ENVIRONMENTAL ASSESSMENT

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

MODIFICATION TO SHOALHAVEN STARCHES EXPANSION PROJECT (MP06_0228)

PROPOSED CO_2 PLANT FORMER DAIRY FARMERS FACTORY SITE AND SHOALHAVEN STARCHES FACTORY SITE

Lot 1 DP 838753 (No. 160), Lot 241 DP 1130535 (No. 171), and Lot 143 DP 1069758 (No. 220), Bolong Road, Bomaderry

Prepared for

Supagas

February 2018

COWMAN STODDART PTY LTD

Environmental Assessment

Project	Modification to Shoalhaven Starches Expansion Project (MP06_0228) – Proposed CO_2 Plant, former Dairy Farmers Site
Address	Lot 1 DP 838753 (No. 160), Lot 241 DP 1069758 (No. 171), Lot 143 DP 1069758 (No. 220), Bolong Road, Bomaderry
Our ref:	17/49
Prepared by Review by	Peta Church Stephen Richardson
Final	27/2/2018

Town Planning, Agricultural & Environmental Consultants

Stephen Richardson, M.App.Sc., BTP, Grad. Dip. Env. Mgt, CPP, MPIA
Stuart Dixon, B. Urb. & Reg. Plan., CPP, MPIA

Associates: Peter Cowman, B.Sc.Agr., MAIAST
Angela Jones, BA Hons, MSc
Toni Wearne, BA (Hist.), Grad. Dip. Urb. & Reg. Plan.

The Holt Centre, 31 Kinghorne Street, Nowra
Telephone (02) 4423 6198 (02) 4423 6199
Fax (02) 4423 1569

PO Box 738, Nowra NSW 2541
www.cowmanstoddart.com.au
info@cowmanstoddart.com.au

COWMAN STODDART PTY LTD

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

ENVIRONMENTAL ASSESSMENT PREPARED BY

Name:	S. D. Richardson
Qualifications:	M. Appl. Sc., B.T.P., Grad. Dip. Env. Mgt, CPP, MPIA
Address:	Cowman Stoddart Pty Ltd 31 Kinghorne Street NOWRA NSW 2541

in respect of

PROJECT TO WHICH PART 3A APPLIES

Proponent Name:	Supagas
Proponent Address:	23 Commercial Drive, Dandenong, Victoria 3175
Land to be developed: Address	160, 171 and 220 Bolong Road, Bomaderry
Lot No., DP/MPS, Vol/Fol etc.	Lot 1 DP 838753, Lot 241 DP 1130535 Lot 143 DP 1069758
Project Development:	Shoalhaven Starches Expansion Project (MP 06_0228)
Proposed Modification to Project:	Proposed CO_2 Plant

Environmental Assessment An Environmental Assessment is attached

Certification

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

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

Signature: _____

Name: S. D. Richardson

Date: 27th February 2018

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

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

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

In association with their expansion project, Shoalhaven Starches also 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.

One of the objectives for the Shoalhaven Starches Expansion Project was to close the loop on waste streams from their factory operations. Shoalhaven Starches have been approached by Supagas to process CO_2 from the Shoalhaven Starches operation that would otherwise be vented to the atmosphere. This proposal is entirely consistent with the objective of closing the loop on waste streams.

Essentially, Supagas seeks to establish a CO_2 plant on the former Dairy Farmers' Factory site to take CO_2 from the Shoalhaven Starches operations and to then process this gas to food grade quality for the food and beverage market. CO_2 will be taken directly from Shoalhaven Starches

via a small raw CO_2 treatment facility and connecting underground pipeline, to the proposed CO_2 Plant to be located on the eastern side of the former Dairy Farmers Factory site.

Supagas will take CO_2 with a purity of approximately 92% from the Shoalhaven Starches operations and process this gas into food grade CO_2 (>99.99% purity) suitable for food and hospitality markets around Australia.

The flue gas will be taken directly from the Shoalhaven Starches Fermenters CO_2 flue therefore reducing CO_2 emissions by up to 50 tonnes per day during the initial stage of the proposal and up to 100 tonnes per day when fully operational.

The proposal will have the following benefits:

- The plant will be designed and built by an Australian owned designed firm based in Melbourne (GLP) with a proven record constructing CO_2 plants.
- Waste generated from the plant will be minimal.
- The primary environmental benefit associated with the project will be the removal of up to 100 tonnes per day of CO_2 (a greenhouse gas emission) and which will then be re-used in other applications.
- The proposal will produce a product that would have otherwise been a waste further reinforcing Shoalhaven Starches objectives of closing the loop on waste streams from their factory operations.
- Supagas is creating another income stream for the Shoalhaven Starches operations that will be able to be further invested in NSW.
- Supagas currently burns natural gas in 3 other locations in order to produce CO_2. The recovery of CO_2 from the Shoalhaven Starches operations will enable these other operations to be phased out further reducing greenhouse gas and other emissions to the atmosphere.
- Expansion of Supagas' operations will result in employment opportunities throughout the distribution network.
- Investment of approximately $9 million on site and a further $6 million in equipment and logistical assets.

The proposed modification does not seek to increase production at the site over that which has been approved.

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

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

- The Department of Planning and Environment;
- Shoalhaven City Council;
- The NSW EPA;
- NSW Office of Water.

This Environmental Assessment has been prepared to address issues raised following this consultation.

The EA is supported by expert assessments addressing:

- Noise Impacts – the EA is supported by a Noise Impact Assessment prepared by Harwood Acoustics which includes recommendations to ensure that this proposal will achieve the noise design goals as outlined under the Environmental Protection Licence that applies to the site. Furthermore, this Noise Assessment demonstrates noise emission during the construction phase of the development will meet noise management levels set by the EPA's relevant guidelines.
- Air Quality Impacts and including Odours – the EA is supported by an Air Quality Assessment prepared by GHD. This assessment concludes that the emission parameters modelled and their impacts will be compliant with relevant assessment criteria.
- Preliminary Hazard Analysis (PHA) prepared by Pinnacle Risk Management Pty Ltd that assesses and compares the risks associated with the proposal and finds that such risks are acceptable when compared against the Department of Planning & Environment's risk criteria.
- Traffic and Car Parking Assessment prepared by ARC Traffic and Transport (ARC) that identifies that there are no access, traffic or parking impacts associated with the proposal – either during operation or construction – that would significantly impact on the efficiency and/or safety of the local traffic environment or existing on-site operations. The trip generation of the proposal during construction would be extremely minor, while once operational the proposal is not expected to generate any additional trips to the local road network.
- Flood Assessment prepared by WMA Water that demonstrates the proposal will not result in any significant increase in the 1% AEP flood level.
- A Site Contamination, Acid Sulphate Soils Assessment and Riverbank Stability Assessment prepared by Coffey Services. These assessments detail and recommend specific

management measures to be undertaken during the construction of the works associated with this modification.

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

The Minister's approval is sought for this Section 75W application.

1.0 INTRODUCTION

1.1 BACKGROUND TO PROJECT

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

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

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

In association with their expansion project, Shoalhaven Starches has also 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.

Shoalhaven Starches Pty Ltd has been approached by Supagas to construct a Carbon Dioxide (CO_2) Plant adjacent to the former Dairy Farmers factory site. This proposal provides a further opportunity to pursue a "closed" system of production for its operations and reduce emissions and environmental impact.

Essentially, Supagas seeks to establish a CO_2 plant on the former Dairy Farmers' Factory site to take CO_2 from the Shoalhaven Starches operations and to then process this gas to food grade quality for the food and beverage market. CO_2 will be taken directly from Shoalhaven Starches via a small raw CO_2 treatment facility and connecting underground pipeline, to the proposed CO_2 Plant to be located on the eastern side of the former Dairy Farmers' factory site.

Supagas will take CO_2 with a purity of approximately 92% from the Shoalhaven Starches operations, namely from the Fermenters located on this site, and process this gas into food grade CO_2 (> 99.99% purity) suitable for food and hospitality markets around Australia.

The flue gas will be taken directly from the Shoalhaven Starches Fermenters CO_2 flue therefore reducing CO_2 emissions by up to 50 tonnes per day during the initial stage of the proposal and up to 100 tonnes per day when fully operational.

The proposed modification does not seek to increase production at the site over that which has been approved.

Rather the modification proposal will have the potential of reducing the CO_2 gas emissions from the Shoalhaven Starches factory by up to 50 tonnes per day initially and up to 100 tonnes per day when fully operational.

Plan details of the proposal form **Annexure 2** to this EA.

2.0 THE SITE AND SURROUNDING LOCALITY

2.1 LOCAL AND REGIONAL CONTEXT

The proposed modification consists of the following subject allotments which all belong to the Manildra Group of companies and which Shoalhaven Starches forms part:

- 160 Bolong Road, Bomaderry (Lot 1 DP 838753), and which also contains the Shoalhaven Starches factory site;
- 171 Bolong Road, Bomaderry (Lot 241 DP 1130535) currently forms part of the Shoalhaven Starches factory operations;
- 220 Bolong Road, Bomaderry (Lot 143 DP 1069758) on the former Dairy Farmers' factory site.

171 Bolong Road is a split lot with a triangular shaped portion of land located on the northern side of Bolong Road as well as a rectangular shaped portion on the southern side of Bolong Road. This proposal concerns only that portion of No. 171 on the southern side of Bolong Road.

220 Bolong Road is an irregular shaped allotment located on the southern side of Bolong Road on the northern bank of the Shoalhaven River and has an area of approximately and 5.7 hectares.

The town of Bomaderry is located within 1 km to the west of the subject lots, and Nowra urban area is situated approximately 2 km to the south west. **Figure 1** shows a site locality plan.

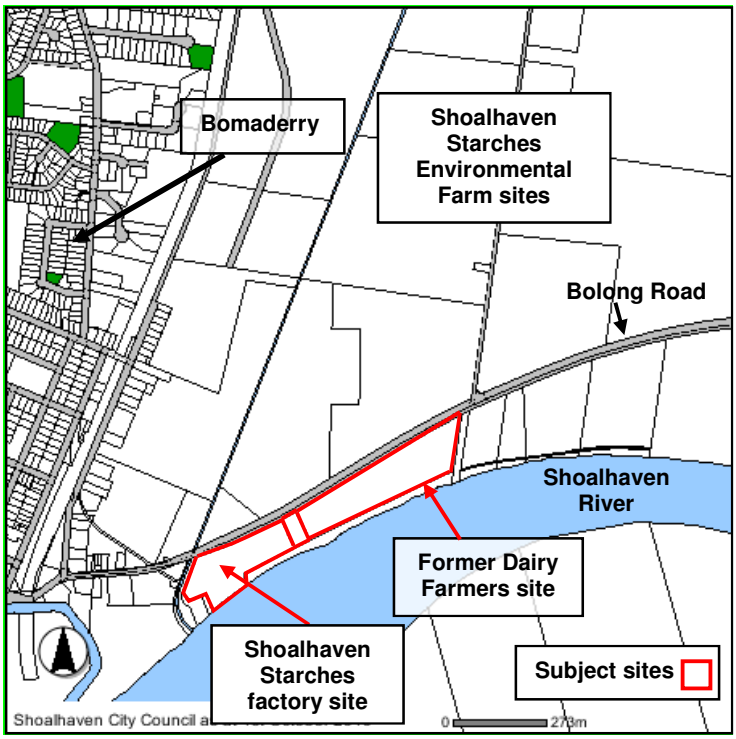


Figure 1: Site locality plan.

The subject site has access to Bolong Road. The existing access driveway for 220 Bolong Road, on which the CO_2 Plant will be located comprises separate ingress and egress driveways with a central median. The driveway provides access to the factory site, and car park located to the front of the existing factory complex.

The CO_2 Plant will be sited adjacent to the former Dairy Farmers' factory (currently used by Argyle Meats), on a triangular patch of land located between the eastern property boundary and the paved truck circulation area which adjoins the eastern side of the meat processing plant.

The western portion of 220 Bolong Road comprises a wastewater treatment plant associated with the former dairy factory consisting of treatment plant, storage dams and tanks, and is currently used as part of the meatworks processing plant. Further to the west of this site is the Shoalhaven Starches factory site.

Located to the north of the 'Dairy Farmers' factory complex and subject site for the CO_2 Plant is the Shoalhaven Starches Environmental Farm.

To the east of the subject site is another industrial site, Boweld Constructions, a heavy engineering factory site. Further afield to the east is farm land and the former Paper Mill site (now also owned by the Manildra Group of Companies).

The Shoalhaven River is located to the south of the site across an existing private railway line.

Aerial photographs of the locality and the site, along with key components of the proposal are shown in **Figures 2 and 3**.

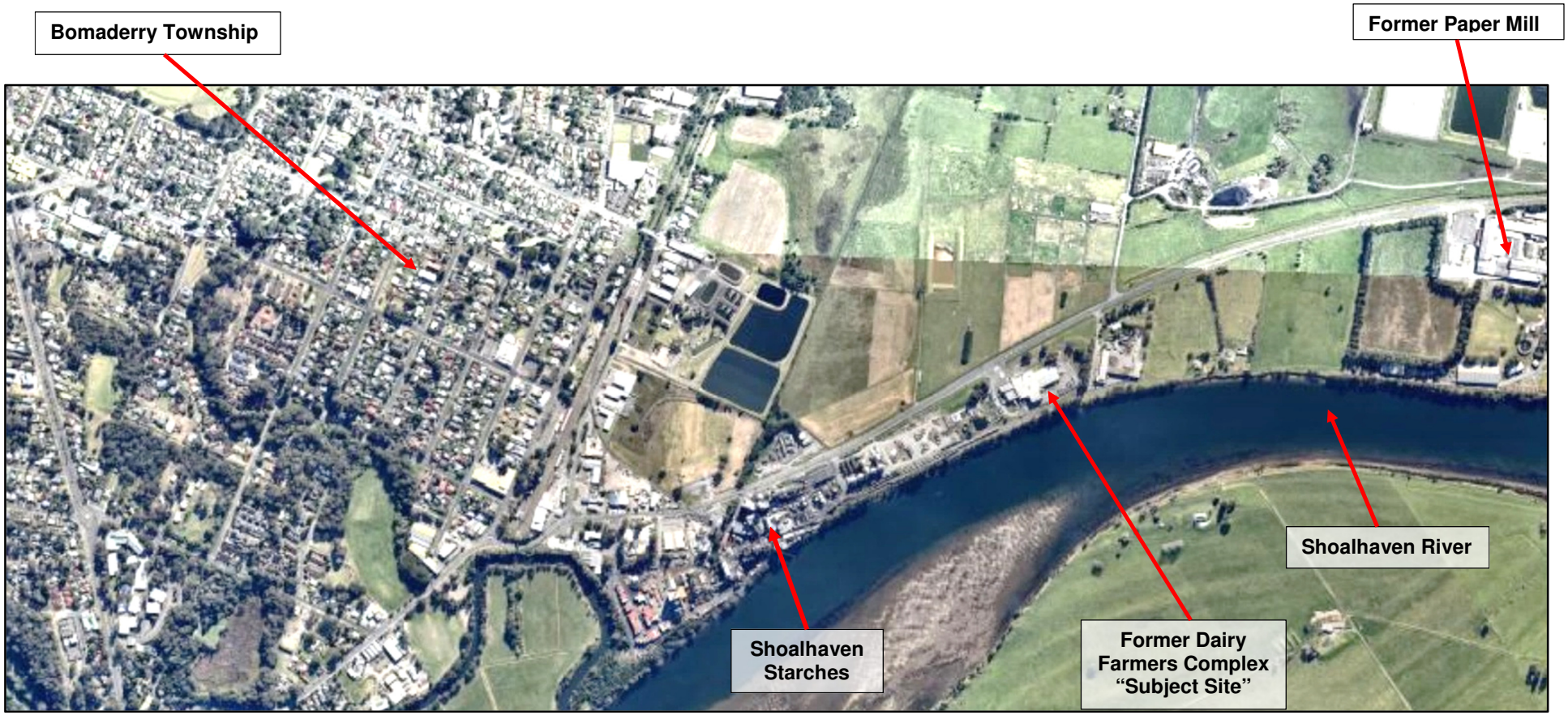


Figure 2: Aerial photograph of the locality.

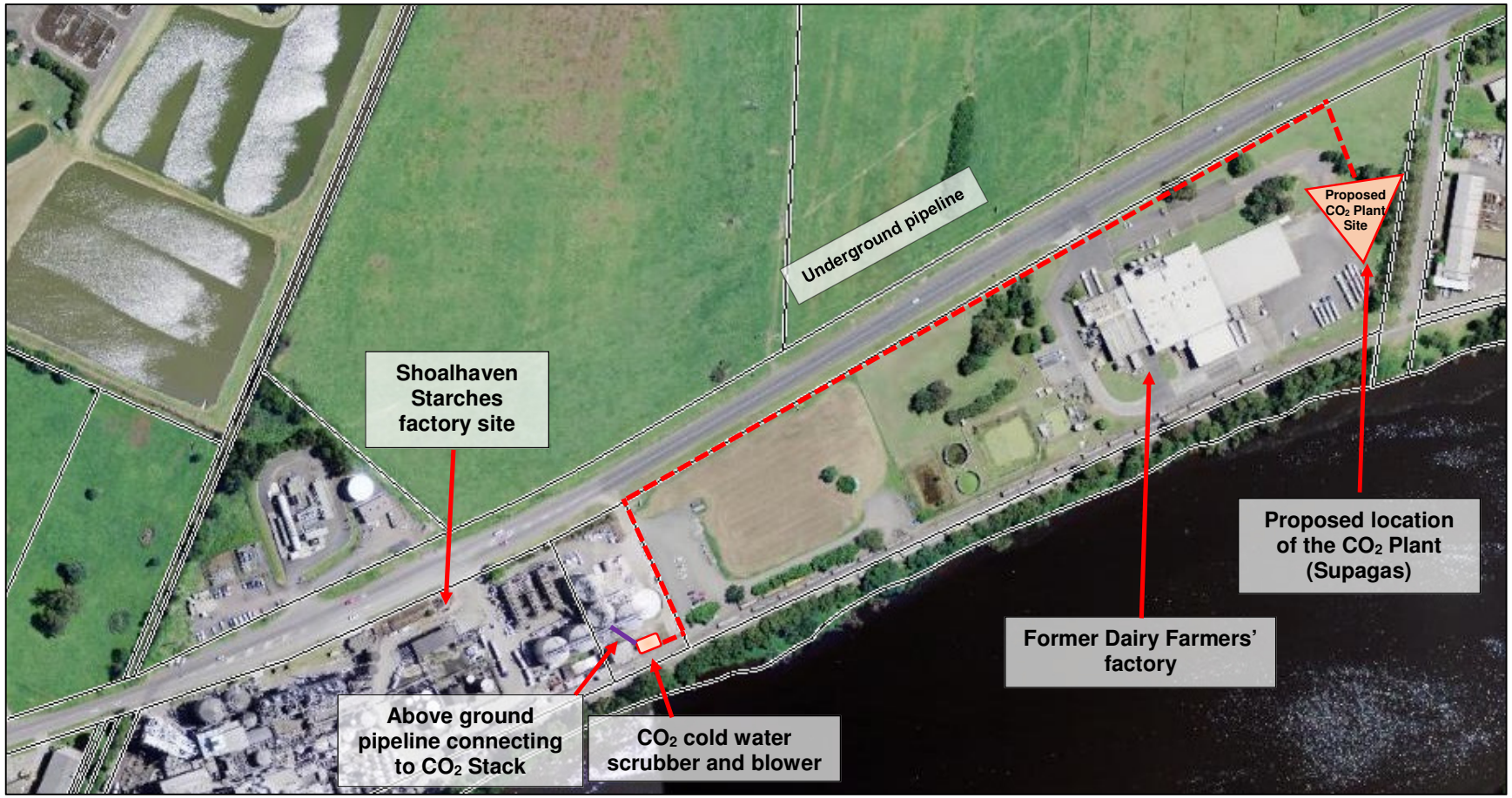


Figure 3: Aerial photograph of site.

