



Transport Assessment

Shoalhaven Starches Expansion Project (Modification 26)

Additional Grain Storage and Handling Facilities; Alterations and Additions to Waste Water Treatment Plan; and Other Works

for

Manildra Group

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Table of Contents

1	Introduction.....	1
1.1	Overview.....	1
1.2	Transport Assessment Scope	2
1.3	Reference Documents	2
1.4	Consultation.....	3
2	The Existing Site.....	8
2.1	Shoalhaven Starches	8
2.2	Site Approvals.....	11
2.3	Staff	12
2.4	Parking	13
3	Existing Transport Networks	14
3.1	Key Roads	14
3.2	Key Intersections	14
3.3	Truck Routes	16
3.4	Future Base Traffic Volumes.....	18
3.5	Future Base Intersection Operations.....	22
3.6	Crash Data.....	23
3.7	Crash History	23
3.8	Public & Active Transport.....	24
3.9	Rail Operations	25
4	Modification 26: Operations.....	27
4.1	Modification 26.....	27
4.2	Access	30
4.3	Traffic.....	30
4.4	Parking	30
4.5	MOD 26 Operational Summary	31
5	Modification 26 Construction.....	32
5.1	Construction Overview	32
5.2	Construction Hours	32
5.3	Access	32
5.4	Construction Traffic.....	32
5.5	Construction Traffic Impacts.....	38
5.6	Construction Staff Parking	38
5.7	Construction Summary.....	38
6	Draft Construction Traffic Management.....	40
6.1	Overview.....	40
6.2	On-Site Management.....	40
6.3	Off-Site Traffic and Pedestrian Management	41
6.4	Principal Contractor Responsibilities	42
6.5	Driver Code of Conduct.....	44
7	Conclusions	47

Appendix A: National Heavy Vehicle Regulator A-Double Approval Permit

Appendix B: Traffic Surveys

Appendix C: SIDRA Movement Summary Reports

1 Introduction

1.1 Overview

arc traffic + transport has been commissioned by Manildra Group (**Manildra**) to prepare a Transport Assessment (**TA**) to examine the potential impacts traffic associated with a Modification (Modification 26 – **MOD 26**) to the current Shoalhaven Starches Expansion Project Approval MP06_0228 (**SSEP Approval**) in place at **Shoalhaven Starches**, located in Bolong Road, Bomaderry. MOD 26 provides for:

- Additional grain silos at the former Dairy Farmers factory (**DF Site**) to the east of the primary Shoalhaven Starches factory site (the **SS Site**) and the construction of associated grain handling facilities. These works will also necessitate an extension of an existing rock wall revetment along the banks of the Shoalhaven River.
- Alterations and additions to the existing Wastewater Treatment Plant (**WWTP**) located at the Shoalhaven Starches Environmental Farm located on the northern side of Bolong Road (the **Farm**).
- Construction of nineteen (19) finished product silos at the SS Site in addition to those approved to be constructed on the northern Packing Plant (**PP Site**).
- Construction of a new rail maintenance building at the eastern terminus of the recently approved Modification 25 (**MOD 25**) rail line extension to the east of the former Australian Pulp and Paper Mill Factory site (**PM Site**). It is also proposed to install provisions for rail fuel storage adjacent to the existing rail line within the PM Site.
- Construction of an Ethanol Maintenance building within the south-eastern part of the SS Site.
- Construction of a Nitric Acid storage facility adjacent to the existing cooling towers to the west of Abernethys Creek.

With specific regard to the transport characteristics of MOD 26, the new infrastructure at the DF Site will require the relocation of some existing staff parking at the DF Site to the staff car park on the northern side of Bolong Road (**Northern CP**), which in turn will result in a redistribution of trips from the DF Site to the Northern CP.

More broadly though, it is important to note from the outset that once the MOD 26 infrastructure becomes operational, it is not anticipated to generate any additional trips to the local road network; as such, from a traffic analysis perspective, the key issue for assessment in this TA is the operation of the local road network during the construction of the MOD 26 infrastructure.

MOD 26 will be assessed by the Department of Planning, Housing and Infrastructure (**DPHI**); further details in regard to MOD 26 are provided in the broader Modification submission which this TA accompanies.

1.2 Transport Assessment Scope

In determining the scope of the TA, arc traffic + transport has referenced Appendix E of the Transport for NSW (**TfNSW**) Guide to Transport Impact Assessment (**TfNSW Guide**), which outlines a Scoping Checklist for the assessment of traffic generating developments. As such, the TA includes an assessment of:

- The existing road network providing access to the different Shoalhaven Starches sites, including future base traffic volumes in key roads, and the operation of key intersections.
- Additional trips generated to the road network by other SSEP Approval Modifications that have yet to commence construction/operation.
- An assessment of the operational traffic characteristics of MOD 26, including vehicle types, vehicle routes, and peak hour and daily traffic volumes; and the potential impact of those additional trips on the operation of the road network.
- An assessment of access paths to, through and from the different Shoalhaven Starches sites by the largest vehicle accessing each site once the MOD 26 infrastructure is operational.
- An assessment of peak operational parking demands and provision.
- An assessment of the construction traffic characteristics of MOD 26, including vehicle types, vehicle routes, and peak hour and daily traffic volumes; and the potential impact of these construction trips on the operation of the road network.
- An assessment of access paths to, through and from the different Shoalhaven Starches sites by the largest vehicle accessing each site while the MOD 26 infrastructure is being constructed.
- An assessment of peak construction parking demands and provision.
- The preparation of a Draft Construction Traffic Management Plan (**Draft CTMP**) which outlines the means by which the construction works can be undertaken with maximum safety and efficiency.

1.3 Reference Documents

1.3.1 Shoalhaven Starches Reports

arc traffic + transport has prepared numerous reports relating to the Shoalhaven Starches operations over many years, including recent assessments for other Modification that have either been determined by DPHI or are currently being assessed or prepared for assessment. As such, it is important that the traffic analysis consider these other Modifications to ensure that any cumulative impacts during the construction of the MOD 26 infrastructure are appropriately considered.

In this regard, the following transport assessments have been referenced in the preparation of the TA:

- Shoalhaven Starches Ethanol Upgrade & Packaging Plant TIA 2008 (**Ethanol Upgrade TIA**);
- Shoalhaven Starches Modification 28 Transport Assessment 2023 (**MOD 28 TA**);
- Shoalhaven Starches Modification 30 Transport Assessment 2025 (**MOD 30 TA**); and

- Shoalhaven Starches Modification 31 Transport Assessment 2025 (**MOD 31 TA**).

Additional assessments relating to past Modifications at the Site prepared by others that are referenced in the TA include:

- Shoalhaven Starches Modification 25 Rail Line Extension Traffic Impact Assessment 2022, prepared by Bitzios Consulting (**MOD 25 TIA**); and
- Shoalhaven Starches Expansion Modification 19 Traffic Impact Assessment 2020, prepared by Bitzios Consulting (**MOD 19 TIA**).

1.3.2 Additional Bolong Road Developments

Manildra and Air Liquide are currently finalising a State Significant Development Application for a proposed CO₂ Facility to be located within the PM Site (the **CO₂ SSDA**), and as such the CO₂ Facility Bolong Road Transport Assessment 2025 (**CO₂ TA**) prepared by arc traffic + transport has been referenced in the TA. It is noted that an additional Modification 33 (**MOD 33**) that proposes a new warehouse facility at the PM Site is also being prepared by Manildra, but would not commence construction until after MOD 26 works are complete.

1.3.3 Transport Guidelines & Controls

The TA references key guidelines and controls relevant to the assessment of the access, traffic and parking characteristics of MOD 26; these include:

- TfNSW Guide;
- Austroads Guide to Traffic Management Part 3: Traffic Studies and Analysis Methods (**GTM Part 3**);
- Austroads Guide to Traffic Management Part 12: Integrated Transport Assessments for Developments (**GTM Part 12**);
- Australian Standard 1742 Manual of Uniform Traffic Control Devices Part 3: Traffic Control for Works on Roads (**AS 1742.3**);
- Roads & Maritime Services Traffic Control at Worksites Manual 2020 (**TCW Manual**);
- Australian Standard 2890.1: Parking Facilities – Off Street Car Parking (**AS 2890.1**); and
- Australian Standard 2890.2: Parking Facilities – Off Street Commercial Vehicle Facilities (**AS 2890.2**).

1.4 Consultation

1.4.1 Department of Planning, Housing and Infrastructure

A Scoping Report detailing the Proposal was prepared by Allen Price and submitted to DPHI in February 2025 (**MOD 26 SR**). Correspondence received from DPHI dated 2/7/2025 identifies a number of issues to be addressed in the MOD 26 submission, but no issues are raised relevant to traffic and transport.

As such, arc traffic + transport have referred to the traffic and transport assessment tasks in the Secretary's Environmental Assessment Requirements (**SEARS**) received from DHPI in regard to the CO2 SSDA and MOD 30, noting that these SEARS are essentially identical to the assessment requirements in the TfNSW Guide Appendix E Scoping Checklist.

A summary of these SEARS relevant to the TA is provided in **Table 1**, along with a summary response to each assessment requirement, and a reference to the section of the TA where each is addressed in further detail.

1.4.2 Transport for NSW and Shoalhaven City Council Correspondence

The Scoping Report was also referred to TfNSW and Shoalhaven City Council (**Council**) on 30 May 2025. Correspondence was subsequently received from TfNSW dated 23 June 2025 in response to their review of the Scoping Report; the TfNSW correspondence states the following:

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.

No correspondence has been received at this time from Council.

Again though, the scope of work provided in the TA is in full accordance with the Scoping Checklist in Appendix E of the TfNSW, and as such it is anticipated that all issues relevant to TfNSW and/or Council have been appropriately considered in the TA.

Table 1: Summary Response to Secretary's Environmental Assessment Requirements

SEAR	Summary Response	TA Reference
Traffic and Transport – including: A Traffic Impact Study prepared in accordance with the Transport for NSW Guide to Transport Impact Assessment (GTIA) and Austroads guidelines, that includes:		
consideration of all deliverables and actions for construction and operation of the development in Appendix E – Scoping checklist of the GTIA.	The TA has been prepared with specific reference to the deliverables and actions detailed in Appendix E of the TfNSW Guide. Of specific relevance to the Proposal, items from the Appendix E Scoping Checklist examined in the TA including: Proposed development Alignment with relevant transport strategies, plans and planning controls Relevant site characteristics, including location and proposed land use mix Plans showing layout of site and access arrangements for all modes Parking provisions and facilities by mode and vehicle type, on-street and off-street Freight and servicing plan	Section 4
	Existing Conditions Area of influence and peak periods identified by mode Road performance analysis Road safety assessment	Section 3
	Development Impacts Trips generated to/from the development by mode Trip distribution and network assignment at an appropriate scale	Section 4.5
	Road performance analysis Road signal warrant and turn lane warrant analysis Road safety assessment	Section 5.7
	On-site transport movements and parking analysis, including swept path diagrams Construction impacts on the surrounding transport network Haul routes and the type of heavy vehicles used Construction impact mitigations	Section 5.4

Table 1: Summary Response to Secretary's Environmental Assessment Requirements (continued)

SEAR	Summary Response	TA Reference
<i>an assessment of cumulative traffic impact on road performance and safety implications at key intersections using an appropriate modelling framework (including the consideration of the Shoalhaven Starches Facility traffic generation, existing base case, future base case and project case scenarios)</i>	An assessment of existing and future base traffic conditions – which considers current Shoalhaven Starches Modification approvals and proposals, as well as other traffic generating developments in the area – has been completed, so that any cumulative impacts arising from the Proposal can be properly determined. It is noted that once operational, the MOD 26 infrastructure will not generate any additional trips to the local road network, and as such the traffic analysis in the TA focuses on potential impacts during the construction of the MOD 26 infrastructure..	Section 3.4 Section 5.4
<i>plans demonstrating how all vehicles likely to be generated during construction and operation and awaiting loading, unloading or servicing can be accommodated on the site to avoid queuing in the street network</i>	Significant space is available within each of the Shoalhaven Starches site accommodating the MOD 26 infrastructure such that all loading/unloading and material stockpiling during the construction works can be entirely contained within these sites at all times. All construction vehicles will enter/depart each site from/to Bolong Road in a forward direction.	Section 5.3 Section 6.3
<i>details of road upgrades, traffic control measures, new roads or access points required for the development if necessary (including approval-in-principle from the relevant road authority, where relevant)</i>	Significant upgrades have been completed in Bolong Road further to past SSEP Approval Modifications, while the intersection of Bolong Road & Watchman's Drive (at the PM Site) was previously constructed with significant ancillary lane infrastructure given the past trip generation of the Paper Mill when operating. In addition, the capacity of the Princes Highway & Bolong Road intersection, as well as adjacent intersections and the Nowra Bridge, have been significantly increased further to the completion of the recent Nowra Bridge Upgrade by TfNSW. It is again noted that once operational, the MOD 26 infrastructure will not generate any additional trips to the local road network..	Section 3

Table 1: Summary Response to Secretary's Environmental Assessment Requirements (continued)

SEAR	Summary Response	TA Reference
<i>details of the likely trip generation during construction, vehicle routes, access and parking arrangements and measures to mitigate any construction traffic and parking impacts, including a Draft Construction Traffic Management Plan detailing.</i>	An assessment of the traffic characteristics of the construction of the MOD 26 infrastructure has been prepared, which indicates that the construction works will generate up to 40 construction vehicle trips in the AM and PM peak hours; only a small percentage of these trips would be truck trips. The traffic analysis provided in the TA indicates that these trips would have no impact on the operation of key intersections or the broader road network, and moreover would be generated only for the duration of the construction works, estimated at between 12 months and 18 months. All parking for construction staff will be provided off-street within existing Shoalhaven Starches car parks; the primary car park will be the Northern CP, while small temporary car parks will be provided in close proximity to works within the SS Site, DF Site, Farm and PM Site as necessary. These car parks will provide capacity well in excess of the peak parking demand of existing operation staff and the additional construction staff. A Draft CTMP has been prepared that outlines the best means of completing the construction of the Facility with minimum impacts on the efficiency and safety of the road network. The CTMP will be finalised further to consideration of any relevant Conditions of Consent to a future SSD approval relating to the construction works.	Section 5.4 Section 5.5 Section 5.6 Section 6

