007 Preliminary Contamination Assessment

A flour mill and associated upgrade works was proposed in 2007 in the southern area of the Shoalhaven Starches Plant. A preliminary contamination assessment was undertaken to assess the potential for soil contamination and check for acid sulphate soils to be present within the portion of the plant to be redeveloped. The 2007 investigation area was located immediately south and 20 m east of the Flour Mill B site.

During the investigation, several chemical storage containers and some drums were observed on the northern portion of the investigation area. The containers appeared to be in good condition and contained non-hazardous substances used for the production of starch. Anecdotal evidence from site interviews revealed the following information:

- This area of the Shoalhaven Starches plant was used primarily for transferring flour from cargo trains to the flour mill and the silos, and also for the transport and temporary storage of other miscellaneous items associated with works in these areas of the plant.
- The building to the east of the current site operated in the past as a flour unloading facility.

  The flour mill consisted of a hydraulic lift beneath the ground surface, which was covered by concrete pavement.
- Paved areas in the southern portion of the plant were typically used as access routes (for pedestrians and forklifts) into the current flour loader facility.

- There were no known chemical/fuels/oils stored, no underground fuel tanks were present and no chemical spills had taken place, to their recollection.

Soil sampling was carried out at six test pit locations in areas immediately south of the current site and approximately 15 m east of the site.

Selected soil samples were tested for a range of contaminants of potential concern (COPCs), including TRH, BTEX, heavy metals (As, Cd, Cr, Cu, Ni, Pb, Zn, Hg), OCPs, OPPs, PAHs, PCBs and asbestos identification. Selected samples were also screened for potential or actual acid sulphate soils.

Concentrations of COPCs were less than adopted human health criteria (commercial/industrial land use). Based on these results it was assessed that that there was a low likelihood of widespread contamination in the soil that would adversely affect the proposed redevelopment works.

Results of the ASS field screening indicated that soil samples recorded pH values greater than 3, following oxidation with hydrogen peroxide, and field pH values above 5, indicating that actual acid sulphate soils are unlikely to be present in the upper 2 m of site soils. Soil samples for ASS screening were not collected at depths greater than 2 m bgs.

Coffey 2008 Preliminary Geotechnical and Environmental Assessment – Proposed Ethanol Expansion

A site history search includes the following relevant information:

- The main starches plant area has been used for several purposes since at least prior to 1949 with various modifications and upgrades over the years. Initial historical records suggest that a plant known as Horlicks occupied the site (probably in the 1950s) and may have produced a drink product, cheese and gluten. Manildra (formerly known by other names) have operated the Shoalhaven Starches plant since about 1970. The plant mainly produced wheat, starch and gluten and later expanded into ethanol production.
- An undated site plan (which lists the site as being owned by Horlicks Pty Ltd, therefore the plan is likely to be pre 1990s) includes several buildings in the vicinity of the proposed Flour Mill B being labelled as 'workshops', 'paint store' and 'garage'. As the plan is sketched and not to scale, the exact location of these buildings are unknown. Reference to historical aerial photographs included in this report suggests that these buildings are located in the vicinity of the Flour Mill A building footprint, to the immediate south and south east of the proposed Flour Mill B site. The same plan shows a footprint of the dryer building (to the north of the proposed Mill Feed building)

as being labelled as 'Horlicks Old Factory', with a water tower to the south of this building.

- A site plan provided by Manildra (dated 1977) indicates that the starch dryer building (to the immediate north and east of the proposed Mill Feed building) was constructed in July 1977. The building to the west of the proposed Flour Mill B site is labelled as a 'boiler house'. The Flour Mill A building and grain storage silos are not shown on this plan.
- A dangerous goods license search was undertaken by WorkCover (now Safework NSW) on 22 August 2007. The search revealed the following:
    - A site plan (dated February 1988) indicated that the buildings to the north and east of the proposed Mill Feed building were used for a Dryer room and store room, respectively. A large above ground tank (AST) used to store water is located to the immediately south-east of the proposed Mill Feed site. The plan shows that three 8.5 kL LPG ASTs were proposed to be installed approximately 20 m to the south of the site. An AST (labelled as 'oil') is marked as being approximately 20 m to the east of the proposed mill feed building. An earthen bund wall surrounds the AST.
    - An undated site plan shows the current Flour Mill A building to be used as 'container unloading'. Existing silos within the footprint of the proposed Flour Mill B site are used for storage.
    - A site plan (dated November 1997) shows that two small above ground tanks (listed as contained hydrochloric acid and caustic) approximately 20 m to the south-east of the proposed Mill Feed building. Additional engineering plants show that these tanks were situated within a masonry wall bund. A building approximately 10 m to the south of the proposed Flour Mill B is labelled as a coal hopper.

