

**Shoalhaven Starches, Bomaderry
Ethanol Upgrade & Packaging Plant Proposal
Traffic Impact Assessment
May 2008**

prepared for

The Manildra Group

prepared by

Christopher Stapleton Consulting Pty Ltd

Introduction

The Manildra Group (Manildra) proposes an upgrade of the Shoalhaven Starches facility at Bomaderry (the Site) to increase ethanol production at the Site from the current approval of 126M litres/year to 300M litres/year (The Proposal).

The Proposal has been classified as a major project under Part 3A of the Environmental Planning & Assessment Act; this traffic impact assessment accompanies a broader Environmental Assessment of the Proposal prepared Cowman Stoddart Pty Ltd.

This assessment investigates the access, traffic and parking characteristics of the Proposal, including the potential impacts on the local and regional transport network. To properly assess these issues, an assessment of the existing and future operation of the local transport network has been undertaken. As part of our assessment, we have referenced the appropriate transportation and design guidelines and criteria, including: -

- RTA's Guide to Traffic Generating Developments (RTA GTGD); Road Design Guide (RTA RDG); Route Assessment Guidelines for Restricted Access Vehicles (RTA RAGRAV); and National Heavy Vehicle Reforms Heavy Vehicle Mass, Loading and Access (RTA NHVR)
- Australian Standards AS 2890.1:2004 (AS 2890.1) and AS 2890.2:2002 (AS 2890.2)
- AustRoads Guide to Traffic Engineering Practice Part 3 (AustRoads Part 3) and Part 5 (AustRoads Part 5)
- Correspondence provided by Shoalhaven City Council (SCC) and the RTA to the Department of Planning (DoP) in regard to the Proposal, and the resulting Director General Requirements (DGR)
- Correspondence provided by Council and the RTA to the DoP in regard to the recent Shoalhaven Starches Flour Mill Project (SSFM Project) and the resulting approval conditions provide by the DoP for the for the SSFM Project.

Throughout the preparation of this assessment, Christopher Stapleton Consulting Pty Ltd (CSC) has specifically engaged with the local and state government authorities, including SCC (Mr Scott Wells, Traffic Manager, and Mr David Pym, Development Manager) and the RTA (Mr Danny Bernadetti, Development Manager Southern Region; Mr Chris Millet, Manager Land Use Development Impacts Southern Region; and Mr Charlie Owens, Heavy Vehicle Route Coordinator, Southern Region) to determine the scope of analysis presented in this assessment and to consult on key local and regional issues. CSC acknowledges from the outset the assistance of SCC and the RTA in regard to these issues.

Executive Summary

CSC has prepared a detailed and independent assessment of the access, traffic and parking issues associated with the Proposal, utilising available data, design standards and traffic analysis models. We have concluded that: -

- Manildra is committed to the implementation of outstanding development consent conditions at the Site. These include a significant upgrade of Access Point 2 to full compliance with a Type A intersection; and a further upgrade of Access Point 3 to limit ongoing maintenance.
- The Proposal will continue to utilise rail as a primary mode of transport, eliminating an additional demand for approximately 400 heavy vehicle trips per week in the local area. While the number of trains servicing the Site will increase (by 4 trains), the packaging plant on the northern side of Bolong Road, along with additional on-site railway siding capacity, will reduce movements across Bolong Road to approximately half current the levels, i.e. halve the number of closures of Bolong Road at the existing railway crossing.
- The Proposal will generate up to 88 additional vehicle trips daily (24 hours) to the local road network; the additional peak hour generation of the Proposal to the local road network would be a maximum of 8 vehicle trips. **These are very minor traffic increases**, which can be accommodated by the same conditioned local road upgrades as required for the recent SSFM Project, **and will have no significant impact on the local traffic network.**
- The provision of a one-way access system from Bolong Road to Railway Street for heavy vehicles accessing the packaging plant is required to provide for safe on-site access and handling, and to incorporate greater rail capacity which in turn will reduce rail crossings of Bolong Road.
- The utilisation of local industrial access routes by heavy vehicles is entirely appropriate and provides VKT, emission and time cost savings, as well as reducing impacts at key intersections.
- Parking is provided on-site and for the packaging plant in excess of the peak staff parking demand.