2 The Existing Site

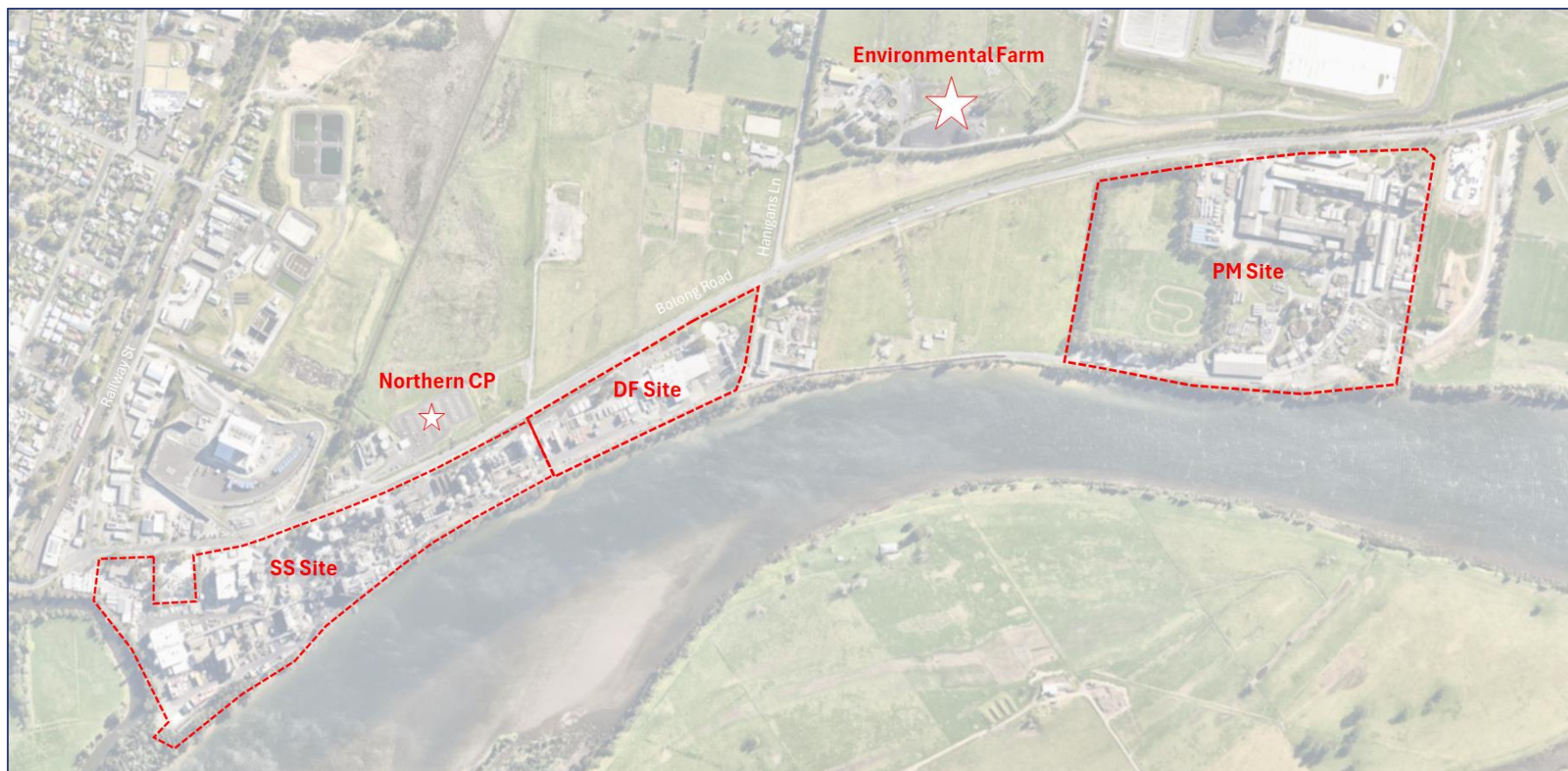
2.1 Shoalhaven Starches

Shoalhaven Starches operations occupy a number of distinct 'sites' in Bomaderry; while operations are integrated across all sites, some sites have been differentiated in the TA for ease of reference. In this regard, the primary sites relevant to the assessment of MOD 26 are:

- The **SS Site**, which lies to the south of Bolong Road east of Railway Street;
- The **DF Site**, which lies to the east of the SS Site south of Bolong Road;
- The **Northern CP**, which lies north of Bolong Road adjacent to the BOC Site;
- The **Farm**, which lies to the north of Bolong Road east of Hanigans Lane; and
- The **PM Site**, which lies south of Bolong Road east of Hanigans Lane.

These sites are shown in their local context in **Figure 1**, and the figures following show a more detailed image of each of the Shoalhaven Starches sites referenced in the TA, including the Manildra designated gate reference for the access points to each of these sites.

Figure 1: Shoalhaven Starches Sites



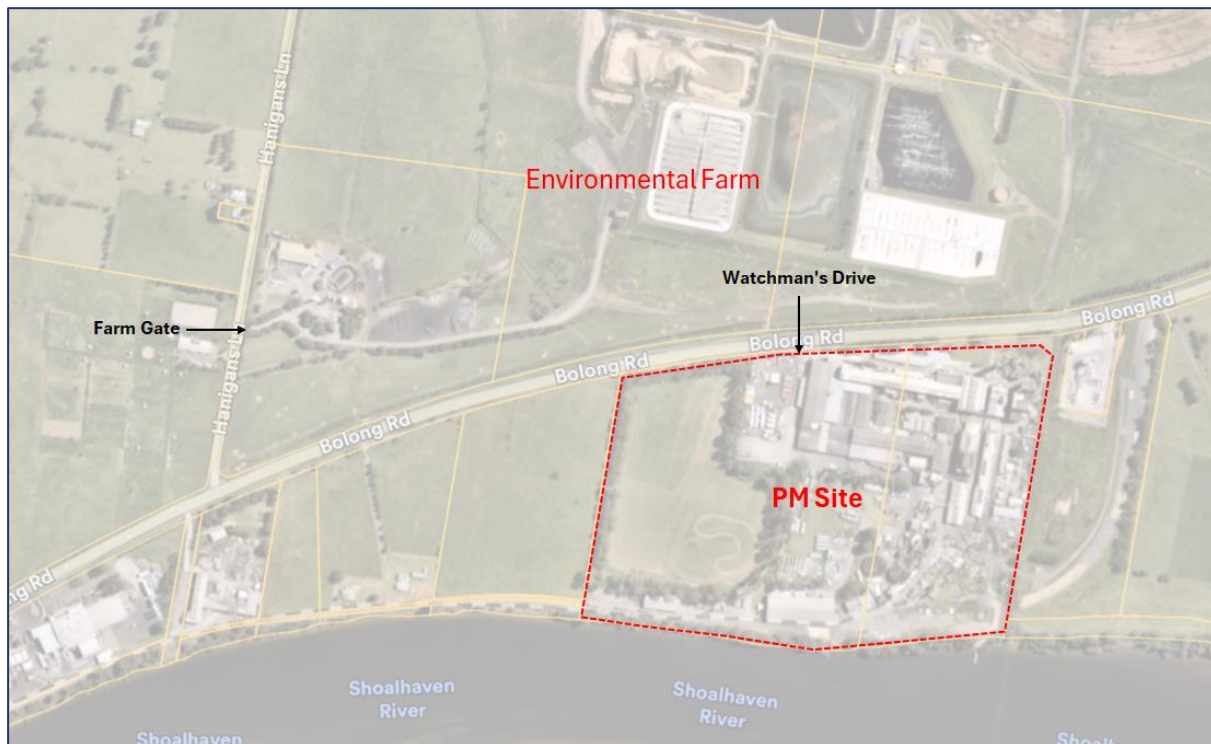
Source: Nearmap

Figure 2: Shoalhaven Starches Site, Dairy Farmers Site and Northern Car Park



Source: Nearmap

Figure 3: Paper Mill Site and Environmental Farm



Source: Nearmap

2.2 Site Approvals

2.2.1 Shoalhaven Starches Expansion Project Approval MP06-0228

The SSEP Approval was granted by the Minister for Planning on the 28 January 2009; this approval also encapsulated previous approvals for the Site into one overall approval (at that time).

The SSEP sought to increase ethanol production at the Site in a staged manner, from 126 million litres per annum (**ML/annum**) to 300 ML/annum. To accomplish the increase in ethanol production, the project required a series of plant upgrades and increase in throughput of raw materials, principally flour and grain.

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

As a result, Manildra have been investigating alternative markets for the ethanol that is and will be produced at the Site in accordance with the SSEP Approval; one such market is the "beverage" market where ethanol is further treated and purified to enable it to meet stringent beverage grade specifications and pass organoleptic testing requirements to enable it to be utilised in the production of alcoholic drinks.

2.2.2 Modification Approvals

Manildra subsequently obtained approval for Modification 12 (**Mod 12**) on 12 September 2017, which provided for modifications to the ethanol distillation plant to enable an increase in production of up to 110 ML/annum of beverage grade ethanol. Mod 12 did not involve an increase in overall ethanol production above the currently approved 300 ML/annum, but rather enabled greater flexibility in the type of ethanol that is produced from the plant. Mod 12 also provided for the relocation and expansion of staff parking areas adjacent to the BOC Gas facility opposite the SS Site north of Bolong Road.

Manildra purchased the former Australia Paper Mill site at 340 Bolong Road, and Modification 14 (**MOD 14**) subsequently provided for the PM Site to be used for the storage of finished products and engineering plant and the use of existing storage tanks, buildings and workshops for purposes ancillary to the primary Shoalhaven Starches operations.

In 2020, Manildra received an approval for Modification 18 (**Mod 18**), which provides for the production of 120 ML/annum of hand sanitizer grade alcohol out of the overall 300 ML/annum approved production limit under the SSEP Approval. Mod 18 followed a request by the Federal Government's Department of Industry, Sciences and Energy to produce more hand sanitizer alcohol in response to the current Coronavirus COVID 19 conditions, noting that Mod 18 similarly does not involve production increasing above the 300 ML/annum limit conditioned under the SSEP Approval.

In 2021, Manildra received an approval for Modification 19 (**Mod 19**) which provides for an increase in capacity of Shoalhaven Starches to produce an additional 100 ML/year of beverage grade ethanol, noting that this does not exceed the maximum production of up to 300 ML/annum conditioned under the SSEP Approval.

Other recently approved or currently proposed Modifications specifically relevant to the TA include:

- Approved Modification 25 (**MOD 25**) which provides for an extension of the on-site rail line to allow additional on-site standing area so that trains longer than 900m can be entirely accommodated on-site, as well as additions to approved product dryers.
- Approved Modification 28 (**MOD 28**), which provides for the construction and operation of a temporary grain storage bunker at the Shoalhaven Starches Environmental Farm located in Hanigans Lane.
- Proposed Modification 30 (**MOD 30**), which provides for an increase in the processing capacity of the existing Supagas facility adjacent to the DF Site.
- Proposed Modification 31 (**MOD 31**), which provides for significant energy efficiencies and emission reductions across Shoalhaven Starches further to the installation of new beverage grade ethanol distillery heat recovery infrastructure; new and upgraded fuel grade ethanol reconfiguration and heat recovery infrastructure; and new and upgraded dried distillers grain heat recovery infrastructure.
- Proposed Modification 32 (**MOD 32**), which provides for a new warehouse at the PM Site to provide greater efficiencies in the movement of products to/from Shoalhaven Starches by third parties. A Scoping Report for MOD 32 is currently being prepared by Manildra.

2.2.3 Paper Mill Site CO2 Facility

At this time, Manildra Energy Australia Pty Ltd and Air Liquide Australia Solutions Pty Ltd are finalising a proposal for the construction and operation of a CO2 Facility to be located within the PM Site. The proposal will allow for the capture and the purification of the CO2 generated as a coproduct of the broader Shoalhaven Starches ethanol production processes into food and beverage grade Liquid Carbon Dioxide.

It is noted that the CO2 Facility proposal will be submitted as a SSDA (80824235 – the **CO2 SSD**) rather than as a Modification to the SSEP Approval.

2.3 Staff

Current Manildra operations require up to 280 permanent staff on-site at any one time (weekdays). In addition, up to 300 contract staff can be on-site at any one time during peak operating and construction periods, or a total of 580 staff at any one time.

2.4 Parking

Car parking is currently provided at all of the key Shoalhaven Starches sites; with reference to past parking surveys, on-site observations and Nearmap images, the total parking supply and average weekday demand across the Shoalhaven Starches sites is summarised in **Table 2**.

Table 2: Shoalhaven Starches Parking Provision and Average Peak Demand

Parking Area	Capacity	Average Peak Demand ²
Western Car Park	15	13
Northern Car Park ¹	438	260
DF Site Car Park	70	64
Paper Mill	30	24
Total	553	361

Note 1: The total spaces in the Northern CP include the 10 spaces provided immediately adjacent to the BOC Site which are used by Shoalhaven Starches staff.

Note 1: Average peak demand represents the average week day demand based on permanent staff and a moderate number of contractors; however, contractor numbers can at times increase based on production spikes and construction projects such as would be the case for the construction of the MOD 26 infrastructure.

With reference to **Table 2**, it is important to note that at the time of the parking (and traffic) surveys, the total number of staff (permanent and contractors) on-site was approximately 479, including 304 permanent staff and 175 contractors; this in turn indicates an average car occupancy of approximately 1.5 staff per vehicle.

Based on our past assessments, contractors tend to have much higher vehicle occupancies, including in some instances the use of small shuttle buses. As such, it anticipated that permanent staff vehicles would have an occupancy closer to 1.1 staff per vehicle, and contractors an occupancy well over 2.0 staff per vehicle.

3 Existing Transport Networks

3.1 Key Roads

3.1.1 Bolong Road

Bolong Road is a Regional 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; it is noted that a lower posted speed limit of 60km/h is in place adjacent to the DF Site and SS Site.

3.1.2 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. These upgrades have significantly increased capacity in Princes Highway through Bomaderry and Nowra, as well as the capacity of these intersections.

3.1.3 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 (see also **Section 3.3**).

3.2 Key Intersections

3.2.1 Bolong Road & Watchman's Drive

All access to the PM 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 PM Site (36m A-Double – see also **Section 3.3**).

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

3.2.2 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. Sight distances at the intersection are in excess of the requirements of GRD Part 3.

3.2.3 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. Sight distances at the intersection are in excess of the requirements of GRD Part 3.

3.2.4 Bolong Road & Gate 1

The intersection of Bolong Road & Gate 1 (DF Site) 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 (**LILLO**) only;
- An acceleration lane from Gate 1 to Bolong Road; and
- Geometry providing for the movement of the largest vehicle accessing the DF Site (36m A-Double – see also **Section 3.3**).

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

3.2.5 Bolong Road & Gate 2

This intersection provides for LILLO movements only due to a central median in Bolong Road adjacent to the Northern CP. As discussed in **Section 3.2.4**, 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. Sight distances at the intersection are in excess of the requirements of GRD Part 3.

3.2.6 Additional Bolong Road Intersections

A number of other local roads and Shoalhaven Starches driveways intersect with Bolong Road between the PM Site and Princes Highway; however, once operational, the MOD 26 infrastructure would not generate any additional trips to/from any of these roads or driveways.

With reference to **Section 5.4**, 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.

3.3 Truck Routes

Bolong Road (between the PM 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 4**.

Figure 4: 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 PM Site, providing for trips to/from Watchman's Drive (PM Site) and Gate 1 (DF Site). This approved 36m A-Double route is not currently shown in the NHVR interactive maps, but a copy of the approval is provided in **Appendix A**.

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 PM Site and DF Site during both the construction and operation of the MOD 26 infrastructure will continue to be no larger than the approved 36m A-Double (see also **Section 4.2**).

With reference to **Figure 4**, 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.

3.4 Future Base Traffic Volumes

3.4.1 Overview

Sections below provide 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 MOD 26 infrastructure would not generate any additional trips.

3.4.2 Traffic Surveys

In 2023, arc traffic + transport 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.

The traffic survey data is provided in **Appendix B**.

3.4.3 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.

