ENVIRONMENTAL ASSESSMENT

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

SHOALHAVEN STARCHES

PROPOSED MODIFICATION:

- **TO THE SIZE AND LOCATION OF THE APPROVED PACKING PLANT;**
- **PROVISION OF AN ADDITIONAL RAIL SPUR LINE AND REALIGNMENT OF BOTH RAIL SPUR LINES AND ROAD ACCESS ON THE PACKING PLANT SITE; AND**
- **CHANGE TO THE ALIGNMENT AND LOCATION OF BOLONG ROAD BRIDGE CROSSING**

RELATING TO PROJECT APPROVAL MP06_0228

SHOALHAVEN STARCHES EXPANSION PROJECT

Prepared for

Shoalhaven Starches Pty Ltd

March 2016

Prepared by:

COWMAN STODDART PTY LTD

Town Planning, Agricultural & Environmental Consultants

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OF THE ENVIRONMENTAL PLANNING AND ASSESSMENT ACT 1979

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Ref. 15/73

Town Planning, Agricultural & Environmental Consultants

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COWMAN STODDART PTY LTD

CERTIFICATION OF ENVIRONMENTAL ASSESSMENT

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

ENVIRONMENTAL ASSESSMENT PREPARED BY

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

in respect of

PROJECT TO WHICH PART 3A APPLIES

Proponent Name:	Shoalhaven Starches Pty Ltd
Proponent Address:	Bolong Road, Bomaderry
Land to be developed: Address	Bolong Road, Bomaderry
Lot No., DP/MPS, Vol/Fol etc.	
Project Development:	Shoalhaven Starches Expansion Project (MP 06_0228) Proposed modifications to Project Approval (MP06_0228); relocation and increase in site area of approved Packing Plant, provision of an additional rail line spur and realignment of both rail spur lines; and change of alignment and location of Bolong Road Bridge crossing.

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: 16th March 2016

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Annexure 4	Plans of Proposed Modifications to Packing Plant
Annexure 5	Preliminary Hazard Analysis prepared by Pinnacle Risk Management Pty Ltd
Annexure 6	Noise Impact Assessment prepared by Day Design Pty Ltd
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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.

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

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

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

Since 2007 the NSW Government has progressively increased the mandated ethanol content by volume in petrol in NSW from 2% to 6% from 1st October 2011.

In 2009 the Minister for Planning issued Project Approval for an application made by Shoalhaven Starches to increase its ethanol production capacity to meet the expected increase in demand for ethanol arising from the abovementioned ethanol mandate by upgrading the existing ethanol plant located at the Shoalhaven Starches Plant at Bomaderry. This Shoalhaven Starches Expansion Project (SSEP) Approval enabled Shoalhaven Starches to increase its ethanol production in a staged manner at its Bomaderry Plant from the previously approved level of 126 million litres per year to 300 million litres per year subject to certain conditions.

Following the Minister's determination Shoalhaven Starches have been implementing and commissioning works in accordance with this approval. The commissioning of components of the approved development provided the Company with an opportunity to review and identify several operational, efficiency and process improvements.

As mentioned above the increase in ethanol production envisaged by the SSEP Project Approval was in response to the NSW Government's ethanol mandate which sought to increase the blending of ethanol in to the total volume of petrol sold in NSW to a 6% ethanol content. The reality however is the amount of ethanol that is being blended with petrol within NSW has to

date fallen well short of this objective. As a result the demand for ethanol is not meeting expectations raised by the NSW Government's ethanol mandate.

Shoalhaven Starches therefore must seek alternative markets for the products that would otherwise be directed into ethanol production. One such approach involves the diversion of liquid starch used in the ethanol production process to the production of dried starch.

Following further detailed engineering design it has become apparent that the footprint originally set aside for the proposed Packing Plant under the SSEP provided insufficient area for the plant, equipment and dry product storage requirements.

This Modification Application will seek to address these deficiencies as it is proposed to increase the floor area of the approved Packing Plant from that which was originally approved as part of the SSEP. It is also proposed to erect storage silos adjacent to the Packing Plant to store product prior to packing. The Packing Plant will remain on the same parcels of land to that where it was originally approved.

It is also proposed to construct an additional rail spur on the subject site and to realign the rail lines to provide improved alignment for rail carriages. The realignment will also necessitate the realignment of the road access.

The Modification Application will also seek the realignment of the overbridge crossing of Bolong Road.

The modifications involving these processes will not result in any increase in the capacity of the plant or production capability above that which has been approved for the site.

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 Infrastructure;
- The Environment Protection Authority;
- The Office of Environment & Heritage;
- The Department of Primary Industries (Water);
- Roads and Maritime Services;
- Office of the National Rail Safety Regulator (NSW);
- Transport NSW; and
- Shoalhaven City Council.

This Environmental Assessment has been prepared to address issues detailed in requirements issued by the Director-General of the Department of Planning and Infrastructure (**Annexure 1**).

The EA is supported by expert assessments addressing:

- Noise Impacts – the EA is supported by a Noise Impact Assessment prepared by Day Design Pty Ltd which demonstrates that the overall development incorporating the works associated with this proposed modification will still achieve the design noise limits for the site and will not cause offensive noise as defined by the Protection of the Environment Operations Act 1997.
- Air Quality Impacts and including Odours – the EA is supported by an Air Quality Impact Assessment prepared by Stephenson Environmental Management Australia (SEMA). This assessment demonstrates that the proposed modifications to the approved Packing Plant are not predicted to make a significant contributions to either the factory's total odour or total suspended particulates impacts.
- Flooding Impacts – the EA is also supported by a report addressing the flooding impacts associated with this proposed modification prepared by Webb McKeown & Associates.
- Geotechnical assessment – an assessment of the riverbank stability of Abernethy's Creek has been prepared by Coffeys to support the EA.
- Preliminary Hazard Analysis (PHA) undertaken by Pinnacle Risk Management Pty Ltd. This PHA finds in summary that:
    - The potential hazardous events associated with the new equipment and building are primarily dust explosions. Given the location of the new equipment then no significant adverse off-site impacts to residential areas or similar are expected. Correspondingly, all risk criteria in HIPAP 4 are expected to be satisfied for this proposal;
    - The risk of propagation to neighbouring equipment is low given the proposed facility location and generous separation distances; and
    - Societal risk, environmental risk and transport risk are all considered to be broadly acceptable.
- Traffic – The EA is also supported by a Traffic Impact Assessment (TIA) prepared by ARC Traffic and Transport which demonstrates that the modifications to the Packing Plant would have no significant impacts on local road networks or the site itself. In summary:
    - The modification proposal will not result in an increase in either vehicle traffic or rail movements at the Bolong Road and Railway Street rail crossing over previous (approved) forecasts.

- The modification proposal provides for the construction of the two approved access points; a 30 space car park; and a pedestrian bridge across Bolong Road in accordance with the SSEP Approval.
- During the Packing Plant construction period (including the period of potential overlap with the modified Starch Dryer No. 5 (Mod. No. 7) construction period and once the Packing Plant is operational, the local road network would continue to operate at a high level of efficiency.
- The staff car park will be designed with reference to the appropriate Australian Standards.
- The minor realignment of the pedestrian bridge provided for by the modification would have no impact on the efficiency or safety of pedestrian movements between the Packing Plant site and the Shoalhaven Starches factory site to the south of Bolong Road.
- Rail movements would not increase above those limits established in the SSEP Approval, and indeed are expected to be further reduced with respect to crossings of Railway Street and Bolong Road given the capacity provided by the additional Packing Plant site rail spur.

- The EA includes a Visual Impact Assessment of the proposed modification proposal. This visual impact assessment includes a photomontage of the modified proposal as well as the approved development to illustrate the visual impacts of the proposed modified proposal.

During the formulation of this EA, and following the completion of expert consultant assessments, Shoalhaven Starches revised the siting of the proposed packing plant to more closely reflect the original approved location of the packing plant on the site. The expert assessment reports noted above were based upon a slightly different proposal in which the packing plant was to be located slightly to the north of it is now currently proposed modified position. It was considered given the late change in the plans, and the further relocation did not have major implications for the findings and recommendations of these expert assessments that these expert reports as finalised have been incorporated into the EA.

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 Environmental Assessment includes a Statement of Additional Commitments outlining additional environmental management, mitigation and monitoring measures that should be implemented to minimise potential impacts associated with the proposal.

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

1.0 INTRODUCTION

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.

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

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

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

Since 2007 the NSW Government has progressively increased the mandated ethanol content by volume in petrol in NSW from 2% to 6% from 1st October 2011.

In 2009 the Minister for Planning issued Project Approval for Shoalhaven Starches to enable the Company to increase its ethanol production capacity to meet the expected increase in demand for ethanol arising from the abovementioned ethanol mandate by upgrading the existing ethanol plant, located at the Shoalhaven Starches Plant at Bomaderry. Subject to certain conditions this Project Approval enabled Shoalhaven Starches to increase its production in a staged manner at its Bomaderry Plant from the previously approved level of 126 million litres per year to 300 million litres per year. The Project Approval included the following alterations and additions:

- The provision of an additional product dryer;
- Additional equipment and storage vessels for the ethanol plant including fermenters, additional cooling towers and molecular sieves;
- Upgrades to the Stillage Recovery Plant, including additional DDGS Dryers, Decanters. Chemical storage and evaporators;
- The installation of a DDGS Pellet Plant; and

- The establishment of a new packing plant, container loading area and rail spur line on the northern side of Bolong Road (It is this component of the approved development that is the subject of this Modification Application).

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

The increase in ethanol production envisaged by the SSEP Project Approval was in response to the NSW Government's 6% ethanol mandate. However in reality the amount of ethanol that is being blended with petrol within NSW has, to date, has fallen well short of this objective. As a result the demand for ethanol is not meeting expectations raised by the NSW Government's ethanol mandate.

Shoalhaven Starches are therefore seeking alternative markets for the products that would otherwise be directed into ethanol production. One such method involves the diverting of the liquid starch used in the ethanol production process to the production of dried starch.

This approach however necessitates different operational and process requirements for the proposed packing plant to that approved under the SSEP. As a result Shoalhaven Starches have identified that the footprint originally set aside for the proposed Packing Plant under the approved Shoalhaven Starches Expansion Project provided an insufficient area for the plant, equipment and product storage.

This Modification Application will address these deficiencies as it is proposed to increase the floor area of the approved Packing Plant from that which was originally approved as part of the SSEP. It is also proposed to erect additional storage silos adjacent to the Packing Plant to store product prior to packing.

The modification proposal also seeks to construct an additional rail spur line, in addition to the spur line approved as part of the SSEP. The provision of the additional rail spur line will maximise efficiency of rail handling, allowing simultaneous loading and unloading of containers, and minimising the need for trains to cross Bolong Road (therefore reducing the times whereby trains block traffic from using Bolong Road).

It is also proposed to realign both rail spur lines with a wider radius arc to better meet rail design standards. The increase in radius arc for these rail spur lines will have the added effect of pushing the vehicle road access closer to the south-eastern boundary of the site. The original Project Approval provided a 30 metre setback between Abernethy's Creek boundary and the proposed access road driveway. As a result of this modification proposal the proposed access road driveway will be situated between 18 and 22 metres from the Abernethy's Creek boundary of the site.

It is also proposed to realign the pedestrian overbridge which crosses Bolong Road from that which was originally approved. The original overhead gantry bridge crossed from the existing factory site on the south side of Bolong Road (Lot B DP 334511), directly across Bolong Road (and diagonally across Abernethy's Creek) onto the north side of Bolong Road onto Lot 2 DP 538289. The modified proposal seeks to relocate the proposed overhead bridge so that it commences on the western side of Abernethy's Creek on Lot 21 DP 1000265 (the site of the present interim Packing Plant site). From this location it will be able to service the existing factory site by pipework extending back across Abernethy's Creek as well as the proposed modified Starches Dryer No. 5 that is proposed to be relocated to this side of Abernethy's Creek (Mod. No. 7). The proposed crossing of Bolong Road will align parallel with Abernethy's Creek and extent to a point in a similar position as the approved overhead bridge on Lot 2 DP 538289. From this point a gantry will connect the bridge, and its associated pipework to the proposed modified packing plant silos and development.

The modifications to these processes will not increase the capacity of the plant or production capability.

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

2.0 THE SITE AND SURROUNDING LOCALITY

The Shoalhaven Starches factory site (SS site) is situated on various allotments of land located along Bolong Road, Bomaderry within the City of Shoalhaven. The factory site is located on the south side of Bolong Road on the northern bank of the Shoalhaven River. The proposed Packing Plant is to be located on the northern side of Bolong Road (refer **Plate 1**).

Plate 1: View of Packing Plant site from Bolong Road.

The Project Approval issued by the Minister related to the following parcels of land (**Table 1**):

Table 1
Shoalhaven Starches Property

Lot	***Deposited Plan (DP) / FP.***
FACTORY	
1	838753
A	334511
B	334511
B	376494
62	1078788
201	1062668
1	385145
241	1130535

Table 1 (continued)

Lot	*Deposited Plan (DP) / FP.*
PACKING PLANT	
16	**1121337**
2	**538289**
WASTEWATER TREATMENT PLANT & ENVIRONMENTAL FARM	
4	610696
	131008
1	842231
2	842231
3	235705
1	235705
2	235705
Part 2	854837
4	1109510
22	811233
164	4469
2	854764
210	6131
211	6131
PT 212	6131
213	6131
214	6131
248	6131
2	955009
42	751268
63	751268
PT 2	854837
3	1109510
2	1109510
1	1109510
2	833181
OVERHEAD BRIDGE – BOLONG ROAD RESERVE	
2	538289
FIRE SERVICES	
241	1130535

The approved Packing Plant is to be located on the northern side of Bolong Road (upon Lot 16 DP 1121337 and Lot 2 DP 538289) (refer **Figure 1**). This modified Packing Plant building and its associated infrastructure and vehicle driveways and container storage will remain on these parcels of land.

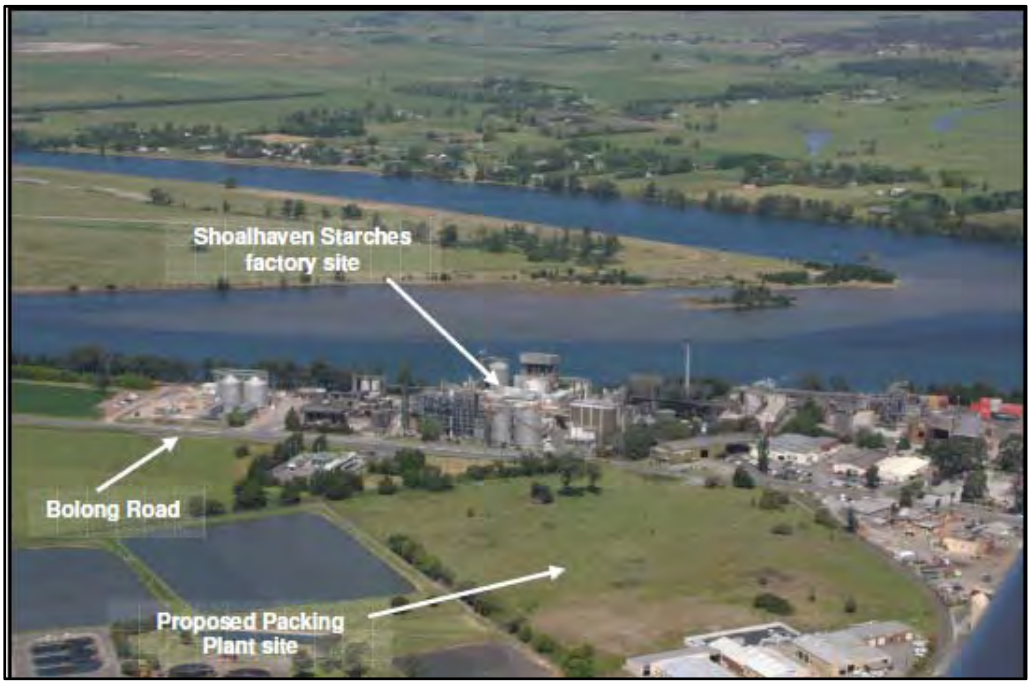

Figure 1: View of proposed Packing Plant site.

As outlined in Section 1.0 above it is proposed to realign the overhead bridge / gantry that crosses Bolong Road from that which was originally approved. The original overhead gantry bridge crossed from the existing factory site on the south side of Bolong Road (Lot B DP 334511), directly across Bolong Road (and diagonally across Abernethy's Creek) onto the north side of Bolong Road onto Lot 2 DP 538289. The modified proposal seeks to relocate the proposed overhead bridge so that it commences on the western side of Abernethy's Creek on Lot 21 DP 1000265 (the site of the present interim Packing Plant site). From this location it will be able to service the existing factory site by pipework extending back across Abernethy's Creek as well as the proposed modified Starches Dryer No. 5 that is proposed to be relocated to this side of Abernethy's Creek (Mod. No. 7). The proposed crossing of Bolong Road will align parallel with Abernethy's Creek and extend to a point in a similar position as the approved overhead bridge on Lot 2 DP 538289. From this point a gantry will connect the bridge, and its associated pipework to the proposed modified packing plant silos and development.

The town of Bomaderry is located 0.5 km (approx.) to the west of the factory site, and the Nowra urban area is situated 2.0 km to the south west of the site.

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

Land to the south of the packing plant site contains a number of industrial land uses including automotive repairs, screen manufacture and supply. Bolong Bricks, Welding premises, Refrigeration and Air-conditioning business and a service station. The BOC Gas Facility site, Integral Energy Natural Gas Installation and Manildra Gas Station are located to the east of the packing plant site

The industrial area is serviced by a privately owned railway spur line that runs from just north of the Nowra-Bomaderry station via the starch plant and Dairy Co-op site to the Paper Mill.

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

The Company also carries out irrigation activities on the Company's Environmental Farm located over 1000 hectares on the northern side of Bolong Road. This area is cleared grazing land and also contains spray irrigation lines and wet weather storage ponds). These wet weather storage ponds on the farm form part of the irrigation management system for the factory.

Figure 2 is a site locality plan depicting the location of the packing plant site as well as the Shoalhaven Starches factory site as well as the surrounding locality.

Figure 3 is a site locality plan depicting the location of Packing Plant site, the Shoalhaven Starches factory site and Environmental Farm as well as the surrounding locality

Figure 4 is a plan of the existing factory site depicting the layout of existing plant on the site as well as plant that has been previously approved as part of the Shoalhaven Starches Expansion Project (MP06_0228).

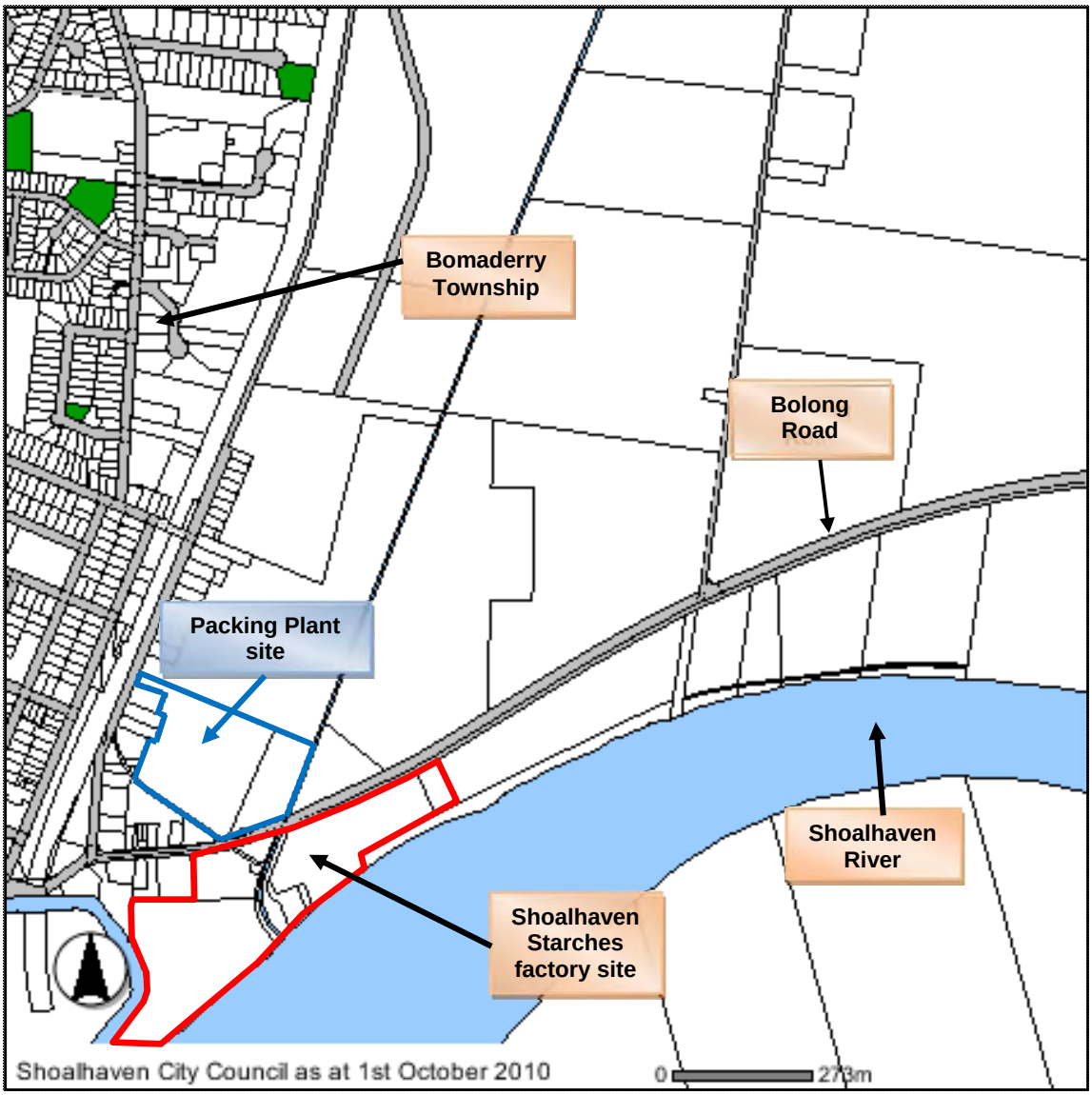

Figure 2: Location plan.

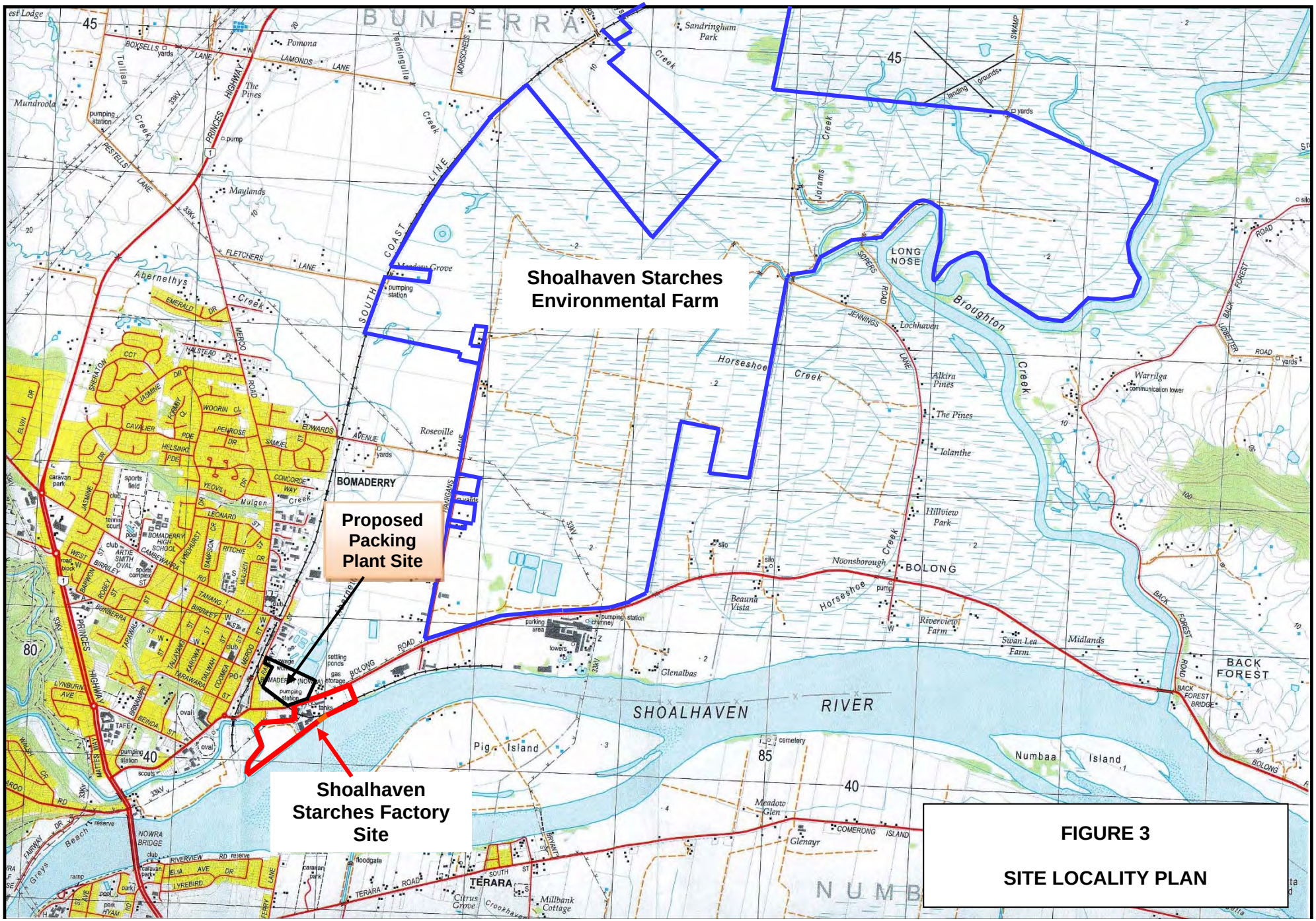

FIGURE 3

SITE LOCALITY PLAN

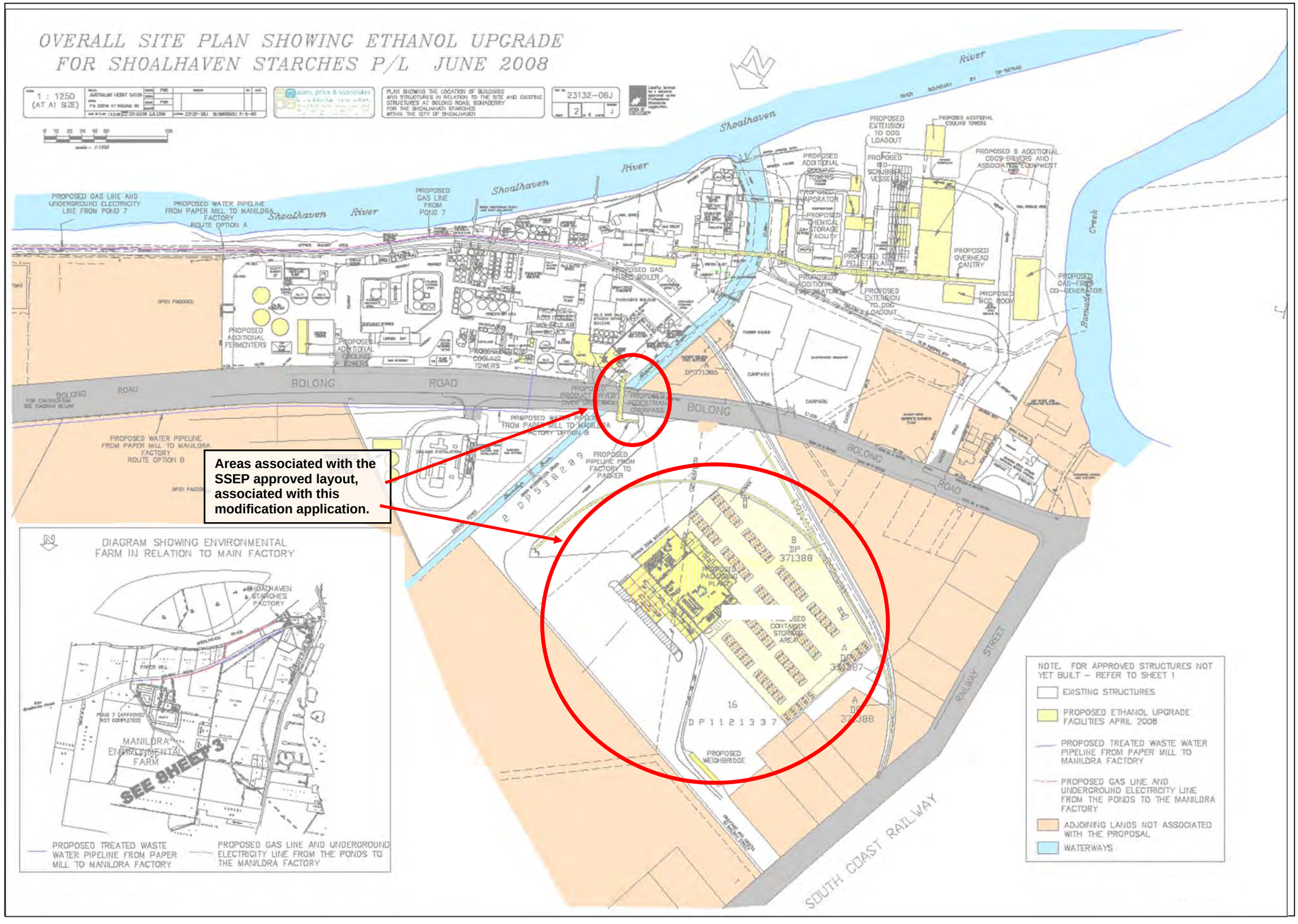

Figure 4: Site plan depicting areas associated with this Modification Application.

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 overall environmental impacts of the Company's operations. As a result Shoalhaven Starches has been moving towards a "closed" system of production. Essentially this entails the efficient use of end products to ensure wastage is reduced to a minimum.

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

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

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

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

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

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

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

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

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

3.2 OPERATING WORKFORCE

3.2.1 Operations

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

3.2.2 Workforce

The plant employs a total of 294 staff, covering all components of production - operators, administrative personnel and maintenance staff. Employee breakdown and hours of shifts are as follows:

A total of around 294 employees:	Management, Technical & Administration	60
	Day Workers	75
	Shift Production (spread over 4 shifts)	145

Hours of Shifts

Plant:	6:00 am to 6:00 pm	- 36 employees	
	6:00 pm to 6:00 am	- 36 employees	
	Day – 7:00 am to 3:00 pm but variable		75 employees, 60 Management, Technical & Administration

Farm:	5:00 am to 5:00 pm	- 2 employees
	5:00 pm to 5:00 am	- 1employees
	7:00 am to 3:00 pm	- 3 employees

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

3.3 RAW MATERIALS

There are six major raw material components used in the Shoalhaven Starches process. These are flour, grain; coal; natural gas; fresh water and salt water.

Flour is delivered to the site from the Company's mills at Manildra, Gunnedah and Narrandera each day of the week. The flour arrives into the plant by Company owned stainless steel rail wagons. The wagons have bottom dumping doors and are unloaded in a building. Flour is also produced by the Flour Mill located within the Bomaderry site. From the silos, the flour is moved into the plant by air as required. The current approved flour consumption of the plant is 20,000 tonnes per week.

Grain is delivered to the site by rail. At present up to approximately 552 tonnes of grain is delivered to the site per day. The grain is milled to produce flour for further processing in the starch and gluten plants. The grain is "dumped" from the train into an underground hopper and conveyed by screw conveyors and bucket elevator into a silo.

Coal is delivered by road from Wallerawang near Lithgow. At present 10 trucks of 30 tonnes per truck are delivered daily. The coal storage area is located between the Shoalhaven River and the existing boilers. The transfer of coal from the storage bins to the boilers is undertaken by front-end loader pushing the coal through a grate and into a pneumatic conveying system up to the boilers.

Natural Gas – the Shoalhaven Starches plant operates partly on natural gas. The site is connected to a natural gas reticulation main.

Fresh water and recycled water is utilised in the starch production process. At present on average a total of 6900 kilolitres of water is used on a daily basis. This comprises 2600 kL from the town water supply, and 4300 kL from a raw water supply provided by Shoalhaven City Council via a pipeline from the former Shoalhaven Paper Mill.

Salt water from the Shoalhaven River is used to cool items of plant before the water is returned to the river.

In addition the factory operations utilise a range of enzymes, additives, fuels and other products in the overall operations. At present the plant utilises approximately 30 tonnes each of acid and caustic products per week.

3.4 HISTORY OF THE DEVELOPMENT WITHIN SHOALHAVEN STARCHES

The Shoalhaven Starches wheat starch and gluten plant at Nowra was originally constructed in 1970. The Manildra flour mills, at Manildra, Narrandera and Gunnedah, supply the Shoalhaven Starches factory, which currently produces wheat starch, gluten, syrups and ethanol (industrial and fuel grades). The Shoalhaven Starches operation provides direct on-site employment for 280 employees. Through the use of contractors it

also indirectly creates employment for many more people in the local and regional economies.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Shoalhaven Starches have subsequently received the following development approvals:

- The establishment of a flour mill on the factory site. This proposal provides for the transportation of wheat directly to the site by train for processing into industrial grade flour for the use in the production of starch and gluten at the factory site.
- An application pursuant to Section 96 of the Environmental Planning & Assessment Act seeking to modify the development approval for the PRP No. 7 project to enable a DDGS Dryer to be installed in a slightly different location in the same building as previously approved; and the installation of an additional evaporator (a redundant piece of equipment located at the Company's Altona Plant in Victoria) to provide standby capacity for the existing evaporator plant when sections of the existing plant are out of service or cleaning.
- A Section 96 modification application for a standby fermenter tank to be installed on the site, to enable the existing fermenter tanks to be taken out of service for maintenance one at a time.

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

3.5 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 (SSEP).

The primary objective of the Shoalhaven Starches Expansion Project is 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 enables Shoalhaven Starches to upgrade plant and increase throughput of raw materials, principally comprising flour and grain.

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

- the provision of an additional dryer for the starch/gluten plant;
- additional equipment and storage vessels for the ethanol plant including 3 additional fermenters, additional cooling towers and molecular sieves;
- upgrades to the Stillage Recovery Plant including 6 additional Dried Distillers Grains Syrup (DDGS) dryers; 10 decanters; chemical storage and two evaporators. The proposal includes the installation of a DDGS Pelletiser Plant within this part of the site; and,
- the establishment of a new packing plant, container loading area and a rail spur line. The establishment of this facility on the northern side of Bolong Road will require the provision of an overhead bridge structure to allow product and safe pedestrian movement across Bolong Road.

  It is this component of the SSEP that is the subject of this modification application.

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

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

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

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

3.6 APPROVAL HISTORY FOLLOWING MP 06_0228

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

On the 30th September, 2010 Shoalhaven City Council approved Development Application DA 10/1843 permitting the upgrade of the existing vehicle entrance at 220 Bolong Road, otherwise known as the "former Dairy Farmers" factory site. The need for these upgrading works arose following the Project Approval requirements for the SSEP, and which included requirements to undertake upgrading works along Bolong Road along the frontage of the site. These upgrading works prevent vehicles travelling east along Bolong Road to turn right into the central vehicle access to the Shoalhaven Starches site; as well as vehicles turning right out from this access point and travelling east along Bolong Road. These approved works also prevent vehicles turning right out of the BOC Carbon Dioxide Plant.

The works associated with this approval will allow vehicles wishing to travel west from the BOC CO_2 plant to leave this site to travel first east; by allowing vehicles to travel to the former Dairy Farmers factory complex and using the upgraded access to turn around before returning west along Bolong Road.

RA 11/1002 Interim Packing Plant

Following the issue of 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 Companies existing Packing Plant which is located within the existing factory site.

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

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

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

Once this modification application for the Packing Plant has been approved, the new Packing Plant constructed and commissioned, the need for the Interim Packing Plant will be reviewed.

DA 11/1855 – Widening of Driveway

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

DA 13/1713 – Demolition of Dimethyl Ether Plant

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

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

On the 19th September 2014 Shoalhaven Starches submitted a development application to Shoalhaven City Council seeking development consent to erect two additional grain silos on the factory site within the vicinity of the existing Flour Mill.

The purpose of these two additional grain silos will be to provide security of raw material storage and supply when there are closures of the Illawarra rail line serving the Shoalhaven Starches site enabling the factory operations to continue during rail line closures. Over recent years there have been occasions when there have been closures

of the Illawarra rail line due to track construction work as well as a result of floods, storms and traffic accidents. During these closures the supply of grain and flour to the Shoalhaven Starches site has been interrupted. The additional grain silos associated with this application will provide a buffer for on-site storage and additional security of storage and supply should closures to the rail line occur in the future.

Other Approvals

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

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

4.0 STATUTORY SITUATION

4.1 PART 3A OF THE EP&A ACT

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

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

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

Projects currently awaiting declaration would not be declared. Generally, applications for the assessment of these projects would be able to be lodged once the new legislation had commenced, provided the category of development is one to which the new system of state significant development applies.

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

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

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

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

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

Supporting regulations and an associated new State Environmental Planning Policy (SEPP) were introduced and came into effect from the 1st October 2011. These supporting provisions provided additional detail with respect to the classes and thresholds for development to be considered as State Significant.

This SEPP was called *State Environmental Planning Policy (State and Regional Development) 2011* and is known as the "State and Regional Development SEPP". This SEPP approximately halves the number of proposals dealt with by the State when compared with the former Part 3A system.

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

The approved Shoalhaven Starches Expansion Project 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 confirmed that Part 3A continues to apply to certain projects subject to transitional provisions identified in Schedule 6A of the Act.

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

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

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

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

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

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

Clause 3 reads:

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

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

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

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

4.2 SECTION 75W AND MODIFICATION PROPOSALS

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

> ***75W Modification of Minister's approval***
>
> *(1) In this section:*
>
> ***Minister's approval** means an approval to carry out a project under this Part, and includes an approval of a concept plan.*
>
> ***modification of approval** means changing the terms of a Minister's approval, including:*

(a) revoking or varying a condition of the approval or imposing an additional condition of the approval, and

(b) changing the terms of any determination made by the Minister under Division 3 in connection with the approval.