3.0 BACKGROUND

3.1 PRODUCTION PROCESSES

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

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

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

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

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

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

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

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

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

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

CO_2 gas is emitted from the above process and expelled through a number of flue structures (stacks) for the Starches factory. The capture and recycling of CO_2 gas emissions to further reduce the greenhouse footprint from the Starches factory, is the objective of this modification proposal.

The CO_2 Plant will take CO_2 directly from the Shoalhaven Starches operations and process this gas to food grade quality for the food and beverage market. By taking the CO_2 directly from the Shoalhaven Starches factory operations, CO_2 emissions can be reduced by up to 50 tonnes per day during the initial stage of the proposal; and up to 100 tonnes per day when fully operational.

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 NSW Government's mandate to increase ethanol content by volume in petrol in NSW from 2% to 6% from October 2011, by upgrading the existing ethanol plant.

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

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

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

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

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

The Project Approval also consolidated all previous approvals into the one approval so that there would be essentially one approval for the site.

3.2.2 Development Application 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.

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 CO_2 sequestration. Proponent – Algae Tec Pty Ltd at 220 Bolong Road (former Dairy Farmers factory site).
- DA 14/1327 – Alterations to existing building (former Dairy Farmers Factory Building) and re-use as a meat processing plant. Proponent – Candal Investments Pty Ltd at 220 Bolong Road (former Dairy Farmers' factory site).

4.0 STATUTORY SITUATION

4.1 PART 3A OF THE EP&A ACT

The previous Part 3A to the Environmental Planning & Assessment Act 1979, and *State Environmental Planning Policy (Major Development)* in 2005, provided an assessment regime for state significant development.

Following the 2011 election, the NSW Government introduced a new regime for state significant development and had the effect of repealing Part 3A. These changes created an alternative assessment system which allows the NSW Government to assess and determine projects which are of State significance.

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

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

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

(a) an approved project (whether approved before or after the repeal of Part 3A),

(b) a project for which environmental assessment requirements were notified or adopted before the repeal of Part 3A,

(c) a project that is the subject of a Part 3A project application and that the regulations declare to be a transitional Part 3A project.

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

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

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

4.2 SECTION 75W AND MODIFICATION PROPOSALS

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

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

> ***75W Modification of Minister's approval***
>
> *(1) In this section:*
>
> ***Minister's approval** means an approval to carry out a project under this Part, and includes an approval of a concept plan.*
>
> ***modification of approval** means changing the terms of a Minister's approval, including:*
>
> *(a) revoking or varying a condition of the approval or imposing an additional condition of the approval, and*
>
> *(b) changing the terms of any determination made by the Minister under Division 3 in connection with the approval.*
>
> *(2) The proponent may request the Minister to modify the Minister's approval for a project. The Minister's approval for a modification is not required if the project as modified will be consistent with the existing approval under this Part.*
>
> *(3) The request for the Minister's approval is to be lodged with the Director-General. The Director-General may notify the proponent of environmental assessment requirements with respect to the proposed modification that the proponent must comply with before the matter will be considered by the Minister.*
>
> *(4) The Minister may modify the approval (with or without conditions) or disapprove of the modification.*
>
> *(5) The proponent of a project to which section 75K applies who is dissatisfied with the determination of a request under this section with respect to the project (or with the failure of the Minister to determine the request within 40 days after it is made) may, within the time prescribed by the regulations, appeal to the Court. The Court may determine any such appeal.*
>
> *(6) Subsection (5) does not apply to a request to modify:*
>
> *(a) an approval granted by or as directed by the Court on appeal, or*
>
> *(b) a determination made by the Minister under Division 3 in connection with the approval of a concept plan.*
>
> *(7) This section does not limit the circumstances in which the Minister may modify a determination made by the Minister under Division 3 in connection with the approval of a concept plan.*

Since initial project approval of MP 06_0228 on 28th January 2009, there have been a number of modification applications made under Section 75W of the EPA Act, the most recent being Modification Application (13), for the carrying out of modifications to Boilers 2, 4 and 6 for the Shoalhaven Starches factory.

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

4.3 LOCAL PLANNING PROVISIONS

Shoalhaven Local Environmental Plan (SLEP) 2014

171 and 220 Bolong Road are zoned IN1 (General Industrial) zone under the provisions of SLEP 2014 (refer **Figure 4**). The objectives of the IN1 zone are:

- *To provide a wide range of industrial and warehouse land uses.*
- *To encourage employment opportunities.*
- *To minimise any adverse effect of industry on other land uses.*
- *To support and protect industrial land for industrial uses.*
- *To allow a diversity of activities that do not significantly conflict with the operation of existing or proposed development.*
- *To enable other land uses that provide facilities or services to meet the day to day needs of workers in the area.*

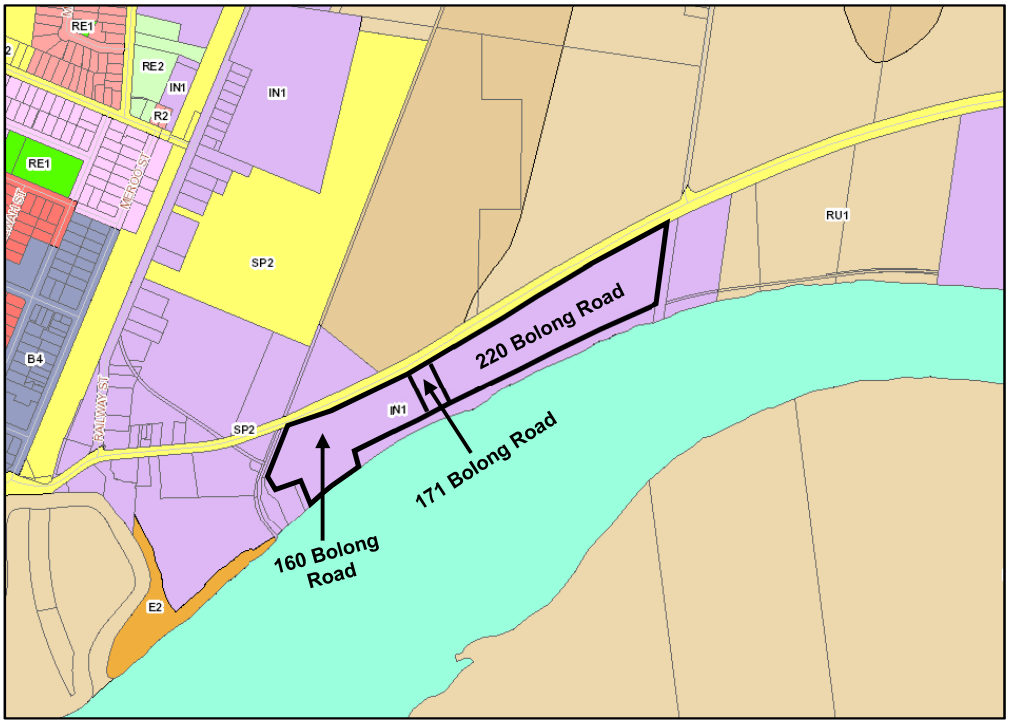


Figure 4: Zoning provisions applying under Shoalhaven LEP 2014.

The proposal is consistent with these objectives as the proposal involves modifications to an existing industrial facility.

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

Table 1

Land Use Permissibility – IN1 Zone (Shoalhaven LEP 2014)

Permitted without consent	Nil.
Permitted with consent	Bulky goods premises; Depots; Freight transport facilities; **General industries**; Industrial training facilities; Kiosks; Light industries; Markets; Neighbourhood shops; Roads; Take away food and drink premises; Timber yards; Warehouse or distribution centres
Prohibited	Agriculture; Air transport facilities; Airstrips; Amusement centres; Animal boarding or training establishments; Camping grounds; Caravan parks; Cemeteries; Charter and tourism boating facilities; Child care centres; Correctional centres; Crematoria; Eco-tourist facilities; Educational establishments; Environmental 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 proposal seeks to extend pipelines from the Shoalhaven Starches factory site, along the Bolong Road frontage of the subject land to connect with the proposed CO_2 plant.

The SLEP 2014 also has a number of specific provisions that apply to the land. The implications that these provisions have in relation to this proposal are discussed in **Table 2** below:

Table 2

Shoalhaven LEP 2014 Provisions

SLEP 2014 Clause	***Provisions***	***Comments***
4.3 Height of Buildings	*(1) The objectives of this clause are as follows:* *(a) to ensure that buildings are compatible with the height, bulk and scale of the existing and desired future character of a locality,* *(b) to minimise visual impact, disruption of views, loss of privacy and loss of solar access to existing development,*	The proposal will involve the erection of a range of structures with heights above ground level to an anticipated maximum height of approximately 7.1 m. Although there is no maximum height specified

Table 2 (continued)

SLEP 2014 Clause	*Provisions*	*Comments*
	(c) to ensure that the height of buildings on or in the vicinity of a heritage item or within a heritage conservation area respect heritage significance. *(2) The height of a building on any land is not to exceed the maximum height shown for the land on the Height of Buildings Map.* *(2A) If the Height of Buildings Map does not show a maximum height for any land, the height of a building on the land is not to exceed 11 metres.*	for the subject land part (2a) of Clause 4.3 of SLEP 2014 states no building is to be in excess of 11 metres. The proposal therefore is considered to comply with the provisions of Clause 4.3.
5.5 Development within the coastal zone	*(1) The objectives of this clause are as follows:* *(a) to provide for the protection of the coastal environment of the State for the benefit of both present and future generations through promoting the principles of ecologically sustainable development,* *(b) to implement the principles in the NSW Coastal Policy, and in particular to:* *(i) protect, enhance, maintain and restore the coastal environment, its associated ecosystems, ecological processes and biological diversity and its water quality, and* *(ii) protect and preserve the natural, cultural, recreational and economic attributes of the NSW coast, and* *(iii) provide opportunities for pedestrian public access to and along the coastal foreshore, and* *(iv) recognise and accommodate coastal processes and climate change, and* *(v) protect amenity and scenic quality, and* *(vi) protect and preserve rock platforms, beach environments and beach amenity, and* *(vii) protect and preserve native coastal vegetation, and* *(viii) protect and preserve the marine environment, and* *(ix) ensure that the type, bulk, scale and size of development is appropriate for the location and protects and improves the natural scenic quality of the surrounding area, and*	The subject land is located within the coastal zone. The proposal is not considered to adversely affect the coastal zone as: • The proposal does not affect or impinge on public access to or along the coastal foreshore. The proposed development is located within an existing industrial site and is considered to be suitable given its type, location and design. The development is also consistent with the zoning objectives for the land. • The proposed underground pipeline located adjacent to the northern side of Bolong Road provides essential infrastructure for the proposed CO_2 Plant and has no adverse impact on the Coastal zone. • The development will not lead to overshadowing of foreshore areas. The site is situated on the northern side of the Shoalhaven River. • The scenic qualities of the area will not diminish. Visual impact is further addressed in Section 8.5 of this EA.

Table 2 (continued)

SLEP 2014 Clause	*Provisions*	*Comments*
5.5 continued	*(x) ensure that decisions in relation to new development consider the broader and cumulative impacts on the catchment, and* *(xi) protect Aboriginal cultural places, values and customs, and* *(xii) protect and preserve items of heritage, archaeological or historical significance* *(2) Development consent must not be granted to development on land that is wholly or partly within the coastal zone unless the consent authority has considered:* *(a) existing public access to and along the coastal foreshore for pedestrians (including persons with a disability) with a view to:* *(i) maintaining existing public access and, where possible, improving that access, and* *(ii) identifying opportunities for new public access, and* *(b) the suitability of the proposed development, its relationship with the surrounding area and its impact on the natural scenic quality, taking into account:* *(i) the type of the proposed development and any associated land uses or activities (including compatibility of any land-based and water-based coastal activities), and* *(ii) the location, and* *(iii) the bulk, scale, size and overall built form design of any building or work involved, and* *(c) the impact of the proposed development on the amenity of the coastal foreshore including:* *(i) any significant overshadowing of the coastal foreshore, and* *(ii) any loss of views from a public place to the coastal foreshore, and* *(d) how the visual amenity and scenic qualities of the coast, including coastal headlands, can be protected, and* *(e) how biodiversity and ecosystems, including:* *(i) native coastal vegetation and existing wildlife corridors, and*	The proposal will not lead to adverse impacts on threatened fauna and flora.

Table 2 (continued)

SLEP 2014 Clause	*Provisions*	*Comments*
5.5 continued	*(ii) rock platforms, and* *(iii) water quality of coastal waterbodies, and* *(iv) native fauna and native flora, and their habitats, can be conserved, and* *(f) the cumulative impacts of the proposed development and other development on the coastal catchment.* *(3) Development consent must not be granted to development on land that is wholly or partly within the coastal zone unless the consent authority is satisfied that:* *(a) the proposed development will not impede or diminish, where practicable, the physical, land-based right of access of the public to or along the coastal foreshore, and* *(b) if effluent from the development is disposed of by a non-reticulated system, it will not have a negative effect on the water quality of the sea, or any beach, estuary, coastal lake, coastal creek or other similar body of water, or a rock platform, and* *(c) the proposed development will not discharge untreated stormwater into the sea, or any beach, estuary, coastal lake, coastal creek or other similar body of water, or a rock platform, and* *(d) the proposed development will not:* *(i) be significantly affected by coastal hazards, or* *(ii) have a significant impact on coastal hazards, or* *(iii) increase the risk of coastal hazards in relation to any other land.*	
5.10 Heritage Conservation	*(1) The objectives of this clause are:* *(a) to conserve the environmental heritage of Shoalhaven; and* *(b) to conserve the heritage significance of heritage items and heritage conservation areas including associated fabric, settings and views; and* *(c) to conserve archaeological sites; and* *(d) to conserve Aboriginal objects and Aboriginal places of heritage significance.* *(2) Development consent is required for any of the following:*	There are no heritage items within the subject land. And the subject site is not located within a heritage conservation area.

Table 2 (continued)

SLEP 2014 Clause	*Provisions*	*Comments*
5.10 continued	*(a) demolishing or moving any of the following or altering the exterior of any of the following (including, in the case of a building, making changes to its detail, fabric, finish or appearance):* *(i) a heritage item,* *(ii) an Aboriginal object* *(iii) a building, work, relic or tree within a heritage conservation area,* *(b) altering a heritage item that is a building by making structural changes to its interior or by making changes to anything inside the item that is specified in Schedule 5 in relation to the item,* *(c) disturbing or excavating an archaeological site while knowing, or having reasonable cause to suspect, that the disturbance or excavation will or is likely to result in a relic being discovered, exposed, moved, damaged or destroyed,* *(d) disturbing or excavating an Aboriginal place of heritage significance,* *(e) erecting a building on land:* *(i) on which a heritage item is located or that is within a heritage conservation area;* *(ii) on which an Aboriginal object is located or that is within an Aboriginal place of heritage significance,* *(f) subdividing land:* *(i) on which a heritage item is located or that is within a heritage conservation area, or* *(ii) on which an Aboriginal object is located or that is within an Aboriginal place of heritage significance.*	
7.1 Acid sulfate soils	*(1) The objective of this clause is to ensure that development does not disturb, expose or drain acid sulfate soils and cause environmental damage.* *(2) Development consent is required for the carrying out of works described in the Table to this subclause on land shown on the Acid Sulfate Soils Map as being of the class specified for those works, except as provided by this clause.*	The subject lots are affected by varying classes of acid sulfate soils, as indicated in the **Figure 5** below.

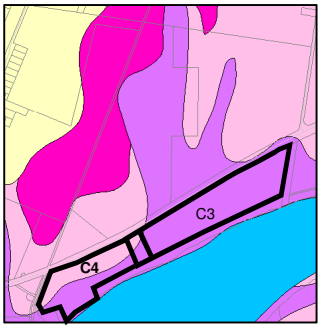
<table>
<tr><th>SLEP 2014 Clause</th><th>Provisions</th><th>Comments</th></tr>
<tr>
<td>7.1 continued</td>
<td>
<table>
<tr><th>Class of Land</th><th>Works</th></tr>
<tr><td>1</td><td>Any works.</td></tr>
<tr><td>2</td><td>Works below the natural ground surface.
Works by which the watertable is likely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


Figure 5: Acid Sulphate Soil Mapping
Coffey Services have undertaken an assessment of acid sulphate soils with respect to this modification proposal (Annexure 8). This issue is further addressed in Section 8.8 of this EA.
</td>
</tr>
</table>

Table 2 (continued)

SLEP 2014 Clause	*Provisions*	*Comments*
7.1 continued	*(a) emergency work, being the repair of the works of the public authority required to be carried out urgently because the works have been damaged, have ceased to function or pose a risk to the environment or to public health and safety,* *(b) routine management work, being the periodic inspection, cleaning, repair or replacement of the works of the public authority (other than work that involves the disturbance of more than 1 tonne of soil).* *(c) minor work, being work that costs less than $20,000 (other than drainage work).* *(6) Despite subclause (2), development consent is not required under this clause to carry out any works if:* *(a) the works involve the disturbance of less than 1 tonne of soil, and* *(b) the works are not likely to lower the watertable.*	
7.3 Flood Planning	*(1) The objectives of this clause are as follows:* *(a) to minimise the flood risk to life and property associated with the use of land,* *(b) to allow development on land that is compatible with the land's flood hazard, taking into account projected changes as a result of climate change,* *(c) to avoid significant adverse impacts on flood behaviour and the environment.* *(2) This clause applies to:* *(a) land identified as "Flood Planning Area" on the Flood Planning Area Map, and* *(b) other land at or below the flood planning level.* *(3) Development consent must not be granted to development on land to which this clause applies unless the consent authority is satisfied that the development:* *(a) is compatible with the flood hazard of the land, and* *(b) will not significantly adversely affect flood behaviour resulting in detrimental increases in the potential flood affectation of other development or properties, and*	The *Flood Planning Area Map* that accompanies the SLEP 2014 identifies the subject land as being flood prone land. The application is supported by a flood assessment undertaken (**Annexure 6**). This issue is discussed further in Section 8.4 of this EA. by WMAwater

Table 2 (continued)

SLEP 2014 Clause	*Provisions*	*Comments*
7.3 continued	*(c) incorporates appropriate measures to manage risk to life from flood, and* *(d) will not significantly adversely affect the environment or cause avoidable erosion, siltation, destruction of riparian vegetation or a reduction in the stability of river banks or watercourses, and* *(e) is not likely to result in unsustainable social and economic costs to the community as a consequence of flooding, and* *(f) will not affect the safe occupation or evacuation of the land.* *(4) A word or expression used in this clause has the same meaning as it has in the Floodplain Development Manual (ISBN 0 7347 5476 0) published by the NSW Government in April 2005, unless it is otherwise defined in this clause.* *(5) In this clause:* ***flood planning level** means the level of a 1:100 ARI (average recurrent interval) flood event plus 0.5 metre freeboard.*	
7.4 Coastal Risk Planning	*(1) The objectives of this clause are as follows:* *(a) to avoid significant adverse impacts from coastal hazards,* *(b) to ensure uses of land identified as coastal risk are compatible with the risks presented by coastal hazards,* *(c) to enable the evacuation of land identified as coastal risk in an emergency,* *(d) to avoid development that increases the severity of coastal hazards.* *(2) This clause applies to the land identified as "Coastal Risk Planning Area" on the Coastal Risk Planning Map.* *(3) Development consent must not be granted to development on land to which this clause applies unless the consent authority is satisfied that the development:* *(a) will avoid, minimise or mitigate exposure to coastal processes, and* *(b) is not likely to cause detrimental increases in coastal risks to other development or properties, and* *(c) is not likely to alter coastal processes and the impacts of coastal hazards to the detriment of the environment, and*	The *Coastal Risk Planning Map* that accompanies the SLEP 2014 does not identify the subject land as a "*Coastal Risk Planning Area*". The provisions of this clause therefore do not apply to the subject site.