3.4.4 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 in **Appendix B**, 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 SS 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 DF Site, to turn back to the west.

3.4.5 Current Projects

To provide an appropriate assessment of future worst case conditions, the future base traffic volumes have also considered to following projects:

- **Modification 28:** MOD 28 provides for temporary grain storage capacity during periods when rail services to the broader SS Site are disrupted, as has been the case in recent years during periods of bad weather. Grain bunkers are located at the Farm, and large delivery trucks bring grain to be stored until such time as a rail disruption occurs; when a disruption occurs, smaller transfer trucks then transfer the grain from the Farm to the SS Site via Gate 13.

However, these operations are anticipated to cease by the end of 2025 further to the additional grain storage capacity being provided under other Modifications, as well as the improved rail access provided further to the MOD 25 approval.

- **Modification 30:** MOD 30 provides for an increase in the processing capacity of the existing Supagas Facility adjacent to the DF Site, and is currently being assessed by the DPHI.

The MOD 30 infrastructure is anticipated to be constructed prior to the MOD 26 construction period, but the additional operational trips generated under MOD 30 would be generated under Base 2030 conditions.

- **Modification 31:** MOD 31 proposes energy efficiencies and emission reductions across Shoalhaven Starches further to the installation of new beverage grade ethanol distillery heat recovery infrastructure; new and upgraded fuel grade ethanol reconfiguration and heat recovery infrastructure; and new and upgraded dried distillers grain heat recovery infrastructure.

The potential exists for the construction of the MOD 31 infrastructure to occur at the same time as the construction of the MOD 26 infrastructure (i.e. under Base 2030 conditions).

- **SSDA 80824235:** The CO2 SSD provides for a new CO2 Facility within the PM Site.

The CO2 SSD infrastructure is anticipated to be constructed prior to the MOD 26 construction period, but the additional operational trips generated under the CO2 SSD would be generated under Base 2030 conditions.

Based on our discussions with Manildra, in reality there is little if any potential for more than one of these projects to be under construction at the same time, simply as a function of the specialist (construction staff) resources; the area needed at different locations for the construction works to take place (such as materials storage areas); and the necessary staging of projects, where the infrastructure associated with one project needs to be completed before the next project can commence construction.

As such, the Base 2030 traffic volumes include:

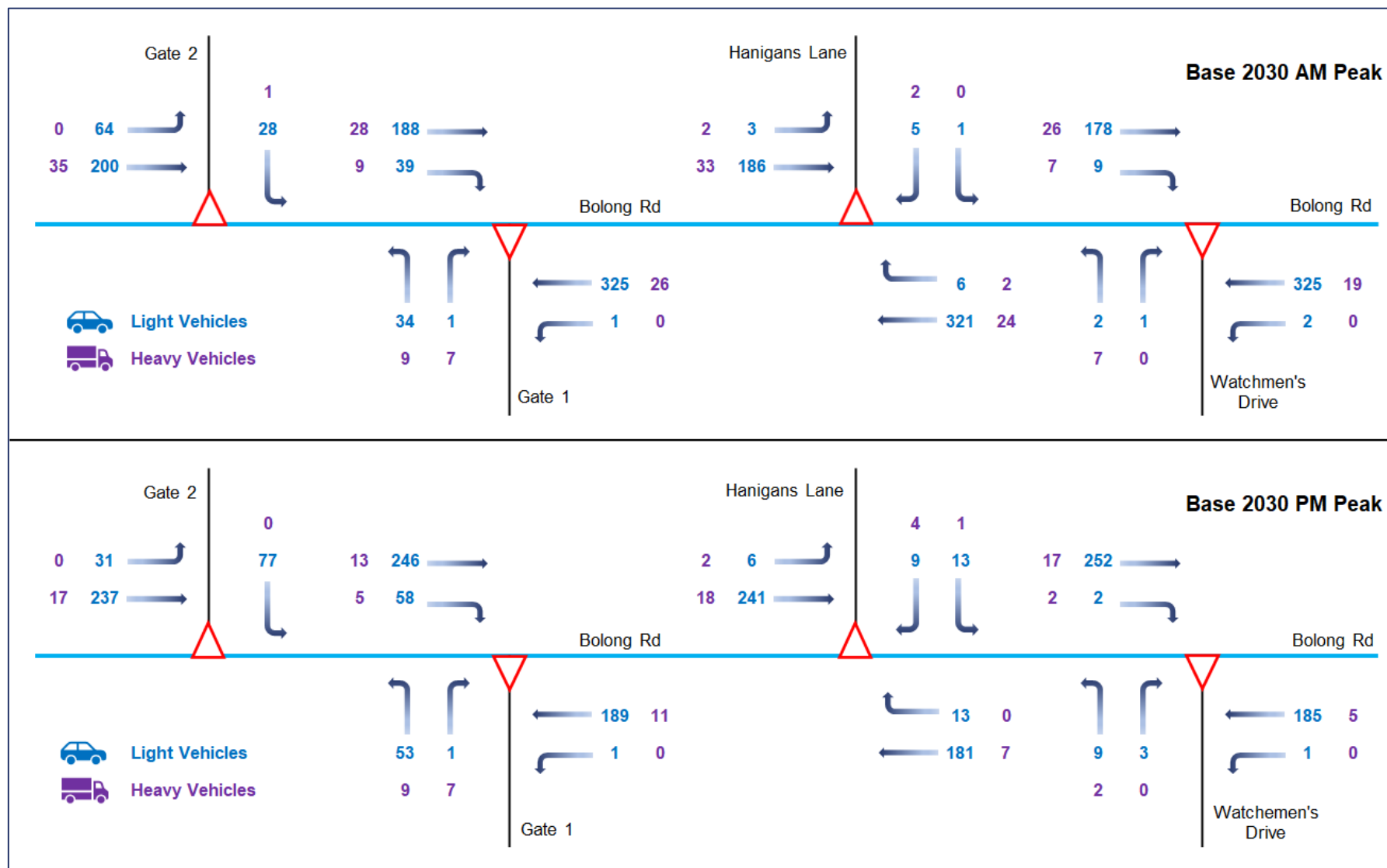
- MOD 30 operational trips;
- CO2 SSD operational trips; and
- MOD 31 construction trips.

Details of these additional operational and construction trips are provided in the MOD 30 TA and CO2 SSD TA, and the MOD 31 TA respectively.

3.4.6 Trip Assignment

With reference to sections above, the peak hour traffic volumes at the key intersections under super-peak Base 2030 conditions, including the additional MOD 30, CO2 SSD and MOD 31 trips, are shown in **Figure 5**.

Figure 5: Base 2030 Peak Hour Traffic Volumes



3.5 Future Base Intersection Operations

3.5.1 SIDRA

The operation of the key intersections under future base conditions has been assessed 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)
- **95thile 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 3** provides a summary of the SIDRA recommended criteria for the assessment of unsignalised intersections.

Table 3: 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

3.5.2 Future Base Intersection Operations

Further to the SIDRA analysis, **Table 4** provides a summary of the operation of the key intersections under Base 2030 conditions; SIDRA Movement Summaries are provided in **Appendix C**.

Table 4: 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 4**, the key intersections will operate at a good LOS under Base 2030 conditions, with minimal AVD and 95QL, while retaining significant spare capacity.

3.6 Crash Data

3.7 Crash History

TfNSW's Centre for Road Safety provides crash data for all roads across NSW for the period 2019 – 2023 inclusive. A review of this data indicates that there were 5 serious crashes (shown as green dots) in Bolong Road in the vicinity of the PM Site during this period, as shown in **Figure 6**.

Figure 6: 2019 – 2023 Crash Locations



Source: TfNSW

Importantly, speed and/or fatigue were identified as contributing factors in all but one of these serious crashes, and none of the crashes occurred at Shoalhaven Starches access driveways. As importantly, no crashes were reported to have involved heavy trucks.

Based on the crash data, there is no information to suggest that the geometry of Bolong Road or intersections along Bolong Road are unsafe, a point inherently agreed by the NHVR given that road safety is a key consideration when assessing RAV permits. Notwithstanding, TfNSW examined the speed limit in different sections of Bolong Road in mid-2024, and in September 2024 the speed limit in Bolong Road between Hanigans Lane and Princes Highway was reduced from 60km/h to 50km/h.

While the transition from the 100km/h speed zone to the 50km/h speed zone is approximately 400m west of the PM Site, this will still provide for some reduction in through vehicle speeds in Bolong Road at Watchman's Drive, though again there is no information to suggest that this section of Bolong Road is in any way unsafe.

3.8 Public & Active Transport

3.8.1 Public Transport

The central part of the SS Site is located approximately 800m east of Bomaderry Station, and from bus stops in Meroo 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 MOD 26.

3.8.2 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 CP and the SS Site and DF Site, but no active transport infrastructure is provided east of the DF Site. Notwithstanding, there would only be a small number of staff – and likely no construction staff – travelling to any of the SS Sites by walking or cycling.

3.9 Rail Operations

3.9.1 Existing Conditions

The SS 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.

3.9.2 Modification 25

As discussed, MOD 25 allows for an extension of the on-site rail line to accommodate longer trains within the SS Site (and within the DF 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 MOD 25 TIA details a road safety audit that was undertaken to examine the potential for additional queuing at the Bolong Road Rail Crossing. In this regard, MOD 25 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 SS 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; these additional queue lengths are illustrated in Figure 4.1 and Figure 4.2 of the MOD 25 TIA respectively, and are reproduced below.

Figure 7: MOD 25 Bolong Road Rail Crossing Westbound Queue Increase



Source: MOD 25 TIA

Figure 8: MOD 25 Bolong Road Rail Crossing Eastbound Queue Increase



Source: MOD 25 TIA

Further to the assessment of the potential impact of these additional queues, MOD 25 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, it can only be concluded that DPHI also agreed with these conclusions.

4 Modification 26: Operations

4.1 Modification 26

As stated in the **Introduction**, MOD 26 will provide for the following:

- Additional grain silos at the DF Site and the construction of 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.
- Alterations and additions to the existing WWTP at the Farm.
- Construction of nineteen (19) finished product silos at the SS Site in addition to those approved to be constructed at the PP Site.
- Construction of a new rail maintenance building to be constructed at the eastern terminus of the approved MOD 25 rail line extension to the east of the PM Site, and provisions for rail fuel storage adjacent to the existing rail line within the PM Site.
- Construction of an Ethanol Maintenance building within the south-eastern part of the SS Site.
- Construction of a Nitric Acid storage facility adjacent to the existing cooling towers to the west of Abernethys Creek.

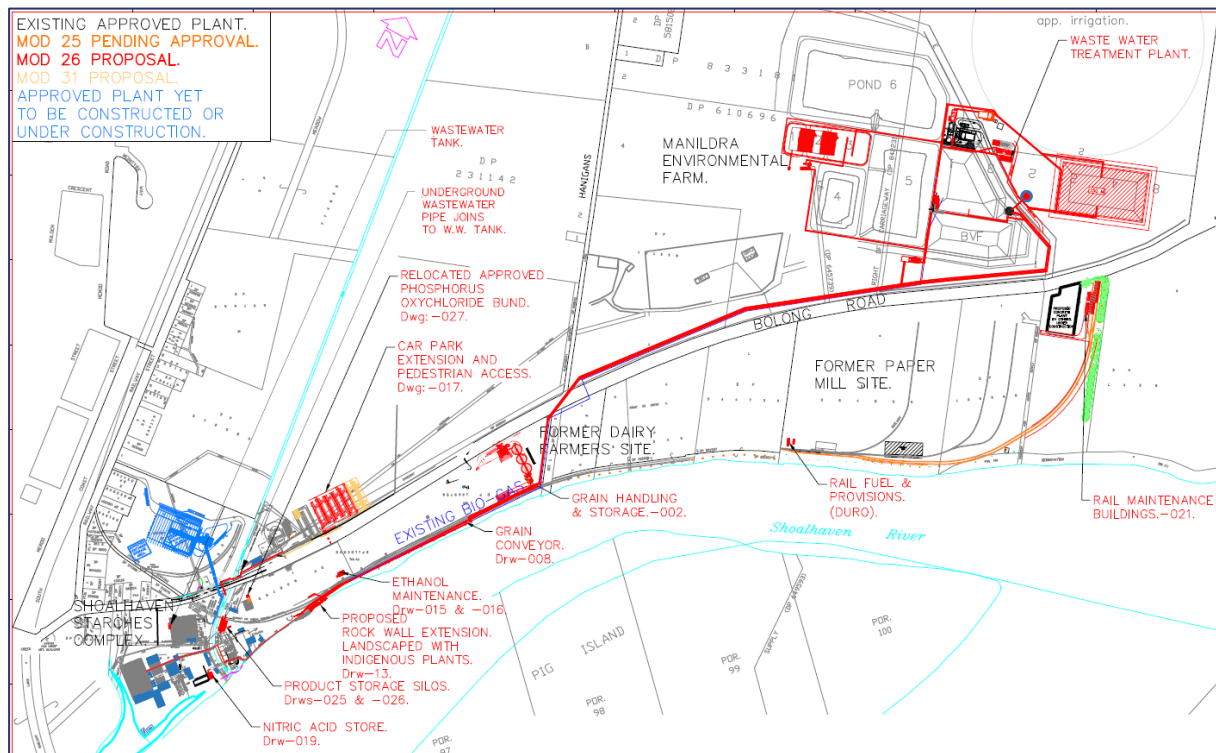
As discussed, the MOD 26 infrastructure at the DF Site will require the relocation of the staff parking at the DF Site to the Northern CP, which in turn will result in a redistribution of trips from the DF Site to the Northern CP.

More broadly, it is again noted that once the MOD 26 infrastructure becomes operational no additional trips will be generated to the local road network; as such, from a traffic analysis perspective the key issue for assessment is the operation of the local road network during the construction of the MOD 26 infrastructure; this is examined in detail in **Section 5**.

Full details of each of the components of MOD 26 are provided within the broader Modification submission that this TA accompanies.