(2) The proponent may request the Minister to modify the Minister's approval for a project. The Minister's approval for a modification is not required if the project as modified will be consistent with the existing approval under this Part.

(3) The request for the Minister's approval is to be lodged with the Director-General. The Director-General may notify the proponent of environmental assessment requirements with respect to the proposed modification that the proponent must comply with before the matter will be considered by the Minister.

(4) The Minister may modify the approval (with or without conditions) or disapprove of the modification.

(5) The proponent of a project to which section 75K applies who is dissatisfied with the determination of a request under this section with respect to the project (or with the failure of the Minister to determine the request within 40 days after it is made) may, within the time prescribed by the regulations, appeal to the Court. The Court may determine any such appeal.

(6) Subsection (5) does not apply to a request to modify:

(a) an approval granted by or as directed by the Court on appeal, or

(b) a determination made by the Minister under Division 3 in connection with the approval of a concept plan.

(7) This section does not limit the circumstances in which the Minister may modify a determination made by the Minister under Division 3 in connection with the approval of a concept plan.

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

4.3 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.

The proposed modification will need to meet the terms/provisions of this licence.

4.4 LOCAL PLANNING PROVISIONS

Shoalhaven Local Environmental Plan (SLEP) 2014

The site is zoned IN1 (General Industrial) zone under the provisions of SLEP 2014 (refer **Figure 5**). The objectives of the IN1 zone are:

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

It is our view that the proposal is consistent with these objectives as the proposal involves alterations and additions to an existing industrial activity.

Industry is a permissible use within this zone. The proposal is permissible subject to Council's consent (see **Table 2** below).

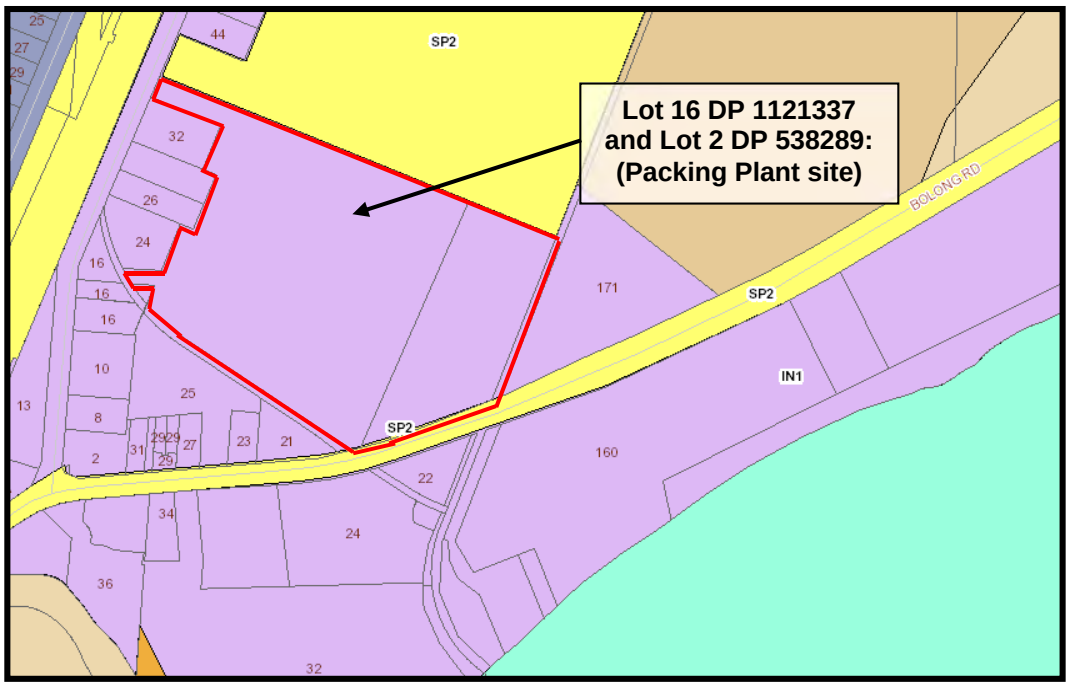

Figure 5: Zoning provisions applying under Shoalhaven LEP 2014.

Table 2

Land Use Permissibility – IN1 Zone (Shoalhaven LEP 2014)

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

The SLEP 2014 also has a number of specific provisions that apply to the land. The implications that these provisions have in relation to this proposal are discussed in **Table 3** below:

Table 3

Shoalhaven LEP 2014 Provisions

SLEP 2014 Clause	***Provisions***	***Comments***
4.3 Height of Buildings	*(1) The objectives of this clause are as follows:* *(a) to ensure that buildings are compatible with the height, bulk and scale of the existing and desired future character of a locality,* *(b) to minimise visual impact, disruption of views, loss of privacy and loss of solar access to existing development,* *(c) to ensure that the height of buildings on or in the vicinity of a heritage item or within a heritage conservation area respect heritage significance.* *(2) The height of a building on any land is not to exceed the maximum height shown for the land on the Height of Buildings Map.* *(2A) If the Height of Buildings Map does not show a maximum height for any land, the height of a building on the land is not to exceed 11 metres.*	The proposed Packing Plant building will have a height above ground level of 13 metres. Silos associated with the Packing Plant will have heights above ground level of 26.6 and 34.43 metres. A gantry situated above the Packing Plant building will have a height of 22.5 m. The gantry containing pipework connecting the Packing Plant to the bridge across Bolong Road will have a height above ground level of 11.8 m. Although there is no maximum height specified for the subject land part (2a) of Clause 4.3 of SLEP 2014

Table 3 (continued)

SLEP 2014 Clause	***Provisions***	***Comments***
4.3 continued		states no building is to be in excess of 11 metres. As such a submission for an exception to development standards under Clause 4.6 of the SLEP 2014 has been prepared and is attached under **Annexure 3**.
4.6 Exceptions to development standards	*(1) The objectives of this clause are as follows:* *(a) to provide an appropriate degree of flexibility in applying certain development standards to particular development,* *(b) to achieve better outcomes for and from development by allowing flexibility in particular circumstances.* *(2) Development consent may, subject to this clause, be granted for development even though the development would contravene a development standard imposed by this or any other environmental planning instrument.* *However, this clause does not apply to a development standard that is expressly excluded from the operation of this clause.* *(3) Development consent must not be granted for development that contravenes a development standard unless the consent authority has considered a written request from the applicant that seeks to justify the contravention of the development standard by demonstrating:* *(a) that compliance with the development standard is unreasonable or unnecessary in the circumstances of the case, and* *(b) that there are sufficient environmental planning grounds to justify contravening the development standard.* *(4) Development consent must not be granted for development that contravenes a development standard unless:* *(a) the consent authority is satisfied that:* *(i) the applicant's written request has adequately addressed the matters required to be demonstrated by subclause (3), and* *(ii) the proposed development will be in the public interest because it is consistent with the objectives of the particular standard and the objectives for development within the zone in which the development is proposed to be carried out, and*	As outlined above with respect to clause 4.3 the modified proposal will comprise components that will be in excess of the 11 metre maximum as specified in (2A) of Clause 4.3 Height of Buildings of the SLEP 2014. The proposed development will form part of the overall Shoalhaven Starches factory complex; and will be situated within an established industrial area. A submission for an exception to development standards has been prepared and is attached to the SEE under **Annexure 3**.

Table 3 (continued)

SLEP 2014 Clause	*Provisions*	*Comments*
4.6 continued	*(b) the concurrence of the Director-General has been obtained.* *(5) In deciding whether to grant concurrence, the Director-General must consider:* *(a) whether contravention of the development standard raises any matter of significance for State or regional environmental planning, and* *(b) the public benefit of maintaining the development standard, and* *(c) any other matters required to be taken into consideration by the Director-General before granting concurrence.* *(6) Development consent must not be granted under this clause for a subdivision of land in Zone RU1 Primary Production, Zone RU2 Rural Landscape, Zone RU3 Forestry, Zone RU4 Primary Production Small Lots, Zone RU6 Transition, Zone R5 Large Lot Residential, Zone E2 Environmental Conservation, Zone E3 Environmental Management or Zone E4 Environmental Living if:* *(a) the subdivision will result in 2 or more lots of less than the minimum area specified for such lots by a development standard, or* *(b) the subdivision will result in at least one lot that is less than 90% of the minimum area specified for such a lot by a development standard.* *Note. When this Plan was made it did not include all of these zones.* *(7) After determining a development application made pursuant to this clause, the consent authority must keep a record of its assessment of the factors required to be addressed in the applicant's written request referred to in subclause (3).* *(8) This clause does not allow development consent to be granted for development that would contravene any of the following:* *(a) a development standard for complying development,* *(b) a development standard that arises, under the regulations under the Act, in connection with a commitment set out in a BASIX certificate for a building to which State Environmental Planning Policy (Building Sustainability Index: BASIX) 2004 applies or for the land on which such a building is situated,* *(c) clause 5.4,* *(ca) clause 6.1 or 6.2.*	

Table 3 (continued)

SLEP 2014 Clause	***Provisions***	***Comments***
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* *(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:*	The subject land is located within the coastal zone. The proposal is not considered to adversely affect the coastal zone based on the following: • The proposal does not affect or impinge on public access to or along the coastal foreshore. • The proposed development is situated adjacent to existing industrial development and is considered to be suitable development given its type, location and design. The development is also consistent with the zoning objectives for the land. • The development will not lead to overshadowing of foreshore areas. The site distant from the Shoalhaven River. • The scenic qualities of the area will not diminish. Visual impact is further addressed in Section 7.9 of this EA. • The proposal will not lead to adverse impacts on threatened fauna and flora.

Table 3 (continued)

SLEP 2014 Clause	*Provisions*	*Comments*
5.5 continued	*(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* *(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:*	

Table 3 (continued)

SLEP 2014 Clause	*Provisions*	*Comments*
5.5 continued	*(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:* *(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,*	There are no heritage items within the subject land. And the subject site is not located within a heritage conservation area. An aboriginal archaeological assessment previously undertaken on this site indicated that: *the potential for any Aboriginal heritage evidence to survive is virtually negligible.* In view of the minimal extent of the proposed impacts, and the register searches, field survey and consultation with the Aboriginal community conducted to date, along with the extensive impacts from current infrastructure further heritage assessment is not considered to be warranted

Table 3 (continued)

<table>
<tr><th>SLEP 2014 Clause</th><th>Provisions</th><th>Comments</th></tr>
<tr><td>5.10 continued</td><td>(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.</td><td></td></tr>
<tr><td>7.1 Acid sulphate soils</td><td>(1) The objective of this clause is to ensure that development does not disturb, expose or drain acid sulphate 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 Sulphate Soils Map as being of the class specified for those works, except as provided by this clause.
<table>
<tr><th>Class of Land</th><th>Works</th></tr>
<tr><td>1</td><td>Any works.</td></tr>
<tr><td>2</td><td>Works below the natural ground surface.
Works by which the watertable is likely to be lowered.</td></tr>
<tr><td>3</td><td>Works more than 1 metre below the natural ground surface.
Works by which the watertable is likely to be lowered more than 1 metre below the natural ground surface.</td></tr>
<tr><td>4</td><td>Works more than 2 metres below the natural ground surface.
Works by which the watertable is likely to be lowered more than 2 metres below the natural ground surface.</td></tr>
</table></td><td>Mapping supporting the SLEP 2013 identifies the subject land as being affected by Class 3 and 4.
This EA that supported by the SSEP included an assessment of the presence of acid sulphate soils and how such soils may be managed in context with this proposal. This earlier assessment recommended that an Acid Sulphate Soil Management Plan (ASSMP) be prepared for the packing plant site and areas within this site where soil disturbance are likely to intersect with acid sulphate soils. This Modification Application does not propose works that would require a modification to this previous recommendation. Under these circumstances this previous recommendation would continue to apply to this proposal. Such an ASSMP should be undertaken prior to construction works commencing on the site.</td></tr>
</table>

Table 3 (continued)

SLEP 2014 Clause	*Provisions*	*Comments*
7.1 continued		

5	*Works within 500 metres of adjacent Class 1, 2, 3 or 4 land that is below 5 metres Australian Height Datum by which the watertable is likely to be lowered below 1 metre Australian Height Datum on adjacent Class 1, 2, 3 or 4 land.*

(3) Development consent must not be granted under this clause for the carrying out of works unless an acid sulphate soils management plan has been prepared for the proposed works in accordance with the Acid Sulphate 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 Sulphate Soils Manual indicates that an acid sulphate soils management plan is not required for the works, and

(b) the preliminary assessment has been provided to the consent authority and the consent authority has confirmed the assessment by notice in writing to the person proposing to carry out the works.

(5) Despite subclause (2), development consent is not required under this clause for the carrying out of any of the following works by a public authority (including ancillary work such as excavation, construction of access ways or the supply of power):

(a) emergency work, being the repair of the works of the public authority required to be carried out urgently because the works have been damaged, have ceased to function or pose a risk to the environment or to public health and safety,

(b) routine management work, being the periodic inspection, cleaning, repair or replacement of the works of the public authority (other than work that involves the disturbance of more than 1 tonne of soil).

(c) minor work, being work that costs less than $20,000 (other than drainage work).

(6) Despite subclause (2), development consent is not required under this clause to carry out any works if:

Table 3 (continued)

SLEP 2014 Clause	***Provisions***	***Comments***
7.1 continued	*(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* *(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.*	The *Flood Planning Area Map* that accompanies the SLEP 2014 identifies the subject land as being flood prone land. This EA is supported by a Flood Impact Assessment carried out by WMAwater (**Annexure 8**). Flooding is further discussed in Section 7.2 of this EA.

Table 3 (continued)

SLEP 2014 Clause	***Provisions***	***Comments***
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* *(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.*	The *Coastal Risk Planning Map* that accompanies the SLEP 2014 does <u>not</u> identify the subject land as a "*Coastal Risk Planning Area*". The provisions of this clause therefore do not apply to the subject site.

Table 3 (continued)

SLEP 2014 Clause	***Provisions***	***Comments***
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* *(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*	The *Terrestrial Biodiversity Map* that accompanies the SLEP 2014 does not identify the subject land as including areas of *Biodiversity - habitat corridor* and/or *Biodiversity - significant vegetation*.

Table 3 (continued)

SLEP 2014 Clause	*Provisions*	*Comments*
7.5 continued	*(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.* *(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,*	The *Riparian Lands and Watercourses Map* that accompanies the SLEP 2014 identify a category 2 watercourse, (Abernethy's Creek) located along the south-western boundary of the site. As detailed in Section 6.2 of this EA, prior to preparing this EA we have consulted with DPI Water in relation to this proposal and specifically in relation to the siting of development within proximity of Abernethy's Creek. DPI Water specifically requested justification for the siting of development within proximity of this watercourse, and specifically requested that information be provided on whether the development would have impacts on the stability of the stream bank of Abernethy's Creek. In addition DPI Water also sought an additional vegetation offset by way of a wider streambank revegetation along Abernethy's Creek. Section 8.4 of this EA addresses these issues in more detail however:

Table 3 (continued)

SLEP 2014 Clause	*Provisions*	*Comments*
7.6 continued	*(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.* *(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.*	• This EA is supported by a Geotechnical Assessment carried out by Coffey Geotechnics (**Annexure 9**), which includes an assessment of the potential impacts of the development on riverbank stability of Abernethy's Creek. • The proposal also makes provision for additional riparian re-vegetation work to be carried out between the proposed access roadway that will serve the development and Abernethy's Creek. This re-vegetation work will be significantly greater than that which was originally approved as part of the SSEP.
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.*	*Natural Resource Sensitivity - Land Map*ping supporting the SLEP 2014 identifies the subject site as a *Sensitive Area*. This EA that supported the original SSEP was supported by a Geotechnical Assessment carried out by Coffey Geotechnics. This assessment included recommendations for the development of this site.

Table 3 (continued)

SLEP 2014 Clause	*Provisions*	*Comments*
7.7 continued	*(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.*	These recommendations will also apply to the proposed modified development.
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.

Table 3 (continued)

SLEP 2014 Clause	*Provisions*	*Comments*
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.* *(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.*	As the site is situated within 30 km of HMAS Albatross Military Airfield and involves a component with a height above ground level of over 30 metres; prior to the preparation of this EA the Department of Defence were consulted with respect to this proposal. A copy of our firm's submission to the Department of Defence and the Department's response to this proposal is included as **Annexure 2** to this EA. The Department indicate that they have no concerns with this proposal.

Table 3 (continued)

SLEP 2014 Clause	***Provisions***	***Comments***
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 that the subject land is located within the vicinity of a sewerage treatment plant. The EA is supported by an Air Quality Assessment undertaken by Stephenson Environmental Management Australia (**Annexure 7**) and a Noise Assessment undertaken by Day Design Pty Ltd (**Annexure 6**). Air quality and noise issues are further discussed in Sections 7.1 and 7.3 of this EA respectively.

5.0 THE MODIFICATION PROPOSAL

5.1 MP06_0228 – THE APPROVED DEVELOPMENT

In 2009 the Minister for Planning issued Project Approval for Shoalhaven Starches to enable the Company to increase its ethanol production capacity to meet the expected increase in demand for ethanol arising from the NSW Government's ethanol mandate by upgrading the existing ethanol plant, located at the Shoalhaven Starches Plant at Bomaderry.

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

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

The SSEP sought to increase ethanol production at the Bomaderry plant in a staged manner from 126 million litres per year to 300 million litres per year.

To accomplish the increase in ethanol production, this project required a series of plant upgrades and increase in throughput of raw materials, principally flour and grain. The Project included the following alterations and additions:

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

It is the packing plant and associated works referred to in the last bullet point above that are the subject of this Modification Application.

Following the Minister's determination Shoalhaven Starches have been implementing and commissioning works in accordance with this approval. The commissioning of components of the approved development provided the Company with an opportunity to review and identify several operational, efficiency and process improvements.

As mentioned above part of the original justification for the SSEP was the need to meet the expected increase in demand for arising from the NSW Government's ethanol mandate which sought to increase the blending of ethanol in to the total volume of petrol sold in NSW to a 6% ethanol content. The reality however is the amount of ethanol that is being blended with petrol within NSW has to date fallen well short of this objective, largely due to on-going exemptions from the mandated ethanol content being granted to the major oil companies.

As a result the demand for ethanol is not meeting expectations raised by the NSW Government's ethanol mandate.

Shoalhaven Starches therefore must seek alternative markets for the products that would otherwise be directed into ethanol production. One such approach involves the diversion of liquid starch used in the ethanol production process to the production of dried starch, resulting in an increase the production of dried starch.

Currently the existing factory operations produce 280 shipping containers of finished dried product per week. Following the SSEP it is anticipated that there will be an increased production of an additional 168 shipping containers of dried product per week resulting in a total of 445 shipping containers produced each week.

This increase in dried starch production will require additional warehouse storage within the packing plant; although the approved container storage area will remain largely unchanged from that which was originally approved under the SSEP.

In addition Shoalhaven Starches wish to provide a range of packaging options not previously considered as part of the SSEP including:

- 12.5 kg bags;
- 25 kg bags;
- bulk bag (1 tonne) for containerisation; and
- direct into containers for the export market.

As a result of the above, and following further engineering design and investigation as to the types of packaging equipment that will need to be located within the proposed Packing Plant building, Shoalhaven Starches have been required to review the size of the Packing Plant on the site resulting in an increase in the size of its footprint and a slight relocation of this building on the site.

Under the original SSEP it was proposed to provide a single rail spur line to service the new packing plant. The increase in the number of containers containing finished product

that will now be required to level the site by rail will necessitate the provision of a second rail spur line in addition to the original approved rail line.

The second rail spur line will result in a significant reduction in crossings of Bolong Road by freight trains. A second spur line will enable trains to be spilt and parked on the subject site reducing the potential for rail crossings and subsequent disruptions to traffic flow along Railway Street.

The second spur line will also allow longer trains to service the site providing efficiency gains for production transportation for the site.

Shoalhaven Starches are also intending to use longer wagons on their trains that will be able to contain three containers as opposed to the current double container wagons. The increase in wagon size will provide additional efficiency gains in the transportation of product from the site.

The increase in wagon length will however require a larger radius arc in the design of the rail spur line as its traverses across the site to satisfy relevant rail safety design guidelines. A narrower radius arc as currently approved would be too tight for the intended wagon size that will be utilised which could result in the derailment of wagons using the site.

The increase in radius of the rail spur lines will have the effect of pushing the access road that will extend from Bolong Road to service the site closer to Abernethy's Creek compared to that which was originally approved. Whilst the original road alignment was 30 metres from Abernethy's Creek, the modified alignment will extend from between 18 to about 22 metres from the creek boundary of the site.

Following the relocation of Starches Dryer No. 5 (as part of Mod. 7), it is now also proposed to re-align the bridge crossing that will serve the packing plant from the Shoalhaven Starches factory site.

The modification proposal will also require the excavation and importation of fill (approximately 34,000 m^3) to raise the finished ground level at the container store and packing plant to 4 m AHD as well as to provide suitable ground levels for the rail spur lines and road access. A plan detailing the regrading details for the site is included in **Annexure 4** of the EA. It is proposed that the importation of fill to the site will be in accordance with the requirements of a Resource Recovery Order and Exemption issued under the Protection of the Environment Operations (Waste) Regulations 2014. Where no resource recovery order or exemption is available for the intended use of a waste material, an application will be made to the EPA in accordance with the Resource Recovery guidelines. The existing 5% AEP flood level at the site is approximately 4.7 m AHD.

5.2 THE MODIFICATION PROPOSAL

5.2.1 Modification to the Proposed Packing Plant

It is proposed to increase the floor area of the approved Packing Plant from that which was originally approved as part of the SSEP. It is also proposed to erect 5 silos adjacent to the Packing Plant to store product prior to packing. The Packing Plant will remain on the same parcels of land where it was originally approved.

Following further detailed engineering design it has become apparent that the footprint originally set aside for the proposed Packing Plant under the SSEP provided insufficient area for the plant, equipment and product storage requirements. As a result it is proposed to increase the floor area of the approved development. The approved Packing Plant under the SSEP comprised a floor area (excluding awnings) of 3050 m^2. The proposed modified Packing Plant will comprise a floor area (excluding awnings) of 6200 m^2 with dimensions of 108 m by 60 m. The modified packing plant will have a height above ground level of approximately 13 metres. There will also be two main storage silos (1,000 tonnes each) located to the east of the packing plant building with heights of approximately 26.5 metres above ground level and 10 m diameter. A further silo structure located above the packing plant building will eventually have a height of 34.3 m above ground level.

The modified proposal will include:

- Transfer blowlines (x 5) from the existing site on the southern side of Bolong Road;
- A modified alignment for the pipe bridge over Bolong Road;
- The packing plant facilities for filling bags and trucks;
- A warehouse for bag storage; and
- A rail extension for loading containers onto trains (250 m long).

In addition to the above, it is proposed to construct a container / truck loading facility between the packing plant and the two silos. A new railway spur line is also proposed to be extended from the existing railway to service this container loading area. The containers are to be stored to the south of the packing plant building.

The dried starch will be pneumatically conveyed from the existing factory site on the south side of Bolong Road to the proposed new silos via an overhead bridge that will cross Bolong Road. This overhead bridge will also double as a pedestrian bridge to improve safety for pedestrians crossing between the existing factory site and the packing plant site. The silos will feed the proposed new packing plant and container loading facility. The bridge crossing

was originally approved as part of the SSEP, however under this proposal the bridge has been relocated and re-aligned. This is discussed further in Section 5.2.2 below.

Gluten is to be transported directly to three storage silos from the existing network and then fed to the bag filling bin.

The ground product starch has the following representative assay:

< 75 micron	=	35 to 40%
< 150 micron	=	10 to 15%
< 250 micron	=	8 to 12%
< 355 micron	=	5 to 6%

The packaged product will be filled into 12.5 kg, 25 kg and 1 tonne bags at dedicated bag filling stations. The 1 tonne bag filling stations will be designed for approximately 40 tonne per hour filling rate.

The increase in footprint of the Packing Plant building has largely arisen as a result of further detailed engineering design in terms of the intended plant and machinery that will be sited within the building to accommodate the requirements of the above packaging options to allow for both local and export markets. These different packaging alternatives will each necessitate different packing plant and equipment not originally envisaged with the SSEP. Furthermore the footprint of these individual packing plant will be larger than that which was originally envisaged with the SSEP.

The new packing plant will be built to avoid dust emissions as product will not be blown into bags but rather mechanically packed. Furthermore, sealing and weighing operations will be completed simultaneously resulting in a reduction in leakages.

The packing plant building has been designed to meet good practice for food safety and housekeeping / cleanliness. The steel work will be on the outside of the wall panels to prevent ledges for product to settle on (ie. reducing the risk of dust explosions).

The bags are to be stored in a new warehouse (concrete and steel construction).

Starch and gluten can be delivered to the market via road or rail, eg. using bulk trucks or bags in containers or on trucks. At this point on the rail system the train is moving at walking pace, ie. process safety incidents involving the train are unlikely.

The packing plant is designed for packing 450 to 480 tonnes per day of product.

All equipment in contact with the product is to be constructed from 304 L or equivalent stainless steel.

The modified proposal will not result in any increase in overall production rate limits that have been imposed by past approvals. The proposal will not involve any change in the amount of raw products that will be utilised; nor will it involve in any changes in the amount of waste waters that will need to be treated and disposed. The increase in dry product is a result of the diversion of liquid starch from ethanol to dry starch and will require additional storage area within this building compared to that originally proposed with the SSEP. The original SSEP Project Approval did not impose limits on the amount of dried product that could be produced from the site.

Due to the increase in the area of the packing plant it is necessary to re-align the approved 30 space car parking area. The car park will be located to the immediate north of the packing plant approximately 7.5 m from the northern boundary of the site. The car park is located in approximately 107 metres west of Abernethy's Creek.

Figure 6 shows the approved Packing Plant and the proposed structures under the modification application. Detailed plans of the modification are included as **Annexure 4** to this EA.

5.2.2 Additional Rail Spur Line within Packing Plant Site

The Modification Application will also seek to provide an additional rail spur line to that which was approved as part of the SSEP on this land as well. The second rail spur line will run parallel and adjacent to the original approved rail spur line. The two rail spur lines will have an overall length each of 260 and 300 m respectively.

The additional rail spur line is required to accommodate the increase in dry product that will be transported from the site in containers for export markets. In addition it is also proposed to consolidate the storage and handling of containers on this part of the overall factory complex, thereby reducing rail movements across Bolong Road (and thereby reducing subsequent traffic impacts along Bolong Road).

Under the original SSEP it was proposed to provide a single rail spur line to service the new packing plant. The increase in the number of finished product containers that will now be required to serve the site by rail will necessitate the provision of a second rail spur line in addition to the original approved rail line.

If a single rail spur line was retained with the increased containers, this would result in a doubling of rail crossings of Railway Street, further disrupting traffic travelling along this industrial road. A second spur line will enable trains to be spilt and parked on the subject site reducing the potential for rail crossings and subsequent disruptions to traffic flow along Railway Street.

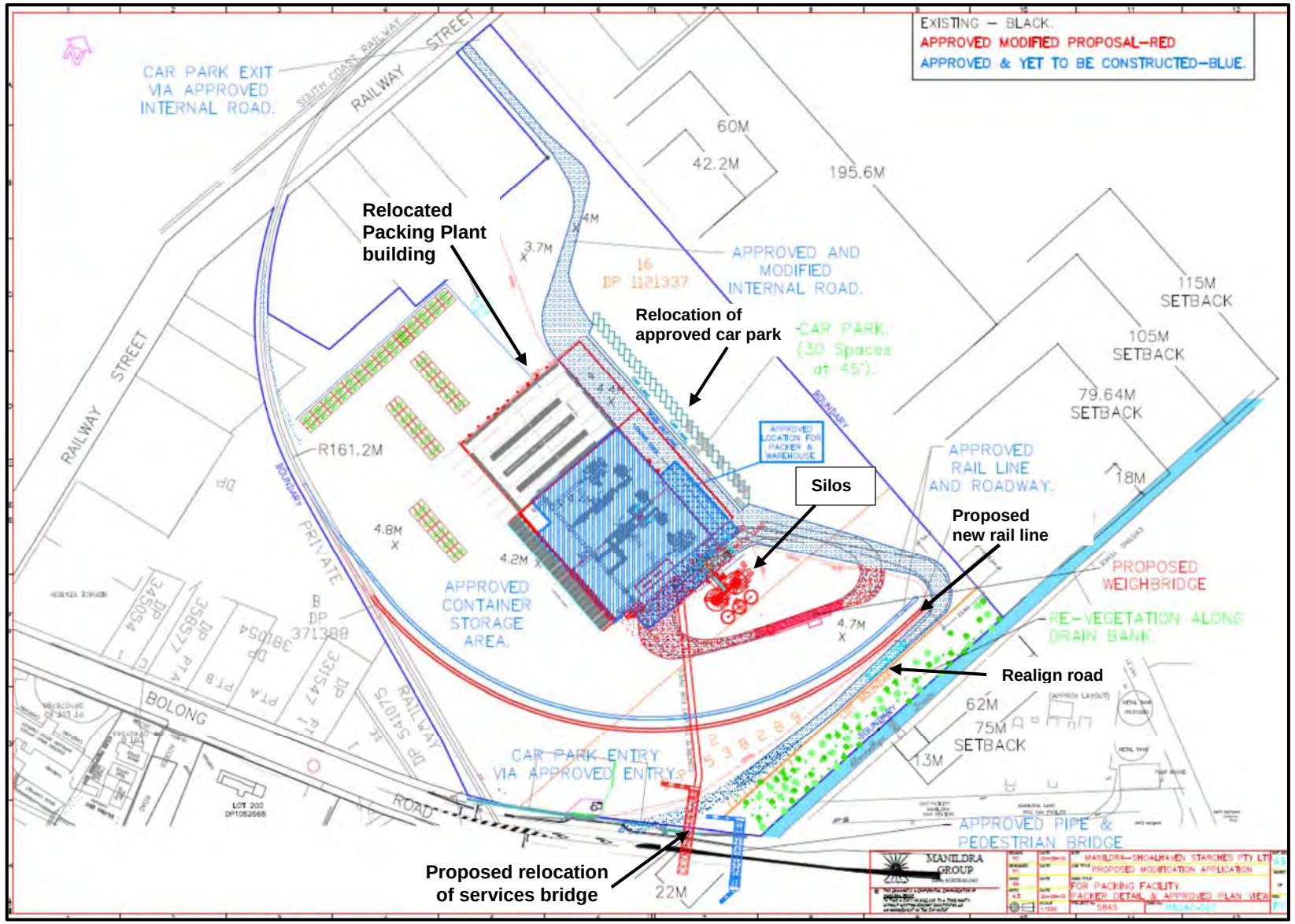

Figure 6: Excerpt of Plans showing Modification to approved Packing Plant (Manildra Group)

The second spur line will also allow longer trains to service the site providing efficiency gains for production transportation for the site. The second spur line will allow the site to be served by trains with a length of up to 700 metres.

Shoalhaven Starches are also intending to use longer wagons on their trains that will be able to contain three containers as opposed to the current double container wagons. The increase in wagon length will provide additional efficiency gains in the transportation of product from the site.

The increase in wagon length will however require a larger radius for the rail spur line alignment as its traverses across the site to satisfy relevant rail safety design guidelines. A narrower radius as currently approved would be too tight for the intended wagon length which could result in the derailment of wagons using the site.

The increase in radius of the rail spur lines has the effect of pushing the rail lines closer to the Abernethy's Creek boundary of the site as well as pushing the access road that will extend from Bolong Road to service the site closer to Abernethy's Creek compared to that which was originally approved. Whilst the original road alignment was 30 metres from Abernethy's Creek, the modified alignment will extend from between 18 to 22 metres from the creek boundary of the site.

To compensate for the loss of buffer between the edge of the proposed road and Abernethy's Creek from that which was originally approved, it is proposed to increase the extent to which riparian revegetation work will be undertaken along this boundary with this creek. Under the original Landscape and Vegetation Management Plan prepared by Coffey Geosciences that formed part of the Project Approval for this site it was proposed that the top of the bank of the creek would be undertaken using *Melaleuca ericifolia* and other species and the planting of groundcover species such as *Lomandra longifolia* and *Dianella spp.* to reduce weed invasion and soil erosion. Under this modified proposal it will be proposed to widen the extent of re-vegetation work to extend up to the edge of the proposed road, to provide a wider extent of re-vegetation work.

5.2.3 Re-alignment of Pedestrian Bridge Crossing over Bolong Road

Under the SSEP approval dried gluten/starch is to be pneumatically conveyed from the existing factory site to the approved packing plant via an overhead bridge which crosses Bolong Road.

It is proposed to realign the bridge which crosses Bolong Road from that which was originally approved under the SSEP approval. The original overhead gantry bridge crossed from the existing factory site on the south side of Bolong Road (Lot B DP 334511),

directly across Bolong Road (and diagonally across Abernethy's Creek) onto the north side of Bolong Road onto Lot 2 DP 538289.

The modified proposal seeks to relocate the proposed overhead bridge so that it commences on the western side of Abernethy's Creek on Lot 21 DP 1000265 (the site of the present interim Packing Plant site). From this location it will be able to service the existing factory site by pipework extending back across Abernethy's Creek as well as the proposed modified Starches Dryer No. 5 that is proposed to be relocated to this side of Abernethy's Creek (Mod. No. 7). The proposed crossing of Bolong Road will align parallel with Abernethy's Creek and extent to a point in a similar position as the approved overhead bridge on Lot 2 DP 538289. From this point a gantry will connect the bridge, and its associated pipework to the proposed modified packing plant silos and development.

The proposed modified bridge structure will have a height above ground level 11.8 m consistent with the approved structure under the SSEP.

The re-alignment of the bridge crossing will reduce energy consumption (and associated costs) by ensuring a more direct transfer route between the Product Dryer (as modified) and the Packing Plant site. Relocating the bridge crossing will also ensure that it does not need to cross Abernethy's Creek as was the case with the approved location.

Dried product will then be directed to underground pipework through a culvert to the packing plant site.

Plan and elevation details of the proposed modification are attached to this submission as **Annexure 4.**

6.0 CONSULTATION

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

- Department of Planning and Infrastructure;
- Environment Protection Authority;
- Office of Environment & Heritage (OEH);
- Department of Primary Industries (Water);
- Roads and Maritime Services;
- The Office of the National Rail Safety Regulator (NSW);
- Transport NSW; and
- Shoalhaven City Council.

Landowners in close proximity to the site have also been consulted via a letter delivered by the Manildra Group on the 28th October 2015. This letter outlined the proposed modifications to the approved Packing Plant. A copy of the letter sent out forms **Annexure 2** to this EA.

6.1 CONSULTATION WITH THE DEPARTMENT OF PLANNING AND INFRASTRUCTURE

Shoalhaven Starches have consulted with staff from the Department of Planning with respect to this proposal. The Department of Planning & Environment have provided requirements for the preparation of this EA in an email dated 6th October 2015, 7th October 2015 and 27th October 2015. These requirements form **Annexure 1** to this EA.

Table 4 provides an outline of these requirements and where they have been addressed in the EA.

Table 4

Department of Planning & Environment Consultation

Issues Raised by DoPE	***Section Addressed in EA***
Modification Description *– Clear description of the modification and staging of works (approved and proposed). Clearly explain if the previously approved elements will also be constructed at the same time as the modification. Include clear figures.*	Section 5.0
Noise *– An assessment in accordance with EPA's Industrial Noise Policy and Interim Construction Noise Guideline, including a description of the proposed mitigation measures.*	Section 8.2
Flooding – *A flood impact assessment including impacts of the increased building footprint on flood storage, flow velocity, and flood depths both on and off the site, including the need for any mitigation and/or compensation measures*	Section 8.4

Table 4 (continued)

Issues Raised by DoPE	***Section Addressed in EA***
Traffic (road and rail) *– Assessment of road and rail traffic impacts including the type and number of movements compared with existing and approved development. Details of how the modification meets the requirements of the Rail Safety National Law (NSW), including accreditation for the scope of works and development of appropriate safety interfaces if required.*	Section 8.6
Air and Odour *– An assessment in accordance with EPA Approved Methods for the Modelling and Assessment of Air Pollutants in NSW, including a comparison with measured impacts (odour audits) and approved impacts*	Section 8.3
Visual *– As assessment of the visual impacts of the increased building footprint, silos and additional rail spur line, including any changes to approved heights, scale and lighting as viewed from key vantage points. Include details of proposed building materials textures and colours, including photomontages to show the changes proposed by the modification*	Section 8.7
Contamination – Original emails dated 6th and 7th of October 2015 specified the need for a Phase 2 Contamination assessment: *A Stage 2 contamination assessment to identify the nature and extent of contamination on the packing plant site and measures to remediate the areas identified as impacted by hydrocarbon and asbestos contamination on the packing plant site. The existing project approval requires a site audit statement to validate the remediation. Assessment/management measures are also required for the groundwater which was identified as impacted by zinc above relevant guidelines, on the packing plant site* Shoalhaven Starches advised DoPE that the location of detected asbestos and petroleum hydrocarbons (borehole CTP28) is located 42 metres west of the proposed packing plant footprint. Following consultation between DoPE and Shoalhaven Starches the following requirements was detailed in an email from DoPE dated 27th October: *Please incorporate information provided…into the EA for the modification so that it is clear that the modified Packing Plant will not have an impact on the area of identified contamination. It would also be helpful to discuss the proposed timing from construction of the approved components, such as the container storage area, as this is adjacent to borehole CTP28. So, include a statement or mitigation measure that the Stage 2 contamination assessment would be undertaken before any works commence on the approved or modified components*	Section 8.1
Hazards *– Preparation of a Preliminary Hazard Analysis in accordance with the Department's HIPAP 6.*	Section 8.1
Consultation *– with neighbouring landowners, Council, EPA, RMS, OEH, DPI, NSW Transport and Office of the National Rail Safety Regulator.*	Section 6.0

6.2 CONSULTATION WITH OTHER GOVERNMENT AGENCIES

Office of Environment & Heritage (OEH)

The main issues raised by OEH was in relation to flooding:

> *The implications of the full range of floods, including events greater than the design flood, up to the probable maximum flood (PMF) should be considered as part of the proposed modification. In particular considerations should be given to:*
>
> - *The impact of flooding on the development;*
> - *The impact of the development on flood behaviour including any management measures to mitigate adverse flood impacts;*
> - *The development control plans or policies of Shoalhaven City Council (SCC) in relation to the management of flood risk;*
> - *The best available flood information for the area from the SCC;*
> - *The SCC's requirements for flood investigations to support development, whether flood information is currently available or not;*
> - *The full range of flood events, up to and including the probable maximum flood (PMF);*
> - *The flood hazard in the area including the hydraulic hazard, floodways, flood readiness, flood warning time, rate of rise of floodwater, flood duration and type of development;*
> - *The flood hazard of any access routes;*
> - *The implications of climate change on flooding; and*
> - *The impact of flooding on the safety of people/users of the development*

Comment:

WMAwater have been engaged by Shoalhaven Starches to carry out a flooding assessment with respect to this modification application. This report investigates the incremental hydraulic impact of the works associated with this modification proposal compared to the findings of their assessment carried out in May 2008 which supported the Shoalhaven Starches Expansion Project and which represents the cumulative impacts of all development by Shoalhaven Starches since approximately 1990. This report forms **Annexure 8** to this EA; and this issue is further addressed in Section 8.4 of this EA

Department of Primary Industries – Water

A meeting was held at the offices of Shoalhaven Starches on the 9th December 2015 and was attended by representatives of Shoalhaven Starches and Cowman Stoddart and Mr David Zerafa representing the DPI – Water.