Table 2 (continued)

SLEP 2014 Clause	*Provisions*	*Comments*
7.4 continued	*(d) incorporates appropriate measures to manage risk to life from coastal risks, and* *(e) is likely to avoid or minimise adverse effects from the impact of coastal processes and the exposure to coastal hazards, and* *(f) provides for the relocation, modification or removal of the development to adapt to the impact of coastal processes and coastal hazards, and* *(g) has regard to the impacts of sea level rise.* *(4) A word or expression used in this clause has the same meaning as it has in the NSW Coastal Planning Guideline: Adapting to Sea Level Rise (ISBN 978-1-74263-035-9) published by the NSW Government in August 2010, unless it is otherwise defined in this clause.* *(5) In this clause:* ***coastal hazard** has the same meaning as in the Coastal Protection Act 1979.*	
7.5 Terrestrial Biodiversity	*(1) The objective of this clause is to maintain terrestrial biodiversity, by:* *(a) protecting native flora and fauna,* *(b) protecting the ecological processes necessary for their continued existence, and* *(c) encouraging the recovery of native flora and fauna, and their habitats.* *(2) This clause applies to land:* *(a) identified as "Biodiversity—habitat corridor" or "Biodiversity—significant vegetation" on the Terrestrial Biodiversity Map, and* *(b) situated within 40m of the bank (measured horizontally from the top of the bank) of a natural waterbody.* *(3) Before determining a development application for development on land to which this clause applies, the consent authority must consider:* *(a) whether the development is likely to have:* *(i) any adverse impact on the condition, ecological value and significance of the fauna and flora on the land, and*	The *Terrestrial Biodiversity Map* that accompanies the SLEP 2014 does <u>not</u> identify the subject land as including areas of *Biodiversity - habitat corridor* and/or *Biodiversity - significant vegetation*. Given the nature of the site the proposal will not have any adverse impacts on the ecological value of the land. There is no vegetation of importance located on the land.

Table 2 (continued)

SLEP 2014 Clause	*Provisions*	*Comments*
7.5 continued	*(ii) any adverse impact on the importance of the vegetation on the land to the habitat and survival of native fauna, and* *(iii) any potential to fragment, disturb or diminish the biodiversity structure, function and composition of the land, and* *(iv) any adverse impact on the habitat elements providing connectivity on the land, and* *(b) any appropriate measures proposed to avoid, minimise or mitigate the impacts of the development.* *(4) Development consent must not be granted to development on land to which this clause applies unless the consent authority is satisfied that:* *(a) the development is designed, sited and will be managed to avoid any significant adverse environmental impact, or* *(b) if that impact cannot be reasonably avoided by adopting feasible alternatives—the development is designed, sited and will be managed to minimise that impact, or* *(c) if that impact cannot be minimised—the development will be managed to mitigate that impact.* *(5) For the purpose of this clause:* ***bank** means the limit of the bed of a natural waterbody.* ***bed,** of a natural waterbody, means the whole of the soil of the channel in which the waterbody flows, including the portion that is alternatively covered and left bare with an increase or diminution in the supply of water and that is adequate to contain the waterbody at its average or mean stage without reference to extraordinary freshets in the time of flood or to extreme droughts.*	
7.6 Riparian land and watercourses	*(1) The objective of this clause is to protect and maintain the following:* *(a) water quality within watercourses,* *(b) the stability of the bed and banks of watercourses,* *(c) aquatic and riparian habitats,* *(d) ecological processes within watercourses and riparian areas.*	The *Riparian Lands and Watercourses Map* that accompanies the SLEP 2014 identify a class 1 watercourse, (Shoalhaven River) adjacent to but not having direct frontage to the subject site.

Table 2 (continued)

SLEP 2014 Clause	*Provisions*	*Comments*
7.6 continued	*(2) This clause applies to all of the following:* *(a) land identified as "Riparian Land" on the Riparian Lands and Watercourses Map,* *(b) land identified as "Watercourse Category 1", "Watercourse Category 2" or "Watercourse Category 3" on that map,* *(c) all land that is within 50 metres of the top of the bank of each watercourse on land identified as "Watercourse Category 1", "Watercourse Category 2" or "Watercourse Category 3" on that map.* *(3) Before determining a development application for development on land to which this clause applies, the consent authority must consider:* *(a) whether or not the development is likely to have any adverse impact on the following:* *(i) the water quality and flows within the watercourse,* *(ii) aquatic and riparian species, habitats and ecosystems of the watercourse,* *(iii) the stability of the bed and banks of the watercourse,* *(iv) the free passage of fish and other aquatic organisms within or along the watercourse,* *(v) any future rehabilitation of the watercourse and its riparian areas, and* *(b) whether or not the development is likely to increase water extraction from the watercourse, and* *(c) any appropriate measures proposed to avoid, minimise or mitigate the impacts of the development.* *(4) Development consent must not be granted to development on land to which this clause applies unless the consent authority is satisfied that:* *(a) the development is designed, sited and will be managed to avoid any significant adverse environmental impact, or* *(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.*	The site is industrial land with no existing vegetation and is beyond the influence of normal fluvial geomorphic processes. The works will have no impact on water quality. As such the development will not have any adverse effect on water quality, flows within the watercourse, aquatic and riparian species or habitats and ecosystems of the watercourse. The works associated with this modification are not located within close proximity of the Shoalhaven River being located over 50 metres to the Shoalhaven River and situated adjacent to existing structures.

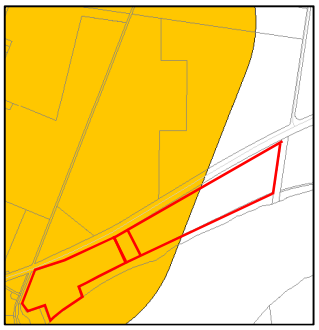
Table 2 (continued)

SLEP 2014 Clause	*Provisions*	*Comments*
7.6 continued	*(5) For the purpose of this clause:* ***bank** means the limit of the bed of a watercourse.* ***bed**, of a watercourse, means the whole of the soil of the channel in which the watercourse flows, including the portion that is alternatively covered and left bare with an increase or diminution in the supply of water and that is adequate to contain the watercourse at its average or mean stage without reference to extraordinary freshets in the time of flood or to extreme droughts.*	
7.7 Landslide risk and other land degradation	*(1) The objective of this clause is to maintain soil resources and the diversity and stability of landscapes, including protecting land:* *(a) comprising steep slopes, and* *(b) susceptible to other forms of land degradation.* *(2) This clause applies to the following land:* *(a) land with a slope in excess of 20% (1:5), as measured from the contours of a 1:25,000 topographical map, and* *(b) land identified as "Sensitive Area" on the Natural Resource Sensitivity–Land Map.* *(3) Before determining a development application for development on land to which this clause applies, the consent authority must consider any potential adverse impact, either from, or as a result of, the development in relation to:* *(a) the geotechnical stability of the site, and* *(b) the probability of increased erosion or other land degradation processes.* *(4) Before granting consent to development on land to which this clause applies, the consent authority must be satisfied that:* *(a) the development is designed, sited and will be managed to avoid any significant adverse environmental impact, or* *(b) if that impact cannot be reasonably avoided—the development is designed, sited and will be managed to minimise that impact, or* *(c) if that impact cannot be minimised – the development will be managed to mitigate that impact.* *(5) In this clause, topographical map means the most current edition of a topographical map, produced by Land and Property Information, a division of the Department of Finance and Services, that identifies the Council's local government area and boundary.*	The proposed works do not involve land with a slope in excess of 20% or areas identified as sensitive land. Under these circumstances the provisions of this clause will not apply to this proposal.

Table 2 (continued)

SLEP 2014 Clause	*Provisions*	*Comments*
7.8 Scenic protection	*(1) The objective of this clause is to protect the natural environmental and scenic amenity of land that is of high scenic value.* *(2) This clause applies to land identified as "Scenic Protection" on the Scenic Protection Area Map.* *(3) In deciding whether to grant development consent for development on land to which this clause applies, the consent authority must:* *(a) consider the visual impact of the development when viewed from a public place and be satisfied that the development will involve the taking of measures that will minimise any detrimental visual impact, and* *(b) consider the number, type and location of existing trees and shrubs that are to be retained and the extent of landscaping to be carried out on the site, and* *(c) consider the siting of the proposed buildings.*	The subject land is <u>not</u> identified as being within a "*Scenic Protection"* area by *Scenic Protection Area Mapping* that accompanies the SLEP 2014. The provisions of this clause therefore do not apply to the subject site. However, the development site is adjacent to the northern bank of the Shoalhaven River which is identified as being within a Scenic Protection area. The visual impact associated with this proposal is discussed in Section 8.5 of this EA.
7.9 HMAS Albatross airspace operations	*(1) The objectives of this clause are as follows:* *(a) to provide for the effective and on-going operation of the HMAS Albatross Military Airfield by ensuring that such operation is not compromised by proposed development that penetrates the Limitation or Operations Surface for that airport,* *(b) to protect the community from undue risk from that operation.* *(2) If a development application is received and the consent authority is satisfied that the proposed development will penetrate the Limitation or Operations Surface, the consent authority must not grant development consent unless it has consulted with the relevant Commonwealth body about the application.* *(3) The consent authority may grant development consent for the development if the relevant Commonwealth body advises that:* *(a) the development will penetrate the Limitation or Operations Surface but it has no objection to its construction, or* *(b) the development will not penetrate the Limitation or Operations Surface.*	The proposed modification is not considered to compromise the operations of HMAS Albatross airspace in this instance. In this regard the proposal involves structures with a maximum height above ground level of only about 7 metres and do not involve an elevation above ground level that will not rigger referral under tis clause.

Table 2 (continued)

SLEP 2014 Clause	*Provisions*	*Comments*
7.9 continued	*(4) The consent authority must not grant development consent for the development if the relevant Commonwealth body advises that the development will penetrate the Limitation or Operations Surface and should not be carried out.* *(5) In this clause:* ***Limitation or Operations Surface** means the Obstacle Limitation Surface or the Procedures for Air Navigation Services Operations Surface as shown on the Obstacle Limitation Surface Map or the Procedures for Air Navigation Services Operations Surface Map for the HMAS Albatross Military Airfield.* ***relevant Commonwealth body** means the body, under Commonwealth legislation, that is responsible for development approvals for development that penetrates the Limitation or Operations Surface for the HMAS Albatross Military Airfield.*	
7.15 Development in the vicinity of extractive industries and sewerage treatment plants	*(1) The objective of this clause is to protect the operational environment of certain industries operating on the land to which this clause applies.* *(2) This clause applies to land identified as "Extractive Industry" and "Sewage Treatment Plant" on the Buffers Map.* *(3) Development consent must not be granted to the carrying out of development on land to which this clause applies unless the consent authority has:* *(a) made an assessment of the impact of noise, odour and other emissions from any industry carried out on that land, and* *(b) considered the potential impact of noise, odour and other emissions associated with that industry on any activities that will be associated with the development, and* *(c) considered any opportunities to relocate the development outside that land, and* *(d) has considered whether the development would adversely affect the operational environment of that industry.*	The Buffers Map that accompanies the SLEP 2014 identifies the western part of the subject land being located within the vicinity of a sewerage treatment plant, as indicated in **Figure 6** below.  **Figure 6: Buffers Mapping (SLEP 2014)**

4.4 PROTECTION OF THE ENVIRONMENT OPERATIONS ACT

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

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

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

5.0 THE MODIFICATION PROPOSAL

5.1 THE ROLE OF THE CO_2 PLANT

CO_2 gas emissions from the Shoalhaven Starches factory operations currently contribute to greenhouse gas emissions. Shoalhaven Starches have over the years sought to progressively close the loop on waste and reduce their environmental footprint in terms of greenhouse gas emission.

The proposal will provide a further opportunity to reinforce a "closed" system of production for its operations and reduce their environmental impact.

Essentially, the CO_2 Plant will capture CO_2 from the flues of Fermenter located at the Shoalhaven Starches factory, transport it by underground pipes to the proposed CO_2 Plant (approximately 675 m to the east, on the former Dairy Farmers' Factory site), then process this gas to food grade quality for distribution to the food and beverage market.

5.2 THE PROPOSED MODIFICATION

The Modification Proposal seeks to install the following equipment and structures on site to enable operation of the CO_2 Plant:

- **Above ground pipeline** approximately 4 m above ground located on the Shoalhaven Starches factory site extending from the CO_2 stack (refer to **Figure 3**) to the cold water scrubber, captures and feeds CO_2 gas.
- **Cold water scrubber and blower.** Located next to the substation towards the rear of the Shoalhaven Starches factory site (refer to **Figure 3**). The cold water scrubber dehumidifies the warm, moist CO_2 exiting the raw gas feed from the Fermenters and will remove water and alcohol from the feed stream. The blower then channels the CO_2 gas through the underground pipeline towards the CO_2 Plant.
- **Underground pipeline** extending from the cold water scrubber to the CO_2 compressor of the CO_2 Plant to be located at 220 Bolong Road, Bomaderry (former Dairy Farmers' factory site). Refer to **Figure 3** for indicative pipeline route.
- **CO_2 Compressor.** The CO_2 compressor takes the dry CO_2 from the cold water scrubber and raises the CO_2 pressure to 1950 KPa.
- **Sulphide removal Beds**. CO_2 is fed into the columns that remove any organic sulphides.
- **Cat Ox System**. CO_2 is fed through a CATOX (similar to a car exhaust) and all traces of Hydrocarbons are burnt into moisture and CO_2.

- **CO_2 driers**. The CO_2 is further dried to a point where its moisture content is reduced to less than 20 parts per million.
- **CO_2 Liquefier**. The gaseous CO_2 at approximately 1800 KPa is liquefied.
- **CO_2 NOx removal vessel**. Liquid CO_2 is fed over a Molecular sieve, that absorbs any NOx. The Molecular sieve changed approximately every 9 months and disposed of in accordance with statutory requirements.
- **CO_2 Tanks**. The CO_2 w2ill then be stored in tanks (one with a capacity of 100 tonnes and the other 200 tonnes providing total storage of 300 tonnes) prior to dispatch.
- **Distribution Weigh Bridge.** The CO_2 is then distributed to customers.
- **Workshop, Amenities, Control Room and MCC buildings** to include a shower and toilet amenities.

The CO_2 will be transferred (as required) from the CO_2 tanks into road tankers and then distributed to the market via one of the following type of road transport:

- B-doubles capable with a capacity of 30 tonnes; and
- Single tankers with a capacity of 20 tonnes.

Initially, 2 truck movements per day are anticipated which will ultimately increase to a maximum of 5 truck movements per day when fully operational. Supagas anticipate all truck access and movements to occur within normal business operating hours.

Operating hours for the proposed CO_2 Plant facility will be within normal business operating hours (ie. 9:00 am to 5:00 pm, Monday to Friday). However, it is noted that the occasional 'outside normal business hours' emergency maintenance repair or servicing of the facility may be required. Lighting for the facility is proposed for this purpose and for security measures. No trucks will be required to access the facility outside normal business operating hours.

Staff numbers are anticipated to be 2 full-time staff on site during normal business operating hours. Occasional servicing of the facility by additional staff for maintenance and repair purposes may also be required during and/ or after normal business operating hours.

It is anticipated that the proposed modification will result in a significant reduction in greenhouse gas emissions for the Shoalhaven Starches operations, being 50 tonnes per day initially and increasing to 100 tonnes per day when fully operational.

5.3 PROCESS DESCRIPTION

The CO_2 Plant will effectively comprise 3 phases over multiple sites.

The first phase involves preliminary treatment of the raw CO_2 at 171 Bolong Road (Shoalhaven Starches factory site) and the collection of the CO_2 and its transfer by underground pipe to 220 Bolong Road (former Dairy Farmers' factory site). Phase 2, involves further processing of the preliminary treated raw CO_2 by the CO_2 Plant. Phase 3 involves storage and distribution of the final processed CO_2 product to customers. Further breakdown of each phase is detailed below:

Phase 1 – Preliminary Treatment of Raw CO_2

Raw CO_2 gas will be fed through an above ground pipe extending from a connection to the CO_2 flue stacks as indicated in **Figure 3** to the raw CO_2 treatment site which will be contained on a footprint of approximately 6 m x 8 m and located directly south of the CO_2 stacks. The above ground pipe will connect directly into the cold water scrubber which dehumidifies the warm, moist CO_2 exiting the raw gas feed and will primarily remove water and alcohol from this feed stream. A blower then channels the CO_2 gas through the underground pipeline towards the CO_2 Plant on the former Dairy Farmers' site. Any residual alcohol from the cold water scrubber process will be captured and reused by the Shoalhaven Starches factory operations.

Phase 2 – CO_2 Treatment Process

The preliminary treated raw CO_2 gas upon reaching the CO_2 treatment plant by underground pipe will initially undertake compression by the CO_2 Compressor. The CO_2 compressor takes the dry CO_2 from the cold water scrubber and raises the CO_2 pressure to 1950 KPa. Any water condensate will be directed to the Shoalhaven Starches water treatment plant.