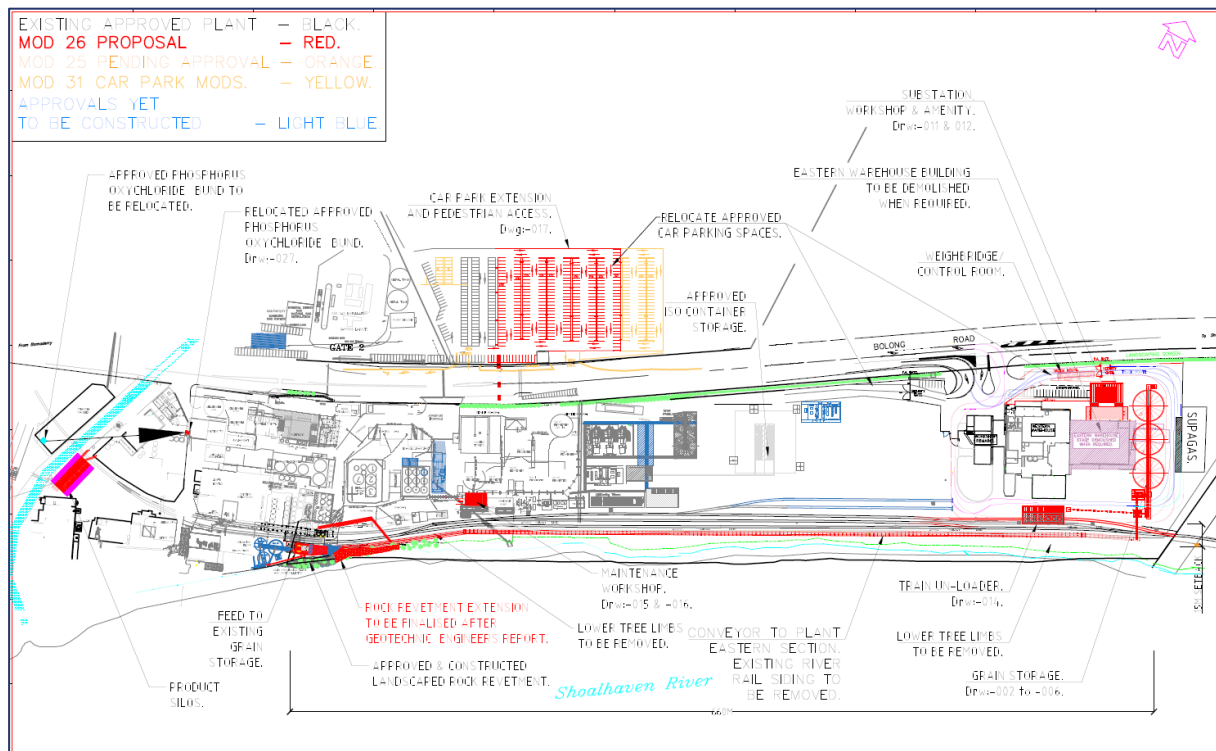
An overview of the location of the new MOD 26 infrastructure across the key Shoalhaven Starches sites is provided in **Figure 9**, and the figures following provide plans of the individual work sites.

Figure 9: MOD 26 Overview



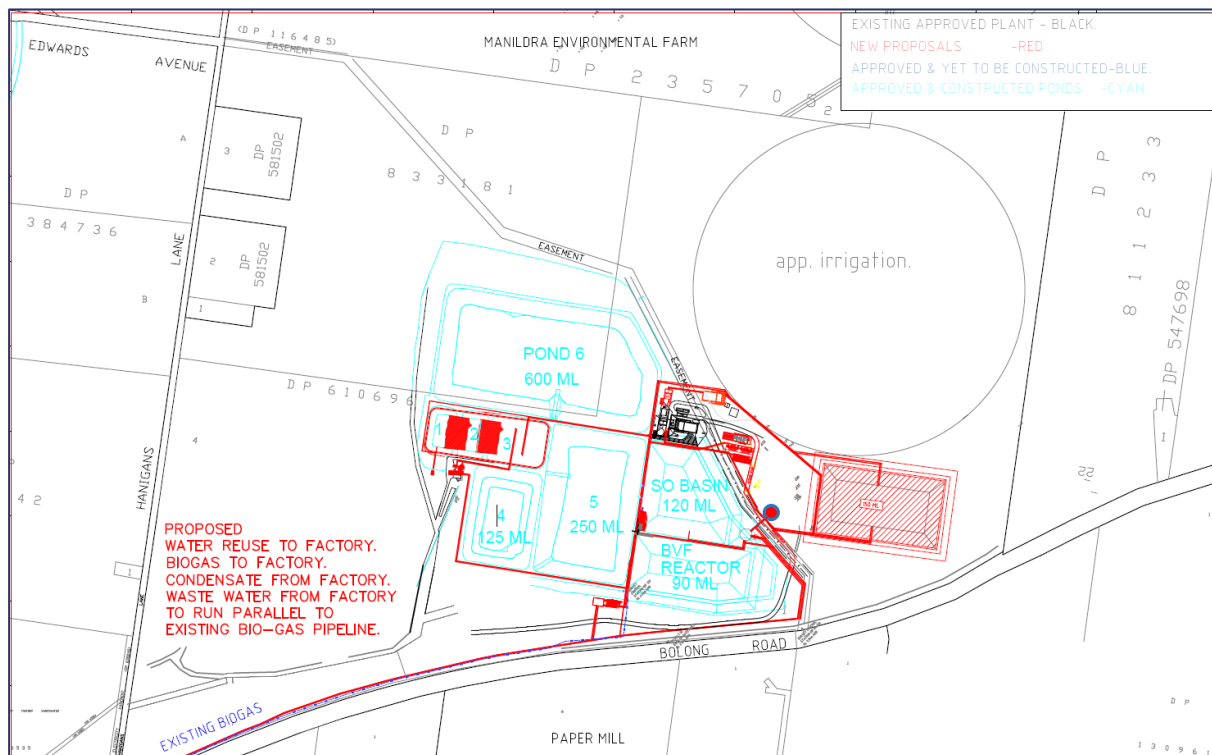
Source: Manildra

Figure 10: MOD 26 SS Site, DF Site and Northern CP Works



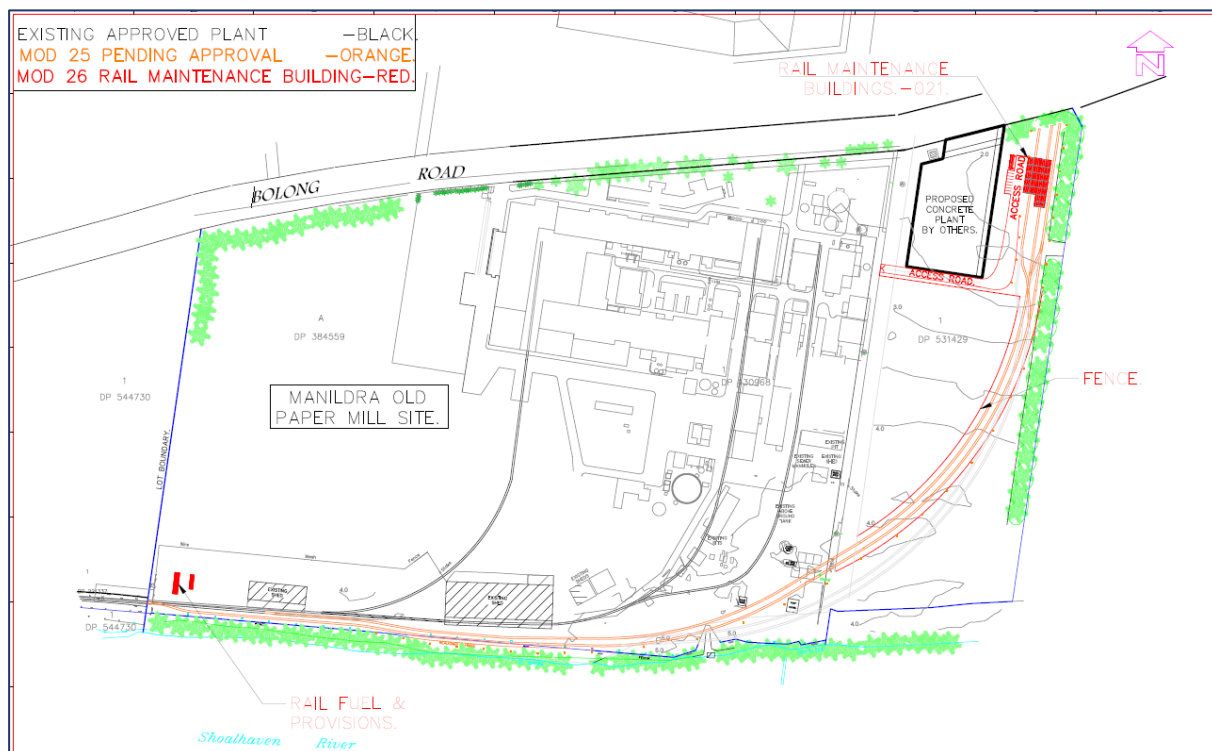
Source: Manildra

Figure 11: MOD 26 Environmental Farm Works



Source: Manildra

Figure 12: MOD 26 Paper Mill Site Works



Source: Manildra

4.2 Access

4.2.1 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; MOD 26 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.

4.2.2 Internal Access

Internal access roads within the PM Site and DF Site will be revised in some instances to provide access to the new MOD 26 infrastructure, and indeed to provide for the new infrastructure itself. 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 by Manildra, and is provided in the broader Modification plans submitted to DPHI.

4.3 Traffic

As discussed previously, once the MOD 26 infrastructure is operational it will not generate any additional trips, and as such would have no impact on the operation of the local road network.

4.4 Parking

MOD 26 provides for the removal of some parking spaces from the DF Site, to be relocated to the Northern CP; 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 5**.

Table 5: 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

With reference to the discussion of parking demand in [Section 2.4](#), 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 there would be additional spare capacity provided in the Shoalhaven Starches car parks, and particularly in the Northern CP; 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 MOD 26.

4.5 MOD 26 Operational Summary

With reference to sections above, once operational the MOD 26 infrastructure will not generate any additional trips to the broader local road network. A small number of staff trips will be redistributed between the DF Site and Northern CP (examined in more detail in [Section 5.4](#)) but this will have no impact on the operation of the Bolong Road intersections with Gate 1 and with Gate 2, the only intersections where volumes would change.

In summary, [arc traffic + transport](#) can support the operation of the MOD 26 infrastructure further to access, traffic and parking considerations.

5 Modification 26 Construction

5.1 Construction Overview

The construction of the MOD 26 infrastructure 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.

5.2 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 (see also **Section 6.2**).

5.3 Access

Access to the construction areas within the DF Site will be via the Bolong Road & Gate 1 intersection, while access to the new rail maintenance building in the PM 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 SS Site.

As discussed in **Section 4.2**, new and revised internal roads will then provide access to all key parts of both sites.

5.4 Construction Traffic

5.4.1 Construction Staff Trips

With reference to **Section 5.1**, the construction of the MOD 26 infrastructure is anticipated to occur over approximately 12 months, with a maximum of 40 construction staff on-site at any one time.

As discussed in **Section 2.4**, 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 DF Site to the Northern CP 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 MOD 26 infrastructure becomes operational.

5.4.2 Construction Truck Trips

With regard to truck trip generation, a total of 100 truck trips would be generated over the entire 12 month construction period, with the maximum number of truck 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 as discussed are approved along Bolong Road.

At the PM Site, it is anticipated that the maximum size vehicle accessing the PM Site for the rail maintenance building works would be a MRV, though it is again noted that access to the PM Site is approved for much larger B-Doubles.

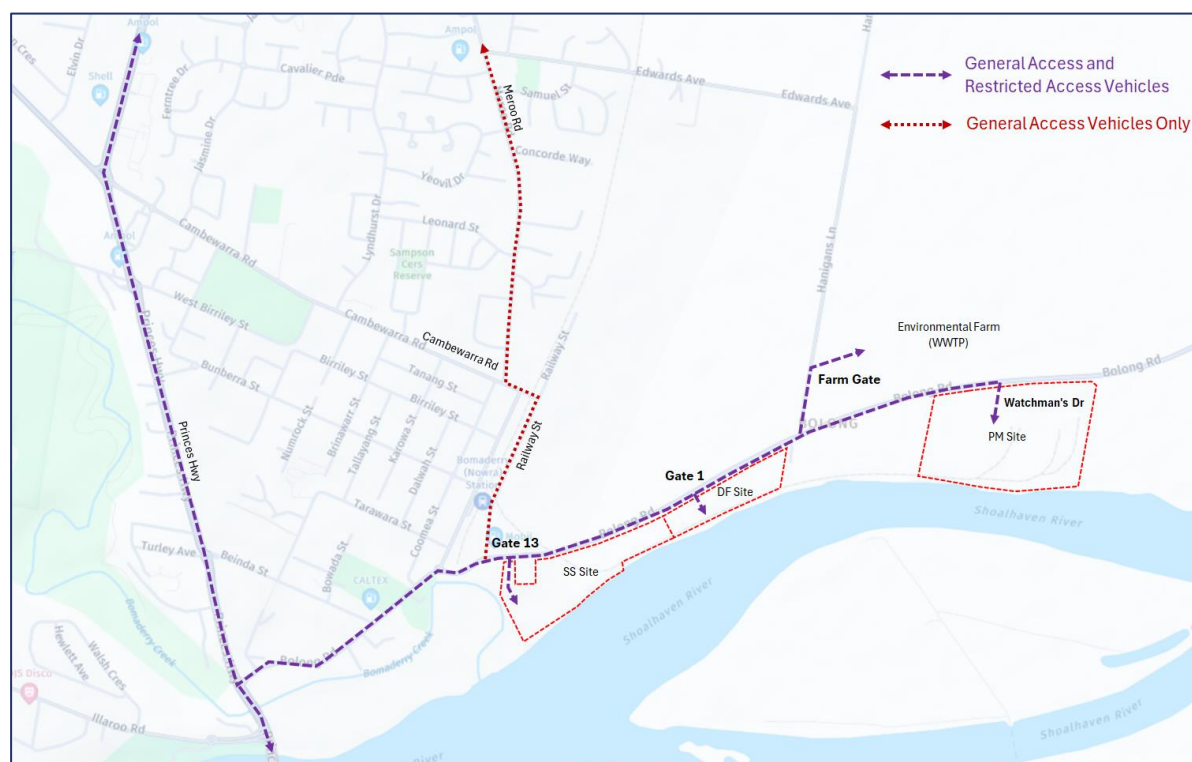
At this time, there is no anticipation of the need for Over Size/Over Mass (**OSOM**) vehicles during the construction period. However, should OSOM vehicles be required, the Principal Contractor for the MOD 26 works would necessarily obtain all relevant approvals prior to any OSOM vehicles travelling to/from any of the Shoalhaven Starches sites (see also **Section 6.3.4**).

5.4.3 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 13** nonetheless shows the designated construction truck routes.

Figure 13: Construction Vehicle Movement Plan



Construction staff trips are also anticipated 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 CP of DF Site, while all construction staff working on the new WWTP infrastructure will park within the Farm; a smaller number of construction trips will also be generated to the PM Site and SS Site.

5.4.4 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 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 DF Site to Northern CP, 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 MOD 26 construction under this worst case scenario are shown in **Figure 14**, noting that in some instances the redistribution of staff trips between the DF Site and Northern CP 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 15**.