At this meeting the proposal to modify the alignment of the rail spur lines which would have the effect of pushing these works and the approved access road further in an easterly direction towards Abernethy's Creek. These modified works would encroach into the 30 metre riparian corridor zone identified in the original riparian assessment that supported the original Project Application for this proposal. As outlined above in Section 5.2.2, the approved Landscape & Vegetation Management Plan under this previous Project Approval made provision for only planting of vegetation along the top bank of Abernethy's Creek to the north of Bolong Road.

At this meeting Mr Zerafa confirmed that the 30 metre riparian corridor zone was a guideline and was not necessarily a specific requirement for development. At this meeting DPI – Water did not raise objection to the proposal provided sufficient justification for the encroachment was provided including:

- The need for the provision of two rail spur lines to provide additional rail storage on the north side of Bolong Road which will reduce the extent to which rail movements will impact on traffic travelling along both Railway Street and Bolong Road.
- The required design requirements that warrant a larger radius to that originally approved.
- The basis for the commencement point of the spur line.
- Demonstrate that the proposed works will not have an adverse impact on the stability of the streambank of Abernethy's Creek.
- Provide a vegetation offset by way of a wider streambank revegetation along the Abernethy's Creek to the east of the proposed road and extending along the Abernethy's Creek frontage to this side. Such revegetation is to be wider than that originally approved (say a minimum of 10 m wide at the northern boundary) and extending towards Bolong Road.

In an email dated 28th January 2016, Mr Zerafa confirmed that the above reflected the outcome of the meeting; and reiterated that riparian re-vegetation along Abernethy's Creek occupy the entire area remaining between the creek and the proposed road.

A copy of an email that was sent to DPI – Water following the meeting confirming the outcome of the meeting and Mr Zerafa's response is included in **Annexure 2** to this EA.

These issues are further discussed in Section 8.4 of this EA.

6.3 CONSULTATION WITH NEIGHBOURING LANDOWNERS

Neighbouring landowners located within close proximity to the site have been consulted via a letter sent out by the Manildra Group on the 28th October 2015. This letter outlined the proposed modifications to the approved Packing Plant. A copy of the letter sent out forms **Annexure 2** to this EA. No responses were received from neighbouring land owners to the modified proposal.

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. Stephenson Environmental Management Australia (SEMA) have been engaged by Shoalhaven Starches to undertaken an Air Quality Impact Assessment with respect to this Modification Proposal. A copy of SEMA's assessment is included as **Annexure 7** to this EA. In relation to this Modification Proposal SEMA conclude that the modified Packing Plant will result in an additional 0.3% of total odour emissions; and 0.1% of TSP emissions; for the total site.	SEMA recommend that a Dust Management Control Plan be developed identifying dust sources and outlining the management and control of emissions and air quality impacts during construction, from dust generated from earthworks, vehicular movements add other engineering activities.	This issue has been identified in the DGRs as a key issue and has been addressed in detail within the EA. Air quality impacts are addressed in Section 8.3 of this EA.
Greenhouse Gas Emissions	The proposed modifications to the packing plant, the installation of an additional rail spur line and the minor realignment of the pedestrian overbridge will have no impact in terms of greenhouse gas emissions emitted from the site.	No additional management or mitigation measures proposed.	Not a key Issue.
Wastewater Treatment	The proposed modifications will not result in any change to the amount of wastewater generated from the site nor that will require treatment. No change in environmental impacts from that originally identified in EA.	No additional management or mitigation measures proposed.	Not a key Issue.
Effluent Irrigation and Storage	The proposed modifications will not result in any change to the amount of wastewater generated from the site and that will require to be irrigated onto the Company's Environmental Farm. No change in environmental impacts from that originally identified in EA.	No additional management or mitigation measures proposed.	Not a key Issue.
Water & Soils	The proposed will have no additional environmental impact in terms of: • Water supply	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*
	• Stormwater management • Acid sulphate soils No change in environmental impacts from that originally identified in EA.		
Noise	Shoalhaven Starches are licensed under the POEOP Act (Environment Protection Licence No. 883) which sets noise limits for the operation of the overall factory complex. Noise goals have been designed for the site to ensure existing noise levels are not increased by additional plant. The EA is supported by a Noise Impact Assessment prepared by Day Design Pty Ltd. A copy of this assessment is included in **Annexure 6** to this EA. Noise Impacts are further addressed in Section 8.2 of this EA. Noise control recommendations approved as part of the Project Approval will be sufficient for the proposal with the exception of a required increase to the height of the barrier to the north and west of the container storage area.	Day Design recommends an increase to the height of the barrier to the north and west of the container storage area.	This issue has been identified as a key issue by the DGRs and is addressed in the EA. Noise impacts are addressed in Section 8.2 of this EA.
Transport & Traffic	The EA is supported by a Traffic Impact Assessment prepared by ARC Traffic and Transport Pty Ltd. A copy of this assessment is included in **Annexure 10** to this EA. Traffic and transport Impacts are further addressed in Section 8.6 of this EA. ARC advise the proposed modifications will: ➢ have no significant impacts on local or on-site traffic environments, ➢ not increase rail movements above those limits established in the SSEP Approval, and ➢ not impact on the efficiency or safety of pedestrian movements. No change in environmental impacts from that originally identified in EA.	No additional management or mitigation measures proposed	This issue has been identified by the DGRs and is addressed in the EA. Traffic impacts are 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 DGRs for this project have identified that a Preliminary Hazard Analysis (PHA) is required to be undertaken in relation to this proposed modification A PHA has been prepared for the proposed modification by Pinnacle Risk Management and forms **Annexure 5** to this EA. This issue is further addressed in Section 8.1 of this EA. The PHA prepared by Pinnacle Risk Management concludes: • The potential hazardous events associated with the new equipment and building are primarily dust explosions. Given the location of the new equipment then no significant adverse off-site impacts to residential areas or similar are expected. Correspondingly, all risk criteria in HIPAP 4 are expected to be satisfied for this proposal; • The risk of propagation to neighbouring equipment is low given the proposed facility location and generous separation distances; and • Societal risk, environmental risk and transport risk are all considered to be broadly acceptable.	The following recommendations are made by the PHA prepared by Pinnacle Risk Management in relation to this modification proposal: • The existing safety management systems, e.g. maintenance procedures, operating procedures, training and emergency response plans, will need to be updated to reflect the proposed changes; and • All explosion vents should be positioned to avoid impact to personnel and sensitive equipment.	This issue has been identified by DGRs as Key Issue. A PHA has been prepared for the Modification Proposal by Matrix Risk Pty Ltd and forms **Annexure 5** to this EA. This issue is further addressed in Section 8.1 of this EA.
Riverbank Stability and Riparian Management	Abernethy's Creek is located within the eastern part of the subject land. As such, the EA for the modification proposal should consider potential impacts upon this watercourse. The approved and modified Packing plant site is located over 300 metres from the Shoalhaven River; and the modified Packing Plant building will be set back 125 metres and the proposed silos approximately 88 metres from Abernethy's Creek. The proposal does however propose to locate the modified rail spur lines and roadworks closer to Abernethy's Creek than that which was originally proposed of Abernethy's Creek (i.e. between 12 and 22 metres). It is also proposed to relocate the bridge crossing within this locality as well.	The assessment undertaken by Coffey's makes a series of recommendations with respect to protecting the banks of Abernethy's Creek and these are discussed in detail in Section 8.4.2 of the EA. In addition to the above, and in accordance with discussions with DPI _ water it is proposed to augment and widen the extent of riparian re-vegetation work that will be undertaken along the Abernethy's Creek bank from that which was	This is a key Issue identified by this EA. A geotechnical report to address the issue of riverbank stability has been prepared by Coffey Geosciences. This issue is addressed in Section 8.5 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*
	The EA is supported by a Geotechnical Assessment including an assessment of the proposal in terms of the stability of Abernethy's Creek prepared by Coffeys Geosciences (**Annexure 9**).	originally approved for this site under the original SSEP approval. In this regard the entire area between the edge of Abernethy's Creek and the proposed realigned road will be revegetated.	
Contamination	The EA for the SSEP project included a site contamination assessment undertaken by Coffey Geosciences. Soil sampling and analysis undertaken from the Packing Plant site identified petroleum hydrocarbon and fragments of Asbestos Containing Material within the central western part of the site which appeared to contain fill materials and ramping west towards neighbouring properties. This assessment concluded that this part of the site required further assessment and remediation / management with respect to the identified contamination. The location of the detected asbestos & petroleum hydrocarbons (borehole CTP28) is situated 42.2 metres west of the proposed modified packing plant footprint. The modified packing plant will therefore not impact on the area of identified by Coffey's as potentially contaminated. The container storage area is adjacent to borehole CTP 28, as was the case with the original SSEP approval. This modification proposal does not alter this situation. Consistent with the findings of the original EA and Project Approval a Phase 2 contamination assessment would be required to be undertaken before any works commence on the works associated with this site.	No additional management or mitigation measures proposed	This issue has been identified by DGRs as Key Issue and is addressed in the EA. Contamination is addressed in Section 8.1 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*
Flooding	The land associated with this revised Modification Proposal is identified by Shoalhaven City Council's Floodplain Management Study and Plan to be partly High and partly Low Hazard Flood Storage. The works associated with this revised Modification Proposal are to be sited largely within that area identified a High Hazard Flood Storage. Shoalhaven Starches have engaged WMAwater to prepare Flood Assessment detailing the potential impacts that the proposed development will have on flood waters within the locality, and to examine measures to mitigate such impacts. Flooding impacts associated with this proposal are discussed in Section 8.4 of this EA.	No additional management or mitigation measures proposed	Flooding has been identified by the DGRs and OEH as a Key Issue that needs to be addressed by this modification application. Flooding is discussed in Section 8.4 of the EA
Waste Management	The proposed will not alter the level of waste that is required to be managed on site. No change in environmental impacts from that originally identified in EA.	No additional management or mitigation measures proposed	Not a key Issue
Visual Impact	The proposed modifications are not expected to have significant impact in terms of the scenic amenity of the locality. The proposed works associated with this modification proposal will result in additional structures becoming visible; however their appearance, scale and height will be similar to existing structures within the immediate locality of the site. The visual impacts associated with this proposal are addressed in Section 8.7 of this EA.	The EA includes the following recommendations to mitigate the visual impact of the proposed works associated with this Modification Application: • In order to further reduce the visual impact of the proposed packing plant and associated works the western boundary of the subject site and the southern boundary along Bolong Road should be landscaped with a combination of trees and shrubs.	This is a key Issue identified by this EA and the DGRs A photomontage of the modified proposal has been prepared to illustrate the visual impacts of the proposed development. Visual impacts are 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*
Visual Impact continued		• A landscape plan should be prepared for those areas of the site associated with this Modification Application and identify suitable plantings which will grow to a suitable height to assist in screening the works associated with this application. • In addition to landscaping, new structures can be constructed and treated to reduce visual impact. Where appropriate and possible, buildings and structures should be constructed of similar materials as those previously used on the site and be of a non-reflective nature. Colours should blend with existing structures on the site to ensure visual harmony. Consideration should be given to incorporating a cladding colour which will blend with the surrounding locality. • Consistent with the findings of the original EA for the SSEP the exterior elements of the proposed overhead product bridge across Bolong Road should be designed to enhance its architectural and visual qualities commensurate with this "gateway" site.	

Table 5 (continued)

Issue	*Relative Change in Environmental Impact*	*Additional Management or Mitigation Measures Required*	*Significance of Issue with this Modification Proposal*
Flora and Fauna	The proposed will all be located within cleared areas of the subject site which is devoid of vegetation. The original Flora and Fauna Assessment carried out by Kevin Mills & Associates that supported the SSEP project did not identify any specific ecological constraints with this part of the site. The proposed modifications will not require any additional vegetation to be disturbed. No change in environmental impacts from that originally identified in EA.	No additional management or mitigation measures proposed	Not a key Issue
Heritage and Archaeological Issues	The original Aboriginal Archaeological Assessment that supported the EA prepared by South East Archaeology did not identify any constraints with respect to this part of the site or this project. The proposed modifications will have no additional impact in terms of indigenous or non-indigenous heritage. No change in environmental impacts from that originally identified in EA.	No additional management or mitigation measures proposed	Not a key Issue

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

- Preliminary hazard analysis;
- Noise impacts;
- Air quality (and including odour) impacts;
- Flooding;
- Riparian issues including riparian corridors and streambank stability.
- Visual impact;
- Contamination; and
- Traffic (road and rail) impacts.

As outlined in the Executive Summary of the EA, during the formulation of the EA, and following completion of expert assessments, Shoalhaven Starches revised the siting of the proposed packing plant to more closely reflect the original approved location for the packing plant. The expert assessments used in this EA were however based upon a slightly different proposal in which the packing plant was to be sited slightly further to the north than that which is now proposed. Such a change however was felt to have no significant implications in terms of the findings and recommendations of these expert assessments. As a result the expert assessments have been incorporated into this EA.

8.0 KEY ISSUES

8.1 PRELIMINARY HAZARD ANALYSIS

The requirements issued by the DoPE in relation to this modification proposal required that the EA address the following:

> ***Hazards -*** *Preparation of a Preliminary Hazard Analysis in accordance with the Department's HIPAP 6.*

The Shoalhaven Starches factory site and its operations comprise a "*potentially hazardous industry*" and "*potentially offensive industry*" under the provisions of *State Environmental Planning Policy No. 33. – Hazardous and Offensive Development*. Under the provisions of clause 12 of this SEPP any proposal involving a potential hazardous industry must be supported by Preliminary Hazard Analysis (PHA) prepared in accordance with relevant Circulars and Guidelines published by the Department.

This Modification Application is supported by a Preliminary Hazard Analysis prepared by Pinnacle Risk Management ("Pinnacle") (**Annexure 5**). This section of the EA is based upon the findings of the PHA undertaken by Pinnacle.

The PHA undertaken by Pinnacle was conducted as follows:

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

8.1.1 Hazard Identification

Process Materials

Starch

Starch or amylum is a carbohydrate consisting of a large number of glucose units joined together. According to Pinnacle it is not defined as a hazardous material or a Dangerous Good.

Starch is produced by most green plants as an energy store. It is the most common carbohydrate in human diets and is contained in large amounts in such staple foods as potatoes, wheat, corn, rice, and cassava.

Papermaking is the largest non-food application for starches globally. In a typical sheet of copy paper, the starch content may be as high as 8%.

Starch is a fine, white, odourless powder. The respiratory TWA according to Pinnacle is 5 mg/m^3. It is insoluble in water. Starch is not defined as a combustible solid (it will not support combustion) but may form explosive mixtures with air. According to Pinnacle it is a potentially explosive dust when critical parameters exist, eg. particle size less than 500 micron and moisture content less than 30%.

According to Pinnacle potential ignition sources include:

- Smouldering, self-heating or burning dust;
- Open flames, eg. welding, hot work, cutting and matches;
- Hot surfaces, eg. hot bearings, dryers, incandescent materials and heaters;
- Lightning;
- Heat from mechanical impact or friction; and
- Electrical discharges and arcs.

K_{st} is a measure of a dust's explosibility classification and is a measure of the maximum rate of pressure rise, i.e. the higher the K_{st} value, the greater the explosive energy. For starch, the K_{st} value is 199 bar.m/s. These are deemed potentially weak explosions although Pinnacle notes that previous incidents involving starch dust explosions have led to fatalities.

Starch is non-toxic to people and has a low environmental impact potential. It is mildly irritating to eyes and lungs.

Gluten

Gluten is a protein composite found in wheat and related grains, including barley and rye. Gluten gives elasticity to dough, helping it rise and keep its shape, and often gives the final product a chewy texture.

Gluten is the composite of two storage proteins, gliadin and a glutenin, and is conjoined with starch in the endosperm of various grass-related grains, eg. wheat. Worldwide, gluten is a source of protein, both in foods prepared directly from sources containing it, and as an additive to foods otherwise low in protein.

Gluten is a fine, pale yellow powder. It is insoluble in cold water. Gluten is ignitable above 460 C and may form explosive mixtures with air. According to Pinnacle it is a potentially explosive dust when critical parameters exist, eg. particle size less than 500 micron. For gluten, the K_{st} value is 100 bar.m/s. As for starch, these are deemed potentially weak explosions. The lower explosion limit is 60 g/m^3 and the bulk density is 0.4 to 0.5 g/cm^3.

Gluten is slightly hazardous in case of inhalation, skin or eye contact and ingestion.

From the above review, according to Pinnacle there are no Dangerous Goods associated with the new packing plant. From the State Environmental Planning Policy (SEPP) No.33, as dust explosions are possible with the product starch and gluten then a PHA is required.

8.1.2 Potential Hazardous Incidents Review

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

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

The identified credible, significant incidents with the potential for off-site impacts for the proposed facility are summarised in the PHA prepared by Pinnacle. These potential events are based known incidents and dust process safety and were derived by Pinnacle following a Hazardous Event Identification workshop conducted at the site. Only the potential hazardous events that could cause significant consequences are addressed in the PHA prepared by Pinnacle.

8.1.3 Risk Analysis

The assessment of risks to both the public as well as to operating personnel around the new packing plant requires an analysis technique commensurate with the nature of the risks involved. Risk analysis could be qualitative, semi-quantitative or quantitative.

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

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

Risk = Likelihood x Consequence

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

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

In the PHA prepared by Pinnacle, however, the approach adopted to assess the risk of the identified hazardous events is scenario based risk assessment. The reasons for this approach are:

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

2. *The new equipment is to be protected from explosions using explosion vents and hence these will limit the impact distance; and*

3. *There are a limited number of process safety events and therefore cumulative and societal risk is not significant. The main events of interest are dust explosions. Therefore, these are analysed in the remaining sections of this report.*

Dust Explosions

The PHA prepared by Pinnacle includes a summary of historical dust explosions. According to Pinnacle not all dust explosions are reported. One analyst reports that only 15% of the actual dust explosions that occur are reported, ie. many more may have occurred. According to Pinnacle dust explosions are credible events and can cause significant impacts.

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

The majority of dust explosion incidents according to Pinnacle resulted in no fatalities. For the incidents where fatalities occurred, these were to on-site personnel. Based upon US statistics, on average, dust explosions result in approximately 5 deaths per year. Historically, about one in six fatalities occur in the food and grain industry. Again, the greater risk for fatality or injury for dust explosions is to on-site personnel.

Given the estimated impact distances and the distances to the nearest boundary to the silos (at least 45 m) then according to Pinnacle no significant off-site impacts are expected from explosion overpressures.

With respect to possible maximum horizontal flame length from a vented dust explosion Pinnacle indicate for a 30 m flame length, the flames are therefore unlikely to impact people off-site as the silos are at least 45 m from the site's closest boundary.

Hence, given the above consequence assessment, according to Pinnacle, adverse impact from the vented dust explosions is unlikely for off-site personnel and therefore the risk of fatality, injury or property damage is expected to comply with relevant risk.

Building Explosions

According to Pinnacle, it is possible that dust explosions could occur in the new bagging area or in the warehouse, eg. deposited dust is not removed due to failure of the housekeeping program.

Doors, if open, as well as failure of the metal sheeting will limit the impact from confined explosions in buildings. This is supported according to Pinnacle by historical evidence where the damage radius of dust explosions is usually limited to the building (or equipment item) in which it occurs and to a very short range outside. Correspondingly, significant adverse impact to people off-site is not expected, in particular, given the large distances to residential areas. The nearest site boundary to the building is approximately 35 m away whilst the nearest residential and shopping areas are over 200 m away.

The packing building has been designed to meet good practice for food safety and housekeeping / cleanliness. The steel work is on the outside of the wall panels to prevent ledges for product to settle on (ie. reducing the risk of dust explosions).

Controls such as housekeeping, hazardous zoning and permits to work are imperative measures to lower the risk of dust explosions within the new building. As this hazard exists now on-site then the existing safety management systems for prevention of confined dust explosions within buildings need to be implemented to the new building.

Dust Explosion Safeguarding

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

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

- Dust Free Process
- Dust Control
- Control of Ignition Sources
- Inerting
- Explosion Isolation
- Explosion Suppression
- Explosion Venting
- Equipment Separation

With respect to this modification proposal Pinnacle indicate the assessment of dust explosion hazards is bound to be subjective because the problem is too complex for quantitative analytical methods to yield an indisputable answer. Therefore, the acceptable safeguards for any given design will vary from company to company. According to Pinnacle most of the dust explosion hazards in the grain, feed and flour industry can be eliminated by soft means such as training, motivation, improving the organisation, good housekeeping and proper maintenance. All of these safeguards are in-place at Shoalhaven Starches.

When these are combined with the additional measures proposed for the new equipment and building then further risk reduction is achieved. According to Pinnacle these additional measures include all equipment handling potentially explosive dust is to be designed to NFPA, IECEX or ATEX standards including rotary valves for seals, explosion vents, equipment bonding and earthing, minimisation of horizontal surfaces in the buildings where dust can collect, screw feeders to contain plugs to prevent flame propagation, generous separation distances between the building, silos and site boundaries, mechanically filling bags (not pneumatic) and hazardous area zoning with the electrics and instruments to suit the requirements. Therefore, according to Pinnacle no further analysis of building dust explosions is warranted.

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

- Scheduled aircraft $1x10^{-8}$/year; and
- Unscheduled aircraft $4x10^{-7}$/year.

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

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

Subsidence	Landslide
Burst Dam	Vermin/insect infestation
Storm and high winds	Forest fire
Storm surge	Rising water courses
Earthquake	Storm water runoff
Breach of security	Lightning
Tidal waves	

These events were reviewed and none of them were found to pose any significant risk to the new facility given the proposed safeguards. Flooding can occur at this site, however, any potential propagation events are unlikely to be significant given that the new equipment and building are being designed for the expected flood conditions.

Cumulative Risk

The PHA prepared by Pinnacle demonstrates that the proposed modifications will have negligible impact on the cumulative risk results for the local area as the significant consequential effects such as explosion overpressures are local to the equipment and there are generous separation distances from the building and equipment to the site's boundary.

Pinnacle concludes that the development does not make a significant contribution to the existing cumulative risk in the area.

Societal Risk

According to the PHA prepared by Pinnacle the risk of fatality arising from this proposal does not extend significantly from the sources and is therefore well away from the residential areas. The concept of societal risk applying to residential population is therefore not applicable for the new equipment.

Risk to the Biophysical Environment

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

As the new equipment is being designed to be above the expected flood levels then significant environmental impact is not expected. Importantly, any spilt material will be contained in the area or via the environmental farm.

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

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

8.1.4 Conclusion and Recommendations

The PHA prepared by Pinnacle in relation to the proposed modifications to the Packing Plant concludes:

In summary:

- *The potential hazardous events associated with the new equipment and building are primarily dust explosions. Given the location of the new equipment then no significant adverse off-site impacts to residential areas or similar are expected. Correspondingly, all risk criteria in HIPAP 4 are expected to be satisfied for this proposal;*
- *The risk of propagation to neighbouring equipment is low given the proposed facility location and generous separation distances; and*
- *Societal risk, environmental risk and transport risk are all considered to be broadly acceptable.*

The PHA prepare by Pinnacle makes the following recommendations:

1. *The existing safety management systems, e.g. maintenance procedures, operating procedures, training and emergency response plans, will need to be updated to reflect the proposed changes; and*
2. *All explosion vents should be positioned to avoid impact to personnel and sensitive equipment.*

8.2 NOISE IMPACTS

The requirements issued by the DoPE in relation to this proposal required that the EA address the following:

> ***Noise –*** *An assessment in accordance with the EPA's Industrial Noise Policy and Interim Construction Noise Guideline, including a description of the proposed mitigation measures. A review of the modification against the existing EPL conditions and any noise reduction programs.*

This Modification Application is supported by a Noise Impact Assessment prepared by Day Design Pty Ltd (**Annexure 6**). This section of the EA is based upon the findings of this noise assessment.

8.2.1 The Locality

The Shoalhaven Starches complex is located on the southern side of Bolong Road across the Shoalhaven River from Nowra.

The proposed modified packing plant and container storage area will be located on the northern side of Bolong Road, opposite the existing complex.

The surrounding area is a mix of commercial, industrial and residential premises.

The nearest residential locations to the proposal are as follows:

- Location 1 – Nobblers Lane, Terara approximately 1750 metres to the south east;
- Location 2 – Riverview Road, Nowra approximately 1160 metres to the south west;
- Location 3 – Meroo Street, Bomaderry approximately 310 metres to the north west;
- Location 4 – Coomea Street, Bomaderry approximately 420 metres to the north west;

Locations are listed in keeping with the order shown in the Environment Protection Licence and are based on the closest noise producing area on the site to the residential area.

Shoalhaven Starches, the proposed site, surrounding area and receptor locations are shown in **Figure 7**.

Figure 7: Receptor locations – Shoalhaven Starches and surrounding area.

8.2.2 Acoustical Criteria

This section presents the noise guidelines applicable to this proposal and establishes the project specific noise criteria.

Department of Planning and Environment

Existing Project Approval

Project Approval for Application No. MP06_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.

Department's Requirement for Modification Assessment

The Department of Planning and Environment requires that in relation to noise the EA addresses the following:

> *"Noise – An assessment in accordance with the EPA's Industrial Noise Policy and Interim Construction Noise Guideline, including a description of the proposed mitigation measures. A review of the modification against the existing EPL conditions and any noise reduction programs."*

Environment Protection Licence 883

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

Section L5 'Noise Limits' of the licence states:

> *"L5.1 the LA10 (15min) sound pressure level contribution generated from the premises must not exceed the following levels when measured at or near the boundary of any residential premises:*
>
> *a) 38 dBA at locations in Terara on the south side of the Shoalhaven River;*
>
> *b) 38 dBA at locations in Nowra on the south side of the Shoalhaven River;*
>
> *c) 42 dBA at locations in Meroo Street, Bomaderry;*
>
> *d) 40 dBA at other locations in Bomaderry."*

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

Shoalhaven Starches Noise Management Plan

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

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

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

EPA Construction Noise Guideline

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

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

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

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

In this instance the entire construction phase may take several months although significant noise producing aspects, such as piling, if required, will last a total of approximately two weeks. Consideration is given to the potential for noise impact from construction activities on residential receptors in Section 8.2.4 of this section of the EA.

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.

Day Design 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 6** below.

Table 6

Rating Background Levels

Noise Measurement Location	***Time Period***	***Rating Background Level***
135 Terara Road, Terara March 2012	Day (7 am to 6 pm)	**33 dBA**
250 Bolong Road, Bomaderry March 2014	Day (7 am to 6 pm)	**38 dBA**
Shoalhaven Village Caravan Park, Nowra - March 2012	Day (7 am to 6 pm)	**40 dBA**

For the purpose of determining the potential for community reaction to noise emission from construction activities, previously measured background noise levels in the vicinity of each receptor location have been used to determine the noise management levels as shown in **Table 7** below.

Table 7

L_{eq} Noise Management Levels from Construction Activities

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

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

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

Definitions of the terms feasible and reasonable are given in Section 1.4 of the Guideline.

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

Project Specific Noise Criteria

When all the above factors are considered, according to Day Design, the most stringent noise criteria for the proposed modified packing plant and container storage area are as follows:

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

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

Construction Phase Noise Management Levels

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

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

8.2.3 Packing Plant and Container Area Operational Noise Emission

Packing Plant Noise Levels

The main sources of noise associated with the operation of the packing plant will be the plant and equipment located within the building and any external silo motors.

Day Design has conducted several noise surveys at Shoalhaven Starches' complex including noise measurements within and around the existing interim packing plant.

Noise measurements were taken by Day Design in terms of L_{10} sound pressure levels and have been used to calculate the L_{10} octave band, and overall 'A' frequency weighted sound power levels, in decibels re: 1 pW, shown in **Table 8** below.

Table 8

L_{10} Sound Power Levels – Packing Plant

Mechanical Plant	***dBA***	***Sound Power Levels (dB) at Octave Band Centre Frequencies (Hz)***							
		63	***125***	***250***	***500***	***1k***	***2k***	***4k***	***8k***
Enclosed Hand Packer Blower	**94**	86	81	87	82	91	89	84	75
Packer Head	**90**	86	77	82	79	82	85	84	83
Heat Sealer	**91**	83	88	89	83	84	82	81	88
Robot / Palletiser	**90**	87	88	87	85	86	83	80	79
Silo Motor	**78**	85	73	74	77	74	70	64	53
Vacuum Cleaner	**99**	74	75	83	86	93	95	92	88
Forklift (Crown CD25S)	**94**	98	89	83	83	93	85	73	68
Truck Movement	**101**	104	104	98	97	96	95	90	92

Container Storage Area

The container area will be located to the south eastern side of the packing. The location and siting of the container storage area will remain largely unchanged from that originally approved under the 2009 Project Approval. Containers will be unloaded and loaded onto the train along the new rail spur line and moved around the area using a 32 ton forklift. Day Design has carried out noise measurements at the existing Shoalhaven Starches complex of 32 ton forklifts loading and unloading containers from a freight train and moving containers around the area.

Table 9 below provides a schedule of the octave band and overall 'A' frequency weighted sound power levels of noise sources associated with the container area.

Table 9

L_{10} Sound Power Levels – Container Loading and Storage

Mechanical Plant	***dBA***	***Sound Power Levels (dB) at Octave Band Centre Frequencies (Hz)***							
		63	***125***	***250***	***500***	***1k***	***2k***	***4k***	***8k***
Freight Train Shunting	**99**	110	104	100	97	92	90	87	80
Hyster Forklift Loading / Unloading or Moving Containers	**100**	104	109	98	96	94	93	86	80

Predicted Noise Levels

Knowing the sound power level of a noise source (see **Tables 8** and **9** above), the sound pressure level (as measured with a sound level meter) can be calculated at a remote

location using suitable formulae to account for building envelope transmission, distance losses, etc.

Table 10 below shows the predicted noise level at each of the receptor locations from the ongoing operation of the proposal.

Table 10

Predicted Noise Levels at Receptor Locations – Packing plant and Container Storage Area

Description	***Predicted Noise Level $L_{10,\ 15\ minute}$ (dBA)at Receptor Location***			
	Location 1	***Location 2***	***Location 3***	***Location 4***
Packing Plant	21	23	29	27
Container Area	25	21	30	28
Combined	**25**	**26**	**32**	**30**
Acceptable Noise Limit ($L_{10,\ 15\ minute}$)	28	28	32	30
Complies	**Yes**	**Yes**	**Yes**	**Yes**

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

- Packing plant includes truck movements and allowable sound level for external plant;
- Container area considers cumulative impact of two forklifts moving containers and not the cumulative impact of the locomotive shunting;
- Packing plant building is constructed in accordance with recommendations made by Day Design;
- Sound barrier screens are erected around the container area as recommended by Day Design.

8.2.4 Construction Noise Emission

The construction process will involve preliminary earthworks, pouring of concrete slabs, erection and fit-out of the packing plant building and silos.

It is likely that piling will be required to establish the footing of the new structures. **Table 11** below shows a schedule of sound power levels for typical construction equipment likely to be used at the site as provided by Day Design.

Table 11

Construction Equipment – L_{eq} Sound Power Levels

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

Table 12 below shows the predicted level of 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 Location*			
	Location 1	*Location 2*	*Location 3*	*Location 4*
Construction Activity*	37 – 43	41 – 47	45 – 52	42 – 49
Acceptable Noise Limit ($L_{10,\ 15\ minute}$)	43	50	48	48
Complies	**Yes**	**Yes**	**No up to + 4**	**No up to + 1**

** The range provided is with and without piling activity.*

8.2.5 Noise Control Recommendations

Project Approved Recommendations

The original Project Approval incorporates noise mitigation measures recommended in *'Acoustical Assessment, Proposed Ethanol Upgrade, Shoalhaven Starches'* – prepared by The Acoustic Group Pty Ltd, ref 38.3849.R52:ZJM,dated 26 June 2008.

Recommendations made in the above-mentioned report included the following:

- *"Walls, roof/ceiling of the packing plant is to be constructed of material having an R_w of not less than 35 dBA;*
- *The forklift (new item) that is used for the loading and stacking of containers is to have a maximum sound pressure level of 80 dBA at 1 metre;*
- *The northern end of the container loading area is to have solid masonry walls not less than 8.5 metres in height and the western and eastern end of the container loading area is to have solid masonry walls not less than 8 metres in height;*

- *We have been instructed that there will be no train movements on the spur line that forms part of the container loading area between the night time period of 10 pm to 7 am;*

- *As part of the management plan for the container loading area during the night time period (10 pm to 7 am) the forklift trucks will only stack two containers high at locations within 10 metres of the wall and only one container high above the ground floor locations more than 10 metres from the wall. No loading of the train in the proposed container loading area will take place during the night time period."*

Following an assessment of the proposed modification, minor amendments to the approved noise control measures are required as detailed below.

Construction of the Packing Plant Building

The following recommendations, with regard to building construction, by Day Design are in keeping with the Project Approval and provide additional detail.

Walls

The external walls of the packing plant building should have a minimum weighted sound reduction index (R_w) 33.

Roof / Ceiling

The roof and ceiling of the building should have a minimum weighted sound reduction index (R_w) 33.

Openings and Container Loading Area

Acoustically untreated openings in the building should not exceed a total of 36 m^2 and be located in the south eastern façade, or south eastern end of the north-western or south-western facades only.

Roller door openings in the south western façade of the building should remain closed when containers are not being loaded in this location.

External Doors

All external doors should be of minimum 44 mm thick, solid core timber construction in well-sealed frames.

Additional Mechanical Plant and Equipment

At the time of writing this report it is not known what, if any, significant noise producing mechanical plant or equipment may be located externally to the packing plant building.

Noise predictions in **Table 10** assume there are five (5) silo motors each with a maximum sound power level (L_w) of 78 dBA, which will be acceptable without additional noise controls.

A final assessment should be carried out prior to the issue of a Construction Certificate once details of any external plant, if any, are known. Any items of externally located plant which exceed the allowable sound power level of 78 dBA may require additional acoustical treatment.

Day Design are confident that the level of noise emission from the proposal will, or can be controlled to, meet the acceptable noise limits at all receptor locations.

Container Area Noise Barriers

According to Day Design, the forklifts intended to be used will operate a sound pressure level that will exceed that envisaged by the original Project Approval. Two Hyster forklifts will be used in the container storage area to unload the train and move containers.

Day Design therefore recommend erecting sound barrier screens along the north-western, north eastern and south-western boundaries of the container area as follows (and shown in **Figure 8**):

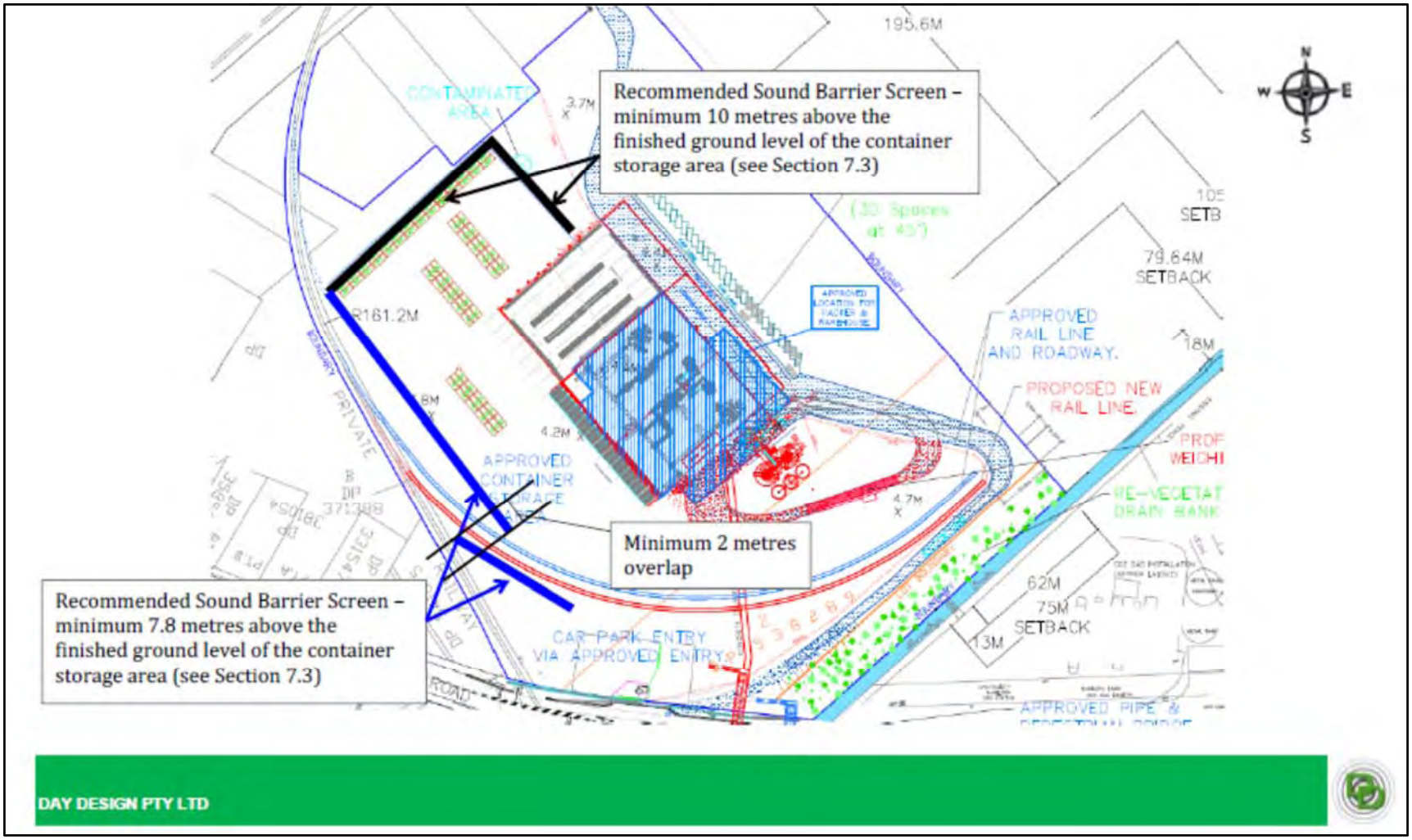

Figure 8: Recommended Sound Barrier Screening.

