Shoalhaven Starches Paper Mill Modification

Traffic Impact Assessment

November 2017

prepared for

Manildra

prepared by

ARC Traffic + Transport

Anton Reisch Consulting Pty Ltd
19 Canoon Road Turramurra NSW 2074
Mob 0427 995160
antonreisch@optusnet.com.au
ACN: 150 259 493

Introduction

Manildra Shoalhaven Starches (Manildra) recently acquired the former Australian Paper Mill Site (the Mill Site) located at 340 Bolong Road, Bomaderry. Manildra proposes a Modification to the existing Shoalhaven Starches Project Approval MP06_0228 to provide for the adaptive reuse of the Mill Site; the Modification would provide for: -

- The use of the existing on-site buildings for the storage of finished product, as well as engineering plant;
- The use of the existing on-site storage tanks for the storage of syrups;
- The use of the external on-site areas to lay down plant and materials that are to be used in the construction of approved projects within the primary Shoalhaven Starches Site (the Starches Site) to the west of the Mill Site, as well as for temporary or overflow shipping container storage;
- The use of existing on-site administration buildings for office staff; and
- The use of the workshop areas for maintenance purposes.

ARC Traffic + Transport (ARC) has been commissioned to examine the access, traffic and parking issues associated with the proposed operations at the Mill Site, and the broader Modification. This assessment also necessarily includes a review of the broader Shoalhaven Starches operations, particularly as a number of additional modifications have recently been approved by the Department of Planning & Environment (DP&E) which will result in changes to the (existing) access, traffic and parking environment along Bolong Road. Notwithstanding, it is important to note from the outset that the Mill Site itself provides significant (existing) access and parking infrastructure that previously provided for a significant on-site workforce, and that the trip generation of the Mill Site further to the Modification will be very minor.

In determining the scope of this assessment, ARC has referenced the assessment recommendations provided by Shoalhaven City Council (Council) to the DP&E in an email dated 3rd November 2017, which include: -

1. *A Traffic Impact Assessment (TIA) is required and should include an analysis of the following:*
   a) *Consistency with current traffic and transport requirements associated with other approved and pending Modifications;*
   b) *A parking analysis to ensure that sufficient parking/hard storage is provided on site to cater for all intended uses, including office and other staff uses, storage of shipping containers and storage of other plant and materials;*
   c) *The TIA should also identify what changes there will be, if any, to the number, frequency, length and times of trains as a result of this proposal;*
   d) *The TIA should review current and proposed traffic impacts at the access point, how these conditions may have changed since the Paper Mill provided the current right and left turn treatments on Bolong Road, and review the adequacy of the current treatments against AUSTROADS guidelines, noting Council's view that the Highway upgrades are unlikely to significantly change traffic volumes on Bolong Road; and*

e) *In reviewing the proposed traffic movements at the access point, the TIA should examine the likely traffic movements outside of daylight hours and review adequacy against AS1158 for lighting improvements at the access.*

ARC has also referenced past (general) assessment requirements of both the DP&E and Council in regard to earlier Modification proposals across the Starches Sites, and particularly the issues identified by both the DP&E and Council in regard to the recently approved Modification 12 (Beverage Grade Ethanol Plant), noting that the recent (September 2017) Modification 12 approval specifically conditions a number of upgrades to the road network providing access to the Starches Site and Dairy Farmers Site (Dairy Site) to the east of the Mill Site.

This assessment references a number of past reports prepared by ARC in regard to the broader Shoalhaven Starches operations; specifically, ARC has referenced the following reports: -

- Shoalhaven Starches Boilers Modification TIA May 2017 (MOD 13 TIA)
- Shoalhaven Starches Access & Parking Assessment April 2017 (APA 2017)
- Shoalhaven Starches Ethanol Upgrade & Packaging Plant TIA 2008 (Ethanol Upgrade TIA)

ARC has also referenced the key standards and guidelines relevant to the assessment of the access, traffic and parking characteristics of the Modification, including: -

- Austroads Guide to Road Design Part 4A Unsignalised and Signalised Intersections (GRD4A)
- Australian Standard 2890.1: Parking Facilities – Off Street Car Parking (AS 2890.1)
- Australian Standard 2890.2: Parking Facilities – Off Street Commercial Vehicle Facilities (AS 2890.1)
- Council's Development Control Plan 2014 (DCP 2014)

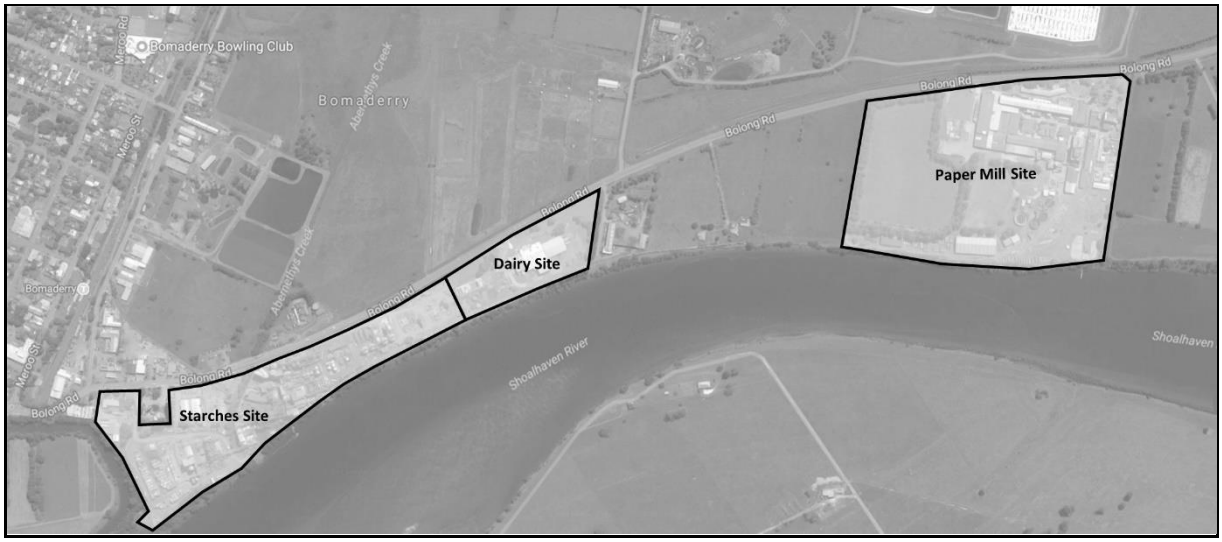
ARC has previously discussed the potential reuse of the Mill Site with Council officers, and specifically the availability of the significant existing access infrastructure from Bolong Road, and additional road upgrades increasing the shoulder width of Bolong Road along the Mill Site frontage (which we note have been recently completed by Council). ARC acknowledges the insight provided by Council officers in regard to these issues, and moreover in regard to broader local access and traffic issues.