The next step involves the removal by Process SKID 01 (refer to Isometric View Plans in **Annexure 2**) which contains sulphur removal beds. In this process, the CO_2 is fed into columns that contain an active ingredient which removes organic sulphides. This active ingredient is removed when spent and sent for disposal at an authorised facility.

The CO_2 is then fed through a CAT OX system (similar to a car exhaust) and all traces of Hydrocarbons are burnt into moisture and CO_2. This system runs at 330 degrees. The final process for SKID 01 involves the de-hydration unit wherein CO_2 is further dried to a point where its moisture content is reduced to less than 20 parts per million. Again, any water condensate from this process will be directed to Shoalhaven Starches waste water

treatment plant. Some water saturated CO_2 gas will be released into the atmosphere from the drying process.

The remaining process (undertaken by Process SKID 02A/B (refer to Isometric View Plans in **Annexure 2**)) involves liquefying the gaseous CO_2. The liquid CO_2 will be then be fed over a molecular sieve which absorbs any nitrogen oxide (NOx). This will be changed out approximately every 9 months and disposed of in accordance with statutory requirements. The liquified CO_2 is then directed to storage. Some CO_2 rich non-condensed liquefier gas is vented and water saturated air discharged during this process.

Phase 3 – Storage and Distribution of the final CO_2 Product

The liquified CO_2 (final product) will be stored in two tanks (one, 100 tonne and one, 200 tonne storage tank providing a total storage capacity of 300 tonnes), awaiting dispatch.

The CO_2 will then be transferred (as required) from the CO_2 tanks into road tankers and then distributed to the market either by:

- B-doubles capable with a capacity of 30 tonnes; and
- Single tankers with a capacity of 20 tonnes.

The trucks will enter and load on the weigh bridge and be weighed prior to leaving the site.

The proposal will result in a significant reduction in greenhouse gas emissions from the Shoalhaven Starches operations, with a reduction of 50 tonnes per day initially for Stage 1 of the proposal, increasing to 100 tonnes per day for Stage 2 of the proposal, when fully operational.

A process flow diagram is shown in **Figure 7** below and all plan and section drawing details of the proposal form **Annexure 2** to this EA.

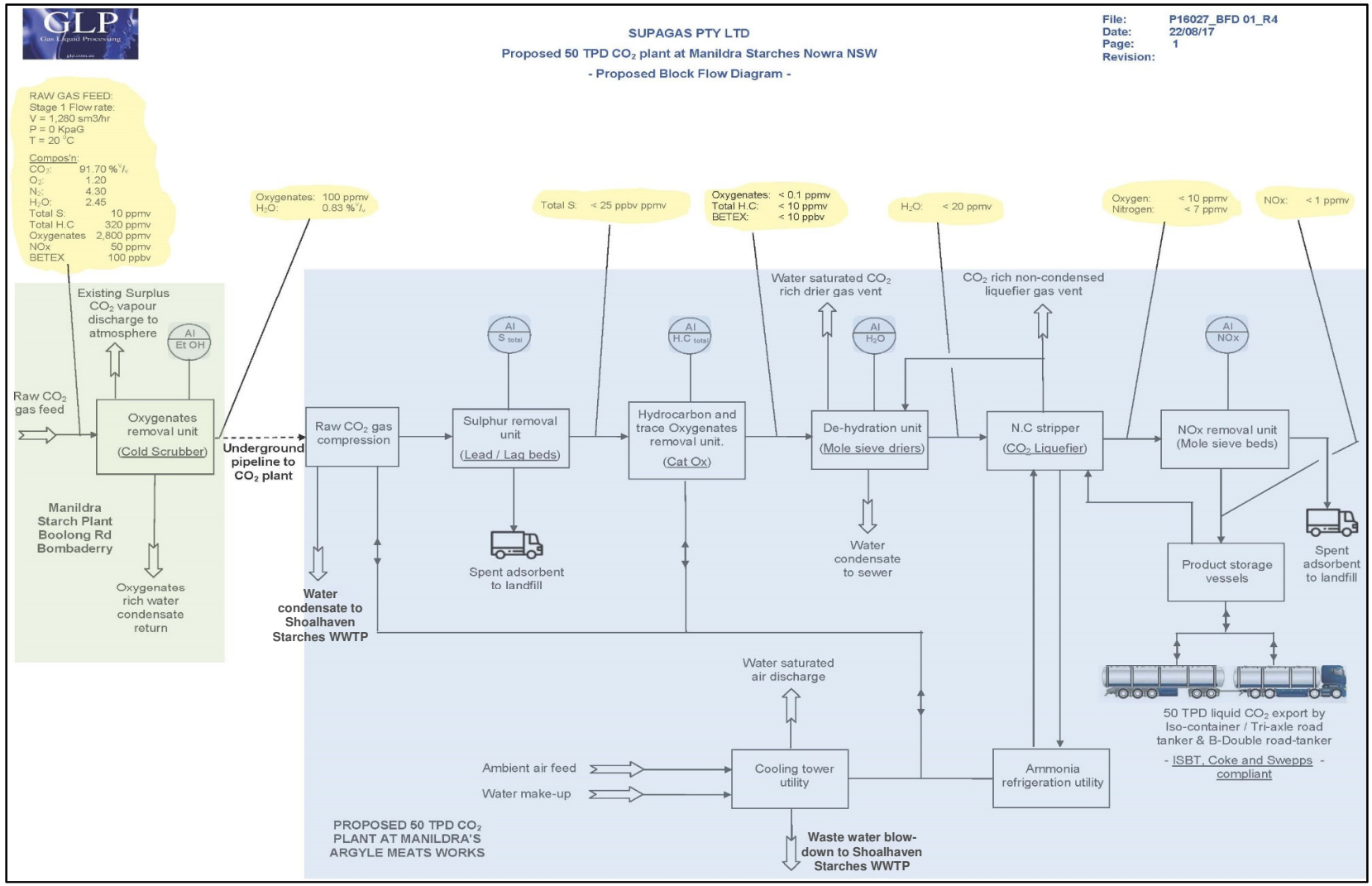


Figure 7: Process Flow Diagram – CO_2 Plant Facility.

Waste

Waste generated from the CO_2 Plant will be minimal, as in itself, the plant will be reducing up to 100 tonnes of CO_2 gas emissions per day by recycling it into a consumable product for the hospitality and retail industry.

All waste water from the processes will be directed to the Shoalhaven Starches Wastewater Treatment Plant. **Table 3** below details the wastewater streams at a production rate of 50 tonnes per day (with double at 100 tonnes per day).

Table 3
Waste water streams from proposed CO_2 Plant (at 50 tonnes per day)

Stream	***Description***	***Flowrate (Units as noted)***	***Temperature °C***
1	Cold scrubber drain	1,028 LPH	17.7
2	CO_2 compressor after-cooler condensate drain	1.8 LPH	35
3	Dehydration unit cooler condensate drain	10.2 LPH	9.5
4	Drier regeneration gas vent	60 sm^3/hr	0 – 240
5	CO_2 liquefier gas vent	128 sm^3/hr	- 28.7
6	Cooling tower blow-down	LPH	90

The flow rate from the cooling tower blowdown will be 90 litres per hour at 50 tonnes per day increasing to 180 litres per hour at 100 tonnes per day. The blow down will have a higher TDS water, and this will be pumped back to the Shoalhaven Starches site within a small diameter pipe that will be installed in the same pit as the CO_2 pipeline.

Residual alcohol from the cold scrubber process will be captured and reused by Shoalhaven Starches.

Any other trade waste, such as active ingredients (minimal anticipated) will be disposed of by an authority facility in accordance with required regulations.

According to Supagas there will not be any significant changes to either water consumption or wastewater generation as a result of this modification.

Annexure 9 to this EA is written confirmation from Shoalhaven Starches confirming that there is sufficient spare capacity within the Shoalhaven Starches Wastewater Treatment System to accommodate wastewater streams from this project.

The proposal will include facilities for a unisex toilet and shower facility. It is acknowledged that the Dairy Farmers site is connected to Council's sewerage scheme via a private sewer pump station and that no internal connection to the sewer is permitted without prior trade approval by Shoalhaven Water. Therefore, it is intended that trade waste approval by Shoalhaven Water be applied for prior to construction of or connection to internal sewer.

6.0 CONSULTATION

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

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

Cowman Stoddart submitted a scoping submission to the Department of Planning & Environment by letter dated 14th August 2017 on behalf of the proponent with respect to this proposal. Planner for Industry Assessments, (Deanna Burn) from the Department of Planning responded to this submission by email dated 28th September 2017 and in summary noted that the issues proposed to be covered by this Environmental Assessment were comprehensive and the Department had no further issues requiring assessment. A copy of this response is contained in **Annexure 1** to this EA.

Correspondence undertaking consultation with Shoalhaven City Council, the EPA and the NSW Office of Water was also undertaken by email dated 14th August 2017 with an attached copy of the scoping submission that was sent to the Department of Planning and Environment. No response has been received to date from either the EPA or NSW Office of Water. It is noted that correspondence between the EPA and acoustic consultant for this EA (Harwood Acoustics) was undertaken in relation to the new Noise Policy and implications for the proposed CO_2 facility and existing Environmental license for Shoalhaven Starches. This is further discussed in Section 8.2.

A response from Shoalhaven City Council was received by email dated 3rd November 2017 and is detailed below in addition to also being included in **Annexure 1** to this EA.

Shoalhaven City Council

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

Table 4

Issues Raised by Shoalhaven City Council

SCC Issue	*Comments*
Traffic & Transport Comments/Requirements: A Traffic Impact Assessment is required.	A traffic impact assessment has been prepared by ARC and attached as **Annexure 7**, and further discussed in Section 8.6.
Environmental Health Comments/ Requirements: Shoalhaven Starches operates under Environmental Protection Agency (EPA) Licence 883 and the following potential environmental impacts have been identified: ▪ Air Quality (and Odours); ▪ Noise; ▪ Acid Sulfate Soils (ASS), and ▪ Site Contamination; ▪ Cooling Towers With regard to air quality, an Air Quality Assessment to ensure compliance with the Air Quality Standards is required to be undertaken for the proposal. With regard to noise, it is proposed that an Environmental Noise Impact Assessment will be submitted to demonstrate how the proposal will satisfy noise limits. Investigations are proposed to ascertain the existence of ASS and the need for an ASS Management Plan. Requirements are also outlined for a Phase 1 – Site Contamination Assessment. With regard to air conditioning/cooling towers, these must be registered with Council. Previously the following conditions were recommended: a) *The air handling system and cooling tower shall be designed, installed and maintained in accordance with the requirement of the Public Health Act 1991 (Part 4 Microbial Control) and Regulations. Further, the air handling system cooling tower shall be designed, installed in accordance with Australian Standard AS3666.1:1995 Air handling and water systems in building - microbial control and shall be maintained in accordance with Australian Standard AS3666.2:1995 Air handling and water systems in building - microbial control - operation and maintenance.* b) *It is legally incumbent on the occupier of the premises to notify the Local Authority (Council) of any changes necessary to update the Register of Premises with Regulated Air Handling Systems installed on them.* c) *All waste water from the cooling tower/humidifier/evaporative cooler/warm water system shall be discharged to sewer under a Trade Waste Agreement with Shoalhaven Water.* <u>Note:</u> The conditions above may be subject to changes in legislation/regulations.	It is acknowledged that the Shoalhaven Starches operates under Environmental protection Agency License Number 883, and reference to this has been made throughout this EA and within the relevant expert reports, as applicable. The EA is supported by an Air Quality Assessment prepared by GHD (**Annexure 5**). Air quality issues are discussed in Section 8.3. The EA is supported by a Noise Impact Assessment prepared by Harwood Acoustics (**Annexure 4**). Noise impact issues are discussed in Section 8.2. The EA is supported by a Phase 1 Site Contamination and Acid Sulfate Soils Assessment prepared by Coffey (**Annexure 8**). Site contamination issues are discussed in Section 8.7 and acid sulfate soils are discussed in Section 8.8. All conditions and requirements relating to air conditioning/ cooling towers for the proposed CO_2 Plant will be adhered to in accordance with the relevant standards and authorities.

Table 4 (continued)

SCC Issue	*Comments*
Flooding Comments/Requirements: This site is categorised as high hazard floodway and the proposal is located partially at high hazard floodway and partially at high hazard flood storage. A detailed flood assessment report is required on how the proposal will achieve all relevant objectives, performance criteria and/or acceptable solutions of Shoalhaven Development Control Plan 2014, as prescribed in Section 5.1 and 5.2 of Chapter G9.	The EA is supported by a Flood Compliance Report prepared by WMAwater (**Annexure 6**). Flooding issues are discussed further in Section 8.4 of this EA.
Shoalhaven Water Comments/Requirements: No additional requirements for this proposal. However, it should be noted the Dairy Farmers site is connected to Council's sewerage scheme via a private sewer pump station. Waste is to be sent to the Manildra Wastewater Treatment Plant, and no connection to the existing internal sewer, which discharges to the private sewer pump station, will be permitted without trade waste approval by Shoalhaven Water.	Noted. All proposed sewer connections will be applied for via application for trade waste approval by Shoalhaven Water (as referred to Section 5.4). All wastewater will be sent to the Manildra Wastewater Treatment Plant or authorised facility.
Building Comments/Requirements: It is assumed that the application will be referred to NSW Fire & Rescue for comment.	The proposal will adhere to all required emergency protocols, policies and procedures, including fire safety and evacuation. It should be noted that a preliminary hazard analysis has been undertaken for the proposal (**Annexure 3**) which addresses all identified risks and provides mitigation measures where required.

7.0 RISK ASSESSMENT OF POTENTIAL ENVIRONMENTAL IMPACTS

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

Table 5
Risk Assessment

Issue	***Relative Change in Environmental Impact***	***Additional Management or Mitigation Measures Required***	***Significance of Issue with this Modification Proposal***
Air Quality (including Odour) Assessment	One of the primary issues that was addressed in the original EA for the Shoalhaven Starches Expansion Project concerned the need for a comprehensive odour assessment and reduction as part of the project. GHD have been engaged by Supagas to undertake an Air Quality Assessment (AQA) with respect to this Modification Proposal. A copy of GHD's assessment is included as **Annexure 5** to this EA.	No additional management or mitigation measures are proposed by the AQA prepared by GHD. No air quality impacts or expected increase to cumulative levels in the local area is anticipated.	Air quality including odour impacts have been identified by GHD and are further addressed in Section 8.3 of this EA.
Wastewater Treatment	***Water Discharges*** The Shoalhaven Starches Factory and Environmental Farm are licensed premises under the Protection of the Environment Operations Act. Wastewater discharges from the site are licensed by the DEC (EPL 883). The plant has a licensed outfall into the Shoalhaven River. The outfall point is a 50 cm diameter metal pipe discharging at the end of an existing jetty. It also has a cooling water discharge comprising a 50 cm diameter pipe which discharges onto a gabion spillway. Under the terms of the Company's EPL water waste streams associated with the plant include: • river water passed through the boiler condensers and the primary side of the heat exchangers; • boiler water treatment plant regeneration waters; and • pH adjusted glucose plant ion exchange unit regeneration waters. All these must be discharged from the cooling water discharges.	No additional management or mitigation measures proposed.	Not a key issue.

Table 5 (continued)

Issue	*Relative Change in Environmental Impact*	*Additional Management or Mitigation Measures Required*	*Significance of Issue with this Modification Proposal*
	The limiting conditions in relation to these discharges include: • The volume of water discharged from the cooling water discharges must not exceed 100,000 kilolitres per day. • The waste waters discharged at both points shall not exceed a temperature of 32°C. This Modification Proposal will not involve any changes to these discharges waters.		
Site Stormwater Management	All site stormwater will be collected and pumped to the Manildra Waste Water Treatment Plant via a Trade Agreement with Shoalhaven Water.	No additional management or mitigation measures proposed.	Not a key issue.
Effluent Irrigation and Storage	The total flour processed on the site as a result of this proposal will not exceed the previously approved amount of 20,000 tpw. Consequently, wastewater volumes will remain unchanged. The proposal will involve the generation of a water condensate which will be directed to the Shoalhaven Starches WWTP. These processes however will only involve a small amount of waste waters that will require to be treated. The treatment and management of wastewater from the site is therefore not envisaged to be a key issue that will need consideration as part of the Environmental Assessment. No change in environmental impacts from that originally identified in EA.	No additional management or mitigation measures proposed.	Not a key issue.

Table 5 (continued)

Issue	***Relative Change in Environmental Impact***	***Additional Management or Mitigation Measures Required***	***Significance of Issue with this Modification Proposal***
Site Contamination	The EA is supported by a Phase 1 Site Contamination Assessment prepared by Coffey Services (**Annexure 8**). Based on the site history and site observations, Coffey identified potential for both low and high likelihood of contamination for the proposed CO_2 Plant. Specifically, the western section of the proposed pipeline was assessed by Coffey's to have a high potential for contamination as bonded asbestos containing material has been previously identified in the area.	In relation to AEC 4 (western section of proposed pipeline), Coffey's recommend the following: • *Sampling of soils be carried out pre-development to assess site conditions, otherwise the site could be managed through adopting a robust construction environmental management plan and Unexpected Finds Protocol (UFP) to mitigate risks to construction workers and the environment. The UFP would assist to provide direction that if, during the excavation work, material is encountered which appears to be potentially contaminated or suspicious, excavation works should cease until observation is carried out by a competent environmental consultant. Potentially contaminated or suspicious material would include stained or odorous soil, fibrous material, asbestos sheeting, drums, metal or plastic chemical containers or brightly coloured material, septic pits etc.* • *should soils require offsite disposal or re-use, then they should be appropriately classified or assessed against relevant resource recovery exemptions and/ or the NSW EPA 2014 Waste Classification Guidelines, whichever is more appropriate.*	Site contamination is addressed in Section 8.7 of this EA.

Table 5 (continued)

Issue	*Relative Change in Environmental Impact*	*Additional Management or Mitigation Measures Required*	*Significance of Issue with this Modification Proposal*
Acid Sulfate Soils	The EA is supported by an Acid Sulphate Soils Assessment also prepared by Coffey's (**Annexure 8**). According to Coffeys, it is possible that Acid Sulfate Soils could be intersected at depths greater than 3 m to 4 m below the ground surface for infrastructure on the southern side of Bolong Road. Acid sulfate soils could be shallower and more sporadic on the northern side of Bolong Road.	Coffey's recommend the following in relation to acid sulfate soil management: • *An acid sulfate soil management plan be prepared for the project which could involve some upfront testing (particularly along the proposed pipeline route) or testing at the time of excavation. The plan should be prepared in accordance with the relevant sections of the 1998 ASS Manual prepared by ASSMAC and details of the plan based on likely volume to be extracted. For small volumes, Coffey's indicate that a simple work plan may be sufficient.* • *'Avoidance' of acid sulfate soils is preferred and Supagas should consider construction methodologies that avoid disturbing ASS, such as use of screw piles (if structurally suitable). In this regard, Coffey's advise that an environmental consultant with suitable experience be engaged to identify and manage ASS to oversee any excavation that could intersect acid sulfate soils and carry out assessment and provide management advice at that time.*	Acid Sulphate Soils is addressed in Section 8.8 of this EA.