Soil sampling was carried out across the Shoalhaven Starches plant using boreholes and test pits, none of which are within 30 m of the current site areas. Soil sampling in the central portions of the Shoalhaven Starches plant recorded fill soils ranging from 0.6 m to 0.75 m, comprising silty sands and some gravel) 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. Acid sulfate soil testing in the central plant area suggested that acid sulfate soils are unlikely to be present in the upper 2 m.

Coffey 2014 Geotechnical Investigation and Preliminary Contamination Assessment

New silos were proposed in 2014 in the southern area of the Shoalhaven Starches Plant. A preliminary contamination assessment (Coffey, 2014) was undertaken to assess the potential for soil contamination and check for acid sulphate soils to be present within the portion of the plant to be redeveloped. The 2014 investigation area was located approximately 10 m southeast of the current site.

During the investigation, a single liquid container (labelled sodium hypochlorite) was observed in the north-western portion of the investigation area. No visual evidence of chemical or oil staining was observed at the site. Anecdotal evidence from site interviews suggested this liquid was used for cleaning purposes.

Some fill soils were noted beneath pavements whilst drilling at two borehole locations in areas approximately 15 m to 20 m southeast of the proposed flour mill site. The origin and quality of the fill was unknown. There was no visual or olfactory evidence of contamination in the fill soils.

Soil sampling was carried out in fill material and samples were tested for a range of contaminants of potential concern (COPCs), including TRH, BTEX, heavy metals (As, Cd, Cr, Cu, Ni, Pb, Zn, Hg), OCPs, OPPs, PAHs and PCBs. Selected samples collected within natural soils (up to 13 m deep) were also tested for potential or actual acid sulphate soils.

Concentrations of COPCs were less than adopted assessment criteria which were based on commercial land use. Based on these results, Coffey assessed that contamination not likely to be present in this area that would pose an unacceptable risk to future site users with respect to the current or proposed site use.

Coffey assessed that acid sulphate soils exist at depths greater than 3 m at the site, with a low risk of these occurring at shallower depths. Coffey recommended an acid sulphate management plan if the development involves excavation of soils from depths greater than 3 m.

8.7.3 Coffey (2015) Geotechnical Advice and Preliminary Contamination Assessment

Manildra Group (trading as Shoalhaven Starches Pty Ltd) has proposed construction of a new flour mill in the Shoalhaven Starches Plant, in a similar location to the proposed Flour

Mill B. A preliminary contamination assessment (Coffey, 2015 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 2015 investigation area was located approximately 10 m south-east of the current site.

A site walkover indicated that the site was paved, with stormwater drainage, which would limit to infiltration of potential contaminants into underlying groundwater and soil. The potential for widespread contamination in soil and groundwater from the use of the types of chemicals identified in the site history and walkover was considered low. Previous soil sampling and analysis in the general vicinity supported this.

Based on the review of previous information, supplemented with additional site history and site observations, it was considered unlikely that contamination is present in this area that would pose an unacceptable risk to current or future site users with respect to the proposed industrial land use.

Based on previous investigations (Coffey 2014), soils beneath depths of 3 m in this general area were considered to be acid sulfate soils. At shallower depths, there was deemed 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.

8.7.4 GHD (2015) Environmental Site Assessment – Area 2 (Paper Mill)

GHD was commissioned by the former owners of the Paper Mill site to undertake an environmental site assessment (ESA) across the site. The ESA was undertaken for divestment purposes, and included a review of desktop information, a site walkover, collection of soil samples from 50 sampling locations across the paper mill site, and installation of five groundwater monitoring wells and subsequent sampling.