- *Along the entire length of the north western boundary of the area and returning along the north eastern boundary to meet the packing plant building to a minimum height of 10 metres above the finished ground level of the container storage area; and*

- *Along the south western boundary of the site on the south western side of the site and to the south west of the rail spur line to a minimum height of 7.8 metres above the finished ground level of the container storage area;*

- *The south western barrier should overlap by a minimum 2 metres where it separates to accommodate the rail spur;*

- *Sound barriers may be constructed from, for example, masonry, shipping containers, 9 mm fibre cement sheet on both sides of 92 mm steel posts, a proprietary modular wall system with a minimum weighted sound reduction index (R_w) 20;*

- *Barriers should be constructed without holes or gaps other than a maximum 50 mm at the base;*

- *All sound barriers should remain in place at all times;*

- *The locomotive should not be used to shunt rail cars whilst being loaded or unloaded;*

- *All other recommendations forming the Project Approval, not superseded in this report should be implemented and maintained (as detailed in Section 7.1);*

Construction Noise

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

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

It can be seen from **Table 12** that the construction noise management levels are likely to be met at each receptor location during general construction activity, with the exception of piling. During piling (if required) there is potential for the noise management levels to be exceeded at receptors 3 and 4, by up to 4 dB, on some occasions. According to Day Design this is not considered a significant exceedance during day time hours for short and sporadic duration.

However, a construction noise management plan should be provided in accordance with NSW EPA's *Interim Construction Noise Guideline* and to satisfy Condition 13 of the Project Approval.

Noise Impact Statement

> *"An assessment of the potential noise impact from the proposed construction and operation of a new packing plant and container storage area on Bolong Road, Bomaderry, NSW has been undertaken.*
>
> *Calculations show that the level of noise emission from the operation of the facility will be within the noise design goals derived from Environment Protection Licence 883 noise limits at each receptor location. This is providing noise control recommendations made in Section 7 of this report are implemented and adhered to."*

8.3 AIR QUALITY (AND ODOUR) IMPACTS

The requirements issued by the DoPE in relation to this proposal required that the EA address the following:

> ***Air & Odour*** *– An assessment in accordance with the EPA's Approved Methods for the Modelling and Assessment of Air Pollutants in NSW, including a comparison with measured impacts (odour audits) and approved impacts.*

This Modification Application is supported by a submission addressing air quality issues associated with the proposed modification prepared by Stephenson Environmental Management Australia (SEMA). A copy of SEMA's submission forms **Annexure 7** to this EA. This section of the EA is based upon the findings of this air quality assessment.

8.3.1 Construction Dust Impacts

Air quality impacts during construction would result from dust generated from earthworks, vehicular movements and other engineering activities during the construction phase. Shoalhaven Starches confirmed there will be no additional diesel locomotive movements in the area during construction.

To estimate the dust emissions during the construction, the emission factor was determined by SEMA from the USEPA AP-42 database. An emission factor is a representative value that attempts to relate the quantity an air pollutant with the process or activity associated with the release of that pollutant.

The general equation for estimating emissions is:

$$E = A \times EF \times (1-ER/100)$$

Where:

E	=	emissions
A	=	Activity Rate;
EF	=	emissions factor and;
ER	=	overall emission reduction efficiency

According to SEMA the emission factor variable (EF) for general construction activity operation is 2.69 megagrams (Mg)/hectare (ha)/month of activity. The Activity Rate in this instance is the area of construction activity.

Using these variables SEMA estimate emissions from the construction of the modified Packaging Plant as 3.08 Mg/ha/month. This factor assumes no dust controls have been applied to the construction process. Therefore, this emissions estimate (E) can be considered a conservative estimate because it assumes construction dust emissions will be controlled by construction contractors on the site at the source of dust emissions. As these dust controls are currently in the process of being specified by construction contractors, in conjunction with Manildra Group, the final version of the variable has not yet been included in this estimate.

According to SEMA there are a number of common mitigation methods to control dust emissions from earthworks and construction. Prior to construction activity, a dust control plan is commonly created which identifies dust sources, and outlines management of emissions.

The most common mitigation method during the construction period is dust suppression by watering down of roads and dust covered surfaces and on-site stockpiles of temporarily stored fill and topsoil to limit erosion by wind. The frequency of watering these surfaces is dependent on weather, soil type and traffic movement. Wind fences are also a common mitigation method, which prevent loose dust from leaving the site during periods of elevated wind speeds.

Other mitigation methods include using temporary grassing or using jute mesh as groundcover, covering stockpiles and locating them in a position where they are protected from prevailing winds, covering truckloads when material is being transported and limiting speed on the construction site. As a result of this dust control plan and applied dust suppression techniques, dispersion modelling of dust emissions during construction has not formed part of this assessment

8.3.2 Emission Monitoring at Existing Packing Plant

Emission monitoring was conducted by SEMA on 19 November 2015 on four existing Packing Plant emission points that are considered to be similar in dimensions, product and emissions to the seven silos in the proposed modified Packing Plant.

Shoalhaven Starches have nominated the following equivalencies between the four existing silos sampled and the proposed silos in the proposed modified Packing Plant.

- Gluten 1A is equivalent to the proposed Small Gluten Silo.

- Starch 4 is equivalent to the proposed Small Starch Silo.
- Gluten 1B is equivalent to the proposed Medium Gluten Silos 1, 2 and 3.
- Starch 6B is equivalent to the proposed Large Starch Silos 1 and 2.

Table 13 summarises the average emission results and the complete report is presented in Appendix A.

Table 13

Average Emission Results Existing Packing Plant November 2015

Parameter	***Units of measure***	***Packing Plant Sampling Location and Date***			
		Gluten 1A *19/11/15*	***Starch 4*** *19/11/15*	***Gluten 1B*** *19/11/15*	***Starch 6B*** *19/11/15*
Temperature	*^oC*	*49.5*	*45.3*	*49.5*	*50.1*
Pressure	*kPa*	*101.3*	*101.3*	*101.3*	*101.3*
Velocity	*m/s*	*12.0*	*11.6*	*15.2*	*15.3*
Normal Volumetric Flow	*m^3/s*	*0.28*	*0.30*	*0.38*	*0.18*
Odour	*ou*	*157*	*56*	*129*	*61*
Oxygen	*%*	*20.9*	*20.9*	*20.9*	*20.9*
Total Inspirable Dust	*mg/m^3*	*0.21*	*0.44*	*0.91*	*3.29*

Key:
^oC = degrees Celsius
kPa = kilo Pascals
m/s = metres per second
m^3/s = dry cubic metre per second 0^oC and 101.3 kilopascals (kPa)
ou = odour units
% = percentage
mg/m^3 = milligrams per cubic metre at 0^oC and 101.3 kilopascals (kPa)

8.3.3 Impact Assessment Criteria

Odour Impact Assessment Criteria

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

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

The GLC assessment criteria for the complex odour compound emissions considered in the modelling are shown in **Table 14**. The predicted odour impact due to the pollutant source must be reported in units consistent with the IAC as peak concentrations (ie. approximately 1 second average).

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

Table 14

Impact Assessment Criteria for Complex Odorous Air Pollutants

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

Key:

ou	=	*odour unit*
>	=	*greater than*
>	=	*less than*

Adjustment for Peak-to-Mean ratios

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

AMMAAP Table 6.1, reproduced in **Table 15** below, provides EPA recommended one-second to one-hour (P/M60) peak-to-mean ratios for estimating concentrations for different source types, stabilities and distances. According to SEMA it is important to note that these emission factors are for idealised situations for one source in flat terrain where the receptor is located along the centreline of the single plume and do not consider

fluctuations away from the plume centre line, terrain influences or plume interactions from multiple sources.

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

Table 15
Peak-to-Mean Factors

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

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

Source: *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales*.

Total Suspended Particulate Matter Impact Assessment Criteria

The AMMAAP criterion for Total Suspended Particulate Matter is outlined in **Table 16**.

Table 16
Impact Assessment Criteria for Total Suspended Particulate Matter

Pollutant	*Averaging Period*	*Impact Assessment Criteria (µg/m^3)*	*Source*
TSP	Annual	90	NHMRC (1996)

Key:

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

8.3.4 Dispersion Modelling Input Data

According to SEMA AERMOD is a recommended Gaussian dispersion modelling system as it accurately estimates Ground Level Concentrations (GLCs) of source emissions. AERMOD requires the following input data – meteorological, buildings and structures on site, surrounding terrain data, discrete receptors and emissions and source information. These are all detailed in this section.

Terrain Input Data

The terrain surrounding the Shoalhaven Starches site ranges from flat terrain in the immediate vicinity to mountains between 100 and 200 metres above sea level in approximately 5 km north-west of the plant. The township of Bomaderry, west of Shoalhaven Starches exists in moderately hilly terrain with slopes ranging from approximately 20 to 50 metres above sea level. The Shoalhaven River extends eastward from the south-east of the area under consideration, with a resultant river valley between Bomaderry and Nowra. The terrain is relatively flat around the river for the area east of Bomaderry.

Meteorological Input Data

The area considered in AQIA dispersion modelling experiences typical coastal weather in addition to locally influenced patterns according to SEMA. A mountain range to the north of the site means northerly winds are much less common than the east-west wind patterns occurring as a result of the coastal sea breeze cycle. The meteorological (MET) file was provided by Lakes Environmental Met Data Services and included hourly data for temperatures, wind speed, wind direction, and mixing heights from January 1st to December 31st 2013. **Figure 9** presents this wind data. The arms in the figure represent the direction from which the wind is blowing and shows that westerlies and north westerlies were the most predominant for the 12 month period, which was considered typical meteorological data.

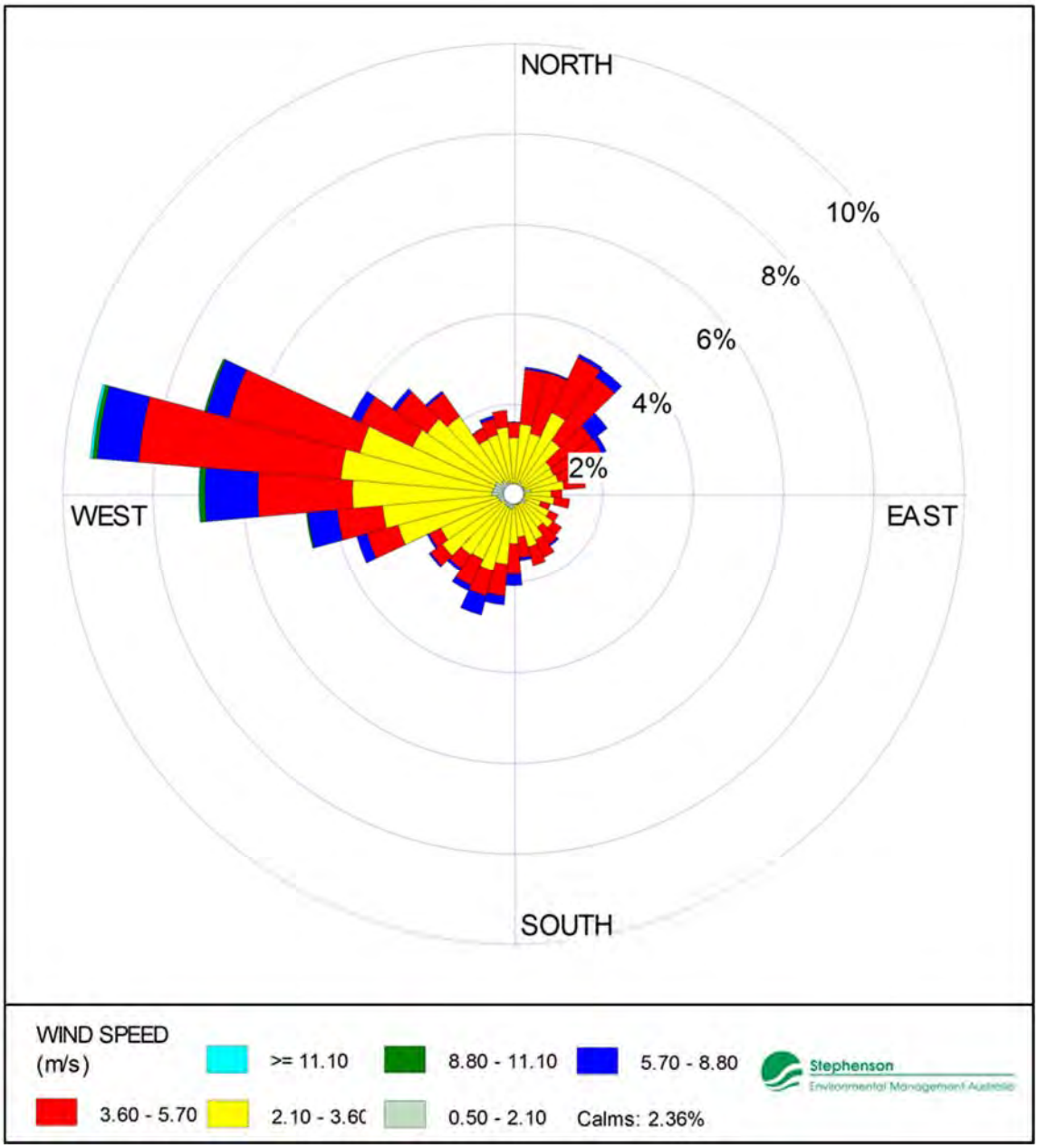

Figure 9: Annual Wind Rose – January 1st - December 31st 2013.

Building Input Data

According to SEMA buildings greater than 0.4 times the height of stack and within a distance of 5 L must be incorporated into modelling, where L is the lesser of the height or width of the building. The proposed modified packing plant has height of 18 metres above ground, and a total width of 60 metres. The proposed silos have heights of 34.3, 26.5 and 20.7 metres above the ground. The buildings incorporated into the modelling assessment were the proposed packing plant building as well as all seven proposed silos. **Figure 10** presents the building profile incorporated into the modelling assessment.

Figure 10: Building input data.

Receptors of Interest

The receptors of interest chosen by SEMA for their air quality assessment include four (4) residential areas, which are Bomaderry, North Nowra, Nowra and Terara. These areas are highlighted in **Figure 11**. For their assessment, the highest odour and TSP GLCs in each of these areas was observed by SEMA and included in their assessment.

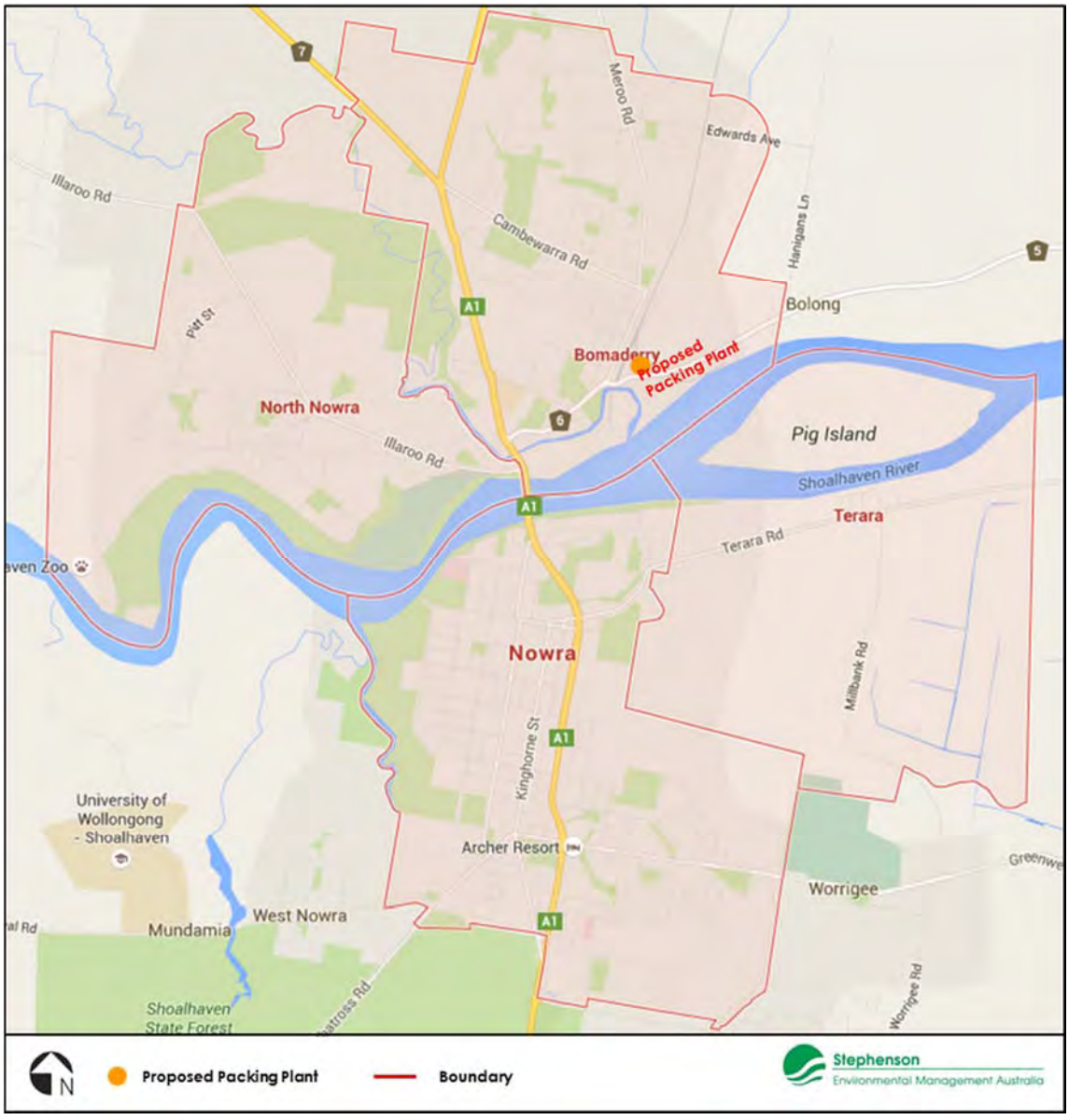

Figure 11: Receptors of interest – locations.

Emission Input Data

Stack emission input data was derived by SEMA from two sources. The Manildra Group provided proposed physical stack information including process function, stack locations, dimensions and expected flow rate.

SEMA conducted emission monitoring tests, including odour and TSP on the existing packing plant exhaust stacks, and used the resulting concentrations and exhaust temperatures as input data. TSP and odour concentrations were derived from emission results from tests conducted in November 2015 on four exhaust points servicing the existing packing plant (two starch and two gluten silos).

Table 17 presents the emissions data for odour and TSP used as input data for the dispersion model and **Table 18** presents physical stack data for the proposed modified packing plant stacks.

Table 17

Packing Plant Emission Input Data

Proposed Emission Point	***TSP***		***Odour***			
	Emission Conc. *(mg/m^3)*	***Mass Emission Rate (MER)*** *(g/s)*	***Emission Conc.*** *(ou)*	***Total Odour MER*** *($ou.m^3/s$)*	***Peak to Mean Ratio***	***Corrected Total Odour MER*** *($ou.m^3/s$)*
Small Gluten Silo	0.9	0.001	160	93	2.3	215
Small Starch Silo	3.3	0.002	60	35	2.3	81
Medium Gluten Silo 1	0.9	0.001	160	173	2.3	399
Medium Gluten Silo 2	0.9	0.001	160	173	2.3	399
Medium Gluten Silo 3	0.9	0.001	160	173	2.3	399
Large Starch Silo 1	3.3	0.005	60	85	2.3	196
Large Starch Silo 2	3.3	0.005	60	85	2.3	196

Table 18

Physical Stack Data – Proposed Modified Packing Plant

Proposed Emission Point	***Stack Height*** *(m)*	***Stack Exit Diameter*** *(m)*	***Exit Velocity*** *(m/s)*	***Exhaust Temperature*** *(°C)*	***Normal Flow Rate*** *(m^3/min)*
Small Gluten Silo	34.3	0.20	18.6	50	35.0
Small Starch Silo	34.3	0.20	18.6	50	35.0
Medium Gluten Silo 1	20.7	0.4 * 0.4	6.8	50	65.0
Medium Gluten Silo 2	20.7	0.4 * 0.4	6.8	50	65.0
Medium Gluten Silo 3	20.7	0.4 * 0.4	6.8	50	65.0
Large Starch Silo 1	26.5	0.4 * 0.4	8.9	50	85.0
Large Starch Silo 2	26.5	0.4 * 0.4	8.9	50	85.0

Key:

Conc.	=	*concentration*	*ou*	=	*odour units*
°C	=	*Degrees Celsius*	*m*	=	*metres*
m/s	=	*metres per second*	*g/s*	=	*grams per second*
$ou/m^3/s$	=	*odour units per cubic metre per second*	*TSP*	=	*total suspended particulates*
mg/m^3	=	*milligrams per cubic metre @ 0°C and one atmosphere pressure*			

8.3.5 Impact Assessment Predictions

SEMA estimates the proposed modifications to the Packing Plant will emit a combined 1,882 ou.m^3/s of odour into the atmosphere. The maximum odour concentration at ground level is predicted to be 0.7 ou from the additional emission points of the proposed modified Packing Plant. The highest impact from the proposed modified Packing Plant stacks on the northwest boundary would be a GLC of 0.4 ou. The maximum predicted worst case TSP GLC is 0.16 µg/m^3 on the boundary of the site.

The air quality impact assessment predictions and concentrations for odour and TSP are presented in **Tables 19** and **20** and in **Figures 12** and **13**.

Table 19

Proposed Modified Packing Plant Predicted Odour GLC

Location	***Parameter***	***Averaging Time***	***Modified packing plant * GLC*** *(ou)*	***Impact Assessment Criteria*** *(ou)*
Site NW boundary	Odour	1 second using peak-to-mean ratio	0.4	2.0
Bomaderry	Odour	1 second using peak-to-mean ratio	0.5	2.0
N Nowra	Odour	1 second using peak-to-mean ratio	0.2	2.0
Nowra	Odour	1 second using peak-to-mean ratio	0.2	2.0
Terara	Odour	1 second using peak-to-mean ratio	0.2	2.0

Table 20

Proposed Modified Packing Plant Predicted TSP GLC

Location	***Parameter***	***Averaging Time***	***Modified packing plant* GLC*** *(µg/m^3)*	***Whole site ** GLC*** *(µg/m^3)*	***Impact Assessment Criteria*** *(µg/m^3)*
Worst case	TSP	Annual	0.161	–	90
Bomaderry	TSP	Annual	0.015	2	90
N Nowra	TSP	Annual	0.002	1	90
Nowra	TSP	Annual	0.008	1	90
Terara	TSP	Annual	0.008	1.5	90

Key: *ou* = *odour units*
µg/m^3 = micrograms per cubic metre
TSP = Total Suspended Particulate Matter
GLC = Ground Level Concentration
* = SEMA prediction (2015)
** = GHD 2008 Ethanol Upgrade predictions (2008)

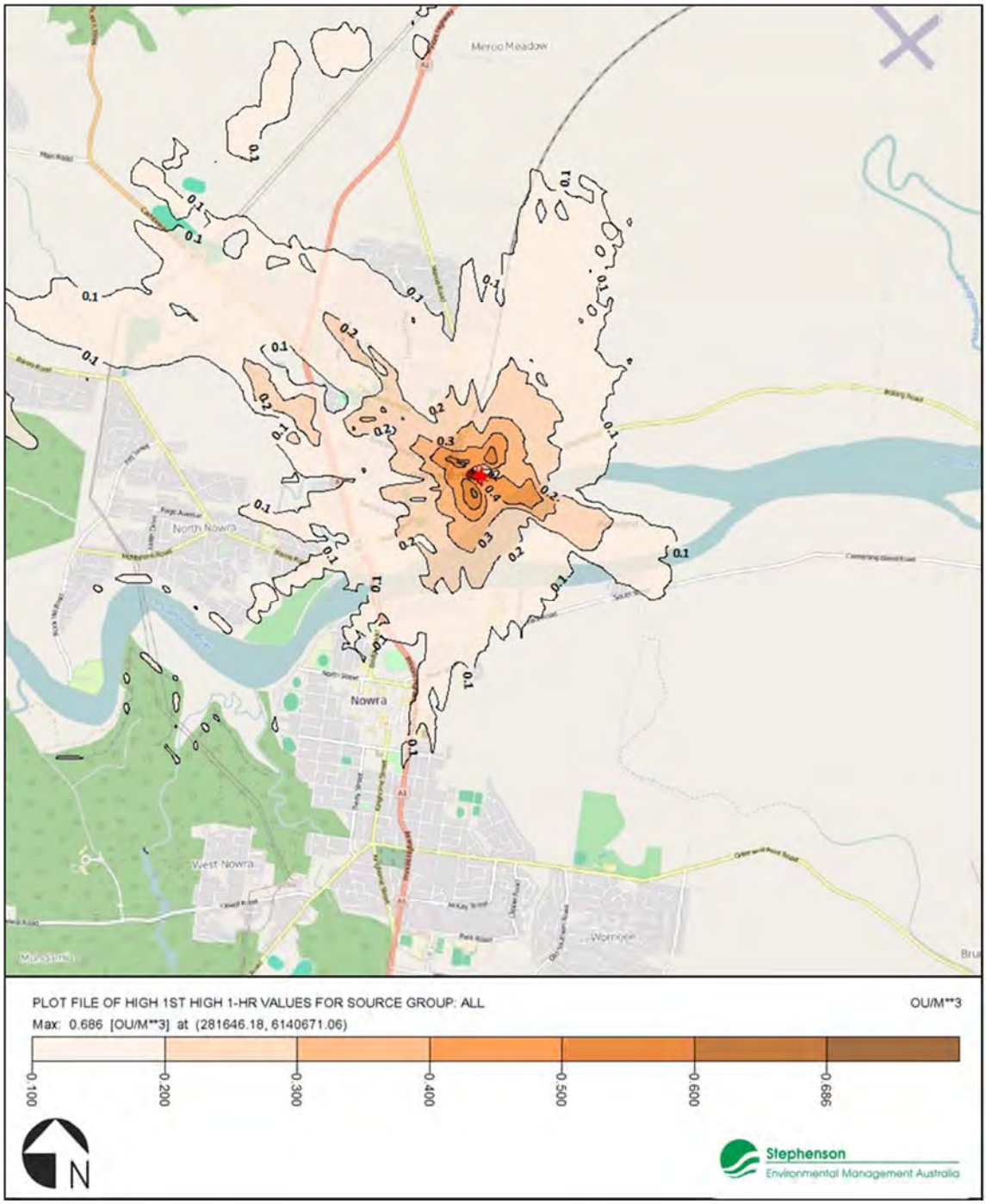

Figure 12: Predicted odour concentrations, proposed modified Packing Plant.

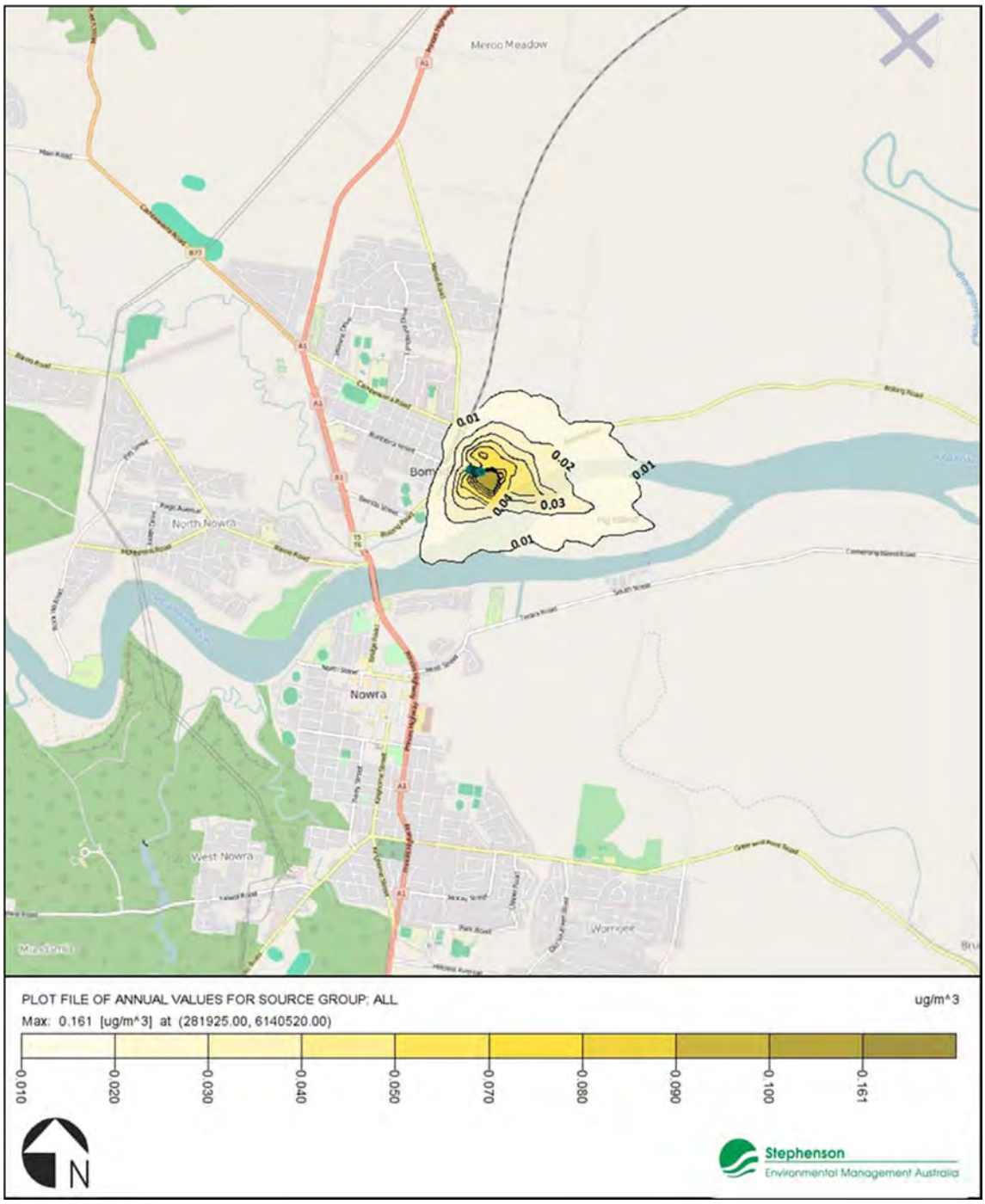

Figure 13: Predicted TSP Concentrations, proposed modified Packing Plant.

8.3.6 Conclusions

The AQIA undertaken by SEMA makes the following conclusions with respect to this modification proposal:

> *The proposed modification to the approved Packing Plant is not predicted to make a significant contribution to either the factory's total odour or TSP impact.*
>
> *The requirements issued by the NSW Department of Planning & Environment required that this air quality assessment include a comparison with measured impacts (odour units) and approved impacts. It is important to note that the Environmental Audit undertaken by GHD between December 2006 and July 2007, and then the subsequent Air Quality Assessment undertaken by GHD in 2008 that supported the Shoalhaven Starches Expansion Project, did not identify the existing or proposed packing plant as a principal source of odour emissions that warranted specific consideration in these previous assessments.*
>
> *Based on available data, measurement results and dispersion modelling, SEMA has estimated that the modified Packing Plant will emit a combined 1,882 ou.m^3/s of odour into the atmosphere. This is an additional 0.3% of total odour emissions from the Shoalhaven Starches factory complex at Bomaderry. The Shoalhaven Starches – Report on Ethanol Upgrade Air Quality Assessment July 2008 estimated that the total odour emissions from the Shoalhaven Starches factory before implementation of odour controls is 604,811 ou.m^3/s. Refer to Appendix B.*
>
> *Based on available data and measurement results, SEMA has estimated that the proposed modified packing plant will emit a combined 0.015 g/s of TSP into the atmosphere. This is an additional 0.1% of TSP emissions for the total site. Refer to Appendix C for the 2008 TSP Emissions Inventory.*
>
> *A Dust Management Control Plan will need to be developed identifying dust sources and outlining the management and control of emissions and air quality impacts, during construction, from dust generated from earthworks, vehicular movements and other engineering activities.*

8.4 RIPARIAN ISSUES

An issues arising from the consultation with DPI – Water related to the relocation of the proposed rail spur lines and access road towards Abernethy's Creek. As a result of this consultation DPI – Water sought justification for the reduction in setback to Abernethy's Creek including:

- *The need for the provision of two rail spur lines so as to provide additional rail storage on the north side of Bolong Road which will reduce the extent to which rail movements will impact on traffic travelling along Bolong Road.*
- *The required design requirements that warrant a larger radius arc than originally approved.*
- *The basis for the commencement point of the spur line.*

- *Demonstrate that the proposal works will not have an adverse impact on the stability of the streambank of Abernethy's Creek.*
- *Provide a vegetation offset by way of a wider streambank revegetation along the Abernethy's Creek to the east of the proposed road and extending along the Abernethy's Creek frontage to this side. Such revegetation is to be wider than that originally approved (say a minimum of 10 m wide at the northern boundary) and extending towards Bolong Road.*

The justification for the additional spur line and its design is dealt with in Section 5.2.2 of this EA.

The impacts of the modified proposal on the stability of the streambank and streambank revegetation are discussed in this section of the EA.

8.4.1 Justification for Modifying Alignment of Rail Spur Line and Road Access

The modification proposal seeks to construct an additional rail spur line, in addition to the spur line approved as part of the SSEP Project Approval.

The provision of the additional rail spur line will maximise efficiency of rail handling, allowing simultaneous loading and unloading of containers, and minimising the need for trains to cross both Bolong Road and Railway Street (therefore reducing the times whereby trains block traffic from using these roads).

An average of 14 trains service the Shoalhaven Starches site each week, and are expressly scheduled (to the extent possible) to be spread across each week, ie. to average 2 trains per day.

These 14 'single' trains then generate additional movements at both the Railway Street and Bolong Road level crossings as a result of the available line capacity (length) between the two crossings (ie. on the Packing Plant site); and as a result of the location of loading/unloading facilities along the existing rail sidings on the southern side of Bolong Road. At Railway Street, this results in minor shunting demands given the availability of the Bomaderry railyard (and across the Packing Plant site). However, at Bolong Road this results in numerous shunting movements by longer trains (and specifically by container trains). As such, the average 14 trains per week can generate over 50 movements at the Bolong Road level crossing.

The provision of the additional rail sidings on the subject site as proposed by the modification proposal will allow container trains – which have the highest number of shunting movements – to be contained on the Packing Plant site, thereby significantly reducing Bolong Road crossing demands.

The second spur line will also allow longer trains to service the site providing efficiency gains for production transportation for the site. The second spur line will allow the site to be served by trains with a length of 700 metres.

Shoalhaven Starches also intend to use longer wagons on their trains that will be able to contain three containers as opposed to the current double container wagons. The increase in wagon length will provide additional efficiency gains in the transportation of product from the site.

The increase in wagon length will however require a larger radius for the rail spur line alignment as its traverses across the site to satisfy relevant rail safety design guidelines. A narrower radius as currently approved would be too tight for the intended wagon length which could result in the derailment of wagons using the site.

The increase in radius of the rail spur lines has the effect of pushing the rail lines closer to the Abernethy's Creek boundary of the site as well as pushing the access road that will extend from Bolong Road to service the site closer to Abernethy's Creek compared to that which was originally approved. Whilst the original road alignment was 30 metres from Abernethy's Creek, the modified alignment will extend from between 18 to 22 metres from the creek boundary of the site.

8.4.2 Riverbank Stability

The approved Packing Plant was to be located approximately 110 metres and the associated rail spur line and road access setback 30 metres from Abernethy's Creek under the SSEP approval.

The modified Packing Plant building will be set back 115 metres; while the associated silos will be setback 88 metres from Abernethy's Creek.

The proposal does propose however to locate the proposed rail spur line and roadworks closer to Abernethy's Creek than that which was originally proposed and approve. The alignment of the approved bridge crossing will also be modified within proximity of Abernethy's Creek as well.

A geotechnical report has been prepared by Coffey Geosciences ("Coffeys") (**Annexure 9**) which includes an assessment of the impacts that these works will have on the stability of the banks of Abernethy's Creek. This section of the EA is based upon the findings of this geotechnical assessment.

The assessment by Coffeys of the stability of the section of Abernethy's Creek where it is closest to both the proposed access road and railways alignments provides factors of safety for both short term and long term cases. The slope stability analyses have been

conducted using Slope/W 2007 version 7.23 and adopting the General Limit Equilibrium (GLE) method. The GLE method encompasses the key elements of the more commonly used Morgenstern – Price method of limit equilibrium analysis with the advantage of a more numerically stable implementation.

At this stage, the assessment by Coffeys is based on the following assumptions:

1. Thickness of the material unit layers as per Coffey reports GEOTWOLL03845AA-AB (dated 17 December 2015) and GEOTWOLL02584AU-AB rev1 (dated 13 July 2012). The proposed development includes a 1.9 m to 2.3 m thick general fill (assumed to be imported) layer to be placed over the current profile which comprises a 0.5 m to 0.7 m thick topsoil layer, underlain by a 0.5 m to 1 m thick layer of firm estuarine clayey sandy silt, 7 m thick soft/firm estuarine silty clay/clay (reference: boreholes RBH03 and RBH04 from the Coffey report GEOTWOLL02584AUAB rev1);
2. The placement of future fill material is assumed to be engineered and controlled. The maximum batter slope for the fill is set at 1H:1V - this applies to a compacted well grained granular fill;
3. The general geometry is based on the drawing as provided by Manildra (Drawing No.: MN262-015 Rev P03 dated 20 August 2015) re-attached in this report as Appendix B;
4. The assumed geotechnical properties used in the short term and long term case assessments are as shown in **Figures 14** to **21**;
5. The maximum load from the vehicles utilising the access road is assumed to be represented with 20 kPa surcharge. The loads from the trains on the rail tracks is assumed to be represented with 44.4kPa surcharge for each track (refer to GEOTWOLL03552AA-AB dated 14 October 2013); and
6. The stability criteria are: Factor of safety (FoS) = 1.3 for short term, FoS = 1.5 for long term, and FoS = 1.2 for long term with rapid drawdown post major flooding event.