Figure 14: MOD 26 Construction Peak Hour Trips

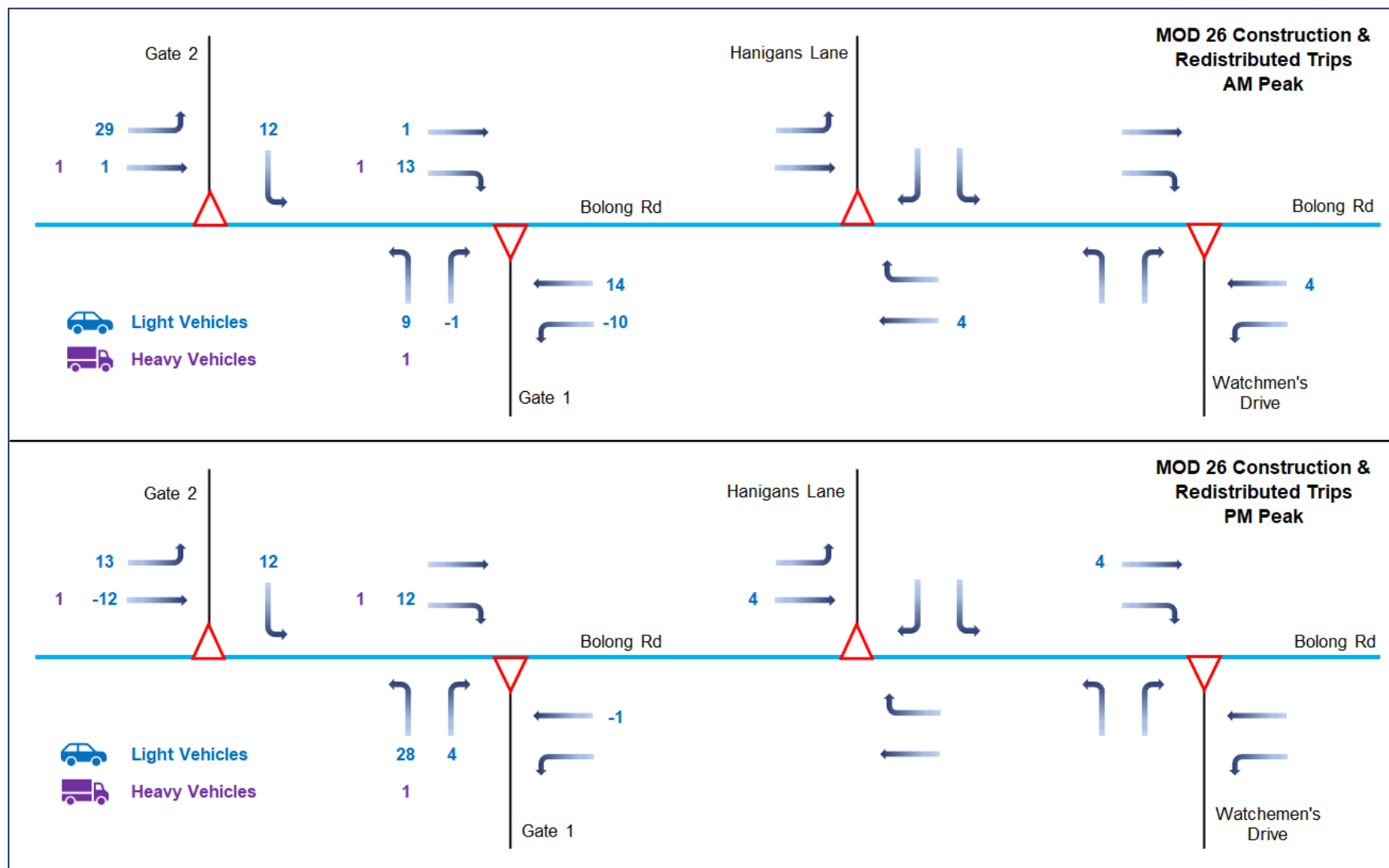
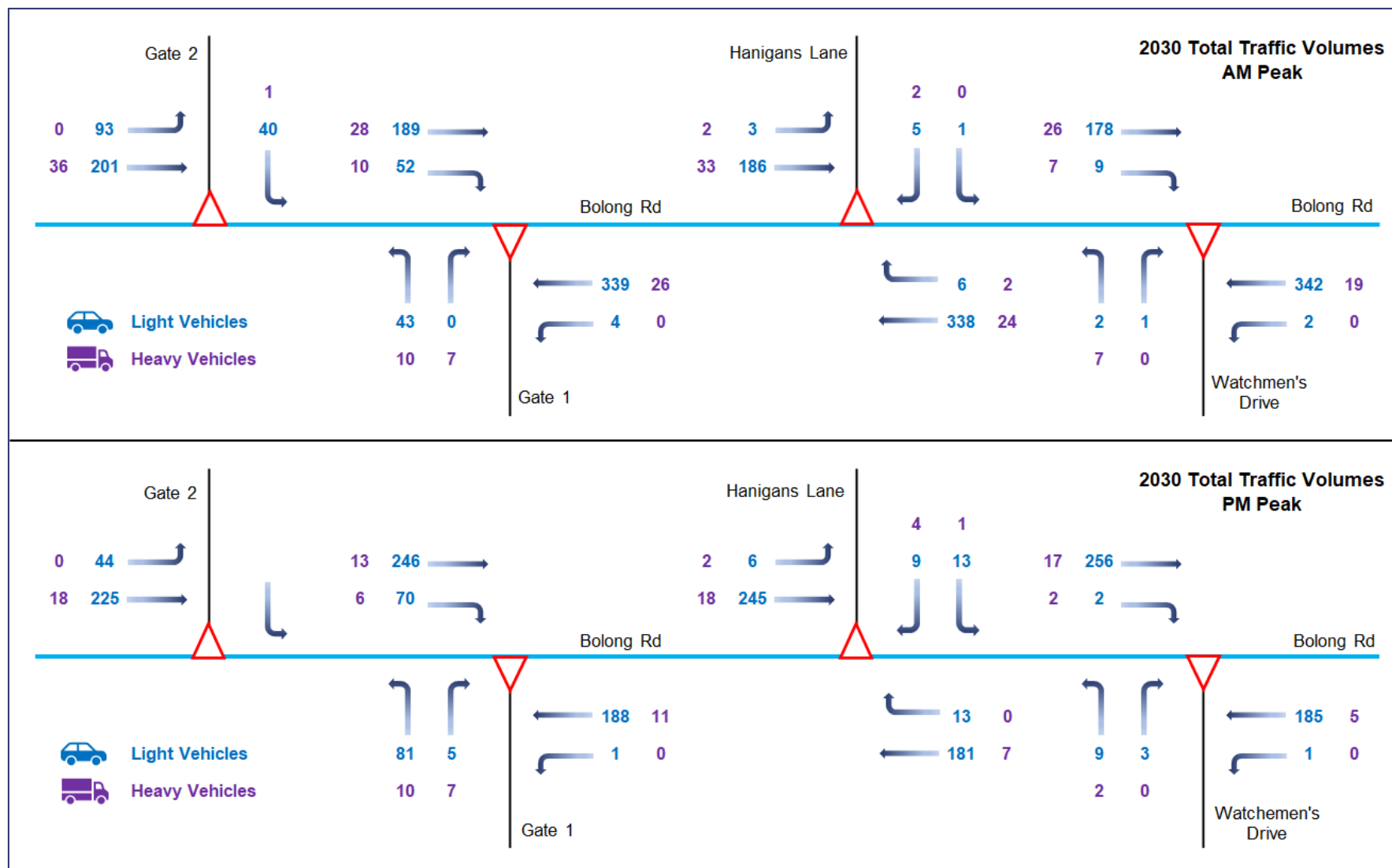


Figure 15: Base 2030 + MOD 26 Construction Total Peak Hour Volumes



5.5 Construction Traffic Impacts

The operation of the key intersections has again been assessed using SIDRA; the results of the analysis are summarised in **Table 6**, and SIDRA Movement Summary reports are provided in **Appendix C**.

Table 6: Base 2030 + MOD 26 Intersection Operations

Base 2030 + MOD 26 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

With reference to **Table 6**, the additional construction trips and redistribution of staff trips arising from MOD 26 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.

5.6 Construction Staff Parking

As discussed, the majority of parking for construction staff will be provided in the Northern CP, 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 WWTP will park within the Farm, and construction staff working on the rail maintenance building will park within the PM 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 working on the MOD 26 within the SS Site at different times during the construction works.

5.7 Construction Summary

With reference to sections above, the construction of the MOD 26 infrastructure 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.

Appropriate access paths to, through and from each of the Shoalhaven Starches sites accommodating the MOD 26 infrastructure 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.

In summary, **arc traffic + transport** can support the construction of the MOD 26 infrastructure further to access, traffic and parking considerations.

6 Draft Construction Traffic Management

6.1 Overview

Sections below provide details of a Construction Traffic Management Plan (**CTMP**), which would be implemented throughout the construction of the MOD 26 infrastructure. The CTMP has been prepared in draft form at this time (**Draft CTMP**) with reference to the Scoping Checklist in Appendix E of the TfNSW Guide, as well as our recent correspondence with Council in regard to the MOD 28 and MOD 30 construction works.

It is noted that the Draft CTMP may be revised further to consideration of any future Conditions of Consent associated with a future Modification approval relating to the construction period, and finalised prior to any construction works commencing.

6.2 On-Site Management

6.2.1 Construction Hours

As discussed in **Section 5.2**, reference to past Conditions of Consent for construction works at Shoalhaven Starches suggest that construction hours will be as follows:

- 7:00am to 6:00pm Monday to Friday;
- 8:00am to 1:00pm on Saturdays; and
- No construction works permitted on Sundays or public holidays.

Notwithstanding, the Conditions of Consent to a future approval of MOD 26 may also include provisions for slightly extended construction work hours noise levels do not significantly exceed the existing background noise levels. Similarly, construction activities outside of the standard work hours may be permitted under some circumstances, including:

- Where required by the Police or a public authority for the delivery of vehicles, plant or materials;
- In an emergency to avoid the loss of life, damage to property or to prevent environmental harm;
- Where the works are inaudible at the nearest sensitive receivers;
- For the delivery, set-up and removal of construction cranes, where notice of the crane-related works is provided to the Planning Secretary and affected residents at least seven days prior to the works; and/or
- Where a variation is approved in advance in writing by the Planning Secretary or their nominee if appropriate justification is provided for the works.

Finally, and while not anticipated at this time, where it is necessary for any significant construction works to occur outside of the conditioned work hours, an application for an Outside of Hours Work Permit (**OHW Permit**) will be submitted to Council, and adjacent residents will also be notified of the proposed works. Any out of hours works would only commence further to an approval of the OHW Permit.

6.2.2 Staff Parking

All construction staff parking will be provided off-street at all times. The primary location for construction staff parking will be the Northern CP, though a smaller number of construction staff may at times park in closer proximity to some of the MOD 26 work sites, for example adjacent to the rail maintenance building on the PM Site. Importantly, all Shoalhaven Starches sites accommodating the new MOD 26 infrastructure have more than enough areas to accommodate any temporary construction staff parking.

As discussed, no off-site (on-street) parking will be permitted, a restriction to be strongly enforced by the Principal Contractor.

6.2.3 Deliveries & Materials Handling

All deliveries and materials handling will occur within the individual Shoalhaven Starches sites; all trucks (and indeed all vehicles) will enter and depart Bolong Road in a forward direction at all times.

6.3 Off-Site Traffic and Pedestrian Management

6.3.1 Designated Truck Routes

The construction of the MOD 26 infrastructure is not anticipated to require the use of trucks larger than those already approved to access the Shoalhaven Starches sites, and in most instances trucks no larger than a 26m B-Double.

As discussed, approved RAV routes are provided in Bolong Road and Princes Highway, while GAVs (such as standard articulated vehicles) are also able to use the local route via Railway Street, Cambewarra Road and Meroo Road between Bolong Road and Princes Highway. These designated truck routes were previously shown in **Figure 13**.

6.3.2 Work Zones

A separate application to Council would be required in the event that any construction work activities require the occupancy of any part of Bolong Road or any other local road. This would require a Road Occupancy Licence (**ROL**) application and approval prior to commencing any such works, and the likely preparation of a Traffic Guidance Scheme (**TGS**) to ensure that those works can be carried out in a safe manner without impact traffic movements (see also **Section 6.3.3**).

6.3.3 Traffic Guidance Schemes

As discussed, any requirement for the occupancy of Bolong Road or other works with the potential to impact the use of Bolong Road (or other local roads or footpaths) would need to be detailed in a TGS, formerly referred to as a Traffic Control Plan.

Any TGS would necessarily be prepared by persons accredited to *Prepare a Work Zone Traffic Management Plan* in accordance with the TCW Manual and AS1742.3. Any TGS involving signage, traffic control or other impacts will require Council approval prior to the construction works to which they relate.

Where relevant, TGS would be updated to respond to any changes to prevailing traffic conditions throughout the course of the construction works, and documented in revisions to the CTMP.

6.3.4 Oversize/Overmass Vehicle Permits

As discussed in **Section 5.4.2**, while no vehicles larger than an approved RAV are anticipated to be required during the construction period, if there is a requirement for such vehicles then an application for an **OSOM Permit** will be prepared and submitted to the NHVR. OSOM Permits may be issued with conditional restrictions that limit the time and days that these vehicles are allowed to access the Site; or with other requirements such as the use of specific routes or escort vehicles.

As part of the OSOM Permit application, there may be a requirement to undertake additional assessments of the capability of the proposed access routes to accommodate OSOM vehicles; for example, this may require further assessment of:

- The load bearing capacity of bridges or culverts along the route;
- The width of carriageways and intersections, and the ability to accommodate the swept paths of larger OSOM vehicles; and/or
- Height clearance under bridges or other vertical obstructions.

Should OSOM vehicles be required, the Principal Contractor will be responsible for ensuring full compliance with the requirements of the OSOM Permit, including the preparation of the OSOM Permit application.

6.3.5 Public Access Management

Appropriate fencing and security gates are already provided at each of the Shoalhaven Starches sites so as to prevent any unauthorised vehicle or pedestrian access.

6.4 Principal Contractor Responsibilities

6.4.1 Site Induction

All construction staff will be properly inducted prior to commencing work on-site. The induction will detail the Principal Contractor's construction safety protocols, including:

- General Site safety;
- Site access, amenities and general procedures;
- Truck movements and on-site parking;
- Neighbour consultation and notification requirements; and
- Project Management's policies and procedures.

6.4.2 Truck Movements

The Principal Contractor will be required to take all steps necessary to ensure all trucks, and truck movements, are as safe as possible, and will not result in truck drivers operating under conditions that are unsafe. This will be achieved by undertaking the following:

- Ensuring all trucks are well maintained and that the equipment enhances driver, operator and passenger safety to as great an extent as practicable;
- Ensuring all truck drivers have a valid Verification of Competency for the class of vehicle they are driving;
- Identifying truck driver training needs and arranging appropriate training or re-training. This is anticipated to include truck driver competency assessments as part of all inductions, and regular Toolbox Talks on safety conditions, managing fatigue, approved truck routes and truck driver responsibilities; and
- Encouraging safe driving behaviour by not covering or re-imbursing staff speeding or other infringement notices; ensuring the legal use of mobile phones only while driving; and providing training on, and circulating information about, travel planning and efficient truck driving habits.

6.4.3 Road Maintenance

All trucks will be required to be appropriately covered when carrying materials to/from any of the on-site work areas during the construction period. Wash down areas will also be provided on-site to minimise to the extent possible the potential for trucks to track any dirt or debris onto Bolong Road.

In addition, a road sweeper is already used by Manildra to maintain all internal roads and sealed areas across Shoalhaven Starches, as well as to maintain clean conditions in Bolong Road at the numerous Shoalhaven Starches access points to Bolong Road, and in Bolong Road itself. This road sweeper will continue to be used to maintain clean conditions in Bolong Road adjacent to all of the construction access points so as to ensure Bolong Road is clear of dirt and debris at all times.

6.4.4 Communications Strategy

A Communications Strategy will be established by the Principal Contractor and included in the CTMP.