Table 5 (continued)

Issue	***Relative Change in Environmental Impact***	***Additional Management or Mitigation Measures Required***	***Significance of Issue with this Modification Proposal***
Riverbank Stability	The EA is supported by a Riverbank Stability Assessment prepared by Coffey's (**Annexure 8**). The risk of riverbank instability is not expected to be significant for the scope of the proposed development.	The following measure for riverbank stability is recommended by Coffey: • *Instability risks could be managed by appropriate footing systems founded at sufficient depth to minimise loads on soils adjacent to the riverbanks. This assessment would need to be confirmed by a specific geotechnical investigation.*	Riverbank Stability is addressed in Section 8.9 of this EA.
Noise	Shoalhaven Starches are licensed under the POEO Act (Environment Protection Licence No. 883) which sets noise limits for the operation of the overall factory complex. Noise goals have been designed for the site to ensure existing noise levels are not increased by additional plant. The noise goals for any new plant are 10 dBA below the EPL noise limits and range between 28 and 32 dBA depending upon the residential receptor location. The EA is supported by a Noise Impact Assessment prepared by Harwood Acoustics Pty Ltd. A copy of this assessment is included in **Annexure 4** to this EA. Noise Impacts are further addressed in Section 8.2 of this EA. Harwood Acoustics conclude in summary that noise emission from the modification proposal will comply with the design noise goal limits imposed on the overall Shoalhaven Starches factory complex by the EPL for the site providing noise control recommendations proposed by Harwood Acoustics are implemented.	The Noise Impact Assessment prepared by Harwood Acoustics conclude: *An assessment of the potential noise impact from the proposed installation and operation of a CO2 Plant by Supagas Pty Ltd at Shoalhaven Starches Pty Ltd's site at 220 Bolong Road, Bomaderry has been undertaken.* *Calculations show that the level of noise emission from the operation of the plant will be within the noise design goals derived from Environment Protection Licence 883 noise limits at each receptor location. This is based on the assumed noise generation of the fixed plant and equipment established in this report.* *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.*	This issue has been identified by the SEARs. Noise impacts are further addressed in Section 8.2 of this EA.

Table 5 (continued)

Issue	***Relative Change in Environmental Impact***	***Additional Management or Mitigation Measures Required***	***Significance of Issue with this Modification Proposal***
Transport & Traffic	A traffic assessment has been undertaken in relation to this proposed modification. The EA is supported by a traffic impact assessment prepared by Anton Reisch Consulting (ARC) (**Annexure 7**).	The Traffic Assessment prepared by ARC makes the following recommendations: • *Parking for staff and occasional visitor (4 spaces) to be provided immediately adjacent to the main CO_2 Plant, and accessible via the existing on site staff parking area located towards the front of the site.* • *The construction of a new access road designed to accommodate the largest anticipated vehicle (i.e. b-doubles) to circulate in an anti-clockwise direction around the main CO_2 Plant.* • *All construction to adhere to the general requirements of Council as employed during past construction projects for Shoalhaven Starches, including:-* - *Limits on construction hours and the hours in which construction vehicles can operate;* - *Limits on routes to be used through the local road network, specifically in regard to Restricted Access Vehicles and a restriction of truck movements to/from Bolong Road east of the Site.*	Traffic issues are further addressed in Section 8.6 of this EA.

Table 5 (continued)

Issue	***Relative Change in Environmental Impact***	***Additional Management or Mitigation Measures Required***	***Significance of Issue with this Modification Proposal***
Hazards	The EA is supported by a Preliminary Hazard Analysis (PHA) which in effect assesses and compares the risks associated with the proposed Supagas Carbon Dioxide Plant against the DoP risk criteria. Pinnacle Risk Management have been engaged to undertake a PHA in relation to this project. The risks associated with the proposed modifications have been assessed by Pinnacle and have been found to be acceptable when compared against the NSW DoP risk criteria. Pinnacle also conclude that societal risk, area cumulative risk, propagation risk, transport risk and environmental risk are also acceptable.	Pinnacle recommend the following: *Ensure that the final design includes means to automatically isolate the carbon dioxide road tanker and storage vessels should a release during a transfer occur (vapour and liquid lines). Actuation should be local as well as remote;* • *Provide CCTV (closed circuit television) coverage of the plant to the Shoalhaven Starches ethanol control room, i.e. these operators control the source of the carbon dioxide;* • *Provide means to suppress an ammonia vapour plume. A plume could occur due to a release from the refrigeration system. Options include using hoses with personnel wearing self-contained breathing apparatus; and* • *Provide alternate emergency assembly areas given that a carbon dioxide plume can travel in any direction.*	The Preliminary Hazard Analysis is discussed in Section 8.1 of the EA.
Flooding	The EA is supported by a Flood Compliance Report prepared by WMAwater which assessed the implication of the proposal on flood levels, flows and velocities. The assessment concluded that there was no significant increase to the 1% AEP, or PMF/ Extreme event flood level on lands outside of Shoalhaven Starches owned land. Consequently, it was not considered necessary to consider flooding impacts further (ie. cumulative effect of proposed works) given the no significant incremental increase as a result of the proposed works.	No additional management or mitigation measures proposed	Not a key issue. Flooding is further discussed in Section 8.4.

Table 5 (continued)

Issue	*Relative Change in Environmental Impact*	*Additional Management or Mitigation Measures Required*	*Significance of Issue with this Modification Proposal*
Waste Management	The proposed CO_2 Plant relating to Project Approval MP06_0228 will not alter the way waste is managed on the site. All waste will be directed to Manildra Wastewater Treatment Plant pursuant to a Trade Waste Agreement with Shoalhaven Water or other authorised facility.	No additional management or mitigation measures proposed	Not a key issue. Waste is further discussed in Section 5.4.
Visual Impact	The works associated with this modification, will be situated within the vicinity of existing industrial development of a similar scale to that which is proposed. Furthermore, the appearance, scale and height of the development will either be obscured from visibility by the public or be similar to existing structures located on the site.	In relation to visual impact, the following is recommended: • *Where appropriate and possible, the proposed CO2 Plant should maintain existing boundary vegetation and increase landscaping and vegetative screening along the frontage to Bolong Road;* • *The materials and colours used for the proposed workshop and amenity buildings associated with the main CO2 Plant should be consistent with those used on adjoining developments and be non-reflective;* • *Colours should blend with existing structures on the site to ensure visual harmony; and*	This is a key Issue identified by this EA. The visual impacts associated with this proposal are addressed in Section 8.5 of this EA.
Flora and Fauna	The proposed works associated with this modification will be located predominantly on existing grassed vacant land. The subject site was historically used for farming and rural purposes (grazing). The site today is heavily disturbed for industrial use purposes with some landscaping present around the perimeter of the site.	No additional management or mitigation measures proposed.	Not a key issue.

Table 5 (continued)

Issue	***Relative Change in Environmental Impact***	***Additional Management or Mitigation Measures Required***	***Significance of Issue with this Modification Proposal***
	There are no identified threatened species or vegetation of significance. The proposed CO_2 Plant will therefore not adversely impact on flora and fauna.		
Heritage and Archaeological Issues	The proposed works associated with this project will be located upon several lots which are not identified or listed as Aboriginal or European cultural heritage significance. The proposed works will therefore have no additional impact in terms of indigenous or non-indigenous heritage.	No additional management or mitigation measures proposed.	Not a key issue.

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

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

8.0 KEY ISSUES

8.1 PRELIMINARY HAZARD ANALYSIS

This Modification Application is supported by a Preliminary Hazard Analysis prepared by Pinnacle Risk Management Pty Ltd ("Pinnacle"). A copy of this PHA forms **Annexure 3** to this EA. This section of the EA is based upon the findings of this assessment.

The risks associated with the proposed modifications to the Shoalhaven Starches Expansion Project (construction of a CO_2 Plant Facility) have been assessed by Pinnacle Risk Management and compared against the DoP risk criteria (refer **Table 6**).

The results are as follows and show compliance with all risk criteria.

Table 6

Risk Assessment

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
Fatality risk to commercial areas, including offices, retail centres, warehouses	5 x 10^{-6} per year	Yes
Fatality risk to sporting complexes and active open spaces	10 x 10^{-6} per year	Yes
Fatality risk to be contained within the boundary of an industrial site	50 x 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 x 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 x 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 x 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 x 10^{-6} per year	Yes

Pinnacle conclude that societal risk, area cumulative risk, propagation risk, transport risk and environmental risk are acceptable.

The primary reasons for the low risk levels from the modifications according to Pinnacle are the separation distances between the hazards and the nearest place of residence and that high levels of carbon dioxide are required to cause fatality.

Pinnacle also commented that the design review process and HAZOP study undertaken for the proposal further mitigates the generic release cases to acceptable levels. This includes designing the ammonia refrigeration system to the relevant Australian Standards

Pinnacle makes the following recommendations in relation to this modification proposal.

1. *Ensure that the final design includes means to automatically isolate the carbon dioxide road tanker and storage vessels should a release during a transfer occur (vapour and liquid lines). Actuation should be local as well as remote;*
2. *Provide CCTV (closed circuit television) coverage of the plant to the Shoalhaven Starches ethanol control room, i.e. these operators control the source of the carbon dioxide;*
3. *Provide means to suppress an ammonia vapour plume. A plume could occur due to a release from the refrigeration system. Options include using hoses with personnel wearing self-contained breathing apparatus; and*
4. *Provide alternate emergency assembly areas given that a carbon dioxide plume can travel in any direction.*

8.2 NOISE IMPACTS

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

The nearest residential locations to the complex are as follows:

- Location 1 – Nobblers Lane, Terara approximately 1400 metres to the south east;
- Location 2 – Riverview Road, Nowra approximately 1600 metres to the south west;
- Location 3 – Meroo Street, Bomaderry approximately 1100 metres to the north west;
- Location 4 – Coomea Street, Bomaderry approximately 1080 metres to the north west.

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

This Modification Application is supported by a Noise Impact Assessment prepared by Harwood Acoustics. A copy of the Noise Impact Assessment prepared by Harwood Acoustics forms **Annexure 4** to this EA. This section of the EA is based upon the findings of this assessment.

8.2.1 Acoustic Criteria

NSW Department of Planning and Environment

Existing Project Approval

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

> *"The proponent shall carry out the project generally in accordance with the:*
>
> *a) EA and associated site plans (see Appendix 2);*
>
> *b) Statement of commitments; and*
>
> *c) Conditions of this approval."*

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

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

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

Existing Project Approval

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

Environment Protection Licence 883

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

Section L5 'Noise Limits' of this licence states:

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

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

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

c) 42 dBA at locations in Meroo Street, Bomaderry;

d) 40 dBA at other locations in Bomaderry."

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

The Shoalhaven Starches complex, neighbouring properties and nearby residential locations are shown on the attached site plan in **Figure 8**.

Figure 8: Location of closest receptors to subject site as per EPL (Harwood Acoustics).

Shoalhaven Starches Noise Management Plan

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

The Shoalhaven Starches Noise Management Plan originally prepared 31 October 2009 and revised 7 September 2010 addresses, among other things, acoustic criteria relating to the Shoalhaven Starches complex and any new developments associated with the

expansion project. Section 3 of the plan lists noise limits from the Environmental Protection Licence as shown in Section 4.1 above and states:

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

EPA Construction Noise Guideline

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

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

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

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

Harwood Acoustics gives consideration to the potential for noise impact from construction activities on residential receptors.

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

Harwood Acoustics has carried out numerous noise surveys in Nowra, Bomaderry and Terara and has found daytime background noise levels range between 33 and 40 dBA depending on the location, as shown in **Table 7** below.

Table 7

Rating Background Levels

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

For the purpose of determining the potential for community reaction to noise emission from construction activities, previously measured background noise levels in the vicinity of each receptor location have been used to determine the noise management levels as shown in **Table 8** below.

Table 8

L_{eq} Noise Management Levels from Construction Activities

Receptor Location	*Noise Management Level*	*How to Apply*
Location 1 (Terara) Location 2 (Nowra) Locations 3 & 4 (Bomaderry)	**43 dBA** (33 + 10) **50 dBA** (40 + 10) **48 dBA** (38 + 10)	The noise affected level represents the point above which there may be some community reaction to noise. ▪ Where the predicted or measured $L_{Aeq\ (15\ min)}$ noise level is greater than the noise affected level, the proponent should apply all feasible and reasonable* work practices to meet the noise affected level. ▪ The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.
	Highly noise affected 75 dB(A)	The highly noise affected level represents the point above which there may be strong community reaction to noise. ▪ Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restricting the hours that the very noisy activities can occur, taking into account: 1. times identified by the community when they are less sensitive to noise (such as before and after school for works near schools, or mid-morning or mid-afternoon for works near residences) 2. if the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.

Project Specific Noise Criteria

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

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

- *28 dBA ($L_{10,\ 15\ minute}$) at locations in Terara on the south side of the Shoalhaven River;*
- *28 dBA ($L_{10,\ 15\ minute}$) at locations in Nowra on the south side of the Shoalhaven River;*
- *32 dBA ($L_{10,\ 15\ minute}$) at locations in Meroo Street, Bomaderry;*
- *30 dBA ($L_{10,\ 15\ minute}$) at other locations in Bomaderry.*

Construction Phase Noise Management Levels:

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

8.2.2 CO_2 Operational Plant Noise Emissions

The main sources of noise associated with the proposal according to Harwood Acoustics are the fixed processing plant comprising cooling tower, pumps, refrigeration units, reboiler, compressor and substation. There will also be truck movements associated with despatching product.

There is no noise data available from the operator or manufacturer at this stage. However, Harwood Acoustics has carried out noise assessments of similar plant and equipment over the past 16 years. In addition, there is an existing CO_2 processing facility located on Bolong Road, Bomaderry opposite the Shoalhaven Starches facility that is owned and operated by BOC Gasses. It is understood that this plant is similar to that proposed by Supagas.

Noise measurements of the BOC Gasses plant undertaken by Harwood Acoustics have been taken at varying distances from the plant and equipment and used, in conjunction with previous measurements of similar plant, to establish the schedule of overall 'A' frequency weighted sound power levels, in decibels re: 1 pW, shown in **Table 9** below.

Table 9

L_{10} Sound Power Levels – CO_2 plant

Description	*$L_{10,\ 15\ minute}$ Sound Power Level (dBA)*
Reboiler	**96**
Cooling tower	**87**
Refrigeration Units	**93**
Compressors	**78**
Pumps	**78**
Overall CO_2 Plant	**98**
Truck	**100**

8.2.3 Noise Level Predictions

8.2.3.1 Predicted Noise Levels

Harwood Acoustics predicts noise levels at each receptor are shown in **Table 10** below.

Table 10

Predicted Noise Levels at Receptor Locations – CO_2 Plant

Description	*Predicted Noise Level $L_{10,\ 15\ minute}$ (dBA) at Receptor Location*			
	Location 1	*Location 2*	*Location 3*	*Location 4*
Design Noise Goal ($L_{10,\ 15\ minute}$)	**28**	**28**	**32**	**30**
CO_2 Plant	26	26	26	26
Complies	**Yes**	**Yes**	**Yes**	**Yes**

The above calculations and predictions consider distance loss to each receptor as well as the following:

- A reduction for duration of a truck operating at full sound power for 5 minutes in any given 15 minute period;
- Ground absorption at receptors R1, R3 and R4 up to a maximum 4 dB.

8.2.3.2 Construction Noise Emission

The construction process will involve removal of obsolete equipment, piling, joining of pipework, pouring concrete slabs and erection of fixed plant. The bulk of equipment will be fabricated offsite and brought to the site on skids.

Table 11 below shows a schedule of sound power levels for typical construction equipment.

Table 11

Construction Equipment – L_{eq} Sound Power Levels

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

Table 12 below shows the predicted level of potential noise emission from construction activities at each of the receptor locations.

Table 12

Predicted Noise Levels at Receptor Locations – Construction Phase

Description	***Predicted Noise Level $L_{eq,\ 15\ minute}$ (dBA) at Receptor Locations***			
	Location 1	***Location 2***	***Location 3***	***Location 4***
Construction Activity	37 – 43	39 – 45	39 – 45	39 – 45
Acceptable Noise Limit ($L_{eq,\ 15\ minute}$)	43	50	48	48
Complies	**Yes**	**Yes**	**Yes**	**Yes**

Ranges are based on activity with and without piling.

According to Harwood Acoustics it can be seen from **Table 12** that the construction noise management levels will be met at each receptor location during the construction phase.

It is worth noting for clarification that the similarity in predicted noise levels at each receptor location from both operational activity and construction works is due to the similar distances in this instance and the effects of ground absorption at R3 and R4 despite being slightly closer than R2 where there is no effect rom ground absorption.

8.2.4 Conclusion

The noise impact assessment undertaken by Harwood Acoustics concludes:

An assessment of the potential noise impact from the proposed installation and operation of a CO2 Plant by Supagas Pty Ltd at Shoalhaven Starches Pty Ltd's site at 220 Bolong Road, Bomaderry has been undertaken.

Calculations show that the level of noise emission from the operation of the plant will be within the noise design goals derived from Environment Protection Licence 883 noise limits at each receptor location. This is based on the assumed noise generation of the fixed plant and equipment established in this report.

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

8.3 AIR QUALITY (INCLUDING ODOUR IMPACTS)

This Modification Application is supported by an Air Quality Assessment (AQA) prepared by GHD Pty Ltd. A copy of GHD's assessment forms **Annexure 5** to this EA. In considering the 'closed system' of the proposed CO_2 Plant and the minor quantities of emissions resultant from such a system, GHD have determined that a full impact assessment is not warranted in this instance. This section of the EA is based upon the findings of this assessment.

The objective of the AQIA prepared by GHD was to identify the sources of emission and to determine whether they will be within relevant air quality standards. To achieve this objective, the AQIA referred to previous Air Quality Assessments undertaken for the site, the *Protection of the Environment Operations Act 1997*, Environmental License Number 883 (for the Shoalhaven Starches Expansion Project) and proposed CO_2 Plant emissions source data.

Site Location and Sensitive Receptors

GHD noted that the site is proximate to a number of sensitive receptors, including the town of Bomaderry to the northwest and Nowra to the south. The nearest receptors to the proposed CO_2 Plant are identified by GHD in **Table 13** (reproduced from Table 1 of GHD's AQA in **Annexure 5**) and mapped in **Figure 9** (sourced from Figure 2-1 of GHD's AQA in **Annexure 5**).

Table 13

Summary of Nearby Sensitive Receptors

(reproduced from Table 1 of GHD's AQA in **Annexure 5**)

Receptor	*Range (m)*	*To nearest odour source*	*Direction*
R1	150	Packing Plant	W
R2	1300	Factory	SW
R3	700	Factory	S
R4	1300	Factory	SE

Figure 9: Site Location and Sensitive Receivers
(sourced from AQIA Report prepared by GHD Pty Ltd)

Emissions

Supagas supplied GHD with a summary of potential emissions from the various process streams. Given that the proposed CO_2 Plant is essentially a 'closed' system, GHD anticipate only minor quantities of emissions. The concentrations of various emissions are presented in **Table 14** (reproduced from Table 2 of GHD's AQA in **Annexure 5**), and summarised following:

- Streams 1, 2, 3 and 6 are liquid and are composed primarily of H_2O.