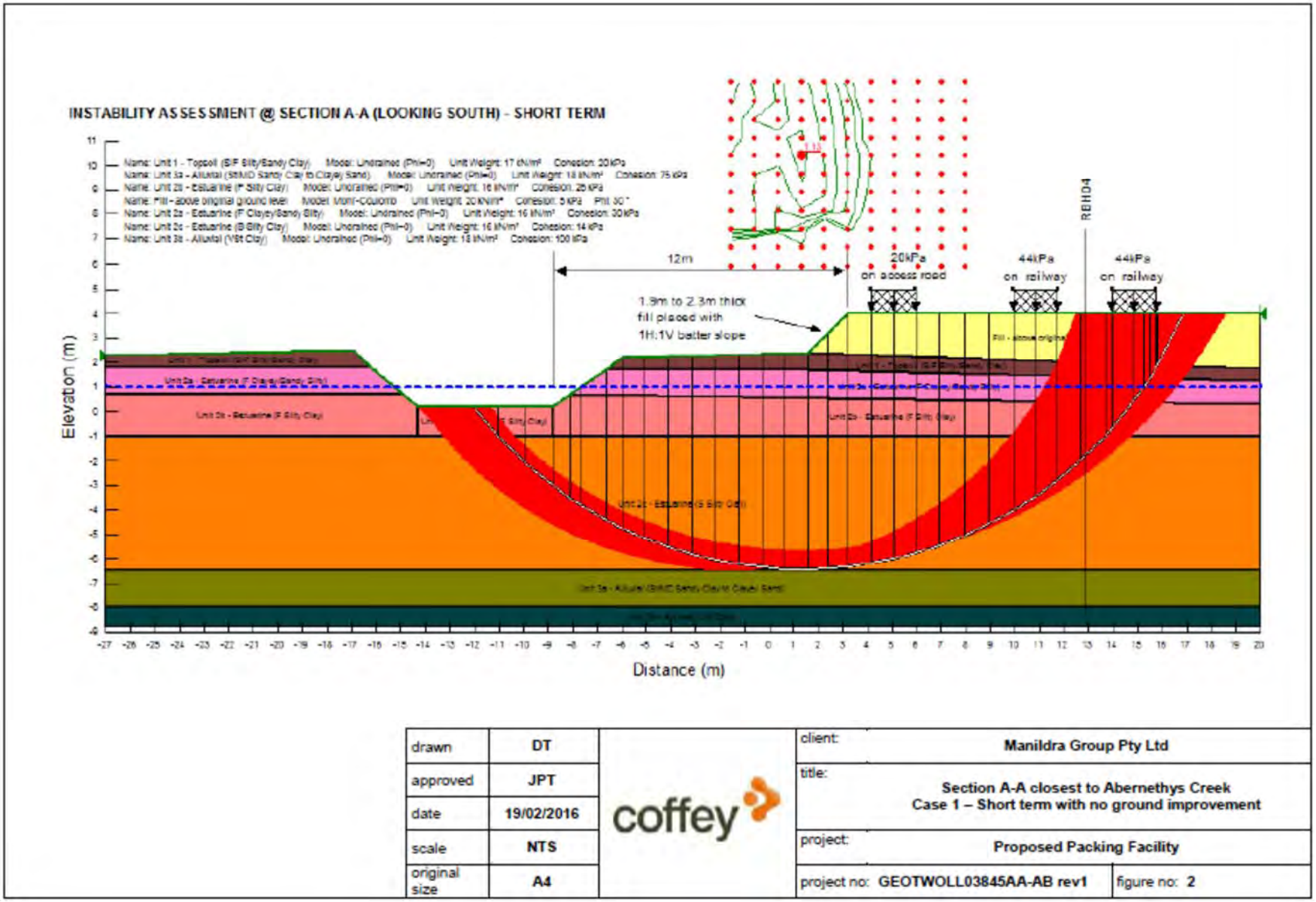

Figure 14: Case 1 – Short term with no ground improvement (extract Figure 2 – Coffey's Geotechnical Assessment)

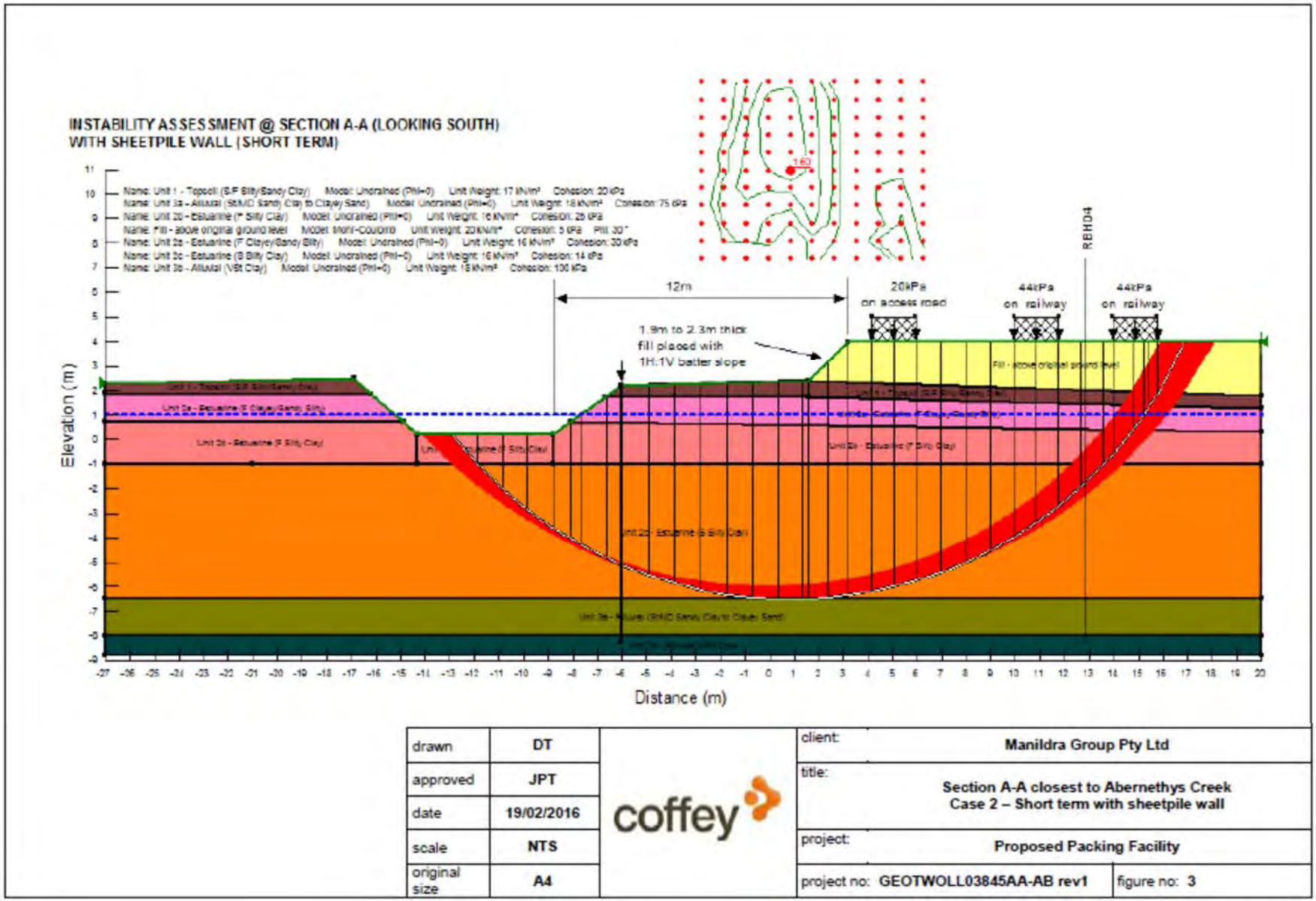

Figure 15: Case 2 – Short term with sheetpile wall (extract Figure 3 – Coffey's Geotechnical Assessment)

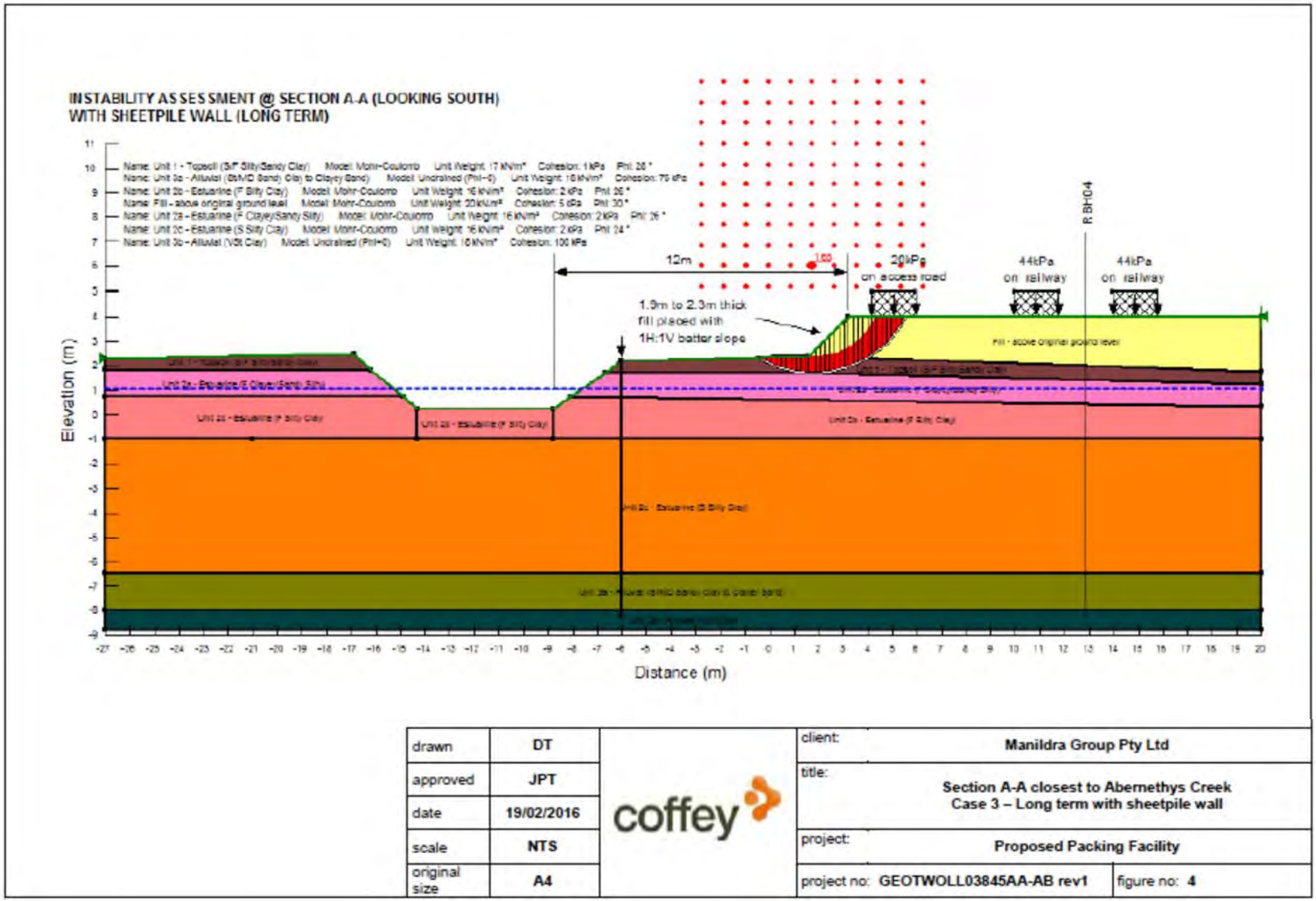

Figure 16: Case 3 – Long term with sheetpile wall (extract Figure 4 – Coffey's Geotechnical Assessment)

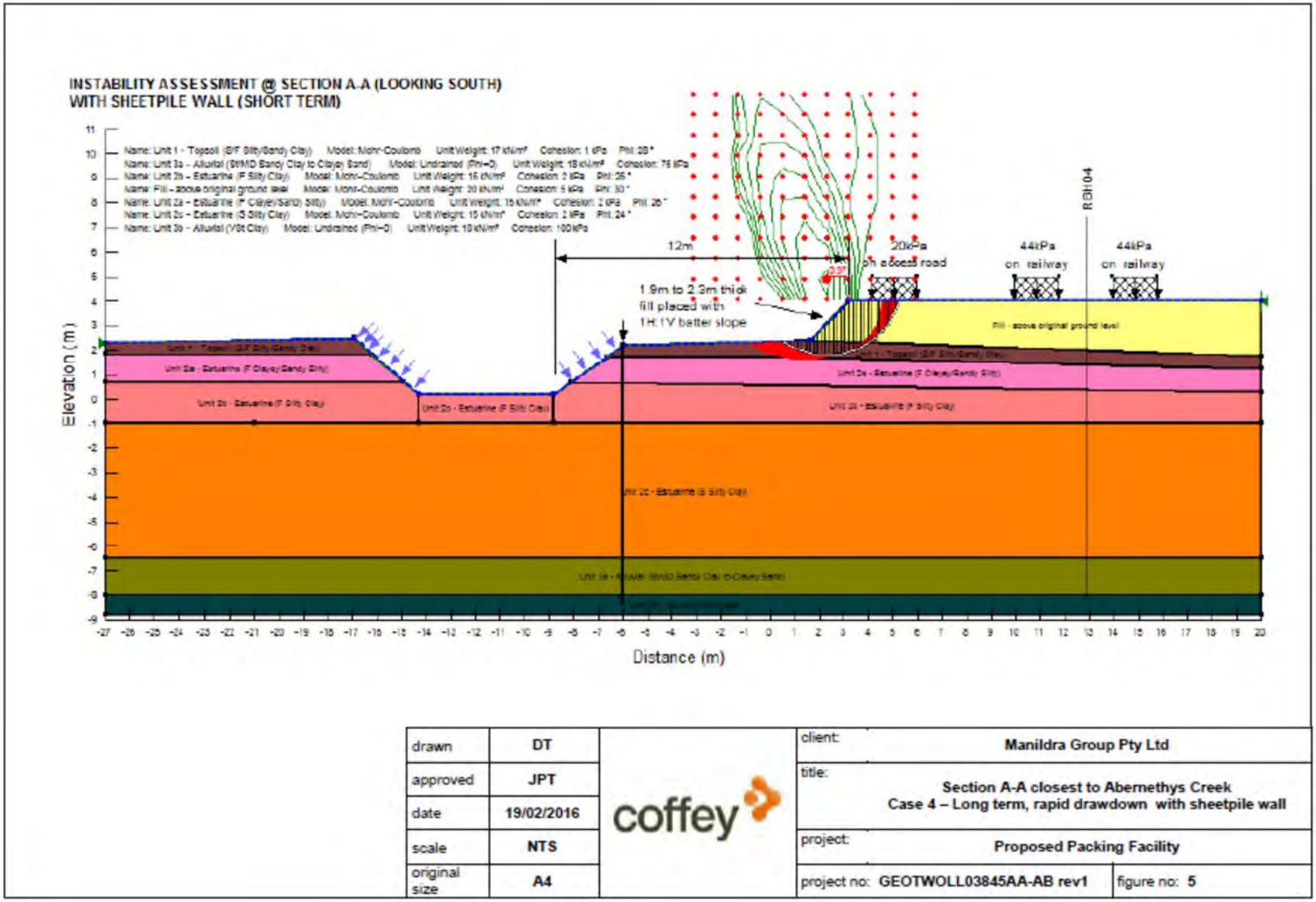

Figure 17: Case 4 – Long term, rapid drawdown with sheetpile wall (extract Figure 5 – Coffey's Geotechnical Assessment)

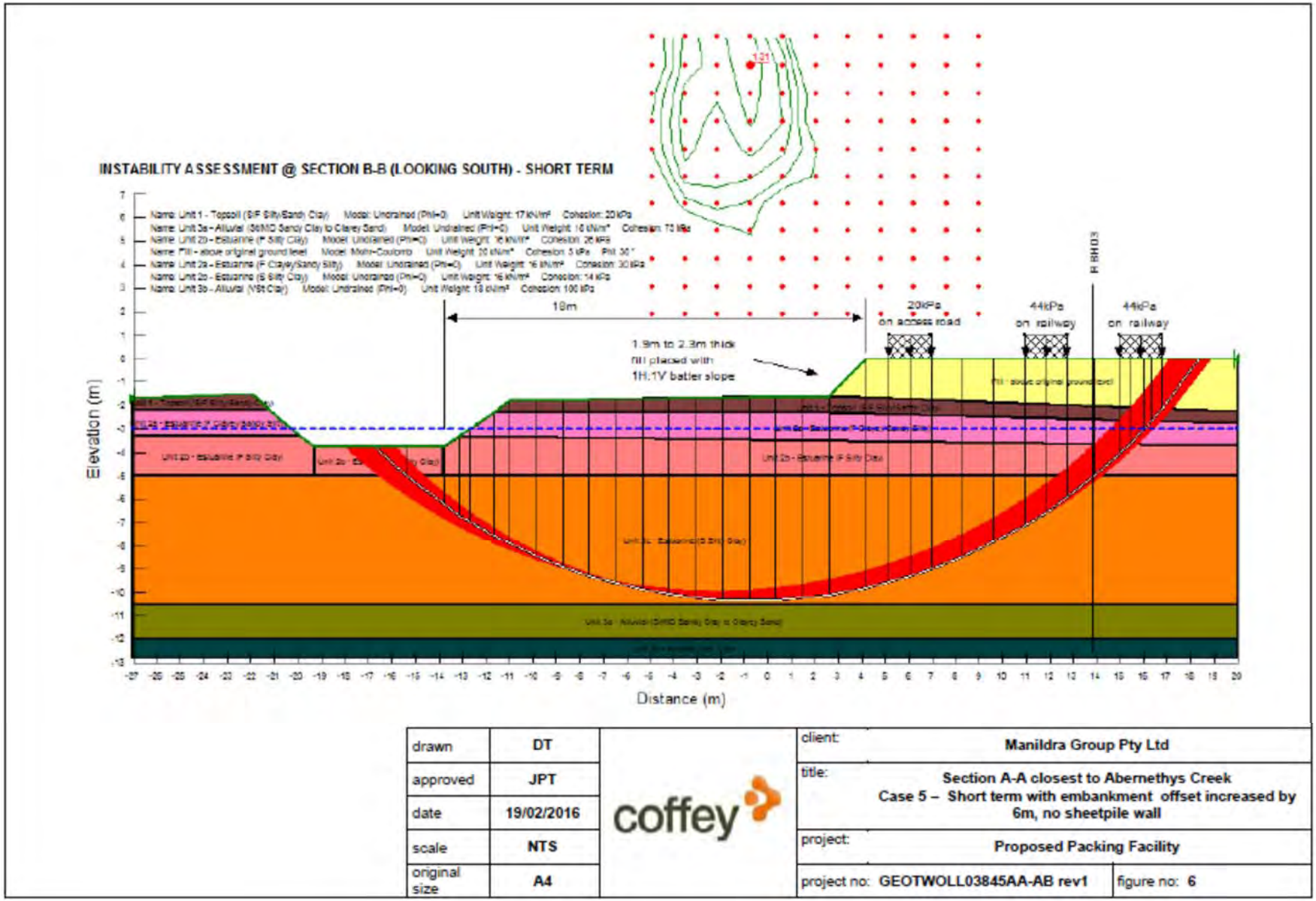

Figure 18: Case 5 – Short term with embankment offset increased by 6 m, no sheetpile wall (extract Figure 6 – Coffey's Geotechnical Assessment)

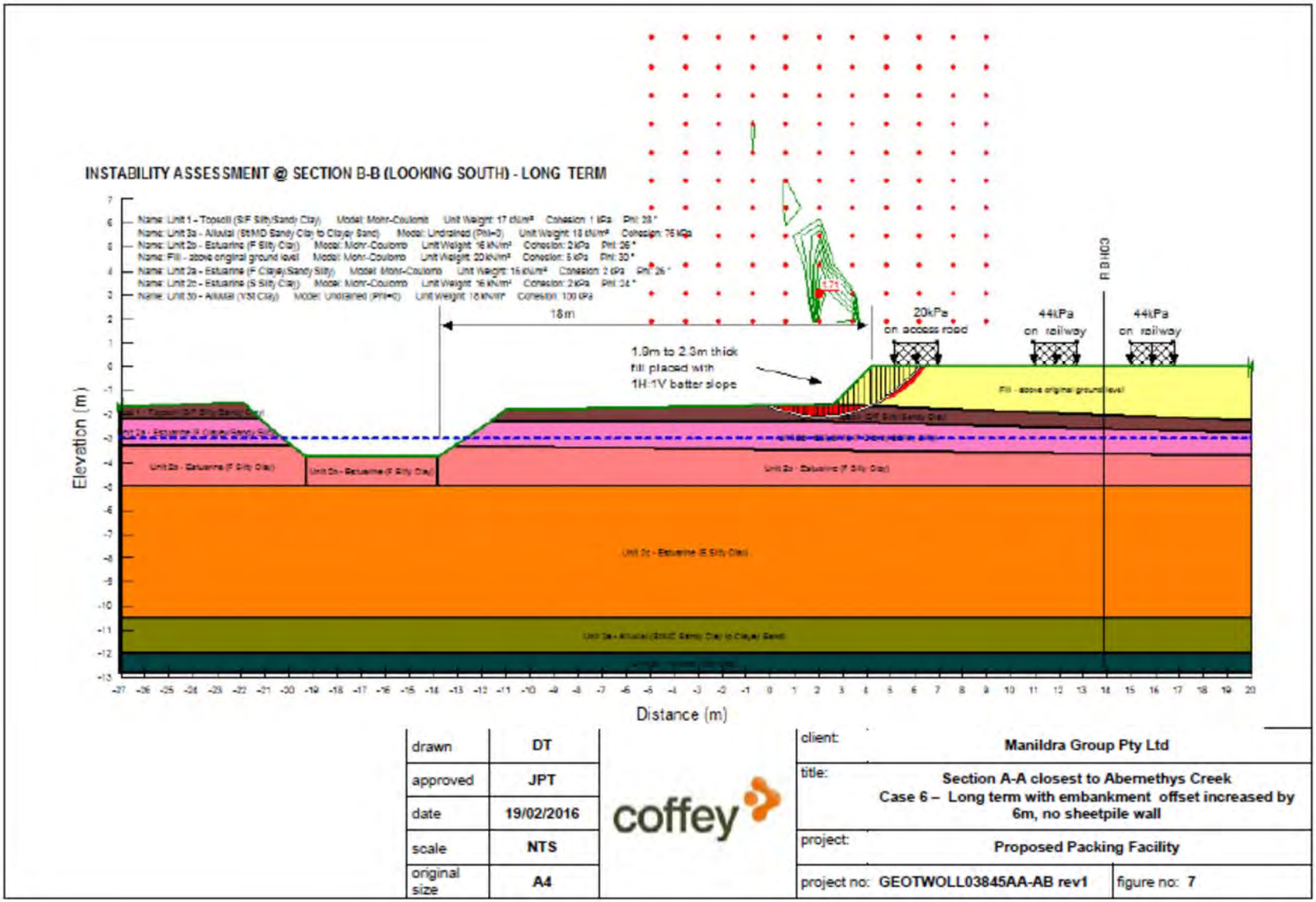

Figure 19: Case 6 – Long term with embankment offset increased by 6 m, no sheetpile wall (extract Figure 7 – Coffey's Geotechnical Assessment)

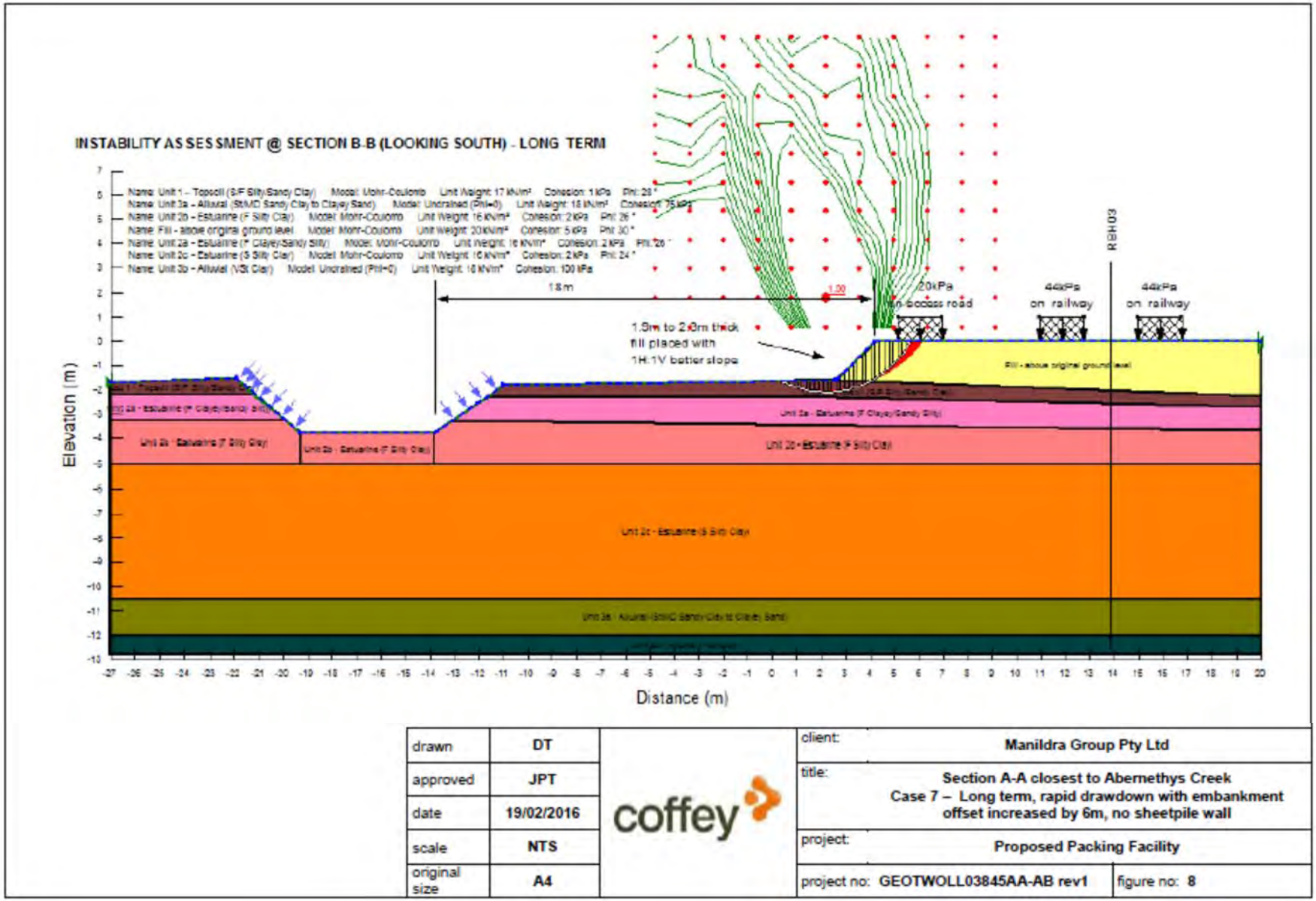

Figure 20: Case 7 – Long term, rapid drawdown with embankment offset increased by 6 m, no sheetpile wall (extract Figure 8 – Coffey's Geotechnical Assessment)

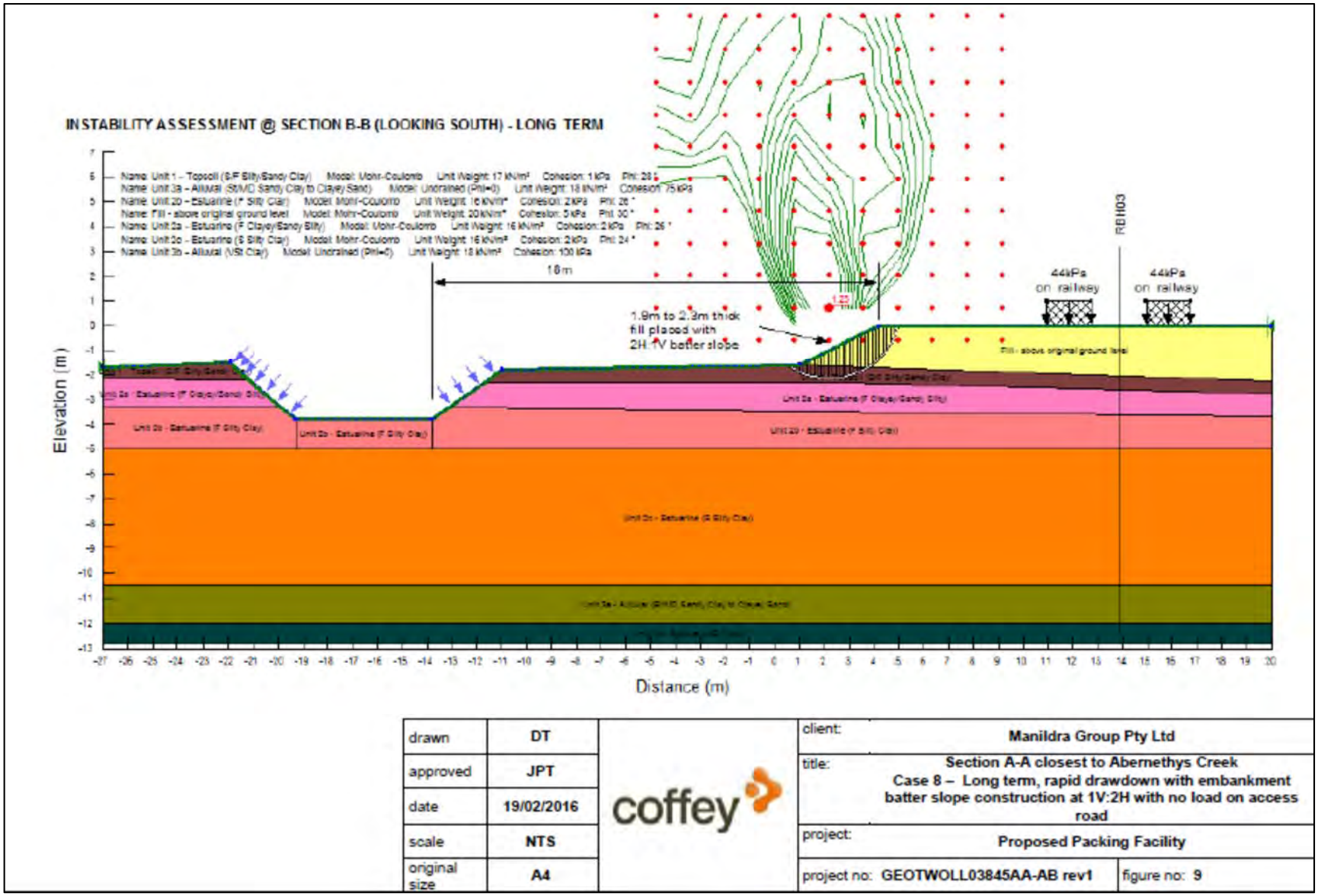

Figure 21: Case 8 – Long term, rapid drawdown with embankment batter slope construction at 1V:2H with no load on access road
(extract Figure 9 – Coffey's Geotechnical Assessment)

Table 21

Summary of Assessed Cases and Resulting Factors of Safety (FoS)

Figure reference	*Case Description*	*FoS*	*Remarks*
Figure 14	Case 1: Short term – construction with no prior ground improvement	1.13	Deep seated failure plane extending under the road and including the railway tracks
Figure 15	Case 2: Short term – construction after installing appropriate sheetpile wall	1.60	Dep seated failure plane but satisfies FoS criterion
Figure 16	Case 3: Long term – construction after installing appropriate sheetpile wall	1.68	Shallow failure plane including the access road but satisfies FoS criterion
Figure 17	Case 4: Long term, rapid drawdown – construction after installing appropriate sheetpile wall	< 1.0	Shallow failure plane including the access road – failure plane does not go through the sheetpile wall
Figure 18	Case 5: Short term – embankment offset increased by 6 m, no sheetpile wall	1.31	Deep seated failure plan but satisfies FoS criterion
Figure 19	Case 6: Long term – embankment offset increased by 6 m, no sheetpile wall	1.71	Shallow failure plane including the access road but satisfies FoS criterion
Figure 20	Case 7: Long term, rapid drawdown – embankment offset increased by 6 m, no sheetpile wall	1.0	Shallow failure plane including the access road
Figure 21	Case 8: Long term, rapid drawdown – embankment batter slope construction at 1V:2H with no load on access road	1.25	Shallow failure plan including the access road but satisfies FoS criterion

Results of the analyses by Coffeys are summarised in **Table 21** above. Based on the results shown, Coffeys conclude that:

1. *The proposed construction of an access road and two rail tracks on a 1.6 m to 2.3 m high embankment built on a relatively thick layer of soft to firm estuarine clay soil would be significant at risk of failure. The failure would likely occur as a deep seated circular failure plane which would include both the road and the railway tracks (Figure 2). Various options have been considered to reduce the risk of instability in the proximity of the creek bank as follows:*

   Option 1

   We recommend installation of a sheetpile wall near the crest of the Abernethy's Creek bank, leaving existing established trees in place where possible. Piles should have an appropriate section and be driven to suitable depth (estimated to be at slow or difficult penetration within the underlying very stiff alluvial clay layer). Assuming a suitable sheet pile wall is provided between the road and the critical section of the

Abernethy's Creek bank, case analyses based on estimated short term, long term, and long term with rapid drawdown post major flooding event scenarios satisfy required FoS (Figures 3 to 5). Note that Figure 5 only shows shallow failure planes which do not propagate towards the proposed location of the sheetpile wall.

Option 2

Where the fill embankment can be offset from the bank of Abernethy's Creek by at least a further 6 m in addition to the 12 m shown in the Manildra Drawing No.: MN262-015 Rev P03, the risk of deep seated failure associated with the creek bank may be significantly reduced. Case analyses based on estimated short term, long term, and long term with rapid drawdown post major flooding event scenarios satisfy required FoS (Figures 6 to 8). Note that Figure 8 only shows shallow failure planes which do not propagate towards the creek;

2. *A relatively steep batter slope within the proposed 1.6 m to 2.3 m thick general fill can be achieved provided slope treatment or ground retention systems are provided. If slope treatment or ground retention systems are not considered, we recommend that the embankment be constructed with a batter slope of 1V:2H (Figure 9); and*

3. *To provide an adequate retention system supporting the proposed fill material, a separate design and analysis should be undertaken considering the following:*

   a. *Relatively thick weak zone at the foundation level;*

   b. *The 1.6m to 2.3m thick general fill layer; and*

   c. *The lateral loads on the access road and the railway track.*

4. *Should Option 1 (ie, sheetpile wall option) be considered, a separate design and analysis should be undertaken. Provided that adequate geotechnical information is available, this analysis will also include the extent the sheetpile wall required.*

Comment

Following consideration of the options put forward by Coffeys, Shoalhaven Starches have elected to pursue Option 2, and have modified the rail spur lines alignment to provide a minimum setback of 18 metres. This is detailed in the plans that accompany this Modification Application.

8.4.3 Streambank Revegetation

In accordance with the original SSEP Project Approval a Landscape and Vegetation Management Plan (LVMP) was prepared by Coffey Geosciences for the SSEP. The LVMP made the following recommendation for re-vegetation works along the Abernethy's Creek bank on the packing plant site:

> *"The riparian zone along the western side of Abernethy's Creek immediately north of Bolong Road has been identified as a Zone A management area. The western bank was cleared by Shoalhaven City*
>
> *Council approximately 18 months ago (Plate 6). Currently the vegetation is dominated by Kikuyu grass and other introduced pasture grasses, and regenerating Acacia mearnsii along the embankment. The management objective is to revegetate the bank and assist with the restoration of a structural and floristically diverse riparian zone. The following management measures are recommended:*
>
> - *Slashing and spraying Kikuyu grass at the rear of the bank to reduce competition*
> - *Plant out the rear of the bank using the full list of species provided in Attachment A – the majority of the planting should be Eucalyptus, Casuarinas and Ficus rubiginosa as these species have deep roots*
>
> *Note: it is recommended that new plantings be completed in 'clumps' spaced 5-10m apart, as this will allow Shoalhaven City Council access to the creek for any future de-snagging or drain cleaning*
> - *Spot spray Kikuyu grass (50cm diameter) from the top of the bank to the water's edge*
> - *Plant the top of the bank Melaleuca ericifolia and other listed species*
> - *Plant groundcover species such as Lomandra longifolia and Dianella spp. to reduce weed invasion and soil erosion*

In accordance with the outcome of consultation with DPI – Water the modification proposal proposes to increase the width of streambank re-vegetation along Abernethy's Creek from that which was approved under the SSEP approval, and which is outlined above.

Under the modified proposal it is proposed to re-vegetate all the area to the east of modified roadway extending from Bolong Road to the northern boundary of the site towards the upper bank of Abernethy's Creek. This will result in an area with a minimum width of 18 metres at the northern boundary of the site and widening to 22 metres at the southern boundary of the site with Bolong Road.

8.5 TRAFFIC

The requirements issued by the DoPE for this project required that the EA address:

> *"Assessment of road and rail traffic impacts including the type and number of movements compared with existing and approved development. Details of how the modification meets the requirements of the Rail Safety National Law (NSW), including accreditation for the scope of works and development of appropriate safety interfaces if required."*

This Modification Application is supported by a traffic 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 traffic impacts of the proposed modification of the packing plant (including during the construction phase). It also assesses the impact of the additional rail spur line proposed for this site and the realignment of the pedestrian bridge over Bolong Road. A copy of ARC's report forms **Annexure 10** to this EA. This section of the EA is based upon the findings of this assessment.