CSC has made the following recommendations to Manildra to achieve appropriate transport outcomes. These recommendations have been adopted by Manildra as part of the Proposal: -

- i. Access Point 2 will be upgraded following approval of final design plans by the relevant local authorities. The upgrade will be implemented as part of the approved SSFM Project, and completed prior to the commencement of the operations provided for by this Proposal.

- ii. Access Point 3 will be upgraded following approval of final design plans by the relevant local authorities. The upgrade will be implemented as part of the approved SSFM Project, and completed prior to the commencement of the operations provided for by this Proposal.
- iii. A new left in only ingress driveway will be provided from Bolong Road to the packaging plant following approval of final design plans by the relevant local authorities.
- iv. The packaging plant driveway to Railway Street will be upgraded to full compliance with the appropriate AS 2890.2:2002 design standards.
- v. A new pedestrian overpass of Bolong Road immediately west of Abernathys Creek will be developed following approval of final design plans by the relevant local authorities.
- vi. The gates providing access to the primary Site car park (Access Point 4) will remain open at all times to allow for the separation of ingress and egress movements; this recommendation has already be implemented by Manildra.
- vii. That rail movements continue to be – as far as practicable – scheduled outside of local peak periods, and specifically outside of the morning and afternoon commuter peak periods, though it is acknowledged that Manildra does not have direct control over the scheduling of rail movements.
- viii. That Manildra continues to provide heavy vehicle drivers with information and training in regard to the use of the designated restricted access vehicle route by restricted access vehicles, and the availability of on-site parking areas.
- ix. That Manildra works constructively with SCC, the RTA and local community through any future implementation of local heavy vehicle route changes; this may include changes to the use of the local industrial vehicle route and key regional routes.

Following our assessment of the key issues associated with the Proposal, and with the application of the recommendations outlined above, CSC has concluded that the Proposal is supportable from an access, traffic and parking perspective.

1 The Existing Local Environment

1.1 Locality

The Site is located on Bolong Road, Bomaderry.

Bomaderry is a mixed residential, commercial and industrial suburb located across the Shoalhaven River from Nowra. Industrial activity is concentrated in the south of the suburb, specifically off Bolong Road east of the Princes Highway; and in the east of the suburb, specifically off Meroo Street and Railway Street. Along with the Site, local industries contribute a relatively minor percentage of vehicle trips to the local road network, bounded by the Princes Highway to the west and north, and Bolong Road to the south. Flows are dominated by local and regional flows accessing or travelling through Nowra.

The residential population of Bomaderry is centred in the north and west of the suburb. The main residential community is located within an area bounded Bolong Road (to the south); Princes Highway (to the west/north); and Meroo Road to the east.

The Site, local industrial areas and residential areas are shown in **Figure 1.1**.