1 The Paper Mill Site

1.1 Location

The Mill Site is located south of Bolong Road, Bomaderry, approximately 600m east of the Dairy Site, and approximately 1km east of the primary Starches Site. These key sites (in the context of this assessment) are shown in **Figure 1.1**.

Figure 1.1 Key Sites, Bolong Road Bomaderry



Source: Nearmap

1.2 Paper Mill Site History

The Shoalhaven Paper Mill was officially opened in February 1957, and in 1961 an expansion program was approved and building commenced on an administration block, water treatment plant, power house, canteen, pulp mill and a second paper machine. At the time, the Mill Site employed approximately 600 staff, and available information suggests that at its peak some 800 staff were employed at the Mill Site.

Demand for paper products declined over the decades, and in 2015 the owners of the Mill Site announced that the Mill Site would close; at that time, the Mill Site was employing approximately 75 staff.

The Mill Site was subsequently purchased by Manildra in 2015.

1.3 Access

Access to the Mill Site is provided via 2 adjacent driveway access points to Bolong Road. Significant auxiliary infrastructure is provided at these Bolong Road intersections, including an Auxiliary Left (AUL) lane of approximately 110m and a Channelised Right (CHR) lane of approximately 130m; both the AUL and CHR provide for both access driveways. It is noted that Council recently completed shoulder widening works along Bolong Road adjacent to the Site.

As stated, ARC has previously discussed the potential use of the Mill Site with Council officers, and it was (without prejudice) generally agreed that the available infrastructure was more than appropriate for a minor trip generating reuse of the Mill Site, specifically given that that infrastructure previously provided for significant higher traffic volumes when the Paper Mill was operating (see also **Section 1.4** below).

It is noted that security gates (which restrict access to internal areas) are located at a distance of approximately 40m from Bolong Road. With reference to the very minor forecast trip generation of the Mill Site further to the Modification, this would provide more than appropriate queuing distance on-site.

1.4 Trip Generation & Distribution

1.4.1 Trip Generation

Further to the closure of the Paper Mill it is not possible to definitively state the previous generation of the Mill Site. However, with reference to available information, it is estimated that: -

- Until relatively recently (early 2000's) it is our understanding that staff levels were still significantly higher than at the time of the Mill closure. Even if it is estimated that the Mill employed only (say) 250 staff, and that only 50% of staff generated vehicle trips in the peak hours, the Mill Site would likely have still generated upward of 100 vehicles per hour (vph) in the peak periods, with trips being primarily arrival trips in the AM peak and primarily departure trips in the PM peak.

- Prior to the closure of the Mill in 2015, an estimated 75 staff worked at the Mill. Applying the same estimates, the Mill Site would have generated approximately 35vph in the peak periods as recently as 2015.

An aerial view of the Mill Site is shown below in **Figure 1.4.1.1**; while the date of the photo is not known, it appears to have been taken in a period of peak operations given the parking demand across the Mill Site. **Figure 1.4.1.2** provides a Nearmap image from 2011 which still indicates a significant parking demand (when compared to that which will be generated by the Modification) but clearly shows a reduced workforce as is consistent with the available information in regard to the Paper Mill operations.

Figure 1.4.1.1 Past Paper Mill Site Parking Demand

Source: Shoalhaven Historical Society

Figure 1.4.1.2 2011 Paper Mill Site Parking Demand

Source: Nearmap

1.4.2 Trip Distribution

Again, it is not known what the exact distribution of trips would have been at the Mill Site, but there is no information to suggested that the trip generation characteristics of the Starches Sites would not similarly have applied to the Mill Site. As such, it is estimated at 25% of trips would have been distributed to/from the east, and 75% of trips would have distributed to/from the west.

1.5 Parking

The Mill Site currently provides 30 parking spaces at the front of the Site, including a mix of 90^0 angled spaces and parallel spaces. With reference to **Figure 1.4.1.1** (and indeed **Figure 1.4.1.2**), it is noted that in the past the large hardstand area across the west of the Mill Site was also used for staff car parking, but as staff numbers (and parking demand) was reduced this area appears to have utilised more for storage, the same use proposed for this area under the Modification.

2 Shoalhaven Starches Operations

2.1 Past Approvals

2.1.1 Shoalhaven Starches Expansion Project Approval MP06-0228

The Shoalhaven Starches Expansion Project (SSEP) Approval was granted by the Minister for Planning on the 28th January 2009, and encapsulated previous approvals into one overall approval. The SSEP is a 'transitional Part 3A Project' for the purposes of Schedule 6A of the Environmental Planning & Assessment Act.

