

Modification Report

**Proposed Modification Application (Mod 26) to
MP06_0228 Shoalhaven Starches Expansion Project**

**Proposed additional grain storage and handling
facilities; proposed alterations and additions to waste
water treatment plant; and other works**

**Shoalhaven Starches
Bolong Road, Bomaderry**

**Prepared for
Shoalhaven Starches Pty Ltd
March 2026**



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Table of Revisions

Initial	Rev	Date	Details
SR	0	27/03/2026	Client Review
ST	1	27/03/2026	Issued for Review by DPHI.



1.0 EXECUTIVE SUMMARY

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

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

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

The Shoalhaven Starches Expansion Project sought to increase ethanol production at the Bomaderry plant in a staged manner from 126 million litres per year to 300 million litres per year. To accomplish the increase in ethanol production, this project required a series of plant upgrades and increase in throughput of raw materials, principally flour and grain. Following the Minister's determination Shoalhaven Starches have been implementing and commissioning works in accordance with this Project Approval.

Shoalhaven Starches now seek approval to modify their Project Approval for the Shoalhaven Starches Expansion Project to:

- Erect additional grain silos at the former Dairy Farmers factory to the east of the Shoalhaven Starches factory site and to construct associated grain handling facilities associated with this grain storage. These works will also necessitate an extension of an existing rock wall revetment along the banks of the Shoalhaven River.
- Undertake alterations and additions to the existing Wastewater Treatment Plant (WTP) located on the Shoalhaven Starches Environmental Farm located on the northern side of Bolong Road.
- Construction of nineteen (19) finished product silos in addition to those approved to be constructed on the northern Packing Plant to the main factory site on the southern side of Bolong Road.
- Construct a new rail maintenance building to be constructed at the eastern terminus of the recently approved Mod 25 rail line extension to the east of the former Pulp and Paper Mill factory site. It is also proposed to install provision for rail fuel storage adjacent to the existing rail line within the former Paper Mill site.
- Construct an Ethanol Maintenance building within the south-eastern part of the main factory site.
- Construct a Nitric Acid storage adjacent to existing cooling towers to the west of Abernethys Creek.



- Relocate the approved Phosphorus Oxychloride storage area to a location to the west of the recently constructed starch reaction tanks. This location provides improved operational and safety considerations. The relocation of the Phosphorus Oxychloride storage area will necessitate the relocation of the approved chemical storage area from this part of the site to an area adjacent to the DDGS Plant.
- The installation of three (3) wheat silos to the west of the former Dairy Farmers factory building will be 32m which remains below the height of the existing industrial complex.
- This Modification Proposal also seeks to modify Appendix 3 Mandatory Odour Controls to the Project Approval to enable the re-routing of the Palmer cooler discharge to the Boiler 5 and 6 stack.

This Modification Report has been prepared to address the above Modification Proposal. The Shoalhaven Starches Expansion Project was a ‘transitional Part 3A Project’ for the purposes of Schedule 6A of the Environmental Planning & Assessment Act 1979 (EP & A Act). As of the 1st March 2018 the transitional arrangements for former Part 3A projects have been discontinued. The discontinuation of the transitional arrangements for Part 3A projects and concept plans means that modifications are assessed through the State Significant Development (SSD) pathway. As such this Modification Application is made pursuant to Section 4.55(2) of the EP & A Act.

This Modification Report is supported by the following expert consideration:

- An Air Quality Impact Assessment (**Annexure A**) by GHD which includes the following findings:
 - Potential impacts associated with dust emissions during construction of the proposed modification were assessed by GHD. Construction activities were identified to primarily consist of demolition, installation of prefabricated structures and minor earthworks. The risk identified for all construction activities according to GHD was low or negligible risk for dust soiling, and negligible risk for human health and ecological impacts. Recommendations for dust management during construction have been provided by GHD to further reduce the risk of dust impacts from construction of the proposed modification.
 - A quantitative assessment utilising dispersion modelling was adopted to assess odour and air pollutant (including particulates, combustion pollutants and metals) emission during operation of the proposed modification. The results of this modelling predicted compliance with the odour criteria for the second highest quarter (2025–2026 Q1) and the average sampling data scenario.

Exceedances were predicted for the scenario using sampling data from the highest quarter (2024–2025 Q4) at six of residential receptors. Shoalhaven Starches is currently investigating the spike in Q4 2024–2025 quarterly odour testing, which includes additional odour sampling, to determine the cause.

A source contribution analysis was undertaken by GHD and recommendations have been provided to investigate potential management and mitigation options to reduce off-site odour impacts.



According to GHD Review a recent odour complaints concluded relatively few complaints have been received in recent years. Recent field ambient odour assessments further indicate that odour was not often detectable offsite, and on occasions where odour was detectable, it was characterized as either 'Very Weak' or 'Weak'. The odour surveys tend to support model findings of predicted odour concentrations within the NSW EPA criteria range.

An air pollutant emissions inventory was also prepared by GHD incorporating the proposed conveyor dust collector system, wheat silo vents, and starch and gluten storage silo baghouses, as well as updates to the stack parameters for the combined stack for no. 5 and 6 boilers. Compliance with the assessment criteria was predicted by GHD at all receptors for all pollutants

- A Site Hazard Analysis (**Annexure B**) prepared by Pinnacle Risk Management (PRM). PRM concludes that the risks associated with the plants and equipment at the Shoalhaven Starches Bomaderry site have been assessed and compared against the Department of Planning (DoP) risk criteria in this report. Based on the assessments in this report PRM indicate all the DoP risk criteria are satisfied.

PRM conclude societal risk, area cumulative risk, environmental risk and propagation risk is acceptable given the existing controls and results of the consequence modelling.

The primary reason for the low risk levels from the site's plants and equipment according to PRM is that significant levels of radiant heat from potential fires, overpressures from dust explosion vents and hydrogen sulphide releases from the biogas system are mostly contained on-site.

The following recommendations are made by PRM for this Modification Proposal:

1. *Ensure that all explosion vents (non-flameless as well as flameless) are directed to a safe location. They should not, for example, be directed to where people work or use walkways.*
 2. *Include in the HAZOP study the nitric acid tank, in particular, how the road tanker transfer system is cleared at the end of the tank filling operation and also the reliability of the scrubber. This is required given the potential to release acidic vapours and nitrogen oxides that can be harmful to personnel local to the tank.*
 3. *Ensure that fire water protection is available as per the requirements of AS2419, in particular, to the proposed equipment at the former Dairy Farmers site; and*
 4. *The design details for the proposed silos and associated equipment items, e.g. the silos' design pressure and explosion vents details, are not currently available. Whilst the corresponding risks are not expected to be intolerable, the modelling of potential dust explosions is to be performed once these design details are known.*
- A Noise and Vibration Impact Assessment (**Annexure C**) by GHD that concludes:



A construction noise assessment was undertaken to determine potential for increased noise levels at sensitive receivers. Construction noise management levels were established using background noise levels which were established using the conducted background noise monitoring. Four construction scenarios were modelled to predict noise levels at representative sensitive receivers. The predicted noise levels indicate that the noise management levels for all construction scenarios are exceeded at several sensitive receivers. As such, mitigation measures have been recommended in Section 8.1.

Noise sources associated with the operation of the proposed modification were identified and modelled in the site wide noise model developed by GHD as part of the noise pollution reduction program. The predicted noise levels from the proposed modification were assessed against design noise goals and shows compliance with the design noise goals at all sensitive receivers.

It is noted that reduced sound power levels were adopted for equipment which was found to contribute significantly to the overall noise levels of the modification. To ensure noise levels of the proposed modification achieve the design noise goals, the further detailed design of the modification must implement mitigation measures to reduce noise emission to achieve the sound power levels presented in Section 6.1.

The analysis for annoying noise characteristics was undertaken and found that the proposed modification does not contain tonal or low frequency noise characteristics.

Additionally, cumulative noise levels of the following scenarios have been predicted:

- Current operations including the proposed modification and the rail line
- Current operations including all approved but not yet constructed modifications, the proposed modification and the rail line.

Predicted noise levels were analysed for annoying noise characteristics and found low frequency noise to be present at all sensitive receivers. The noise levels were assessed against the EPL noise limits, which shows exceedances at all sensitive receivers from existing noise sources. However, for acoustic compliance data, the bi annual compliance data should be referred to.

Nonetheless, the proposed modification is anticipated to have no contribution to the overall noise levels from the site as the predicted noise levels are below the design noise goals.

Recommended construction mitigation measures are provided in Section 8.1 and recommendations for further detailed design of the proposed modification to minimise operational noise are provided in Section 8.2.

- A “Feasibility Assessment for irrigation of treated wastewater” carried out by Earthwise Environmental (EE). As part of Mod 26, Shoalhaven Starches propose to upgrade the wastewater treatment plant to increase treatment capacity, improve water recycling and enhance biogas recovery. Wastewater inflows to the WTP are



forecast to increase from 11.5 ML/d to 15.6 ML/d. With expanded MBR/RO capacity, factory re-use is anticipated to rise from 7.0 ML/d to 13.0 ML/d, reducing treated wastewater irrigation from 3.1 – 3.4 ML/day currently to 2.6 ML/day post Mod 26. While volumes are expected to decrease, the proportion of RO retentate in the irrigation water will increase, elevating nutrient and salinity concentrations. These changes will influence irrigation practices at the Shoalhaven Starches Environmental Farm with less water but more concentrated nutrient and salt loads requiring careful management. EE make a raft of recommendations to address site limitations and risks identified by their assessment with respect to the on-going spray irrigation of treated wastewaters onto the Shoalhaven Starches Environmental Farm following this Modification Proposal.

- A Flood Assessment prepared (**Annexure D**) by WMAwater that concludes works associated with the Modification Proposal will increase flood levels. In summary the maximum cumulative increases in flood level since 1990 are shown below. However, in all three events most areas only experience a maximum increase of up to 0.1m on land outside of that owned by Shoalhaven Starches.
 - 5% AEP – up to 0.05m
 - 1% AEP – up to 0.1m
 - PMF – up to 0.2m (Figure 12).

The maximum incremental increases in flood level since November 2025 are shown below. However, the increases are predominantly within land owned by Shoalhaven Starches.

- 5% AEP – up to 0.01m ,
- 1% AEP – up to 0.01m ,
- PMF – up to 0.05m .

WMAwater indicate there are no viable means of reducing the increase in peak flood levels resulting from these works. One of the most beneficial and practical means of reducing flood damages to existing buildings and risk to life, according to WMAwater is to improve the awareness and preparedness of the occupants or employees. There are several ways of undertaking such a scheme and these are outlined in the Flood Compliance Assessment and most require involvement by Council and / or the SES. Funding a scheme would assist in improving the community's flood awareness and consequently reducing flood damages and risk to life for all floodplain occupiers.

- A Traffic Assessment (**Annexure E**) prepared by ARC Traffic & Transport (ARC) that concludes:
 - Access to the individual Shoalhaven Starches sites – both the during construction and operation of the MOD 26 infrastructure – will be provided via intersections that have all been appropriately designed to accommodate the maximum sized vehicles entering/departing each site.
 - Once operational, the MOD 26 infrastructure is not anticipated to generate any additional trips other than occasional maintenance vehicles and the like.
 - While MOD 26 will not increase operational staff, the loss of a small number of parking spaces to accommodate the MOD 26 infrastructure will not affect the



ability of existing and proposed off-street parking areas to easily accommodate even super-peak staff (operational and construction) parking demand.

- The construction of the MOD 26 infrastructure will generate up to 22 vehicle trips in a peak hour. SIDRA analysis indicates that these additional trips would have no impact on the operation of key local intersections or broader road network, noting further that these would be temporary trips during construction only.
- Significant space for construction staff parking and truck loading/unloading and material stockpiling is available within each of the Shoalhaven Starches sites accommodating the MOD 26 infrastructure; no construction staff parking or materials handling would occur in Bolong Road.
- A Draft CTMP has been prepared to ensure that the construction of the MOD 26 infrastructure can be undertaken safely and efficiently without impacting the local road network. The CTMP will be finalised further to consideration of any future Conditions of Consent in a Modification approval and implemented prior to any construction work commencing and then for the duration of the construction works.

In summary, Arc Traffic + Transport has determined that the construction and operation of the MOD 26 infrastructure is supportable further to access, traffic and parking considerations.

- An Aboriginal Cultural Heritage Assessment (**Annexure F**) prepared by Apex Archaeology which concluded the proposal would not impact on any Aboriginal heritage values.
- A Heritage Impact Assessment (**Annexure G**) prepared by Apex Archaeology which identifies the proposed works are not considered likely to impact on the heritage values of any items within or adjacent to the study areas. No further archaeological or heritage assessment is required for the project.
- The Modification Proposal will impact an area containing mapped as having biodiversity values that are not biodiversity certified by the NSW Biodiversity Values Mapping (BVM). The BVM indicates that the mapped area contains threatened species or communities with potential for serious and irreversible impacts' (SAIL). Given the proposed development may have impacts on land included on the BVM, the Biodiversity Offsets Scheme is triggered and the preparation of a Biodiversity Development Assessment Report is required. The Modification Application is supported by a streamlined BDAR prepared by Ecoplaning (**Annexure H**).

As all impacts to biodiversity cannot be avoided by the proposal, Ecoplaning propose mitigation measures to assist with ensuring that direct and indirect impacts are mitigated to the fullest extent practical including.

- Preparation of a Construction Environmental Management Plan including:
 - Formulation of Pre-clearance protocols
 - Site management and construction controls

In addition to the above a biodiversity offset requirement for residual impacts of a proposed development must be calculated in accordance with Section 10.1 and Section 10.2 of the Biodiversity Assessment Method (BAM). The streamlined BDAR prepared by Ecoplanning outlines the credit requirements for the proposed development to achieve the 'no net loss standard' established by the BAM.

- An Aquatic Ecological Assessment (**Annexure I**) prepared by Lesryk Environmental includes the following conclusions:
 - The field investigation and desktop review undertaken for this assessment provided a clear characterisation of the estuarine habitats present within, and adjacent to, the proposed works. Field investigations confirmed the presence of sandy and silty substrates, scattered cobbles and pebbles, accumulations of woody debris, isolated boulders, small patches of *Avicennia marina* (Grey Mangrove), and the existing rock revetment wall. No seagrass beds, saltmarsh, or other mapped sensitive estuarine habitats were detected.
 - Comparison with government spatial datasets revealed a discrepancy between previously mapped estuarine macrophytes and observations made in the field investigation. While Fisheries NSW and SEED portal mapping indicated the historical presence of seagrasses (e.g., *Zostera* spp.) near the subject site, these features were not detected during tow camera transects or SCUBA inspections. This indicates that available mapping in the locality is outdated or inaccurate, and that seagrass meadows are no longer present near the proposed activity.
 - The works to extend the existing revetment wall are not considered to have a serious and irreversible impact to key fish habitats or fisheries resources as these were not observed to be present in the areas investigated.
 - While the Shoalhaven River is classified more broadly as Class 1 – Major key fish habitat under the Policy and guidelines for fish habitat conservation and management – Update 2013, assessment of the observed habitats against the criteria set out in the Guidelines determined that all aquatic habitats within the study area conform to Type 2 KFH. These habitats provide foraging opportunities, shelter, and structural complexity for fish and other aquatic biota, but do not meet the criteria for Type 1 KFH, which include critical habitats such as seagrass meadows, saltmarsh, and recognised spawning or nurse grounds. This means that the works footprint, and adjacent areas potentially subject to indirect impact, contain estuarine habitats of moderate ecological importance and that potential impacts can be managed effectively through the application of appropriate mitigation and management measures during construction. To ensure that residual impacts are minimised and ecological values maintained, a suite of recommended bio-engineered solutions and habitat management measures are outlined in section 7 of this report.
 - Based on the outcomes of the field survey, it is not considered that the works within the section of the Shoalhaven River that are to be impacted by the proposed activity will be inconsistent with the objectives of the FM Act. The works will not affect fish stocks, key fish habitats, threatened species or marine vegetation.



- An Integrated Water Cycle Management Strategy (**Annexure J**) prepared by Allen Price which concludes
 - The Qualitative Stormwater Quality Assessment demonstrates that operational activity of the minor works to be undertaken within the existing managed area and operational activity of the WWTP, Rail Maintenance Building, the Grain Handling Facility (Unloader, Silos, LV Substation and Weighbridge) and Conveyor are unlikely to increase stormwater pollutant export from the site.
 - Stormwater pollutants generated from operational activity of the Northern Carpark (including future Mod 31) can be mitigated by a modifying the existing retention pond with a conventional buffer strip and detention pond.
 - Potential short term stormwater quality impacts from the construction works can be mitigated by the implementation of erosion and sediment control plan and staged earthworks such that the performance objectives and criteria in Ch G2 can be satisfied.
 - The proposal is considered adequate from a stormwater management perspective and is recommended to be supported by the NSW Department of Planning, Housing and Infrastructure.
- A Geotechnical, Contamination and Acid Sulphate Soils assessment (**Annexure K**) prepared by GHD which concludes:

Geotechnical

Riverbank and creek stability is a critical consideration for several sites associated with this Modification Proposal. GHD indicate the proposed rock revetment wall along a section of the Shoalhaven River will meet geotechnical stability criteria under both long-term and short-term conditions, improving riverbank resilience and reducing erosion risks. This design was developed using existing geotechnical and survey data ((Coffey, 2017), KMK Geotechnics (2024) and Allen Price (2025)). Two representative cross-sections were analysed under varying groundwater conditions and seismic loading. The load from the proposed conveyor belt structure was not considered by GHD in the analysis, as they anticipate the conveyor will be supported on piles, transferring loads directly to deeper strata rather than the revetment slope. GHD indicate the concept design satisfies minimum factor of safety requirements ($FoS \geq 1.5$ for long-term and $FoS \geq 1.3$ for short-term conditions). Rock sizing, hydraulic performance, and bio-engineering treatments were not addressed and should be confirmed during detailed design.

GHD indicate the grain conveyor and grain storage & handling facility present elevated risk due to proximity to the Shoalhaven Riverbank and the scale of proposed structures. The grain conveyor, potentially located within 1m of the riverbank crest, spans variable ground conditions and lies adjacent to areas of documented instability, including historical failures and ongoing erosion. The grain storage and handling facility positioned 30 to 65 m from the riverbank, will impose significant loads requiring deep foundations.



GHD recommend riverbank stability assessments should be reviewed and updated for the grain conveyor and grain storage & handling facility sites to account for proposed loads and current conditions. These measures will ensure that detailed design addresses both structural integrity and environmental stability.

Dam Safety

GHD undertook a review of dam safety for existing and proposed WWTP ponds which revealed that historical stability issues have occurred primarily due to dispersive soils and high water levels, leading to batter instability and the need for emergency sheet piling along critical embankments.

While these measures have mitigated immediate risks, observations of slumping, surface erosion and possible dispersive erosion (tunnelling) highlight the need for ongoing monitoring and maintenance.

GHD indicate the Modification Proposal will also require assessment of these risks, in order to assess both performance and regulatory compliance requirements for Dams Safety NSW (DSNSW) under the Dam Safety Act 2015 and Dam Safety Regulation 2019.

While none of the existing ponds are classified as 'Declared Dams' under DSNSW, GHD indicate the proposed 150 ML treated effluent storage pond and conversion of Ponds 1 to 3 into an 80 ML anaerobic digester introduce additional dam safety considerations that will require a Consequence Category Assessment (CCA) under DSNSW regulations. The scale and function of the new and upgraded structures suggests that a Desktop Consequence Category Assessment (DCCA), which constitutes a desktop based, risk focused assessment should be conducted in the first instance, with the completion of a formal CCA assessment, should this be indicated by the results of the DCCA.

Risks such as overtopping, internal erosion, seepage, and rapid drawdown remain relevant and GHD indicate should be addressed through appropriate design measures, including spillway provision, drainage systems, and dispersive soil erosion protection.

GHD also indicate that monitoring programs should include visual inspections, piezometer readings, and inclinometer checks, supported by a Dam Safety Operation Manual and Emergency Response Procedures.

Contamination

Based on investigation results, potential for contamination was identified by GHD in 15 areas of environmental concern (AECs) potentially impacting soil, surface water and/or groundwater. The occurrence of contamination (if present) is expected to be localised. The likelihood for contamination to exist within the identified AECs was assessed as very low to high. Potential source-pathway-receptor (SPR) linkages were assessed and could be complete, if contamination were present, for:

- Human receptors:

- Construction workers/visitors that have direct contact with soil and groundwater may be exposed to contamination via dust and vapours (via inhalation) generated during excavation or installation of piles.
- Ecological receptors:
 - During construction, in the vicinity of Shoalhaven River and Abernethys Creek, potential impacts to aquatic species is possible from the mobilisation of contaminants from soil and / or groundwater.
 - Additional potential for exposure to soil and perched groundwater may occur during the construction phase where hardstand areas may be removed, or soil exposed in resulting excavations, in areas outside of the main plant.

Based on the results of this PSI for contamination, GHD recommend that a Targeted Site Investigation (TSI) is undertaken for AECs where the likelihood of contamination to exist is assessed as moderate to high and high, to assess if SPR linkages are complete. AECs where the likelihood of contamination was assessed as moderate, low to moderate, low and very low can be managed at the time of construction should contamination be encountered.

GHD also recommend that an Asbestos Management Plan (AMP) for AEC 2, however would also be applicable to manage other areas where asbestos is encountered during construction as an unexpected find. The AMP should be developed in line with the current NSW WHS Act (2011) and Regulation (2025), NEPC (2013), WA DoH (2021), and relevant Codes of Practice (SafeWork NSW, 2014; 2019a; 2019b) as a means to comply with asbestos regulation and prevent (so far as is reasonably practicable) or minimise exposure to hazards including airborne asbestos.

GHD recommended that a Construction Environmental Management Plan (CEMP) be prepared to manage the potential contaminant exposure risks during construction activities, and manage potential unexpected finds (e.g. buried waste, demolition waste, ACM, etc.) that could be encountered. Therefore, the CEMP should also include an Unexpected Finds Protocol (UFP). A site-specific Work Health Safety and Environment (WHSE) plan should be prepared, to ensure appropriate safety and workplace hygiene practices are implemented to minimise potential risks from exposure to contamination. The WHSE plan must address all relevant regulatory requirements and as a minimum, should consider incorporating the relevant practices set out in CRC Care (2018) National Remediation Framework: Guideline on health and safety, Version 0.1: August 2018. The CEMP should also make reference to the AMP.

GHD also recommend that site workers should be advised of the potential contamination risks at the sites and have appropriate personal protective equipment (PPE) available should contamination be encountered and have also read and understood management documents that apply to the construction sites.

Acid Sulphate Soil (ASS)



Based on the results of previous investigations, GHD indicate that ASS may be encountered at variable depths within the proposed development areas where deep footing systems such as bored or Continuous Flight Auger (CFA) piles or trenching/excavations deeper than 1 m are required. Soft dark grey to black clays and loose grey sands were encountered at test locations within or in the vicinity of the development areas, particularly in the main plant area and at the WWTP, which are indicative of coastal ASS. Limited ASS investigations have been carried out to assess the presence of ASS.

Therefore, GHD recommend that an Acid Sulfate Soil Management Plan (ASSMP) be developed and actioned where excavations associated with the proposed development will disturb ASS and/or require dewatering which could result in the lowering of the water table. It is understood that ASSMPs already exist for some areas of the Main Plant and WWTP. Existing ASSMPs should be reviewed and updated to reflect changes in ground disturbance activities, quantities and guidelines. Further investigations could be considered to assess the absence or presence of ASS to better inform ASS management options during soil disturbance.

Salinity Potential

GHD indicate environmental monitoring results between 2012 and 2024 indicate soils in paddocks at the WWTP range from moderately saline to extremely saline, where highest salinity is recorded in the upper 0.1 m of the soil profile. Electrical conductivity (EC) concentrations were variable across the monitoring period. Groundwater EC results indicate moderate salinity but are stable and remained consistent with long term averages. There were no visual signs of salt accumulation or shift towards salt tolerant species observed during fieldwork. Based on the results of this preliminary salinity assessment, site soils may have saline concentrations which could adversely affect very sensitive crops. GHD recommend that:

- Soil sampling be undertaken to assess the salinity potential within the eastern portion of the site.
- The effects of salinity on foundations be assessed as part of future detailed geotechnical investigations in accordance with AS 2159 – 2009 Piling – Design and Installation.

Riparian Corridor

Manildra was previously granted Project Approval (MP06_0228, dated 28 January 2009) by the Minister of Planning for the proposed Shoalhaven Starches Expansion project, which permitted development within the riparian corridor.

Based on review of the *Guidelines for Controlled Activities on Waterfront Land* (2018), some of the proposed development areas occur within the riparian corridor. The proposed development sites, (with the exception of the nitric acid store), occur within areas that have previously been developed as part of the Shoalhaven Starches Plant. Based on the location of the proposed developments, vegetation removal, other than grass cover, is not expected. Given the prior industrial development and limited vegetation removal required,



GHD consider the Modification Proposal is consistent with previous developments that have occurred at the Main Plant and WWTP.

Surface & Groundwater Impacts

GHD have also undertaken a review of potential impacts to surface water and groundwater with respect to the proposed development was undertaken with respect to *NSW Aquifer Interference Policy 2018*.

- The Modification Application is also supported by a Green House Gas (GHG) Emissions Assessment prepared by GHD which concludes that Scope 1 and 2 emissions from the construction of Modification Proposal are estimated to be 651 tCO₂-e, which represents less than 0.001% of NSW and 0.006% of NSW Industrial sector's annual emissions, and therefore negligible.

Annual net scope 1 and 2 emissions during operations after the Modification Proposal is implemented are estimated to result in negative net emissions once operational, due to the displacement of natural gas in the boilers with the additional biogas being produced and captured at the expanded wastewater treatment facility. As the grid decarbonises the emissions from electricity will fall each year and therefore the carbon savings from the Modification Proposal would likely improve further over time, at this level of production.

Therefore, the long term GHG impact of the Modification Proposal is helping to support the NSW government's ambitions for emissions reduction in NSW and limiting the impact of climate change in the Illawarra-Shoalhaven region.



2.0 INTRODUCTION

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

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

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

As the Department are aware the Manildra Group of Companies acquired the former Australian Paper Mill (APM) site located at 340 Bolong Road and which is located further to the east of the Shoalhaven Starches factory operations. Indeed, on the 27 April 2018 the Minister for Planning approved the use of the former Paper Mill site in conjunction with the Shoalhaven Starches site under Mod 14 for the purposes of providing storage for the approved factory operations and to accommodate the storage of plant and materials used in the construction of various construction projects that take place at the factory site.

Shoalhaven Starches now seek approval to modify their Project Approval for the Shoalhaven Starches Expansion Project to:

- Erect additional grain silos at the former Dairy Farmers factory to the east of the Shoalhaven Starches factory site and to construct associated grain handling facilities associated with this grain storage. These works will also necessitate an extension of an existing rock wall revetment along the banks of the Shoalhaven River.
- Undertake alterations and additions to the existing Wastewater Treatment Plant (WTP) located on the Shoalhaven Starches Environmental Farm located on the northern side of Bolong Road.
- Construction of nineteen (19) finished product silos in addition to those approved to be constructed on the northern Packing Plant to the main factory site on the southern side of Bolong Road.
- Construct a new rail maintenance building to be constructed at the eastern terminus of the recently approved Mod 25 rail line extension to the east of the former Pulp and Paper Mill factory site. It is also proposed to install provision for rail fuel storage adjacent to the existing rail line within the former Paper Mill site.
- Construct an Ethanol Maintenance building within the south-eastern part of the main factory site.



- Construct a Nitric Acid storage adjacent to existing cooling towers to the west of Abernethys Creek.
- Relocate the approved Phosphorus Oxychloride storage area to a location to the west of the recently constructed starch reaction tanks. The relocation of the Phosphorus Oxychloride storage area will necessitate the relocation of the approved chemical storage area from this part of the site to an area adjacent to the DDGS Plant.
- This Modification Proposal also seeks to modify Appendix 3 Mandatory Odour Controls to the Project Approval to enable the re-routing of the Palmer cooler discharge to the Boiler 5 and 6 stack.

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

The Modification Application is made pursuant to Section 4.55(2) of the EP & A Act. This Modification Report has been prepared in support of the Modification Application.

The Modification Application is supported by plans supplied by Shoalhaven Starches.

This Modification Application is supported by the following expert assessments:

- An Air Quality Assessment prepared by GHD Pty Ltd (**Annexure A**)
- A Site Hazard Analysis prepared by Pinnacle Risk Management (**Annexure B**)
- An Environmental Noise Impact Assessment by GHD Pty Ltd (**Annexure C**)
- A Flood Compliance Report prepared by WMAwater (**Annexure D**) .
- A Traffic Impact Study prepared by Anton Reisch Consulting (**Annexure E**) .
- An Aboriginal Due Diligence Assessment prepared by Apex Archaeology (**Annexure F**)
- A Heritage Impact Statement prepared by Apex Archaeology (**Annexure G**)
- A Biodiversity Development Assessment Report carried out by Ecoplaning Pty Ltd) (**Annexure H**)
- An Aquatic Assessment prepared by Lesryk Environmental (**Annexure I**)
- An Integrated Water Cycle Management Strategy prepared by Allen Price (**Annexure J**)
- A Geotechnical, Contamination and Acid Sulphate Soils Assessment prepared by GHD (**Annexure K**)



- A Feasibility Assessment of Wastewater Irrigation and Wastewater Management Plan prepared by Earthwise Environmental (**Annexure L**)
- Greenhouse Gas Emissions Assessment prepared by GHD (**Annexure M**)
- Clause 4.6 Variation Request prepared by Allen Price (**Annexure N**)

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

3.0 SITE AND SURROUNDS

The Shoalhaven Starches factory complex is situated upon various allotments of land along Bolong Road, Bomaderry, within the Shoalhaven Local Government Area.

The Shoalhaven Starches factory site is located on the southern side of Bolong Road on the northern bank of the Shoalhaven River with some operations located on the northern side of Bolong Road. The Shoalhaven Starches factory site (excluding the former Dairy Farmers and former Australian Paper Mill sites) has an area of approximately 12.5 hectares. Components of this Modification Proposal comprising a maintenance workshop and the feed to the existing rain storage within the existing factory site will be located within the factory site.

Manildra also acquired the former Dairy Farmers factory located at 220 Bolong Road (Lot 143 DP 1069758); as well as the former Australian Paper Mill located at 340 Bolong Road (Lot A DP 384559 & Lot 102 DP 1283484). This Modification Proposal primarily involves works to be carried out on the former Dairy Farmers Factory site. The proposed grain silos and grain handling facilities and other associated works will be located on this site.

Shoalhaven Starches also operate a rail spur line that is situated along the northern bank of the Shoalhaven River. For the purposes of this Modification Proposal, this rail spur line is situated within Lot 1 DP 385145. This Modification Proposal will also involve works associated with a conveyor and services gantry that will be located to the south of the existing rail line, and which will connect the proposed grain silos and handling facilities to the Shoalhaven Starches factory site.

All the lands associated with this Modification Application are included in the Project Approval MP 06_0228 (as amended) (Mod 16).

Figure 1 is a site locality plan depicting the location of the lands associated with this Modification Application.

Figure 2 is an aerial image of the location of rain silos and handling facilities within the former Dairy farmers factory site.

The lands associated with this Modification Proposal are all zoned E4 (General Industrial) zone under the provisions of Shoalhaven Local Environmental Plan 2014 (SLEP 2014).

The town of Bomaderry is located just over 1.5 km (approx.) to the west of the former Dairy farmers factory site, and the Nowra urban area is situated 3.0 km to the south-west of the site. The "Riverview Road" area of the Nowra Township is situated approximately 2.0 km to the south-east of the former APM site across the Shoalhaven River.

The village of Terara is situated approximately 1.2 kilometres to the south of the former Dairy Farmers site, across the Shoalhaven River. Burruga (Pig) Island is situated between the factory site and the village of Terara and is currently used for dairy cattle grazing.



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

The state railway terminates at Bomaderry with a separate, privately owned spur line to the factory site and which extends up to the western boundary of the former APM site. The proposed conveyor and services gantry will be partly located within the land associated with this rail spur line.

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

Both the Shoalhaven Starches factory and former Dairy Farmers sites have direct road frontage to Bolong Road to the north. The Shoalhaven River flows along the southern boundary of both sites.

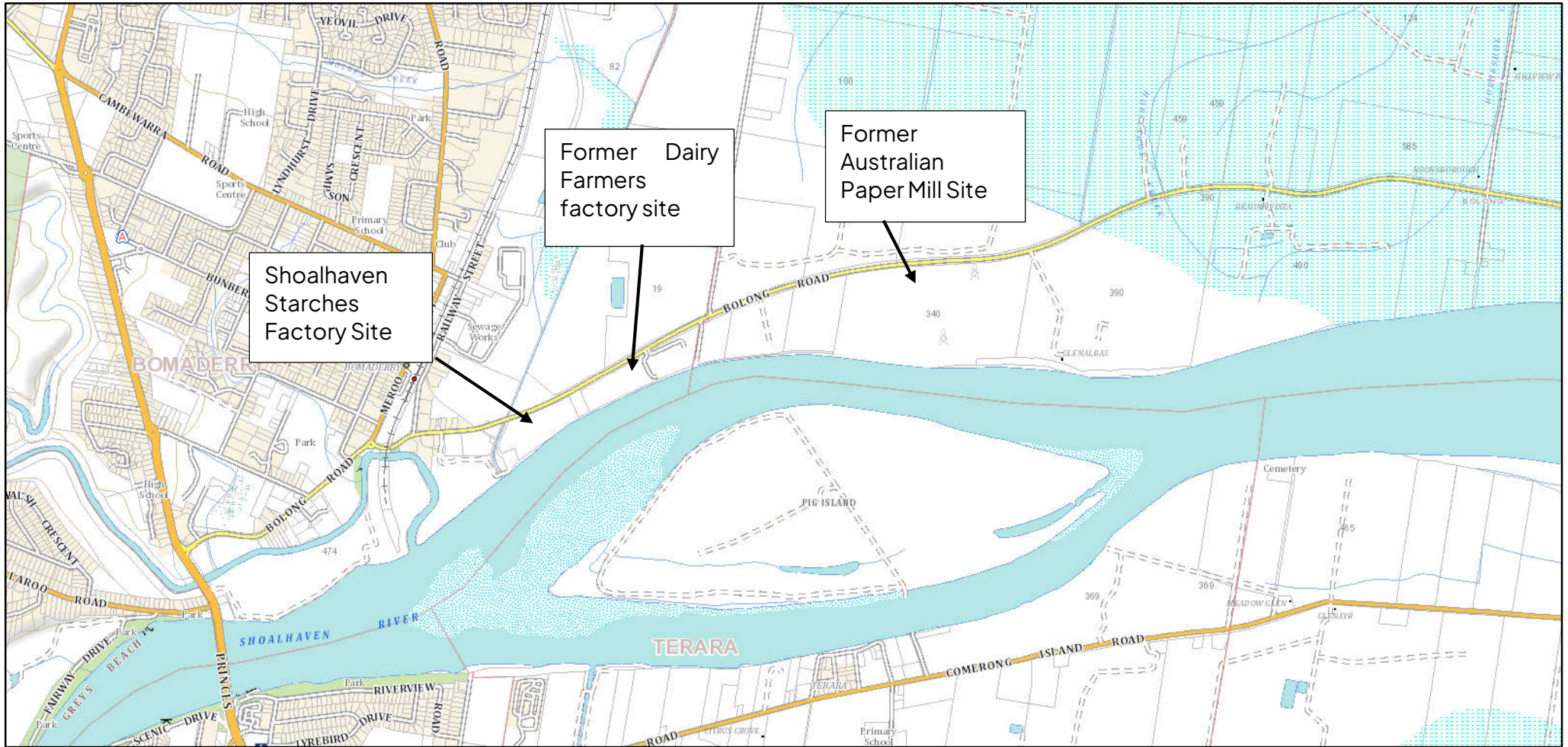


Figure 1: Site Locality Plan



Figure 2: Aerial Image of location of proposed works within the Shoalhaven Starches factory site and former Dairy Farmers Factory Site

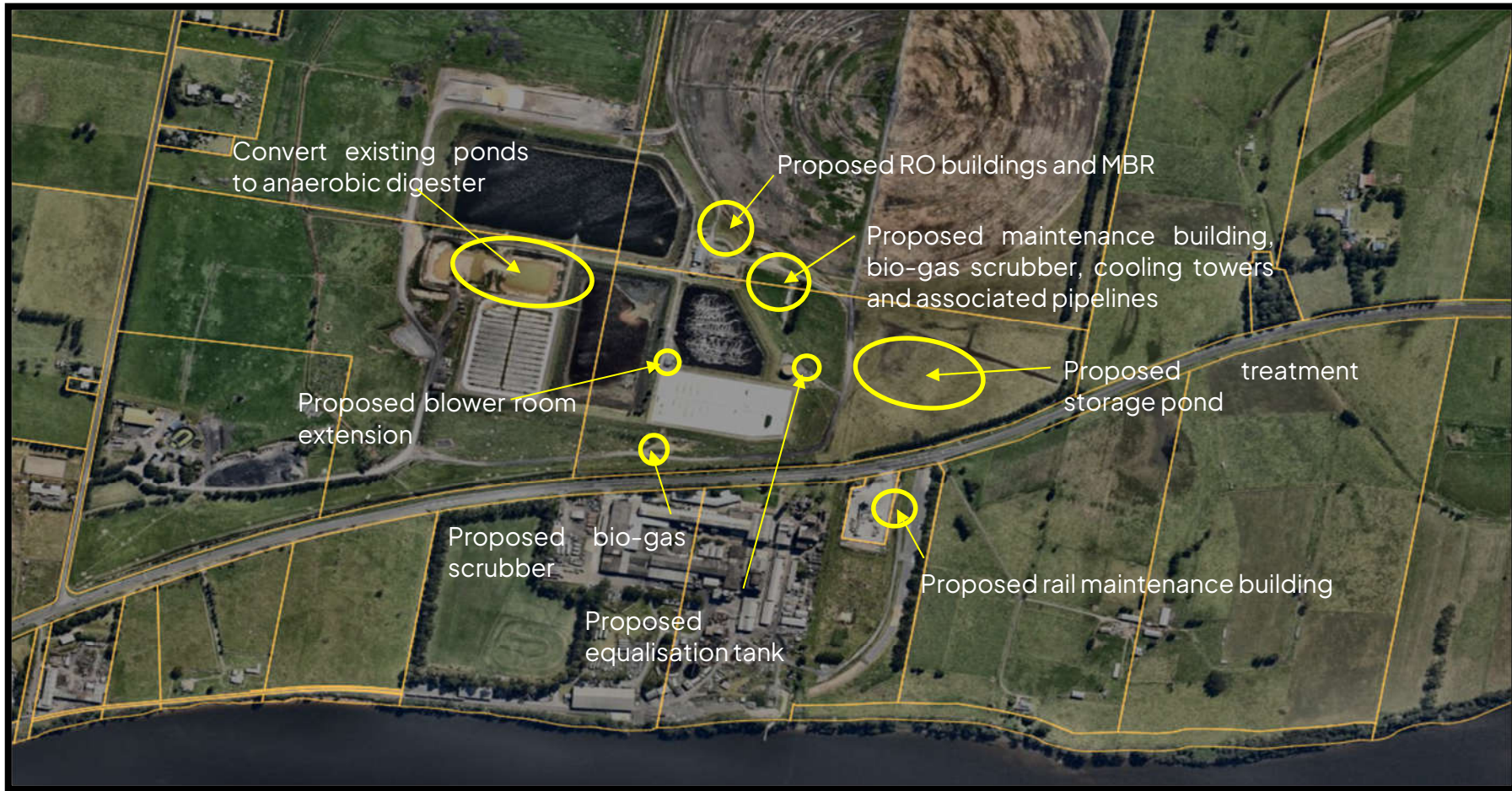


Figure 3: Aerial image of location of proposed works associated with Wastewater Treatment Plant



4.0 BACKGROUND

4.1 PRODUCTION PROCESSES

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

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

This Modification Application seeks approval to construct additional grain storage and handling facilities within the former Dairy farmers factory site.

The Company has previously received approval from the Minister for Planning for the erection of flour mills on site to enable the milling of part of the Company's flour requirements to be processed directly on the site. The remainder of the Company's flour requirements continue to be sourced from the Company's off-site flour mills.

Flour is transferred via storage to the "wet end" of the plant where fresh water is added. The subsequent mixing and separation process produces starch and gluten. The gluten is dried to enable it to be packaged and distributed as a high protein food additive for human consumption. This product is then taken from the site after packaging for both local and export markets.

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

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

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

Ethanol production results in some liquid and solid by-products, which are processed through the stillage recovery process plant (which was approved as part of PRP No. 7 in



2005). The solids in the stillage are recovered as Dried Distillers Grains and Syrup (DDGS), dried and sold as a high protein cattle feed with the remaining water used for irrigation.

The wastewater resulting from the ethanol production is treated in the wastewater treatment plant located on the northern side of Bolong Road and is re-used in the Starch Plant and the surplus is irrigated onto Shoalhaven Starches Environmental Farm to the north of Bolong Road. This farmland is used for fodder crops, pasture and cattle grazing. Boilers are used to produce steam which is used for a multitude of purposes throughout the factory site wherever product is dried, evaporated or heated.

4.2 RECENT DEVELOPMENT AND APPROVAL HISTORY

4.2.1 PROJECT APPROVAL MP 06_0228

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

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

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

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

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

As outlined in previous modifications the expected increase in demand for ethanol to meet the demand arising from the NSW Government's mandate to increase the blending of ethanol in the total volume of petrol sold in NSW has however not occurred. This is due largely from a failure of the mandate to be imposed on petroleum suppliers. As a result, Shoalhaven Starches have been investigating alternative markets for products used in the manufacture of ethanol and Shoalhaven Starches now propose to undertake further modifications to the Shoalhaven Starches Expansion Project Approval (MP06_0228) as listed below. Allen Price Pty Ltd has prepared this Modification Report on behalf of Shoalhaven Starches Pty Ltd for the following modifications.

Under Mod 16 Shoalhaven Starches obtained approval to utilise grain, that was approved to directly feed the fermentation process in the ethanol production process, to instead



increase the amount of flour that was produced on site (with the installation of an additional Flour Mill) to in effect increase starch and gluten production.

In addition, under Mod 16 Shoalhaven Starches obtained approval for the construction of a new industrial building adjoining the recently constructed Starch Dryer No. 5 building to the west of Abernethy's Creek. This new industrial building will contain:

- The construction of a Specialty Product Building within which a range of modified gluten products for the food industry; and modified starches for both paper manufacturing as well as food production.
- The resultant increase in starch and gluten production would require the conversion of two existing Gluten Dryers (Nos. 1 and 2) into starch production. Mod 16 therefore included the construction of a new Gluten Dryer (D8), to replace the capacity lost by the conversion of Dryers Nos. 1 and 2 to starch.

The footprint of the GD8 building was subsequently increased under Mod 17. The increase in the footprint of the GD8 building under Mod 17 provided for the reorientation of the dryer to provide operational efficiencies and to enable the installation of a Wet End Processing Plant within the building.

Shoalhaven Starches obtained modification approval for Mod 18 to enable the production of 120 ML per annum of hand sanitizer grade alcohol, out of the overall 300 ML per annum approved production limit imposed by Project Approval MP 06_0228. Mod 18 follows a request by the Federal Government's Department of Industry, Sciences and Energy to produce more hand sanitizer alcohol in response to the Coronavirus COVID 19 crisis. Mod 18 will not involve production increasing above the 300 ML per annum limit imposed by MP 06_0228.

In addition, Shoalhaven Starches obtained modification approval for Mod 19 that enabled a further increase in the proportion of 'beverage' grade ethanol that is able to be produced on the site. Mod 19 will enable increased flexibility in terms of the range of types of ethanol produced at the site (i.e. between fuel, industrial, pharmaceutical and beverage grade ethanol) to meet market demands. Mod 19 will enable an increase in capacity of the plant to produce an additional 100 ML per year of beverage grade ethanol. Mod 19 will **not** however involve an increase in the overall ethanol production at the site above the current approved 300 ML per year.

In addition to the above, Shoalhaven Starch have also been investigating alternative starch and gluten products and most notably with the introduction of the Specialised Product Building under Mods 16 and 21.

In addition, a further critical component of the SSEP was the introduction of a WWTP. that would treat the increased volume of wastewater arising from the expansion of site operations proposed under the SSEP. The wastewater treatment process was a mandatory odour control as part of the SSEP which has significantly reduced odours from the premises. Under the SSEP it was proposed that waste waters would be treated



sequentially through anaerobic and aerobic digestion systems located and incorporated within one of the existing waste water storage ponds to fully treat all organic material.

The waste water treatment process envisaged the treatment of in the order of 9.6 ML/d of wastewaters; with 7.1 ML/d treated to a standard that it was able to be recovered for re-use in the factory processes.

The waste water treatment process under the SSEP introduced Anaerobic digestion, a biological process conducted in the absence of oxygen. Anaerobic digestion (or fermentation) of organic matter is carried out by a special mixed group of anaerobic microorganisms (bacteria). During anaerobic treatment, these microorganisms utilise the organic matter contained in the wastewater as a source of food and energy. As a result, microorganisms essentially convert organic matter to biogas containing methane (65%). Under the SSEP this biogas was able to be used as an energy source for the Shoalhaven Starches operations. Under the existing SSEP the existing waste water treatment plant produces in the order of 1,700 GJ/d of biogas which is supplied to power (in part) the existing gas fired boilers at the factory site.

The SSEP approval also included approval to establish a new Packing Plant, container loading area and a rail spur line on the northern side of Bolong Road. These works are presently under construction. In 2019 the Independent Planning Commission approved Mod 16 which included the construction of a Specialty Product Facility and additional Gluten Dryer. The Specialty Products Building would enable the production of an increased range of specialised products as an extension to Shoalhaven Starches existing product line. The specialty products comprise a range of modified gluten products for the food industry, and modified starches for both paper manufacturing as well as food production. Shoalhaven Starches identified under the subsequent Mod 21 that because of the increase in the range of products that will be able to be produced arising from the works associated with Mod 16, amendments were required to the approved Packing Plant on the northern side of Bolong Road to accommodate these different products. This involved the provision of twenty (20) silos to accommodate the storage of an increased variety of finished products.

Under the recent Mod 25, approval has been obtained to modify the SSEP approval to enable the extension of the rail line from its present terminus at the south-western boundary of the former Paper Mill site to a point to the north-eastern boundary of this site; as well as carrying out additions to product dryers 3 & 4 building involving installation of starch grinding bag houses.

4.2.2 APPROVAL HISTORY FOLLOWING MP 06_0228

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

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



Bolong Road turning right into the central vehicle access point to the Shoalhaven Starches site and prevented vehicles turning right out from this access point and travelling east along Bolong Road.

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

RA 11/1002 Interim Packing Plant

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

DA 11/1855 – Widening of Driveway

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

DA 13/1713 – Demolition of Dimethyl Ether Plant

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

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

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

DA 16/1827 – Demolition of Existing Air Compressor Shed

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

Other Approvals

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

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

Modification Applications

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

Table 1 – Summary of Recent Modifications

Modification	Summary of Modifications	Approval Date
Modification 1	• Removed the requirement for dried distillers' grain (DDG) pelletising plant from the list of mandatory odour controls. • Implement alternate odour controls including a new loading chute with dust extractor and extension of the load-out shed to fully enclose truck loading.	30/9/2011
Modification 2	Install additional infrastructure to improve operational and energy efficiency, including two additional fermenter tanks, an evaporator, beer column, heat exchangers, substation and compressors.	14/9/2012
Modification 3	Relocate approved 60 space staff car park to the former Dairy Farmers site and include the site in the project approval, following acquisition by the Applicant.	9/10/2012
Modification 4	Relocate the approved DDG pelletising plant within the factory site, increases its footprint and approved height, from 21m to 28m.	24/3/2014
Modification 5	Modify the design, footprint and odour controls on the DDG pelletising plant including a 49m air discharge stack and 8 storage silos.	16/9/2015

Modification 6	• Demolish a disused industrial building “Moorehouse” purchased by the Applicant • Construct a temporary car park on the northern side of Bolong Road.	25/11/2015
Modification 7	Relocate the approved Starch Dryer No. 5 to the former “Moorehouse” site, increase the footprint and construct a substation, pipework and pipe gantry.	18/12/2016
Modification 8	Extend the existing flour mill to increase flour production from 265,000 to 400,000 tonnes per annum (tpa) and offset imports of flour to the factory from mills in western NSW.	1/3/2016
Modification 9	• Increase the size of the approved packing plant to increase the type and volume of packaged dried products. • Construct a container storage and truck loading area with noise barriers. • Extend and duplicate the approved rail spur line. • Install product pipes under Bolong Road, a small bag packer at the DDG pellet plant and a new stormwater detention tank.	8/3/2017
Modification 10	Construct a new flour mill B and increase flour production on site from 400,000 tpa to 842,400 tpa. Relocate storage silos and construct a mill feed structure.	18/4/2017
Modification 11	• Reducing the number of approved DDGS Dryers from six to four. • A minor modification to the footprint of the four DDG dryers. • Relocation of the cooling towers in the DDG Plant. • A Mill Feed Silo and structure to feed DDG dryers. • Expanded use of the existing coal and woodchip storage area within the SS Environmental farm. • The addition of two biofilters to cope with the increased number of DDG Dryers. • A forklift maintenance building adjacent to the relocated DDG dryers,	1/9/2017

	along with a container preparation area adjacent to the relocated DDG Dryers.	
Modification 12	Modifications to the existing Ethanol Distillery Plant to increase the proportion of ‘beverage’ grade ethanol that is able to be produced on the site. This modification will enable increased flexibility in terms of the range of types of ethanol produced at the site (ie. between fuel, industrial and beverage grade ethanol) to meet market demands; and modify the type and location of the Water Balance Recovery Evaporator that has been previously approved under Mod 2 adjacent to the Ethanol Plant.	1/9/2017
Modification 13	• Modification of boilers 2 and 4, with the conversion of boiler 4 from gas fired to coal fired. • Installation of an additional baghouse on boiler 6.	18/1/2018
Modification 14	Modifications to the former Australian Paper Mill site, i.e. The site associated in part with this Modification Application. This Modification sought approval to use this site for: • The use of existing buildings on the site for the storage of finished products, as well as engineering plant. • The use of existing storage tanks for the storage of syrups. • The use of external areas on the site to lay down plant and materials that are to be used in the construction of approved plant on the Shoalhaven Starches factory site as well as temporary and overflow shipping container storage. • The use of existing administration buildings for office staff; and • The use of existing workshops for maintenance purposes.	27/4/2018
Modification 15	Construction of the Supagas CO2 plant at the former Dairy Farmers factory site.	7/8/2018

Modification 16	• Installation of a third flour mill C within the existing flour mill B building. • Undertaking modifications to flour mills A and B. • The construction of a new industrial building adjoining the Starch Dryer No. 5 building containing: ○ The new product dryer; ○ Plant and equipment associated with the processing of specialised speciality products. • Addition to Starch Dryer No. 5 building to house a baghouse for this dryer ○ Conversion of two existing gluten dryers (1 and 2) to starch dryers. ○ Additional sifter for the interim packing plant. ○ Construction of a coal-fired co-generation plant to the south of the existing boiler house complex. The co-generation plant will house a new boiler (no. 8). ○ Construction of lime silos: The lime injection system will consist of two storage silos and associated equipment for injecting powdered lime into each of the coal fired boilers. ○ Relocation of the existing boiler no. 7 to the northern side of the overall boiler house complex. ○ Construction of an indoor electrical substation on the northern side of Bolong Road. ○ Construction of an additional rail intake pit for the unloading of rail wagons. ○ Extension of the existing electrical substation located within the main factory area. • An additional coal fired co-generation plant was also approved under Mod 16. This coal fired co-generation plant was to be sited immediately to the south of the existing boiler house complex	18/6/2019
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	situated to the east of Abernethy's Creek. This coal fired co-generation plant would generate a total of 15 MW of power for the site. It is proposed that this coal fired co-generation plant will be in part replaced by the proposed gas fired co-generation plant as part of this Modification Application.	
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Modification 17	• Relocation of Baghouse for Starch Dryer No. 5. • Installation of Service Lift adjacent to Starch Dryer No. 5. • Elevating Service Conduit extending from factory site on southern side of Bolong Road to approved packing plant on northern side of Bolong Road above ground. • Use of woodchips as fuel source in Boilers 2 and 4. • Modification to condition 14J(e) – Amendment to design specification for silencers to exhaust fans for Flour Mill B. • The increase in the building footprint of Product Dryer Building (PDB). • The increase in the building footprint of the Specialty Products Building (SPB) which adjoins the PDB building. • The provision of additional bulk chemical storage to the south of the PDB and SPB buildings. • Demolition of part of the existing Maintenance Office and Stores to facilitate the extension of the PDB and SPB buildings to the west. • Repurposing the remaining part of the Maintenance building to provide staff amenities and Plant Operation Control Rooms. • To facilitate internal truck movements associated with the amendments to the SPB, existing car parking (48 spaces) currently located to the north and west of the Maintenance Building will be relocated to an existing approved car parking located on the north side of Bolong Road. • Extend the sifter room situated on top of the interim packing plant. • Install a Product Dryer (No. 9) within the footprint of the SPB as approved under Mod 16.	23/10/2020
Modification 18	Relocation of Approved Gas Fired Boiler and other Associated Works to Facilitate	4/9/2020

	Production of 'Hand Sanitiser' Alcohol in response to COVID19 Crisis.	
Modification 19	Expansion of the ethanol distillery plant including new distillery columns, three ethanol storage tanks and cooling towers to facilitate the production of 100 mega litres (ML) of beverage grade ethanol within the approved limits and additional site infrastructure.	8/320/21
Modification 20	Alterations to Existing CO2 Plant (Supagas)	26/10/2021
Modification 21	Modification to Packing Plant including the reconfiguration of existing silo storage into 16 small storage silos, additional rail spur and associated train tunnel, and ancillary additions; installation of a raw wastewater tank; nitrogen generator and storage tanks; an Indirect Cooking Facility; and relocation of car parking.	16/5/2022
Modification 23	Modification to construct and operate a 60-megawatt gas fired co-generation plant to replace two approved, but not constructed, co-generation plants.	28/4/2022
Modification 24	Modification to the approved Gluten Dryer No. 8 (GD8) Building including the increase in building footprint, increase in building height, re-siting of the GD8 building and the relocation of site infrastructure to accommodate changes to the GD8 building.	15/2/2022
Modification 25	Rail line extension and additions to product dryers 3 & 4 building involving installation of starch grinding bag houses.	5/6/2025
Modification 27	Modification to approved RWW Buffer Tank	5/10/2022
Modification 28	Proposed Temporary Emergency Grain Storage	20/6/2023
Modification 29	Additional MVR evaporator and relocation of approved cooling towers; additional stillage evaporators and associated equipment; re-configuration of the approved biofilter's; substations and switchroom.	19/12/2024
Modification 30	Alterations and additions to Supagas CO2 Plant including additional plant and equipment and amendments to facility footprint.	10/02/2026

5.0 CONSULTATION

Consultation with government agencies was undertaken on an earlier version of Modification Proposal that involved primarily the proposed grain storage and handling facilities during May 2022. Given the scope of works for this Modification Application has been revised further consultation has been undertaken with government agencies in relation to this current Modification Proposal. To ensure clarity this section of the Modification Report addresses the outcome of the most recent consultation with government agencies as they relate to this current Modification Proposal.

Prior to the preparation of this Modification Report for this Modification Proposal consultation was undertaken on the 29 May 2025 with the following Federal, state and local government agencies:

- Australian Department of Defence
- Department of Planning, Housing and Infrastructure (DPHI);
- Department of Climate Change, Energy, the Environment and Water (DCCEEW);
- NSW EPA;
- Waterways Operations – TfNSW
- Department of Primary Industries (DPI) – Fisheries
- DPHI – Crown Lands
- NSW Fire & Rescue;
- Transport for NSW (TfNSW).
- Shoalhaven City Council (SCC)

At the time of preparing this Modification Report responses have been received from:

- Australian Department of Defence
- DPHI
- DCCEEW – Water
- DPI – Fisheries
- NSW EPA
- DPHI – Crown Lands
- Fire & Rescue NSW
- TfNSW – Water Operations
- TfNSW

Copies of the above government agency responses are included with this Modification Application documentation.

