

STATEMENT OF ENVIRONMENTAL EFFECTS

APPLICATION TO MODIFY PROJECT APPROVAL MP06_0228
SHOALHAVEN STARCHES EXPANSION PROJECT

MODIFICATION APPLICATION No. 19 (Mod 19)
(MADE PURSUANT TO S.4.55(1A) OF THE
ENVIRONMENTAL PLANNING & ASSESSMENT ACT)

PROPOSED UPGRADE TO ETHANOL DISTILLERY PLANT
TO INCREASE PROPORTION OF “BEVERAGE” GRADE ETHANOL
PRODUCED AND OTHER WORKS

SHOALHAVEN STARCHES
BOLONG ROAD, BOMADERRY

Prepared for
SHOALHAVEN STARCHES PTY LTD
September 2020

Statement of Environment Effects

Project	Application to Modify Project Approval MP06_0228, Shoalhaven Starches Expansion Project (Modification Application No. 19 (Mod 19)) – Proposed Upgrade to Ethanol Distillery Plant to Increase Proportion of “Beverage” Grade Ethanol Produced and Other Works
Address	Bolong Road, Bomaderry
Our ref:	20/31
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EXECUTIVE SUMMARY

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

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

Project Approval MP06_0228 was granted by the Minister for Planning on the 28th January 2009 for the Shoalhaven Starches Expansion Project. This approval also encapsulated previous approvals for the site into one overall approval for the site (at that time).

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

Following the Minister's determination Shoalhaven Starches have been implementing and commissioning works in accordance with this Project Approval.

The Shoalhaven Starches Expansion Project sought to increase ethanol production to meet the then expected increase in demand for ethanol arising from the NSW Government's mandate to increase the blending of ethanol in the total of volume of petrol sold in NSW towards an ethanol content of 10% by 2011. Unfortunately, the expected increase in demand for ethanol to meet the demand arising from this mandate has not occurred due largely from a failure of the mandate to be imposed on petroleum suppliers.

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

Shoalhaven Starches intend to undertake modifications to the existing Ethanol Distillery Plant located at their Bomaderry factory site to increase the proportion of 'beverage' grade ethanol that is able to be produced on the site. The modification will enable increased flexibility in terms of the range of types of ethanol produced at the site (ie. between fuel, industrial, pharmaceutical and beverage grade ethanol) to meet market demands.

The proposed modification will enable an increase in capacity of the plant to produce an additional 100 ML per year of beverage grade ethanol. The proposal will **not** however involve an increase in the overall ethanol production at the site above the current approved 300 ML per year.

In addition to the above this Modification Application will also seek approval for ancillary works associated with the approved Product Dryer and Specialty Product Buildings located to the west of Abernethy's Creek. These works include:

- The construction of a cable stay pipe bridge across Abernethy's Creek to supply power and product to these buildings.
- The construction of three (3) product silos above the existing interim packing plant. The construction of these three (3) silos will necessitate the relocation of an approved electrical substation that was approved (but not yet constructed) below and within the footprint of where it is now proposed to site the proposed product silos. This electrical sub-station is to be relocated to a position on the northern side (Bolong Road frontage) of the Starch Dryer No. 5 building.
- The relocation of six (6) approved but not yet constructed, and the construction of an additional ten (10) product storage tanks. Under the existing approvals for the site, ten (10) product storage tanks were to be sited to the rear of the Starch Dryer No. 5 and Specialty Product Buildings on the western side of Abernethy's Creek. Following detailed design, the diameter of the tanks has now increased and additional area is required for associated pumps and supporting equipment. As a result there is insufficient room to locate these tanks in the approved location.

These tanks will therefore be re-located; immediately to the east of the Starch Dryer No. 5 building (6 tanks); six (6) tanks will be constructed to the rear of the Specialty Product and Starch Dryer No. 5 buildings; and two sets of two (2) tanks each will be sited further to the south to the west of and adjacent to Abernethy's Creek. The northern most of these two sets of tanks will require the slight re-alignment of the approved but not yet constructed gantry that is to be constructed across this location.

Unrelated to the above works, it has also been ascertained that the extension of the existing electrical substation located on the eastern side of Abernethy's Creek will need to be relocated from the approved position due construction constraints in the approved location.

It is also proposed to extend the existing car park located within the western part of the site in a south-westerly direction to provide an additional thirty-one (31) car parking spaces for staff and contractors.

This Statement of Environmental Effects (SEE) has been prepared in support of this Modification Application.

Plans of the Modification Proposal are included in **Annexure 2**.

The Shoalhaven Starches Expansion Project was a ‘transitional Part 3A Project’ for the purposes of Schedule 6A of the Environmental Planning & Assessment Act. As of the 1st March 2018 the transitional arrangements for former Part 3A projects have been discontinued. The discontinuation of the transitional arrangements for Part 3A projects and concept plans means that modifications are assessed through the State Significant Development (SSD) pathway. As such this Modification Application is made pursuant to Section 4.55(1A) of the Environmental Planning & Assessment Act 1979.

The preparation of this SEE has been undertaken following consultation with the DPIE, the EPA, The Natural Resource Access Regulator (NRAR), Fire & Rescue NSW, The Australian Department of Defence and Shoalhaven City Council.

The SEE is supported by the following expert assessments:

- An Air Quality Impact Assessment by GHD (**Annexure 3**). GHD conclude that:
 - There will be a marginal increase in predicted odour impacts as a result of the modification. The odour criteria however will be met at all residential sensitive receptors and it is considered highly unlikely that the increase in odour would be detected at sensitive receptors.
 - Air quality impacts are predicted to comply with the criteria at all residential sensitive receptors.
 - Overall, the proposal should be acceptable from an air quality perspective.
- A Noise Assessment by Harwood Acoustics (**Annexure 4**) makes the following conclusions:
 - Noise producing aspects of this proposed modification include the processing plant and equipment associated with the modifications to the distillery, the proposed cooling towers and the pump motors associated with the product storage silos.
 - The level of noise emission from the modification to the ethanol distillery will be within the noise design goals derived from Environment Protection Licence 883 noise limits at each receptor location without the need for additional noise controls at this stage.
 - A final assessment of required noise controls will be undertaken at the time of the Design Noise Verification process prior to construction, or during commissioning, as required, to ensure the noise design goals are met at all receptors.

- The level of noise emission from the construction phase of the project will be within the noise management levels set by the NSW EPA's *Interim Construction Noise Guideline* with the exception of piling activity on some occasions.
- Construction noise mitigation measures are included in the Construction Safety & Environmental Management Plan prepared by Shoalhaven Starches.
- A Flood Compliance Report prepared by WMA Water (**Annexure 5**) concludes there would be no significant incremental increase in the 1% AEP flood level as a result of the proposed works.
- A Preliminary Hazard Analysis (PHA) undertaken by Pinnacle Risk Management (**Annexure 6**) that assess the risks associated with the proposed modifications and provides a comparison against relevant risk criteria. The PHA demonstrates the Modification Proposal will comply with all risk criteria. The PHA also concludes that societal risk, area cumulative risk and environmental risk will be acceptable.
- A Traffic Impact Assessment prepared by Bitzios Consulting (**Annexure 7**) that concludes
 - The modification will not result in any changes to access location or form and the vehicle types accessing the site will not change.
 - A swept path assessment demonstrates that a design service vehicle (25m B-Double) can safely and efficiently access the proposed load out and circulate the relevant areas of the site.
 - The proposed car parking provision exceeds the expected permanent and temporary / construction parking requirements.
 - The proposed extension of the western car park complies with relevant requirements of AS2890.1
 - Excluding construction traffic, the proposed modification is expected to generate no additional heavy vehicle movements and a maximum of two (2) light vehicle trips in the AM and PM peak hours.
 - Construction traffic volumes are not expected to have an adverse impact on the surrounding road network.
 - The Modification Proposal is not expected to have any adverse impacts on the surrounding road network in relation to the Bolong Road railway crossing at the heavy rail site access.

- Based on the above assessment Bitzios conclude that there are no significant traffic or transport impacts associated with the proposed development expansion to preclude its approval and relevant conditioning on traffic or transport planning grounds.
- A Geotechnical and Riverbank Stability Assessment by GHD (**Annexure 8**) that concludes the proposed works at all sites will have no influence on the stability of the northern bank of the nearby Shoalhaven River, western bank of Abernethy's Creek and eastern bank of Bomaderry Creek. This assumes that all structures will be supported on deep piles founded in weathered rock and therefore will not increase loading of the ground adjacent to the banks. Short term construction loading of the ground surface adjacent to the western bank of Abernethy's Creek will need to be assessed for stability, including crane pad and piling platform assessments. Creek bank erosion protection may be required where removal of vegetation or ground disturbance occurs over the creek bank during construction.
- A Site Contamination Assessment carried out by GHD (**Annexure 8**). Based on site history and site observation results, potential for contamination was identified by GHD in five areas of environmental concern (AECs) which included:
 - AEC 1: Storage and use of fuels and chemicals associated with operations at the plant.
 - AEC 2: Potential weathering of hazardous building materials and demolition of site structures
 - AEC 3: Potential application of pesticides, herbicides, fertilisers
 - AEC 4: Fill of unknown quantity and origin
 - AEC 5: Storage and use of PFAS based firefighting foams

Based upon the findings of their investigation GHD have made a number of recommendations in order to further assess or mitigate contamination risks associated with these sites.

- An Acid Sulphate Soils (ASS) Assessment carried out by GHD (**Annexure 8**) identifies that ASS could be encountered within alluvial soils underlying the fill materials at depths ranging from 1 m to 4 m depending upon the location on the overall site. Disturbance of ASS is likely to occur at these sites according to GHD as CFA piles will be used to excavate foundations. GHD recommended that an acid sulphate soil management plan (ASSMP) should be developed and actioned where excavations associated with the Modification proposal will disturb ASS and / or require dewatering which could result in the lowering of the water table.

The Modification Application will not involve changes to the size, scale or intensity of the existing Shoalhaven Starches operations. The modification proposal will not result in any increases in

overall production rates from the site, nor will it involve any significant changes in level of impacts arising from the approved development.

The SEE concludes that the proposed modifications will have minimal environmental impacts; and the development to which Project Approval MP06_0228 as modified by the Modification Application relates, will be substantially the same development as the development for which this consent was originally granted and before that consent as originally granted was modified.

1.0 INTRODUCTION

Project Approval MP06_0228 was granted by the Minister for Planning on the 28th January 2009 for the Shoalhaven Starches Expansion Project. This approval also encapsulated previous approvals for the site into one overall approval for the site (at that time).

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

Following the Minister's determination, Shoalhaven Starches have been implementing and commissioning works in accordance with this approval.

The Shoalhaven Starches Expansion Project sought to increase ethanol production to meet the then expected increase in demand for ethanol arising from the NSW Government's mandate to increase the blending of ethanol in the total of volume of petrol sold in NSW towards an ethanol content of 10% by 2011. Unfortunately, the expected increase in demand for ethanol to meet the demand arising from this mandate has not occurred due largely from a failure of the mandate to be imposed on petroleum suppliers.

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

Shoalhaven Starches intend to undertake modifications to the existing Ethanol Distillery Plant located at their Bomaderry factory site to increase the proportion of 'beverage' grade ethanol that is able to be produced on the site. The modification will enable increased flexibility in terms of the range of types of ethanol produced at the site (ie. between fuel, industrial, pharmaceutical and beverage grade ethanol) to meet market demands.

The proposed modification will enable an increase in capacity of the plant to produce an additional 100 ML per year of beverage grade ethanol. The proposal will **not** however involve an increase in the overall ethanol production at the site above the current approved 300 ML per year.

In addition to the above this Modification Application will also seek approval for ancillary works associated with the approved Product Dryer and Specialty Product Buildings located to the west of Abernethy's Creek. These works include:

- The construction of a cable stay pipe bridge across Abernethy's Creek to supply power and product to these buildings.
- The construction of three (3) product silos above the existing interim packing plant. The construction of these three (3) silos will necessitate the relocation of an approved electrical substation that was approved (but not yet constructed) below and within the footprint of where it is now proposed to site the proposed product silos. This electrical substation is to be relocated to a position on the northern side (Bolong frontage) of the Starch Dryer No. 5 building.
- The relocation of six (6) approved but not yet constructed, and the construction of an additional ten (10) product storage tanks. Under the existing approvals for the site, ten (10) product storage tanks were to be sited to the rear of the Starch Dryer No. 5 and Specialty Product Buildings on the western side of Abernethy's Creek. Following detailed design, the diameter of the tanks has now increased and additional area is required for associated pumps and supporting equipment. As a result there is insufficient room to locate these tanks in the approved location.

These tanks will therefore be re-located immediately to the east of the Starch Dryer No. 5 building (6 tanks); six (6) tanks will be constructed to the rear of the Specialty Product and Starch Dryer No. 5 buildings; and two sets of two (2) tanks each will be sited further to the south within the site adjacent to and to the west of Abernethy's Creek. The northern most of these two sets of tanks will require the slight re-alignment of the approved but not yet constructed gantry that is to be constructed across this location.

Unrelated to the above works, it has also been ascertained that the extension of the existing electrical substation located on the eastern side of Abernethy's Creek will need to be relocated from the approved position due construction constraints in the approved location.

It is also proposed to extend the existing car park located within the western part of the site in a south-westerly direction to provide an additional thirty-one (31) car parking spaces for staff and contractors.

The Modification Application will not involve changes to the size, scale or intensity of the existing Shoalhaven Starches operations. The modification proposal will not result in any increases in production rates from the site, nor will it involve any changes in level of impacts arising from the approved development.

The Modification Application is made pursuant to Section 4.55(1A) of the Environmental Planning & Assessment Act. This SEE has been prepared in support of the Modification Application.

The SEE has been prepared following consultation with the:

- DPIE;
- EPA;
- NRAR;
- Fire & Rescue NSW;
- Australian Department of Defence;
- Shoalhaven City Council

Responses from the above government agencies that have been received at the time of preparing this SEE are included as **Annexure 1** to this SEE.

The Modification Application is supported by plans included in **Annexure 2**, and the following expert assessment reports:

- Air Quality Assessment prepared by GHD Pty Ltd (**Annexure 3**);
- An Environmental Noise Impact assessment prepared by Harwood Acoustics (**Annexure 4**);
- A Flood Compliance Report prepared by WMA Water (**Annexure 5**);
- A Preliminary Hazard Analysis prepared by Pinnacle Risk Management (**Annexure 6**).
- A Traffic Impact Assessment prepared by Bitzios Consulting (**Annexure 7**);
- A Geotechnical, Contamination, Acid Sulphate Soil and Riverbank Stability Assessment prepared by GHD (**Annexure 8**).

It is considered that the components associated with this Modification Application will not have any significant adverse environmental impacts; and as a result of this Modification Application the development to which Project Approval MP06_0228 as modified relates will be substantially the same development as the development for which this consent was originally granted and before that consent as originally granted was modified.

2.0 SITE AND SURROUNDS

2.1 LOCAL AND REGIONAL CONTEXT

The Shoalhaven Starches factory complex is situated upon various allotments of land along Bolong Road, Bomaderry, within the Shoalhaven local government area. The factory site is located on the southern side of Bolong Road on the northern bank of the Shoalhaven River with some operations located on the northern side of Bolong Road. The Shoalhaven Starches site (excluding the former Dairy Farmers and former Paper Mill sites) has an area of approximately 12.5 hectares.

The works associated with this modification proposal involve the following parcels of land:

- Lot 1 DP 838753;
- Part Lot 241 DP 1130535;
- Lot 143 DP 1069758;
- Lot B DP 376494;
- Lots A & B DP 334511;
- Lot 4 DP 548205;
- Lot 2 DP 548659;
- Lots 31 and 34 DP 1222627.

Figure 1 is a site locality plan.

The land associated with this modifications is zoned IN1 (General Industrial) zone under the provisions of SLEP 2014.

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

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

There are a number of industrial land uses which have developed on the strip of land between Bolong Road and the Shoalhaven River. Industrial activities have included a metal fabrication factory, the Shoalhaven Starches site and the former Dairy Farmers factory and Shoalhaven Paper Mill (now owned by the Manildra Group of Companies). The industrial area is serviced by a privately owned spur railway line that runs from just north of the Nowra-Bomaderry station to the Starches Site.

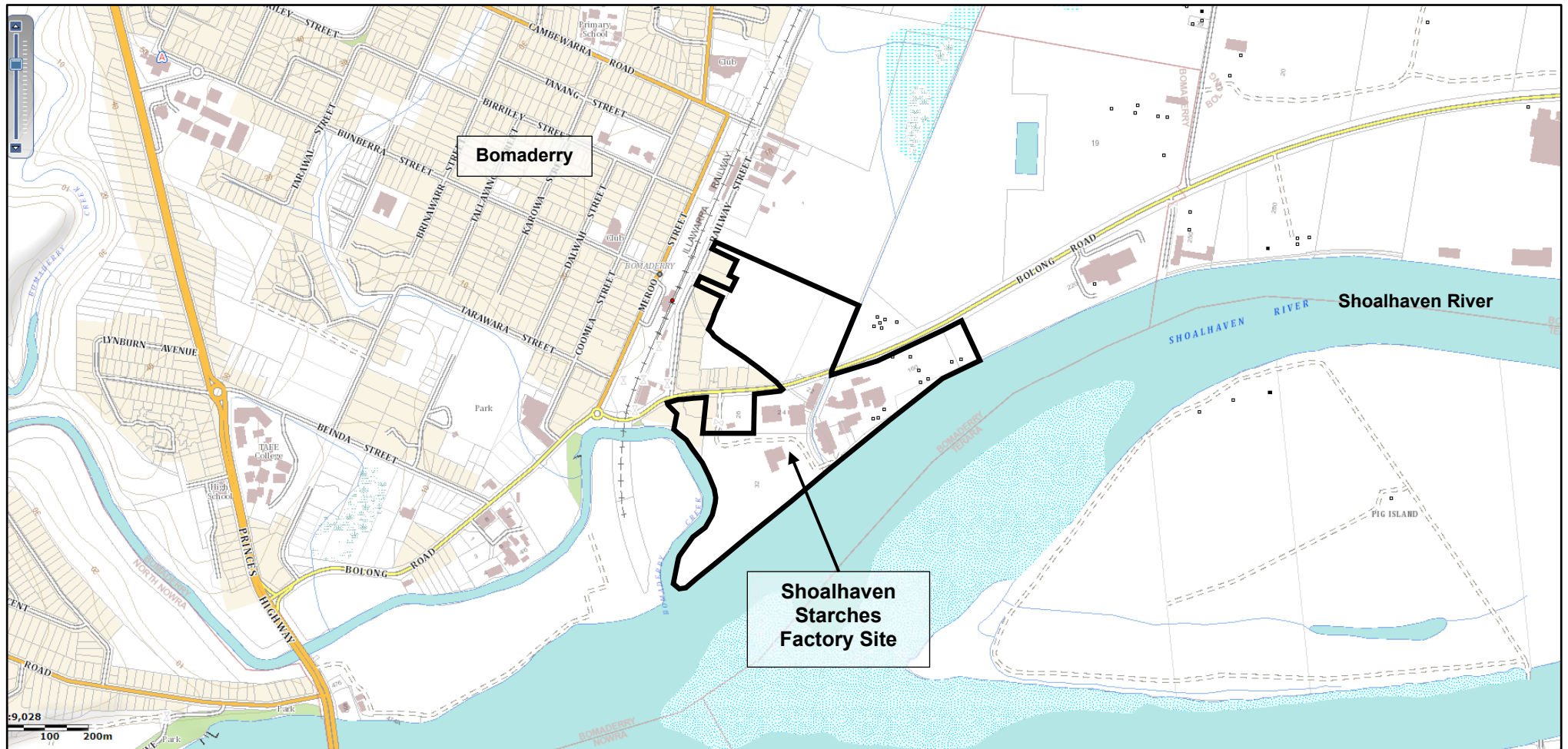


Figure 1: Site Locality Plan.

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

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

The factory site has direct road frontage to Bolong Road to the north. The Shoalhaven River flows along the southern boundary of the factory site.

Figures 2 and 3 are aerial photographs of the locality and the site respectively. **Figure 4** shows the location of the ethanol plant; **Figure 5** shows the location of the additional cooling towers; and **Figure 6** shows the area of the factory to the west of Abernathy's Creek.



Figure 2: Aerial photograph of locality.



Figure 3: Aerial photograph of Shoalhaven Starches factory site.



Figure 4: Aerial view of existing ethanol plant.

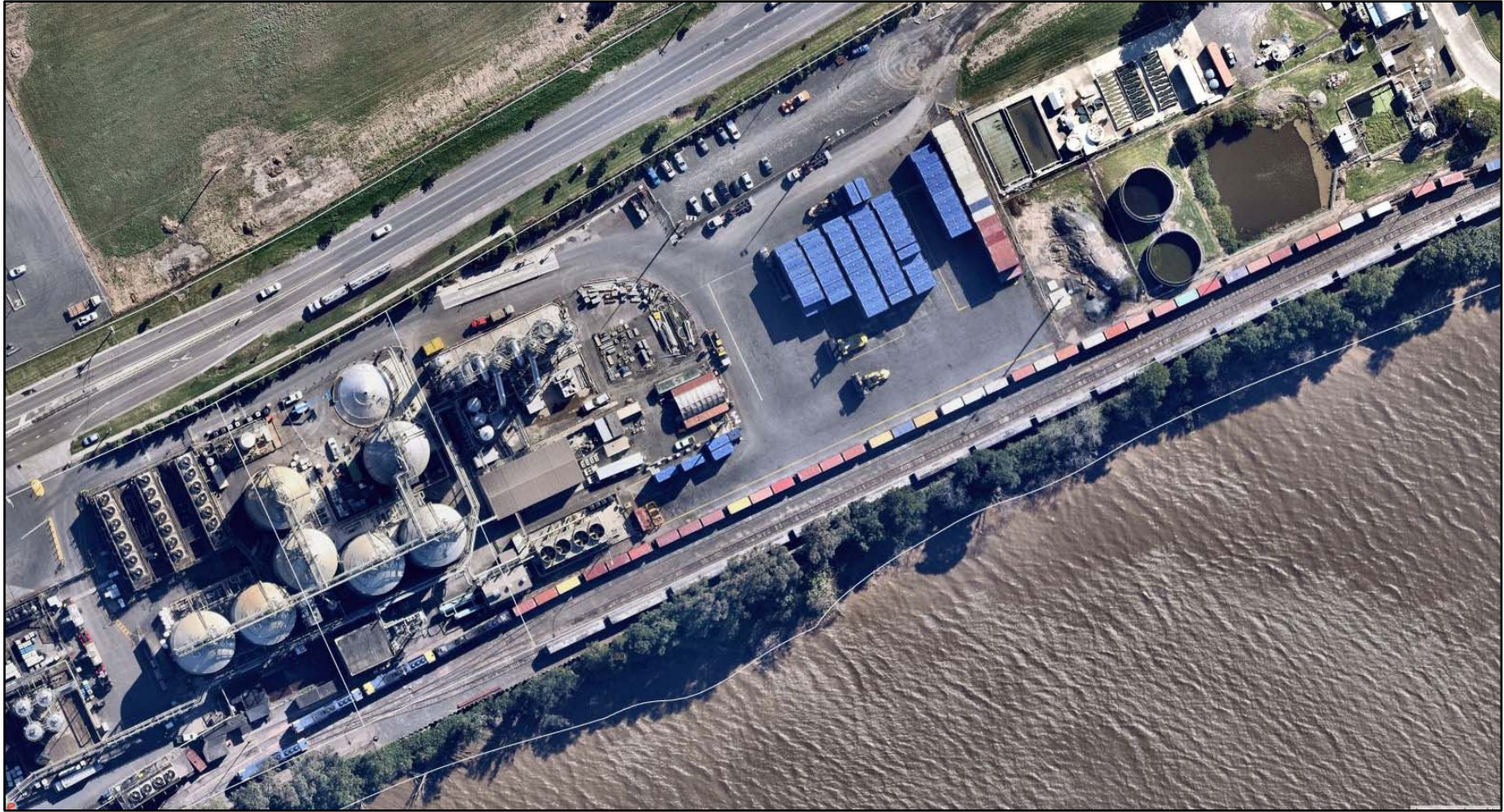


Figure 5: Location of additional cooling towers.



Figure 6: Aerial view of location of proposed specialty products and product dryer buildings location.

3.0 BACKGROUND

3.1 PRODUCTION PROCESSES

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

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

The Company received approval from the Minister for Planning for the erection of flour mills 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 requirements 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 starch that is separated from the flour is either dried or remains in liquid form. The dried and liquid starch is sold to the paper and food industries. The starch is used for food, cardboard, paper and other industrial purposes. Liquid starch is used in the ethanol production process.

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

The by-products from the starch, gluten and syrup production processes are combined to feed the fermentation and distillation stage of ethanol production. The outputs are fuel, industrial and beverage grade ethanol. Industrial grade ethanol is used in producing pharmaceuticals, printer's ink and methylated spirits.

Ethanol production results in some liquid and solid by-products, which are processed through the stillage recovery process plant (which was approved as part of PRP No. 7 in 2005). The solids in the stillage are recovered as Dried Distillers Grains Syrup (DDGS), dried and sold as a high protein cattle feed with the remaining water used for irrigation.

The wastewater resulting from the ethanol production is treated in the wastewater treatment plant located on the northern side of Bolong Road and is re-used in the Starch Plant and the surplus is irrigated onto Shoalhaven Starches Environmental Farm to the north of Bolong Road. This farmland is used for fodder crops, pasture and cattle grazing.

Boilers are used to produce steam which is used for a multitude of purposes throughout the factory site wherever product is dried, evaporated or heated.

3.2 RECENT DEVELOPMENT AND APPROVAL HISTORY

3.2.1 Project Approval MP 06_0228

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

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

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

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

In addition, as part of the Project Approval, Shoalhaven Starches were required to undertake comprehensive odour reduction measures for both the existing factory site and the works associated with the Expansion Project.

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

The Project Approval also enabled the biological treatment of waste waters from the factory site and the re-use of over half the treated wastewater within the factory processes,

with the remainder irrigated onto the Company's Environmental Farm. The Project Approval also consolidated all previous approvals into the one approval so that there would be essentially one approval for the site.

3.2.2 Approval History following MP 06_0228

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

Project Approval MP 06_0228 required vehicle access points to the Bomaderry site to be upgraded to the satisfaction of Council and the RMS. The subsequent upgrading works included the construction of a concrete median along the centre of Bolong Road to the east of Abernethy's drain in such a manner that prevented vehicles travelling east along Bolong Road turning right into the central vehicle access point to the Shoalhaven Starches site and prevented vehicles turning right out from this access point and travelling east along Bolong Road.

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

RA 11/1002 Interim Packing Plant

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

DA 11/1855 – Widening of Driveway

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

DA 13/1713 – Demolition of Dimethyl Ether Plant

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

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

On the 19th September 2014 Shoalhaven Starches submitted a development application to Shoalhaven City Council seeking development consent to erect two additional grain silos on the factory site within the vicinity of the existing Flour Mill, to provide security of raw material storage and supply when there are closures of the Illawarra rail line serving the Shoalhaven Starches site. Shoalhaven City Council approved this development application on the 27th April 2017.

DA 16/1827 – Demolition of Existing Air Compressor Shed

On the 7th July 2016 Shoalhaven Starches submitted a development application to Shoalhaven City Council seeking the demolition of an existing air compressor shed on the site. This development application was approved by Shoalhaven City Council on the 29th July 2016.

Other Approvals

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

- DA 11/1936 – Algae Demonstration Plant for evaluation of algae production and processing for alternative fuel and CO₂ sequestration. Proponent - Algae Tec Pty Ltd at 220 Bolong Road (former Dairy Farmers factory site).
- DA 14/1327 – Alterations to existing building (former Dairy Farmers Factory Building) and re-use as a meat processing plant. Proponent – Candal Investments Pty Ltd at 220 Bolong Road (former Dairy Farmers factory site).
- DA 15/1892 – Installation of Liquid Oxygen Vessel (6,000L). Proponent – Argyle Prestige Meats Ltd at 220 Bolong Road (former Dairy Farmers factory site).

Recent Modification Applications

Project Approval MP 06_0228 has also been the subject of the following recent modifications applications (**Table 1**).

Table 1
Summary of Recent Modification Applications (2015 – 2017)

Modification	Summary of Modifications
Modification 11	<ul style="list-style-type: none"> Reducing the number of approved DDGS Dryers from six to four. A minor modification to the footprint of the four DDG dryers. Relocation of the cooling towers in the DDG Plant. A Mill Feed Silo and structure to feed DDG dryers. Expanded use of the existing coal and woodchip storage area within the SS Environmental farm. The addition of two biofilters to cope with the increased number of DDG Dryers. A forklift maintenance building adjacent to the relocated DDG dryers, along with a container preparation area adjacent to the relocated DDG Dryers.
Modification 12	Modifications to the existing Ethanol Distillery Plant to increase the proportion of ‘beverage’ grade ethanol that is able to be produced on the site. This modification will enable increased flexibility in terms of the range of types of ethanol produced at the site (ie. between fuel, industrial and beverage grade ethanol) to meet market demands; and modify the type and location of the Water Balance Recovery Evaporator that has been previously approved under Mod. 2 adjacent to the Ethanol Plant.
Modification 13	<ul style="list-style-type: none"> Modification of boilers 2 and 4, with the conversion of boiler 4 from gas fired to coal fired. Installation of an additional baghouse on boiler 6.
Modification 14	Modifications to the former paper mill site.
Modification 15	Construction of the SupaGas CO2 plant at the former Dairy Farmer factory site.
Modification 16	<ul style="list-style-type: none"> Installation of a third flour mill C within the existing flour mill B building. Undertaking modifications to flour mills A and B. The construction of a new industrial building adjoining the Starch Dryer No. 5 building containing: <ul style="list-style-type: none"> The new product dryer; Plant and equipment associated with the processing of specialised speciality products. Addition to Starch Dryer No 5 building to house a bag house for this dryer <ul style="list-style-type: none"> Conversion of two existing gluten dryers (1 and 2) to starch dryers. Additional sifter for the interim packing plant. Construction of a coal-fired co-generation plant to the south of the existing boiler house complex. The co-generation plant will house a new boiler (No. 8). Construction of lime silos: The lime injection system will consist of two storage silos and associated equipment for injecting powdered lime into each of the coal fired boilers. Relocation of the existing boiler no. 7 to the northern side of the overall boiler house complex. Construction of an indoor electrical substation on the northern side of Bolong Road. Construction of an additional rail intake pit for the unloading of rail wagons. Extension of the existing electrical substation located within the main factory area.

Table 1 (continued)

Modification	Summary of Modifications
Modification 17 (yet to be determined)	<ul style="list-style-type: none"> • Relocation of Baghouse for Starch Dryer No. 5. • Installation of Service Lift adjacent to Starch Dryer No. 5. • Elevating Service Conduit extending from factory site on southern side of Bolong Road to approved packing plant on northern side of Bolong Road above ground. • Use of woodchips as fuel source in Boilers 2 and 4. • Modification to condition 14J(e) – Amendment to design specification for silencers to exhaust fans for Flour Mill B. • The increase in the building footprint of Product Dryer Building (PDB). • The increase in the building footprint of the Specialty Products Building (SPB) which adjoins the PDB building. • The provision of additional bulk chemical storage to the south of the PDB and SPB buildings. • Demolition of part of the existing Maintenance Office and Stores to facilitate the extension of the PDB and SPB buildings to the west. • Repurposing the remaining part of the Maintenance building to provide staff amenities and Plant Operation Control Rooms. • To facilitate internal truck movements associated with the amendments to the SPB, existing car parking (48 spaces) currently located to the north and west of the Maintenance building will be relocated to an existing approved car parking located on the north side of Bolong Road. • Extend the sifter room situated on top of the interim packing plant. • Install a Product Dryer (No. 9) within the footprint of the SPB as approved under Mod 16.
Modification 18	<ul style="list-style-type: none"> • Relocation of Approved Gas Fired Boiler and other Associated Works to Facilitate Production of 'Hand Sanitiser' Alcohol in response to COVID 19 Crisis.

4.0 CONSULTATION

Prior to the preparation of this SEE consultation has been undertaken with:

- Department of Planning, Industry and Environment;
- EPA;
- Natural Resource Access Regulator (NRAR);
- NSW Fire & Rescue;
- Shoalhaven City Council;
- Australian Department of Defence.

A meeting was held between staff from DPIE, Shoalhaven Starches and Cowman Stoddart on the 12th June 2020. Following that meeting DPIE staff advised that formal requirements for the preparation of this SEE were not required.

Written consultation was undertaken separately with the EPA, NRAR, NSW Fire & Rescue, SCC and the Department of Defence. At the time of preparing this SEE responses have been received from the EPA, NRAR and Department of Defence, and these responses are included in **Annexure 1** to this SEE. The following is a summary of the responses made by government agencies to this proposal at the time of preparing this report.

EPA

The following email response was received from Janine Goodwin, Unit Head South East Region of the EPA on the 7th August 2020:

"Thank you for your email 6 August seeking comments from the EPA. My understanding from our telephone conversation was that given the time lapsed, and that the mod application was going to be lodged with Planning shortly, that you no longer required a submission from the EPA. I apologise that this was obviously not your take away from the conversation, and hope this hasn't caused unnecessary delays."

At this stage, the EPA does not have any specific comments in relation to the draft proposal.

The EPA advises that the application will need to assess the proposed changes to any infrastructure and processes at the premises, and identify potential impacts on expected pollution emissions from these modifications. Any identified impacts that may result in changes to current pollutant emissions from the premises will need to be adequately evaluated against appropriate legislative requirements and government guidelines."

NRAR

The following email response was received from David Zerafa, Senior Water Regulation Officer with the NRAR:

I have considered your request regarding the proposed modification to MP06_0228 and associated plans you have provided.

I can advise that NRAR has no specific requirements for consideration for any modifications contained within the footprint of the existing Shoalhaven Starches complex as is the case in this proposal.

Australian Department of Defence

The following responses was received from the Australian Department of Defence in correspondence dated 22nd July 2020.

Thank you for referring the abovementioned proposal to the Department of Defence (Defence) for comment. The site is approximately 10.65 kilometres northeast of HMAS Albatross and has a natural ground level of approximately 4.00 metres Australian Height Datum (AHD). Defence understands the proposed development to be at 56.40 metres above ground level (AGL) which is 60.40 metres AHD. A crane is proposed to be used during construction that will extend to a maximum height of 84.00 metres AGL which is 88.00 metres AHD.

Defence is duly concerned to ensure its operations at HMAS Albatross are not constrained by incompatible development on surrounding land. The Obstacle Limitation Surface (OLS) assessment has determined that the proposed development will not infringe the OLS.

We request that HMAS Albatross be notified at commencement of construction and completion of construction to ensure that it is a known hazard from the outset. Correspondence is to be sent to david.anderson@defence.gov.au.

The proposed development meets the requirement for reporting of tall structures. Defence therefore requests that the proponent provide Defence and Air Services Australia (ASA) with “as constructed” details for the facility. The details can be emailed to ASA at vod@airservicesaustralia.com.

5.0 PROPOSED MODIFICATION TO PROJECT APPROVAL MP06_0228

5.1 SUMMARY OF MODIFICATION PROPOSAL

Table 2 below provides a summary of the proposed works associated with this Modification Application.

Table 2
Summary of Proposed Works under Mod 19

Factory Component	Proposed Works associated with Modification Application No. 19 (Mod 19)
<u><i>Upgrades to Beverage Grade Ethanol Plant</i></u>	
Ethanol Plant	<ul style="list-style-type: none"> • Installation of additional distillation columns and associated processing equipment within the Ethanol Distillery Plant. • Three (3) additional Ethanol Storage Tanks. • Additional Ethanol Loadout. • Associated twelve (12) additional cooling towers. This necessitates the relocation of the approved ISO Container Storage Area. • Relocation of Ethanol Distillery Control Room.
<u><i>Other Modification Works</i></u>	
Specialty Product and Starch Dryer No. 5 Buildings	<ul style="list-style-type: none"> • Construction of Cable Stay Pipe Bridge from eastern side of Abernethy's Creek to Specialty Product and Starch Dryer No. 5 building. • Relocation of six (6) approved but not constructed product tanks and construction of additional ten (10) new product tanks.
Interim Packing Plant	<ul style="list-style-type: none"> • Three (3) additional product silos above interim packing plant. • The construction of the above product silos will require the relocation of the approved but not yet constructed electrical substation to the northern side of the Starch Dryer No. 5 building.
Electrical Substation	<ul style="list-style-type: none"> • Relocation of approved electrical sub-station on eastern side of Abernethy's Creek due to construction constraints in the approved location.
South-western Car Park	<ul style="list-style-type: none"> • Extend the existing car park located within the south-western part of the site to provide an additional thirty-one (31) car parking spaces.

5.2 ETHANOL PLANT UPGRADE WORKS

5.2.1 Upgrades to beverage grade ethanol plant

Shoalhaven Starches intend to undertake modifications to the existing Ethanol Distillery Plant located at their Bomaderry factory site to increase the proportion of 'beverage' grade ethanol that is able to be produced on the site. The modification will enable increased flexibility in terms of the range of types of ethanol produced at the site (ie. between fuel, industrial, pharmaceutical and beverage grade ethanol) to meet market demands.

The proposed upgrades to beverage grade facility under Mod 19 will be designed to make up to 100 ML of beverage grade ethanol per annum at 96.5 vol% ethanol.

There will however be no increase in overall ethanol production above the current approved 300 ML per year and no increase in waste-water generation as a result of the modification.

Under Project Approval MP-06-0228 Shoalhaven Starches are limited to the production of 300 ML of ethanol per annum. Mod 12 enabled the production of 110 ML of beverage grade ethanol within the overall 300 ML production limitation.

Under Mod 19 it is proposed to produce an additional 100 ML of beverage grade ethanol per annum. As a result, within the overall ethanol production limitation of 300 ML per annum, Shoalhaven Starches will be able to produce up to 210 ML of beverage grade ethanol per annum and 90 ML of all other grades of ethanol per annum (ie. totalling 300 ML per annum).

Following approval of the recent Mod 18, of the 210 ML of beverage grade ethanol that will be able to be produced (including under the current proposed Mod 19), Shoalhaven Starches will be able to produce up to 120 ML of hand sanitiser grade ethanol. This will leave up to 90 ML of beverage grade ethanol to be able to be produced. Of the 120 ML of hand sanitiser grade ethanol, Shoalhaven Starches will produce on site 1.5 ML of hand sanitiser Product.

Importantly, as outlined above, this modification seeks to enable increased flexibility in terms of the range of types of ethanol produced at the site (ie. between fuel, industrial, pharmaceutical and beverage grade ethanol) to meet market demands. As a result Shoalhaven Starches want to be able to be able to manage their production of different grades of ethanol on-site to be able to meet changes in market demand, whilst maintaining an overall ethanol production limitation of 300 ML per annum.

Figure 7 below provides a diagrammatic representation of the maximum annual ethanol production from the Shoalhaven Starches factory site having regard to the relevant Modification Applications including the proposed Mod 19.

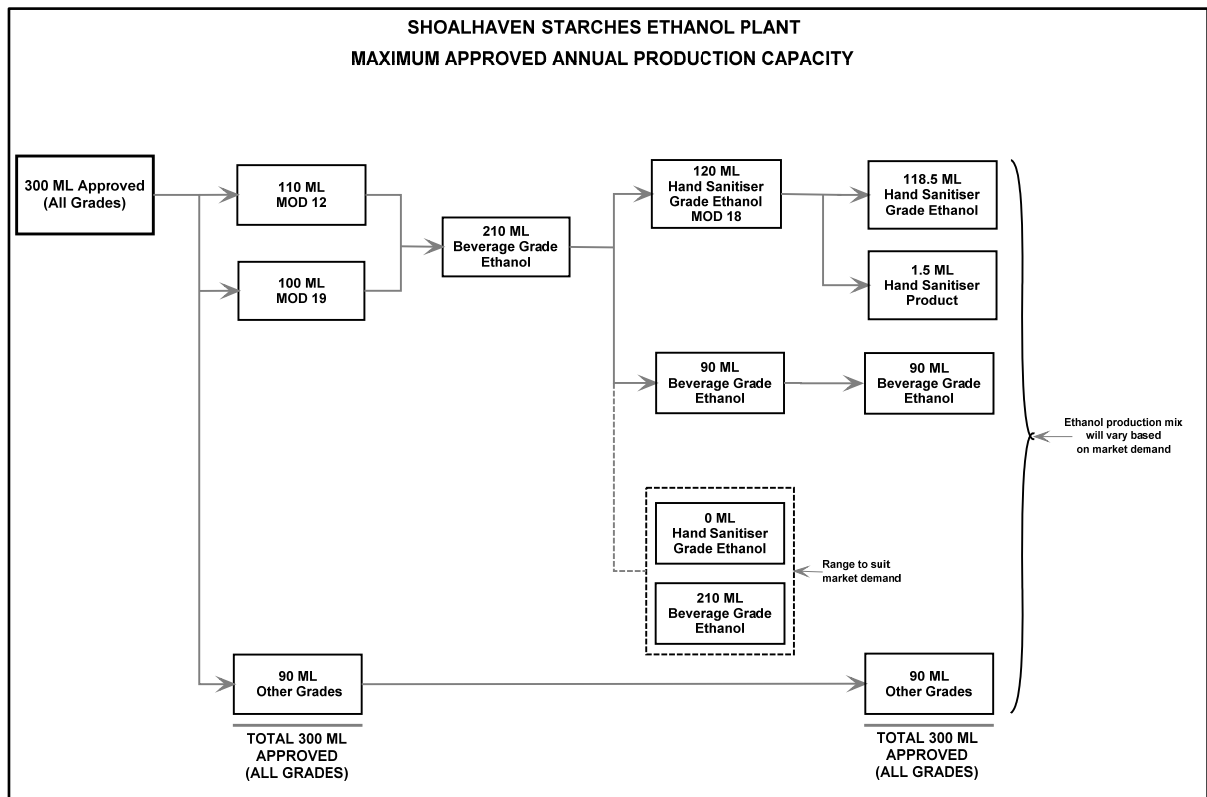


Figure 7: Shoalhaven Starches Maximum Approved Ethanol Production Capacity.