The SSEP provides for an increase in ethanol production at Shoalhaven Starches in a staged manner from 126 million litres per year to 300 million litres per year. To accomplish the increase in ethanol production, the SSEP required a series of plant upgrades and increases in throughput of raw materials, principally flour and grain. The SSEP included the following primary alterations and additions: -

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

As outlined, the SSEP Approval also consolidates all previous approvals (up to that time) into a single Project Approval.

2.1.2 SSEP Modifications

Following the SSEP Approval, Manildra acquired the Dairy Site, and commenced investigations into relocating the Packing Plant from the approved PP Site north of Bolong Road to the Dairy Site; as an interim measure during these investigations, approval was provided in 2012 for the Interim Packing Plant operations at their current location. Modification 3 (Dairy Site Car Park) was also approved at this time, providing for additional Starches staff parking to be provided in the Services Area (between the Ethanol Plant and Dairy Site) to be accessed via the Dairy Site (and in turn the intersection of Bolong Road & Dairy Site).

In 2015, Manildra submitted modification proposals to the DP&E in regard to the demolition of an industrial building on the Moorehouse Site (Modification 6) and for the construction of the No.5 Starch Dryer on the Moorehouse Site (Modification 7); for minor design amendments to the Packing Plant (Modification 9); and for construction and operation of a new Flour Mill (Modification 10). These Modifications have all been approved by the DP&E.

More recently (2016) Manildra submitted additional Modification proposals, including for a reduction in the number of DDG dryers on the SS Site and associated works (Modification 11); and for the construction of an Ethanol Distillation Plant to provide beverage grade alcohol (Modification 12). As discussed, these Modifications have been recently approved by the DP&E.

The only other Modification currently before the DP&E relates to the conversion of on-site Boilers from gas fired to coal fired (Modification 13), noting that Modification 13 would have little if any impact on the local access, traffic or parking environment, and moreover in no way alter the primary recommendations of the APA 2017, the implementation of which has now been conditioned in the Modification 12 approval (see further below).

Finally, a further modification is currently being developed providing for the establishment of a CO_2 Plant on the Dairy Site. ARC is currently preparing a traffic assessment in regard to this proposed CO_2 Plant, noting that our work to date indicates that the CO_2 Plant would have a very minor trip generation, based on only 2 staff operating the CO_2 Plant, and a maximum of 2 trucks per day being generated once fully operational. As such, it is again our opinion that the CO_2 Plant Modification would have no impact on this current Modification, nor would this current Modification have any impact on the CO_2 Plant Modification proposal.

2.2 SSEP Modification Upgrades

As discussed in the **Introduction**, the recent APA 2017 provided a number of recommendations to address issues raised by the DP&E, Council and the RMS in regard to areas of non-compliance (from earlier Modification conditions) and in regard to the Modifications recently before the DP&E. Key recommendations, which have been adopted by Manildra and now form Conditions of Consent in regard to Modification 12, include: -

- The extension of the Bolong Road median and barrier fence across Ethanol Driveway, thereby requiring vehicle movements from the west to utilise the Dairy Site turn facility in an identical manner to movements to the Glutton Driveway (for which the Dairy Site turn facility was designed). This would also eliminate observed U-Turn concerns at the intersection of Bolong Road & Ethanol Driveway.

- The provision of additional car parking to be accessed via the Dairy Site, generally consistent with the Modification 3 (Dairy Site Car Park) approval.

- The provision of all access to the Services Area via the Dairy Site, allowing for the closure (to all but emergency vehicles) of the existing Service Driveway which provides an internal link between Ethanol Driveway and the Services Area.

- Further to the above, the upgrade of the Bolong Road & Dairy Site intersection to provide full compliance with the approved Modification 3 (Dairy Site Car Park) design plans, and specifically in regard to geometric design deficiencies. It is also noted that the reinstatement of car parking accessed via the Dairy Site requires the provision of a left turn auxiliary lane, Bolong Road to Dairy Driveway, as originally proposed in the approved Modification 3 (Dairy Site Car Park) design plans.

- The continued use of the Temporary Car Park located on the PP Site through to the end of construction of the Modification (Flour Mill B) infrastructure.

- Upgrades of existing staff car parks across the Starches Sites to provide compliance with Australian Standard in regard to aisle and space dimensions.

The DP&I has conditioned that these works be completed to be completed prior to the commencement of construction of the Modification 12 infrastructure. As stated, plans for all upgrades are currently being finalised for approval by Council, and it is anticipated that all works would be completed prior to the construction of the Modification 12 infrastructure.

2.3 DF Site Meat Processing Plant

In 2014, a Meat Processing Plant, utilising some of the existing on-site buildings generally occupying the eastern portion of the Dairy Site, was approved by Council. The traffic assessment prepared by ARC for the Meat Plant proposal estimated that the Meat Plant would have a daily staff total of 50, and generate approximately 3 - 4 trucks per day (or 6 – 8 truck trips per day). However, the Meat Plant is currently operating below capacity, such that while truck trips remain in line with these original estimates, up to 40 staff only are currently employed at the Meat Plant. Importantly, the operating hours of the Meat Plant mean that staff trips are primarily generated well outside of the AM and PM commuter peak periods.

It is noted that the transport operations of the Meat Plant – and moreover access to the Dairy Site, and truck movements within the Dairy Site – would be essentially unchanged further to the implementation of the broader Starches Site access, traffic and parking recommendations detailed in **Section 1.2. 3** above. Moreover – and with reference to **Section2** – it is our opinion that the Modification would similarly have no impact on, or be impacted by, the implementation of these recommendations.

