



ABN 29 057 616 896

PRELIMINARY ENVIRONMENTAL ASSESSMENT REPORT

A BACKGROUND REVIEW OF THE PROPOSAL

PROPOSED ETHANOL PRODUCTION UPGRADE INCLUDING PROPOSED ODOUR REDUCTION AND WASTE WATER TREATMENT MEASURES FOR EXISTING AND PROPOSED SHOALHAVEN STARCHES OPERATIONS

SHOALHAVEN STARCHES (MANILDRA GROUP) BOLONG ROAD BOMADERRY

Prepared for:

SHOALHAVEN STARCHES PTY LTD

NOVEMBER 2007

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EXECUTIVE SUMMARY

The Manildra Group is a wholly Australian owned manufacturer of a variety of flour, starch, gluten, glucose and ethanol based products.

The Shoalhaven Starches factory located on Bolong Road, Bomaderry produces a range of products for the food, beverage, confectionary and paper producing industries including: starch, 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 and which included the extension of the company's irrigation of waste water onto additional lands. This approval also enabled ethanol production at the plant to increase from 100 million litres per year to 126 million litres per year.

The use of ethanol as a fuel (or fuel additive) has many benefits including:

- it is a renewable fuel and lessens reliance on fossil fuels;
- it reduces greenhouse gas emissions and other air pollutants such as carbon monoxide and particulates;
- it reduces imports of oil and stimulates regional and local economies if produced locally.

Given the above benefits, the Federal and State Governments have introduced a range of initiatives to encourage the increased use of ethanol as a fuel additive.

The NSW Government has recently mandated the blending of 2% of ethanol into the total volume of petrol sold in NSW as a first step towards a 10% ethanol content by 2011.

As a result, the Manildra Group is planning 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.

Shoalhaven Starches plans to increase ethanol production at its Bomaderry Plant from the current approved 126 million litres per year to 300 million litres per year. According to Shoalhaven Starches much of the proposed increases in ethanol production can be accommodated within the existing capacity of the Bomaderry Plant.

To accomplish the full increase in ethanol production, this proposal however will require some plant upgrades and an increase in the throughput of raw materials, principally flour and grain.

The following additions and alterations are proposed for the existing factory site as part of the ethanol upgrade:

- 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 5 additional Dried Distillers Grains Syrup (DDGS) dryers; 10 decanters; chemical storage and two evaporators. The proposal also includes the installation of a DDGS Pellet Plant within this part of the site.
- the establishment of a new packing plant and container loading area.

In addition to the upgrade to the Company's Ethanol plant, Shoalhaven Starches also propose to undertake comprehensive odour reduction measures for both the existing factory site and including the work associated with this proposal. 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 has been completed (by GHD Pty Ltd). The audit report includes a number of recommendations for the implementation of works to the site, some of which require development approval. These works have therefore been included with this project. The Department of Environment and Climate Change (DECC) have advised that the recommendations of the audit report will need to be implemented prior to the implementation of the ethanol upgrade project.

The proposal includes the biological treatment of waste waters from the factory site. It is proposed to re-use approximately half the treated waste water within the factory and the remainder irrigated onto the Company's Environmental Farm. Discussions are also being undertaken with the Paper Mill for further re-use at this factory complex as well as Shoalhaven City Council for re-use in the longer term in the REMS Scheme.

The project will also involve an upgrade to services to the site such as electric power, natural gas, etc. The proposal includes the provision of a gas fired co-generation plant.

The proposed development is a project within the terms of Part 3A of the Environmental Planning & Assessment Act 1979. It comes within Item 3 to Schedule 1 of the State Environmental Planning Policy (Major Projects) 2005. In this regard, it is a development having a capital investment more than \$30 million for the purpose of an agricultural produce industry and food and beverage processing (ethanol plant).

The estimated capital cost of the expansion of the plant is approximately \$100 million.

The project will create an estimated peak construction workforce of up to 150 jobs during a 12 month construction phase; and will not only assist in maintaining the existing workforce at the plant currently comprising 243 employees; but will also create up to an estimated 25 additional on-going positions on the site after the upgrade.

The purpose of this Preliminary Environmental Assessment is to consider the potential environmental issues associated with this proposal; and to establish the key issues associated with the project.

This Preliminary Assessment is to be submitted to the Department of Planning to assist the Director-General of Planning to provide requirements for the preparation of the Environmental Assessment that will need to be prepared to support this proposal.

Following consideration of the potential environmental issues arising in relation to this proposal this Preliminary Assessment establishes that the key issues in relation to this project would include the following:

- odour management;
- air emissions and air quality control;
- greenhouse gas emissions;
- noise impacts;
- water and in particular waste water management;
- flooding;
- hazard analysis;
- geotechnical and river bank stability;
- potential acid sulphate soils;
- traffic and transport.

This Preliminary Assessment identifies that the above key issues will be required to be addressed in detail in any Environmental Assessment (EA) prepared for the project.

In addition to the above it is a recommendation of this Preliminary Assessment that Shoalhaven Starches undertake a comprehensive community consultation process prior to preparing the EA document. Such an approach will ensure that issues of interest to the local community are addressed as part of the EA approach.

Ecological and heritage (both Indigenous and non-indigenous heritage) in light of previous assessment undertaken for the site are considered to have a lower level of significance in relation to the project.

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1.0 INTRODUCTION

1.1 BACKGROUND TO PROJECT

The Manildra Group is a wholly Australian owned manufacturer of a variety of flour, starch, gluten, glucose and ethanol based products.

The Shoalhaven Starches factory located on Bolong Road, Bomaderry produces a range of products for the food, beverage, confectionary and paper producing industries including: starch, 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 and which included the extension of the company's irrigation of treated waste water onto additional lands. This approval also enabled ethanol production at the plant to increase from 100 million litres per year to 126 million litres per year.

The use of ethanol as a fuel (or fuel additive) has many benefits including:

- it is a renewable fuel and lessens reliance on fossil fuels;
- it reduces greenhouse gas emissions and other air pollutants such as carbon monoxide and particulates;
- it reduces imports of oil and stimulates regional and local economies if produced locally.

Given the above benefits, the Federal and State Governments have introduced a range of initiatives to encourage the increased use of ethanol as a fuel additive.

The NSW Government has recently mandated the blending of 2% of ethanol into the total volume of petrol sold in NSW as a first step towards a 10% ethanol content by 2011.

As a result, the Manildra Group is planning 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 factory at Bomaderry.

In addition to the above, following investigation of odour complaints in 2004, the Department of Environment and Climate Change (DECC) successfully prosecuted Shoalhaven Starches in the Land and Environment Court in 2006 for the emission of offensive odours. The Land and Environment Court has required Shoalhaven Starches

to engage a suitably qualified person to prepare a comprehensive environmental audit of the facility and Environmental Farm. GHD Pty Ltd was subsequently engaged by Shoalhaven Starches to undertake this audit. This audit has been completed and the report has been submitted to the Court and the DECC. This proposal therefore includes those works recommended by this audit to reduce offensive odours (where development approval is necessary).

1.2 THE PROPOSAL

1.2.1 Ethanol Plant Upgrade

Shoalhaven Starches plans to increase ethanol production at its Bomaderry plant from the current approved 126 million litres per year to 300 million litres per year. According to Shoalhaven Starches much of the proposed increase in ethanol production can be accommodated within the existing plant capacity of the Bomaderry Plant.

To accomplish the full increase in ethanol production, this proposal involves the following components:

1. The following additions and alterations to the existing factory site:
 - the provision of an additional dryer for the starch/gluten production plant;
 - additional equipment and storage capacity for the ethanol plant including 3 additional fermenters, additional cooling towers and an additional molecular sieve;
 - upgrades to the Stillage Recovery Plant including 5 additional Dried Distillers Grains Syrup (DDGS) dryers; 10 decanters and chemical storage; and two evaporators. The proposal will also include the installation of a DDGS Pellet Plant within this part of the site;
 - the establishment of a new packing plant and container loading area (including new railway spur line).
2. The proposal includes the biological treatment of waste waters from the factory site. Approximately half of the treated waste water will be re-used within the factory and the remainder irrigated onto the Company's Environmental Farm. Discussions are also being undertaken with the Paper Mill for re-use in the Mill's operations as well as the Council for re-use within the REMS scheme. The biological treatment of factory waste water will require the adaption of one of the existing Wet Weather Ponds located on the Company's Environmental Farm. In

order to ensure there is no reduction in wet weather storage impacts it is intended to construct Pond No. 7 which was approved by the Minister for Planning in 2002.

3. The project will also involve an upgrade to services to the site such as electric power, natural gas, etc. The proposal includes the provision of a gas fired co-generation plant.

1.2.2 Environmental Audit

Following investigation of odour complaints in 2004, DECC successfully prosecuted Shoalhaven Starches in the Land and Environment Court in 2006 for the emission of offensive odours.

The Land and Environment Court judgement of 2 November 2006 required Shoalhaven Starches to engage a suitably qualified person to conduct a comprehensive environmental audit of the factory and Environmental Farm in order to identify and quantify all odours generated by the operations, and to provide recommendations for the improved management of odours. Shoalhaven Starches engaged GHD Pty Ltd to conduct the environmental audit.

This environmental audit has been completed and a report of the audit has been submitted to the Land and Environment Court and the DECC. The Audit Report includes a range of recommendations for improvements to the Shoalhaven Starches factory and Environmental Farm operations. In addition to which, the Company has agreed to a Plan and Timetable to implement the recommendations of the Environmental Audit. A copy of the recommendations of the Audit Report and the Company's Implementation Plan are included as **Annexure A** to this PEA. Many of the works associated with these recommendations do not require further approvals and the Company has commenced to undertake these measures. A number of the recommended works may require development approval. These works are therefore included as part of this proposal. These recommendations will need to be addressed prior to commencement of works associated with the Ethanol Upgrade project.

1.3 PART 3A OF THE ENVIRONMENTAL PLANNING & ASSESSMENT ACT 1979

The proposed development is a project within the terms of Part 3A of the Environmental Planning & Assessment Act 1979. It comes within Item 3 to Schedule 1 of the State Environmental Planning Policy (Major Projects) 2005. In this regard, it is a development having a capital investment more than \$30 million for the purpose of an agricultural produce industry and food and beverage processing (ethanol plant).

The estimated capital cost of the expansion of the plant is approximately \$100 million.

The project will create an estimated peak construction workforce of up to 150 jobs during a 12 month construction phase; and will not only assist in maintaining the existing workforce at the plant currently comprising 243 employees; but is also expected to create up to an estimated 25 additional on-going positions on the site after the upgrade.

2.0 BACKGROUND

2.1 THE SITE AND ITS SURROUNDING LOCALITY

The Shoalhaven Starches factory site is situated on various allotments of land on Bolong Road, Bomaderry within the City of Shoalhaven. The factory site, which is located on the south side of Bolong Road on the northern bank of the Shoalhaven River, has an area of approximately 12.5 hectares (refer **Plate 1**). This proposal will also involve a portion of land that the Company owns located on the northern side of Bolong Road.

The development concerns the following parcels of land:

<i>Lot</i>	<i>Deposited Plan (DP) No.</i>
A	FP 334511
B	FP 334511
B	FP 376494
1	385145
1	838753
62	1078788
201	1062668
A	371386
Part Lot 142	1069758
5	825808
2	538285

The proposal also includes the re-use of the existing Wet Weather Storage Pond No. 5 to biologically treat waste waters prior to the re-use in their factory processes on the site; irrigation on the Environmental Farm or transfer to Council's Sewerage System for ultimate re-use in the REMS Scheme; or the possible re-use in the Paper Mill processing operation. This pond is located upon Lot 4 DP 610696.

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. Although the "Riverview Road" area of the Nowra Township is situated approximately 600 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. Pig Island is situated between the factory site and the village of Terara and is currently used for dairy cattle grazing.



Plate 1: Aerial view of Shoalhaven Starches factory site.

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, Shoalhaven Dairy Co-op (Australian Co-operative Foods Ltd) (since closed down) 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 via the starch plant and Dairy Co-op to the Paper Mill.

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

The Company also has an Environmental Farm located over 1000 hectares on the northern side of Bolong Road. This area is cleared grazing land and contains spray irrigation lines and wet weather storage ponds (total capacity 925 Megalitres). There are at present 6 wet weather storage ponds on the farm that form part of the waste water management system for the factory. A seventh pond approved in 2002 is currently in the process of being constructed. The proposal will result in treated waste water from the

factory site, currently directed to the Environmental Farm for irrigation, to be further treated prior to its reuse or distribution as outlined above.

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). The area mainly comprises large rural properties with isolated dwellings, although there are clustering of rural residential development along Jennings Lane (approximately 1 kilometre away) and Back Forest Road (approximately between 500 metres to 1.2 kilometres away) to the west of the Environmental Farm; and Jaspers Brush Road, approximately 1.2 kilometres to the north of the Environmental Farm. This proposal will result in a significant improvement in the quality of waste water diverted onto the farm.

Figure 1 is a site locality plan depicting the location of the factory site and Environmental Farm as well as the surrounding locality.

Plate 1 provides an aerial view over the factory site.

2.2 PRODUCTION PROCESSES

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

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

The Company has 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. 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. The wastage from the starch process 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 industrial purposes. The wastage from the liquid starch process 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 also has some wastage that is used in the ethanol process.

The wastage 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, which is used in producing pharmaceuticals, printer's ink and methylated spirits.

Ethanol production results in some solid and waste water wastage, which is processed through the stillage recovery process plant, which was approved as part of PRP No. 7. The waste solids are recovered for DDGS (Dried Distillers Grains Syrup) being dried and sold as a high protein cattle feed with the clean water now used for irrigation. The waste water resulting from the ethanol production is pumped to holding tanks and pH corrected, before being irrigated onto Shoalhaven Starches Environmental Farm to the north of Bolong Road. This farm land is used for fodder crops, pasture and cattle grazing.

2.3 HISTORY OF DEVELOPMENT ON THE SITE

Shoalhaven Starches Pty Ltd is a member of the Manildra Group of Companies, which is the largest user of wheat in Australia. The Manildra Group originated from the NSW Country town of Manildra where a single flour mill was purchased in 1952.

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 243 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 State 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:

- Protein Isolate plant and DDGS Dryer;
- 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. Measures are currently underway to commence construction of this pond.

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 Section 76A(7) of the Environmental Planning & Assessment Act. Under the provisions of this declaration, all development except *“alterations and additions to existing development which, in the opinion of the Minister in consultation with Council, are of minor nature and do not to any significant extent change the scale, size, design or environmental impact of the existing development”* requires the Minister’s consent.

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, essentially involves the introduction of additional decanters, the 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 result in the generation of odours.

The recovery of the suspended and soluble solids from the waste water can 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. 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 approval has now been substantially installed and commissioned.

Shoalhaven Starches have recently received the following development approvals for:

- 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 one of the existing fermenter tanks to be taken out of service for maintenance.

3.0 THE PROPOSAL

3.1 OBJECTIVES OF THE ETHANOL UPGRADE

The Federal and State Governments have introduced a range of initiatives to encourage the increased use of ethanol as a fuel additive.

The NSW Government has recently mandated the blending of 2% ethanol into the total volume of petrol sold in NSW as a first step towards a 10% ethanol content in 2011,

The use of ethanol as another fuel (or fuel additive) has many benefits including:

- it is a renewable fuel and lessens reliance on fossil fuels;
- it reduces greenhouse gas emissions and other air pollutants such as carbon monoxide and particulates;
- it reduces imports of oil and stimulates regional and local economies if produced locally.