The Modification Proposal will involve the installation of distillation columns and associated processing equipment immediately to the west of the existing beverage grade ethanol plant. The proposed plant and equipment are of similar design, size and operation to the existing beverage grade ethanol modification approved under Mod 12. **Figure 8** below provides a plan view of the proposed works associated with this part of Mod 19.

To facilitate the construction of the upgrade to the Ethanol Plant, to secure suitable hazard separation buffers within the plant site it will be also necessary to secure a part closure of Bolong Road reserve, and for the closed section of the road to be consolidated into the Shoalhaven Starches site. The part road closure application process has already been commenced separately with Shoalhaven City Council. The extent of the road closure is also detailed in **Figure 8** below.

There are three stages within the existing industrial grade ethanol distillery (corresponding to the order of installation). These processes were installed prior to the installation of the first beverage grade distillery in 2017.

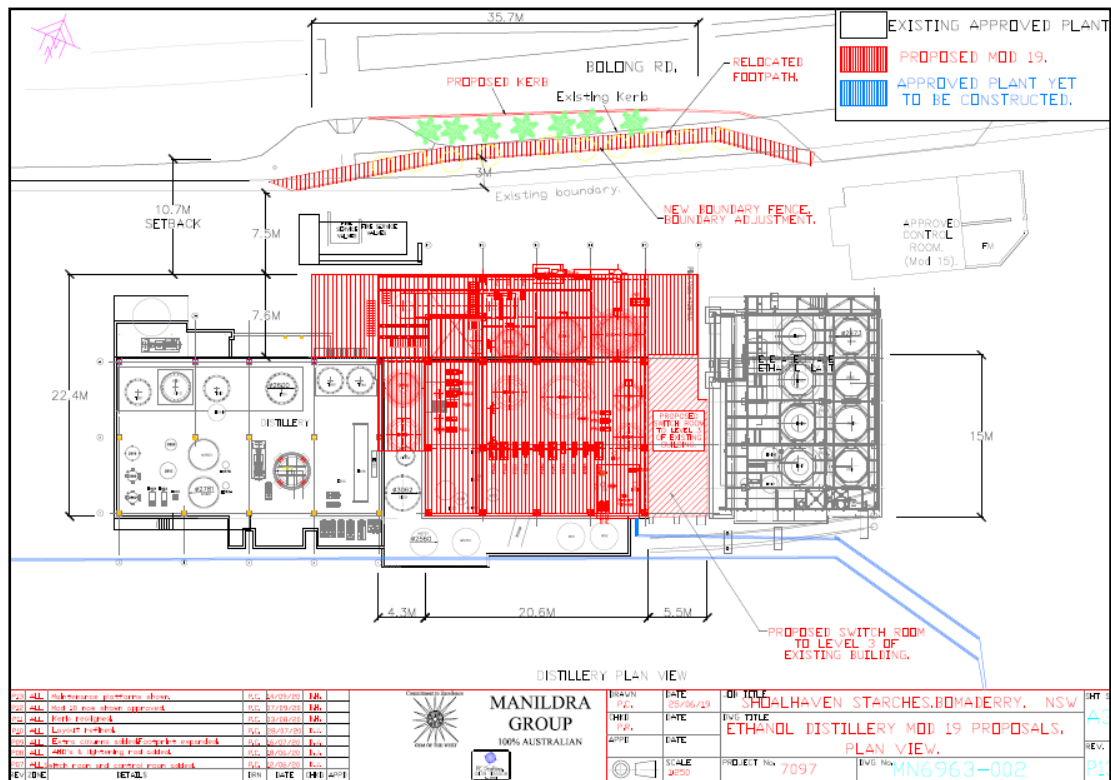


Figure 8: Plan view of Ethanol Plant upgrade.

The proposed upgrades to beverage grade facility under Mod 19 will be similar to the existing first stage industrial grade ethanol facility, ie. it will involve the same feed (beer at 7% to 12% ethanol) and unit operations such as distillation columns (both vacuum and pressurised), vessels, heat exchangers and pumps. Essentially, this part of the project is replacing one ethanol purification process with another (the latter will produce a higher-grade ethanol).

The production of beverage grade ethanol from beer at 7% to 12% by volume alcohol coming from the wheat starch slurry fermentation will be performed in a distillation / rectification process that includes the following steps:

- Stripping, degassing and concentration to produce raw alcohol at 93 to 95% volume (performed in the column D510/D511/D520);
- Purification by the hydroselction column (D530);
- Rectification by the rectification column (D540);
- Refining by the refining column (D550); and
- Heads (light impurities like esters and aldehydes) and Tails (eg. other impurities such as isoamyl alcohol, n-butanol and iso-butanol) concentrate in the Heads and Tails concentration column (D560). The D560 column will be also process the Heads and Tails produced by the existing (first) beverage grade distillery.

The production of beverage grade ethanol (96.5 vol%) from beer is performed in a rectification process including the following steps. The plant is designed to produce 250 m³/day of beverage grade ethanol.

First Step: Degassing, Stripping and Concentration

The beer at 7% - 12 % volume and 70°C from the fermentation unit feeds the first process.

The purpose of the combined degassing (D511), stripping (D510) and concentration (D520) column is:

- To eliminate the beer gas (eg. air, carbon dioxide and sulphur dioxide) in the degassing column D511;
- To strip the alcohol in the beer from 7% to 12% volume to 0.03% volume in the stripping column D510; and
- To concentrate the alcohol from the stripping column to about 93% to 95% volume in the concentration column D520.

All three sections of this combined column are operated at vacuum conditions.

The spent wash or thin stillage from the bottom of D510 is sent to the existing site stillage plant.

The alcoholic vapours at 93 to 95% volume coming from the top of the concentration column D520 are condensed in a plate condenser and a seal condenser. All the condensates are collected in the vessel R525 and then sent as reflux to the concentration column D520. A small portion of “heads” (light impurities like esters and aldehydes) from the reflux line is sent to the impurities extraction vessel R543. Other impurities, “tails” (eg. isoamyl alcohol, n-butanol and iso-butanol), are also removed from selected trays in D520 and sent to R543.

The concentrated liquid alcohol at 93% to 95% volume is extracted a few trays below the top of D520 and sent to the hydroselection column (D530).

In order to achieve a higher quality product and reduce the risks of copper corrosion, the pH may be adjusted to between 7.5 and 8.5. This pH adjustment is performed by injection of caustic soda (3 to 5 wt%) below the low oils extraction point on the concentration column D520.

When required, the relevant equipment is cleaned (Clean-In-Place). This requires a complete plant shutdown.

Second Step: Purification Performed in the Hydrosélection Column D530.

The hydrosélection column D530 operates similarly to the hydrosélection column in the existing beverage grade distillery.

The ethanol from D520 contains other impurities in low concentrations such as esters and aldehydes whose relative volatilities in ethanol increase when water is added. These are separated from the ethanol in the hydrosélection column by having a high flow of water to the top of the column. The impurities are carried out the top of the column with the ethanol vapours and condensed. An impurities bleed stream is transferred to vessel R543. The hydrosélection column bottoms steam contains approximately 10% to 12% ethanol by volume and importantly, the majority of impurities have been removed. This stream is pumped to the rectification column D540.

The hydrosélection column operates at vacuum conditions.

Third Step: Rectification Performed in the Rectification Column D540.

The rectification column D540 operates similarly to the rectification process in the existing (first) beverage grade distillery with the exception that the existing process has two columns operating in parallel.

Purified ethanol at 10% to 12% from the hydrosélection column feeds the rectification column, ie. D540. The main functions of the rectification column are:

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

Some heads (impurities such as aldehydes and acetaldehydes) are concentrated at the top of the rectification column. Therefore, a small bleed stream of heads is sent to vessel R543. The beverage grade ethanol stream is taken from lower trays to avoid being off specification in heads.

Along the column D540, extraction streams are made to extract low oils (eg. isoamyl alcohol or fusel oils), high oils (eg. n-butanol, isobutanol and n-propanol) and very high oils. All of these extractions are sent to the impurities extraction collector vessel R543 prior feeding of the low-grade alcohol column D560.

D540 operates at 2.3 bara pressure.

Fourth Step: Refining Performed in the Refining Column D550.

The refining column D550 operates similarly to the refining column in the existing beverage grade distillery, ie. vacuum operation.

The ethanol from the rectification column D540 feeds the refining column D550.

The purpose of the refining column D550 is:

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

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

Fifth Step: Heads and Tails Concentration in the Heads and Tails Column D560.

The vessel R543 contains all the streams containing the impurities from the various unit operations in the plant. R543 feeds the Heads and Tails column D560.

The purpose of the Heads and Tails concentration column D560 (which operates like a rectification column) is:

- To strip the alcohol in the feed (about 60% to 70% vol) to an alcohol content in the spent feints below 0.03% (spent feints is the bottom stream from D560 which is sent to the Manildra waste water treatment plant);
- To concentrate the alcohol to obtain at the top of the column a concentration of at least 95% by volume (this stream is recycled to the hydroselection column); and
- To eliminate all the impurities and send them to the storage, ie.
 - Heads (eg. aldehydes, acetaldehydes and esters);
 - The low oils (eg. isoamyl alcohol called “fusel oils” mainly); and
 - The high oils (eg. n-butanol, isobutanol and n-propanol).

The ethanol containing the impurities is sold as a low-grade product.

All effluent from the process flows to the Shoalhaven Starches waste water treatment plant for treatment. Mod 19 will not involve any increase in the overall amount of effluent that is required to be treated within the waste water treatment plant.

5.2.2 Additional Ethanol Storage Tanks

Existing Ethanol Storage Tanks

Prior to the Mod 12 (2017), there were seven ethanol storage tanks in the ethanol storage area (Tanks 1 to 7) and two ethanol tanks in the ethanol day tank area. The latter two tanks were removed and four new tanks were installed as part of Mod 12. An additional tank was also installed in the ethanol storage area (Tank 8). The new tanks were constructed from stainless steel and are fixed roof.

The capacity of Tank 8 is 777 m³. It is 7.46 m diameter and 17 m high.

The four smaller tanks are 240 m³ each. They are 4.5 m diameter and 14.7 m high.

The four smaller tanks operate as day tanks, ie. any off-specification ethanol product from the existing beverage grade ethanol plant is diverted to these tanks and then to other existing tanks or processes (rather than flow to the larger tank which contains the on-specification product ethanol for the customers).

The beverage grade ethanol is pumped into road tankers or ISO containers at the road tanker transfer area for delivery to the customers. Two dedicated parallel loading arms were installed for the beverage grade ethanol.

Under Mod 18 it was proposed to install two additional hand sanitiser ethanol tanks (Tanks 14 and 15) in the existing ethanol day tank bund that will increase the Extra Neutral Alcohol (ENA at 96.5% vol ethanol) storage on site. The tanks will be constructed from 304 L stainless steel and are to be fixed roof. The two tanks will be 240 m³ each, ie. identical to the existing four tanks that are located in the same bunded area. Their diameter will be 4.5 m and they will be 14.7 m tall. The tanks will be designed to AS1692 or an equivalent standard.

These two tanks will operate as batching tanks in a similar way to the existing four tanks, ie. any off-specification ethanol product from the plant is diverted to these tanks.

Proposed Additional Ethanol Storage Tanks

Mod 19 proposes the installation of an additional three Ethanol Storage tanks in the ethanol day tank bund. These three tanks will be identical in size to the existing tanks, ie. 240 m³ each, 4.5 m diameter and 17 m high.

The additional three tanks will replicate the functionality of the existing tanks. They will provide buffer storage of product to enable the quarantining of production for quality testing prior to release for transfer into the bulk Extra Neutral Alcohol (ENA) storage tank or to road tanker for despatch. Product that fails quality testing will be downgraded and

transferred to existing industrial grade product storage tanks for despatch or further processing.

A new valve manifold and pumping station will be installed in a compound adjacent to the tank bund to route product into and out of the tanks. Three pumps will be used to either transfer product to either bulk storage or the two new loadout arms.

Once all proposed tanks are installed there will be nine identical tanks within the ethanol day tank bund.

Figure 9 provides a plan view of the siting of the proposed additional ethanol storage tanks as Ethanol Loadout.

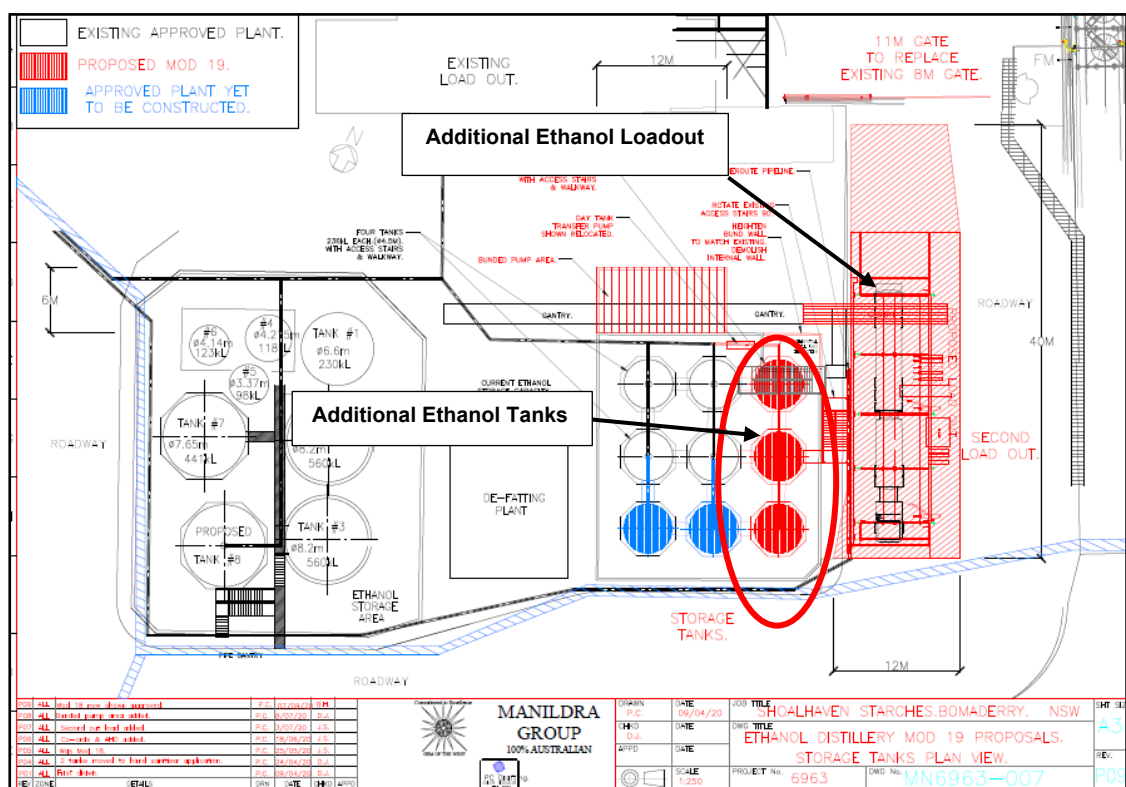


Figure 9: Plan of Location of Additional Ethanol Tanks and Loadout.

5.2.3 Additional Ethanol Loadout

A new road tanker loadout facility is also proposed to be installed immediately to the east of the ethanol day tank storage area (also shown in **Figure 9** above). This loadout facility will replicate the functionality of the existing facility and will consist of two loading arms to allow for the loading of both tanks of a B-double road tanker simultaneously. The facility will be used to load both road tankers and containerised tanks (Isotainers). It will be equipped with the same safety systems as the existing facility including fire deluge, safety shower and eye wash units and overfill detection and protection.

5.2.4 Additional Cooling Towers and associated relocation of approved ISO Container Storage Area

The upgraded beverage grade ethanol plant will be provided with cooling towers comprising standard cells (approximately 12) with total capacity of 6,390 m³/hour (of cooling water). The cooling towers will be fiberglass casing, stainless steel structure with a plastic fil with a height above ground level of 7.6 metres. **Figure 10** below provides a plan view of the location of the additional cooling towers.

As evident from **Figure 10** below the placement of the additional cooling towers in the location shown will require the relocation of the approved ISO container storage area that was approved in this location under Mod 12.

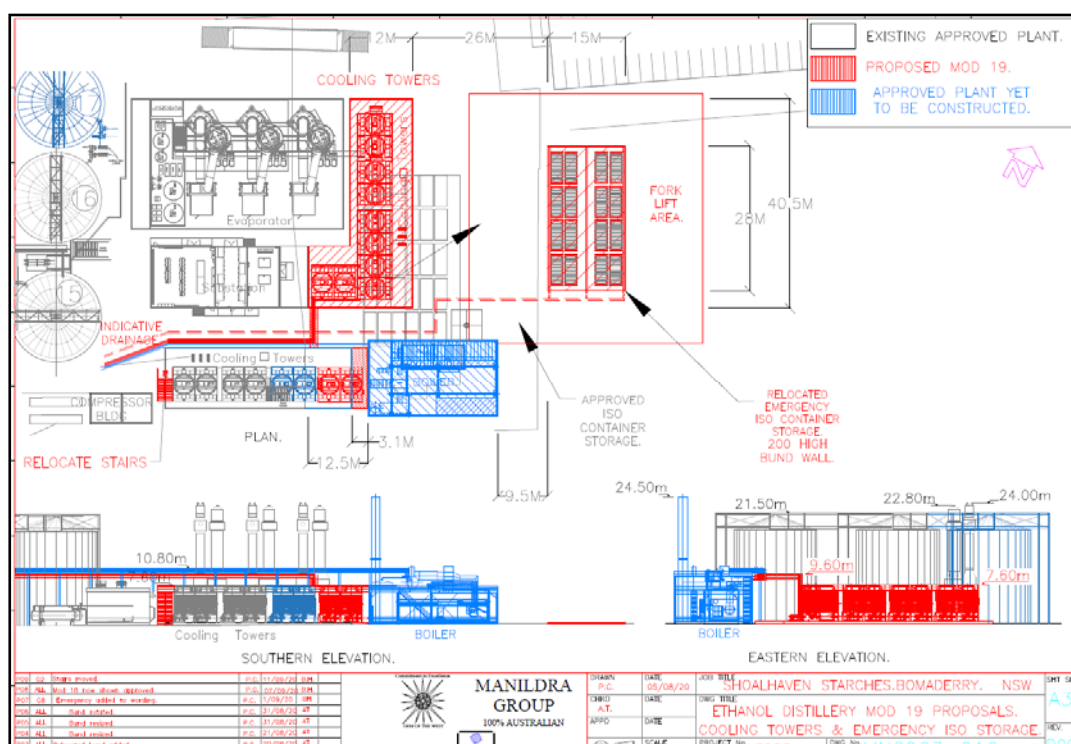


Figure 10: Plan of proposed additional cooling towers and relocation of approved ISO container storage area.

5.2.5 Relocation of Approved Ethanol Distillery Control Room

The existing Ethanol Distillery Control Room is presently situated adjacent to the existing ethanol plant. To enable the siting of the proposed new switch room associated with the proposed upgrade works it is proposed to relocate the control room to the re-purposed water pump room situated immediately to the north-east of the distillery complex as was originally envisaged under the Mod 15 approval (as shown in **Figure 8** above).

5.3 OTHER MODIFICATION WORKS

In addition to the proposed upgrade to the Beverage grade ethanol plant, it is also proposed under Mod 19 to seek approval for ancillary works associated with the approved Product Dryer and Specialty Product Buildings located to the west of Abernethy's Creek, which were approved as part of Mods 16 and 17.

5.3.1 Proposed Pipe Bridge

It is proposed to construct a cable stay pipe bridge across Abernethy's Creek to supply power and product to these buildings (**Figure 11**).

The proposed Pipe Bridge will extend from the existing Boiler No. 1 located to the east of Abernethys Creek, across Abernethys Creek before travelling in a north-westerly direction to the new Starch Dryer No. 5 building and then will serve this building as well as the proposed Specialty Product and Product Dryer Buildings approved under Mods 16 and 17. At its crossing of Abernethy's Creek the bridge will have a height of 2.4 metres above ground level.

The construction of the bridge across Abernethy's Creek will require the removal of some vegetation comprising overgrown Privet. It should be noted that the removal of this privet vegetation was foreshadowed by the approved Landscape and Vegetation Management Plan that was approved under the overall Project Approval MP 06_0228 for the site.

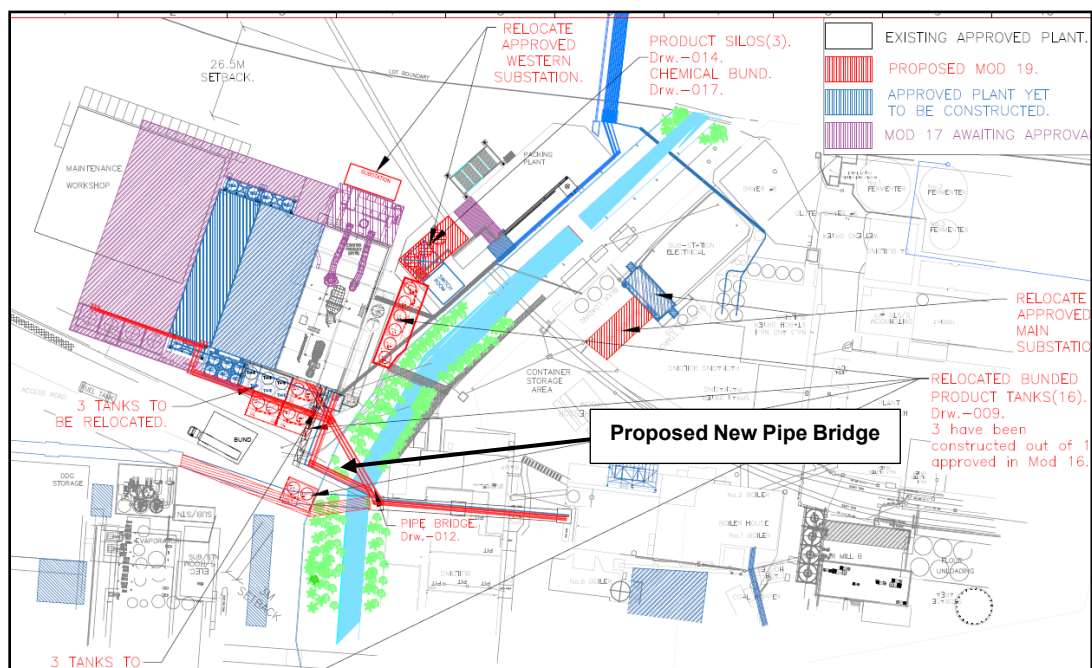


Figure 11: Plan view of new pipe bridge.

- New liquid tanks;
- A process that modifies starch to produce “cross-linked” starch, ie. a specific product to meet market demands; and
- Three new silos for storage of “cross-linked” starch.

The tank history and modifications are detailed as follows.

1. There were originally six tanks approved to the south of Starch Dryer No. 5. These tanks hold liquid starch, ie. water and 36 to 38% starch and were approved under Mod 16. Three larger tanks were installed instead of the proposed six smaller tanks. These are shown on **Figure 13** below as the three black tanks labelled “1”.
Caustic soda (10 to 12wt%) is added to these tanks for pH control.
2. There are six silos in **Figure 13** shown in blue immediately to the west of the three black tanks mentioned in Point 1 above. These silos were also approved as part of Mod 16. These silos hold cationic starch. These are labelled as “2” in **Figure 13**. There are no planned modifications to these silos.
3. There are six tanks on **Figure 13** shown in red immediately to the east and south of the three black tanks mentioned in Point 1 above. These proposed tanks will also contain liquid starch. These tanks are labelled as “3” in **Figure 13**. The Product Storage Tanks will each have a height of 13.5 metres above ground level and diameter of 3.6 metres and will sit within a bunded area with a height of 0.6 metres.
For the three tanks shown in black (Point 1) and the six tanks shown in red (Point 3), 10 to 12 wt% caustic soda will be added to the liquid starch for pH correction.
The liquid starch is then pumped to the existing factory to be dried.
4. “Cross-linked” starch will be produced within the six reaction tanks (labelled “4” in **Figure 13**). Each tank will have a capacity of 100 m³. Initially, liquid starch will be pumped into these tanks. Caustic soda (10 to 12 wt%) will be added to raise the pH and then phosphorous oxychloride (approximately 10 L per tank batch). The mixture will be allowed to react to form the required modified starch and then neutralised with either 33 wt% hydrochloric acid or 50 wt% sulphuric acid.

The phosphorous oxychloride will be delivered to site in drums and stored either in a dedicated Dangerous Goods cabinet and/or within a purpose-built pressure vessel (1.2 m³). The phosphorous oxychloride will be transferred from a drum using a vacuum system into the pressure vessel and then transferred using nitrogen pressure to the reaction tanks. This is to minimise the number of equipment items that need maintenance

and hence the potential for health impacts. The phosphorous oxychloride transfer facility will be located under the southern end of the starch packing shed awning roof (labelled “5” in **Figure 13**).

The modified or cross-linked starch will then be pumped to the Starch Dryer No. 5 for drying prior to being conveyed to one of three new silos. These silos will each have a capacity of 75 tonnes and will be located above the approved interim packing shed awning roof in line with the existing silos (also labelled “5” in **Figure 13**).

The cross-linked starch will be conveyed to the Cationic Starch Plant (yet to be constructed – approved under MOD 16) for further processing.

It is proposed to install four additional liquid starch tanks for GemGel, ie. a specific liquid starch product for papermills. These tanks will be installed to the south of Starch Dryer No. 5 and are shown in two separate bunded areas (labelled “6” in **Figure 13**). These additional four tanks will allow other liquid starch tanks to be maintained. As with the above liquid starch tanks, caustic and/or acid will be added to make the required specification.

Caustic soda and hydrochloric acid will be stored in approved but yet to be constructed tanks to the south of the Gluten Dryer 8 building. The existing sulphuric acid tank in the Starch Dryers 3 and 4 area will be used to supply this acid. New pumping systems will be installed to deliver these chemicals to the required tanks.

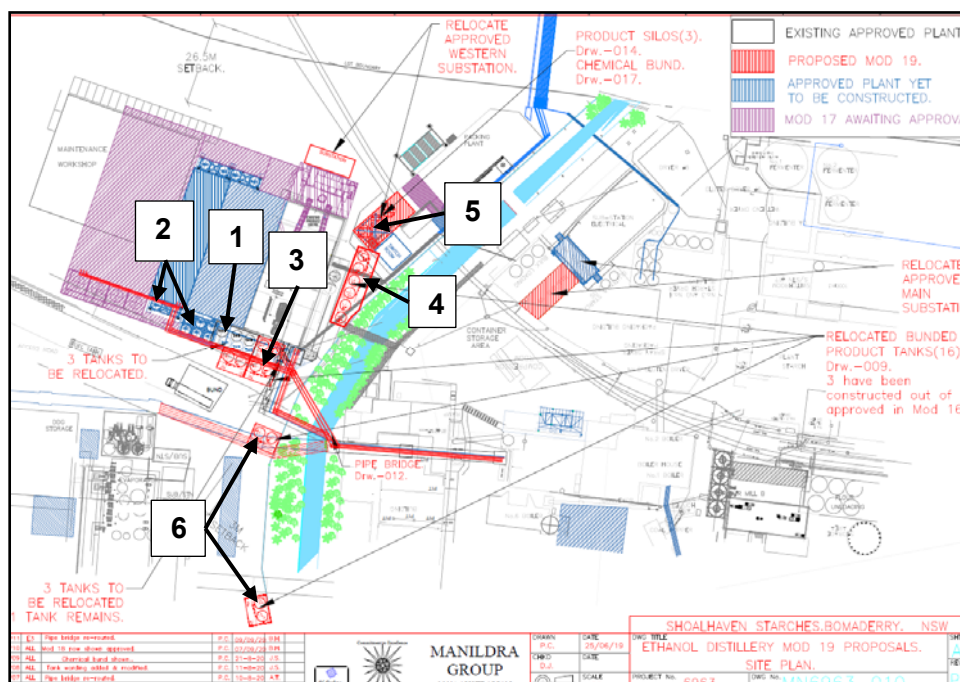


Figure 13: Additional storage tanks.

5.3.4 Relocation of Approved Electrical Substation

Unrelated to the above works, it is also proposed that the extension of the existing electrical substation located on the eastern side of Abernethy's Creek will need to be relocated from the approved position due construction constraints in the approved location (refer **Figure 14**).

Instead the substation will be sited on top of the existing packing plant, and perpendicular to the footprint of the approved sub-station location. The substation will have a maximum height above ground level of 17 metres.

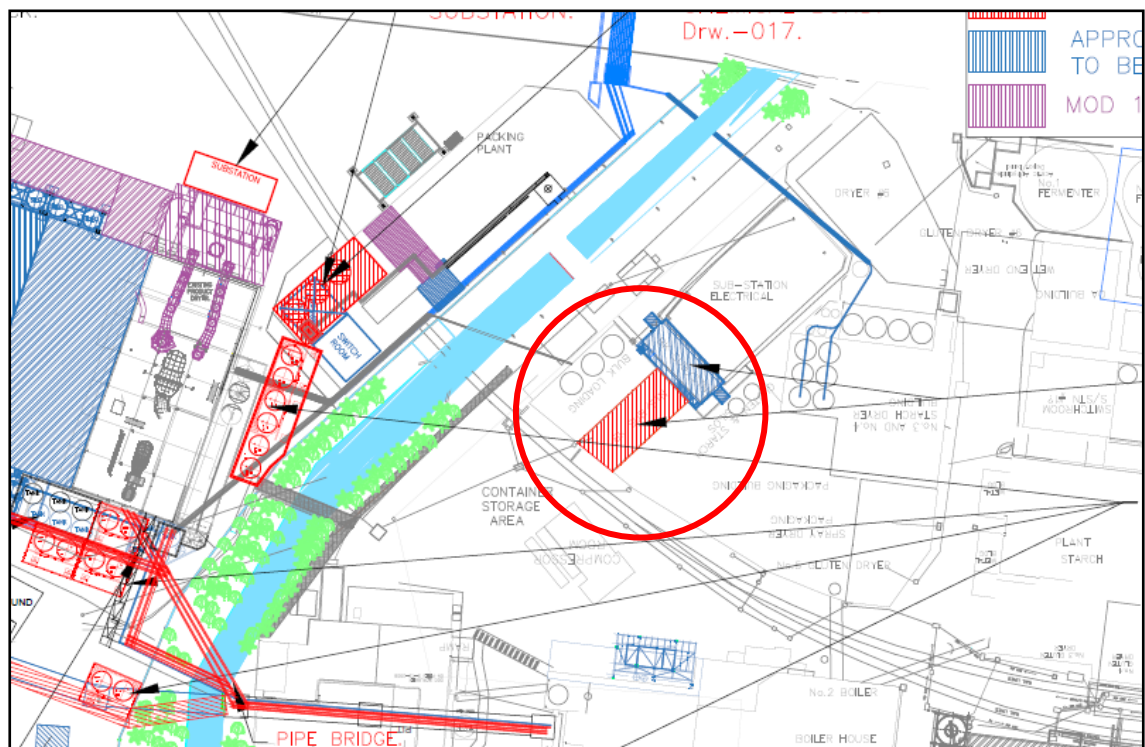


Figure 14: Plan view of relocated substation.

5.3.5 Extension to South-western Car Park

It is also proposed to extend the existing car park located within the western part of the site in a south-westerly direction to provide an additional thirty-one (31) car parking spaces for staff and contractors (**Figure 15**).

Plans of the proposed works associated with this Modification Application are included within **Annexure 2** to this SEE.

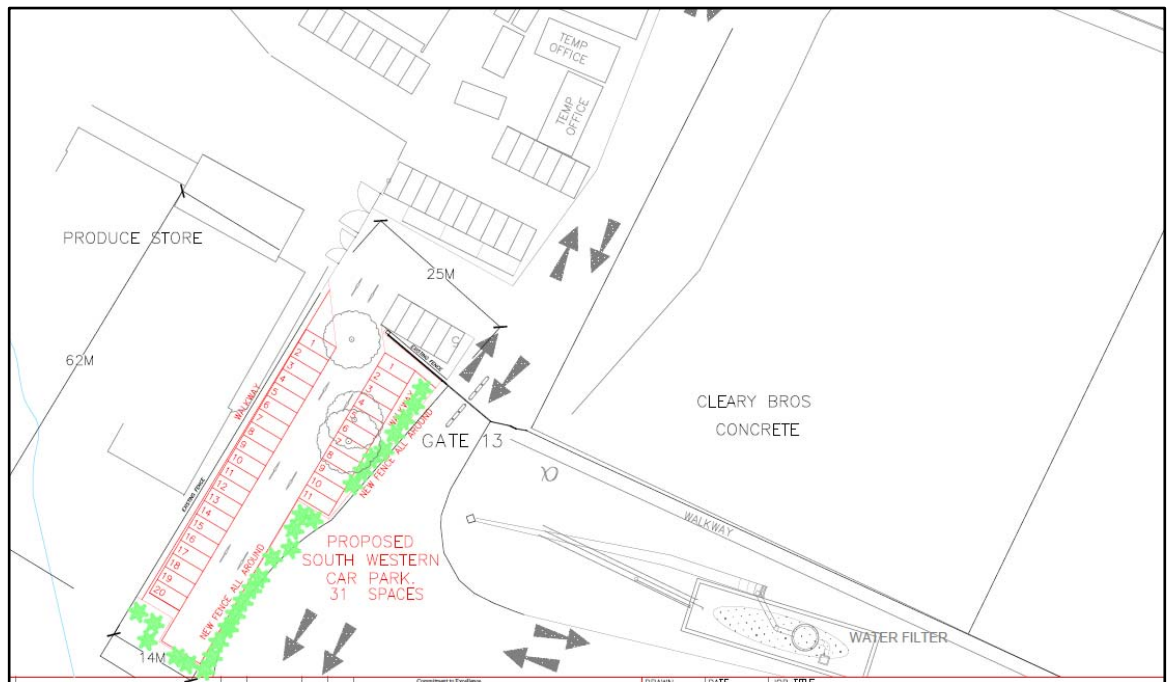


Figure 15: Plan view of proposed extension to south-western car park.

6.0 SECTION 4.55(1A) OF THE EP&A ACT

This application is made pursuant to Section 4.55(1A) of the Environmental Planning & Assessment (EP&A) Act.

Section 4.55(1A) of the EP&A Act reads:

4.55 Modification of consents—generally

(1A) Modifications involving minimal environmental impact. *A consent authority may, on application being made by the applicant or any other person entitled to act on a consent granted by the consent authority and subject to and in accordance with the regulations, modify the consent if—*

- (a) it is satisfied that the proposed modification is of minimal environmental impact, and*
- (b) it is satisfied that the development to which the consent as modified relates is substantially the same development as the development for which the consent was originally granted and before that consent as originally granted was modified (if at all), and*
- (c) it has notified the application in accordance with—*
 - (i) the regulations, if the regulations so require, or*
 - (ii) a development control plan, if the consent authority is a council that has made a development control plan that requires the notification or advertising of applications for modification of a development consent, and*
- (d) it has considered any submissions made concerning the proposed modification within any period prescribed by the regulations or provided by the development control plan, as the case may be.*

Subsections (1), (2) and (5) do not apply to such a modification.

Fundamentally an application made pursuant to Section 4.55(1A) must demonstrate that: the proposed modification will have minimal environmental impact; and the development to which the consent as modified relates is substantially the same development as the development for which consent was originally granted and before that consent as originally granted was modified.

Such an assessment would typically need to appreciate both the qualitative and quantitative aspects of the development being compared in its proper context as described by Bignold J at paragraphs 54 to 56 in *Moto Projects (No.2) Pty Ltd v North Sydney C [1999] NSWLEC 280*.

This judgment includes the following comments:

54. *The relevant satisfaction required by s 96(2)(a) to be found to exist in order that the modification power be available involves an ultimate finding of fact based upon the primary facts found. I must be satisfied that the modified development is substantially the same as the originally approved development.*

55. *The requisite factual finding obviously requires a comparison between the development, as currently approved, and the development as proposed to be modified. The result of the comparison must be a finding that the modified development is “essentially or materially” the same as the (currently) approved development.*
56. *The comparative task does not merely involve a comparison of the physical features or components of the development as currently approved and modified where that comparative exercise is undertaken in some type of sterile vacuum. Rather, the comparison involves an appreciation, qualitative, as well as quantitative, of the developments being compared in their proper contexts (including the circumstances in which the development consent was granted).*

The *Modifying an Approved Project* draft guidelines produced as part of the *Draft Environmental Impact Assessment Guidance Series* by the NSW Department of Planning and Environment in June 2017, provides some guidance when assessing modifications of State Significant development:

For SSD, a proponent must demonstrate that the change, if carried out, would result in a development that would be substantially the same development as the original development. In order to draw this conclusion, a proponent must have regard to the following considerations, which have been established through decisions of the NSWLEC:

- *“Substantially” means “essentially or materially” or “having the same essence.”*
- *A development can still be substantially the same even if the development as modified involves land that was not the subject of the original consent (provided that the consent authority is satisfied that the proposal is substantially the same).*
- *If the development as modified, involves an “additional and distinct land use”, it is not substantially the same development.*
- *Notwithstanding the above, development as modified would not necessarily be substantially the same solely because it was for precisely the same use as that for which consent was originally granted.*
- *To determine whether something is “substantially the same” requires a comparative task between the whole development as originally approved and the development as proposed to be modified. In order for the proposal to be “substantially the same”, the comparative task must:*
 - *result in a finding that the modified development is “essentially or materially” the same*
 - *appreciate the qualitative and quantitative differences in their proper context*
 - *in addition to the physical difference, consider the environmental impacts of proposed Modification Applications to approved developments.*

“Substantially” means “essentially or materially” or “having the same essence.”

Comments:

It is considered the modification proposal is substantially the same as that approved and is development that could be considered *“materially the same as that previously approved”*. Furthermore, it is considered that the modifications proposed are of the same ‘essence’ as the approved development given that:

- the proposal maintains the current land use approved at the site and does not seek to alter the over-riding character of development;
- the proposed built form is substantially the same as that already approved, in that development is to consist of industrial buildings, plant and equipment located within the general confines of the Shoalhaven Starches Factory site;
- The proposed modifications do not represent an expansion of the of Shoalhaven Starches’ footprint and the majority of the modifications will be located within the main factory site; and
- The proposed buildings maintain the same form as that approved with due consideration given in the Modification Application to relevant issues pertaining to air quality, noise and flood impacts.
- The proposal does not seek to increase overall production from the site nor will it involve the generation of any additional significant environmental impacts.

A development can still be substantially the same even if the development as modified involves land that was not the subject of the original consent (provided that the consent authority is satisfied that the proposal is substantially the same).

Comment

The proposal does not involve land that was not the subject of the approval which was in place at the time that the Shoalhaven Starches Expansion Project site transitioned from the Transitional Part 3A provisions to being assessed as State Significant Development

If the development as modified, involves an “additional and distinct land use”, it is not substantially the same development.

Comment

The proposal does not involve an *“additional and distinct land use”*. None of the proposed modifications represent an additional and distinct land use. Whilst this modification proposal involves a number of individual components these modifications all relate to existing approved development on the site.

Notwithstanding the above, development as modified would not necessarily be substantially the same solely because it was for precisely the same use as that for which consent was originally granted.

Comment

This Modification Application only seeks to modify elements that have already been approved and will not change the scale or use of these aspects.