Table 2 is a summary of the issues raised by government agencies to this proposal at the time of preparing this report, and our responses as to how the issues have been addressed in this Modification Report.

Table 2 – Summary of Issues raised by Government agencies

Table 2 – Summary of Issues raised by government agencies	
Government Agency	Comments
Australian Department of Defence As advised, only part of the Shoalhaven Starches project footprint falls within the Nowra Airfield Defence Aviation Area declaration. The part that does require further assessment from Defence if the height is above 90m above ground level, this includes any new structures and plumes. Further information is available on the Defence Aviation Area regulation web page: https://www.defence.gov.au/about/locations_property/defence-aviation-areas-regulation. Please find below an image which indicates (in green) what part is assessable over 90m. 	None of the proposed works associated with this Modification Proposal that are to be situated within the Nowra Airfield Defence Aviation Area declaration as highlighted by the submission prepared by Department of Defence will have a height (including flume height) above 90 metres. In this regard the Modification Proposal does include a flare from the blower room post scrubber as part of the works to the Wastewater Treatment Plant. This flare structure will have a maximum height of 15.9 m AHD. Manildra advise that this structure is not a stack, it is a low pressure 'candle stick' flare with a maximum flame length of 10 metres, therefore the top of the flame will be 25.9 m AHD, with zero velocity at 90 m AHD. Under these circumstances no further assessment is required in this regard.

DPHI The Department's main comments relate to the inclusion of alterations and additions to the WTP in the scope of the modification application. In particular, the Department seeks further clarification on the project need for the increase in biogas production and if this is driven by increased energy demand of the site from other modification works undertaken at the site. Further, the Department expects thorough justification be provided that the proposed modification remains consistent with the 4.55(1A) pathway vs 4.55(2). In addition, the Department maintains that demonstrated improvements to the sites noise emissions under the Pollution Reduction Program (PRP) required by the EPL be undertaken prior to introducing any further noise sources to the sites overall noise profile.	The biogas is a by-product of the WTP process and is proportional to the amount of 'food' (COD) loading sent to the WWTP; biogas production is not the main driver for the expansion. The WTP expansion is required as the existing WTP is already at capacity and to enable for future increase in food (COD) loading and flows as a result of increase in production envisaged under the existing approved production rates. The proposed expansion to the WTP allows for additional biogas handling systems which will enable an increase in biogas use (above existing use) as some biogas is currently not utilised back in the boilers and is rather flared at the Farm. Section 7 of this Modification Report provides justification as to how the Modification Proposal is consistent with the provisions of S.4.55(2) of the EP & A Act. The Modification Report is supported by a Noise Impact Assessment prepared by GHD which addresses the implications the Pollution Reduction Program has for this Modification Proposal.
DPHI – Crown Lands In response to your email below, I'm assuming that you mean DPHI-Planning when you refer to NSW DPHI. Correct? Crown Lands also forms part of DPHI, but I think you are seeking comments from us in our capacity as the "landowner" of the bed of the Shoalhaven River. In that respect I have looked at the plans you have provided but its currently unclear if any of the works will take place below the mean high water mark (MHWM), i.e. on the bed of the river.	The proposed revetment wall extension along the Shoalhaven River embankment that forms part of this Modification Application in part encroaches below mean high water mark (MHWM) and therefore intrudes into "Crown Land". Crown Lands have issued their landowners consent for the lodgement of this application for those works associated with the proposed rock revetment wall extension with Crown land along the Shoalhaven River embankment.

Plans 7549-008 and 7549-013 don't appear to depict the MHW (property boundary as defined by DP 1305953 and DP 385145).

If all the works and proposed fixed structures/improvements/rock revetments/etc. are going to be located within the property boundaries of the private land, then this Department as the adjoining landowner has no objections or comments.

If any part of the proposed works will be undertaken below the MHW, then landowner's consent from this Department is required prior to the lodgement of the modification application with NSW DPHI-Planning.

<https://www.crownland.nsw.gov.au/sites/default/files/2022-07/landowners-consent-application-form.pdf>

The application would need to be supported by an identification survey existing structures Identification Survey including:

- i. title block, border, scale, key, boundary dimensions, site area, north point and, where applicable, vertical datum and contours;
- ii. location and use of existing structures, including any reclaimed area and free standing piles below Deed Mean High Water Mark;
- iii. the position of the Deed Mean High Water Mark in relation to the registered deposited plan boundaries;
- iv. the calculated areas (m²) for each structure or reclamation below the Deed Mean High Water Mark

- plans or drawings describing the proposed development. It must be overlayed on the Identification Survey and indicate:

- i. the location of the proposed development (including extensions or additions to existing structures) below the Deed Mean High Water Mark;
- ii. elevations and sections showing proposed materials, external finishes and heights
- iii. the calculated areas for each structure or reclamation below the Deed Mean High Water Mark

If fixed improvements are to be installed below the MHW, then an ongoing licence from this Department will be required if the Modification application is approved and prior to commencement of any works.

If that is the case, then I would recommend consolidating the existing two licences (acc 9601 and acc 597467) and the new additional area via an application to revoke the current tenures and grant a new licence. https://www.crownland.nsw.gov.au/licences-leases-and-permits/apply-or-manage-licence/revocation-of-an-existing-licence-and-issue-a-new-licence	
DCCEEW (Water Group)	
1	A detailed and consolidated site water balance.
2	Description of all works/activities that may intercept, extract, use, divert or receive surface water and/or groundwater. This includes the description of any development, activities or structures that will intercept, interfere with or remove groundwater, both temporary and permanent.
3	Details of all water take for the life of the project and post closure where applicable. This is to include water taken directly and indirectly, and the relevant water source where water entitlements are required to account for the water take. If the water is to be taken from an alternative source confirmation should be provided by the supplier that the appropriate volumes can be obtained. Shoalhaven Starches presently purchase approximately 7 ML per day of water (potable & raw water) from Shoalhaven Water. This Modification Proposal will not increase the use of water on site.
4	Details of Water Access Licences (WALs) held to account for any take of water where required, or demonstration that WALs can be obtained prior to take of water occurring. This should include an assessment of the current market depth where water entitlement is required to be purchased. Any exemptions or exclusions to requiring approvals or licenses under the <i>Water Management Act 2000</i> should be detailed by the proponent. Shoalhaven Starches advise that they are aware of only one (1) Water Access Approval for a bore on Lot 164 DP 4469, Approval Number 10WA106095. Shoalhaven Starches advise that water is not taken from this bore. It is believed the bore may have been a previous groundwater test point.

5	A description of groundwater conditions that provides an understanding of groundwater level across the site under a range of wet and dry conditions.	The GHD Geotechnical Rep[ort includes a review of potential impacts to surface water and ground water. This is further discussed in Section 8.6.1 of this Modification Report.
6	Assessment of impacts on surface and ground water sources (both quality and quantity), related infrastructure, adjacent licensed water users, basic landholder rights, watercourses, riparian land, groundwater dependent ecosystems, and ground water levels; including measures proposed to reduce and mitigate these impacts.	The GHD Geotechnical Rep[ort includes a review of potential impacts to surface water and ground water. This is further discussed in Section 8.6.1 of this Modification Report.
7	Proposed surface and groundwater monitoring activities and methodologies.	The GHD Geotechnical Rep[ort includes a review of potential impacts to surface water and ground water. This is further discussed in Section 8.6.1 of this Modification Report.
8	Identify the proposed construction and/or use of a declared dam under Dam Safety Regulations. This is to include existing declared dams with or without physical modifications, new declared dams, modifications to existing dam/s that would require the dam to be declared or the decommissioning of a declared dam.	The GHD Report includes an assessment of the Modification Proposal and in particular the proposed WWTP{ ponds having regard to the Dam Safety Regulations. This is further discussed in Section 8.5.4 of this Modification Report.
9	Describe the consequence category of existing declared dam/s and provide an overview of compliance with the requirements of the Dam Safety Regulation, including (but not limited to) requirements for a dam safety management system, operations and maintenance plans, and emergency plans.	The GHD Geotechnical Report includes an assessment of the Modification Proposal and in particular the proposed WWTP{ ponds having regard to the Dam Safety Regulations. This is further discussed in Section 8.5.4 of this Modification Report.
10	Include a consequence category assessment for new declared dams, proposed modifications to existing declared dam/s,	The GHD Geotechnical Report includes an assessment of the Modification Proposal and in particular the proposed WWTP{ ponds

	modifications to existing dam/s that would require the dam to be declared or declared dams to be decommissioned.	having regard to the Dam Safety Regulations. This is further discussed in Section 8.5.4 of this Modification Report.
11	Describe the decommissioning process of any existing declared dam.	The GHD Geotechnical Report includes an assessment of the Modification Proposal and in particular the proposed WWTP{ ponds having regard to the Dam Safety Regulations. This is further discussed in Section 8.5.4 of this Modification Report.
12	Describe all mining and mining related activities proposed within a Mining Notification Area and assess the impacts of the proposed activities on any declared dam. This is to include proposed mitigating measures and monitoring programs.	Not applicable
13	Identification and impact assessment of all works/activities located on waterfront land including an assessment against Guidelines for Controlled Activities on Waterfront Land (DPE 2022).	The GHD Geotechnical Rep[ort includes a review of implications of development on waterfront land having regard to the Guidelines for Controlled Activities on Waterfront Land . This is further discussed in Section 8.6.1 of this Modification Report.
14	Assessment of project against relevant policies and guidelines.	Refer above
DPI – Fisheries DPIRD Fisheries provides the following comments on this proposal at this pre-lodgement stage. The proposed modification works are along the Shoalhaven River, which is considered Type 1, Class 1 Key Fish Habitat (KFH). Seagrass (Zostera), marine vegetation, has historically been mapped along the edge of the bank in front of the site. For additional context, DPIRD Fisheries would like to highlight geotechnical issues with the site, that lead to the comments below: • The site has a history of mobilisation of soil mass through the river bank over steepening and softening of the toe of the slope (SMEC 2022). • Previous erosional protection works have taken place along this stretch of the Shoalhaven River, with marginal success. In some		The Modification Report is supported by an Aquatic Assessment prepared by Lesryk Environmental. This is further discussion in Section 8.4.1 of this Modification Report.

- instances, these have shifted the erosional pressures up and downstream and currently have evidence of erosion themselves.
- The progressive recessing of the Shoalhaven River at this site is expected to continue and potentially amplify with sea-level rise and extreme weather events (SMEC 2022).
 - A large silo failure led to a significant pollution event within the Shoalhaven River and restricted access for commercial fishers during the clean-up period.

The modification is not considered consistent with the FM Act nor with DPIRD Fisheries Policy. DPIRD Fisheries generally requires riparian buffer zones to be established and maintained for developments or activities in or adjacent to TYPE 1 KFH. For the Shoalhaven River, the recommended width is 50 m. The proposed works have not accounted for any effective riparian buffer and of significant concern is that in places there is as little as 1 m between the proposed conveyor and services gantry and the bank of the Shoalhaven River. To be consistent with DPIRD's Policy, installation of infrastructure within the riparian buffer zone shall be avoided or minimised. DPIRD Fisheries can see no evidence that Shoalhaven Starches have attempted to avoid or minimise impacts in development of the proposed modification.

In this instance, measures to protect the Shoalhaven River should be prioritised, particularly in the case of uncertainty. DPIRD Fisheries has serious concern about the placement of a new conveyor within the residual riparian corridor that remains between Shoalhaven Starches and the Shoalhaven River. DPIRD Fisheries considers that the likelihood of bank failure would be increased from these works and the consequence this would be serious and irreversible, with the potential for the infrastructure and grain to contaminate Shoalhaven River. DPIRD Fisheries recommend that development so close to the Shoalhaven River be avoided, as a priority and placed elsewhere on-site.

DPIRD Fisheries recommends bank protection works that provide an improved ecological outcome, with bio-engineered techniques to be

prioritised. Considering the current riverbank stability around the proposed rock revetment works, DPIRD Fisheries remains open to the possibility of successfully planting riparian vegetation within the rock revetment although a final assessment will be made upon review of a detailed design. It is expected that the riparian corridor and bank be both geotechnically stable and <u>ecologically</u> improved before any new structures, including a conveyor, are introduced, to prevent added pressure on the riverbank. Should the Shoalhaven Starches choose to pursue the proposal in its current form DPIRD Fisheries would request the following, at the SEARs stage: • a full assessment of the risk-weighted consequences for the proposal. • careful evaluation of how the proposal avoids serious or irreversible damage to key fish habitats and fisheries resources • an assessment as to how the proposal meets the Policy and objects of the FM Act. Additional specific environmental assessment requirements for the proposal that is lodged with DPHI will be provided at the request for SEARs stage. Reference: SMEC, 2022. <i>Shoalhaven Riverbank Stability Assessment</i>. Prepared for Manildra Group Pty Ltd, 20 June 2022.	
NSW EPA Key Areas Wastewater treatment The proposal includes significant modifications to the WTP, increasing capacity from 10 ML/day to approx. 14 ML/ day. The proposal will also increase the amount of treated water re-used on-site from 6.5 ML/day to approximately 12 ML/day and reduce the amount of treated water that will be spray irrigated from 3 ML/day to 2 ML/day. The modification report should clearly detail any operational changes associated with the	The Modification Proposal is supported by a “Feasibility Assessment for Irrigation of Treated Wastewater” prepared by Earthwise Environmental. This report provides an assessment in terms of: • suitability of the irrigation area, including site, soil, and groundwater limitations and mitigation measures;



increase in WTP capacity and reduction in amount of treated water to be irrigated.	• present and expected wastewater quality and loading rates; • current and expected nutrient, salt, and water balances with respect to land carrying capacity; • irrigation method and mitigation measures (as outlined in the Shoalhaven WMP, EE 2023); and • ongoing soil and water monitoring, including management criteria and responses (Shoalhaven WMP, EE 2023).
Air quality/Odour The proposal includes potential sources for additional emissions of odour and air pollutants from the site operations. In addition to the general requirements outlined in Attachment A, the Air Quality Impact Assessment supporting the Modification Report should include consideration of the cumulative impacts from existing development and the proposal, and any findings or recommendations from the Pollution Reduction Study recently prepared by as part of EPL 883.	This issue is further discussed in Section 8.8 of this Modification Report. The Modification Report is supported by an Air Quality Impact Assessment prepared by GHD. Air quality impacts are further discussed in Section 8.3.3 of this Modification Report.
Noise The proposal includes a number of additional noise sources. In addition to the general requirements outlined in Attachment A, the Noise and Vibration Impact Assessment supporting the Modification Report should address the site wide noise model prepared for the site in 2022, and any findings or recommendations from the recently prepared Pollution Reduction Study as part of EPL 883.	The Modification Report is supported by a Noise Impact Assessment prepared by GHD. Noise impacts are further discussed in Section 8.3.3 of this Modification Report.
Flooding	The Modification Report is supported by a Flood Compliance Report prepared by WMAwater. Flooding is further discussed in Section 8.3.5 of this Modification Report.

It is noted the site is located within a high hazard floodway. The proposed modification involves the addition of chemical storage (nitric acid), and the potential impact of flooding on any storage areas should be clearly addressed. The EPA have also supplied general assessment requirement which are addressed as a separate document to this Modification Report.	
Fire & Rescue NSW Thanks for your time this morning; As discussed, FRNSW will not comment on this project at this time. FRNSW and DPHI have established processes for review and recommendations for state significant development including modification applications with the DPHI, and with consent authorities for designated development. It would be FRNSW expectation that regular applicable processes (FEBQ and FER), codes and standards (NCC) and legislative instruments will be followed for this proposal and FRNSW will engage with the consent authority through the established processes.	Fire & Rescue NSW's comments are noted.
Transport for NSW (Maritime) The Maritime Boating Safety Officer for the area is familiar with this section of the waterway and the existing rock revetment wall and has provided no concerns regarding the existing wall or the proposed extension. Thus, in response to the supplied documentation for the subject proposal, I wish to confirm that Maritime has no objections to this proposal assessed on the grounds of impact to navigation, or further comments or feedback to provide for inclusion in the modification report.	It is noted that Transport for NSW (Maritime) raise no objection to the Modification Proposal.
Transport for NSW (Transport Planning – Planning, Integration and Passenger)	



Thank you for your email. TfNSW appreciates the early consultation regarding the proposed modification (Mod 26). Please note that at this stage TfNSW has no further comments on the scoping proposal. The Department has confirmed that they intend to notify and invite TfNSW for comment on the proposed modification upon formal lodgement. On this basis, TfNSW will provide formal comments to the Department as part of the modification approval process, when further information is available.	It is noted that TfNSW (Transport Planning – Planning, Integration and Passenger) did not wish to comment on the Modification Proposal as part of the Applicant’s consultation process. The Modification Application is supported by a Transport Assessment prepared by ARC. Traffic issues are further addressed in Section 8.7 of this Modification Report.
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6.0 PROPOSED MODIFICATION TO PROJECT APPROVAL MP06_0228

6.1 SUMMARY OF MODIFICATION PROPOSAL

Table 3 below provides a summary of the proposed works associated with this Modification Application.

Table 3 - Summary of Proposed Modification Proposal

Factory Component	Proposed Works associated with Modification Application No. 26 (Mod 26)
Additional grain storage and handling facilities	• The installation of three (3) wheat silos to the west of the former Dairy Farmers factory building. • Construction of a train unloading facility to the south of the former Dairy Farmers factory building. • The installation of a container inverter to be sited to the west of the propped silos. • The installation of a grain conveyor and services gantry that will connect the proposed grain storage and handling facilities along the Shoalhaven River frontage of the site to the Shoalhaven Starches factory site. • The construction of the conveyor will in part require the extension of the rock revetment wall along the Shoalhaven River embankment. • The installation of a weighbridge to the north of the former Dairy Farmers factory building. • The construction of an electricity substation control room, workshop and office building to the north of the former Dairy Farmers factory building. • The above works will necessitate the demolition of the eastern part of the former Dairy Farmers factory building (as required). • The relocation of the existing car park located between the Bolong Road frontage and the former Dairy farmers factory building.

WTP Upgrade	• Construction of one in-ground treated effluent storage pond with a capacity of 150 ML. • Convert the existing Wet Weather Storage Ponds No. 1, 2 and 3 into another Anaerobic Digester with a volume of 80 ML. • It is proposed to install an above ground enclosed steel 400 KL Equalisation Tank to the east of the existing SO Basin. • Construction of a building for biogas collection fans from the new Pond 3 digester immediately to the south of the converted Anaerobic Digester. • Installation of Biogas scrubber units. • Interconnecting pipework, pumps and blowers. • A new wastewater collection tank (70 KI) at the factory and new pipe to the WWTP. • Substation and maintenance shed. • Additional MBR and RO plant and associated building.
Relocation of approved finished product silos	• Relocate and construct up to 15 finished product silos (starch & gluten) on the main factory site instead of in conjunction with the Northern Packing Plant site.
Other Works	
Rail maintenance building	• Construct a rail maintenance building, with associated internal vehicle access, at the eastern terminus of the recently approved Mod 25 rail line extension to the east of the former Paper Mill factory site. • It is also proposed to install provision for rail fuel storage adjacent to the existing rail line within the former Paper Mill site.
Ethanol Maintenance Building	• Construct an Ethanol Maintenance building within the south-eastern part of the main factory site.
Nitric Acid Storage	• Construction of a Nitric Acid storage adjacent to existing cooling towers to the west of Abernethys Creek.
Phosphorus Oxychloride storage area	• Relocate the approved Phosphorus Oxychloride storage area to a location to the west of the recently constructed starch reaction tanks. The relocation of the Phosphorus Oxychloride storage area will necessitate the relocation of the approved

	chemical storage area from this part of the site to an area adjacent to the DDGS Plant.
Palmer cooler discharge and combined Boiler Stack for No. 5 & 6 Boilers	- This Modification Proposal also seeks to modify Appendix 3 Mandatory Odour Controls to the Project Approval to enable the re-routing of the Palmer cooler discharge to the Boiler 5 and 6 stack. - Boiler 5 is currently not running, only boiler 6 is currently emitting from this stack. The exit velocity from Boiler 6 only ranges from approximately 6.08 to 7.86 m/s. The height of this stack has been reduced from 54 m to 49 m due to corrosion in the stack. Additionally, as outlined above, it has been proposed to redirect emissions from the Palmer Cooler through this stack, bypassing combustion of this exhaust stream. Odour emissions from this source have been estimated based on recent odour sampling and the addition of odour from the Palmer Cooler, based on sampling results from the Palmer Cooler.

6.2 ADDITIONAL GRAIN STORAGE & HANDLING FACILITIES

During recent years Shoalhaven Starches have experienced significant disruptions to their supply of wheat due to:

- Drought, which resulted in a reduction in wheat production.
- Floods which have disrupted the rail network for extended periods.
- Rail infrastructure upgrades and maintenance which have also resulted in extended periods during which grain could not be transported by rail to the site.

These disruptions to raw material supply have had significant impacts on the Shoalhaven Starches operations.

To minimise the impacts of interruptions to raw material supply Shoalhaven Starches propose to construct additional grain storage and grain handling facilities to be located at

the former Dairy Farmers factory site which now forms part of the Manildra holdings these works will include:

- The installation of three (3) wheat silos to the west of the former Dairy Farmers factory building. These silos will have an overall height above ground level of 32 metres, diameter 23.683 metres and a volume of 11577.3 m³. Each silo will have the capacity to store 9000 tonnes of wheat.

Shoalhaven Starches seek to ensure that they are able to store a minimum of one week supply of wheat on site (23,000 tonnes initially). In addition to providing a buffer to interruptions to supply, the multiple silos will also enable Shoalhaven Starches to segregate wheat storage to reflect different quality specifications to enable the blending of wheat with different specifications to ensure a homogenous and consistent quality supply to the Shoalhaven Starches factory operations.

- It is also proposed to construct a train and truck unloading facility to the south of the former Dairy Farmers factory building. Wheat that is brought to the site will be loaded into this facility and then delivered to the storage silos by conveyors. The unloading facility will accommodate wheat brought to the site by either rail or road. Whilst the bulk of Shoalhaven Starches raw material is supplied to the site by rail, during times when rail supply is interrupted, wheat will continue to be supplied to the site by road and unloaded into the same system as used for unloading by rail. The unloading facility will have the capacity to unload 1500 tonnes per hour enabling Shoalhaven Starches to unload a train in three (3) hours.
- The Modification Proposal will also include the installation of services and grain conveyor gantry. Wheat that is delivered to the rail and road intake pits will need to be lifted to enable it to be delivered into the silos. The stored grain will then need to be transferred from the bottom of the silos over the rail line and then transferred by conveyor along the southern boundary of the site to be used in the Shoalhaven Starches factory operations located further to the west.
- The proposal includes the installation of a weighbridge to be sited to north of the former Dairy Farmers factory building. The weighbridge will provide a commercially calibrated scale to weigh containers of wheat and provide a raw material intake scale.
- As this location is separated from the main Shoalhaven Starches factory operations it is also proposed to provide a maintenance building to provide an area where repairs and maintenance can be undertaken. This facility will enable maintenance personnel to respond quickly and efficiently for maintenance and repair tasks to this plant.
- A high voltage substation will be sited adjoining the northern side of the former Dairy Farmers factory building. This substation will provide electricity supply (transformers) and the electrical distribution equipment to operate the grain intake system.

- The Modification Proposal will also involve the loss of approximately half the existing car parking area located between the Bolong frontage of the site and the former Dairy Farmers factory building to enable heavy vehicle movement along the frontage of the site and then to the rear of the site. It is envisaged the car park on the northern side of Bolong Road will have sufficient capacity to accommodate the loss of these parking spaces.

The rationale that underpins these works includes:

- The additional grain storage capacity will provide a raw material storage buffer which will reduce the risk from disruptions to supply following transport difficulties, floods (as has occurred recently), droughts and maintenance works to the rail network.
- Shoalhaven Starches will be able to separate different grades of wheat. This will enable different grades of wheat to be stored separately allowing a more consistent raw material feed to the Shoalhaven Starches factory operations increasing plant efficiencies.
- Wheat will be able to be delivered to the site safely and efficiently via either road or rail.
- Regular maintenance and cleaning of the wheat storage system will be able to be carried out without impeding production processes.
- Shoalhaven Starches will be able to undertake more efficient cleaning of the wheat storage thereby reducing wastage.

6.3 ALTERATIONS & ADDITIONS TO WASTEWATER TREATMENT PLANT (WTP)

Shoalhaven Starches also propose to also undertake modifications to their WTP that will enable an increase in the WTP capacity and additional biogas production that will be able to be used as an energy source within the factory operations. It is envisaged that under the proposed modifications to the WTP biogas production will increase from the current 3500 m³/h to 5000 m³/h, an increase of 1,500 m³/h. This increase in biogas production would be equivalent to a reduction in 10% of the site's natural gas usage.

At present the Shoalhaven Starches production processes are resulting in an average of 11.5 ML/day, and maximum peak flow of 14.4 ML/day, of wastewater being directed to the existing WTP. This is already approaching the design capacity of the existing WTP. It is anticipated that wastewater flows will further increase when production rates at the site reach the approved flour and ethanol production rates. At present Shoalhaven Starches are operating at about 10% below these approved limits.

Wastewater flows have increased recently in proportion to flour processing at the site. Shoalhaven Starches are unsure as to whether there is a single reason for this increase in

wastewater. It may be the result of several factors such as the recent production of different types of finished products, with the production of some finished products being more water intensive than others. Additional WTP capacity is therefore required to accommodate these increased wastewater flows.

The Modification Proposal will therefore involve the following components:

- It is proposed to construct one in-ground treated effluent storage pond with a capacity of 150 ML adjacent and to the east of the existing SO Basin and BVF Reactor (Anaerobic Digester) approved under the SSEP. This additional treated wastewater storage is required to compensate for the loss of storage as a result of the conversion of Ponds 1, 2 and 3 that will be discussed below.
- It is also proposed to convert the existing Wet Weather Storage Ponds No. 1, 2 and 3, situated to the north of the approved SO Basin, into another Anaerobic Digester with a volume of approximately 80 ML. This pond will also be covered with a gas tight floating cover and utilise the same anaerobic digester format that is presently used on the site, a Bulk Volume Fermenter (BVF). Infrastructure within the pond and under the pond cover will facilitate the action of anaerobic micro-organisms responsible for the digestion of the soluble and suspended organic matter. Metabolism of organic matter will generate the biogas
- It is proposed to install an above ground enclosed steel 400 KL Equalisation Tank to the south-west of the converted Pond 3 anaerobic digester. The role of the Equalisation Tank will be to equalize the raw wastewater flow to Pond 3.
- It is proposed to construct a building for biogas collection fans from the new Pond 3 digester immediately adjacent and to the south-west of the Equalisation Tank.
- Biogas scrubber units including flares will be installed. The scrubber will remove Hydrogen Sulfide (H₂S) from the biogas which will reduce acid corrosion in the boilers and improve air quality (reduction in SO₂ emissions). The chillers cool the biogas and remove moisture from the biogas.
- Interconnecting pipework, pumps and blowers.
- A new wastewater collection tank (70 KL) at the factory site and a new pipe to the Wastewater Treatment Plant to service the western area of the factory site.
- Substation and maintenance shed to service the new plant and equipment at the Farm.
- Additional MBR and RO plant and associated building.

The WTP upgrades will result in an increase in WTP capacity from 10 ML/day to approximately 14 ML/day and increase the amount of treated water returned to the factory for re-use from 6.5 ML/day to approximately 12 ML/day. The amount of water that will be sent to irrigation is estimated to be approximately 2 ML/day. At present approximately 3



ML/day of treated water is spray irrigated. The proposed work will therefore result in a reduction in the volume of treated water that will be required to be spray irrigated.

6.4 RELOCATION OF FINISHED PRODUCT SILOS

Shoalhaven Starches currently have approval for the construction of 20 finished product silos within the Northern Packing Plant site presently under construction on the northern side of Bolong Road (Mod 21).

Shoalhaven Starches now propose, on an interim short-term basis, to construct up to 19 finished product silos (starch & gluten) on the main factory site.

The rationale for these works is the current silo configuration and pneumatic transfer system at the factory site will require 4 product transfers to transfer product to the Northern Packing Plant site. Each pneumatic transfer is powered by electricity and results in moisture loss in the product.

Relocating the finished proposed product silos and associated transfer system to the factory site, as proposed under this Modification Proposal, will require only 2 transfers to the Northern Packing Plant site. This will result in electricity savings (estimated in the order of 4,200 MWh savings per annum.) and less moisture loss in the finished product. There are also significant project cost and labour savings by installing more finished product storage on the factory site.

The product will transfer from the proposed factory silos directly into the Northern Packing Plant Feed Bins located within the Northern Packing Plant building. It is anticipated that the current approved silos within the Northern Packing Plant site will be constructed as a longer-term project when Shoalhaven Starches explore increased production from their overall operations in the future.

The relocated finished product silos will be housed within a building that will have a footprint of 29.4 metres by 17 metres, and an overall height above ground level of 44.56 metres.

The Finished Product Silo building will be connected to the existing factory across the internal rail spur line by two pipe bridges.

6.5 OTHER WORKS

In addition to the above works the Modification Proposal will also include the following works:

- Shoalhaven Starches also propose to construct a rail maintenance building, with associated internal vehicle access, to be constructed at the eastern terminus of the recently approved Mod 25 rail line extension to the east of the former Pulp and Paper Mill factory site.

The rail maintenance building will have a footprint of 40.507 m by 19.465 metres and will have a height above ground level of 9.0 m. The rail maintenance building will be located at the north-eastern terminus of the recently approved rail line extension approved under Mod 25 and set back 25 metres from the Bolong Road frontage of the site.

A proposed new internal access road will link the proposed rail maintenance building with the existing internal driveway system within the former Paper Mill site. This internal access driveway will also provide access to a staff amenity building and parking area (eight (8) parking spaces).

- It is also proposed to install provision for rail fuel storage adjacent to the existing rail line within the former Paper Mill site.
- Construction of an Ethanol Maintenance building within the south-eastern part of the main factory site. This building will have dimensions of 16.5 metres by 9 metres, and a height above ground level of 6.2 metres. The building will include an internal mezzanine level for storage purposes.
- Construction of a Nitric Acid storage and bund adjacent to existing cooling towers to the west of Abernethys Creek.
- Relocate the approved Phosphorus Oxychloride storage area to a location to the west of the recently constructed starch reaction tanks. This location provides improved operational and safety considerations. The relocation of the Phosphorus Oxychloride storage area will necessitate the relocation of the approved chemical storage area from this part of the site to an area adjacent to the DDGS Plant.
- Palmer cooler discharge

In addition to the above works, this Modification Proposal also seeks to modify the mandatory odour controls listed under Appendix 3 of the Project Approval. The mandatory odour controls listed under Appendix 3 of the Project Approval includes

“Re-route the Palmer cooler discharge stack to at least 2 of the boilers”.

This was completed several years ago.

As part of the conversion of Boiler 6 from, coal to gas as approved under Mod 23, it is proposed to reduce the height of the stack for Boilers 5 and 6 due to corrosion in a section of this stack (from 54 m to 49 m).

Boiler No.5 (previously on coal) has been off-line for several months and there are no medium-term plans to convert this Boiler to gas (due to Cogeneration Plant (Mod 23) now providing the majority of steam to the factory site).

Due to the decreased capacity of odour combustion as a result of Boiler 5 being off-line, Shoalhaven Starches propose to divert the Palmer cooler air stream (low odour concentration) directly into the Boiler 5 & 6 combined stack.



This increased airflow within this stack will increase the velocity and result in improved odour dispersion, resulting in an overall decrease in odour emission from the stack. Details of this change are included in the MOD 26 AQIA (main section is 6.2).

As a result of this proposed change, Appendix 3 Mandatory Odour Controls to the Project Approval will need to be modified to read:

“Re-route Palmer cooler discharge to Boiler 5 & 6 stack.”

This Modification Proposal therefore also seeks to modify Appendix 3 Mandatory Odour Controls to the Project Approval to enable the re-routing of the Palmer cooler discharge to the Boiler 5 and 6 stack as outlined above.

The Modification Report is supported by plans prepared by Shoalhaven Starches of the works associated with this Modification Proposal. **Figure 4** below includes plan details of these works.

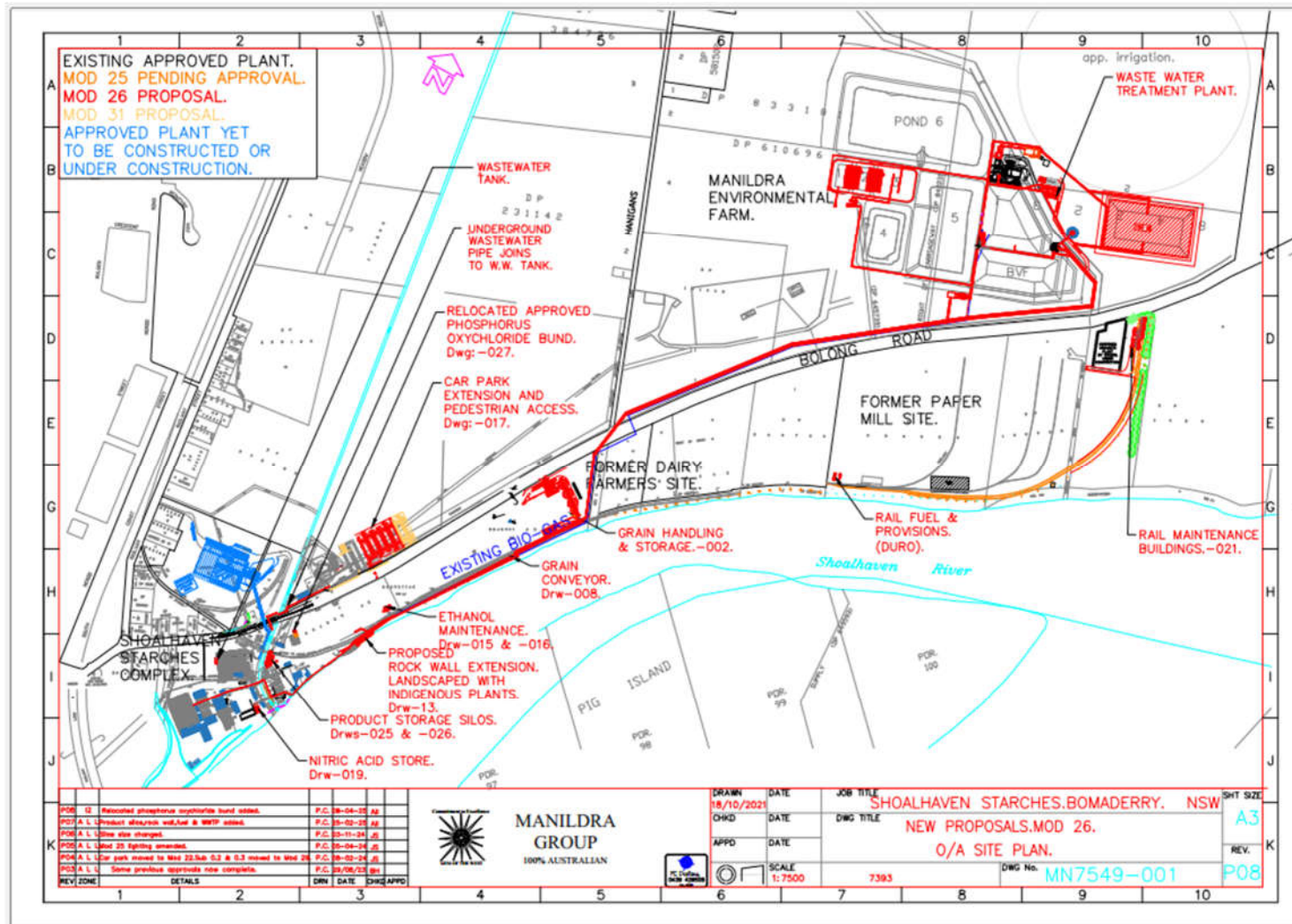


Figure 4: Overall Site Plan of proposed works associated with Modification Application



The Modification Application is supported by plans prepared by Shoalhaven Starches, and the following expert assessments:

- Air Quality Impact Assessment prepared by GHD.
- Site Hazard Analysis prepared by Pinnacle Risk Management (PRM).
- An Environmental Noise Impact Assessment prepared by GHD.
- Flood Compliance Report prepared by WMAwater.
- Traffic Impact Study prepared by ARC Transport & Traffic.
- Aboriginal and Non-Aboriginal Heritage Assessments prepared by Apex Archaeology.
- Biodiversity Development Assessment Report prepared by Ecoplanning.
- Aquatic Assessment prepared by Lesryk Environmental.
- Integrated water Cycle Management Strategy prepared by Allen Price
- Geotechnical, Dam Safety NSW Requirements, Contamination and Acid Sulphate Soils Assessment prepared by GHD.

7.0 SECTION 4.55(2) OF THE EP&A ACT

This application is made pursuant to Section 4.55(2) of the EP&A Act.

Section 4.55(2) of the EP&A Act reads:

(2) Other modifications

A consent authority may, on application being made by the applicant or any other person entitled to act on a consent granted by the consent authority and subject to and in accordance with the regulations, modify the consent if—

- a) it is satisfied that the development to which the consent as modified relates is substantially the same development as the development for which consent was originally granted and before that consent as originally granted was modified (if at all), and
- b) it has consulted with the relevant Minister, public authority or approval body (within the meaning of Division 4.8) in respect of a condition imposed as a requirement of a concurrence to the consent or in accordance with the general terms of an approval proposed to be granted by the approval body and that Minister, authority or body has not, within 21 days after being consulted, objected to the modification of that consent, and
- c) it has notified the application in accordance with—
 - i. the regulations, if the regulations so require, or
 - ii. a development control plan, if the consent authority is a council that has made a development control plan that requires the notification or advertising of applications for modification of a development consent, and
- d) it has considered any submissions made concerning the proposed modification within the period prescribed by the regulations or provided by the development control plan, as the case may be.

Subsections (1) and (1A) do not apply to such a modification.

Fundamentally an application made pursuant to Section 4.55(2) must demonstrate that the development to which the consent as modified relates is substantially the same development as the development for which consent was originally granted and before that consent as originally granted was modified.

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

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

55. The requisite factual finding obviously requires a comparison between the development, as currently approved, and the development as proposed to be modified. The result of the comparison must be a finding that the modified development is “essentially or materially” the same as the (currently) approved development.

56. The comparative task does not merely involve a comparison of the physical features or components of the development as currently approved and modified where that comparative exercise is undertaken in some type of sterile vacuum. Rather, the comparison involves an appreciation, qualitative, as well as quantitative, of the developments being compared in their proper contexts (including the circumstances in which the development consent was granted).

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

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

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

- in addition to the physical difference, consider the environmental impacts of proposed Modification Applications to approved developments.

Comment

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

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

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

Comment

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

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

Comment

The Modification Proposal does not involve an “additional and distinct land use’. The proposed modification involves additional grain storage and handling facilities; additions to the existing wastewater treatment plant and other works within the footprint of the existing factory site; that already serves the existing Shoalhaven Starches operations.

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

Comment

The modification proposal does not seek to change the nature of the approved use of the site; it will remain as originally approved.

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

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

Comment

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

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

The rationale that underpins the additional grain storage and handling does not seek to enable an increase in production from the site but rather to improve sustainable operations:

- The additional grain storage capacity will provide a raw material storage buffer which will reduce the risk from disruptions to supply following transport difficulties, floods (as has occurred recently), droughts and maintenance works to the rail network.
- Shoalhaven Starches will be able to separate different grades of wheat. This will enable different grades of wheat to be stored separately allowing a more consistent raw material feed to the Shoalhaven Starches factory operations increasing plant efficiencies.
- Wheat will be able to be delivered to the site safely and efficiently via either road or rail.
- Regular maintenance and cleaning of the wheat storage system will be able to be carried out without impeding production processes.
- Shoalhaven Starches will be able to undertake more efficient cleaning of the wheat storage thereby reducing wastage.

The proposed upgrades to the WTP seek to address anticipated wastewater rates under the existing approved flour and ethanol production rates. As outlined above in Section 6.3 wastewater flows have increased recently in proportion to flour processing at the site. Shoalhaven Starches are unsure as to whether there is a single reason for this increase in

wastewater. It may be the result of several factors such as the recent production of different types of finished products, with the production of some finished products being more water intensive than others. Additional WTP capacity is therefore required to accommodate these increased wastewater flows.

The rationale for the proposed finished product silos is to provide energy and cost efficiencies. Relocating the finished proposed product silos and associated transfer system to the factory site will require only 2 transfers to the Northern Packing Plant site. This will result in electricity savings (estimated in the order of 4,200 MWh savings per annum.) and less moisture loss in the finished product. There are also significant project cost and labour savings by installing more finished product storage on the factory site.

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

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

The proposal will not comprise any qualitative or quantitative changes in overall production from the site. The proposal essentially seeks provide a more overall sustainable and efficient factory operation.

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

It is our view that the proposed modification will not have significant environmental impacts, and the modified development is substantially the same as approved Project. As such the modification proposal is considered consistent with provisions of Section 4.55(2) of the Act in this instance.

Given the above circumstances it is our view the development as modified by this modification application will be substantially the same development as the development for which consent was originally granted having regard to both the qualitative and quantitative elements of that development.

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

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

8.1 ENVIRONMENTAL PLANNING INSTRUMENTS

8.1.1 STATE ENVIRONMENTAL PLANNING POLICIES

Table 4 details State Environmental Planning Policies (SEPP) that apply to the land and whether they are applicable to the proposal.

Table 4 – State Environmental Planning Policies that Apply to the Subject Site

State Environmental Planning Policy	Applicable Yes/No
State Environmental Planning Policy (Planning Systems) 2021	Yes (Proposal involves modification of SSD)
State Environmental Planning Policy (Building Sustainability Index: BASIX) 2004	No
State Environmental Planning Policy (Exempt and Complying Development Codes) 2008	No
State Environmental Planning Policy (Biodiversity & Conservation) 2021	Yes
State Environmental Planning Policy (Housing) 2021	No
State Environmental Planning Policy (Transport & Infrastructure) 2021	Yes
State Environmental Planning Policy (Industry and Employment) 2021	No
State Environmental Planning Policy No 65-Design Quality of Residential Apartment Development	No
State Environmental Planning Policy (Primary Production) 2021	No
State Environmental Planning Policy (Precincts – Central River City) 2021	No
State Environmental Planning Policy (Precincts – Western Parklands City) 2021	No
State Environmental Planning Policy (Precincts – Eastern Harbour City) 2021	No
State Environmental Planning Policy (Precincts – Regional) 2021	No
State Environmental Planning Policy (Primary Production) 2021	No
State Environmental Planning Policy (Resilience & Hazards) 2021	Yes

SEPP – Transport & Infrastructure

Division 17 of this SEPP relates to Road and Traffic while Schedule 3 of the SEPP outlines traffic generating development which requires referral to Roads and Maritime Services (RMS).

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

Development purpose	Column 1: Size or capacity – site with access to any road	Column 2 Size or capacity—site with access to classified road or to road that connects to classified road (if access within 90m of connection, measured along alignment of connecting road)
Car parks	200 or more car parking spaces	50 or more car parking spaces
Industry	20,000m ² in site area or (if the site area is less than the gross floor area) gross floor area	5000 m ² in site area or (if the site area is less than the gross floor area) gross floor area
Any other purpose	200 or more motor vehicles per hour	50 or more motor vehicles per hour

The proposal involves the regularisation and provision of 283 parking spaces on the northern side of Bolong Road. The proposal will therefore trigger the above criteria in this Schedule that would warrant the development application being referred to the RMS, and therefore the provisions of this SEPP would not apply to this proposal.

It should be noted, as outlined in Section 5, consultation was undertaken prior to the preparation of this Modification Application with TfNSW. TfNSW declined to provide comment in relation to this proposal at that time, preferring instead to comment on the proposal once consulted directly by DPHI following the formal submission of the Modification Application.

The Modification Application is supported by a Transport Impact Assessment prepared by Anton Reisch Consulting. Section 8.7 of this Modification Report addresses the traffic implications of the Modification Proposal.

SEPP – Resilience & Hazards

Costal Management

Part 2 of this SEPP deals with coastal management and stipulates Development Controls for Coastal Management Areas.

Division 1 outlines the controls to be applied to development in the Coastal Wetlands and Littoral Rainforests Area.

Coastal Wetlands and Littoral Rainforests Area.

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

Coastal Environment Area

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

The subject land is mapped under this SEPP Mapping as being located within the Coastal Environment Area as seen below in **Figure 5**.

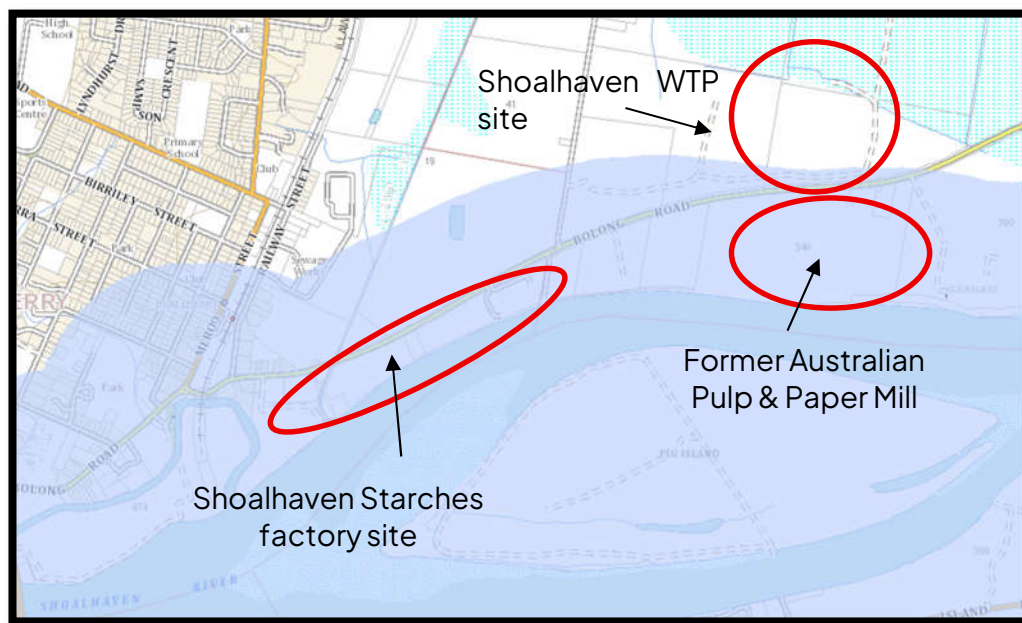


Figure 5: Coastal Environment Area Map.

Clause 2.10 of the SEPP specifies matters that must be considered in determining development applications on land within the Coastal Environment Area. Clause 2.10 reads:

- 1) *Development consent must not be granted to development on land that is within the coastal environment area unless the consent authority has considered whether the proposed development is likely to cause an adverse impact on the following:*
 - a) *the integrity and resilience of the biophysical, hydrological (surface and groundwater) and ecological environment,*
 - b) *coastal environmental values and natural coastal processes,*
 - c) *the water quality of the marine estate (within the meaning of the Marine Estate Management Act 2014), in particular, the cumulative impacts of*

the proposed development on any of the sensitive coastal lakes identified in Schedule 1,

- d) *marine vegetation, native vegetation and fauna and their habitats, undeveloped headlands and rock platforms,*
 - e) *existing public open space and safe access to and along the foreshore, beach, headland or rock platform for members of the public, including persons with a disability,*
 - f) *Aboriginal cultural heritage, practices and places,*
 - g) *the use of the surf zone.*
- 2) *Development consent must not be granted to development on land to which this clause applies unless the consent authority is satisfied that:*
- a) *the development is designed, sited and will be managed to avoid an adverse impact referred to in subclause (1), or*
 - b) *if that impact cannot be reasonably avoided—the development is designed, sited and will be managed to minimise that impact, or*
 - c) *if that impact cannot be minimised—the development will be managed to mitigate that impact.*

Comment:

- The proposal is not near a headland or rock platform and as such does not impact on public access to these areas.
- The proposal will not adversely impact on the visual amenity and scenic qualities of the coast.
- The Modification Application is supported by an Aboriginal Due Diligence Assessment prepared by Apex Archaeology that concludes the proposal will not impact on any Aboriginal heritage values.
- The Modification Application is supported by a Biodiversity Development Assessment prepared by Ecoplanning and Aquatic Assessment prepared by Lesryk Environmental. With respect to the coastal environment area provisions of this SEPP, Ecoplanning state that:

The bank stabilisation works within the Shoalhaven River may temporarily alter the integrity and resilience of the hydrological values of the Shoalhaven River. Water quality may also be temporarily impacted. However, the works are needed to prevent further bank erosion and collapses and cannot be reasonably avoided, and impacts will be minimised through the implementation of the site-specific CEMP.

The proposed development has been sited to avoid all non-essential impacts to vegetation, fauna and fauna habitats. Rock revetment works will impact on 0.08 ha native vegetation located along the Shoalhaven River.

The development is not expected to impact upon coastal processes as the proposal does not involve any changes to the existing use of the coastal area. Existing public open space and safe access to and along the foreshore, beach, headland, rock platform or surf zone will not be altered as part of this proposal.

Indirect impacts to native vegetation, fauna, water quality, hydrological regime and the coastal environments will be managed through the implementation of the CEMP, see details below in Section 7.

- The Modification Application is supported by an Integrated Water Cycle Management Study prepared by Allen Price which incorporates erosion and sediment control measures to minimise impact on the water quality of the adjoining watercourses.
- The proposed development is not located within close proximity to the surf zone and will not impact on coastal environmental values or natural coastal processes.

Coastal Use Area

Division 4 of the SEPP specifies the controls to be applied to development in the Coastal Use Area. The subject land is also within the Coastal Use zone as seen below in **Figure 6**. As such the provisions which apply to this mapping are relevant to the proposed development.

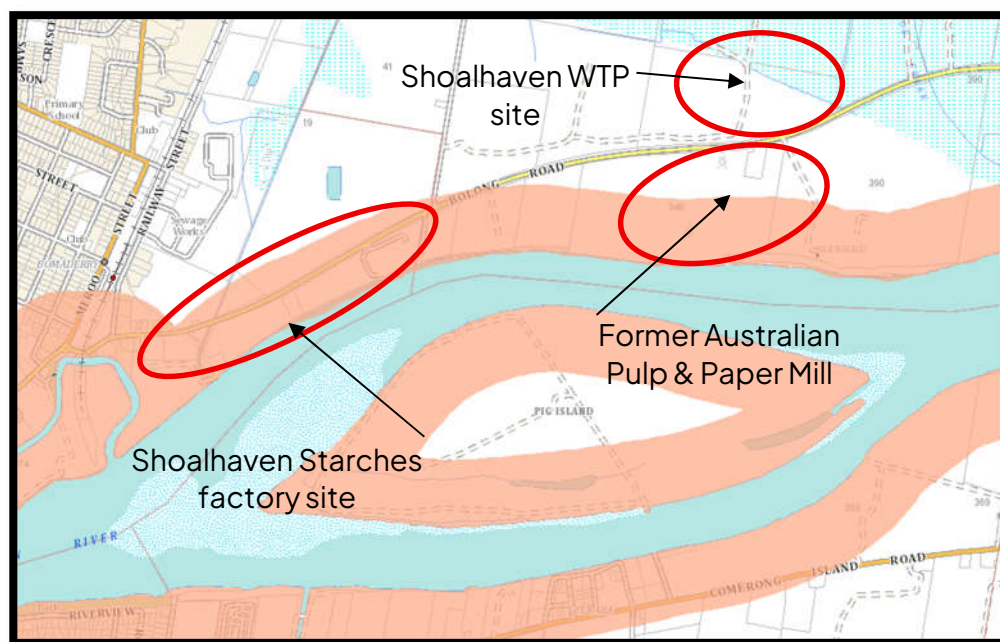


Figure 6: Coastal Use Area Map.

Clause 2.11 of the SEPP specifies matters that must be considered in determining development applications on land within the Coastal Use Area. Clause 14 reads:

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

Comment:

- The proposal will not impact on existing safe access to the foreshore. The proposal is not near a beach, headland or rock platform and as such does not impact on public access to these areas.
- The works associated with this modification proposal will not cause overshadowing of the foreshore area or wind funnelling. The development will not block views from public places. The proposal will not adversely impact on the visual amenity and scenic qualities of the coast.

- As detailed above, the proposal will not adversely impact on Aboriginal cultural heritage and places.
- The works associated with this modification proposal are of a bulk, scale and size that are consistent with existing industrial development on the site and will not create an adverse visual impact in this locality.
- The Modification Application is supported by a Biodiversity Development Assessment prepared by Ecoplaning and Aquatic Assessment prepared by Lesryk Environmental. With respect to the coastal use area provisions of this SEPP Ecoplaning state that:

The proposed development will not impact any existing access to the coastal use area, as no the public access exists presently. No overshadowing, wind funnelling or loss of views from public places to foreshores will result as part of the proposal. Nor will the visual amenity and scenic qualities of the coast/coastal headlands be affected. This report has not assessed the presence of Aboriginal cultural heritage or any cultural and built environment heritage.

The development has no impact on Coastal Use Areas. The proposal includes upgrades to the existing Shoalhaven Starches facility including the WTP. The design has taken into account the surrounding coastal and built environment.

Under these circumstances the proposal is considered to be consistent with the objectives.

Part 2.3 Miscellaneous

The Modification Proposal in part includes the extension of a rock revetment wall along the Shoalhaven Riverbank frontage to the Subject Site.

Section 4.1 of the Coastal Management Act 2016 defines coastal protection works to mean:

- (a) beach nourishment activities or works, and
- (b) activities or works to reduce the impact of coastal hazards on land adjacent to tidal waters, including (but not limited to) seawalls, revetments and groynes.

As these waters of the Shoalhaven River adjacent to the subject site are tidal; and given these works involve a revetment wall; such works could be considered a “coastal protection work” for the purposes of the Coastal Management Act 2016.

Clause 2.16(1) of this SEPP stipulates that:

2.16(1) Coastal protection works by person other than public authority

Development for the purpose of coastal protection works may be carried out on land to which this Chapter applies by a person other than a public authority only with development consent.

Given the provisions of Clause 2.16(1) above the proposed rock revetment wall that forms part of this Modification Proposal requires to obtain development consent.

Hazardous & Offensive Development

Chapter 3 of this SEPP deals with Hazardous and offensive development. Clause 3.11 of this SEPP requires that a person who proposes to carry out development for the purposes of a potentially hazardous industry must prepare a preliminary hazard analysis in accordance with the current circulars or guidelines published by the Department of Planning and submit the analysis with the development application.

The Modification Proposal is supported by a Preliminary Hazard Analysis prepared by Pinnacle Risk Management Pty Ltd. This matter is further addressed in Section 7.2.4 of this Modification Report.

SEPP (Biodiversity and Conservation) 2021

In March 2021, the Chapter 4 (Koala Habitat Protection 2021) of the State Environmental Planning Policy (Biodiversity and Conservation) replaced the SEPP (Koala Habitat Protection) as the policy framework guiding Koala habitat protection.

Chapter 4 (Koala habitat protection 2021) of State Environmental Planning Policy (Biodiversity and Conservation) 2021 (Biodiversity Conservation SEPP 2021) applies to the study area, as it has an area greater than 1 ha and occurs in the Shoalhaven City Council Local Government Area (Shoalhaven LGA).

Clause 4.2 defines Core Koala Habitat as:

- (a) an area of land which has been assessed by a suitably qualified and experienced person as being highly suitable koala habitat and where koalas are recorded as being present at the time of assessment of the land as highly suitable koala habitat, or*
- (b) an area of land which has been assessed by a suitably qualified and experienced person as being highly suitable koala habitat and where koalas have been recorded as being present in the previous 18 years.*

In relation to the provisions of this SEPP, the Streamlined BDAR prepared by Ecoplaning states:

*The subject land occurs within the South Coast Koala Management Area. One tree species present within the subject land, *Corymbia maculata*, is listed as a Koala use tree species for the South Coast in Schedule 2 of the Biodiversity Conservation SEPP 2021. *Corymbia maculata* trees have been planted along the railway line*

proximate to the proposed conveyor belt alignment and grain handling facility. These trees are isolated and do not adjoin any suitable larger areas of suitable Koala habitat. The nearest record for the Koala located 4.51 km from the subject land at Cabbage Tree Flat recorded in January 2023, however this record is on the opposite side of the Shoalhaven River and is therefore geographically isolated from the subject land (NSW DCCEE 2025d). The next nearest record is from Jaspers Brush, approximately 6.65 km north of the subject land (NSW DCCEE 2025d). However, there is no evidence of historical occupation in the subject land.