8.5.1 Access

Shoalhaven Starches Site

Manildra's Shoalhaven Starches operations occupy a number of distinct 'sites' in Bomaderry. While operations are integrated across all sites, ARC has differentiated these sites in this assessment for ease of reference.

The primary Shoalhaven Starches (SS) site and immediately adjacent Dairy Farmers site (DF site) to the east are located south of Bolong Road, Bomaderry, while the approved Packing Plant (PP) site is located directly opposite the SS site on the northern side of Bolong Road. Within the broader SS site, the Moorehouse site lies south of Bolong Road, immediately west of the railway line, while the Interim Packing Plant site (IPP site) lies south of Bolong Road immediately east of the railway line.

A final site warranting discussion is the small Shoalhaven Water site (SW site) which fronts Bolong Road directly opposite the IPP site.

These sites are shown in their local context in **Figure 22.**

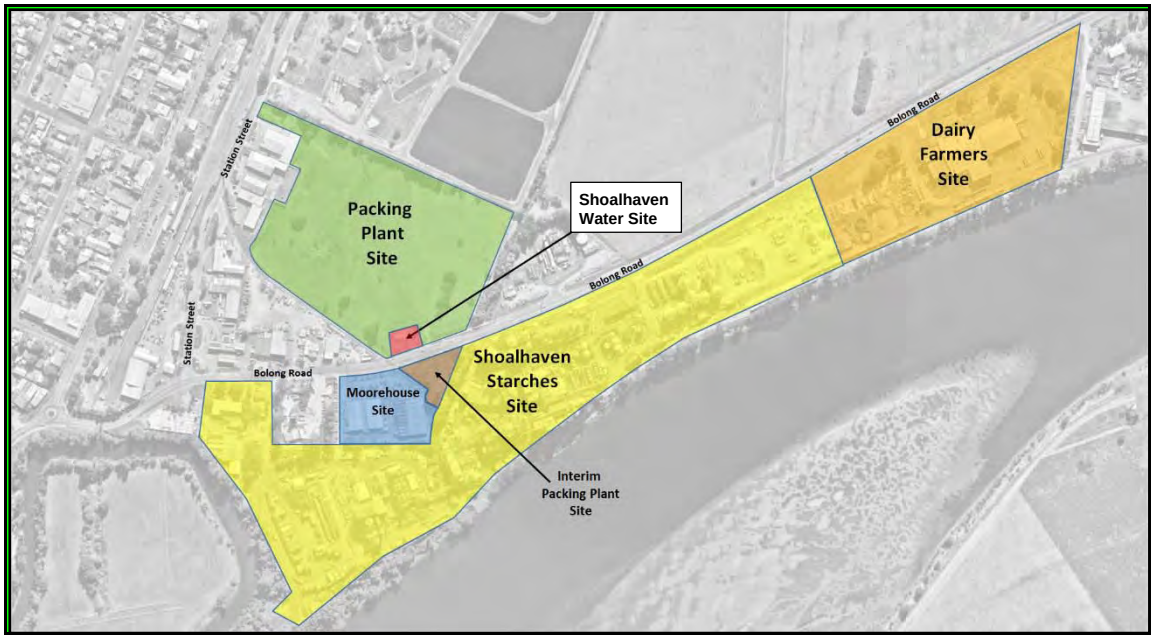

Figure 22: Location plan.
(ARC Traffic & Transport)

Access

The Modification will provide for the construction of the two PP site access points in accordance with the SSEP Approval. ARC advise these access points will provide for Packing Plant construction trips during the construction period; and for a redistribution of existing interim Packing Plant staff and heavy vehicles trips from existing SS Site access points once the packing plant is operational.

Bolong Road & SS Site Western Access Point (AP 3)

The intersection of Bolong Road & AP 3 currently provides two-way access for light and heavy vehicle traffic generated in the western and southern parts of the SS Site.

At present heavy vehicles are required to transport product and consumable materials from the IPP site to the broader SS site for rail transport; this results in daily heavy vehicle trips being generated on a 'loop' between AP 3 and the IPP site. The product carrying heavy vehicle trips will be eliminated once the Packing Plant is operational, while a small number of movements will continue to transport consumable items (paper bags, bulk bags, cardboard liners etc) from AP 3 to the PP site.

Bolong Road & Moorehouse Site Access Point (AP 4)

The intersection of Bolong Road & AP 4 currently provides two-way access to a designated staff car park for some 118 vehicles. Further to the Packing Plant becoming operational, IPP site staff currently using the Moorehouse site for parking would be relocated to the PP site.

Bolong Road and Interim Packing Plant Access Point (IPP 1)

The intersection of Bolong Road & IPP 1 provides separate entry and departure driveways (joined by a small internal access road). Further to the Packing Plant becoming operational, heavy vehicle trips generated by the IPP Site would be relocated to the PP Site (noting again the removal altogether of 'looping' product trips). As importantly, it is noted that the light vehicle trips previously surveyed at the IPP site – constituting previously required contractor and maintenance vehicle trips – are no longer generated.

A future use for the IPP site (ie. further to operations moving to the Packing Plant) has not been determined at this time, but any future use would necessarily require appropriate approvals.

PP Site Access Points

The SSEP Approval provides for two access points to the PP site, both of which will be constructed as approved.

The initial construction task will include the construction of the approved two-way access point to Railway Street (PP 2) and on-site driveways to the staff car park and to the construction site. During the later stages of construction, an internal access road will be constructed to the existing driveway crossover at Bolong Road (PP 1). Once the Packing Plant becomes operational, both access points would be available for use in accordance with the distribution profile provided for in the SSEP Approval.

The previous Demolition Modification (Mod. No. 6) and Starch Dryer No. 5 Relocation Modification (Mod. No. 7) provide for the retention of the existing Bolong Road pedestrian crossing (designed with reference to the SSEP Approval – PP 1) and a (minor) access road (which it is acknowledged is not in accordance with the SSEP Approval, providing a different alignment and for two-way movements).

Further to the Demolition Modification, it is proposed that this existing access road would be widened and extended along its current alignment to provide access to a temporary car park on the PP site to accommodate SS site staff relocated from the Moorehouse site during the demolition and construction periods associated with these Modifications respectively. Full details of these access and traffic characteristics of these proposals are provided in the separate TIA prepared by ARC for these two separate modification applications.

The potential exists for some part of the Dryer construction period to overlap with the Packing Plant construction period. During this period, all access to the Packing Plant construction areas would be exclusively via PP 2, while access to the temporary car park (for SS Sit staff relocated from the Moorehouse site, and for Dryer construction staff) would be exclusively via PP 1.

Once the Dryer construction is completed, the temporary car park will be removed, allowing for the retrofitting of PP 1 and construction of the PP 1 as a left turn in access road only (ie. arrival only) and aligned and constructed to provide compliance with the SSEP Approval.

Other SS Site Access Points

Three other SS site access points are provided to Bolong Road, including the Central Access Point (AP 2); Eastern Access Point (AP 1); and the Dairy Farmers Access Point (DF 1). However, the Modification proposal would not generate any additional movements to these intersections over previously approved flows.

8.5.2 Existing Traffic Flows

Further to the commission of traffic surveys over many years, and in consultation with Council, ARC has over time developed base peak period traffic flows for the key intersections along Bolong Road that reflect 120th Highest Hour (or 'recreational peak') conditions. 2014 recreational peak flows were most recently reported in the Meat Plant TIA, and have been adapted for this assessment, and include:

- 2016 recreational peak through flows in Bolong Road;
- All approved/proposed access and intersection infrastructure to October 2015;
- All approved/proposed flows to the SS Site and DF Site to October 2015; and
- A minor trip assignment to reflect the occasional parking accessed via PP 1.

Base 2016 peak hour traffic flows for the assessment are provided in **Figures 23** to **26**. These flows take into account future flow estimates associated with the Princes Highway Upgrade.

Princes Highway Upgrade

The upgrade of the Princes Highway between Gerringong and Bomaderry has developed as three consecutive RMS projects – the Gerringong Bypass Project; the Foxground & Berry Bypass Project; and the Berry to Bomaderry Upgrade Project.

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

The most recent RMS modelling concludes that the transfer from the Sandtrack to the upgraded Princes Highway will be very significant. Further to discussions between ARC and the RMS (Mr Nick Boyd, Senior Project Manager), ARC has confirmed that further to the completion of the (currently under construction) Foxground & Berry Bypass, that with or without the construction of the Berry to Bomaderry Upgrade (in planning by the RMS) the RMS estimates the Princes Highway attracting some 80% of through trips, and the Sandtrack only 20% of through trips.

Taking into account other factors (such as general background traffic growth) the future traffic flows to the Princes Highway and to the Sandtrack (and indeed specifically to Bolong Road at Meroo Road, ie. immediately west of the SS Site) are provided in **Table 22** below.

Table 22

Princes Highway Upgrade Future Flow Estimates

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

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

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

The opening of the Gerringong Bypass in August 2015 will see this transfer from the Sandtrack to Princes Highway commence, but with construction of the additional stages still ongoing or in planning, the Sandtrack is still expected to attract moderate flows in the short term (to 2018), ie. the significant reduction would not be achieved until the opening of the Foxground and Berry Bypass. It is estimated that in this period (2015 – 2018) Bolong Road flows would be reduced by approximately 15% - 20% (from pre-opening levels).

Dryer Modification Traffic Flows

ARC note there is potential for the Packing Plant construction to coincide with the construction of the Dryer on the Moorehouse site. ARC advise that during the Dryer

construction staff relocated from the Moorehouse site and Dryer construction workers would use the temporary car park on the PP site thereby impacting on the traffic flows of the PP site. As such ARC have provided two base flow scenarios:

- ***Scenario 1 2016 Base Flows + Dryer Construction***

  This scenario provides the base network/flows for the assessment of the period where Packing Plant construction and Dryer construction coincide.

- ***Scenario 2 2016 Base Flows***

  This scenario provides the base network/flows for the assessment of the period where Packing Plant construction only is occurring (with all access via PP 2 only) and then for the operational Packing Plant (with access available via both PP 1 and PP 2).

Peak hour traffic flows for these two base scenarios are provided in the **Figures 23** to **26** below. It is noted that after 2016 flows in Bolong Road are expected to further reduce, such that 2016 remains (what will be for many years) a 'peak flow' year in Bolong Road, and therefore an appropriate base for the assessment of both the Packing Plant construction and operational traffic flows.

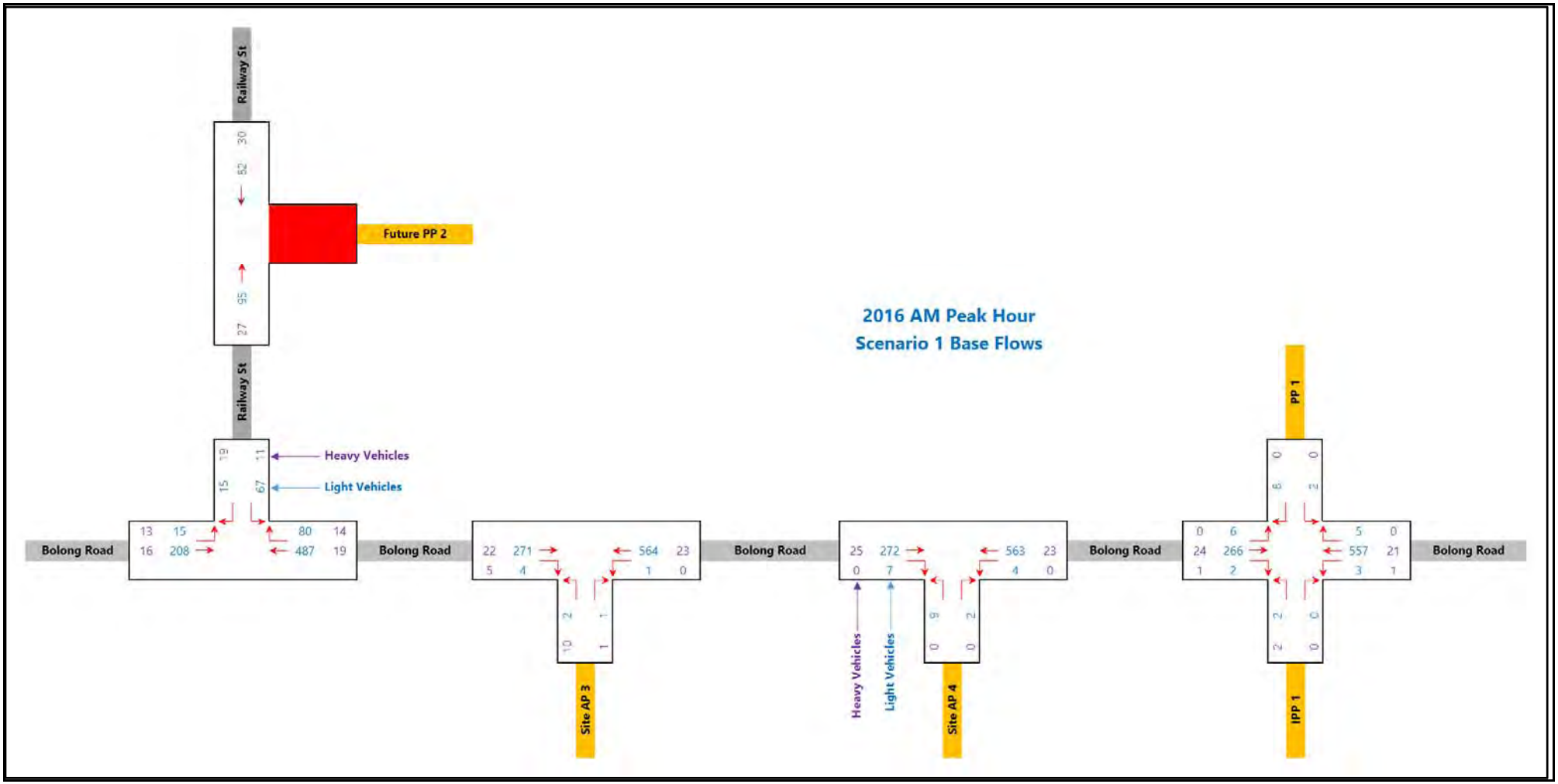

Figure 23: 2016 AM Peak Hour – Scenario 1 Base Traffic Flows
(ARC Traffic and Transport)

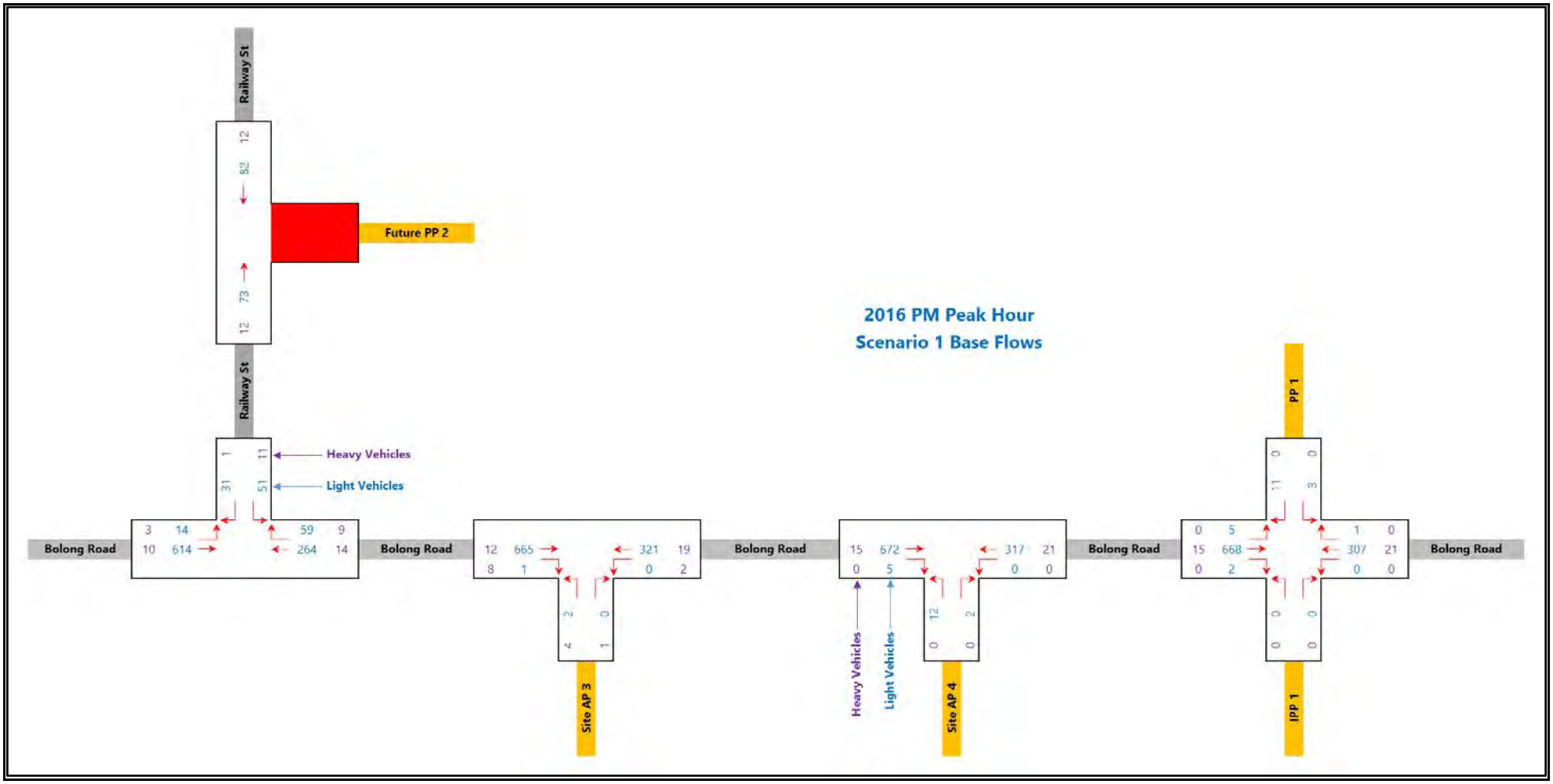

Figure 24: 2016 PM peak hour – Scenario 1 Base Traffic Flows.
(ARC Traffic and Transport)

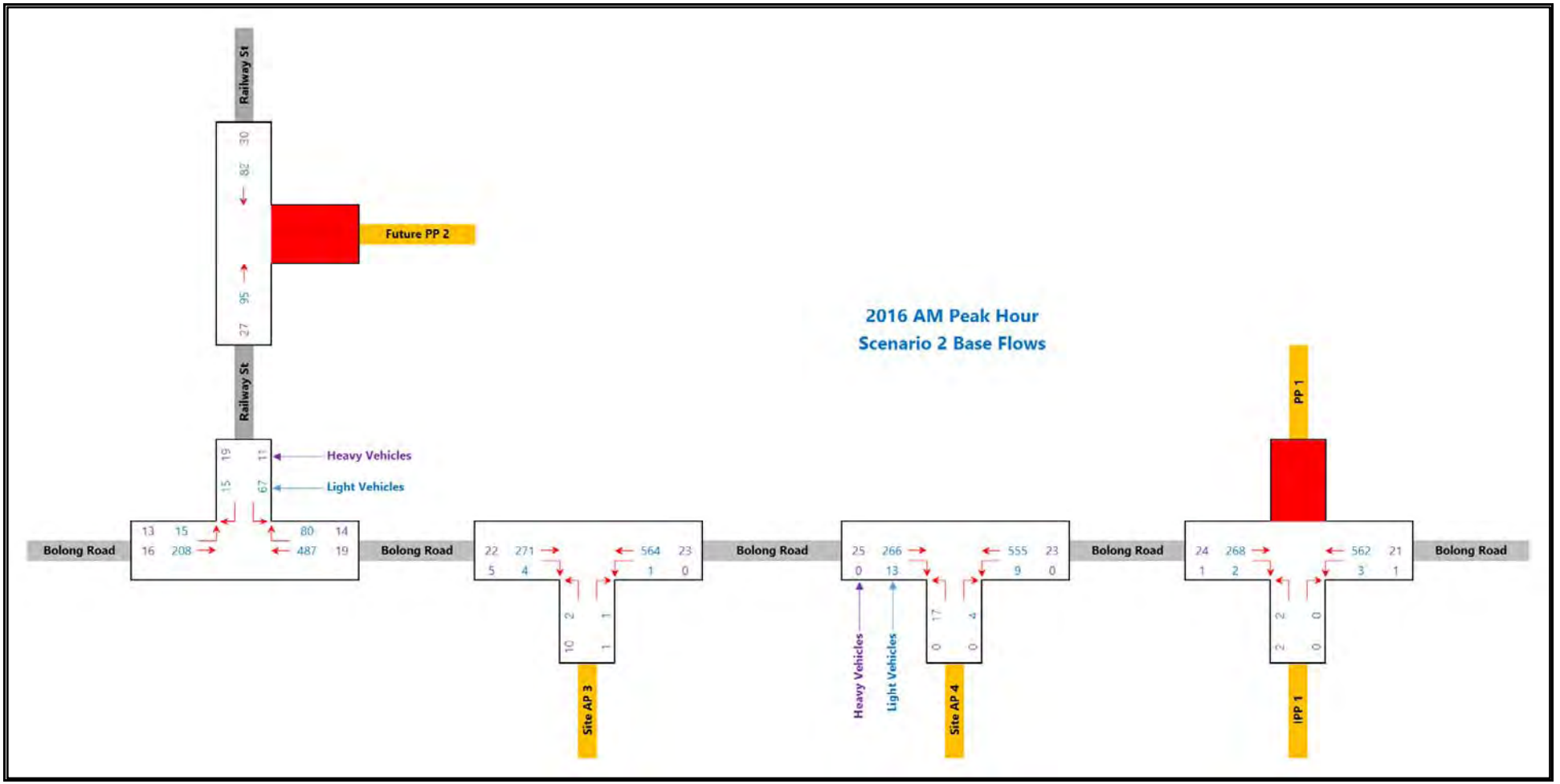

Figure 25: 2016 AM peak hour – Scenario 2 Base Traffic Flows.
(ARC Traffic and Transport)

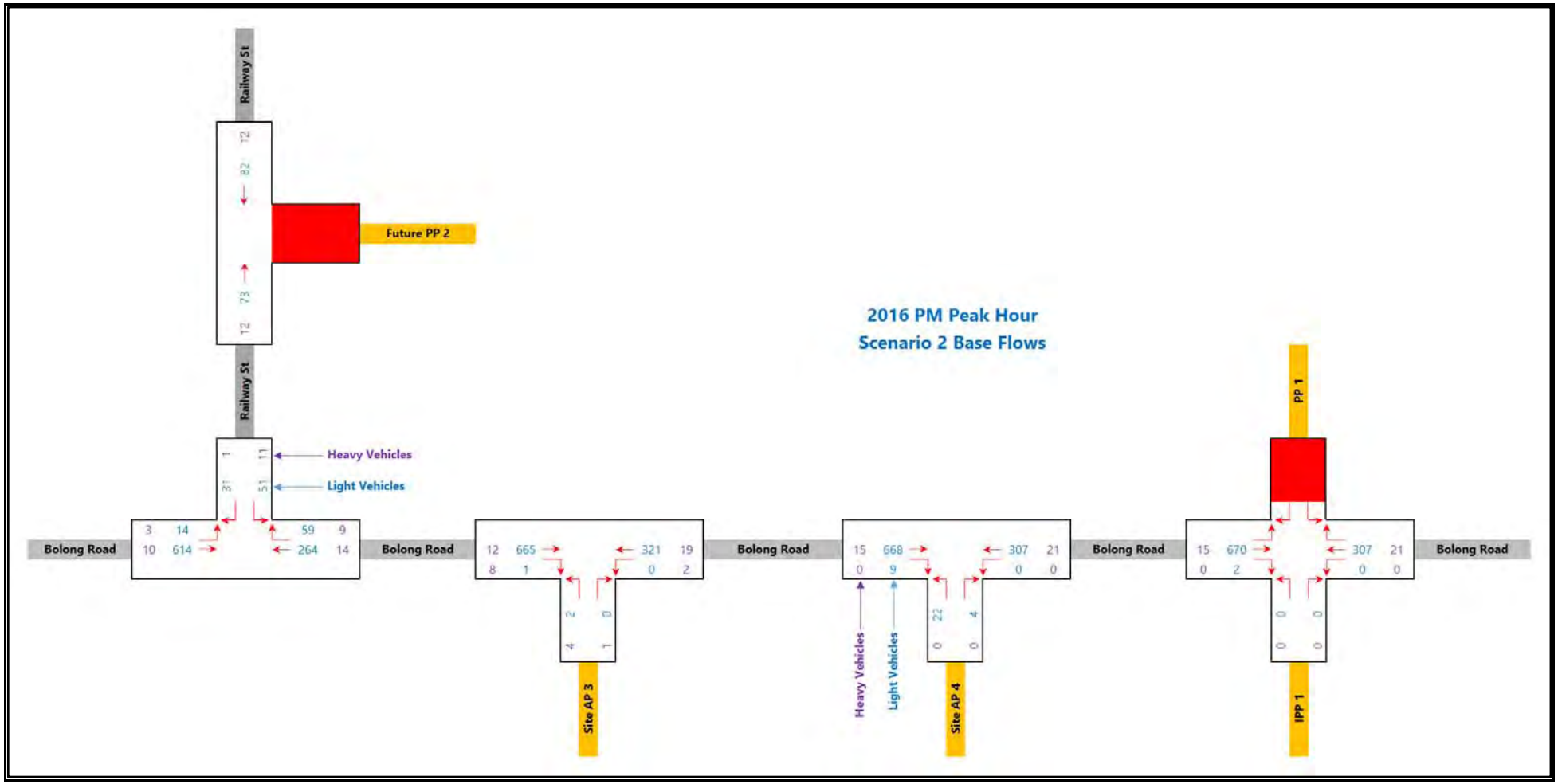

Figure 26: 2016 PM peak hour – Scenario 2 Base Traffic Flows.
(ARC Traffic and Transport)

Intersection Performance Assessment

In order to determine the performance of the key intersections, as well as the local intersection Bolong Road and Railway Street, the RMS approved SIDRA (Version 6.1) intersection model been utilised by ARC to determine current intersection operations. The SIDRA inputs includes peak hour traffic flows and speed profiles, intersection geometry and operational controls, and in turn SIDRA reports the following key performance measures:

- Level of Service
- Delay
- Degree of Saturation

The performance of key intersections under base conditions is addressed by ARC in **Tables 23** and **24** below.

Table 23

Scenario 1 Base Intersection Performance

Scenario 1 Base Flows Intersection Performance	Level of Service		Average Delay (s)		Degree of Saturation		Queue Length (m)	
	AM	PM	AM	PM	AM	PM	AM	PM
Bolong Road & Railway Street	B	A	1.9	1.9	0.345	0.334	7.5	7.8
Bolong Road & Access Point 3	A	A	0.4	0.3	0.309	0.304	1.6	1.4
Bolong Road & Access Point 4	A	A	0.2	0.1	0.310	0.301	0.7	0.4
Bolong Road & IPP 1 & PP 1	A	B	0.3	0.3	0.310	0.358	0.9	1.4

Table 24

Existing Intersection Performance

Scenario 2 Base Flows Intersection Performance	Level of Service		Average Delay (s)		Degree of Saturation		Queue Length (m)	
	AM	PM	AM	PM	AM	PM	AM	PM
Bolong Road & Railway Street	B	A	1.9	1.9	0.343	0.332	7.4	7.7
Bolong Road & Access Point 3	A	A	0.4	0.3	0.309	0.303	1.5	1.4
Bolong Road & Access Point 4	A	A	0.4	0.2	0.309	0.301	1.1	0.8
Bolong Road & IPP 1	A	A	0.1	0.1	0.308	0.357	0.3	0.1

Based upon **Tables 23** and **24**, according to ARC all site access intersections, and the intersection of Bolong Road and Railway Street, operate at a good level of service under 'base' conditions, with minimal average delays and significant spare capacity.

Finally, ARC note that further to the opening of upgraded sections of the Princes Highway, a percentage of the arrival and departure trips from/to the east reported at the SS Site access points are expected to be redistributed to the Princes Highway (ie. to/from the

west) in the same way as general sub-regional trips are redistributed. However, this is not expected to have a significant impact on the operation of these access intersections.

Rail Operations

Shoalhaven Starches uses rail for the majority of transport operations, including incoming raw materials and outgoing product. This is has very significant benefits in reducing vehicle trip generation, and specifically heavy vehicle trip generation; it is estimated that existing rail movements equate to the generation of some 100 heavy vehicle trips per day.

All trains are currently required to use the Railway Street and Bolong Road level crossing to/from the southern side of Bolong Road.

Container Trains

An average of 4 (export material) container trains operate weekly, carrying a total of approximately 280 containers per week. Two types of train configuration are used, being a 40 wagon train (generally used three time a week) and a 20 wagon train (generally used once a week). The majority of these container train services will be relocated to the proposed rail spurs on the PP site, with a commensurate reduction in crossings to/from the southern side of Bolong Road.

Grain Trains

An average of 4 grain trains operate weekly, comprising 31 wagons and carrying an average weekly volume of approximately 7,200 tonnes. These train services will marginally increase in line with the SSEP Approval, and continue to use the existing sidings on the southern side of Bolong Road.

Flour Trains

An average of 6 flour trains operate weekly, carrying an average weekly volume of approximately 11,500 tonnes. Three types of train configuration are generally used, being a 35 wagon train, a 27 wagon train and a 23 wagon train. These train services will be marginally reduced in line with the SSEP Approval, and continue to use the existing sidings on the southern side of Bolong Road.

Railway Crossings

An average of 14 trains service the SS Site each week, and are expressly scheduled (to the extent possible) so as to be spread across each week, ie. to average 2 trains per day.

Importantly, these 14 ‘single’ trains then generate additional movements at both the Railway Street and Bolong Road level crossings as a result of the available line capacity (length) between the two crossings (ie. on the PP Site); and as a result of the location of

loading/unloading facilities along the existing rail sidings on the southern side of Bolong Road. At Railway Street, this results in minor shunting demands given the availability of the Bomaderry railyard (and across the PP Site). However, at Bolong Road this results in numerous shunting movements by longer trains (and specifically by container trains). As such, the average 14 trains per week can generate over 50 movements at the Bolong Road level crossing.

The provision of new PP Site rail sidings as part of this modification proposal will allow the majority of container trains – which have the highest number of shunting movements – to be contained on the PP Site, thereby significantly reducing Bolong Road crossing demands. In addition, a future Modification (currently in preliminary planning by Manildra) will provide additional siding capacity on the southern side of Bolong Road, thereby reducing shunting requirements (see also Section 2.6).

Railway Operations Accreditation

Manildra Group is rail safety accredited as the Rail Infrastructure Manager (RIM) for the SS Site. This accreditation requires Manildra Group to have all systems in place to manage the requirements of the RIM for day to day rail operations through a Safety Management System (SMS) which must conform to the Rail Safety National Law (NSW) to which Manildra Group has been subject to ongoing and successful audits.

Traffic Issues associated with the Modification Proposal

The assessment of traffic flows undertaken by ARC examines the traffic and transport characteristics of the following:

- Packing Plant construction works coinciding with the final stage of Dryer construction works;
- Packing Plant construction works only;
- Packing Plant operations; and
- Rail operations (once the Packing Plant is operational).

Packing Plant Construction

Access

Work will commence with the construction of the approved industrial access point (PP 2) to Railway Street, and internal roads to the construction works area and staff car park, which will also be constructed as part of initial works. This access point and all internal access roads will be designed in accordance with AS 2890.2.

All Packing Plant construction staff and heavy vehicle trips will use access point PP 2 throughout the construction process. The construction of the internal access road to PP 1 will be completed in the later stages of the construction process. ARC indicate it is proposed that this access point would only be used once the Packing Plant is operational.

Construction Trip Generation

Heavy Vehicle Trips

ARC estimate that the Packing Plant construction will throughout generate no more than 10 heavy vehicles (or 20 heavy vehicle trips) per day carrying materials and plant. ARC state it is estimated that no more than 2 heavy vehicle trips would be generated during the (commuter) peak hours.

Construction Staff Vehicle Trips

ARC estimate that the Packing Plant construction will employ up to 27 construction staff per day, including an on-site supervisor and occasional specialists. As with previous projects, a core group of construction staff (11) are expected to arrive in group transport (i.e. shuttle buses) from Wollongong, while other construction staff would generate a mix of shared and individual private vehicle trips. Given that shift times are expected to fall outside of (commuter) peak periods, and the expectation of only minor driver only trips, ARC estimate that no more than 4 staff vehicle trips would be generated during the (commuter) peak hours.