To determine whether something is “substantially the same” requires a comparative task between the whole development as originally approved and the development as proposed to be modified. In order for the proposal to be “substantially the same”, the comparative task must:

- ***result in a finding that the modified development is “essentially or materially” the same***
- ***appreciate the qualitative and quantitative differences in their proper context***
- ***in addition to the physical difference, consider the environmental impacts of proposed Modification Applications to approved developments.***

Comment

Quantitatively, the proposal does not represent any increases in production in the terms of processing of flour and starch / gluten or overall ethanol production.

The qualitative elements of the proposal demonstrate that the environmental and amenity impacts of the modification proposal are limited and justifies this proposal being considered as a modification.

This proposal will not expand the overall footprint of the approved Shoalhaven Starches factory. All of the proposed modifications are located within the existing Shoalhaven factory site. The proposed development will have a limited additional visual impact. The bulk, character and scale of the structures associated with this modification application will not be dissimilar to that of other industrial type development associated with the existing factory site. Furthermore, the proposed works will be sited within proximity of similar structures of a similar nature. The works will be sited in the midst of the existing factory complex and will be viewed within this context.

The SEE is supported by the following expert assessments:

- An Air Quality Assessment by GHD which concludes that whilst there may be a marginal increase in predicted odour impacts as a result of the modification, odour criteria will be met at all residential sensitive receptors and GHD consider it highly unlikely that the increase in odour would be detected at sensitive receptors.

GHD also predict that quality impacts will comply with the criteria at all residential sensitive receptors.

Overall, according to GHD, the proposal should be acceptable from an air quality perspective.

- An Environmental Noise Impact Assessment by Harwood Acoustics concludes the level of noise emission from the modification to the ethanol distillery will be within the noise design goals derived from Environment Protection Licence 883 noise limits at each receptor location without the need for additional noise controls at this stage.

A final assessment of required noise controls will be undertaken at the time of the Design Noise Verification process prior to construction, or during commissioning, as required, to ensure the noise design goals are met at all receptors.

The level of noise emission from the construction phase of the project according to Harwood Acoustics will also be within the noise management levels set by the NSW EPA's *Interim Construction Noise Guideline* with the exception of piling activity on some occasions.

- A Flood Compliance Report by WMA Water concludes that there would be no significant incremental increase in the 1% AEP flood level as a result of the proposed works
- A Preliminary Hazard Analysis (PHA) prepared by Pinnacle Risk Management demonstrates the Modification Proposal will comply with all risk criteria; and also societal risk, area cumulative risk and environmental risk will be acceptable.
- A Traffic Impact Assessment prepared by Bitzios Consulting that concludes that there are no significant traffic or transport impacts associated with the proposed development.
- A Geotechnical and Riverbank Stability Assessment prepared by GHD that demonstrates the proposed works at all sites will have no influence on the stability of the northern bank of the nearby Shoalhaven River, western bank of Abernethy's Creek and eastern bank of Bomaderry Creek. This assumes that all structure will be supported on deep piles founded in weathered rock and therefore will not increase loading of the ground adjacent to the banks. Short term construction loading of the ground surface adjacent to the western bank of Abernethy's Creek will need to be assessed for stability, including crane pad and piling platform assessments. Creek bank erosion protection may be required where removal of vegetation or ground disturbance occurs over the creek bank during construction.
- A Site Contamination Assessment prepared by GHD that demonstrates that based on site history and site observation results, potential for contamination was identified by GHD in five areas of environmental concern (AECs) which included:

- AEC 1: Storage and use of fuels and chemicals associated with operations at the plant.
- AEC 2: Potential weathering of hazardous building materials and demolition of site structures.
- AEC 3: Potential application of pesticides, herbicides, fertilisers.
- AEC 4: Fill of unknown quantity and origin.
- AEC 5: Storage and use of PFAS based firefighting foams.

GHD make a number of recommendations to further assess or mitigate contamination risks associated with these sites.

The works associated with this modification application do not represent an additional and or distinct land use as all proposed modifications facilitate and improve the existing approved production processes.

The proposal will not comprise any qualitative or quantitative changes in overall production from the site. The proposal essentially seeks to change the proportion of different grades of ethanol that are produced from the site.

The modified proposal represents a scale of development that will be commensurate with the bulk, scale and character of the approved development.

As is evident from the expert consultant assessments that support the Modification Application the Modified proposal will not result in any significant qualitative or quantitative environmental impacts when compared to the approved development.

It is our view that the development is substantially the same as approved Project. As such the modification proposal is considered consistent with provisions of Section 4.55(1A) of the Act in this instance.

Given the above circumstances it is our view that the modification proposal; will have not result in any significant adverse environmental impact when compared to the original approved development; and the development as modified by this modification application will be substantially the same development as the development for which consent was originally granted having regard to both the qualitative and quantitative elements of that development.

7.0 SECTION 4.15(1)(A) – ENVIRONMENTAL PLANNING PROVISIONS

In determining an application made pursuant to Section 4.55 of the EP&A Act the consent authority must take into consideration such of the matters referred to in Section 4.15(1) as are of relevance to the development the subject of the application.

7.1 ENVIRONMENTAL PLANNING INSTRUMENTS

7.1.1 State Environmental Planning Policies

Table 3 details State Environmental Planning Policies (SEPP) that apply to the land and whether they are applicable to the proposal.

Table 3
State Environmental Planning Policies that Apply to the Subject Site

<i>State Environmental Planning Policy</i>	<i>Applicable Yes/No</i>
State Environmental Planning Policy (Affordable Rental Housing) 2009 (pub. 2009-07-31)	No
State Environmental Planning Policy (Building Sustainability Index: BASIX) 2004 (pub. 2004-06-25)	No
State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 (pub. 2008-12-12)	No
State Environmental Planning Policy (Housing for Seniors or People with a Disability) 2004 (pub. 2004-03-31)	No
State Environmental Planning Policy (Infrastructure) 2007 (pub. 2007-12-21)	Yes
State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007 (pub. 2007-02-16)	No
State Environmental Planning Policy (Miscellaneous Consent Provisions) 2007 (pub. 2007-09-28)	No
State Environmental Planning Policy No 1-Development Standards (pub. 1980-10-17)	No
State Environmental Planning Policy No 21-Caravan Parks (pub. 1992-04-24)	No
State Environmental Planning Policy No 30-Intensive Agriculture (pub. 1989-12-08)	No
State Environmental Planning Policy No 33-Hazardous and Offensive Development (pub. 1992-03-13)	Yes
State Environmental Planning Policy No 36-Manufactured Home Estates (pub. 1993-07-16)	No
State Environmental Planning Policy No 50-Canal Estate Development (pub. 1997-11-10)	No
State Environmental Planning Policy No 55-Remediation of Land (pub. 1998-08-28)	Yes

Table 3 (continued)

State Environmental Planning Policy	Applicable Yes/No
State Environmental Planning Policy No 62-Sustainable Aquaculture (pub. 2000-08-25)	No
State Environmental Planning Policy No 64-Advertising and Signage (pub. 2001-03-16)	No
State Environmental Planning Policy No 65-Design Quality of Residential Apartment Development (pub. 2002-07-26)	No
State Environmental Planning Policy No 70-Affordable Housing (Revised Schemes) (pub. 2002-05-01)	No
State Environmental Planning Policy (Primary Production and Rural Development) 2019	No
State Environmental Planning Policy (Vegetation in Non-Rural Areas) 2017: Subject Land (pub. 2017-08-25)	No
State Environmental Planning Policy (Coastal Management) 2018	Yes

SEPP – Infrastructure

This SEPP aims to facilitate the effective delivery of infrastructure across the state and that appropriate agencies are made aware of and are given an opportunity to make representations in respect of certain development, including traffic generating developments. Division 17 relates to Road and Traffic infrastructure while Schedule 3 of the SEPP outlines traffic generating development which requires referral to Roads and Maritime Services (RMS). The proposal does not trigger the criteria in this Schedule that would warrant the development application being referred to the RMS, and therefore the provisions of this SEPP would not apply to this proposal.

Schedule 3 includes the following criteria that may have relevance to this proposal:

Development purpose	Column 1: Size or capacity – site with access to any road	Column 2 Size or capacity—site with access to classified road or to road that connects to classified road (if access within 90m of connection, measured along alignment of connecting road)
Car parks	200 or more car parking spaces	50 or more car parking spaces
Industry	20,000m ² in site area or (if the site area is less than the gross floor area) gross floor area	5,000 m ² in site area or (if the site area is less than the gross floor area) gross floor area
Any other purpose	200 or more motor vehicles per hour	50 or more motor vehicles per hour

The modification proposal does not specifically trigger the above criteria. Under these circumstances the RMS is not required to be notified of this proposal.

SEPP No.33 – Hazardous and Offensive Development

The objectives of SEPP No. 33 are set out in clause 2 of the SEPP and include:

- (a) to amend the definitions of hazardous and offensive industries where used in environmental planning instruments, and*
- (b) to render ineffective a provision of any environmental planning instrument that prohibits development for the purpose of a storage facility on the ground that the facility is hazardous or offensive if it is not a hazardous or offensive storage establishment as defined in this Policy, and*
- (c) to require development consent for hazardous or offensive development proposed to be carried out in the Western Division, and*
- (d) to ensure that in determining whether a development is a hazardous or offensive industry, any measures proposed to be employed to reduce the impact of the development are taken into account, and*
- (e) to ensure that in considering any application to carry out potentially hazardous or offensive development, the consent authority has sufficient information to assess whether the development is hazardous or offensive and to impose conditions to reduce or minimise any adverse impact, and*
- (f) to require the advertising of applications to carry out any such development.*

The Modification Proposal is supported by a Preliminary Hazard Analysis prepared by Pinnacle Risk Pty Ltd in accordance with the provisions of this SEPP (**Annexure 6**). Pinnacle Risk have undertaken a review of the works associated with this current Modification Proposal and assessed and compared the proposed works against relevant risk criteria.

SEPP (Coastal Management) 2018

This SEPP seeks to promote an integrated and co-ordinated approach to land use planning in the coastal zone in a manner consistent with the objects of the Coastal Management Act 2016 by:

- a) managing development in the coastal zone and protecting the environmental assets of the coast, and*
- b) establishing a framework for land use planning to guide decision-making in the coastal zone, and*
- c) mapping the 4 coastal management areas which comprise the NSW coastal zone, in accordance with the definitions in the Coastal Management Act 2016.*

This Policy applies to land within the coastal zone. Section 5 of the *Coastal Management Act 2016* provides that the **coastal zone** means the area of land comprised of the following coastal management areas:

- a) the coastal wetlands and littoral rainforests area,
- b) the coastal vulnerability area,
- c) the coastal environment area,
- d) the coastal use area.

Part 2 of the Coastal Management SEPP stipulates the Development Controls for Coastal Management Areas. Division 1 outlines the controls to be applied to development in the Coastal Wetlands and Littoral Rainforests Area.

Coastal Wetlands and Littoral Rainforests Area.

Mapping supporting the SEPP outlines the subject land is not mapped as containing coastal wetlands or littoral rainforest.

Coastal Environment Area

Division 3 of the SEPP stipulates the controls to be applied to development in the Coastal Environment Area.

The subject land is mapped under the NSW Coastal Management SEPP Mapping as being located within the Coastal Environment Area as seen below in **Figure 16**.

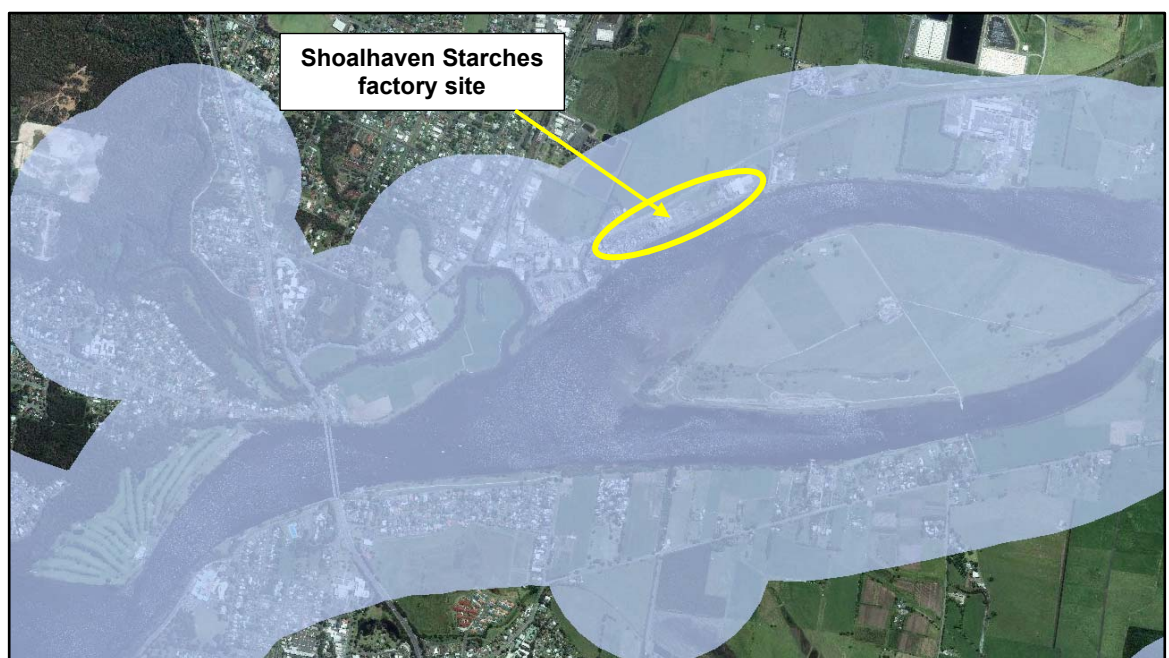


Figure 16: NSW Coastal Management SEPP: Coastal Environment Area Map.

Clause 13 of the SEPP specifies matters that must be considered in determining development applications on land within the Coastal Environment Area. Clause 13 reads:

- 1) *Development consent must not be granted to development on land that is within the coastal environment area unless the consent authority has*

considered whether the proposed development is likely to cause an adverse impact on the following:

- a) the integrity and resilience of the biophysical, hydrological (surface and groundwater) and ecological environment,*
 - b) coastal environmental values and natural coastal processes,*
 - c) the water quality of the marine estate (within the meaning of the Marine Estate Management Act 2014), in particular, the cumulative impacts of the proposed development on any of the sensitive coastal lakes identified in Schedule 1,*
 - d) marine vegetation, native vegetation and fauna and their habitats, undeveloped headlands and rock platforms,*
 - e) existing public open space and safe access to and along the foreshore, beach, headland or rock platform for members of the public, including persons with a disability,*
 - f) Aboriginal cultural heritage, practices and places,*
 - g) the use of the surf zone.*
- 2) Development consent must not be granted to development on land to which this clause applies unless the consent authority is satisfied that:*
- a) the development is designed, sited and will be managed to avoid an adverse impact referred to in subclause (1), or*
 - b) if that impact cannot be reasonably avoided—the development is designed, sited and will be managed to minimise that impact, or*
 - c) if that impact cannot be minimised—the development will be managed to mitigate that impact.*

Comment:

- The proposal is not near a headland or rock platform and as such does not impact on public access to these areas.
- The proposal will not adversely impact on the visual amenity and scenic qualities of the coast.
- The proposal involves works within an existing developed industrial site and is unlikely to impact on items of Aboriginal cultural heritage.
- The proposal involves works within an existing developed industrial site and will not impact upon the integrity or resilience of the biophysical or ecological environment.
- The proposal will incorporate erosion and sediment control measures to minimise impact on the water quality of the adjoining watercourses.
- The proposal will not involve any significant adverse impact on marine or native vegetation.
- The proposed development is not located within close proximity to the surf zone and will not impact on coastal environmental values or natural coastal processes.

Coastal Use Area

Division 4 of the SEPP specifies the controls to be applied to development in the Coastal Use Area. The subject land is also within the Coastal Use zone as seen below in **Figure 17**. As such the provisions which apply to this mapping are relevant to the proposed development.



Figure 17: NSW Coastal Management SEPP: Coastal Use Area Map.

Clause 14 of the SEPP specifies matters that must be considered in determining development applications on land within the Coastal Use Area. Clause 14 reads:

- (1) *Development consent must not be granted to development on land that is within the coastal use area unless the consent authority:*
 - (a) *has considered whether the proposed development is likely to cause an adverse impact on the following:*
 - (i) *existing, safe access to and along the foreshore, beach, headland or rock platform for members of the public, including persons with a disability,*
 - (ii) *overshadowing, wind funneling and the loss of views from public places to foreshores,*
 - (iii) *the visual amenity and scenic qualities of the coast, including coastal headlands,*
 - (iv) *Aboriginal cultural heritage, practices and places,*
 - (v) *cultural and built environment heritage, and*
 - (b) *is satisfied that:*
 - (i) *the development is designed, sited and will be managed to avoid an adverse impact referred to in paragraph (a), or*

- (ii) *if that impact cannot be reasonably avoided—the development is designed, sited and will be managed to minimise that impact, or*
 - (iii) *if that impact cannot be minimised—the development will be managed to mitigate that impact, and*
 - c) *has taken into account the surrounding coastal and built environment, and the bulk, scale and size of the proposed development.*

Comment:

- The proposal will not impact on existing safe access to the foreshore. The proposal is not near a beach, headland or rock platform and as such does not impact on public access to these areas.
- The works associated with this modification proposal will not cause overshadowing of the foreshore area or wind funnelling. The development will not block views from public places. The proposal will not adversely impact on the visual amenity and scenic qualities of the coast.
- As detailed above, the proposal will not adversely impact on Aboriginal cultural heritage and places.
- The works associated with this modification proposal are of a bulk, scale and size that are consistent with existing industrial development on the site and will not create an adverse visual impact in this locality.

Under these circumstances the proposal is considered to be consistent with the objectives and provisions of the Coastal Management SEPP.

SEPP No. 55 - Remediation of Land

SEPP 55 aims to essentially promote the remediation of contaminated land for the purposes of reducing the risk of harm to human health and the environment. In particular clause 7 of the SEPP requires that a consent authority must not consent to any development unless:

- it has considered whether the land is contaminated;
- if the land is contaminated whether the land is suitable in its contaminated state (or will be suitable after remediation for the purpose for which development is proposed; and
- if the land requires remediation to be made suitable, it is satisfied that the land will be remediated before the land is used for that purpose.

Furthermore, if a change of use of land for residential purpose is proposed, where:

- there is no knowledge (or incomplete knowledge) of past uses;
- on which it would have been lawful to carry out such past uses during any period in respect of which there is no knowledge (or incomplete knowledge).

The consent authority is required to consider a report detailing the findings of a preliminary investigation of the land.

The SEE is supported by a site contamination assessment prepared by GHD (**Annexure 8**) that has been prepared in response to the provisions of this SEPP. This issue is further addressed in Section 7.2.8 of this SEE.

7.1.2 Local Environmental Plan

Shoalhaven Local Environmental Plan 2014

The parcels of land associated with this modification application are zoned IN1 General Industrial under the provisions of the Shoalhaven LEP 2014 (refer **Figure 18**).

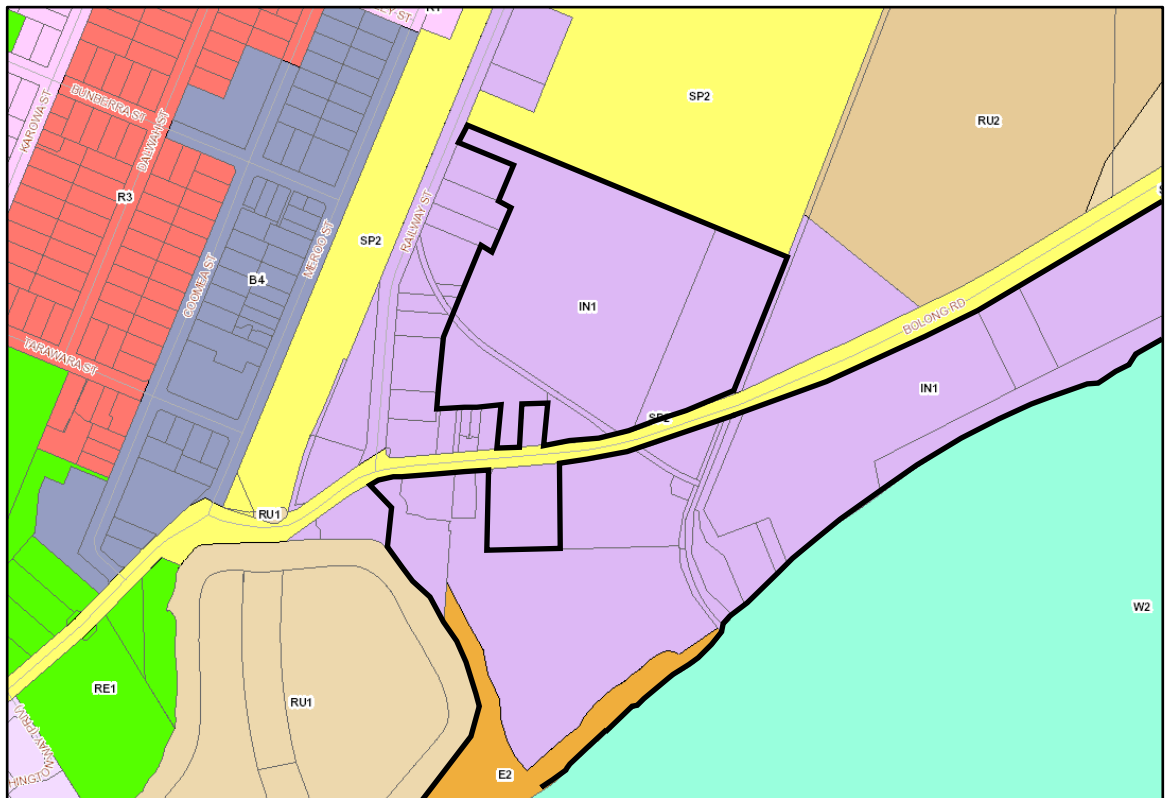


Figure 18: Extract of zoning map under the SLEP 2014.

The objectives of the IN1 zone are:

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

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

It is our view that the proposal is consistent with these objectives as the proposal involves modifications to an existing industrial facility.

“General industries” are permissible within the IN1 zone subject to consent (**Table 4**). The proposal involves modifications to an existing industrial development and is therefore permissible with consent.

Table 4
Land Use Permissibility – IN1 Zone (Shoalhaven LEP 2014)

Permitted without consent	Nil.
Permitted with consent	Bulky goods premises; Depots; Freight transport facilities; General industries ; Industrial training facilities; Kiosks; Light industries; Markets; Neighbourhood shops; Roads; Take away food and drink premises; Timber yards; Warehouse or distribution centres
Prohibited	Agriculture; Air transport facilities; Airstrips; Amusement centres; Animal boarding or training establishments; Camping grounds; Caravan parks; Cemeteries; Charter and tourism boating facilities; Child care centres; Correctional centres; Crematoria; Eco-tourist facilities; Educational establishments; Environmental facilities; Exhibition villages; Extractive industries; Farm buildings; Forestry; Function centres; Health services facilities; Highway service centres; Home-based childcare; Home businesses; Home occupations; Home occupations (sex services); Information and education facilities; Marinas; Mooring pens; Moorings; Office premises; Open cut mining; Places of public worship; Registered clubs; Residential accommodation; Respite day care centres; Restricted premises; Retail premises; Sex services premises; Tourist and visitor accommodation; Water recreation structures; Wharf or boating facilities.

The SLEP 2014 also has a number of specific provisions that apply to the land. The implications that these provisions have in relation to this proposal are discussed in **Table 5** below:

Table 5
Shoalhaven Local Environment Plan Provisions

SLEP 2014 Clause	Provisions	Comments
Clause 4.3 <i>Height of Buildings</i>	<p>(1) <i>The objectives of this clause are as follows:</i></p> <ul style="list-style-type: none"> (a) <i>to ensure that buildings are compatible with the height, bulk and scale of the existing and desired future character of a locality,</i> (b) <i>to minimise visual impact, disruption of views, loss of privacy and loss of solar access to existing development,</i> (c) <i>to ensure that the height of buildings on or in the vicinity of a heritage item or within a heritage conservation area respect heritage significance.</i> <p>(2) <i>The height of a building on any land is not to exceed the maximum height shown for the land on the Height of Buildings Map.</i></p> <p>(2A) <i>If the Height of Buildings Map does not show a maximum height for any land, the height of a building on the land is not to exceed 11 metres.</i></p>	<p>Although there is no maximum height specified for the subject land, Clause 4.3(2A) imposes a maximum building height of 11 m where no specific height limit is designated.</p> <p>The proposal will involve the erection of a range of structures with heights above the 11 metres height limit level ranging from 11.3 m up to 54.2 m (and including a lightning rod with a height of 56.6 m).</p> <p>Under these circumstances this SEE is supported by a Written Request made pursuant to Clause 4.6 (Annexure 9) justifying non-compliance with this maximum building height limit.</p>
Clause 4.6 <i>Exceptions to development standards</i>	<p>(1) <i>The objectives of this clause are as follows:</i></p> <ul style="list-style-type: none"> (a) <i>to provide an appropriate degree of flexibility in applying certain development standards to particular development,</i> (b) <i>to achieve better outcomes for and from development by allowing flexibility in particular circumstances.</i> <p>(2) <i>Development consent may, subject to this clause, be granted for development even though the development would contravene a development standard imposed by this or any other environmental planning instrument. However, this clause does not apply to a development standard that is expressly excluded from the operation of this clause.</i></p> <p>(3) <i>Development consent must not be granted for development that contravenes a development standard unless the consent authority has considered a written request from the applicant that seeks to justify the contravention of the development standard by demonstrating:</i></p> <ul style="list-style-type: none"> (a) <i>that compliance with the development standard is unreasonable or unnecessary in the circumstances of the case, and</i> 	<p>The proposal will involve the erection of a range of structures with heights above the 11 metres height limit level ranging from 11.3 m up to 54.2 m (and including a lightning rod with a height of 56.6 m).</p> <p>The proposed development will be erected within the broader approved Shoalhaven Starches factory site.</p> <p>As the proposed works will be built within the existing industrial complex it is not expected that the new development will have an undue effect due to its height.</p> <p>This Modification Application is supported by a Clause 4.6 Written Request justifying a departure to Clause 4.3(2A) under the specific circumstances of this case.</p>

Table 5 (continued)

SLEP 2014 Clause	Provisions	Comments
4.6 continued	<p>(b) that there are sufficient environmental planning grounds to justify contravening the development standard.</p> <p>(4) Development consent must not be granted for development that contravenes a development standard unless:</p> <p>(a) the consent authority is satisfied that:</p> <p>(i) the applicant's written request has adequately addressed the matters required to be demonstrated by subclause (3), and</p> <p>(ii) the proposed development will be in the public interest because it is consistent with the objectives of the particular standard and the objectives for development within the zone in which the development is proposed to be carried out, and</p> <p>(b) the concurrence of the Director-General has been obtained.</p> <p>(5) In deciding whether to grant concurrence, the Director-General must consider:</p> <p>(a) whether contravention of the development standard raises any matter of significance for State or regional environmental planning, and</p> <p>(b) the public benefit of maintaining the development standard, and</p> <p>(c) any other matters required to be taken into consideration by the Director-General before granting concurrence.</p> <p>(6) Development consent must not be granted under this clause for a subdivision of land in Zone RU1 Primary Production, Zone RU2 Rural Landscape, Zone RU3 Forestry, Zone RU4 Primary Production Small Lots, Zone RU6 Transition, Zone R5 Large Lot Residential, Zone E2 Environmental Conservation, Zone E3 Environmental Management or Zone E4 Environmental Living if:</p> <p>(a) the subdivision will result in 2 or more lots of less than the minimum area specified for such lots by a development standard, or</p>	

Table 5 (continued)

SLEP 2014 Clause	Provisions	Comments
4.6 continued	<p>(b) the subdivision will result in at least one lot that is less than 90% of the minimum area specified for such a lot by a development standard.</p> <p><i>Note. When this Plan was made it did not include all of these zones.</i></p> <p>(7) After determining a development application made pursuant to this clause, the consent authority must keep a record of its assessment of the factors required to be addressed in the applicant's written request referred to in subclause (3).</p>	
Clause 5.10 Heritage Conservation	<p>(1) The objectives of this clause are:</p> <p>(a) to conserve the environmental heritage of Shoalhaven; and</p> <p>(b) to conserve the heritage significance of heritage items and heritage conservation areas including associated fabric, settings and views; and</p> <p>(c) to conserve archaeological sites; and</p> <p>(d) to conserve Aboriginal objects and Aboriginal places of heritage significance.</p> <p>(2) Development consent is required for any of the following:</p> <p>(a) demolishing or moving any of the following or altering the exterior of any of the following (including, in the case of a building, making changes to its detail, fabric, finish or appearance):</p> <p>(i) a heritage item,</p> <p>(ii) an Aboriginal object</p> <p>(iii) a building, work, relic or tree within a heritage conservation area,</p> <p>(b) altering a heritage item that is a building by making structural changes to its interior or by making changes to anything inside the item that is specified in Schedule 5 in relation to the item,</p>	<p>There are no heritage items within the subject land, and the subject site is not located within a heritage conservation area.</p> <p>The site is a highly disturbed industrial site that has been used for industrial purposes for decades. No excavation is proposed as such the proposal is not expected to disturb any Aboriginal objects or relics.</p>

Table 5 (continued)

SLEP 2014 Clause	Provisions	Comments						
5.10 continued	<p>(c) <i>disturbing or excavating an archaeological site while knowing, or having reasonable cause to suspect, that the disturbance or excavation will or is likely to result in a relic being, discovered, exposed, moved damaged or destroyed,</i></p> <p>(d) <i>disturbing or excavating an Aboriginal place of heritage significance,</i></p> <p>(e) <i>erecting a building on land:</i></p> <p style="padding-left: 20px;">(i) <i>on which a heritage item is located or that is within a heritage conservation area;</i></p> <p style="padding-left: 20px;">(ii) <i>on which an Aboriginal object is located or that is within an Aboriginal place of heritage significance,</i></p> <p>(f) <i>subdividing land:</i></p> <p style="padding-left: 20px;">(i) <i>on which a heritage item is located or that is within a heritage conservation area, or</i></p> <p style="padding-left: 20px;">(ii) <i>on which an Aboriginal object is located or that is within an Aboriginal place of heritage significance.</i></p>							
Clause 7.1 Acid sulfate soils	<p>(1) <i>The objective of this clause is to ensure that development does not disturb, expose or drain acid sulfate soils and cause environmental damage.</i></p> <p>(2) <i>Development consent is required for the carrying out of works described in the Table to this subclause on land shown on the Acid Sulfate Soils Map as being of the class specified for those works, except as provided by this clause.</i></p> <table border="1"><thead><tr><th><i>Class of Land</i></th><th><i>Works</i></th></tr></thead><tbody><tr><td>1</td><td><i>Any works.</i></td></tr><tr><td>2</td><td><i>Works below the natural ground surface. Works by which the watertable is likely to be lowered.</i></td></tr></tbody></table>	<i>Class of Land</i>	<i>Works</i>	1	<i>Any works.</i>	2	<i>Works below the natural ground surface. Works by which the watertable is likely to be lowered.</i>	<ul style="list-style-type: none">The SEE is supported by an Acid Sulphate Soils (ASS) Assessment prepared by GHD (Annexure 8) which An Acid Sulphate Soils (ASS) Assessment carried out by GHD (Annexure 8) identifies that ASS could be encountered within alluvial soils underlying the fill materials at depths ranging from 1 m to 4 m depending upon the location on the overall site. Disturbance of ASS is likely to occur at these sites according to GHD as CFA piles will be used to excavate foundations. GHD recommend that an acid sulphate soil management plan (ASSMP) should be developed and actioned where excavations associated with the Modification proposal will disturb ASS and / or require dewatering which could result in the lowering of the water table.
<i>Class of Land</i>	<i>Works</i>							
1	<i>Any works.</i>							
2	<i>Works below the natural ground surface. Works by which the watertable is likely to be lowered.</i>							

Table 5 (continued)

SLEP 2014 Clause	Provisions	Comments						
7.1 continued	<table><tr><td>3</td><td>Works more than 1 metre below the natural ground surface. Works by which the watertable is likely to be lowered more than 1 metre below the natural ground surface.</td></tr><tr><td>4</td><td>Works more than 2 metres below the natural ground surface. Works by which the watertable is likely to be lowered more than 2 metres below the natural ground surface.</td></tr><tr><td>5</td><td>Works within 500 metres of adjacent Class 1, 2, 3 or 4 land that is below 5 metres Australian Height Datum by which the watertable is likely to be lowered below 1 metre Australian Height Datum on adjacent Class 1, 2, 3 or 4 land.</td></tr></table> <p>(3) Development consent must not be granted under this clause for the carrying out of works unless an acid sulfate soils management plan has been prepared for the proposed works in accordance with the Acid Sulfate Soils Manual and has been provided to the consent authority.</p> <p>(4) Despite subclause (2), development consent is not required under this clause for the carrying out of works if:</p> <p>(a) a preliminary assessment of the proposed works prepared in accordance with the Acid Sulfate Soils Manual indicates that an acid sulfate soils management plan is not required for the works, and</p> <p>(b) the preliminary assessment has been provided to the consent authority and the consent authority has confirmed the assessment by notice in writing to the person proposing to carry out the works.</p>	3	Works more than 1 metre below the natural ground surface. Works by which the watertable is likely to be lowered more than 1 metre below the natural ground surface.	4	Works more than 2 metres below the natural ground surface. Works by which the watertable is likely to be lowered more than 2 metres below the natural ground surface.	5	Works within 500 metres of adjacent Class 1, 2, 3 or 4 land that is below 5 metres Australian Height Datum by which the watertable is likely to be lowered below 1 metre Australian Height Datum on adjacent Class 1, 2, 3 or 4 land.	
3	Works more than 1 metre below the natural ground surface. Works by which the watertable is likely to be lowered more than 1 metre below the natural ground surface.							
4	Works more than 2 metres below the natural ground surface. Works by which the watertable is likely to be lowered more than 2 metres below the natural ground surface.							
5	Works within 500 metres of adjacent Class 1, 2, 3 or 4 land that is below 5 metres Australian Height Datum by which the watertable is likely to be lowered below 1 metre Australian Height Datum on adjacent Class 1, 2, 3 or 4 land.							

Table 5 (continued)

SLEP 2014 Clause	Provisions	Comments
7.1 continued	<p>(5) <i>Despite subclause (2), development consent is not required under this clause for the carrying out of any of the following works by a public authority (including ancillary work such as excavation, construction of access ways or the supply of power):</i></p> <ul style="list-style-type: none"> (a) <i>emergency work, being the repair of the works of the public authority required to be carried out urgently because the works have been damaged, have ceased to function or pose a risk to the environment or to public health and safety,</i> (b) <i>routine management work, being the periodic inspection, cleaning, repair or replacement of the works of the public authority (other than work that involves the disturbance of more than 1 tonne of soil).</i> (c) <i>minor work, being work that costs less than \$20,000 (other than drainage work).</i> <p>(6) <i>Despite subclause (2), development consent is not required under this clause to carry out any works if:</i></p> <ul style="list-style-type: none"> (a) <i>the works involve the disturbance of less than 1 tonne of soil, and</i> (b) <i>the works are not likely to lower the watertable.</i> 	
Clause 7.3 Flood Planning	<p>(1) <i>The objectives of this clause are as follows:</i></p> <ul style="list-style-type: none"> (a) <i>to minimise the flood risk to life and property associated with the use of land,</i> (b) <i>to allow development on land that is compatible with the land's flood hazard, taking into account projected changes as a result of climate change,</i> (c) <i>to avoid significant adverse impacts on flood behaviour and the environment.</i> <p>(2) <i>This clause applies to land at or below the flood planning level.</i></p> <p>(3) <i>Development consent must not be granted to development on land to which this clause applies unless the consent authority is satisfied that the development:</i></p> <ul style="list-style-type: none"> (a) <i>is compatible with the flood hazard of the land, and</i> 	The application is supported by a Flood Compliance Report prepared by WMA Water (Annexure 5) which concludes there would be no significant incremental increase in the 1% AEP flood level as a result of the proposed works. This issue is further addressed in Section 7.2.7 of this SEE.