- Stream 1 (cold water scrubber drain) is estimated to have vapour comprising of a number of potentially odorous oxygenated chemical compounds including Ethanol, Acetaldehyde and Ethyl Acetate. Supagas advise that vapour exiting the cold scrubber is sent down the pipeline to the CO_2 Plant for further treatment. Therefore, GHD note that this source will **not** be a source of odorous or toxic emissions.
- Stream 2 (CO_2 compressor after-cooler condensate drain) may contain trace levels of oxygenated chemical compounds, however GHD note that this stream of up to 1.8 litres per hour (99.7% H_20 and 0.3% CO_2) is **not** a significant quantity to be a source of odorous emissions.
- Stream 3 (dehydration unit cooler condensate drain) and Stream 4 (drier regeneration gas vent), GHD note contain **no** odorous or toxic air pollutants.
- Stream 4 (drier regeneration gas vent) and Stream 5 (CO_2 liquefier gas vent) are two sources of gaseous emissions which GHD note contain **no** odorous or toxic air pollutants.

Table 14

Summary of Plant Emissions
(reproduced from Table 2 of GHD AQA in **Annexure 5**)

*Stream	Description	Flow rate	Temp °C	Concentration (Mole %)						
				CO_2	O_2	N_2	H_2O	**Oxygenates	pH (Type)	Odour
1	Cold water scrubber drain	1.028 LPH	17.7	0.1	0	0	99.57	0.33	6.2	Probable
2	CO_2 compressor after cooler condensate drain	1.8 LPH	35	0.3	Trace	Trace	99.7	Trace	3.0	Nil
3	Dehydration unit cooler condensate drain	10.2 LPH	9.5	0.3	Trace	Trace	99.7	Nil	3.0	Nil
4	Drier regeneration gas vent	60 sm^3/hr	0-240	65.2	5.52	29.28	Nil	Nil	NA	Nil
5	CO_2 liquefier gas vent	128 sm^3/hr	-28.7	65.2	5.52	29.28	Nil	Nil	NA	Nil
6	Cooling tower blow-down	LPH	90	Trace	Trace	Trace	100	Nil	6.8	Nil

* Stream numbers may be found on Proposed Block Flow Diagram Document Number P16027_BFD 01_R5 (shown on Page 2-2).

** Oxygenates comprises mixture of compounds given below in varying proportions with the predominate species being ethanol.

Environmental Protection License

GHD acknowledge that Shoalhaven Starches operate under Environmental Protection License Number 833, which states that they must not cause or permit the emission of offensive odour beyond the boundary of the premises. GHD further note that previous odour assessments undertaken for Shoalhaven Starches (Mod13 Air Quality Assessment, GHD 2017) show that the site is currently predicted to comply with the odour criterion at the four assessed nearby receptors.

Potential Impacts

GHD summarise the potential impacts as follows:

- Stream 1 generates small quantities of potentially odorous emissions, however any vapour will be discharged into the pipeline to the CO_2 Plant.
- Stream 2 may have trace levels of oxygenated chemical compounds however this would be less than 1.8 millilitres (less than 0.1% of 1.8 L) per hour.

Overall, based on the information provided, GHD state that no significant or assessable odour or other toxic emissions are anticipated, and there will be no impacts on any nearby sensitive receptors.

Conclusion

The AQA prepared by GHD concludes:

> *"The proposal is primarily enclosed with only minor emissions to air. Air quality impacts (odour and other pollutants) are not anticipated and there is no expected increase to the cumulative levels in the local area".*

8.4 FLOODING

The subject site is prone to inundation during the 1% Annual Exceedance Probability (AEP) flood event by floodwaters from the Shoalhaven River. Therefore, the Modification Application is supported by a Flood Compliance Report prepared by WMAwater ("WMA") (**Annexure 6**). This section of the EA is based upon the findings of this assessment.

Hydraulic Assessment

The position of the proposed CO_2 plant is surrounded on the upstream (west) and downstream (east) side by existing buildings. Thus, according to WMA the flow path of floodwaters from the Shoalhaven River over the river bank and towards Bolong Road and through the site is already impeded however this will be increased with the proposed construction of the plant.

WMA identified that the construction of any works on the floodplain will cause a loss of temporary floodplain storage and a loss of hydraulic conveyance, and that any resulting increase in flood levels depends upon the magnitude of these losses. Given the proposed plant comprises a small footprint with much of it raised and the floodplain storage area of the Shoalhaven River floodplain is of the order of 100 km^2 WMA determined that the loss of temporary floodplain storage due to the proposed works is negligible.

WMA further indicate the loss of hydraulic conveyance depends on the extent of the restriction to a flow path caused by the proposed plant. Prior to construction of the Dairy Farmers' factory (which closed 2006) there would have been significant flow through the site during a flood, as there is across any river bank. However, since then, the construction of the Dairy Farmers' factory has significantly restricted the flow path through the site.

The proposed works (cold water scrubber) at 160 Bolong Road were considered by WMA too small to be accurately modelled within the existing hydraulic model and therefore determined 'minimal impact' on flood levels outside the immediate 10 m radius of the proposed works. Similarly, WMA also determined the loss of temporary storage due to such minimal works to be negligible.

Chapter G9 of Shoalhaven DCP: Development on Flood Prone Land

The flood assessment by WMA has addressed the applicable performance criteria of Chapter G9 of the Shoalhaven DCP, as requested by Shoalhaven Council (refer to Section 6.0). This is demonstrated in Section 3.1 of the Flood Compliance Report and reproduced in **Table 15**.

Table 15

Performance Criteria and Response for Section 5.1 of Chapter 9 of the SDCP
(sourced from Section 3.1 of the Flood Compliance Report prepared by WMAwater in **Annexure 6**)

Performance Criteria	***Response***
P1 Development or work on flood prone land will meet the following:	
The development will not increase the risk to life or safety of persons during a flood event on the development site and adjoining land.	Up to two additional workers from will be on the site. Thus, the proposed development will increase the number of workers who may be subject to flood risk. The use of this site is further away from high ground than the existing plant at 160 Bolong Road. Consequently, any rescue during a flood will be more hazardous unless workers are evacuated prior to the river overtopping the northern bank. However, the existing building on the site has areas for safe refuge above even the PMF.
The development or work will not unduly restrict the flow behaviour of floodwaters.	Refer Hydraulic Impact Assessment (Section 3.2 of Flood Compliance Report in **Annexure 6**).

Table 15 (continued)

Performance Criteria	*Response*
The development or work will not unduly increase the level or flow of floodwaters or stormwater runoff on land in the vicinity. 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.	The proposed development is within existing built up industrial land with trees on the periphery of the site. All runoff under existing and future conditions will reach the ground in nearly identical locations and thus the works will have no impact on erosion or siltation.
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.	A separate structural report will be provided.
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.	A separate structural report on the potential failure of existing buildings and stored equipment and product will be provided.
Potential damage due to inundation of proposed buildings and structures is minimised.	Inundation of the site and the proposed plant and / or debris impact may cause damage to electrical and other components feeding the equipment as well as damage to the plant itself. These issues will be considered in an updated Shoalhaven Starches Flood Plan. Of importance is the potential risk from equipment being moved by floodwaters from the site.
The development will not obstruct escape routes for both people and stock in the event of a flood.	The proposed works will not occupy escape routes or cause workers to become trapped.
The development will not unduly increase dependency on emergency services.	The works will increase the number of workers from Shoalhaven Starches who may be subject to flood risk. These issues will need to be examined in an updated Shoalhaven Starches Flood Plan.
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.	Refer Hydraulic Impact Assessment (Section 3.2 of Flood Compliance Report in **Annexure 6**).
The development will not adversely affect the integrity of floodplains and floodways, including riparian vegetation, fluvial geomorphologic environmental processes and water quality.	The works will be constructed on land designated as high hazard floodway in the 1% AEP event (from flood certificate in Appendix B). The site is industrial land with limited existing vegetation and is beyond the influence of normal fluvial geomorphic processes. The works will have no impact on water quality.

Hydraulic Modelling Results

WMA conclude:

> *The proposed works do slightly decrease the amount of floodwaters from entering the northern floodplain across the river bank. Thus immediately upstream and to the east of the proposed works there is a slight increase in peak level in the 1% event with a more extensive impact in the PMF / Extreme*

event. Though this increase in level is largely within the confines of land owned by Shoalhaven Starches. The potential impact of the proposed works is much reduced as they are sheltered behind existing buildings and structures that already inhibit the flow path.

Downstream of the proposed works on Bolong Road there is a reduction in peak level of less than 0.1m. This occurs because the proposed works reduce slightly the amount of flood waters crossing through the site and thus flood levels are slightly lowered.

In conclusion the proposed works do not significantly increase the 1% AEP, or PMF / Extreme event flood level on lands outside those owned by Shoalhaven Starches. Consequently it was not considered necessary to consider the cumulative effects of the proposed works as there is no significant incremental increase as a result of these works.

8.5 VISUAL IMPACTS

The Scenic Character and Environment

The subject 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 subject site is characterised by typical industrial structures with an overall bulk and scale that dominates the surrounding locality. The structural components located on that part of 171 Bolong Road which is on the southern side of Bolong Road and which form part of the Shoalhaven Starches factory complex, include a cold water scrubber, blower and 4 m high above ground pipeline extending from the rear (flue) stacks to the cold water scrubber. The above ground pipeline is the highest structure proposed to be located on 171 Bolong Road and together with the cold water scrubber and blower, are located to the rear of the dominating stack structures for the Shoalhaven Starches factory complex.

The main part of the proposed Supagas facility is the CO_2 Plant to be located on the former Dairy Farmers' factory site. This plant will comprise a range of structures and buildings including storage tanks, processing equipment, compressor, pipe racks, cooling tower, transformer, workshop and amenities buildings. The maximum height of the tallest structure will be a storage tank at 7.26 m in height, closely followed by Process Skid 02A/B at

approximately 7 m in height. The setback of the CO_2 Plant is approximately 50 m from Bolong Road to the north and 80 m from the Shoalhaven River to the south.

Whilst the proposed works on 171 Bolong Road will be barely visible from relevant vantage points due to visual obstruction from the existing industrial facility (Shoalhaven Starches ethanol distillery), the proposed works on 220 Bolong Road will be more visible from relevant vantage points. Overall the appearance of the site is considered typical of an industrial facility of this nature and consistent with surrounding development in the immediate vicinity.

The most relevant vantage points from where the proposed CO_2 Plant is visible would include:

The Princes Highway – views of the existing factory site are possible from selected locations along the Princes Highway north of Bomaderry, travelling in both a northerly and southerly direction. Whilst the location of the CO_2 Plant is slightly visible in the landscape, its overall visual impact is reduced by virtue of the distance between the plant; the intermittent nature of the views; a rise in topography which screens the site from view; and vegetation.

Burraga (Pig) Island – Burraga Island is situated in the middle of the Shoalhaven River and provides the closest vantage point to the southern boundary of the CO_2 Plant site. The island however is privately owned and not accessible to the public. Vegetation screening along the riverbank adjacent to the site reduces the visibility of existing buildings and structures.

Bolong Road – Bolong Road runs along the frontage of both the main and raw CO_2 treatment plant sites. Views of the CO_2 Plant will be readily visible when travelling in both an easterly or westerly direction. Attempts have been made to provide some tree planting along the boundaries of 220 Bolong Road and 171 Bolong Road to “soften” the appearance of the development.

Nowra Bridge – The Nowra Bridge crosses the Shoalhaven River and provides limited opportunities for views of the Shoalhaven factory site. The dominant visual elements from the bridge are the river, vegetation along the riverbanks and the escarpment.

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 proposed CO_2 Plant on the former Dairy Farmers’ site 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 and the former Dairy Farmers' factory, like the other significant industrial sites, is visible from the lookout.

Visual Impact of Proposal

The proposed CO_2 Plant will involve the erection of structures with varying dimensions and height adjacent to existing industrial facilities. The proposed works will include:

- Raw CO_2 Treatment Plant (located at 171 Bolong Road) – construction of cold water scrubber, chiller and above ground piping. The cold water scrubber is approximately 4.1 m high. The chiller has a maximum height of 1.4 m in height and the above ground piping is approximately 4 m in height.
- CO_2 Plant (located at 220 Bolong Road) – construction of workshop, amenities buildings, process skids, pipe racks, storage tanks and a range of other, less prominent ancillary infrastructure. The maximum height of the CO_2 Plant will be 7.26 m which is the height of the storage tank located closest to the Shoalhaven River. The process skids located closest to the Shoalhaven River will have a similar maximum height of 7.0 m.

The proposed CO_2 Plant reflects a character and scale that is consistent with existing structures located upon the former Dairy Farmers' factory and the adjacent Boweld factory to the east.

The visual impact of these works from the identified vantage points (refer **Figure 10**) is described as follows:

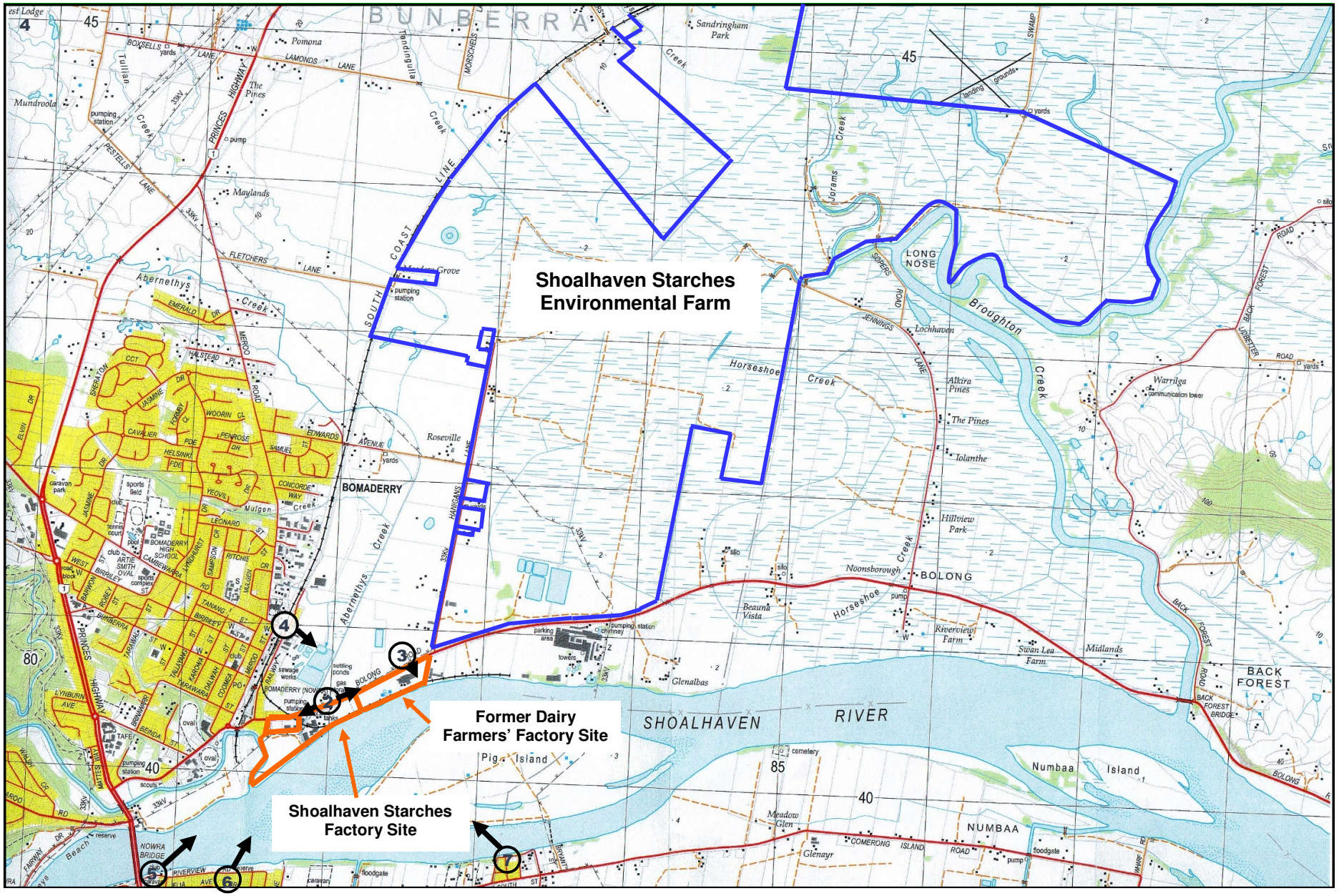


Figure 10: Vantage Points for Plates

The Princes Highway

The Shoalhaven Starches sites (predominantly the factory) are 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 Shoalhaven 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, the maximum height of the proposal at only 7.2 m and the screening of the site attributed to terrain, existing infrastructure and vegetation, the proposed CO_2 Plant will not be visible from these vantage points.

Plate 1: View of Shoalhaven Starches Factory from Princes Highway (within vicinity of Boxsells Lane). Shoalhaven factory stack is barely visible.

Bolong Road

The existing Shoalhaven factory site and former Dairy Farmers' factory site are clearly visible from Bolong Road by vehicles approaching from the east, and along the frontage of the site refer (**Plate 2**).

Works associated with this modification on the Shoalhaven factory site (raw CO_2 treatment) will involve significantly less bulk, scale and height of development when compared to existing structures. View of the raw CO_2 treatment structure will not be visible from Bolong Road due to obstruction from existing development located closer to Bolong Road.

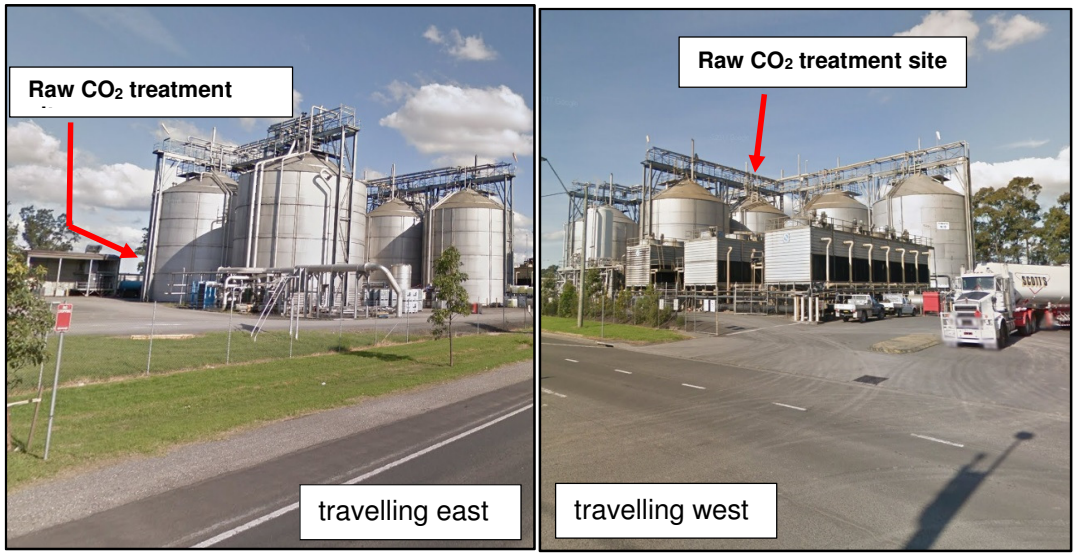


Plate 2: View of Shoalhaven Starches factory site travelling east and west along Bolong Road.
(Note: Proposed Raw CO_2 treatment facility is shielded from view in both directions by existing flue stacks for the ethanol distillery.)