The Manildra Group is planning to increase its ethanol production capacity to meet the expected increase in demand for ethanol arising from the NSW Government's timetable for implementation of its further ethanol initiatives by upgrading the existing ethanol plant, located at the Shoalhaven Starches Plant at Bomaderry.

Shoalhaven Starches plans to increase ethanol production at its Bomaderry plant from the current approved 126 million litres per year to 300 million litres per year and to undertake other plant upgrades at that facility to improve its overall competitiveness and environmental performance.

3.2 ENVIRONMENTAL AUDIT

The Land and Environment Court on the 2 November 2006 handed down a judgement that required Shoalhaven Starches to engage a suitably qualified person to conduct a comprehensive audit of the factory and Environmental Farm in order to identify and quantify all odours generated by the operations, and to provide recommendations for the improved management of odours. Shoalhaven Starches engaged GHD Pty Ltd to conduct the environmental audit.

The objective of the environmental audit program was to address the requirements of Condition 2 of Annexure B to the Land and Environment Court judgement of 2 November 2006, which states:

- (2) *For the purposes of ensuring no offensive odours as defined by the Protection of the Environment Operations Act 1997 are emitted from the premises, the defendant must engage a suitably qualified expert or experts to conduct an environmental audit that must:*
- (a) *Identify and list every process, activity and substance stored or used at the premises that generates or has the potential to generate odours.*
 - (b) *Benchmark each process and activity identified at (a) against comparable international best available technology and industry best management practice relating to the control of odour from that process and activity.*
 - (c) *Identify and list every actual and every potential source of offensive odour at the premises. This must include all point, diffuse and fugitive sources.*
 - (d) *Identify for each odour source identified at (c) the cause or causes of the odour.*
 - (e) *Quantify for each odour source identified at (c) the actual and potential nature, strength and duration of occurrence of the odour in accordance with the publication "NSW DEC 2005 Approved Methods for the Sampling and Analysis of Air Pollutants in NSW".*
 - (f) *Model for each odour source identified at (c) the impacts and potential impacts of the odour at all sensitive receptors in accordance with the publication "NSW DEC 2005 Approved Methods of the Modelling and Assessment of Air Pollutants in NSW".*
 - (g) *Identify all available options to prevent the generation of offensive odour for each actual and potential odour source identified at (c).*
 - (h) *Where at (g) prevention is not possible, identify all available options to minimise the generation of offensive odour for each actual and potential odour source identified at (c).*
 - (i) *Describe, quantify and model the likely environmental impacts of implementing each option identified at (g) and (h).*
 - (j) *State for each actual and potential odour source identified at (c), the preferred option for the prevention or minimisation of the generation of offensive odour from that source.*
 - (k) *Review the adequacy of policies, procedures, standards, practices and training at the premises in relation to environmental performance and in particular odour management. Where any inadequacy is found to exist recommend options to address each inadequacy.*
 - (l) *Produce an audit report that details all of the above.*

The Environmental Audit has now been completed and submitted to the Land and Environment Court and DECC. **Annexure A** to this Preliminary Environmental

Assessment (PEA) includes the recommendations of the Audit and the associated Implementation Plan prepared by Shoalhaven Starches. These recommendations include works that will need to be undertaken to various parts of the factory and Environmental Farm. The DECC have indicated that the recommendations of the audit will need to be undertaken prior to the implementation of the Ethanol Upgrade project. Under these circumstances the components of the audit recommendation that require to obtain development approval have been included in the PEA.

3.3 SUMMARY OF PROPOSAL

Table 1 below provides a summary of the proposed development.

Table 1
Summary of Proposal

<i>Factory Component</i>	<i>Proposed Works Associated with Ethanol Upgrade Project</i>	<i>Existing Approved Production</i>	<i>Proposed Production</i>
Starch Plant	Dryer.	10,000 tonnes per week flour processing	15,000 tonnes per week flour processing
Grain Plant	Nil. Existing equipment has sufficient spare capacity.	3864 tonnes per week (552 tonnes/day) of grain	6720 tonnes per week (960 tonnes per day) of grain
Ethanol Plant	3 additional fermenters. Additional cooling towers. Molecular sieve.	126 ML p.a. ethanol	300 ML p.a. ethanol
Stillage Recovery (DDGS Plant)	5 additional DDGS Dryers (and associated equipment). 2 additional evaporators. Chemical Storage. DDGS Pellet Plant.	2030 tonnes per week DDGS	6400 tonnes per week DDGS
Packing Plant	Construct new Packing Plant and Container Loading Facility on Lot 5 DP 825808.	Production at the packing plant is determined upon the type and size of packaging and market demand.	
Environmental Farm	Anaerobic and Aerobic Waste Water Treatment Ponds.		Approximately 9 ML per day.

Figure 2 is a site plan depicting the proposed additions to the factory site.

Figure 3 outlines the configuration of the wet weather storage ponds located on the Company's Environmental Farm and includes the reconfiguration of Pond 5 associated with this proposal.

Figure 4 provides a flow chart depicting the proposal in terms of the processes at the site.

3.4 THE STARCH PLANT

Flour is pneumatically conveyed from storage bins to the starch plant, where the flour is mixed with water and separated into two components:

- (i) Gluten, which has a high protein content (about 75%) is sold to local and export markets.
- (ii) Starch, which is processed and then directed to:
 - (a) dry starch markets, both local and export;
 - (b) domestic liquid starch markets;
 - (c) the glucose plant which processes the starch further to produce glucose and other products;
 - (d) the ethanol plant, where the starch is converted to sugars, which are fermented and distilled to produce ethanol.

This proposal will require an increase in the amount of flour transferred to the site for processing from the current approved 10,000 tonnes per week to 15,000 tonnes per week, including the 5000 tonnes per week of flour to be produced on-site by the Company's previously approved flour mill

Shoalhaven Starches indicate that existing plant within the starch and gluten production plants; and approved flour mill, will be largely able to accommodate the increase in flour processing associated with this proposal.

An additional dryer will need to be installed adjacent to proposed Dryer No. 5 (approved under the previous PRP No. 7 approval).

In relation to the Starch Plant the Environmental Audit mainly recommends the cleaning of ducting within the various plant components, to remove built up solids that can become odorous. The Audit also recommends that ducting within the various plant components is modified to provide free vertical discharge to improve dispersion. These

general maintenance works do not require development approval and therefore do not form part of this PEA.

3.5 THE 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 the Stillage Recovery Plant where the solids are removed for high protein cattle feed and the clean water is directed to the Environmental Farm for irrigation purposes.

The distillery at Shoalhaven Starches is supplied feed material from 2 sources on the site:

- Starch from the starch plant; and
- Crushed grain from the grain processing plant.

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

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

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

In order to enable sufficient grain for the increase in ethanol production at the site it is proposed to increase the intake of grain to the site from the currently approved 552 tonnes per day to 960 tonnes per day. According to Shoalhaven Starches existing plant and equipment will have sufficient spare capacity to accommodate this increase in grain intake.

The Audit makes no recommendations in terms of the Grain Plant.

3.6 ETHANOL PLANT

The ethanol plant utilises waste from the starch, gluten and syrups sections of the plant to feed fermentation and distillation, which produces ethanol. In effect the ethanol

production process comprises an integral component of the Company's waste treatment process. The starch from the starch plant and grain crushed from the grain plant are mixed in the fermentation plant and the starch in this feedstock is converted to sugars, which are then fermented to produce ethanol. The fermentation process is a natural process where yeast converts the incoming sugars to ethanol. This process requires a residence time of approximately 50 hours, which necessitates the use of large holding tanks called fermenters, which allow time for the process to take place producing a "beer" to feed the distillery.

The distillery separates the ethanol from the "beer" in the "beer" column then purifies the ethanol by passing it through rectification columns and molecular sieves which remove the remaining water, which is not removed by the "beer" column. The ethanol is then ready for sale.

In order to increase ethanol production from the current approved 126 megalitres per annum to 300 megalitres per annum Shoalhaven Starches envisage that much of the existing and approved plant associated with the distillery will have sufficient spare capacity to accommodate the increase in production. In order to increase production however it will be necessary to install:

- an additional 3 fermentation tanks;
- additional cooling towers;
- additional molecular sieves.

The Environmental Audit recommends the capture of discharges from various pieces of plant (such as grain silo baghouse, coolers and fermenters) and to direct to either chemical absorption, adsorption biological or thermal treatments. Under Shoalhaven Starches Implementation Plan which accompanies the Environmental Audit and which has been submitted to the Land & Environmental Court and DECC; the Company proposes to investigate the above options should the efficacy of odour abatement measures proposed in the DDG, waste water treatment and Environmental Farm following source specific modelling of more detailed engineering design, suggest that such are required.

The following is a brief outline of what is meant by these treatment measures:

Chemical Absorption

Chemical absorption provides removal of odour by the mass transfer of odorous compounds from foul gases using a liquid solvent. Packing or plates are used to facilitate gas-liquid contact and improve mass transfer efficiency.

A number of absorbing agents can be used with preference given to those that react with odour producing compounds present in the air stream. Absorbing agents are typically oxidising in nature and include sodium hypochlorite, hydrogen peroxide, ozone and potassium permanganate.

Carbon Adsorption

Adsorption is a process by which odorous compounds are removed from the foul air stream adhering to a particulate surface (adsorbent) with a large surface area. The compounds adhere to the adsorbent either by physical or chemical forces. The most common adsorbent used for odour removal is activated carbon. Once the adsorption capacity of the unit has been reached, the activated carbon medium must be replaced or regenerated.

The use of adsorption is limited to situations where the air flow rates are below 10 000 m³/hr and the temperature and relative humidity are below 40°C and 75% respectively. Furthermore, dust in the air stream must be avoided as it can greatly reduce the removal efficiency of the adsorber. For acidic gases, the activated carbon is often impregnated with an alkaline material such as sodium hydroxide to provide a longer life of the carbon.

Biological Treatment

Biological treatment involves the use of micro-organisms to degrade odorous compounds contained with the foul air stream. The two major types of biological odour control technologies are biofilters and bioscrubbers.

- ***Biofilter***

In a biofilter (soil beds, compost filter), foul air is passed through a fixed filter medium consisting of organic material such as wood chips, solid and peat/heather. For acidic gases, lime is used in the bed.

Micro-organisms colonise the filter medium and degrade odorous compounds as they are adsorbed into the filter medium.

- *Bioscrubbers*

A bioscrubber is essentially a packed bed absorber that contains micro-organisms in the packing and sump. The packing must be kept moist to sustain the bacterial population.

Thermal Treatment

Thermal treatment will provide removal of odorous compounds via oxidation at high temperatures (combustion). All organic and some inorganic compounds such as carbon monoxide and ammonia can be oxidised at high temperatures.

There are three thermal treatment methods:

- thermal oxidation;
- thermal oxidation in an existing boiler; and
- catalytic oxidation.

Preferred Approach

The thermal treatment option is the Company's preferred approach of those listed above as it will involve the use of existing infrastructure on the site. The other options are considered inappropriate for the following reasons:

- They involve the use of additional infrastructure currently not in use on the factory site.
- The ability to use existing infrastructure reduces capital expenditure on the site.
- The use of existing equipment reduces the need for additional maintenance.
- Utilising existing equipment can implement odour controls more quickly.
- Any scrubbing type option generates additional liquid wastes that need to be treated and disposed.
- The thermal treatment approach is a known technological approach to treatment of odours.

3.7 WASTE WATER TREATMENT AND DISPOSAL

3.7.1 Stillage Recovery

The 2003 approval by the Minister for Planning 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 waste water system.

This process includes the use of decanters, evaporators and DDGS 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. The increase in ethanol production will require the installation of an additional 10 decanters in a new purpose built building to the west of the site.

Evaporators are designed to reduce the water content of "thin" stillage (after it passes through the decanters) and the coarse solids are removed. The evaporators operate by mechanical vapour recompression. The thin stillage from the decanters is fed into tubes within the evaporator and heated by recompressed steam. The water within the overflow is heated to a point where the water 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. The existing and approved evaporation plant, according to Shoalhaven Starches, will largely have sufficient capacity to accommodate the increase in production of ethanol associated with this proposal. Only one additional evaporator will need to be erected within the existing evaporation plant to accommodate this proposal.

The syrup product is directed to DDGS dryers for further drying. The DDGS dryer is essentially a barrel in which a bundle of steam heated tubes are rotated at low speed. Evaporator concentrate (syrup) and decanter concentrate (wet insoluble solids) are fed into one end of the barrel and traversed through to the other end by shovels. Heat from the tubes removes moisture.

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

The proposed increase in ethanol production at the plant will require 5 additional DDGS dryers with associated new decanters to be installed within the western portion of the site. It is expected that the new plant associated with the stillage recovery process will increase dry product from the current approved 2030 tonnes per week to 6400 tonnes per week.

The five (5) new dryers and associated decanters would be equipped with the required equipment to meet statutory emission requirements for particulate and odour emissions.

The air exiting the dryer will be passed through furnaces to burn out all odour emitting substances before release to the atmosphere.

The product from the drying process results in a dry product that is sold for use as stock feed.

Shoalhaven Starches also propose to install a DDGS Pellet Plant, which essentially seeks to provide the Company with a hedge for its market position in terms of providing flexibility to meet market demand for this product. It should also be noted that the installation of a DDGS Pellet Plant is one of the recommendations of the Environmental Audit.

It is proposed to site the Pellet Plant partly adjacent the existing DDGS Dryer building. The plant will consist of a series of bins and mills to process the loose DDGS material into pellets.

The Pellet Plant will consist of:

- Pelletiser machinery, housed in a proposed new structure.
- A product conveyor to transport the pelletised DDGS from the pelletiser to the storage facility. The conveyor will be maintained under slight negative pressure, will be aspirated, and will vent through a single baghouse.
- An extension to the existing DDGS storage facility to provide sufficient space to segregate granular and pelletised DDGS.
- A pellet storage facility, which will be vented through a baghouse.
- A pellet out-load system, which will be aspirated through a baghouse.

Essentially the pellet plant will process “loose” DDGS material into pellets to enable this product to be exported as stock feed. The existing “loose” DDGS material is unable to be exported overseas. The processing of this loose material into pellets will enable the Company to export this material overseas during periods when the local demand for “loose” DDGS is reduced. This proposal essentially seeks to provide greater flexibility for the processing of DDGS on the site to meet the demands of both the local and export markets.

The additional benefit with the installation of a DDGS Pellet Plant, is the anticipated role that such a plant may have in reducing odours that emanate from this part of the site. The Environmental Audit specifically recommends the installation of a DDGS Pellet Plant.

The Pellet Plant itself will not however result in any increase in the amount of flour or grain brought to the site to be processed on the site. The Pellet Plant will merely involve an alternative means of processing the DDGS material that is already processed on the site into an alternative product for re-sale and re-use.

Essentially DDGS from the DDGS Dryers that would otherwise be directed to the DDGS load out as “loose” material will be able to be re-directed to the Pellet Plant.

In addition to the proposed Pellet Plant, in accordance with the Company’s Implementation Plan prepared in response to the Environmental Audit, a number of measures are initially proposed to reduce odours in the DDGS Plant including:

- improving the DDG Dryer fume handling system;
- covering or venting the condensate tank;
- better housekeeping initiatives.

These measures do not require to obtain development approval. It is proposed to measure the effectiveness of these measures. If these measures are found to be insufficient, further measures as proposed by the Environmental Audit will be implemented. As with the Ethanol Plant and described in Section 3.6 of this PEA, these additional measures would include the capture of discharges and direct them to either chemical absorption, adsorption biological or thermal treatment.