Table 5 (continued)

SLEP 2014 Clause	Provisions	Comments
	<p>(b) <i>will not significantly adversely affect flood behaviour resulting in detrimental increases in the potential flood affectation of other development or properties, and</i></p> <p>(c) <i>incorporates appropriate measures to manage risk to life from flood, and</i></p> <p>(d) <i>will not significantly adversely affect the environment or cause avoidable erosion, siltation, destruction of riparian vegetation or a reduction in the stability of riverbanks or watercourses, and</i></p> <p>(e) <i>is not likely to result in unsustainable social and economic costs to the community as a consequence of flooding, and</i></p> <p>(f) <i>will not affect the safe occupation or evacuation of the land.</i></p> <p>(4) <i>A word or expression used in this clause has the same meaning as it has in the Floodplain Development Manual (ISBN 0 7347 5476 0) published by the NSW Government in April 2005, unless it is otherwise defined in this Plan.</i></p> <p>(5) <i>(Repealed)</i></p>	
<p><i>Clause 7.4 Coastal Risk Planning</i></p>	<p>(1) <i>The objectives of this clause are as follows:</i></p> <p>(a) <i>to avoid significant adverse impacts from coastal hazards,</i></p> <p>(b) <i>to ensure uses of land identified as coastal risk are compatible with the risks presented by coastal hazards,</i></p> <p>(c) <i>to enable the evacuation of land identified as coastal risk in an emergency,</i></p> <p>(d) <i>to avoid development that increases the severity of coastal hazards.</i></p> <p>(2) <i>This clause applies to the land identified as “Coastal Risk Planning Area” on the Coastal Risk Planning Map.</i></p> <p>(3) <i>Development consent must not be granted to development on land to which this clause applies unless the consent authority is satisfied that the development:</i></p> <p>(a) <i>will avoid, minimise or mitigate exposure to coastal processes, and</i></p>	<p>The <i>Coastal Risk Planning Map</i> that accompanies the SLEP 2014 does <u>not</u> identify the subject land as a “<i>Coastal Risk Planning Area</i>”.</p> <p>The provisions of this clause therefore do not apply to the subject site.</p>

Table 5 (continued)

SLEP 2014 Clause	Provisions	Comments
7.4 continued	<p>(b) <i>is not likely to cause detrimental increases in coastal risks to other development or properties, and</i></p> <p>(c) <i>is not likely to alter coastal processes and the impacts of coastal hazards to the detriment of the environment, and</i></p> <p>(d) <i>incorporates appropriate measures to manage risk to life from coastal risks, and</i></p> <p>(e) <i>is likely to avoid or minimise adverse effects from the impact of coastal processes and the exposure to coastal hazards, and</i></p> <p>(f) <i>provides for the relocation, modification or removal of the development to adapt to the impact of coastal processes and coastal hazards, and</i></p> <p>(g) <i>has regard to the impacts of sea level rise.</i></p> <p>(4) <i>A word or expression used in this clause has the same meaning as it has in the NSW Coastal Planning Guideline: Adapting to Sea Level Rise (ISBN 978-1-74263-035-9) published by the NSW Government in August 2010, unless it is otherwise defined in this clause.</i></p> <p>(5) <i>In this clause:</i> coastal hazard <i>has the same meaning as in the Coastal Protection Act 1979.</i></p>	
Clause 7.5 Terrestrial Biodiversity	<p>(1) <i>The objective of this clause is to maintain terrestrial biodiversity, by:</i></p> <p>(a) <i>protecting native flora and fauna,</i></p> <p>(b) <i>protecting the ecological processes necessary for their continued existence, and</i></p> <p>(c) <i>encouraging the recovery of native flora and fauna, and their habitats.</i></p> <p>(2) <i>This clause applies to land:</i></p> <p>(a) <i>identified as “Biodiversity—habitat corridor” or “Biodiversity—significant vegetation” on the Terrestrial Biodiversity Map, and</i></p> <p>(b) <i>situated within 40m of the bank (measured horizontally from the top of the bank) of a natural waterbody.</i></p>	<p>The Terrestrial Biodiversity Map that accompanies the SLEP 2014 does <u>not</u> identify the subject land as including areas of Biodiversity - habitat corridor and/or Biodiversity - significant vegetation.</p> <p>Given the nature of the site the proposal is unlikely to have any adverse impacts on the ecological value of the land.</p>

Table 5 (continued)

SLEP 2014 Clause	Provisions	Comments
7.5 continued	<p>(3) <i>Before determining a development application for development on land to which this clause applies, the consent authority must consider:</i></p> <p>(a) <i>whether the development is likely to have:</i></p> <ul style="list-style-type: none"> (i) <i>any adverse impact on the condition, ecological value and significance of the fauna and flora on the land, and</i> (ii) <i>any adverse impact on the importance of the vegetation on the land to the habitat and survival of native fauna, and</i> (iii) <i>any potential to fragment, disturb or diminish the biodiversity structure, function and composition of the land, and</i> (iv) <i>any adverse impact on the habitat elements providing connectivity on the land, and</i> <p>(b) <i>any appropriate measures proposed to avoid, minimise or mitigate the impacts of the development.</i></p> <p>(4) <i>Development consent must not be granted to development on land to which this clause applies unless the consent authority is satisfied that:</i></p> <ul style="list-style-type: none"> (a) <i>the development is designed, sited and will be managed to avoid any significant adverse environmental impact, or</i> (b) <i>if that impact cannot be reasonably avoided by adopting feasible alternatives—the development is designed, sited and will be managed to minimise that impact, or</i> (c) <i>if that impact cannot be minimised—the development will be managed to mitigate that impact.</i> <p>(5) <i>For the purpose of this clause:</i></p> <p>bank <i>means the limit of the bed of a natural waterbody.</i></p> <p>bed, <i>of a natural waterbody, means the whole of the soil of the channel in which the waterbody flows, including the portion that is alternatively covered and left bare with an increase or diminution in the supply of water and that is adequate to contain the waterbody at its average or mean stage without reference to extraordinary freshets in the time of flood or to extreme droughts.</i></p>	

Table 5 (continued)

SLEP 2014 Clause	Provisions	Comments
Clause 7.6 Riparian land and watercourses	<p>(1) <i>The objective of this clause is to protect and maintain the following:</i></p> <ul style="list-style-type: none"> (a) <i>water quality within watercourses,</i> (b) <i>the stability of the bed and banks of watercourses,</i> (c) <i>aquatic and riparian habitats,</i> (d) <i>ecological processes within watercourses and riparian areas.</i> <p>(2) <i>This clause applies to all of the following:</i></p> <ul style="list-style-type: none"> (a) <i>land identified as “Riparian Land” on the Riparian Lands and Watercourses Map,</i> (b) <i>land identified as “Watercourse Category 1”, “Watercourse Category 2” or “Watercourse Category 3” on that map,</i> (c) <i>all land that is within 50 metres of the top of the bank of each watercourse on land identified as “Watercourse Category 1”, “Watercourse Category 2” or “Watercourse Category 3” on that map.</i> <p>(3) <i>Before determining a development application for development on land to which this clause applies, the consent authority must consider:</i></p> <ul style="list-style-type: none"> (a) <i>whether or not the development is likely to have any adverse impact on the following:</i> <ul style="list-style-type: none"> (i) <i>the water quality and flows within the watercourse,</i> (ii) <i>aquatic and riparian species, habitats and ecosystems of the watercourse,</i> (iii) <i>the stability of the bed and banks of the watercourse,</i> (iv) <i>the free passage of fish and other aquatic organisms within or along the watercourse,</i> (v) <i>any future rehabilitation of the watercourse and its riparian areas, and</i> (b) <i>whether or not the development is likely to increase water extraction from the watercourse, and</i> (c) <i>any appropriate measures proposed to avoid, minimise or mitigate the impacts of the development.</i> 	<p>The <i>Riparian Lands and Watercourses Map</i> that accompanies the SLEP 2014 identify a category 1 watercourse (Shoalhaven River), adjacent to the southern boundary of the Shoalhaven Starches factory site and a category 2 watercourse Abernethy’s Creek flowing through the factory site (north-south)</p> <p>The site is industrial land with no existing vegetation and is beyond the influence of normal fluvial geomorphic processes. As such the development will not have any adverse effect on water quality, flows within the watercourse, aquatic and riparian species or habitats and ecosystems of the watercourse.</p> <p>An assessment has been undertaken by GHD in relation to riverbank stability (Annexure 8). With respect to the potential impact of the proposed modification works on riverbank stability, GHD conclude the proposed works at all sites will have no influence on the stability of the northern bank of the nearby Shoalhaven River, western bank of Abernethy’s Creek and eastern bank of Bomaderry Creek. This assumes that all structure will be supported on deep piles founded in weathered rock and therefore will not increase loading of the ground adjacent to the banks. Short term construction loading of the ground surface adjacent to the western bank of Abernethy’s Creek will need to be assessed for stability, including crane pad and piling platform assessments. Creek bank erosion protection may be required where removal of vegetation or ground disturbance occurs over the creek bank during construction.</p>

Table 5 (continued)

SLEP 2014 Clause	Provisions	Comments
7.6 continued	<p>(4) Development consent must not be granted to development on land to which this clause applies unless the consent authority is satisfied that:</p> <ul style="list-style-type: none"> (a) the development is designed, sited and will be managed to avoid any significant adverse environmental impact, or (b) if that impact cannot be reasonably avoided—the development is designed, sited and will be managed to minimise that impact, or (c) if that impact cannot be minimised—the development will be managed to mitigate that impact <p>(5) For the purpose of this clause:</p> <p>bank means the limit of the bed of a watercourse.</p> <p>bed, of a watercourse, means the whole of the soil of the channel in which the watercourse flows, including the portion that is alternatively covered and left bare with an increase or diminution in the supply of water and that is adequate to contain the watercourse at its average or mean stage without reference to extraordinary freshets in the time of flood or to extreme droughts.</p>	
Clause 7.7 Landslide risk and other land degradation	<p>(1) The objective of this clause is to maintain soil resources and the diversity and stability of landscapes, including protecting land:</p> <ul style="list-style-type: none"> (a) comprising steep slopes, and (b) susceptible to other forms of land degradation. <p>(2) This clause applies to the following land:</p> <ul style="list-style-type: none"> (a) land with a slope in excess of 20% (1:5), as measured from the contours of a 1:25,000 topographical map, and (b) land identified as “Sensitive Area” on the Natural Resource Sensitivity—Land Map. <p>(3) Before determining a development application for development on land to which this clause applies, the consent authority must consider any potential adverse impact, either from, or as a result of, the development in relation to:</p>	<p>The proposed works involve land identified as sensitive land under the SLEP 2014 mapping. Under these circumstances the provisions of this clause will apply to this proposal.</p> <p>As outlined above in relation to Clause 7.6, GHD have undertaken a geotechnical assessment of the site in relation to the proposed works associated with this Modification Application. This assessment concludes the proposed works at all sites will have no influence on the stability of the northern bank of the nearby Shoalhaven River, western bank of Abernethy’s Creek and eastern bank of Bomaderry Creek. This assumes that all structure will be supported on deep piles founded in weathered rock and therefore will not increase loading of the ground</p>

Table 5 (continued)

SLEP 2014 Clause	Provisions	Comments
	<p>(a) <i>the geotechnical stability of the site, and</i></p> <p>(b) <i>the probability of increased erosion or other land degradation processes.</i></p> <p>(4) <i>Before granting consent to development on land to which this clause applies, the consent authority must be satisfied that:</i></p> <p>(a) <i>the development is designed, sited and will be managed to avoid any significant adverse environmental impact, or</i></p> <p>(b) <i>if that impact cannot be reasonably avoided—the development is designed, sited and will be managed to minimise that impact, or</i></p> <p>(c) <i>if that impact cannot be minimised – the development will be managed to mitigate that impact.</i></p> <p>(5) <i>In this clause, topographical map means the most current edition of a topographical map, produced by Land and Property Information division of the Department of Finance and Services, that identifies the Council's local government area and boundary.</i></p>	<p>adjacent to the banks. Short term construction loading of the ground surface adjacent to the western bank of Abernethy's Creek will need to be assessed for stability, including crane pad and piling platform assessments. Creek bank erosion protection may be required where removal of vegetation or ground disturbance occurs over the creek bank during construction.</p>
7.8 Scenic protection	<p>(1) <i>The objective of this clause is to protect the natural environmental and scenic amenity of land that is of high scenic value.</i></p> <p>(2) <i>This clause applies to land identified as "Scenic Protection" on the Scenic Protection Area Map.</i></p> <p>(3) <i>In deciding whether to grant development consent for development on land to which this clause applies, the consent authority must:</i></p> <p>(a) <i>consider the visual impact of the development when viewed from a public place and be satisfied that the development will involve the taking of measures that will minimise any detrimental visual impact, and</i></p> <p>(b) <i>consider the number, type and location of existing trees and shrubs that are to be retained and the extent of landscaping to be carried out on the site, and</i></p> <p>(c) <i>consider the siting of the proposed buildings.</i></p>	<p>The subject land is <u>not</u> identified as being within a "Scenic Protection" area by <i>Scenic Protection Area Mapping</i> that accompanies the SLEP 2014.</p> <p>The provisions of this clause therefore do not apply to the subject site.</p> <p>The visual impact associated with this proposal are discussed in Section 7.2.6 of this SEE.</p>

7.1.3 Development Control Plans (DCP) and Policies

Shoalhaven Development Control Plan (DCP) 2014

Given the nature of the works associated with this modification proposal it is considered the provisions of the Shoalhaven DCP 2014 are not directly relevant to this modification application apart from the provisions of *Chapter G9: Development on Flood Prone Land*.

The SEE is supported by a Flood Compliance Report prepared by WMA Water which addresses flooding issues which arise in relation to this Modification Proposal. A copy of the WMA Water submission is included in **Annexure 5** of this SEE. Flooding issues are further in Section 7.2.7 of this SEE.

Table 6 below is an extract from the WMA Water submission addressing the relevant provisions (section 5.1) of Chapter G9 of the Shoalhaven DCP 2014.

Table 6
Performance Criteria – General (Section 5.1 DCP 2014)
Extract from WMA Water Flood Compliance Report

<i>Performance Criteria</i>	<i>Response</i>
P1 Development or work on flood prone land will meet the following:	
<i>The development will not increase the risk to life or safety of persons during a flood event on the development site and adjoining land.</i>	The works are such that their construction will require 65 additional contractors but only an additional 2 full time workers. Thus, there will not be a significant increase in the permanent workforce on the site or provide an additional threat to the safety of any worker during a flood.
<i>The development or work will not unduly restrict the flow behaviour of floodwaters.</i>	Refer Hydraulic Impact Assessment.
<i>The development or work will not unduly increase the level or flow of floodwaters or stormwater runoff on land in the vicinity.</i>	Refer Hydraulic Impact Assessment below.
<i>The development or work will not exacerbate the adverse consequences of floodwaters flowing on the land with regard to erosion, siltation and destruction of vegetation.</i>	The works are within existing built up industrial land clear of vegetation. Due to there being no significant increase in footprint and all runoff under existing and future conditions reaching the ground in nearly identical locations, the works will have no impact on erosion or siltation.
<i>The structural characteristics of any building or work that are the subject of the application are capable of withstanding flooding in accordance with the requirements of the Council.</i>	A separate structural report will be provided.
<i>The development will not become unsafe during floods or result in moving debris that potentially threatens the safety of people or the integrity of structures.</i>	A separate structural report will be provided.

Table 6 (continued)

Performance Criteria	Response
<i>Potential damage due to inundation of proposed buildings and structures is minimised.</i>	The works are largely sealed structures with many parts of the works above the PMF flood level which means there will be minimal damage due to inundation, unless the structure itself fails. There will potentially be some damage to electrical and other components feeding the equipment and these are considered in Shoalhaven Starches Flood Plan.
<i>The development will not obstruct escape routes for both people and stock in the event of a flood.</i>	The works will not occupy escape routes or cause workers to become trapped.
<i>The development will not unduly increase dependency on emergency services.</i>	The works are such that their construction will not significantly increase the number of workers on the site or provide an additional threat to the safety of any worker during a flood.
<i>Interaction of flooding from all possible sources has been taken into account in assessing the proposed development against risks to life and property resulting from any adverse hydraulic impacts.</i>	Refer Hydraulic Impact Assessment below.
<i>The development will not adversely affect the integrity of floodplains and floodway's, including riparian vegetation, fluvial geomorphologic environmental processes and water quality.</i>	The works will be constructed on land designated as high hazard floodway in the 1% AEP event. The site is industrial land with nil existing vegetation and is beyond the influence of normal fluvial geomorphic processes. The works will have no impact on water quality.

7.1.4 Protection of the Environment Operations Act and Associated Regulations

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

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

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

7.2 THE LIKELY IMPACTS OF THE DEVELOPMENT, INCLUDING ENVIRONMENTAL IMPACTS ON BOTH NATURAL AND BUILT ENVIRONMENTS, AND SOCIAL AND ECONOMIC IMPACTS IN THE LOCALITY

7.2.1 Risk Assessment of Potential Environmental Impacts

The purpose of this section of the SEE is to provide a risk assessment of the potential environmental impacts associated with the modification proposal. This section (**Table 7**) compares the potential impacts from the proposed modification against the approved project. The comparison uses the key environmental impacts assessed in the original EA that supported the original MP06_0228 and summarises the relative change in environmental impacts associated with the proposed modification.

Table 7
Risk Assessment

<i>Relative Change in Environmental Impact</i>	<i>Additional Management or Mitigation Measures Required</i>	<i>Significance of Issue with this Modification Proposal</i>
Air Quality (including Odour) Assessment		
<p>One of the primary issues that was addressed in the original EA for the Shoalhaven Starches Expansion Project concerned the need for a comprehensive air quality assessment (including odour assessment) and reduction of odours as part of the project.</p> <p>This SEE is supported by an air quality assessment prepared by GHD which addresses the relevant aspects of this Modification Application in terms of air quality (including odour) impacts.</p> <p>GHD's assessment concludes that there was a marginal increase observed in predicted odour impacts as a result of the modification. The odour criteria however will be met at all residential sensitive receptors and GHD considers it highly unlikely that the increase in odour would be detected at sensitive receptors.</p> <p>Air quality impacts are predicted by GHD to comply with the criteria at all residential sensitive receptors.</p> <p>Overall, GHD concludes the proposal should be acceptable from an air quality perspective.</p>	<p>GHD do not propose any additional management or mitigative measures are required for this Modification Application.</p>	<p>This issue is further addressed in Section 7.2.2 of this SEE.</p>
Transport and Traffic		
<p>The proposed modification overall does not involve; any significant increases in traffic generated to the site; any changes to vehicle entrances to the site; or alternations to the layout of approved car parking areas.</p> <p>The SEE is supported by a Traffic Impact Assessment prepared by Bitzios Consulting which concludes:</p>	<p>No additional management or mitigative measures are proposed in terms of traffic or car parking.</p>	<p>This issue is further addressed in Section 7.2.5 of this SEE.</p>

Table 7 (continued)

Relative Change in Environmental Impact	Additional Management or Mitigation Measures Required	Significance of Issue with this Modification Proposal
<p><i>The key findings of the traffic impact assessment for the proposed Shoalhaven Starches expansion location at 22 & 24 and 171 Bolong Road, Bomaderry are as follows:</i></p> <ul style="list-style-type: none"> ▪ <i>The proposed expansion (Modification 19) proposes the installation of distillation columns, associated processing equipment, boundary adjustment to Bolong Road, additional 3 ethanol storage tanks, additional ethanol load out, relocation of the existing ethanol distillery control room and other ancillary works</i> ▪ <i>Public transport access to the site is limited with a single bus and rail service approximately 600m from the subject site with services every 1-2 hours</i> ▪ <i>Pedestrian footpaths are provided fronting the site and two (2) pedestrian refuges provide active transport connectivity between areas of the subject site</i> ▪ <i>The subject site is accessed via several existing accesses off Bolong Road and the proposed modification will not result in any changes to access location or form and the vehicle types accessing the site will not change</i> ▪ <i>A swept path assessment demonstrates that a design service vehicle (25m B-Double) can safely and efficiently access the proposed load out and circulate the relevant area of the site</i> ▪ <i>The proposed modification of a short segment of footpath and kerb on the southern side of Bolong Road facilities safe pedestrian separation from proposed plant infrastructure and through traffic on Bolong Road.</i> 		

Table 7 (continued)

Relative Change in Environmental Impact	Additional Management or Mitigation Measures Required	Significance of Issue with this Modification Proposal
<ul style="list-style-type: none"> ▪ The proposed car parking provision exceeds the expected permanent and temporary / construction parking requirements ▪ The proposed extension of the western car park complies with relevant requirements of AS2890.1 ▪ Excluding construction traffic, the proposed modification is expected to generate no additional heavy vehicle movements and a maximum of two (2) light vehicle trips in the AM and PM peak hours ▪ Construction traffic volumes are not expected to have an adverse impact on the surrounding road network ▪ Modification 19 is not expected to have any adverse impacts on the surrounding road network in relation to the Bolong Road railway crossing at the heavy rail site access. <p>Based on the above assessment we conclude that there are no significant traffic or transport impacts associated with the proposed development expansion to preclude its approval and relevant conditioning on traffic or transport planning grounds.</p>		
Site Contamination		
<p>The SEE is supported by a Contamination Assessment prepared by GHD (Annexure 8) which identifies potential for contamination in five areas of environmental concern (AECs) which included:</p> <ul style="list-style-type: none"> • AEC 1: Storage and use of fuels and chemicals associated with operations at the plant. • AEC 2: Potential weathering of hazardous building materials and demolition of site structures 	<p>Based upon the findings of their preliminary investigation, GHD make the following recommendations in order to further assess or mitigate contamination risks associated with the sites:</p> <ul style="list-style-type: none"> • <i>Recommendations prior to development:</i> <ul style="list-style-type: none"> – Site 2: Assess the extent of asbestos impacted material. Based on the results of the assessment, remediation and/or management of the impacted area may be required. 	<p>This issue is further addressed in Section 7.2.8 of this SEE.</p>

Table 7 (continued)

Relative Change in Environmental Impact	Additional Management or Mitigation Measures Required	Significance of Issue with this Modification Proposal
<ul style="list-style-type: none"> AEC 3: Potential application of pesticides, herbicides, fertilisers AEC 4: Fill of unknown quantity and origin AEC 5: Storage and use of PFAS based firefighting foams <p>Based upon the findings of this preliminary investigation GHD have made a number of recommendations in order to further assess or mitigate contamination risks associated with these sites.</p>	<ul style="list-style-type: none"> Site 6: <ul style="list-style-type: none"> Assess the extent of asbestos impacted material. Manildra indicated that the proposed carpark area will be filled and therefore are likely to adopt a capping remediation strategy and record the asbestos impacted area on their asbestos register. Limited information on ground conditions is available for Site 6 and given the presence of asbestos, further investigation of subsurface conditions should be carried out to assess the potential for contamination to exist, prior to the construction of the carpark. Recommendations during development <ul style="list-style-type: none"> Assuming the above recommendations are carried out, any risk of exposure to potential contamination can be managed through an Unexpected Finds Protocol (UFP) and site-specific Work Health Safety and Environment (WHSE) plan. These plans are further discussed below: <ul style="list-style-type: none"> Preparation of an UFP to manage occurrences of contamination that may be encountered during excavation works. These occurrences may include ACM, staining, odours or ground conditions that differ significantly to what has been encountered during previous investigations. Site workers should be advised of the potential contamination risks at the sites and have appropriate personal protective equipment (PPE) available should contamination be encountered. A site-specific WHSE plan should be prepared, to ensure appropriate safety and workplace hygiene practices are implemented to minimise potential risks from exposure to contamination. The WHSE plan must address all relevant regulatory requirements and as a minimum, should consider incorporating the relevant 	

Table 7 (continued)

Relative Change in Environmental Impact	Additional Management or Mitigation Measures Required	Significance of Issue with this Modification Proposal
	<p><i>practices set out in CRC Care (2018) National Remediation Framework: Guideline on health and safety, Version 0.1: August 2018 (ref: https://www.crccare.com/files/dmfile/Healthandsafety_Rev0.pdf)</i></p> <ul style="list-style-type: none"> <i>– Some opportunistic sampling and analysis could be undertaken to better assess risk associated with exposure. These samples could also be used to inform the waste classification of excavated spoil.</i> <i>– Assess waste classification of soils to be excavated to allow off-site disposal of surplus materials to an appropriately licenced waste facility.</i> <p><i>Remaining Sites where AECs were assessed as low, are not considered to preclude the proposed development. At some locations, there is limited soil and/or groundwater data available. Therefore, a direct assessment of SPR linkages cannot be undertaken at this stage. Further investigation of these areas can be undertaken at a later stage to supplement existing data and allow for further assessment of SPR linkages.</i></p>	
Acid Sulphate Soils		
<p>The SEE is supported by an Acid Sulphate Soil (ASS) Assessments prepared by GHD which An Acid Sulphate Soils (ASS) Assessment carried out by GHD (Annexure 8) identifies that ASS could be encountered within alluvial soils underlying the fill materials at depths ranging from 1 m to 4 m depending upon the location on the overall site. Disturbance of ASS is likely to occur at these sites according to GHD as CFA piles will be used to excavate foundations.</p>	<p>GHD recommend that an acid sulphate soil management plan (ASSMP) should be developed and actioned where excavations associated with the Modification proposal will disturb ASS and / or require dewatering which could result in the lowering of the water table.</p>	<p>This issue is further addressed in Section 7.2.10 of this SEE.</p>

Table 7 (continued)

Relative Change in Environmental Impact	Additional Management or Mitigation Measures Required	Significance of Issue with this Modification Proposal
<p>Noise</p> <p>This SEE is supported by an Environmental Noise Impact Assessment prepared by Harwood Acoustics Pty Ltd. A copy of this assessment is included in Annexure 4 to this SEE.</p> <p>Noise producing aspects of this proposed modification include the processing plant and equipment associated with the modifications to the distillery, the proposed cooling towers and the pump motors associated with the product storage silos.</p> <p>According to Harwood Acoustics the level of noise emission from the modification to the ethanol distillery will be within the noise design goals derived from Environment Protection Licence 883 noise limits at each receptor location without the need for additional noise controls at this stage.</p> <p>A final assessment of required noise controls will be undertaken at the time of the Design Noise Verification process prior to construction, or during commissioning, as required, to ensure the noise design goals are met at all receptors.</p> <p>According to Harwood Acoustics the level of noise emission from the construction phase of the project will be within the noise management levels set by the NSW EPA's <i>Interim Construction Noise Guideline</i> with the exception of piling activity on some occasions.</p> <p>Construction noise mitigation measures are included in the Construction Safety & Environmental Management Plan prepared by Shoalhaven Starches.</p>		
	<p>In summary, the Environmental Noise Impact Assessment prepared by Harwood Acoustics includes the following recommendations for noise mitigation associated with this Modification Proposal:</p> <p>Ethanol Plant and Equipment Noise Levels Verification</p> <p>Providing a noise level of 98 dBA (L_w) for all plant and equipment combined, that will be located within the distiller and associated with the production of beverage grade ethanol, is not exceeded the noise design goals will be met at each receptor.</p> <p>A final design will be undertaken at the time of Design Noise Verification process once all of the details of the plant and equipment are finalised, or during construction or commissioning of the plant.</p> <p>In the event that a reduction in noise from the equipment associated with the plant and equipment is required according to Harwood Acoustics this will be achieved through a combination of localised acoustical treatment including, for example, localised screening, construction of acoustical enclosures, the lagging of pipe work and the judicious location of the plant.</p> <p>According to Harwood Acoustics any additional noise controls, if required will not be particularly onerous and the noise design goals can easily be achieved for this modification.</p> <p>Cooling Tower – Sound Level Design Goals</p> <p>The noise modelling of the cooling towers is based on a sound power level (L_w) of 87 dBA for a two fan unit with a maximum number of 12 fans to be installed over time.</p> <p>Noise modelling has been undertaken by Harwood Acoustics and includes attenuation from structures on Site and shows that, in conjunction with the noise emission arising from the beverage grade ethanol plant, that the noise design goals will be met at all receptors without the need for noise controls.</p>	<p>Noise impacts are further addressed in Section 7.2.3 of this SEE.</p>

Table 7 (continued)

<i>Relative Change in Environmental Impact</i>	<i>Additional Management or Mitigation Measures Required</i>	<i>Significance of Issue with this Modification Proposal</i>
	<p>However, as with the ethanol plant and equipment, a final design will be undertaken at the time of the Design Noise Verification process once all of the details of the cooling tower plant and equipment are finalised, or during construction or commissioning of the plant.</p> <p>Construction Noise</p> <p>The Project Approval prescribes allowable operation hours for construction activities in Clause 11 and Clause 13, which states:-</p> <p><i>“During construction, the Applicant shall implement all reasonable and feasible measures to minimise the construction noise impacts of the project development.”</i></p> <p>According to Harwood Acoustics construction noise management levels are likely to be met at each receptor location during general construction activity, with the exception of piling. During piling there is potential for the noise management levels to be exceeded on some occasions and most likely only in Bomaderry at Merroo Street residences, closest to the Site. This is not considered a significant exceedance during day time hours for short and sporadic duration.</p> <p>Construction noise mitigation measures are included in the Construction Safety & Environmental Management Plan prepared by Shoalhaven Starches.</p>	
Hazards		
<p>The Modification Application is supported by a Preliminary Hazard Analysis (PHA) prepared by Pinnacle Risk Management which assesses the risks associated with the proposed modifications and compares against relevant risk criteria. The PHA identifies that the proposed modifications will comply with all risk criteria.</p> <p>Societal risk, area cumulative risk and environmental risk are also concluded to be acceptable.</p>	<p>The PHA prepared by Pinnacle Risk includes the following recommendations:</p> <ol style="list-style-type: none"> <i>1. Provide leak detection in the proposed pump bund with an alarm in the control room.</i> <i>2. Provide fire detection in the proposed pump bund that automatically initiates a deluge system.</i> <i>3. Ensure that the fire water containment systems are adequate to contain the design quantities of contaminated fire water for the new processes, in particular, the new beverage grade distillery and the new road tanker loadout.</i> 	<p>The SEE is supported by a PHA prepared by Pinnacle Risk Management addressing this issue (Annexure 6). This issue is further addressing Section 7.2.4 of this SEE.</p>

Table 7 (continued)

<i>Relative Change in Environmental Impact</i>	<i>Additional Management or Mitigation Measures Required</i>	<i>Significance of Issue with this Modification Proposal</i>
Flooding		
The subject site is inundated during the 1% Annual Exceedance Probability (AEP) flood event by floodwaters from the Shoalhaven River. The sites are categorised as high hazard floodway and high hazard flood storage. This Modification Application is supported by an assessment submission prepared by WMA Water ("WMA") (Annexure 5). The submission prepared by WMA Water identifies that that there would be no significant incremental increase in the 1% AEP flood level as a result of the modification proposal.	No additional management or mitigation measures proposed.	The SEE is supported by a submission prepared by WMA Water addressing this issue (Annexure 5). This issue is further addressing Section 7.2.7 of this SEE.
Waste Management		
The proposed modifications will not alter the way waste is managed on the site. The site is already subject to an existing Waste Management Plan prepared in accordance with the original Project Approval.	No additional management or mitigation measures proposed, although any approval for this Modification Application should require the existing Waste Management Plan to be revised to incorporate the elements that form part of this Modification Application.	Not a key issue. This issue is not further addressed in this SEE.
Site Stormwater Management		
A Stormwater Assessment was prepared by Allen Price and Scarratts in relation to Mod. 16. This assessment included the area of the site associated with this Modification Proposal. This Modification Proposal does not alter the findings of this previous assessment.	No additional management or mitigation measures proposed.	Not a key issue. This issue is not further addressed in this SEE.
Visual Impact		
The majority of the works associated with this modification will be situated within the vicinity of existing industrial development of a similar scale to that which is proposed.	No additional management or mitigation measures proposed.	The visual impacts associated with this modification proposal are addressed in Section 7.2.6 of this SEE.

Table 7 (continued)

<i>Relative Change in Environmental Impact</i>	<i>Additional Management or Mitigation Measures Required</i>	<i>Significance of Issue with this Modification Proposal</i>
Flora and Fauna		
The proposed works associated with this modification will all be located within the factory site, which is largely devoid of vegetation. The proposed re-alignment of the pipe bridge across Abernethys Creek will require disturbance to Privet vegetation. This vegetation was identified under the Vegetation Management Plan approved for the site under the original	No additional management or mitigation measures proposed.	Not a key issue. This issue is not further addressed in this SEE.
Project Approval for management. The original Flora and Fauna Assessment carried out by Kevin Mills & Associates for the Expansion Project did not identify any specific ecological constraints with this part of the site. The proposal will not require any additional native vegetation to be disturbed. No change in environmental impacts from that originally identified in the EA are envisaged.		
Heritage and Archaeological		
The proposed works associated with this modification will be located within the factory site which was not previously identified by the EA for the Shoalhaven Starches Expansion Project as an area subject to either Aboriginal or European cultural heritage significance. The original Aboriginal Archaeological Assessment that supported the EA prepared by South East Archaeology did not identify any constraints with respect to the parts of the site associated with this modification proposal. The proposed works will have no additional impact in terms of indigenous or non-indigenous heritage. No change in environmental impacts from that originally identified in EA.	No additional management or mitigation measures proposed.	Not a key issue. This issue is not further addressed in this SEE.

Table 7 (continued)

<i>Relative Change in Environmental Impact</i>	<i>Additional Management or Mitigation Measures Required</i>	<i>Significance of Issue with this Modification Proposal</i>
Effluent Irrigation and Storage		
This Modification Proposal will not increase waste waters that will need to be generated, treated and disposed. This Modification Application does not seek to alter the existing approve wastewater treatment and disposal measures for the existing site operations.	No additional management or mitigation measures proposed.	Not a key issue. This issue is not further addressed in this SEE.
Wastewater Treatment		
<p><u>Water Discharges</u></p> <p>The Shoalhaven Starches Factory and Environmental Farm are licensed premises under the Protection of the Environmental Operations Act. Wastewater discharges from the site are licensed by the DEC (EPL 883).</p> <p>The plant has a licensed outfall into the Shoalhaven River. The outfall point is a 50 cm diameter metal pipe discharging at the end of an existing jetty. It also has a cooling water discharge comprising a 50 cm diameter pipe which discharges onto a gabion spillway.</p> <p>Under the terms of the Company's EPL discharge streams associated with the plant include:</p> <ul style="list-style-type: none"> • 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. <p>All these must be discharged from the cooling water discharges. The limiting conditions in relation to these discharges include:</p> <ul style="list-style-type: none"> • The volume of water discharged from the cooling water discharges must not exceed 100,000 kilolitres per day. 	No additional management or mitigation measures.	Not a key issue. This issue is not further addressed in this SEE.

Table 7 (continued)

<i>Relative Change in Environmental Impact</i>	<i>Additional Management or Mitigation Measures Required</i>	<i>Significance of Issue with this Modification Proposal</i>
<ul style="list-style-type: none">• The wastewaters discharged at both points shall not exceed a temperature of 32°C.• This Modification Proposal will not involve any changes to these discharge waters.		

7.2.2 Air Quality Issues

GHD were engaged to conduct an air quality impact assessment for the proposed modifications associated with this Modification Application (**Annexure 3**). This section of the SEE provides a summary of the findings of the GHD Air Quality Impact Assessment for this Modification Application.

7.2.2.1 Criteria for Assessment

Odour

Odour Concentration

Odour 'strength' or concentration is measured in odour units (OU), where 1 OU represents the concentration of a sample that can just be detected by 50% of people in a controlled situation where there is no background 'ambient' odour.

EPA Criterion for Odour

EPA has defined an odour criterion and the Odour Guideline specifies how it should be applied in dispersion modelling to assess the likelihood of nuisance impact arising from the emission of odour.

Odour impact is a subjective experience and has been found to depend on many factors, the most important of which are:

- The **F**requency of the exposure
- The **I**ntensity of the odour
- The **D**uration of the odour episodes
- The **O**ffensiveness of the odour
- The **L**ocation of the source

These factors are often referred to as the FIDOL factors.

DEC defined the odour criterion to take account of two of these factors (**F** is set at 99 percentile, **I** is set at from 2 to 7 OU). The choice of criterion odour level has also been made to be dependent on the population of the affected area, and to some extent it could be said that population is a surrogate for location – so that the **L** factor has also been considered. The relationship between the criterion odour level **C** to affected population **P** is given below.

$$C = [\log P - 4.5] \div -0.6 \quad \text{Equation 1}$$

Table 8 lists the values of C for various values of affected populations as obtained using equation 1.

Table 8
Odour Criterion for the Assessment of Odour

<i>Population of affected community</i>	<i>Odour performance criteria (nose response odour certainty units at 99th percentile)</i>
Single Residence ($\leq \sim 2$)	7
~ 10	6
~ 30	5
~ 125	4
~ 150	3
Urban ($\sim 2,000$)	2

The NSW Approved Methods specifies a criterion of two odour units at the 99th percentile over a short-term averaging nose-response time of one second for a complex mixture of odorous air pollutants in an urban area (population greater than 2000 or with schools and hospitals). The criterion is applied at the location of the nearest sensitive receptor or likely future location of sensitive receptor.

5 OU is commonly taken as a conservative measure of the odour level which can be distinguished against the ambient background level of odour, and which if offensive, could result in complaint.

1 OU generally cannot be detected in a non-laboratory situation (ie. where the ambient background odour levels reduce the detectability of a given odorant).

As the CALPUFF dispersion model (utilised in this assessment), when operating in micrometeorological mode can only predict concentrations over an averaging period of one hour, a ratio between the one second peak concentration and 60-minute average concentration has been applied to the source odour emission rates. In this manner, the predicted one-hour odour levels predicted in CALPUFF represent the corresponding one second short-term levels required to be compared to the DEC criterion. The ratio is known as the peak to mean ratio (PM60). PM60 is a function of source type, stability category and range (ie. near or far-field), and values are tabulated in the modelling Guideline¹. This is reproduced in **Figure 19**.

¹ Approved Methods for the Modelling and Assessment of Air Pollutants in NSW (DEC, 2005).

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

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

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

Figure 19: Extract from NSW Approved Methods.

Other Air Quality Impacts

Potential non-odorous air quality impacts from the site include dust and products of combustion.

The following pollutants have been assessed against relevant criteria:

- Total suspended particles (TSP);
- Fine particulate matter less than 10-micron equivalent aerodynamic diameter (PM10);
- Fine particulate matter less than 2.5-micron equivalent aerodynamic diameter (PM2.5).
- Products of combustion including carbon monoxide, oxides of nitrogen (NO_x), sulphur dioxide (SO₂), hydrogen chloride (HCL), heavy metals (Type I & II), total volatile organic compounds (VOC), polycyclic aromatic hydrocarbons (PAHs) and hydrogen fluoride (HF).

The air quality impact assessment criteria for these pollutants has been sourced from the Approved Methods and is summarised in **Table 9**.

Table 9
Air Quality Impact Assessment Criteria – Other Pollutants

<i>Pollutant</i>	<i>Averaging Period</i>	<i>Criterion</i>
Particulate Matter PM ₁₀	24 hours	50 µg/m ³
	Annual	25 µg/m ³
Particulate Matter PM _{2.5}	24 hours	25 µg/m ³
	Annual	8 µg/m ³
TSP	Annual	90 µg/m ³
Carbon monoxide (CO)	15 minutes	100 µg/m ³
	1 hour	30 µg/m ³
	8 hours	10 µg/m ³
Sulphur dioxide (SO ₂)	10 minutes	712 µg/m ³
	1 hour	570 µg/m ³
	24 hours	228 µg/m ³
Nitrogen dioxide (NO ₂)	1 hour	246 µg/m ³
	Annual	62 µg/m ³
Hydrogen fluoride (HF)	90 days	0.25 µg/m ³
	30 days	0.4 µg/m ³
	7 days	0.8 µg/m ³
	24 hours	1.55 µg/m ³
Hydrogen Chloride (HCL)	1 hour	0.14 mg/m ³
Polycyclic aromatic hydrocarbon (PAH)	1 hour	0.0004 mg/m ³
Type 1 metals		
Antimony	1 hour	0.009 mg/m ³
Arsenic	1 hour	0.00009 mg/m ³
Cadmium	1 hour	0.000018 mg/m ³
Lead	Annual	0.5 µg/m ³
Mercury	1 hour	0.0018 mg/m ³
Type 2 metals		
Beryllium	1 hour	0.000004 mg/m ³
Chromium	1 hour	0.00009 mg/m ³
Manganese	1 hour	0.018 mg/m ³
Nickel	1 hour	0.00018 mg/m ³

7.2.2.2 Meteorological Data

A 12-month dataset was constructed by GHD using the 3D prognostic modelling package, TAPM and the diagnostic 3D meteorological model, CALMET for the period from January to December 2004. This 12-month period was chosen to be consistent with previous modelling undertaken for the 2008 Air Quality Assessment, approved at the time by EPA and to allow to a direct comparison to previous modelling.

The CALMET modelling can be summarised as follows:

- Prognostic models TAPM and CALMET were used for initial wind field ‘guesses’;
- Observations from both the environmental farm Automatic Weather Station (AWS) and Nowra AWS were used to optimise and check the prognostic model simulations;
- Wind speeds and direction observations from the environmental farm AWS were assimilated into the prognostic model to make the data site-specific.

The result of assimilating this data into the CALMET simulations makes the data site-specific (required for a Level 2 assessment), and inter-annual variability is not required to be accounted for, with the conditions of the Approved Methods met for using “*at least one-year of site-specific meteorological data*”.

An annual wind rose generated using CALMET is provided in **Figure 20** to show the wind field at the factory. The following trends are evident from **Figure 20**:

- Annual average wind speed of 3.2 m/s;
- Winds are most prevalent from the west and west northwest, accounting for around one third of all winds;
- Winds are least prevalent along the north-south axis;
- Light winds (shown in grey) are more prevalent from the north-west;
- Drainage flows occurring during stable conditions at night time are dominated by the following distinct features (in order of scale):
 - Shoalhaven River running west to east through the site;
 - Browns Mountains to the northwest of the site;
 - Yalwal State Forest mountain range to the west.

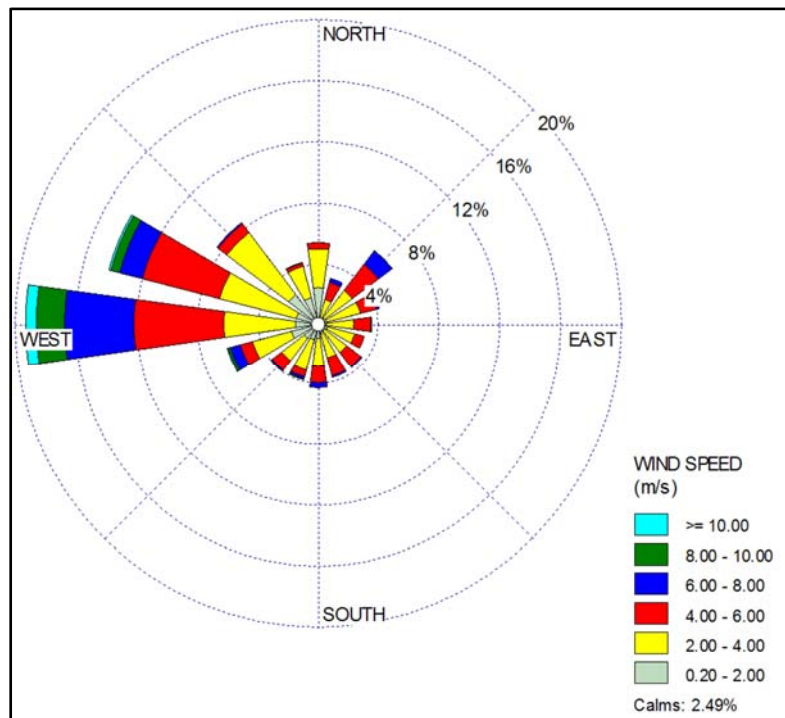


Figure 20: CALMET wind rose for the Factory.

7.2.2.3 Background Air Quality

The OEH runs a state wide air quality monitoring network, with the nearest monitoring site to Shoalhaven Starches being Albion Park South. Albion Park South commenced operation in 2006 meaning that daily background particulate levels (PM_{2.5} and PM₁₀) cannot be directly compared to the GHD CALPUFF model of the site which uses meteorology from 2004.

Background levels of pollutants used in the assessment are provided in **Table 10** with the exception of PM_{2.5} and PM₁₀, which is based on 2004 data from Wollongong. This is because the nearest monitoring station that operated in 2004 with both PM_{2.5} and PM₁₀ data is the Wollongong site, approximately 20 km to the north of Albion Park. Wollongong generally experiences elevated particulate levels compared to Albion Park South due to the greater presence of emissions from urban and industrial sources (refer to **Table 10**).

Highest measured levels of particulate for the year 2004 at Wollongong are shown in the contemporaneous assessment in Section 8.

A reasonable representation of ambient PM_{2.5} and PM₁₀ (24-hour) concentration levels is the 70th percentile for use in plotting general cumulative impacts. The 70th percentile at Albion Park South in 2016 was 18.3 µg/m³ for PM₁₀ and 8.0 µg/m³ for PM_{2.5}.