Works associated with the CO2 Plant on the former Dairy Farmers' site will comprise structures of a similar height, bulk and scale as the existing structures on the former Dairy farmers' site as well as those located on adjoining property to the east of the site (Boweld Constructions). The proposed CO_2 Plant structure is also setback (approximately 50 m) from Bolong Road to maintain similar alignment to adjoining structures. Refer to **Plate 3.** It is recommended that additional landscape screening be provided between the Bolong Road and the CO_2 plant site (refer to 'Landscape Screening' below for further details).

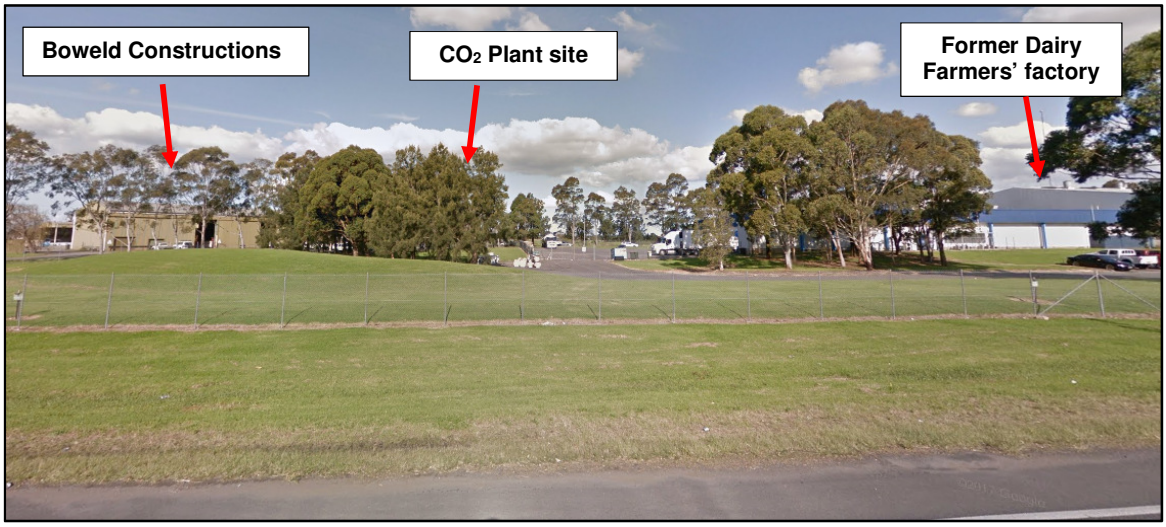


Plate 3: View of CO_2 Plant site from Bolong Road
(Note: CO_2 Plant to be setback in similar alignment with Dairy Farmers' factory and Boweld Constructions and of a similar height, bulk and scale).

Bomaderry Urban Area

The township of Bomaderry is slightly elevated and some locations within this urban area have extensive views of the Shoalhaven factory site and partial view of the former Dairy Farmers' factory site (refer **Plate 4**).

The raw CO_2 treatment site, located behind the flue stacks for the ethanol distillery on the Shoalhaven Starches factory site will not be visible from this vantage point. The CO_2 Plant located adjacent to the former Dairy Farmers' factory may be partially visible however will be partially screened from view due to varying terrain, distance and obstruction by existing vegetation

Plate 4: View of Shoalhaven Starches factory site and former Dairy Farmers' factory site from the intersection 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 5**).

Plate 5: View of raw CO_2 treatment site from Nowra Bridge over the Shoalhaven River.

The proposed works associated with the CO_2 Plant are not visible from this vantage point due to a bend in the river which obscures the Dairy Farmers' factory site from view of Nowra Bridge. The raw CO_2 treatment site to located on the Shoalhaven Factory site, although sited close to the river, will also be obscured from view due to existing riparian vegetation. The proposed works will not be visible from Nowra bridge.

Riverview Road

The main vantage point from where the proposed works for the raw CO_2 treatment facility to be located on the Shoalhaven factory site could be slightly visible from residences along Riverview Road directly south of the site (refer **Plate 6**). This view is from a distance of about 750 metres. Riverside vegetation along both the northern and southern banks will considerably obstruct the raw CO_2 treatment site from view. Furthermore, given that the maximum height of the raw CO_2 treatment site is 4 m and the overall structural envelope is approximately 6 m x 8 m, the proposed works are not considered to adversely impact visual amenity or scenic impact from this vantage point. The CO_2 Plant site is not visible from this vantage point.

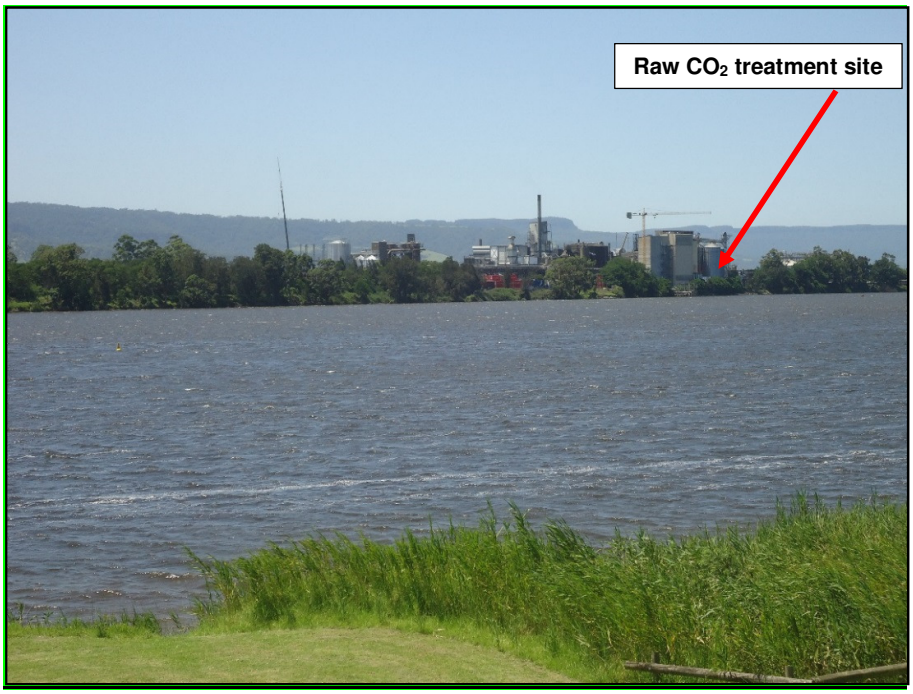


Plate 6: View of Raw CO_2 Treatment site from Riverview Road area.

Terara

The village of Terara is approximately 1.4 kilometres due South from both the Shoalhaven Starches factory site and former Dairy Farmers' factory site. The view of both factory sites as seen from Berry Street, Terara is shown in **Plate 7**.

Plate 7: View of Shoalhaven Starches factory and former Dairy Farmers' factory from Berry Street, Terara.

The existing boiler stack is clearly visible from this vantage point, however it is very unlikely that the proposed raw CO_2 treatment facility will be visible from this vantage point given its relatively low height of 4 m and small scale footprint. The proposed CO_2 Plant on the former Dairy Farmers' factory site may be visible in part, however will be considerably

obscured from view by substantial vegetative screening in the south-east corner of the site, in addition to riparian corridor planting along the Shoalhaven River. Overall, the proposal is not considered to be an adverse visual impact from this vantage point.

Cambewarra Lookout

Cambewarra Lookout is situated about 7 km to the northwest of the subject sites. 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 both factory sites for the Shoalhaven Starches are visible from this vantage point, due to scale of the view, it would be considerably difficult to make out the works associated with CO_2 Plant 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 could be undertaken to minimise the visual impact of the proposal. Where appropriate and possible, the proposed CO_2 Plant should maintain existing boundary vegetation and increase landscaping and vegetative screening along the frontage to Bolong Road. The materials and colours used for the proposed workshop and amenity buildings associated with the CO_2 Plant should be consistent with those used on adjoining developments. Colours should blend with existing structures on the site to ensure visual harmony.

Landscape Screening

Additional landscape screening between the frontage of Bolong Road and the proposed CO_2 Plant will further minimise visual impact associated with proposal. The proposed circular road around the CO_2 Plant for truck movements and parking (refer to following Section 8.6 Traffic and Parking) will necessitate removal of some existing landscaping, and therefore it is proposed to replace and add to any removed landscaping for the site by planting between the Bolong Road reserve and the CO_2 Plant building footprint (refer **Plate 8**).

Plate 8: Area for additional landscape screening.

8.6 TRAFFIC AND PARKING

This Modification Application is supported by a Traffic Impact Assessment prepared by ARC Traffic & Transport (ARC). In undertaking their assessment ARC has referenced their previous assessments that have been undertaken in relation to the Shoalhaven Starches site. This assessment has reviewed the potential construction and operational aspects of the proposal, and provides recommendations by which potential impacts can be minimised if not entirely ameliorated. A copy of ARC's report forms **Annexure 7** to this EA. This section of the EA is based upon and provides a summary of the main findings of this assessment.

Access

Road Network Access

All access to the proposed CO_2 Plant will be by the existing intersection of Bolong Road and the former Dairy Farmers' site located at 220 Bolong Road, Bomaderry. Of note, is that all trucks will arrive and depart to Bolong Road west of the former Dairy Farmers' site. No truck trips will be generated to Bolong Road east of the former Dairy Farmers' site.

Only occasional maintenance access is required to the raw CO_2 treatment site (cold water scrubber) to be located at 171 Bolong Road, Bomaderry and it is understood that access for this purpose would be provided via the main access for the ethanol distillery.

Internal Staff Vehicle Access

Parking for staff (and the occasional visitor and/ or maintenance person) will be provided adjacent to the CO_2 Plant, and accessible via the existing on-site staff parking area located towards the front of the site. An additional 4 parking spaces will be provided to accommodate the minimal staff (maximum of 2) in addition to the occasional visitor or maintenance person. Proposed parking (4 spaces) for the CO_2 Plant is shown on Figure 2.2.3.1 within the Traffic Assessment Report by ARC in **Annexure 7**.

Internal Truck Access

Truck access to and from the proposed CO_2 Plant will essentially be along the same truck access paths as currently used by trucks for the meat plant (currently operating within the former Dairy Farmers' factory). Trucks for the CO_2 Plant will continue to enter the site via Bolong Road (from the west) and then proceed to the south of the site via the central access aisle which traverses through existing buildings, and then turn left (east) along the internal access road towards the CO_2 Plant. Trucks would then circle (anti-clockwise) around the Plant via a new access road designed to accommodate the largest anticipated vehicle (ie. b-doubles) and park on the designated weigh bridge for loading to occur. The weighbridge then reports the loaded weight of trucks and departure is via the access aisle that runs along the western side of the site to return to Bolong Road.

Note: The satellite images over which the truck movements are displayed show a truck parking area to the south of the site, which is no longer used.

Trip Generation and Distribution

Trip Generation

The proposed CO_2 Plant will be built over two stages, the first stage will generate approximately 50 tonnes per day and the second stage when fully operational, will generate a maximum of 100 tonnes of CO_2 per day. Transport will include the use of B-Doubles with a carrying capacity of 30 tonnes and single articulated trucks with a carrying capacity of 20 tonnes, thus requiring a maximum of 2 B-Doubles and 2 articulated vehicles each day when fully operational.

The peak daily truck generation of the CO_2 Plant is estimated at 8 trucks per day, with no more than an estimated 2 truck trips (1 arrival and 1 departure trip) being generated within peak commuter hours.

Staff trip generation is minimal given that only 2 permanent full-time staff will be employed for the CO_2 Plant. As a worst case scenario, staff would generate 2 arrival trips in the AM peak hour and 2 departure trips in the PM peak hour.

Therefore, based on the above, ARC conclude that the total peak generation for the CO_2 Plant, when fully operational, is estimated at a maximum of 4 vehicle trips in both the AM and PM peak hours.

Trip Distribution

Distribution of CO_2 will occur throughout Australia, including to Beenleigh, Qld; Ingleburn, NSW; Adelaide, South Australia and Dandenong, Victoria. Therefore, ARC analyse that all truck trips would be generated to and from the Princes Highway, west of the former Dairy Farmers' site. These trips would be distributed either directly via Bolong Road to/ from the Princes Highway, or via the alterative heavy vehicle route along Railway Street, Cambewarra Road and Meroo Road to/ from the Princes Highway. It is noted that Meroo Road does not provide for Restricted Access Vehicles (RAVs) and as such any RAVs would be required to utilise the direct Bolong Road to/ from Princes Highway, however, there is no expectation at this time that RAVs would be used for transportation of CO_2.

ARC also indicate that heavy vehicle restrictions are in force along parts of Bolong Road, east of the former Dairy Farmers' site, and as such, no truck trips would be generated to/ from Bolong Road to the east.

In relation to staff trip distribution, ARC estimate that these are expected to have the same percentage distribution as those assigned to Shoalhaven Starches staff trips, being approximately 25% of trips to/from the east and 75% of trips to/ from the west. ARC note of course that with only 2 staff as proposed for the CO_2 Plant, this would equate to either 100% to the east or 50% in both directions.

Construction

According to ARC, it is expected that any Modification approval to Project MP 06_0228 will condition the requirement for a Construction Traffic Management Plan. Details of construction requirements were not known at the time the traffic assessment was prepared, however ARC expects that construction will be significantly less in scope than recent construction projects and those scheduled to occur across the Shoalhaven Starches sites.

ARC identified that there is no information to suggest that a short construction period would in any way significantly impact the operation of the Bolong Road and former Dairy Farmers' site intersection located at 220 Bolong Road, and emphasise the presence of existing access paths and space throughout the site which could be used by construction vehicles and staff parking during construction.

In relation to the proposed raw treatment CO_2 site (cold scrubber) located on 171 Bolong Road, ARC similarly identified that further construction details and requirements may need to be provided (to Council), however there is no information to suggest that construction could not be completed with minimal impact along Bolong Road.

ARC anticipates that construction would be expected to adhere to the general requirements of Council, as employed during past projects, including:

- Limits on construction hours, and the hours in which construction vehicles can operate; and
- Limits on routes to be used through the local road network, specifically in regard to Restricted Access Vehicles (which it is noted are not expected to be required for the construction works) and a restriction of truck movements to/from Bolong Road east of the site.

Traffic Impacts

According to ARC, the proposed CO_2 Plant will have little, if any impact, on the local road network, given the minimal trip generation of plant operations. Even if traffic flows in Bolong Road increased annually from the existing peak levels, ARC confirmed that SIDRA modelling for the 3 – 4 vehicle trips in a peak hour would have no impact on the levels of service as reported under 2017 and 2027 base conditions (referred to in Table 1.5.2 of the Traffic Assessment within **Annexure 7**). Essentially, no change to key indicators such as average delay, degree of saturation or queue lengths would occur from the proposed additional vehicle trips.

Similarly, ARC conclude that the additional 4 trips into the on-site traffic environment would have no impact on existing on-site operations, with the turning facility providing ample capacity to accommodate an average of 1 additional vehicle trip every 15 minutes during peak hours.

Parking

The proposed CO_2 Plant provides for an additional 4 parking spaces which ARC comments is more than enough capacity for staff and the occasional visitor demands. ARC confirmed that the parking spaces will be provided adjacent and parallel to the building structures (as shown in Figure 2.2.3.1 of the Traffic Assessment in **Annexure 7**), and will be designed in compliance with AS 2890.1.

Conclusion

The Traffic Impact Assessment prepared by ARC concludes:

"Following a detailed and independent assessment of the access, traffic and parking characteristics of the proposed Modification, ARC has concluded that the Modification – and specifically the potential impacts of the Plant's operational traffic - would have no significant impacts on the local traffic environment. In summary:-

- *The Modification will utilise the existing intersection of Bolong Road & Dairy Site, which, as recently conditioned, will be fully upgraded to provide design compliance with past conditioned upgrades, and additionally include new infrastructure as required further to the recent approval of Modification 12.*
- *The minimal additional trips generated by the Modification will utilise existing on-site access paths to and from the Plant.*
- *The Plant will generate only a very minor level of daily and peak hour traffic; these additional trips would have no impact on the operation of key local intersections or on the internal access network within the Dairy Site.*
- *Parking will be provided that meets the peak staff demand.*
- *There is no information to suggest that the construction of the Plant and ancillary infrastructure could not be carried out within minimal impact.*

8.7 SITE CONTAMINATION

The Modification Application is supported by a Phase 1 Site Contamination, Preliminary Acid Sulphate Soils and Riverbank Stability Assessment prepared by Coffey's (**Annexure 8**). Coffey's has carried out previous geotechnical and environmental reports in this general area. The scope of works included a site history review (including review of previous reports) wherein it was noted that the Contamination Assessment undertaken by Coffey in 2015 for the proposed Starches Product Dryer (Part Lot 143 DP1069758) identified soils with bonded asbestos containing material (ACM) close to where the underground pipeline for the CO_2 Plant is proposed to be located. This has been considered and investigated further in relation to the subject site(s).

Site History and Observations

The general area on which the CO_2 Plant is to be located had a history of either vacant or rural/ agricultural purposes (early 20th century). Between 1903 to 1970, the main site (to contain the proposed CO_2 Plant) was owned by a variety of individuals for farming purposes (mainly dairy). Historical aerial photography further indicates that the site was grassed rural land (likely grazing) up to between 1984 and 1992. During this time, a Dairy Farmers' milk co-op was built and the site to the east of the co-op formed an unused grassed area and does not appear to have been used during or post the co-op. The area of the proposed raw CO_2 primary treatment (cold scrubber) on the Shoalhaven Starches factory site had a similar

history to the former Dairy Farmers' site, except that fermenters were constructed on the former site between 2002 and 2013. The proposed underground pipeline alignment intersects an area with a former homestead which was present prior to 1993.

Limited information on filling was available. A grassed fill mound was observed in the northern part of the CO_2 Plant site, which was also evident in aerial photos back to 1993 when the dairy co-op building was established. The area of the proposed raw CO_2 preliminary treatment facility (cold scrubber) had a gravel hardstand and some fill may be present. As mentioned above, a previous report by Coffey identified soils with bonded asbestos containing material (ACM) close to where the proposed underground pipeline is to be located.