Packing Plant Construction Period Traffic Flows

As discussed earlier ARC indicate the Packing Plant construction could potentially coincide with the Dryer construction for a short period (estimated at 2 – 3 months), after which trips associated with the Dryer construction would no longer be generated. As such, the Packing Plant construction trips detailed above have been assigned to the two base flow scenarios as outlined in **Figures 23** – **26**. The resulting total flows are shown in the **Figures 27 – 30** below

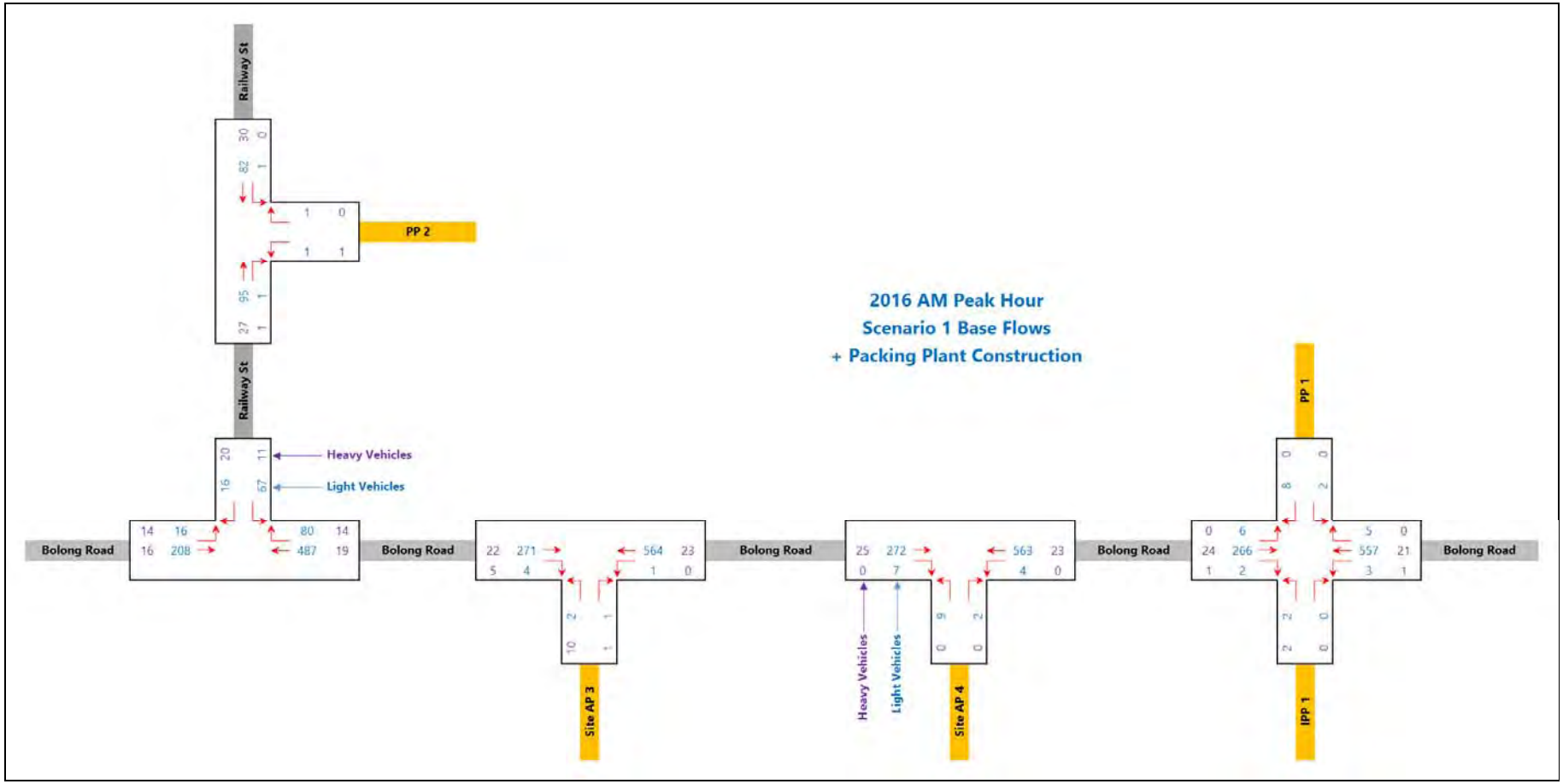

Figure 27: 2016 AM Peak Hour – Scenario 1 Base Flows + Packing Plant Construction.
(ARC Traffic and Transport)

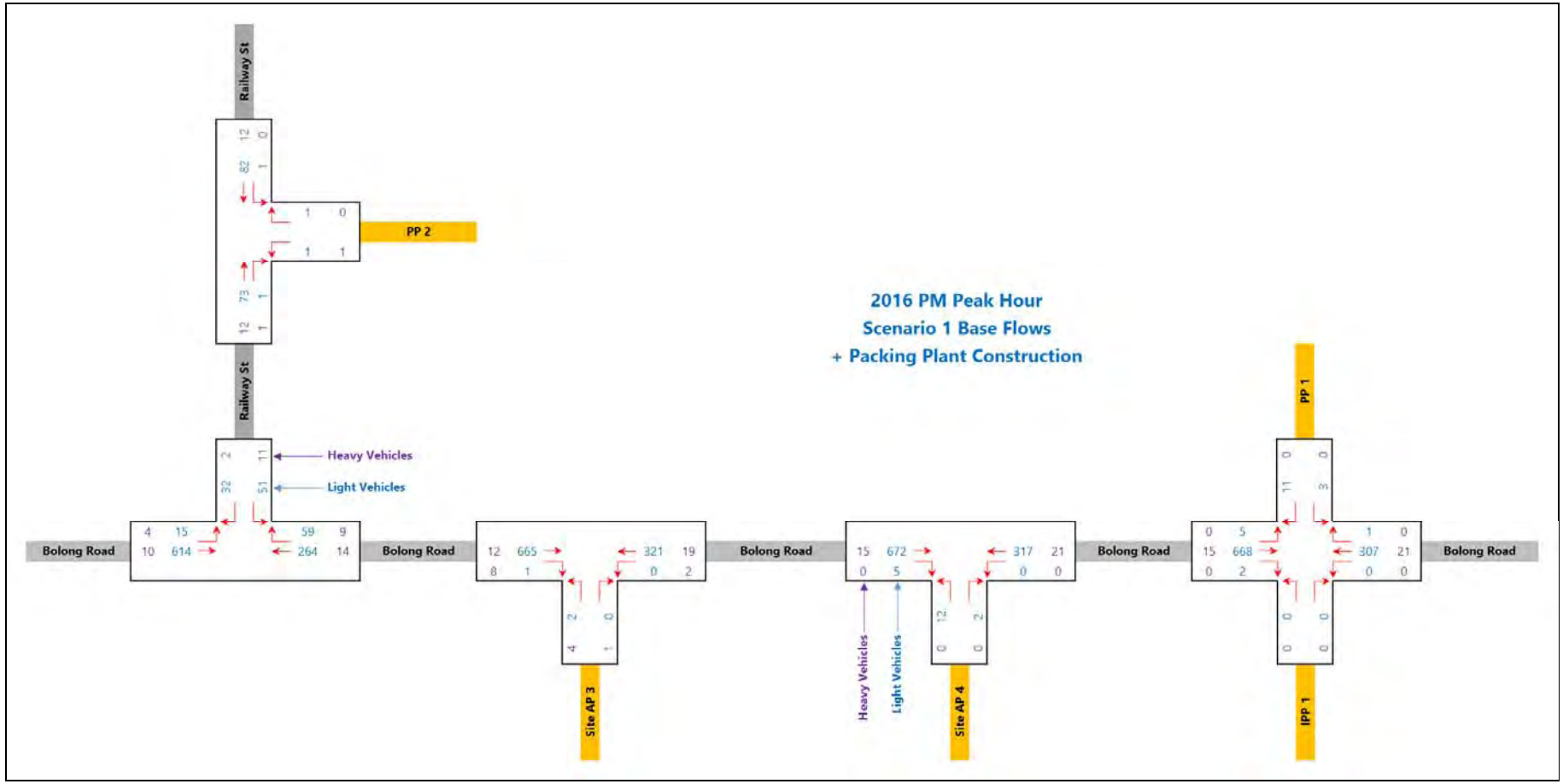

Figure 28: 2016 PM Peak Hour – Scenario 1 Base Flows + Packing Plant Construction.
(ARC Traffic and Transport)

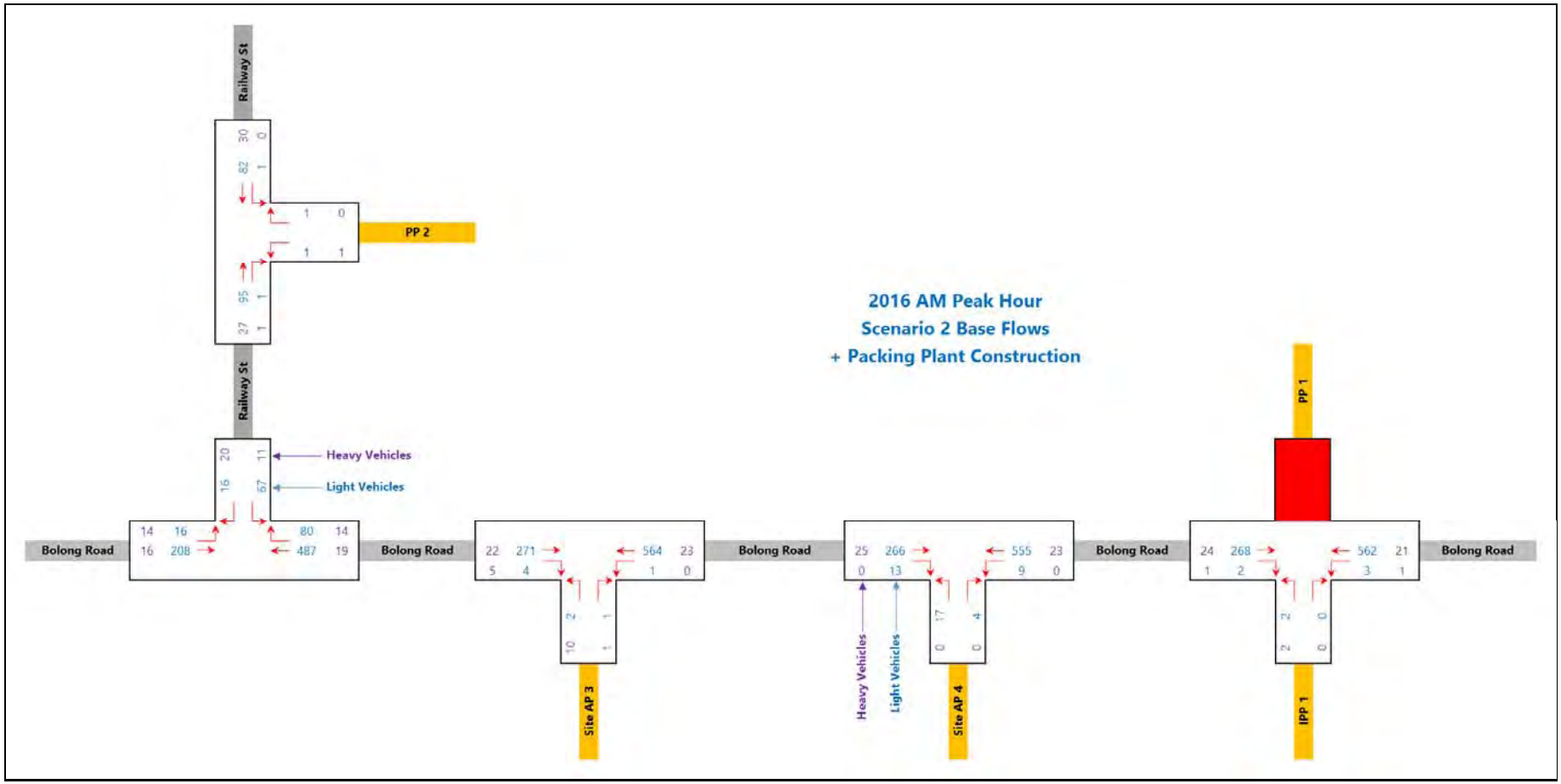

Figure 29: 2016 AM Peak Hour – Scenario 2 Base Flows + Packing Plant Construction.
(ARC Traffic and Transport)

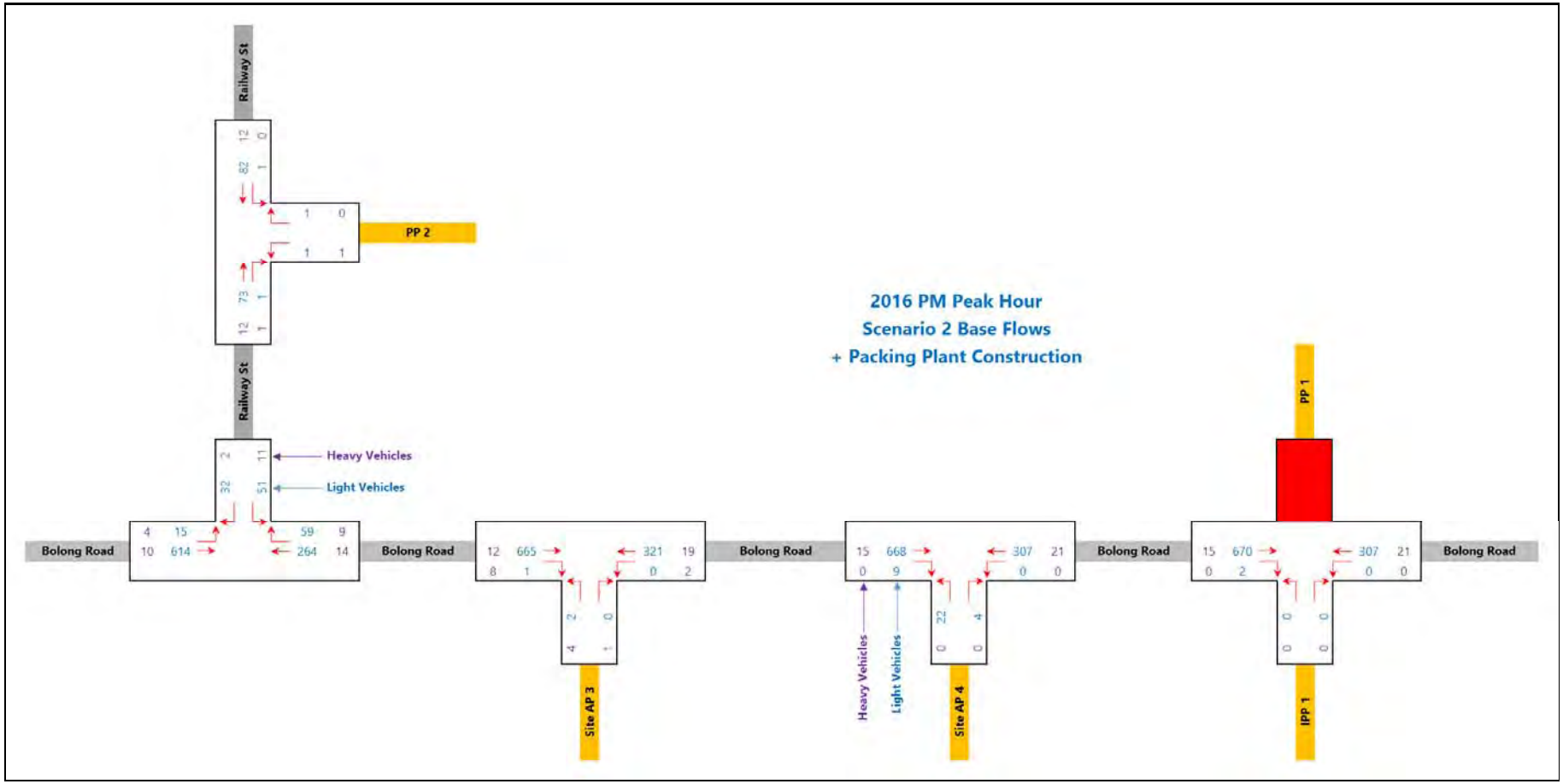

Figure 30: 2016 PM Peak Hour – Scenario 2 Base Flows + Packing Plant Construction.
(ARC Traffic and Transport)

Packing Plant Operations

Access

Once operational, access to the Packing Plant will be available via both PP 1 at Bolong Road, and PP 2 at Railway Street. PP 1 will provide for heavy vehicle arrival trips only as per the SSEP Approval, with PP 2 providing for heavy vehicle departure trips, as well as all staff arrival and departure trips. It is noted that the provision of an additional weighbridge off Bolong Road will remove the need for heavy vehicles to loop on-site, and that the queue length provided between the weighbridge and Bolong Road would more than appropriately accommodate what, according to ARC, are very minimal peak heavy vehicle flows

Operational Trip Generation

Heavy Vehicle Trips

ARC estimate once in operation the Packing Plant will generate only a small number of heavy vehicle trips, associated with the limited demand for road transported product (ie. trips to and from the regional road network); and heavy vehicles delivering consumable materials from within the SS Site (south of Bolong Road) to the PP Site.

ARC advise it is estimated that no more than 15 heavy vehicles (or 30 heavy vehicle trips) would be generated by the Packing Plant operations per day, approximately 75% of which would be to/from the regional road network, and 25% of which would be to/from the SS site south of Bolong Road. ARC estimate that no more than 4 heavy vehicle trips would be generated in the (commuter) peak hours.

According to ARC it is important to note that the interim Packing Plant currently generates a higher number of heavy vehicle trips as a result of product needing to be transported (by heavy vehicle) from the IPP site to the broader SS site. This has resulted in the generation of 'looping' trips between AP 3 and the IPP site, ie. departing the SS site via AP 3 with product, unloading product at the IPP site (for rail transport) and then returning to the SS site via AP 3.

The provision of the pipe infrastructure contained within the Bolong Road pedestrian bridge will result in these product carrying heavy vehicle trips no longer being generated.

Operational Staff Vehicle Trips

ARC indicate that Packing Plant staff trips will not be additional trips generated to the local network, but trips redistributed from existing parking on the Moorehouse Site to the PP site.

A total of 12 staff currently working at the IPP site will be relocated to the PP site, with a resulting reduction in trip generation to/from, and parking demand at, the Moorehouse Site. Based on current shift structures, ARC estimate that up to 4 (commuter) peak hour staff vehicle trips would be redistributed from the Moorehouse Site to the PP site (via PP 2).

Operational Traffic Flows

Total traffic flows related to the operation of the Packing Plant are shown below in **Figures 31** and **32**:

Traffic Impacts

Intersection Performance

ARC have undertaken an assessment of intersection performance using SIDRA and based on the calculated total traffic flows during the construction and operation stages. The results of ARC's analysis (see **Annexure 10**) indicate all site access intersections, and the intersection of Bolong Road and Railway Street, operate at a good level of service under 'base' conditions, with minimal average delays and significant spare capacity.

According to ARC traffic conditions under both construction and operational conditions would have no significant impact on the operation of the local traffic network, with no significant changes in average delay, reductions in capacity, or increases in queue lengths at any of the key intersections. Indeed, conditions will be significantly improved from those forecast (and approved) in the original SSEP traffic assessments further to traffic reduction in Bolong Road based on the upgrades to the Princes Highway.

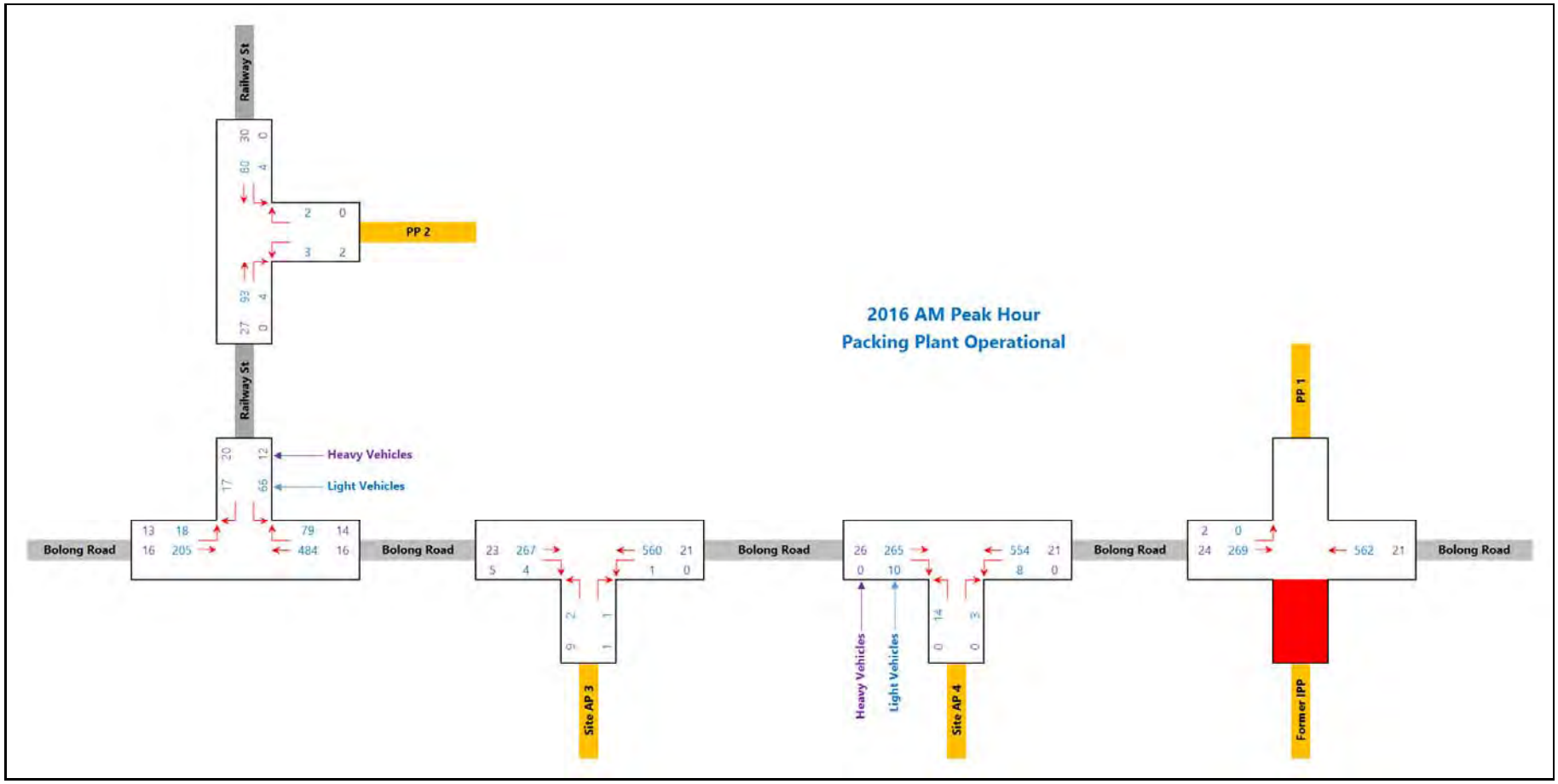

Figure 31: 2016 AM Peak Hour – Packing Plant Operational.
(ARC Traffic and Transport)

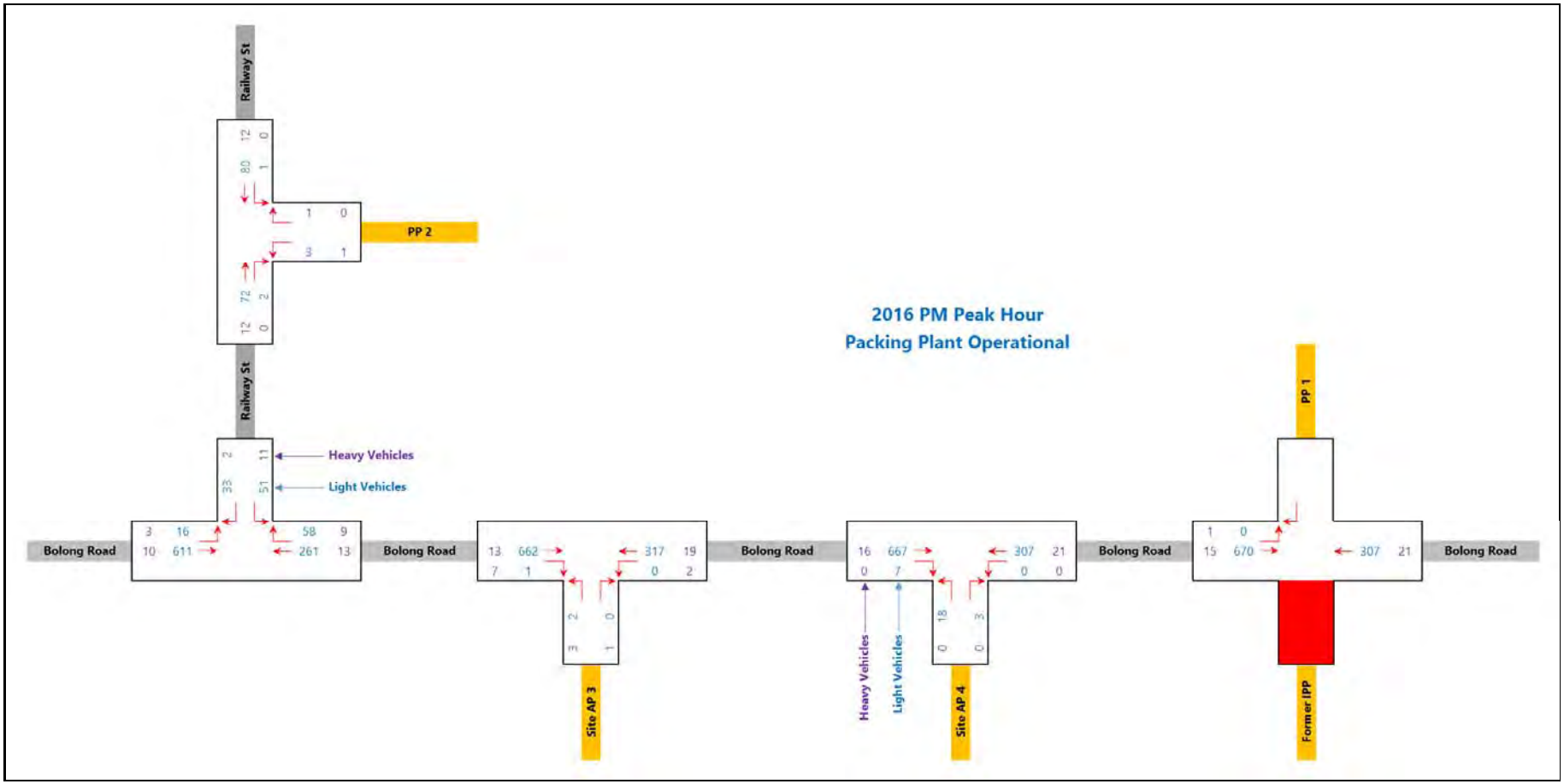

Figure 32: 2016 PM Peak Hour – Packing Plant Operational.
(ARC Traffic and Transport)

Parking

Under the SSEP Approval (*Condition 31*), 30 staff parking spaces will be provided on the PP site. This allocation of spaces provides for additional demands generated at shift changeover and for visitor parking. In summary, the proposed car park will appropriately accommodate all PP site parking demands such that there would be no off-site parking requirement.

The car park will be designed in accordance with AS 2890.1 with regard to aisle widths and space dimensions, and it is recommended that one space be designed as an accessible with reference to AS 2890.6.

During the construction period, construction staff would utilise informal parking adjacent to the construction areas in the northern part of the PP site, until such time as the formal Packing Plant car park is completed. It is again noted that Packing Plant construction staff would not use the (Dryer Modification proposed) temporary car park in the southern part of the PP site, nor would any access be available between PP 2 and the temporary car park.

Pedestrian Access

The SSEP provides for the construction of a pedestrian footbridge crossing of Bolong Road, providing pedestrian access between the PP Site and the SS Site south of Bolong Road. Under this modification the location and alignment of the bridge has been revised. On the southern side of Bolong Road it now links to the existing pedestrian path west of Abernathy's Creek (rather than the previously proposed landing to the east of Abernathy's Creek).

This modification has been provided to provide more efficient connections to key facilities serviced by the pipework contained within the bridge (for example the relocated Dryer on the Moorehouse Site). It is the opinion of ARC that this realignment would have no impact on pedestrian movement efficiency or safety.

Rail Operations

The Modification provides for two rail spurs to the PP Site. The provision of these spurs is designed to maximise the efficiency of rail handling, allowing for simultaneous loading and unloading of containers, and minimising crossings of Bolong Road.

Container Trains

In line with the SSEP Approval, an average of 5 container trains will be required each week, each of which would provide a formation of up to 700m (comprised of up to 35 longer wagons than currently used).

The majority of container trains will utilise the PP site rail spurs, though it is noted that a portion of some trains may cross to the southern side of Bolong Road to access existing DDG loading facilities. However, this would entail a single arrival and single departure crossing, ie. it would not require shunting.

The use of the PP site rail spurs is expected, according to ARC, to reduce container train movements at Bolong Road by more than 20 movements per week. At Railway Street, the capacity provided by the PP site rail spurs is also expected to reduce shunting (from the Bomaderry rail yards) such that even with the additional train service, total container train movements at Railway Street would be generally unchanged from existing movements.

Grain and Flour Trains

Grain and flour trains will continue to use the existing sidings on the southern side of Bolong Road.

With regard to grain trains, 4 services weekly would continue to be generated, though the length of trains would increase to an average 40 wagon service. Flour trains will reduce to 5 services per week, though train are expected to accommodate larger capacity wagons and be of a slightly longer length than existing.

The longer grain and flour trains will require additional shunting movements, but these are expected to be partially off-set by the reduced number of flour trains, and moreover by the very significant reduction in movements further to the use of the PP site rail spurs by container trains.

Future Railway Crossings

The railway crossings of Railway Street are expected to remain largely unchanged. At Bolong Road, the minor increase in grain and flour train movements would be more than off-set by the removal of [the majority of] container train movements, such that Bolong Road rail crossing movements according to ARC are estimated to be reduced by approximately 20 movements per week from current levels.

Finally, it is important to acknowledge that the SSEP Approval includes an upgrade of the existing rail sidings on the southern side of Bolong Road, specifically to remove shunting requirements at Bolong Road. Manildra is currently investigating these upgrades, which are expected to form a future Modification application; once this upgrade is completed, crossing of Bolong Road would be even further to reduced.

Railway Design and Operations Accreditation

Manildra is rail safety accredited as the RIM for the site; this accreditation requires Manildra to have all systems in place to manage the requirements of the RIM for the day to day operation through a SMS which conforms to the RSNL (NSW).

An integral requirement in proving the new rail infrastructure is compliance with the RSNL (NSW), which requires in turn that any new proposed construction activity is to be notified to the Office of National Rail Safety Regulation (ONRSR) through a Management of Change process. The Management of Change process includes formal documentation to be submitted to the ONRSR and also requires that Manildra keep the ONRSR informed of the process commencing with design through to construction and commissioning of any new sidings, inclusive of rail safety risk assessment documentation.

Manildra will necessarily comply fully with these procedures, noting that the process commences only further to an Approval (of the Modification). At this time, detailed track design components have yet to be finalised, and as discussed above there will be a requirement to conduct and finalise the risk assessment for the design and construction/commissioning stages; and then another operational risk assessment prior to any new or change in operation.

Manildra has an existing Safety Interface Agreement in place with Sydney Trains (Transport for NSW) which caters for the existing interface connection, which will not be affected by the Modification given that the new works will be within the Manildra owned land. In addition, Manildra has an Interface Agreement in place with Shoalhaven Council for both the Railway Street and Bolong Road rail level crossings.

Finally, it is important to note that the Bolong Road railway crossing was upgraded in accordance with the SSEP Approval to provide compliance with the Australian Level Crossing Assessment Model (ALCAM) standards. Manildra's National Rail Management section has determined (with reference to ALCCAM) that the modification proposal would not require any additional upgrades of the existing crossing infrastructure at either Bolong Road or Railway Street, (nor is such required per the SSEP Approval).

8.5.3 Conclusion

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

> *Following a detailed and independent assessment of the access, traffic and parking conditions associated with the Modification, ARC has concluded that the Modification – and specifically the construction works associated with the Modification - would have no significant impacts on the local or on-site traffic environments. In summary: -*

- *While the Modification provides for an increased floor-area for the Packing Plant, once operational the Modification would not result in any increase in production from the broader Shoalhaven Starches over that which has been the subject of past approvals, nor as a result an increase in either vehicle traffic or rail movements at the Bolong Road and Railway Street rail crossing over previous (approved) forecasts.*

- *The Modification provides for the construction of the two approved PP Site access points; a 30 space car park; and a pedestrian bridge across Bolong Road in accordance with the SSEP Approval.*

- *During the Packing Plant construction period (including the period of potential overlap with the Dryer construction period) and once the Packing Plant is operational, the local road network would continue to operate at a high level of efficiency.*

- *The staff car park will be designed with reference to the appropriate Australian Standards.*

- *The minor realignment of the pedestrian bridge provided for by the Modification would have no impact on the efficiency or safety of pedestrian movements between the PP Site and the broader SS Site south of Bolong Road.*

- *Rail movements would not increase above those limits established in the SSEP Approval, and indeed are expected to be further reduced in regard to crossings of Railway Street and Bolong Road given the capacity provided by the additional PP Site rail spur.*

8.6 VISUAL IMPACTS

The requirements issued by the DoPE for this project required that the EA address:

> ***Visual -*** *An assessment of the visual impacts of the increased building footprint, silos and additional rail spur line, including any changes to approved heights, scale and lighting as viewed from key vantage points. Include details of proposed building materials, textures and colours, including photomontages to show the changes proposed by the modification.*

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

The Scenic Character and Environment

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

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

forming a background to the rural landscape are the timbered slopes of the Cambewarra escarpment.

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

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

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

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

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

<u>Burraga (Pig) Island</u> – Burraga Island is situated in the middle of the Shoalhaven River and provides the closest vantage point to the southern boundary of the site. The island however is privately owned and not accessible to the public. Vegetation screening along

the riverbank adjacent to the site also reduces the visibility of the existing buildings and structures.

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

Nowra Bridge – The Nowra Bridge crosses the Shoalhaven River and provides limited opportunities for views of the factory site. The dominant visual elements from the bridge are the river, vegetation along the riverbanks and the escarpment. The visual impact of the factory site is reduced by distance as well as the bridge structure which permits only glimpses of the site. The existing Moorehouse building is not visible from this vantage points.

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

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

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

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

Visual Impact of Proposal

The proposed modified Packing Plant will involve a change in location and an increase in height of the Packing Plant from that which was approved.

The proposed modified Packing Plant building will have a height above ground level of 13 metres. The modified proposal will also include a series of silo structures that will range in height above ground level of 20.7; 26.5 and 34.3 metres.

Such heights will not be inconsistent with the prevailing height of development on the Shoalhaven Starches factory site. For instance:

- The adjacent Interim Packing Plant – 34 metres;
- The existing boiler house stack has a height of 53.7 metres;
- The No. 5 Starches Dryer stack was approved at 33 metres;
- The existing Flour Mill has a height above ground level of 34.78 metres;
- The constructed No. 6 Dryer (Wet End) has a height of 43.0 metres.

The proposal will therefore comprise a height that is generally consistent with the prevailing height of existing development within the overall factory site.

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

The external cladding of the proposed Starch Dryer building will also be coloured “Jasper” (of the Colourbond range) consistent with the prevailing external colours of the adjacent Interim Packing Plant building.

The visual impact of these works from the identified vantage points (refer **Figure 33**) is described as follows:

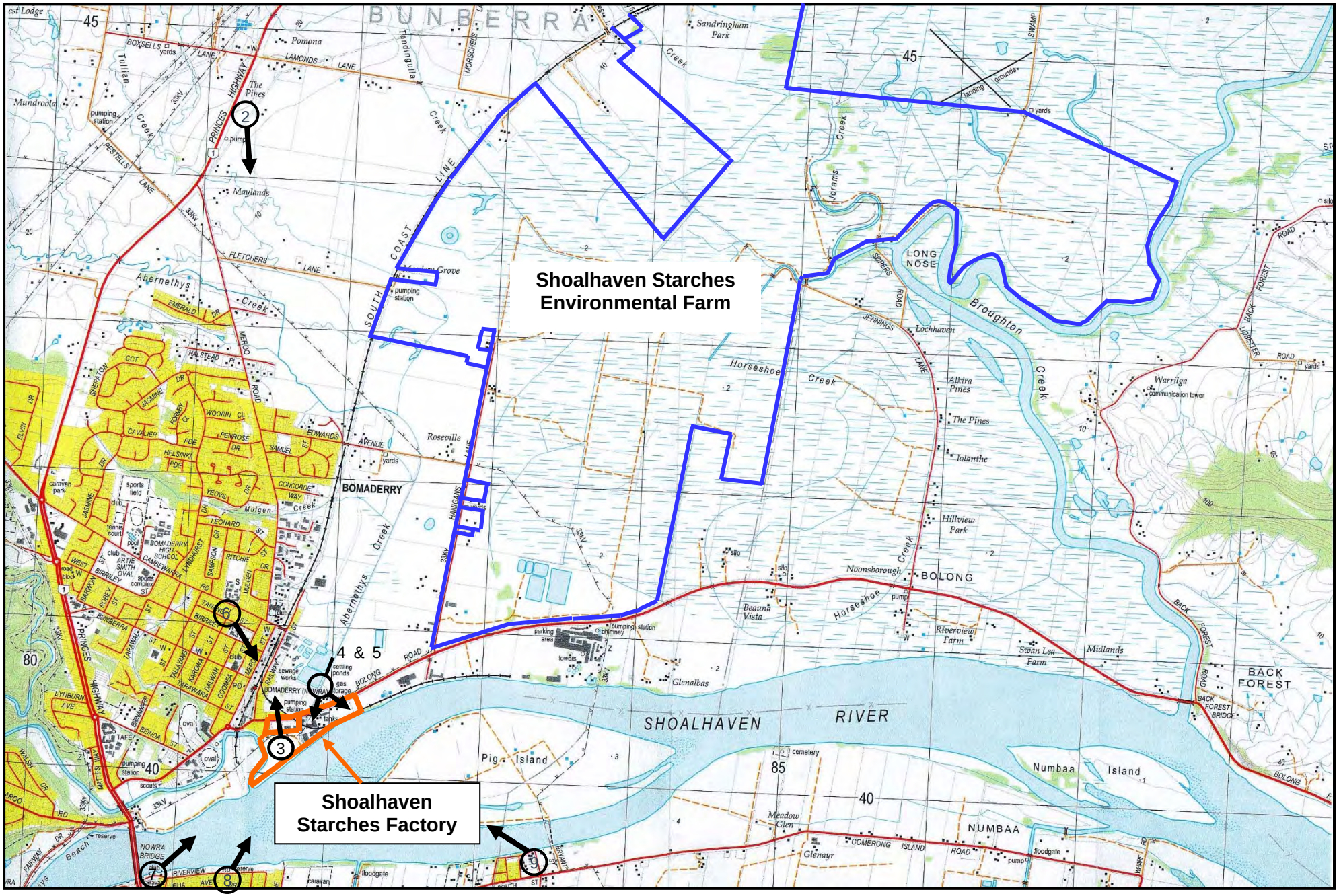

Figure 33: Vantage Points for Plates.

The Princes Highway

The Shoalhaven Starches factory is mainly visible from a section of the Princes Highway between Boxsells Lane and Devitts Lane, Jaspers Brush (refer **Plate 2**). Due to the configuration of the highway and the siting of the factory, only southbound vehicles view the site. Vantage points along this section of the highway are 4.5 to 5.0 km from the site. The site becomes less exposed and is eventually obscured by a rise in topography further south of Boxsells Lane.

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

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

Plate 2: View of Shoalhaven Starches Factory from Princes Highway (within vicinity of Boxsells Lane).
Factory stack barely visible from this vantage point.

Bolong Road

The Packing Plant site is clearly visible from Bolong Road by vehicles approaching from the east, and along the frontage of the site refer (**Plate 3**).

Works associated with the proposed packing plant will mainly involve structures of a similar bulk and scale as existing structures within the overall Shoalhaven Starches factory site on the south side of Bolong Road and will not be distinctly different in style, from or scale to existing industrial development allocated on the north side of Bolong road and along Railway Street.. In these circumstances the proposed structures create forms similar to existing industrial structures within the vicinity.

Plate 3: View of site from Bolong Road.

Bolong Road will be the main vantage point from where the modified packing plant will be visible. In accordance with the Department requirements for the preparation of this EA, photomontages have been prepared showing the visual impact of the approved packing plant and modified packing plant when viewed from vantage points along Bolong Road **(Figures 34** to **37**).

Figure 34: Photomontage of approved Packing Plant as seen from Bolong Road.

Figure 35: Photomontage of proposed Modified Packing Plant as seen from Bolong Road.

Figure 36: Photomontage of approved Packing Plant when viewed from Bolong Road (further west than Figure 34).

Figure 37: Photomontage of proposed Modified Packing Plant when viewed from Bolong Road (further west than Figure 35).

It should be noted that the Shoalhaven Starches factory site is visible to the south of Bolong Road from this same vantage points as shown in **Plates 4** and **5** below.

Plate 4: View of Shoalhaven Starches factory site from Bolong Road (same vantage point as shown in **Plate 5** but to south-east)

Plate 5: View of Shoalhaven Starches factory site from Bolong Road (same vantage point as shown in **Plate 4** but to south) – showing Interim Packing Plant

As is evident from **Plates 4** and **5** there are already industrial buildings and structures of significant size and scale within the vicinity of the site, and within close proximity of Bolong Road.

As is evident from the photomontages in **Figures 34 to 37** the proposed modified packing plant will be set further back from Bolong Road which will assist in reducing its scale and visual impact when viewed from along Bolong Road.

In addition the approved Landscape and Vegetation Management Plan that supported the EA for the Project Approval made provision for screen planting along the northern side of the Bolong Road frontage that will further reduce any visual impact created by the modified Packing Plant buildings and its associated development (refer **Figure 38**).

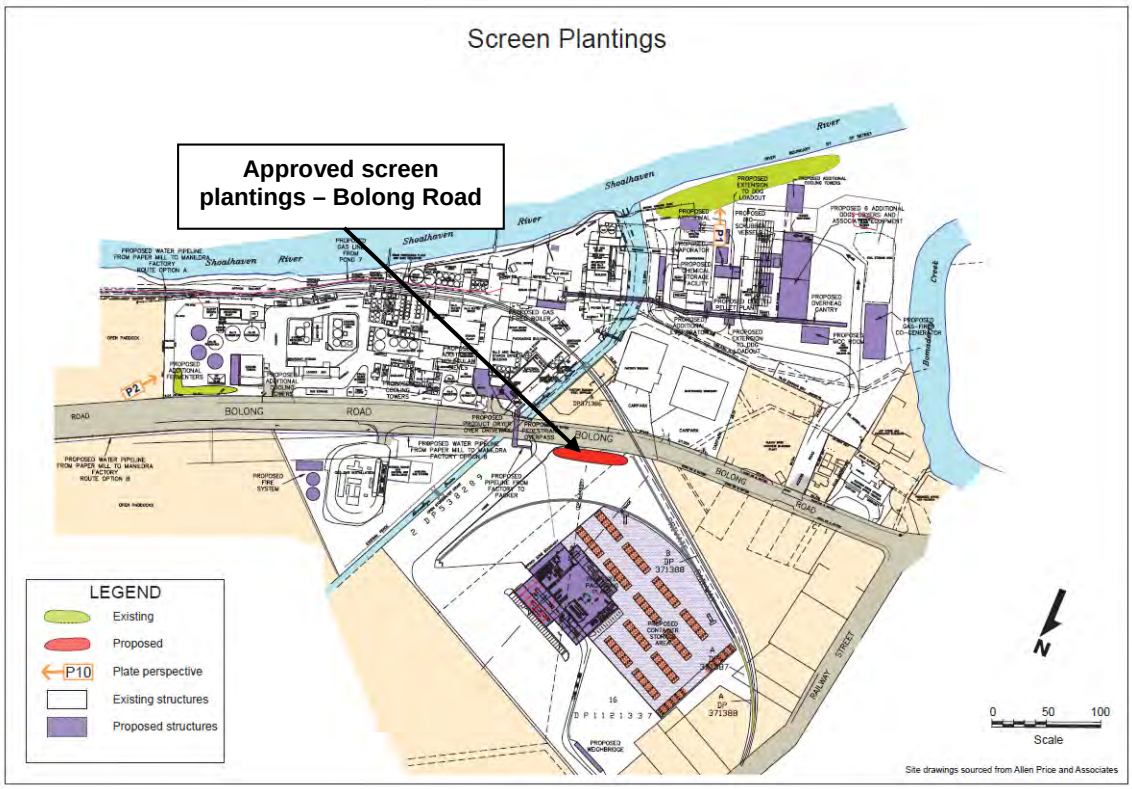

Figure 38: Extract from approved Landscape and Vegetation Managment Plan showing proposed screen plantings (Coffey Geosciences, 2009).