1.2 Local Traffic Network

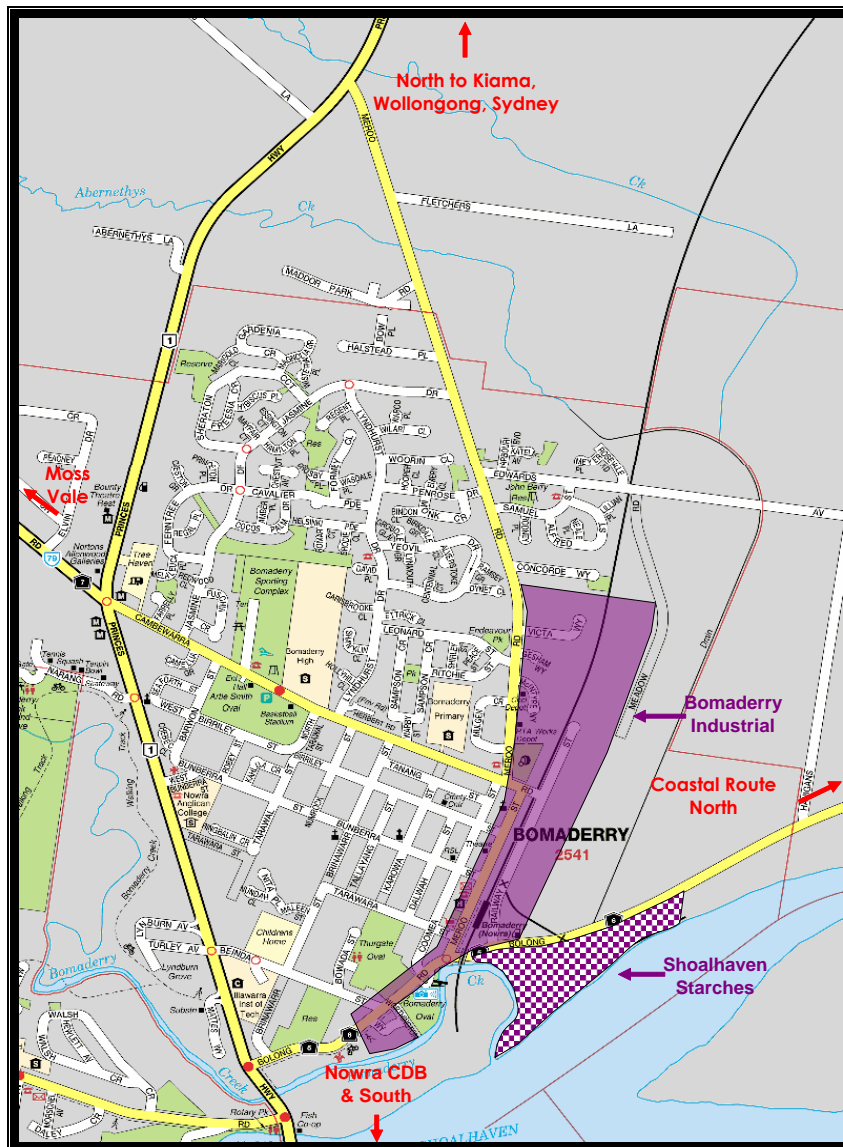
1.2.1 The Princes Highway

The local traffic network is dominated by the Princes Highway, which provides primary north-south access through the northern and southern suburbs of Nowra. Through the majority of the 'local' network shown in **Figure 1.1**, the Princes Highway has a speed limit of 70km/h, but there are also local restrictions (School Zones) which reduce the speed limit during the morning commuter peak period and early afternoon commuter peak period.

The Princes Highway through the local network generally provides a minimum of 4 lanes, with additional capacity at major junctions controlled by signalised intersections and high capacity roundabouts.

With heavy vehicle limits on the coastal routes to the north (Route 293 – Bolong Road) the vast majority of heavy vehicle traffic generated from Nowra and Bomaderry uses the Princes Highway for sub-regional and regional access.

Figure 1.1 Site & Locality



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From the perspective of this assessment, the Princes Highway provides the following key intersections: -

- **Princes Highway & Bolong Road** (Signalised)

As stated in SCC correspondence to the DoP of May 2007 and in the DGR of January 2008; and as outlined in the 2002 Shoalhaven Starches Pollution Reduction Plant 7 Access Traffic & Parking Report (PRP7 Traffic Report) prepared by CSC, this intersection generally operates at a satisfactory level but can experience delays during peak periods, and during holiday peaks.

- **Princes Highway & Cambewarra Road** (Roundabout)

This intersection accommodates existing regional and local traffic demands (north-south), as well as providing for a trips demand to/from the west (Cambewarra West and through to Moss Vale).

- **Princes Highway & Meroo Road** (Priority)

This intersection has been upgraded in recent years, and along with excellent sight distance to the north and south provides appropriate acceleration and deceleration lanes through a seagull configuration.

- **Princes Highway & Illaroo Road/Shoalhaven River Bridge**

The intersection of the Princes Highway & Illaroo Road, and then the available capacity of the Bridge (and indeed further the signals at Bridge Road on the southern side of the Bridge) is an acknowledged constraint in the local traffic network. Significant additional development is currently occurring west of the Princes Highway (North Nowra), and it is anticipated that additional capacity will be required. A bypass was proposed in the late 1990's and early 2000's (specifically to reduce flows along the Princes Highway through both Bolong Road and Illaroo Road).