No information was available to suggest chemical use or storage at the CO_2 plant site. The site is furthermore not subject to any notifications under the Contaminated Land Management Act 1997 or listed under the NSW EPA Register (including immediate surrounds).

Coffey's undertook a site walkover by an environmental scientist familiar with the area on 15 September 2017 in the company of a Supagas representative. Site observations revealed no visible evidence of underground storage tanks, chemical storage or staining. No apparent evidence was noted of vegetation die back. The area north of Bolong Road appeared to be generally grassed grazing land. Observation of the proposed raw CO_2 (cold water scrubber) site is relatively small (approximately 6 x 8 m) and is currently occupied by 2 shipping containers said to be containing general equipment.

Based on the site history and site observations (as summarised above), there is potential for both low and high likelihood of contamination, as discussed further below.

Potential Contamination Sources

Coffey's identified and classified four sources of potential contamination sources, otherwise known as Areas of Environmental Concern (AECs). These findings are highlighted in **Table 16** (extracted from Coffey's Report in **Annexure 8**) and summarised following:

- AECs 1, 2 and 3 (as described in **Table 16**) have generally a low likelihood for being affected by contamination that would pose an unacceptable risk to human health or the environment under the proposed development scenario;
- AEC 4 (the western section of the proposed pipeline) was assessed to have a high potential for contamination as bonded asbestos containing material has been previously identified in the area.

Table 16

Potential AEC/ Source Summary
(sourced from Phase 1 Contamination and preliminary Acid Sulfate Soil and Riverbank Stability Assessments prepared by Coffey)

AEC /Source	Likelihood of contamination	COPCs
AEC 1 - The main CO2 plant and the raw CO2 treatment plant from potential presence of imported fill of unknown origin and quality (in particular the grassed mound in the northern part of the main CO2 plant)	Low	TRH, BTEX, PAH, OC/OP, PCB, heavy metals and asbestos
AEC 2 – Proposed main CO_2 plant from possible effluent irrigation	Low	Nutrients, pH and salinity (in groundwater and surface water)
AEC 3 – Proposed raw CO_2 plant area from nearby substation and other industrial activity	Low	Petroleum hydrocarbons, heavy metals
AEC 4 – Western section of proposed pipeline (area of former homestead – see Figure 2) where bonded asbestos containing material has been previously identified	High	Asbestos (if the pipeline goes underground or if foundations are required within area of adjacent hardstand noted to contain asbestos).

Recommendations

Based upon their findings, Coffey's consider AECs 1, 2 and 3 have generally a low likelihood for being affected by contamination that would pose an unacceptable risk to human health or the environment under the proposed development scenario.

AEC 4 (western section of the pipeline) was assess by Coffey's to have a high potential for contamination as bonded asbestos containing material has been previously identified in this area. In relation to this area, Coffey's recommend:

> *Sampling of soils be carried out pre-development to assess actual conditions of the site conditions; otherwise the site could be managed through adopting a robust construction environmental management plan and Unexpected Finds Protocol (UFP) to mitigate risks to construction workers and the environment. The UFP would assist to provide direction that if, during the excavation work, material is encountered which appears to be potentially contaminated or suspicious, excavation works should cease until observation is carried out by a competent environmental consultant. Potentially contaminated or suspicious material would include stained or odorous soil, fibrous material, asbestos sheeting, drums, metal or plastic chemical containers or brightly coloured material, septic pits etc; AND*
>
> *Should soils require offsite disposal or re-use, then they should be appropriately classified or assessed against relevant resource recovery exemptions and/ or the NSW EPA 2014 Waste Classification Guidelines, whichever is more appropriate.*

8.8 ACID SULPHATE SOILS

The Coffey's report referred to in Section 8.7 above (**Annexure 8**) also addressed the issue of Acid Sulphate Soils (ASS).

Site Observations and Previous Assessments

A review of acid sulphate soil potential was also conducted as part of the previous investigations undertaken by Coffey's as mentioned in Section 8.7 above. Coffey has previously carried out numerous assessments on land between Bolong Road and the Shoalhaven River for Manildra, which identified that it is possible that ASS could be intersected at depths greater than 3 m to 4 m below the ground surface at the sites of both the CO_2 Plant and the raw CO_2 treatment plant (cold scrubber). At shallower depths, there is a low risk of acid sulphate soils, which may be influenced by the presence of fill. Coffey's continue to clarify that should dark, grey, high plasticity estuarine clays be encountered at depths shallower than 3m, these soils should be considered potential acid sulphate soils.

A previous assessment by Coffey in 2008, on land to the north of Bolong Road and east of the proposed pipeline, recorded some actual acidity possibly suggesting potential acid sulfate soils. Such recordings suggest that acid sulfate soils could be sporadic and in lenses within vicinity of the proposed pipeline.

Potential for Acid Sulfate Soils

Based on the geological site setting, previous and current results, Coffey's conclude that it is possible that ASS could be intersected at depths greater than 3 m to 4 m below the ground surface for infrastructure on the southern side of Bolong Road, and that acid sulfate soils could be shallower and more sporadic on the northern side of Bolong Road for the proposed pipeline.

Recommendations

Coffey's recommend the following:

> *An acid sulfate soil management plan be prepared for the project which could involve some upfront testing (particularly along the proposed pipeline route) or testing at the time of excavation. The plan should be prepared in accordance with the relevant sections of the 1998 ASS Manual prepared by ASSMAC and details of the plan based on likely volume to be extracted. For small volumes, Coffey's indicate that a simple work plan may be sufficient.*
>
> *'Avoidance' of acid sulfate soils is preferred and Supagas should consider construction methodologies that avoid disturbing ASS, such as use of screw piles (if structurally suitable). In this regard, Coffey's advise that an environmental consultant with suitable experience be engaged to identify and manage ASS to oversee any excavation that could intersect acid sulfate soils and carry out assessment and provide management advice at that time.*

8.9 RIVERBANK STABILITY

The Coffey's report referred to in Section 8.7 above (**Annexure 8**) also addressed the Riverbank stability for the Shoalhaven River located directly south of the CO_2 plant site and raw CO_2 primary treatment (cold water scrubber) site.

Observations

Coffey's observed that the CO_2 site is relatively remote (about 40m) from the northern bank of the Shoalhaven River and while the raw CO_2 site is located closer to the river (about 20 m), it has a much smaller footprint.

Conclusion

Given the inferred ground conditions and remoteness of the proposed development from the riverbank, Coffey's conclude:

> *"that the risk of riverbank instability is not expected to be significant for the scope of development as proposed"*.

Recommendations

Coffey's advise that instability risks could be managed by appropriate footing systems founded at sufficient depth to minimise loads on soils adjacent to the riverbanks. Such assessment would need to be confirmed by specific geotechnical investigation.

9.0 STATEMENT OF ADDITIONAL COMMITMENTS

Section 8.0 of the EA for the Shoalhaven Starches Expansion Project prepared by our firm provides a Statement of Commitments agreed to by Shoalhaven Starches Pty Ltd outlining environmental management, mitigation and monitoring measures to be implemented to minimise potential impacts associated with the Shoalhaven Expansion Project and having regard to the findings of the EA.

The only additional commitments arising from this modification proposal (and to which both Shoalhaven Starches and Supagas commit) include the following:

9.1 PRELIMINARY HAZARD ANALYSIS

Table 17 outlines recommended additional management procedures and design considerations that Supagas commits to implementing and incorporating into practices that would prevent and / or minimise risk scenarios from occurring.

Table 17

Preliminary Hazard Analysis

Preliminary Hazard Analysis
Supagas commits to implementing the recommendations of the PHA prepared by Pinnacle Risk as follows: • *Ensure that the final design includes means to automatically isolate the carbon dioxide road tanker and storage vessels should a release during a transfer occur (vapour and liquid lines). Actuation should be local as well as remote;* • *Provide CCTV (closed circuit television) coverage of the plant to the Shoalhaven Starches ethanol control room, i.e. these operators control the source of the carbon dioxide;* • *Provide means to suppress an ammonia vapour plume. A plume could occur due to a release from the refrigeration system. Options include using hoses with personnel wearing self-contained breathing apparatus; and* • *Provide alternate emergency assembly areas given that a carbon dioxide plume can travel in any direction.*

9.2 VISUAL IMPACT

As outlined in Section 8.5 of this EA it is our view that the proposed works will not create a significant adverse visual impact due principally to the location of the proposed works within the vicinity of existing structures of a similar height, bulk and scale as those works which are proposed. Shoalhaven Starches however commit to the following additional measures as outlined in **Table 18** to assist in screening and further minimising visual impacts arising from the proposed works.

Table 18

Visual Impact

Measures
Supagas commits to where appropriate and possible, the proposed works associated with this modification should be constructed of similar materials as those previously used on the site and be of a non-reflective nature. Colours should blend with existing structures on the site to ensure visual harmony. Landscape screening will be provided between the Bolong Road reserve and the CO_2 Plant to be located on 220 Bolong Road, Bomaderry.

9.3 TRAFFIC

Supagas commit to the following statements as outlined in **Table 19** to assist in minimising traffic impacts arising from the proposed modification.

Table 19

Traffic Impacts

Measures
Supagas commits to the following statements as outlined in the traffic impact assessment prepared by ARC: • *Parking for staff and occasional visitor (4 spaces) will be provided immediately adjacent to the main CO_2 Plant, and accessible via the existing on site staff parking area located towards the front of the site.* • *The construction of a new access road designed to accommodate the largest anticipated vehicle (i.e. b-doubles) will circulate in an anti-clockwise direction around the main CO_2 Plant.* • *The Modification will utilise the existing intersection of Bolong Road & Dairy Site, which, as recently conditioned, will be fully upgraded to provide design compliance with past conditioned upgrades, and additionally include new infrastructure as required further to the recent approval of Modification 12.* • *The minimal additional trips generated by the Modification will utilise existing on-site access paths to and from the Plant.* • *The Plant will generate only a very minor level of daily and peak hour traffic; these additional trips would have no impact on the operation of key local intersections or on the internal access network within the Dairy Site.* • *Parking will be provided that meets the peak staff demand.* • *There is no information to suggest that the construction of the Plant and ancillary infrastructure could not be carried within minimal impact.* • *All construction will adhere to the general requirements of Council as employed during past construction projects for Shoalhaven Starches, including* - *Limits on construction hours and the hours in which construction vehicles can operate;* - *Limits on routes to be used through the local road network, specifically in regard to Restricted Access Vehicles and a restriction of truck movements to/from Bolong Road east of the Site.*

9.4 SITE CONTAMINATION

Supagas commit to the following additional measures as outlined in **Table 20** to manage potential site contamination issues arising from the proposed modification.

Table 20

Site Contamination

Measures
Supagas commits to the following recommendations for AEC 4 (western section of proposed pipeline) of the site contamination assessments assessment prepared by Coffey's: *Sampling of soils be carried out pre-development to assess actual conditions of the site conditions; otherwise the site could be managed through adopting a robust construction environmental management plan and Unexpected Finds Protocol (UFP) to mitigate risks to construction workers and the environment. The UFP would assist to provide direction that if, during the excavation work, material is encountered which appears to be potentially contaminated or suspicious, excavation works should cease until observation is carried out by a competent environmental consultant. Potentially contaminated or suspicious material would include stained or odorous soil, fibrous material, asbestos sheeting, drums, metal or plastic chemical containers or brightly coloured material, septic pits etc; AND* *Should soils require offsite disposal or re-use, then they should be appropriately classified or assessed against relevant resource recovery exemptions and/ or the NSW EPA 2014 Waste Classification Guidelines, whichever is more appropriate*

9.5 ACID SULPHATE SOILS

Supagas commit to the following additional measures as outlined in **Table 21** to manage potential acid sulfate soil issues arising from the proposed modification.

Table 21

Acid Sulphate Soils

Measures
Supagas commits to the following recommendations of the acid sulphate soils assessment prepared by Coffey's: *An acid sulfate soil management plan be prepared for the project which could involve some upfront testing (particularly along the proposed pipeline route) or testing at the time of excavation. The plan should be prepared in accordance with the relevant sections of the 1998 ASS Manual prepared by ASSMAC and details of the plan based on likely volume to be extracted. For small volumes, Coffey's indicate that a simple work plan may be sufficient.* *'Avoidance' of acid sulfate soils is preferred and Supagas should consider construction methodologies that avoid disturbing ASS, such as use of screw piles (if structurally suitable). In this regard, Coffey's advise that an environmental consultant with suitable experience be engaged to identify and manage ASS to oversee any excavation that could intersect acid sulfate soils and carry out assessment and provide management advice at that time.*

9.6 RIVERBANK STABILITY

Supagas commit to the following measures as outlined in **Table 22** to assist in managing riverbank stability issues arising from the proposed modification.

Table 22

Riverbank Stability

Measures
Supagas commits to the following recommendations of the riverbank stability assessment prepared by Coffey's: • *Any identified instability risks will be managed by appropriate footing systems founded at sufficient depth to minimise loads on soils adjacent to the riverbanks. Such assessment will be confirmed by a specific geotechnical investigation.*

10.0 CONCLUSION

In 2009 the Minister for Planning issued Project Approval for an application made by Shoalhaven Starches to increase its ethanol production capacity at its existing ethanol plant located at the Shoalhaven Starches Plant at Bomaderry. This Project Approval enables Shoalhaven Starches to increase its ethanol production in a staged manner at its Bomaderry Plant from the current approved 126 million litres per year to 300 million litres per year.

The Project Approval also consolidated all previous approvals into the one Project Approval.

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

In association with their expansion project, Shoalhaven Starches also pursued a number of technological innovations particularly with respect to reducing 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.

One of the objectives for the Shoalhaven Starches Expansion Project was to close the loop on waste streams from their factory operations.

Shoalhaven Starches have been approached by Supagas to construct a CO_2 Plant on the former Dairy Farmers' site to process CO_2 to be taken from the Shoalhaven Starches operations which would otherwise be vented to the atmosphere.

Essentially, Supagas seek to establish a CO_2 Plant on the former Dairy Farmers' Factory site, which will take CO2 from the Shoalhaven Starches factory operations, and to then process this gas to food grade quality for distribution to the food and beverage market. CO_2 will be taken directly from Shoalhaven Starches factory operations via a small raw CO_2 treatment facility (cold water scrubber) and connecting underground pipeline, to the CO_2 Plant to be located on the former Dairy Farmers' Factory site. Four (4) parking spaces and a circulation road around the CO_2 Plant are also proposed to accommodate staff (and visitor) parking demands and truck movements on site.

The proposed CO_2 Plant will significant achieve this by reducing CO_2 greenhouse gas emissions by 50 tonnes per day initially and increasing to 100 tonnes per day when fully operational.

The modified proposal will not result in any increase in production from the site over that which has been the subject of past approvals.

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

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

- The Department of Planning and Environment;
- Shoalhaven City Council;
- The NSW EPA; and
- NSW Office of Water.

This Environmental Assessment has been prepared to address issues raised by these government agencies.

The EA is supported by expert assessments addressing:

- Noise Impacts – the EA is supported by a Noise Impact Assessment prepared by Harwood Acoustics which demonstrates that this proposal will achieve the noise limits as outlined under the Environmental Protection Licence that applies to the site. Furthermore noise emission during the construction phase of the development will meet noise management levels set by the EPA's relevant guidelines.
- Air Quality impacts including odours – the EA is supported by an Air Quality Assessment prepared by GHD. This assessment concludes that given the "enclosed" nature of the proposal, air quality impacts (odour ad other pollutants) are not anticipated and there is no expected increase to the cumulative levels in the local area.
- Preliminary Hazard Analysis (PHA) prepared by Pinnacle Risk Pty Ltd that assesses and compares the risks associated with the proposal and finds that such risks are acceptable when compared against the Department of Planning & Environment's risk criteria.
- Traffic and Car Parking Assessment prepared by ARC Traffic and Transport that identifies that there are no access, traffic or parking impacts associated with the proposal – either during operation or construction – that would significantly impact on the efficiency and/or safety of the local traffic environment or existing on-site operations. The trip generation of the proposal during construction is anticipated to have minimal impact, while once operational the proposal is expected to have little, if any impact to the local road network.
- Flood Assessment prepared by WMAwater that demonstrates the proposal will not result in any significant increase in the 1% AEP flood level.
- A site Contamination, Acid Sulphate Soils and Riverbank Stability Assessment prepared by Coffey Services. These assessments detail specific management measures to be undertaken during the construction of the works associated with this modification.

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

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

ANNEXURE 1

Requirements for EA

issued by the Department of Planning and Shoalhaven City Council

Lot 1 DP 838753 (No. 160), Lot 241 DP 1130535 (No. 171) and Lot 143 DP 1069758 (220), Bolong Road, Bomaderry

ANNEXURE 2

Plan and Process Details
of Proposed CO_2 Plant

prepared by
GLP Group Pty Ltd

Lot 1 DP 838753 (No. 160), Lot 241 DP 1130535 (No. 171)
and Lot 143 DP 1069758 (220), Bolong Road, Bomaderry

ANNEXURE 3

Preliminary Hazard Analysis

prepared by

Pinnacle Risk Management Pty Ltd

Lot 1 DP 838753 (No. 160), Lot 241 DP 1130535 (No. 171) and Lot 143 DP 1069758 (220), Bolong Road, Bomaderry

ANNEXURE 4

Environmental Noise Impact Assessment

prepared by

Harwood Acoustics

Lot 1 DP 838753 (No. 160), Lot 241 DP 1130535 (No. 171) and Lot 143 DP 1069758 (220), Bolong Road, Bomaderry

ANNEXURE 5

Air Quality Assessment

prepared by GHD Pty Ltd

Lot 1 DP 838753 (No. 160), Lot 241 DP 1130535 (No. 171) and Lot 143 DP 1069758 (220), Bolong Road, Bomaderry

ANNEXURE 6

Flood Compliance Report

prepared by

WMAwater Pty Ltd

Lot 1 DP 838753 (No. 160), Lot 241 DP 1130535 (No. 171) and Lot 143 DP 1069758 (220), Bolong Road, Bomaderry

COWMAN STODDART PTY LTD

ANNEXURE 7

Traffic Impact Assessment

prepared by

ARC Traffic & Transport

Lot 1 DP 838753 (No. 160), Lot 241 DP 1130535 (No. 171) and Lot 143 DP 1069758 (220), Bolong Road, Bomaderry

ANNEXURE 8

Phase 1 Contamination and Preliminary Acid Sulphate Soils and River Bank Stability Assessments

prepared by

Coffey Services Australia Pty Ltd

Lot 1 DP 838753 (No. 160), Lot 241 DP 1130535 (No. 171) and Lot 143 DP 1069758 (220), Bolong Road, Bomaderry

ANNEXURE 9

Correspondence from Shoalhaven Starches Pty Ltd confirming Sufficient Spare Capacity within Wastewater Treatment System

Lot 1 DP 838753 (No. 160), Lot 241 DP 1130535 (No. 171) and Lot 143 DP 1069758 (220), Bolong Road, Bomaderry