Although some Koala use trees are present in the subject land, the subject land is not considered to be suitable habitat for the Koala. The subject land lacks areas of suitable habitat that are connected to broader areas of Koala habitat. There are no records for Koalas within the subject land.

8.1.2 Local Environmental Plan

Shoalhaven Local Environmental Plan 2014

The parcels of land associated with the proposed grain storage and handling facilities and those located within the Shoalhaven Starches factory site are all zoned E4 General Industrial; while the additions to the existing WTP are on land zoned RU1 Primary Production and partially RU2 Rural Landscape; under the provisions of the Shoalhaven LEP 2014 (SLEP 2014) (refer Figure 7).

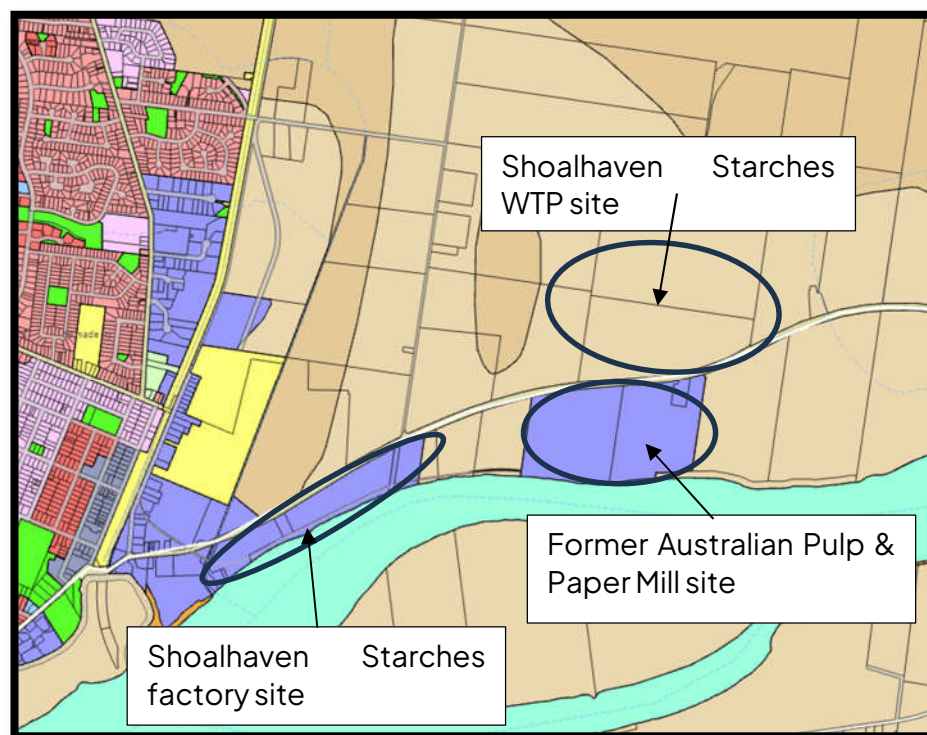


Figure 7: Extract of zoning map under the SLEP 2014.



The objectives of the E4 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 for the E4 zone as the proposal involves modifications to an existing industrial facility.

“General industries” are permissible within the E4 zone subject to consent (**Table 5**). The proposal involves modifications to an existing industrial development and is therefore permissible with consent.

Table 5 - Land Use Permissibility – E4 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 objectives of the RU1 zone are:

- To encourage sustainable primary industry production by maintaining and enhancing the natural resource base.
- To encourage diversity in primary industry enterprises and systems appropriate for the area.
- To minimise the fragmentation and alienation of resource lands.
- To minimise conflict between land uses within this zone and land uses within adjoining zones.
- To conserve and maintain productive prime crop and pasture land.
- To conserve and maintain the economic potential of the land within this zone for extractive industries.

It is our view that the proposal is consistent with these objectives as:

- the proposal involves modifications to an existing approved rural industrial operation.

- The Modification Proposal will not result in the alienation or fragmentation of agricultural land.
- The proposal has been designed and incorporates measures to minimise conflicts with surrounding land uses.

Table 6 outlines the land use table provisions applicable to the RU1 zone that apply to the site.

Table 6 - Land Use Permissibility – RU1 Zone (Shoalhaven LEP 2014)

Permitted without consent	Extensive agriculture; Forestry; Home occupations
Permitted with consent	Agriculture; Air transport facilities; Airstrips; Animal boarding or training establishments; Aquaculture; Artisan food and drink industries; Boat building and repair facilities; Boat sheds; Building identification signs; Business identification signs; Camping grounds; Cellar door premises; Cemeteries; Charter and tourism boating facilities; Community facilities; Crematoria; Depots; Dual occupancies (attached); Dwelling houses; Eco-tourist facilities; Educational establishments; Environmental facilities; Environmental protection works; Extractive industries; Farm buildings; Flood mitigation works; Food and drink premises; Group homes; Helipads; Home-based child care; Home businesses; Home industries; Information and education facilities; Intensive livestock agriculture; Intensive plant agriculture; Marinas; Markets; Mooring pens; Moorings; Offensive industries; Open cut mining; Places of public worship; Plant nurseries; Recreation areas; Recreation facilities (indoor); Recreation facilities (major); Recreation facilities (outdoor); Roads; Roadside stalls; Rural industries ; Rural workers' dwellings; Tourist and visitor accommodation; Veterinary hospitals; Water recreation structures; Water supply systems
Prohibited	Hotel or motel accommodation; Pubs; Serviced apartments; Any other development not specified in item 2 or 3

A small portion of the works associated within the WTP are also situated within the RU2 zone. The objectives of the RU2 zone are:

- To encourage sustainable primary industry production by maintaining and enhancing the natural resource base.
- To maintain the rural landscape character of the land.
- To provide for a range of compatible land uses, including extensive agriculture.

As mentioned in Section 8.2 below, section 4.38(3) of the Environmental Planning & Assessment Act permits the consent authority to determine a development application in respect of State significant development including a development being partly prohibited by an environmental planning instrument under section 4.38 (3).

It is our view that the proposal is consistent with these objectives as:

- The proposed works associated with the Modification Proposal within the RU2 zone relate to upgrade works to the existing WTP associated with the Shoalhaven Starches operations. These works relate to an existing rural industry operation
- The proposed modification within the RU2 zone relates to upgrade works to the existing WTP, and specifically works to the existing wet weather storage ponds. These works will not involve substantial changes to the outward appearance of these existing works.
- The proposed modification within the RU2 zone relates to upgrade works to the existing WTP which will be compatible with the existing use of the subject land.

Table 7 outlines the land use table provisions applicable to the RU2 zone that apply to the site.

Table 7- Land Use Permissibility –RU2 Zone (Shoalhaven LEP 2014)

Permitted without consent	Extensive agriculture; Forestry; Home occupations
Permitted with consent	Agriculture; Air transport facilities; Airstrips; Animal boarding or training establishments; Aquaculture; Artisan food and drink industries; Boat building and repair facilities; Boat sheds; Building identification signs; Business identification signs; Camping grounds; Caravan parks; Cellar door premises; Cemeteries; Charter and tourism boating facilities; Community facilities; Crematoria; Depots; Dual occupancies (attached); Dwelling houses; Eco-tourist facilities; Environmental facilities; Environmental protection works; Extractive industries; Farm buildings; Flood mitigation works; Food and drink premises; Freight transport facilities; Funeral homes; Group homes;

	Hazardous industries; Helipads; Home-based child care; Home businesses; Home industries; Information and education facilities; Marinas; Markets; Mooring pens; Moorings; Offensive industries; Places of public worship; Plant nurseries; Recreation areas; Recreation facilities (indoor); Recreation facilities (major); Recreation facilities (outdoor); Roads; Roadside stalls; Rural industries ; Tourist and visitor accommodation; Veterinary hospitals; Water recreation structures; Water supply systems
Prohibited	Hotel or motel accommodation; Pubs; Serviced apartments; Any other development not specified in item 2 or 3

“Rural industries” are defined for the purposes of the SLEP 2014 as meaning:

***rural industry** means the handling, treating, production, processing, storage or packing of animal or plant agricultural products for commercial purposes, and includes any of the following—*

- (a) agricultural produce industries,*
- (b) livestock processing industries,*
- (c) composting facilities and works (including the production of mushroom substrate),*
- (d) sawmill or log processing works,*
- (e) stock and sale yards,*
- (f) the regular servicing or repairing of plant or equipment used for the purposes of a rural enterprise.*

Note—

Rural industries are not a type of **industry**—see the definition of that term in this Dictionary.

The Shoalhaven Starches overall operations process wheat, other grains and flour to produce a range of products. Such an activity is consistent with the definition of an ‘agricultural produce industry’ which is defined under the SLEP 2014 as meaning:

***agricultural produce industry** means a building or place used for the handling, treating, processing or packing, for commercial purposes, of produce from agriculture (including dairy products, seeds, fruit, vegetables or other plant material), and includes wineries, flour mills, cotton seed oil plants, cotton gins, feed mills, cheese and butter factories, and juicing or canning plants, but does not include a livestock processing industry.*

Note—

Agricultural produce industries are a type of **rural industry**—see the definition of that term in this Dictionary.

As outlined in the 'note' in the above definition Agricultural produce industries are a type of rural industry. The Modification Proposal forms part of the Shoalhaven Starches operations. The Modification Proposal involves works that are ancillary to the use of the site as a rural industry and therefore permissible with consent within the RU1 and RU2 zones (refer **Tables 6 & 7**).

In addition to the above, the Modification Proposal includes the provision of pipework below Bolong Road within the vicinity of Hanigans Lane as well as within the vicinity of Abernethys Creek (and including along the existing pedestrian bridge crossing of Abernethys Creek). The land within which these works are proposed is zoned SP2 Special Infrastructure Road.

The objectives of the SP2 zone are:

- To provide for infrastructure and related uses.
- To prevent development that is not compatible with or that may detract from the provision of infrastructure.

Table 8 outlines the land use table provisions applicable to the SP2 zone that apply to the site.

Table 8 – Land Use Permissibility – SP2 Zone SLEP2014

Permitted without consent	Nil
Permitted with consent	Aquaculture; Roads; The purpose shown on the <i>Land Zoning Map</i> , including any development that is ordinarily incidental or ancillary to development for that purpose
Prohibited	Any development not specified in item 2 or 3

The proposed pipework below Bolong Road within the SP2 zone would not be permitted with consent and therefore this section of the proposal is partially prohibited within the SP2 zone.

As mentioned in Section 8.2 below, section 4.38(3) of the Environmental Planning & Assessment Act permits the consent authority to determine a development application in respect of State significant development including a development being partly prohibited by an environmental planning instrument under section 4.38 (3).

The Modification Proposal also proposed the extension of the existing rock revetment wall partway along the Shoalhaven River embankment. Part of this work encroaches below the Mean High Water Mark for the Shoalhaven River and within land zoned W2 Recreational Waterways.

The zone objectives of the W2 zone are:

- To protect the ecological, scenic and recreation values of recreational waterways.

- To allow for water-based recreation and related uses.
- To provide for sustainable fishing industries and recreational fishing.

It is considered the proposed revetment wall extension is not inconsistent with the above objectives given the works proposed to stabilise and existing eroding embankment.

Table 9 outlines the land use table provisions applicable to the RU1 zone that apply to the site.

Table 9 – Land Use Permissibility – W2 Zone SLEP2014

Permitted without consent	Nil
Permitted with consent	Aquaculture; Boat building and repair facilities; Boat sheds; Charter and tourism boating facilities; Environmental facilities; Environmental protection works ; Jetties; Kiosks; Marinas; Mooring pens; Moorings; Recreation areas; Recreation facilities (outdoor); Restaurants or cafes; Sewerage systems; Water recreation structures; Water supply systems
Prohibited	Industries; Local distribution premises; Multi dwelling housing; Residential flat buildings; Seniors housing; Warehouse or distribution centres; Any other development not specified in item 2 or 3

As outlined in Table 9 above, environmental protection works are permissible with consent within the W2 zone. The proposed revetment wall work seeks to prevent erosion of the Shoalhaven riverbank and therefore could be considered “environmental protection works” which are defined for the purposes of the SLEP 2014 as meaning:

environmental protection works means works associated with the rehabilitation of land towards its natural state or any work to protect land from environmental degradation, and includes bush regeneration works, wetland protection works, erosion protection works, dune restoration works and the like, but does not include coastal protection works.

As discussed in Section 8.1.1 above, the rock revetment work could also be considered a coastal protection work in which case the above provisions would not apply to these works, but rather the provisions of Clause 2.16(10) of SEPP (Resilience & Hazards) 2021 would apply to these works.

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 9** below:

Table 10 Shoalhaven Local Environment Plan Provisions

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.	Although there is no maximum height specified for the subject land, Clause 4.3(2A) imposes a maximum building height of 11 m where no specific height limit is designated. The Modification Proposal includes: • Grain storage silos – 31.995 m • Grain storage and associated conveyors and bucket elevators – 44 m • Office workshop – 17 m • Train and truck unloader – 13.54 m • Grain unloader and substation – 16.85 m • Screening building – 26 m • Product Silos – 44.5 m • Biogas Scrubber tanks – 16.5 m • Equalisation tank – 12 m • Wastewater Tanks – 17 m • Biogas blower room – 12 m Under these circumstances, the proposal involves structures that will exceed the maximum building height limit of 11 m. The SEE is supported by a Written Request made pursuant to Clause 4.6 justifying non-compliance with this maximum building height limit.
Clause 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	The proposal will involve the erection of structures that will exceed the 11 metres building height limit set by Clause 4.3(2A). The proposed development will be erected within the broader approved Shoalhaven Starches factory site and operations.

	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 (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	As the proposed works will be built within the existing industrial complex it is not expected that the new structures will have an undue effect due to its height. A written request pursuant to Clause 4.6 is not required for the contravention of a development standard arising as a result of a modification application per <i>SDHA Pty Ltd v Waverley Council</i> [2015] NSWLEC 65 at [34] – [35]. This Modification Application is however supported by a Clause 4.6 Written Request that serves to justify the contravention of a development standard and assess the impacts of the proposed variation to the maximum height of building control under Shoalhaven LEP 2014.
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	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).	
Clause 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. The Modification Application is supported by a Heritage Impact Statement prepared by Apex Archaeology which concludes the proposed works are not considered likely to impact on the heritage values of any items within or adjacent to the study areas. Apex indicate that no further archaeological or heritage assessment is required for the project. The Modification Application is supported by an Aboriginal Due Diligence Assessment prepared by Apex Archaeology which concludes the proposal will not impact on any Aboriginal heritage values.

	(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.	
Clause 5.21 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 flood function and behaviour on the land, taking into account projected changes as a result of climate change, (c) to avoid adverse or cumulative impacts on flood behaviour and the environment, (d) to enable the safe occupation and efficient evacuation of people in the event of a flood.	The Modification Application is supported by a Flood Compliance Report prepared by WMAwater. Flooding is further addressed in Section 8.3.5 of this Modification Report. With respect to the specific matters raised by Clause 5.21 the Flood Compliance Report makes the following comments. (1) <i>The objectives of this clause are as follows—</i> <i>(a) to minimise the flood risk to life and property associated with the use of land,</i> Every reasonable endeavour has been made by Shoalhaven Starches to achieve these goals. However, the Shoalhaven Starches plant has been at this site for over 50 years and it is not viable to relocate it to a flood free site. Expansion must

	(2) Development consent must not be granted to development on land the consent authority considers to be within the flood planning area unless the consent authority is satisfied the development— (a) is compatible with the flood function and behaviour on the land, and (b) will not adversely affect flood behaviour in a way that results in detrimental increases in the potential flood affectation of other development or properties, and (c) will not adversely affect the safe occupation and efficient evacuation of people or exceed the capacity of existing evacuation routes for the surrounding area in the event of a flood, and (d) incorporates appropriate measures to manage risk to life in the event of a flood, and (e) will not adversely affect the environment or cause avoidable erosion, siltation, destruction of riparian vegetation or a reduction in the stability of riverbanks or watercourses. (3) In deciding whether to grant development consent on land to which this clause applies, the consent authority must consider the following matters— (a) the impact of the development on projected changes to flood behaviour as a result of climate change, (b) the intended design and scale of buildings resulting from the development, (c) whether the development incorporates measures to minimise the risk to life and ensure the safe evacuation of people in the event of a flood, (d) the potential to modify, relocate or remove buildings resulting from development if the surrounding area is impacted by flooding or coastal erosion. (4) A word or expression used in this clause has the same meaning as it has in the Considering Flooding in Land Use Planning Guideline unless it is otherwise defined in this clause. (5) In this clause—	occur to be economic and meet the demands of consumers. The works are such that the construction will require approximately 40 additional temporary contractors but no additional full-time workers. Thus, there will not be a significant increase in the permanent workforce on the site or provide an additional threat to the safety of any worker during a flood. Possible flood risk management measures are addressed in Section 4.2 of this Report. <i>(b) to allow development on land that is compatible with the flood function and behaviour on the land, taking into account projected changes as a result of climate change,</i> As noted above the incremental hydraulic impacts associated with this Mod26 works are within Council's tolerable range of +/- 50mm. The proposal involves a modification to an existing industrial complex established on the subject land prior to flood planning provisions and understanding of flood function and behaviour. This proposal involves modifications and installation of additional plant within this existing established industrial complex. Climate change has been considered in Section 3 a) below and in Section 6.2 and Appendix C. <i>(c) to avoid adverse or cumulative impacts on flood behaviour and the environment,</i> Refer Section 3 of this Report. As most of the surrounding floodplain is land owned by Shoalhaven Starches, so also are the affectations.
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	Considering Flooding in Land Use Planning Guideline means the Considering Flooding in Land Use Planning Guideline published on the Department's website on 14 July 2021. Flood planning area has the same meaning as it has in the Floodplain Development Manual. Floodplain Development Manual means the Floodplain Development Manual (ISBN 0 7347 5476 0) published by the NSW Government in April 2005.	Possible flood risk management measures are addressed in Section 4.2 of this Report. <i>(d) to enable the safe occupation and efficient evacuation of people in the event of a flood.</i> Every reasonable endeavour has been made by Shoalhaven Starches to achieve these goals and already has a comprehensive Flood Evacuation Plan. This will be updated to include the proposed works but the proposed works do not reduce the ability of workers to safely leave the site. The works are such that the construction will require approximately 40 additional temporary contractors but no additional full-time workers. Thus, there will not be a significant increase in the permanent workforce on the site or provide an additional threat to the safety of any worker during a flood. The works will not occupy escape routes or cause workers to become trapped. <i>(2) Development consent must not be granted to development on land the consent authority considers to be within the flood planning area unless the consent authority is satisfied the development—</i> <i>(a) is compatible with the flood function and behaviour on the land,</i> Refer response in Point 1. b) above. <i>(b) will not adversely affect flood behaviour in a way that results in detrimental increases in the potential flood affectation of other development or properties,</i>
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		This has been demonstrated by the modelling results. Refer to Section 3 of this Report. <i>(c) will not adversely affect the safe occupation and efficient evacuation of people or exceed the capacity of existing evacuation routes for the surrounding area in the event of a flood,</i> As noted above in Point 1 a) and d) above. <i>(d) incorporates appropriate measures to manage risk to life in the event of a flood,</i> As noted above in Point 1 d). <i>(e) will not adversely affect the environment or cause avoidable erosion, siltation, destruction of riparian vegetation or a reduction in the stability of riverbanks or watercourses.</i> The works are largely within existing built-up industrial land clear of vegetation and clear of riverbanks and watercourses. The works will thus not exacerbate erosion, siltation and destruction of vegetation caused by floodwaters flowing on the land. <i>(3) In deciding whether to grant development consent on land to which this clause applies, the consent authority must consider the following matters</i> <i>(a) the impact of the development on projected changes to flood behaviour as a result of climate change,</i> Climate change will potentially affect the Shoalhaven Starches plant in two ways. Firstly, a rise
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		in the ocean will potentially raise flood levels at the site. This can largely be ignored as the site is some 15 kms from the ocean, thus the flood levels at the site are dominated by the flow in the Shoalhaven River rather than the ocean level. Secondly, a rise in rainfall intensity or duration in a design event due to climate change will impact the site by raising design flood levels. Anthropomorphic rainfall increase climate change has been included in the hydrologic and hydraulic modelling for the design flood contours and depth figures in Appendix C. In summary, climate change rainfall increases will change the absolute design flood levels for a design scenario but generally not the relative flood level increases (i.e existing v design scenario). Climate change was considered in the November 2022 Lower Shoalhaven River Flood Study (Reference 1) providing the following summary. The study also assessed the potential impacts of both Climate Change induced rainfall increases and sea level rise using current recommended ARR2019 values based on global climate modelling. Increased rainfall due to climate change has the biggest impact in the Shoalhaven River upstream of Nowra Bridge due to the increased flows and the incised valley. The increased flow dominates changes in expected flood levels to approximately Terara, with sea level rise having impacts in the Shoalhaven River downstream of Terara and in the Crookhaven River/Crookhaven Creek floodplain.
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		Only minor increases in flood level are observed in the Broughton Creek floodplain. For the 1% AEP, with rainfall increases of 16.3% due to Climate Change, associated increased flows may result in increases in flood levels in the Shoalhaven River upstream of Nowra by up to almost 1.4m at Grassy Gully and 1.1m at Gradys Caravan Park reducing to 200mm at Nowra Bridge. Increases in the lower floodplain areas are generally less than 150mm for all scenarios up to 7.6% rainfall increase with increases typically 150 – 250 mm for the 16.3% (2090 RCP 8.5) rainfall increase. In combination with Sea Level Rise a further increase in water levels may be expected around low-lying foreshore areas and up to 400mm total water level increases near the Shoalhaven and Crookhaven River entrances. <i>(b) the intended design and scale of buildings resulting from the development,</i> The proposed works are as far as possible located to minimise the affectation on flood levels but as noted above, the existing plant cannot be moved. <i>(c) whether the development incorporates measures to minimise the risk to life and ensure the safe evacuation of people in the event of a flood,</i> As noted above in Point 1 a) and d). <i>(d) the potential to modify, relocate or remove buildings resulting from development if the surrounding area is impacted by flooding or coastal erosion.</i>
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		Coastal erosion is not relevant for this site being 15 kms upstream. The proposal involves a modification to an existing industrial complex established on the subject land prior to flood planning provisions and understanding of flood function and behaviour. Consideration was given to modifying the design and relocation of the proposed buildings and plant / works during preparation of the proposed works to minimise potential hydraulic impacts, as noted in 3 b) above. Where practical this was undertaken. Possible flood risk management measures are addressed in Section 4.2.								
Clause 7.1 Acid sulphate soils	(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 water table 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 water table is likely to be lowered more than 1 metre below the natural ground surface.</td></tr></table>	Class of Land	Works	1	Any works.	2	Works below the natural ground surface. Works by which the water table is likely to be lowered.	3	Works more than 1 metre below the natural ground surface. Works by which the water table is likely to be lowered more than 1 metre below the natural ground surface.	The Modification Application is supported by an assessment of ASS prepared by GHD. Based on the results of previous investigations, GHD indicate that ASS may be encountered at variable depths within the proposed development areas where deep footing systems such as bored or Continuous Flight Auger (CFA) piles or trenching/excavations deeper than 1 m are required. Soft dark grey to black clays and loose grey sands were encountered at test locations within or in the vicinity of the development areas, particularly in the main plant area and at the WWTP, which are indicative of coastal ASS. Limited ASS investigations have been carried out to assess the presence of ASS. GHD recommend that an Acid Sulfate Soil Management Plan (ASSMP) be developed and actioned where excavations associated with the proposed development will disturb ASS and/or require
Class of Land	Works									
1	Any works.									
2	Works below the natural ground surface. Works by which the water table is likely to be lowered.									
3	Works more than 1 metre below the natural ground surface. Works by which the water table is likely to be lowered more than 1 metre below the natural ground surface.									

	4	Works more than 2 metres below the natural ground surface. Works by which the water table is likely to be lowered more than 2 metres below the natural ground surface.	dewatering which could result in the lowering of the water table. It is understood that ASSMPs already exist for some areas of the Main Plant and WWTP. Existing ASSMPs should be reviewed and updated to reflect changes in ground disturbance activities, quantities and guidelines. Further investigations could be considered to assess the absence or presence of ASS to better inform ASS management options during soil disturbance.
	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 water table 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: (a) the works involve the disturbance of less than 1 tonne of soil, and (b) the works are not likely to lower the watertable.	
Clause 7.4 Coastal Planning	Risk	(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.	The <i>Coastal Risk Planning Map</i> that accompanies the SLEP 2014 does <u>not</u> identify the subject land as a “<i>Coastal Risk Planning Area</i>”. The provisions of this clause therefore do not apply to the subject site.

	(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.	
Clause 7.5	(1) The objective of this clause is to maintain terrestrial biodiversity, by:	The Terrestrial Biodiversity Map that accompanies the SLEP 2014 does not identify the subject land as

Terrestrial Biodiversity	(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	including areas of Biodiversity - habitat corridor and/or Biodiversity - significant vegetation. The Modification Application is supported by a Streamlined BDAR prepared by Ecoplaning. Ecological issues are further addressed in Section 8.4 of this report.
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	(b) if that impact cannot be reasonably avoided by adopting feasible alternatives—the development is designed, sited and will be managed to minimise that impact, or (c) if that impact cannot be minimised—the development will be managed to mitigate that impact. (5) For the purpose of this clause: bank means the limit of the bed of a natural waterbody. bed, of a natural waterbody, means the whole of the soil of the channel in which the waterbody flows, including the portion that is alternatively covered and left bare with an increase or diminution in the supply of water and that is adequate to contain the waterbody at its average or mean stage without reference to extraordinary freshets in the time of flood or to extreme droughts.	
Clause 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	The Riparian Lands and Watercourses Map that accompanies the SLEP 2014 identifies a category 1 watercourse (Shoalhaven River), adjacent to the southern boundary of the Shoalhaven Starches factory site and a category 2 watercourse Abernethy’s Creek flowing through the factory site (north south). The Modification Application is supported by an assessment of the impacts that the proposed works will have on the riverbank stability of the Shoalhaven River prepared by GHD (Annexure K). This assessment also provides an assessment of the proposed works on the riparian areas of this watercourse. This issue is further discussed in Section 8.5.3 of this report.

	1", "Watercourse Category 2" or "Watercourse Category 3" on that map. (3) Before determining a development application for development on land to which this clause applies, the consent authority must consider: (a) whether or not the development is likely to have any adverse impact on the following: (i) the water quality and flows within the watercourse, (ii) aquatic and riparian species, habitats and ecosystems of the watercourse, (iii) the stability of the bed and banks of the watercourse, (iv) the free passage of fish and other aquatic organisms within or along the watercourse, (v) any future rehabilitation of the watercourse and its riparian areas, and (b) whether or not the development is likely to increase water extraction from the watercourse, and (c) any appropriate measures proposed to avoid, minimise or mitigate the impacts of the development. (4) Development consent must not be granted to development on land to which this clause applies unless the consent authority is satisfied that: (a) the development is designed, sited and will be managed to avoid any significant adverse environmental impact, or (b) if that impact cannot be reasonably avoided—the development is designed, sited and will be managed to minimise that impact, or (c) if that impact cannot be minimised—the development will be managed to mitigate that impact (5) For the purpose of this clause:	The Modification Application is supported by an Streamlined BDAR prepared by Ecoplanning and Aquatic Ecological Assessment prepared by Lesryk Environmental. Ecological issues are further addressed in Section 8.2.2 of this report. The Modification Application is also supported by an Integrated Water Cycle Management Strategy prepared by Allen Price which addresses measures to protect water quality of the Shoalhaven River.
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	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.	
Clause 7.7 Landslide risk and other land degradation	(1) The objective of this clause is to maintain soil resources and the diversity and stability of landscapes, including protecting land: (a) comprising steep slopes, and (b) susceptible to other forms of land degradation. (2) This clause applies to the following land: (a) land with a slope in excess of 20% (1:5), as measured from the contours of a 1:25,000 topographical map, and (b) land identified as “Sensitive Area” on the Natural Resource Sensitivity—Land Map. (3) Before determining a development application for development on land to which this clause applies, the consent authority must consider any potential adverse impact, either from, or as a result of, the development in relation to: (a) the geotechnical stability of the site, and (b) the probability of increased erosion or other land degradation processes. (4) Before granting consent to development on land to which this clause applies, the consent authority must be satisfied that: (a) the development is designed, sited and will be managed to avoid any significant adverse environmental impact, or	The proposed works involve land identified as sensitive land under the SLEP 2014 mapping. Under these circumstances the provisions of this clause will apply to this proposal. As outlined above in GHD have undertaken a geotechnical assessment of in relation to this Modification Proposal. This is addressed further in Section 8.5.3 of this Modification Report.

	(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 division of the Department of Finance and Services, that identifies the Council's local government area and boundary.	
Clause 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 not 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. The visual impact associated with this proposal are discussed in Section 8.9 of this Modification Report.

Clause 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	As highlighted in Section 5 above, the Australian Department of Defence have been consulted in relation to this proposal. None of the proposed works associated with this Modification Proposal that are to be situated within the Nowra Airfield Defence Aviation Area declaration as highlighted by the submission prepared by Department of Defence will have a height (including flume height) above 90 metres. In this regard the Modification Proposal does include a flare from the blower room post scrubber as part of the works to the Wastewater Treatment Plant. This flare structure will have a maximum height of 15.9 m AHD. Manildra advise that this structure is not a stack, it is a low pressure ‘candle stick’ flare with a maximum flame length of 10 metres, therefore the top of the flame will be 25.9 m AHD, with zero velocity at 90 m AHD. Under these circumstances no further assessment is with respect to this clause.
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	(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	
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Shoalhaven Development Control Plan (SDCP) 2014

Chapter G2 Sustainable Stormwater Management and Erosion / Sediment Control

The purpose of this chapter of the SDCP is to provide guidance about how to implement sustainable stormwater management and design principles for stormwater management.

The Modification Application is supported by an Integrated Water Cycle Management Strategy (WICMS) prepared by Allen Price to address the provisions of this chapter of the SDCP

The IWCMS demonstrates that operational activity of the minor works to be undertaken within the existing managed area and operational activity of the WWTP, Rail Maintenance Building, the Grain Handling Facility (Unloader, Silos, LV Substation and Weighbridge) and Conveyor are unlikely to increase stormwater pollutant export from the site.

Further the IWCMS indicates that stormwater pollutants generated from operational activity of the Northern Carpark (including future Mod 31) can be mitigated by a modifying the existing retention pond with a conventional buffer strip and detention pond.

The IWCMS indicates that potential short term stormwater quality impacts from the construction works can be mitigated by the implementation of erosion and sediment control plan and staged earthworks such that the performance objectives and criteria in Ch G2 can be satisfied.

The IWCMS concludes that the proposal is considered adequate from a stormwater management perspective and is recommended to be supported by the NSW Department of Planning, Housing and Infrastructure.

Chapter G9: Development on Flood Prone Land

The provisions of *Chapter G9: Development on Flood Prone Land* of the Shoalhaven SDCP 2014 have relevance to this proposal.

This Modification Application is supported by a Flood Compliance Report prepared by WMAwater (**Annexure D**).

Tables 11, 12 and 13 below addresses the relevant provisions (Sections 5.1 and 5.2 respectively) of Chapter G9 of the Shoalhaven SDCP 2014 having regard to the findings of the Flood Compliance Report prepared by WMAwater in relation to this Modification Proposal.

Table 11- Performance Criteria – General (Section 5.1 SDCP 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 the construction will require 40 additional contractors but no additional full time workers. Thus, there will not be a significant increase in the permanent workforce on the site or provide an additional threat to the safety of any worker during a flood.
The development or work will not unduly restrict the flow behaviour of floodwaters.	Refer Section 3 Flood Compliance Report
The development or work will not unduly increase the level or flow of floodwaters or stormwater runoff on land in the vicinity.	Refer Section 3 Flood Compliance Report. As the majority of local catchment runoff is entirely contained within land owned by Shoalhaven Starches, so also are any affectations.
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 largely within existing built-up industrial land clear of vegetation. All runoff under existing and future conditions will reach the ground in nearly identical locations, the works will have no significant impact on erosion or siltation.
The structural characteristics of any building or work that are the subject of the application are capable of withstanding flooding in accordance with the requirements of the Council.	A separate structural report will be provided.
The development will not become unsafe during floods or result in moving debris that potentially threatens the safety of people or the integrity of structures.	A separate structural report will be provided.
Potential damage due to inundation of proposed buildings and structures is minimised.	Structural failure of the works during a flood will potentially increase the rate of inflow of floodwaters from the Shoalhaven River to the northern floodplain. However, the increased rate of inflow is unlikely to cause damage to surrounding buildings or structures outside Shoalhaven Starches lands.
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 or provide an additional threat to the safety of any worker during a flood.
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 3 Flood Compliance Report
The development will not adversely affect the integrity of floodplains and floodway's, including riparian vegetation, fluvial geomorphologic environmental processes and water quality.	The works will be constructed on land designated as part high hazard floodway in the 1% AEP event. The site is mainly industrial land with nil existing vegetation (apart from grass) and is beyond the influence of normal fluvial geomorphic processes. The works will have no impact on water quality or the integrity of the floodplain and floodways.

Table 12 - Performance Criteria - General (Section 5.2 of SDCP)

Performance Criteria	Response
P2 Filling or excavation on flood prone land will meet the following:	
High hazard floodway areas are kept free of fill and/or obstructions.	Part of the works may be in a high hazard floodway as that is the only possible location for the works within the existing plant layout.
The proposed fill or excavation will not unduly restrict the flow behaviour of floodwaters.	Refer Section 3 Flood Compliance Report
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 3 Flood Compliance Report
The proposed fill or excavation will not exacerbate erosion, siltation and destruction of vegetation caused by floodwaters flowing on the land.	The works are largely within existing built-up industrial land clear of vegetation. The works will not exacerbate erosion, siltation and destruction of vegetation caused by floodwaters flowing on the land
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 proposed locations of the works are the only possible locations within the existing plant layout.
The proposed excavation does not create new habitable rooms, non-habitable storage areas or carparks with floor levels below the existing ground level.	No excavation will be undertaken apart from creation of foundations or similar. There are no proposed habitable rooms. All non-habitable and the storage of hazardous or similar material which will be flood proofed to the 1% AEP flood level (including climate change -refer Appendix C) or above.

	Any floor levels will be set as high as practical for safe access in an industrial plant.
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*Table 13 Site Specific Flood Related Development Controls – Lower Shoalhaven River
(Section 5.4.4 of DCP)*

Specific Controls	Response
INDUSTRIAL DEVELOPMENT AT BOMADERRY	
The potential hydraulic effects of any future construction works shall be minimised through locating them in the “shadow” of other buildings or away from the main flow paths where possible.	Refer responses in Section 5.3 and 5.4.of the Flood Compliance Report.
Any proposed works must be designed and located to minimise any increase in flood damages to other users/occupiers of the floodplain.	Refer responses in Section 5.3 and 5.4.of the Flood Compliance Report.
A full hydraulic assessment will be required prior to any future development or redevelopment to assess the potential impacts upon flooding.	Refer responses in Section 5.3 and 5.4.of the Flood Compliance Report.

8.2 ENVIRONMENTAL PLANNING & ASSESSMENT (EP&A) ACT

The EP&A Act is the principal planning and development legislation in New South Wales. Section 4.36(2) of the EP&A Act declares development that is state significant development (SSD), and further details that a State Environmental Planning Policy may declare any development to be SSD. This is further discussed in Section 5.2.9 below.

The proposal is identified as SSD under State Environmental Planning Policy (Planning Systems) 2021 (the “Planning Systems SEPP”).

Section 4.38 outlines the parameters for which the consent authority is to determine a development application in respect of State significant development including a development being partly prohibited by an environmental planning instrument under section 4.38 (3).

Sections 4.41 and 4.42 identify the relevant approvals that are not required for developments classified as state significant developments. Upon consideration of the types of approvals applied under this part, the following permits were determined to be applicable to the proposed development:

- An environment protection licence under Chapter 3 of the Protection of the Environment Operations Act 1997 (for any of the purposes referred to in section 43 of that Act); and
- A consent under section 138 of the Roads Act 1993.

8.2.1 PROTECTION OF THE ENVIRONMENT OPERATIONS ACT AND ASSOCIATED REGULATIONS

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

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

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

8.2.2 BIODIVERSITY CONSERVATION (BC) ACT & REGULATIONS

The NSW Biodiversity Conservation Act 2016 (BC Act) establishes the biodiversity assessment requirements for proposed developments and land use change. The BC Act comprises a mandatory framework for addressing impacts on biodiversity from development and clearing. The framework includes the Biodiversity Offsets Scheme (BOS) and assessment methodologies such as the Biodiversity Assessment Method (BAM). When the BOS is triggered, a Biodiversity Development Assessment Report (BDAR) is required, and the BAM must be applied.

Triggers for the BOS include:

- Exceeding the native vegetation clearing threshold (based on minimum lot size)
- Direct impacts occurring on land identified on the Biodiversity Values Map (BVM)
- A significant impact on threatened species or threatened ecological communities (or their habitat)

The proposed development will impact an area containing mapped biodiversity values that are not biodiversity certified (Figure 8). The BVM indicates, according to Ecoplanning, that the mapped area contains threatened species or communities with potential for serious and irreversible impacts' (SAIL). Given the Modification Proposal may have impacts on land included on the BVM, the BOS is triggered and the preparation of a BDAR is required.



Figure 8 : Biodiversity Values Mapping and the site, Source : Ecoplaning

When the BOS is triggered but impacts to native vegetation or biodiversity may be low, the BAM provides an option to prepare a BDAR using a Streamlined Assessment. Streamlined Assessments only assess impacts on threatened species that are at risk of Serious and Irreversible Impacts (SAILs).

This Modification Proposal is supported by a BDAR prepared by Ecoplaning that uses the Streamlined Assessment module for small area developments, as outlined in Appendix C of the BAM (DPIE 2020a). Ecoplaning indicate that the small area module may be used where vegetation clearing is below the clearing threshold associated with the minimum lot size of the development site. The native vegetation clearing threshold associated with the development site is 0.25 ha. In accordance Table 12 of Appendix C in the BAM (DPIE 2020a), a small area module is appropriate to apply as only 0.08 ha of native vegetation is proposed for clearing.

Ecoplaning advise that the streamlined assessment module cannot be used if the Biodiversity Values within the subject land are mapped as core koala habitat identified in a plan of management under the State Environmental Planning Policy (SEPP) (Biodiversity and Conservation) 2021. There is no approved Koala Plan of Management associated with the subject land. The reporting requirements for the Streamlined BDAR prepared by Ecoplaning are taken from Appendix C and Table 27 of the BAM.

The terrestrial ecological impacts associated with this Modification Proposal are further discussed in Section 8.4.

8.2.3 COASTAL MANAGEMENT ACT 2016

As outlined in Section ? below, the Modification Proposal in part includes the extension of an existing rock revetment wall along part of the Shoalhaven Riverbank frontage to the subject site.

Section 4.1 of the Coastal Management Act 2016 defines coastal protection works to mean:

- (a) beach nourishment activities or works, and*
- (b) activities or works to reduce the impact of coastal hazards on land adjacent to tidal waters, including (but not limited to) seawalls, revetments and groynes.*

As these waters of the Shoalhaven River adjacent to the subject site are tidal; and given these works involve a revetment wall; such works could be considered a ‘coastal protection works’.

Section 27 of this legislation stipulates:

27 Granting of development consent relating to coastal protection works

- (1) Development consent must not be granted under the Environmental Planning and Assessment Act 1979 to development for the purpose of coastal protection works, unless the consent authority is satisfied that—*
 - (a) the works will not, over the life of the works—*
 - (i) unreasonably limit or be likely to unreasonably limit public access to or the use of a beach or headland, or*
 - (ii) pose or be likely to pose a threat to public safety, and*
 - (b) satisfactory arrangements have been made (by conditions imposed on the consent) for the following for the life of the works—*
 - (i) the restoration of a beach, or land adjacent to the beach, if any increased erosion of the beach or adjacent land is caused by the presence of the works,*
 - (ii) the maintenance of the works.*
- (2) The arrangements referred to in subsection (1)(b) are to secure adequate funding for the carrying out of any such restoration and maintenance, including by either or both of the following—*

(a) by legally binding obligations (including by way of financial assurance or bond) of all or any of the following—

- (i) the owner or owners from time to time of the land protected by the works,
- (ii) if the coastal protection works are constructed by or on behalf of landowners or by landowners jointly with a council or public authority—the council or public authority,

Note—

The Environmental Planning and Assessment Act 1979, section 4.17(6) provides that a development consent may be granted subject to a condition, or a consent authority may enter into an agreement with an applicant, that the applicant must provide security for the payment of the cost of making good any damage caused to any property of the consent authority as a consequence of the doing of anything to which the consent relates.

(b) by payment to the relevant council of an annual charge for coastal protection services (within the meaning of the Local Government Act 1993).

(3) The funding obligations referred to in subsection (2) (a) are to include the percentage share of the total funding of each landowner, council or public authority concerned.

Comment

With respect to the above provisions:

- Given Shoalhaven Starches land holding extends up the MHWL, there is no physical public access along this river frontage. Further the proposed works are not situated within the vicinity of a “beach or headland”. Under these circumstances the proposed works will not unreasonably limit or be likely to unreasonably limit public access to or the use of a beach or headland.
- The Modification is supported by a geotechnical assessment prepared by GHD which includes recommendations for the construction of these works. Under these circumstances it is considered the works should not pose a risk to public safety.
- It is understood that a condition may be imposed on any approval requiring satisfactory arrangements to be entered into for the on-going maintenance of the works in question.

8.2.4

FEDERAL ENVIRONMENT AND BIODIVERSITY CONSERVATION (EPBC) ACT

The EPBC Act establishes a process for assessing the environmental impact of activities and developments where Matters of National Environmental Significance (MNES) may be affected. Under the Act any action which “has, will have, or is likely to have a significant impact on a matter of national environmental significance” is defined as a “controlled action”, and requires approval from the Commonwealth Department of the Environment and Energy (DoEE) who are responsible for administering the EPBC Act.

The Commonwealth has developed Significant Impact Guidelines (DotE 2013) and conservation advice for each MNES, to provide assistance in assessing impacts on MNES and help decide whether or not a referral to the Commonwealth is required.

The streamlined BDAR carried out by Ecoplanning has been undertaken in accordance with the provisions of this legislation. With respect to the provisions of this legislation Ecoplanning states the following:

Following review of the results of a Protected Matters Search Tool Report (Commonwealth DCCEE 2025) and field surveys (as part of this BDAR) of the subject land one MNES is present within the subject land. Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland is an Endangered Ecological Community listed under the EPBC Act. This community was considered as part of this assessment, however the vegetation within the subject land does not meet the minimum condition thresholds to be valid for assessment under the EPBC Act.

The Grey-headed Flying-fox is listed as Vulnerable under the EPBC Act. Foraging habitat is present in the study area in the form of native and exotic flowering trees and shrubs. A significant impact assessment in accordance with the Significant Impact Guidelines (DotE 2013) has been undertaken and is provided in Appendix D. This assessment has determined that no significant impact to the species will occur as a result of the proposal

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

8.3.1 RISK ASSESSMENT OF POTENTIAL ENVIRONMENTAL IMPACTS

The purpose of this section of the Modification Report is to provide a risk assessment of the potential environmental impacts associated with the modification proposal. This section (**Table 13**) compares the potential impacts from the proposed modification against the approved project. The comparison uses the key environmental impacts assessed in the original EA that supported the original MP06_0228 and summarises the relative change in environmental impacts associated with the proposed modification.

Table 14 – Risk Assessment

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 air quality assessment (including odour assessment) and reduction of odours as part of the project. The Modification Application is supported by an Air Quality Assessment prepared by GHD (Annexure A). Potential impacts associated with dust emissions during construction of the proposed modification were assessed by GHD. The risk identified for all receptor types according to GHD was low risk during excavation works, and negligible risk during demolition, construction and from trackout. Recommendations for dust management during construction have been formulated by GHD to further reduce the risk of dust impacts from construction of the proposed modification. A quantitative assessment utilising dispersion modelling was adopted by GHD to assess odour and air pollutant (including particulates, combustion pollutants and metals) emissions. An updated odour emissions inventory was prepared based on the findings of the Odour PRS and NSW EPA feedback. This incorporated the proposed effluent storage dam, farm tank and membrane bioreactor, and updates to the combined stack for number 5 and 6 boilers and no. 1 starch dryer. Odour	The AQIA prepared by GHD proposes the following odour management and mitigation measures. <i>To inform odour management and mitigation, a source contribution analysis was undertaken at each of the twelve residential receptors. The analysis identified the following sources where mitigation efforts would be most effectively focused to minimise off site odour impacts:</i> • <i>Ethanol Recovery Scrubber Discharge (ERESC) – this source contributed an average of 15% of odour impacts during the worst case hour at the receptors</i> • <i>No. 3 Gluten dryer baghouse (S03) – this source contributed an average of 14% of odour impacts during the worst case hour at the receptors</i> • <i>Pellet Plant exhaust stack (PPES) – this source contributed an average of 39% of odour impacts during the worst case hour at the receptors</i> • <i>Combined Boiler Stack for No. 5 & 6 Boilers (BOILR5) – this source contributed an average of 17% of odour impacts during the worst case hour at the receptors.</i> <i>If additional odour mitigation is required (e.g. if complaints are received or if increasing concentrations are observed during quarterly sampling), it is recommended that further investigation is undertaken</i>	This issue is further addressed in Section 8.3.2 of this Modification Report.

emissions inventories were prepared for the average of the last four quarters, as well as the highest quarter from the last four quarters (2023- 2024 Q4) and the second highest quarter (2025-2026 Q4).

The results of the odour modelling carried out by HGHD predict compliance with the odour criteria for the second highest quarter (2025-2026 Q1) and the average sampling data scenario.

Exceedances were predicted for the scenario using sampling data from the highest quarter (2024-2025 Q4) at six residential receptors. Shoalhaven Starches is currently investigating the spike in Q4 2024-2025 quarterly odour of testing, which includes additional odour sampling, to determine the cause.

A source contribution analysis was undertaken by GHD and recommendations have been formulated to investigate potential management and mitigation options to reduce off-site odour impacts.

Review of recent odour complaints by GHD concluded that relatively few complaints have been received in recent years. Recent field ambient odour assessments indicate that odour was not often detectable offsite, and on occasions where odour was detectable, it was characterized as either 'Very Weak' or 'Weak'. The odour surveys tend to support model findings of predicted odour concentrations within the NSW EPA criteria range. Odours classified as weak would likely be below 5 OU which is often attributed as an annoyance threshold for odour.

into the above identified sources to determine potential odour management and mitigation options.

The above source contributions were identified based on the average quarter sampling data. Off site odour impacts are dependent on the worst case sources during a particular quarter. Therefore when complaints are received or if increasing concentrations are observed during quarterly sampling, the worst case contributing sources for that quarter should be investigated.

The findings of the odour sampling should be compared against the odour emission rate assumptions adopted in this report (refer Section 6.1.5.2). Should significant discrepancies (differences) between the model assumptions and sampled results be identified, it is recommended that Manildra conduct an internal investigation to determine likely reasons/causes for the differences. Implementation of additional odour mitigation and management measures should be considered if odour emissions are higher than assumed in this assessment.

An air pollutant emissions inventory was prepared by GHD incorporating the proposed conveyor dust collector system, wheat silo vent, and starch and gluten storage silo baghouses, as well as updates to the stack parameters for the combined stack for no. 5 and 6 boilers. Compliance with the assessment criteria was predicted by GHD at all receptors for all pollutants.		
Transport and Traffic		
The Modification Application is supported by a Traffic Impact Study (TIS) prepared by Anton Reisch Consulting (Annexure E). The TIS concludes: the construction and operation of the MOD 26 infrastructure is supportable further to access, traffic and parking considerations.	ARC have prepared a Draft CTMP has been prepared to ensure that the construction of the MOD 26 infrastructure can be undertaken safely and efficiently without impacting the local road network. The CTMP will be finalised further to consideration of any future Conditions of Consent in a Modification approval, and implemented prior to any construction work commencing and then for the during of the construction works.	This issue is further addressed in Section 8.7 of this Modification Report.
Site Contamination		
The Modification Application is supported by site contamination assessment undertaken by GHD. Based on investigation results, potential for contamination was identified by GHD in 15 areas of environmental concern (AECs) potentially impacting soil, surface water and/or groundwater. The occurrence of contamination (if present) is expected to be localised. The likelihood for contamination to exist within the identified AECs was assessed as very low to high. Potential source-pathway-receptor (SPR) linkages were assessed and could be complete, if contamination were present, for: - Human receptors: - Construction workers/visitors that have direct contact with soil and groundwater may be	Based upon the findings of their assessment, GHD, outline the following recommendations to further assess or mitigate contamination risks: <i>Based on the results of this PSI for contamination, a Targeted Site Investigation (TSI) is recommended for AECs where the likelihood of contamination to exist is assessed as moderate to high and high, to assess if SPR linkages are complete. AECs where the likelihood of contamination was assessed as moderate, low to moderate, low and very low can be managed at the time of construction should contamination be encountered.</i>	This issue is further addressed in Section 8.5.1 of this Modification Report.

exposed to contamination via dust and vapours (via inhalation) generated during excavation or installation of piles. - Ecological receptors: - During construction, in the vicinity of Shoalhaven River and Abernethys Creek, potential impacts to aquatic species is possible from the mobilisation of contaminants from soil and / or groundwater. - Additional potential for exposure to soil and perched groundwater may occur during the construction phase where hardstand areas may be removed, or soil exposed in resulting excavations, in areas outside of the main plant.	- An Asbestos Management Plan (AMP) is recommended for AEC 2, however would also be applicable to manage other areas where asbestos is encountered during construction as an unexpected find. The AMP should be developed in line with the current NSW WHS Act (2011) and Regulation (2025), NEPC (2013), WA DoH (2021), and relevant Codes of Practice (SafeWork NSW, 2014; 2019a; 2019b) as a means to comply with asbestos regulation and prevent (so far as is reasonably practicable) or minimise exposure to hazards including airborne asbestos. - It is recommended that a Construction Environmental Management Plan (CEMP) be prepared to manage the potential contaminant exposure risks during construction activities, and manage potential unexpected finds (e.g. buried waste, demolition waste, ACM, etc.) that could be encountered. Therefore, the CEMP should also include an Unexpected Finds Protocol (UFP). A site-specific Work Health Safety and Environment (WHSE) plan should be prepared, to ensure appropriate safety and workplace hygiene practices are implemented to minimise potential risks from exposure to contamination. The WHSE plan must address all relevant regulatory requirements and as a minimum, should consider incorporating the relevant practices set out in CRC Care (2018) National Remediation Framework: Guideline on health and safety, Version 0.1: August 2018. The CEMP should also make reference to the AMP.	
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	Site workers should be advised of the potential contamination risks at the sites and have appropriate personal protective equipment (PPE) available should contamination be encountered and have also read and understood management documents that apply to the construction sites.	
Acid Sulphate Soils (ASS)		
The Modification Application is supported by ASS assessment undertaken by GHD. Based on the results of previous investigations, GHD indicate that ASS may be encountered at variable depths within the proposed development areas where deep footing systems such as bored or Continuous Flight Auger (CFA) piles or trenching/excavations deeper than 1m are required. Soft dark grey to black clays and loose grey sands were encountered at test locations within or in the vicinity of the development areas, particularly in the main plant area and at the WWTP, which are indicative of coastal ASS. Limited ASS investigations have been carried out to assess the presence of ASS.	GHD recommend that an Acid Sulfate Soil Management Plan (ASSMP) be developed and actioned where excavations associated with the proposed development will disturb ASS and/or require dewatering which could result in the lowering of the water table. It is understood that ASSMPs already exist for some areas of the Main Plant and WWTP. Existing ASSMPs should be reviewed and updated to reflect changes in ground disturbance activities, quantities and guidelines. Further investigations could be considered to assess the absence or presence of ASS to better inform ASS management options during soil disturbance.	This issue is further addressed in Section 8.5.2 of this Modification Report.
Salinity potential		
GHD have also addressed soil salinity. GHD indicate environmental monitoring results between 2012 and 2024 indicate soils in paddocks at the WWTP range from moderately saline to extremely saline, where highest salinity is recorded in the upper 0.1 m of the soil profile. Electrical conductivity (EC) concentrations were variable across the monitoring period. Groundwater EC results indicate moderate salinity but are stable and remained consistent with long term averages. There were no visual signs of salt accumulation or shift towards salt tolerant species observed during fieldwork.	Based on the results of this preliminary salinity assessment, site soils may have saline concentrations which could adversely affect very sensitive crops. GHD therefore recommend that: - Soil sampling be undertaken to assess the salinity potential within the eastern portion of the site. - The effects of salinity on foundations be assessed as part of future detailed geotechnical investigations in accordance with AS 2159 – 2009 Piling – Design and Installation	This issue is further addressed in Section 8.5.5 of this Modification Report.
Noise		



A Noise & Vibration Impact Assessment prepared by GHD in relation to this Modification Application. GHD conclude:

A construction noise assessment was undertaken to determine potential for increased noise levels at sensitive receivers. Construction noise management levels were established using background noise levels which were established using the conducted background noise monitoring. Four construction scenarios were modelled to predict noise levels at representative sensitive receivers. The predicted noise levels indicate that the noise management levels for all construction scenarios are exceeded at several sensitive receivers. As such, mitigation measures have been recommended in Section 8.1.

Noise sources associated with the operation of the proposed modification were identified and modelled in the site wide noise model developed by GHD as part of the noise pollution reduction program. The predicted noise levels from the proposed modification were assessed against design noise goals and shows compliance with the design noise goals at all sensitive receivers.

It is noted that reduced sound power levels were adopted for equipment which was found to contribute significantly to the overall noise levels of the modification. To ensure noise levels of the proposed modification achieve the design noise goals, the further detailed design of the modification must implement mitigation measures to reduce noise emission to achieve the sound power levels presented in Section 6.1.

Recommended construction mitigation measures are provided in Section 8.1 and recommendations for further detailed design of the proposed modification to minimise operational noise are provided in Section 8.2. of the Noise & Vibration Impact Assessment respectively.

Noise impacts are further addressed in Section 8.3.3 of this Modification Report.



The analysis for annoying noise characteristics was undertaken and found that the proposed modification does not contain tonal or low frequency noise characteristics.

Additionally, cumulative noise levels of the following scenarios have been predicted:

- Current operations including the proposed modification and the rail line
- Current operations including all approved but not yet constructed modifications, the proposed modification and the rail line.

Predicted noise levels were analysed for annoying noise characteristics and found low frequency noise to be present at all sensitive receivers. The noise levels were assessed against the EPL noise limits, which shows exceedances at all sensitive receivers from existing noise sources. However, for acoustic compliance data, the bi annual compliance data should be referred to.

Nonetheless, the proposed modification is anticipated to have no contribution to the overall noise levels from the site as the predicted noise levels are below the design noise goals.

Hazards

A Site Hazard Analysis prepared by Pinnacle Risk Management (PRM). PRM concludes that the risks associated with the plants and equipment at the Shoalhaven Starches Bomaderry site have been assessed and compared against the Department of Planning (DoP) risk criteria in this report. Based on the assessments in this report, Pinnacle Risk Management indicate all the DoP risk criteria are satisfied. Societal risk, area cumulative risk, environmental risk and propagation risk is also concluded to be acceptable given the existing controls and results of the consequence modelling. The primary reason for the low risk levels from the site's plants and equipment according to Pinnacle Risk Management is that significant levels of radiant heat from potential fires, overpressures from dust explosion vents and hydrogen sulphide releases from the biogas system are mostly contained on-site.	The following recommendations are made by PRM for this Modification Proposal: 1. <i>Ensure that all explosion vents (non-flameless as well as flameless) are directed to a safe location. They should not, for example, be directed to where people work or use walkways.</i> 2. <i>Include in the HAZOP study the nitric acid tank, in particular, how the road tanker transfer system is cleared at the end of the tank filling operation and also the reliability of the scrubber. This is required given the potential to release acidic vapours and nitrogen oxides that can be harmful to personnel local to the tank.</i> 3. <i>Ensure that fire water protection is available as per the requirements of AS2419, in particular, to the proposed equipment at the former Dairy Farmers site; and</i> 4. <i>The design details for the proposed silos and associated equipment items, e.g. the silos' design pressure and explosion vents details, are not currently available. Whilst the corresponding risks are not expected to be intolerable, the modelling of potential dust explosions is to be performed once these design details are known.</i>	This issue is further addressing Section 8.3.4 of this Modification Report.
Flooding The subject site is inundated during the 1% Annual Exceedance Probability (AEP) flood event by floodwaters from the Shoalhaven River. The sites are categorised as high hazard floodway and high hazard flood storage. This Modification	WMAwater outline that there are no viable means of reducing the increase in peak flood levels resulting from these works. One of the most beneficial and practical means of reducing flood damages to existing buildings and risk to life is to improve the awareness and preparedness of the occupants or	This issue is further addressed in Section 8.3.5 of this Modification Report.