3.7.2 Waste Water Disposal

The increase in ethanol production will result in an increase in the volume of water used in the upgraded plant processes and a concomitant increase in waste water.

The Company has been investigating various options with respect to the treatment and re-use or disposal of additional waste water generated by the proposed ethanol upgrade. Following these investigations the Company has come to the conclusion that it would be advantageous to the Company, to the local Shoalhaven community and to the Shoalhaven City Council if a facility for treating the Company’s waste water could be integrated with the two existing Council’s Sewage Treatment Plants in close proximity to the site. To this end the Company is undertaking discussions and negotiations with Shoalhaven City Council to enable the re-use or disposal of a portion of the Company’s waste water via the Council’s Sewerage Treatment Plant outlets.

Annexure B to this report includes correspondence between Shoalhaven Starches and Shoalhaven City Council detailing negotiations and discussions concerning the re-use or disposal of a portion of the Company’s waste water by Council’s Sewage System.

Subsequent to this correspondence Shoalhaven City Council on the 20th November 2007 made the following resolution in support of this approach:

“Council cooperate with Manildra with a view to achieve a joint waste water disposal option to serve Manildra and Council's requirements in the future.”

The Council's sewerage treatment system will not be able to cope with the load of organic material in the Company's waste water from the existing and proposed operation. It will be necessary for the Company to treat the waste water to a suitable level of purity comparable to that achieved by the Council for its waste after processing through the Sewerage Treatment Plants before it is directed to the Council's facility for re-use or disposal

The Company therefore proposes to treat its waste water sequentially through anaerobic digestion and aerobic digestion systems located and incorporated within one of the existing waste water holding ponds to fully treat all organic material and eliminate the odour generating potential. The proposal therefore seeks to adapt Wet Weather Storage Pond No. 5 located upon the Company's Environmental Farm for this purpose.

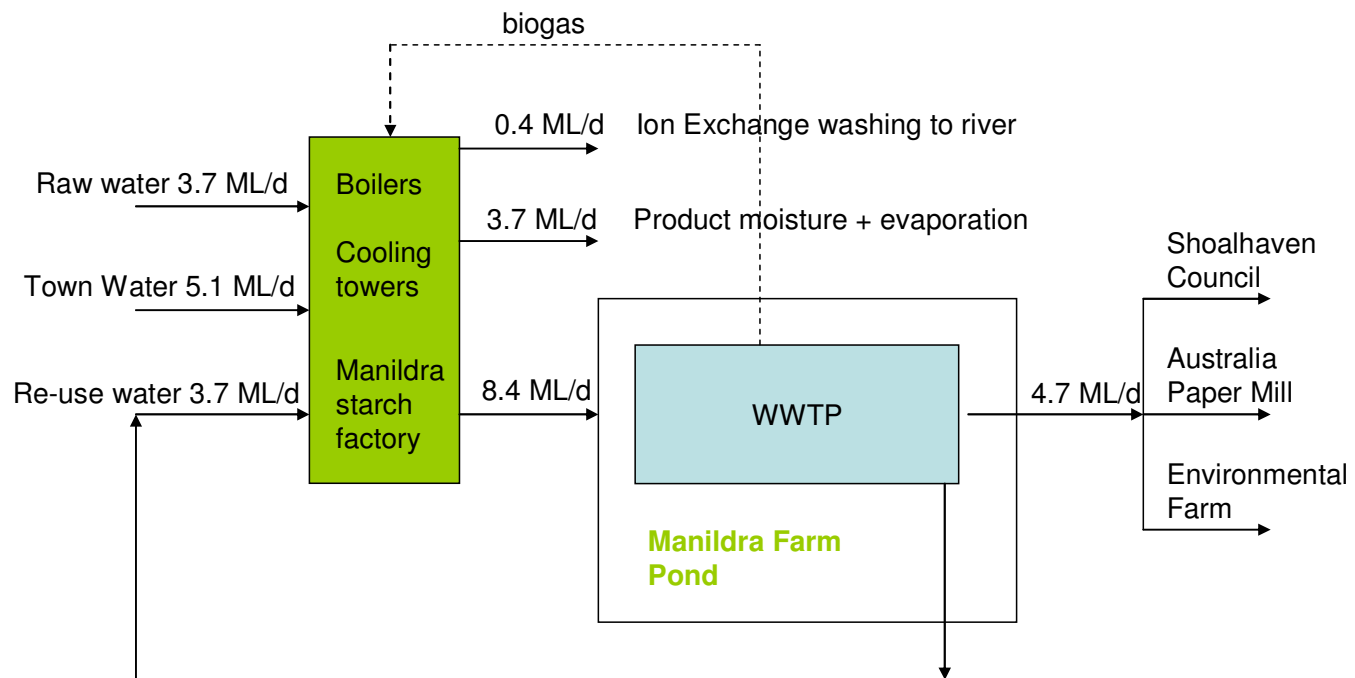
Anaerobic digestion is a biological process whereby organic wastes are broken down by certain micro-organisms adapted for life and growth in the absence of dissolved oxygen that is under anaerobic conditions. These micro-organisms obtain oxygen for their life processes from the combined oxygen contained within the organic materials and concomitantly generate a mixture of methane and carbon dioxide. So as the BOD is digested, biogas containing energy-rich methane is produced. It is proposed to re-direct this biogas for use as an energy source in the Factory's operations. The process set up in one of the ponds has been selected because of its ability to digest both dissolved and particulate organic material. The large volume of the pond will also allow substantial fluctuations in both the quantity and quality of the incoming waste water to be averaged out. Anaerobic digestion is used as the first step of the overall digestion because it is able to handle high concentrations of organic material. This step will not eliminate all the organic material but will reduce it to a level that can be further processed to almost complete removal by aerobic digestion.

The aerobic digestion process utilises micro-organisms that can utilise low levels of soluble organic material as an energy source for life and growth. The consequence of this activity is the generation of carbon dioxide and insoluble biomass (the bacterial cells themselves) while continually depleting the content of soluble organics from its surroundings until there is little to none remaining. At this point the biomass can be removed and the water released for disposal or re-use.

It is proposed to construct within existing Pond No. 5 a number of smaller ponds to allow the sequential anaerobic and aerobic processes. Residual volume will be used as additional wet weather storage capacity. Pond 5 currently provides a storage capacity of 250 ML. It is proposed that the anaerobic digestion pond will be approximately 90ML and will be sealed over by a floating cover designed to eliminate air, to allow biogas collection underneath and to prevent odour from escaping to the environment. The aerobic digestion will occur in an adjacent 15ML pond. To facilitate the whole process additionally an enclosed tank of approximately 4ML will act as an initial receival buffer so that any fluctuations in quality of in-feed that might be injurious to the anaerobic micro-organisms can be identified and averaged before being delivered into the anaerobic digester. Another pond approximately 10 ML capacity will act as a holding buffer for the fully treated waste water prior to its release for in-factory use, irrigation on the Environmental Farm, use by the Australia Paper Mill or dispatch to the Shoalhaven City Council for re-use or disposal.

Figure 5 details a proposed water and waste water balance for the site following the ethanol upgrade project.

FIGURE 5
PROPOSED WATER USE, RE-USE AND WASTE WATER MANAGEMENT
AT MANILDRA GROUP, BOMADERRY PLANT



3.8 PROPOSED NEW PACKING PLANT AND CONTAINER LOADING AREA

It is also proposed to relocate the existing packing plant and its associated container loading facilities from their current congested position within the existing factory complex to an undeveloped property owned by the Manildra Group of Companies on the northern side of Bolong Road. The property comprises two allotments, Lot 5 DP 825808 and Lot 2 DP 538289 (refer **Plate 2**).

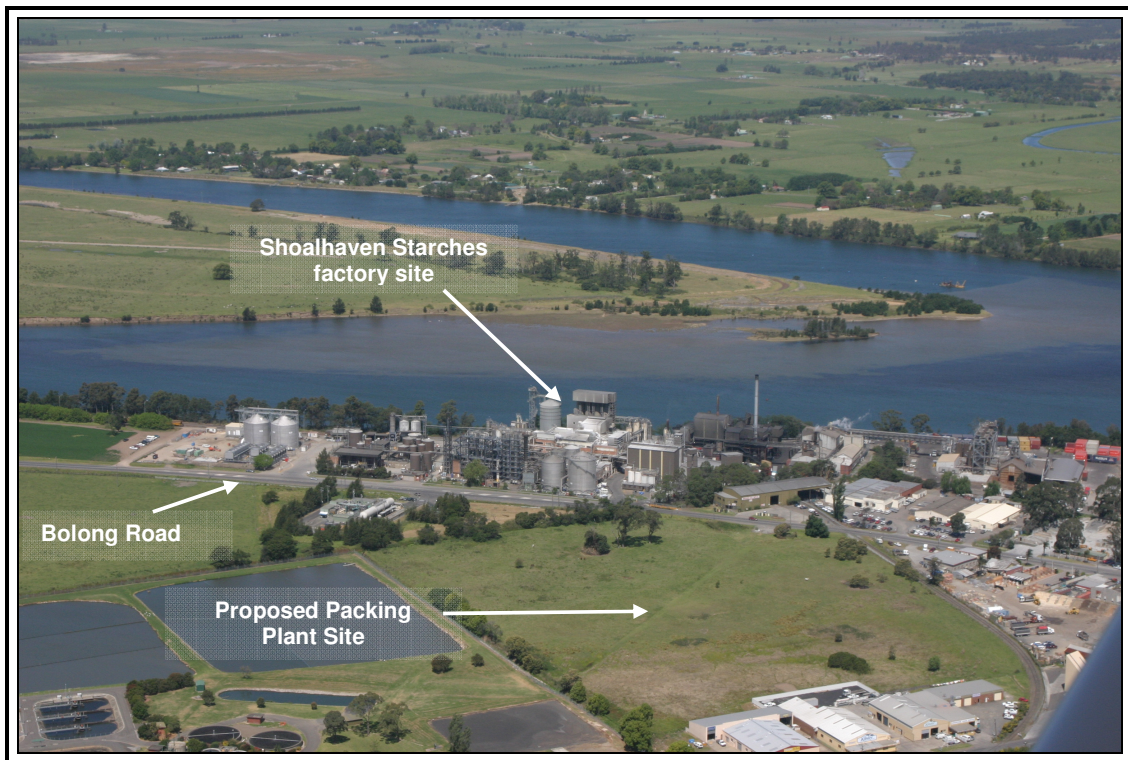


Plate 2: Aerial view of site of proposed packing plant and

The proposal will seek to erect a purpose designed and built factory building with dimensions of approximately 75 metres by 40 metres, and having a height of approximately 9 metres above ground level. This building will also contain two storage silos with heights of approximately 30 metres above ground level.

In addition to the above it is proposed to relocate the Company's container loading facility (associated with the packing plant) adjacent to the proposed new packing plant. This area will comprise dimensions of approximately 80 metres by about 80 metres, and will comprise a bitumen sealed hard stand surface. A new railway spur line is also proposed to be extended from the existing railway to service this container loading area.

It is proposed that dried gluten/starch will be pneumatically conveyed from the existing site to the proposed new packing plant via underground pipes. This dried material will be pneumatically conveyed and stored in the proposed silos.

The silos will then feed the proposed new packing plant. The need for the new packing plant has largely arisen from the demands of the Company's customers who are seeking improvements to the sealing of the bags used for packaging. At present difficulties arise with the current packing plant whereby bags are filled and weighed separately. This results in damages to the seals of bags through the 'double handling' of bags; resulting in leakages.

The existing system involves product being blown into bags, which results in the escape of product resulting in product loss and dust generation.

The new packing plant will overcome these difficulties as product will not be blown into bags, but rather mechanically packed. Furthermore, sealing and weighing operations will be completed simultaneously resulting in a reduction in leakages.

Overall the new packing plant will provide a more efficient packaging system with less product loss and dust generation.

In addition the new system will result in a reduction of packaging materials. Under the current system '3 ply' paper bags are used in packaging. The new packing plant will be able to use '2 ply' bags resulting in a 30% reduction in packaging materials.

Given the efficiency gains, the new packing plant will be able to meet the requirements of the proposed production increases in starch and gluten, associated with this proposal. The existing packing plant would not be able to meet these requirements; it simply does not have the spare capacity.

The new plant will have other advantages:

- The existing plant is located within a heavily congested section of the factory. This area has heavy truck; train; and forklift movements creating safety concerns for employees. The new site will be significantly less congested.
- The existing packing plant, as with the remainder of the factory, operates 24 hours per day, seven days a week, 365 days of the year. It is not possible to close the existing packing plant operations down while new plant is installed. The new packing plant will enable existing operations to continue up until the new packing plant is commissioned.

- With heavy vehicles entering the site by left turn only via Bolong Road the number of heavy vehicle movements crossing Bolong Road will be reduced; thereby reducing the traffic conflicts along this route.

3.9 ENERGY AND UTILITIES

The existing plant has the capacity to produce 170 t/h of process steam by five boilers, the plant has four (4) coal fired and one (1) gas fired boiler. This involves the use of 100,000 tonnes per year of coal and 180 Terajoules of Natural Gas per annum.

The site currently has electricity demand of 20 MVA.

The total energy requirements for the plant resulting from the proposed increased in ethanol production is estimated to be comprised of:

- approximately 250 t/h process steam;
- approximately 28 MVA electrical power;
- up to 4 Petajoules Natural Gas (depending upon which energy supply option is eventually selected) per annum;
- the combustion of biogas produced during the biological water treatment process. This will offset some of the natural gas requirement.

In order to accommodate this increase in energy requirements, the Company is proposing a gas-fired co-generation plant to be constructed on the site.

As will be explained in greater detail in Section 5.5.1 of this PEA, the proposal will result in an increase in water consumption at the plant to accommodate the upgrade. It is proposed however to reduce the amount of potable water used at the site; and instead increase the amount of raw water used at the site. To ensure this raw water is of a satisfactory standard for the factory process at Shoalhaven Starches it is proposed to treat this raw water at an under-utilised treatment plant located at the Australian Paper Mill located further to the east of the site along Bolong Road, before piping this treated raw water to the site. At present a raw water line extends from the Australian Paper Mill to the site to supply the Company's raw water supply requirements. The provision of treated raw water to the site will require an additional pipeline to extend from the Paper Mill to the site in a route adjacent to the existing raw water pipeline. The pipeline route extends along land under the ownership of the Manildra Group of Companies.

4.0 STATUTORY APPROVAL CONTEXT

4.1 SHOALHAVEN LOCAL ENVIRONMENTAL PLAN 1985

The Main Factory Site

The majority of the existing Shoalhaven Starches Factory Site within which the ethanol, glucose, starch and grain plants are sited is zoned 4(e) Industrial (Restricted Development) under the provisions of Shoalhaven Local Environmental Plan 1985. The objective of this zone is:

“...identify locations in existing industrial areas with development problems where special consideration will be required before development can be approved.”

Industrial development is permissible under the provisions of this zoning.

The Proposed Packing Plant and Container Storage

The proposed Packing Plant and container storage are proposed to be sited upon Lot 2 DP 538289 and Lot 5 DP 825808 Bolong Road, Bomaderry. This land is located along the northern side of Bolong Road directly opposite the existing factory and the Company's administration offices.

These parcels of land are zoned Rural 1(g) and Industrial 4(e) (Restricted Development) pursuant to the provisions of SLEP 1985.