3 Local Traffic Environment

3.1 Key Intersections

The Mill Site (and indeed all Starches Sites) are provided with access to Bolong Road. In regard to the Modification, ARC has identified the intersections of Bolong Road with the Mill Site, Dairy Site, and the Starches Site's Western Driveway, as the key intersections for analysis. At all other intersections (between the Mill Site and Western Driveway) there will be only very minor changes in traffic flows, and those additional or redistributed flows will present only as through flows (in Bolong Road) rather than as turning movements which would (potentially) impact intersection operations.

Very significantly, east of the Mill Site and west of Western Driveway, traffic flows would essentially be unchanged by the Modification, i.e. unchanged from existing approved flows (see also **Section 4**).

3.2 Existing Traffic Flows

3.2.1 Bolong Road Through Flows

The APA 2017 provides a detailed assessment of future traffic flows to Bolong Road further to the redistribution of trips arising from the detailed access recommendations, and further to the (short term) potential for the simultaneous construction of the Modification 10 (Flour Mill B) and Modification 12 (Beverage Grade Ethanol Plant) infrastructure. The resulting through flows in Bolong Road have been referenced to provide 2017 base flows in Bolong Road for this assessment, though it is noted that once these construction projects are completed the trip generation of the Starches Sites (both to the primary Starches Site and car park accessed via the Dairy Site) to/from Bolong Road would be significantly reduced, such as that for the 2027 forecast year the trip generation of the Starches Sites would be operational only.

These through flows represent '120th Highest Hour' recreational peak flows, and have been developed by ARC in consultation with Council over time and through numerous survey projects across the Starches Sites. Importantly, the through flows used in this assessment (and in the APA 2017) do not include any reduction in future through movements (in Bolong Road) further to the Princes Highway Upgrade; it is the opinion of Council that the current proportional distribution of north-south sub-regional trips between the Princes Highway and the 'Sandtrack' (Bolong Road) will not change further to the Princes Highway Upgrade (currently well advanced).

We note that it is the RMS position (recently confirmed as part of the APA 2017 assessment) that there will be a very significant redistribution of trips; estimates provided in the technical appendices supporting the Princes Highway Upgrade suggest that the 2019 AADT in Bolong Road will represent less than 60% of the 2013 AADT. Even with background growth continuing after 2019, the 2029 AADT is estimated to represent only 70% of the 2013 AADT; and the 2039 AADT still only some 87% of 2013 AADT.

To this end, ARC commissioned surveys in Bolong Road immediately east of Dairy Site between the 19th September and 3rd October 2017; these survey dates include both school holiday and non-school holiday periods, and also the flows on Monday 1st October – the Queen's Birthday Public Holiday – which in our opinion would represent a high recreation peak flow, particularly in the PM peak as people return from holidays. What the survey indicates is that even the very highest surveyed hour (on the Monday) was some 30% lower than the recreational peak flows (120th highest hour) which has previously been used by ARC. In our opinion, this certainly supports the contention that the Princes Highway Upgrade has led to a reduction in trips using the Sandtrack route.

Notwithstanding, and as per previous agreement with Council, ARC has used the higher (Council forecast) through flows to provide what would be in our opinion an (absolute) worst case assessment. We have also factored these base flows by 1.5% per year (in line with modelling completed by the RMS for the Princes Highway Upgrade) to provide forecast base year flows to 2027. It is again noted that in our opinion (and in the opinion of the RMS) through flows in Bolong Road in 2027 will be significantly lower than 2017 flows.

3.2.2 Dairy Site and Western Driveway Trips

APA 2017 also provides a detailed assignment of trips to the Dairy Site, again based on a period of peak construction activity (Modification 10 and Modification 12 construction), as well as the generation of the Meat Plant. In addition to these trips, the MOD 13 TIA submitted as part of the Modification 13 application identified the generation of a small number of additional trips during the construction works for Modification 13; these trips – being exclusively construction staff trips given that all construction truck trips would be to and from the west of the Modification 13 construction site (within the SS Site) - have also been added to the peak flows determined in APA 2017 for the 2017 base year for this assessment.

Similarly, the background assessment developed by ARC for the APA 2017 trip assignment also included consideration of traffic flows at all of the Starches Site driveways, with a particularly focus on the Western Driveway as this provide access for staff car parking and, more particularly, for the majority of truck trips generated to and from the Starches Site. It is noted that these Western Driveway traffic flows were most recently reported in the MOD 13 TIA.

Finally, ARC has included in the base assessment flows the very minor generation of the proposed CO_2 Plant, estimated at no more than 2 light vehicle trips and 2 truck trips to/from the Dairy Site during peak hours.

3.2.3 Base Assessment Flows

With reference to sections above, **Figure 3.2.3.1** provides a summary of 2017 base flows at the key intersections, while **Figure 3.2.3.2** provides a summary of 2027 base flows at the key intersections. It is again noted that the 2017 flows include the higher (Council forecast) through flows in Bolong Road as discussed above, and all trips associated with approved and proposed Modification construction works.

The 2027 flows include the higher (Council forecast) through flows in Bolong Road factored annually, but not the trips associated with approved and proposed Modification construction works, which would be completed many years prior to this forecast year.