CSC is also aware of requests by SCC for the RTA to investigate upgrades along the Princes Highway corridor from Bolong Road through to the south of the Bridge, and additionally requests for AUSLINK funding of such upgrades.

With reference to our past work for SCC and in the local area, it is our understanding that SCC and the RTA have undertaken some preliminary planning for an upgrade of the Shoalhaven River crossing (and indeed a new crossing), but there has not been to our knowledge any significant assessment nor funding commitment to future projects along the Princes Highway through Nowra.

Significantly, the Proposal would not increase traffic flows in the Princes Highway south of Bolong Road by more than one or two peak hour trips.

1.2.2 Route 293 (Bolong Road)

An alternative to the Princes Highway for north-south traffic is provided by Bolong Road, which generally follows the coastline between Gerringong and Nowra. While heavy vehicle restrictions (5t weight) apply north of Bomaderry, our discussions with the RTA have determined that there is potential for new [residential] development to the north-east of Nowra which would be serviced by Bolong Road.

Conversely, proposals currently under consideration by the RTA for a significant upgrade of the Princes Highway between Gerringong and Bomaderry may in the future reduce the [regional] travel demand along this alternative route.

Bolong Road (and thence Gerroa Road) provides two traffic lanes with additional turning/passing areas at significant local intersections. Speeds are generally set at 80km/h - 100km/h east of the Site (with a transition area from 100km/h to 60km/h directly adjacent to the Site) and thence 60km/h through to the Princes Highway. It is important to note that the surveys commissioned by CSC and prepared by SCC (reported below) show that speeds in excess of the 60km/h limit are maintained west of the transition zone itself, but that further west (of the railway line) they are generally lower than the limit (at an average of 50km/h in the 60km/h zone).

From the perspective of this assessment, Bolong Road provides the following key intersections: -

- **Princes Highway & Bolong Road** (Signalised)

See **Section 1.2.1** above.

- **Bolong Road & Meroo Street** (roundabout)

This intersection provides for primarily local traffic to and from the southern residential areas of Bomaderry, and specifically the town centre north of Bolong Road.

- **Bolong Road & Railway Street** (Priority)

This intersection plays an important role for local industries – including the Site and other industries located to the west of the Site along Bolong Road – as it provides access to a public weighbridge north of Bolong Road, and thence through-routing via Meroo Road or Cambewarra Road to the Princes Highway for [unrestricted] heavy vehicles. In practice, this intersection allows for a westbound vehicle to pass a turning vehicle (to Railway Street) under most conditions due to the width of the carriageway and adjacent verge; however, it is acknowledged that the intersection is generally not well defined.

- **Bolong Road & Site Access Points**

The Site provides 4 key access points to Bolong Road; these access points are examined in greater detail in **Section 2**.

1.2.3 Bomaderry Industrial Access Route

Railway Street, Cambewarra Road and Meroo Road (north of Cambewarra Road) form an important local industrial access route through Bomaderry for local industries, including the Site. Weight and size restrictions apply to a small section of this route, specifically Railway Street immediately south of Cambewarra Road to the public weighbridge; Cambewarra Road; and Meroo Road between Cambewarra Road and McIntyre Way.

These restrictions apply only to *restricted access vehicles*; with reference to the RTA's RAGRAV and NHVR, and to our discussions with Mr Charlie Owens of the RTA, this means only vehicles over 19m or over 50t are prohibited from this small section of the local network. All vehicles under 19m in length or 50t in weight are permitted to use this section of the network, while Railway Street (between Bolong Road and the public weighbridge) and Meroo Road (north of McIntyre Way) are specifically designated by the RTA for restricted access vehicle routes for vehicles up to 26m in length and over 50t.

More detail of the operation of local roads is provided below.