The proposed Packing Plant and container storage area is proposed to be sited entirely on Lot 5. This component is to be sited entirely within that part of the site zoned 4(e). As outlined above, industrial development is permissible under this zoning.

The Eastern Portion of the Site (Amendment No. 59)

The eastern portion of the factory site, ie. that portion of the site to the east of the Ethanol Distillery, is zoned Rural 1(g) under the provisions of SLEP 1985. This area is however affected by the provisions of an amendment to the SLEP 1985 (Amendment No. 59). The aim of this amending LEP is:

“To protect the environment of the City of Shoalhaven by permitting development on the land to which this plan applies, for the purposes of facilities associated with the starch mill located on land adjoining the land to which the plan applies that will improve the quality of processed water waste water leaving the mill site.”

The amending LEP enables:

“the erection of facilities associated with a starch mill situated on the adjoining land, including a fire service tank and pumphouse, ethanol storage

and recovery tanks and associated loading facilities and an employee car park, provided that the Council is satisfied that:

- a) the capacity of the floodway to accommodate flood flows is maintained; and*
- b) all structures are designed to withstand at least a 1 in 100 year flood; and*
- c) all footings and foundations are protected against scouring erosion and undermining; and*
- d) there will be adequate safeguards to contain and collect leaks and spillages."*

The Far Eastern Portion of the Site

The PRP No. 7 project (approved by the Minister for Planning in 2003) included a proposal to relocate an employee car park to an area to the east of what was then the existing car park. This adjoining land is zoned Rural 1(g) Flood Liable under the provisions of the Shoalhaven Local Environmental Plan 1985.

The present ethanol upgrade proposal seeks to erect three fermentation tanks that will be sited either wholly or partly within this area of the site.

It is noted that "*rural industry*" is a permissible use within the Rural 1(g) zone. The Shoalhaven Local Environmental Plan 1985 adopts (with certain exceptions) the Environmental Planning & Assessment Model Provisions. Under the Model Provisions a rural industry means the:

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

The proposed fermenters are plant associated with the overall Shoalhaven Starches factory complex. As outlined this factory complex processes wheat, other grains and flour to produce a range of products. Under these circumstances, such an activity would sit within the above definition and therefore the proposed fermenters, forming part of the Shoalhaven Starches complex would be a permissible use within the Rural 1(g) zone as a "rural industry".

Alternatively, "*waste treatment and disposal, in each case involving the use of water*" is also permissible within the 1(g) zone. The ethanol production plant at Shoalhaven Starches essentially takes the waste (including waste water) from the starch, gluten and syrup components of the plant to feed the fermentation and distillation of ethanol production. In effect the ethanol plant could be described as a waste treatment process.

This waste treatment process could therefore be considered as a permissible use under the Rural 1(g) zone.

Area to West of Abernethy's Creek (Amendment No. 171)

That portion of the site which is situated to the west of Abernethy's Creek is also zoned Rural 1(g) Flood liable zone, as well as partly Environmental Protection 7(f3) Foreshores Protection zone and partly 4(e) Industrial (Restricted Development) zone.

The land is however affected by Amendment No 171 to SLEP 1985. The aims of this amending LEP are to:

- "a) Provide for the expansion of an existing industrial operation which is located on land adjoining the land to which this land applies, provided the Shoalhaven City Council is satisfied that issues related to flooding, traffic impact, risk, noise, visual impact, the management of the riparian buffer zone and the potential existence of acid sulphate soils have been addressed; and*
- b) Acknowledge the importance of establishing an adequate riparian buffer zone adjoining Bomaderry Creek and the Shoalhaven River by zoning an appropriate area Environmental Protection (F3) (Foreshores Protection) zone under the City of Shoalhaven Local Environmental Plan 1985."*

This Amendment to SLEP permits the erection of facilities ancillary to the starch mill situated on adjoining land provided the consent authority is satisfied that issues relating to flooding, traffic impact, risk, noise, visual impact, management of riparian buffer zone and potential existence of acid sulphate soils have been addressed. This proposal seeks to locate an additional evaporator and 5 additional DDGS Dryers (and associated plant), extension to the approved DDG Loadout (PRP No. 7), additional evaporators, chemical storage, condensate defatting plant, DDGS Pellet Plant and gas fired co-generation plant in this part of the site. Given these uses are ancillary to the existing DDGS Plant located on this site, and forms part of the overall Starch Plant operations, such uses are permissible subject to development consent.

The Environmental Farm

The land associated with the Environmental Farm is zoned Rural 1(g) Flood Liable under SLEP 1985. The objectives of the Rural 1(g) zone are:

- (a) to limit the erection of structures on land subject to periodic inundation,*
- (b) to ensure that dwelling-houses are erected on land subject to periodic inundation only in conjunction with agricultural use,*
- (c) to ensure that the effect of inundation is not increased through development,*

- (d) *to restrict development and how it is carried out so that its potential to have an adverse impact on site and off site on acid sulfate soils is reduced or eliminated, and*
- (e) *to conserve and maintain the productive potential of prime crop and pasture land.*

Activities involving *waste treatment and disposal, in each case involving the use of water* are permissible subject to development consent. This proposal includes the adaptive re-use of part of the existing Pond No. 5 as an anaerobic and aerobic waste water treatment plant. Such a use is therefore permissible within the 1(g) zone.

4.2 PART 3A ENVIRONMENTAL PLANNING & ASSESSMENT ACT 1979

The introduction of Part 3A to the Environmental Planning & Assessment Act 1979; and the introduction of State Environmental Planning Policy (Major Projects); brought about a change in the regime concerning the assessment of state significant development. Pursuant to Section 75B of the Act, development subject to the provisions of Part 3A of the Act includes development referred to within a State Environmental Planning Policy. The Minister for Planning is the consent authority for such development.

State Environmental Planning Policy (Major Projects) supports the introduction of Part 3A to the Act. Schedules 1 and 2 of this SEPP outline those developments that are essentially subject to the provisions of Part 3A of the Act.

Schedule 1 SEPP (Major Projects)

Schedule 1 of SEPP (Major Projects) outlines classes of development that, in the opinion of the Minister, are declared to be projects to which Part 3A of the Act apply. Group 1 within this schedule outlines criteria for agricultural, timber and related industries and includes:

3 *Agricultural produce industries and food and beverage processing*

Development that employs 100 or more people or has a capital investment value of more than \$30 million for any of the following purposes:

- (a) *abattoirs or meat packing, boning or products plants; milk or butter factories; fish packing, processing, canning or marketing facilities; animal or pet feed; gelatine plants; tanneries; wool scouring or topping; rendering plants, or*
- (b) *cotton gins; cotton seed mills; sugar mills; sugar refineries; grain mills or silo complexes; edible or essential oils processing; breweries; distilleries; **ethanol plants**; soft drink manufacture; fruit juice works; canning or bottling works; bakeries; small goods manufacture, cereal processing or margarine manufacturing, or*
- (c) *organic fertiliser plants or composting facilities or works.*

This proposal includes alterations and additions to an exiting ethanol plant that currently employs around 230 people. The proposed alterations and additions to the factory are estimated to involve a capital investment of approximately \$100 million and will provide on-going employment for up to an additional 25 people in the operation of the plant.

Schedule 2 SEPP (Major Projects)

Schedule 2 of SEPP (Major Projects) also outlines those classes situated within the coastal zone that are also deemed to be state significant development. This Schedule includes:

1 Coastal areas

(1) *Development within the coastal zone for any of the following purposes:*

- (a) *extractive industries,*
- (b) *landfill facilities,*
- (c) *mining that is designated development and that is wholly or partly in a sensitive coastal location,*
- (d) *marinas that are designated development and that are wholly or partly in a sensitive coastal location,*
- (e) *the following types of industries (other than mining or extractive industries) but only if they are:*
 - (i) *designated development, and*
 - (ii) *in the case of the metropolitan coastal zone—wholly or partly in a sensitive coastal location:*

agricultural produce industries, bitumen pre-mix industries, breweries or distilleries, cement works, ceramic or glass industries, chemical industries or works, chemical storage facilities, composting facilities or works, contaminated soil treatment works, crushing, grinding or separating works, drum or container reconditioning works, electricity generating stations, livestock intensive industries, livestock processing industries, mineral processing or metallurgical works, paper, pulp or pulp products industries, petroleum works, wood or timber milling or processing works, or wood preservation works,

The subject site is situated within the Coastal zone. The classes of development outlined in bold above are applicable to the subject site.

4.3 RELEVANT LEGISLATION AND OTHER APPROVALS

In accordance with Part 3A of the EP&A Act, approvals under the eight Acts listed under Section 75U Clause 1 of the EP&A Act are not required. These Acts include:

- (a) *the concurrence under Part 3 of the Coastal Protection Act 1979 of the Minister administering that Part of the Act,*
- (b) *a permit under section 201, 205 or 219 of the Fisheries Management Act 1994 ,*
- (c) *an approval under Part 4, or an excavation permit under section 139, of the Heritage Act 1977 ,*
- (d) *a permit under section 87 or a consent under section 90 of the National Parks and Wildlife Act 1974 ,*
- (e) *an authorisation referred to in section 12 of the Native Vegetation Act 2003 (or under any Act to be repealed by that Act) to clear native vegetation,*
- (f) *a permit under Part 3A of the Rivers and Foreshores Improvement Act 1948,*
- (g) *a bush fire safety authority under section 100B of the Rural Fires Act 1997 ,*
- (h) *a water use approval under section 89, a water management work approval under section 90 or an activity approval under section 91 of the Water Management Act 2000 .*

The proposal may however be subject to the following legislation and approval requirements.

Commonwealth Environment Protection and Biodiversity Conservation Act (EPBC Act)

Under the EPBC Act 1999, approval of the Commonwealth Minister for the Environment is required for actions that may have a significant impact on matters of National Environmental Significance, except in circumstances which are set out in the EPBC Act. Approval from the Commonwealth is in addition to any approvals under NSW legislation.

A Flora and Fauna Assessment undertaken by Kevin Mills & Associates as part of the previous PRP No. 7 proposal approved by the Minister in 2003, and which included the same lands as this current project, also included an assessment under the requirements of this legislation. This assessment concluded:

“The proposed upgrade and expansion of the Environmental Farm are not likely to have a significant effect on any species or communities listed under the Environmental Protection and Biodiversity Conservation Act. It is

therefore not necessary to refer the matter to the Commonwealth Environment Minister for approval."

Protection of the Environment Operations Act

The existing development 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.

The proposal will necessitate the modification of the terms / provisions of this licence to be reviewed.

This will trigger the integrated development provisions of the EP&A Act.

Threatened Species Conservation Act

This legislation was introduced with the objectives of conserving threatened species, populations and ecological communities of animals and plants. The Act amends the Environmental Planning & Assessment Act and the National Parks & Wildlife Act. With respect to this proposal the legislation introduces the need for a proposal to address certain matters in respect of threatened species and their habitats.

A Flora and Fauna Assessment undertaken by Kevin Mills & Associates accompanied the EIS submitted in connection with previous PRP No. 7 proposal approved by the Minister in 2003, and which included the same lands as this current project, included an assessment under the requirements of this legislation. This assessment concluded:

"The proposed upgrade and expansion of the Environmental Farm are not likely to have a significant effect on any threatened species, populations or ecological communities. The preparation of a Species Impact Statement is therefore not required."

4.4 STATE ENVIRONMENTAL PLANNING POLICIES

The following State Environmental Planning Policies (SEPPs) are relevant to the proposed development:

- **SEPP No. 11 - Traffic Generating Developments**

The objective of this policy is to ensure the Roads and Traffic Authority is made aware of and given an opportunity to make representations in respect of developments that are likely to have an impact on traffic volumes and road networks in the locality. The proposal may require to be referred to the Local Traffic Committee under the provisions of this policy.

- **SEPP No. 14 - Coastal Wetlands**

The aim of this policy is to “ensure that coastal wetlands are preserved and protected in the environmental and economic interest of the state.”

In respect of land to which this policy applies, development consent is required to:

- (a) clear that land;
- (b) construct a levee on that land;
- (c) drain that land; or
- (d) fill that land.

One SEPP No. 14 wetland (No. 369) is located within the Environmental Farm land. The works associated with this proposal should not directly affect this wetland.

- **SEPP No. 33 - Hazardous and Offensive Development**

The Shoalhaven factory site comprises a “*potentially hazardous industry*” and “*potentially offensive industry*” under the provisions of this policy. Under the provisions of clause 12 of this SEPP any proposal involving a potentially hazardous industry must prepare a Preliminary Hazard Analysis.

- **SEPP No. 71 - Coastal Protection**

On the 1st November 2002 the State Government gazetted SEPP No. 71. This policy

- “*identifies State significant development in the coastal zone, and*
- *requires development applications to carry out development in sensitive coastal locations to be referred to the Director-General for comment, and*
- *identifies master plan requirements for certain development in the coastal zone.*”

The coastal zone has the same meaning as in the Coastal Protection Act 1979. This Act essentially maps the area of land and waters that lie to the west of coastal

waters. From a perusal of this mapping it is evident that the coastal zone covers the subject land, and the factory site is also identified as a sensitive coastal location under this SEPP. Under these circumstances, the subject site is affected by the provisions of this Policy.

- **SEPP - Major Projects 2005**

The aims of this Policy are as follows:

- (a) *to identify development to which the development assessment and approval process under Part 3A of the Act applies;*
- (b) *to identify any such development that is a critical infrastructure project for the purposes of Part 3A of the Act;*
- (c) *to facilitate the development, redevelopment or protection of important urban, coastal and regional sites of economic, environmental or social significance to the State so as to facilitate the orderly use, development or conservation of those State significant sites for the benefit of the State;*
- (d) *to facilitate service delivery outcomes for a range of public services and to provide for the development of major sites for a public purpose or redevelopment of major sites no longer appropriate or suitable for public purposes;*
- (e) *to rationalise and clarify the provisions making the Minister the approval authority for development and sites of State significance, and to keep those provisions under review so that the approval process is devolved to Councils when State planning objectives have been achieved.*

This SEPP is addressed in Section 4.2 of this report. Essentially the Minister has declared that this project is a major project pursuant to the provisions of Part 3A of the EP&A Act and SEPP (Major Projects) 2005. The provisions of this policy therefore apply to this project.

4.5 REGIONAL ENVIRONMENTAL PLANS

The subject site is affected by the provisions of the Illawarra Regional Environmental Plan (IREP). The IREP was gazetted on 11 April 1986 and provides a statutory framework that ensures that regional needs and interests are taken into account in local and state planning activities.

The main purpose of the IREP is to provide a framework for the coordination of responsibilities between State and local government agencies, to ensure that:

- the best use of land resources is achieved;

- the quality of life, especially as it is affected by land use is maintained and where possible improved;
- regional needs and interests are taken into account in local and state planning;
- a stable and attractive climate exists for public and private investment.

From a perusal of the plans which accompany the IREP it is evident that the subject land has been identified as part of a large area of land in the Nowra / Bomaderry district with *landscape or environmental attributes*.