The site had operated as a paper mill since the 1950s until circa 2015. A historical aerial photograph from 1984 shows multiple objects, possibly soil stockpiles, present across the grassed area. In other historical aerial photographs, the proposed laydown area appears grassed and vacant, with the exception of a gravel road present in aerial photography from the late 1990s onwards, running through the laydown area towards the south of the paper mill site. A historical site plan (dated 1991) does not feature any buildings or structures within the proposed laydown area.

Three test pits (A2_TP09, A2_TP13 and A2_TP14) were excavated within 15 m of the proposed laydown area. Samples were collected in the upper 0.5 m and analysed for

heavy metals (Al, As, Cd, Cu, Pb, Cr, Hg, Ni and Zn), TRH and PAHs. Concentrations were less than adopted guideline criteria for industrial land use.

Bonded ACM, and visual evidence of contamination was not noted to have been observed in the proposed silo laydown area.

8.7.5 Site interview information

Information on the site history was obtained by interviewing available persons who have worked at the Shoalhaven Starches plant for up to 15 years with knowledge of the study area at the time of the fieldwork.

Anecdotal information suggested that construction of the existing silos on the site occurred earlier than construction of other surrounding buildings. Since then, the remainder of the site has been used as a thoroughfare for vehicles and forklifts, or for temporary storage of miscellaneous construction materials and chemical containers.

Anecdotal evidence suggested that there were no known significant spills of chemicals on-site. It was also noted that any general liquid spills were typically washed down into drains and then discharged into water treatment ponds to the north of the Shoalhaven Starches Plant.

To the west, the boiler house uses wood chips and coal as fuel and produces ash waste. Ash is loaded onto truck via the ash hopper and taken offsite for disposal. Cargo trains use the railway line to the north for importing and exporting of goods.

8.7.6 Summary of site history

The following is a summary of the site history:

- Prior to 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.
- Buildings were situated adjacent the site prior to the 1970s.
- The building to the west is the boiler house, and the building to the north is the starch process plant.
- Since at least the 1980s, the site has been used as a loading area.
- The silos present in the site have been present since at least the early 1990s. A plan (dated 1992) shows the silo's labelled as 'storage silos';
- The adjacent flour mill and silos (east of the site) were constructed in about 2007;

- There has been some localised chemical storage on paved surfaces at the site. Based on available information there appears to have been a reasonably good level of housekeeping kept at the site;
- The available site history information has not identified evidence of the use of underground tanks or boilers at the site (or in the immediate vicinity of the site); and
- Based on anecdotal evidence and visual observations there does not appear to have been significant spills at the site.

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 that would affect the results of this assessment.

8.7.7 Findings Concerning Contamination

Based on the site history, two potentially contaminating activities were identified within the site comprising:

- Potential presence of fill soils (of unknown origin and quality); and
- Chemical storage.

Fill soils have been tested in previous investigations nearby the proposed Flour Mill B and the proposed laydown area in the Paper Mill site. Concentrations of contaminants were less than adopted guideline criteria. Based on the assumption that fill soil types are likely to be similar within the site, it is considered unlikely that fill soils are contaminated.

The proposed construction sites within the Shoalhaven Starches plant are currently paved, with stormwater drainage, which would limit to infiltration of potential contaminants into underlying groundwater and soil. The laydown area in the paper mill site is currently grassed, and the silos are proposed to be installed on dunnage (e.g. plastic matting), with no excavation proposed. The potential for contamination to be present in the small area of the Paper Mill to be used as a lay down area, that would restrict it from being used as a lay down area is low. The potential for widespread contamination in soil and groundwater from the use of the types of chemicals identified in the site history and walkover impacting the proposed sites is considered low. Previous soil sampling and

analysis in the general vicinity supports this.

Based on the review of previous information, supplemented with additional site history and site observations, it is considered unlikely that contamination is present in this area that would pose an unacceptable risk to current or future site users with respect to the proposed industrial land use.

Should evidence of contamination be identified during construction stages, a suitably qualified environmental practitioner should be engaged to assess the potential for risk to human health or environment and provide advice on proper management.

Soil assessment would be required for any excess construction spoil requiring offsite disposal or reuse.