Table 10
Background Air Quality Data – Albion Park South (2016)

<i>Pollutant</i>	<i>Averaging Period</i>	<i>Concentration (100th Percentile)</i>	<i>Units</i>
Nitrogen dioxide (NO ₂)	1 hour	80.8	µg/m ³
	Annual	7.1	
Sulphur dioxide (SO ₂)	1 hour	57.6	µg/m ³
	24 hour	15.7	
	Annual	1.6	
Carbon monoxide (CO) ¹	1 hour	1.0	mg/m ³
	8 hour	0.6	
PM ₁₀	24 hours	43.2	µg/m ³
	Annual	14.9	
PM _{2.5}	24 hours	30.7	µg/m ³
	Annual	7.2	

¹ CO was sourced from the Wollongong monitoring station as this was not available at Albion Park South.

The contemporaneous particulate assessment was undertaken using data from Wollongong in 2004. A review of particulate levels at Wollongong and Albion Park is provided in **Table 11**.

Average particulate levels at Wollongong have reduced from 2004 to 2016. Levels at Albion Park South in 2016 are lower than the levels at Wollongong over the same period.

Table 11
Review of Particulate Monitoring at Albion Park South and Wollongong, µg/m³

<i>Site and Year</i>	<i>Albion Park 2016</i>	<i>Wollongong 2016</i>	<i>Wollongong 2004</i>
Average PM ₁₀	14.9	17.3	25.5
70 th percentile PM ₁₀	18.3	20.7	28.8
90 th percentile PM ₁₀	25.6	29.7	37.8
Average PM _{2.5}	7.2	7.4	9.7
70 th percentile PM _{2.5}	8.0	8.3	12.2
90 th percentile PM _{2.5}	11.2	11.6	16.4

Shoalhaven Starches engaged Stephenson Environmental Management Australia to conduct targeted background ambient air quality monitoring at 26 Coomea Street, Bomaderry over four seasons. The maximum measured levels of pollutants measured over the monitoring periods with a 24-hour averaging period were:

- SO₂ – 10.2 µg/m³;

- NO₂ – 54.5 µg/m³;
- PM₁₀ – 28.1 µg/m³;

According to GHD, the results show all pollutants are significantly lower than the levels recorded at Albion Park South and would include any emissions from the Shoalhaven Starches site. The maximum levels all readily comply with the relevant criteria. Using the background data from Albion Park South in this assessment allows for additional conservatism.

7.2.2.4 Odour Assessment

Emissions Inventory

Source Identification

Odour emanating from Shoalhaven Starches is comprised of a complex mixture of primarily odorous volatile organic compounds (VOCs). VOC speciation data from a range of principal odour sources indicates that the individual VOCs within the mixture tend to be classified under odour-based air quality criteria rather than toxicity-based² criteria. Therefore, the identified sources of odour are modelled collectively as odour.

Consistent with the previous air quality assessments, according to GHD, the following sources contribute to the majority of the odour impacts from the Shoalhaven Starches sites:

- DDG Plant (including Pellet Plant exhaust stack and biofilters);
- Starch Plant (Gluten and Starch Dryers);
- Ethanol Plant (yeast propagators and retention tank).

A number of other minor odour sources contribute to the remainder of the plant's odour impact.

Source Summary and Comparison

Modelling undertaken by GHD for the proposed Mod 19 scenario comprised the following sources:

- 67 point sources in total throughout the site;
 - 64 point sources with constant emissions'
 - Three point sources with variable emissions.
- 11 area sources (consisting of two biofilters and the effluent treatment ponds).

² Based on VOC speciation data for selected sources in the DDG plant: DDG dryers, palmer cooler and condensate tanks.

- Five volume sources within the factory area.
- These sources are detailed in **Table 12**.

A comparison of the sources between Mod 13, Mod 16, Mod 17 and the current modification is also provided in **Table 12**. This shows that the total odour levels increase by approximately 13.5% between the previous (Mod 17) and current modifications (Mod 19).

This increase is primarily due to the highest quarterly results displaying significantly higher source emissions for the following three sources (compared to Mod 17):

- Boiler nos. 5 & 6: Increase from an MOER of 68,610 to 88,902;
- Ethanol recovery scrubber: Increase from an MOER of 15,405 to 33,091;
- Environmental farm after WWTP (including biofilters, effluent storage dams, sulphur oxidation basin and membrane bioreactor): Increased from an MOER of 9,671 to 21,557.

Table 12
Comparison of Odour Emissions from Previous Mods to Current Mod 19

<i>Source</i>	<i>Model</i>	<i>MOER OU.m³/s (Mod 13)</i>	<i>MOER OU.m³/s (Mod 16)</i>	<i>Modelled Mod 17 MOER OU.m³/s</i>	<i>Modelled Mod 19 MOER OU.m³/s</i>
Boiler house					
Boiler no 2	BOILR2	-	-	-	12,677
Boiler no 4	BOILR4	3,171	5,666	22,077	27,988
Boilers nos 5 & 6	BOILR5	38,463	43,711	68,610	88,902
Subtotal MOER		41,634	49,377	90,687	129,567
% of total MOER		15%	18.3%	23.8%	29.9%
DDG Plant					
Condenser drain	VCD	31	31	31	4,419
DDG ten storage area	DDG36	1,929	1,929	1,929	1,929
Product storage sheds	DDG34	1,023	1,023	1,023	1,023
Light phase tank	DDG19	20	20	20	74
Cooling towers	DDG46	172	172	172	0
DDG loadout shed awning	DDG35	923	923	923	923
Pellet exhaust stack	PPES	38,240	31,544	88,073	67,000
Pellet silo	S12	350	350	350	350
Stillage surge tank	SST	149	149	149	173
Pellet plant fugitives (non-DDG sources)	PPF	5,771	5,771	5,771	5,771
Additional Cooling towers	CTP	172	172	172	0
Subtotal MOER		48,780	42,084	98,613	81,661
% of total MOER		17.5%	15.6%	25.9%	18.9%

Table 12 (continued)

<i>Source</i>	<i>Model</i>	<i>MOER OU.m³/s (Mod 13)</i>	<i>MOER OU.m³/s (Mod 16)</i>	<i>Modelled Mod 17 MOER OU.m³/s</i>	<i>Modelled Mod 19 MOER OU.m³/s</i>
Ethanol Plant					
Yeast Propagators – tanks 4 and 5	YP45	820	820	820	820
Grain retention tank	GRT	3,250	3,250	3,250	4,535
Ethanol recovery scrubber	ERESC	3,132	10,660	15,405	33,091
Fermenters 10-16	FERM	2,668	3,298	795	2,500
Jet cooker 1 retention tank	E13	1,067	1,067	1,067	1,067
Jet cooker 2/4 grain retention	E7	567	567	567	567
Feed to distillery	E22	83	83	83	83
Subtotal MOER		11,587	19,745	21,987	42,663
% of total MOER					
Distillery					
Incondensable gases vent	D6	558	558	558	558
Molec. sieve vacuum drum	D2	1,350	1,350	1,350	1,350
Column washing vent	CWV	23	25	27	1,399
Distillation plan column washing vent (proposed as part of Mod 19)	CWV2				1,399
Subtotal MOER		1,931	1,933	1,934	4,707
% of total MOER		0.7%	0.7%	0.5%	1.1%
Starch and Glucose					
Flour mill A exhaust	A4	679	679	6779	679
Flour mill A exhaust	A5	96	96	96	96
Flour mill A exhaust	A6	449	449	449	449
Flour mill A exhaust	A7	932	932	932	932
Drum vac receiver	C4	1,400	1,400	1,400	1,400
Dry gluten roof bin	S07	4,500	4,500	4,500	4,500
Enzyme tanks	B7	2,042	2,042	2,042	2,042
Flash vessel jet cooker	C1	970	970	970	970
Flour bin aspirator	S13A	500	500	500	500
Flour bin aspirator	S13B	500	500	500	500
Flour bin motor drive	S06	283	283	283	283
Flour mill aspiration (Mod 8)	FMP1	266	205	205	205
Flour mill aspiration (Mod 8)	FMP2	205	266	266	266
High protein dust collector	S08	600	600	600	600
Ion exchange effluent tank	C18	250	250	250	250
No. 1 gluten dryer baghouse	S02	5,925	5,166	5,166	9,800
No. 1 starch dryer	S01	5,193	5,193	11,316	2,800
No. 2 gluten/starch dryer	S04	2,354	5,166	5,166	7,200
No. 3 gluten dryer baghouse	S03	58,917	29,036	21,696	12,700
No. 3 starch dryer	S18	1,663	5,166	5,166	3,800
No. 4 gluten dryer baghouse	S05	31,222	22,433	13,693	9,100
No. 4 starch dryer	S19	1,824	4,008	5,020	3,600
No. 5 ring dryer gluten/starch	SDR5	4,817	4,817	4,817	4,350

Table 12 (continued)

<i>Source</i>	<i>Model</i>	<i>MOER OU.m³/s (Mod 13)</i>	<i>MOER OU.m³/s (Mod 16)</i>	<i>Modelled Mod 17 MOER OU.m³/s</i>	<i>Modelled Mod 19 MOER OU.m³/s</i>
No. 5 starch dryer (existing)	SD5C	6,800	6,800	3,393	4,931
No. 5 starch dryer (new stack)	SD5N			17,387	25,269
No. 6 gluten dryer	GD6	12,568	12,568	12,568	12,568
No. 7 gluten dryer	GD7	9,553	9,553	9,553	9,553
Spray dryer	S20	738	738	738	738
Starch factory rejects	E10	183	183	183	183
Farm tank	F18	3,834	3,834	3,834	3,833
Pellet mill silo	PMFS	173	173	173	173
Flour mill B exhaust	FMBA to FMBM	5,637	4,621	4,621	3,621
Flour mill C exhaust	FMC1 to FMC3	n/a	1,658	1,658	1,560
No. 8 gluten dryer No. 8	GD8	n/a	12,568	12,568	12,568
Product dryer 9	PD9	n/a	n/a	5,166	9,800
Subtotal MOER		165,073	147,353	157,553	15,819
% of total MOER		59.3%	54.7%	41.3%	35.1%
Packing Plant (not constructed)					
Starch silo 1	PPL1	86	86	86	86
Starch silo 2	PPL2	86	86	86	86
Gluten silo 1	PPM1	173	173	173	173
Gluten silo 2	PPM2	173	173	173	173
Gluten silo 3	PPM3	173	173	173	173
Small gluten silo	PPS1	92	92	92	92
Small starch silo	PPS2	35	35	35	35
Subtotal MOER		818	818	818	818
% of total MOER		0.3%	0.3%	0.3%	0.3%
Area sources: Environmental farm after WWTP					
Biofilter A	BIO1	44	1,408	1,386	502
Biofilter B	BIO2	330	803	1,111	1,648
Biofilter C	BIO3	1,089	1,089	1,089	1,089
Biofilter D	BIO4	1,280	1,280	1,280	1,280
Storage dam 1	PO1	148	71	119	1,475
Storage dam 2	PO2	1,656	248	143	973
Storage dam 3	PO3	192	569	1,231	2,962
Storage dam 5	PO5	515	971	1,922	6,538
Storage dam 6	PO6	1,775	1,435	793	3,097
Sulphur oxidation basin	SOBAS	830	349	535	1,939
Membrane bio-reactor	MBR	62	62	62	54
Subtotal MOER		8,317	8,286	9,671	21,557
% of total MOER		3.0%	3.1%	2.5%	5.0%
TOTAL (Mod 11 and Mod 12)		278,140			
TOTAL (Mod 16)			269,595		
TOTAL (Mod 17)				381,265	
TOTAL (Mod 19)					432,792

Dispersion Modelling

The odour dispersion modelling was conducted using the Gaussian puff model CALPUFF Version 7. This model is also a recognised regulatory model in NSW. Where the modelling of odour dispersion is in complex terrain (as is the case at the Shoalhaven site), CALPUFF is recommended for use under NSW Guidelines. CALPUFF is especially suited for modelling light to calm wind conditions.

Predicted Odour Impacts

Figure 21 shows the predicted 99th percentile odour impacts (one-minute nose-response time) for the proposed Mod 19 operations and the previous modifications.

Table 13 shows the predicted odour levels for the proposal (Mod 19). **Table 13** also shows the previous modification results.

According to GHD, the predicted odour levels are generally equivalent to those predicted for Modification 17, with the exception of an increase at commercial receptors C2, C3, C4, C6 and C7. The increase is primarily attributed to higher quarterly sampling results particularly at the boiler house.

The results show that the impact assessment odour criteria are achieved at all residential sensitive receptors.

Seven commercial/industrial receptors are included in the assessment. These are all located within approximately 125 m of the site. One hour, 99th percentile odour impacts have been predicted based on the hours of operation of the receptors (ie. predicted odour impacts when the sites are not operational have been excluded from the assessment). Commercial/industrial receptors C4, C5, and C7 marginally exceed the criteria of 6 OU (assumed the same criteria as R1) due to the higher quarterly results.

Commercial receptor C1 is located approximately 45 m from the site and is the BOC CO₂ Plant. Given the industrial nature of C1, and its existing proximity to the site no significant odour impacts are anticipated from the proposal.

One odour complaint (in July 2020) attributed to the Shoalhaven Starches plant was received in the last year.

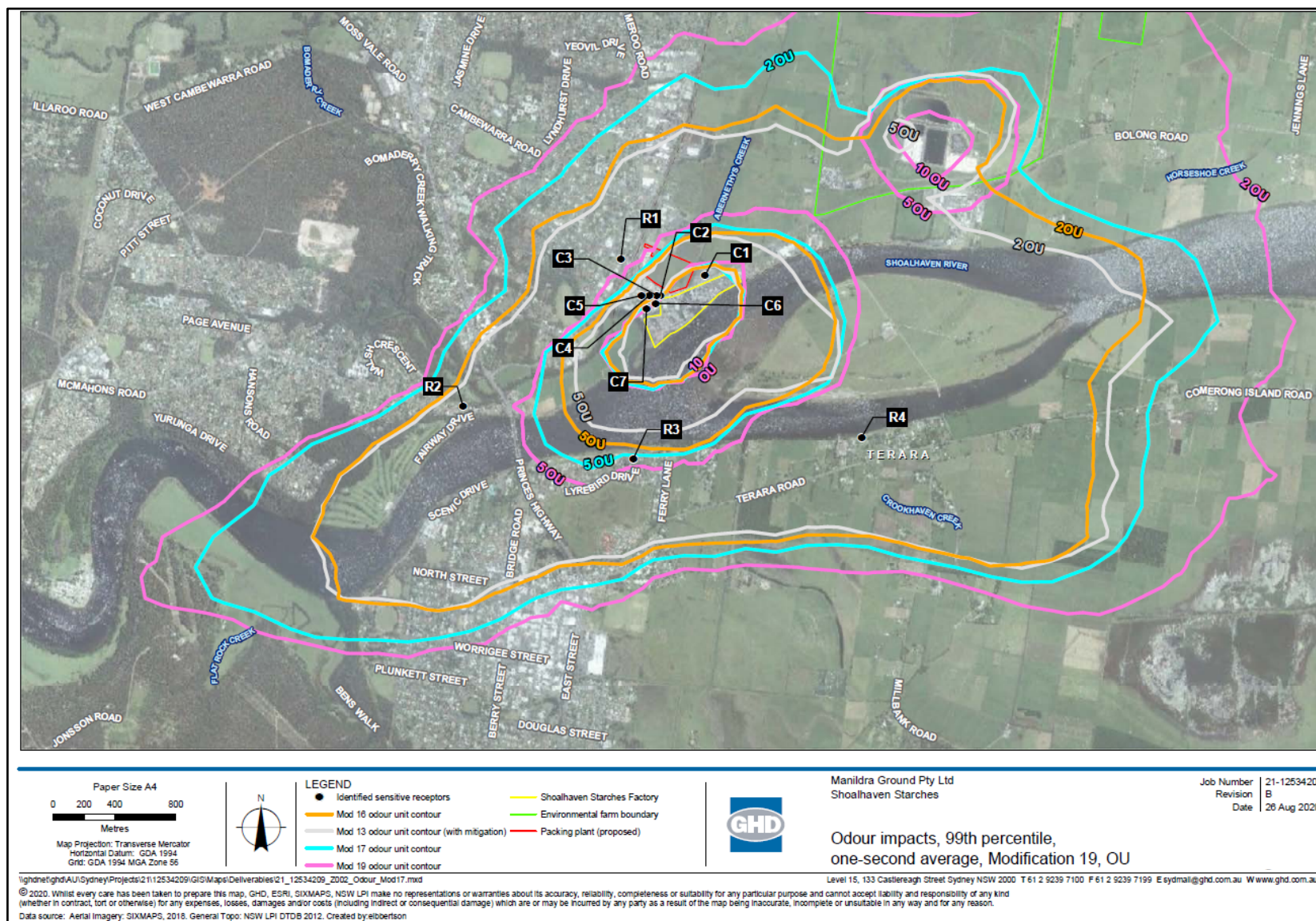


Figure 21: Odour impacts, 99th percentile, one-second average, Modification 19, OU.

Table 13
Predicted peak (99th Percentile, Short Term Averaged)
Odour Impact at Nearby Receptors

Receptor	Range, m	To nearest odour source	Direction	2009 EA approved 'base case' odour criterion	Odour impact, OU, 99 th Percentile, nose-response time			
					Mod 13	Mod 16	Mod 17 (rounded as per EPA advice)	Mod 19
R1 Bomaderry	150	Packing Plant	W	6	3.3	3.5	4	4
R2 North Nowra	1300	Factory	SW	3	2.5	2.6	3	3
R3 Nowra	700	Factory	S	5	4	4.6	5	5
R4 Terara	1300	Factory	SE	5	3.7	3.7	4	4
C1	45	Factory	N	n/a	n/a	10.3	12	12
C2	20	Factory	N	n/a	n/a	5.8	8	10
C3	30	Factory	N	n/a	n/a	5.3	7	9
C4	75	Factory	NW	n/a	n/a	4.4	6	7
C5	125	Factory	NW	n/a	n/a	6.1	7	7
C6	30	Factory	NW	n/a	n/a	5.4	7	10
C7	55	Factory	NW	n/a	n/a	4.8	7	8

7.2.2.5 Air Quality Assessment

Emissions Inventory

In addition to odour emissions, the operation of the Shoalhaven Starches plant also has the potential to generate emissions of particulate matter and products of combustion.

The emissions inventory, according to GHD, for Modification 19 includes all existing air emissions sources and those proposed in previous Modifications (up to and including Modification 17). Emission rates were estimated for a factory throughput of 300 Mega litres per annum (maximum approved throughput).

One new emission source, the three new product silos, is proposed as part of Modification 19. According to GHD, the operation of these silos has the potential to emit particulate matter. The silos are not a source of products of combustion or PAH, VOCs and metals.

Generally the emissions estimation methodology adopted by GHD for Modification 19 was consistent with that of Modification 17. Modification 19 emission rates were updated based on most recent sampling data to reflect the site's current operations. Assumptions

and changes made to the baseline air quality model as part of this assessment are discussed in detail below for each of the individual source types.

Boiler emissions

Emission estimation based on site specific sampling data was prioritised where available. If monitoring data was not available, National Pollutant Inventory emissions factors (NPI factors) were used. Emission was scaled based on proposed boiler fuel usage rates for Modification 19 provided by Manildra.

Boiler emissions were estimated based on the properties outlined in **Table 14**.

Table 14
Boiler Emissions Estimation

Boiler	Fuel Type	Modification 19 fuel usage	Emission estimation methodology*
Boiler 1	Gas fuelled	71.5 GJ/hour	NPI factors
Boiler 2	75% coal, 25% woodchips	Coal: 1.17 t/hr Woodchips: 0.62 t/hr	Coal: SEMA (2020) Compliance Stack Emission Survey – Q4 2019-2020 – Boiler 2 – Report No. 7050 Woodchips: Average of past sampling data as presented in GHD (2020)
Boiler 3	Standby boiler, operation not proposed and therefore not included in this assessment.		
Boiler 4	84% coal, 16% woodchips	Coal: 2.43 t/hr Woodchips: 0.74 t/hr	SEMA (2020) Compliance Stack Emission Survey – Q4 2019-2020 – Boiler 4 – Report No. 7051A Woodchips: NPI factors
Boiler 5/6	Coal	12.2 t/hr	SEMA (2020) Compliance Stack Emission Survey – Q4 2019-2020 – Boiler 5&6 – Report No. 7049
Boiler 7	Standby boiler, operation not proposed and therefore not included in this assessment.		
Boiler 8	Coal	8.3 t/hr	Scaled off boiler 5/6 emission rates based on proposed fuel usage rates.

* PAH and FL emissions for all boilers have been calculated based on the emission factors listed in *National Pollutant Inventory Emission Estimation Technique manual for Combustion in Boilers, version 3.6* (December 2011) Table 10.

Boiler details and modelled emission rates used as part of the Modification 19 air quality assessment are summarised in **Table 15** and **Table 16**.

Product Dryer Emissions

The following updates have been made by GHD to the site emissions inventory for the product dryers:

- Emissions rates were updated based on recent sampling including:
 - NO_x emissions from starch dryers 2, 4 and 5 and gluten dryers 1, 2, 3 and 4 were updated based on the measured NO_x concentrations and flowrates provided in SEMA (2020) Starch and Gluten Dryers NO_x Emission Test Report No. 7093. NO_x emissions from Starch dryer 3 were scaled off starch dryer 4 based on flowrate. NO_x emissions from starch dryer 5 and gluten dryers 6, 7 and 8 were calculated using NPI factors
 - Particulate matter emissions from starch dryers 1 and 4 and the spray dryer were updated based on SEMA (2020) Stack Emission Survey - Particulate Matter – Starch Dryer 1, 4 and Spray Dryer - Report No. 7071
- All other dryer emissions sources are as per Mod 17.

Other Emission Sources

Other emissions sources, including the two gas turbines, would remain unchanged from previous assessments.

It should be noted that the gas turbines were assessed as part of the 2008 air quality assessment (GHD, 2008) and have been approved by EPA. However, the gas turbines have not yet been constructed.

The gas turbines would be installed as part of a gas-fired co-generation plant, which would be used to supply electricity and steam to the factory.

The turbines have been included as part of the cumulative assessment. The modelled emission rates from turbines are summarised in **Table 15** and **Table 16**.

Table 15
Emission Inventory – Particulate Matter

<i>Discharge Point</i>	<i>Model ID</i>	<i>EPA ID</i>	<i>Emission Control</i>	<i>TSP (g/s)</i>	<i>PM₁₀ (g/s)</i>
Boiler No. 1	BOILR1		Gas-fired	0.072	0.072
Boiler No. 2	BOILR2	45	Cyclone and fabric filter	0.072	0.06
Boiler No. 4	BOILR4	42	Cyclone and fabric filter	0.14	0.053
Boiler No. 5/6	BOILR5	35	Fabric filter	0.19	0.088
Boiler No. 8 (proposed)	BOILR8		Cyclone and fabric filter	0.13	0.06
Gluten dryer No. 1	S02	8	Fabric filter	0.015	0.0003
Gluten dryer No. 2	S04	9	Fabric filter	0.015	0.001

Table 15 (continued)

<i>Discharge Point</i>	<i>Model ID</i>	<i>EPA ID</i>	<i>Emission Control</i>	<i>TSP (g/s)</i>	<i>PM₁₀ (g/s)</i>
Gluten dryer No. 3	S03	10	Fabric filter	0.02	0.02
Gluten dryer No. 4	S05	11	Fabric filter	0.02	0.02
Ring Dryer No. 5	SDR5		Fabric filter	0.012	0.012
Gluten dryer No. 6	GD6		Fabric filter	0.02	0.02
Gluten dryer No. 7	GD7		Fabric filter	0.035	0.035
Gluten dryer No. 8	GD8		Fabric filter	0.02	0.02
Starch dryer No. 1	S01	12	Wet-scrubber	0.044	0.033
Starch dryer No. 3	S18	13	Wet-scrubber	0.04	0.013
Starch dryer No. 4	S19	14	Wet-scrubber	0.057	0.029
Starch dryer No. 5 (existing)	SD5C	47	Cyclone	0.065	0.065
No. 5 Starch dryer (new – SD5 was split into 2 stacks)	SD5N		Cyclone	0.33	0.33
Spray dryer 5	S20		Fabric filter	0.0028	0.0019
Flour Mill	FMP1, FMP2		Fabric filter	0.0005	0.0005
New Flour Mill B (Mod 10)	FMBA- FMBM		Fabric filter	0.0037	0.0037
Flour Mill C (new)	FMC1- FMC3		Fabric filter	0.0013	0.0013
DDG Pellet Plan (Mod 4 & Mod 5)	PPF		Fabric filter	0.25	0.25
Packing Plant (Mod 9 approved)	PPL1-2, PPM1-3, PPS1-2		Fabric filter	0.016	0.016
Co-generator turbine No. 1 (proposed)	TURB1		Gas-fired	0.15	0.15
Co-generator turbine No. 2 (proposed)	TURB2		Gas-fired	0.15	0.15
Silo source 1 (combined stack for 3 silos)	SILO1		Fabric filter	0.0042	0.0042
Silo source 2 (combined stack for 6 silos)	SILO2		Fabric filter	0.0042	0.0042
Silo source 3 (combined stack for 2 silos)	SILO3		Fabric filter	0.017	0.017
Silo source 4 (combined stack for 6 silos)	SILO4		Fabric filter	0.0042	0.0042
Silo source 5 (combined stack for 3 silos) (proposed as part of Mod 19)	SILO5		Fabric filter	0.013	0.013
Product dryer 9	PD9		Fabric filter	0.015	0.0003

Table 16: Emission Inventory – Products of Combustion

<i>Discharge Point</i>	<i>Boiler No. 1</i>	<i>Boiler No. 2</i>	<i>Boiler No. 4</i>	<i>Boiler No. 5/6</i>	<i>Boiler No. 8</i>	<i>S02</i>	<i>S04</i>	<i>S03</i>	<i>S05</i>	<i>GD6</i>	<i>GD7</i>	<i>S19</i>	<i>SD5C</i>	<i>SD5N</i>	<i>Turbine No. 1 & 2 (combined)</i>
Fuel type	Natural gas and biogas	Coal and woodchip	Coal and woodchip	Coal	Coal	Natural gas	Natural gas	Natural gas	Natural gas	Natural gas	Natural gas	Natural gas	Natural gas	Natural gas	Natural gas
Status / details	Existing. No change		Existing, changing from gas to coal-fired		Existing, changing from gas to coal-fired		Existing, coal consumption increasing		New proposed boiler		Natural gas is fed through to the dryers for combustion. The majority of the gas is fed to gluten dryers 6 and 7 and starch dryer 5.				Approved, yet to be constructed
Stack height (m)	25	40	41	54	54	25.5	27	21	30	35	29	20	33.5	30	30
Exhaust temp. (K)	453	442	435	410	410	346	340	344	350	346	341	320	335	335	160
Stack diameter (m)	0.9	0.65	0.9	2.05	2	3.2	3.2	2.5	2.7	1.7	1.8	1.2	2.35	2.35	0.5
Exhaust velocity (m/s)	25.0	25.3	24.3	14.1	11.5	14.0	17.0	9.2	17.0	19.1	19.3	23.0	14.3	14.3	25
Oxygen (%)	ND	ND	11.2	8.7	ND	20.9	20.9	20.9	20.9	ND	ND	20.9	ND	ND	ND
Moisture (%)	ND	ND	4	5.2	ND	6.2	5.7	9.2	5.6	ND	ND	6.2	ND	ND	ND
Exhaust flow rate, actual (m³/s)	ND	10.1	18.8	53.5	36.4	1,180	1,110	2,450	2,370	ND	ND	1,370	ND	ND	ND
Ratio (Actual to normalised flow)	ND	1.7	1.7	1.6	1.6	1.3	1.4	1.4	1.4	ND	ND	1.2	ND	ND	ND
Emission rate (g/s)															
CO	0.23	0.33	0.50	8.5	5.8	-	-	-	-	0.17	0.13	-	0.06	0.33	0.92
SO ₂	0.011	2.2	3.5	20.2	14	-	-	-	-	0.0025	0.0019	-	0.0010	0.0050	0.023
NO ₂	1.6	1.5	4.1	16.9	12	0.12	0.024	0.43	0.060	0.39	0.29	0.036	0.016	0.082	6.64
VOC	0.053	0.031	0.041	0.20	0.14	-	-	-	-	-	-	-	-	-	-
Antimony (Sb) Type I	-	2.1E-05	7.6E-05	1.7E-04	1.2E-04	-	-	-	-	-	-	-	-	-	-
Arsenic (As) Type I	1.9E-06	2.9E-05	8.1E-05	1.7E-04	1.2E-04	-	-	-	-	-	-	-	-	-	-
Cadmium (Cd) Type I	1.1E-05	2.4E-06	2.8E-06	4.4E-06	3.0E-06	-	-	-	-	-	-	-	-	-	-
Lead (Pb) Type I	4.8E-06	1.4E-04	2.8E-04	1.3E-04	8.7E-05	-	-	-	-	-	-	-	-	-	-

Table 16 (continued)

<i>Discharge Point</i>	<i>Boiler No. 1</i>	<i>Boiler No. 2</i>	<i>Boiler No. 4</i>	<i>Boiler No. 5/6</i>	<i>Boiler No. 8</i>	<i>S02</i>	<i>S04</i>	<i>S03</i>	<i>S05</i>	<i>GD6</i>	<i>GD7</i>	<i>S19</i>	<i>SD5C</i>	<i>SD5N</i>	<i>Turbine No. 1 & 2 (combined)</i>
Mercury (Hg) Type I	2.5E-06	6.2E-06	1.3E-05	6.0E-06	4.1E-06	-	-	-	-	-	-	-	-		-
Beryllium (Be) Type II	1.2E-08	1.6E-06	7.8E-06	1.3E-05	8.7E-06	-	-	-	-	-	-	-	-		-
Chromium (Cr) Type II	1.4E-05	1.7E-05	3.3E-05	1.1E-04	7.3E-05	-	-	-	-	-	-	-	-		-
Cobalt (Co) Type II	7.9E-07	1.7E-05	1.9E-05	2.1E-05	1.4E-05	-	-	-	-	-	-	-	-		-
Manganese (Mn) Type II	3.7E-06	6.5E-05	4.5E-05	1.1E-04	7.3E-05	-	-	-	-	-	-	-	-		-
Nickel (Ni) Type II	2.0E-05	1.1E-04	1.6E-04	2.7E-04	1.9E-04	-	-	-	-	-	-	-	-		-
Selenium (Se) Type II	2.3E-07	1.1E-04	1.9E-04	1.7E-04	1.2E-04	-	-	-	-	-	-	-	-		-
Tin (Sn) Type II	-	5.3E-05	1.9E-04	4.4E-04	3.0E-04	-	-	-	-	-	-	-	-		-
Vanadium (V) Type II	-	2.7E-05	9.8E-05	2.1E-04	1.4E-04	-	-	-	-	-	-	-	-		-
Hydrogen Chloride (HCL)	-	2.9E-03	2.0E-03	2.6E-01	1.8E-01	-	-	-	-	-	-	-	-		-
Polycyclic Aromatic Hydrocarbons (PAH)	6.2E-06	7.8E-05	6.0E-05	3.2E-05	2.2E-05	-	-	-	-	-	-	-	-		-
Hydrogen Fluoride (FL)	-	9.7E-03	1.3E-02	2.5E-01	1.7E-02	-	-	-	-	-	-	-	-		-
Emission rates, normalised (mg/m³)															
CO	22.2	33.4	30.8	182.7	161.1	-	-	-	-	-	-	-	-	-	-
SO ₂	14.6	39.4	32.2	433.7	382.4	-	-	-	-	3.8	2.6	-	5.2	5.2	-
NO ₂	0.7	257.2	228.2	362.8	320.0	-	-	-	-	0.06	0.04	-	0.08	0.08	-
TSP	103.4	180.0	267.8	4.0	3.5	1.1	0.2	9.6	0.6	8.9	6.0	1.4	1.3	1.3	-
Type 1 and 2 metals (combined)	4.5	8.6	8.9	0.04	0.03	0.1	0.1	0.4	0.2	0.5	0.7	2.2	5.2	5.2	-

Table 16 (continued)

<i>Discharge Point</i>	<i>Boiler No. 1</i>	<i>Boiler No. 2</i>	<i>Boiler No. 4</i>	<i>Boiler No. 5/6</i>	<i>Boiler No. 8</i>	<i>S02</i>	<i>S04</i>	<i>S03</i>	<i>S05</i>	<i>GD6</i>	<i>GD7</i>	<i>S19</i>	<i>SD5C</i>	<i>SD5N</i>	<i>Turbine No. 1 & 2 (combined)</i>
Cadmium	0.004	0.1	0.1	0.0001	0.0001	-	-	-	-	-	-	-	-	-	-
Mercury	0.0007	0.0003	0.0002	0.0001	0.0001	-	-	-	-	-	-	-	-	-	-
VOC	0.0002	0.0007	0.0009	4.4	3.8	-	-	-	-	-	-	-	-	-	-
HCL	3.3	3.7	2.7	5.6	4.9	-	-	-	-	-	-	-	-	-	-
FL	-	0.3	0.1	5.4	0.5	-	-	-	-	-	-	-	-	-	-
The emission rate limits are as follows: Protection of the Environment Operations (Clean Air) Regulation (2010): CO: 125 mg/m ³ ; SO ₂ : 1000 mg/m ³ ; NO ₂ : 500 mg/m ³ ; TSP: 50 mg/m ³ ; Type 1 and 2 metals (combined): 1 mg/m ³ ; Cadmium: 0.2 mg/m ³ ; Mercury: 0.2 mg/m ³ ; VOC: 40 mg/m ³ ; HCL: 100 mg/m ³ ; FL: 50 mg/m ³ EPA: SO ₂ : 600 mg/m ³ ; NO ₂ : 500 mg/m ³ ; TSP: 30 mg/m ³ ; Type 1 and 2 metals (combined): 1 mg/m ³ ; Cadmium: 0.2 mg/m ³ ; Mercury: 0.2 mg/m ³ ; VOC: 40 mg/m ³ .															

Dispersion Modelling

The air quality dispersion modelling was conducted using the Gaussian puff model CALPUFF Version 7.

Predicted air quality impacts

Particulates

The impact of dust emissions principally relates to the potential effect on human health of inhalation of particles in the air column, and it is the finer fraction that have the greater potential to cause respiratory health effects. EPA have advised to assess PM_{2.5}, if PM₁₀ impacts are significant. The PM_{2.5} emissions from some sources on site are not known, however guidance is available for estimates of PM_{2.5} from boilers in the NPI. NPI emission factors for coal boilers with a baghouse states that PM_{2.5} emissions are half of PM₁₀ emissions and the ratio of PM_{2.5} to PM₁₀ in gas fired boilers is the same. Therefore a ratio of PM₁₀ to PM_{2.5} emissions of 2:1 was adopted by GHD.

A summary of the maximum incremental predicted levels at each receptor site, according to GHD, is presented in **Table 17**. The worst case predicted incremental PM₁₀ level at a residential sensitive receptors is at R1 with a level of 7.9 µg/m³.

Table 17
Maximum Predicted Incremental Ground Level PM₁₀, PM_{2.5} and TSP Concentrations

<i>Receiver</i>	<i>Pollutant</i>				
	<i>PM₁₀ (24 hour)</i>	<i>PM₁₀ (Annual)</i>	<i>PM_{2.5} (24 hour)</i>	<i>PM_{2.5} (Annual)</i>	<i>TSP (Annual)</i>
Criteria µg/m³	50	25	25	8	90
R1	7.9	0.7	4.0	0.4	0.8
R2	4.3	0.4	2.1	0.2	0.5
R3	4.9	0.6	2.5	0.3	0.6
R4	4.6	0.9	2.3	0.4	0.9
C1	11.3	1.6	5.7	0.8	2.0
C2	15.8	2.7	7.9	1.3	3.0
C3	16.0	2.6	8.0	1.3	2.8
C4	15.3	2.3	7.6	1.2	2.5
C5	13.5	2.0	6.7	1.0	2.1
C6	16.5	3.2	8.3	1.6	3.5
C7	15.6	2.8	7.8	1.4	3.0

A contemporaneous assessment has been undertaken by GHD for the year 2004 in accordance with the Approved Methods. Predicted 24 hour PM_{2.5} and PM₁₀ values from the site in 2004 have been added to the 24 hour measured values at Wollongong for every day in the year.

The top predicted, measured and total concentrations at the most impacted residential receptor (R1) and commercial receptor (C6) are presented in **Table 18** to **Table 21** below. The background and incremental contributions for the highest cumulative concentrations are also included.

Results of the assessment, according to GHD, show full compliance with the PM_{2.5} and PM₁₀ 24 hour criteria at the worst impacted residential sensitive receptor R1.

Results of the assessment predict exceedances of the PM₁₀ 24 hour criteria for 3 days of the year and an exceedance of the PM_{2.5} 24 hour criteria for one day of the year at the worst impacted commercial receptor C6. The exceedances are bold in **Table 20** and **Table 21**. The exceedances are primarily attributed to high background concentrations as background PM₁₀ accounts for 94%, 92% and 97% of the criteria and background PM_{2.5} accounts for 89% of the criteria on the days of the predicted exceedances.

Plots of the predicted 24 hour maximum PM₁₀ levels are provided in **Figure 22** (incremental impact) and in **Figure 23**, cumulative impact with 70th percentile PM₁₀ levels at Albion Park South 2016 for comparative purposes.

Plots of the predicted 24 hour maximum PM_{2.5} levels are provided in **Figure 24** (cumulative impact with 70th percentile PM_{2.5} levels at Albion Park South 2016 for comparative purposes).