Figure 3.2.3.1 2017 Peak Hour Base Assessment Traffic Flows

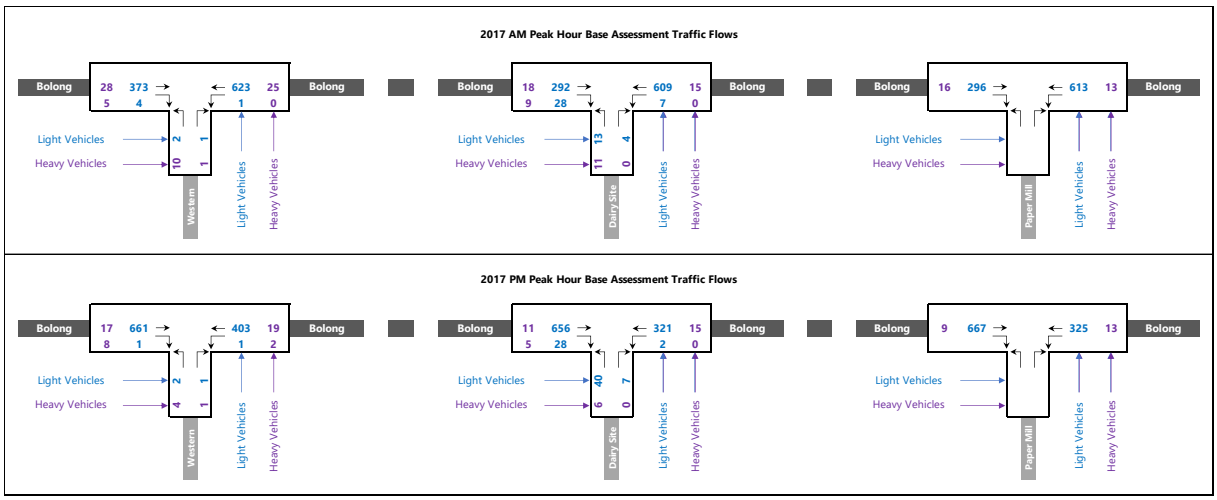
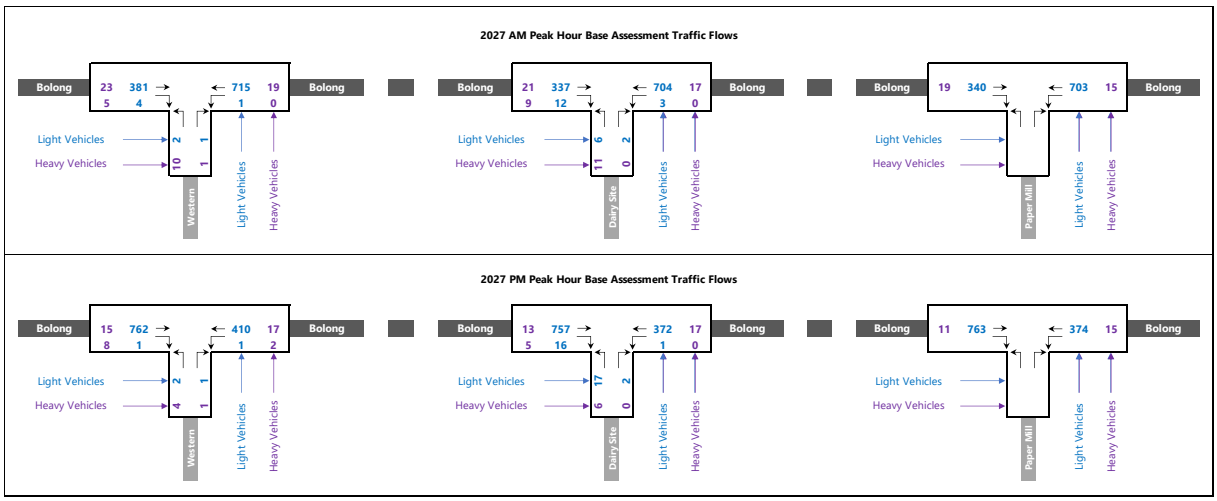


Figure 3.2.3.2 2027 Peak Hour Base Assessment Traffic Flows



3.3 Intersection Operations

3.3.1 SIDRA

The operations of the key intersections have been assessed using the SIDRA intersection model (Version 7.0). SIDRA reports key intersection performance indicators as detailed below.

3.3.1.1 Level of Service

Level of Service is a basic performance indicator assigned to an intersection based on average delay. For signalised and roundabout intersections, Level of Service is based on the average delay to all vehicles, while at priority controlled intersections Level of Service is based on the worst approach delay.

The RMS Level of Service parameters are detailed in **Table 3.3.1.1**.

Table 3.3.1.1 RMS Level of Service Parameters

Level of Service (RMS)	Control delay per vehicle in seconds (d) (including geometric delay)		
	Signals and Roundabouts	Rating	Stop and Give Way Signs
A	d < 14.5	Good	d < 14.5
B	14.5 < d < 28.5	Good with acceptable delay	14.5 < d < 28.5
C	28.5 < d < 42.5	Satisfactory	28.5 < d < 42.5
D	42.5 < d < 56.5	Near capacity	42.5 < d < 56.5
E	56.5 < d < 70.5	At capacity	56.5 < d < 70.5
F	70.5 < d	Over capacity	70.5 < d

Source: SIDRA

3.3.1.2 Degree of Saturation

Degree of Saturation 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). The capacity of the movement with the highest DoS is reported.

3.3.1.3 Delay

Delay represents the difference between interrupted and uninterrupted travel times through and intersection, and is measured in seconds per vehicle in this assessment. Delays include queued vehicles accelerating and decelerating from/to the intersection stop, as well as general delays to all vehicles travelling through the intersection. With reference to the LoS criteria above, the average intersection delay for signals and roundabouts represents an average of delays to all vehicles on all approaches, while for priority intersections the average delay for the worst approach is used.

3.3.1.4 Queue Length

Queue length is the number of vehicles waiting at the stop line, and in this assessment is based on the 95th percentile back of queue length. It is measured as the number of queued vehicles per traffic lane at the start of the green period (signals) or queued vehicles in each 'gap acceptance cycle' for roundabouts and priority intersections (i.e. the longest period in which no vehicles from the minor movement can enter the opposing primary flow).

3.3.2 2017 and 2027 Base Intersection Operations

The 2017 and 2027 base operations of the key intersections are reported in **Table 3.3.2**.