Part VI of the IREP is concerned with industry. Industrial objectives relevant to this proposal are:

48. *The objectives relating to industry are:*

- (a) *To ensure that there is sufficient industrially zoned land to meet industrial needs.*
- (b) *To encourage industries and other enterprises to locate within the region to diversify the economic base or act as stimuli to the local economy or both and so provide new employment opportunities; and*
- (c) *To locate industrial land where it will meet the particular requirements of industry while having a minimal adverse impact on the natural environment and the amenity of living areas.*

The IREP also states that adequate services must be available to meet the demands of any industrial development, which may be permissible under the provisions of the Council's Local Environmental Plan

Under clause 139 of the IREP, provisions relating to high rise buildings are addressed:

139(2) *The consent authority shall not consent to a development application to erect a building or to alter an existing building by increasing its height, where the building after erection or alteration will have a height:*

- (a) *in the case of land shown on the map as regional commercial centre and land zoned 2(c) Residential "C" under Wollongong Local Environmental Plan No. 38 (other than that north of Bourke Street or Corrimal Street) of more than 20 metres; or*
- (b) *in the case of other land in the Wollongong sub region and the Shoalhaven sub region of more than 11 metres,*

without the concurrence of the Director.

The IREP makes provision for the control of building heights. Specifically clause 139(2)(b) requires the concurrence of the Director-General for consent to erect a building where the building will have a height of more than 11 metres. The proposal includes

components of the development, which are over 20 metres in height, and the Director-General's concurrence is therefore required prior to the issuing of any consent for these aspects of this project.

Clause 139(3) sets out the matters for consideration that the Director-General must take into consideration in granting concurrence under this clause, including:

- a) the height, scale, bulk and density of the proposed building;*
- b) the external appearance and materials used on the exterior of the proposed building;*
- c) the relationship of the proposed building to the streetscape or landscape;*
- d) the effect of the proposed building on public amenity, including pedestrian amenity;*
- e) the effect of the proposed development on wind patterns and wind velocity in public places;*
- f) the effect of the proposed building on overshadowing of public places;*
- g) the effect of the proposed building on views from public places;*
- h) the effect of the proposed building on any items of the environmental heritage in the vicinity; and*
- i) the effect of reflections from the exterior of the proposed building on roads, public places and buildings in the vicinity.*

4.6 OTHER RELEVANT POLICIES

The following policies are also likely to have relevance to the subject proposal of site:

- NSW Government Coastal Policy;
- NSW Government Floodplain Management Manual;
- South Coast Regional Strategy
- Southern Catchment Management Blueprint;
- Shoalhaven City Council Development Control Plan No. 93 Controls for Waste Minimisation & Management;
- Shoalhaven City Council Interim Flood Policy;
- Shoalhaven Estuary Management Plan;
- Lower Shoalhaven Floodplain Management Study and Plan.

4.7 APPROVAL REGIME FOR PROJECT

As outlined above in Section 4.2, the proposed development meets the criteria for a Major Project under Part 3A of the EP&A Act and SEPP (Major Project) 2005. The Department in a letter dated 30th August 2006 has confirmed that the project is deemed to be a “major project”.

In accordance with Part 3A of the EP&A Act, approvals listed under eight Acts listed under Section 75U Clause 1 of the EP&A Act are not required.

The existing development has an Environmental Protection Licence (EPL) under the Protection of the Environment Operations Act 1997 (POEO Act) (EPL No. 883).

5.0 POTENTIAL ENVIRONMENTAL ISSUES ASSOCIATED WITH PROJECT

5.1 ODOUR MANAGEMENT

Prior to 1992 odours have been mainly generated from the disposal of starch waste water on the Environmental Farm; with waste water application to moist ground resulting in waste water ponding and odour generation.

The Environmental Farm forms part of the waste water management system for the factory. Treated waste water is irrigated onto the farm to provide water and nutrients for fodder crops (such as ryegrass) grown on the farm. Under conditions where waste water cannot be directly irrigated (eg. wet weather conditions) the waste water is stored in ponds located on the farm.

Prior to the installation of the Ethanol Distillery and the stillage recovery process implemented by PRP No. 7 conditions leading to odour development on the irrigation land arose from:

- poor surface drainage;
- decreased infiltration due to high organic load;
- age and type of pasture;
- irrigation issues; and
- sludge stored in the ponds.

The establishment of the ethanol distillery plant in 1992 removed the starch content. Since this time Shoalhaven Starches have reduced odours by the removal of solids from waste water. This was as a result of the PRP No. 7 project approved by the Minister in 2003.

The Company's Pollution Reduction Program, formulated by the EPA requires:

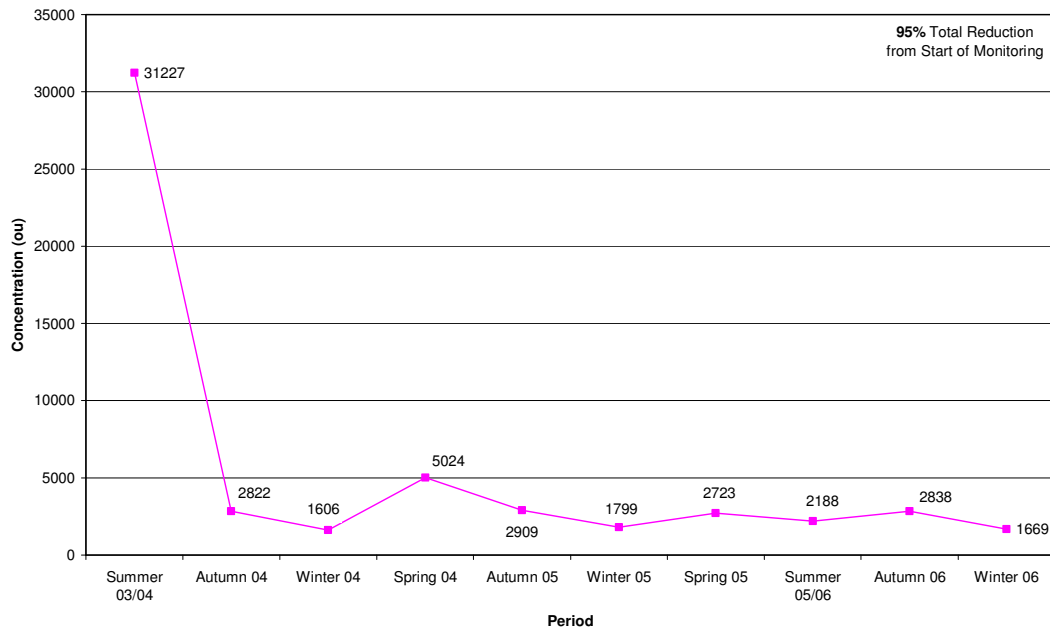
"The licensee must not cause or permit the emission of offensive odour from the upgraded waste water management system. The system should comply with this requirement having regard to the EPA's interim odour performance criteria contained in the EPA's draft policy "Assessment and Management of Odour from Stationary Sources in NSW (January 2001)".

The aim of the PRP No. 7 project, approved by the Minister in 2003 sought to further reduce soluble and suspended solids in the waste water; thereby further improving the quality of the waste water irrigated onto the environmental farm. It was envisaged that

improving the quality of waste water sprayed onto the environmental farm would reduce the level of odours emitted from the farm to the surrounding locality.

Figure 6 is a graph illustrating odour emission levels from a typical pond (Pond 3), showing odour readings from summer 2003/2004 to winter 2006. It is evident from a review of this graph that there has been a dramatic reduction in odour emissions since the commissioning of PRP7 in autumn 2004.

Figure 6 - Pond 3 Odour Concentrations
(Source - Stephenson Environmental Management Australia)



Shoalhaven Starches also adopts measures to mitigate odour impacts from the ponds and the farm including:

- The waste water entering the ponds for storage is mixed and pH adjusted using sulphuric acid to a pH of approximately 2.5. This maintains the water in the pond at an acidic pH and minimises the microbial activity that could result in odour generation.
- Trees planted around the site increase wind turbulence which assists with odour dispersion.
- Sludge solids deposited in the ponds are also injected into the farm soil to further minimise odour generation.

- Under the Company's Pollution Reduction Program No. 17 and in accordance with agreements with the DECC, Pond No. 4 which contains old solids and washdown water is covered as part of the company's Odour Management Plan.
- Installation of low drift, spray nozzles on centre pivot irrigators.

Following complaints from members of the community in 2004, and subsequent investigations by Shoalhaven Starches and the DECC regarding odours reported to have emanated from Shoalhaven Starches operations. DECC successfully prosecuted Shoalhaven Starches in the Land and Environment Court in 2006 for the emission of offensive odours.

The Land and Environment Court judgement of 2 November 2006 required Shoalhaven Starches to engage a suitable qualified person to conduct a comprehensive environmental audit of the factory and Environmental Farm in order to identify and quantify all odours generated by the operations, and to provide recommendations for the improved management of odours. Shoalhaven Starches engaged by GHD Pty Ltd to conduct the environmental audit.

As part of this audit a plan has been prepared to prevent (or where this is not possible mitigate) the emission of offensive odours from the Company's activities. This audit and plan presents an opportunity for Shoalhaven Starches to commit to a clear path to achieving sustainable performance. This audit underpins future decisions on new development on this site. Some of the recommendations of the audit are being implemented now, while others form part of this proposal. The DECC indicate that the ethanol upgrade cannot proceed without the recommendations of the audit being implemented.

Any upgrade to ethanol production at this site will need to be able to demonstrate that there will continue to be a significant reduction in odours generated from the site over time in keeping with the objectives of the DECC and Shoalhaven Starches and the findings of the environmental audit that has been undertaken by GHD Pty Ltd for the site.

Odour management is a key issue that will be addressed in detail in the Environmental Assessment.

A comprehensive Air Quality Impact Assessment will be required for the proposal including odour modelling for the factory as well as environmental farm, and incorporating the findings and recommendations of the audit. In this regard Shoalhaven Starches have engaged GHD Pty Ltd (the Company responsible for the Environmental Audit) to prepare the Air Quality Impact Assessment for the proposal.

Given the scale of the proposed upgrade, and the emissions likely to be generated by it, it is considered necessary to prepare a full Air Quality Impact Statement in accordance with the *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW* (DEC 2005) and the *Assessment and Management of Odour from Stationary Services in NSW* (DEC 2006).

The air quality assessment would require that both odour and particulate generation from the proposed upgrade is assessed in the context of the modelled emissions post-implementation of the recommendations of the odour audit. This would require an assessment that is similar in scale and nature to the current odour audit modelling, and would also encompass the detailed assessment of particulates.

Methodology

GHD proposes to adopt and refine the methodology used for the Environmental Audit project. The assessment would require a full consideration of the existing odour emissions from the site and the cumulative impact likely to be associated with emissions generated by the proposed upgrade. The data would be modelled using the existing odour model generated during the odour audit. The results would be expressed relative to the situation following implementation of the odour control techniques recommended in the odour audit (*ie.* the modelled results would be used as the baseline against which changes are assessed).

GHD will use particulate emission rate data for all significant existing and proposed sources of particulate emissions. GHD understand that particulate emission testing has been conducted on the coal-fired boiler stacks and on a limited number of other plant processes that are equipped with fabric filter air quality control systems. This emission data, along with the proposed plant equipment specifications, will be used to derive an emission inventory for use in the air quality impact assessment. The need for additional emission testing, to supplement existing data, will be considered. It may also be advisable to undertake additional background PM₁₀ monitoring to obtain a locally relevant baseline – it is noted that the existing background data was collected at Albion Park and appears to be relatively high and may not be representative of local conditions. The results of the particulate assessment would also be expressed relative to the existing situation, and also to the situation following implementation of the control techniques recommended in the odour audit.

Deliverables

The deliverables would be:

1. An odour and particulate emissions inventory spreadsheet; and
2. An air quality impact assessment report in accordance with DECC guidelines.

Manildra would monitor the success of the measures implemented to reduce odours. The success would be gauged generally through the reduction in complaints received, together with periodic odour sampling/monitoring. The number, location and frequency of complaints would be tracked and documented through the complaints management system that would be included as a component of an Environmental Management System developed to be consistent with an AS/NZA ISO 14001:2004.

Management and monitoring of the off-site odour impacts would be undertaken according to the principles detailed in DECC's *Technical Framework – Assessment and Management of Odour from Stationary Sources in NSW* (November 2006), and the associated Technical Notes, with the ultimate aim of achieving acceptable performance. If a continuing odour problem is identified, the process would generally include:

1. A review of odour management and control strategies to identify the causes;
2. The identification and rectification (where possible) of the causes; and
3. Ongoing monitoring to determine whether the odour impacts have been mitigated.

The process would ensure that improvements are implemented as necessary to ensure that offensive odour is not emitted from the site.

5.2 AIR EMISSIONS

In addition to odour control management as outlined in Section 5.1 above, the existing plant has several other air emission sources. The existing operation has the following emission control equipment to minimise emissions to the atmosphere:

- Approximately 60 baghouses to capture particulate matter.
- 3 wet scrubbers and condensers form part of the equipment to control the gas stream prior to the DDGS dryers bleed air passing through to the boiler for destruction.
- A carbon dioxide (CO₂) collection plant. This plant takes part of the CO₂ generated from fermenters and compresses the gas for sale, (eg. aerated “soft drinks”). This reduces the greenhouse gas emissions to the atmosphere. The plant is owned and operated by BOC Gases.

- The Stillage Recovery Plant is a closed loop system. Approximately 5 - 10% leakage air is aspirated. This aspirated air is directed to Boiler 5 and 6 in the Boiler Plant where it is burnt in the furnaces of the boilers.

The increase in ethanol production at the site may potentially increase air emissions from the plant, particularly in terms of:

- Additional particulates from the grain and starch plants. These risks will be eliminated by the use of suitable particulate control equipment.
- Additional CO₂ generation from the additional fermenters.
- Aspirated air from the additional DDGS Dryers (This air however will continue to be aspirated in the boilers or furnaces).
- Bio-gas from the waste water treatment plant (the bio-gas however will be re-used as a supplementary fuel in the boilers).

Process design and pollution control equipment will need to ensure that emissions will be compliant with the ambient air quality objectives of the Company's EPL and the Protection of the Environment Operations Act. The issue of air emissions, and including greenhouse gas emissions, is also likely to be a significant key issue that will need to be addressed in any application for approval from the Minister. A comprehensive Air Quality Impact Assessment for the proposal will be required for the proposed expansion of the plant and Environmental Farm.

5.3 GREENHOUSE GAS EMISSIONS

In addition to addressing odour and air quality impacts, the Environmental Assessment will also need to address greenhouse gas emissions associated with the proposed upgrade. The purpose of the greenhouse assessment will be to calculate the emissions of greenhouse gases associated with the proposed development, and to compare these to the alternative no-change scenario. In order to obtain a comprehensive estimate, several emission sources will be considered (both direct and indirect), associated with:

- the preparation and acquisition of raw materials;
- transfer of major raw materials (including wheat) to Bomaderry by truck or train;
- energy and fuel used on site for the production of ethanol, starch, gluten and other products, including grid electricity, natural gas, petroleum, diesel, etc;
- storage of products on site;
- waste disposal and waste water treatment;

- transport of products from Shoalhaven Starches to depots, distributors and consumers; and
- useage of ethanol blended fuels.

The emissions from these life cycle stages will be aggregated and compared to the no-change scenario of continuing to operate the current Shoalhaven Starches facility (without upgrade) and the continued combustion of 100% crude oil derived petroleum fuels.

Methodology

In addition to carrying out the odour and air quality assessments for the project, the assessment of greenhouse emissions will be carried out by GHD Pty Ltd.

GHD Pty Ltd has prepared their greenhouse assessment methodology in accordance with the general principles of:

- The recognised international standard – the “Greenhouse Gas Protocol, A Corporate Accounting and Reporting Standard” developed by the World Business Council for Sustainable Development (CHG Protocol);
- Life Cycle Assessment principles (ISO 14040 series); and
- The Australian Greenhouse Office (AGO) Factors and Methods Workbook.