The Communications Strategy will outline the most effective communication methods to ensure adequate information is provided to relevant authorities and the local community (where required), and will assist the Principal Contractor to deliver any construction traffic changes with minimal disruption to the on and off-site vehicle and pedestrian environment.

As a minimum, the Communications Strategy will include:

- The erection of signs providing advanced notice of works and/or any traffic control measures to be implemented (on or off-site);

- Written notices to surrounding residents who would potentially be impacted by the construction works (prior to commencement of those works); and
- A contact person for the Principal Contractor to answer enquiries from local residents and other stakeholders.

6.4.5 CTMP Monitoring and Review

The development of a program to monitor the effectiveness of the CTMP will also be established by the Principal Contractor.

The CTMP will be subject to ongoing review to further enhance the safety and efficiency of the construction works; any and all reviews will be documented by the Principal Contractor, with considerations for review potentially including the following:

- Tracking deliveries and general construction vehicle movements against estimated volumes (as detailed in the TA);
- Identifying any shortfalls in the existing CTMP, and developing an updated action plan to address issues that may arise during construction (for example, parking or access issues);
- Ensuring that any TGS (where required) is updated by accredited persons to ensure they remain consistent with construction requirements and the intent of the CTMP; and/or
- Undertaking regular checks to ensure all loads are leaving the Site appropriately covered and without tracking materials onto the Bolong Road carriageway.

6.5 Driver Code of Conduct:

6.5.1 Driver Code of Conduct Objectives

Further to the above, a Driver Code of Conduct (**Driver COC**) will be prepared and provided to all construction vehicle drivers accessing the Site. The objectives of the Driver COC include:

- Minimising the impact of construction vehicle movements on the on-site work environment and local road network;
- Minimising conflict with other on and off-site road users;
- Minimising construction vehicle traffic noise; and
- Ensuring truck drivers use the designated vehicle routes (as detailed in **Section 6.3.1**) based on the size of vehicle they are driving.

The Driver COC will also require that, while driving any truck or other vehicle for construction related purposes, drivers must:

- Demonstrate safe driving and road safety activities;
- Abide by traffic and road legislation; and
- Follow Site signage and instructions at all times.

6.5.2 Breach of Driver Code of Conduct

The following activities by any construction vehicle driver would be considered as a breach of the Driver COC:

- Reckless or dangerous driving causing injury or death;
- Driving whilst disqualified or not correctly licensed;
- Drinking or being under the influence of drugs while driving;
- Failing to stop after an incident;
- Loss of demerit points leading to suspension of licence;
- Any actions that warrant the suspension of a licence; and/or
- Exceeding the speed limit in place on any permanent or temporary roads.

Any drivers found to be in breach of the Driver COC would be notified of the breach, as would their immediate managers, who would in turn be required to provide additional training/guidance to the driver. Any repeat offenders would be prevented from returning to Site.

6.5.3 Driver Responsibilities

All construction vehicle drivers must:

- Be responsible and accountable for their actions when operating a truck or company vehicle;
- Ensure they have a current driver licence for the class of vehicle they are driving, and this licence is to be carried with them at all times;
- Immediately notify their manager if their drivers licence has been suspended, cancelled, or has had limitations applied;
- Comply with all traffic and road legislation when driving;
- Regularly check the operating condition of trucks or company vehicles;
- Not drive along routes other than the designated truck routes in accordance with the size of vehicle they are driving.
- Never drive under the influence of alcohol or drugs;
- Wear a safety seat belt at all times when in the vehicle;
- Report any near-misses, crashes or scrapes to their manager, including those that do not result in injury;
- Report infringements to a manager at the earliest opportunity;
- Report vehicle defects to a manager prior to the next use of the vehicle; and
- Keep loads covered at all times (where relevant).

6.5.4 Crash or incident Procedure

In the event of a crash or other traffic incident, the construction vehicle driver is required to:

- Stop the vehicle as close to it as possible to the scene, making sure this not hindering traffic;
- Ensure one's own safety first, then help any injured people and seek assistance immediately if required;
- Ensure that key information is exchanged with the other driver, including the registration, names and insurance details of other vehicles/drivers;
- Ensure that the police are contacted should there be a disagreement over the cause of the crash, if there are injuries or if property is damaged; and
- As soon as reasonably practical, report all details gathered to Manildra and the Principal Contractor.

7 Conclusions

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.

Appendix A: National Heavy Vehicle Regulator A-Double Permit



Permit number

978442V2

Performance Based Standards (PBS) Authorisation Permit

Heavy Vehicle National Law

This Permit is issued under the provisions of *Section 143 of the Heavy Vehicle National Law* for the operation of a Class 2 vehicle (as defined in this Permit) subject to the conditions set out in this Permit and any attachments.

Permit details

This Permit is issued to

MANILDRA FLOUR MILLS PTY. LTD.

Address

6 FRANK ST
GLADESVILLE, NSW 2111

Type

Performance Based Standards (PBS)

Vehicle configuration and description

PBS vehicle
A-Double (3-2-3)

Permit period

Start date

21-Mar-2024

End date

07-Mar-2027

Authorised Routes

Turn by turn description

978442r1v1 - Single Route

1) Approved to operate at HML 85.5t

Start: 160 Bolong Road, Bomaderry NSW 2541

Bolong Road, Bomaderry

Destination: PBS Level 2B HML Tier 3 Network, Princes Highway, Bomaderry NSW 2541

Return unladen via:

Bolong Road, Bomaderry

Destination: Bolong Road, Bomaderry NSW 2541 (Approx. 1.02km East of Railway Street)

Bolong Road, Bomaderry

End: 160 Bolong Road, Bomaderry NSW 2541

2) Approved to operate at HML 85.5t

Start: PBS Level 2B HML Tier 3 Network, Old Port Road, Port Kembla NSW 2505

Foreshore Road, Port Kembla

End: Port Access, Foreshore Road, Port Kembla NSW 2505

Return unladen via reversal of route

978442r3v1 - Single Route

Shoalhaven City Council -

1) Approved to operate at CML 81.5t

Start: Manildra Group, Bolong Road, Bomaderry NSW 2541

Bolong Road, Bomaderry

End: PBS Level 2B GML and CML Tier 3 Network, Princes Highway, Bomaderry NSW 2541

Return via reversal of route

Port Botany -

2) Approved to operate at CML 81.5t

Start: PBS Level 2B GML and CML Tier 3 Network, Bumborah Point Road, Port Botany NSW 2019

Simblist Road, Port Botany

Friendship Road, Port Botany

Destination: Quantem, Friendship Road, Port Botany NSW 2019

Friendship Road, Port Botany

End: PBS Level 2B GML and CML Tier 3 Network, Bumborah Point Road, Port Botany NSW 2019

Sydney Airport -

3) Approved to operate at CML 81.5t

Start: PBS Level 2B GML and CML Tier 3 Network, Joyce Drive, Mascot NSW 2020

Qantas Drive, Mascot

End: PBS Level 2B GML and CML Tier 3 Network, Robey Street, Mascot NSW 202

No return trip permitted

Appendix B: Traffic Surveys

Source: TIS Surveys

Location	-	Duration	7:00 - 9:00
	Bolong Road		16:00 - 18:00
	Dairy Farmers (DF Site) Driveway		
	Bolong Road	Day/Date	Tuesday, 7 November 2023
Suburb	BOMADERRY	Weather	-

All Vehicles Time Per Hour	NORTH										EAST												
	-										Bolong Road												
	L		I		R					L		I		R					TOTAL				
	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	TOTAL	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	TOTAL	LIGHT	HEAVY	TOTAL
7:00 - 8:00											10	0	10	204	25	229				239	404	76	480
7:15 - 8:15											9	0	9	246	25	271				280	458	73	531
7:30 - 8:30											11	0	11	278	21	299				310	496	71	567
7:45 - 8:45											14	0	14	283	20	303				317	520	63	583
8:00 - 9:00											13	2	15	263	17	280				295	524	57	581
Period End																							
16:00 - 17:00											0	0	0	164	6	170				170	466	23	489
16:15 - 17:15											0	0	0	138	5	143				143	427	22	449
16:30 - 17:30											1	0	1	113	6	119				120	385	28	413
16:45 - 17:45											1	0	1	108	9	117				118	365	30	395
17:00 - 18:00											3	1	4	109	10	119				123	365	34	399
Period End																							

All Vehicles Time Per Hour	SOUTH										WEST													
	Dairy Farmers (DF Site) Driveway											Bolong Road											TOTAL	TOTAL
	L		I		R						L		I		R					TOTAL	LIGHT	HEAVY	TOTAL	
	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	TOTAL	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	TOTAL		LIGHT	HEAVY	TOTAL			
7:00 - 8:00	28	7	35				6	0	6	41				131	34	165	25	10	35	200	404	76	480	
7:15 - 8:15	30	9	39				4	0	4	43				137	31	168	32	8	40	208	458	73	531	
7:30 - 8:30	29	10	39				5	0	5	44				141	31	172	32	9	41	213	496	71	567	
7:45 - 8:45	25	9	34				6	1	7	41				162	24	186	30	9	39	225	520	63	583	
8:00 - 9:00	35	10	45				6	2	8	53				170	18	188	37	8	45	233	524	57	581	
Period End																								
16:00 - 17:00	50	4	54				3	0	3	57				211	8	219	38	5	43	262	466	23	489	
16:15 - 17:15	45	6	51				5	0	5	56				203	5	208	36	6	42	250	427	22	449	
16:30 - 17:30	39	8	47				5	0	5	52				200	6	206	27	8	35	241	385	28	413	
16:45 - 17:45	37	6	43				5	0	5	48				187	7	194	27	8	35	229	365	30	395	
17:00 - 18:00	40	7	47				4	0	4	51				178	8	186	31	8	39	225	365	34	399	
Period End																								

Location	BOC and Car Park Driveway	Duration	7:00 - 9:00
	Bolong Road		16:00 - 18:00
	-		
	Bolong Road	Day/Date	Tuesday, 7 November 2023
Suburb	BOMADERRY	Weather	-

All Vehicles Time Per Hour	NORTH										EAST												
	BOC and Car Park Driveway										Bolong Road												
	L		I		R					L		I		R					TOTAL		TOTAL		
	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	TOTAL	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	TOTAL	LIGHT	HEAVY	TOTAL			
7:00 - 8:00	6	1	7							7			232	29	261			261	434	76	510		
7:15 - 8:15	7	1	8							8			279	31	310			310	486	71	557		
7:30 - 8:30	7	1	8							8			311	30	341			341	522	71	593		
7:45 - 8:45	15	1	16							16			317	28	345			345	542	62	604		
8:00 - 9:00	20	0	20							20			302	24	326			326	524	53	577		
Period End																							
16:00 - 17:00	40	0	40							40			219	14	233			233	486	29	515		
16:15 - 17:15	40	0	40							40			194	15	209			209	457	27	484		
16:30 - 17:30	33	0	33							33			163	12	175			175	421	26	447		
16:45 - 17:45	33	0	33							33			157	11	168			168	399	26	425		
17:00 - 18:00	39	0	39							39			161	11	172			172	402	27	429		
Period End																							

All Vehicles Time Per Hour	SOUTH										WEST										TOTAL		TOTAL
	-										Bolong Road												
	L			I			R			TOTAL	L			I			R			TOTAL	LIGHT	HEAVY	TOTAL
	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ		LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ				
7:00 - 8:00											49	1	50	147	45	192				242	434	76	510
7:15 - 8:15											41	1	42	159	38	197				239	486	71	557
7:30 - 8:30											38	1	39	166	39	205				244	522	71	593
7:45 - 8:45											35	0	35	175	33	208				243	542	62	604
8:00 - 9:00											16	1	17	186	28	214				231	524	53	577
Period End																							
16:00 - 17:00											16	0	16	211	15	226				242	486	29	515
16:15 - 17:15											18	1	19	205	11	216				235	457	27	484
16:30 - 17:30											24	1	25	201	13	214				239	421	26	447
16:45 - 17:45											21	1	22	188	14	202				224	399	26	425
17:00 - 18:00											21	2	23	181	14	195				218	402	27	429
Period End																							

Location - Duration 7:00 - 9:00
Bolong Road 16:00 - 18:00
Shoalhaven Starches Western Driveway
Bolong Road Day/Date Tuesday, 7 November 2023
Suburb BOMADERRY Weather -

All Vehicles Time Per Hour	NORTH									EAST													TOTAL			TOTAL
	-									Bolong Road																
	L			I			R			TOTAL	L			I			R			TOTAL	LIGHT		HEAVY			
LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	LIGHT		HEAVY	Σ	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	LIGHT		HEAVY					
7:00 - 8:00											17	7	24	192	32	224				248	416	95	511			
7:15 - 8:15											18	8	26	248	25	273				299	477	81	558			
7:30 - 8:30											17	9	26	282	20	302				328	517	78	595			
7:45 - 8:45											18	8	26	293	21	314				340	530	71	601			
8:00 - 9:00											18	6	24	283	19	302				326	512	68	580			
Period End																										
16:00 - 17:00											1	3	4	235	9	244				248	481	43	524			
16:15 - 17:15											3	5	8	199	7	206				214	440	36	476			
16:30 - 17:30											2	6	8	166	6	172				180	406	32	438			
16:45 - 17:45											2	5	7	161	8	169				176	373	33	406			
17:00 - 18:00											2	5	7	161	10	171				178	370	35	405			
Period End																										

All Vehicles Time Per Hour	SOUTH									WEST													TOTAL			TOTAL
	Shoalhaven Starches Western Driveway									Bolong Road																
	L			I			R			TOTAL	L			I			R			TOTAL	LIGHT		HEAVY			
LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	LIGHT		HEAVY	Σ	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	LIGHT		HEAVY					
7:00 - 8:00	3	4	7				18	8	26	33				169	36	205	17	8	25	230	416	95	511			
7:15 - 8:15	6	5	11				22	10	32	43				163	26	189	20	7	27	216	477	81	558			
7:30 - 8:30	7	4	11				17	11	28	39				173	25	198	21	9	30	228	517	78	595			
7:45 - 8:45	7	7	14				18	9	27	41				179	21	200	15	5	20	220	530	71	601			
8:00 - 9:00	10	7	17				20	6	26	43				171	22	193	10	8	18	211	512	68	580			
Period End																										
16:00 - 17:00	10	7	17				8	8	16	33				221	8	229	6	8	14	243	481	43	524			
16:15 - 17:15	9	6	15				7	6	13	28				218	5	223	4	7	11	234	440	36	476			
16:30 - 17:30	7	3	10				4	7	11	21				222	5	227	5	5	10	237	406	32	438			
16:45 - 17:45	6	3	9				2	7	9	18				198	7	205	4	3	7	212	373	33	406			
17:00 - 18:00	10	3	13				2	7	9	22				192	9	201	3	1	4	205	370	35	405			
Period End																										