Table 3.3.2 2017 and 2027 Base Intersection Operations

Assessment Base Flows Intersection Operations	Level of Service		Average Delay (s)		Minor Approach Average Delay (s)		Degree of Saturation		95%ile Queue Length (m)	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Bolong Road & Dairy Site 2017	B	B	0.6	0.5	21.7	24.7	0.325	0.346	2.0	1.1
Bolong Road & Dairy Site 2027	C	C	0.4	0.3	29.6	35.0	0.379	0.403	1.8	0.8
Bolong Road & Western Driveway 2017	A	A	0.5	0.3	11.2	10.3	0.359	0.325	2.3	2.3
Bolong Road & Western Driveway 2027	B	A	0.6	0.3	14.5	12.9	0.403	0.369	3.0	2.6

With reference to **Table 3.3.2**, each of the key intersections operate at a good Level of Service in both 2017 and 2027, with minor average delays and significant spare capacity. It is again noted that these operations are based on higher through flows in Bolong Road than are estimated by the RMS, and indeed higher than the recently surveyed recreational peak flows.

Moreover of course, the Mill Site intersection(s) to Bolong Road essentially operates with no delay given that there is no consistent trip generation to/from the Mill Site at this time.

4 The Modification Proposal

4.1 The Proposal

As stated in the **Introduction**, Manildra proposes a Modification to the existing Shoalhaven Starches Project Approval MP06_0228 to provide for the adaptive reuse of the Mill Site; the Modification would provide for: -

- The use of the existing on-site buildings for the storage of finished product, as well as engineering plant;
- The use of the existing on-site storage tanks for the storage of syrups;
- The use of the external on-site areas to lay down plant and materials that are to be used in the construction of approved projects within the primary Shoalhaven Starches Site (the SS Site) as well as for temporary or overflow shipping container storages;
- The use of existing on-site administration buildings for office staff; and
- The use of the workshop areas for maintenance purposes.

Full details of each of the components of the Modification are provided within the broader Environment Assessment that this assessment accompanies.

From the outset – and of specific relevance to this assessment - it is important to state that the Mill Site will primarily serve as an auxiliary site to the primary Starches Site. As such, the Mill Site is not expected to generate "additional'' truck (or staff) trips to the local and sub-regional road network, but rather redistributed trips, i.e. a truck trip that would have previously been generated to/from Bolong Road at the Starches Site (and more specifically at the Western Driveway) would instead be generated to/from the Mill Site; similarly, a staff trip that would have previously been generated to the Western Driveway or one of the other staff car parks accessed via Bolong Road would instead be generated to/from the Mill Site.

As such, the additional trip generation of the Mill Site will be primarily limited to the generation of (a small number of) trips between the Mill Site and the Western Driveway; east of the Mill Site and west of the Western Drive, trip generation would essentially remain within existing approved limits. This is further examined in **Section 4.3** and **Section 4.4**.

4.2 Access

4.2.1 Road Network Access

All access to the Mill Site will be via the existing driveway intersections to Bolong Road.

As previously discussed, the Mill Site provides two adjacent driveways to Bolong Road, both of which are accessed via (both) the AUL and CHR. With reference to the on-site access proposals outlined in **Section 2.2.2** below, it is anticipated that the eastern driveway will be the primary driveway as this provides access to all internal storage/servicing areas and to staff parking. The western driveway is likely to be used only rarely, primarily by trucks departing from the western storage area within the Mill Site.

4.2.2 Internal Access

The Mill Site provides extensive internal access infrastructure suitable for the movement of trucks to all sections of the Mill Site in an identical manner to the previously used on-site truck paths.

4.3 Staff Trip Generation & Distribution

4.3.1 Staff Trip Generation

It is proposed that up to 24 staff could be employed at the Mill Site at any one time, including: -

- 1 full time storeman, potentially supplemented on occasion by 2 additional storemen, working hours 7:00am – 4:00pm Monday to Friday;
- 1 additional storeman employed during peak project periods, working hours 7:00am – 4:00pm Monday to Friday;
- 10 Administration and IT personnel, working hours 8:00am to 5:00pm Monday to Friday; and
- Up to 10 contractors (engineering), working hours 7:00am – 4:00pm Monday to Friday

With reference to the expected work hours for different staff, and the trip generation characteristics of staff as determined on our recent assessments, it is estimated that staff could generate up to 12 vph in both the AM and PM peak periods.

4.3.2 Staff Trip Distribution

There is no information to suggest that the distribution of staff trips at the Mill Site would be significantly different to the distribution of staff trips at the Starches Site, and as such it is estimated that approximately 25% of trips would be to/from the east, and 75% of trips would be to/from the west.

With regard to arrival and departure patterns, the fact that office staff are expected to make up the majority of trips during the peak hours suggests that approximately 90% of trips would be arrival trips in the AM peak, and 90% of trips would be departure trips in the PM peak.

4.4 Truck Trip Generation & Distribution

4.4.1 Truck Trip Generation

4.4.1.1 Product Storage

Further to the Modification, product that would have otherwise be dispatched directly to customers from the Starches Site will now be stored on the Mill Site, given the lack of room on the Starches Site. In practice, this will require the transport (by truck) of finished product from the Starches Site to the Mill Site (for storage) and then the transport (at a later date) of that stored product from the Mill Site direct to customers via the regional road network.

Importantly, the only additional trips being generated would therefore be the additional truck trips carrying the finished materials from the Starches Site east to the Mill Site, and then those (empty) trucks returning to the Starches Site after delivering to the Mill Site; and the additional trips between the Mill Site and the Western Driveway as product is dispatched. East of the Mill Site and west of the Starches Site trip generation would be no different from that provided for under existing approvals.