Table 18
Summary of Highest Measured and Predicted PM₁₀ levels, µg/m³ (R1)

<i>Top 10 PM₁₀ Background</i>		<i>Top 10 PM₁₀ Incremental</i>		<i>Top 10 PM₁₀ Cumulative</i>			
<i>Date</i>	<i>PM₁₀ Background</i>	<i>Date</i>	<i>PM₁₀ Incremental</i>	<i>Date</i>	<i>PM₁₀ Cumulative</i>	<i>Background Contribution</i>	<i>Site Contribution</i>
08/03/2004	49.0	10/03/2004	7.9	08/03/2004	49.0	49.0	0.0
27/11/2004	48.4	22/03/2004	6.7	27/11/2004	48.7	48.4	0.3
21/02/2004	47.0	17/08/2004	4.3	26/03/2004	48.7	46.1	2.6
26/03/2004	46.1	01/03/2004	3.7	21/02/2004	47.8	47.0	0.8
08/12/2004	43.7	23/09/2004	3.7	09/02/2004	44.6	43.1	1.5
10/01/2004	43.4	22/01/2004	3.6	08/12/2004	43.8	43.7	0.1
09/02/2004	43.1	04/04/2004	3.5	10/01/2004	43.4	43.4	0.0
06/02/2004	41.2	28/03/2004	3.3	06/02/2004	42.9	41.2	1.7
07/12/2004	40.8	09/11/2004	3.3	22/01/2004	41.6	38.0	3.6
20/02/2004	40.4	28/04/2004	3.2	07/12/2004	41.3	40.8	0.5

Table 19

Summary of Highest Measured and Predicted PM_{2.5} levels, µg/m³ (R1)

<i>Top 10 PM_{2.5} Background</i>		<i>Top 10 PM_{2.5} Incremental</i>		<i>Top 10 PM_{2.5} Cumulative</i>			
<i>Date</i>	<i>PM_{2.5} Background</i>	<i>Date</i>	<i>PM_{2.5} Incremental</i>	<i>Date</i>	<i>PM_{2.5} Cumulative</i>	<i>Background Contribution</i>	<i>Site Contribution</i>
10/01/2004	22.6	10/03/2004	4.0	21/02/2004	22.7	22.3	0.4
21/02/2004	22.3	22/03/2004	3.4	10/01/2004	22.6	22.6	0.0
26/03/2004	19.9	17/08/2004	2.2	26/03/2004	21.2	19.9	1.3
06/02/2004	19.0	01/03/2004	1.9	06/02/2004	19.8	19.0	0.8
09/02/2004	18.3	23/09/2004	1.8	09/02/2004	19.1	18.3	0.8
11/02/2004	17.9	22/01/2004	1.8	11/02/2004	18.6	17.9	0.7
09/03/2004	17.6	04/04/2004	1.8	27/11/2004	17.7	17.5	0.2
08/03/2004	17.5	28/03/2004	1.6	09/03/2004	17.6	17.6	0.0
08/03/2004	17.5	09/11/2004	1.6	13/03/2004	17.5	17.0	0.5
13/03/2004	17.0	28/04/2004	1.6	08/03/2004	17.5	17.5	0.0

Table 20

Summary of Highest Measured and Predicted PM₁₀ levels, µg/m³ (C6)

<i>Top 10 PM₁₀ Background</i>		<i>Top 10 PM₁₀ Incremental</i>		<i>Top 10 PM₁₀ Cumulative</i>			
<i>Date</i>	<i>PM₁₀ Background</i>	<i>Date</i>	<i>PM₁₀ Incremental</i>	<i>Date</i>	<i>PM₁₀ Cumulative</i>	<i>Background Contribution</i>	<i>Site Contribution</i>
08/03/2004	49.0	22/03/2004	16.5	21/02/2004	55.8	47.0	8.8
27/11/2004	48.4	10/03/2004	14.0	26/03/2004	53.4	46.1	6.4
21/02/2004	47.0	25/02/2004	12.7	27/11/2004	51.9	48.4	2.9
26/03/2004	46.1	20/10/2004	12.2	08/03/2004	49.0	49.0	0.0
08/12/2004	43.7	20/03/2004	12.1	09/02/2004	46.2	43.1	3.0
10/01/2004	43.4	17/08/2004	11.5	22/01/2004	46.0	38.0	7.8
09/02/2004	43.1	02/03/2004	10.9	08/12/2004	45.9	43.7	1.8
06/02/2004	41.2	09/11/2004	10.6	06/02/2004	44.8	41.2	3.5
07/12/2004	40.8	19/10/2004	10.6	07/12/2004	44.8	40.8	3.6
20/02/2004	40.4	03/04/2004	10.0	10/01/2004	43.4	43.4	0.0

Table 21

Summary of Highest Measured and Predicted PM_{2.5} levels, µg/m³ (C6)

<i>Top 10 PM_{2.5} Background</i>		<i>Top 10 PM_{2.5} Incremental</i>		<i>Top 10 PM_{2.5} Cumulative</i>			
<i>Date</i>	<i>PM_{2.5} Background</i>	<i>Date</i>	<i>PM_{2.5} Incremental</i>	<i>Date</i>	<i>PM_{2.5} Cumulative</i>	<i>Background Contribution</i>	<i>Site Contribution</i>
10/01/2004	22.6	22/03/2004	8.3	21/02/2004	26.7	22.3	4.4
21/02/2004	22.3	10/03/2004	7.0	26/03/2004	23.5	19.9	3.6
26/03/2004	19.9	25/02/2004	6.3	10/01/2004	22.6	22.6	0.0
06/02/2004	19.0	20/10/2004	6.1	07/02/2004	20.9	16.2	4.7

Table 21 (continued)

<i>Top 10 PM_{2.5} Background</i>		<i>Top 10 PM_{2.5} Incremental</i>		<i>Top 10 PM_{2.5} Cumulative</i>			
<i>Date</i>	<i>PM_{2.5} Background</i>	<i>Date</i>	<i>PM_{2.5} Incremental</i>	<i>Date</i>	<i>PM_{2.5} Cumulative</i>	<i>Background Contribution</i>	<i>Site Contribution</i>
09/02/2004	18.3	20/03/2004	6.1	06/02/2004	20.8	19.0	1.8
11/02/2004	17.9	17/08/2004	5.8	11/02/2004	20.7	17.9	2.8
09/03/2004	17.6	02/03/2004	5.4	20/03/2004	20.6	14.5	6.1
08/03/2004	17.5	09/11/2004	5.3	13/03/2004	20.5	17.0	3.5
27/11/2004	17.5	19/10/2004	5.3	09/02/2004	19.8	18.3	1.5
13/03/2004	17.0	03/04/2004	5.0	27/11/2004	19.2	17.5	1.7

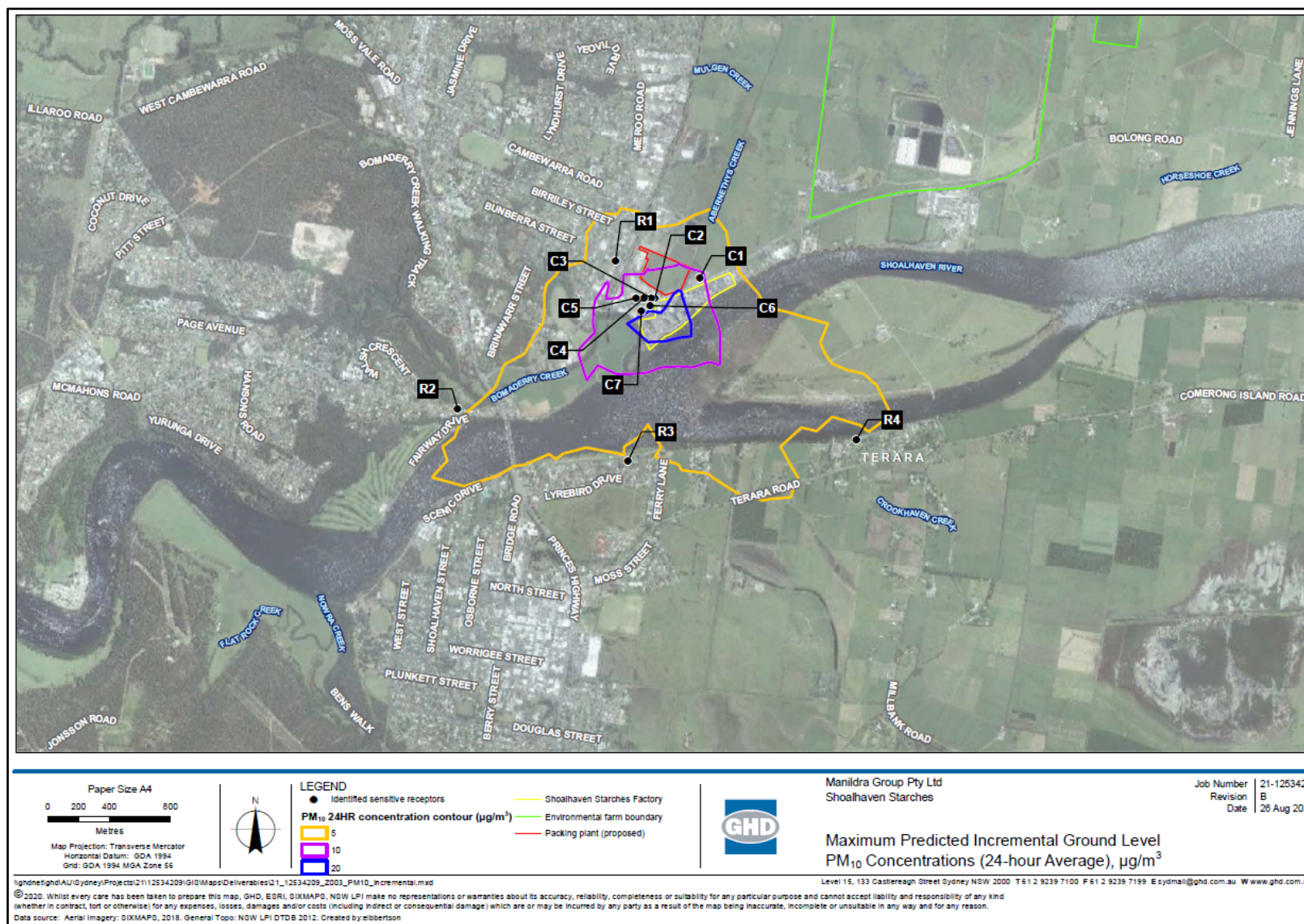


Figure 22: Maximum Predicted Incremental Ground Level PM₁₀ Concentrations (24-hour Average), µg/m³.

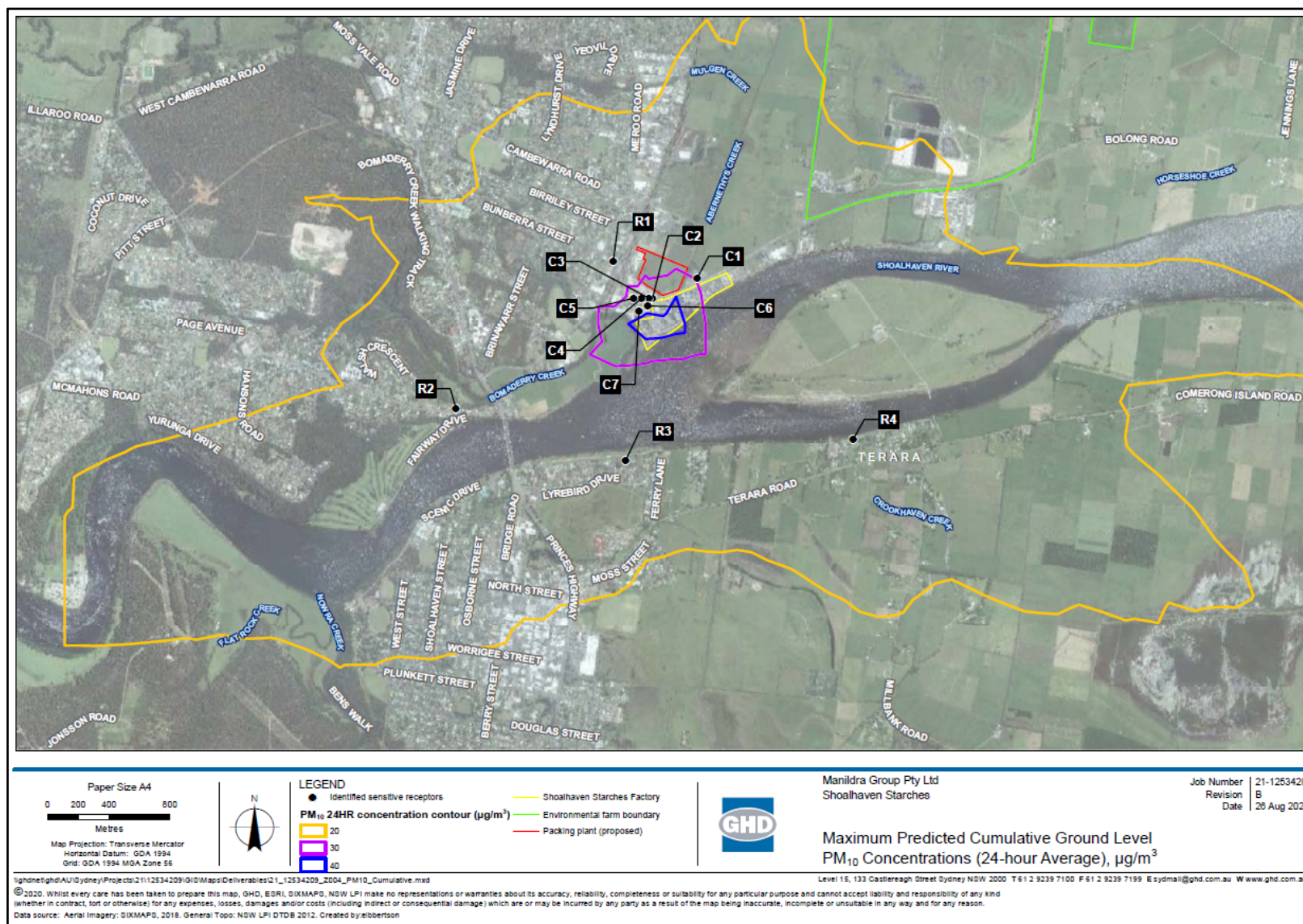


Figure 23: Maximum Predicted Cumulative Ground Level PM₁₀ Concentrations (24-hour Average), µg/m³.

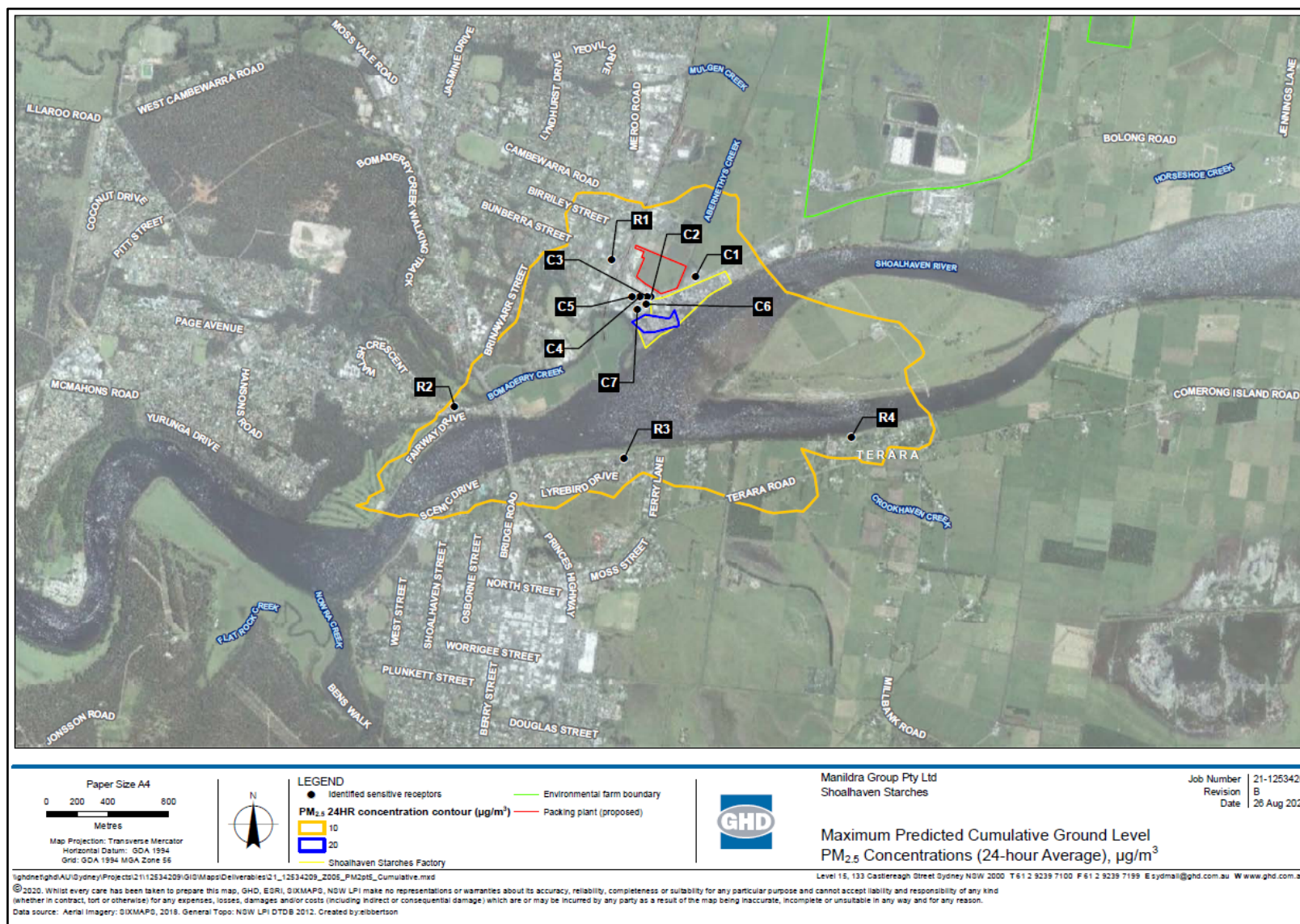


Figure 24: Maximum Predicted Cumulative Ground Level PM_{2.5} Concentrations (24-hour Average), µg/m³.

Products of combustion

The primary pollutants in coal and gas fired boiler emissions are oxides of nitrogen (NO_x), formed by the high temperatures in the combustors, sulphur dioxide (SO_2), formed from the sulphur content of the fuel, VOCs, hydrogen chloride (HCL), polycyclic aromatic hydrocarbons (PAH), carbon monoxide (CO) and hydrogen fluoride (HF) all formed by incomplete combustion of the fuel.

All pollutants have all been assessed by GHD against their relevant criteria from the Approved Methods.

Predicted levels for SO_2 , NO_2 , CO, HF and HCL are provided in **Table 22** to **Table 26**. According to GHD, the predicted levels comply at all receptors for SO_2 , CO, HF and HCL.

Contour plot of cumulative hourly average SO_2 predictions are shown in **Figure 25**, in order to get an appreciation of the hourly averaged pattern of dispersion.

The predicted levels for nitrogen dioxide exceed the criteria at all commercial/industrial sensitive receptors. However, the predicted levels assume that 100% of NO will be converted to NO_2 as per Method 1 of the Approved Methods. This is considered extremely conservative as in reality, only a fraction of the NO will be converted to NO_2 .

Therefore, a more detailed assessment has been undertaken by GHD for all receptors using Method 2 of the Approved Methods. Method 2 is based on NO reacting with ozone in the atmosphere to form NO_2 . Background ozone data was sourced from Kembla Grange for the year 2004. The calculated NO_2 levels using Method 2 are provided in **Table 23**. Using this method no exceedances are predicted.

Effect of Mod 19 changes

According to GHD, no new sources of combustion products are proposed as part of Modification 19. The emissions inventory was updated with the most recent sampling results and therefore there is a slight variation in the predicted products of combustion concentrations.

Table 22
Maximum Predicted Ground Level Sulphur Dioxide Concentrations

<i>Receptor</i>	<i>Total Impact (Incremental plus background) ($\mu\text{g}/\text{m}^3$)</i>			
<i>Criteria, $\mu\text{g}/\text{m}^3$</i>	<i>712 (10 min¹)</i>	<i>570 (1 hour)</i>	<i>228 (24 hour)</i>	<i>60 (Annual)</i>
Background, $\mu\text{g}/\text{m}^3$	No data²	57.6	15.7	1.6
Bomaderry (R1)	253.8	194.7	48.7	5.3
North Nowra (R2)	191.0	150.8	43.3	3.7
Nowra (R3)	233.1	180.2	34.8	2.7
Terara (R4)	178.4	142.0	25.2	2.3
C1	490.8	360.3	96.2	9.5
C2	586.3	427.1	72.4	10.2
C3	537.5	393.0	69.5	9.7
C4	451.8	333.1	68.3	8.8
C5	386.0	287.1	68.8	8.0
C6	495.4	363.6	77.8	10.5
C7	420.4	311.1	76.1	9.6

¹ The 10 minute concentrations were calculated from the hourly values by applying a peak mean factor of $(60/10)^{0.2}$.

² The 10 minute background levels were assumed to be the same as the 1 hour background levels in the absence of monitoring data.

Table 23
Maximum Predicted Ground Level Nitrogen Dioxide Concentrations

<i>Receptor</i>	<i>Total Impact (Incremental plus background) ($\mu\text{g}/\text{m}^3$)</i>		
<i>Criteria, $\mu\text{g}/\text{m}^3$</i>	<i>712 (1 hour, Method 1)</i>	<i>246 (1 hour, Method 2)</i>	<i>62 (Annual)</i>
Background, $\mu\text{g}/\text{m}^3$	80.8	n/a	7.1
Bomaderry (R1)	260	119.4	13.5
North Nowra (R2)	242.9	110.3	11.3
Nowra (R3)	222.7	133.2	8.8
Terara (R4)	207.1	169.0	9.0
C1	420.3	243.4	19.4
C2	475.8	175.2	23.5
C3	439.2	165.7	22.9
C4	459.4	165.5	22.2
C5	475.5	164.4	21.5
C6	424.2	164.5	24.4
C7	535.1	197.7	23.8

Table 24
Maximum Predicted Ground Level Carbon Monoxide Concentrations

<i>Receptor</i>	<i>Total Impact (Incremental plus background) (mg/m³)</i>		
<i>Criteria, mg/m³</i>	<i>100 (15 min¹)</i>	<i>30 (1 hour)</i>	<i>10 (8 hour)</i>
<i>Background, mg/m³</i>	<i>No data²</i>	<i>1</i>	<i>0.6</i>
Bomaderry (R1)	1.08	1.06	0.64
North Nowra (R2)	1.06	1.04	0.63
Nowra (R3)	1.07	1.05	0.62
Terara (R4)	1.05	1.04	0.61
C1	1.17	1.13	0.67
C2	1.22	1.17	0.67
C3	1.20	1.15	0.66
C4	1.16	1.12	0.66
C5	1.14	1.11	0.66
C6	1.18	1.14	0.67
C7	1.15	1.11	0.66

¹ The 15 minute concentrations were calculated from the hourly values by applying a peak mean factor of (60/15)^{0.2}.

² The 15 minute background levels were assumed to be the same as the 1 hour background levels in the absence of monitoring data.

Table 25
Maximum Predicted Ground Level Hydrogen Fluoride Concentrations

<i>Receptor</i>	<i>Total Impact (Incremental plus background) (µg/m³)</i>			
<i>Criteria, µg/m³</i>	<i>1.5 (24 hour)</i>	<i>0.8 (7 day)</i>	<i>0.4 (30 day)</i>	<i>0.5 (90 day)</i>
<i>Background, µg/m³</i>	<i>No data</i>	<i>No data</i>	<i>No data</i>	<i>No data</i>
Bomaderry (R1)	0.21	0.07	0.05	0.04
North Nowra (R2)	0.17	0.05	0.04	0.02
Nowra (R3)	0.13	0.02	0.01	0.01
Terara (R4)	0.06	0.01	0.01	0.00
C1	0.62	0.22	0.10	0.06
C2	0.33	0.13	0.09	0.08
C3	0.32	0.13	0.09	0.07
C4	0.29	0.12	0.08	0.06
C5	0.32	0.12	0.07	0.06
C6	0.36	0.16	0.10	0.08
C7	0.33	0.15	0.10	0.08

Table 26
Maximum Predicted Ground Level Hydrogen Chloride Concentrations

<i>Receptor</i>	<i>Averaging Period</i>	<i>Incremental Impact (Mg/m³)</i>	<i>Background Concentration (mg/m³)</i>	<i>Total Impact (mg/m³)</i>	<i>Criteria (mg/m³)</i>
Bomaderry (R1)	1 hour	0.001	-	0.001	0.14
North Nowra (R2)	1 hour	0.001	-	0.001	0.14
Nowra (R3)	1 hour	0.001	-	0.001	0.14
Terara (R4)	1 hour	0.001	-	0.001	0.14
C1	1 hour	0.004	-	0.004	0.14
C2	1 hour	0.004	-	0.004	0.14
C3	1 hour	0.004	-	0.004	0.14
C4	1 hour	0.003	-	0.003	0.14
C5	1 hour	0.002	-	0.002	0.14
C6	1 hour	0.003	-	0.003	0.14
C7	1 hour	0.003	-	0.003	0.14

PAH, VOCs and metals

The maximum predicted (99.9 percentile, 1-hour average) ground level incremental PAH, VOC and metal concentrations (with the exception of lead which is presented as a 100 percentile annually averaged concentration to align with its assessment criteria), within and beyond the factory site boundary by GHD are provided in **Table 27**. The predicted levels, according to GHD, are significantly lower than the respective EPA principal toxic air pollutant criteria for all substances both within and beyond the site boundary.

Effect of Mod 19 changes

According to GHD, no new sources of PAH, VOC or metal emissions are proposed as part of Modification 19 compared to those assessed in Modification 17.

Table 27
Maximum Predicted Ground Level PAH, VOC and Metals Concentrations

<i>Receptor</i>	<i>Incremental Impact (mg/m³)</i>										
<i>Pollutant</i>	<i>PAH</i>	<i>VOC</i>	<i>Antimony</i>	<i>Arsenic</i>	<i>Cadmium</i>	<i>Mercury</i>	<i>Beryllium</i>	<i>Chromium</i>	<i>Manganese</i>	<i>Nickel</i>	<i>Lead</i>
<i>Criteria</i>	<i>0.0004 mg/m³ (1 hour)</i>	<i>Individual VOCs (1 hour)</i>	<i>9.00E-03 mg/m³ (1 hour)</i>	<i>9.00E-05 mg/m³ (1 hour)</i>	<i>1.80E-05 mg/m³ (1 hour)</i>	<i>1.80E-03 mg/m³ (1 hour)</i>	<i>4.00E06 mg/m³ (1 hour)</i>	<i>9.00E-05 mg/m³ (1 hour)</i>	<i>1.80E-02 mg/m³ (1 hour)</i>	<i>1.80E-04 mg/m³ (1 hour)</i>	<i>5.0E-04 mg/m³ (Annual)¹</i>
Bomaderry (R1)	1.1E-06	1.7E-03	1.3E-06	1.4E-06	1.3E-07	1.3E-07	1.1E-07	8.8E-07	1.1E-06	2.8E-06	9.0E-08
North Nowra (R2)	9.0E-07	1.2E-03	9.5E-07	9.9E-07	1.2E-07	1.3E-07	7.8E-08	6.1E-07	8.5E-07	2.1E06	5.6E-08
Nowra (R3)	1.4E-06	1.6E-03	1.2E-06	1.3E-06	2.4E-07	1.8E-07	1.0E-07	7.7E-07	1.2E-06	2.8E-06	4.5E-08
Terara (R4)	1.1E-06	1.1E-03	8.5E-07	8.9E-07	1.0E-07	9.3E-08	7.0E-08	5.6E-07	9.2E-07	1.8E-06	2.9E-08
C1	3.0E-06	4.3E-03	3.2E-06	3.5E-06	3.7E-07	4.3E-07	2.7E-07	2.2E-06	3.1E-06	7.4E-06	2.7E-07
C2	2.9E-06	5.2E-03	3.6E-06	3.8E-06	4.2E-07	4.2E-07	2.9E-07	2.5E-06	3.3E-06	8.0E-06	3.0E-07
C3	2.7E-06	4.7E-03	3.3E-06	3.5E-06	3.8E-07	3.8E-07	2.6E-07	2.3E-06	3.0E-06	7.2E-06	2.7E-07
C4	2.1E-06	3.7E-03	2.7E-06	2.8E-06	3.1E-07	2.8E-07	2.1E-07	1.8E-06	2.3E-06	5.7E-06	2.3E-07
C5	1.7E-06	2.9E-03	2.2E-06	2.3E-06	2.4E-07	2.3E-07	1.8E-07	1.5E-06	1.9E-06	4.6E-06	1.9E-07
C6	2.6E-06	4.3E-03	3.0E-06	3.2E-06	4.0E-07	3.9E-07	2.5E-07	2.1E-06	2.9E-06	7.0E-06	3.3E-07
C7	2.1E-06	3.5E-03	2.6E-06	2.7E-06	3.0E-07	3.1E-07	2.1E-07	1.7E-06	2.5E-06	5.8E-06	2.7E-07
Maximum level (on site)	6.3E-06	1.0E-02	7.1E-06	7.5E-06	2.0E-06	8.4E-07	5.9E-07	4.5E-06	6.0E-06	1.5E-05	5.3E-07

¹ Lead criteria converted from µg/m³ to mg/m³ so that all results have consistent units.

Conclusion

The Air Quality Impact Assessment undertaken by GHD in connection with Mod 19 concludes:

“GHD was engaged by Manildra to conduct an air quality and odour impact assessment for a proposed modification to the approved SSEP.

The modification proposes changes to the existing Ethanol Distillery Plant to increase the production of ‘beverage’ grade ethanol on site and would include the installation of distillation columns and associated processing equipment, a site boundary adjustment, the addition of 3 ethanol storage tanks, the construction of an additional ethanol loadout and the construction of three product silos.

A marginal increase was observed in predicted odour impacts as a result of the modification. The odour criteria is met at all residential sensitive receptors and it is considered highly unlikely that the increase in odour would be detected at sensitive receptors.

Air quality impacts are predicted to comply with the criteria at all residential sensitive receptors.

Overall, the proposal should be acceptable from an air quality perspective.”

7.2.3 Noise Impact Issues

Harwood Acoustics were engaged to conduct a noise impact assessment for the proposed modifications associated with this Modification Application (**Annexure 4**). A copy of Harwood Acoustics findings in relation to this current Modification Application as a result of this review is included as **Annexure 4** to this SEE. This section of the SEE provides a summary of the findings of the Environmental Noise Impact Assessment prepared by Harwood Acoustics for this Modification Application

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

The nearest residential receptor locations to the proposal are as follows:

- Location 1 – Nobblers Lane, Terara approximately 1450 metres to the south-east,
- Location 2 – Riverview Road, Nowra approximately 1090 metres to the south-west,
- Location 3 – Meroo Street, Bomaderry approximately 630 metres to the north-west,
- Location 4 – Coomera Street, Bomaderry approximately 700 metres to the north-west.

Locations are listed in keeping with the order shown in Environment Protection Licence number 883 for the site.

Distances are based on the location of the main ethanol distillery plant area as a reference only. The Shoalhaven Starches site and receptor locations are shown in **Figure 26** along with some of the main components of the proposal.



Figure 26: Receptor Locations Plan – Shoalhaven Starches, Bomaderry.

7.2.3.1 Noise Criteria

The noise guidelines applicable to this modification proposal and the project specific noise goals are described by Harwood Acoustics as follows.

NSW Department of Planning and Environment

Existing Project Approval

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

"Condition 2

The applicant shall carry out the development generally in accordance with the:

- a) *EA and associated site plans (see Appendix 2).*

Condition 2A

The applicant shall carry out the development generally in accordance with the:

- a) *Statement of commitments,*
- b) *Conditions of this consent, and*
- c) *Revised statement of commitments for Appendix 6.”*

The original Project Approval incorporates noise mitigation measures recommended in the ‘*Acoustical Assessment, Proposed Ethanol Upgrade, Shoalhaven Starches*’ – prepared by The Acoustic Group Pty Ltd, ref 38.3849.R52:ZJM, dated 26 June 2008. This document forms part of the EA and statement of commitments and it is implicit that the noise control recommendations within this document are required to be implemented as part of the Project Approval.

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

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

Existing Project Approval

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

NSW EPA’s Environment Protection Licence

Shoalhaven Starches operates under Environment Protection Licence 883 issued by the NSW Environment Protection Authority.

Section L5 ‘Noise Limits’ of the licence states:

“L5.1 the LAeq (15min) sound pressure level contribution generated from the premises must not exceed the following levels when measured at or near the boundary of any residential premises:*

- a) *38 dBA at locations in Terara on the south side of the Shoalhaven River;*
- b) *38 dBA at locations in Nowra on the south side of the Shoalhaven River;*

- c) 42 dBA at locations in Meroo Street, Bomaderry;
- d) 40 dBA at other locations in Bomaderry.”

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

Shoalhaven Starches Noise Management Plan

The Project Approval for the Shoalhaven Starches Expansion Project, required the preparation of a Noise Management Plan for addressing and managing noise emission from the expansion project.

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

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

Given the number of modifications subsequent to the original approval and location of new noise sources, it is recommended by Harwood Acoustics that the noise design goals are set to a minimum 15 dB below the EPL noise limits henceforth.

Construction Noise Criteria

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

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

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

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

Consideration is given to the potential for noise impact from construction activities on residential receptors in by Harwood Acoustics.

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

Harwood Acoustics have carried out numerous noise surveys in Nowra, Bomaderry and Terara and has found daytime background noise levels range between 33 and 40 dBA depending on the location, as shown in **Table 28** below.

Table 28
Rating Background Levels – Nowra, Terara and Bomaderry, NSW

<i>Location</i>	<i>Time of Day</i>	<i>Rating Background Level (L₉₀)</i>
135 Terara Road, Terara March 2012	Day (7 am to 6 pm)	33 dBA
55 Terara Road, Nowra February 2015	Day (7 am to 6 pm)	36 dBA
Cambewarra Rd, Bomaderry July 2010	Day (7 am to 6 pm)	40 dBA
Shoalhaven Village Caravan Park, Nowra March 2012	Day (7 am to 6 pm)	40 dBA

For the purpose of determining the potential for community reaction to noise emission from construction activities, previously measured background noise levels in the vicinity of each receptor location have been used to determine the noise management levels as shown in **Table 29** below.

Table 29
L_{eq} Noise Management Levels from Construction Activities

<i>Receptor Location</i>	<i>Noise Management Level</i>	<i>How to Apply</i>
Location 1 (Terara)	43 dBA (33 + 10)	The noise affected level represents the point above which there may be some community reaction to noise. <ul style="list-style-type: none"> Where the predicted or measured L_{Aeq (15 min)} noise level is greater than the noise affected level, the proponent should apply all feasible and reasonable* work practices to meet the noise affected level. The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.
Location 2 (Nowra)	50 dBA (40 + 10)	
Locations 3 & 4 (Bomaderry)	48 dBA (38 + 10)	

Table 29 (continued)

Receptor Location	Noise Management Level	How to Apply
	Highly noise affected 75 dB(A)	<p>The highly noise affected level represents the point above which there may be strong community reaction to noise.</p> <ul style="list-style-type: none"> ▪ Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restricting the hours that the very noisy activities can occur, taking into account: <ol style="list-style-type: none"> 1. times identified by the community when they are less sensitive to noise (such as before and after school for works near schools, or mid-morning or mid-afternoon for works near residences) 2. if the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.

* Section 6, “work practices” of The *Interim Construction Noise Guideline*, states:- “there are no prescribed noise controls for construction works. Instead, all feasible and reasonable work practices should be implemented to minimise noise impacts.

This approach gives construction site managers and construction workers the greatest flexibility to manage noise”.

The ‘highly noise affected’ level of 75 dBA represents the point above which there may be strong community reaction to noise. This level is provided in the Guideline and is not based on the RBL.

Project Specific Noise Goals

According to Harwood Acoustics the most relevant criteria are as follows:

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

- 23 dBA ($L_{eq, 15 \text{ minute}}$) at locations in Terara on the south side of the Shoalhaven River;
- 23 dBA ($L_{eq, 15 \text{ minute}}$) at locations in Nowra on the south side of the Shoalhaven River;
- 27 dBA ($L_{eq, 15 \text{ minute}}$) at locations in Meroo Street, Bomaderry;
- 25 dBA ($L_{eq, 15 \text{ minute}}$) at other locations in Bomaderry.

Construction Phase Noise Management Levels

- 43 dBA ($L_{eq, 15 \text{ minute}}$) at locations in Terara;
- 48 dBA ($L_{eq, 15 \text{ minute}}$) at locations in Bomaderry; and
- 50 BA ($L_{eq, 15 \text{ minute}}$) at locations in Nowra.

7.2.3.2 ***Ethanol Plant and Equipment Noise Emission Plant and Equipment Source Noise Levels***

The main sources of noise associated with the modification proposal according to Harwood Acoustics will be the plant and equipment associated with the modification to the ethanol distillery to facilitate beverage grade production.

The main processing plant is the Extra Neutral Alcohol Unit 2 which will be supplied by TechnipFMC Pty Ltd.

Given that there will be no increase to the overall production of ethanol at the facility there will be no significant increase in heavy vehicle or mobile plant movements associated with this modification.

All existing noise sources that are associated with the production of ethanol, including the beverage grade production are considered as part of the cumulative noise from the site. For this reason, the noise design goals are stringent, to ensure that any new noise sources that are not part of current operations, do not increase overall site noise. To this end, there is no consideration given to modelling existing noise sources, such as truck movements, that already form part of the existing site operations despite potentially being utilised in beverage grade ethanol production.

Table 30 below provides a schedule of overall 'A' frequency weighted sound power levels, in decibels re: 1 pW, of noise sources associated with proposed modification. These are derived from manufacturer's data, previously measured noise levels of indicative plant and equipment and the author's data base of similar items of plant and equipment.

Table 30
 $L_{eq, 15 \text{ minute}}$ Sound Power Levels – Plant and Equipment

Description	$L_{10, 15 \text{ minute}}$ Sound Power Level (dBA)
Beverage Grade Ethanol Plant (combined)	98
Cooling Tower (Low noise) x 12	87 (per two fan units)
Storage Tanks (bundled pump motor)	80 (per two silos)

Harwood Acoustics have carried several noise assessments at the Shoalhaven Starches facility including for the previous modification application for an increase to beverage grade ethanol production in 2016. In addition to this, a noise validation assessment was undertaken in 2020 where noise measurements of the plant installed for beverage grade production was measured on site. The sound power level shown in **Table 30** above, as

derived from the supplier's noise design goal for the processing plant, is in keeping with the noise measurements of similar equipment at the ethanol distillery.

Sound data for the cooling tower is derived from manufacturer's data for a low noise model (Baltimore) installed under Modification 15 and the sound data for the storage silo motors is derived from noise measurements of similar motors conducted at the Site.

Noise Level Predictions

Modelling Equations

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

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

Where: L_w is the sound power level of the noise source;

Dc is directivity correction; and

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

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

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

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

Predicted Noise Levels

Predicted noise levels at each receptor location are shown in **Table 31** below.

The predicted noise levels assume recommendations made in Section 7.2.3.4 of this report have been implemented.

Table 31
Predicted Noise Levels at Receptor Locations

Description	Predicted Noise Level $L_{eq, 15 \text{ minute}}$ (dBA) at Receptor Location			
	Location 1	Location 2	Location 3	Location 4
Design Noise Goal ($L_{eq, 15 \text{ minute}}$)	23	23	27	25
Ethanol Distillery Plant & Equipment	<20	<20	22 to 23	22 to 23
Cooling Towers	<20	<20	21	20

Table 31 (continued)

Description	Predicted Noise Level $L_{eq, 15 \text{ minute}}$ (dBA) at Receptor Location			
	Location 1	Location 2	Location 3	Location 4
Storage Tanks and Silos	<15	<20	<15	<15
Combined	20	22	25 to 26	24 to 25
Complies	Yes	Yes	Yes	Yes

Predictions in Table 30 assume the following:-

- Distance loss to each receptor,
- Acoustical shielding from structures on the Site,
- Sound power levels for each item of plant and equipment do not exceed those shown in Table 3.

7.2.3.3 Construction Noise Emission

The construction works will consist of piling, pouring of concrete slabs for the buildings and silos, construction of the industrial buildings and the installation of all plant and equipment. **Table 32** below provides a schedule of sound power levels for typical construction equipment.

Table 32
Typical Construction Equipment – L_{eq} Sound Power Levels

Description	L_{eq} Sound Power Level (dBA)
Auger Piling (CFA Rig)	113
Mobile Crane (Diesel)	110
30 Tonne Excavator	110
Concrete Truck / Pump	105
Dump Truck	110
Grinder	105
Power Saw	101

Table 33 below shows the predicted level of potential noise emission from construction activities at each of the receptor locations according to Harwood Acoustics.

Table 33
Predicted Noise Levels at Receptor Locations – Construction Phase

<i>Description</i>	<i>Predicted Noise Level $L_{eq, 15 \text{ minute}}$ (dBA) at Receptor Locations</i>			
	<i>Location 1</i>	<i>Location 2</i>	<i>Location 3</i>	<i>Location 4</i>
Noise Design Goal ($L_{eq, 15 \text{ minute}}$)	43	50	48	48
Construction Activity*	36 – 40	37 – 41	46 - 50	44 – 48
Complies	Yes	Yes	No + 2 dB (during piling)	Yes

* Range provided with and without piling activity.

Predictions include an increase in truck movements during the construction phase. Noise generated by the increase in construction worker personal vehicle movements will not be perceptible at the residential receptor locations.

7.2.3.4 Recommended Noise Controls

Harwood Acoustics propose the following noise controls, based on the assumed sound levels of typical plant and equipment.

Ethanol Plant and Equipment Noise Levels Verification

The supplier has provided a noise design goal of 60 dBA L_{eq} , at 30 metres from the plant and equipment to be installed at the site that is the main process equipment in the beverage grade ethanol production.

This equates according to Harwood Acoustics to a sound power level of 98 dBA (L_w) for all plant and equipment combined, that will be located within the distillery.

Providing this noise level is not exceeded for all plant associated with the production of beverage grade ethanol, the noise design goals according to Harwood Acoustics will be met at each receptor.

A final design will need to be undertaken at the time of Design Noise Verification process once all of the details of the plant and equipment are finalised, or during construction or commissioning of the plant.

In the event that a reduction in noise from the equipment associated with the plant and equipment is required this will be achieved according to Harwood Acoustics through a combination of localised acoustical treatment including, for example, localised screening, construction of acoustical enclosures, the lagging of pipe work and the judicious location of the plant.

According to Harwood Acoustics any additional noise controls, if required will not be particularly onerous and the noise design goals can easily be achieved for this modification.

Cooling Tower – Sound Level Design Goals

The noise modelling of the cooling towers is based on a sound power level (L_w) of 87 dBA for a two fan unit with a maximum number of 12 fans to be installed over time.

Noise modelling has been undertaken by Harwood Acoustics and includes attenuation from structures on site and shows that, in conjunction with the noise emission arising from the beverage grade ethanol plant, that the noise design goals will be met at all receptors without the need for noise controls.

However, as with the ethanol plant and equipment, a final design will be undertaken at the time of the Design Noise Verification process once all of the details of the cooling tower plant and equipment are finalised, or during construction or commissioning of the plant.

Construction Noise

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

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

According to the assessment carried out by Harwood Acoustics construction noise management levels are likely to be met at each receptor location during general construction activity, with the exception of piling.