Application is supported by a Flood Compliance Report prepared by WMAwater. In summary, WMAwater outline the maximum cumulative increases in flood level since 1990 are shown below. However, in all three events most areas only experience a maximum increase of up to 0.1m on land outside of that owned by Shoalhaven Starches. ○ 5% AEP – up to 0.05m ○ 1% AEP – up to 0.1m ○ PMF – up to 0.2m (Figure 12). The maximum incremental increases in flood level since November 2025 are shown below. However, the increases are predominantly within land owned by Shoalhaven Starches. ○ 5% AEP – up to 0.01m , ○ 1% AEP – up to 0.01m , ○ PMF – up to 0.05m .	employees. There are several ways of undertaking such a scheme and these are outlined in Table 4 of the Flood Compliance Report and most require involvement by Council and / or the SES. Funding a scheme would assist in improving the community's flood awareness and consequently reducing flood damages and risk to life for all floodplain occupiers.	
Waste Management		
The proposed modifications will not alter the way waste is managed on the site. The site is already subject to an existing Waste Management Plan prepared in accordance with the original Project Approval.	No additional management or mitigation measures proposed, although any approval for this Modification Application should require the existing Waste Management Plan to be revised to incorporate the elements that form part of this Modification Application.	Not a key issue. This issue is not further addressed in this Modification Report.
Site Stormwater Management		



The Modification Application is supported by a IWCMS prepared by Allen Price . According to Allen Price the IWCMS demonstrates that operational activity of the minor works to be undertaken within the existing managed area and operational activity of the WWTP, Rail Maintenance Building, the Grain Handling Facility (Unloader, Silos, LV Substation and Weighbridge) and Conveyor are unlikely to increase stormwater pollutant export from the site. Stormwater pollutants generated from operational activity of the Northern Carpark (including future Mod 31) can according to Allen Price be mitigated by a modifying the existing retention pond with a conventional buffer strip and detention pond. Potential short term stormwater quality impacts from the construction works can also, according to Allen Price, be mitigated by the implementation of erosion and sediment control plan and staged earthworks such that the performance objectives and criteria in Ch G2 can be satisfied. The proposal is considered by Allen Price to be adequate from a stormwater management perspective and is recommended to be supported by the NSW Department of Planning, Housing and Infrastructure.	The IWCMS prepared by Allen Price includes conceptual soil & water management and stormwater plans for the proposed works.	This issue is further addressed in Section 8.6.2 of this Modification Report.
Visual Impact		
The Shoalhaven Starches factory site is situated on Bolong Road, the gateway to Bomaderry, within an area currently containing a mixture of rural and industrial land uses. These different land uses contrast with each other and result in a mixed visual character. The rural areas, much of which comprises the Shoalhaven Starches Environmental Farm, are generally flat to gently undulating and planted with pasture grasses. These areas have a typical rural/agricultural character, common throughout the	It is note anticipated that the Modification Proposal will result in a significant visual impact within the broader locality given the proposed works are largely located within the confines of the exist89ing developed areas of the Shoalhaven Starches operations. No additional mitigation measures are proposed to reduce	The visual impacts associated with this modification proposal are addressed in Section 8.9 of this Modification Report.

region. To the north and forming a background to the rural landscape are the timbered slopes of the Cambewarra escarpment. The Shoalhaven Starches factory complex is characterised by typical industrial structures with an overall bulk and scale that dominates the surrounding locality. The site, despite being partially screened by vegetation along Bolong Road, the Shoalhaven River and Abernethy's Creek visually dominates the immediate locality. The development is particularly exposed to view along Bolong Road. This view reveals some of the internal structures within the site including recovery and storage tanks, car park, fermentation tanks and the Ethanol Plant. Overall, the appearance of the site is typical of an industrial facility of this scale and nature. Section 8.9 of this Modification Report addresses the visual impacts associated with this Modification Proposal.		
Flora and Fauna		
The Modification Proposal will impact an area containing mapped biodiversity values that are not biodiversity certified. The Biodiversity Values Mapping indicates that the mapped area contains threatened species or communities with potential for serious and irreversible impacts' (SAIL). Given the proposed development may have impacts on land included on the BVM, the BOS is triggered and the preparation of a BDAR is required. The Modification Application is supported by a streamlined BDAR prepared by Ecoplanning.	As all impacts to biodiversity cannot be avoided by the proposal, the mitigation measures proposed by Ecoplanning below will assist with ensuring that direct and indirect impacts are mitigated to the fullest extent practical. • Preparation of a Construction Environmental Management Plan including: ○ Formulation of Pre-clearance protocols	This issue is further addressed in Section 8.4 of this Modification Report.

	Site management and construction controls Ecoplanning also conclude that a biodiversity offset requirement for residual impacts of a proposed development must be calculated in accordance with Section 10.1 and Section 10.2 of the Biodiversity Assessment Method (BAM). The streamlined BDAR prepared by Ecoplanning outlines the credit requirements for the proposed development to achieve the 'no net loss standard' established by the BAM.	
The Modification Application is also supported by an Aquatic Assessment prepared by Lesryk Environmental. The field investigation and desktop review undertake by Lesryk Environmental for this assessment provide a characterisation of the estuarine habitats present within, and adjacent to, the proposed works. Field investigations confirmed the presence of sandy and silty substrates, scattered cobbles and pebbles, accumulations of woody debris, isolated boulders, small patches of <i>Avicennia marina</i> (Grey Mangrove), and the existing rock revetment wall. No seagrass beds, saltmarsh, or other mapped sensitive estuarine habitats were detected. According to Lesryk Environmental comparison with government spatial datasets revealed a discrepancy between previously mapped estuarine macrophytes and observations made in the field investigation. While Fisheries NSW and SEED portal mapping indicated the historical presence of seagrasses (e.g., <i>Zostera</i> spp.) near the subject site, these features were not detected during tow camera transects or SCUBA inspections. This indicates that available mapping in the	To ensure that residual impacts are minimised and ecological values maintained, Lesryk Environmental have recommended a suite of bio-engineered solutions and habitat management measures are outlined in section 7 of the Aquatic Assessment.	This issue is further addressed in Section 8.4.1 of this Modification Report.



locality is outdated or inaccurate, and that seagrass meadows are no longer present near the proposed activity.

The works to extend the existing revetment wall are not considered by Lesryk Environmental to have a serious and irreversible impact to key fish habitats or fisheries resources as these were not observed to be present in the areas investigated.

While the Shoalhaven River is classified more broadly as Class 1 – Major key fish habitat under the Policy and guidelines for fish habitat conservation and management – Update 2013, assessment of the observed habitats by Lesryk Environmental against the criteria set out in the Guidelines determined that all aquatic habitats within the study area conform to Type 2 KFH. These habitats provide foraging opportunities, shelter, and structural complexity for fish and other aquatic biota, but do not meet the criteria for Type 1 KFH, which include critical habitats such as seagrass meadows, saltmarsh, and recognised spawning or nursery grounds. This means that the works footprint, and adjacent areas potentially subject to indirect impact, contain estuarine habitats of moderate ecological importance and that potential impacts can be managed effectively through the application of appropriate mitigation and management measures during construction.

Based on the outcomes of the field survey, Lesryk Environmental indicate it is not considered that the works within the section of the Shoalhaven River that are to be impacted by the proposed activity will be inconsistent with the objectives of the FM Act. The works will not affect fish stocks, key fish habitats, threatened species or marine vegetation.



Heritage and Archaeological		
The Modification Application is supported by a Heritage Impact Statement prepared by Apex Archaeology which concludes that the proposal will not impact on any heritage items in the vicinity of the site and is not considered to have any impact on any Aboriginal heritage values. The Modification Application is also supported by an Aboriginal Due Diligence Assessment prepared by Apex Archaeology which identified no areas of archaeological potential within the area associated with this proposal.	In terms of Aboriginal cultural heritage, Apex Archaeology recommend in part that: • No further Aboriginal archaeological assessment is <i>required prior to the commencement of development works as described in this report.</i> • <i>This due diligence assessment must be kept by the Manildra Group of Companies so that it can be presented, if needed, as a defence from prosecution under Section 86(2) of the National Parks and Wildlife Act 1974.</i> • <i>The results of this assessment fulfil the requirement for archaeological assessment in accordance with the 2010 Guide to Investigation, assessing and reporting on Aboriginal cultural heritage in NSW and the Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales (Code of Practice).</i> • <i>The proposed works must be contained to the area assessed during this archaeological assessment, as shown on Figure 2. If the proposed location is amended, further archaeological assessment may be necessary to determine if the proposed works will impact any Aboriginal objects or archaeological deposits.</i> • <i>Should unanticipated archaeological material be encountered during site works, all work must cease and an archaeologist contacted to make an assessment of the find. Further archaeological assessment and Aboriginal community consultation may be required prior to the recommencement of works. Any objects confirmed to be Aboriginal in origin must be reported to Heritage NSW</i>	These issues are further addressed in Section 8.10 of this Modification Report.

	In terms of non-indigenous heritage, Apex Archaeology recommend that should unanticipated archaeological material be encountered during site works, all work must cease and an archaeologist contacted to make an assessment of the find. Further archaeological assessment may be required prior to the recommencement of works. Any historical objects must be reported to Heritage NSW.	
Effluent Irrigation and Storage		
This Modification Application is supported by a feasibility assessment for the irrigation of treated wastewater prepared by Earthwise Environmental (EE). The process of converting wheat flour into these products requires the use of large volumes of freshwater drawn both from the Shoalhaven City Council (SCC) drinking water supply and recovered water from Manildra's own reverse osmosis (RO) treatment plant. The raw untreated wastewater from the SHS plant is pumped to the Manildra owned Shoalhaven Starches Environmental Farm (SSEF) to undergo multiple stages of anaerobic, aerobic and tertiary treatment (via RO). The RO retentate (or reject water) which is high in nutrients and salts is typically blended with the less saline treated wastewater before being irrigated over an effluent utilisation area (EUA) covering approximately 520 hectares (ha). A detailed overview of the water treatment process is outlined in the SHS Wastewater Management Plan (WMP) (EE, 2023).	The following measures are proposed by EE to address the site limitations and risks and to ensure the long term sustainability of wastewater irrigation at the SSEF. • Irrigation of treated wastewater in accordance with NSW EPA guidelines titled "Environmental Guidelines - Use of effluent by irrigation" (NSW DEC, 2004) and the SHS WMP (EE, 2023) • Irrigation of the treated wastewater should only take place within the irrigation areas outlined in the SHS irrigation master plan, or SLP (Allen, Price & associates, 2007). Irrigation scheduling should ensure that the wastewater is irrigated across the farm uniformly to ensure an even application of wastewater, salt and nutrients. • Erosion prevention in accordance with the NSW Department of Primary Industries publication "Saving Soils - A landholder's guide to preventing and repairing soil erosion" (Alt, Jenkins, & Lines Kelly, 2009). • Soil phosphorus levels have been persistently high for many years and rates of removal are slow but steady. It is foreseen	This issue is further discussed in Section 8.8 of this Modification Report.

SHS is licensed to irrigate the wastewater under their NSW Environmental Protection Authority (EPA) Environmental Protection Licence (EPL) No 883. Irrigation practices were initially guided by the 2011 WMP prepared by Murtagh & Lugg, and in 2023 the WMP was reviewed and updated by Earthwise Environmental (EE, 2023).

Shoalhaven Starches (Manildra Group) is proposing a wastewater treatment plant (WTP) upgrade at the SSEF to increase treatment capacity, improve water recycling, and enhance biogas recovery as part of the Mod26 plant expansion and upgrades. Wastewater inflows to the WTP are forecast to increase from ~11.5 ML/d to ~15.6 ML/d. With expanded MBR/RO capacity, factory reuse will rise from ~7.0 ML/d to ~13.0 ML/d, reducing treated wastewater irrigation from ~3.1–3.4 ML/d currently to ~2.6 ML/d post-upgrade. While volumes are expected to decrease, the proportion of RO retentate in the irrigation water will increase, elevating nutrient and salinity concentrations.

These changes will influence irrigation practices at the SSEF, with less water but more concentrated nutrient and salt loads requiring careful management. The expansion of the SHS plant is expected to alter the quality and quantity of the irrigated wastewater and may lead to potential impacts on-site and off-site to the local environment.

As part of the Mod 26 application, the NSW EPA requested that SHS provide an assessment of the sustainability of the effluent irrigation scheme, addressing:

- suitability of the irrigation area, including site, soil, and groundwater limitations and mitigation measures;

that no P based fertilizers will be needed to maintain or boost pasture growth in the foreseeable future and therefore should not be used until soil and plant tissue analysis indicates otherwise. Soil P levels should continue to be monitored (at the surface and down the profile) and reported on an annual basis in the soil and groundwater monitoring report.

- Monitoring of wastewater quality in accordance with the SHS WMP (EE, 2023). For the first 12 months post-upgrade, wastewater volumes and chemical composition (salinity, nutrients, metals) should be monitored on a monthly basis, rather than quarterly, to ensure that wastewater is appropriately characterised and to enable timely review and adjustment of the WMP. Following this initial period, monitoring may revert to a quarterly regime, subject to EPA approval and evidence that wastewater quality has stabilised.
- Soil and groundwater monitoring in accordance with the SHS WMP (EE, 2023)
- Continue testing of plant tissue in accordance with the SHS WMP (EE, 2023)
- Install at least six piezometers in low-lying areas of the SSEF (e.g. Pivots 1, 2B, 3, 4, 5, 7) to allow farm management to assess watertable depth prior to irrigation. If groundwater is within 0.5 m of the surface and surface ponding is evident, irrigation should be withheld, and wastewater retained in storage until conditions improve. Piezometer readings should be supported by simple on-ground checks (e.g. walking paddocks to assess firmness underfoot or using a shovel to examine soil moisture and structure), ensuring that decisions reflect both monitoring data and field conditions.

• present and expected wastewater quality and loading rates; • current and expected nutrient, salt, and water balances with respect to land carrying capacity; • irrigation method and mitigation measures (as outlined in the Shoalhaven WMP, EE 2023); and • ongoing soil and water monitoring, including management criteria and responses (Shoalhaven WMP, EE 2023).	• Continual monitoring of wastewater EC (salinity) levels once the upgrade is complete. At least 12 months of real-time (or very frequent, i.e., daily) data is needed. • If the target EC value of < 3,800 dS/m is frequently exceeded salt levels may require management via dilution with less saline water (such as harvested fresh rainwater) or other suitable salt reduction measure. A lower EC threshold may be required if field observations or soil monitoring indicate an excess buildup of salt. • Continue silage and pasture harvesting to remove accumulated salts and nutrients. Select crops with high sodium and nutrient uptake rates (e.g. ryegrass, millet) in preference to species with lower sodium uptake rates (e.g. maize). • Contact a CPSS (or equivalent) if pastures or crops show unexpected signs of failure or groundcover rapidly diminishes. ▪ Review and update the SHS WMP by EE (2023) after 12 months of operation, The updated WMP should include: ° ▪ Review of total wastewater volumes, the amount of water recovered, and the amount of water irrigated. ▪ a review of wastewater quality (salt and nutrients) ▪ Results for water hardness (pH, EC, Na, Cl, CaCo3, Mg, Ca) for 100% retentate and then follow up results after this water is blended with less hard water (i.e., at the point of irrigation). This should provide an indication of dilution. ▪ Updated nutrient and salt balances ° Review of soil and groundwater monitoring results	
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Wastewater Treatment		
Water Discharges The Shoalhaven Starches Factory and Environmental Farm are licensed premises under the Protection of the Environmental Operations Act. Wastewater discharges from the site are licensed by the DEC (EPL 883). The plant has a licensed outfall into the Shoalhaven River. The outfall point is a 50 cm diameter metal pipe discharging at the end of an existing jetty. It also has a cooling water discharge comprising a 50 cm diameter pipe which discharges onto a gabion spillway. Under the terms of the Company's EPL discharge streams associated with the plant include: • river water passed through the boiler condensers and the primary side of the heat exchangers; • boiler water treatment plant regeneration waters; and • pH adjusted glucose plant ion exchange unit regeneration waters. All these must be discharged from the cooling water discharges. The limiting conditions in relation to these discharges include: • The volume of water discharged from the cooling water discharges must not exceed 100,000 kilolitres per day. • The wastewaters discharged at both points shall not exceed a temperature of 32°C. • This Modification Proposal will not involve any changes to these discharge waters.	No additional management or mitigation measures.	Not a key issue. This issue is not further addressed in this Modification Report.
Greenhouse Gas Emissions		
The Modification Report is supported by a Greenhouse Gas Emissions Assessment prepared by GHD which concludes Scope 1 and 2 emissions from the construction of the Modification Proposal are estimated to be 651 tCO₂-e, which	GHD indicate the Modification Proposal includes expanding the capacity of onsite wastewater treatment, producing additional biogas which is captured and sent to the boilers. This	The GHG Assessment is further discussed in Section



represents less than 0.001% of NSW and 0.006% of NSW Industrial sector's annual emissions, and therefore negligible. Annual net scope 1 and 2 emissions during operations after the Modification Proposal is implemented are estimated by GHD to result in negative net emissions once operational, due to the displacement of natural gas in the boilers with the additional biogas being produced and captured at the expanded wastewater treatment facility. As the grid decarbonises the emissions from electricity will fall each year and therefore the carbon savings from the modification would likely improve further over time, at this level of production. Therefore, the long term GHG impact of the Modification Proposal according to GHD is helping to support the NSW government's ambitions for emissions reduction in NSW and limiting the impact of climate change in the Illawarra-Shoalhaven region.	reduces the Plant's reliance on fossil fuels by supplementing natural gas with biogas in the boilers, reducing its scope 1 emissions and increasing the use of renewable fuels onsite and therefore reducing the annual operational emissions at the factory site in the long run. This demonstrates according to GHD that the Modification Proposal is largely in effect a mitigation measure for the emissions of the Shoalhaven Starches operations as a whole. Expanding the wastewater treatment also allows for a larger volume of waste to be treated and re-used onsite, reducing the waste created by the plant. This Modification Proposal has also considered the use of electrical power tools to replace traditionally diesel-powered devices during construction, to further reduce impact. t	8.3.2 of this Modification Report.
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8.3.2 AIR QUALITY ISSUES

GHD were engaged to conduct an Air Quality Assessment for the proposed modifications associated with this Modification Application. This section of the Modification Report provides a summary of the findings of the GHD Air Quality Impact Assessment for this Modification Application.

8.3.2.1 Nearby Sensitive Receptors

The Approved Methods define a sensitive receptor as “a location where people are likely to work or reside; this may include a dwelling, school, hospital, office or public recreational area”.

The site is proximate to a number of sensitive receptors. The township of Bomaderry lies to the northwest of the factory and west of the packing plant. Nowra is situated south of the plant. Commercial and industrial sensitive receptors are located directly adjacent to the site and across from it along Bolong Road.

The sensitive receptors identified by GHD are shown in Figure 9.

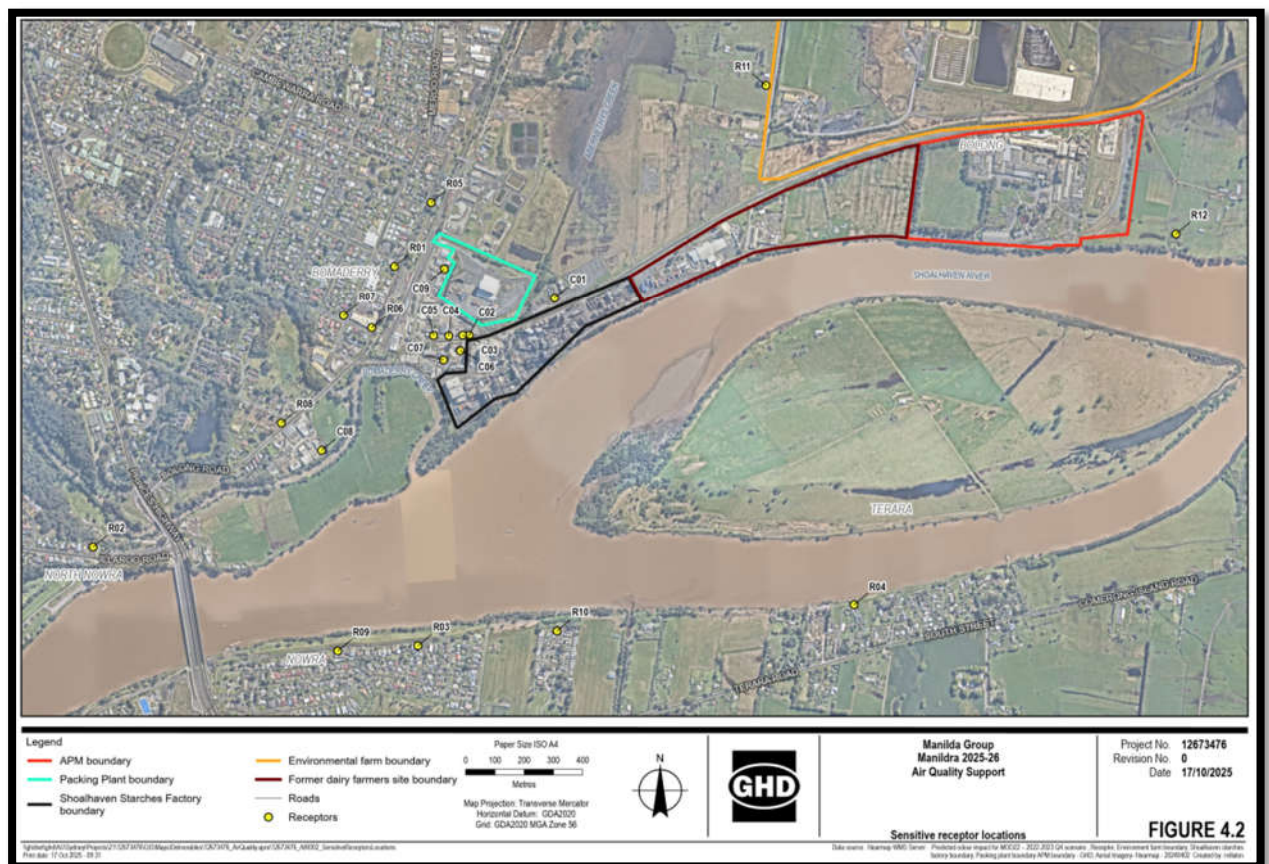


Figure 9 Sensitive Receptors Source GHD

8.3.2.2 Construction Assessment

Potential impacts associated with dust emissions during construction of the Modification Proposal were assessed by GHD using a risk assessment based on the UK IAQM guidance. Construction activities were identified to primarily consist of demolition, installation of prefabricated structures and minor earthworks. The risk identified by GHD for all construction activities was low or negligible risk for dust soiling, and negligible risk for human health and ecological impacts.

GHD have proposed specific mitigation measures to further minimise the risk of dust impacts at receptor locations during construction works including:

- Prepare a dust management plan for the works
- Inform construction staff of activities likely to cause high dust emissions (as part of site inductions) and appropriate methods to mitigate dust emissions
- Use dust suppression watering via water truck or cart during high dust generating activities
- Reducing or stopping construction works if dust plumes are observed travelling off site beyond the site boundary – Covering of loads during transport to prevent loss of material during haulage

8.3.2.3 Operational Assessment

A quantitative assessment utilising dispersion modelling was adopted by GHD to assess odour and air pollutant (including particulates, combustion pollutants and metals) emission during operation of the Modification Proposal.

An updated odour emissions inventory was prepared by GHD based on the findings of the Odour Pollution Reduction Study and NSW EPA feedback. This incorporated the proposed effluent storage dam, farm tanks and membrane bioreactor, and updates to the combined stack for number 5 and 6 boilers and no. 1 starch dryer. Odour emissions inventories were prepared for three scenarios based on average odour sampling data across the last four quarters (last 12 months of data), worst case (highest) odour sampling data for one quarter, and second highest odour sampling data for one quarter.

Boiler 5 & 6 stack sensitivity analysis

Due to the proposed changes in emissions from the combined boiler stack for No. 5 & 6 boilers, a sensitivity analysis was undertaken by GHD comparing:

- A stack height change from 54 m to 49 m (with an exit velocity of 6.08 m/s)
- Incorporating the emissions from the Palmer Cooler (with a stack height of 49 m)

Results from this testing at the nearby sensitive receptors is shown in Table 6.6. Note that as there was only one sampling point at the boiler 5 & 6 stack during the last four quarters of sampling (2024-25 Q2 to 2025-26 Q1), no distinction is made between the average results and the maximum quarter results.

The results indicate that the reduction in height from 54 m to 49 m slightly increases impacts at the nearby receptors. A maximum increase of 0.12 OU (at C01 and C02) was predicted. Incorporating the exhaust flow from the Palmer Cooler reduces predicted odour impacts compared with the existing case. Although a reduced stack height was used as well as incorporating odour from the Palmer Cooler, the flow rate from the stack was increased which leads to improved dispersion. A maximum reduction of 0.52 OU (at C02 and C06) was predicted.

Overall site impacts

Predicted odour contour dispersion plots prepared by GHD are provided in:

- Figure 10 – 2024-2025 Q4 sampling data (highest quarter) scenario
- Figure 11 – 2025-2026 Q1 sampling data (second highest quarter) scenario

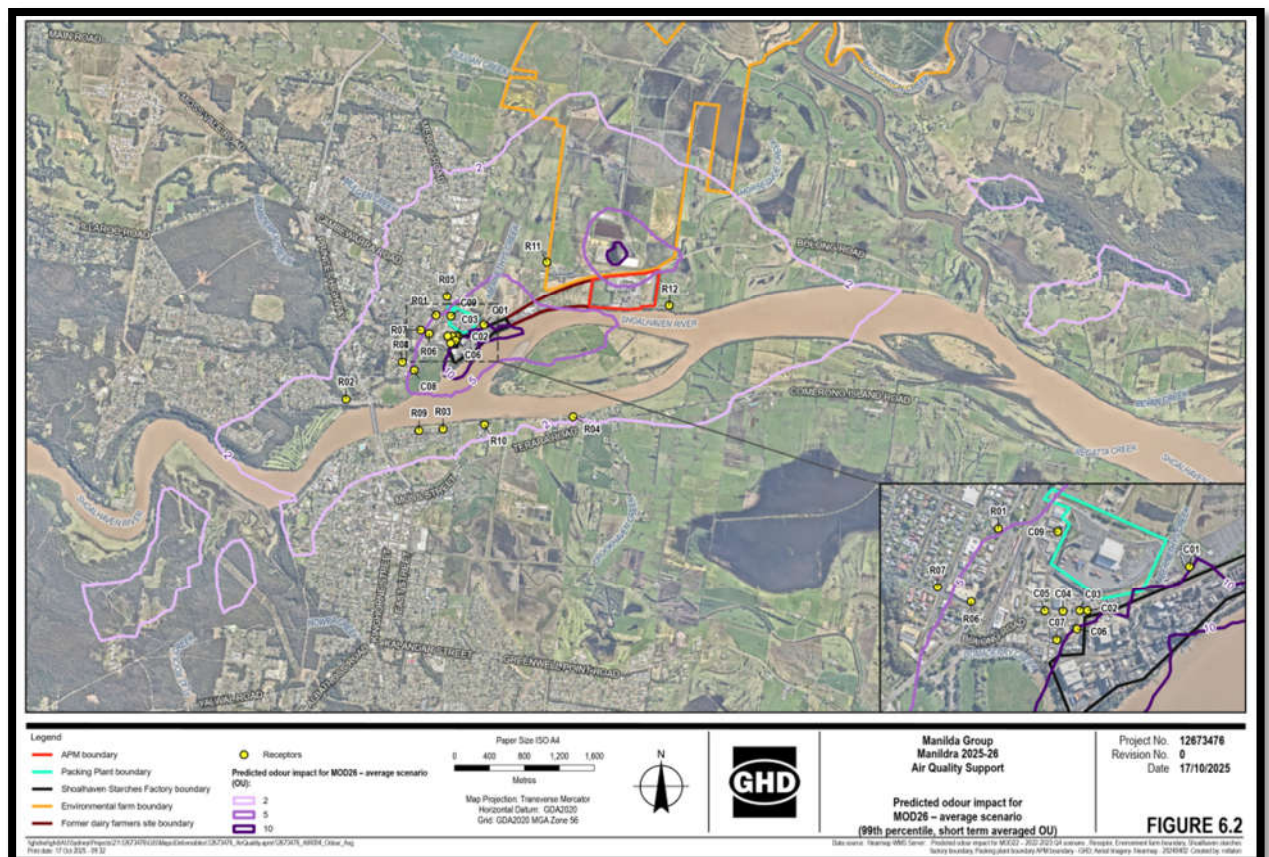


Figure 10 : Predicted odour impact for average scenario Source GHD

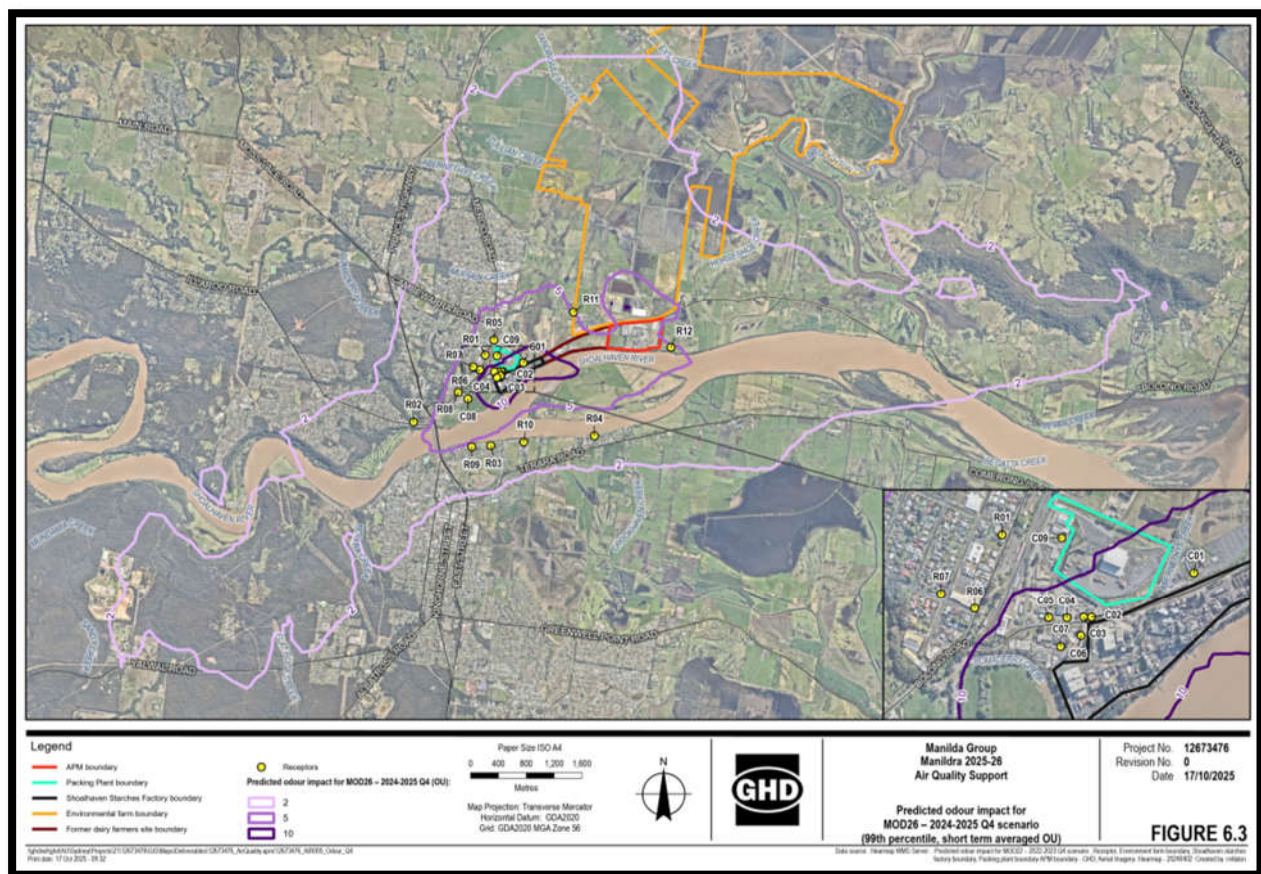


Figure 11 Predicted odour impacts 2024-2025 Q4 scenario

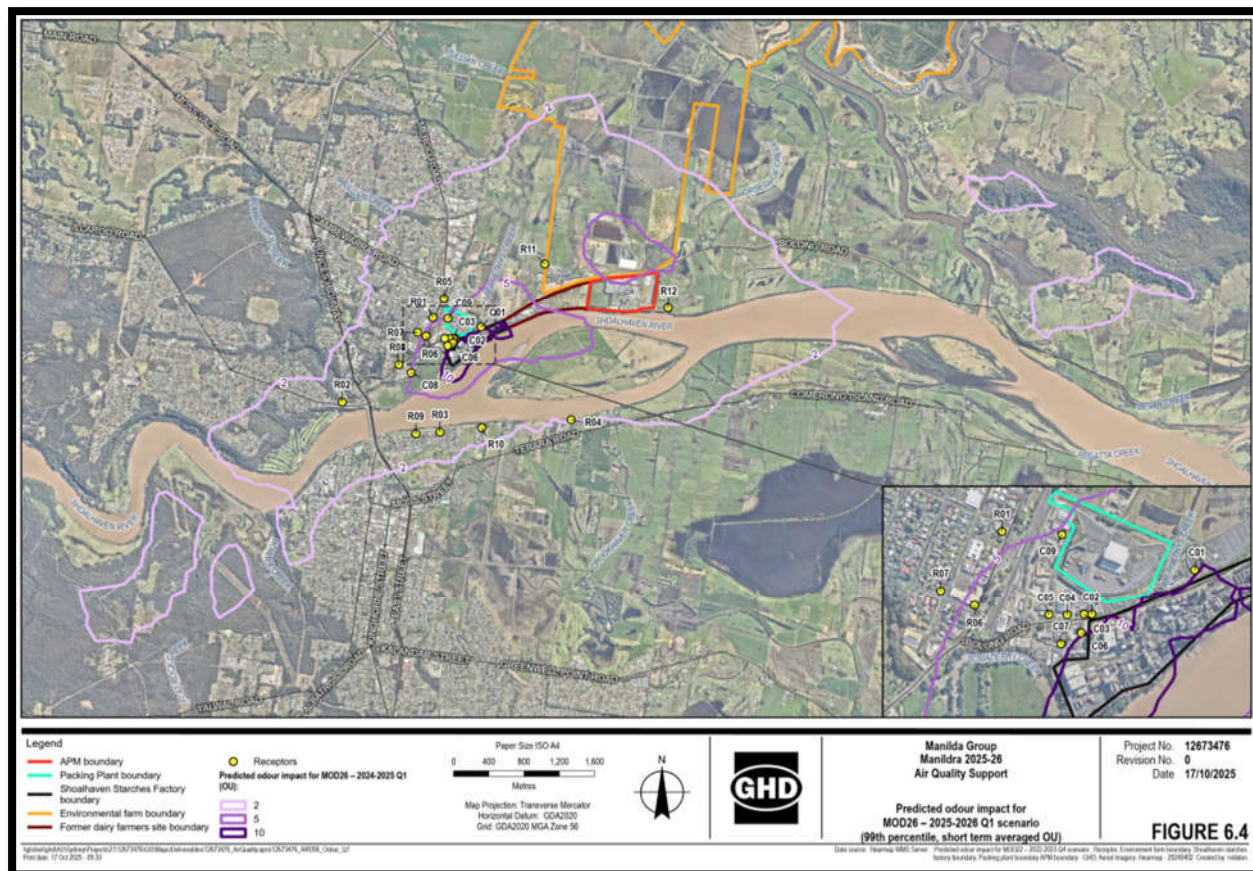


Figure 12 Predicted odour impact for 2025 – 2026 Q1 scenario

The results of the odour modelling for this Modification Proposal predicted compliance with the odour criteria for the second highest quarter (2025-2026 Q1) and the average sampling data scenario.

Exceedances were predicted by GHD for the scenario using sampling data from the highest quarter (2024-2025 Q4) at six of the residential receptors (R01, R02, and R05-R08). Shoalhaven Starches is currently investigating the spike in Q4 2024-2025 quarterly odour testing, which includes additional odour sampling, to determine the cause.

To inform odour management and mitigation, a source contribution analysis was undertaken by GHD at each of the twelve residential receptors. The analysis identified the following sources where mitigation efforts would be most effectively focused to minimise off site odour impacts:

- Ethanol Recovery Scrubber Discharge (ERESC) – this source contributed an average of 15% of odour impacts during the worst case hour at the receptors

- No. 3 Gluten dryer baghouse (S03) – this source contributed an average of 14% of odour impacts during the worst case hour at the receptors
- Pellet Plant exhaust stack (PPES) – this source contributed an average of 39% of odour impacts during the worst case hour at the receptors
- Combined Boiler Stack for No. 5 & 6 Boilers (BOILR5) – this source contributed an average of 17% of odour impacts during the worst case hour at the receptors

If additional odour mitigation is required (e.g. if complaints are received or if increasing concentrations are observed during quarterly sampling), GHD recommend that further investigation is undertaken into the above identified sources to determine potential odour management and mitigation options.

The above source contributions were identified by GHD based on the average quarter sampling data. Off site odour impacts are dependent on the worst case sources during a particular quarter. Therefore when complaints are received or if increasing concentrations are observed during quarterly sampling, the worst case contributing sources for that quarter should be investigated.

The findings of the odour sampling should be compared against the odour emission rate assumptions adopted by GHD. Should significant discrepancies (differences) between the model assumptions and sampled results be identified, GHD recommend that Shoalhaven Starches conduct an internal investigation to determine likely reasons/causes for the differences. Implementation of additional odour mitigation and management measures should be considered if odour emissions are higher than assumed in this assessment.

Review of recent odour complaints concluded that relatively few complaints have been received in recent years. Recent field ambient odour assessments undertaken by Northstar indicate that odour was not often detectable offsite, and on occasions where odour was detectable, it was characterized as either 'Very Weak' or 'Weak'. The odour surveys tend to support model findings of predicted odour concentrations within the NSW EPA criteria range. Odours classified as weak would likely be below 5 odour units (OU) which is often attributed as an annoyance threshold for odour.

An air pollutant emissions inventory was also prepared by GHD incorporating the proposed conveyor dust collector system, wheat silo vents, and starch and gluten storage silo baghouses, as well as updates to the stack parameters for the combined stack for no. 5 and 6 boilers. Compliance with the assessment criteria was predicted at all receptors for all pollutants.

The Air Quality Impact Assessment prepared by GHD concludes with respect to this Modification Proposal:

“GHD was engaged by Manildra to conduct an air quality and odour impact assessment for a proposed modification to the approved SSEP. The modification seeks to install an additional grain storage and handling facility, upgrades to the WTP, relocation of approved finished product silos, and other minor site additions. The assessment was undertaken in accordance with relevant legislation and government guidance.

Potential impacts associated with dust emissions during construction of the proposed modification were assessed using a risk assessment based on the UK IAQM guidance. Construction activities were identified to primarily consist of installation of prefabricated structures and minor earthworks. The risk identified for all receptor types was low risk during excavation works, and negligible risk during demolition, construction and from trackout. Recommendations for dust management during construction were provided to further reduce the risk of dust impacts from construction of the proposed modification.

A quantitative assessment utilising dispersion modelling was adopted to assess odour and air pollutant (including particulates, combustion pollutants and metals) emissions during operation of the proposed modification.

An updated odour emissions inventory was prepared based on the findings of the Odour PRS and NSW EPA feedback. This incorporated the proposed effluent storage dam, farm tank and membrane bioreactor, and updates to the combined stack for number 5 and 6 boilers and no. 1 starch dryer. Odour emissions inventories were prepared for the average of the last four quarters, as well as the highest quarter from the last four quarters (2023-2024 Q4) and the second highest quarter (2025-2026 Q4).

The results of the MOD26 odour modelling predicted compliance with the odour criteria for the second highest quarter (2025-2026 Q1) and the average sampling data scenario.

Exceedances were predicted for the scenario using sampling data from the highest quarter (2024-2025 Q4) at six of the residential receptors (R01, R02, and R05-R08). Shoalhaven Starches is currently investigating the spike in Q4 2024-2025 quarterly odour of testing, which includes additional odour sampling, to determine the cause.

A source contribution analysis was undertaken and recommendations were provided to investigate potential management and mitigation options to reduce off-site odour impacts.

Review of recent odour complaints concluded that relatively few complaints have been received in recent years. Recent field ambient odour assessments undertaken by Northstar indicate that odour was not often

detectable offsite, and on occasions where odour was detectable, it was characterized as either 'Very Weak' or 'Weak'. The odour surveys tend to support model findings of predicted odour concentrations within the NSW EPA criteria range. Odours classified as weak would likely be below 5 OU which is often attributed as an annoyance threshold for odour.

An air pollutant emissions inventory was prepared incorporating the proposed conveyor dust collector system, wheat silo vent, and starch and gluten storage silo baghouses, as well as updates to the stack parameters for the combined stack for no. 5 and 6 boilers. Compliance with the assessment criteria was predicted at all receptors for all pollutant."

8.3.3 NOISE IMPACTS

GHD have undertaken a Noise & Vibration Impact Assessment for the Modification Proposal. This section of the report provides a summary of the findings of the Environmental Noise Impact Assessment for this Modification Application.

At the outset it should be noted that the NSW EPA has issued a Noise Pollution Reduction Program (Noise PRP) as part of an amendment to Shoalhaven Starches EPL number 883. GHD has completed the first stage of the Noise PRP, which included the identification of all existing noise sources on the site and identification of mitigation measures to be implemented and reviewed for feasibility. GHD has developed a site-wide noise model (SWNM) for the site as described in the report Shoalhaven Starches Pollution Reduction Program – Noise Compliance Investigation (GHD, 2025).

8.3.3.1 Sensitive Receivers

Noise and vibration sensitive receivers are defined based on the type of occupancy and the activities performed in the land use. Sensitive noise and vibration receivers could include:

- residential dwellings
- classrooms
- hospitals
- places of worship
- passive and active recreational areas such as parks, sporting fields, golf courses. Note that these recreational areas are only considered sensitive when they are in use or occupied
- hotels, motels, caretaker's quarters, holiday accommodation and permanent resident caravan parks.

To assess noise levels from the site, noise sensitive receivers within 1.5 km have been considered and representative receivers in each direction have been identified by GHD. A total of 15 receivers has been included in the noise model. Details of these receivers are outlined in Table 15 and are shown on Figure 13.

Receiver R5 is located relatively close to the site and represents Burruga/Pig Island. The noise levels at this receiver have been included in this report for informational purposes, however, this receiver is currently an uninhabited dwelling.

Table 15 : Sensitive Receivers (Source GHD)

Receiver ID	Address	Receiver type	Land use	Direction from receiver to main site
EPL assessment locations				
R1	135 Terara Road, Terara	Residential	RU1 – Primary Production	North
R2	45 Ferry Lane, Terara	Residential	R2 – Low density residential	Northeast
R3	41A Merroo Street, Bomaderry	Residential	MU1 – Mixed use	Southeast
R4	1-3 Merroo Street, Bomaderry	Residential	R1 – General residential	Southeast
R7	19 Merroo Street, Bomaderry	Residential	MU1 – Mixed use	Southeast
R8	1 Nobblers Lane, Terara	Residential	RU1 – Primary Production	North
R9	2 Tarawara Street, Bomaderry	Residential	MU1 – Mixed use	East southeast
R10	10 Tarawara Street, Bomaderry	Residential	R3 – Medium Density Residential	Southeast
R11	17 Coomea Street, Bomaderry	Residential	R3 – Medium Density Residential	Southeast
R12	6 Birriley Street, Bomaderry	Residential	R3 – Medium Density Residential	Southeast
R13	1 Coomea Street, Bomaderry	Residential	R1 – General residential	Southeast
Additional residential locations				
R5	Burruga/Pig Island, Terara	Residential – uninhabited ¹	RU1 – Primary Production	Northwest
R6	39 Hanigans Lane, Bolong	Residential	RU1 – Primary Production	Southwest
R14	390 Bolong Road, Bolong	Residential	RU1 – Primary Production	West
R15	1 Bryant Street, Terara	Residential	RU1 – Primary Production	Northwest

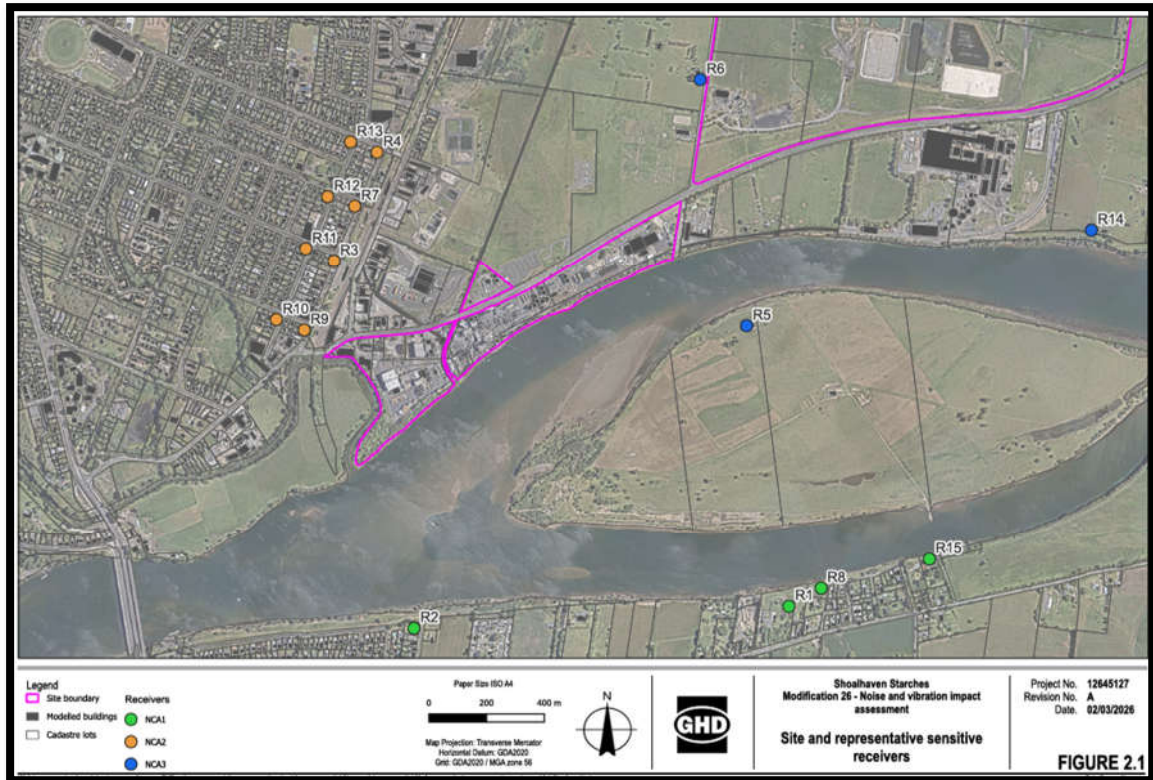


Figure 13 : Site and representative sensitive receivers (Source GHD)

8.3.3.2 Construction Noise Impacts

Construction Noise Modelling Results

Construction noise levels have been predicted by GHD at the sensitive receivers with consideration to the noise management levels (NML) derived from the Interim Construction Noise Guidelines (ICNG). The predicted LAeq noise levels along with the standard hours NMLs for each receiver is presented in Table 16.

Received noise levels shown in red indicate an exceedance of the NML. Based on the predicted noise levels, all construction scenarios are predicted by GHD to result in exceedances of the NML at several receivers. Receivers R5 and R6 are anticipated to experience the highest noise levels. During the loudest construction activities (earthworks or demolition works, CS1), receivers R5 and R6 are predicted to experience a noise level of 10 and 7 dB above the NML respectively. Other sensitive receivers are predicted to experience lower noise levels.

The exceedances would result in noticeable noise levels at the sensitive receivers. However, as the construction is temporary and during the ICNG's recommended standard construction hours, noise impacts are considered by GHD to be minor. Nevertheless, reasonable and feasible mitigation measures are recommended by

GHD which are discussed below in Table 20 to be implemented to minimise noise impacts from the construction of the proposed modification.

Table 16 : Predicted noise levels during construction activities (Source GHD)

Receiver ID	NCA	Address	Noise Management Level (dBA)	Predicted construction noise level L _{Aeq,15min} (dBA)			
				CS1	CS2	CS3	CS4
R1	NCA1	135 Terara Road, Terara	45	38	37	34	36
R2	NCA1	45 Ferry Lane, Terara	45	50	49	46	48
R3	NCA2	41A Meroo Street, Bomaderry	49	51	50	47	49
R4	NCA2	1-3 Meroo Street, Bomaderry	49	47	46	43	45
R5	NCA3	Burrage Island	45	55	54	51	53
R6	NCA3	39 Hanigans Lane, Bolong	45	52	51	48	50
R7	NCA2	19 Meroo Street, Bomaderry	49	48	47	44	46
R8	NCA1	1 Nobblers Lane, Terara	45	41	40	37	39
R9	NCA2	2 Tarawara Street, Bomaderry	49	50	49	46	48
R10	NCA2	10 Tarawara Street, Bomaderry	49	44	43	40	42
R11	NCA2	17 Coomea Street, Bomaderry	49	48	47	44	46
R12	NCA2	6 Birriley Street, Bomaderry	49	47	46	43	45
R13	NCA2	1 Coomea Street, Bomaderry	49	45	44	41	43
R14	NCA3	390 Bolong Road, Bolong	45	45	44	41	43
R15	NCA3	1 Bryant Street, Terara	45	42	41	38	40

8.3.3.3 Operational Noise Impacts

Annoying Characteristics analysis

One-third octave results have been analysed by GHD for tonal and low frequency characteristics for both the existing site and the proposed modification.

Tonal noise

The analysis for tonal frequency characteristics indicates. According to GHD, that none of the triggers have been met for either MOD26 on its own or the existing site including MOD26. As such, no tonal noise corrections have been applied by GHD to the predicted noise levels.

Low frequency noise

The analysis undertaken by GHD for low frequency noise characteristics indicates the following:

- The noise levels for the Modification Proposal individually do contain low frequency noise characteristics, with the difference between the C-weighted and A-weighted noise levels at sensitive receivers being more than 15 dB. However, the low frequency noise thresholds are not exceeded

at the sensitive receivers due the predicted levels being minimal. Therefore, no penalty for low frequency noise has been applied to presented noise levels of the Modification Proposal individually.

- The cumulative noise levels of the current site, including the Modification Proposal, contain low frequency noise levels with the difference between the C-weighted and A-weighted noise levels at sensitive receivers being more than 15 dB. Additionally, the low frequency noise thresholds are predicted by GHD to be exceeded at the sensitive receivers by more than 5 dB in several one-third octave bands. Therefore, a 2 dB (daytime) and 5 dB (evening and nighttime) penalty for low frequency noise is applied to the predicted noise levels.

Predicted Operational Noise Levels

Predicted operational noise levels have been provided for the following scenarios:

- The Modification Proposal: noise from proposed plant and equipment associated with the Modification Proposal
- Cumulative: cumulative noise from current site operations, including the Modification Proposal and the rail line
- Cumulative approved not yet constructed (ANYC): cumulative noise from current operations plus all approved but not yet constructed components, including the Modification Proposal and the rail line.

The predicted operational noise levels for each of the above scenarios have been assessed as follows.

The Modification Proposal

The predicted LAeq,15min operational noise level contours from the Modification Proposal components and all of the Modification Proposal are shown Figure 14.

GHD expect that the grain storage and handling facilities to be the main contributing component of the Modification Proposal at most sensitive receivers, except at R1, R6, and R13, where the water treatment plant upgrade is predicted by GHD to contribute more. The finished product silos generally contribute minimally to the modification's noise levels.

As noise levels from the Modification Proposal are predicted to not exceed the low frequency noise thresholds at any of the sensitive receivers, no correction for low frequency noise characteristics have been applied by GHD to the predicted noise levels.

As shown in Figure 14, the noise levels of the modification are predicted to comply with the design noise goal. However, it is noted that a reduced sound power level was adopted for equipment which was found to contribute significantly to the overall noise levels of the modification. The plant and equipment for the Modification Proposal must be designed to achieve the noise emissions detailed in below.

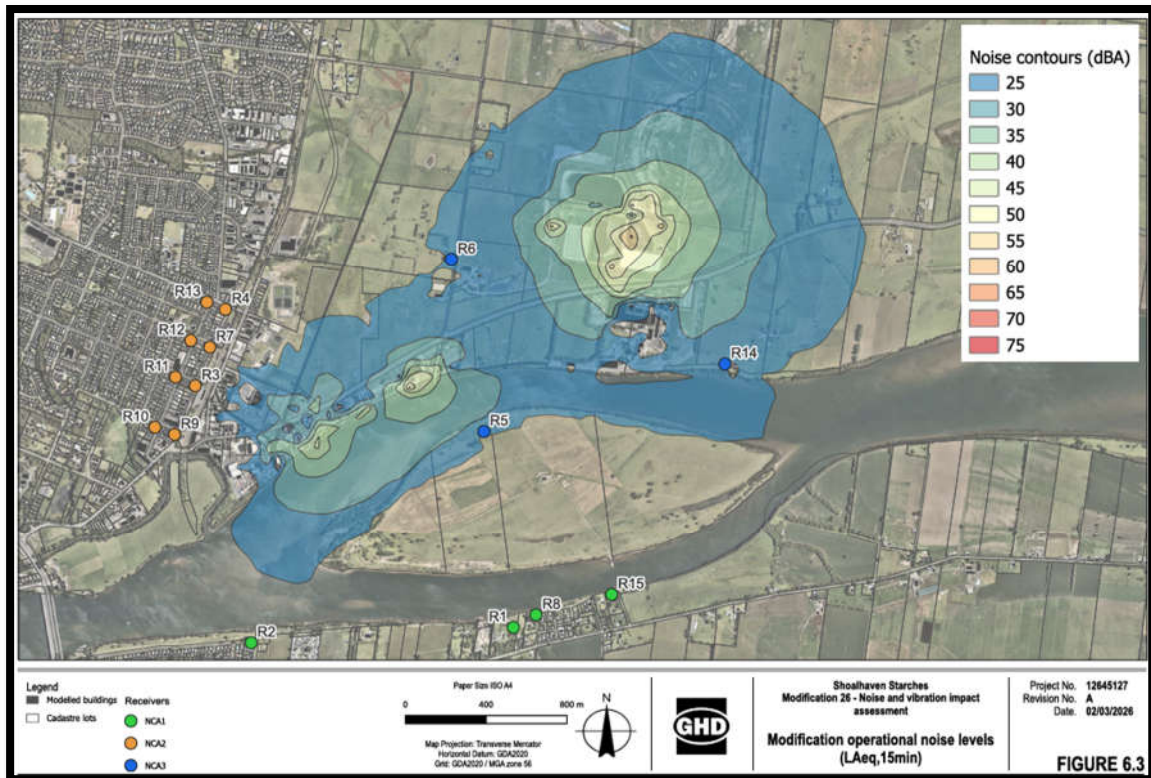


Figure 14: Modification operational noise levels (Source: GHD)

Cumulative noise levels

The predicted LAeq,15min operational noise level contours as formulated by GHD from the cumulative scenarios (excluding rail line) during neutral and noise enhancing weather conditions are shown in Figure 15 and Figure 16 respectively.