During peak operating periods, it is estimated that a truck carrying finished product from the Starches Site to the Mill Site could be generated every hour, and as such generate up to 10 trucks per day, or 20 truck trips per day, being exclusively trips from the Western Driveway to the Mill Site, and a trip from the Mill Site back to the Western Driveway.

In addition, a (small) proportion of the stored product may occasionally be transported from the Mill Site back to the Starches Site for packing into containers for rail dispatch. However, this would likely generate on average no more than 1 – 2 trucks, or 2 – 4 truck trips, per day, with these trips again comprising trips from the Western Driveway to the Mill Site, and from the Mill Site back to the Western Driveway.

4.4.1.2 Packing Consumables

Packing consumables currently delivered to the Starches Site (an average of 1 truck per day) would instead be delivered to and stored at the Mill Site, and brought to the Starches Site for use when required (estimated at up to 2 trucks per day during peak operating periods).

As such, an existing delivery truck trip currently turning to Western Driveway would instead continue along Bolong Road and turn to the Mill Site, and then depart back along Bolong road as a through trips rather than a left turn departure trip from the Western Driveway. In addition, an average of 2 additional truck trips per day would again be generated as trips from the Western Driveway to the Mill Site, and from the Mill Site back to the Western Driveway.

4.4.1.3 Plant & Equipment Storage

The storage of plant and equipment at the Mill Site would generate truck trips with essentially identical characteristics to packing material trips, i.e. instead of the plant and equipment being stored on the Starches Site it will be stored on the Mill Site. This again means that additional trips will be generated between the Mill Site and the Western Drive and vice versa (depending on when plant and equipment is required/not required) but no additional trips east of the Mill Site or west of the Western Driveway.

During peak construction projects, it is estimated that up to 10 trucks – or 20 truck trips – could be generated each day by the movement of plant and equipment between the Mill Site and Starches Site.

4.4.1.4 Syrup Storage

Syrup storage demands are currently very minor, and over time are expected to become negligible if not entirely redundant. Notwithstanding, it is estimated that 1 truck per day, or 2 truck trips per day – could be generated by the syrup storage operations. These again would be trips between the Mill Site and the Western Driveway and vice versa.

4.4.1.5 Total Truck Generation

With reference to sections above, it is estimated that the Modification could generate up to 26 trucks, or 52 truck trips per day, during peak construction periods (with a significant proportion of these trips being the movement of plant and equipment). Outside of peak construction periods, it is estimated that the Modification could generate up to 16 trucks, or 32 truck trips, per day.

In the peak hours, it is estimated that the Mill Site could generate up to 6 truck trips during peak construction periods, and up to 4 truck trips outside of peak construction periods.

4.4.2 Truck Trip Distribution

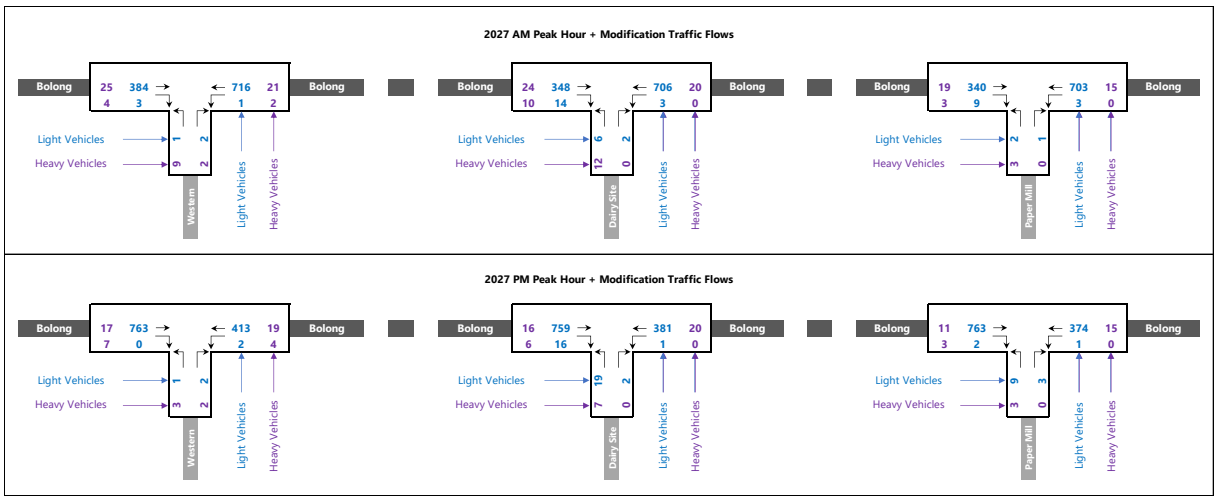
As discussed, all additional truck trips would be generated in Bolong Road only between the Mill Site and the Western Driveway; no additional trips would be generated east of the Mill Site or west of the Western Driveway.

4.5 Total Peak Hour Trip Generation

With reference to sections above, the peak generation of the Mill Site is estimated at 12 light vehicle trips per hour and 6 truck trips per hour, with the potential for these peak trips to be generated in both the AM and PM peak periods.

The resulting traffic flows at the key intersections in 2027 are reported in **Figure 4.5** below, noting that so as to provide a worst-case assessment the peak Mill Site generation (associated with a construction project peak requiring plant and equipment deliveries) has been assigned.

Figure 4.5 2027 Peak Hour Traffic Flows + Modification



4.6 Traffic Impacts

With reference to sections above, it is immediately apparent that the Modification would have little if any impact on the local road network.

In the first instance, the trip generation of the Mill Site further to the Modification represents only a minor percentage of the past generation of the Mill Site, yet all of the key intersection infrastructure remains, augmented as noted previously by Council's recent shoulder widening adjacent to the Mill Site.