These are considered to represent best practice in Australian greenhouse gas accounting.

The AGO Factors and Methods Workbook will not cover all factors necessary to attain a comprehensive estimate of the facility’s life cycle emissions. GHD has made allowances for a limited search for published data for factors not readily available on the production of ethanol. GHD’s methodology outlines a proposed approach to address factors that are not available.

General Description of Proposed Work Plan

GHD’s proposed work plan is based on undertaking procedures to provide an estimate of the life cycle emissions associated with the project, based on key life stages.

Information Review

GHD would request background and supporting information required to undertake the greenhouse assessment. GHD will compile a list of additional data required from Shoalhaven Starches, once appropriate life cycle boundaries have been defined.

Information will include records for each life cycle stage of raw material acquisition, production, transportation and use.

Depending on the boundaries selected, other information may be required. Priority will be given to obtaining credible information for the components likely to result in the highest emissions, and therefore account for significant fractions of the total inventory. The information request list will indicate the priority of information.

GHD would request raw data and supporting documentation where appropriate.

Greenhouse Assessment

GHD will complete the following tasks to develop the greenhouse assessment:

- Define an appropriate scope for the greenhouse gas assessment, considering the possible emission sources of greenhouse gases, including carbon dioxide, nitrous oxide, methane, perfluorocarbons, hydrofluorocarbons and sulphur hexafluoride (SF₆);
- Identify all relevant aspects of energy use and emissions within the life cycle;
- Identify and apply appropriate emission factors from the current AGO Factors and Methods Workbook (December 2006);
- Identify and apply appropriate factors for raw materials and other emission sources where available. If required information is not available in a reasonable time period, GHD will identify this, and make assumptions as appropriate to provide the most reasonable estimate possible;
- Outline the calculation procedures used to create the greenhouse gas emissions inventory;
- Convert energy consumption data into quantities of carbon dioxide equivalent emissions for each life cycle stage, and sum these values to estimate the total greenhouse gas emissions attributable to the product;
- Estimate the overall accuracy and comment on the sensitivity of the greenhouse assessment to possible changes that could occur during operation; and
- Calculate the difference between burning of petroleum derived from crude oil and ethanol fuels.

5.4 NOISE

The DECC Licence for the Shoalhaven Starches Plant is based upon the minimum ambient background levels that generally tend to occur at night, whereas construction activities mainly occur in the daytime.

The current EPL conditions relate to criteria derived from night time ambient measurements and the EPA Environmental Noise Control Manual (the “ENCM”) that utilised the concept of an average maximum (L_{10}) noise level versus the average minimum (L_{90} background) level.

Condition L6.3 of the EPA Licence for the site states:

The LA_{10} (15 minute) 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:

- 38 dB(A) at locations in Terara on the south side of the Shoalhaven River;*
- 38 dB(A) at locations in Nowra on the south side of the Shoalhaven River;*
- 42 dB(A) at locations in Meroo Street, Bomaderry; and*
- 40 dB(A) at other residential locations in Bomaderry.*

Compliance testing conducted on a regular basis (every 6 months) on behalf of Shoalhaven Starches to date has found noise emissions from the premises generally satisfies the EPA criteria as a result of implementation of various noise control measures associated with previous expansion works on the Shoalhaven Starches site.

The expanded operation will continue to operate 24 hours per day, 7 days per week except during possible maintenance shut down periods. The expanded operation has the potential to increase noise emissions from the plant processes, although acoustical treatment of these components will assist in minimising the noise impact from the site. Acoustic impacts associated with the proposal are therefore expected to be a significant key issue that will be required to be addressed in detail in any Environmental Assessment.

It is expected that an operational acoustic assessment will be required to be prepared generally having regard to the *DEC’s Industrial Noise Policy (INP) and the Company’s EPL requirements* to address the proposal.

Construction noise is not part of the Company EPL and utilises different noise indices to that for the operating plant. The current EPA Licence conditions relate to criteria derived

from night time ambient measurements and the EPA Environmental Noise Control Manual (the “ENCM”) that utilised the concept of an average maximum (L10) noise level versus the average minimum (L90 background) level.

The ENCM indicates the $L_{A10,T}$ sound pressure levels shall be measured or computed at any point within one metre of the boundary of the nearest affected residential premises. Measurements shall be made over a 10 to 15 minute interval (T), using the “fast” response of the sound level meter. The $L_{A10,T}$ is the A-weighted sound pressure level which is exceeded for 10 percent of the time over the measurement interval T.

Due to the location of the plant being significantly removed from residential premises and the existing ambient levels, primarily as a result of traffic in the area, normal construction activities are not envisaged to create a significant noise impact based upon the experience of previous development proposals that have been constructed on the site.

In addition to the assessment of noise from the construction and subsequent operation of plant on the site, it is envisaged that the acoustical assessment will also address noise from transport associated with the proposal. In this regard, product is proposed to be delivered to and from the site by means of both road and rail. Noise associated with road and rail is not covered by the INP but is required to be assessed in accordance with specific policies and guidelines of the DECC. The Acoustic assessment will also need to address traffic and rail noise impacts associated with this proposal.

The EPA currently has a noise control guidelines for rail traffic set out as a Chapter 163 in their Environmental Noise Control Manual. This guideline sets out noise levels in relation to rail movements as they may impact upon residential receivers. The criterion specifies a 24 hour L_{eq} level of 60 dB(A) for existing operations with a maximum passby level of 85 dB(A). For new facilities, the EPA utilise criterion 5 dB below that for existing facilities. Therefore, on the days and nights where there are additional rail movements, there is a need to assess the noise contribution from such movements with respect to the existing acoustic environment.

With respect to road traffic movements, the EPA has a separate noise policy identified as Environmental Criteria for Road Traffic Noise (“ECRTN”). Table 1 of the ECRTN nominates criteria for different road classifications for both the noise emission level for daytime and night time operations. Category 7 covers the matter of land use developments with potential to create additional traffic on existing freeway/arterials and nominates a daytime criteria of 60 dB(A) L_{eq} and a night time criterion of 55 dB(A). If the either criterion is already exceeded, the EPA place a specification that traffic arising from

the development should not lead to an increase in existing noise levels of more than 2 dB.

EPA Road Traffic Development Category 8 is identified as a land use development with potential to create additional traffic on collector road, where the daytime criteria is expressed as an L_{eq} 60 dB(A) for a one hour period and night time criterion of L_{eq} 55 dB(A) (one hour). Again if either criterion is already exceeded, the traffic arising from the development should not lead to an increase in existing levels more than 2 dB.

Therefore the criterion applied for the assessment of road traffic will vary upon the road classification and the need to consider whether the DECC criterion is already exceeded or not, and whether as a result of the subject development the criteria would then be exceeded.

In addition to the overall L_{eq} level as a result of traffic, the DECC will likely require consideration of the sleep disturbance, which involves the assessment of individual truck passbys as they may relate to residential premises on such roads, and must also take account of the night time ambient background levels.

Therefore in terms of the assessment of noise associated with the operational plant versus transport, there are different criteria and different assessment procedures used for the different noise sources.

5.5 TRAFFIC AND TRANSPORT

Traffic Access

Traffic access to the Shoalhaven Starches site is provided via Bolong Road from the Princes Highway. From the Highway, trips distribute to the north and south, as well as to the west (via a northern route through Albion Park to the Hume Highway or via Moss Vale). Light and heavy vehicle trips are able to disperse from the site along the local industrial route via Meroo Road, Cambewarra Road and Railway Street for trips between the Highway north of Bomaderry and Bolong Road. This route is available to all vehicles other than oversized, restricted access vehicles (over 19 m or over 40 t). Heavy vehicles are not permitted to use Bolong Road (eastbound) for regional trips.

Heavy vehicle trips use the following regional routes:

North

- Via Bolong Road, Railway Street, Cambewarra Road and Meroo Road to the Princes Highway.

- Via Bolong Road and the Princes Highway (oversized vehicle restrictions apply in a small section of the route including parts of Railway Street, Cambewarra Road and Meroo Road).

South

- Via Bolong Road and the Princes Highway south.
- Via Bolong Road, Railway Street and Cambewarra Road (through Moss Vale).
- Via Bolong Road and the Princes Highway north through Mount Ousley and Wilton for B-doubles.
- Via Bolong Road and the Princes Highway south to Nowra businesses or driver residences (no B-double route south of Nowra).

West

- Via Bolong Road and the Princes Highway north (B-doubles through Mount Ousley and Wilton).
- Via Bolong Road, Railway Street and Cambewarra Road (through Moss Vale).

It is understood that Shoalhaven City Council has previously expressed concern about the use of local residential streets particularly within Bomaderry by heavy vehicles. These concerns relate to the amount of heavy vehicle movements as well as the hours of the day that these heavy vehicle movements take place.

Shoalhaven City Council have also previously raised concern with respect to the adequacy of the Bolong Road/Princes Highway intersection; and specifically its ability to accommodate increased heavy vehicle traffic. In particular concern is raised as to the adequacy of the right turn lane from Bolong Road into the highway to cater for increased heavy vehicle movements.

Site Access

Access to the site for heavy and light vehicles is currently provided via four separate access points to Bolong Road. Vehicle movements to these access points remain constant throughout the week; some small access changes occur when the train is stopped on-site, requiring vehicles to [occasionally] depart via a different access point during that period.

Access Point 1 is located at the eastern end of the Site. The intersection of this access point and Bolong Road is designed as a Type “C” intersection (as described by

AustRoads in the *Guide to Traffic Engineering Practice Part 5*). Access Point 1 provides access for:

- Staff vehicles to the primary staff car park (arrival and departure);
- Ethanol trucks (arrival and departure);
- Brewers syrup trucks (arrival and departure);
- Glucose trucks (arrival and departure);
- Starch trucks (arrival and departure).

Access Point 2 is located just to the east of the railway line, and directly adjacent to a drainage culvert (Abernathy's Creek). This access point does not strictly comply with Type "A" intersection requirements (as per AustRoads) but generates very minimal traffic.

It is noted that Shoalhaven City Council have previously raised concerns with the adequacy of this existing access to the site.

Access Point 2 provides access for:

- Staff vehicles (minimal);
- Brewers syrup trucks (departure only);
- Bulk starch (arrival and departure);
- Glucose trucks (departure only).

Access Point 3 is located at the end of a spur road that leads from the primary Shoalhaven Starches site around behind smaller industrial units to a point adjacent (west) to the Cleary Bros Concrete site. The spur continues to an intersection with Bolong Road. The intersection is designed as a Type "A" intersection (as per AustRoads) though the road reserve is not fully sealed.

It is understood that Shoalhaven City Council have previously raised the adequacy of this existing access to the site and indicate that the unsealed areas adjacent to this intersection are in poor condition.

It should be noted that the Minister's approval for the Flour Mill includes a condition that requires that prior to commencement of construction of the Flour Mill that these three accesses are to be upgraded to a safe and appropriate level (following consultation with the RTA and Council).

Access Point 4 is located to the west of the railway and provides access to a staff car park via a separate ingress and egress driveway.

The proposed Packing Plant and container loading area will introduce a new ingress from Bolong Road into this site; and egress into Railway Street.

As the upgrade seeks to increase ethanol production, it is envisaged that truck movements will increase from the current approved levels by about 15 truck movements per day from access point 1, transporting ethanol from the site and about 4 to 5 truck movements per day from access point 3 transporting DDGS. Movements from access point 2 will remain unchanged while a small number of additional staff vehicle trips will be generated at each access point to the available on-site parking across the site. It is expected that the proposed packing plant will involve about 10 – 12 truck movements per day.

Parking

Under the existing PRP No. 7 approval it was proposed that parking within the Shoalhaven Starches factory site would be increased to a total of 185 parking spaces, which was considered sufficient to provide parking to accommodate peak parking demands on site.

The proposed upgrade to the ethanol production process in part seeks to site fermentation tanks on the previously approved car parking site. A new main car park (access point 4) is now located within an industrial complex recently purchased by the Manildra Group of Companies. This site is centrally located between the factory site and the Company's administration headquarters.

Overall the existing factory site contains 207 offstreet parking spaces. Under these circumstances the EA will be required to review the provision of parking on-site to ensure there is sufficient offstreet car parking to cater for staff and visitor parking associated with both the existing and that associated with the proposed upgrade.

Pedestrian Movements

It is understood that Shoalhaven City Council has expressed previous concerns about pedestrian movements associated with employees from Shoalhaven Starches within Bolong Road. This concern appears to emanate from the apparent use of the Bolong Road reserve for the parking of employee vehicles. It was envisaged with the PRP No. 7 proposal that the provision of the then proposed parking areas would overcome this concern. The Company has provided another pedestrian crossing across Abernethy's

Creek to overcome this concern. The issue of the provision of on-site parking for staff / employee will need to be examined in details as part of the EA for this project.

Rail

Along the southern edge of the site is a private rail line with two sidings. The line originates from Bomaderry, and is joined at Bomaderry to the main South Coast line from Sydney. Under current operations, trains arrive and depart at the Shoalhaven Starches site as follows:

- (i) Arrive at 3:00 am and depart at about 10:00 am. Presently these trains usually run on Tuesday and Thursday.
- (ii) Arrive at about 3:00 pm and depart at about 10:00 pm. Presently these trains run every day except Saturday.

Following the establishment of the proposed Flour Mill (recently approved by the Minister) the number of train movements will not increase; although the scheduling of trains may need to be modified.

The proposed upgrading of the ethanol plant will result in an increase in rail traffic to the site.

Traffic and transport issues (including rail, off street car parking and pedestrian movements) are considered a crucial key issue that will need to be examined in detail. Given the nature of the proposal it is proposed that the Environmental Assessment will need to be accompanied by a Traffic and Transport Impact Assessment addressing these aspects. In particular such an assessment will need to address:

- The existing regional and local traffic access to the site.
- Existing traffic generation associated with the site and proposed increase in traffic generation (both heavy and light vehicle). The distribution of this traffic on local traffic routes and the impacts on the environmental capacity and adequacy of these routes to accommodate any increase in traffic associated with the proposal, including the adequacy of the Princes Highway/Bolong Road intersection to accommodate additional heavy vehicles associated with this proposal.
- The impacts associated with any increase in traffic generated by the proposal (heavy and light vehicles) and impacts on the level of service of existing intersections both at the site and along traffic routes.
- The overall provision of off-street car parking on the site; and the need to provide additional or to regularise existing off-site car parking associated with the proposal.

- Pedestrian access within and external of the site.
- Any changes to the importation of raw materials to the site by rail in terms of both number of trains and likely changes to the times that trains will arrive and depart from the site.
- The adequacy of existing access points to the site. Whether access points need to be upgraded to accommodate increased traffic associated with the proposal.

5.6 WATER AND WASTE WATER MANAGEMENT

5.6.1 Water Consumption

Water is used in the starch production process. Production of starch and protein (gluten) from wheat flour is a water-based mechanical separation process, which results in the production of an aqueous waste stream which contains residual fibre, soluble sugars, soluble protein and low-grade starch.

It is common practice in the worldwide starch-gluten industry that up to 10 tonnes of water is required for each tonne of flour processed. Using technology developed at Shoalhaven Starches, water consumption is approximately 3 tonnes per flour processed and equivalent to world's best practice.

A daily average of 8,300 kilolitres of water is used presently by Shoalhaven Starches for their total operations, comprising:

- 5,100 KL from the municipal drinking water supply; and
- 2,400 KL from a raw water supply provided by Shoalhaven City Council via a pipeline from the Australian Paper Mill.