Location -

Bolong Road

Dairy Farmers (DF Site) Driveway

Bolong Road

Suburb BOMADERRY

Duration 7:00 - 9:00

16:00 - 18:00

Day/Date Tuesday, 7 November 2023

Weather -

All Vehicles Time Per Hour	NORTH								EAST								TOTAL	
	-								Bolong Road								TOTAL	
	L		I		R		TOTAL		L		I		R		TOTAL		TOTAL	
	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ			LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ			LIGHT	HEAVY
7:00 - 8:00									10	0	10	204	25	229		239	404	76
7:15 - 8:15									9	0	9	246	25	271		280	458	73
7:30 - 8:30									11	0	11	278	21	299		310	496	71
7:45 - 8:45									14	0	14	283	20	303		317	520	63
8:00 - 9:00									13	2	15	263	17	280		295	524	57
Period End																		
16:00 - 17:00									0	0	0	164	6	170		170	466	23
16:15 - 17:15									0	0	0	138	5	143		143	427	22
16:30 - 17:30									1	0	1	113	6	119		120	385	28
16:45 - 17:45									1	0	1	108	9	117		118	365	30
17:00 - 18:00									3	1	4	109	10	119		123	365	34
Period End																		

All Vehicles Time Per Hour	SOUTH								WEST								TOTAL	
	Dairy Farmers (DF Site) Driveway								Bolong Road								TOTAL	
	L		I		R		TOTAL		L		I		R		TOTAL		TOTAL	
	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ			LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ			LIGHT	HEAVY
7:00 - 8:00	28	7	35				41					131	34	165	25	10	35	480
7:15 - 8:15	30	9	39				43					137	31	168	32	8	40	531
7:30 - 8:30	29	10	39				44					141	31	172	32	9	41	567
7:45 - 8:45	25	9	34				41					162	24	186	30	9	39	583
8:00 - 9:00	35	10	45				53					170	18	188	37	8	45	581
Period End																		
16:00 - 17:00	50	4	54				57					211	8	219	38	5	43	489
16:15 - 17:15	45	6	51				56					203	5	208	36	6	42	449
16:30 - 17:30	39	8	47				52					200	6	206	27	8	35	413
16:45 - 17:45	37	6	43				48					187	7	194	27	8	35	395
17:00 - 18:00	40	7	47				51					178	8	186	31	8	39	399
Period End																		

Location BOC and Car Park Driveway
Bolong Road
-
Bolong Road
Suburb BOMADERRY

Duration 7:00 - 9:00
16:00 - 18:00
Day/Date Tuesday, 7 November 2023
Weather -

All Vehicles Time Per Hour	NORTH BOC and Car Park Driveway										EAST Bolong Road										TOTAL		
	L			I			R				TOTAL	L			I			R					
	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	TOTAL		LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	TOTAL	LIGHT	HEAVY
7:00 - 8:00	6	1	7							7				232	29	261				261	434	76	510
7:15 - 8:15	7	1	8							8				279	31	310				310	486	71	557
7:30 - 8:30	7	1	8							8				311	30	341				341	522	71	593
7:45 - 8:45	15	1	16							16				317	28	345				345	542	62	604
8:00 - 9:00	20	0	20							20				302	24	326				326	524	53	577
Period End																							
16:00 - 17:00	40	0	40							40				219	14	233				233	486	29	515
16:15 - 17:15	40	0	40							40				194	15	209				209	457	27	484
16:30 - 17:30	33	0	33							33				163	12	175				175	421	26	447
16:45 - 17:45	33	0	33							33				157	11	168				168	399	26	425
17:00 - 18:00	39	0	39							39				161	11	172				172	402	27	429
Period End																							

All Vehicles Time Per Hour	SOUTH									WEST													
	-									Bolong Road													
	L			I			R			TOTAL	L			I			R			TOTAL	TOTAL		TOTAL
	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ		LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ		LIGHT	HEAVY	
7:00 - 8:00											49	1	50	147	45	192				242	434	76	510
7:15 - 8:15											41	1	42	159	38	197				239	486	71	557
7:30 - 8:30											38	1	39	166	39	205				244	522	71	593
7:45 - 8:45											35	0	35	175	33	208				243	542	62	604
8:00 - 9:00											16	1	17	186	28	214				231	524	53	577
Period End																							
16:00 - 17:00											16	0	16	211	15	226				242	486	29	515
16:15 - 17:15											18	1	19	205	11	216				235	457	27	484
16:30 - 17:30											24	1	25	201	13	214				239	421	26	447
16:45 - 17:45											21	1	22	188	14	202				224	399	26	425
17:00 - 18:00											21	2	23	181	14	195				218	402	27	429
Period End																							

Location Princes Highway
Bolong Road
Princes Highway
-
Suburb BOMADERRY

Duration 7:00 - 9:00
16:00 - 18:00
Day/Date Tuesday, 7 November 2023
Weather -

All Vehicles Time Per Hour	NORTH Princes Highway										EAST Bolong Road										TOTAL			TOTAL
	L			T			R			TOTAL	L			T			R			TOTAL				
	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ		TOTAL	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	LIGHT	HEAVY		Σ	TOTAL	LIGHT	HEAVY
7:00 - 8:00	2	3	5	1184	97	1281				1286	317	31	348				2	8	10	358	2679	260	2939	
7:15 - 8:15	2	4	6	1385	104	1489				1495	390	35	425				3	7	10	435	3136	273	3409	
7:30 - 8:30	3	6	9	1555	108	1663				1672	452	30	482				4	4	8	490	3431	272	3703	
7:45 - 8:45	3	3	6	1609	118	1727				1733	512	27	539				4	3	7	546	3642	280	3922	
8:00 - 9:00	2	4	6	1543	121	1664				1670	501	25	526				6	5	11	537	3643	309	3952	
Period End																								
16:00 - 17:00	6	3	9	1142	84	1226				1235	486	14	500				7	2	9	509	3543	171	3714	
16:15 - 17:15	8	3	11	1120	68	1188				1199	440	10	450				5	3	8	458	3471	155	3626	
16:30 - 17:30	7	4	11	1084	54	1138				1149	423	4	427				6	5	11	438	3392	134	3526	
16:45 - 17:45	5	3	8	1061	44	1105				1113	374	5	379				8	5	13	392	3318	115	3433	
17:00 - 18:00	4	5	9	1003	31	1034				1043	348	9	357				6	5	11	368	3106	97	3203	
Period End																								

All Vehicles Time Per Hour	SOUTH									WEST										TOTAL				
	Princes Highway									-														
	L			T			R			TOTAL	L			T			R			TOTAL	TOTAL		TOTAL	
	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ		LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ		LIGHT	HEAVY		
7:00 - 8:00				909	90	999	265	31	296	1295										2679	260	2939		
7:15 - 8:15				1060	93	1153	296	30	326	1479										3136	273	3409		
7:30 - 8:30				1115	85	1200	302	39	341	1541										3431	272	3703		
7:45 - 8:45				1191	95	1286	323	34	357	1643										3642	280	3922		
8:00 - 9:00				1258	118	1376	333	36	369	1745										3643	309	3952		
Period End																								
16:00 - 17:00				1565	52	1617	337	16	353	1970										3543	171	3714		
16:15 - 17:15				1576	59	1635	322	12	334	1969										3471	155	3626		
16:30 - 17:30				1545	59	1604	327	8	335	1939										3392	134	3526		
16:45 - 17:45				1547	50	1597	323	8	331	1928										3318	115	3433		
17:00 - 18:00				1455	42	1497	290	5	295	1792										3106	97	3203		
Period End																								

Appendix C: SIDRA Movement Summary Reports

Bolong Road & Watchman's Drive Base 2030 AM

MOVEMENT SUMMARY

 Site: [Bolong Road & Watchman's Drive Base 2030 AM (Site Folder: General)]

Site Category: Existing Design
Stop (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver Speed
		[Total veh/h	HV] veh/h	[Total veh/h	HV] %	v/c	sec		[Veh. veh	Dist] m				
South: Watchman's Drive														
1	L2	9	7	9	77.8	0.023	10.3	LOS A	0.1	0.9	0.50	1.00	0.50	25.6
3	R2	1	0	1	0.0	0.023	11.0	LOS A	0.1	0.9	0.50	1.00	0.50	29.7
Approach		10	7	11	70.0	0.023	10.4	LOS A	0.1	0.9	0.50	1.00	0.50	26.0
East: Bolong Road														
4	L2	2	0	2	0.0	0.001	7.9	LOS A	0.0	0.0	0.00	0.66	0.00	75.3
5	T1	344	19	362	5.5	0.192	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	99.9
Approach		346	19	364	5.5	0.192	0.1	NA	0.0	0.0	0.00	0.00	0.00	99.7
West: Bolong Road														
11	T1	204	26	215	12.7	0.119	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	99.9
12	R2	16	7	17	43.8	0.023	11.1	LOS A	0.1	0.8	0.46	0.70	0.46	31.2
Approach		220	33	232	15.0	0.119	0.8	NA	0.1	0.8	0.03	0.05	0.03	86.1
All Vehicles		576	59	606	10.2	0.192	0.5	NA	0.1	0.9	0.02	0.04	0.02	89.9

Bolong Road & Watchman's Drive Base 2030 PM

MOVEMENT SUMMARY

 Site: [Bolong Road & Watchman's Drive Base 2030 PM (Site Folder: General)]

Site Category: Existing Design
Stop (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES [Total veh/h]		DEMAND FLOWS [Total veh/h]		Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh]		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Watchman's Drive														
1	L2	11	2	12	18.2	0.020	5.6	LOS A	0.1	0.5	0.35	0.89	0.35	29.2
3	R2	3	0	3	0.0	0.020	9.0	LOS A	0.1	0.5	0.35	0.89	0.35	30.3
Approach		14	2	15	14.3	0.020	6.4	LOS A	0.1	0.5	0.35	0.89	0.35	29.4
East: Bolong Road														
4	L2	1	0	1	0.0	0.001	7.9	LOS A	0.0	0.0	0.00	0.66	0.00	75.3
5	T1	190	5	200	2.6	0.104	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	100.0
Approach		191	5	201	2.6	0.104	0.0	NA	0.0	0.0	0.00	0.00	0.00	99.8
West: Bolong Road														
11	T1	269	17	283	6.3	0.151	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	99.9
12	R2	4	2	4	50.0	0.005	10.0	LOS A	0.0	0.2	0.33	0.62	0.33	31.6
Approach		273	19	287	7.0	0.151	0.2	NA	0.0	0.2	0.00	0.01	0.00	96.9
All Vehicles		478	26	503	5.4	0.151	0.3	NA	0.1	0.5	0.01	0.03	0.01	91.7

Bolong Road & Hanigans Lane Base 2030 AM

MOVEMENT SUMMARY

▼ Site: [Bolong Road & Hanigans Lane Base 2030 AM (Site Folder: General)]

Site Category: Existing Design
Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES [Total veh/h] veh/h		DEMAND FLOWS [Total HV] %		Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh] Dist] m		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Bolong Road														
5	T1	345	24	363	7.0	0.202	0.0	LOS A	0.1	0.7	0.02	0.02	0.02	99.3
6	R2	8	2	8	25.0	0.202	9.4	LOS A	0.1	0.7	0.02	0.02	0.02	64.0
Approach		353	26	372	7.4	0.202	0.3	NA	0.1	0.7	0.02	0.02	0.02	98.0
North: Hanigans Lane														
7	L2	1	0	1	0.0	0.014	5.3	LOS A	0.0	0.4	0.48	0.66	0.48	53.9
9	R2	7	2	7	28.6	0.014	8.8	LOS A	0.0	0.4	0.48	0.66	0.48	48.3
Approach		8	2	8	25.0	0.014	8.3	LOS A	0.0	0.4	0.48	0.66	0.48	48.9
West: Bolong Road														
10	L2	5	2	5	40.0	0.133	8.9	LOS A	0.0	0.0	0.00	0.02	0.00	71.0
11	T1	219	33	231	15.1	0.133	0.0	LOS A	0.0	0.0	0.00	0.02	0.00	99.6
Approach		224	35	236	15.6	0.133	0.2	NA	0.0	0.0	0.00	0.02	0.00	98.7
All Vehicles		585	63	616	10.8	0.202	0.4	NA	0.1	0.7	0.02	0.02	0.02	97.0

Bolong Road & Hanigans Lane Base 2030 PM

MOVEMENT SUMMARY

▼ Site: [Bolong Road & Hanigans Lane Base 2030 PM (Site Folder: General)]

Site Category: Existing Design
Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES [Total veh/h HV] veh/h		DEMAND FLOWS [Total veh/h HV] %		Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh Dist] m		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Bolong Road														
5	T1	188	7	198	3.7	0.114	0.1	LOS A	0.1	0.8	0.06	0.04	0.06	97.8
6	R2	13	0	14	0.0	0.114	8.5	LOS A	0.1	0.8	0.06	0.04	0.06	64.2
Approach		201	7	212	3.5	0.114	0.6	NA	0.1	0.8	0.06	0.04	0.06	94.6
North: Hanigans Lane														
7	L2	13	4	14	30.8	0.024	6.0	LOS A	0.1	0.7	0.39	0.59	0.39	49.5
9	R2	7	2	7	28.6	0.024	7.6	LOS A	0.1	0.7	0.39	0.59	0.39	49.4
Approach		20	6	21	30.0	0.024	6.6	LOS A	0.1	0.7	0.39	0.59	0.39	49.5
West: Bolong Road														
10	L2	8	2	8	25.0	0.151	8.5	LOS A	0.0	0.0	0.00	0.02	0.00	76.5
11	T1	259	18	273	6.9	0.151	0.0	LOS A	0.0	0.0	0.00	0.02	0.00	99.4
Approach		267	20	281	7.5	0.151	0.3	NA	0.0	0.0	0.00	0.02	0.00	98.5
All Vehicles		488	33	514	6.8	0.151	0.7	NA	0.1	0.8	0.04	0.05	0.04	93.1

Bolong Road & Gate 1 Base 2030 AM

MOVEMENT SUMMARY

▽ Site: 1 [Bolong Road & Gate 1 Base 2030 AM (Site Folder: General)]

Site Category: Existing Design
Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES [Total veh/h]		DEMAND FLOWS [Total veh/h]		Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh]		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Gate 1														
1	L2	43	9	45	20.9	0.028	2.0	LOS A	0.0	0.0	0.00	0.32	0.00	29.9
3	R2	8	7	8	87.5	0.044	17.2	LOS B	0.1	1.8	0.76	0.77	0.76	24.5
Approach		51	16	54	31.4	0.044	4.4	LOS A	0.1	1.8	0.12	0.39	0.12	28.9
East: Bolong Road														
4	L2	1	0	1	0.0	0.001	4.6	LOS A	0.0	0.0	0.00	0.53	0.00	46.6
5	T1	351	26	369	7.4	0.199	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	49.9
Approach		352	26	371	7.4	0.199	0.1	NA	0.0	0.0	0.00	0.00	0.00	49.9
West: Bolong Road														
11	T1	216	28	227	13.0	0.127	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	49.9
12	R2	48	9	51	18.8	0.060	6.9	LOS A	0.2	1.9	0.46	0.63	0.46	27.3
Approach		264	37	278	14.0	0.127	1.3	NA	0.2	1.9	0.08	0.12	0.08	43.4
All Vehicles		667	79	702	11.8	0.199	0.9	NA	0.2	1.9	0.04	0.08	0.04	44.8

Bolong Road & Gate 1 Base 2030 PM

MOVEMENT SUMMARY

▽ Site: 1 [Bolong Road & Gate 1 Base 2030 PM (Site Folder: General)]