8.8 ACID SULPHATE SOILS

As referred to in Section 8.7 above the Geotechnical and Preliminary Environmental Report prepared by Coffey Geotechnics ("Coffey's") and which forms **Annexure 10** to this EA also included an assessment acid sulphate soils (ASS). This section of the EA is based upon the findings of this assessment.

ASS is naturally occurring soil and sediment containing iron sulphides which when exposed to oxygen can generate sulphuric acid.

Reference to the Burrier/Berry 1:25,000 Acid Sulphate Soil Risk Map (1997) Edition 2, prepared by the Department of Land and Water Conservation (DLWC), indicates that 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 3 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 (2007 and 2014) indicate that acid sulphate soils are likely to exist at depths greater than 3m at the site.

Based on previous investigations (Coffey 2014), soils beneath depths of 3m in this general area are considered to be acid sulphate soils. At shallower depths, there is a low risk that acid sulphate 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 sulphate soils unless otherwise tested.

Should the proposed development involve excavation of soils from depths greater than 3 m at the site, and/or dewatering that could result in a drop in the water table, this could also impact acid sulphate soils, then an acid sulphate management plan (ASSMP) should be developed and actioned.

An ASSMP will present the approach and methodology of acid sulphate 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.

8.9 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 10** to this EA also included a geotechnical assessment including an assessment of riverbank stability. A copy of Coffey's report forms **Annexure 10** to this EA. This section of the EA is based upon the findings of this assessment.

8.9.1 Local geology and hydrogeology

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.

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 in adjacent areas to the development site indicated the presence of fill ranging between 0.5m to 2.5m depths, generally comprising of silty sand/ sandy silt/gravelly sand or bedding sands. Generally, deeper fill soils were encountered to the north 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.

Based on observations by Coffey's 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.

8.9.2 River bank stability

Review of river bank revetment wall monitoring

Flour Mill B is located about 20 m from the bank of the Shoalhaven River and revetment wall. Any new 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 revetment wall. This will also apply to the bank of Abernethy's Creek where one of the current flour mill silos will be re-located. The proposed gantry along the top of the river bank is understood to be lightly loaded and will make use of existing supports. There are some sections of the river bank in the vicinity of the gantry where deterioration of the bank has occurred, including the timber wall area which has now been assessed and a design for remediation works prepared. The gantry loads should have no influence on the stability of the river bank.

In summary, according to Coffey's, the proposed flour mill development should have no effect on the stability of the current river bank stability provide the following recommendations are complied with:

- All heavily loaded structures with 20 m of the river bank or within 10m of the bank of Abernethy's Creek 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 10 m of the river bank or within 5 m of the Abernethy's Creek bank, unless a specific assessment of the crane loads and ground condition is carried out;
- Significant ground vibration such as pile driving should be avoided.

As the nearby rock revetment wall along the Shoalhaven River is showing signs of deterioration Coffey's recommend that maintenance be carried out to reinstate the toe where displacement of rocks has occurred and that ongoing survey monitoring of the wall and the adjacent river bed be carried out to assess movement

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 18 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 18

Preliminary Hazard Analysis

Preliminary Hazard Analysis
Shoalhaven Starches commits to implementing the recommendations made by Pinnacle Risk as detailed in Table 1 of their PHA in relation to this Modification Application.

9.2 NOISE

Table 19 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 new flour mill.

Table 19

Noise Mitigation Measures

Measures and Design Considerations
Walls The walls of the Flour Mill B building should have a minimum weighted sound reduction index (Rw) 24. In this instance calculations are based on *'Kingspan'* Architectural Wall Panelling system *AWP 80*. *Roof / Ceiling* The roof and ceiling of the flour mill building should have a minimum weighted sound reduction index (Rw) 23. In this instance calculations are based on *'Kingspan'* Architectural Roof Panelling system *'K-Dek (KS 1000 KD)'*.