The proposed upgrade to the facilities for increased production of ethanol and gluten and associated by-products will necessitate increased water usage both potable water for processing flour and non-potable water for steam generation, cooling and uses. After installation of the proposed Waste Water Treatment Plant and the availability of treated water for re-use, daily water supply will comprise:

- 5,100 KL of potable quality water;
- 3,700 KL of raw water;
- 3,700 KL of treated water for re-use.

A proposal that the Company will obtain the majority of its potable quality water requirement through an arrangement with the Australian Paper Mill with the balance

being provided by Shoalhaven City Council is being assessed. This arrangement would benefit all parties. The Australia Paper Mill is presently only operating at one third of capacity. It is supplied by a 20 ML per day pipeline for raw water and has its own water treatment plant capable of delivering up to 12 ML per day of potable quality water. Of this, up to 6 ML per day would be made available to Shoalhaven Starches; the balance of approximately 2 ML per day would be provided by Shoalhaven City Council. Full operation of the Australia Paper Mill water treatment plant would provide cost savings to both the Australia Paper Mill and to the Company. It would also result in a reduction of the off-take from Shoalhaven City Council thereby increasing their capacity to supply additional industries and dwellings. Shoalhaven City Council would also provide stand-by supply on an interruptible basis in the event of temporary unavailability from Australia Paper Mill.

The requirement for non-potable water provided from re-processed water generated by the proposed waste water treatment plant would partly replace raw water presently being provided by Shoalhaven City Council and saving on water being taken from the Shoalhaven River and its catchment.

Figure 5 details a proposed water and waste water balance for the site following the ethanol upgrade project.

5.6.2 Water Quality Impacts

Water Discharges

The Shoalhaven Starches Factory and Environmental Farm are licensed premises under the Protection of the Environment Operations Act. Waste water 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
- 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 water discharged from both discharges shall not contain more than 500 micrograms per litre of chlorine; and comprise a pH within the limits of 6.5 to 8.5.

The potential impacts associated with the upgrade to the factory to increase ethanol production are not expected to increase cooling water discharges in excess of the Company's EPL requirements.

Surface Water Management

The existing factory site is divided into three separate surface water management areas:

- Stormwater flows within the western portion of the site are directed to collection pits. Following small storm events, stormwater is pumped from these pits to the farm irrigation system. During heavy rainfall, stormwater flows directly to Abernethy's Creek.
- The central portion contains the ethanol distillery, starch plant and fermentation area. The Distillery is contained within a bunded area. Surface water within this area is directed to a separate collection pit, prior to discharge to the environmental farm.
- The eastern portion of the site contains ethanol storage, fermenters, loading facilities and car park. Again the ethanol storage and recovery areas are contained within bunded areas. Stormwater flows within this area are directed to a first flush pit in the south eastern corner of the site.

Overall the possible environmental risk associated with surface water is potential spillage of chemicals associated with the production processes. The risk is considered manageable through appropriate storage system design, spill management procedures and stormwater management. Surface water management will be addressed in the Environmental Assessment for the project.

5.6.3 Waste Water Management

The EPL for the site limits the volume of treated waste water discharged from the factory to the waste water storage ponds to not exceed 1720 ML per year. This flow is directed

to the environmental farm for irrigation. The Environmental Farm covers 1000 ha of cleared grazing land. The treated waste water is limed ready for spray irrigation to produce forage, silage and pasture on licensed irrigation areas.

During prolonged wet weather, this treated waste water is directed to the wet weather storage ponds (capacity 925 ML) also situated within the Environmental Farm. The wet weather pond system presently comprises 6 ponds with a combined storage capacity of 925 ML and covering an area of around 15 ha. A 7th pond is to be constructed having an additional capacity of 220 ML. This will provide additional storage capacity to ensure that present operations can continue should a prolonged wet weather period be encountered before the proposed waste water treatment plant becomes fully operational.

For over 10 years, ground water and surface water monitoring has been undertaken across the farm providing a means to investigate irrigation practices.

It is estimated that the proposal will increase the production of waste water to 8.4 ML per day. It is estimated that up to 3.7 ML per day of this treated- waste water will be used for non-potable and potable requirements after re-processing through the proposed waste water treatment plant. The balance of the re-processed water will be used for irrigation on the Environmental Farm, be used by Australia Paper Mill or be transferred to Shoalhaven City Council for re-use in the longer term in the REMS Scheme.

It should also be noted that according to Shoalhaven Starches, the quality of the waste water will be significantly improved compared to the current waste water quality both in terms of COD loading and odour.

A comprehensive Waste Water Treatment Plant (WWTP) will be constructed in stages on the Environmental Farm associated with the Storage Ponds. The WWTP will have the volumetric capacity and operational capability to treat the total flow and organic load received from the Shoalhaven Starches site.

The WWTP will be constituted by sequential anaerobic digestion and aerobic digestion facilities.

The preferred anaerobic digester format, a Bulk Volume Fermenter (BVF), will be constructed from a 90 ML lagoon/ pond that will be completely covered with a gas tight floating cover. Infrastructure within the pond under the cover will facilitate the action of the anaerobic micro-organisms responsible for digestion of the soluble and suspended organic matter. The average residence time in the BVF will be about 10 days. Organic matter will be digested and concomitantly a mixture of methane and carbon dioxide will

be generated. A small negative pressure will be maintained under the cover so that the gas mixture (biogas) is continuously withdrawn for use as an energy source.

The BVF system was selected because it eliminates the need for any primary treatment such as dissolved air flotation; the BVF can accept all soluble and suspended solids. It generates very little waste sludge of its own and can digest the sludge/ biomass generated downstream by the aerobic system. The large size of the BVF and the volume of biomass provide a reactor that can absorb potential shock loadings of pH or temperature or solids content. Biogas will be drawn off uniformly and continuously which will be used in the boiler. The BVF requires fewer nutrient chemicals to be added for stable operation and requires a low level of manpower to operate.

Residual soluble organic matter in the effluent from the BVF is further removed under aerobic conditions by micro-organisms that live and multiply by using this soluble organic matter and so generate biomass (microbial cells) and purified water. This process will occur in a Sequential Batch Reactor (SBR) in which it is supplied with abundant oxygenation/ aeration during the reaction phase. After a settling phase, purified water is decanted from the biomass. Some of this sludge will be returned to the BVF for digestion and some will be applied to the land on the Environmental Farm.

The SBR cycle is under computer control. The batch kinetics allow for high removal rates due to high average substrate concentrations. Reaction can go to completion because there is no influent during the latter portions of the cycle which results in very low final effluent concentrations.

The quality of the purified water will be dependent on the extent of aerobic treatment; a more prolonged treatment will be required to comply with the Shoalhaven City Council EPL.

Figure 5 details a proposed water and waste water balance for the site following the ethanol upgrade project.

5.7 FLOODING

The factory and environmental farm are located on the Shoalhaven River floodplain which has a history of significant flooding. The largest recent flood in March 1978 had a flood level estimated at 4.2 metres AHD adjacent to the subject site. Flooding is therefore a key issue that will need to be addressed in any EA.

The Lower Shoalhaven Flood Study undertaken on behalf of the PWD in 1990 provided estimates for design flood levels adjacent to the subject site. Results from that study were used in a flood study undertaken by BHP Engineering in 1989 to address the

location of alternative floodways. In that report the 20 year average recurrence level (ARI) flood level in the Shoalhaven River was estimated to be approximately 4.2 m AHD at the site with a 100 year ARI estimated to be 5.3 m AHD.

It is understood that a Lower Shoalhaven Floodplain Management Study has been finalised, however the results of this study have as of yet not been released for public review.

The flooding impacts on any proposal on the site will require to be assessed, including the cumulative impacts of flooding as a result of development on the floodplain since 1990, and not just the incremental effects of the proposed works. The assessment is likely to be required to address flooding impacts in terms of economic, social and environmental impacts as well as impacts on future development. The assessment should also examine measures that could be incorporated into the project to mitigate and/or attenuate any impacts associated with the development.

5.8 HAZARD ANALYSIS

In general, risk assessment of industrial developments follows 5 basic steps:

- identification of potential hazards;
- an evaluation of safeguards to minimise the chance of occurrence of the identified hazards and their impact;
- an assessment of the magnitude of the consequences of the identified hazards;
- an assessment of the likelihood of occurrence; and
- an assessment of the risk by a combination of the consequences and likelihood's and comparison with tolerability criteria.

The Department of Planning has prepared a set of guidelines to help determine the level required according to the nature of the development:

- Multi-level Risk Assessment (MRA) describes the level and extent of the analysis reflecting the nature, scale, location of the proposed development;
- Hazardous Industry Planning Advisory Paper (HIPAP) No. 6 provides guidelines on requirements of the analysis;
- Hazardous Industry Planning Advisory Paper (HIPAP) No. 4 provides the adopted risk criteria for land use planning decisions;
- SEPP No. 33 provides a screening tool to determine whether a proposed development is hazardous and offensive, whether it requires a PHA, whether the

PHA needs to be qualitative or quantitative and whether a detailed transportation study is required.

As the proposal involves an increase in ethanol production, and therefore increases in the production, handling, storage and transportation of ethanol and associated chemicals the proposal will be subject to the provisions of SEPP No. 33 - Offensive & Hazardous Industry. The need for a Preliminary Hazard Analysis under the provisions of this SEPP to accompany the Environmental Assessment will need to be addressed. Given the nature and scale of the increase in ethanol production this also will be a key issue that will need to be addressed in any EA.

5.9 GEOTECHNICAL ISSUES AND RIVER BANK STABILITY

The bank of the Shoalhaven River adjacent to the Shoalhaven Starches factory site has a known history of recession. In addition, the development of the Shoalhaven Starches site has occurred over many years without the provision of an appropriate foreshore setback and riparian buffer. The river bank is reasonably high and dominated by exotic vegetation and weeds, predominantly coral trees and lantana.

As outlined in Section 4.1 of this PEA it should also be noted that the western portion of the site is affected by SLEP 1985 Amendment No. 171. The aims of this amending Local Environmental Plan include:

“b) Acknowledge the importance of establishing an adequate riparian buffer zone adjoining Bomaderry Creek and the Shoalhaven River by zoning an appropriate area Environmental Protection (F3) (Foreshores Protection) zone under the City of Shoalhaven Local Environmental Plan 1985.”

Figure 2 shows the extent of the 7(f3) zone as it affects the site. No works are proposed as part of this project within this area of the site.

A recent bank collapse has occurred along a small section of the bank and is currently being addressed by Shoalhaven Starches. Such events present risks to existing infrastructure on the site and generally require bank restoration and protection works to restore bank stability.

Given the above, if any future works associated with this project are proposed within close proximity of the river bank an assessment of the river bank stability should be undertaken for these aspects of the project and options for any necessary remediation/bank enhancements should be determined.

Whilst the site is physically constrained, any bank stabilisation options should endeavour to be sympathetic to the geomorphic and ecological functions of the riverbank in addition to providing any necessary bank stability function.

Options should also allow for the removal of exotic vegetation and weeds and incorporate the re-establishment of appropriate native vegetation. In addition to ecological and stability functions, native vegetation may assist the screening of both the existing and proposed infrastructure.

Undertaking bank stabilisation/enhancement works requires good access and if necessary, appropriate works should be investigated prior to the construction of any additional infrastructure before access is further impeded and to ensure that the riverbank/shoreline will be stable in the longer term, thereby enhancing protection for both existing and new infrastructure.

5.10 ACID SULPHATE SOILS

The Department of Energy and Water's Acid Sulfate Soils Risk maps indicate that the site has a low probability of acid sulphate soil (ASS) risk with localised occurrences of ASS likely at depths generally below 3 metres of the ground surface.

Potential acid sulphate soils are characterised by the presence of iron sulphide and jarosite. The sulphides are maintained in a stable state when completely waterlogged, ie. below the water table. If the water table falls however, air can penetrate the sulphide material, oxidising eventually to sulphuric acid.

Under the *"Acid Sulphate Soils Advisory Circular"* (Circular No. F11, Department of Planning) a number of options are outlined to manage areas containing acid sulphate as potential acid sulphate soils. Areas with this potential should select compatible land use techniques that do not result in a lowering of the water table. A high water table should be monitored and maintained. Better drainage management should also be included to prevent the formation of acid sulphate soils and prevent affected sites being over drained. Ameliorating acidity can also be achieved by neutralising the pH of the soil, traditionally achieved with the use of lime.

A review has been undertaken of the Department of Land and Water Conservation Acid Sulphate Soil Risk Map for Burrier/Berry (Map No. 2 Edition 2) as it relates to the subject site. The site is shown as comprising "A14" (Alluvial Levee Elevation 4 metres) characteristics.

The site is mapped as having a low probability of occurrence of acid sulphate soils within the soil profile. The maps indicate that the environment of deposition is generally not

suitable for the formation of acid sulphate soil materials. Soil materials are often Pleistocene in age. If acid sulphate soils are present, mapping indicates that they would be sporadic and may be buried by alluvium and windblown sediments, and would be at depths greater than 3 metres below ground surface.

In terms of environmental risk, the mapping indicates that this type of landform is not expected to contain acid sulphate soil materials, therefore land management is generally not affected by acid sulphate soils.

There is the potential for highly localised occurrence of acid sulphate soil materials to be found, especially near boundaries with environments with high probability of occurrence. Disturbance of these soil materials will result in an environmental risk that will vary with elevation and depth of disturbance.

Coffey Geotechnics have been previously engaged by Shoalhaven Starches to undertake acid sulphate soil investigations of the site subject. These investigations have identified, and essentially confirmed the ASS mapping provided by DWE, that field screening results also suggested that the soils within the upper 2 m were unlikely to be acid sulphate soils. According to Coffey Geotechnics it is probable that acid sulphate soils could occur at depths beyond those assessed in this study.

In considering this proposal, activities such as excavations for piling etc and any river bank stabilisation works in areas of ASS risk should be identified and if necessary an ASS management plan prepared. The level of assessment should be undertaken in a manner that is consistent with the NSW Government guidelines regarding assessing and managing acid sulfate soils from the *Acid Sulfate Soil Manual* by ASSMAC.

5.11 SOCIO-ECONOMIC IMPACTS

5.11.1 Economic Impacts

The proposed alterations and additions to the factory site will require a capital investment of around \$100 million.

The City has a high unemployment rate of 12.5%, which is higher than both the Illawarra and South Eastern Region (5.0%) and the State (4.9%). Unemployment is a very significant problem in the Shoalhaven due to the relatively limited employment opportunities and the desirability of the area as a place to live.

At this stage it is envisaged that the proposal will involve an additional workforce of up to 150 people during the estimated 9 month construction period of the development.

The existing factory site currently employs around 243 people. Following construction it is envisaged that the alterations and additions to the plant will not only assist in maintaining employment on the site but also provide up to an additional 25 direct ongoing jobs in the operation of the facility.

The EA should describe in detail the expected socio-economic impacts associated with this proposal including:

- Employment generated by proposal including full and part-time.
- Expected expenditure associated with project and the anticipated distribution of expenditure in terms of international, national and regional and local economies.
- The anticipated construction workforce associated with the proposal.
- The anticipated amenity impacts on the locality.

5.11.2 Community Consultation

The Shoalhaven Starches Plant is an important employer within the Shoalhaven; and creates a significant contribution to both the local, regional and State economy.