Bomaderry Urban Area

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

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

The proposed modified packing plant may be slightly visible from this vantage point as are other similar scale size and structures, although the modified development building will be shielded by industrial buildings located along Railway Street (in the foreground). In this way the vista from this vantage point will not be significantly altered.

Nowra Bridge

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

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

The existing factory site is largely obscured by riverside vegetation. Packing plant site is not visible from this vantage point.

Riverview Road

The existing factory site is visible will be from residences along Riverview Road directly south of the site (refer **Plate 8**) however the packing plant site is not highly visible from this vantage point. This view is from a distance of about 750 metres. Riverside vegetation along both the northern and southern banks of the river softens much of the factory site from view.

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

Terara

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

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

The packing plant development as modified will unlikely be visible from this vantage point. Such should also be seen in context however as other parts of the factory site such as the Flour Mill, associated grain silos, ethanol plant and boiler house stack are already visible from this vantage point. The proposal will not be out of character with the prevailing structures which are already visible from this vantage point.

Cambewarra Lookout

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

Overall it is considered that the proposed works will not create a significant adverse visual impact due, principally, to the existing industrial development. There are however measures which Shoalhaven Starches could undertake to minimise the visual impact of the proposed stack. Where appropriate and possible, the relocated Starch Dryer No. 5 building should be constructed of similar materials as those previously used on the site and be of a non-reflective nature. Colours should blend with existing structures on the site to ensure visual harmony. Consideration should be given to incorporating a cladding colour if possible which will match existing development on the site.

8.7 SITE CONTAMINATION

The requirements issued by the DoPE for this EA in part required:

> ***Contamination –*** *a Stage 2 contamination assessment to identify the nature and extent of contamination on the packing plant site and measures to remediate the areas identified as impacted by hydrocarbon and asbestos contamination on the packing plant site. The existing project approval requires a site audit statement to validate the remediation. Assessment/management measures are also required for groundwater which was identified as impacted by zinc above relevant guidelines, on the packing plant site.*

Following further consultation between Shoalhaven Starches and the Department with respect to this specific requirement, the Department revised the above requirement as follows:

> *I have reviewed the information provided and agree that the Phase 2 contamination assessment can be provided post determination.*
>
> *Can you please incorporate the information provided in your email below into the EA for the modification so that it is clear that the modified packing plant will not have an impact on the area of identified contamination. It would also be helpful to discuss the proposed timing for construction of the approved components, such as the container storage area, as this is adjacent to borehole CTP 28. So, include a statement or mitigation measure that the Phase 2 contamination assessment would be undertaken before any works commence on the approved or modified components.*

The EA for the original SSEP project included a site contamination assessment undertaken by Coffey Geosciences. Soil sampling and analysis undertaken from the Packing Plant site (identified as borehole CTP 28 within the assessment undertaken by Coffey's*)* identified petroleum hydrocarbon contamination and fragments of Asbestos Containing Material (ACM) within the central western part of the site which appeared to contain fill materials and ramping west towards neighbouring properties. This assessment concluded that this part of the site required further assessment and remediation / management with respect to the identified contamination.

The location of the detected ACM & petroleum hydrocarbons is situated approximately 42 metres west of the proposed modified packing plant footprint (refer **Figure 39**).

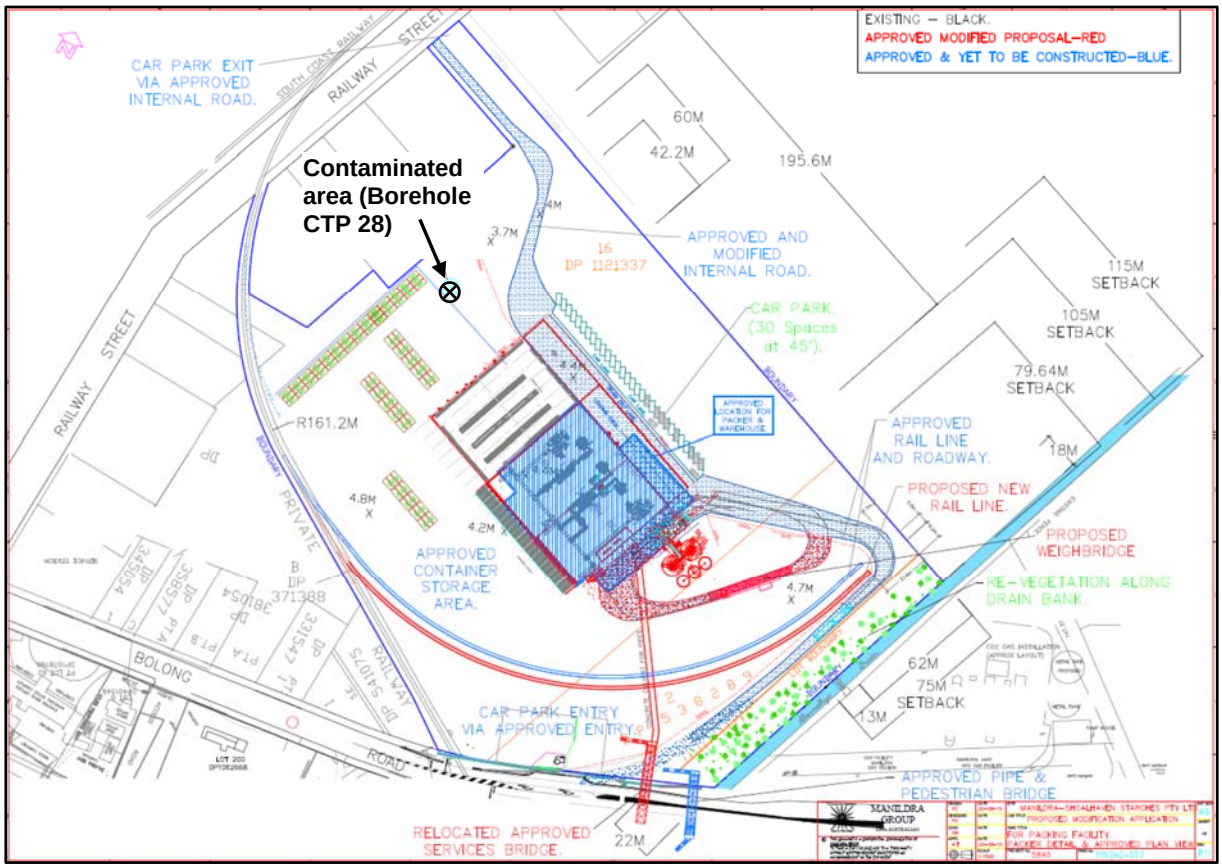

Figure 39: Location of identified contaminated area (Borehole CTP 28) in relation to modified Packing Plant footprint.

The modified packing plant will therefore not directly impact on the area of identified by Coffeys as potentially contaminated.

The container storage area is adjacent to borehole CTP 28, as was the case with the original SSEP approval. This modification proposal does not alter this situation.

Consistent with the findings of the original EA and Project Approval a site audit statement prepared by an accredited site auditor indicating the site is suitable for its intended use(s) would be required to be undertaken before any works commence on this overall site.

8.8 FLOODING

The requirements issued by the DoPE for this EA in part required:

> *"Flooding – A flood impact assessment including impacts of the increased building footprint on flood storage, flow velocity and flood depths both on and off-site, including the need for any mitigation and/or compensation measures."*

In addition to the above the Office of Environment and Heritage in a submission dated 5th November 2015 requested the implications of the full range of floods, including events greater than the design flood, up to the probable maximum flood (PMF) should be considered as part of the proposed modification; and in particular consideration should be given to:

- *the impact of flooding on the development;*
- *the impact of the development on flood behaviour including any management measures to mitigate adverse flood impacts;*
- *the impact of flooding on the safety of people/users of the development;*
- *the development control plans or policies of Shoalhaven City Council (SCC) in relation to the management of flood risk;*
- *the best available flood information for the area from SCC;*
- *the SCC's requirements for flood investigations to support development, whether flood information is currently available or not;*
- *the full range of flood events, up to and including the probable maximum flood (PMF);*
- *the flood hazard in the area including the hydraulic hazard, floodways, flood readiness, flood warning time, rate of rise of floodwater, flood duration and type of development;*
- *the flood hazard of any access routes;*
- *the implications of climate change on flooding; and*
- *the impact of flooding on the safety of people/users of the development.*

The EA is supported by a flood assessment prepared by WMAwater (WMA) (**Annexure 8**). This assessment has been prepared to address the issues raised by both DoPE as well as OEH above. This section of the EA is based upon the findings of this assessment.

8.8.1 Approach

Background

Each development on the floodplain has the potential to cause an impact upon flood levels. The potential impacts of works within the floodplain on hydraulic characteristics are twofold – firstly a loss of temporary floodplain storage volume and secondly a loss of flow area. It is the loss of flow area which produces the greatest impact, as the area of floodplain storage lost due to all works since 1990, represents approximately less than 1% of the total available floodplain storage area for the northern floodplain (say 3000+ hectares).

Whilst the individual impacts (construction of a road) may be small the cumulative increases from several developments may be significant. Therefore, the proposed works

in 2008 needed to be assessed in the context of total cumulative impacts of all development within the immediate area. It is not possible to itemise all of the developments on the floodplain and their effects since white settlement. For the purposes of reporting the nominal starting date for the assessment of cumulative effects is 1990. This date was agreed previously and approximately corresponds to the floodplain development status at the time when the current design flood level information was established (1990 Lower Shoalhaven River Flood Study).

For the above reasons the impacts assessed in the May 2008 Proposed Ethanol Production Upgrade Report represented the cumulative increases for all development by Shoalhaven Starches and others (Dairy Farmers pond) since 1990 and not just the incremental effects of the proposed ethanol upgrade and odour reduction works in 2008.

The impacts can be subdivided into hydraulic (changes in flood level, flow and velocity), social, economic and environmental.

An assessment of such impacts is required in order to ascertain the possible damages to the existing and proposed structures making up the plant, and also to advise Council of the likelihood of any increase in risk to other occupiers or users of the floodplain. It should be noted that the three main floodplain users (Shoalhaven Starches, Dairy Farmers and the Paper Mill (both now owned by the Manildra group of companies)) work in conjunction or cooperation with each other. Each have swapped or sold land on the adjoining floodplain in recent times to suit their commercial needs.

Shoalhaven Starches and the Paper Mill “share” the railway line which passes through all three properties. Shoalhaven Starches also supplied product to the Paper Mill in the past. These two plants are located on the banks of the river in order to distance themselves from the urban environment and to be close to an unlimited supply of water. They also require a large amount of “flat” land for their operation with good road and rail access. Shoalhaven Starches makes excellent use of the floodplain by irrigating and farming the land using recycled water from the plant (initially stored in the seven effluent ponds).

Approach Adopted in Flood Assessment

May 2008 Proposed Ethanol Production Upgrade Report

The May 2008 Proposed Ethanol Production Upgrade Report undertook a detailed hydraulic analysis using the CELLS model of all the works proposed as part of this program. The works on the subject site, which would impact on flooding, as part of this included:

- rail spur line;

- packing shed (3050 m^2);
- container storage area;
- road access and parking.

2016 Modification Application

Under this Modification Application it is proposed to undertake the following works, which would impact on flooding:

- increase the floor area of the packing plant from 3050 m^2 to 6200 m^2 (excluding awnings);
- construct 5 storage silos adjacent to the packing plant;
- relocate the packing plant within the previously approved lots (Lot 16 DP 1121337 and Lot 2 DP 538289);
- import fill and regrade to construct a temporary and a permanent car park;
- import fill and regrade to construct a raised road from Bolong Road to the packing plant;
- import fill and regrade to create a pad for temporary storage of containers;
- assume containers will be stored on the site during a flood;
- import fill and regrade to construct an additional rail spur line adjacent to the packing plant to accommodate the increase in dry product transported from the site; and
- change the location and alignment of the pipe bridge across Bolong Road.

Approximately 34,000 m^3 of fill will be imported with the finished ground level at the container store at 4 m AHD. The existing 5% AEP flood level at the site is at approximately 4.7 m AHD.

Assessment of Impact of Proposed Works on Flooding

The loss of hydraulic conveyance depends on the extent of the restriction to a flowpath caused by the works. Prior to construction of the Shoalhaven Starches plant at Bomaderry there would have been significant flow through the site during a flood, as there is across any river bank. However, since approximately 1960 the ongoing construction of the plant has effectively blocked the flow path through the site. This issue has been investigated by WMA in their report titled "*Further Development within the Manildra starches Plant off Bolong Road, Bomaderry - Hydraulic Assessment*". In summary an agreement was reached that any future development within the intensively built –up area, as indicated on

Figure 40 below (taken from that report) would not require hydraulic modelling to quantify the hydraulic impacts and cumulative effects.

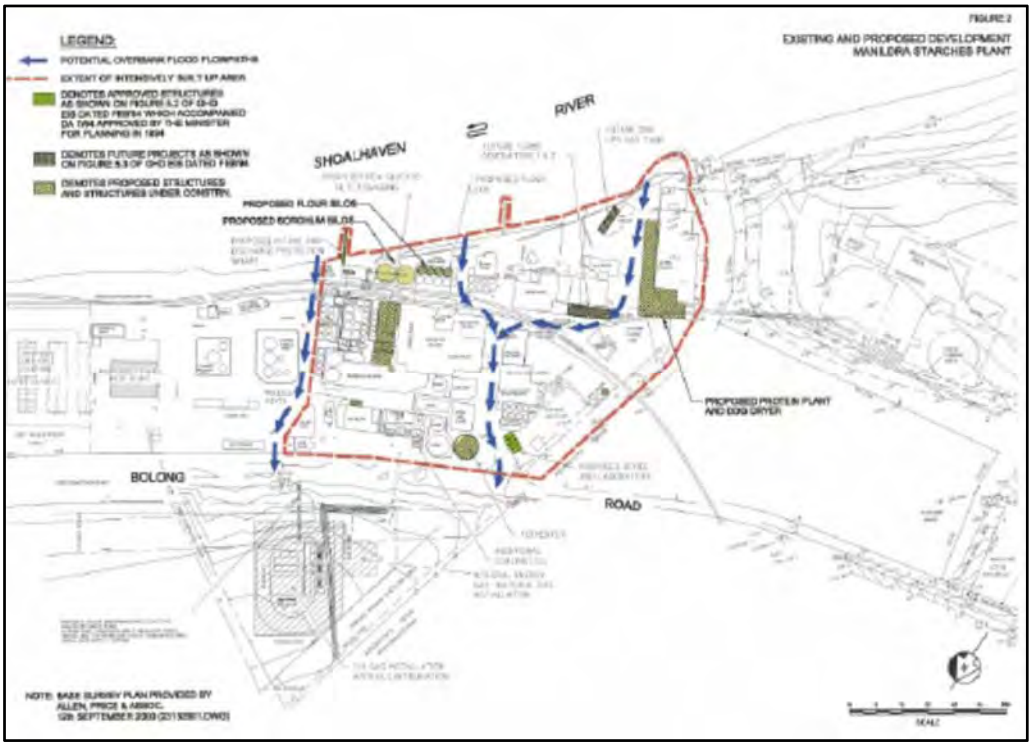

Figure 40: Agreed extent of intensively built-up area.

Thus in simple terms works within this intensively built-up area do not require hydraulic modelling but they do require hydraulic modelling if located outside the intensively built-up area (as are the proposed works).

As part of the current flood assessment the following have been undertaken by WMA:

1. Modification of the TUFLOW model to represent the loss of conveyance and temporary floodplain storage due to the proposed works. It should be noted that the modelling only considers the hydraulic effect of the increase in building footprint of the packing shed, fill for construction of the rail line / packing shed / roads etc. and storage of containers;

2. Comparison of the design flood levels for the design (inclusion of the proposed works) to the present day approved extent of development flood levels. This indicates the incremental increase in flood level due to the proposed works;

3. Assessment of the increase in above floor building inundation as a result of the proposed works.

8.8.2 Flood Impact Assessment

Increase in 1% AEP Flood Levels

According to WMA the results from a comparison to present day 2015 approved works are provided on **Figure 41**. These show that for the majority of the surrounding area there is no change to the 1% AEP flood level. The increases that do occur, according to WMA, are predominantly to land and buildings owned by Shoalhaven Starches. It should be noted that the works will only increase flood levels in events that overtop the northern river bank (approximately a 5% AEP event) and floodwaters flow across the site and towards Bolong Road. Thus in smaller events (all historical floods since March 1978) the works would have no impact on flood levels.

The maximum increase in the 1% AEP flood, on land not owned by Shoalhaven Starches, is up to 0.05 m and occurs on Bolong Road between the railway line crossing and Abernethy's Drain (Creek) crossing adjacent to the Shoalhaven Starches plant and on 21 Bolong Road (**Figure 41**).

Figure 41: Extract from WMAwater Flood Assessment (Image 3).

Increases in Above Floor Inundation

The only building potentially affected by the proposed works is at 21 Bolong Road (red outline on **Figure 41**). This building (refer **Plate 10**) is a two storey commercial premise. The surveyed round floor level is at 4.91 m AHD and the upper floor is at 6.91 m AHD.

Plate 10: 21 Bolong Road (taken from Google StreetView).
(WMAwater Flood Assessment)

Council's flood certificates indicate a 1% AEP flood level of approximately 5.6 m AHD at this location. Thus the ground floor will be inundated by approximately 0.7 m and the upper floor will not be inundated. **Figure 41** indicates that the ground floor is at the very periphery of the affected area and thus may or may not be subject to any flood level increase due to the proposed works.

8.8.3 Compliance With Shoalhaven City Council's Chapter G9: Development On Flood Prone Land (DCP2014)

Council's Flood Certificates

Council's flood certificates advise that the site is inundated in the 1% AEP event and is described as High Hazard Flood Storage. It should be noted that Council's description of the hydraulic and hazard categorisation is based on CELLS model results from the 1990 Lower Shoalhaven River Flood Study. However the CELLS model could not accurately define these categorisations due to its limited model structure.

Council's flood certificates indicate that the 2050 projected sea level rise estimate of 0.4 m due to climate change will not increase the 1% AEP flood level at this site as it is too far upstream from the ocean.

Compliance

The Flood Assessment prepared by WMA addresses how the proposal complies with Chapter G9: Development on Flood Prone Land of Council's DCP 2014 (refer **Table 25**).

As the works will not involve subdivision of lands compliance with these performance criteria has not been addressed.

Table 25

Compliance with Chapter G9 – Shoalhaven DCP 2014

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.	The works are such that their construction will not significantly increase the number of workers on the site (beyond that under Project Approval MP06_0228) or additionally threaten their safety during a flood.
The development or work will not unduly restrict the flow behaviour of floodwaters.	Refer Section 8.8.2 – Flood Impact Assessment.
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 works are within industrial land clear of vegetation and due to their relatively small footprint will have no significant impact on erosion or siltation. Neither will the increase in impervious area cause any significant increase in runoff from the site.
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 will be provided.
Potential damage due to inundation of proposed buildings and structures is minimised.	There will potentially be some damage to electrical and other components, including the stored containers and these are considered in Shoalhaven Starches Flood Plan. Electrical components should as far as possible be raised above the 1% AEP flood level + 0.50 m.
The development will not obstruct escape routes for both people and stock in the event of a flood.	The works will not occupy escape routes or cause workers to become trapped.
The development will not unduly increase dependency on emergency services.	The works are such that their construction will not significantly increase the number of workers on the site (beyond that under Project Approval MP06_0228), additionally threaten their safety during a flood or increase the need for emergency services.
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 Section 8.8.2 – Flood Impact Assessment.

Table 25 (continued)

Performance Criteria	***Response***
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 flood storage in the 1% AEP event. The site is vacant land with no existing vegetation apart from grasses and is beyond the influence of normal fluvial geomorphic processes. The works will employ measures to ensure no impact on water quality.
P2 Filling or excavation on flood prone land will meet the following:	
	The works involve earthworks, including significant filling but limited excavation.
High hazard floodway areas are kept free of fill and/or obstructions.	The location is within a high hazard flood storage area, however the location of the works is determined by the nearby rail line and other related plant. There is no other location where the works could be situated. The hydraulic impact of the proposed works is minimised by being located in a flood storage rather than a floodway area.
The proposed fill or excavation will not unduly restrict the flow behaviour of floodwaters.	Refer Section 8.8.2 – Flood Impact Assessment.
The proposed fill or excavation will not unduly increase the level or flow of floodwaters or stormwater runoff on land in the vicinity, including adjoining land.	Refer Section 8.8.2 – Flood Impact Assessment.
The proposed fill or excavation will not exacerbate erosion, siltation and destruction of vegetation caused by floodwaters flowing on the land.	The site is vacant grassed land and is beyond the influence of normal fluvial geomorphic processes.
The proposed fill or excavation will not be carried out on flood prone land if sufficient flood free area is available for development within the subject property.	The location is within a high hazard flood storage area, however the location of the works is determined by the nearby rail line and other related plant. Other sites have been evaluated and the outcome is that there is no other location where the works could be situated.
The proposed excavation does not create new habitable rooms, non habitable storage areas or car parks with floor levels below the existing ground level.	The works do not involve habitable or non-habitable residential storage areas or below ground car parks.

8.8.4 NSW Office of Environment and Heritage Letter of 9 November 2015

The Flood Assessment prepared by WMA also addresses the issues raised by the NSW Office of Environment and Heritage in their letter of 9th November 2015 as follows:

The Impact of Flooding on the Development

Flooding will impact on the development. In events greater than the 5% AEP it is likely that the Shoalhaven Starches plant will be shut down and all workers will be evacuated from the site. Initially this will result in loss of production and possible damage to stored products and equipment in larger events up to the PMF. These issues have been addressed in an updated (to include these works) Shoalhaven Starches Flood Plan.

The works have been raised to reduce the frequency of inundation but cannot be removed from the floodplain to eliminate the risk of flooding. It is impractical to raise the works to the PMF to eliminate flood damages.

Following each flood Shoalhaven Starches undertakes a review of its flood related procedures, as was undertaken for the event of 26th August 2015.

The Impact of the Development on Flood Behaviour Including any Management Measures to Mitigate Adverse Flood Impacts

The impacts of the proposed works have been evaluated using the TUFLOW hydraulic model and the results are provided in Section 3.

No mitigation works are possible but management measures to address the impact of flooding on the safety of workers and damage to the plant are addressed in the Shoalhaven Starches Flood Plan.

The Impact of Flooding on the Safety of People/Users of the Development

Flooding will potentially impact on the safety of personnel on the site at the time of the event and has been addressed in the Shoalhaven Starches Flood Plan. In summary due to a relatively long available warning time (of the order of 12 to 24 hours) there is ample opportunity to enact the Flood Plan and in this way safely remove personnel from the site prior to any inundation.

The Development Control Plans or Policies of Shoalhaven City Council (SCC) in Relation to the Management of Flood Risk

This has been addressed in Section 4.

The Best Available Flood Information for the Area from SCC

As noted previously the best available design flood information is provided in Reference 2 which supersedes that undertaken previously for Shoalhaven City Council (Reference 1).

The SCC's Requirements for Flood Investigations To Support Development, Whether Flood Information is Currently Available or Not

This has been addressed in Section 4.

The Full Range of Flood Events, up to and Including the Probable Maximum Flood (PMF)

The increase in flood level has only been considered for the 1% AEP event. In the 5% AEP event there will be no increase in flood level as it is only in greater events that the river bank is overtopped.

Events greater than the 1% AEP (up to the PMF) have been considered for damage and evacuation purposes in the Shoalhaven Starches Flood Plan. For evacuation all staff will be removed from the site prior to the site first becoming inundated. Thus there will be no additional risk to staff with a larger event.

In events larger than the 1% AEP it is likely that additional damages to contents and structures will be incurred on the site. These damages cannot be protected by any reasonable means.

The Flood Hazard in the Area Including the Hydraulic Hazard, Floodways, Flood Readiness, Flood Warning Time, Rate Of Rise of Floodwater, Flood Duration and Type of Development

Council's flood certificates (Appendix D) advise that the site is inundated in the 1% AEP event and is described as High Hazard Flood Storage. However the proposed location of the works is determined by the nearby rail line and other related plant. Other sites have been evaluated and the outcome is that there is no other location where these particular works could be situated.

Shoalhaven Starches has a Flood Plan which will be updated to include the proposed additional plant and storage areas. Due to the relatively large catchment area of the Shoalhaven River (7,000 km^2) there is of the order of 12 to 24 hours advance warning of a flood. Shoalhaven Starches Flood Plan will ensure that all staff are removed from the site in advance of any site inundation. The duration of inundation will make no significant impact on the level of flood damages or risk to life.

As the proposed development is a packing shed and storage area for goods there will be a high loss if inundation occurs. This has been considered in development of the plans and floor levels but these damages cannot be protected by any reasonable means.

The Flood Hazard of Any Access Routes

The Flood Plan requires evacuation of staff west along Bolong Road to high ground (refer **Figure 42***). Evacuation of staff should occur prior to any overtopping of the river bank but the short length of travel along a sealed road and with rising flood access minimises the risks.*

Figure 42*: Evacuation Route to High Ground.*

The Implications of Climate Change on Flooding

Possible changes to design flood levels (sea level rise and rainfall intensity increase) have been evaluated in Reference 2. The results indicated that sea level rise would have negligible impact on flood levels at the site due to the considerable distance upstream from the Pacific Ocean. Any increase in design rainfall intensities will increase design flood levels. Reference 2 indicates that a 10%, 20% and 30% increase in design rainfalls will increase 1% AEP flood levels by approximately 0.1m, 0.2m and 0.3m respectively at the site.

Council's flood certificates (Appendix D) indicate that the 2050 projected sea level rise estimate of 0.4m due to climate change will not increase the 1% AEP flood level at this site as it is too far upstream from the ocean.

9.0 STATEMENT OF ADDITIONAL COMMITMENTS

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

The only additional commitments arising from this modification proposal include the following:

9.1 PRELIMINARY HAZARD ANALYSIS

Table 26 outlines recommended additional management procedures and design considerations that Shoalhaven Starches commits to implementing and incorporating into practices that would prevent and / or minimise risk scenarios from occurring.

Table 26

Preliminary Hazard Analysis

Preliminary Hazard Analysis
Shoalhaven Starches commits to implementing the following recommendations made by Pinnacle as part of their PHA in relation to this Modification Application: • *The existing safety management systems, e.g. maintenance procedures, operating procedures, training and emergency response plans, will need to be updated to reflect the proposed changes; and* • *All explosion vents should be positioned to avoid impact to personnel and sensitive equipment.*

9.2 VISUAL IMPACT

As outlined in Section 8.6 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 27** to assist in screening and further minimising visual impacts arising from the proposed works.

Table 27

Visual Impact Mitigation Measures

Visual Impact Mitigation Measures
Shoalhaven Starches commits to implementing the following recommendations to mitigate the visual impact of the proposed works associated with this Modification Application: • *In order to reduce the visual impact of the proposed packing plant and associated works, the northern and eastern boundaries of the subject site should be landscaped with a combination of trees and shrubs planted. The boundary along Bolong Road should also be landscaped.* • *A Landscape Plan should be prepared for those areas of the site associated with this Modification Application and identify suitable plantings which will grow to a suitable height to assist in screening the works associated with this application.* • *Where tree planting has already been established, measures should be taken to protect existing vegetation during the construction phase.* • *In addition to landscaping, new structures can be constructed and treated to reduce visual impact. Where appropriate and possible, buildings and structures should be constructed of similar materials as those used in the vicinity of the site. Colours and materials should be consistent with those used in the vicinity of the site.*

9.3 AIR QUALITY IMPACTS

As outlined in Section 8.3 of this EA it is our view that the proposed works will not create a significant adverse air quality impact. Shoalhaven Starches however commit to the following additional measures as outlined in **Table 28** to assist in screening and further minimising visual impacts arising from the proposed works.

Table 28

Air Quality Impact Mitigation Measures

Air Quality Impact Mitigation Measures
Shoalhaven Starches commits to implementing the following recommendations to mitigate the dust impact of the proposed works associated with this Modification Application: • *A Dust Management Control Plan will need to be developed identifying dust sources and outlining the management and control of emissions and air quality impacts, during construction, from dust generated from earthworks, vehicular movements and other engineering activities*

9.4 RIPARIAN ISSUES

As outlined in Section 8.4 Shoalhaven Starches commit to the following additional measures as outlined in **Table 29** to assist minimising impacts arising from the proposed works on Abernethy's Creek.

Table 29

Riparian Re-vegetation

Riparian Re-vegetation Measures
Shoalhaven Starches commits to increasing the width of streambank re-vegetation along Abernethy's Creek from that which was approved under the SSEP approval. Shoalhaven Starches commits to re-vegetate all the area to the east of modified roadway extending from Bolong Road to the northern boundary of the site. This will result in an area with a minimum width of 18 metres at the northern boundary of the site and widening to 22 metres at the southern boundary of the site with Bolong Road.

9.5 NOISE CONTROL

As outlined in Section 8.2.5 Shoalhaven Starches commit to the following additional measures in **Table 30** to assist in minimising noise impacts arising from the proposed modification.

Table 30

Noise Impacts

Noise Control Recommendations
Shoalhaven Starches commits to the following recommendations made by Day Design in relation to this modification proposal: Following an assessment of the proposed modification, minor amendments to the approved noise control measures are required as detailed below. ***Construction of the Packing Plant Building*** The following recommendations, with regard to building construction, by Day Design are in keeping with the Project Approval and provide additional detail. *Walls* The external walls of the packing plant building should have a minimum weighted sound reduction index (R_w) 33. *Roof / Ceiling* The roof and ceiling of the building should have a minimum weighted sound reduction index (R_w) 33. *Openings and Container Loading Area* Acoustically untreated openings in the building should not exceed a total of 36 m^2 and be located in the south eastern façade, or south eastern end of the north-western or south-western facades only.

Noise Control Recommendations

Roller door openings in the south western façade of the building should remain closed when containers are not being loaded in this location.

External Doors

All external doors should be of minimum 44 mm thick, solid core timber construction in well-sealed frames.

Additional Mechanical Plant and Equipment

At the time of writing this report it is not known what, if any, significant noise producing mechanical plant or equipment may be located externally to the packing plant building.

Noise predictions assume there are five (5) silo motors each with a maximum sound power level (L_w) of 78 dBA, which will be acceptable without additional noise controls.

A final assessment should be carried out prior to the issue of a Construction Certificate once details of any external plant, if any, are known. Any items of externally located plant which exceed the allowable sound power level of 78 dBA may require additional acoustical treatment.

Day Design are confident that the level of noise emission from the proposal will, or can be controlled to, meet the acceptable noise limits at all receptor locations.

Container Area Noise Barriers

According to Day Design, the forklifts intended to be used will operate a sound pressure level that will exceed that envisaged by the original Project Approval. Two Hyster forklifts will be used in the container storage area to unload the train and move containers.

Day Design therefore recommend erecting sound barrier screens along the north-western, north eastern and south-western boundaries of the container area as follows:

- *Along the entire length of the north western boundary of the area and returning along the north eastern boundary to meet the packing plant building to a minimum height of 10 metres above the finished ground level of the container storage area; and*
- *Along the south western boundary of the site on the south western side of the site and to the south west of the rail spur line to a minimum height of 7.8 metres above the finished ground level of the container storage area;*
- *The south western barrier should overlap by a minimum 2 metres where it separates to accommodate the rail spur;*
- *Sound barriers may be constructed from, for example, masonry, shipping containers, 9 mm fibre cement sheet on both sides of 92 mm steel posts, a proprietary modular wall system with a minimum weighted sound reduction index (R_w) 20;*
- *All sound barriers should remain in place at all times;*
- *The locomotive should not be used to shunt rail cars whilst being loaded or unloaded;*

Noise Control Recommendations

- *All other recommendations forming the Project Approval, not superseded in this report should be implemented and maintained (as detailed in Section 7.1);*

Construction Noise

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

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

The construction noise management levels are likely to be met at each receptor location during general construction activity, with the exception of piling. During piling (if required) there is potential for the noise management levels to be exceeded at receptors 3 and 4, by up to 4 dB, on some occasions. According to Day Design this is not considered a significant exceedance during day time hours for short and sporadic duration.

However, a construction noise management plan should be provided in accordance with NSW EPA's *Interim Construction Noise Guideline* and to satisfy Condition 13 of the Project Approval.

10.0 CONCLUSION

The SSEP was approved in January 2009 by the then Minister for Planning under Part 3A of the Environmental Planning & Assessment Act. This application is made pursuant to Section 75W of the Environmental Planning & Assessment Act 1979 and seeks to modify the location of the approved Starch Dryer.

The Project Approval included the consolidation of all previous approvals (up to that time) into the one Project Approval.

The Project included the following alterations and additions:

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

The original justification for the SSEP was the need to meet the expected increase in demand for arising from the NSW Government's ethanol mandate which sought to increase the blending of ethanol in to the total volume of petrol sold in NSW to a 6% ethanol content. The reality however is the amount of ethanol that is being blended with petrol within NSW has to date fallen well short of this objective, largely due to on-going exemptions from the mandated ethanol content being granted to the major oil companies.

As a result the demand for ethanol is not meeting expectations raised by the NSW Government's ethanol mandate.

Shoalhaven Starches therefore must seek alternative markets for the products that would otherwise be directed into ethanol production. One such approach involves the diversion of liquid starch used in the ethanol production process to the production of dried starch, resulting in an increase the production of dried starch.

Currently the existing factory operations produce 280 shipping containers of finished dried product per week. Following the SSEP it is anticipated that there will be an increased production of an additional 168 shipping containers of dried product per week resulting in a total of 445 shipping containers produced each week.

This increase in dried starch production will require additional warehouse storage within the packing plant; although the approved container storage area will remain largely unchanged from that which was originally approved under the SSEP.

In addition Shoalhaven Starches wish to provide a range of packaging options not previously considered as part of the SSEP including:

- 12.5 kg bags;
- 25 kg bags;
- Bulk bag (1 tonne) for containerisation; and
- Direct into containers for the export market.

As a result of the above, and following further engineering design and investigation as to the types of packaging equipment that will need to be located within the proposed packing plant building, Shoalhaven Starches have been required to review the size of the Packing Plant on the site resulting in an increase in the size of its footprint of this building on the site.

Under the original SSEP it was proposed to provide a single rail spur line to service the new packing plant. The increase in the number of containers containing finished product that will now be required to level the site by rail will necessitate the provision of a second rail spur line in addition to the original approved rail line.

The second rail spur line will result in a significant reduction in crossings of Bolong Road by freight trains. A second spur line will enable trains to be spilt and parked on the subject site reducing the potential for rail crossings and subsequent disruptions to traffic flow along Railway Street.

The second spur line will also allow longer trains to service the site providing efficiency gains for production transportation for the site.

Shoalhaven Starches are also intending to use longer wagons on their trains that will be able to contain three containers as opposed to the current double container wagons. The increase in wagon size will provide additional efficiency gains in the transportation of product from the site.

The increase in wagon length will however require a larger radius arc in the design of the rail spur line as its traverses across the site to satisfy relevant rail safety design guidelines. A narrower radius arc as currently approved would be too tight for the intended wagon size that will be utilised which could result in the derailment of wagons using the site.

The increase in radius of the rail spur lines will have a flow on effect of pushing the access road that will extend from Bolong Road to service the site closer to Abernethy's Creek compared to that which was originally approved. Whilst the original road alignment was 30 metres from

Abernethy's Creek, detailed design has determined the modified alignment will extend from between 18 to 22 metres from the creek boundary of the site.

Following the relocation of Starches Dryer No. 5 (as part of Mod. 7), it is now also proposed to realign the bridge crossing that will serve the packing plant from the Shoalhaven Starches factory site.

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

- The Department of Planning and Infrastructure;
- The Environment Protection Authority;
- The Office of Environment & Heritage;
- The Department of Primary Industries (Water);
- Roads and Maritime Services;
- Office of the National Rail Safety Regulator (NSW);
- Transport NSW; and
- Shoalhaven City Council.

This Environmental Assessment has been prepared to address issues detailed in requirements issued by the Director-General of the Department of Planning and Infrastructure (**Annexure 1**).

The EA is supported by expert assessments including:

- Environmental Noise Impact assessment prepared by Day Design Pty Ltd.
- Air Quality (including Odours) prepared by Stephenson Environmental Management Australia (SEMA).
- Flooding Impact Assessment prepared by Webb McKeown & Associates.
- Riverbank stability assessment of Abernethy's Creek prepared by Coffey Geosciences.
- Preliminary Hazard Analysis (PHA) prepared by Pinnacle Risk Management Pty Ltd.
- Traffic Impact Assessment (TIA) prepared by ARC Traffic and Transport
- The EA also includes a Visual Impact Assessment of the proposed modification proposal. This visual impact assessment includes a photomontage of the modified proposal as well as the approved development to illustrate the visual impacts of the proposed modified proposal.

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 proposal will not involve any change in the amount

of raw products that will be utilised; nor will it involve any changes in the amount of waste waters that will need to be treated and disposed.

Following a comparison of the modified proposal to that originally approved having regard to the key issues originally identified associated with this Project, this Environmental Assessment concludes that the proposal is suitable for the site and this locality and consistent with the objects of the Environmental Planning & Assessment Act.

The Minister's approval of this proposed modification to Project Approval MP 06_0228 is sought.