Site Category: Existing Design
Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES [Total veh/h]		DEMAND FLOWS [Total veh/h]		Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh]		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Gate 1														
1	L2	62	9	65	14.5	0.039	2.0	LOS A	0.0	0.0	0.00	0.32	0.00	29.9
3	R2	8	7	8	87.5	0.033	11.9	LOS A	0.1	1.4	0.67	0.65	0.67	25.4
Approach		70	16	74	22.9	0.039	3.1	LOS A	0.1	1.4	0.08	0.36	0.08	29.3
East: Bolong Road														
4	L2	1	0	1	0.0	0.001	4.6	LOS A	0.0	0.0	0.00	0.53	0.00	46.6
5	T1	200	11	211	5.5	0.112	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	50.0
Approach		201	11	212	5.5	0.112	0.1	NA	0.0	0.0	0.00	0.00	0.00	49.9
West: Bolong Road														
11	T1	259	13	273	5.0	0.145	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	49.9
12	R2	63	5	66	7.9	0.060	5.6	LOS A	0.2	1.8	0.33	0.55	0.33	27.5
Approach		322	18	339	5.6	0.145	1.1	NA	0.2	1.8	0.06	0.11	0.06	43.0
All Vehicles		593	45	624	7.6	0.145	1.0	NA	0.2	1.8	0.04	0.10	0.04	42.7

Bolong Road & Gate 2 Base 2030 AM

MOVEMENT SUMMARY

▼ Site: [Bolong Road & Gate 2 Base 2030 AM (Site Folder: General)]

Site Category: Existing Design
Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES [Total veh/h HV] veh/h		DEMAND FLOWS [Total veh/h HV] %		Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. Dist] veh m		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
North: Gate 2														
7	L2	29	1	31	3.4	0.024	2.8	LOS A	0.1	0.7	0.33	0.40	0.33	37.7
Approach		29	1	31	3.4	0.024	2.8	LOS A	0.1	0.7	0.33	0.40	0.33	37.7
West: Bolong Road														
10	L2	64	0	67	0.0	0.036	5.5	LOS A	0.0	0.0	0.00	0.58	0.00	53.6
11	T1	234	34	246	14.5	0.138	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		298	34	314	11.4	0.138	1.2	NA	0.0	0.0	0.00	0.12	0.00	58.4
All Vehicles		327	35	344	10.7	0.138	1.4	NA	0.1	0.7	0.03	0.15	0.03	55.7

Bolong Road & Gate 2 Base 2030 PM

MOVEMENT SUMMARY

▼ Site: [Bolong Road & Gate 2 Base 2030 PM (Site Folder: General)]

Site Category: Existing Design
Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES [Total veh/h HV] veh/h		DEMAND FLOWS [Total veh/h HV] %		Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. Dist] veh m		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
North: Gate 2														
7	L2	77	0	81	0.0	0.063	2.9	LOS A	0.3	1.8	0.35	0.43	0.35	37.7
Approach		77	0	81	0.0	0.063	2.9	LOS A	0.3	1.8	0.35	0.43	0.35	37.7
West: Bolong Road														
10	L2	31	0	33	0.0	0.018	5.5	LOS A	0.0	0.0	0.00	0.58	0.00	53.6
11	T1	254	17	267	6.7	0.143	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		285	17	300	6.0	0.143	0.6	NA	0.0	0.0	0.00	0.06	0.00	59.2
All Vehicles		362	17	381	4.7	0.143	1.1	NA	0.3	1.8	0.07	0.14	0.07	52.8

Bolong Road & Watchman's Drive Base 2030 + MOD 26 AM

MOVEMENT SUMMARY

 Site: [Bolong Road & Watchman's Drive Base 2030 AM + MOD 26 (Site Folder: General)]

Site Category: Existing Design
Stop (Two-Way)

Vehicle Movement Performance																
Mov ID	Turn	INPUT VOLUMES [Total veh/h		HV] veh/h	DEMAND FLOWS [Total veh/h		HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	QUEUE Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Watchman's Drive																
1	L2	9	7	9	77.8	0.024	10.6	LOS A	0.1	0.9	0.52	1.00	0.52	25.6		
3	R2	1	0	1	0.0	0.024	11.4	LOS A	0.1	0.9	0.52	1.00	0.52	29.6		
Approach		10	7	11	70.0	0.024	10.7	LOS A	0.1	0.9	0.52	1.00	0.52	25.9		
East: Bolong Road																
4	L2	2	0	2	0.0	0.001	7.9	LOS A	0.0	0.0	0.00	0.66	0.00	75.3		
5	T1	361	19	380	5.3	0.202	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	99.9		
Approach		363	19	382	5.2	0.202	0.1	NA	0.0	0.0	0.00	0.00	0.00	99.7		
West: Bolong Road																
11	T1	204	26	215	12.7	0.119	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	99.9		
12	R2	16	7	17	43.8	0.024	11.3	LOS A	0.1	0.8	0.48	0.71	0.48	31.2		
Approach		220	33	232	15.0	0.119	0.8	NA	0.1	0.8	0.03	0.05	0.03	86.1		
All Vehicles		593	59	624	9.9	0.202	0.5	NA	0.1	0.9	0.02	0.04	0.02	90.1		

Bolong Road & Watchman's Drive Base 2030 + MOD 26 PM

MOVEMENT SUMMARY

 Site: [Bolong Road & Watchman's Drive Base 2030 PM + MOD 26 (Site Folder: General)]

Site Category: Existing Design
Stop (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV] veh/h	[Total veh/h	HV] %	v/c	sec		[Veh. veh	Dist] m				km/h
South: Watchman's Drive														
1	L2	11	2	12	18.2	0.020	5.6	LOS A	0.1	0.5	0.35	0.89	0.35	29.2
3	R2	3	0	3	0.0	0.020	9.1	LOS A	0.1	0.5	0.35	0.89	0.35	30.3
Approach		14	2	15	14.3	0.020	6.4	LOS A	0.1	0.5	0.35	0.89	0.35	29.4
East: Bolong Road														
4	L2	1	0	1	0.0	0.001	7.9	LOS A	0.0	0.0	0.00	0.66	0.00	75.3
5	T1	190	5	200	2.6	0.104	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	100.0
Approach		191	5	201	2.6	0.104	0.0	NA	0.0	0.0	0.00	0.00	0.00	99.8
West: Bolong Road														
11	T1	273	17	287	6.2	0.153	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	99.9
12	R2	4	2	4	50.0	0.005	10.0	LOS A	0.0	0.2	0.33	0.62	0.33	31.6
Approach		277	19	292	6.9	0.153	0.2	NA	0.0	0.2	0.00	0.01	0.00	96.9
All Vehicles		482	26	507	5.4	0.153	0.3	NA	0.1	0.5	0.01	0.03	0.01	91.8

Bolong Road & Hanigans Lane Base 2030 + MOD 26 AM

MOVEMENT SUMMARY

Site: [Bolong Road & Hanigans Lane Base 2030 AM + MOD 26 (Site Folder: General)]

Site Category: Existing Design
Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES [Total veh/h]		DEMAND FLOWS [Total veh/h]		Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh]		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Bolong Road														
5	T1	362	24	381	6.6	0.212	0.0	LOS A	0.1	0.7	0.02	0.01	0.02	99.3
6	R2	8	2	8	25.0	0.212	9.4	LOS A	0.1	0.7	0.02	0.01	0.02	64.0
Approach		370	26	389	7.0	0.212	0.2	NA	0.1	0.7	0.02	0.01	0.02	98.1
North: Hanigans Lane														
7	L2	1	0	1	0.0	0.015	5.3	LOS A	0.0	0.4	0.48	0.66	0.48	53.7
9	R2	7	2	7	28.6	0.015	9.0	LOS A	0.0	0.4	0.48	0.66	0.48	48.2
Approach		8	2	8	25.0	0.015	8.5	LOS A	0.0	0.4	0.48	0.66	0.48	48.8
West: Bolong Road														
10	L2	5	2	5	40.0	0.133	8.9	LOS A	0.0	0.0	0.00	0.02	0.00	71.0
11	T1	219	33	231	15.1	0.133	0.0	LOS A	0.0	0.0	0.00	0.02	0.00	99.6
Approach		224	35	236	15.6	0.133	0.2	NA	0.0	0.0	0.00	0.02	0.00	98.7
All Vehicles		602	63	634	10.5	0.212	0.3	NA	0.1	0.7	0.02	0.02	0.02	97.0

Bolong Road & Hanigans Lane Base 2030 + MOD 26 PM

MOVEMENT SUMMARY

Site: [Bolong Road & Hanigans Lane Base 2030 PM + MOD 26 (Site Folder: General)]

Site Category: Existing Design
Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES [Total veh/h]		DEMAND FLOWS [Total veh/h]		Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh]		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Bolong Road														
5	T1	188	7	198	3.7	0.114	0.1	LOS A	0.1	0.8	0.06	0.04	0.06	97.8
6	R2	13	0	14	0.0	0.114	8.5	LOS A	0.1	0.8	0.06	0.04	0.06	64.2
Approach		201	7	212	3.5	0.114	0.6	NA	0.1	0.8	0.06	0.04	0.06	94.6
North: Hanigans Lane														
7	L2	13	4	14	30.8	0.024	6.1	LOS A	0.1	0.8	0.39	0.59	0.39	49.5
9	R2	7	2	7	28.6	0.024	7.7	LOS A	0.1	0.8	0.39	0.59	0.39	49.4
Approach		20	6	21	30.0	0.024	6.6	LOS A	0.1	0.8	0.39	0.59	0.39	49.5
West: Bolong Road														
10	L2	8	2	8	25.0	0.154	8.5	LOS A	0.0	0.0	0.00	0.02	0.00	76.5
11	T1	263	18	277	6.8	0.154	0.0	LOS A	0.0	0.0	0.00	0.02	0.00	99.4
Approach		271	20	285	7.4	0.154	0.3	NA	0.0	0.0	0.00	0.02	0.00	98.5
All Vehicles		492	33	518	6.7	0.154	0.7	NA	0.1	0.8	0.04	0.05	0.04	93.2

Bolong Road & Gate 1 Base 2030 + MOD 26 AM

MOVEMENT SUMMARY

▼ Site: 1 [Bolong Road & Gate 1 Base 2030 AM + MOD 26 (Site Folder: General)]

Site Category: Existing Design
Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES [Total veh/h]		DEMAND FLOWS [Total veh/h]		Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh. Dist]		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Gate 1														
1	L2	53	10	56	18.9	0.034	2.0	LOS A	0.0	0.0	0.00	0.32	0.00	29.9
3	R2	8	7	8	87.5	0.047	18.8	LOS B	0.2	1.9	0.77	0.79	0.77	24.2
Approach		61	17	64	27.9	0.047	4.2	LOS A	0.2	1.9	0.10	0.38	0.10	29.0
East: Bolong Road														
4	L2	1	0	1	0.0	0.001	4.6	LOS A	0.0	0.0	0.00	0.53	0.00	46.6
5	T1	365	26	384	7.1	0.206	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	49.9
Approach		366	26	385	7.1	0.206	0.1	NA	0.0	0.0	0.00	0.00	0.00	49.9
West: Bolong Road														
11	T1	217	28	228	12.9	0.128	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	49.9
12	R2	62	10	65	16.1	0.078	7.0	LOS A	0.3	2.4	0.47	0.65	0.47	27.3
Approach		279	38	294	13.6	0.128	1.6	NA	0.3	2.4	0.10	0.14	0.10	42.2
All Vehicles		706	81	743	11.5	0.206	1.0	NA	0.3	2.4	0.05	0.09	0.05	44.0

Bolong Road & Gate 1 Base 2030 + MOD 26 PM

MOVEMENT SUMMARY

▼ Site: 1 [Bolong Road & Gate 1 Base 2030 PM + MOD 26 (Site Folder: General)]

Site Category: Existing Design
Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES [Total veh/h]		DEMAND FLOWS [Total veh/h]		Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh. Dist]		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Gate 1														
1	L2	91	10	96	11.0	0.056	2.0	LOS A	0.0	0.0	0.00	0.32	0.00	29.9
3	R2	12	7	13	58.3	0.041	9.5	LOS A	0.1	1.5	0.64	0.63	0.64	26.0
Approach		103	17	108	16.5	0.056	2.9	LOS A	0.1	1.5	0.07	0.36	0.07	29.4
East: Bolong Road														
4	L2	1	0	1	0.0	0.001	4.6	LOS A	0.0	0.0	0.00	0.53	0.00	46.6
5	T1	199	11	209	5.5	0.111	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	50.0
Approach		200	11	211	5.5	0.111	0.1	NA	0.0	0.0	0.00	0.00	0.00	49.9
West: Bolong Road														
11	T1	259	13	273	5.0	0.146	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	49.9
12	R2	76	6	80	7.9	0.072	5.6	LOS A	0.3	2.1	0.33	0.55	0.33	27.5
Approach		335	19	353	5.7	0.146	1.3	NA	0.3	2.1	0.07	0.13	0.07	42.1
All Vehicles		638	47	672	7.4	0.146	1.2	NA	0.3	2.1	0.05	0.12	0.05	41.2

Bolong Road & Gate 2 Base 2030 + MOD 26 AM

MOVEMENT SUMMARY

▼ Site: [Bolong Road & Gate 2 Base 2030 AM + MOD 26 (Site Folder: General)]

Site Category: Existing Design
Give-Way (Two-Way)

Vehicle Movement Performance																	
Mov ID	Turn	INPUT VOLUMES [Total veh/h		HV] veh/h	DEMAND FLOWS [Total veh/h		HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh		Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
North: Gate 2																	
7	L2	41	1	43	2.4	0.034	2.8	LOS A	0.1	0.9	0.34	0.41	0.34	37.7			
Approach		41	1	43	2.4	0.034	2.8	LOS A	0.1	0.9	0.34	0.41	0.34	37.7			
West: Bolong Road																	
10	L2	93	0	98	0.0	0.053	5.6	LOS A	0.0	0.0	0.00	0.58	0.00	53.6			
11	T1	237	36	249	15.2	0.141	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9			
Approach		330	36	347	10.9	0.141	1.6	NA	0.0	0.0	0.00	0.16	0.00	58.0			
All Vehicles		371	37	391	10.0	0.141	1.7	NA	0.1	0.9	0.04	0.19	0.04	54.7			

Bolong Road & Gate 2 Base 2030 + MOD 26 PM

MOVEMENT SUMMARY

▼ Site: [Bolong Road & Gate 2 Base 2030 PM + MOD 26 (Site Folder: General)]

Site Category: Existing Design
Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES [Total veh/h]		DEMAND FLOWS [Total veh/h]		Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh]		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
North: Gate 2														
7	L2	89	0	94	0.0	0.073	2.8	LOS A	0.3	2.0	0.34	0.42	0.34	37.7
Approach		89	0	94	0.0	0.073	2.8	LOS A	0.3	2.0	0.34	0.42	0.34	37.7
West: Bolong Road														
10	L2	44	0	46	0.0	0.025	5.5	LOS A	0.0	0.0	0.00	0.58	0.00	53.6
11	T1	243	18	256	7.4	0.137	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		287	18	302	6.3	0.137	0.9	NA	0.0	0.0	0.00	0.09	0.00	58.9
All Vehicles		376	18	396	4.8	0.137	1.3	NA	0.3	2.0	0.08	0.17	0.08	51.9