Given the scale of the proposed ethanol expansion capability on the site, and the potential impacts associated with such an expansion, it is Shoalhaven Starches view that prior to the preparation of the Environmental Assessment process that a community consultation process be undertaken that seeks to:

- increase the awareness of the community of the proposal;
- achieve feedback on the proposal;
- identify concerns raised by the community to the proposal and issues that may require to be addressed in any Environmental Assessment;
- inform the community of how Shoalhaven Starches will seek to address their concerns.

It is proposed that as part of the process of preparing the Environmental Assessment that a formal community consultation process will be undertaken involving both the community, relevant community interest groups as well as relevant government agencies.

In order to undertake this community consultation Shoalhaven Starches have engaged Twyford Consulting, a specialist community consultation consultancy firm, to devise an appropriate community engagement approach that would achieve the above stated objectives.

5.12 ECOLOGICAL ISSUES

A Flora and Fauna Assessment was originally undertaken by Kevin Mills & Associates for the previous PRP No. 7 project. The areas of the site assessed by this previous assessment included areas that will be the subject of this proposal.

With respect to these areas this assessment made the following comments:

The Eastern Part of the Site

This proposal will involve the siting of additional fermenters within this part of the site previously assessed by Kevin Mills & Associates, and now developed. The assessment by Kevin Mills & Associates made the following comments in relation to this land before it was developed in conjunction with the PRP No. 7 project:

This half-hectare of cleared land on the eastern side of the plant was covered by introduced grasses and other introduced herbaceous species, particularly Kikuyu Grass Pennisetum clandestinum, Clover Trifolium repens, Prairie Grass Bromus cartharticus, Ryegrass Lolium sp., Spear Thistle Cirsium vulgare and Ribbed Plantain Plantago lanceolata. Many other introduced plant species also occur there, such as Paddy's Lucerne Sida rhombifolia, Fat Hen Chenopodium album, Fleabane Conyza sp., Flatweed Hypochaeris radicata, Moth Vine Araujia hortorum, and other introduced plant species.

There was a row of trees along the southern and western edges of this site. The trees along the southern edge are a mixture of River Oak Casuarina cunninghamiana, Maple Acer sp., Fig Ficus hillii and various Eucalypts Eucalyptus spp. The trees along the southern edge were Maples and River Oaks. These trees should either be retained on the site, within the proposed carpark, or replaced with suitable native tree species.

Only a few common bird species were seen in the trees on this site, such as galahs, house sparrows, starlings, mynahs and finches; most of these species are introduced, as expected in the absence of good quality habitat.

The Western Part of the Site

This proposal will involve a range of works within this part of the site previously assessed by Kevin Mills & Associates, and now developed. The assessment by Kevin Mills & Associates made the following comments in relation to this land before it was developed in conjunction with the PRP No. 7 project

Most of this site is currently used for parking and the storage of materials. The land has been surfaced with gravel, bitumen and concrete. The exception is the southwestern corner of the site, behind the fence, where there is a small area of wasteland. This area is covered by plants, but almost all are weeds, such as Curled Dock Rumex crispus, Cobbler's Pegs Bidens pilosa, Common Sow-thistle Sonchus oleraceus, Bushy Starwort Aster subulatus, Flatweed Hypochaeris radicata, Spear Thistle Cirsium vulgare and Stagger Weed Stachys arvensis. The native Common Rush Juncus usitatus also occurs in this area.

*Along the river bank, there is a line of Swamp Oak *Casuarina glauca* and Fern-leaved Wattle *Acacia filicifolia*, and *Lantana camara* is common.*

Because this site is so small and lacks fauna habitat, no birds were seen. Many species, however, would occur along the river just beyond the southern boundary of the property.

Shoalhaven Starches Environmental Farm

The land used by the Shoalhaven Starches as an Environmental Farm has been cleared and farmed for more than a century. Located on the broad floodplain of the lower Shoalhaven River, the land is flat and some parts are criss-crossed with drains to assist in the removal of water from the land. Half of the farm is irrigated with waste water from the company's plant.

According to Kevin Mills & Associates, the paddocks have been pasture improved for many years and used for grazing. The native vegetation has almost totally disappeared, except along the edge of Broughton Creek. Trees dot the paddocks and form rows along some of the fence lines; some have regenerated since clearing, while others were obviously planted. The species include Swamp Oak *Casuarina glauca*, Radiata Pine *Pinus radiata*, Prickly-leaved Paperbark *Melaleuca styphelioides*, Narrow-leaved Paperbark *Melaleuca linariifolia*, Black Wattle *Acacia mearnsii*, Bangalay *Eucalyptus botryoides* and Norfolk Island Pine *Araucaria heterophylla*. In some places, there are low-lying depressions with tussocks of Rushes *Juncus* spp. and a few other wetland plants.

This previous assessment concluded:

"The proposed upgrade and expansion of the Environmental Farm are not expected to have an adverse impact on flora and fauna, in general, or on threatened species, populations and ecological communities, in particular. The proposed work is being undertaken to achieve a better outcome for the environment."

Given the subject proposal involves installation of additional plant within existing developed areas of the factory site and only works within the existing Pond No. 5 on the Environmental Farm, it is not anticipated that the proposal will raise significant issues in terms of threatened species or their habitats, as previously identified by Kevin Mills & Associates.

Under these circumstances the ecological impacts of the proposal are not considered to be a key issue, and will have a low level of significance in relation to the proposal.

5.13 HERITAGE AND ARCHAEOLOGICAL ISSUES

5.13.1 Aboriginal Archaeology

South East Archaeology were originally engaged by the Company to undertake an Aboriginal Archaeological Survey and Assessment of the development sites associated with the previous PRP No. 7 project.

The archaeological survey was undertaken in consultation with the Nowra Local Aboriginal Land Council and the Shoalhaven Aboriginal Elders. The findings and recommendations in part of this assessment included:

“The proposed extensions to the Shoalhaven Starches Environmental Farm facilities at Nowra will result in impacts to a maximum area of approximately 0.5 hectares in relation to the car park, 1.8 hectares for the evaporation plant and associated facilities, and a small proportion of a 34 hectare irrigation area in which irrigators and pipelines will be installed and drainage works will occur (Figures 1 & 2).

No Aboriginal heritage evidence has been identified within these areas during the present investigation or has been previously reported there. Considering the topographical context of the study area, results of this and other surveys in the region, and high levels of existing ground disturbance, it is highly unlikely that any evidence other than a very low-density distribution of artefacts may occur. Such evidence, if it exists, is unlikely to surpass the threshold for scientific significance.

Given the subject proposal essentially involves the installation of additional plant within existing developed areas of the factory site and only works within the existing Pond No. 5 within the Environmental Farm; it is not anticipated that the proposal will raise significant issues in terms Aboriginal archaeology, as previously identified by South East Archaeology. Under these circumstances the Aboriginal archaeological impacts of the proposal are not considered to be a key issue that will require further assessment or consideration and will have a low level of significance in relation to the proposal.

5.13.2 European Heritage

A review of heritage schedules of the IREP No. 1, and the National Trust register has revealed no known items of European heritage value on the factory site.

Council's recently gazetted heritage LEP does identify an item of environmental heritage on the Company's Environmental Farm, on Lot 23 DP 811233. This item is a weatherboard and iron farm house, which is dated to about 1910. The Heritage Study that supports the LEP describes this building as:

“Weatherboard and galvanised iron cottage reflecting the influence of the Federation style on the local Victorian Georgian idiom. The traditional hipped roof form with encircling verandahs has been modified by the

introduction of two projecting gables which effectively truncate the verandah, restricting it to two sides. In contrast to other nearby weatherboard cottages the structure is clad with broad edge moulded pine boards. Windows are simple 2x2 sash but those in the gabled projections reflect Federation style in the use of narrow flanking fixed lights. The building appears to be supported on brick piers. At the rear a single brick chimney defines the kitchen and adjacent skillion extension. The cottage is similar to urban forms such as Cambewarra Post Office."

The Heritage Study assessed the significance of this structure as follows:

"A simple weatherboard cottage reflecting the transition of the late Victorian vernacular style towards the Federation style. Characteristic of small farmhouses erected on land made available by the subdivision of the Berry Estate c.1900. Contributes to the Berry-Bolong pastoral landscapes. Local significance (Shoalhaven District)."

The factory site is located 2.0 kilometres to the south west and no works are envisaged within the environmental farm within the vicinity of this building. Under the circumstances it is considered that the project will have no significant impact on its heritage significance, and no further assessment is considered necessary in this regard.

5.14 ENERGY CONSUMPTION

The existing plant has the capacity to produce 170 t/h of process steam by five boilers. The boilers are primarily fuelled by coal.

The maximum demand for electrical power to the site is 20 MVA.

The Company also currently utilises 180 Terajoules of Natural Gas.

The total energy requirements for the plant resulting from the proposed increased in ethanol production is estimated to be:

- approximately 250 t/h process steam;
- approximately 28 MVA maximum demand of electrical power;
- up to 4 Petajoules Natural Gas (depending upon which energy supply option eventually selected).

The increase in energy requirements will be addressed by:

- The additional power supply will be provided from the electricity grid by upgrading the incoming power supply system.
- A gas fired co-generation plant is being proposed by the Company. This would supply electric power and process steam.

- The re-use of bio-gas obtained through the water treatment process to supplement the increased energy demand in the boilers. The biogas will be able to be directed to either the existing gas fuel boilers or coal fired boilers.

In June 2006 Shoalhaven Starches engaged the services of Energy & Management Services to undertake an energy audit of the factory processes and to identify potential improvements in energy performance. The Review encompassed coal, gas and electricity use. As a result of this audit significant opportunities were identified and analysed for cost effectiveness. Total savings from short term initiatives alone amounted to \$452,000 per annum. This review included a comprehensive approach to energy savings throughout the plant. The Company proposes to implement the same approach outlined in this report to similar components and strategies for the proposed ethanol upgrade project.

Just as important, this audit estimated that the site summer and winter peak demand could be reduced by 562 kW resulting in savings in the State's generation capacity requirements. The audit included preliminary modelling of a 14 MW cogeneration unit to supply most of the electrical load. This modelling indicated a potential for a cost effective energy initiative. Energy demand on the NSW generation system would then be reduced by a significant amount. This proposal therefore includes the construction of a gas powered cogeneration plant on the site. Dependent upon the economies of energy supply, to provide sufficient power to accommodate the proposed upgrade it is proposed to provide a co-generation plant to provide 30 MW.

5.15 VISUAL IMPACTS

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 landuses 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 factory site is visible would include:

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

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

Bolong Road – Bolong Road runs along the frontage of the site. Views of the plant 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 Pig Island and the vegetated riverbanks. **Plate 3** provides a view of the site from the banks of the Shoalhaven River from Terara.



Plate 3: View of Shoalhaven Starches factory site from Terara.

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. **Plate 4** provides a view of the site from Riverview Road.



Plate 4: View of Shoalhaven Starches factory site from Riverview Road.

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.

All the works associated with the upgrade to the ethanol production plant on the site are proposed essentially within the developed portion of the site, adjacent to structures of a similar height, bulk and scale.

The proposed structures within the existing factory site are generally of a similar height as the existing structures. The building forms, shapes and characteristics are also similar to those that presently exist on the site, and will conform to the visual character of the site, ie. it is industrial development within an industrial setting.

Overall it is considered that the proposed works will not necessarily create a significant adverse visual impact due, principally, due to the existing industrial development on the site. The EA will however need to consider the visual impact associated with the proposal from vantage points within the surrounding locality, including those identified above.

5.16 LAND CONTAMINATION

Given the industrial nature of the site and its history of use the EA document should also address the assessment and management of any land contamination to ensure that the land is not put to a use that may be inappropriate due to the presence of contamination. Under the Land Contamination Act there is a responsibility to notify the DECC of sites that pose a significant risk of harm to human health or the environment.

It should be noted that Coffey Geosciences have previously been engaged to review the likelihood of soil contamination associated with the site. In their most recent assessment of the site in terms of the proposed flour mill they concluded:

"The results of this preliminary study did not indicate concentrations of a suite of potential chemicals of concern above the adopted soil investigation levels for an industrial land use setting within the soil profile tested. Based on these results it appears that there is a low likelihood of widespread contamination in the soil that would adversely affect the proposed redevelopment works.

Access to the levee/river bank was poor at the time of the fieldwork and only surface soil samples could be collected. Based on the history of this area and the results of the surface samples it appears that there is a low likelihood that these soils would be contaminated."

It is envisaged that the objective of any land contamination assessment would be to provide information on the potential for soil contamination to be present within the portion of the factory site to be developed as part of this project and to make recommendations on the need for further investigation and or remediation, should contamination be present.

It is envisaged that such an assessment would include the following scope of work to meet the objectives of this assessment:

- a limited site history study which would include a walkover of the area where the upgrade works are to take place and holding interviews with persons familiar with the history of this part of the site;
- field investigations comprising excavation of test pits, from which the subsurface conditions can be logged and soil samples collected. In addition surface soil samples could also be collected from the accessible parts of the levee/river bank;
- laboratory analysis of selected soil samples for a suite of analytes including Total Petroleum Hydrocarbons (TPH), Benzene, Toluene, Ethylbenzene, Xylenes (BTEX), Polycyclic Aromatic Hydrocarbons (PAH), Polychlorinated Biphenyls (PCB), Organochlorine Pesticides (OCP), Organophosphorous Pesticides (OPP), asbestos

and heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc); and

- preparation of a report summarising the history, presenting the fieldwork and laboratory results, interpretation of the analytical results and findings, comparing contaminant concentrations to guidelines for industrial land use, providing recommendations on the need for further investigation, remediation and/or management with respect to soil contamination and acid sulfate soils (as applicable).

5.17 CUMULATIVE IMPACTS

Having regard to the findings of any investigation and assessments with respect to the above key issues it is considered that any EA should assess the potential impacts of the project including the potential cumulative impacts that may arise from the combined operation of the project and existing activities, and particularly with respect to:

- air quality impacts in terms of odour generation, dust (particulates) and green house gas emissions;
- noise
- waste water treatment and disposal
- traffic and transport

6.0 SUMMARY OF KEY ISSUES

Following consideration of the potential environmental issues arising in relation to this proposal, as discussed in Section 5.0 of this report, it is possible to establish that the key issues in relation to this project would include the following:

- odour management;
- air emissions and air quality control;
- greenhouse gas emissions;
- noise impacts;
- water and in particular waste water management;
- flooding;
- hazard analysis;
- geotechnical and river bank stability;
- potential acid sulphate soils;
- traffic and transport.

The above key issues will be required to be addressed in detail in any Environmental Assessment (EA) prepared for the project.

In addition to the above it is a recommendation of this preliminary assessment that Shoalhaven Starches undertake a comprehensive community consultation prior to preparing the EA document. Such an approach will ensure that issues of interest to the local community are addressed as part of the EA approach.

Ecological and Heritage (both Indigenous and non-indigenous heritage) in light of previous assessment undertaken for the site are considered to have a low level of significance in relation to the project.

7.0 DIRECTOR-GENERAL'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS

Cowman Stoddart Pty Ltd on behalf of Shoalhaven Starches Pty Ltd requests that the Director-General of Planning provides his requirements for the environmental assessment for the proposed expansion of the Shoalhaven Starches factory to accommodate an increase in ethanol production from the current approved 126 million litres per annum to 300 million litres per annum as outlined in this submission.

Steve Richardson

Town Planner CPP MPIA

ANNEXURES

ANNEXURE A

Recommendations of the Environmental Audit and Shoalhaven Starches Implementation Plan of the Audit Recommendations

ANNEXURE B

Correspondence Between Shoalhaven Starches and Shoalhaven City Council Concerning Waste Water Treatment.