Measures and Design Considerations
Ventilation Penetrations There should be no acoustically untreated penetrations in the walls or roof. Any doors to the building must remain closed at all times the plant is in operation. If natural ventilation is required, sections of the northern and eastern walls only may be fitted with acoustic louvres. The required insertion loss of acoustic louvres will depend on the maximum surface area of louvered sections required to facilitate adequate ventilation.
6.2 External Mechanical Plant *Roof Mounted Fans* It is proposed to install a selection of nine (9) exhaust fans of varying capacity which will discharge to the roof of the building and each fan will be fitted with a silencer. However, selections of fan make and model have not been finalised at this stage. In order for noise goals to be met at the closest residential receptors to Flour Mill B, Shoalhaven Starches commit tothe following:- • the level of noise emission from each individual fan (maximum 9) should not exceed a sound pressure level of 65 dBA (L10, 15 minute) when measured at a distance of 3 metres from the discharge silencer; • this can be achieved by fitting silencers to the discharge side of each of the fans A final assessment will be required prior to the installation of all fans to ensure the minimum noise reduction is achieved and the correct silencers selected, once selections are finalised. *Additional External Mechanical Plant* In addition to the roof mounted exhaust fans, new external mechanical plant is likely to be located beneath the mill feed silos at ground level and include small motors, bucket elevators,. The specific selection, location and height of any new externally located mechanical plant is not yet finalised. There is potential for there to be line of sight from the new mill feed plant to Location 2. In this event, localised acoustical treatment may be required to reduce the level of noise emission from external mechanical plant to within acceptable limits at Location 2 only. The type and final location of external mechanical plant will determine the extent to which acoustical treatment is required, prior to commissioning. Acoustical treatment is unlikely to be extensive, as an example, predictions assume a sound barrier screen erected no further than 3 metres to the south of any item of plant to a minimum height of 1.5 metres above the highest item of mechanical plant.

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 20** to assist in screening and further minimising visual impacts arising from the proposed works.

Table 20

Visual Impact

Measures
Shoalhaven Starches commits to where appropriate and possible, the proposed flour mill 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

As outlined in Section 8.6 of this EA it is the view of ARC 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.

Shoalhaven Starches however commit to the following additional measures as outlined in **Table 21** to assist in screening and further minimising visual impacts arising from the proposed works.

Table 21

Traffic Impacts

Measures
Shoalhaven Starches commits to preparing a Construction Traffic Management Plan (CTMP) that should be implemented for the construction phase such that both on and off-site impacts are minimised and safety – particularly on-site in the vicinity of the construction area – maximised. Some of these details will require finalisation further to consultation with Council, and further to a determination of a construction contractor. Notwithstanding the findings above, it remains 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, Shoalhaven Starches commits to the following initiatives, which essentially mirror the Construction Traffic Management Plan (CTMP) prepared by ARC for the construction requirements of previous projects, including most recently 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 SS Site operations; or on the off-site traffic environment. In this regard, it is proposed that all construction staff parking be provided for in the approved temporary construction parking area located on the northern side of Bolong Road, which is readily accessible to the SS Site, noting the existing pedestrian paths on both sides of Bolong Road and the pedestrian refuge in Bolong Road. • 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 Western 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 finishing 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.

9.5 SITE CONTAMINATION

Table 22 outlines recommended additional management procedures that Shoalhaven Starches commits to implementing and incorporating into practices to address potential site contamination.

Table 22

Site Contamination

Management Procedures
Based on the review of the site contamination assessment undertaken by Coffey's, it is considered unlikely that contamination is present in this area that would pose an unacceptable risk to current or future site users with respect to the proposed industrial land use.

Management Procedures
Should evidence of contamination be identified during construction stages, Shoalhaven Starches commits to a suitably qualified environmental practitioner should be engaged to assess the potential for risk to human health or environment and provide advice on proper management. Soil assessment would be required for any excess construction spoil requiring offsite disposal or reuse.

9.6 ACID SULPHATE SOILS

Table 23 outlines recommended additional management procedures that Shoalhaven Starches commits to implementing and incorporating into practices to address potential acid sulphate soils.