During piling there is potential for the noise management levels to be exceeded on some occasions and most likely only in Bomaderry at Meroo Street residences, closest to the site. According to Harwood Acoustics this is not considered a significant exceedance during day time hours for short and sporadic duration.

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

7.2.3.5 Conclusion

The Noise Impact Assessment prepared by Harwood Acoustics for Mod 19 concludes:

“An assessment of the potential noise impact from the proposed modification to the existing ethanol distillery at Shoalhaven Starches on Bolong Road, Bomaderry, NSW to facilitate an increase in the proportion of beverage grade ethanol that is produced at the Site, has been undertaken.”

Noise producing aspects of this proposed modification include the processing plant and equipment associated with the modifications to the distillery, the proposed cooling towers and the pump motors associated with the product storage silos.

Computer noise modelling has been undertaken based on the manufacture's data that has been calibrated to previous noise measurements of similar equipment taken at the Site. Calculations show that the level of noise emission from the modification to the ethanol distillery will be within the noise design goals derived from Environment Protection Licence 883 noise limits at each receptor location without the need for additional noise controls at this stage.

A final assessment of required noise controls will be undertaken at the time of the Design Noise Verification process prior to construction, or during commissioning, as required, to ensure the noise design goals are met at all receptors.

The level of noise emission from the construction phase of the project will be within the noise management levels set by the NSW EPA's Interim Construction Noise Guideline with the exception of piling activity on some occasions.

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

7.2.4 Preliminary Hazard Analysis

Pinnacle Risk Management were engaged to undertake a Preliminary Hazard Analysis (PHA) for the proposed modifications associated with this Modification Application (**Annexure 6**). A copy of Pinnacle Risk Management's findings as a result of this review is included as **Annexure 6** to this SEE. This section of the SEE provides a summary of the findings of the Preliminary Hazard Analysis prepared by Pinnacle Risk Management for this Modification Application

The risks associated with the proposed modifications have been assessed by Pinnacle Risk Management and compared against relevant risk criteria issued by the DPIE.

The results of Pinnacle Risk Management are summarised in **Table 34** as follows and demonstrate compliance with all risk criteria.

Table 34
Summary of Assessment of Proposed Modification against Risk Criteria

Description	Risk Criteria	Risk Acceptable?
Fatality risk to sensitive uses, including hospitals, schools, aged care	0.5 x 10 ⁻⁶ per year	Yes
Fatality risk to residential and hotels	1 x 10 ⁻⁶ per year	Yes

Table 34 (continued)

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

Societal risk, area cumulative risk and environmental risk are also concluded by Pinnacle Risk Management to be acceptable.

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

Based on the analysis Pinnacle Risk Management make the following recommendations:

1. *Provide leak detection in the proposed pump bund with an alarm in the control room.*
2. *Provide fire detection in the proposed pump bund that automatically initiates a deluge system.*
3. *Ensure that the fire water containment systems are adequate to contain the design quantities of contaminated fire water for the new processes,*

in particular, the new beverage grade distillery and the new road tanker loadout.

7.2.5 Traffic and Car Parking

Bitzios Consulting were engaged to undertake a traffic impact assessment of the proposed modifications associated with this Modification Application. A copy of the Traffic Impact Assessment prepared by Bitzios Consulting is included as **Annexure 7** to this SEE. This section of the SEE provides a summary of the findings of the Traffic Impact Assessment prepared by Bitzios Consulting prepared for this Modification Application.

7.2.5.1 Site Access and Connectivity

Vehicular Access

The Shoalhaven Starches factory and supporting facilities are accessed via several access points from Bolong Road. Heavy rail access is also available to the site via a private rail spur line extending from Bomaderry Train Station (**Figure 27**).

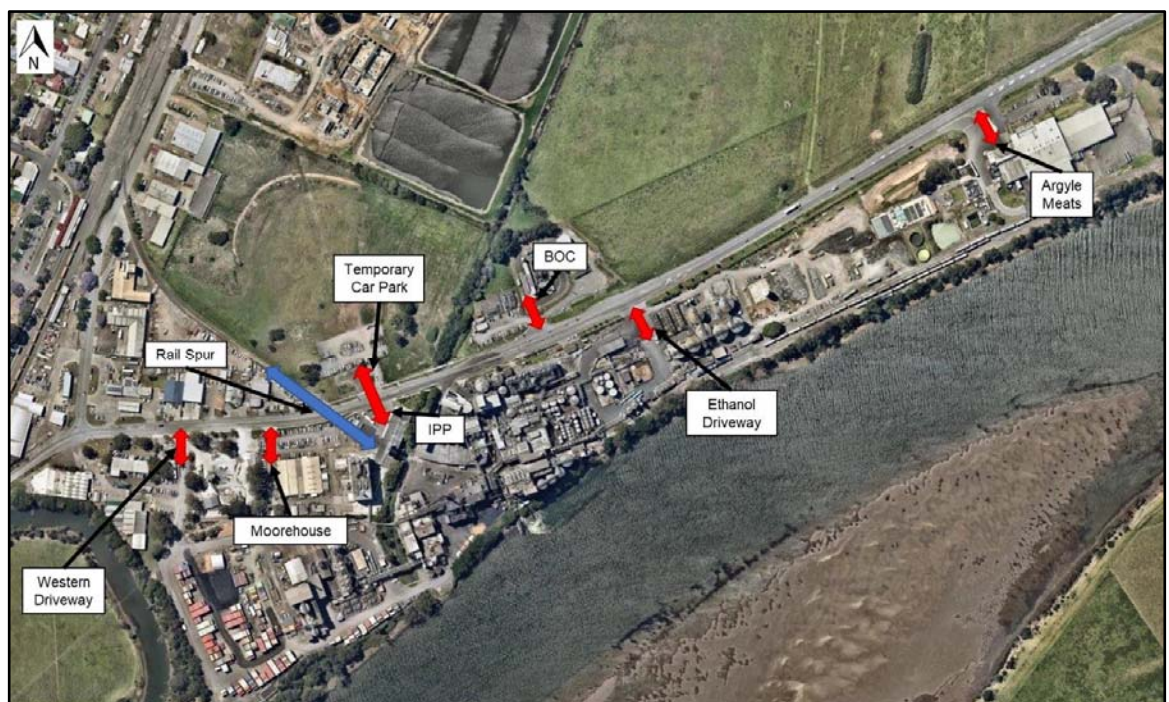


Figure 27: Location of access points to Shoalhaven Starches (courtesy Bitzios Consulting).

Mod 19 proposes no changes in the method or location of delivery / removal of resources, products or waste from the subject site. As such, any additional heavy vehicles continually accessing the site as a result of Mod 19 will use existing accesses approved for use by each relevant vehicle type.

It is noted that some additional heavy vehicles may be temporarily required to access the site for construction works. According to Bitzios Consulting, it is expected that existing access locations would be sufficient to accommodate all construction traffic, however Bitzios Consulting recommend that construction traffic operations be subject to a Construction Traffic Management Plan (CTMP).

Proposed Loadout

Mod 19 proposes an additional ethanol loadout east of the ethanol storage area. A swept path assessment was undertaken by Bitzios Consulting which demonstrates 25.0 m B-double vehicles are able to safely and efficiently manoeuvre around the circulating area and proposed load out. Swept path assessments also demonstrate ingress and egress movements from the relevant Bolong Road access.

Pedestrian Connectivity

As a result of the proposed part road closure associated with Mod 19 (being dealt with by Shoalhaven City Council separately to Mod 19) the Bolong Road frontage is required to shift immediately behind the kerb. The relocated footpath would be directly adjacent to the existing kerb line. As such, to ensure sufficient separation between vehicles travelling west along Bolong Road and pedestrians, kerb widening is proposed. Noting that 'No Stopping' signage is currently present at this location; the proposed kerb modification is considered by Bitzios to maximise pedestrian safety and will not impact any on-street parking.

7.2.5.2 *Parking Assessment*

Car Park Provision

In accordance with the *Shoalhaven Starches, Bomaderry, Access & Parking Assessment* (SSBAPA) completed by ARC in April 2017, existing parking demand is accommodated by several car parks across the site. An existing temporary car park is also present on the northern side of Bolong Road to the east of the rail spur. An extension of the western car park is also proposed as a part of MOD 19. The capacity of these existing and proposed car parks is as follows:

- Existing permanent car parking:
 - Western car park: 52 spaces;
 - Moorehouse car park: 110 spaces;
 - Eastern car park: 60 spaces;
 - BOC car park: 58 spaces.

- Temporary car parking: 100 spaces.
- Proposed car parking extension: 31 spaces.

The location of these existing car parks is illustrated in **Figure 28**.

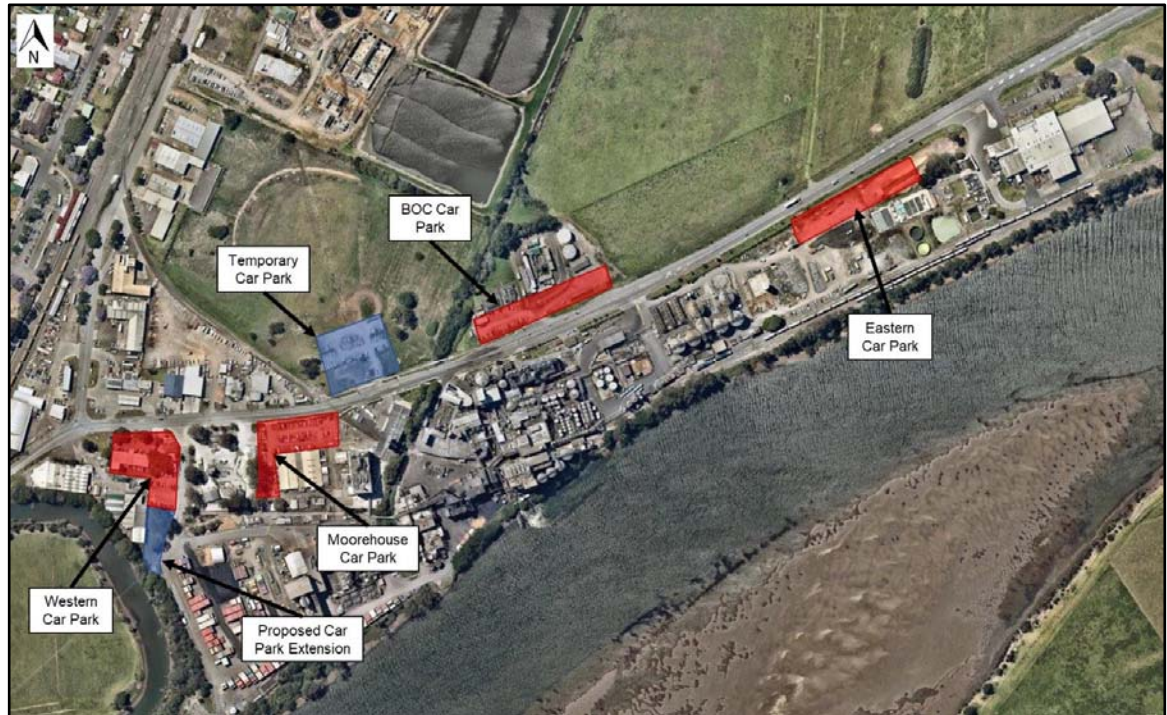


Figure 28: Existing car park locations.

It is noted that there is also potential throughout the site for some vehicles to park at informal parking locations. However, the number of parking spaces available cannot be quantified and thus for the purposes of this assessment informal parking has been disregarded.

Existing Car Parking Demand

In accordance with the SSBAPA, 311 staff are employed across the Shoalhaven Starches site. However, as the factory operates 24 hours per day with varying shift times, there are typically a maximum of 157 employees currently on-site during the period between 8:00 am and 2:00 pm. However, as stated in the MOD 16 traffic assessment, the maximum number of staff on-site may be higher with contractors or increased peak staff numbers coinciding with new infrastructure coming on-line. It is also noted that MOD 16 was expected to generate an additional 5 permanent staff. As such, as per the MOD 16 traffic assessment (*P3530.003R Shoalhaven Starches Expansion TIA Report*), existing permanent parking provision shall accommodate the demand of a total of 220 permanent staff on-site simultaneously.

The SSBAPA indicated that permanent staff car occupancy is very low. Furthermore, access to the site by alternate transport means is limited. As such, for a conservative assessment, it is assumed that permanent parking provision must accommodate for one (1) parking bay for each of the Shoalhaven Starches permanent employees and contract staff.

Mod 19 Car Parking Demand and Requirements

Mod 19 will result in an additional two (2) permanent personnel on-site simultaneously requiring permanent car parking.

Mod 19 construction works will also involve a total of 65 construction employees on-site daily. As such, parking provision for a total of 65 construction staff is required. In accordance with Section 1.3.3 of the SSBAPA, Bitzios estimates that 65 construction staff would generate a formal parking demand of up to 39 spaces or 0.6 parking spaces per construction employee. These rates are consistent with the MOD 16 traffic assessment and are considered appropriate as:

- It is unlikely that all personnel for all construction works taking place simultaneously will be on-site at the same time;
- It is expected that some vehicles for construction works would park in informal locations near the works locations;
- A small amount of carpooling or alternate transport use by construction employees is expected.

According to Bitzios an additional 30 parking spaces is required for Mod 19 construction employees. The car parking demand and provision for the Shoalhaven Starches site is therefore outlined in **Table 35**.

Table 35
Car Parking Demand and Provision

<i>Car Parking Type</i>	<i>Existing Staff</i>	<i>Modification 19 Staff</i>	<i>Parking Rate</i>	<i>Total Parking Demand</i>	<i>Provision</i>	<i>Excess / Shortfall</i>
Permanent	220	2	1 per staff	222	311	+89
Temporary	N/A	65	0.6 per staff	39	100	+61
TOTAL	220	67	N/A	261	411	+150

According to Bitzios the proposed car parking provision associated with Mod 19 will exceed the expected permanent and temporary / construction parking requirements.

Proposed Car Park Extension Layout and Geometry

The proposed western car park extension layout has been assessed by Bitzios against the relevant requirements of AS2890.1 as summarised in **Table 36**.

Table 36
Western Car Park Extension Layout Assessment

<i>Component</i>	<i>Requirement</i>	<i>Proposed</i>	<i>Compliant</i>
Staff Car Parking (User Class 1A)	2.4 m x 5.4 m	2.4 m x 5.5 m	YES
Parking Aisle	5.8m (+0.3 m where bounded by a wall)	7 m	YES
Aisle Extension	Minimum 1 m	5.5 m	YES
Grades (Car Parking Modules)	Max. 1:20 parallel to direction of bay and max. 1:16 in any other direction	Not shown, assumed flat	YES

According to Bitzios the proposed car park extension complies with the relevant requirements of AS2890.1.

7.2.5.3 Traffic Assessment

Permanent Traffic

Mod 19 will not result in any change to the current overall ethanol production of 300 ML per year. As such, according to Bitzios no changes are envisaged to heavy vehicle trips associated with the change in ethanol production as part of Mod 19.

An additional two (2) permanent staff will be employed. As such, conservatively assuming new staff members arrive and depart during peak hours, an additional two (2) light vehicle trips will be generated in the AM and PM peak periods. According to Bitzios traffic generated by permanent staff associated with Mod 19 is expected to have no adverse impacts on the surrounding road network.

Temporary Construction Traffic

It is anticipated that Mod 19 will generate a maximum of 65 construction personnel involved in construction works on a daily basis. In accordance with the *Shoalhaven Starches, Bomaderry, Access & Parking Assessment*, light vehicle traffic generated by the facility is equal to 0.5 peak hour trips per parking space. As such, construction traffic for Mod 19 is estimated by Bitzios to generate approximately 33 peak hour light vehicle trips. This, according to Bitzios, is considered a conservative assessment as:

- It is unlikely that all construction works will be occurring simultaneously
- Construction traffic peak is not expected to align with the commuter / network peak.

As a result of the construction works, some additional heavy vehicles are also expected to access the site. Construction activities are expected to generate heavy vehicle traffic related to concrete pours and delivery of material or machinery. However, according to Bitzios, the volume of this traffic is not expected to be significant and will rarely coincide with network peak traffic times.

Considering the traffic volumes outlined above, construction traffic volumes are not expected to have an adverse impact on the surrounding road network considering the following:

- In accordance with SIDRA analysis conducted by ARC, as outlined in the *Shoalhaven Starches, Bomaderry, Access & Parking Assessment (2017)* and the *Shoalhaven Starches, Bomaderry MP 06_0028 Modification Traffic Impact Assessment (2017)*, the Bolong Road / Railway Street intersection and all accesses operate well within acceptable performance limits in terms of LOS, delay and queuing.
- Increases in queuing at accesses as a result of development or construction traffic will be contained on-site and thus have no impact on the surrounding road network.
- The proposed construction works are expected to occur over a limited time period and as such construction traffic will have no lasting impact on the network.

Railway Crossing Impacts

The site is accessed by heavy rail freight services via a private rail spur crossing Bolong Road. Mod 19 is not expected to generate additional heavy rail movements to and from the site. According to Bitzios Consulting, Mod 19 is not expected to have any adverse impacts on the surrounding road network in relation to the Bolong Road railway crossing at the heavy rail site access.

The Traffic Impact Assessment prepared by Bitzios concludes:

The key findings of the traffic impact assessment for the proposed Shoalhaven Starches expansion location at 22 & 24 and 171 Bolong Road, Bomaderry are as follows:

- *The proposed expansion (Modification 19) proposes the installation of distillation columns, associated processing equipment, boundary adjustment to Bolong Road, additional 3 ethanol storage tanks, additional ethanol load out, relocation of the existing ethanol distillery control room, additional cooling towers, relocation of container storage and other ancillary works*
- *Public transport access to the site is limited with a single bus and rail service approximately 600m from the subject site with services every 1-2 hours*

- *Pedestrian footpaths are provided fronting the site and two (2) pedestrian refuges provide active transport connectivity between areas of the subject site*
- *The subject site is accessed via several existing accesses off Bolong Road and the proposed modification will not result in any changes to access location or form and the vehicle types accessing the site will not change*
- *A swept path assessment demonstrates that a design service vehicle (25m B-Double) can safely and efficiently access the proposed load out and circulate the relevant area of the site*
- *The proposed modification of a short segment of footpath and kerb on the southern side of Bolong Road facilitates safe pedestrian separation from proposed plant infrastructure and through traffic on Bolong Road.*
- *The proposed car parking provision exceeds the expected permanent and temporary / construction parking requirements*
- *The proposed extension of the western car park complies with relevant requirements of AS2890.1*
- *Excluding construction traffic, the proposed modification is expected to generate no additional heavy vehicle movements and a maximum of two (2) light vehicle trips in the AM and PM peak hours*
- *Construction traffic volumes are not expected to have an adverse impact on the surrounding road network*
- *Modification 19 is not expected to have any adverse impacts on the surrounding road network in relation to the Bolong Road railway crossing at the heavy rail site access.*

Based on the above assessment we conclude that there are no significant traffic or transport impacts associated with the proposed development expansion to preclude its approval and relevant conditioning on traffic or transport planning grounds.

7.2.6 Visual Impact

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

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

The Shoalhaven Starches factory complex is characterised by typical industrial structures with an overall bulk and scale that dominates the surrounding locality. The site, despite being partially screened by vegetation along Bolong Road, the Shoalhaven River and Abernethy's Creek visually dominates the immediate 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 scale and nature.

The most relevant vantage points from where the overall factory site is visible (see **Figure 29**) would include:

- The Princes Highway – views of the existing factory site are possible from selected locations along the Princes Highway north of Bomaderry, travelling in both a northerly and southerly direction. Whilst the factory site is visible in the landscape, its overall visual impact is reduced by virtue of the distance between the plant; the intermittent nature of the views; a rise in topography which screens the site from view; and vegetation.
- Burruga (Pig) Island – Burruga Island is situated in the middle of the Shoalhaven River and provides the closest vantage point to the southern boundary of the site. The island however is privately owned and not accessible to the public. Vegetation screening along the riverbank adjacent to the site also reduces the visibility of the existing buildings and structures.
- Bolong Road – Bolong Road runs along the frontage of the site. Views of the factory are possible when travelling in either an easterly or westerly direction. Some attempts have been made to provide some tree planting along the boundaries to “soften” the appearance of the development. The existing building forms and structures are however clearly visible to motorists travelling along this stretch of Bolong Road.
- Nowra Bridge – The Nowra Bridge crosses the Shoalhaven River and provides limited opportunities for views of the factory site. The dominant visual elements from the bridge are the river, vegetation along the riverbanks and the escarpment. The visual impact of the factory site is reduced by distance as well as the bridge structure which permits only glimpses of the site.
- Bomaderry urban area – The existing plant is visible from a number of locations within the eastern outskirts of Bomaderry. Bomaderry is slightly elevated and some locations within the urban area do have extensive views of the site.

- Terara – Distant views of the Plant are possible from a number of vantage points in and around the village of Terara on the southern bank of the River. The visual impact of the site however is reduced by distance, the intervening landform of Burraga (Pig) Island and the vegetated riverbanks.
- Riverview Road – Views of the site are available from residential development on the southern bank of the Shoalhaven River. Vegetation along both the northern and southern banks of the river partially screen the site from view.
- Cambewarra Lookout – Cambewarra lookout is a popular tourist lookout providing panoramic views over the Shoalhaven floodplain and estuary. Shoalhaven Starches, like the other significant industrial sites, is visible from the lookout.

Visual Impact of Proposal

This modification proposal involves several components that have relevance in terms of potential visual impacts including:

- The upgrade works to the Ethanol Distillery with the installation of additional distillation columns and associated works.
- The installation of additional ethanol storage tanks and ethanol loadout.
- The construction of additional cooling towers towards the eastern extent of the factory site.
- The construction of the product silos above the interim packing plant, and the associated relocation of the approved electrical substation to a position of the northern side of Starch Dryer No. 5.
- The relocation and construction of additional product storage tanks to the west of Abernethy's Creek.

Ethanol Distillery Upgrade Works

The upgrade works within the Ethanol Distillery will include the installation of additional distillation columns that will range in height from 33.6 m to 54.2 m above ground level. The columns will be constructed of similar materials to the existing columns associated with the existing ethanol plant and comprise a similar appearance as these existing structures.

Two of the proposed new distillation columns will have heights that will exceed the heights of the existing distillation columns. The maximum height of the existing columns is 46.0 m, and as a result the highest of the proposed distillation columns will be over 8.0 m higher than this existing column. These proposed new columns will be some of the highest

structures that will be located on the site, although the boiler house stack at 53.7 m will still be the highest structures associated with the site.

Additional Ethanol Storage Tanks and Ethanol Loadout

The proposed additional ethanol storage tanks will be constructed adjacent to existing ethanol storage tanks. The proposed new ethanol storage tanks will have a height of 17 metres which will match the existing tanks. Further the proposed new tanks will be constructed of similar materials as the existing tanks.

The Ethanol Loadout which is to be sited to the east of the Ethanol Storage Tanks will have a height of 11.3 metres above ground level and will comprise a similar scale and design of structure as the existing loadout building which is situated immediately to the north-west of the proposed new loadout building.

Additional Cooling Towers

It is proposed to construct 12 new cooling towers to the east of the existing evaporators and fermenters that are located within the eastern extremity of the factory site. The proposed new cooling towers will comprise a height above ground level of 7.6 metres which will be dwarfed by the evaporators and fermenters which they will adjoins which rise up to 21.5 m above ground level.

Additional Product Silos

The Modification Proposal will also involve the construction of three Product Silos above the interim packing plant. These product silos will have a height above ground level and will match the design, appearance and height of the existing product silo which already sits above the interim packing plant.

The construction of these additional product silos will also require the relocation of the western substation that was to be situated within the footprint of what would become these silos, to a position to the north of the Starch Dryer No. 5 building. This western substation building will comprise a footprint of 15 m by 6 m and a height above ground level of 8.0 m. This structure will sit on the north side of the Starch Dryer No. 5 building and will be dwarfed by this existing building.

Relocation and Additional Product Storage Tanks

Ten storage tanks were originally approved to the rear of the Starch Dryer No. 5 and Specialty Product Buildings. Only three of these tanks have been constructed. It is proposed to slightly relocate six of the approved tanks within this location to the rear of these two buildings. It is also proposed to construct the four remaining approved tanks to

the south along the western banks of Abernethy's Creek. It is also proposed to construct an additional six tanks immediately to the east of the Starch Dryer No. 5 building adjacent to the western bank of Abernethy's Creek. These tanks will all have the same dimensions comprising a diameter of 9.1 m and height above ground level of 13.5 m.

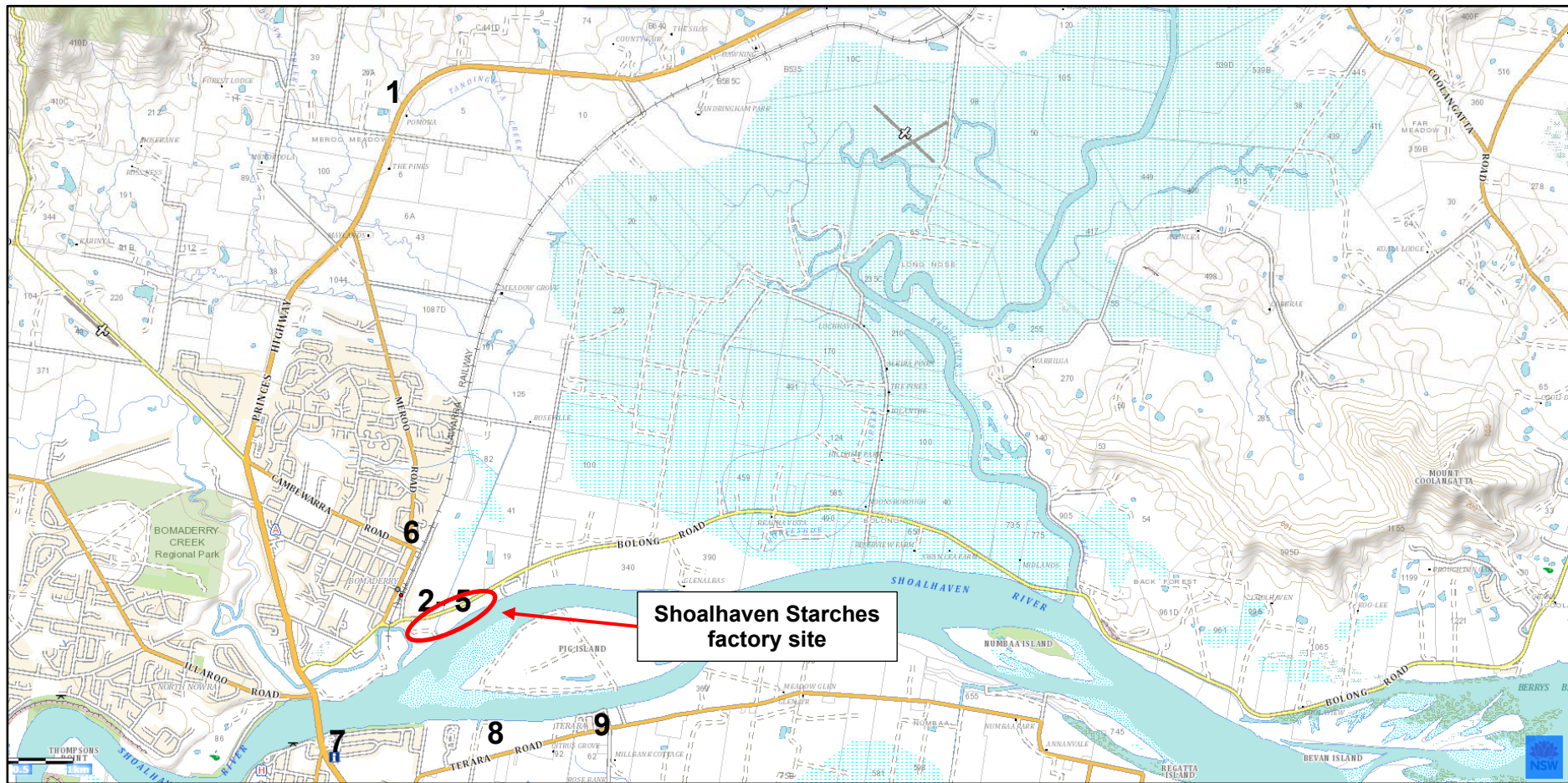


Figure 29: Vantage Points for Plates 1 – 9.

The Princes Highway

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

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

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

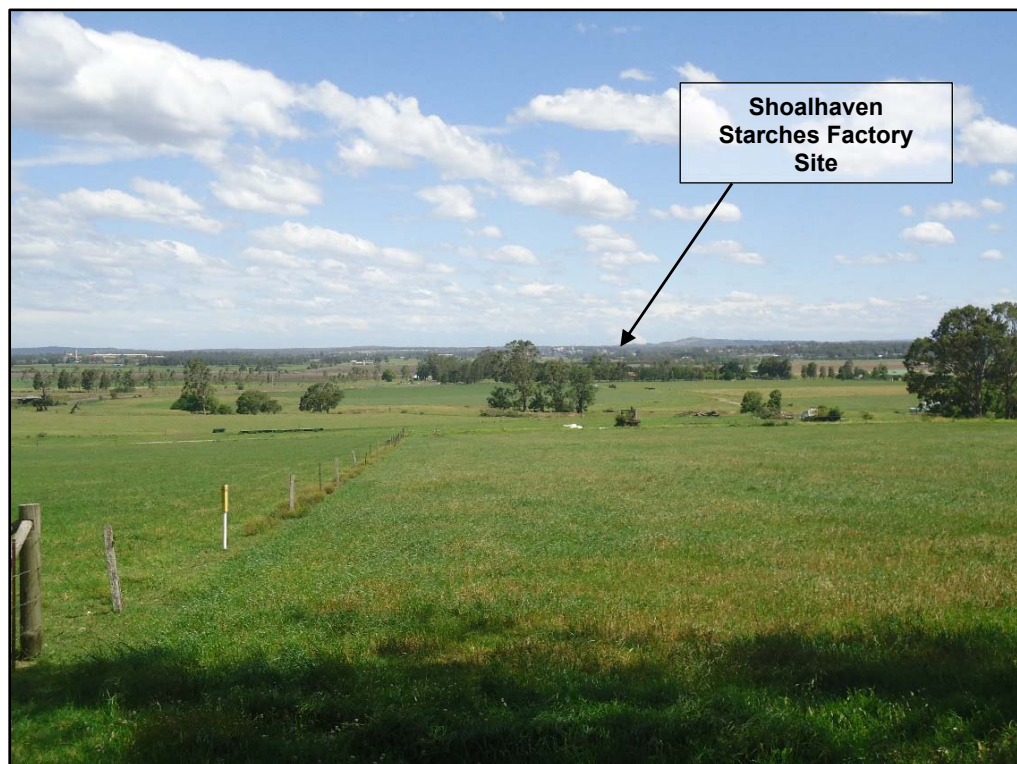


Plate 1: View of Shoalhaven Starches Factory from Princes Highway
(within vicinity of Devitts Lane).
(Site of proposed works not clearly visible from this vantage point.)

Bolong Road

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

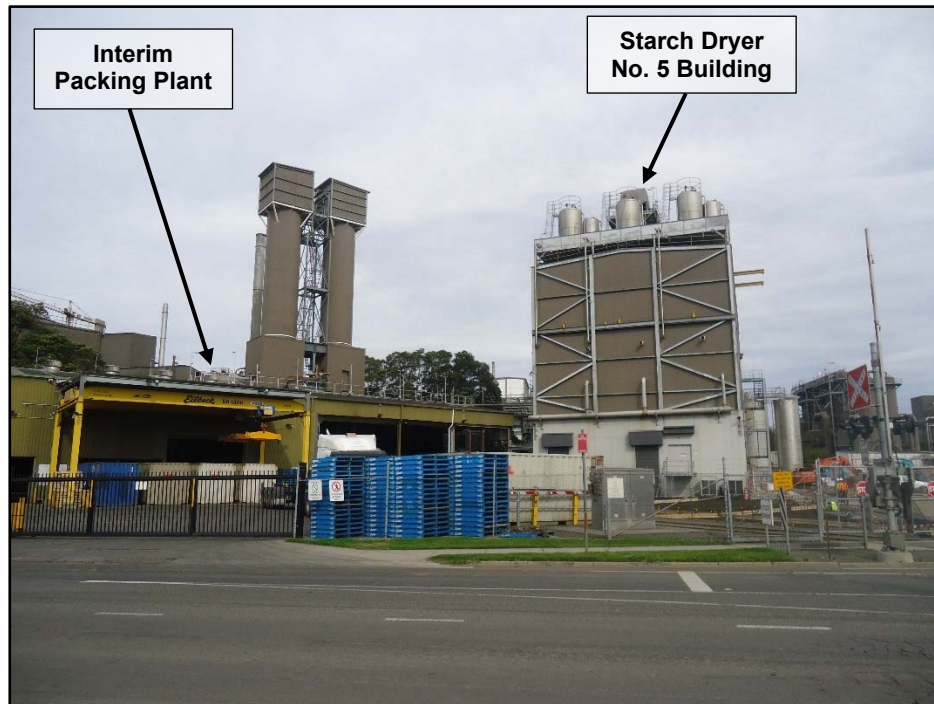


Plate 2: View of Shoalhaven Starches factory site (Starch Dryer No. 5 and Interim Packing Plant building) from Bolong Road.

The additional product silos are to be located above the interim packing plant adjacent to the existing product silos. The additional silos will have the same height and visual appearance to the existing silos that presently sit above this building.

The additional product silos will require the relocation of an approved electrical substation to be sited to the frontage of the Starch Dryer No. 5 Building. The electrical substation building will appear as a small addition to the frontage of the Starch Dryer No. 5 building and will sit well within the silhouette of this building.

The additional product storage tanks to be situated to the east of the Starch Dryer Building No. 5 will also be partially visible from Bolong Road, albeit partly screened by the Starch Dryer No. 5 building. These structures will be visible in context of both the product silos sitting above the interim Packing Plant as well as the Starch Dryer No. 5 building. These additional tanks will not appear out of context from this vantage point.



Plate 3: View of Existing Ethanol Distillery Plant when viewed from Bolong Road.

The existing Ethanol Distillery Plant is clearly visible from Bolong Road. The proposed works associated with this Modification Proposal will involve the removal of part of the existing distillery to construct the new Beverage Grade Ethanol Plant distillery columns and associated structures. The new Beverage Grade Ethanol Plant columns will be taller than the existing columns but will sit only slightly higher than the existing beverage grade ethanol plant visible in **Plate 3** above. As a result this component of the overall Modification Proposal is not considered to be out of character with the existing development within this part of the site.



Plate 4: View of existing Ethanol Storage Tanks and location of new Ethanol Loadout.

The proposals new Ethanol Storage Tanks are to sit adjacent to the existing Ethanol Storage Tanks visible in **Plate 4** above and will be identical in height and form to these existing storage tanks.

The new Ethanol Loadout will be situated adjacent to the new Ethanol Storage Tanks and will not be dissimilar in appearance to the existing loadout, which is also visible in **Plate 4** above, albeit with a different alignment to Bolong road to the existing facility.



Plate 5: View of location of proposed additional Cooling Towers.

The proposed additional Cooling Towers are to be sited to the east and adjacent to the existing Evaporators and Fermenter Tanks situated within the eastern part of the factory site and which are visible in **Plate 5** above. The Cooling Towers will only have a height of about 7.6 metres above ground level and will be dwarfed by the Evaporators and fermenters. Furthermore road side landscaping, visible in **Plate 5** above, will further obscure these structures from view from Bolong Road.

Bomaderry Urban Area

The township of Bomaderry is slightly elevated and some locations within this urban area have extensive views of the site (refer **Plate 6**).

In light of the prevailing scale of existing development located within Shoalhaven Starches site the proposed modification works will be largely viewed as part of the main industrial centre of the Shoalhaven factory site. The works associated with this Modification Proposal and most notably the proposed product silos and tanks, and the new Beverage Grade Ethanol Plant will be visible from this vantage point. However these works will be seen in context of the Starch Dryer building, existing product Silos and the existing Ethanol Plant which are also presently visible from this location. These works will be of a scale and character of development that will be in keeping with the prevailing scale and character of development associated with the Shoalhaven Starches factory site.



Plate 6: View of Shoalhaven Starches factory site from corner of Railway Street and Cambewarra Road, Bomaderry.

Nowra Bridge

The view from Nowra Bridge to the east is mainly dominated by the river, riparian vegetation and the floodplain (refer **Plate 7**).

The site is largely obscured by riverside vegetation. The Starch Dryer No. 5 building is not partially visible from this vantage point. Given the proposed product silos and tanks, and the proposed beverage grade ethanol plant are to be sited generally to the eastern side of this building (and therefore further away from this vantage point) these works will not be overly visually prominent from this vantage point although the tops of the new beverage grade ethanol plant may be visible above the Starch Dryer No. 5 building. The additional product tanks to be sited to the south of the Starch Dryer No. 5 building may also be visible although as part of an overall backdrop of the existing factory development. These structures however would be in context of this existing building and within the scale of other structures such as the Boiler House Stack which is also visible from this vantage point.



Plate 7: View of Shoalhaven Starches factory site from Nowra Bridge over the Shoalhaven River.

Riverview Road

Plate 8 below provides a view of the Shoalhaven Starches factory site from Riverview Road located on the south side of the Shoalhaven River. This view is from a distance of about 750 metres. Riverside vegetation along both the northern and southern banks of the river softens much of the site from view. The proposed works are generally situated to the east of existing development that is visible from this vantage point and will therefore be screened from view from this vantage point. The upper sections of the of the new beverage grade ethanol plant may be visible above the Starch Dryer No. 5 building. The additional product tanks to be sited to the south of the Starch Dryer No. 5 building may also be visible although as part of an overall backdrop of the existing factory development. However, as with the view from the Nowra Bridge in **Plate 7**, these structures would be in context of this existing building and within the scale of other structures such as the Boiler House Stack which is also visible from this vantage point.



Plate 8: View of Shoalhaven Starches factory site from Riverview Road area.

Terara

The village of Terara is approximately 1.5 kilometres from the factory. The view of the Shoalhaven Starches factory site as seen from the banks of the Shoalhaven River adjacent to the village of Terara is shown in **Plate 9**.

The Ethanol Distillery and Fermenters located to the east of the site are partially visible from this vantage point. The proposed new beverage grade ethanol plant will be partially visible from this vantage point; however it will be seen in context of the existing ethanol plant. Similarly the proposed cooling towers to be situated to the east of the Fermenters and Evaporators to the east of the factory site may be visible from this vantage point, again they will sit within the silhouette of these existing structures. Furthermore the view from this vantage point is across and over Burraga (Pig) Island. Vegetation on the island and along the northern banks of Shoalhaven River also help to obscure the view of the site.



Plate 9: View of Shoalhaven Starches factory site from village of Terara.

Cambewarra Lookout

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

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

7.2.7 Flooding

WMA Water were engaged to undertake a Flood Compliance Report for the proposed modifications associated with this Modification Application (**Annexure 5**). This section of the SEE provides a summary of the findings of the WMA Water's flood assessment for this Modification Application.

The 1% AEP flood level for the subject site is 5.7 m AHD. An indicative ground level for the subject site is 4.5 m AHD.

During the 1% AEP event parts of the sites are described as having a flood hazard categorisation of High Hazard and Floodway and that the projected sea level rise estimates due to climate change will not increase the 1% AEP flood level at this site. It should be noted that the high hazard and floodway classifications (and all other flood related data) were taken from the hydraulic model established in the 1990 Shoalhaven River Flood Study. These are the maximum classifications for the site and according to WMA Water the hazard will decrease towards Bolong Road as floodwaters dissipate into the northern floodplain.

The construction of any works on the floodplain will cause a loss of temporary floodplain storage and a loss of hydraulic conveyance. The resulting increase in flood levels will depend upon the magnitude of these losses. Given that parts of the proposed plant are on piers and / or raised above the 1% AEP flood level and the floodplain storage area of the Shoalhaven River floodplain is of the order of 100 km², the loss of temporary floodplain storage due to the works is, according to WMA Water, generally too small to be accurately evaluated (it is accounted for in the TUFLOW modelling for major structures). The main issue from a flooding perspective is therefore the construction of plant as it will impede flow from the Shoalhaven River crossing the site to enter the northern floodplain (ie. reduce the hydraulic conveyance through the site and potentially raise flood levels elsewhere).

Prior to construction of the Shoalhaven Starches factory there would have been significant flow through the site during a flood, as there is across any riverbank. However, since approximately 1960 the ongoing construction of the factory has effectively blocked the flow path through a large part of the site. This issue has been investigated in WMA Water's October 2000 report titled *"Further Development within the Manildra starches Plant off Bolong Road, Bomaderry - Hydraulic Assessment"*. In summary an agreement was reached that any future development within the intensively built-up area, as indicated on the **Figure 30** below (taken from that report) would not require hydraulic modelling to quantify the hydraulic impacts and cumulative effects.