The cumulative operational noise levels are assessed by GHD against the EPL limits and have been corrected for low frequency noise. The cumulative noise levels, including approved but not yet constructed modifications and the Modification Proposal, are predicted by GHD to exceed the EPL noise limits at all locations.

However, as the Modification Proposal is predicted to achieve the design noise goals, GHD indicate the Modification Proposal would not contribute to the overall noise levels. This is also highlighted by the difference in overall noise levels and that of the modification individually.

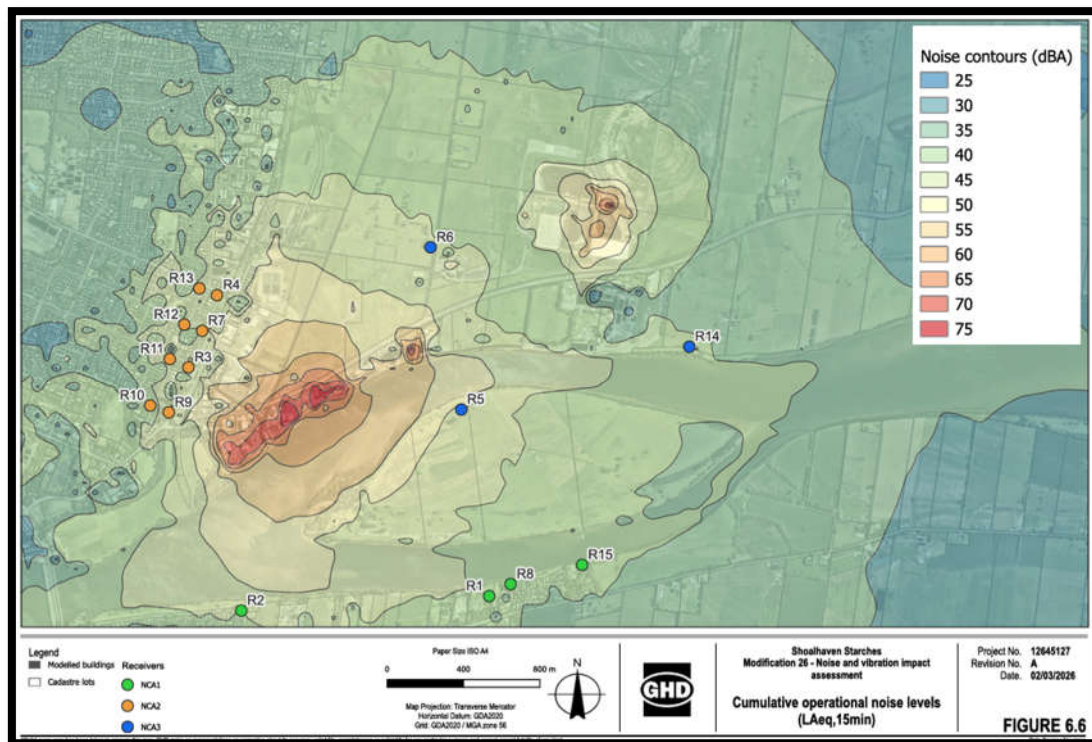


Figure 15; Cumulative operation noise levels (LAeq, 15 min) (Source GHD)

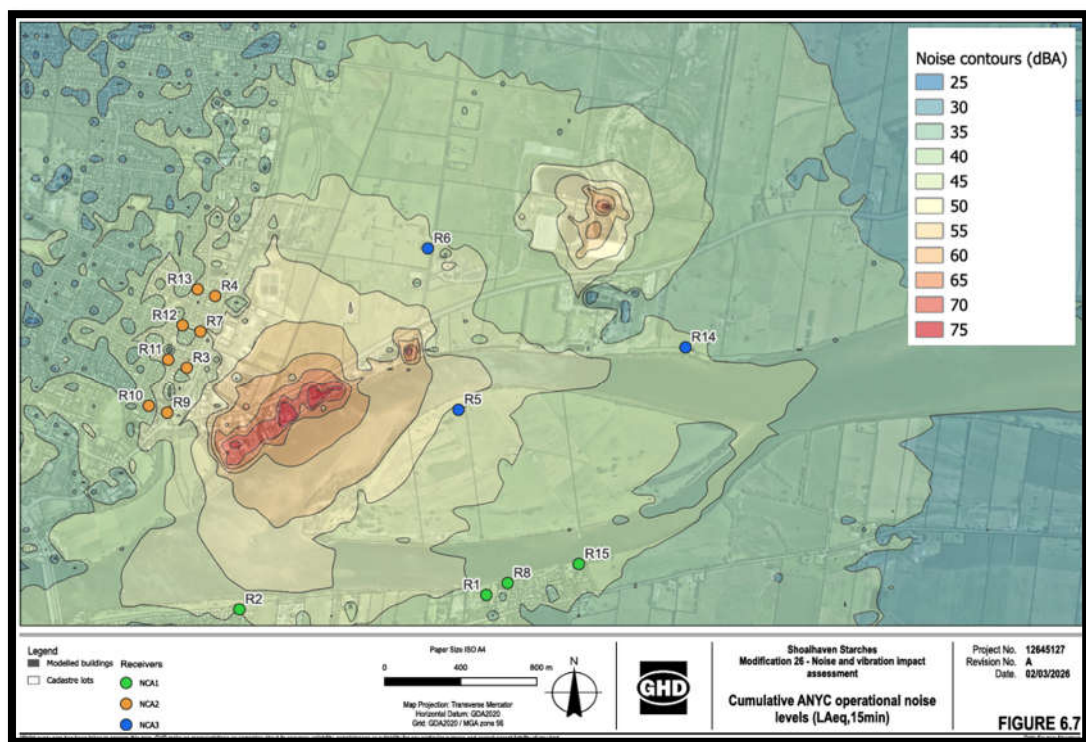


Figure 16 : Cumulative ANYC operational noise levels (LAeq, 15 min) (Source GHD)

8.3.3.4 Road traffic noise impacts

The increase in road traffic noise level at the residence closest to Bolong Road during construction of the modification is presented in Table 18 along Bolong Road. The table shows that along Bolong Road the road traffic noise levels do not increase by more than 2 dB and as such GHD indicate that no impacts are anticipated at receivers.

*Table 17" Predicted increase in road traffic noise levels during construction
(Source GHD)*

Road	Road type	Distance to nearest residence (m)	Period	Daytime controlling criteria (dBA)	Existing noise level (dBA)	Predicted noise level (dBA)	Noise level increase difference (dB)	Consideration for mitigation?
Bolong Road	Sub-arterial road	15 ¹	Day	60 L _{eq,15hr}	67.7	67.7	0.0	No
			Night	55 L _{eq,5hr}	60.4	60.4	0.0	No

8.3.3.5 Mitigation Measures

Construction noise mitigation measures

As the NMLs are predicted by GHD to be exceeded at several receivers, reasonable and feasible mitigation measures must be implemented to reduce the potential for noise impacts on surrounding receivers and sensitive land uses during construction. These measures should be incorporated into the construction noise management plan (CNMP) developed for the proposed modification.

Table 18: Construction noise mitigation measures

Action required	Details
General controls	
Site inductions	All employees, contractors and subcontractors are to receive an environmental induction. The induction should include: – All relevant project specific and standard noise mitigation measures – Relevant licence and approval conditions – Permissible hours of work – Location of nearest sensitive receivers – Construction employee parking areas – Designated loading/unloading areas and procedures – Site opening/closing times (including deliveries) – Environmental incident procedures.
Behavioural practices	No swearing or unnecessary shouting or loud stereos/radios on site. No dropping of materials from height, throwing of metal items and slamming of doors.
Implement community consultation measures	Contact will be established with the local residents and the construction program and progress communicated on a regular basis, particularly when noisy activities are planned. Affected receivers will be notified of the intended work, its duration and times of occurrence. This may include a local community update letters for specific construction activities and a project info line.
Implement complaints management measures	Complaints will be managed in accordance with the procedure outlined below. Signage at each site will clearly and visibly provide a contact number and name to receive complaints and enquiries about construction. In this instance the response would be to: – Verbally respond to complainant – Provide a written response within seven calendar days if the complaint cannot be resolved verbally – Log the complaint, and any actions taken with regards to the complaint within a complaints register – Undertake monitoring at the complainant's residence(s) – Investigate the nature and reasons of the impact – Investigate and implement further mitigation measures to minimise the impact
Source controls	
Construction hours and scheduling	Comply with the recommended standard construction hours outlined by the ICNG, unless out of hours work has been approved. No truck movements before 7.00 am or after 6.00 pm. For any work that would take place outside of normal construction hours: – Undertake an assessment of the potential noise impacts associated with the proposed activities and outline specific mitigation measures. – Residents potentially affected by such activities will be notified at least five days before hand.

Action required	Details
	- Minimise consecutive night activities in the same locality and provide periods of quiet if activities occur for extended periods during the night. - Conduct activities in a manner that eliminates or minimises the need for audible warning alarms.
Equipment selection	Use quieter construction methods where reasonable and feasible (e.g. vibratory or bored piling instead of impact hammer piling).
Use and siting of plant	Simultaneous operation of noisy plant within discernible range of a sensitive receiver is to be avoided. The offset distance between noisy plant and adjacent sensitive receivers is to be maximised. Plant used intermittently to be throttled down or shut down. Noise-emitting plant to be directed away from sensitive receivers.
Plan worksites and activities to minimise noise	Plan traffic flow, parking and loading/unloading areas to minimise reversing movements within the site.
Minimise disturbance arising from delivery of goods to construction sites	Loading and unloading of materials/deliveries is to occur during standard construction hours. Contractors are to avoid dropping materials from height where practicable, during loading and unloading. Delivery vehicles to be fitted with straps rather than chains for unloading, wherever possible.

Operational noise mitigation measures

In order to achieve compliance with the design noise goal for the Modification Proposal GHD recommend the following mitigation measures into the detailed design of the plant.

Table 19: Operational noise mitigation measures (Source GHD)

MOD26 component	Action required	Details
Further detailed design – Grain storage and handling facilities		
Conveyors and bucket elevators	Equipment selection and mitigation design	The sound power levels of the equipment should be equal or lower than those presented in Table 6.1. Where required, enclosures should be implemented to reduce noise levels of the equipment. This particularly applies to the conveyor motors of the grain storage bucket elevators, grain storage feed conveyors and conveyor to plant.
	Positioning of equipment	During detailed design, equipment should be positioned to maximise shielding by existing or proposed structures where reasonably possible
Train and truck unloader building	Detailed design of building	The detailed design of the train and truck unloader building should consider the following: - The sound power level of building features (facades and roofs) should be equal or lower than the levels presented in Table 6.2. - During detailed design, the sound power levels of building features should be estimated based on the proposed equipment within the buildings, the transmission loss and dimensions of the building features. - Noise generating equipment should be enclosed within a section of the building to minimise noise emitting through the openings in the west and eastern facades. - Fan discharge outlets should be positioned in the northern façade. - Fan discharge outlets should be fitted with silencers or acoustic louvres to minimise noise emissions and should achieve the sound power levels presented in Table 6.2.
Silo grain screening and sieve buildings	Detailed design of building	The detailed design of the silo grain screening and sieve buildings should consider the following: The sound power level of building features (facades and roofs) should be equal or lower than the levels presented in Table 6.3 and Table 6.4.

MOD26 component	Action required	Details
		- During detailed design, the sound power levels of building features should be estimated based on the proposed equipment within the buildings, the transmission loss and dimensions of the building features. - Fan discharge outlets should be positioned in the northern façade. - Fan discharge outlets of the silo grain screening building should be fitted with silencers or acoustic louvres to minimise noise emissions and should achieve the sound power levels presented in Table 6.3.
Stage 1 screening building	Detailed design of building	The detailed design of the Stage 1 screening building should consider the following: - The sound power level of building features (facades and roofs) should be equal or lower than the levels presented in Table 6.5. - During detailed design, the sound power levels of building features should be estimated based on the proposed equipment within the buildings, the transmission loss and dimensions of the building features. - Fan discharge outlets should be positioned in the northern façade. - Fan discharge outlets of the silo grain screening building should be fitted with silencers or acoustic louvres to minimise noise emissions and should achieve the sound power levels presented in Table 6.5.
Further detailed design – Water treatment plant upgrade		
Membrane bioreactors	Equipment selection and mitigation design	The sound power levels of the equipment should be equal or lower than those presented in Table 6.6. Where required, acoustic enclosures must be designed and implemented to minimise noise emissions.
	Positioning of equipment	During detailed design, equipment should be positioned to maximise shielding by existing or proposed structures where reasonably possible
Reverse osmosis building	Detailed design of building	The detailed design of the RO building should consider the following: - The sound power level of building features (facades and roofs) should be equal or lower than the levels presented in Table 6.7. - During detailed design, the sound power levels of building features should be estimated based on the proposed equipment within the buildings, the transmission loss and dimensions of the building features.
Cooling towers	Equipment selection and mitigation design	The sound power levels of the equipment should be equal or lower than those presented in Table 6.8. Where required, mitigation measures such as operating at lower fan speeds or silencers should be implemented to minimise noise emissions.
	Detailed design of cooling towers	During detailed design, the required number and sizing of the cooling towers should be refined. Where possible, the cooling towers should be designed as small as reasonably possible while achieving the total SWLs presented in Table 6.8.
Scrubber #1 and #2	Equipment selection	The sound power levels of the equipment should be equal or lower than those presented in Table 6.9. Where required, noise generating equipment of the scrubbers must be enclosed to minimise noise emissions.
Biogas shed expansion outdoor sources	Equipment selection	The sound power levels of the equipment should be equal or lower than those presented in Table 6.10.
Biogas shed expansion and scrubber #2 blower room	Detailed design of building	The detailed design of the biogas expansion shed and scrubber #2 blower buildings should consider the following: - The sound power level of building features (facades and roofs) should be equal or lower than the levels presented in Table 6.11. - Construct both buildings with improved transmission loss values compared to the existing biogas blower shed. - During detailed design, the sound power levels of building features should be estimated based on the proposed equipment within the buildings, the transmission loss and dimensions of the building features.

MOD26 component	Action required	Details
Equalisation tanks	Equipment selection	The sound power levels of the equipment should be equal or lower than those presented in Table 6.12.
BVF pumps	Equipment selection and mitigation design	The sound power levels of the equipment should be equal or lower than those presented in Table 6.13. Where required, acoustic enclosures or noise walls must be designed and implemented to minimise noise emissions.
Further detailed design – Finished product silos		
Finished product silos	Detailed design of building	The detailed design of the over capped structure of the finished product silo should consider the following: – The sound power level of building features (facades and roofs) should be equal or lower than the levels presented in Table 6.14. – During detailed design, the sound power levels of building features should be estimated based on the proposed equipment within the buildings, the transmission loss and dimensions of the building features.
Noise validation		
All components	Noise validation report prior to construction	In accordance with Development Consent condition 14M, a noise validation report will be prepared prior to construction, to demonstrate compliance with the design noise goals can be achieved based on the detailed design. If required, mitigation measures to reduce noise levels to achieve the design noise goals should be provided in the noise validation report.
	Noise validation report during operation	Once the proposed modification is operational, a noise validation assessment would be undertaken to confirm if noise levels comply with the predictions detailed in the noise validation report.

The Noise & Vibration Impact Assessment makes the following conclusion with respect to this Modification Proposal.

GHD was engaged by Manildra to conduct a noise and vibration impact assessment for a proposed modification to the approved SSEP. The modification seeks to deploy a suite of heat recovery updates and enabling infrastructure to capture and transform waste heat into usable energy to drive the ethanol, starch and gluten manufacturing processes.

A construction noise assessment was undertaken to determine potential for increased noise levels at sensitive receivers. Construction noise management levels were established using background noise levels which were established using the conducted background noise monitoring. Four construction scenarios were modelled to predict noise levels at representative sensitive receivers. The predicted noise levels indicate that the noise management levels for all construction scenarios are exceeded at several sensitive receivers. As such, mitigation measures have been recommended in Section 8.1.

Noise sources associated with the operation of the proposed modification were identified and modelled in the site wide noise model developed by GHD as part of the noise pollution reduction program. The predicted noise levels from the proposed modification were assessed against design noise goals and shows compliance with the design noise goals at all sensitive receivers.

It is noted that reduced sound power levels were adopted for equipment which was found to contribute significantly to the overall noise levels of the

modification. To ensure noise levels of the proposed modification achieve the design noise goals, the further detailed design of the modification must implement mitigation measures to reduce noise emission to achieve the sound power levels presented in Section 6.1.

The analysis for annoying noise characteristics was undertaken and found that the proposed modification does not contain tonal or low frequency noise characteristics.

Additionally, cumulative noise levels of the following scenarios have been predicted:

- Current operations including the proposed modification and the rail line
- Current operations including all approved but not yet constructed modifications, the proposed modification and the rail line.

Predicted noise levels were analysed for annoying noise characteristics and found low frequency noise to be present at all sensitive receivers. The noise levels were assessed against the EPL noise limits, which shows exceedances at all sensitive receivers from existing noise sources. However, for acoustic compliance data, the bi annual compliance data should be referred to.

Nonetheless, the proposed modification is anticipated to have no contribution to the overall noise levels from the site as the predicted noise levels are below the design noise goals.

Recommended construction mitigation measures are provided in Section 8.1 and recommendations for further detailed design of the proposed modification to minimise operational noise are provided in Section 8.2.

8.3.4 SITE HAZARD ANALYSIS

PRM have undertaken a Site Hazard Analysis (SHA) for the proposed modifications. A copy of PRM's SHA supports this Modification Application.

Table 21 below provides PRMs comments in terms of the various components of this Modification Proposal and those components that require assessment in terms of the Hazard Analysis



Table 20: Modification Proposal Scope Items

Factory Component	Proposed Works associated with Modification Application No. 26 (Mod 26)	Comments
Additional grain storage and handling facilities	• The installation of three (3) wheat silos to the west of the former Dairy Farmers factory building. • Construction of a train and truck unloading facility to the south of the former Dairy Farmers factory building. • The installation of a container inverter to be sited to the west of the proposed silos. • The installation of a grain conveyor and services gantry that will connect the proposed grain storage and handling facilities along the Shoalhaven River frontage of the site to the Shoalhaven Starches factory site. • The construction of the conveyor will in part require the extension of the rock revetment wall along the Shoalhaven River embankment. • The installation of a weighbridge to the north of the former Dairy Farmers factory building. • The construction of an electricity substation control room, workshop and office building to the north of the former Dairy Farmers factory building. • The above works will necessitate the demolition of the eastern part of the former Dairy Farmers factory building (as required). • The relocation of the existing car park located between the Bolong Road frontage and the former Dairy farmers factory building.	• These silos are included in this Hazard Analysis (HA) given the risk of dust explosions and fires. • The train unloading facility is included in this HA given the risk of dust explosions and fires. • No credible off-site risks for this equipment. Therefore, it is not included in the HA. • This equipment is included in this HA given the risk of dust explosions and fires. • No credible off-site risks for the remaining scope items. Therefore, they are not included in the HA.



Factory Component	Proposed Works associated with Modification Application No. 26 (Mod 26)	Comments

Factory Component	Proposed Works associated with Modification Application No. 26 (Mod 26)	Comments
Waste Water Treatment Plant (WWTP) Upgrade	• Construction of one in-ground treated effluent storage pond with a capacity of 150 ML. • Convert the existing Wet Weather Storage Ponds No. 1, 2 and 3 into another Anaerobic Digester with a volume of 80 ML. • It is proposed to install an above ground enclosed steel 400 KL Equalisation Tank to the east of the existing Sulphur Oxidation (SO) Basin. • Construction of a building for biogas collection fans from the new Pond 3 digester immediately to the south of the converted Anaerobic Digester. • Installation of Biogas scrubber units. • Interconnecting pipework, pumps and blowers. • A new wastewater collection tank (70 Kl) at the factory and new pipe to the WWTP. • Substation and maintenance shed. • Additional Membrane Bioreactor (MBR) and Reverse Osmosis (RO) plant and associated building.	• All process modifications associated with the WWTP are included in this HA.

Factory Component	Proposed Works associated with Modification Application No. 26 (Mod 26)	Comments
Relocation of approved finished product silos	Relocate and construct up to 15 (OR 19???) finished product silos (starch and gluten) on the main factory site instead of in conjunction with the Northern Packing Plant site.	These silos are included in this HA given the risk of dust explosions and fires.
Other Works		
Rail Maintenance Building	- Construct a rail maintenance building, with associated internal vehicle access, at the eastern terminus of the recently approved Mod 25 rail line extension to the east of the former Paper Mill factory site. - It is also proposed to install provision for rail fuel storage (diesel) adjacent to the existing rail line within the former Paper Mill site.	The rail fuel (diesel) storage tank is to be an industry standard self-bunded tank (140 m³) which is to be located away from other Dangerous Goods. Also, as diesel is a combustible liquid then the risk of fires is low (e.g. Applying SEPP 33 does not require assessment of isolated combustible liquids storage tanks) then this tank is not included in this HA
Ethanol Maintenance Building	Construct an Ethanol Maintenance building within the south-eastern part of the main factory site.	No credible off-site risks for this scope item. Therefore, it is not included in the HA.
Nitric Acid Storage	Construction of a nitric acid storage adjacent to existing cooling towers to the west of Abernethys Creek.	The nitric acid storage tank is included in this HA given the risk of releases impacting people and/or the environment.

The risks associated with the Modification Proposal have been assessed and compared by PRM against the DoP risk criteria. The results are outlined in Table 22 below.

Table 21 : Results of Risk Assessment

Description	Risk Criteria	Risk Acceptable?
Fatality risk to sensitive uses, including hospitals, schools, aged care	0.5×10^{-6} per year	Yes
Fatality risk to residential and hotels	1×10^{-6} per year	Yes
Fatality risk to commercial areas, including offices, retail centres, warehouses	5×10^{-6} per year	Yes
Fatality risk to sporting complexes and active open spaces	10×10^{-6} per year	Yes
Fatality risk to be contained within the boundary of an industrial site	50×10^{-6} per year	Yes
Injury risk – incident heat flux radiation at residential areas should not exceed 4.7 kW/m^2 at frequencies of more than 50 chances in a million per year or incident explosion overpressure at residential areas should not exceed 7 kPa at frequencies of more than 50 chances in a million per year	50×10^{-6} per year	Yes
Toxic exposure – Toxic concentrations in residential areas which would be seriously injurious to sensitive members of the community following a relatively short period of exposure	10×10^{-6} per year	Yes
Toxic exposure – Toxic concentrations in residential areas which should cause irritation to eyes or throat, coughing or other acute physiological responses in sensitive members of the community	50×10^{-6} per year	Yes
Propagation due to Fire and Explosion – exceed radiant heat levels of 23 kW/m^2 or explosion overpressures of 14 kPa in adjacent industrial facilities	50×10^{-6} per year	Yes

PRM also conclude that societal risk, area cumulative risk and environmental risk are also acceptable. The primary reason for the low risk levels according to PRM is that significant levels of radiant heat from potential fires, overpressures from dust explosion vents and hydrogen sulphide releases from the biogas system are mostly contained on-site.

PRM make the following recommendations in relation to this Modification Proposal:

1. *Ensure that all explosion vents (non-flameless as well as flameless) are directed to a safe location. They should not, for example, be directed to where people work or use walkways.*
2. *Include in the HAZOP study the nitric acid tank, in particular, how the road tanker transfer system is cleared at the end of the tank filling operation and also the reliability of the scrubber. This is required given the potential to release acidic vapours and nitrogen oxides that can be harmful to personnel local to the tank.*

3. *Ensure that fire water protection is available as per the requirements of AS2419, in particular, to the proposed equipment at the former Dairy Farmers site; and*
4. *The design details for the proposed silos and associated equipment items, e.g. the silos' design pressure and explosion vents details, are not currently available. Whilst the corresponding risks are not expected to be intolerable, the modelling of potential dust explosions is to be performed once these design details are known.*

8.3.5 FLOODING

WMAwater have prepared a Flood Compliance Assessment in relation to this Modification Application.

The proposed works associated with this Modification Proposal are situated on land inundated in the 1% Annual Exceedance Probability (AEP) flood event by floodwaters from the Shoalhaven River (as determined in the November 2022 Shoalhaven River Flood Study). The construction of any works on the floodplain will cause a loss of temporary floodplain storage and a loss of hydraulic conveyance. The resulting increase in flood levels will depend upon the magnitude of these losses.

Prior to construction of the Shoalhaven Starches plant at Bomaderry there would have been significant flow through the site and adjoining land during a flood, as there is across any riverbank. Since approximately 1970 the ongoing construction of the plant has reduced the flow path through a large part of Shoalhaven Starches lands on the northern bank. Floodwaters are therefore diverted to other parts of the floodplain and this may increase flood levels on these lands.

It should be noted that other works on the Shoalhaven River floodplain (e.g. completed new bridge at Nowra and upgrading of the Terara levee) will also have contributed to changes in flood level over time in parts of the floodplain. The impacts of these other works have not been determined as part of this report.

Past Flood Studies

Several previous flood studies have been undertaken for Shoalhaven City Council and Shoalhaven Starches. The key ones are listed below.

1. Lower Shoalhaven River Flood Study, November 2022 ("2022 LSRFS") (for Council by Stantec).
2. Shoalhaven River Flood Study, March 2013 ("2013 LSRFS") (for Shoalhaven Starches by WMAwater).
3. Lower Shoalhaven River Flood Study, April 1990 ("1990 LSRFS") (for Council by Webb McKeown & Associates now known as WMAwater)



WMAwater has also undertaken many (> 10) flood impact assessment / compliance reports for Shoalhaven Starches in the last 15+ years. These past flood impact assessments by WMAwater were undertaken using hydraulic models prepared initially in 1990 LSRFS and subsequently in 2022 LSRFS. With completion of the November 2022 Lower Shoalhaven River Flood Study (2022 LSRFS), the hydrologic and hydraulic models established in that study have been adopted for use in this report by WMAwater for Shoalhaven Starches.

These flood impact assessment reports determined the incremental changes in peak flood levels due to ongoing proposed works by Shoalhaven Starches. It is only since 2023/2024, with the adoption of the computer models provided in 2022 LSRFS, that the cumulative effects of all works by Shoalhaven Starches have been quantified.

A comparison between the peak 1% AEP flood levels from the March 2013 (2013 LSRFS) flood study and the November 2022 (2022 LSRFS) flood study indicates a significance reduction in flood levels. This has occurred due to many factors including the adoption of the 2019 Australian Rainfall and Runoff guidelines in 2022 LSRFS, whilst 2013 LSRFS and 1990 LSRFS adopted the prior 1987 edition of ARR.

Development on the Floodplain

Each development on the floodplain has the potential to cause an impact upon flood levels. WMAwater advise that the impacts of works within the floodplain on hydraulic characteristics are twofold, firstly, a loss of temporary floodplain storage volume and secondly a loss / restriction of flow area or conveyance. It is the loss of flow area which produces the greatest impact, as the area of floodplain storage lost due to all works by Shoalhaven Starches since 1990, represents less than 1% of the total available floodplain storage area of the northern floodplain of the Shoalhaven River.

Scope of Work

The scope of work adopted by WMAwater was to use up to date hydraulic modelling taken from 2022 LSRFS to assess the impacts on flooding of the proposed works by Shoalhaven Starches. This report provides an assessment of the implications of the Modification Proposal on surrounding flood levels and considers both the incremental effect (i.e. the change compared to that previously approved up to November 2025 that includes built and not yet built), as well as the cumulative effects of all past approved works (built and not yet built) by or for Shoalhaven Starches since 1990.

It should be noted that the design events (5% AEP, 1% AEP and the PMF) adopted to assess the impacts on flooding of the proposed works do not include anthropomorphic climate change (i.e. rainfall increase and sea level rise). However, climate change has been considered in Appendix C of the Flood Compliance Report.

WMAwaytyer advise that the hydraulic modelling assumes the same topography (taken from 2022 LSRFS) for 1990 and November 2025 conditions outside the lands owned by Shoalhaven Starches. However, within the Shoalhaven Starches lands, including the



Supagas facility, the 2022 LSRFS TUFLOW model has been revised to create the following three model scenarios.

1. The works as present in 1990 (termed the 1990 Existing model).
2. Those approved (built and not yet built) as of November 2025 (termed the November 2025 Existing model).
3. Those approved (built and not yet built) as of November 2025 plus including the Mod26 proposed works as shown on Figure 2 (termed the Mod26 Design or Proposed model).

Thus, for example, the constructed new bridge over the Shoalhaven River at Nowra is included in all three scenarios as are all works on the Riverview Road / Terara levee. This approach therefore only determines the cumulative effects of the works by or for Shoalhaven Starches since 1990 and has not assessed the impacts of other works on the floodplain in that time.

Assessment of Flood Impacts of Modification Proposal

The impacts of the proposed development on flooding have been evaluated for the following two scenarios.

- Comparison of the Proposed with the November 2025 Existing model. This determines the incremental impact of the Modification Proposal.
- Comparison of the Proposed with the 1990 Existing model. This provides the cumulative effects of the Modification Proposal plus all approved (built and not yet built) works by or for Shoalhaven Starches since 1990.

Results of Assessment

The works associated with the Modification Proposal will according to WMA water increase flood levels.

In summary the maximum cumulative increases in flood level since 1990 are shown below. However, in all three events most areas only experience a maximum increase of up to 0.1m on land outside of that owned by Shoalhaven Starches.

- 5% AEP – up to 0.05m (Figure 17),
- 1% AEP – up to 0.1m (Figure 18),
- PMF – up to 0.2m (Figure 19).

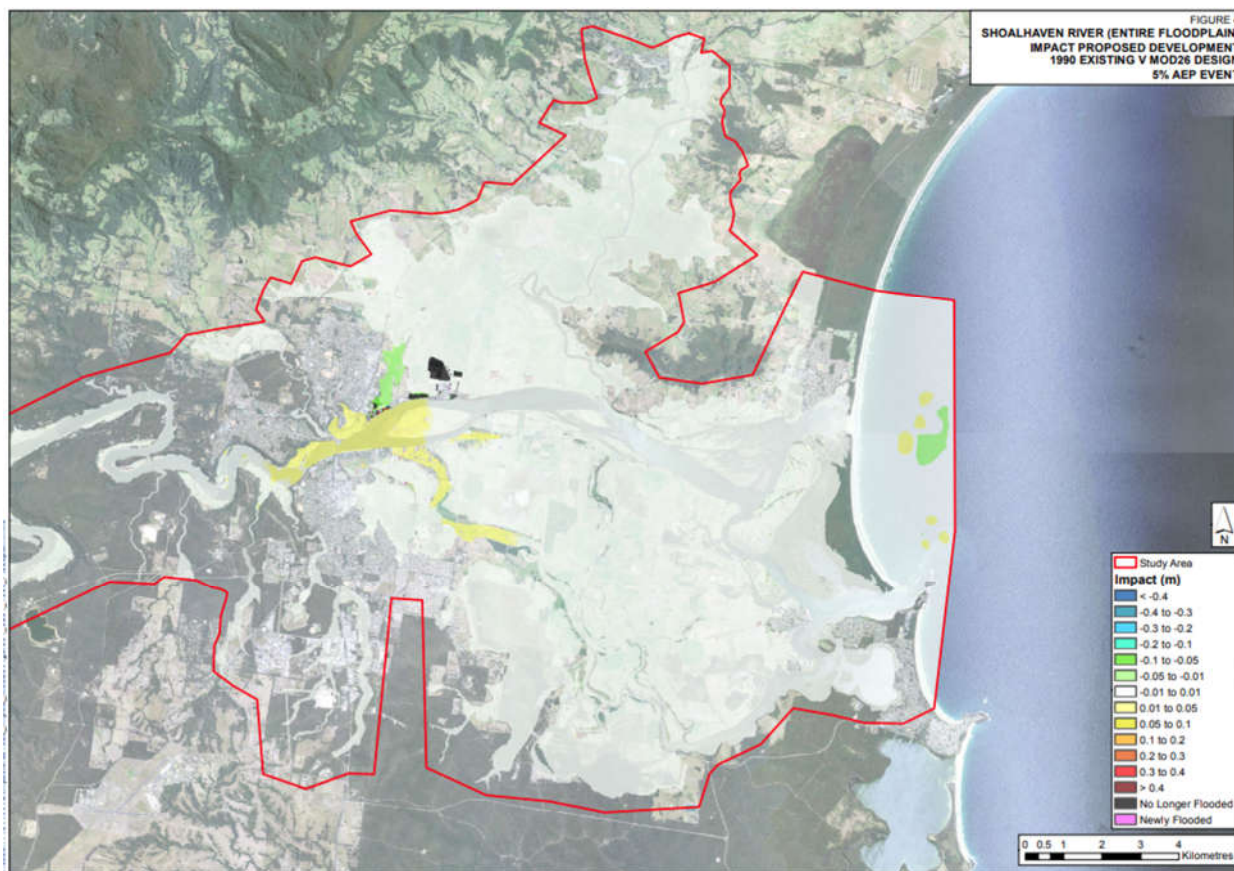


Figure 17 : Impact Proposed Development – 1990 Existing v Mod 26 Proposal 5 % AEP Event Source WMAwater

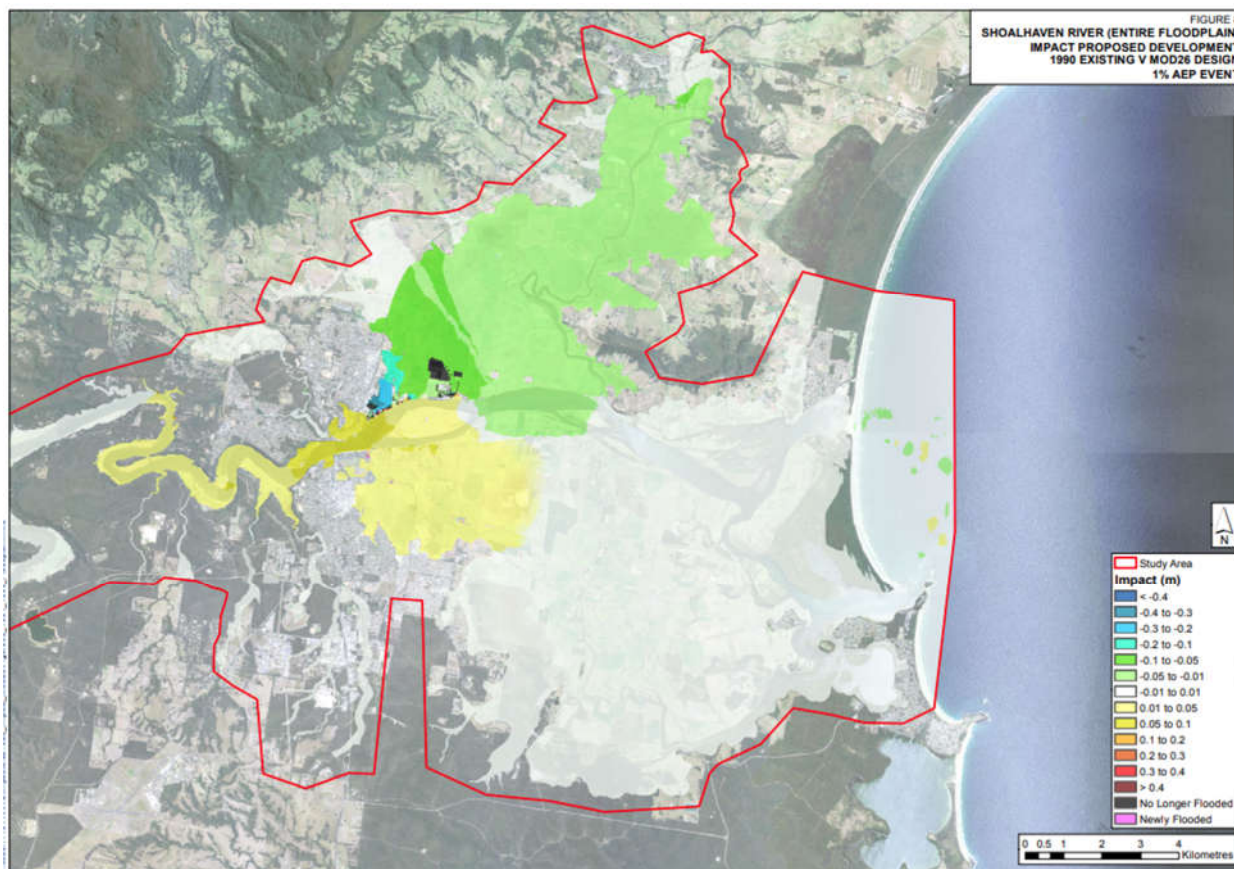


Figure 18 ; Impact Proposed Development – 1990 Existing v Mod 26 Proposal 1 % AEP Event Source WMAwater

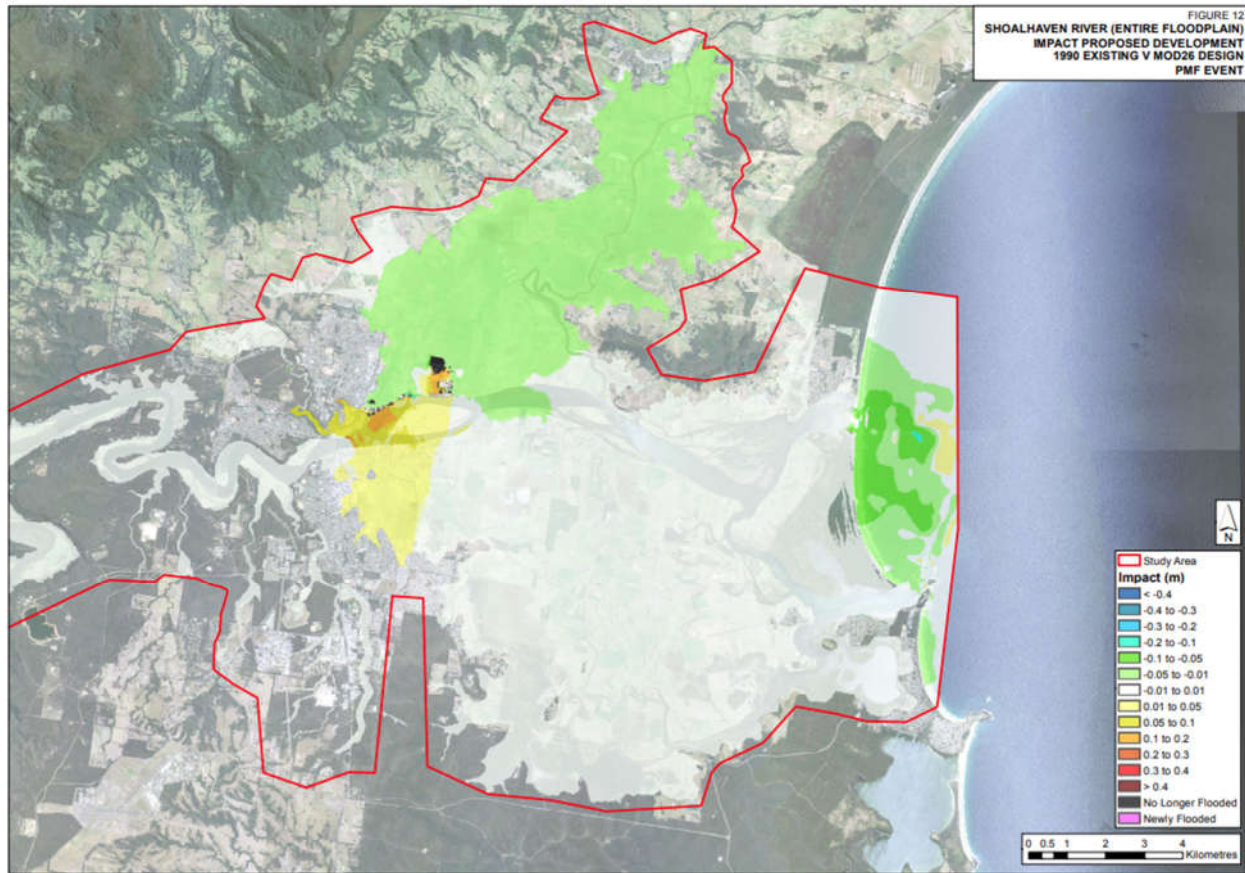


Figure 19 Impact Proposed Development – 1990 Existing v Mod 26 Proposal PMF Event
Source WMAwater

The maximum incremental increases in flood level since November 2025 are shown below. However, the increases are predominantly within land owned by Shoalhaven Starches.

- 5% AEP – up to 0.01m (Figure 17),
- 1% AEP – up to 0.01m (Figure 18),
- PMF – up to 0.05m (Figure 19).

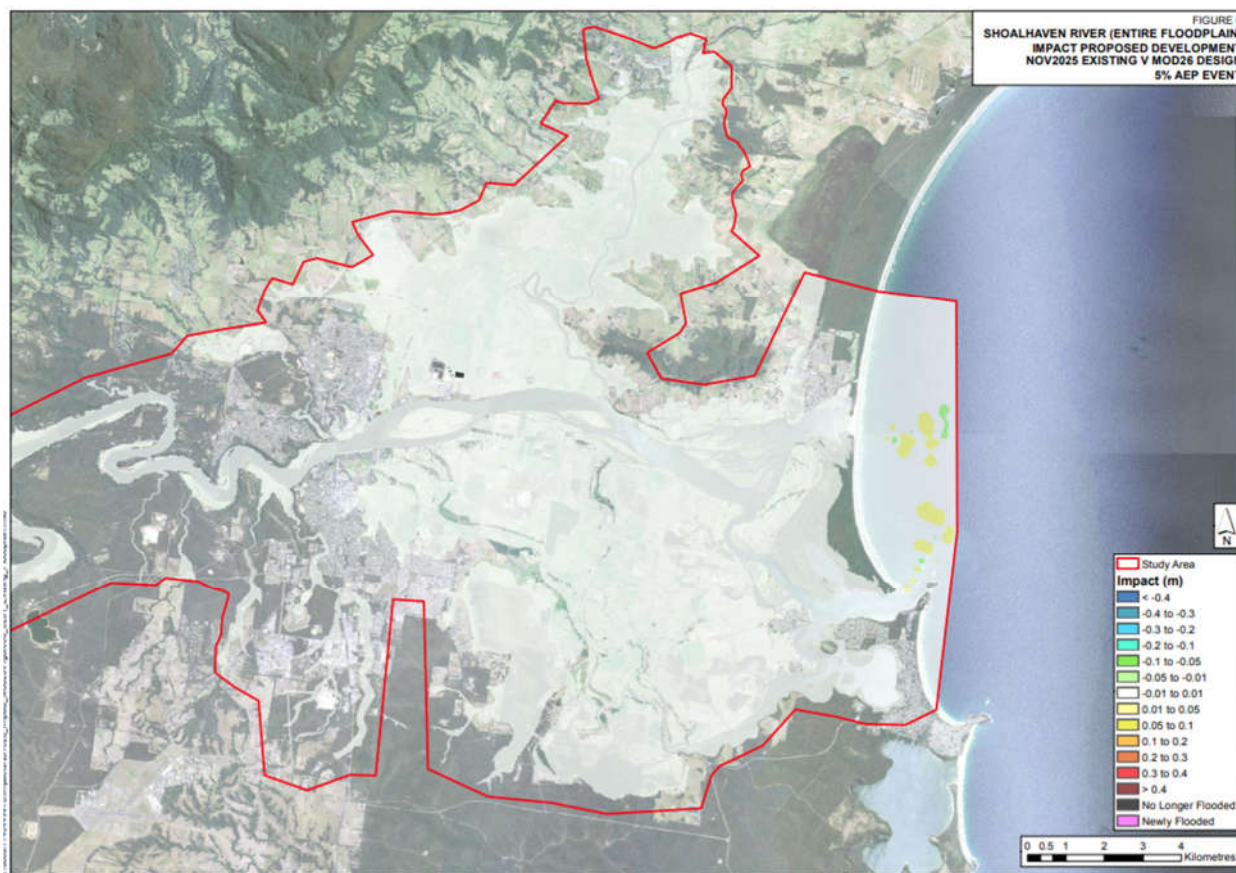


Figure 20 : Impact Proposed Development Nov 2025 Existing v Mod 26 Design 5% AEP
Event Source WMAwater

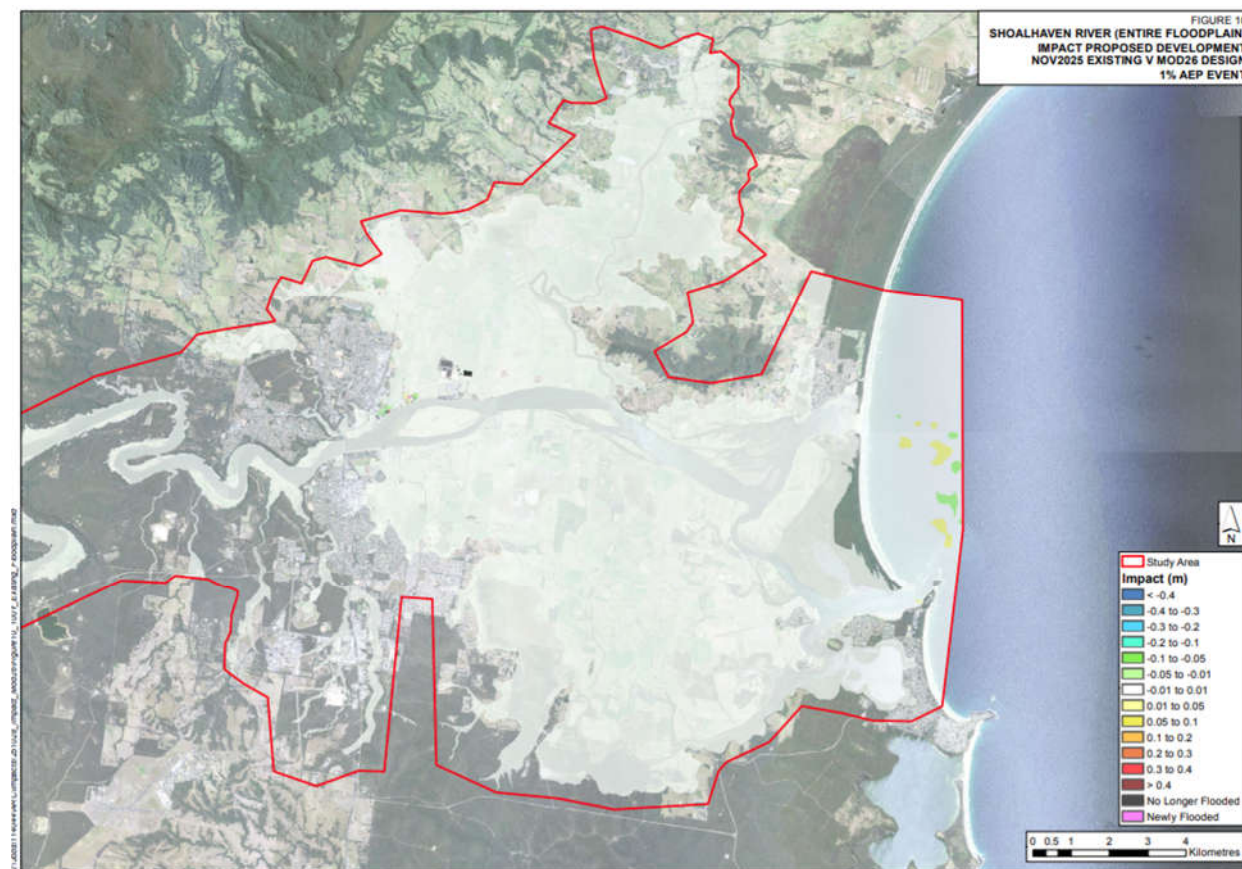


Figure 21 : Impact Proposed Development Nov 2025 Existing v Mod 26 Design 1% AEP Event Source WMAwater

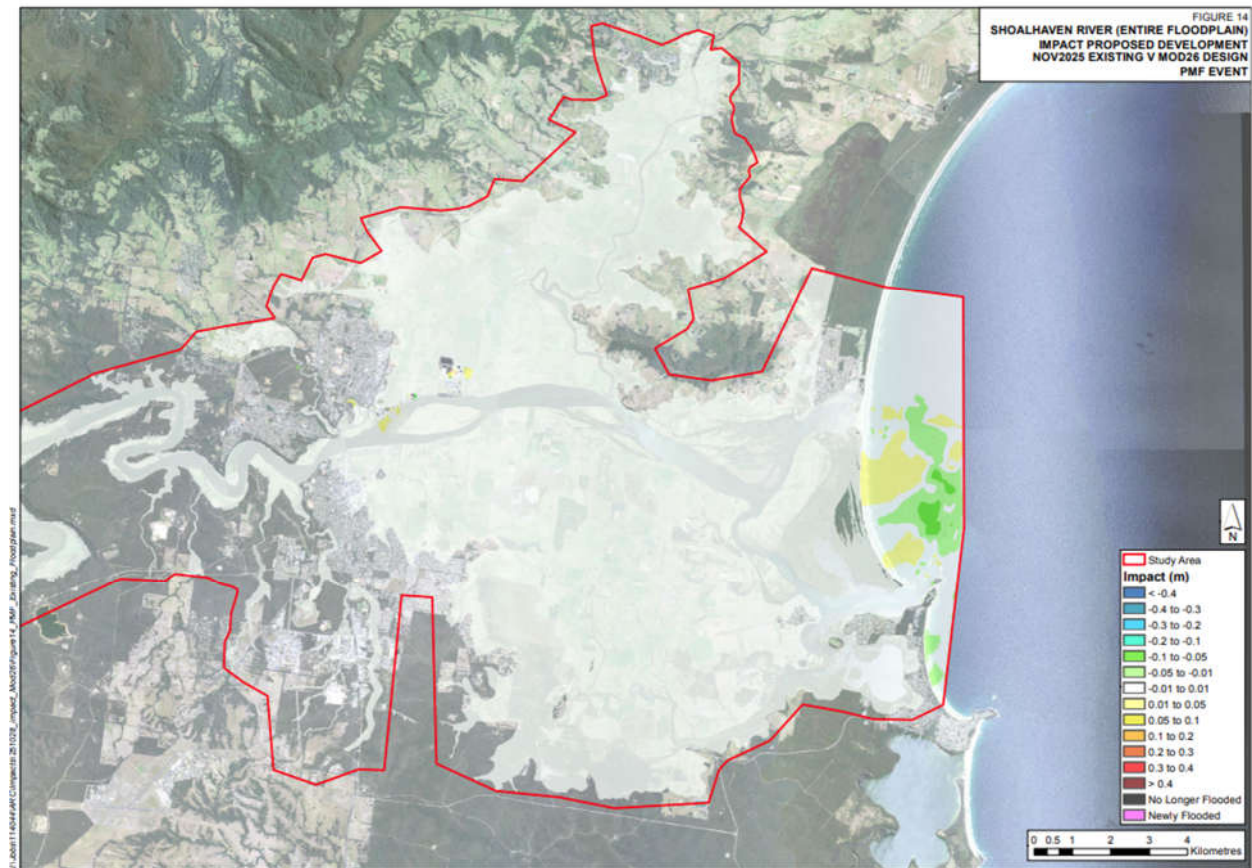


Figure 22: Impact Proposed Development Nov 2025 Existing v Mod 26 Design PMF Event
Source WMAwater

Possible Mitigation Measures

WMAwater advise that there are no viable means of reducing the increase in peak flood levels resulting from these works.

According to WMAwater the only viable management measures to reduce the impact of the works by or for Shoalhaven Starches are response modification measures. These might include the following.

- Improve / update the existing BoM or other local flood warning system.
- Improve / update the evacuation planning strategy.
- It is unlikely that improving the actual evacuation access routes are possible but installation of flood depth markers or similar would assist in informing evacuees of the risk in driving through floodwaters.

- Provision of advice to landowners (by a flier or similar provided by the SES or Council) of the need to prepare a flood evacuation plan would potentially mean reduced risk and / or damages in an event. This measure would have to be repeated at regular intervals.
- One of the most beneficial and practical means of reducing flood damages to existing buildings (residential, commercial and industrial) is to improve the awareness and preparedness of the occupants. There are several ways of undertaking such a scheme and these are outlined in Table 16 below and most require involvement by Council and / or the SES. Funding a scheme would assist in improving the community's flood awareness and consequently reducing flood damages. Some Councils in NSW have undertaken flood awareness flood awareness workshops with landowners

Table 22 : Flood Awareness Methods

Method	Comment
Letter/pamphlet from Council	These may be sent (annually or biannually) with the rate notice or separately. A Council database of flood liable properties/addresses makes this a relatively inexpensive measure which can be effective if residents take the time to absorb and apply the suggestions. The pamphlet can inform residents of ongoing implementation of the flood studies or similar on Council's web site, changes to flood levels, climate change or any other relevant information.
Council website	Council should continue to update and expand their website to provide both technical information on flood levels as well as qualitative information on how residents can make themselves flood aware. This would provide an excellent source of knowledge on flooding within the study area (and elsewhere in the LGA) as well as on issues such as climate change.
Community Working Group	Council could initiate a Community Flood Working Group framework (undertaken in other catchments elsewhere) and this would provide a valuable two-way conduit between local residents and Council.
School project or local historical society	This provides an excellent means of informing the younger generation about flooding, waterway management and climate change. It may involve talks from various authorities and can be combined with other related topics such as water quality.
Displays at key locations or similar	This is an inexpensive way of informing the community and may be combined with related displays.
Historical flood markers and flood depth markers	Signs or marks can be prominently displayed on telegraph poles or such like to indicate the level reached in previous floods. Depth indicators advise of potential hazards. These are inexpensive and effective but in some flood communities are not well accepted as it is considered that they may affect property values.
Articles in local newspapers	Ongoing articles in the newspapers will ensure that the flood and climate change issues are not forgotten. Historical features and remembrance of the anniversary of past events are interesting for residents.
Collection of peak water level data from future floods	Collection of data (photographs) assists in reinforcing to the residents that Council is aware of the problem and ensures that the design flood levels are as accurate as possible. This might also include establishment of peak water level marker poles and which house floors are inundated.
Types of information available	A recurring problem in many flood liable areas is that new owners consider they were not adequately advised that their property was flood affected on the 10.7 Certificate during the purchase process. Council may wish to advise interested parties, when they inquire during the property purchase process, regarding flood information currently available, how it can be obtained and the cost. This information also needs to be provided to all tenants and visitors who may rent for a period. Some Councils have conducted "briefing" sessions with real estate agents and conveyancers.
Establishment of a flood affectation effects database	A database would provide information on (say) which houses require evacuation, which public structures will be affected (e.g., telephone or power cuts). This database should be updated following each flood with input from the community.
Flood preparedness program	Providing information to the community regarding flooding helps to inform it of the problems and associated implications. However, it does not necessarily adequately prepare people to react effectively to the problem. A Flood Preparedness Program would ensure that the community is adequately prepared. The SES would take a lead role in this.
Develop approaches to foster community ownership of the problem	Flood damages in future events can be minimised if the community is aware of the problem and takes steps to find solutions. The development of approaches that promote community ownership should therefore be encouraged. For example, residents should be advised that they have a responsibility to advise Council if they see a problem such as debris blockage or such like. This process can be linked to water quality or other water related issues including estuary management. The specific approach can only be developed in consultation with the community.

8.4 ECOLOGICAL IMPACTS

8.4.1 TERRESTRIAL ECOLOGICAL IMPACTS

The Modification Application is supported by a streamlined BDAR prepared by Ecoplaning. The following section of the Modification Report is based upon the findings of the streamlined BDAR prepared by Ecoplaning.

8.4.1.1 Assessing and offsetting impacts

Assessment of impacts

Assessing impacts to native vegetation, habitat, TECs and threatened species habitat

In accordance with Section 8.1 of the BAM, direct impacts to threatened entities and their habitat must be assessed and impacts to native vegetation described.

According to Ecoplaning, the Modification Proposal will include direct impacts to 0.08 ha of native vegetation comprising *South Coast Floodplain Grassy Swamp Forest - PCT 4049* in a 'Disturbed' condition class. An area of 0.23 ha supporting PCT 4049 will be avoided within the subject land and a total of 2.49 ha of PCT 4049 will be retained in the study area. In accordance with Section 9.1 of the BAM, consideration must be given to identify every threatened entity at risk of Serious and Irreversible Impacts (SII) that may be affected by the proposal. The streamlined BDAR demonstrates that threatened entities at risk of an SII have considered. According to Ecoplaning no species at risk of an SII are expected to occur within the study area.