Table 23

Potential Acid Sulphate Soils

Management Procedures
Based on the assessment undertaken by Coffey's, soils beneath depths of 3 m in this general area are considered to be acid sulphate soils. At shallower depths, there is a low risk that acid sulphate 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 sulphate soils unless otherwise tested. Should the proposed development involve excavation of soils from depths greater than 3 m at the site, and/or dewatering that could result in a drop in the water table, this could also impact acid sulphate soils, then Shoalhaven Starches commits to the preparation and actioning of an acid sulphate management plan (ASSMP) The ASSMP will present the approach and methodology of acid sulphate 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. Should the proposed development involve excavation of soils from depths greater than 3m at the site, and/or dewatering that could result in a drop in the water table, this could also impact acid sulphate soils, then Shoalhaven Starches commits to the preparation and actioning of an acid sulphate management plan (ASSMP) The ASSMP will present the approach and methodology of acid sulphate 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.

9.7 GEOTECHNICAL AND RIVERBANK STABILITY

Table 24 outlines recommended additional management procedures that Shoalhaven Starches commits to implementing and incorporating into practices to address geotechnical and riverbank stability issues.

Table 24

Geotechnical and Riverbank Stability

Management Procedures
The new flour mill is located about 20m from the bank of the Shoalhaven River and revetment wall. Any new 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 revetment wall. This will also apply to the bank of Abernethy's Creek where one of the current flour mill silos will be re-located. The proposed gantry along the top of the river bank is understood to be lightly loaded and will make use of existing supports. There are some sections of the river bank in the vicinity of the gantry where deterioration of the bank has occurred, including the timber wall area which has now been assessed and a design for remediation works prepared. The gantry loads should have no influence on the stability of the river bank. In summary the proposed flour mill development should have no effect on the stability of the current river bank stability provide Shoalhaven Starches commits to ensuring the following recommendations are complied with:-. • All heavily loaded structures with 20m of the river bank or within 10m of the bank of Abernethy's Creek 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; • Significant ground vibration such as pile driving should be avoided. As the nearby rock revetment wall along the Shoalhaven River is showing signs of deterioration Shoalhaven Starches commit to ensuring that maintenance be carried out to reinstate the toe where displacement of rocks has occurred and that ongoing survey monitoring of the wall and the adjacent river bed be carried out to assess movement.

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.

12,300 tonnes per week of flour is approved to be transported to the site by rail for use in the production process at the site in conjunction with the 7,700 tonnes per week of flour that is approved to be milled by the existing Flour Mill located on the site.

Shoalhaven Starches propose to increase industrial grade flour production at the Bomaderry Plant. The proposed new Flour Mill will, in conjunction with the flour already processed on the site, process 16,200 tonnes of flour at the Bomaderry plant per week, with 3,800 tonnes of flour being transported by rail to the site from Manildra.

The establishment of an additional new Flour Mill at the Bomaderry site will enable subsequent spare capacity at the Company's Manildra Flour Mill to be devoted to the production of higher grade flour therefore increasing export opportunities for the Company.

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 the Department of Planning & Environment. This Environmental Assessment has been prepared to address issues detailed in requirements supplied by the Department.

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 the proposal will still 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 Stephenson Environmental Management Australia (SEMA). This assessment identifies:
  - The maximum TSP ground level concentration (GLC) is predicted to be 2.01 µg/m^3, which is significantly below the impact assessment criteria of 90 µg/m^3.

    Following implementation of the approved odour controls, the maximum worst case odour GLC is predicted to be between 1.9 ou and 2.9 ou, which potentially exceeds the regulatory impact assessment criteria of 2 ou.

    However, the following will further ameliorate this worst case predicted odour impact:

    - *The output of the Ethanol Upgrade odour impact model prepared by GHD did not report in two significant numbers. Therefore rather than a specific GLC, only a statistical range can be predicted for the worst case cumulative GLC. More accurate prediction of the cumulative odour impact to more than one significant number is not possible.*
    - *Worst case cumulative odour predictions assume that both the SEMA and GHD models used identical coordinates and time, and that ground level odour concentrations are additive.*
    - *Odour emissions from the proposed Flour Mill B can also be expected to have a similar, neutral hedonic tone to the existing mill because the proposed mill will be processing the same type of grain using equipment and processes similar to the existing mill. That is to say the odour emissions from the proposed flour mill would be regarded as neither pleasant nor unpleasant. The total odour emission rate for the proposed flour mill would not have a significant adverse incremental or cumulative odour impact at the Shoalhaven Starches factory site.*
- Flooding Impacts – the EA is also supported by a report prepared by WMA Water. This report indicates that any increase in the 1% AEP flood level as a result of the proposed works would be less than 0.01 m and would not extend beyond the land owned by Shoalhaven Starches.
- PHA prepared by Pinnacle Risk Pty Ltd that assesses and compares the risks associated with the proposal against the Department of Planning's risk criteria and in summary finds:
  - The potential hazardous events associated with the new flour mill are dust explosions and smouldering fires. Given the nearest public land is approximately 110 m away and the river is 25 m away then no adverse off-site impacts are expected;
  - All risk criteria in HIPAP 4 is expected to be satisfied for this development;