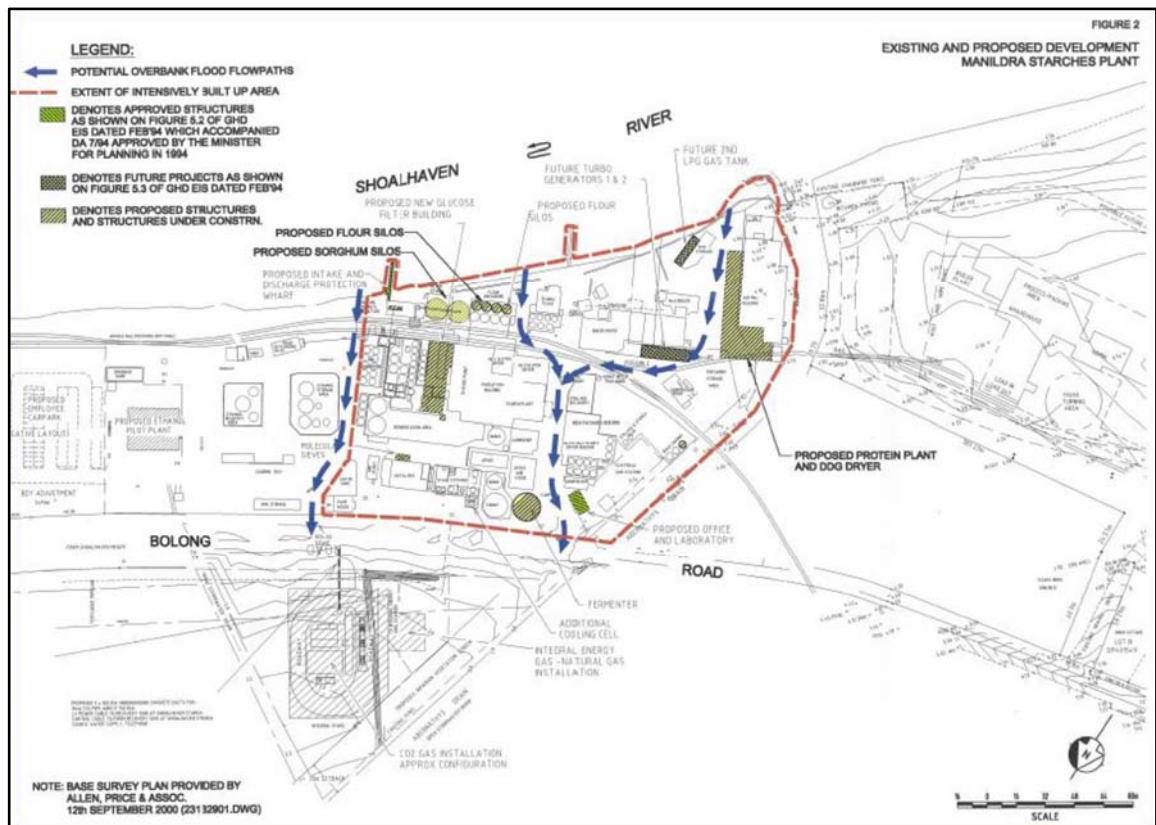


Figure 30: Plan of Intensively Built Up Area

Flood impact assessment of the proposed plant (ie. will the works impact on flood levels) has therefore been separated into the following two categories according to their site locations.

- **Proposed Plant within the Intensively Built Up Area**
 - a) Ethanol plant modifications, Drw 002 to 006;
 - e) Part of Pipe bridge and re-route of pipe gantry approval, Drw 012;
 - g) Relocated main substation extension, Drw 014;
 - k) Relocation of approved ethanol distillery control room, Drw 002.
- **Proposed Plant outside the Intensively Built Up Area**
 - b) Ethanol storage and load out additions, Drw 007 to 008;
 - c) Relocated banded product tanks, Drw 009 to 010;
 - d) South-western car park extension, Drw 011;
 - e) Part of Pipe bridge and re-route of pipe gantry approval, Drw 012;
 - f) Product silos, chemical storage tanks, Drw 09 & 013;
 - h) Relocated western substation, Drw 015;

- i) Additional cooling towers, Drw 016;
- j) Relocation of approved ISO container storage, Drw 016.

Hydraulic Impact Assessment

Four components of the proposed modification works are within the *intensively built up area*. As such the loss of flow conveyance due to construction of the works in this area, according to WMA Water, will be minimal as the existing access corridors (which become flow paths during a flood) through the site will always remain. For this reason no hydraulic impact assessment has been undertaken for these works.

Of the remaining items located outside the agreed upon *intensively built up area*, Item d) – the south-western car park extension, involves no buildings, minimal earth works and all cars will be removed prior overtopping of the river bank.

Item e) – part of Pipe bridge and re-route of pipe gantry approval, will involve no buildings, minimal earth works and the hydraulic impedance of the gantry supports is too small to be accurately modelled. Thus the hydraulic impact of these two items is considered by WMA Water to be nil and has not been considered further.

Hydraulic modelling of the remaining items has been undertaken as described below.

Hydraulic Modelling

Hydraulic or flood modelling typically involves the setting up and calibration of two computer models. A hydrologic model that converts the rainfall to runoff and a hydraulic model that includes inflow from the hydrologic model, as well as ocean boundaries, which determines peak flood levels and velocities based on hydraulic formulae. Both models are calibrated to historical data, including historical flood levels and river flow gauging's, to ensure that they can replicate the historical events and are then used to determine design flood events. These are events that have a known probability of occurrence, such as the 1% Annual Exceedance Probability (AEP) event.

The CELLS model of the Shoalhaven River (established as part of the 1990 *Lower Shoalhaven River Flood Study*) represented the channel and floodplain as a series of interconnected cells, termed either river or floodplain cells. The river cells were connected by cross sections and the floodplain cells connected by weirs. Approximately 100 cells were used in the Shoalhaven River model with some cells over 4 km² in area. The CELLS model is termed a one dimensional (1D) branched model in that it cannot account for flow in other than the one direction but has “branches” which allow flow to extend across the floodplain. The model used both field survey for weirs as well as bathymetric survey for the river cross sections at approximately 1 to 2 kilometre spacing.

The CELLS model is an unsteady flow model, according to WMA Water, in that it modelled the full flood event (rising and falling water levels) and not just the peak and included ocean tidal hydrographs at both entrances, namely the Shoalhaven Heads and Crookhaven River, and some six flow hydrographs from the WBNM hydrologic model. Council's Flood Certificates are based on results from the CELLS model.

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

The main advancements in hydraulic modelling are the use of more complex computer software (TUFLOW) that allows the river and floodplain to be discretised into a grid. This is typically 15 m by 15 m on large rivers and up to 2 m by 2 m on small urban catchments. These models are termed 2 Dimensional (2D) in that they determine the flow direction between grid cells producing vector velocities. These models, according to WMA Water, are able to more accurately define the topography and in turn can more accurately represent the hydraulic effects of even a small development on a large floodplain. The use of TUFLOW allows more accurate definition of all hydraulic parameters (hazard, hydraulic classification, peak velocities and depths etc.) on the site. Thus, rather than a single value provided from the CELLS model (1990 *Lower Shoalhaven River Flood Study*) TUFLOW is able to demonstrate that hazard, velocity and other parameters will change as flow crosses over the northern bank and enters the northern floodplain.

Hydraulic Modelling Process

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

Item b) – ethanol storage and load out additions, Drw 007 to 008, involves the construction of three 236kL storage tanks as indicated in the plan below, as well as an extension of the bund wall. The bund wall is designed to “capture” the contents of the tanks if a leak occurs. Whilst it may also prevent inundation of the bunded area in a flood, it has not been structural designed for this purpose. For this reason the TUFLOW hydraulic modelling has not included the inclusion of the bund walls. It should also be noted that the bund wall has been in existence for at least 20 years and has not been simulated in hydraulic modelling in the past.

The modelling process compared the peak flood levels in each grid cell for the *Existing* and *Proposed* scenarios. The *Existing* scenario represents the existing floodplain including all proposed but un-built approved Shoalhaven Starches structures as at August 2020. The *Proposed* scenario reflects the existing floodplain but including the remaining items as described above. The comparison between the *Existing* and *Proposed* scenarios is termed a flood impact map.

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

Hydraulic Modelling Results

In summary according to WMA Water, the proposed works associated with the Modification Proposal create a very small decrease in flood level north of the plant and a similar slight increase in flood level to the immediate south of the works. This occurs as the proposed works restrict the flow of floodwaters through the plant reaching the northern floodplain. The increase in flood level according to WMA Water is largely within the confines of land owned by Shoalhaven Starches.

WMA Water conclude that there would be no significant incremental increase in the 1% AEP flood level as a result of the proposed works within the existing Shoalhaven Starches plant area.

7.2.8 Site Contamination

The SEE is supported by a “Geotechnical, Contamination, Acid Sulphate Soil and Riverbank Stability Assessment” prepared by GHD (The “*GHD Geotechnical Report*”) (**Annexure 8**). This section of the SEE is based upon the findings of the GHD Geotechnical Report.

Figure 31 below is an extract from the GHD Geotechnical Report and outlines the proposed works as described by this assessment report.

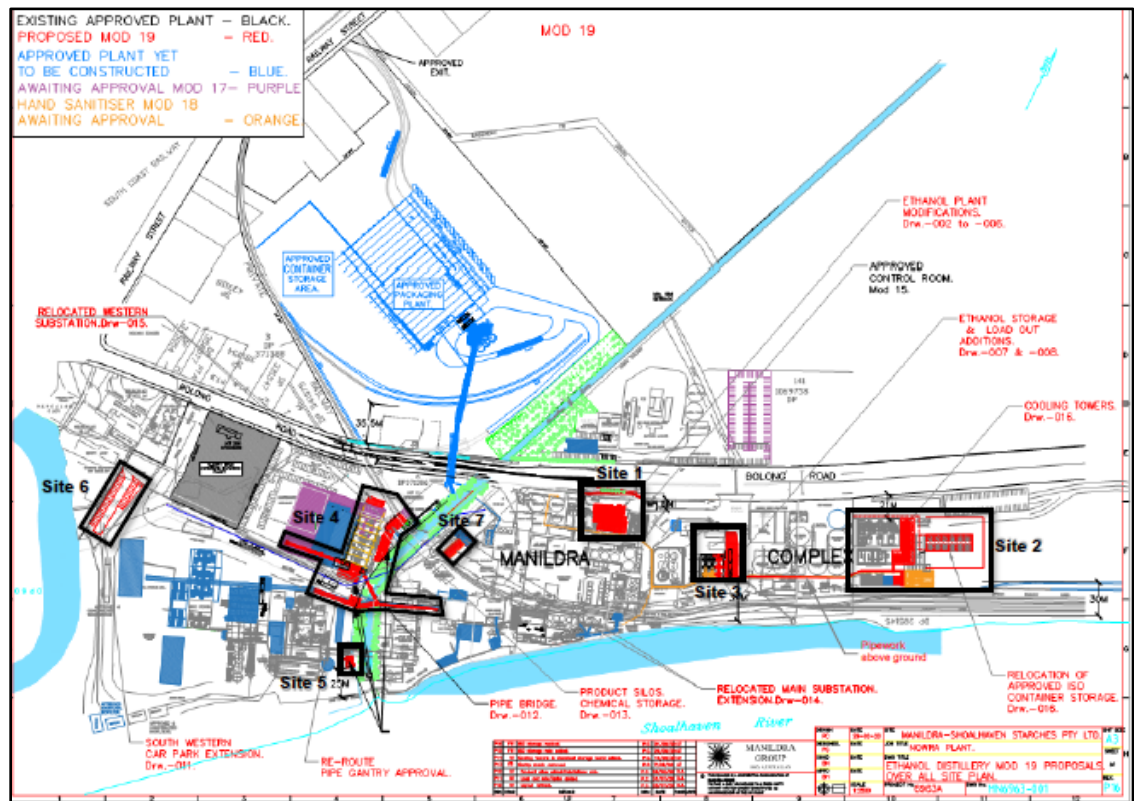


Figure 31: Proposed works as described by the GHD Geotechnical Report.

According to GHD a review of site history information indicates that prior to 1950, the subject site and surrounding areas were possibly used for rural land use. In 1952, the Horlicks Factory occupied an area west and southwest of the current investigation sites and immediately east of Abernethy's Creek. The Horlicks Factory was a milk processing plant. Horlick expanded their production to include starch and gluten products. Shoalhaven Starches was established at the Horlicks Factory in 1970s and produced wheat, starch and gluten products. Between 1970 and 1992, Shoalhaven Starches expanded the plant infrastructure to increase production and to produce ethanol products. Between 1993 and 2003, facilities including a distillery (Site 1 - **Figure 31**), dryers and evaporation plant were installed at the plant.

Site history information indicates that up until 1993/1994 the eastern plant areas, which includes Sites 2 and 3 (**Figure 31**), were primarily vacant grazing land. From this time were developed into paved car parking areas. During April/May 2007 the ethanol upgrade works commenced. Site 2 has remained generally undeveloped. Prior to 2013, Site 2 was occupied by grassed paddocks then after 2013 the area was used for car parking and storage. Site 3 has been used for ethanol storage since the early 1990s.

The south-western plant area was a vacant field up until the early 2000s. Historically this area may have been used for growing crops. From the early 2000s, the area was

developed and used for DDGS load out facility, DDGS storage building, evaporators and cooling towers, storage areas and a coal stockpile. No structures have been placed at Sites 5 and 6.

The majority of Site 4 was developed from the early 1960s and formerly occupied by Moorhouse, an agricultural equipment supplier. Between the late 1970s and late 1990s / early 2000s, the north-eastern portion of Site 4 was owned and occupied by a steel fabrication company that stored steel within this structure. Moorhouse was demolished c2018 to make way for the construction of Product Dryer No. 5. ACM was identified within the Moorhouse building that occupied Site 4 and was removed prior to demolition and clearance certificate provided.

Based on site history and site observation results, potential for contamination was identified by GHD in five areas of environmental concern (AECs) which included:

- AEC 1: Storage and use of fuels and chemicals associated with operations at the plant.
- AEC 2: Potential weathering of hazardous building materials and demolition of site structures.
- AEC 3: Potential application of pesticides, herbicides, fertilisers.
- AEC 4: Fill of unknown quantity and origin.
- AEC 5: Storage and use of PFAS based firefighting foams.

Table 37 below provides a summary of potential contamination as identified by GHD and having regard to the sites outlined in **Figure 31**.

Table 37
Summary of Potential Contamination Source per Site

AEC	COPCs	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Likelihood*	Likely depth and Extent of Potential Contamination Including Rationale for Likelihood of Contamination to Exist
AEC 1: Storage and use of fuels and chemicals associated with operations at the plant	TRH, BTEX, PAH	X	X	X	X	-	-	N/A	Low	Typically contamination associated with chemical storage areas is in near surface soils and can potentially impact groundwater. The likelihood of contamination was assessed as low because of no reported spills in the last 20 years and the majority of chemicals are stored within concrete bunded areas or on paved surfaces. In addition, spills, if they were to occur, would be captured by the stormwater drainage network where the chemical would either be recovered for reuse or sent off-site to the treatment facility. The concrete floor of the bunded area in Site 3 (proposed ethanol storage) appeared to be cracked and may allow spills to migrate into the subsurface. The previous investigations did not identify impacts in the vicinity of the UST located approximately 30 m and slightly up-gradient of Site 4.
AEC 2: Potential weathering of hazardous building materials and demolition of site structures	Asbestos, heavy metals	X	X	X	X	-	-	N/A	Low (Sites 1, Site 3, Site 5) Moderate (Site 4) High (Site 2, Site 6)	Contamination (if present) would typically be located in near surface soils adjacent to and within the footprint of former structures, in particular at Site 4. Although ACM was removed by a licenced asbestos removalist and a clearance certificate provided, it is not uncommon for remnant ACM fragments to remain in near surface soils, below newly installed pavements and/or recently imported fill, within the vicinity of the former structure. ACM fragments were identified within the southern portion of Site 2 and within fill material in the vicinity of the communications service pit in Site 6. There is a high likelihood that other ACM fragments will be present within fill material in these areas of Site 2 and Site 6.

Table 37 (continued)

AEC	COPCs	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Likelihood*	<i>Likely depth and Extent of Potential Contamination Including Rationale for Likelihood of Contamination to Exist</i>
										The likelihood of contamination being present for remaining sites is assessed as low because these areas of the site were developed in the early 1990s, construction materials comprised metal, brick and concrete and Manildra confirmed that no ACM was present in the switch room. In addition, limited sampling and analysis has not reported concentrations of asbestos or heavy metals that exceed human health criteria for commercial / industrial land use.
AEC 3: Potential application of pesticides, herbicides, fertilisers	OCP, OPP, arsenic, nitrogen	-	X	X	X	X	X	N/A	Low	Contamination, if present, may impact the original topsoil layer than exists below the fill. Limited sampling and analysis reported OCP, OPP and arsenic concentrations did not exceed assessment criteria for commercial / industrial land use.
AEC 4: Fill of unknown quantity and origin	TRH, BTEX, PAH, OCP, OPP, PCB, heavy metals, asbestos	X	X	X	X	X	X	N/A	Low	The depth of impact and extent will be governed by the thickness and distribution of fill used in a particular area of a site. Fill is expected to be relative shallow occurring beneath pavements and grassed areas. Based on the results limited sampling and analysis undertaken and that extensive filling has not occurred at the site, the likelihood for widespread contamination is assessed as low.
AEC 5: Storage and use of PFAS based firefighting foams	PFAS	X	-	-	-	-	-	N/A	Low	Contamination (if present) would typically be located in near surface soils where the foams were initially released onto the ground. PFAS can readily mobilise to groundwater. The depth of groundwater will govern the where potential contamination may be encountered. Groundwater is expected to occur within 1.5 m and 3 m of the ground surface. Site history information indicated that no PFAS based foams were released at the site and the fire

Table 37 (continued)

AEC	COPCs	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Likelihood*	<i>Likely depth and Extent of Potential Contamination Including Rationale for Likelihood of Contamination to Exist</i>
										system was activated using water only during the commissioning phase. A false alarm occurred on two occasions where PFAS free foams were released. The foam releases occurred within paved areas and were contained and sent to Manildra's wastewater treatment plant. Based on usage of foams at the site, the potential likelihood of PFAS contamination was assessed as low to moderate.

Table notes:

"X" = AEC applicable to a particular site

"-" = AEC does not apply to a particular site

N/A = not applicable

* Likelihood is the probability of contamination being present and subject to exposure during the proposed installation, categorised on a scale from high (near 100% probability of being present) to very low (near 0% probability of being present).

For AEC 1, AEC 3 and AEC 4, the likelihood of contamination to exist was assessed by GHD as low. If contamination were present in AEC 1, AEC 3 and AEC 4, it is likely according to GHD to exist in the near surface soils (ie. upper 0.2 m of the soil profile) to depth of about 1 m below ground surface. In areas of locally deeper fill, contamination if present, could exist at depths below 1 m.

For AEC 2, the likelihood for asbestos contamination to exist at Site 4 was considered by GHD as moderate, whilst there was a high likelihood for Site 2 and Site 6. The likelihood of asbestos contamination present at remaining Sites was considered low. According to GHD, Coffey Geosciences in a 2015 investigation assessed the extent of asbestos contamination within Site 2. However, since the 2015 investigation, the area has been developed, which may have changed the distribution of the asbestos impacted materials. For Site 4, although ACM was removed by a licenced asbestos removalist and a clearance certificate provided, it is not uncommon for remnant ACM fragments to remain in near surface soils, below newly installed pavements and/or recently imported fill, within the vicinity of the former structure. The extent of asbestos contamination has not been assessed at Site 6 but appears to be associated with the recent installation of a communications pit and fill surrounding this pit. The fragments were observed at the surface however could exist throughout the fill.

For AEC 5, the likelihood of contamination to exist was assessed by GHD as low to moderate. Although PFAS based foams were stored on-site between 1992 and 2004, they were never deployed. Non-PFAS based foams were released on two occasions in response to a false alarm. Both foam releases occurred within paved areas and were contained and sent to Manildra's waste water treatment plant. For AEC 5, if contamination were present it may occur in near surface soils where the foams were initially released onto the ground. PFAS can readily mobilise to groundwater. According to GHD, the depth of groundwater will govern where potential contamination may be encountered. Groundwater is expected to occur within 1.5 m and 3 m of the ground surface.

The primary receptor is considered by GHD to be workers/visitors involved with the associated earthworks, such as those working directly working with soil. Earthworks are likely to involve shallow excavations associated with pavements and installation of underground services whilst deeper excavations will be required for foundations. This exposure scenario provides an increased likelihood that workers will be in direct contact with soil and groundwater and exposed to dust and vapours via inhalation generated during excavation. Therefore, the Source-Pathway-Receptor (SPR) linkages could be

complete if contamination exists. For remaining potential receptors such as groundwater users and ecological receptors, the SPR linkages were assessed to be incomplete.

GHD make the following recommendations in order to further assess or mitigate contamination risks associated with the sites:

- *Recommendations prior to development:*
 - *Site 2: Assess the extent of asbestos impacted material. Based on the results of the assessment, remediation and/or management of the impacted area may be required.*
 - *Site 6:*
 - *Assess the extent of asbestos impacted material. Manildra indicated that the proposed carpark area will be filled and therefore are likely to adopt a capping remediation strategy and record the asbestos impacted area on their asbestos register.*
 - *Limited information on ground conditions is available for Site 6 and given the presence of asbestos, further investigation of subsurface conditions should be carried out to assess the potential for contamination to exist, prior to the construction of the carpark.*
- *Recommendations during development*
 - *Assuming the above recommendations are carried out, any risk of exposure to potential contamination can be managed through an Unexpected Finds Protocol (UFP) and site-specific Work Health Safety and Environment (WHSE) plan. These plans are further discussed below:*
 - *Preparation of an UFP to manage occurrences of contamination that may be encountered during excavation works. These occurrences may include ACM, staining, odours or ground conditions that differ significantly to what has been encountered during previous investigations. Site workers should be advised of the potential contamination risks at the sites and have appropriate personal protective equipment (PPE) available should contamination be encountered.*
 - *A site-specific WHSE plan should be prepared, to ensure appropriate safety and workplace hygiene practices are implemented to minimise potential risks from exposure to contamination. The WHSE plan must address all relevant regulatory requirements and as a minimum, should consider incorporating the relevant practices set out in CRC Care (2018) National Remediation Framework: Guideline on health and safety, Version 0.1: August 2018 (ref: https://www.crccare.com/files/dmfile/Healthandsafety_Rev0.pdf)*
 - *Some opportunistic sampling and analysis could be undertaken to better assess risk associated with exposure. These samples could also be used to inform the waste classification of excavated spoil.*

- *Assess waste classification of soils to be excavated to allow off-site disposal of surplus materials to an appropriately licenced waste facility.*

Remaining Sites where AECs were assessed as low, are not considered to preclude the proposed development. At some locations, there is limited soil and/or groundwater data available. Therefore, a direct assessment of SPR linkages cannot be undertaken at this stage. Further investigation of these areas can be undertaken at a later stage to supplement existing data and allow for further assessment of SPR linkages.

7.2.9 Geotechnical and Riverbank Stability

The GHD Geotechnical Report (**Annexure 8**) referred to in Section 7.2.8 above also addressed the implication that geotechnical constraints associated with the site and specifically having regard to riverbank stability have for the proposed modifications. This section of the SEE is based upon the findings of the GHD Geotechnical Report.

The proposed modifications at Sites 1 to 6 (**Figure 31**) above, as described by GHD, are located within areas where the geotechnical conditions are well understood based on a number of earlier geotechnical and environmental investigations for previous developments of the Shoalhaven Starches factory site. In general, the sites are underlain by deep alluvial and residual soils to depths greater than about 10 m in the western plant area and to depths greater than 25 m at the eastern end of the plant. Weathered sandstone bedrock occurs beneath the alluvial and residual soils in the western part of the plant. The depth to rock is significant at the eastern end of the plant and may be in excess of 35 m as indicated in an earlier geotechnical report by Coffey (October 2014).

In the past, the existing larger structures and storage tanks/silos within the plant have been supported on deep pile footing systems with piles socketed into rock. GHD understand this will be the case for the modifications at Sites 1 and 3 and also Site 5 (**Figure 31**) with all major structures and storage vessels to be supported on piles to rock. The piled footing systems will effectively transfer most of the structural loads to the rock and prevent the structures and storage vessels from transferring significant loads to the surface and upper soil profile. In addition, the structures proposed at the four sites are all sufficiently remote from the river bank with the closest (Site 5) being approximately 25 m from the river bank at its nearest point.

The stability analysis undertaken by GHD confirmed that the proposed structures at Sites 1 and 3 (**Figure 31**) in the central part of the plant and the proposed storage vessels at Site 5 in the eastern plant area will have no influence on the stability of the northern bank of the nearby Shoalhaven River, provided all structures are supported on deep piled

footings. For the structures at Sites 1, 3 and 5, GHD indicate that it is expected that piles will be terminated in rock.

For Site 2, the proposed cooling towers are located in an area underlain by deep alluvium/residual soils possibly in excess of 35 m, therefore, according to GHD, displacement piles such as screw piles or driven piles may need to be considered for the support of the cooling towers rather than piles to rock. For the container storage area, footings for the concrete bund wall may need to be extended by piles to bear uniformly in dense or very stiff soils. The recent asphalt surfaced pavement may also need to be assessed to determine whether suitable subgrade preparation and the constructed pavement will provide suitable high level support for the loads applied by the stacked containers.

According to GHD the structures proposed in close proximity to the banks of Abernethy's Creek (Sites 4 and 5) will also have no influence on the long term stability of the creek bank provide all structures are supported on piles extending to rock.

For the proposed development of Sites 4 and 5 close to Abernethy's Creek, GHD indicate the short term stability of the creek bank will need to be considered for the effects of construction loads occurring within 8 m of the creek bank. These loads will include heavy equipment such as cranes, piling rigs, large excavators and trucks, as well as temporary storage of construction materials and equipment, and stockpiling of excavated materials. Loads applied by cranes and piling rigs in particular according to GHD should be individually assessed based on a loading analysis for each item of plant and the proposed position of its supports on the working platform or pad. Disturbances to the creek banks, including removal of vegetation, excavations and filling should be avoided as this may instigate erosion and instability of the banks. Where vegetation is required to be removed for the construction, erosion protection measures may be required such as rock revetment lining of the bank.

In relation to the proposed development of Site 6 – western carpark, GHD indicate this development will not adversely influence the stability of the nearby bank of Bomaderry Creek provided fill is not placed to a depth greater than 1 m within a distance of 10 m of the top of the creek bank. GHD indicate that all earthworks should be undertaken in accordance with AS3798 – 2007 and include suitable collection and drainage of surface water to the creek. Surface water discharge onto the creek bank will require the provision of rock revetment or similar protection. Where wet or saturated soils are encountered within the area to be re-graded, subsoil drainage should be provided together with treatment of any soft or loose soils before placing imported fill or constructing pavements.

For each of the proposed development sites, GHD recommend that geotechnical subsurface investigations be undertaken to confirm foundation design parameters and expected piling depths. For the western carpark area, GHD recommend that subsurface investigation be carried to assess the extent of site preparation earthworks required prior to placement of select imported fill.

In relation to the stability of the river bank, GHD recommend that survey monitoring of the rock revetment wall and sheet pile wall be continued at least once per year and following any significant rain event where the river level rises more than 1 m above its normal low/high tide levels. General observations of the condition of the river bank should also be undertaken from a boat to assess the extent of damage when flood or high water levels occur in the river.

In relation to Abernethy's Creek, GHD recommend that the condition of the creek banks should be observed following periods of heavy rain and raised water levels, and weekly during the construction phase to ensure that no unusual or obvious instability of the banks is occurring.

7.2.10 Acid Sulphate Soils (ASS)

The GHD Geotechnical Report (**Annexure 8**) referred to in Sections 7.2.8 and 7.2.9 above also addressed the implication that acid sulphate soils (ASS) have for the proposed modifications. This section of the SEE is based upon the findings of the GHD Geotechnical Report.

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

The Burrier/Berry 1:25,000 Acid Sulphate Soil Risk Map (1997) Edition 2, prepared by the Department of Land and Water Conservation (DLWC), indicates that the site is mapped within an area having a low probability of ASS occurrence being described as elevated alluvial plains and levees. For Sites 3, 5 and 7 (**Figure 31**), ASS, if present, is likely to be greater than 3 m below the ground surface. For Site 2 (**Figure 31**), ASS, it is possible that ASS could be intersected at depths greater than 4 m bgs (Coffey 2015). For the remaining sites, ASS may occur within 1 m to 3 m of the ground surface.

GHD understand from communications with Manildra that ASS were encountered at depth during the construction of Product Dryer No. 5 and described the soil as being "mildly acidic". The depth of the ASS was not recorded. Very loose grey clayey sand was encountered between 2.8 m and 5.4 m bgs at CBH501, which is consistent with ASS.

Possible ASS were also encountered during the construction of a substation located immediately north and west of Site 2.

The ASS risk map shows areas immediately to the south of the site within the river, as being estuarine bottom sediments with a high probability of ASS occurrence.

Previous assessments by Coffey Geosciences in 2007 and 2014 indicate that ASS are likely to exist at depths greater than 3 m at the subject site. ASS results for the central plant (CBH107 closest area to Site 1) did not identify ASS within the upper 2.1 m of the soil profile.

According to GHD (and with reference to **Figure 31**) for:

- Sites 3 and 5, ASS, if present, is likely to be greater than 3 m below the ground surface.
- Site 2, it is possible that ASS could be intersected at depths greater than 4 m bgs.
- For the remaining sites, ASS may occur within 1 m to 3 m of the ground surface. Disturbance of ASS is likely to occur at these sites as CFA piles will be used to excavate foundations.

GHD recommend that an ASS management plan (ASSMP) be developed and actioned where excavations associated with the proposed development will disturb ASS and/or require dewatering which could result in the lowering of the water table.

7.3 THE SUITABILITY OF THE SITE FOR DEVELOPMENT

In our view the site is suitable for the development, and including the development as modified by this application:

- The subject land is suitably zoned and the proposal satisfies state and local planning provisions applying to the land.
- The modified proposal will not have any significant additional impacts on the environmental values of this locality over and above those envisaged by the original approved development.
- The modified development will not result in any significant adverse effects on local amenity.
- The modification proposal does not seek to alter the approved physical extent of operations. Under these circumstances the proposal will not result in any increased inputs to the production process; increased production; or increases in traffic or other impacts on the locality.

Given these circumstances it is our view that the subject site is suitable for the proposed development.

7.4 SUBMISSIONS

It is envisaged that the development application once submitted to the Department will be placed on public exhibition; and the general public will be afforded an opportunity to review the documentation supporting the application.

Any public submissions made following the exhibition will need to be taken into consideration by Council when it determines the application.

7.5 THE PUBLIC INTEREST

It is our view that the modification proposal is in the public interest:

- The proposal is consistent with the objectives of state and local planning provisions applying to the site.
- The modified proposal will not result in any significant adverse environmental impacts.
- The modified proposal will not result in any significant amenity impacts in the locality.
- The modified proposal will be substantially the same development as that approved under the Project Approval.

8.0 CONCLUSION

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

Project Approval MP06_0228 was granted by the Minister for Planning on the 28th January 2009 for the Shoalhaven Starches Expansion Project. This approval also encapsulated previous approvals for the site into one overall approval for the site (at that time).

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

Following the Minister's determination Shoalhaven Starches have been implementing and commissioning works in accordance with this approval.

The Shoalhaven Starches Expansion Project sought to increase ethanol production to meet the then expected increase in demand for ethanol arising from the NSW Government's mandate to increase the blending of ethanol in the total of volume of petrol sold in NSW towards an ethanol content of 10% by 2011. Unfortunately, the expected increase in demand for ethanol to meet the demand arising from this mandate has not occurred due largely from a failure of the mandate to be imposed on petroleum suppliers.

As a result, Shoalhaven Starches have been investigating alternative markets for the ethanol that is and will be produced at their Bomaderry plant in accordance with the Project Approval. One such market is the "beverage" market where ethanol is further treated and purified to enable it to meet stringent beverage grade specifications to enable it to be utilised in the products such as alcoholic drinks.

Shoalhaven Starches propose to undertake modifications to the existing Ethanol Distillery Plant to increase the proportion of 'beverage' grade ethanol that is able to be produced on the site. The modification will enable increased flexibility in terms of the range of types of ethanol produced at the site (ie. between fuel, industrial, pharmaceutical and beverage grade ethanol) to meet market demands.

The proposed modification will enable an increase in capacity of the plant to produce an additional 100 ML per year of beverage grade ethanol. The proposal will **not** however involve an increase in the overall ethanol production at the site above the current approved 300 ML per year.

In addition to the above this Modification Application will also seek approval for ancillary works associated with the approved Product Dryer and Specialty Product Buildings located to the west of Abernethy's Creek. These works include:

- The construction of a cable stay pipe bridge across Abernethy's Creek to supply power and product to these buildings.
- The construction of three (3) product silos above the existing interim packing plant. The construction of these three (3) silos will necessitate the relocation of an approved electrical substation that was approved (but not yet constructed) below and within the footprint of where it is now proposed to site the proposed product silos. This electrical sub-station is to be relocated to a position on the northern side (Bolong frontage) of the Starch Dryer No. 5 building.
- The relocation of six (6) approved but not yet constructed, and the construction of an additional ten (10) product tanks.

Unrelated to the above works, it has also been ascertained that the extension of the existing electrical substation located on the eastern side of Abernethy's Creek will need to be relocated from the approved position due construction constraints in the approved location.

It is also proposed to extend the existing car park located within the western part of the site in a south-westerly direction to provide an additional thirty-one (31) car parking spaces for staff and contractors.

The Modification Application will not involve changes to the size, scale or intensity of the existing Shoalhaven Starches operations. The modification proposal will not result in any increases in production rates from the site, nor will it involve any changes in level of impacts arising from the approved development.

The Shoalhaven Starches Expansion Project was a 'transitional Part 3A Project' for the purposes of Schedule 6A of the Environmental Planning & Assessment Act. As of the 1st March 2018 the transitional arrangements for former Part 3A projects have been discontinued. The discontinuation of the transitional arrangements for Part 3A projects and concept plans means that modifications are assessed through the State Significant Development (SSD) pathway. As such this Modification Application is made pursuant to Section 4.55(1A) of the Environmental Planning & Assessment Act 1979.

This SEE therefore supports a modification application made pursuant to Section 4.55(1A) of the Environmental Planning & Assessment Act.

The preparation of this SEE has been undertaken following consultation with The Department of Planning, Industry and Environment, EPA, NRAR, Fire & Rescue NSW, Shoalhaven City Council and the Australian Department of Defence.

The SEE is also supported by the following expert assessments:

- An Air Quality Impact Assessment by GHD (**Annexure 3**). GHD conclude that whilst there will be a marginal increase in predicted odour impacts as a result of the modification; odour criteria will be met at all residential sensitive receptors. GHD consider it highly unlikely that the increase in odour would be detected at sensitive receptors.

Air quality impacts are predicted by GHD to comply with the criteria at all residential sensitive receptors.

Overall, GHD conclude the proposal should be acceptable from an air quality perspective.

- A Noise Assessment by Harwood Acoustics (**Annexure 4**) which states the level of noise emission from the modification to the ethanol distillery will be within the noise design goals derived from Environment Protection Licence 883 noise limits at each receptor location without the need for additional noise controls at this stage.

A final assessment of required noise controls will be undertaken at the time of the Design Noise Verification process prior to construction, or during commissioning, as required, to ensure the noise design goals are met at all receptors.

The level of noise emission from the construction phase of the project will be within the noise management levels set by the NSW EPA's *Interim Construction Noise Guideline* with the exception of piling activity on some occasions. Construction noise mitigation measures are included in the Construction Safety & Environmental Management Plan prepared by Shoalhaven Starches.

- A Flood Assessment prepared by WMA Water (**Annexure 5**) which concludes there would be no significant incremental increase in the 1% AEP flood level as a result of the proposed works.
- A Preliminary Hazard Analysis (PHA) undertaken by Pinnacle Risk Management (**Annexure 6**) that assesses the risks associated with the proposed modifications and compares them against the relevant risk criteria. The PHA demonstrates the Modification Proposal will comply with all risk criteria. The PHA also concludes that societal risk, area cumulative risk and environmental risk will be acceptable.
- A Traffic Impact Assessment prepared by Bitzios Consulting (**Annexure 7**) that concludes that there are no significant traffic or transport impacts associated with the proposed

development expansion to preclude its approval and relevant conditioning on traffic or transport planning grounds.

- A Geotechnical Assessment that included an analysis of the impact of the proposed modification on riverbank stability by GHD (**Annexure 8**) concludes the proposed works at all sites will have no influence on the stability of the northern bank of the nearby Shoalhaven River, western bank of Abernethy's Creek and eastern bank of Bomaderry Creek. This is based on the assumption that all structures will be supported on deep piles founded in weathered rock and will therefore not increase loading of the ground adjacent to the banks. GHD indicate that short term construction loading of the ground surface adjacent to the western bank of Abernethy's Creek will need to be assessed for stability, including crane pad and piling platform assessments. Creek bank erosion protection may be required where removal of vegetation or ground disturbance occurs over the creek bank during construction.
- Based on site history and site observations, a site contamination assessment carried out by GHD (**Annexure 8**) identified potential for contamination in five areas of environmental concern (AECs) which included:
 - AEC 1: Storage and use of fuels and chemicals associated with operations at the plant;
 - AEC 2: Potential weathering of hazardous building materials and demolition of site structures;
 - AEC 3: Potential application of pesticides, herbicides, fertilisers;
 - AEC 4: Fill of unknown quantity and origin;
 - AEC 5: Storage and use of PFAS based firefighting foams.

GHD have made a number of recommendations in order to further assess or mitigate contamination risks associated with these sites.

- GHD also undertook an assessment of the implications that ASS may have for the Modification Proposal (**Annexure 8**). For Sites 3 and 5, ASS, if present, is likely to be greater than 3 m below the ground surface. For Site 2, ASS, it is possible that ASS could be intersected at depths greater than 4 m bgs. For the remaining sites, ASS may occur within 1 m to 3 m of the ground surface. Disturbance of ASS is likely to occur at these sites as CFA piles will be used to excavate foundations. GHD recommend that an ASS management plan (ASSMP) be developed and actioned where excavations associated with the proposed development will disturb ASS and/or require dewatering which could result in the lowering of the water table.

The Modification Application will not involve changes to the size, scale or intensity of the existing Shoalhaven Starches operations. The modification proposal will not result in any increases in production rates from the site, nor will it involve any changes in level of impacts arising from the approved development.

It is considered that this Modification Application; will have minimal environmental impact; and the development to which Project Approval MP06_0228 as modified relates will be substantially the same development as the development for which this consent was originally granted and before that consent as originally granted was modified.

The SEE includes an assessment of the proposal having regard to the relevant matters for consideration as listed under Section 4.15 of the Environmental Planning and Assessment Act, 1979. The assessment concludes that the modification proposal, within its local context, is satisfactory and should be approved.

Approval for this Modification Application is sought.



Stephen Richardson RPIA
COWMAN STODDART PTY LTD

ANNEXURE 1

Responses from Government Agencies

**Shoalhaven Starches
Bolong Road, Bomaderry**

ANNEXURE 2

Plans of Modification Proposal

**Shoalhaven Starches
Bolong Road, Bomaderry**

ANNEXURE 3

Air Quality Assessment

**prepared by
GHD Pty Ltd**

**Shoalhaven Starches
Bolong Road, Bomaderry**

ANNEXURE 4

Environmental Noise Impact Assessment

**prepared by
Harwood Acoustics**

**Shoalhaven Starches
Bolong Road, Bomaderry**

ANNEXURE 5

Flood Compliance Report

**prepared by
WMA Water**

**Shoalhaven Starches
Bolong Road, Bomaderry**

ANNEXURE 6

Preliminary Hazard Analysis

**prepared by
Pinnacle Risk Pty Ltd**

**Shoalhaven Starches
Bolong Road, Bomaderry**

ANNEXURE 7

Traffic Impact Assessment

**prepared by
Bitzios Consulting**

**Shoalhaven Starches
Bolong Road, Bomaderry**

ANNEXURE 8

Geotechnical, Contamination, Acid Sulphate Soil And Riverbank Stability Assessment

**prepared by
GHD Pty Ltd**

**Shoalhaven Starches
Bolong Road, Bomaderry**

ANNEXURE 9

Clause 4.6 Written Request

**prepared by
Cowman Stoddart Pty Ltd**

**Shoalhaven Starches
Bolong Road, Bomaderry**