Assessing indirect impacts on native vegetation

Ecoplaning indicate that it is difficult to quantify indirect impacts associated with the Modification Proposal (construction and operation phases), but these may include impacts such as noise due to the conveyor belt construction and operation, erosion, altered run-off regimes or inadvertent impacts to adjacent aquatic habitat or vegetation. The existing highly disturbed nature of the subject land means that indirect impacts are unlikely to have a significant impact on the surrounding environment. An assessment of all potential indirect impacts resulting from the proposal is displayed below in Table 24.

Table 23 : Assessment of indirect impacts (Source Ecoplanning)

Indirect impact type	Nature	Extent	Frequency	Duration	Timing
Inadvertent impacts on adjacent habitat or vegetation	There is a low possibility that the construction phase and during operation may result in inadvertent impacts to adjacent habitat or vegetation. The consequence of inadvertent impacts is high because native vegetation adjacent to the subject land is identified as a TEC. However, the probability of inadvertent impacts is low based on the existing use of the site and implementation of relevant mitigation measures including a CEMP. Mitigation and management of impacts is discussed further in Section 7 .	Native vegetation and habitat retained adjoining the subject land.	Ongoing during construction phase. Infrequent during operation phase.	Ongoing during construction phase	Ongoing during construction phase
Reduced viability of adjacent habitat due to edge effects	Majority of vegetation within the subject land are subject to edge effects. The strip of vegetation along the Shoalhaven River will be at risk of edge effects such as increased weed incursion. However, the risk of edge effects can be successfully managed through the implementation of mitigation measures during construction and operational phases. The proposal is unlikely to reduce the viability of areas of habitat in the subject land as the surrounding areas are fragmented from these areas and are already edge effected following the historic clearing of the vast majority of the subject land	Native vegetation and habitat retained adjoining the subject land	Ongoing during construction and operation activities.	Throughout the construction and operation period.	Short term
Reduced viability of adjacent habitat due to noise, dust or light spill	During construction there is the potential for dust and noise emissions to cause habitat within these areas to become temporarily unsuitable. However, these impacts will be temporary and intermittent by nature. It is anticipated that construction works will be restricted to daytime hours, therefore artificial light spill is unlikely to occur.	Native vegetation and habitat retained adjoining the subject land.	Ongoing during construction activities.	Throughout the construction period	Short term

Indirect impact type	Nature	Extent	Frequency	Duration	Timing
	No reduction in viability of adjacent habitat is expected during the operational phase due to infrequent use and the low impact of the development in terms of small footprint.				
Transport of weeds and pathogens from the site to adjacent vegetation	There is potential to transport weeds and pathogens to the retained vegetation during construction and operation of the proposal. The current condition of vegetation to be retained is poor to moderate. Weed management measure will be implemented during construction and operational phases to reduce the risk of pathogens and weeds invading the vegetation corridor. As part of the CEMP, weed management and hygiene protocols should be strictly implemented during construction and operational phases to reduce the risk of pathogens and weeds invading the surrounding bushland.	Native vegetation and habitat retained adjoining the subject land	Ongoing during construction activities	Throughout the construction period	Potentially Long term
Increased risk of starvation, exposure and loss of shade or shelter	The development is not expected to result in any indirect impacts resulting in an increased risk of starvation, exposure and loss of shade or shelter. As no significant changes to exposure or shade are proposed within the redevelopment.	NA	NA	NA	NA
Loss of breeding habitats	No loss of breeding habitat is expected to result from the proposed development due to the small impact footprint and retention of vast areas of native vegetation within the forested corridor. No hollow bearing trees are being removed.	NA	NA	NA	NA

Indirect impact type	Nature	Extent	Frequency	Duration	Timing
Trampling of threatened flora species	The proposed construction is not expected to result in any indirect impacts resulting from trampling of threatened flora. No threatened flora species were recorded within the subject land and threatened flora is considered unlikely to occur in the adjacent vegetation.	NA	NA	NA	NA
Inhibition of nitrogen fixation and increased soil salinity	The development is not expected to result in any inhibition of nitrogen fixation.	NA	NA	NA	NA
Fertiliser drift	The development is not expected to result in the use of fertiliser as no dwelling or inhabited areas are being created.	NA	NA	NA	NA
Rubbish dumping	The proposal is not expected to result in any increased rubbish dumping.	NA	NA	NA	NA
Wood collection	The proposal is unlikely to result in wood collection given it will only be assessed by the staff and the estuarine vegetation is not likely to be used for firewood.	NA	NA	NA	NA
Bush rock removal and disturbance	Bush rock is not present within the study area or subject land.	NA	NA	NA	NA
Increase in predatory species populations	The development could result in a minor increase in predatory species by attracting feral cats and foxes which are adapted to modified landscapes. This is however unlikely, and these species already occur in the area.	NA	NA	NA	NA



Indirect impact type	Nature	Extent	Frequency	Duration	Timing
Increase in pest animal populations	The proposal is not expected to result in an increase in pest and vermin animal species, as the existing operations at the Shoalhaven Starches attract some pest and vermin species, such as rock doves, rats and mice.	NA	NA	NA	NA
Increased risk of fire	The development is not expected to result in any increased risk of fire.	NA	NA	NA	NA
Disturbance to specialist breeding and foraging habitat, e.g. beach nesting for shorebirds.	The development is not expected to result in any disturbance to specialist breeding and foraging habitat.	NA	NA	NA	NA

Assessing prescribed biodiversity impacts

Prescribed biodiversity impacts are defined under Clause 6.1 of the BC Reg and Section 6 of the BAM and include impacts on biodiversity values in addition to, or instead of, impacts from clearing vegetation and/or loss of habitat. The presence of biodiversity values prescribed by the BC Reg 2017 and BAM have been considered by Ecoplanning in context of the subject land as outlined in Table 25 below.

Table 24: Prescribed Biodiversity Impacts (Source Ecoplanning)

Prescribed Biodiversity Impacts	Presence within the subject land
<i>(a) the impacts of development on the following habitat of threatened species or ecological communities:</i> <i>(i) karst, caves, crevices, cliffs, rocks and other geological features of significance,</i> <i>(ii) human made structures,</i> <i>(iii) non-native vegetation.</i>	The subject land does not contain areas of cliffs, crevices, rocks and other geological areas of significance. There are many human made structures within the subject land and directly adjacent to the subject land. These include carparks, the railway line, silos and buildings. The water treatment plant includes large ponds, three smaller ponds will be combined to form one larger pond. The remaining ponds will be unchanged. The ponds provide some habitat for waterbirds. No human or manmade structures will be removed as part of the proposed works. A pair of White-bellied Sea Eagles were observed perched on a tall light pole within the Starches facility (outside of the subject land). Non-native vegetation is common throughout the subject land. Non-native vegetation within the subject land is made up of exotic paddocks typically dominated by Kikuyu grass and several weeds. A number of landscaped garden beds were also present within the subject land planted out with native species.
<i>(b) the impacts of development on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range (impacts on movement of threatened species that maintains lifecycles –BC reg)</i>	As discussed in Section 2.1 (streamlined BDAR), native vegetation along Shoalhaven River retains some connectivity to Shoalhaven River riparian vegetation and Bomaderry Creek which flows into Bomaderry Creek Regional Park. Vegetation along Shoalhaven River eventually joins large expanses of bushland to the west of

	Nowra. This corridor along the Shoalhaven River is narrow and partially disturbed. Beyond the vegetation along the Shoalhaven River, the remainder of the subject land has no connectivity and is within a highly disturbed environment with large areas of cleared land that are mostly used for agricultural purposes. The proposed works are contained to the extension of existing infrastructure. The only works that could impact upon movement corridors for fauna is the rock revetment along the Shoalhaven River. Given the subject land / footprint is positioned within a large forest/estuarine corridor, there will be no loss of connectivity as a result of the proposed works and no further assessment of impacts to habitat connectivity are required. The loss of 0.08 ha will not isolate or fragment any areas of habitat which may reduce the abundance of threatened species or restrict the movement of threatened species.
<i>(c) that affect water quality, water bodies and hydrological processes that sustain threatened entities (including from subsidence or subsidence from underground mining)</i>	The proposal includes works within the Shoalhaven River. Rock revetment along 50 m of the Shoalhaven River is needed to avoid potential spillage into the river. The Shoalhaven River is expected to provide habitat for threatened species, for example foraging habitat for the White bellied Sea Eagle which was observed perched onsite during the field survey. The proposed rock revetment works within Shoalhaven River has the potential to impact on water quality and hydrological processes. An aquatic survey has been prepared by Lesryk Environmental (2025) to specifically assess fisheries habitat within the Shoalhaven River. The aquatic survey determined the presence of aquatic habitat in the form of sandy and silty substrates, scattered cobbles and pebbles, accumulations of woody debris, isolated boulders, small patches of <i>Avicennia marina</i> (Grey Mangrove), and the existing rock revetment wall. No seagrass beds, saltmarsh, or

	other mapped sensitive estuarine habitats were detected (Lesryk Environmental 2025). These habitats provide foraging opportunities, shelter, and structural complexity for fish and other aquatic biota, but do not meet the criteria for Type 1 KFH, which include critical habitats such as seagrass meadows, saltmarsh, and recognised spawning or nurse grounds. This means that the works footprint, and adjacent areas potentially subject to indirect impact, contain estuarine habitats of moderate ecological importance and that potential impacts can be managed effectively through the application of appropriate mitigation and management measures during construction. The subject land contains areas mapped on the Acid Sulfate Soils Risk map (NSW DCCEE 2024b). The classes are defined below: • L4: Low probability >3 m below ground surface • L2: Low probability 1 - 3 m below ground surface • H1: High probability 1 - 2 m below surface Excavation of soils should consider potential acid sulfate soils risks, particularly in the northern portion of the subject land mapped as H1. The oxidation of acid sulfate soils (which can result in low dissolved oxygen, fish kills and plant kills) should be avoided. Furthermore, through the implementation Construction Environmental Management Plan (CEMP), any potential runoff and oxidation that may impact on water quality during the construction phase will be mitigated.
<i>(d) on threatened and protected animals from turbine strikes from a wind farm</i>	Not applicable – threatened species will not be at risk of turbine strikes from the proposal.
<i>(e) on threatened species or fauna that are part of a TEC from vehicle strikes.</i>	During the construction phase vehicle access is likely to increase. This would be limited to vehicles that require access to undertake the works. Following construction, vehicle access will not increase as a result of the proposed

	works. Increased vehicle strikes are unlikely to occur.
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8.4.1.2 Mitigation and management of impacts

As all impacts to biodiversity cannot be avoided by the Modification Proposal, Ecoplanning recommend the following mitigation measures to assist with ensuring that direct and indirect impacts are mitigated to the fullest extent practical. Table 26 includes measures to be implemented to avoid and minimise biodiversity impacts, consistent with the requirements of Section 8.4 of the BAM 2020.

Construction Environmental Management Plan (CEMP)

Ecoplanning recommend that a site-specific CEMP will be developed prior to any works taking place and implemented over the life of the project. The CEMP will incorporate adaptive management principles.

The CEMP should incorporate the recommendations included in the Lesryk Environmental Aquatic Survey (2025) to ensure impacts aquatic environment are minimised. The CEMP will outline management actions to avoid inadvertently causing additional impacts to those described in this BDAR. Management actions will avoid and/or limit the potential for indirect offsite impacts and include an appropriate erosion and sedimentation control plan and measures to prevent the introduction of weed species. Any management actions should follow best practice protocols such as Landcom (2004) or the NSW Transport Biodiversity Guidelines (2011).

Ecoplanning propose mitigation measures as outlined below. An unexpected finds procedure will be put in place at the time of construction to avoid and mitigate any potential harm or injury to non-threatened fauna species. Pre-clearance protocols are also further discussed below.

In summary, the CEMP should be provided as a plan(s) in A1 format and illustrate details such as:

- Staging methodology
- Location of site fencing
- Location of silt fences, traps or filters
- Location of stockpiles, storage sheds and equipment
- Vegetation protection
- Biodiversity Management Plan
- Any approval and notification requirements
- Other relevant recommendations and issues as identified

The CEMP should incorporate the recommendations included in the Lesryk Environmental Aquatic Survey (Section 8.4.1).

Pre-clearance protocols



Native fauna may be present on the subject land at the time of construction. Ecoplanning therefore recommend that appropriate pre clearance protocols are to be put in place at the time of vegetation clearing to mitigate and avoid potential harm or injury to native fauna. These protocols should be included in the CEMP. They should include, as a minimum, pre-clearance surveys to identify habitat trees within or near the proposed footprint. Habitat trees are considered any tree which may provide shelter, foraging or breeding habitat for fauna and include, but not limited to hollow branches or stick nests. Micro siting of the proposed footprint can then be implemented to allow for retention of any habitat trees.

Site management and construction controls

To avoid potential indirect offsite impacts during construction, Ecoplanning also recommend that an appropriate erosion and sedimentation control plan should be in place, following best practice protocols such as those detailed in Landcom (2004). The recommendations included in the Lesryk Environmental Aquatic Survey (Section 8.4.1) specially addressing indirect impacts to the aquatic environment should be considered.

Table 25: Summary of proposed mitigation measures (Source Ecoplanning)

Mitigation action	Development phase	Outcome	Timing	Responsibility
As part of the CEMP, a Biodiversity Management Plan (BMP) will be prepared prior to clearing of native vegetation subject land. The BMP would include the following: - Preparation of maps to clearly identify construction limits. - Erosion and sediment control actions in accordance with the Blue Book (Landcom 2004) to be implemented during construction phases. - Any required updates to the site induction procedure. - Pre-clearance protocols as outlined above. - Identification of weed plumes and priority weeds including their treatment and management. - Ensure clean plant and equipment are used to ensure pathogens and environmental weeds are not introduced.	Pre-construction	Flora and fauna would be managed in accordance with the requirements of the BMP; prevention of over clearing of vegetation; prevention of weed establishment and invasion.	Pre-construction and construction	Construction contractor
Prior to the commencement of clearing, a pre-clearing survey will be conducted to confirm the absence of any fauna within the trees to be removed. Any habitat trees (e.g. Mangroves and Swamp Oaks containing hollows and/or nests/possum dreys should be clearly identified.	Pre-construction	Prevents fauna injury/mortality	Prior to vegetation removal	Project ecologist

Mitigation action	Development phase	Outcome	Timing	Responsibility
Site inductions during construction to include a briefing regarding the local fauna of the site and protocols to be undertaken if fauna are encountered.	Pre-construction	Prevents fauna injury/mortality	Construction	Construction contractor
Frequent maintenance of construction machinery and plant will be undertaken to minimise unnecessary noise or air pollution.	Construction	Minimises disruption to fauna foraging, nesting or roosting behaviours	Construction	Construction contractor
For unexpected finds or if any animal is injured during the construction, contact the relevant local wildlife rescue agency (e.g. WIRES) and/or veterinary surgery as soon as practical. Until the animal can be cared for by a suitably qualified animal handler, if possible minimise stress to the animal and reduce the risk of further injury by: • Handling fauna with care and as little as possible. • Covering larger animals with a towel or blanket and placing in a large cardboard box. • Placing small animals in a cotton bag, tied at the top. • Keeping the animal in a quiet, warm, ventilated and dark location.	Construction / Operation	Prevents fauna injury/ mortality	Pre-construction, construction and operation	Construction contractor

8.4.1.3 Offset requirements and credit calculations

A biodiversity offset requirement for residual impacts of a proposed development must be calculated in accordance with Section 10.1 and Section 10.2 of the BAM. The following section details the credit requirements for the proposed development to achieve the 'no net loss standard' established by the BAM according to Ecoplaning .

Impacts on native vegetation and TECs

According to Ecoplaning, Section 9.2.1 of the BAM indicates that the following vegetation zones require offsets:

- Vegetation zones that have a VI score ≥ 15 where the PCT is representative of an endangered (EEC) or critically endangered ecological community (CEEC)
- A vegetation zone that has a vegetation integrity score of ≥ 17 where the PCT is associated with threatened species habitat or is a vulnerable ecological community.
- A vegetation zone that has a vegetation integrity score ≥ 20 . As shown below in Table 8.1, the vegetation integrity score for each vegetation zone is above the minimum requiring offsetting. Given that all vegetation zone are identified as a TEC and have VI scores greater than 17.

As shown below in Table 27 the vegetation integrity score for each vegetation zone is above the minimum requiring offsetting. Given that all vegetation zone are identified as a TEC and have VI scores greater than 17.

Table 26 : Vegetation zones assessed that require offsetting (source Ecoplaning)

Veg zone	PCT	Condition class	Vegetation Integrity Score	Total impact (ha)
3	PCT 4049 - South Coast Floodplain Grassy Swamp Forest	Disturbed	24.6	0.08

Impacts on threatened species and their habitat

Ecoplaning indicate that Section 9.2.2 of the BAM requires offsetting for the impacts of proposals on threatened species that require species credits. Section 5.2.5 of the BAM requires a species polygon to be prepared if surveys confirm that a species credit species is present. Ecoplaning indicate that no species credit species were detected within the subject land and no offsetting for threatened species and their habitat is required.

Impacts that do not require offsetting or further assessment

In accordance with Section 9.3 of the BAM, areas within the subject land that do not contain native vegetation do not need to be assessed for ecosystem credits. As shown in Figure 23, only a small portion of the native vegetation within the subject land is going to be impacted and thus requires offsetting.



Figure 23; Impacts requiring an offset (Source Ecoplanning)

Credit calculations

Ecosystem credits

The ecosystem credits required to offset the proposal as identified by Ecoplanning are provided in Table 28. A total of one ecosystem credit is required to offset the proposed vegetation clearing.

Table 27 : Ecosystem credit summary (Source Ecoplanning)

Vegetation zone	Plant community type	Condition class	VI Score	Total impact (ha)	Ecosystem credits
3	PCT 4049 - South Coast Floodplain Grassy Swamp Forest	Disturbed	24.6	0.08	1
Total				0.08	1

Species credits

Ecoplanning indicate that no species credits are required to be offset.

Biodiversity Conservation Fund

The Biodiversity Offsets Payment Calculator (BOPC) was replaced by the Biodiversity Conservation Fund (BCF) Charge System on 17 October 2022. Under the BCF Charge System, the cost of ecosystem credits is no longer provided in the BAM-C. The BCF Charge System is managed by the Biodiversity Conservation Trust (BCT), who will determine the credit charge.

8.4.2 AQUATIC ECOLOGICAL IMPACTS

The Modification Application is supported by assessment of the impacts of the proposed works on aquatic ecology prepared by Lesryk Environmental. The following section of the Modification Report is based upon the findings of the aquatic ecological assessment prepared by Lesryk Environmental.

Aquatic habitats Present

The field investigation confirmed that the aquatic environment present was variable across the study area. Tow-camera transects revealed the presence of sand flats, sand with scattered cobbles and pebbles, and areas of fine silt sediments. In addition, accumulations of large woody debris (snags) and isolated boulders were observed across sections of the riverbed, providing areas of structural complexity.

Four small patches of mangrove habitat were present along the riverbank. Each patch consisted of a single Grey Mangrove (*Avicennia marina* subsp. *australasica*) tree, with associated pneumatophore fields ranging in area from about 1.7 - 7 sqm, totalling approximately 23 sqm . The mangroves were positioned in the intertidal zone on the riverbank and their approximate locations are noted in Figure 24.

No seagrass beds were detected within the study area. Neither the tow-camera transects, nor the SCUBA-assisted dive identified the presence of *Zostera*, *Posidonia*, or any other seagrass taxa. Similarly, no extensive beds of other submerge aquatic macrophytes were observed. During the survey, no floating remnants of seagrass were noted and none were noted washed up on the shore near the proposal area.

It is noted that the spatial accuracy of the mapped features presented in Figure 24 is limited. This map is provided to illustrate the general location and relative extent of habitats observed, rather than to serve as precise habitat distribution data.



Figure 24 : Habitat composition identified during investigation Source Lesryk Environmental

Species Recorded

Lesryk conducted a survey of the fish assemblages present in another proximate stretch of the Shoalhaven River, this present about 150 m upstream of the proposed activity (authors field notes). The fish recorded during that previous surveys are also presented in Table 29.

Table 28 – Fish Species Recorded

Key:

A – Species recorded during the current survey

B – Species recorded during the October 2024 Survey

Common Name	Scientific Name	Detection Method	A	B
Yellowfin Bream	<i>Acanthopagrus australis</i>	Observed from boat, recorded on tow camera, observed on BRUV	x	x
Mullet	<i>Mugil cephalus</i>	Observed from boat, recorded on tow camera, observed on BRUV	x	x
Silver-biddy	<i>Gerres oyena</i>	Observed from boat		x
Smooth Toadfish	<i>Tetractenos glaber</i>	Observed from boat, recorded on tow camera, observed on BRUV	x	x
Unknown fingerling	N/A	Observed from boat, recorded on tow camera, observed on BRUV	x	x

According to Lesryk:

- None of the fish recorded during the current or previous survey are listed under either the EPBC or FM Acts.
- No State or Federally listed threatened fish are known from the reach of the Shoalhaven River in which the proposed activity will occur.
- Reference to the Federal Government's Protected Matters Search Tool notes that the Black Rockcod (*Epinephelus daemeli*), Macquarie Perch (*Macquaria australasica*) and Australian Grayling (*Prototroctes maraena*), these listed as Vulnerable, Endangered and Vulnerable under the EPBC Act respectively, are identified as 'species or species habitat may occur within area' (Cth DCCEEW 2025).

Determination of Key Fish Habitat (KFH)

According to Lesryk Environmental the Shoalhaven River is mapped as KFH.

The aquatic habitats recorded during the Lesryk Environmental's investigation were assessed against the habitat categories set out in the Policy and Guidelines for Fish Habitat Conservation and Management – Update 2013 (DPI 2013). This assessment considered both the character and extent of each habitat component within the study area and the criteria used to define KFH Types.

According to Lesryk Environmental no seagrass, saltmarsh, freshwater wetlands, or mapped sensitive estuarine habitats were present within the study area. These features are primary triggers for Type 1 KFH under the Guidelines. The site is estuarine (tidally influenced

Shoalhaven River) and, therefore, the freshwater-specific Type 1 categories (e.g. in-stream gravel beds, large rocks, snags, native aquatic plants) are not applicable.

Lesryk Environmental outlined that observed habitats – including mangroves, sand with scattered cobbles/pebbles, silt patches, accumulations of woody debris, and rocky material associated with the existing revetment wall – are all recognised under the Guidelines as Type 2 KFH. While these habitats are important for providing structural complexity, refuge, and foraging areas, Lesryk Environmental indicate they do not meet the criteria for critical habitats essential to the survival and productivity of fish stocks.

On this basis, the aquatic habitats within the works footprint and surrounding survey area are determined by Lesryk Environmental to constitute Type 2 KFH.

Conclusions & Recommendations

The field investigation and desktop review undertaken for this assessment have provided a clear characterisation of the estuarine habitats present within, and adjacent to, the proposed activity. Field investigations confirmed the presence of sandy and silty substrates, scattered cobbles and pebbles, accumulations of woody debris, isolated boulders, small patches of *Avicennia marina* (Grey Mangrove), and the existing rock revetment wall. No seagrass beds, saltmarsh, or other mapped sensitive estuarine habitats were detected.

Comparison with government spatial datasets revealed a discrepancy between previously mapped estuarine macrophytes and observations made in the field investigation. While Fisheries NSW and SEED portal mapping indicated the historical presence of seagrasses (e.g., *Zostera* spp.) near the subject site, these features were not detected during towcamera transects or SCUBA inspections. This indicates that available mapping in the locality is outdated or inaccurate, and that seagrass meadows are no longer present near the proposed activity.

The works to extend the existing revetment wall are not considered to have a serious and irreversible impact to key fish habitats or fisheries resources as these were not observed to be present in the areas investigated.

While the Shoalhaven River is classified more broadly as Class 1 – Major key fish habitat under the Policy and guidelines for fish habitat conservation and management – Update 2013, assessment of the observed habitats against the criteria set out in the Guidelines determined that all aquatic habitats within the study area conform to Type 2 KFH. These habitats provide foraging opportunities, shelter, and structural complexity for fish and other aquatic biota, but do not meet the criteria for Type 1 KFH, which include critical habitats such as seagrass meadows, saltmarsh, and recognised spawning or nurse grounds. This means that the works footprint, and adjacent areas potentially subject to indirect impact, contain estuarine habitats of moderate ecological importance and that potential impacts can be managed effectively through the application of appropriate mitigation and management measures during construction. To ensure that residual impacts are minimised and ecological values maintained, a suite of recommended bio-engineered



solutions and habitat management measures are proposed by Lesryk Environmental and these are outlined below.

The objects of the Fisheries Management M Act are to conserve, develop and share the fishery resources of the State for the benefit of present and future generations. In particular, the objects of this Act include:

- (a) to conserve fish stocks and key fish habitats, and*
- (b) to conserve threatened species, populations and ecological communities of fish and marine vegetation, and*
- (c) to promote ecologically sustainable development, including the conservation of biological diversity,*

and, consistently with those objects:

- (d) to promote viable commercial fishing and aquaculture industries, and*
- (e) to promote quality recreational fishing opportunities, and*
- (f) to appropriately share fisheries resources between the users of those resources, and*
- (g) to provide social and economic benefits for the wider community of New South Wales, and*
- (h) to recognise the spiritual, social and customary significance to Aboriginal persons of fisheries resources and to protect, and promote the continuation of, Aboriginal cultural fishing.*

Based on the outcomes of the field survey, it is not considered that the works within the section of the Shoalhaven River that are to be impacted by the proposed activity will be inconsistent with the objectives of the FM Act.

The works will not affect fish stocks, key fish habitats, threatened species or marine vegetation. The proposed activity is a deemed SSD. Approval under 201, 205 or 219 of the FM Act are not required for SSD.

The following recommendations are proposed by Lesryk Environmental to ensure that the works are undertaken in an ecologically sustainable manner:

- *Applicable erosion and sediment controls are to be implemented during the course of the works. These should be monitored and maintained throughout the course of the project.*

- Erosion and sedimentation control devices employed in the Shoalhaven River such as floating booms, should not prevent the passage of fish species.
- Erosion and sediment controls are not to be removed until all exposed surfaces are stabilised. These structures should be monitored, particularly after periods of heavy rainfall.
- To prevent runoff directly entering the Shoalhaven River, permanent diversion channels should be included within the construction plans. This will assist in diverting any site or stormwater runoff into the existing stormwater management system.
- Areas where bank erosion was observed near the proposed activity should be remediated and stabilised. In stabilising these areas, consultation with an ecological or bush regeneration firm should be entered into to ensure outcomes that benefit the localities terrestrial and aquatic flora and fauna communities are achieved.
- To ensure they are not indirectly affected, and to retain/permit the development of a riparian corridor, all recorded mangroves within 10 m of the proposed works should be flagged on site prior to works. These are to be retained and where applicable (on land) a 5 m wide buffer exclusion fence installed around them.
 - The positions of the mangroves should be clearly located on site through the erection of temporary bunting or similar to prevent any indirect impacts on these plants arising during the course of the works. This should be done in consultation with a botanist or similar qualified person.
- In consultation with a suitably qualified bush regeneration firm, particularly one familiar with estuarine environments, replanting of the area in front, and atop of, the toe of the existing and extended revetment wall, or within this structure through appropriate design, with mangroves and other native plants should occur.
- In consultation with a suitably qualified commercial company, stabilisation of existing eroded areas within proximity of the works must be conducted before commencement. This will prevent sediment laden runoff from entering into the Shoalhaven River.
- All vehicle movements on site, where possible, should be restricted to the north of the works. This ensuring there are no vehicles traversing on the riverbank, increasing possible erosion. Spot checks on machinery/equipment used will be conducted daily before works commence to reduce the risk of water contamination (i.e., associated with fuel or oil leaks).
- If a spill occurs, both Shoalhaven Starches Pty Ltd environmental advisor (or similar officer) and the NSW EPA will be notified immediately.

- *DPIRD Fisheries (1800 043 536) must be immediately notified of any fish kills in the vicinity of the proposed activity. In such cases, all activities other than emergency response procedures are to cease until the issue is rectified and written approval to proceed is provided by DPIRD Fisheries.*
- *Spill kits must be maintained on-site at all times. The type and nature of the kit must be commensurate to the type and quantity of any hazardous material used on-site.*
- *If machinery/equipment requires re-fuelling, this would occur within a bunded area at a minimum 50 m from the Shoalhaven River.*
- *If stored on the barge, materials (e.g. oils, chemicals) will be stored in an appropriate cabinet or container with impervious flooring and sufficient capacity to contain 110% of the largest container protected in a bunded area to prevent leaks or spills entering the water. These containers will only be removed for a specific activity and then returned.*
- *The barge will be refuelled off-site.*
- *To prevent seabed disturbance, all barge mobilisation and movement will be done during favourable tide, wind and low wave/wash conditions, with the pushing vessel operated to minimise sediment disturbance and prevent strike or disturbance to seabed aquatic habitats.*
- *Use of the barge should not interact with the bed of the Shoalhaven River or be located in one position for the entirety of the project (thereby overshadowing aquatic environments) or interfere with the four mangroves recorded or prevent the passage of fish.*

8.5 SOIL ISSUES

8.5.1 SITE CONTAMINATION

The Modification Application is supported by a “Geotechnical, Dam Safety NSW Requirements for WWTP Upgrade, Contamination and Acid Sulphate Soil Assessment” carried out by GHD (“the GHD Geotechnical Report”). This report prepared by GHD includes an assessment of potential site contamination.

The GHD Geotechnical Report describes the development areas associated with this Modification Proposal (Figure 25) as comprising:

- Site 1: Wastewater tank
- Site 2: Nitric acid bund
- Site 3: Product storage silos

- Site 4: Underground wastewater pipe
- Site 5: Phosphorus oxychloride bund
- Site 6: Carpark extension
- Site 7: Rock wall extension
- Site 8: Ethanol maintenance workshop
- Site 9: Grain conveyor
- Site 10: Grain storage and handling facility
- Site 11: Rail fuel and provisions
- Site 12: Rail maintenance building, access road and fences
- Site 13: Wastewater treatment plant (WWTP) Upgrade

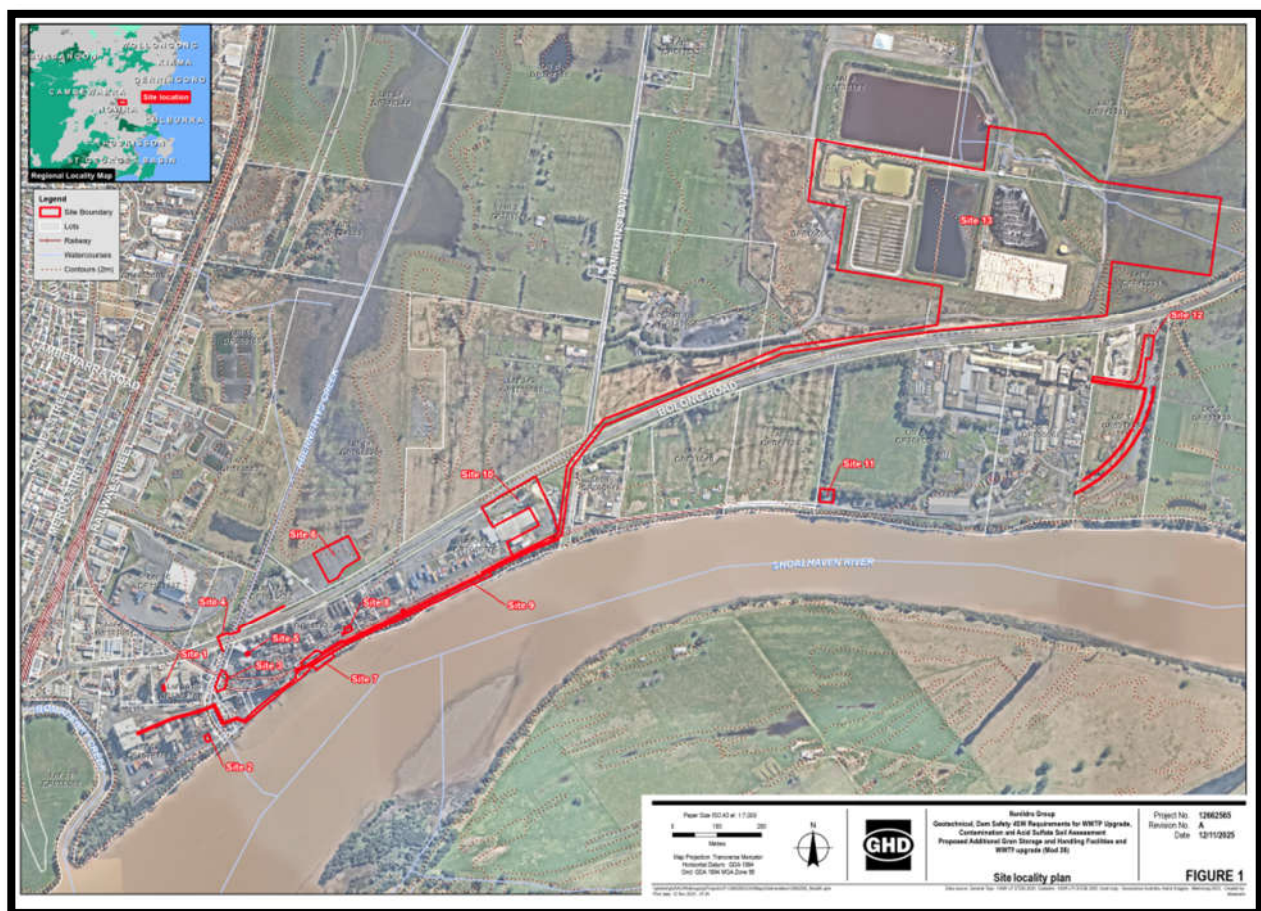


Figure 25 : Site Development Areas Source GHD

Historical review undertaken by GHD indicates that the development areas associated with this Modification Proposal were primarily agricultural land before progressive industrial development began in the 1950s, with the establishment of the Horlicks Factory as a milk processing plant west and south-west of the current sites. Shoalhaven Starches commenced operations in the 1970s at the former Horlicks site, producing wheat, starch, and gluten, while Moorehouse Industries operated a machinery service and manufacturing business nearby until its acquisition by Manildra in the early 2000s. Since 1993, the main plant has expanded significantly to support increased ethanol production, with new facilities including silos, tanks, distillery, workshops, and chemical storage areas installed across various proposed development sites (Sites 1 to 3, Site 5, Sites 7 to 10, Site 12 (western portion of the proposed WWTP pipeline)). The railway corridor, constructed in the 1960s, and other minor developments north of Bolong Road, such as farmhouses and a sewer pump station, have contributed to the evolving land use in the area. Sites 4 and 6, north of Bolong Road, remained largely undeveloped until recent years, with Site 6 only transitioning from grass paddock to a carpark in late 2022.

The WWTP (Site 13) was constructed some time between 1984 and 1993. Prior to this time, the site and surrounding areas were used for agricultural land use. The WWTP has expanded over time to include holding ponds, buildings and irrigation area (north-east of Site 13). The WWTP receives wastewater from the main plant that is generated through factory process, stormwater and / or spills (e.g. chemicals). The remaining sections of the proposed WWTP pipeline (i.e. north-south and eastern portions) also pass through areas previously used for agricultural purposes. The eastern portion of the pipeline and immediate surrounds have remained largely undeveloped except for an existing biogas pipeline, drainage swale, fence and possibly some filling with coal ash. The north-south portion of the pipeline lies immediately west of the Manildra property boundary and is flanked by light industrial businesses (i.e. electrical, fabrication) to the east, and SupaGas facility and fill mound to the west. Prior to the industrial buildings, possible farmhouses occupied the area east of the site.

Sites 11 and 12 are located within the former Paper Mill site, established by 1961, which has seen minimal layout change except for some ground disturbance and infrastructure additions over the years. The eastern section (Site 12) has remained a grass paddock, used primarily for grazing and crop production, with minor development such as a water pumping station until October 2023. From October 2023, the Cleary Bros concrete batching plant was constructed, followed by the rail extension by Manildra from March 2024 (still in progress).

Several site investigations for geotechnical, contamination and ASS have been carried out over the past 30 years. The investigations have identified several areas of environmental concern (AECs) related to past industrial activities. While limited soil and groundwater sampling has been undertaken, especially at the WWTP and pipeline routes, the majority of soil samples from the main plant align with health assessment criteria for industrial land use. Groundwater sampling has occasionally detected exceedances of ecological criteria, particularly for anthracene and certain metals. Localised contamination, including fragments of asbestos containing material (ACM), lead, total recoverable hydrocarbons

(TRH), and Per- and Polyfluoroalkyl Substances (PFAS) has been identified at certain sites, although widespread contamination is considered unlikely. Overall, historical and recent site activities have resulted in isolated areas requiring further investigation and management, with no significant impact identified for proposed developments to date.

Based on investigation results, potential for contamination was identified by GHD in 15 AECs potentially impacting soil, surface water and/or groundwater (refer Figures 26 and 27).

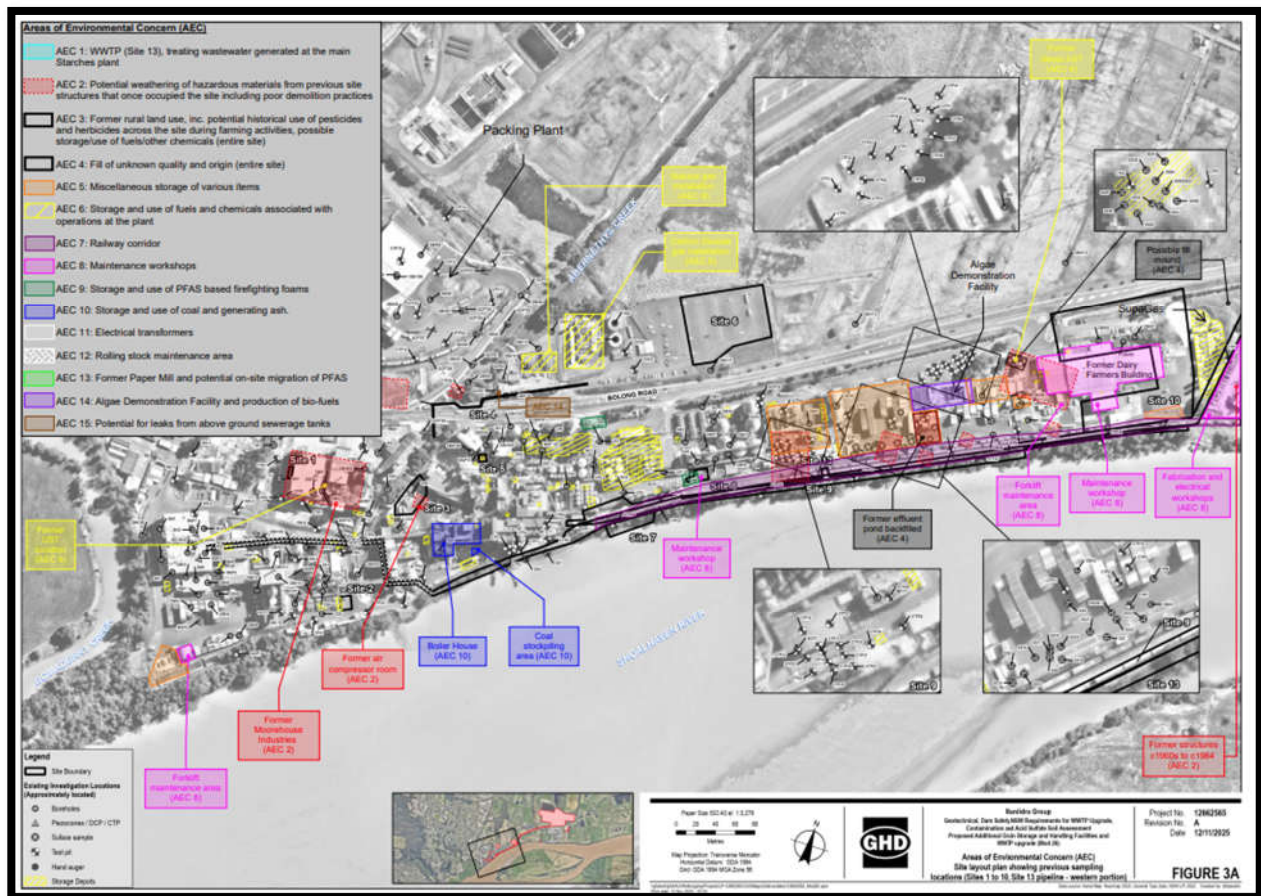


Figure 26 : Areas of Environmental Concern (AECs) (Factory site) Source : GHD

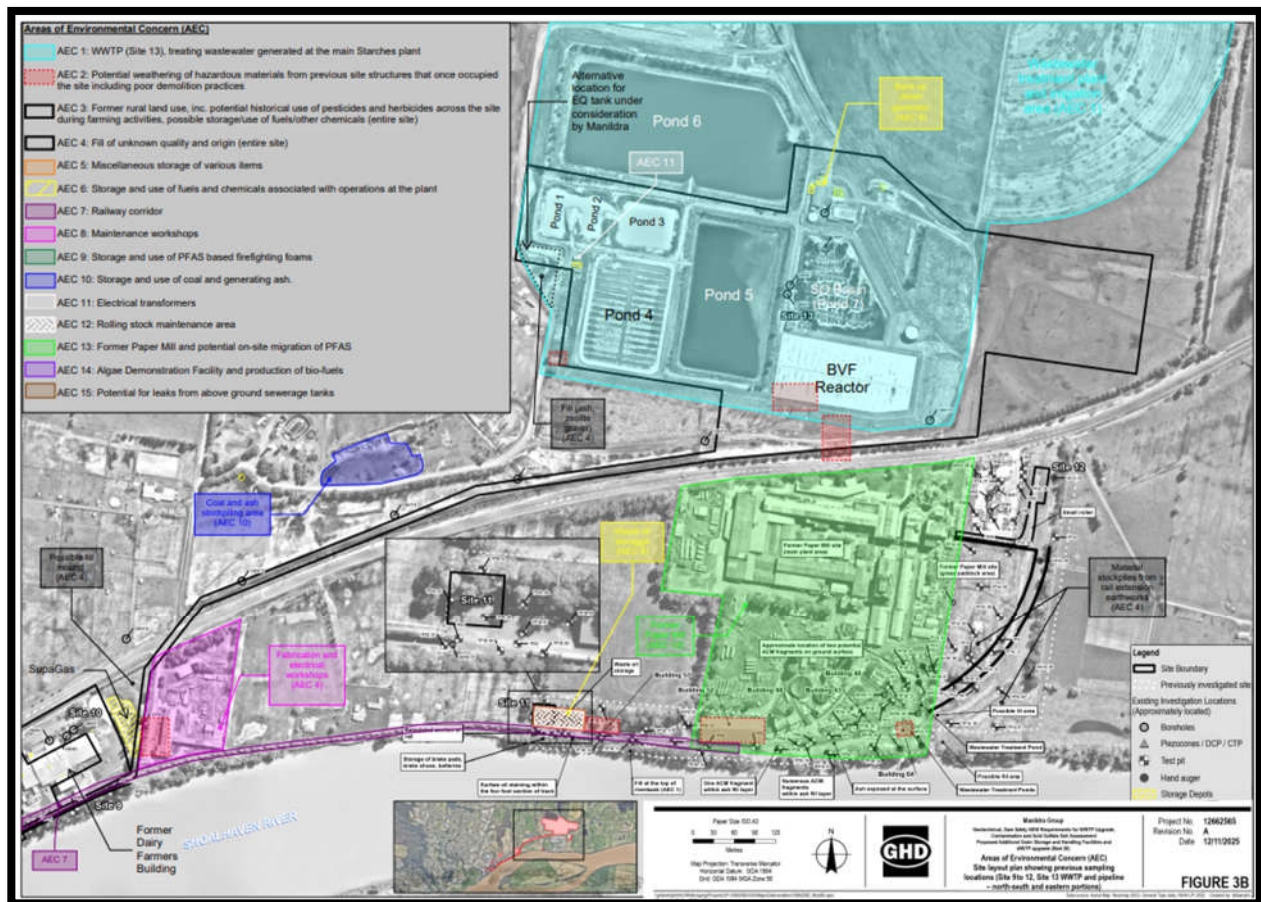


Figure 27 : Areas of Environmental Concern (AECs) WWTP and former Paper Mills sites
Source GHD

GHD indicate the occurrence of contamination (if present) is expected to be localised. The likelihood for contamination to exist within the identified AECs was assessed as very low to high, along with associated contaminants of potential concern (COPCs). Potential source-pathway-receptor (SPR) linkages were assessed and could be complete, if contamination were present, for:

- Human receptors:
 - Construction workers/visitors that have direct contact with soil and groundwater may be exposed to contamination via dust and vapours (via inhalation) generated during excavation or installation of piles.
- Ecological receptors:
 - During construction, in the vicinity of Shoalhaven River and Abernethys Creek, potential impacts to aquatic species is possible from the mobilisation of contaminants from soil and / or groundwater.

- Additional potential for exposure to soil and perched groundwater may occur during the construction phase where hardstand areas may be removed, or soil exposed in resulting excavations, in areas outside of the main plant.

GHD indicate, a Targeted Site Investigation (TSI) is recommended for AECs where the likelihood of contamination to exist is assessed as moderate to high and high, to assess if SPR linkages are complete. AECs where the likelihood of contamination was assessed as moderate, low to moderate, low and very low can be managed at the time of construction should contamination be encountered.

An Asbestos Management Plan (AMP) is recommended by GHD for AEC 2, however would also be applicable to manage other areas where asbestos is encountered during construction as an unexpected find. The AMP should be developed in line with the current NSW WHS Act (2011) and Regulation (2025), NEPC (2013), WA DoH (2021), and relevant Codes of Practice (SafeWork NSW, 2014; 2019a; 2019b) as a means to comply with asbestos regulation and prevent (so far as is reasonably practicable) or minimise exposure to hazards including airborne asbestos.

GHD also recommend that a Construction Environmental Management Plan (CEMP) be prepared to manage the potential contaminant exposure risks during construction activities, and manage potential unexpected finds (e.g. buried waste, demolition waste, ACM, etc.) that could be encountered. Therefore, the CEMP should also include an Unexpected Finds Protocol (UFP). A site-specific Work Health Safety and Environment (WHSE) plan should be prepared, to ensure appropriate safety and workplace hygiene practices are implemented to minimise potential risks from exposure to contamination. The WHSE plan must address all relevant regulatory requirements and as a minimum, should consider incorporating the relevant practices set out in CRC Care (2018) National Remediation Framework: Guideline on health and safety, Version 0.1: August 2018. The CEMP should also make reference to the AMP.

GHGD also recommend that site workers should be advised of the potential contamination risks at the sites and have appropriate personal protective equipment (PPE) available should contamination be encountered and have also read and understood management documents that apply to the construction sites

GHD further recommends the following:

- Assess waste classification of soils excavated as part of the development to allow off-site disposal of surplus materials to an appropriately licenced waste facility in accordance with NSW EPA waste classification guidelines (NSW EPA, 2014); and for Sites where PFAS is a COPC, soils should also be analysed for PFAS in accordance with Amendment 1 dated October 2016 (NSW EPA, 2016).
- For general contamination risk management, a contamination register should be prepared which clearly documents where contamination has been identified at the site or is likely to be encountered based on previous investigation results.

- Prepare and implement an Environmental Management Plan (EMP) which focuses on improving site practices and minimisation of future contamination.
- Review of the existing chemical register and update to include the current chemical storage arrangements throughout the Manildra property, in particular, the sodium hydroxide storage located approximately 7m north of the relocated approved chemical storage (northern portion).

8.5.2 ACID SULPHATE SOILS

The GHD Geotechnical Report prepared by GHD also includes an assessment in term of Acid Sulphate Soils (ASS).

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

According to the Burrier/Berry 1:25,000 Acid Sulfate Soil Risk Map (1997) Edition 2, prepared by the Department of Land and Water Conservation (DLWC) (DLWC, 1997), the majority of the proposed development areas associated with this Modification Proposal are mapped within an area having a low probability of ASS occurrence (yellow shading) (Figure 15). However, parts of Site 12 and Site 13 occur within an area having a high probability of ASS (magenta shading). The ASS risk map also shows estuarine bottom sediments (magenta shading) with a high probability of ASS occurrence below the Shoalhaven River and Bomaderry Creek

The sites are situated within the following depositional environments:

- Sites 3 to 6 and 12: alluvial plain landform (AP2) where the depth of ASS occurrence is between 1 and 3 m of the ground surface. Elevation between 2 and 4 m AHD.
- Sites 1, 2, 7 to 11, 12 (southern third) and 13 (western portion of pipeline): alluvial levee landform (AL4) where the depth of ASS occurrence is depths greater than 3 m below the ground surface. Elevation is greater than 4 m AHD
- Site 12 (northern two-thirds) and Site 13 (WWTP and eastern portion of pipeline):
 - Alluvial plain landform (AP1) where the depth of ASS occurrence is within 1 m of the ground surface. Elevation 1 to 2 m AHD.
 - Alluvial plain landform (AP2) where the depth of ASS occurrence is between 1 and 3 m of the ground surface. Elevation between 2 and 4 m AHD



Figure 28: ASS Occurrence relative to each Site (GHD)

Based on the results of previous investigations, GHD indicate that ASS may be encountered at variable depths within the proposed development areas where deep footing systems such as bored or Continuous Flight Auger (CFA) piles or trenching/excavations deeper than 1m are required. Soft dark grey to black clays and loose grey sands were encountered at test locations within or in the vicinity of the development areas, particularly in the main plant area and at the WWTP, which are indicative of coastal ASS. Limited ASS investigations have been carried out to assess the presence of ASS.

GHD recommends that an Acid Sulfate Soil Management Plan (ASSMP) be developed and actioned where excavations associated with the proposed development will disturb ASS and/or require dewatering which could result in the lowering of the water table. It is understood that ASSMPs already exist for some areas of the Main Plant and WWTP. GHD indicate that existing ASSMPs should be reviewed and updated to reflect changes in ground disturbance activities, quantities and guidelines. Further investigations could be considered to assess the absence or presence of ASS to better inform ASS management options during soil disturbance.

8.5.3

GEOTECHNICAL AND RIVERBANK STABILITY

The GHD Geotechnical Report also provided a review of available geotechnical information and site observations to assess the potential impacts of proposed Mod 26 structures on the stability of Bomaderry, Abernethys Creek, and the Shoalhaven River. This assessment

provides concept-level guidance based on previous investigations and visual inspections, noting that detailed site-specific investigations will be required to confirm design assumptions.

According to GHD, across the sites, subsurface conditions generally comprise shallow fill overlying alluvial soils of variable consistency, transitioning to residual soils and weathered sandstone at depth. Depth to competent founding material varies significantly, influencing foundation design requirements. Sites with soft or compressible alluvium (Sites 1, 3, 8, and 10) are unlikely to support shallow footings and will require deep piled foundations or ground improvement. Conversely, sites with stiff to very stiff soils (Sites 2, 5, 6, 11, and 12) may accommodate shallow foundations, subject to confirmation through targeted investigations.

Riverbank and creek stability is a critical consideration for several sites. GHD indicate the proposed rock revetment wall at Site 7 meets geotechnical stability criteria under both long-term and short-term conditions, improving riverbank resilience and reducing erosion risks. This design was developed using existing geotechnical and survey data (Coffey, 2017), KMK Geotechnics (2024) and Allen Price (2025)). Two representative cross-sections were analysed by GHD under varying groundwater conditions and seismic loading. The load from the proposed conveyor belt structure was not considered in the GHDF analysis, as it is anticipated that the conveyor will be supported on piles, transferring loads directly to deeper strata rather than the revetment slope. GHD concludes the concept design satisfies minimum factor of safety requirements ($FoS \geq 1.5$ for long-term and $FoS \geq 1.3$ for short-term conditions). Rock sizing, hydraulic performance, and bio-engineering treatments were not addressed and should be confirmed during detailed design.

GHD indicate Sites 9 and 10 present elevated risk due to proximity to the Shoalhaven Riverbank and the scale of proposed structures. The grain conveyor (Site 9), potentially located within 1 m of the riverbank crest, spans variable ground conditions and lies adjacent to areas of documented instability, including historical failures and ongoing erosion. The grain storage and handling facility (Site 10) positioned 30 to 65 m from the riverbank, will impose significant loads requiring deep foundations.

Further GHD indicate construction activities, including trenching for pipelines and underground services, may encounter soft soils and shallow groundwater, requiring excavation support and dewatering. Embankment works at the WWTP (Site 13) must consider loading effects and include monitoring during and after construction. Erosion and sediment controls should be implemented for works near watercourses.

GHD recommend that site-specific geotechnical investigations, including boreholes and in-situ testing, be undertaken for all major structures to confirm subsurface conditions and foundation requirements. Riverbank stability assessments should be reviewed and updated for sites 9 and 10 to account for proposed loads and current conditions. These measures will ensure that detailed design addresses both structural integrity and environmental stability.

8.5.4 DAM SAFETY

The GHD Geotechnical Report included a review of dam safety for the existing and proposed WWTP ponds (Site 13) which revealed that historical stability issues have occurred primarily due to dispersive soils and high water levels, leading to batter instability and the need for emergency sheet piling along critical embankments.

While these measures have mitigated immediate risks, observations of slumping, GHD indicate surface erosion and possible dispersive erosion (tunnelling) highlight the need for ongoing monitoring and maintenance.

The works associated with the Modification Proposal will also require assessment of these risks, in order to assess both performance and regulatory compliance requirements for Dams Safety NSW (DSNSW) under the Dam Safety Act 2015 and Dam Safety Regulation 2019.

While none of the existing ponds are classified as 'Declared Dams' under DSNSW, GHD indicate the proposed 150 ML treated effluent storage pond and conversion of Ponds 1 to 3 into an 80 ML anaerobic digester introduce additional dam safety considerations that will require a Consequence Category Assessment (CCA) under DSNSW regulations.

GHD outline the scale and function of the new and upgraded structures suggests that a Desktop Consequence Category Assessment (DCCA), which constitutes a desktop based, risk focused assessment should be conducted in the first instance, with the completion of a formal CCA assessment, should this be indicated by the results of the DCCA.

GHD conclude that risks such as overtopping, internal erosion, seepage, and rapid drawdown remain relevant and should be addressed through appropriate design measures, including spillway provision, drainage systems, and dispersive soil erosion protection.

In addition GHD recommend that monitoring programs should include visual inspections, piezometer readings, and inclinometer checks, supported by a Dam Safety Operation Manual and Emergency Response Procedures.

8.5.5 SOIL SALINITY

According to the GHD Geotechnical Report environmental monitoring results between 2012 and 2024 indicate soils in paddocks at the WWTP range from moderately saline to extremely saline, where highest salinity is recorded in the upper 0.1 m of the soil profile. Electrical conductivity (EC) concentrations were variable across the monitoring period.

GHD indicate that groundwater EC results indicate moderate salinity but are stable and remained consistent with long term averages. There were no visual signs of salt accumulation or shift towards salt tolerant species observed during fieldwork.



Based on the results of this preliminary salinity assessment, site soils may have saline concentrations which could adversely affect very sensitive crops. GHD therefore recommend that:

- Soil sampling be undertaken to assess the salinity potential within the eastern portion of the site.
- The effects of salinity on foundations be assessed as part of future detailed geotechnical investigations in accordance with AS 2159 – 2009 Piling – Design and Installation

8.6 WATER QUALITY

8.6.1 SURFACE AND GROUNDWATER IMPACTS

The GHD Report also gives consideration in relation to those parts of the Modification Proposal that occur within the riparian corridor having regard to aquifer interference in accordance with the NSW Aquifer Interference Policy 2018. The proposed development area, except for the carpark realignment, occurs within the riparian corridor (NSW Department of Industry, 2018, p. 6). Below are relevant extracts from Water Management Act 2000 and NSW Aquifer Interference Policy 2018, which form the basis of this review of potential impacts to surface water and groundwater with respect to the proposed development.

The Water Management Act 2000 defines an aquifer interference activity as that which involves any of the following:

- the penetration of an aquifer,
- the interference with water in an aquifer,
- the obstruction of the flow of water in an aquifer,
- the taking of water from an aquifer in the course of carrying out mining or any other activity prescribed by the regulations, and
- the disposal of water taken from an aquifer in the course of carrying out mining or any other activity prescribed by the regulations.