Secondly, SIDRA modelling of the future flows indicates that at the intersections of Bolong Road & Western Driveway, and Bolong Road & Dairy Site there is essentially no change in the base intersection operations in 2027, while the intersection of Bolong Road & Mill Site will operate at an appropriate level of service with significant spare capacity, and certainly with significantly lower delays and with more spare capacity than it would have under past Mill Site operations. The SIDRA results of the future operations are provided in **Table 4.6** below.

Table 4.6 Future Intersection Operations

2027 Intersection Operations Base Assessment Flows + Modification	Level of Service		Average Delay (s)		Minor Approach Average Delay (s)		Degree of Saturation		95%ile Queue Length (m)	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Bolong Road & Paper Mill	B	A	0.3	0.3	21.8	14.2	0.393	0.422	1.0	1.5
Bolong Road & Dairy Site	C	C	0.4	0.3	29.8	35.3	0.380	0.404	1.8	0.8
Bolong Road & Western Driveway	B	B	0.6	0.4	23.8	26.1	0.408	0.371	3.6	2.7

In summary, the Modification would have no significant impacts on the operation of the local road network or on the key Bolong Road access intersections.

4.7 Parking

As previously discussed, the Mill Site currently provides a total of 30 staff parking spaces at the front of the Mill Site (centred around the office buildings in which the majority of staff will work). As such, the full staff parking demand (up to 24 parking spaces) can be appropriately met on-site using the existing parking spaces. ARC notes that these spaces may require remarking in some instances, necessarily to the requirements of AS 2890.1.

4.8 Response to Council Issues

Sections below provide a specific response to the recommended assessment tasks as submitted to the DP&E by Council, dated 3rd November 2017.

4.8.1 Consistency with Current Modification Conditions

In and of itself, the Modification would have no impact on the key access upgrades now conditioned by the DP&E in regard to the recent Modification 12 approval, nor would those conditioned upgrades impact on the Modification. Notwithstanding, it is noted that Manildra has committed to the completion of all of the Modification 12 conditioned upgrades.

4.8.2 Parking Capacity

As discussed in sections above, the Site provides a total of 30 marked parking spaces, which would exceed the peak staff parking demand as well as providing for occasional visitor trips. It is noted that the relocation of (some) staff to the Mill Site will reduce parking demands across the Starches Sites, though parking across those Starches Sites will remain in excess of peak demands as determined in the APA 2017.

There is no information available to suggest that the available on-site hard stand areas would not provide for the peak storage demands.

4.8.3 Train Operations

The Modification would have no impact on existing train operations; the frequency, length, crossing duration and crossing times of trains at the Bolong Road railway crossing would remain entirely within existing approved limits.

4.8.4 Adequacy of Existing Auxiliary Infrastructure, Bolong Road & Mill Site

As discussed in sections above, and as previously (without prejudice) agreed with Council, it is the opinion of ARC that the existing CHR and AUL treatments at the Site are more than appropriate to accommodate what is a very minor trip generation associated with the Modification, noting that the trip generation of the Mill Site further to the Modification would represent only a fraction of the trips previously generated by the Paper Mill when operational.

Notwithstanding, even accounting for Council's higher traffic forecasts in Bolong Road (as discussed in **Section 3.2.1**) the very minor left turn demand (Bolong Road to Mill Site) would not trigger any warrants for an upgrade of the existing AUL to a Channelised Left (CHL) turn lane with reference to the GRD 4A, while the existing CHR treatment already essentially provides the highest treatment appropriate to the intersection.

Based on satellite images from July 2017, the marking of all auxiliary lanes appears to be in good order.

4.8.5 Intersection Lighting

With reference to shift times for staff at the Mill Site (as discussed in **Section 4.3.1**) all staff trips would be generated during 'daylight' hours, i.e. between approximately 6:30am (estimated earliest arrival time for staff commencing a 7:00am shift) and 5:30pm (estimated latest departure time for staff finishing work at 5:00pm). In addition, there is no information to suggest that truck trips would be generated outside of daylight hours. As such, it is our understanding that there would be no need to provide additional lighting at the intersection.

Notwithstanding, should there be a future demand for such movements outside of daylight hours, an additional assessment of lighting requirements may be required.

5 Conclusions

Following a detailed and independent assessment of the access, traffic and parking characteristics of the proposed Modification, ARC has concluded that the Modification would have no significant impact on the local traffic environment. In summary: -

- The Modification will utilise the existing auxiliary intersection infrastructure at the Bolong Road access driveways, and there is significant existing on-site access infrastructure for truck access to all parts of the Mill Site. Security gates are located well away from Bolong Road to ensure that on-site queueing would not extend to Bolong Road.

- The Modification would generate significantly fewer trips to the Mill Site than previous generated by the Paper Mill, and all additional trip generation will essentially be limited to the section of Bolong Road between the Mill Site and the Western Driveway; east of the Mill Site and west of Western Driveway the Modification would not generate any additional trips over those approved under the SSEP Approval.

- All key intersections along Bolong Road will continue to operate at good Levels of Service through 2027 even further to consideration of higher than forecast through flows in Bolong Road, and would be appropriately provided for by the significant existing auxiliary infrastructure at the Bolong Road & Mill Site intersection, infrastructure which previously provided for significantly higher trip generation at the Mill Site.

- Existing on-site parking is in excess of the peak staff parking demand and located in close proximity to the key staff buildings.

- On-site hardstand storage areas provide significant capacity, and there is no information to suggest that these areas would not provide fully for the storage demands of the Mill Site.

- The Modification would have no bearing on current approved Modification across the broader Starches Sites.

- The Modification would have no bearing on existing approved train operations.

- All vehicle movements to or from the Mill Site are expected to occur during daylight hours; should vehicles movements outside of daylight hours be proposed in the future, a review of lighting requirements will be required.