- The risk of propagation to neighbouring equipment is low given that the potential dust explosions are either to be vented to atmosphere or of limited consequential impact and the potential fires are of a smouldering nature; and
- Societal risk, environmental risk and transport risk are all considered to be broadly acceptable.

- Traffic & 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.

  This assessment provides an outline of a Construction Traffic Management Plan that should be implemented for the construction phase such that both on and off-site impacts are minimised and safety – particularly on-site in the vicinity of the construction area – maximised.

- Site Contamination, Acid Sulphate Soils and Riverbank Stability prepared by Coffey Geosciences which concludes:
  - It is unlikely that contamination is present within this area of the site that would pose an unacceptable risk to current or future site users with respect to the proposed industrial land use. Should evidence of contamination be identified during construction stages, a suitably qualified environmental practitioner should be engaged to assess the potential for risk to human health or environment and provide advice on proper management. Soil assessment would also be required for any excess construction spoil requiring offsite disposal or reuse.
  - That soils beneath depths of 3 m in this general area are considered to be acid sulphate soils. At shallower depths, there is a low risk that acid sulphate soils are present, however this may be influenced by the presence of fill within the site.

    Should the proposed development involve excavation of soils from depths greater than 3 m at the site, and/or dewatering that could result in a drop in the water table, this could also impact acid sulphate soils, then the preparation and actioning of an acid sulphate management plan (ASSMP) should be undertaken. The ASSMP will present the approach and methodology of acid sulphate soil management at the site during the construction phase.

- The new flour mill is located about 20 m from the river bank and revetment wall. The new structures will be supported on deep piled foundations to rock and therefore should not add any additional load to the soils behind the river bank revetment wall. Therefore, according to advice received from Coffey's the proposed flour mill development should have no effect on the stability of the current river bank stability provided the recommendations detailed in this EA are undertaken.

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

The Environmental Assessment includes a Statement of Additional Commitments that should be read in conjunction with the Statement of Commitments detailed in the original EA. This Statement of Additional Commitments outlines environmental management, mitigation and monitoring measures that should be implemented to minimise potential impacts associated with this proposal.

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 the modification application.

ANNEXURE 1

Consultation and Requirements for EA

issued by

Secretary of the Department of Planning
EPA
Shoalhaven City Council
Australian Department of Defence

ANNEXURE 1

ANNEXURE 2

Flow Diagram

ANNEXURE 2

ANNEXURE 3

Plan Details

of Proposed New Flour Mill 'B'

ANNEXURE 3

ANNEXURE 4

Submission under Clause 4.6
of Shoalhaven LEP 2014

prepared by

Cowman Stoddart Pty Ltd

ANNEXURE 4

ANNEXURE 5

Flood Assessment

prepared by

Webb McKeown & Associates

ANNEXURE 5

ANNEXURE 6

Air Quality Impact Assessment

prepared by

Stephenson Environmental Management Australia

ANNEXURE 6

ANNEXURE 7

Noise Impact Assessment

prepared by

Harwood Acoustics Pty Ltd

ANNEXURE 7

ANNEXURE 8

ANNEXURE 8

Preliminary Hazard Analysis

prepared by

Pinnacle Risk Management

ANNEXURE 9

ANNEXURE 9

Traffic and Car Parking Assessment

prepared by

ARC Traffic & Transport

ANNEXURE 10

Geotechnical and Preliminary Environmental Report

prepared by

Coffey Geotechnics

ANNEXURE 10

ANNEXURE 11

Concept Stormwater Plans

prepared by

Allen Price & Scarratts

ANNEXURE 11