The NSW Aquifer Interference Policy 2018 states:

- Examples of aquifer interference activities include mining, coal seam gas extraction, injection of water, and commercial, industrial, agricultural and residential activities that intercept the water table or interfere with aquifers. The Water Management (General) Regulation 2011 states that an aquifer interference activity also includes the extraction of sand and the extraction of road base material.
- Aquifer interference activities may take water from the water source in which they exist as well as connected groundwater and surface water sources. Even where



there is no take of water, aquifer interference activities can still affect the functioning of aquifers which can impact water users and dependent ecosystems.

Part 5 (Water management principles) of the Water Management Act 2000 states:

(8) In relation to aquifer interference activities:

- (a) the carrying out of aquifer interference activities must avoid or minimise land degradation, including soil erosion, compaction, geomorphic instability, contamination, acidity, waterlogging, decline of native vegetation or, where appropriate, salinity and, where possible, land must be rehabilitated, and*
- (b) the impacts of the carrying out of aquifer interference activities on other water users must be avoided or minimised.*

Based on the definition provided in Water Management Act 2000 and examples provided in the NSW Aquifer Interference Policy 2018, GHD indicate the proposed development could be considered an aquifer interference activity. The proposed development occurs within:

- A riparian corridor
- Close proximity to the northern bank of the Shoalhaven River
- Close proximity to Abernethys Creek
- An area where potential contamination may exist from current and / or historical activities
- An area where low probability ASS occurrence has been mapped and previous investigations suggest Coastal ASS may be present.

In addition, Section 3.3 of the NSW Aquifer Interference Policy 2018 describes aquifer interference activities which are considered to have minimal impact on water dependent assets. The construction and operation of the majority of the proposed developments are not listed in this section. However, Section 3.3 of the NSW Aquifer Interference Policy 2018 describes the construction and operation of various below ground infrastructure such as pipes, tunnels and lined ponds and “construction and on-going use of waste liquid/effluent storage and irrigation reuse schemes”, which would apply to the installation of wastewater pipelines connecting the plant to the WWTP (Sites 4 and 13) and proposed treated effluent storage pond (Site 13). The commonality of these activities is the minimisation of surface water / groundwater connections and hydraulically connecting multiple aquifers.

The majority of the proposed development will comprise surface infrastructure consistent with ‘access tracks’ and ‘building and work pads’ whilst other structures such as the product and grain silos (Site 3 and Site 10) will likely require deep foundations and the treated effluent storage pond (Site 13) will require additional excavations. Foundations and deep excavations may intercept the shallow groundwater, which was encountered

between 0.6 m and 4 m bgl. Foundations and underground structures will comprise concrete or steel and therefore unlikely to form a connection with surface water / groundwater and multiple aquifers.

Section 3.2.3 of the NSW Aquifer Interference Policy 2018 requires the proponent (i.e. Manildra) to assess the potential impacts of aquifer interference activities using a risk based approach. The NSW Aquifer Interference Policy 2018 requires the proponent to respond to the considerations listed in Table 30 below to enable assessment of the potential impact of the activity.

Table 29 : Review of Potential Aquifer Interference Activities

Considerations for assessing potential impacts of aquifer interference activities	Proponents' response NSW Aquifer Interference Policy 2018 considerations
Establishment of baseline groundwater conditions including groundwater depth, quality and flow based on sampling of all existing bores in the area potentially affected by the activity, any existing monitoring bores and any new monitoring bores that may be required under an authorisation issued under the Mining Act 1992 or the Petroleum (Onshore) Act 1991.	Previous investigations (refer to Sections 3.6.2 and 4.6) established groundwater baseline conditions, quality, depth, and flow direction. Twenty-three (23) groundwater bores within 500 m of the site were registered for monitoring purposes and the area appears to be serviced by reticulated water suggesting groundwater is not a primary resource for the area (refer to Section 3.6.1 of the GHD Geotechnical Report).
A strategy for complying with any water access rules applying to relevant categories of water access licences, as specified in relevant water sharing plans. For example, returning water of an acceptable quality to the affected water source during periods when flows are at levels below which water users are not permitted to pump.	Not applicable. Minor dewatering of excavations may be required for this project to manage shallow groundwater seepages. Water removed from the excavation is likely to be transferred to Manildra's wastewater treatment facility. Groundwater is not used as a primary resource in the area.
Details of potential water level, quality or pressure drawdown impacts on nearby water users who are exercising their right to take water under a basic landholder right. Consideration will need to be given to any relevant distance restriction requirements that may be specified in any relevant water sharing plan or any remediation measures to address these impacts	Not applicable. Minor dewatering of excavations may be required for this project to manage shallow groundwater seepages. Water removed from the excavation is likely to be transferred to Manildra's wastewater treatment facility. Groundwater is not used as a primary resource in the area
Details of potential water level, quality or pressure drawdown impacts on nearby licensed water users in connected groundwater and surface water sources.	Not applicable. Minor dewatering of excavations may be required for this project to manage shallow groundwater seepages. Water removed from the excavation is likely to be transferred to Manildra's wastewater treatment facility. Groundwater is not used as a primary resource in the area.

Details of potential water level, quality or pressure drawdown impacts on groundwater dependent ecosystems.	Not applicable. Minor dewatering of excavations may be required for this project to manage shallow groundwater seepages. Water removed from the excavation is likely to be transferred to Manildra's wastewater treatment facility. Groundwater is not used as a primary resource in the area
Details of potential for increased saline or contaminated water inflows to aquifers and highly connected river systems. [ASS is also a consideration in Section 3.2.2 of the NSW Aquifer Interference Policy 2018	The proposed development is unlikely to increase salinity levels or increase the potential for contaminated water to flow into aquifers or river systems for the majority of the proposed developments. However, an increase in salinity levels were reporting in monitoring of WWTP irrigation areas, north-east of Site 13 (WWTP) (Section 3.7). It is noted that maintenance activities occur within Shoalhaven Starches Plant. It has been recommended that environmental practices are reviewed, and measures put into place that will reduce contamination from this activity (e.g. oil leaks, spills, etc.). For ASS, excavations may disturb underlying alluvial soil (i.e. potential ASS). Minor dewatering of excavations may be required for this project to manage shallow groundwater seepages. An ASSMP has been recommended to manage potential acid generation during earthworks, and additional ASS investigations to better inform ASS management options.
Details of the potential to cause or enhance hydraulic connection between aquifers.	Minor dewatering of excavations may be required for this project to manage shallow groundwater seepages. Water removed from the excavation is likely to be transferred to Manildra's wastewater treatment facility. Groundwater is not used as a primary resource in the area.
Details of the potential for riverbank instability, or high wall instability or failure to occur	The results of the slope stability analysis indicates that the existing ground and loading condition may result in localised failure of the steep northern riverbank of the Shoalhaven River during high rainfall and flood events. This will generally occur as wedge failures extending up to a few metres back from the current bank profile. Local failure of the riverbank occurred in June 2013 and was subsequently stabilised using sheet piles along the affected section. Minor bank failures have occurred since 2013 but have not required stabilisation nor encroached into the rail corridor. Slope stability assessment using worse case conditions, indicates riverbank failure may encroach into

	the rail corridor. Riverbank failure occurred following the collapse of grain silos, west of Sites 9 and 13 (western portion of the proposed WWTP pipeline). This area of the riverbank was stabilised with rock revetment. The slope stability assessment is further discussed in Sections 8 and 9.1 of the GHD Geotechnical Report.
Details of the method for disposing of extracted water (in the case of coal seam gas activities).	Not applicable.

8.6.2 STORMWATER MANAGEMENT

The Modification Report is supported by an Integrated Water Cycle Management Strategy (IWCMS) prepared by Allen Price. The IWCMS prepared by Allen Price concludes:

This report has assessed the stormwater quality and quantity impacts of proposed Mod 26 against the provisions of Chapter G2 of the SCC DCP.

The Qualitative Stormwater Quality Assessment demonstrates that operational activity of the minor works to be undertaken within the existing managed area and operational activity of the WWTP, Rail Maintenance Building, the Grain Handling Facility (Unloader, Silos, LV Substation and Weighbridge) and Conveyor are unlikely to increase stormwater pollutant export from the site.

Stormwater pollutants generated from operational activity of the Northern Carpark (including future Mod 31) can be mitigated by a modifying the existing retention pond with a conventional buffer strip and detention pond.

Potential short term stormwater quality impacts from the construction works can be mitigated by the implementation of erosion and sediment control plan and staged earthworks such that the performance objectives and criteria in Ch G2 can be satisfied.

The proposal is considered adequate from a stormwater management perspective and is recommended to be supported by the NSW Department of Planning, Housing and Infrastructure.

8.6.3 RIPARIAN CORRIDORS

The GHD Report identifies that Shoalhaven Starches was previously granted Project Approval (MP06_0228, dated 28 January 2009) by the Minister of Planning for the proposed Shoalhaven Starches Expansion project, which permitted development within the riparian corridor.

Based on review of the Guidelines for Controlled Activities on Waterfront Land (2018), GHD identify that some of the proposed development areas occur within the riparian corridor. The proposed development sites, except for Site 2, occur within areas that have been previously developed as part of the Shoalhaven Starches Plant. Based on the location of the proposed developments, vegetation removal other than grass cover, is not expected.

Given the prior industrial development and limited vegetation removal required, GHD considers the current development proposal to be consistent with previous developments that have occurred at the Main Plant and WWTP.

8.7 TRAFFIC IMPACTS

The Modification Application is supported by a Traffic Impact Study prepared by ARC Traffic & Transport (“ARC”) (**Annexure E**). This section of the Modification Report provides a summary of the findings of the ARC’s Traffic Impact Study for this Modification Application.

8.7.1 EXISTING TRANSPORT NETWORKS

Key Roads

Bolong Road

Bolong Road is a local road which runs east-west from Gerroa Road at Coolangatta and the Princes Highway at Bomaderry. In the vicinity of the Mill Site, it provides 1 traffic lane in each direction, and has a posted speed limit of 100km/h; ARC notes that a lower posted speed limit of 60km/h is in place adjacent to the former Dairy Farmers Site and Shoalhaven Starches Site.

Princes Highway

Princes Highway is a National Highway that generally runs north-south from Sydney to Adelaide along the eastern coast.

West of Shoalhaven Starches, Princes Highway provides 2 – 3 lanes in each direction, while north of Bomaderry it has been significantly upgraded in recent years to provide bypasses of Berry, Foxground and Gerringong. TfNSW has recently completed construction works associated with the Nowra Bridge Upgrade project, which include a new bridge over the Shoalhaven River, and upgrades to the intersections of Princes Highway & Bolong Road and Princes Highway & Illaroo Road. ARC indicates these upgrades have significantly increased capacity in Princes Highway through Bomaderry and Nowra, as well as the capacity of these intersections.

Railway Street – Cambewarra Road – Meroo Road

Railway Street, Cambewarra Road and Meroo Road form a local truck route between Bolong Road and the Princes Highway interchange at Pestells Lane. Each of these roads provide 1 traffic lane in each direction, and a 50km/h posted speed limit other than the northern section of Meroo Road on the approach to the Princes Highway Interchange.

Key Intersections

Bolong Road & Watchman's Drive

All access to the Paper Mill Site is provided via the intersection of Bolong Road & Watchman's Drive, which provides significant auxiliary infrastructure including:

- A Channelised Right (CHR) lane, Bolong Road to Watchman's Drive;
- An Auxiliary Left (AUL) lane, Bolong Road to Watchman's Drive; and
- Geometry providing for the movement of the largest vehicle accessing the former Paper Mill Site (36m A- Double).

ARC indicate sight distances at the intersection are in excess of the requirements of GRD Part 3.

Bolong Road & Hanigans Lane

The intersection of Bolong Road & Hanigans Lane operates under priority (Give Way) control and provides only Basic treatments on all approaches. ARC indicates sight distances at the intersection are in excess of the requirements of GRD Part 3.

Hanigans Lane & Farm Gate

The intersection of Bolong Road & Hanigans Lane operates under priority (Give Way) control and provides only Basic treatments on all approaches. ARC indicates sight distances at the intersection are in excess of the requirements of GRD Part 3.

Bolong Road & Gate 1.

The intersection of Bolong Road & Gate 1 has been extensively upgraded over the past 10 years, and includes the following:

- A CHR lane from Bolong Road to Gate 1;
- An AUL lane from Bolong Road to Gate 1;
- A large internal apron area within the DF Site to provide for U-Turns from other SS Site driveways and the Northern CP where access is restricted to left in/left out (LILO) only;
- An acceleration lane from Gate 1 to Bolong Road; and
- Geometry providing for the movement of the largest vehicle accessing the former Dairy Farmers Site (36m A- Double).

Sight distances according to ARC at the intersection are in excess of the requirements of GRD Part 3.

Bolong Road & Gate 2

This intersection provides for LILO movements only due to a central median in Bolong Road adjacent to the Northern CP. The majority of trips by staff parking in the Northern CP are to the west, and that as such these trips use the Bolong Road & Gate 1 intersection (and the



internal DF Site driveway apron) to turn around so as to depart to the west. ARC indicates sight distances at the intersection are in excess of the requirements of GRD Part 3.

Additional Bolong Road Intersections

A number of other local roads and Shoalhaven Starches driveways intersect with Bolong Road between the Paper Mill Site and Princes Highway; however, once operational, ARC indicates the modification proposal would not generate any additional trips to/from any of these roads or driveways.

ARC indicates Construction trips would have little if any potential to impact the operation of these intersections based on the relatively minor and temporary number of construction trips past these driveways in Bolong Road (i.e. through trips in Bolong Road only); the generation of most construction trips outside of commuter peak hours; and the distribution of construction staff trips to numerous available routes. As such, the traffic analysis focuses on the key intersections as identified in sections above.

Truck Routes

Bolong Road (between the former Paper Mill Site and Princes Highway) and Princes Highway are NHVR approved Restricted Access Vehicle (RAV) routes providing for vehicles up to and including 26m B-Doubles. As shown in Figure 29.



Figure 29 - Restricted Access Vehicle Routes – Source: NHVR

Importantly, in March 2024 the NHVR also provided an approval for the use of 36m A-Doubles in Bolong Road between Princes Highway (north of Bolong Road only) and the Former Paper Mill Site, providing for trips to/from Watchman's Drive (PM Site) and Gate 1 (former Dairy Farmers Site). This approved 36m A-Double route is not currently shown in the NHVR interactive maps.

All RAV routes are assessed by the NHVR and/or TfNSW to ensure that these routes are appropriately designed to provide for the movement of the largest vehicles permitted to use them. This means that the geometry of these roads and intersections has been determined by the NHVR and/or the TfNSW to be appropriate to the movement of large

vehicles both along Bolong Road and to the numerous Shoalhaven Starches access driveways.

The largest trucks that will access the former Paper Mill Site and former Dairy Farmers Site during both the construction and operation of the modification proposal will continue to be no larger than the approved 36m A-Double.

While parts of Railway Street and Meroo Road are also approved RAV routes, a complete RAV approved route is not available for the entire trip between Bolong Road and Princes Highway. As such, this route is only available for General Access Vehicles (**GAVs**), generally being articulated vehicles up to 20m in length.

8.7.2 FUTURE BASE TRAFFIC VOLUMES

Overview

Below provides details of the determination of **Base 2030** traffic volumes in Bolong Road, and at the key intersections; 2030 represents the estimated maximum timeframe for the approval and then construction of the MOD 26 infrastructure. As discussed, once operational the modification proposal would not generate any additional trips.

Traffic Surveys

In 2023, ARC commissioned peak hour traffic surveys in Bolong Road at the intersection of Bolong Road & Gate 1 to inform the MOD 28 TA and MOD 31 TA traffic analysis. While sections below provide analysis of the potential for Bolong Road traffic volumes to have increased over 5 and then 10 years to the Base 2030 and Base 2035 traffic volumes – for example further to general background traffic increases, and/or the construction or operation of other SSEP Approval works – these surveyed volumes remain appropriate base volumes for the traffic analysis.

Background Traffic Growth

The 2023 traffic volumes in Bolong Road have been factored with reference to the average annual growth rates in Bolong Road identified by TfNSW in the traffic reports prepared for the Nowra Bridge Upgrade, being 1.7% per annum (linear); this growth rate has been applied over 7 years to provide the underlying Base 2030 traffic volumes; and by 12 years to provide the underlying Base 2035 traffic volumes.

Super-Peak Shoalhaven Starches Staff Trips

At the time the surveys were undertaken, there were approximately 100 fewer staff on-site across Shoalhaven Starches than could be on-site (across Shoalhaven Starches) further to all current SSEP Approval Modifications being under construction or in operation.

Importantly, this super-peak would include construction staff working to complete other approved infrastructure across Shoalhaven Starches.

To calculate the additional trips that could be generated under these conditions, the traffic analysis has considered the following:

- With reference to the traffic survey data set, peak staff arrival periods occur prior to the AM commuter peak hour, but are generally steady across the broader PM peak period. To provide a conservative assessment, 40% of additional staff trips have been assigned in the AM peak hour, and 50% assigned in the PM peak hour.
- Contract and construction staff have a higher vehicle occupancy than permanent staff; however, for the traffic analysis a conservative occupancy of 1.2 staff per vehicle has been adopted.
- The distribution of trips is based on the existing distribution characteristics across the numerous Shoalhaven Starches driveway intersections to Bolong Road, including both arrival and departure patterns and directional distribution.
- All additional staff trips have been assigned to the Northern Car Park, located on the northern side of Bolong Road opposite the Shoalhaven Starches Site.
- Finally, the assignment of additional trips considers the left in/left out restrictions at the intersection of Bolong Road & Northern Car Park, which in turn results in the majority of trips then using the intersection of Bolong Road & Gate 1, and the internal driveway apron within the former Dairy Farmers Site, to turn back to the west.

Trip Assignment

The peak hour traffic volumes at the key intersections under super- peak Base 2030 conditions, including the additional traffic associated with recent projects, are shown in **Figure 30**.

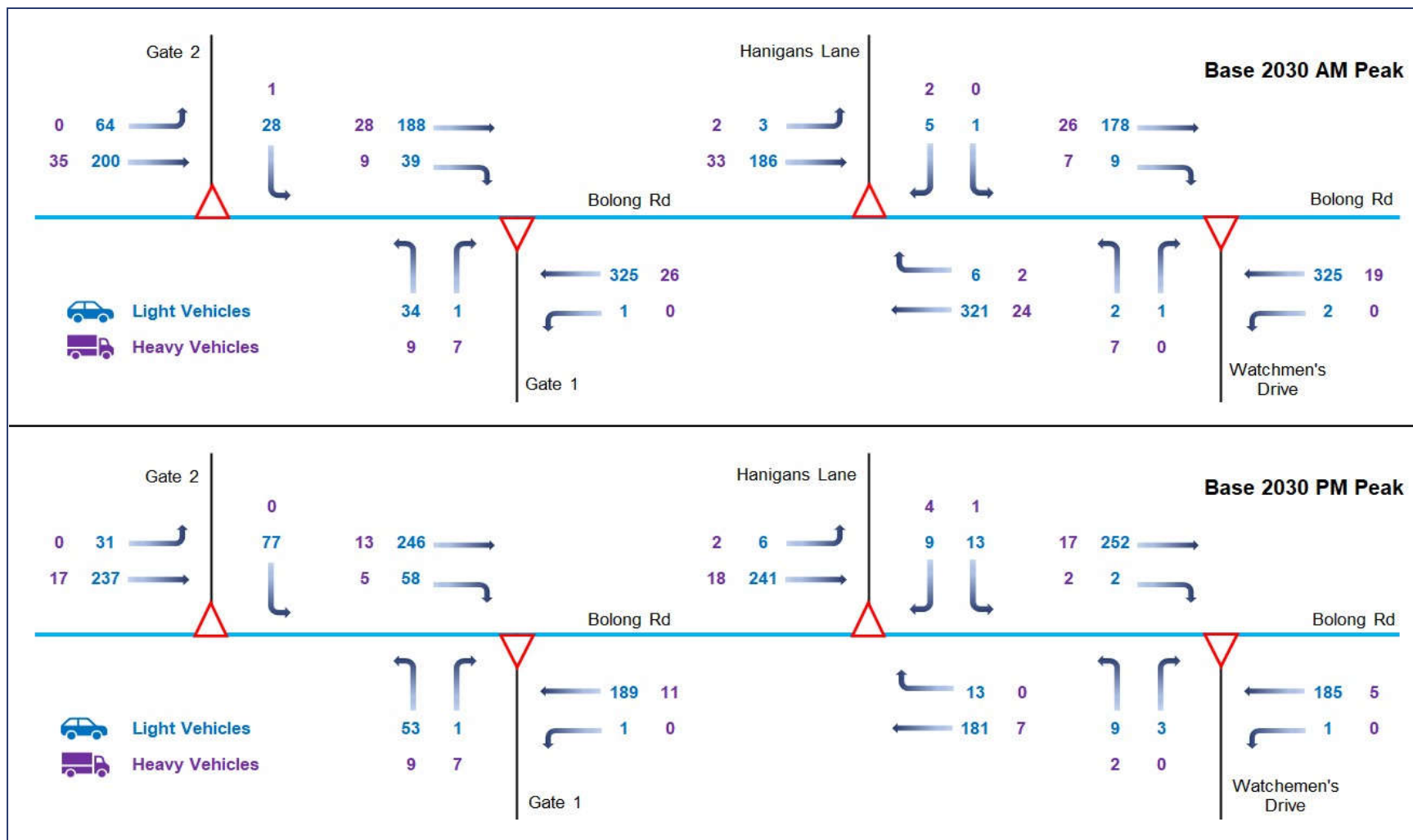


Figure 30: Base 2030 Peak Hour Traffic Volumes

SIDRA

The operation of the key intersections under future base conditions has been assessed by ARC using the SIDRA intersection model. SIDRA provides a number of key outputs by which to measure the performance of an intersection, including:

- **Average Vehicle Delay (AVD):** AVD (or average delay per vehicle in seconds) for intersections is used to determine an intersection's Level of Service (see below).
- **Level of Service (LOS):** LOS is a comparative measure that provides an indication of the operating performance, based on AVD. For unsignalised intersections, LOS is based on the worst average delay to any approach at the intersection.
- **Degree of Saturation (DOS):** DOS is defined as the ratio of demand (arrival) flow to capacity. DOS above 1.0 represent over-saturated conditions (demand flows exceed capacity) and degrees of saturation below 1.0 represent under-saturated conditions (demand flows are below capacity).
- **95%ile Queue Length (95QL):** 95QL is the length below which 95% of all modelled queue lengths fall, or 5% of modelled queues exceed.

With regard to LOS, **Table 31** provides a summary of the SIDRA recommended criteria for the assessment of unsignalised intersections.

Table 30 – SIDRA Level of Service Criteria

Level of Service	Average Delay (seconds per vehicle)	Unsignalised Intersections
A	less than 14	Good operation
B	15 to 28	Good with acceptable delays & spare capacity
C	29 to 42	Satisfactory
D	43 to 56	Operating near capacity
E	57 to 70	At capacity; at signals, incidents will cause excessive delays Roundabouts require other control mode
F	More than 70	Unsatisfactory and requires additional capacity.

Source: SIDRA Systems

8.7.4

FUTURE BASE INTERSECTION OPERATIONS

Further to the SIDRA analysis, **Table 32** provides a summary of the operation of the key intersections under Base 2030 conditions.

Table 31 – Base 2030 Intersection Operations

Base 2030 Intersection Operations	Level of Service		Average Delay (s)		95QL (m)		Degree of Saturation	
	AM	PM	AM	PM	AM	PM	AM	PM
Bolong Rd & Watchman's Dr	A	A	11.1	10	0.5	0.5	0.192	0.151
Bolong Rd & Hanigans Ln	A	A	9.4	8.5	0.7	0.8	0.202	0.151
Bolong Rd & Gate 1	B	A	17.2	11.9	1.9	1.8	0.199	0.145
Bolong Rd & Gate 2	A	A	5.5	5.5	0.7	1.8	0.138	0.143

With reference to **Table 32** ARC indicates the key intersections will operate at a good LOS under Base 2030 conditions, with minimal AVD and 95QL, while retaining significant spare capacity.

Crash Data

TfNSW's Centre for Road Safety provides data in regard to crashes across NSW for the reporting period 2019 – 2023 inclusive. A review of this data by ARC indicates 4 *serious* crashes in Bolong Road between the former Paper Mill Site and Hanigans during this period, but the data also indicates that TfNSW determined that speeding or fatigue was a contributing factor in each of these crashes.

Overall, ARC indicates there is no information to indicate that the geometry of Bolong Road, nor the design of key Shoalhaven Starches intersection, would in and of itself generate any road safety concerns.

8.7.5

PUBLIC & ACTIVE TRANSPORT

Public Transport

The central part of the Shoalhaven Starches Site is located approximately 800m east of Bomaderry Station, and from bus stops in Merroo Street through which local Bomaderry and Nowra bus services operate; all other sites are located more than 1.5km from the

Bomaderry Station, and no bus services are available in Bolong Road. As such, it is acknowledged that there is little potential for construction or operational staff to use public transport for all or part of the journey to any of the Shoalhaven Starches sites relevant to modification proposal.

Active Transport

As part of past Modifications, significant pedestrian infrastructure has been provided in Bolong Road adjacent to the key Shoalhaven Starches sites, including pedestrian refuges and footpaths providing access between the Northern Car Park and the Shoalhaven Starches Site and former Dairy Farmers Site, but no active transport infrastructure is provided east of the former Dairy Farmers Site. Notwithstanding, there would only be a small number of staff – and likely no construction staff – travelling to any of the Shoalhaven Starches Sites by walking or cycling.

8.7.6

8.5.6 RAIL OPERATIONS

Existing Conditions

The Subject Site includes an on-site rail line (approximately 1.2km long) which can accommodate trains up to up to 900m in length; current train movements include:

- Eight 900m long grain train services each week, with one each day arriving at 3:00pm and departing at 11:00pm, and the eighth service arriving at 3:00am each Wednesday morning;
- Four 900m long container train export services which arrive at 3:00am each Tuesday, Thursday, Saturday and Sunday, and depart on the same day at 10:40am; and
- Two 720m long flour train services which arrive each Monday and Friday morning at 3:00am and depart the same day at 11:00pm.

Modification 25

MOD 25 allows for an extension of the on-site rail line to accommodate longer trains within the Subject Site (and within the former Dairy Farmers Site), including:

- A 1,010m grain train (110m increase); and
- A 1,280m container train (380m increase).

No changes are proposed to the length of flour trains.

To determine the potential impact on the road network arising from the MOD 25 proposal, the TIA for MOD 25 details a road safety audit that was undertaken to examine the potential for additional queuing at the Bolong Road Rail Crossing. In this regard,



previous TIA calculated the additional time required for the longest train (container trains) to cross Bolong Road, finding it would take 11 minutes to cross to/from the Subject Site, an increase of 1 minute over the existing crossing time.

In turn, the additional traffic queue length east and west of the Bolong Road crossing was estimated to increase by 10%, or by 50m on the westbound approach and 30m on the eastbound approach.

Further to the assessment of the potential impact of these additional queues, this former TIA provides the following conclusions:

- *The proposed extension would allow trains up to 1,280m to access the site wholly in one movement and remove the need to stop mid-crossing*
- *The increased train length is anticipated to result in an overall increase of one minute crossing time at the existing rail crossing*
- *The increased crossing time is anticipated to result in an increase of approximately 50m to the eastern approach and 30m to the western approach*
- *Both increases to are not expected to result in any adverse impacts to the surrounding road network as no additional crossovers or intersections are impacted by the increased queue length.*

Noting that MOD 25 has now been approved, ARC concludes that DPHI accepted these conclusions

8.7.7 THE MODIFICATION PROPOSAL

Access

Bolong Road Access Driveways

Access to the different Shoalhaven Starches sites will be essentially unchanged other than the provision of new driveways at Gate 2. At present, Gate 2 provides a two-way driveway for LIFO movements only; the modification proposal provides for a separate entry driveway (left in only) and separate departure driveway (left out only), noting that a short AUL will be retained to maximise the safety and efficiency of left turn entry movements.

All intersections will retain their ability to accommodate the arrival and departure movements of the largest vehicles accessing each of the Shoalhaven Starches sites. Swept path analysis has been undertaken by Manildra and is provided in the broader Modification plans submitted to DPHI.

Internal Access

Internal access roads within the former Paper Mill Site and former Dairy Farmers Site will be revised in some instances to provide access to the modification proposal.

Notwithstanding, all internal roads will retain their ability to accommodate the arrival and departure movements of the largest vehicles accessing each of the Shoalhaven Starches sites. Swept path analysis has been undertaken.

Traffic

As discussed previously, once the modification proposal is operational it will not generate any additional trips, and as such would have no impact on the operation of the local road network.

Parking

The modification proposal provides for the removal of some parking spaces from the DF Site, to be relocated to the Northern Car Park, as well as minor changes to parking across Shoalhaven Starches. Further to these changes, a total of some 508 parking spaces will be available across the Shoalhaven Starches sites, as summarised in **Table 33**.

Table 32 - Future Shoalhaven Starches Parking Provision

Parking Area	Capacity
Western Car Park	15
Northern Car Park	438
Dairy Farmers Site	25
Paper Mill Site	30
Total	508

ARC indicates that application of the peak demand and car occupancies to super-peak conditions (580 on-site staff) indicates a maximum parking demand for approximately 405 parking spaces across the Shoalhaven Starches sites, noting that these super-peak conditions are anticipated to include a higher proportion of contractors than permanent staff, and in turn higher vehicle occupancies. As such, the super-peak parking demand can be accommodated across the different Shoalhaven Starches sites without any need to use off-site (on-street) parking.

Finally, even further to super-peak conditions ARC indicates there would be additional spare capacity provided in the Shoalhaven Starches car parks, and particularly in the Northern Car Park; this provides for some additional future-proofing should Modifications that generate additional parking be proposed at Shoalhaven Starches; and/or to provide parking capacity for temporary construction staff working on current or future Modification works such as the modification proposal.

Construction Overview

The construction of the modification proposal is anticipated to be staged over a period of approximately 12 months, with a maximum of 40 construction staff on-site at any one time, including 20 construction staff across the Shoalhaven Starches sites and 20 construction staff at the Farm. It is noted that in reality the works will be staged such that no more than 20 construction staff would be on-site in most instances.

It is further estimated that up to 50 trucks (100 truck trips) could be generated over the 12 month construction period.

Construction Hours

In accordance with past construction work, construction hours (and construction truck movement hours) are anticipated to be restricted to 7:00am – 6:00pm Monday to Friday, and 8:00am to 1:00pm on Saturdays; no construction works would be undertaken on Sundays or public holidays.

While not anticipated at this time, where it is necessary for works to occur outside of these hours, an application for an Outside of Hours Work Permit (**OHW Permit**) will necessarily be submitted to Council; any out of hours works would only commence further to an approval of the OHW Permit.

Access

Access to the construction areas within the former Dairy Farmers Site will be via the Bolong Road & Gate 1 intersection, while access to the new rail maintenance building in the former Paper Mill Site will be via the Bolong Road & Watchman's Drive intersection. A small number of trips will on occasion also be via Gate 13 for works within the Shoalhaven Starches Site.

New and revised internal roads will then provide access to all key parts of both sites.

Construction Traffic

Construction Staff Trips

The construction of the modification proposal is anticipated to occur over approximately 12 months, with a maximum of 40 construction staff on-site at any one time.

ARC state that based on previous construction works it is anticipated that these specialist construction staff would travel in group transport; as a worst case, it is estimated that construction staff could generate up to 20 arrival trips and 20 departure trips each day based on an average vehicle occupancy of 2 per vehicle. Based on the anticipated construction hours, the majority of these trips would occur outside of the commuter peaks.

In addition, the relocation of some staff parking from the former Dairy Farmers Site to the Northern Car Park will result in a minor redistribution of trips between the Bolong Road intersections at Gate 1 and Gate 2; however, this would not result in any additional trips being generated to the broader local road network either during construction or once the modification proposal becomes operational.

Construction Truck Trips



With regard to truck trip generation, ARC indicates a total of 100 truck trips would be generated over the entire 12 month construction period, with the maximum number of trucks per day anticipated to be generated during the initial earthworks period being no more than 4 truck trips per day. The maximum size construction vehicle will be a 26m B-Double, which are approved along Bolong Road.

At the former Paper Mill Site, it is anticipated that the maximum size vehicle accessing the PM Site for the rail maintenance building works would be a MRV, though again access to the former Paper Mill Site is approved for much larger B-Doubles.

At this time, there is no anticipation need for Over Size/Over Mass (**OSOM**) vehicles during the construction period. However, should OSOM vehicles be required, the Principal Contractor for the modification proposal works would necessarily obtain all relevant approvals prior to any OSOM vehicles travelling to/from any of the Shoalhaven Starches sites.

Construction Vehicle Trip Distribution

All truck trips will travel to/from the west of the PM Site given the weight restrictions in Bolong Road east of the PM Site. The majority of these trips would be to/from Princes Highway, either via Bolong Road (trips to the south); or Railway Street, Cambewarra Road and Meroo Road (trips to the north and west). It is noted that these are the same routes as designated for truck movements during past construction projects, and that any RAVs would be required to strictly use the route via Bolong Road and Princes Highway, i.e. they are not approved for the route via Railway Street, Cambewarra Road and Meroo Road.

While the TCW Manual does not require the preparation of a Vehicle Movement Plan (**VMP**) as part of a CTMP where truck trips do not exceed 10 truck trips per day, **Figure 31** nonetheless shows the designated construction truck routes.

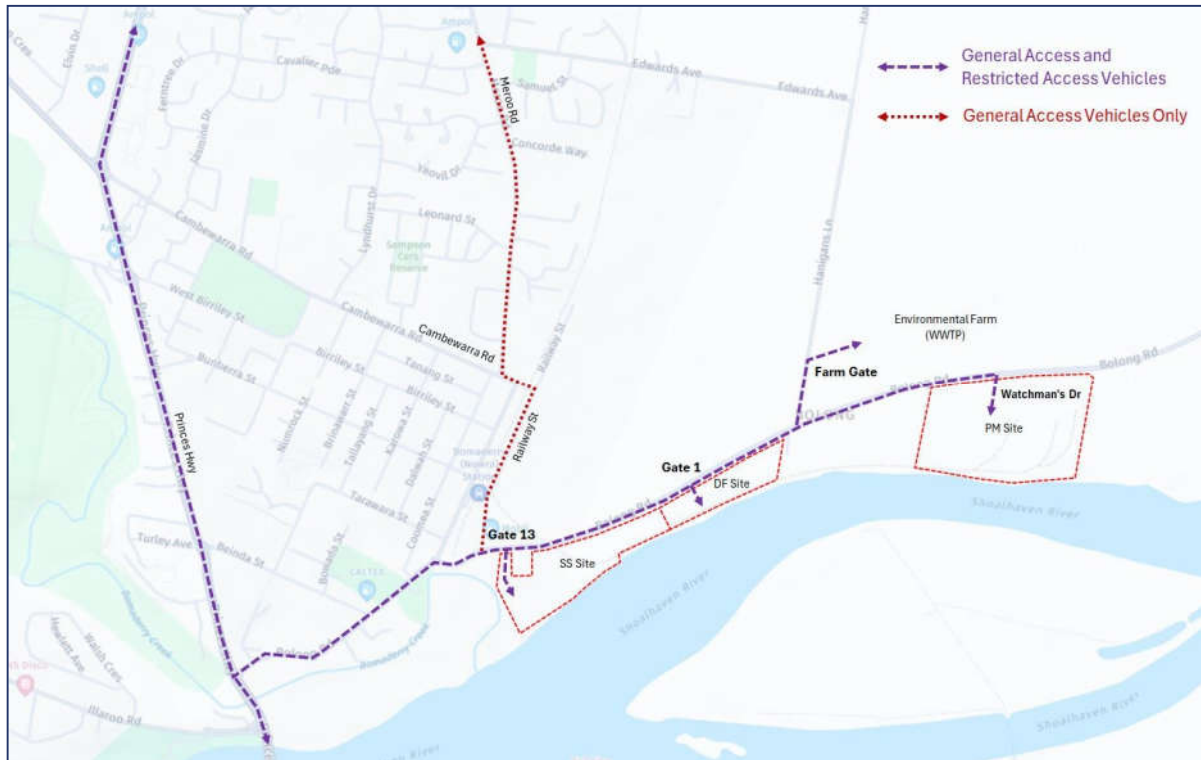


Figure 31 Construction Movement Plan

Construction staff trips are also anticipated by ARC to be generated primarily to/from the west, with specialised construction staff and local construction contractors most likely to be situated in Bomaderry and Nowra.

The majority of construction staff for the works south of Bolong Road will park in the Northern Car Park of the former Dairy Farmers Site, while all construction staff working on the new WTP will park within the Farm; a smaller number of construction trips will also be generated to the former Paper Mill Site and Shoalhaven Starches Site.

Construction Trip Assignment

The greatest potential for the construction works to impact the local road network is at the intersection of Bolong Road & Gate 1, where turning movements are already the highest of all Shoalhaven Starches access intersections, and where there are 2 opposed right turn movements (to Gate 1 and from Gate 1). As such, as a worst case scenario all construction trips have been assigned by ARC to the intersection of Bolong Road & Gate 1, as well as to the other key intersections as through trips. In reality of course, construction trips will be spread across a number of Shoalhaven Starches sites, reducing the potential for impacts at any single intersection.

In addition, the assignment of trips has also accounted for the relocation of staff parking from the former Dairy Farmers Site to Northern Car Park, noting again that other than a redistribution of trips in Bolong Road, this would not result in additional trips being generated to the broader local road network.



The additional/redistributed traffic volumes at the key intersections during the modification proposal construction under this worst case scenario are shown in **Figure 32**, noting that in some instances the redistribution of staff trips between the former Dairy Farmers Site and Northern Car Park results in negative volume being assigned to some movements. The total future volumes under a Base 2030 + MOD 26 Construction are then shown in **Figure 33**.

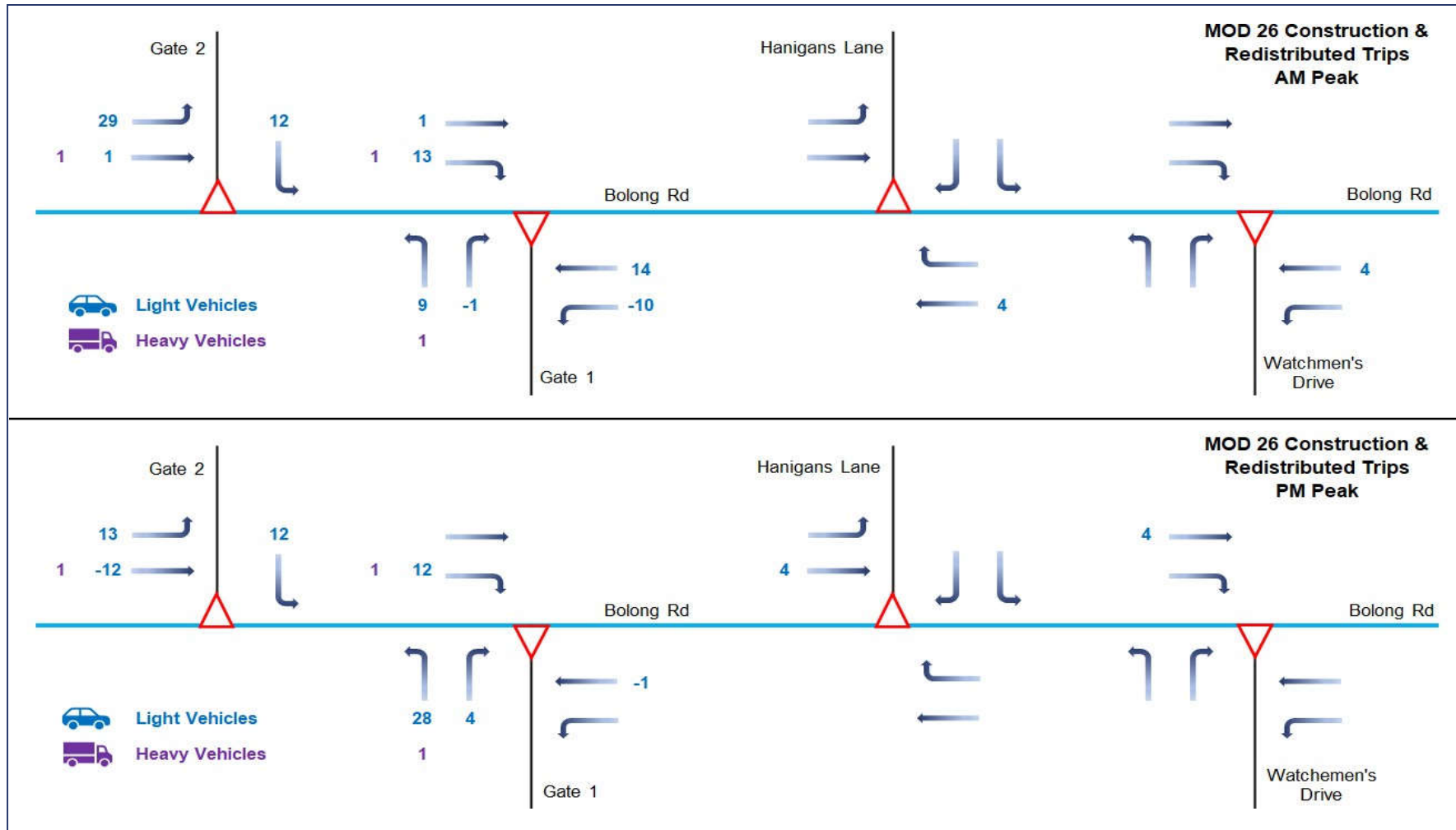


Figure 32: Modification Proposal Peak Hour Trips

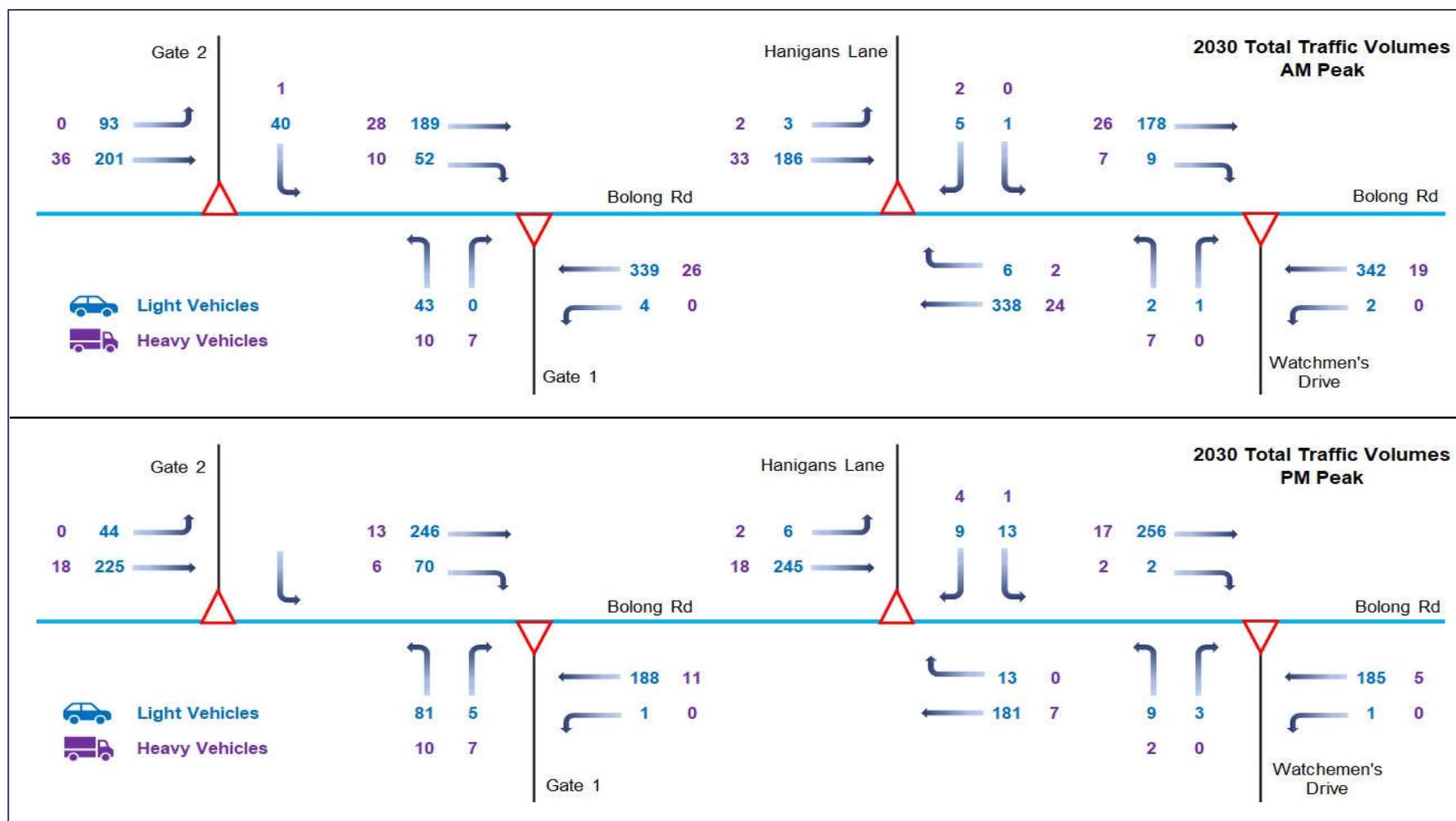


Figure 33: Base 2030 + Modification Proposal Total Peak Hour Volumes

Construction Traffic Impacts

The operation of the key intersections has again been assessed by ARC using SIDRA; the results of the analysis are summarised in **Table 34**.

Table 33- Base 2030 + modification proposal Intersection Operations

Base 2030 + modification proposal Intersection Operations	Level of Service		Average Delay (s)		95QL (m)		Degree of Saturation	
	AM	PM	AM	PM	AM	PM	AM	PM
Bolong Rd & Watchman's Dr	A	A	11.4	10	0.9	0.5	0.202	0.153
Bolong Rd & Hanigans Ln	A	A	9.4	8.5	0.7	0.8	0.212	0.154
Bolong Rd & Gate 1	B	A	18.8	9.5	2.4	2.1	0.206	0.146
Bolong Rd & Gate 2	A	A	5.6	5.5	0.9	2	0.141	0.137

The additional construction trips and redistribution of staff trips arising from modification proposal will have no impact on the operation of the key intersections, all of which will retain the same LOS as under Base 2030 conditions. In addition, there are no significant increases in AVD or 95QL, and each intersection would continue to retain significant spare capacity.

Construction Staff Parking

According to ARC, the majority of parking for construction staff will be provided in the Northern Car Park, which provides appropriate capacity such as to eliminate the need for off-site (on-street) parking even during super-peak conditions.

Construction staff working on the WTP will park within the Environmental Farm, and construction staff working on the rail maintenance building will park within the former Paper Mill Site, noting that both these sites have significant areas available to accommodate temporary construction staff parking demand. A minor number of temporary parking spaces may also be provided for construction staff within the Shoalhaven Starches Site at different times during the construction works.

Construction Summary

The modification proposal according to ARC will generate only a very moderate number of trips during the peak hours and across the day; these trips would have no impact on the operation of key intersections or the broader road network.

ARC indicate appropriate access paths to, through and from each of the Shoalhaven Starches sites accommodating the modification proposal are provided for the largest vehicle accessing each site during construction, and there is also significant room within



each site to accommodate all loading/unloading, stockpiling, material storage and construction staff parking requirements.

8.7.9

THE TRANSPORT ASSESSMENT PREPARED BY ARC CONCLUDES:

Further to a detailed assessment of the Proposal, arc traffic + transport provides the following conclusions:

- Access to the individual Shoalhaven Starches sites - both the during construction and operation of the MOD 26 infrastructure - will be provided via intersections that have all been appropriately designed to accommodate the maximum sized vehicles entering/departing each site.
- Once operational, the MOD 26 infrastructure is not anticipated to generate any additional trips other than occasional maintenance vehicles and the like.
- While MOD 26 will not increase operational staff, the loss of a small number of parking spaces to accommodate the MOD 26 infrastructure will not affect the ability of existing and proposed off-street parking areas to easily accommodate even super-peak staff (operational and construction) parking demand.
- The construction of the MOD 26 infrastructure will generate up to 22 vehicle trips in a peak hour. SIDRA analysis indicates that these additional trips would have no impact on the operation of key local intersections or broader road network, noting further that these would be temporary trips during construction only.
- Significant space for construction staff parking and truck loading/unloading and material stockpiling is available within each of the Shoalhaven Starches sites accommodating the MOD 26 infrastructure; no construction staff parking or materials handling would occur in Bolong Road.
- A Draft CTMP has been prepared to ensure that the construction of the MOD 26 infrastructure can be undertaken safely and efficiently without impacting the local road network. The CTMP will be finalised further to consideration of any future Conditions of Consent in a Modification approval, and implemented prior to any construction work commencing and then for the during of the construction works.

In summary, ARC traffic + transport has determined that the construction and operation of the MOD 26 infrastructure is supportable further to access, traffic and parking considerations.

8.8 IRRIGATION OF TREATED WASTEWATER

The process of converting wheat flour into wheat gluten (protein), starches (carbohydrate) and ethanol as carried out at the Shoalhaven Starches operations, requires the use of freshwater drawn both from the Shoalhaven City Council (SCC) drinking water supply and recovered water from Manildra's own reverse osmosis (RO) treatment plant. The raw untreated wastewater from the Shoalhaven Starches factory operations is pumped to the Shoalhaven Starches Environmental Farm (SSEF) to undergo multiple stages of anaerobic, aerobic and tertiary treatment (via RO). The RO retentate (or reject water) which is high in nutrients and salts is typically blended with the less saline treated wastewater before being irrigated over an effluent utilisation area (EUA) covering approximately 520 hectares (ha).

Shoalhaven Starches is licensed to irrigate the wastewater under their NSW Environmental Protection Authority (EPA) Environmental Protection Licence (EPL) No 883. Irrigation practices were initially guided by the 2011 WMP prepared by Murtagh & Lugg, and in 2023 the WMP was reviewed and updated by Earthwise Environmental (EE, 2023).

This Modification Proposal seeks to upgrade the existing wastewater treatment plant (WTP) upgrade at the SSEF to increase treatment capacity, improve water recycling, and enhance biogas recovery. Wastewater inflows to the WTP are forecast to increase from ~11.5 ML/d to ~15.6 ML/d. With expanded MBR/RO capacity, factory reuse will rise from ~7.0 ML/d to ~13.0 ML/d, reducing treated wastewater irrigation from ~3.1–3.4 ML/d currently to ~2.6 ML/d post-upgrade. While volumes are expected to decrease, the proportion of RO retentate in the irrigation water will increase, elevating nutrient and salinity concentrations.

These changes will influence irrigation practices at the SSEF, with less water but more concentrated nutrient and salt loads requiring careful management. The expansion of the Shoalhaven Starches plant is expected to alter the quality and quantity of the irrigated wastewater and may lead to potential impacts on-site and off-site to the local environment.

As part of the Mod 26 application, the NSW EPA has requested that an assessment of the sustainability of the effluent irrigation scheme, addressing:

- suitability of the irrigation area, including site, soil, and groundwater limitations and mitigation measures;
- present and expected wastewater quality and loading rates;
- current and expected nutrient, salt, and water balances with respect to land carrying capacity;
- irrigation method and mitigation measures (as outlined in the Shoalhaven WMP, EE 2023); and
- ongoing soil and water monitoring, including management criteria and responses (Shoalhaven WMP, EE 2023).



This Modification Proposal is supported by a “*Feasibility Assessment for Irrigation of Treated Wastewater*” prepared by Earthwise Environmental (EE) addresses the matters for consideration raised by the EPSA and provides additional recommendations for soil and water monitoring.

Suitability of irrigation area and site limitations

The SSEF covers ~920 ha, of which ~520 ha are approved for irrigation after buffer zones are applied. Site constraints include drainage lines, Broughton Creek, residential dwellings, frequent flooding, and shallow groundwater. To manage wet periods, Shoalhaven Starches maintains ~908 ML of wet-weather storage, with plans to increase capacity to ~1,125 ML. At 75% full, this provides ~83 days of storage at current irrigation volumes, increasing to ~108 days post-upgrade.

Soil assessment and limitations

According to EE, soils at the SSEF display severe inherent limitations, primarily from salinity in low-lying paddocks near drainage lines and creeks, and from very low permeability associated with clay-rich subsoils and poor structure (exacerbated by sodicity). Shallow watertables are also common, and groundwater at the site is typically both saline and sodic. In addition, soils exhibit moderate limitations relating to sodicity, aggregate stability, and waterlogging risk.

Salinity

In terms of salinity, root-zone EC values (~1 dS/m) EE indicate that have remained stable for two decades. Salt tolerant pastures (kikuyu, ryegrass, millet, sorghum, maize) are used to manage saline conditions.

Sodicity:

With respect to sodicity, compared to non-irrigated paddocks, EE indicate exchangeable sodium percentage (ESP) has increased five-fold, with some topsoil’s marginally sodic (ESP ~6–7%). Most topsoils remain stable due to high organic matter and salinity-induced flocculation. Subsoils in sections of the farm (at depth) are dispersive, which is likely to be a natural feature of the native soils.

Hydraulic constraints:

EE indicate the poorly structured medium clays exhibit very low Ksat (<0.06 m/d) therefore in line with AS/NZS 1547:2002 a Long Term Acceptance Rate (LTAR) of -2 mm is adopted. Post-upgrade, irrigate depths (-0.50 mm/d) are expected to remain well below the LTAR.

pH and nutrients:

Chemically, EE outline that irrigation has increased topsoil pH from acidic (-4.1) to neutral-alkaline (-7.5). Some paddocks exceed pH 8.0, reducing phosphorus availability and affecting trace element uptake. Surface soils are highly enriched in phosphorus (6,000–18,000 mg/kg), though sorption capacity remains in the surface and subsurface and no leaching has been observed. Nitrogen is generally well assimilated; elevated nitrate (>500



mg/kg) is occasionally detected and requires careful management. Cation balance: In terms of cation balance, exchangeable calcium has declined relative to magnesium, lowering the Ca:Mg ratio. Ongoing monitoring and calcium amendments (e.g. gypsum, aglime) are recommended.

Metals:

Finally, with respect to metals, EE indicate concentrations remain below ANZECC (2000) cumulative contaminant loading limits. Elevated molybdenum reflects natural enrichment, not irrigation inputs.

Overall, despite severe inherent limitations, EE outline that conservative irrigation depths, cut-and-remove silage practices, gypsum application, and crop selection are a few management practices undertaken by Shoalhaven Starches to assimilate wastewater inputs sustainably.

8.8.1

ASSESSMENT OF CURRENT AND PROPOSED WASTEWATER QUALITY AND LOADING RATES

EE state that wastewater is classified as high-strength due to elevated TDS, nitrogen, and phosphorus. Metals are generally low, though exceedances of ANZECC (2000) guideline values were noted for manganese, molybdenum, and iron. Iron exceedances are not considered a concern. For manganese and molybdenum, the 95% UCL exceeded the long-term trigger value (LTV) but remained well below the short-term trigger value (STV), indicating that risks are low and ongoing monitoring is sufficient.

Three scenarios (S1–S3) were modelled by EE with a brief summary of each:

- S1 (status quo): Concentrations remain similar to current values; loads of most parameters decrease with reduced volumes. Risk is low, though supplementary fertilisers (N, K, Ca) may be required.
- S2 (moderate +25% increase): Nitrogen and potassium loads increase, which is agronomically beneficial. Phosphorus loads remain steady; SAR rises marginally. Risks remain manageable with silage removal and crop selection management options.
- S3 (worst case, salts and nutrients at 95% UCL's): Nutrient and salt concentrations increase significantly, with nitrogen loads tripling. This scenario presents the highest risk and may require blending the salt and nutrient rich RO retentate with fresh water or other management interventions may be required.

Overall assessment: According to EE monitoring to date indicates that the site can sustainably assimilate current nutrient loads. Under S1, loads decrease and risks are lowest. S2 presents manageable changes provided silage removal, soil testing, and crop selection strategies continue. S3 would impose much higher nutrient and salt loads, particularly nitrogen; however, whether this scenario eventuates cannot be assumed. Close monitoring of wastewater chemistry in the first 12–18 months, together with soil response, will be essential to determine if S3 conditions arise. If wastewater chemistry indicates such a trend, further evaluation of soil health indicators (e.g. changes in ground cover, pasture

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composition, soil structure, increases in soil salinity or exchangeable sodium/magnesium, or reduced crop yields) would be required to guide management. Across all scenarios, the cut-and-remove silage strategy remains central to nutrient and salt balance, supported by salt-tolerant pastures such as ryegrass and kikuyu. EE state that ongoing monitoring of nutrient status, metals, salinity, exchangeable cations (Na, Ca, Mg, K), and soil structural stability remains critical to ensuring the long-term sustainability of wastewater irrigation.

Details of irrigation method and mitigation measures

EE states that irrigation methods and mitigation measures are detailed in the SHS WMP (EE, 2023), which remains the governing document for farm operations under DC 06_0228 and EPL 883. The WMP provides clear guidance on irrigation scheduling, infrastructure controls, wastewater treatment targets and triggers, contingency actions, and ongoing soil and groundwater monitoring. EE state, the WMP should be read in conjunction with their report, as its trigger-action framework underpins long-term environmental performance and regulatory compliance.

Wastewater volumes, water balance and wet weather storage

Volumes and minimum area (LTAR-based).

Current average irrigation to the EUA is ~3.36 ML/d (~0.65 mm/d across 520 ha). Post-upgrade, EE indicate net retentate available for irrigation is forecast at 2.6 ML/d (~0.50 mm/d). By comparison, the most limiting soils at the SSEF are medium clays with very low permeability ($K_{sat} < 0.06$ m/d), corresponding to a LTAR of -2 mm/d under AS/NZS 1547:2012. On this basis, a minimum irrigation area of 170 ha would be required at 3.4 ML/d or 130 ha at 2.6 ha per day. With 520 ha available EE states the SSEF retains a substantial buffer above the LTAR requirement, ensuring operational flexibility and resilience to salinity and SAR constraints.

Water balance

Two balances were run by EE using the current (3.4 ML/d) and post-upgrade (2.6 ML/d) irrigation volumes with median (decile 5) rainfall. Both scenarios according to EE returned zero additional storage requirement. These results assume no run-off and flooding and are intended to test median climatic conditions only.

Wet-weather storage provision.

Recognising the site's floodplain setting and the frequent need to suspend irrigation during wet periods, wet-weather storage is critical. The proposed system provides a total capacity of ~1,125 ML (Ponds 4, 5, 6 and a new 150 ML dam). For feasibility and compliance assessments, only these dams are counted as wet-weather storage. Treatment process units (e.g. anaerobic digester, BVF reactor, SO Basin and equalisation tanks) contribute an additional ~296 ML of incidental process retention/flow-balancing but are not included in the wet-weather storage capacity outlined above.

Operational resilience (duration modelling).

Assuming storages are 75% full at the onset of a flood event (i.e. ~281 ML of available capacity), the current indicative storage duration is ~83 days at 3.4 ML/d. Post-development, EE indicates this extends to ~108 days at 2.6 ML/d. Actual storage performance will vary depending on antecedent dam levels and concurrent rainfall inflows, noting that the modelling does not account for direct rainfall capture within the storages or any pre-event drawdown.

Conclusions for feasibility.

The combination of reduced post-upgrade irrigation volumes (2.6 ML/d), ample EUA (520 ha) and ~1,125 ML of dedicated storage according to EE supports the feasibility of ongoing irrigation under median climatic conditions. Flooding remains a primary controlling site constraint. Maintaining operational headroom in storages (particularly ahead of the wet season) and retaining contingency measures (e.g., emergency releases of treated wastewater subject to EPA approval) are essential to manage extended irrigation shutdowns. Continued adherence to conservative LTAR application on the most restrictive soil areas, together with active storage management, will according to EE be central to long-term operational reliability.

Ongoing soil and water monitoring

Details of the current soil and wastewater monitoring program, along with associated management criteria, are outlined in the SHS WMP (EE, 2023). The WMP is expected to remain suitable for at least 12–18 months following commissioning of the Mod 26 upgrade.

Given the difficulty in predicting future salt and nutrient concentrations, their loading rates, and potential impacts on soil and groundwater, EE indicates that a program of intensified wastewater monitoring will be required. Specifically, for the first 12 months post-upgrade, wastewater should be monitored more frequently than the current monthly regime—covering both irrigation volumes and chemical composition—to ensure wastewater is appropriately characterised and the WMP reviewed and updated accordingly.

EE also stipulate that the existing annual soil and groundwater monitoring program—operated across six paired monitoring sites on a three-year paddock rotation—should be maintained. However, the rotation interval should be shortened if early indicators of stress are observed, such as rapid declines in crop or pasture yields, shifts in species composition, or changes in cattle behaviour or weight. In such cases, an environmental consultant should be engaged without delay to investigate potential causes and recommend corrective measures.

In summary, EE state adaptive monitoring supported by a post-upgrade review of the WMP will be critical to protecting soil and water resources as the upgraded plant becomes operational. This adaptive framework provides the platform for implementing the site-specific recommendations outlined in the following section

In conclusions EE make the following recommendations in relation to this Modification Proposal:

The following measures are recommended to address the site limitations and risks identified in Section 11 and to ensure the long-term sustainability of wastewater irrigation at the SSEF.

- Irrigation of treated wastewater in accordance with NSW EPA guidelines titled “Environmental Guidelines – Use of effluent by irrigation” (NSW DEC, 2004) and the SHS WMP (EE, 2023)
- Irrigation of the treated wastewater should only take place within the irrigation areas outlined in the SHS irrigation master plan, or SLP (Allen, Price & associates, 2007). Irrigation scheduling should ensure that the wastewater is irrigated across the farm uniformly to ensure an even application of wastewater, salt and nutrients.
- Erosion prevention in accordance with the NSW Department of Primary Industries publication “Saving Soils – A landholder’s guide to preventing and repairing soil erosion” (Alt, Jenkins, & Lines Kelly, 2009).
- Soil phosphorus levels have been persistently high for many years and rates of removal are slow but steady. It is foreseen that no P based fertilizers will be needed to maintain or boost pasture growth in the foreseeable future and therefore should not be used until soil and plant tissue analysis indicates otherwise. Soil P levels should continue to be monitored (at the surface and down the profile) and reported on an annual basis in the soil and groundwater monitoring report.
- Monitoring of wastewater quality in accordance with the SHS WMP (EE, 2023). For the first 12 months post-upgrade, wastewater volumes and chemical composition (salinity, nutrients, metals) should be monitored on a monthly basis, rather than quarterly, to ensure that wastewater is appropriately characterised and to enable timely review and adjustment of the WMP. Following this initial period, monitoring may revert to a quarterly regime, subject to EPA approval and evidence that wastewater quality has stabilised.
- Soil and groundwater monitoring in accordance with the SHS WMP (EE, 2023)
- Continue testing of plant tissue in accordance with the SHS WMP (EE, 2023)
- Install at least six piezometers in low-lying areas of the SSEF (e.g. Pivots 1, 2B, 3, 4, 5, 7) to allow farm management to assess watertable depth prior to irrigation. If groundwater is within 0.5 m of the surface and surface ponding is evident, irrigation should be withheld, and wastewater retained in storage until conditions improve. Piezometer readings should be supported by simple on-ground checks (e.g. walking paddocks to assess firmness underfoot or using a shovel to examine soil moisture and structure), ensuring that decisions reflect both monitoring data and field conditions.

- *Continual monitoring of wastewater EC (salinity) levels once the upgrade is complete. At least 12 months of real-time (or very frequent, i.e., daily) data is needed.*
- *If the target EC value of < 3,800 dS/m is frequently exceeded salt levels may require management via dilution with less saline water (such as harvested fresh rainwater) or other suitable salt reduction measure. A lower EC threshold may be required if field observations or soil monitoring indicate an excess buildup of salt.*
- *Continue silage and pasture harvesting to remove accumulated salts and nutrients. Select crops with high sodium and nutrient uptake rates (e.g. ryegrass, millet) in preference to species with lower sodium uptake rates (e.g. maize).*
- *Contact a CPSS (or equivalent) if pastures or crops show unexpected signs of failure or groundcover rapidly diminishes.*
- *Review and update the SHS WMP by EE (2023) after 12 months of operation, The updated WMP should include:*
 - *Review of total wastewater volumes, the amount of water recovered, and the amount of water irrigated.*
 - *a review of wastewater quality (salt and nutrients) • Results for water hardness (pH, EC, Na, Cl, CaCo₃, Mg, Ca) for 100% retentate and then follow up results after this water is blended with less hard water (i.e., at the point of irrigation). This should provide an indication of dilution.*
 - *Updated nutrient and salt balances*
 - *Review of soil and groundwater monitoring results*

8.9 VISUAL IMPACT

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

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

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



particularly exposed to view along Bolong Road. This view reveals some of the internal structures within the site including recovery and storage tanks, car park, fermentation tanks and the Ethanol Plant. Overall, the appearance of the site is typical of an industrial facility of this scale and nature.

The most relevant vantage points from where the works associated with this Modification Proposal is visible (see Figure 34) would include:

- The Princes Highway – views of both the existing factory site and former APM 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.

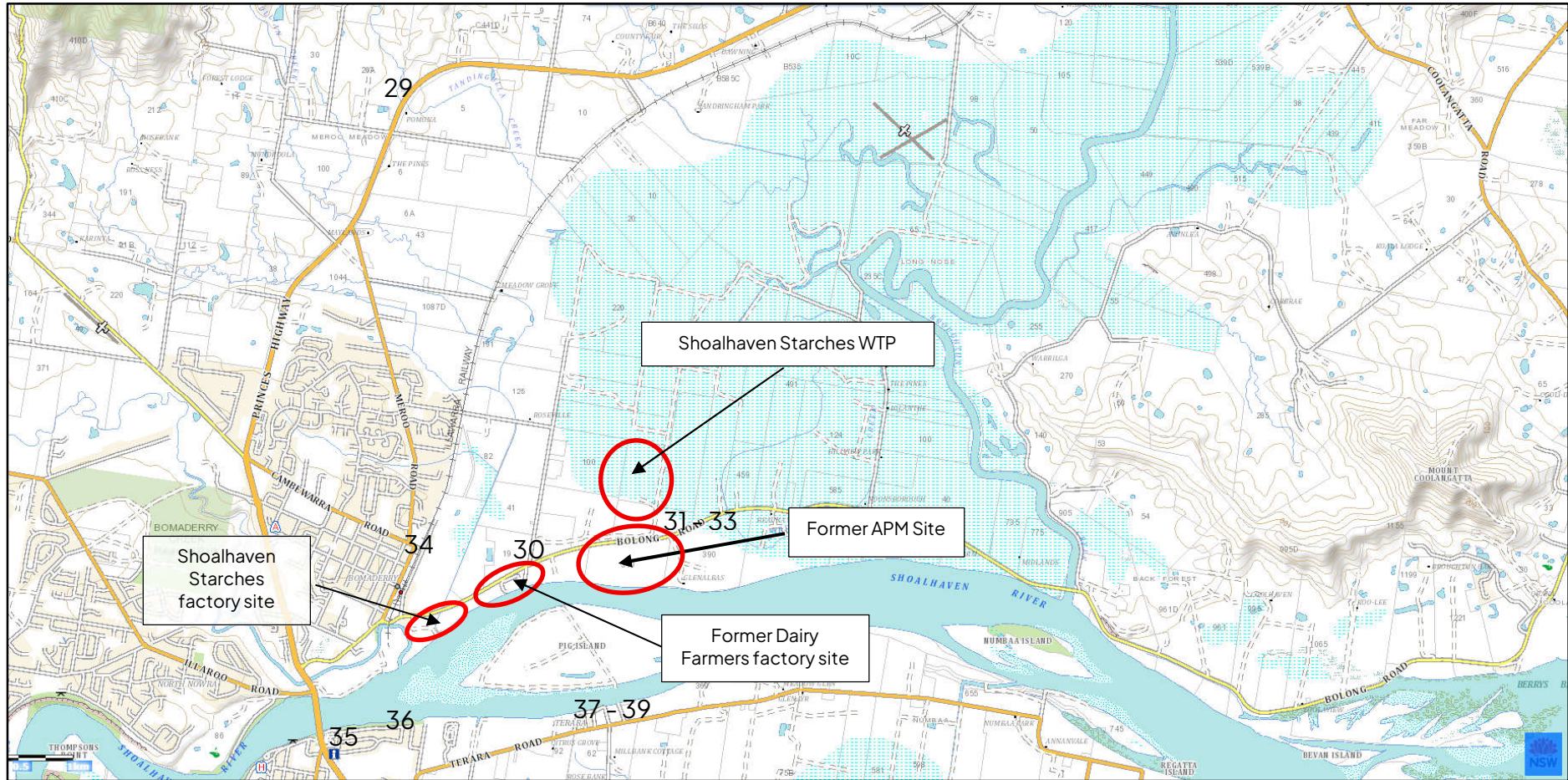


Figure 34: Vantage Points for Figures 29 - 38.

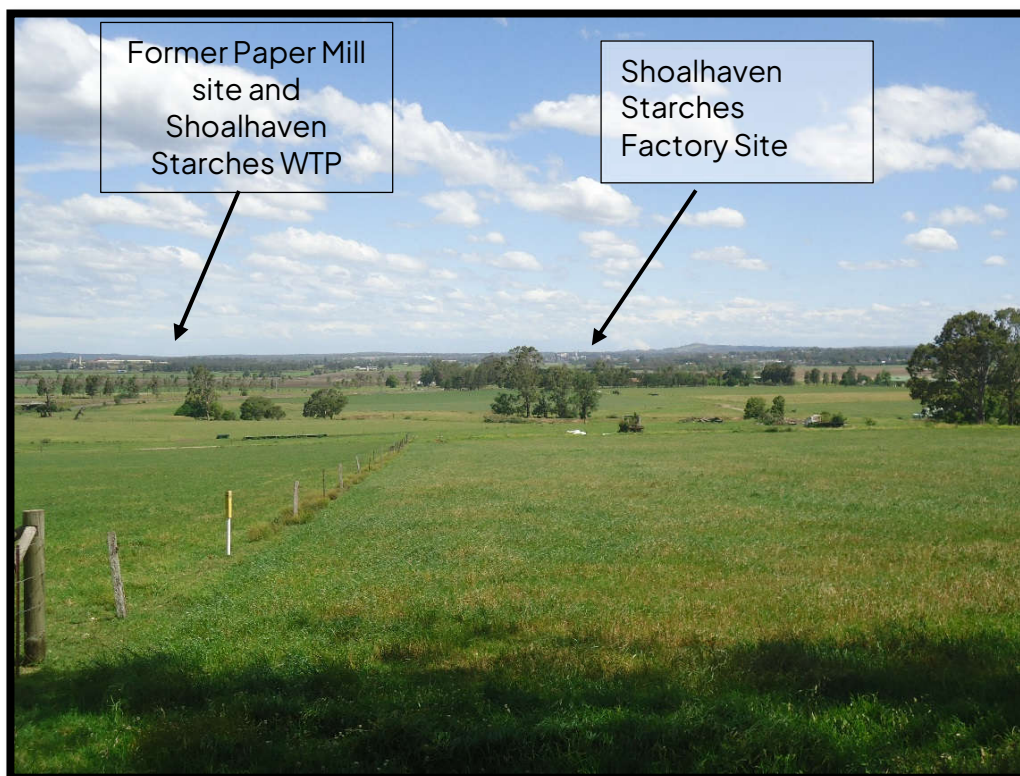
- Burraga (Pig) Island – Burraga Island is situated in the middle of the Shoalhaven River and provides the closest vantage point to the southern boundary of the site. The island however is privately owned and not accessible to the public. Vegetation screening along the riverbank adjacent to the site also reduces the visibility of both the existing factory and former APM site.
- Bolong Road – Bolong Road runs along the frontage of the site. Views of both the factory, former APM site and the WTP and associated ponds are possible when travelling in either an easterly or westerly direction. Some attempts have been made to provide some tree planting along the boundaries to “soften” the appearance of development. The existing building forms and structures are however clearly visible to motorists travelling along this stretch of Bolong Road.
- Nowra Bridge – The Nowra Bridge crosses the Shoalhaven River and provides limited opportunities for views of the factory site. The former APM and WTP sites are not visually prominent from this vantage point. The dominant visual elements from the bridge are the river, vegetation along the riverbanks and the escarpment. The visual impact of the factory site is reduced by distance as well as the bridge structure which permits only glimpses of the site.
- Bomaderry urban area – The existing plant is visible from a number of locations within the eastern outskirts of Bomaderry. Bomaderry is slightly elevated and some locations within the urban area do have extensive views of the site.
- 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.
- Terara – Distant views of the Shoalhaven Starches factory site are possible from a number of vantage points in and around the village of Terara on the southern bank of the Shoalhaven River. The visual impact of the factory however is reduced by distance, the intervening landform of Burraga (Pig) Island and the vegetated riverbanks.
- 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.

The Princes Highway

The Shoalhaven Starches factory site and former Australian Paper Mill site (now owned by Manildra) are visible from a section of the Princes Highway between Boxsells Lane and Devitts Lane, Jaspers Brush. The former Dairy Farmers site however is not visually prominent from this location. The existing WTP and associated wastewater storage ponds are not visible from this vantage point largely due to distance as well as intervening vegetation (refer **Figure 35**). 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 both sites are only barely visible. The rising topography upon which Bomaderry is sited screens portions of both sites, as does intervening vegetation.

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



*Figure 35: View of Shoalhaven Starches Factory from Princes Highway (within vicinity of Devitts Lane).
(Site of proposed works not clearly visible from this vantage point.)*

Bolong Road

The existing factory site, the former Dairy Farmers site and the former APM site are clearly visible from Bolong Road by vehicles approaching from the east and west, and along the frontage of the site refer.

The proposed grain storage silos will be situated immediately between the existing former Dairy Farmers factory building and existing Supagas CO2 Plant. Figure 36 provides a view of the former Dairy Farmers building as viewed from the Bolong Road frontage of the site.



Figure 36: View of former Dairy Farmers factory building from Bolong Road.

The proposed rail minatanence building will be situated within proximity of the recently constructed rail line extension (Mod 25) and the recently constructed Clearly Bros Concrete Plant (Figure 37); as well as within vicinity of the former Australian Pulp and Paper Mill (figure 38).



Figure 37 "View of location of proposed rail; maintenance building site between extended rail line (mod 25) and Cleary Bros concrete plant as viewed from Bolong Road

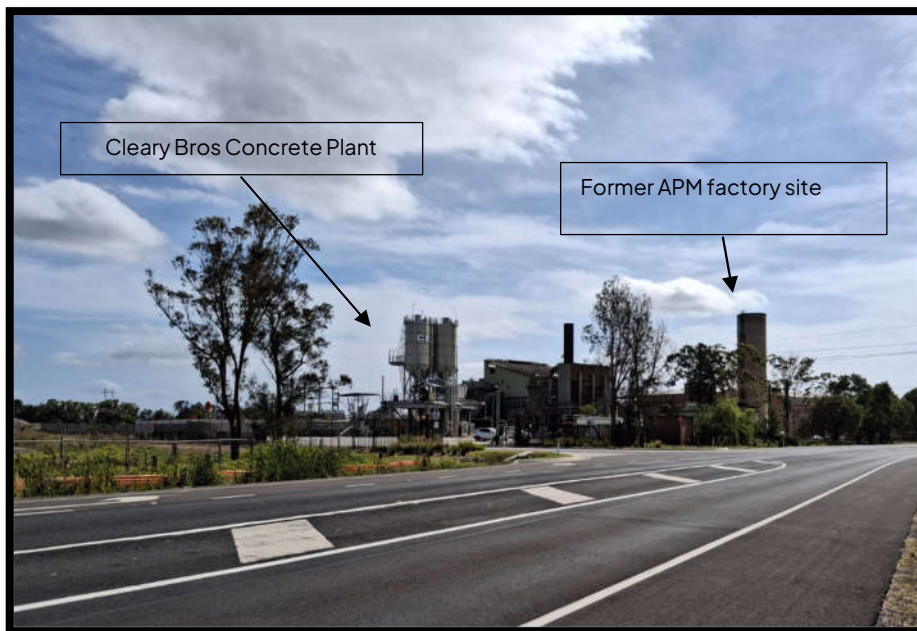


Figure 38 : View of the Cleary Bros Concrete Plant and former Paper Mill site from Bolong Road.

As is evident from **Figure 39 below** the boundary of the Shoalhaven Starches Environmental Farm along the north side of Bolong Road contains an established tree screen which assists with minimising any visual impact likely to be created by the proposed new wet weather

storage pond and other works associated with the WTP when viewed from along Bolong Road.



Figure 39 : Established tree screen along north side of Bolong Road frontage to the Shoalhaven Starches Environmental Farm

Bomaderry Urban Area

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

In light of the prevailing scale of existing development located within Shoalhaven Starches site the proposed product silos building will not be visually prominent from this vantage point as they will be shielded from view by existing buildings and structures with the factory site.

The former Dairy Farmers factory site is visible from this vantage points, within a gap between existing residential and industrial buildings located along Railway Street (Figure 34). The proposed grain storage and handling facilities will be visible from this vantage point. These structures will be visible in context of existing industrial development (namely the former Dairy Farmers factory buildings, and Supagas CO2 plant).



Figure 40 : View from intersection Railway Street & Cambewarra Road Bomaderry east

Nowra Bridge

The view from the vicinity of the Nowra Bridge that crosses the Shoalhaven River to the east is mainly dominated by the river, riparian vegetation and the floodplain. The existing Shoalhaven Starches factory site rises above this riparian vegetation (refer Figure 41).



Figure 41: View of Shoalhaven Starches factory site from the vicinity of the Nowra Bridge over the Shoalhaven River.

The works associated with this Modification Proposal will be largely obscured by riverside vegetation and the existing factory development.

The proposed product silos building, and works associated with the new grain conveyor will not be visually prominent from the view shown in Figure 41 above.

The former Dairy Farmers site and the WTP site are not visible from this location, and therefore the location of the proposed grain storage and handling facilities and proposed upgrade works to the WTP will not be visible from this vantage point (Figure 41).

Riverview Road

Figure 42 below provides a view of the Shoalhaven Starches factory site from Riverview Road located on the south side of the Shoalhaven River. This view is from a distance of about 750 metres. Riparian vegetation along both the northern and southern banks of the river soften much of the site from view. As with the view from within the vicinity of the Nowra Bridge over the Shoalhaven River, the view of the Shoalhaven Starches factory rises above the riparian vegetation along the riverbank.

The proposed product silos may be visible in context of the existing factory development. The grain conveyor and the proposed extension of the rock revetment wall will not be visible from this vantage point.

The former Dairy Farmers site and the WTP site are not visible from this location, and therefore the location of the proposed grain storage and handling facilities and proposed upgrade works to the WTP will not be visible from this vantage point (Figure 35).



Figure 42 : 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 Figure 43.

The view from this vantage point is across and over Burraga (Pig) Island. Vegetation on the island and along the northern banks of Shoalhaven River also help to obscure the view of the existing factory site.

Various parts of the existing factory site are visible from this vantage point, although somewhat obscured by vegetation.

The works associated with the silos building will sit within the silhouette of existing buildings associated with the Shoalhaven Starches operations from this vantage point and will not be visually prominent. The proposed conveyor along the river bank will not be visible from this vantage point due to riparian vegetation.



Figure 43: View of Shoalhaven Starches factory site from village of Terrara.

The view from the Terrara village north towards the former Dairy Farmers site is across and over Burruga (Pig) Island (Figure 44). Vegetation on the island and along the northern banks of Shoalhaven River obscure the view of this site. The proposed gain storage and handling facilities are likely to rise slightly above this vegetation, however the view will be softened by this riparian vegetation. .



*Figure 44: View north from Terara village
towards location of former Dairy Farmers site.*

The view from the Terara village north towards the former APM site is across and over Burruga (Pig) Island (Figure 45). Vegetation on the island and along the northern banks of Shoalhaven River obscure the view of this site. The former APM factory site and parts of the rail line are visible, although the riverside vegetation assists with softening this view. The proposed rail maintenance buildings and works associated with the WTP will however not be visible from this vantage point.



*Figure 45 : View north from Terara village
towards location of former Dairy Farmers site.*

Cambewarra Lookout

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

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

8.10 INDIGENOUS AND NON-INDIGENOUS HERITAGE

8.10.1 INDIGENOUS HERITAGE

Apex Archaeology (“Apex”) were engaged to undertake an Aboriginal Due Diligence Assessment in accordance with the DECCW 2010 *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* the (the Due Diligence Code of Practice), in order to assess the Aboriginal cultural heritage values of the subject site.

Apex conducted a site visit on Wednesday 22 June 2022. No previously recorded archaeological sites are located within the study area. No newly identified archaeological material was identified by Apex during their site survey.

Apex identified that ground disturbance was high within the study area. The proposed locations are all within the central and southern boundary of the facility and have seen extensive site disturbance over the last 100 years. No natural ground surfaces remain within the study area.

No areas of archaeological potential were identified by Apex within the study area.

Based upon their assessment Apex concluded that the proposal will not impact on any Aboriginal heritage values within the proposed impact area. Apex recommend that:

- No further Aboriginal archaeological assessment is required prior to the commencement of development works as described in this report.
- This due diligence assessment must be kept by the Manildra Group of Companies so that it can be presented, if needed, as a defence from prosecution under Section 86(2) of the National Parks and Wildlife Act 1974.
- The results of this assessment fulfil the requirement for archaeological assessment in accordance with the 2010 Guide to Investigation, assessing and reporting on Aboriginal cultural heritage in NSW and the Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales (Code of Practice).
- The proposed works must be contained to the area assessed during this archaeological assessment, as shown on Figure 2. If the proposed location is amended, further archaeological assessment may be necessary to determine if the proposed works will impact any Aboriginal objects or archaeological deposits.
- Should unanticipated archaeological material be encountered during site works, all work must cease and an archaeologist contacted to make an assessment of the find. Further archaeological assessment and Aboriginal community consultation may be required prior to the recommencement of works. Any objects confirmed to be Aboriginal in origin must be reported to Heritage NSW.



8.10.2

NON-INDIGENOUS HERITAGE

Apex were also engaged to undertake a Heritage Impact Statement of the land associated with the Modification Proposal (**Annexure G**).

According to Apex:

- *The study area is not listed as an item of historical heritage.*
- *One heritage item of local significance is located approximately 500m to the north west of the study area, comprising the Bomaderry Railway Station and yard group, along with the former Bomaderry Milk Factory, which is located approximately 500m west of the study area.*
- *Two additional heritage items are located approximately 900m to the east and north east of the rail maintenance building study area, comprising the Berry Estate vertical timber slab cottage and outbuildings, and “Beuna Vista” – dairy farm complex including Berry Estate vertical timber slab barn.*
- *No newly identified items of historical heritage were noted within the study area.*
- *It is proposed to build additional Grain Storage and Handling Facilities within the existing site.*
- *The proposed development would not impact on any of the listed heritage sites in the wider vicinity.*
- *The study areas are not considered to have archaeological potential.*
- *Overall, it is not considered that the proposed works would have any impact on the heritage significance of the listed sites in the wider vicinity of the study areas.*

The following recommendations have been made by Apex for this project:

The proposed works are not considered likely to impact on the heritage values of any items within or adjacent to the study areas. No further archaeological or heritage assessment is required for the project.

Should unanticipated archaeological material be encountered during site works, all work must cease and an archaeologist contacted to make an assessment of the find. Further archaeological assessment may be required prior to the recommencement of works. Any historical objects must be reported to Heritage NSW.

8.11 GREENHOUSE GAS EMISSIONS

The Modification Application is supported by a Greenhouse Gas (GHG) Emissions Assessment prepared by GHD. This report assesses the GHG impact of the proposal over the construction phase and 25-year operational life. This includes considering benefits of displacing the use of natural gas in the boilers with the additional biogas being produced from the wastewater treatment plant expansion.

Currently, the Shoalhaven Starches site mainly relies on natural gas in boilers to produce the steam required for factory operations. The plant processes flour into several outputs; gluten, starch, glucose dried distiller grain, and various grades of ethanol. There is also a co-generation plant onsite which generates electricity for use by the Plant.

Construction Impacts

According to GHD construction-related emissions include:

- Emissions from the consumption of fuel during construction of the modification
- Emissions from the consumption of grid electricity for electric power tools during construction

Table 35 below summarises the construction activity and emissions.

Table 34 - Construction activity & emissions

Activity	Activity data	Units	Total emissions (tCO ₂ -e)	
			Scope 1	Scope 2
Fuel combustion - construction equipment	226	kL	613	-
Fuel combustion – light vehicles	14	kL	37	-
Electricity from the grid	1.8	MWh	-	0.9
Total emissions (tCO₂-e)			650	0.9

Operational Impacts

According to GHD operational-related emissions include:

- Emissions from fuel consumption from the movement of grain onsite
- Emissions from the consumption of biogas
- Emissions from wastewater treatment
- Emissions from natural gas consumption in boilers and co-generation units
- Emissions associated with the consumption of grid electricity

Table 36 below summarises the operational activity and emissions, comparing current activities to those of the site after this Modification Proposal is implemented.

Table 35 : Operational activities & emissions

Activity	EF (kg CO ₂ -e / unit)	Current Activity / BAU (tCO ₂ -e)	Post MOD (tCO ₂ -e)	Change in emissions (2028) (t CO ₂ -e)	Change in emissions (2038) (t CO ₂ -e)	Change in emissions (2048) (t CO ₂ -e)
Natural gas consumption in HRSG, boilers, gas turbines	51.53	345,990	329,297	-16,693	-16,693	-16,693
Natural gas direct to gluten and starch dryers	51.53	23,247	23,247	0	0	0
Biogas consumption - Boiler 6	6.43	2,788	4,562	1,774	1,774	1,774
Wastewater treatment plant		3,394	3,575	181	181	181
Stationary diesel used onsite	2,710	1,522	1,522	0	0	0
Transport diesel (used in trains)	2,716	5,044	5,044	0	0	0
Transport diesel (trucks etc)	2,718	643	643	0	0	0
Transport gasoline	2,313	148	148	0	0	0
Electricity from the grid (2028)	380	27,339	38,990	11,651		
Electricity from the grid (2038)	80	5,756	8,208		2,453	
Electricity from the grid (2048)	80	5,756	8,208			2,453
Total (2028)		411,656	407,027	-4,629		
Total (2038)		390,073	376,246		-13,827	
Total (2048)		390,073	376,246			-13,827

The GHG Emissions Assessment undertaken by GHD concludes that Scope 1 and 2 emissions from the construction of the Modification Proposal are estimated to be 651 tCO₂-e, which represents less than 0.001% of NSW and 0.006% of NSW Industrial sector's annual emissions, and therefore negligible.

Annual net scope 1 and 2 emissions during operations after the Modification Proposal is implemented are estimated to result in negative net emissions once operational, due to the displacement of natural gas in the boilers with the additional biogas being produced and captured at the expanded wastewater treatment facility. As the grid decarbonises the emissions from electricity will fall each year and therefore the carbon savings from the modification would likely improve further over time, at this level of production.

Therefore, the long term GHG impact of the Modification Proposal according to GHD is helping to support the NSW government's ambitions for emissions reduction in NSW and limiting the impact of climate change in the Illawarra-Shoalhaven region.

8.12 THE SUITABILITY OF THE SITE FOR DEVELOPMENT

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

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

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

8.13 THE PUBLIC INTEREST

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

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

9.0 CONCLUSION

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

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

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

This report supports a Modification Application that seeks approval to modify their Project Approval for the Shoalhaven Starches Expansion Project to enable:

Shoalhaven Starches now seek approval to modify their Project Approval for the Shoalhaven Starches Expansion Project to:

- Erect additional grain silos grain silos at the former Dairy Farmers factory to the east of the Shoalhaven Starches factory site and to construct associated grain handling facilities associated with this grain storage. These works will also necessitate an extension of an existing rock wall revetment along the banks of the Shoalhaven River.
- Undertake alterations and additions to the existing Wastewater Treatment Plant (WTP) located on the Shoalhaven Starches Environmental Farm located on the northern side of Bolong Road.
- Construction of nineteen (19) finished product silos in addition to those approved to be constructed on the northern Packing Plant to the main factory site on the southern side of Bolong Road.
- Construct a new rail maintenance building to be constructed at the eastern terminus of the recently approved Mod 25 rail line extension to the east of the former Pulp and Paper Mill factory site. It is also proposed to install provision for rail fuel storage adjacent to the existing rail line within the former Paper Mill site.
- Construct an Ethanol Maintenance building within the south-eastern part of the main factory site.
- Construct a Nitric Acid storage adjacent to existing cooling towers to the west of Abernethys Creek.
- Relocate the approved Phosphorus Oxychloride storage area to a location to the west of the recently constructed starch reaction tanks. The relocation of the Phosphorus Oxychloride storage area will necessitate the relocation of the

approved chemical storage area from this part of the site to an area adjacent to the DDGS Plant.

- This Modification Proposal also seeks to modify Appendix 3 Mandatory Odour Controls to the Project Approval to enable the re-routing of the Palmer cooler discharge to the Boiler 5 and 6 stack.

The Shoalhaven Starches Expansion Project was a ‘transitional Part 3A Project’ for the purposes of Schedule 6A of the Environmental Planning & Assessment Act. As of the 1st March 2018 the transitional arrangements for former Part 3A projects have been discontinued. The discontinuation of the transitional arrangements for Part 3A projects and concept plans means that modifications are assessed through the State Significant Development (SSD) pathway. As such this Modification Application is made pursuant to Section 4.55(2) of the Environmental Planning & Assessment Act 1979.

This Modification Report is supported by the following expert consideration:

- An Air Quality Impact Assessment prepared by GHD which includes the following findings:
 - Potential impacts associated with dust emissions during construction of the proposed modification were assessed by GHD. Construction activities were identified to primarily consist of demolition, installation of prefabricated structures and minor earthworks. The risk identified for all construction activities according to GHD was low or negligible risk for dust soiling, and negligible risk for human health and ecological impacts. Recommendations for dust management during construction have been provided by GHD to further reduce the risk of dust impacts from construction of the proposed modification.
 - A quantitative assessment utilising dispersion modelling was adopted to assess odour and air pollutant (including particulates, combustion pollutants and metals) emission during operation of the proposed modification. The results of this modelling predicted compliance with the odour criteria for the second highest quarter (2025-2026 Q1) and the average sampling data scenario.

Exceedances were predicted for the scenario using sampling data from the highest quarter (2024-2025 Q4) at six of residential receptors. Shoalhaven Starches is currently investigating the spike in Q4 2024-2025 quarterly odour testing, which includes additional odour sampling, to determine the cause.

A source contribution analysis was undertaken By GHD and recommendations have been provided to investigate potential management and mitigation options to reduce off-site odour impacts.

According to GHD Review a recent odour complaints concluded relatively few complaints have been received in recent years. Recent field ambient odour assessments further indicate that odour was not often detectable offsite, and on occasions where odour was detectable, it was characterized as either 'Very Weak' or 'Weak'. The odour surveys tend to support model findings of predicted odour concentrations within the NSW EPA criteria range.

An air pollutant emissions inventory was also prepared by GHD incorporating the proposed conveyor dust collector system, wheat silo vents, and starch and gluten storage silo baghouses, as well as updates to the stack parameters for the combined stack for no. 5 and 6 boilers. Compliance with the assessment criteria was predicted by GHD at all receptors for all pollutants

- A Site Hazard Analysis prepared by Pinnacle Risk Management (PRM). PRM concludes that the risks associated with the plant and equipment at the Shoalhaven Starches Bomaderry site have been assessed and compared against the Department of Planning (DoP) risk criteria in this report. Based on the assessments in this report, PRM indicate all the DoP risk criteria are satisfied.

PRM concludes that societal risk, area cumulative risk, environmental risk and propagation risk is acceptable given the existing controls and results of the consequence modelling.

The primary reason for the low risk levels from the site's plants and equipment according to Pinnacle Risk Management is that significant levels of radiant heat from potential fires, overpressures from dust explosion vents and hydrogen sulphide releases from the biogas system are mostly contained on-site.

The following recommendations are made by Pinnacle Risk Management for the this Modification Proposal:

1. *Ensure that all explosion vents (non-flameless as well as flameless) are directed to a safe location. They should not, for example, be directed to where people work or use walkways.*
2. *Include in the HAZOP study the nitric acid tank, in particular, how the road tanker transfer system is cleared at the end of the tank filling operation and also the reliability of the scrubber. This is required given the potential to release acidic vapours and nitrogen oxides that can be harmful to personnel local to the tank.*
3. *Ensure that fire water protection is available as per the requirements of AS2419, in particular, to the proposed equipment at the former Dairy Farmers site; and*

4. The design details for the proposed silos and associated equipment items, e.g. the silos' design pressure and explosion vents details, are not currently available. Whilst the corresponding risks are not expected to be intolerable, the modelling of potential dust explosions is to be performed once these design details are known.

- A Noise and Vibration Impact Assessment by GHD that concludes:

A construction noise assessment was undertaken to determine potential for increased noise levels at sensitive receivers. Construction noise management levels were established using background noise levels which were established using the conducted background noise monitoring. Four construction scenarios were modelled to predict noise levels at representative sensitive receivers. The predicted noise levels indicate that the noise management levels for all construction scenarios are exceeded at several sensitive receivers. As such, mitigation measures have been recommended in Section 8.1.

Noise sources associated with the operation of the proposed modification were identified and modelled in the site wide noise model developed by GHD as part of the noise pollution reduction program. The predicted noise levels from the proposed modification were assessed against design noise goals and shows compliance with the design noise goals at all sensitive receivers.

It is noted that reduced sound power levels were adopted for equipment which was found to contribute significantly to the overall noise levels of the modification. To ensure noise levels of the proposed modification achieve the design noise goals, the further detailed design of the modification must implement mitigation measures to reduce noise emission to achieve the sound power levels presented in Section 6.1.

The analysis for annoying noise characteristics was undertaken and found that the proposed modification does not contain tonal or low frequency noise characteristics.

Additionally, cumulative noise levels of the following scenarios have been predicted:

- Current operations including the proposed modification and the rail line
- Current operations including all approved but not yet constructed modifications, the proposed modification and the rail line.

Predicted noise levels were analysed for annoying noise characteristics and found low frequency noise to be present at all sensitive receivers. The noise levels were assessed against the EPL noise limits, which shows exceedances at all sensitive receivers from existing noise sources. However, for acoustic compliance data, the bi annual compliance data should be referred to.

Nonetheless, the proposed modification is anticipated to have no contribution to the overall noise levels from the site as the predicted noise levels are below the design noise goals.

Recommended construction mitigation measures are provided in Section 8.1 and recommendations for further detailed design of the proposed modification to minimise operational noise are provided in Section 8.2.

- A “Feasibility Assessment for irrigation of treated wastewater” carried out by Earthwise Environmental (EE). As part of Mod 26, Shoalhaven Starches propose to upgrade the wastewater treatment plant to increase treatment capacity, improve water recycling and enhance biogas recovery. Wastewater inflows to the WTP are forecast to increase from 11.5 ML/d to 15.6 ML/d. With expanded MBR/RO capacity, factory re-use is anticipated to rise from 7.0 ML/d to 13.0 ML/d, reducing treated wastewater irrigation from 3.1 – 3.4 ML/day currently to 2.6 ML/day post Mod 26. While volumes are expected to decrease, the proportion of RO retentate in the irrigation water will increase, elevating nutrient and salinity concentrations. These changes will influence irrigation practices at the Shoalhaven Starches Environmental Farm with less water but more concentrated nutrient and salt loads requiring careful management. EE make a raft of recommendations to address site limitations and risks identified by their assessment with respect to the on-going spray irrigation of treated wastewaters onto the Shoalhaven Starches Environmental Farm following this Modification Proposal.
- A Flood Assessment prepared by WMAwater that concludes works associated with the Modification Proposal will increase flood levels. In summary the maximum cumulative increases in flood level since 1990 are shown below. However, in all three events most areas only experience a maximum increase of up to 0.1m on land outside of that owned by Shoalhaven Starches.
 - 5% AEP – up to 0.05m
 - 1% AEP – up to 0.1m
 - PMF – up to 0.2m (Figure 12).

The maximum incremental increases in flood level since November 2025 are shown below. However, the increases are predominantly within land owned by Shoalhaven Starches.

- 5% AEP – up to 0.01m ,
- 1% AEP – up to 0.01m ,
- PMF – up to 0.05m .

WMAwater indicate there are no viable means of reducing the increase in peak flood levels resulting from these works. One of the most beneficial and practical means of reducing flood damages to existing buildings and risk to life, according to WMAwater is to improve the awareness and preparedness of the occupants

or employees. There are several ways of undertaking such a scheme and these are outlined in the Flood Compliance Assessment and most require involvement by Council and / or the SES. Funding a scheme would assist in improving the community's flood awareness and consequently reducing flood damages and risk to life for all floodplain occupiers.

- A Transport Assessment prepared by ARC that concludes:
 - Access to the individual Shoalhaven Starches sites - both the during construction and operation of the MOD 26 infrastructure - will be provided via intersections that have all been appropriately designed to accommodate the maximum sized vehicles entering/departing each site.
 - Once operational, the MOD 26 infrastructure is not anticipated to generate any additional trips other than occasional maintenance vehicles and the like.
 - While MOD 26 will not increase operational staff, the loss of a small number of parking spaces to accommodate the MOD 26 infrastructure will not affect the ability of existing and proposed off-street parking areas to easily accommodate even super-peak staff (operational and construction) parking demand.
 - The construction of the MOD 26 infrastructure will generate up to 22 vehicle trips in a peak hour. SIDRA analysis indicates that these additional trips would have no impact on the operation of key local intersections or broader road network, noting further that these would be temporary trips during construction only.
 - Significant space for construction staff parking and truck loading/unloading and material stockpiling is available within each of the Shoalhaven Starches sites accommodating the MOD 26 infrastructure; no construction staff parking or materials handling would occur in Bolong Road.
 - A Draft CTMP has been prepared to ensure that the construction of the MOD 26 infrastructure can be undertaken safely and efficiently without impacting the local road network. The CTMP will be finalised further to consideration of any future Conditions of Consent in a Modification approval, and implemented prior to any construction work commencing and then for the during of the construction works.

In summary, arc traffic + transport has determined that the construction and operation of the MOD 26 infrastructure is supportable further to access, traffic and parking considerations.

- An Aboriginal Cultural Heritage Assessment prepared by Apex Archaeology which concluded the proposal would not impact on any Aboriginal heritage values.

- A Heritage Impact Assessment prepared by Apex Archaeology which identifies that the proposed works are not considered likely to impact on the heritage values of any items within or adjacent to the study areas. No further archaeological or heritage assessment is required for the project..
- The Modification Proposal will impact an area containing mapped as having biodiversity values that are not biodiversity certified by the NSW Biodiversity Values Mapping (BVM). The BVM indicates that the mapped area contains threatened species or communities with potential for serious and irreversible impacts' (SAIL). Given the proposed development may have impacts on land included on the BVM, the Biodiversity Offsets Scheme is triggered and the preparation of a Biodiversity Development Assessment Report is required. The Modification Application is supported by a streamlined BDAR prepared by EcoPlanning.

As all impacts to biodiversity cannot be avoided by the proposal, EcoPlanning propose mitigation measures to assist with ensuring that direct and indirect impacts are mitigated to the fullest extent practical including.

- Preparation of a Construction Environmental Management Plan including:
 - Formulation of Pre-clearance protocols
 - Site management and construction controls

In addition to the above a biodiversity offset requirement for residual impacts of a proposed development must be calculated in accordance with Section 10.1 and Section 10.2 of the Biodiversity Assessment Method (BAM). The streamlined BDAR prepared by EcoPlanning outlines the credit requirements for the proposed development to achieve the 'no net loss standard' established by the BAM.

- An Aquatic Ecological Assessment prepared by Lesryk Environmental which includes the following conclusions:
 - The field investigation and desktop review undertaken for this assessment provided a clear characterisation of the estuarine habitats present within, and adjacent to, the proposed works. Field investigations confirmed the presence of sandy and silty substrates, scattered cobbles and pebbles, accumulations of woody debris, isolated boulders, small patches of *Avicennia marina* (Grey Mangrove), and the existing rock revetment wall. No seagrass beds, saltmarsh, or other mapped sensitive estuarine habitats were detected.
 - Comparison with government spatial datasets revealed a discrepancy between previously mapped estuarine macrophytes and observations made in the field investigation. While Fisheries NSW and SEED portal mapping indicated the historical presence of seagrasses (e.g., *Zostera* spp.) near the subject site, these features were not detected during tow camera transects

or SCUBA inspections. This indicates that available mapping in the locality is outdated or inaccurate, and that seagrass meadows are no longer present near the proposed activity.

- The works to extend the existing revetment wall are not considered to have a serious and irreversible impact to key fish habitats or fisheries resources as these were not observed to be present in the areas investigated.
- While the Shoalhaven River is classified more broadly as Class 1 – Major key fish habitat under the Policy and guidelines for fish habitat conservation and management – Update 2013, assessment of the observed habitats against the criteria set out in the Guidelines determined that all aquatic habitats within the study area conform to Type 2 KFH. These habitats provide foraging opportunities, shelter, and structural complexity for fish and other aquatic biota, but do not meet the criteria for Type 1 KFH, which include critical habitats such as seagrass meadows, saltmarsh, and recognised spawning or nursery grounds. This means that the works footprint, and adjacent areas potentially subject to indirect impact, contain estuarine habitats of moderate ecological importance and that potential impacts can be managed effectively through the application of appropriate mitigation and management measures during construction. To ensure that residual impacts are minimised and ecological values maintained, a suite of recommended bio-engineered solutions and habitat management measures are outlined in section 7 of this report.
- Based on the outcomes of the field survey, it is not considered that the works within the section of the Shoalhaven River that are to be impacted by the proposed activity will be inconsistent with the objectives of the FM Act. The works will not affect fish stocks, key fish habitats, threatened species or marine vegetation.
- An Integrated Water Cycle Management Strategy prepared by Allen Price concludes:
 - The IWCMS demonstrates that operational activity of the minor works to be undertaken within the existing managed area and operational activity of the WWTP, Rail Maintenance Building, the Grain Handling Facility (Unloader, Silos, LV Substation and Weighbridge) and Conveyor are unlikely to increase stormwater pollutant export from the site.
 - Stormwater pollutants generated from operational activity of the Northern Carpark (including future Mod 31) can be mitigated by a modifying the existing retention pond with a conventional buffer strip and detention pond.
 - Potential short term stormwater quality impacts from the construction works can be mitigated by the implementation of erosion and sediment control plan and staged earthworks such that the performance objectives and criteria in Ch G2 can be satisfied.

- The proposal is considered adequate from a stormwater management perspective and is recommended to be supported by the NSW Department of Planning, Housing and Infrastructure.
- A Geotechnical, Contamination and Acid Sulphate Soils assessment prepared by GHD which concludes:

Geotechnical

Riverbank and creek stability is a critical consideration for several sites associated with this Modification Proposal. GHD indicate the proposed rock revetment wall along a section of the Shoalhaven River will meet geotechnical stability criteria under both long-term and short-term conditions, improving riverbank resilience and reducing erosion risks. This design was developed using existing geotechnical and survey data ((Coffey, 2017), KMK Geotechnics (2024) and Allen Price (2025)). Two representative cross-sections were analysed under varying groundwater conditions and seismic loading. The load from the proposed conveyor belt structure was not considered by GHD in the analysis, as they anticipate the conveyor will be supported on piles, transferring loads directly to deeper strata rather than the revetment slope. GHD indicate the concept design satisfies minimum factor of safety requirements ($FoS \geq 1.5$ for long-term and $FoS \geq 1.3$ for short-term conditions). Rock sizing, hydraulic performance, and bio-engineering treatments were not addressed and should be confirmed during detailed design.

GHD indicate the grain conveyor and grain storage & handling facility present elevated risk due to proximity to the Shoalhaven Riverbank and the scale of proposed structures. The grain conveyor, potentially located within 1 m of the riverbank crest, spans variable ground conditions and lies adjacent to areas of documented instability, including historical failures and ongoing erosion. The grain storage and handling facility positioned 30 to 65 m from the riverbank, will impose significant loads requiring deep foundations.

GHD recommend riverbank stability assessments should be reviewed and updated for the grain conveyor and grain storage & handling facility sites to account for proposed loads and current conditions. These measures will ensure that detailed design addresses both structural integrity and environmental stability.

Dam Safety

GHD undertook a review of dam safety for existing and proposed WWTP ponds which revealed that historical stability issues have occurred primarily due to dispersive soils and high water levels, leading to batter instability and the need for emergency sheet piling along critical embankments.

While these measures have mitigated immediate risks, observations of slumping, surface erosion and possible dispersive erosion (tunnelling) highlight the need for ongoing monitoring and maintenance.

GHD indicate the Modification Proposal will also require assessment of these risks, in order to assess both performance and regulatory compliance requirements for Dams Safety NSW (DSNSW) under the Dam Safety Act 2015 and Dam Safety Regulation 2019.

While none of the existing ponds are classified as 'Declared Dams' under DSNSW, GHD indicate the proposed 150 ML treated effluent storage pond and conversion of Ponds 1 to 3 into an 80 ML anaerobic digester introduce additional dam safety considerations that will require a Consequence Category Assessment (CCA) under DSNSW regulations. The scale and function of the new and upgraded structures suggests that a Desktop Consequence Category Assessment (DCCA), which constitutes a desktop based, risk focused assessment should be conducted in the first instance, with the completion of a formal CCA assessment, should this be indicated by the results of the DCCA.

Risks such as overtopping, internal erosion, seepage, and rapid drawdown remain relevant and GHD indicate should be addressed through appropriate design measures, including spillway provision, drainage systems, and dispersive soil erosion protection.

GHD also indicate that monitoring programs should include visual inspections, piezometer readings, and inclinometer checks, supported by a Dam Safety Operation Manual and Emergency Response Procedures

Contamination

Based on investigation results, potential for contamination was identified by GHD in 15 areas of environmental concern (AECs) potentially impacting soil, surface water and/or groundwater. The occurrence of contamination (if present) is expected to be localised. The likelihood for contamination to exist within the identified AECs was assessed as very low to high. Potential source-pathway-receptor (SPR) linkages were assessed and could be complete, if contamination were present, for:

- Human receptors:
 - Construction workers/visitors that have direct contact with soil and groundwater may be exposed to contamination via dust and vapours (via inhalation) generated during excavation or installation of piles.
- Ecological receptors:

- During construction, in the vicinity of Shoalhaven River and Abernethys Creek, potential impacts to aquatic species is possible from the mobilisation of contaminants from soil and / or groundwater.
- Additional potential for exposure to soil and perched groundwater may occur during the construction phase where hardstand areas may be removed, or soil exposed in resulting excavations, in areas outside of the main plant.

Based on the results of this PSI for contamination, GHD recommend that a Targeted Site Investigation (TSI) is undertaken for AECs where the likelihood of contamination to exist is assessed as moderate to high and high, to assess if SPR linkages are complete. AECs where the likelihood of contamination was assessed as moderate, low to moderate, low and very low can be managed at the time of construction should contamination be encountered.

GHD also recommend that an Asbestos Management Plan (AMP) for AEC 2, however would also be applicable to manage other areas where asbestos is encountered during construction as an unexpected find. The AMP should be developed in line with the current NSW WHS Act (2011) and Regulation (2025), NEPC (2013), WA DoH (2021), and relevant Codes of Practice (SafeWork NSW, 2014; 2019a; 2019b) as a means to comply with asbestos regulation and prevent (so far as is reasonably practicable) or minimise exposure to hazards including airborne asbestos.

GHD recommended that a Construction Environmental Management Plan (CEMP) be prepared to manage the potential contaminant exposure risks during construction activities, and manage potential unexpected finds (e.g. buried waste, demolition waste, ACM, etc.) that could be encountered. Therefore, the CEMP should also include an Unexpected Finds Protocol (UFP). A site-specific Work Health Safety and Environment (WHSE) plan should be prepared, to ensure appropriate safety and workplace hygiene practices are implemented to minimise potential risks from exposure to contamination. The WHSE plan must address all relevant regulatory requirements and as a minimum, should consider incorporating the relevant practices set out in CRC Care (2018) National Remediation Framework: Guideline on health and safety, Version 0.1: August 2018. The CEMP should also make reference to the AMP.

GHD also recommend that site workers should be advised of the potential contamination risks at the sites and have appropriate personal protective equipment (PPE) available should contamination be encountered and have also read and understood management documents that apply to the construction sites.

Acid Sulphate Soil (ASS)

Based on the results of previous investigations, GHD indicate that ASS may be encountered at variable depths within the proposed development areas where deep footing systems such as bored or Continuous Flight Auger (CFA)

piles or trenching/excavations deeper than 1 m are required. Soft dark grey to black clays and loose grey sands were encountered at test locations within or in the vicinity of the development areas, particularly in the main plant area and at the WWTP, which are indicative of coastal ASS. Limited ASS investigations have been carried out to assess the presence of ASS.

Therefore, GHD recommend that an Acid Sulfate Soil Management Plan (ASSMP) be developed and actioned where excavations associated with the proposed development will disturb ASS and/or require dewatering which could result in the lowering of the water table. It is understood that ASSMPs already exist for some areas of the Main Plant and WWTP. Existing ASSMPs should be reviewed and updated to reflect changes in ground disturbance activities, quantities and guidelines. Further investigations could be considered to assess the absence or presence of ASS to better inform ASS management options during soil disturbance.

Salinity Potential

GHD indicate environmental monitoring results between 2012 and 2024 indicate soils in paddocks at the WWTP range from moderately saline to extremely saline, where highest salinity is recorded in the upper 0.1 m of the soil profile. Electrical conductivity (EC) concentrations were variable across the monitoring period. Groundwater EC results indicate moderate salinity but are stable and remained consistent with long term averages. There were no visual signs of salt accumulation or shift towards salt tolerant species observed during fieldwork. Based on the results of this preliminary salinity assessment, site soils may have saline concentrations which could adversely affect very sensitive crops. GHD recommend that:

- Soil sampling be undertaken to assess the salinity potential within the eastern portion of the site.
- The effects of salinity on foundations be assessed as part of future detailed geotechnical investigations in accordance with AS 2159 – 2009 Piling – Design and Installation.

Riparian Corridor

Manildra was previously granted Project Approval (MP06_0228, dated 28 January 2009) by the Minister of Planning for the proposed Shoalhaven Starches Expansion project, which permitted development within the riparian corridor.

Based on review of the *Guidelines for Controlled Activities on Waterfront Land* (2018), some of the proposed development areas occur within the riparian corridor. The proposed development sites, (with the exception of the nitric acid store), occur within areas that have previously been developed as part of the Shoalhaven Starches Plant. Based on the location of the proposed developments, vegetation removal, other than grass cover, is not expected.



Given the prior industrial development and limited vegetation removal required, GHD consider the Modification Proposal is consistent with previous developments that have occurred at the Main Plant and WWTP.

Surface & Groundwater Impacts

GHD have also undertaken a review of potential impacts to surface water and groundwater with respect to the proposed development was undertaken with respect to *NSW Aquifer Interference Policy 2018*.

- The Modification Application is also supported by a Green House Gas Emissions Assessment prepared by GHD which concludes The Modification Application is also supported by a Green House Gas (GHG) Emissions Assessment prepared by GHD which concludes that Scope 1 and 2 emissions from the construction of Modification Proposal are estimated to be 651 tCO₂-e, which represents less than 0.001% of NSW and 0.006% of NSW Industrial sector's annual emissions, and therefore negligible.

Annual net scope 1 and 2 emissions during operations after the Modification Proposal is implemented are estimated to result in negative net emissions once operational, due to the displacement of natural gas in the boilers with the additional biogas being produced and captured at the expanded wastewater treatment facility. As the grid decarbonises the emissions from electricity will fall each year and therefore the carbon savings from the Modification Proposal would likely improve further over time, at this level of production.

Therefore, the long term GHG impact of the Modification Proposal is helping to support the NSW government's ambitions for emissions reduction in NSW and limiting the impact of climate change in the Illawarra-Shoalhaven region.

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

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

Approval for this Modification Application is sought.

Stephen Richardson RPIA
Allen Price Pty Ltd

Sebastian Tauni RPIA