- **Railway Street**

Railway Street, with a public weighbridge and direct access to a number of local industrial sites, is an important (though relatively low generating) industrial road and attracts few residential trips. Railway Street provides two wide traffic lanes, and has a speed limit of 50km/h. On-street parking is available along the majority of Railway Street, but is little used.

- **Cambewarra Road**

Cambewarra Road is an important link between the residential streets of Bomaderry and the Princes Highway, and also links to the west towards Cambewarra West, and thence further west towards Moss Vale. Restricted access vehicle limits in Cambewarra Road are more easily reasoned, as (west of Meroo Road) it provides a distinctly residential environment and is fronted by schools. Cambewarra Road provides two traffic lanes, on-street parking and a posted speed limit of 50km/h with additional local (School) speed restrictions during peak periods.

- **Meroo Street & Meroo Road**

Meroo Street runs roughly parallel to the Princes Highway between Bolong Road and Cambewarra Road, and then Meroo Road links from Cambewarra Road to the Princes Highway north of Bomaderry.

General (weight) heavy vehicle access restrictions in Meroo Street (between Bolong Road and Cambewarra Road, i.e. through the town centre) result in this section of the road operating as a local collector street. North of Cambewarra Road however, the traffic flow in Meroo Road includes a higher percentage of heavy vehicles from the local industrial areas travelling to and from the north, and includes – as noted above – specific provisions for restricted access vehicles between the Princes Highway and McIntyre Way. Meroo Street and Meroo Road generally provide two traffic lanes, and have posted speed limits of 50km/h (through the residential area); Meroo Road has an 80km/h speed limit on the approach to the Princes Highway.

1.3 Traffic Flows

1.3.1 Classifier Counters

Following detailed on-site discussions with SCC, CSC commissioned a series of classifier counter installations along the primary heavy vehicle routes to and from the Site. Counters were installed by SCC at agreed locations in August 2007.

The classifier counters provide details of vehicle movements by class of vehicle over the full 24 hour period (and thence for a period of 7 days). Vehicle movements were logged by direction at all key sites.

1.3.2 Intersection Surveys

The classifier counter surveys were supplemented by intersection movement counts at each of the primary access points to the Site and key local intersections of Bolong Road & Railway Street, and the Princes Highway & Bolong Road.

The intersection surveys were conducted by Curtis Traffic Surveys in August 2007, coinciding with the counter survey period (for correlation). Surveys were conducted during the morning (6:00am – 9:00am) and evening (4:00pm – 7:00pm) peak periods, coinciding with local commuter peak periods. Intersection survey periods and locations were also agreed with SCC.

1.3.3 Heavy Vehicle "Log"

A final survey was prepared by CSC in consultation with Manildra, which provided a log of scheduled heavy vehicle movements to and from the Site. The log provides information on product/material vehicles accessing the site, and therefore suitable survey data by which to determine characteristics including the distribution of trips and vehicle types.

1.3.4 Survey Period Issues

During the survey period (August 2007), a significant amount of extra activity (i.e. above 'standard' Site operations) was occurring on the Site, specifically relating to construction work for the previously approved PRP7 Project upgrade. This meant that the counter and intersections surveys reported much higher flows than would occur under standard operating conditions. The heavy vehicle log reported only standard material and production movements, i.e. no construction/contractor heavy vehicles.

Our discussions with Mr Gerry Thompson, Operations Manager for the Site, provided the following construction and contractor characteristics at the time of the surveys: -

- Approximately 190 contractor staff on-site on a peak day additional to Site employees.
- Approximately 100 heavy vehicles (construction materials) accessed the Site each day in addition to the standard Site heavy vehicle generation.

For the primary assessment of intersection performance (existing and future) CSC has retained the surveyed flows to represent 'super-peak' operations at the Site, as it is not possible to distinguish with certainty trips generated by standard operations and those generated by contractor/construction demands. **In our opinion, these conditions provide an appropriate assessment of the potential construction traffic of the Proposal, and certainly represent conditions in excess of the average Site operations.** A more detailed analysis of the Site traffic generation is provided in **Section 2** below.

1.3.5 Survey Results

A summary of the survey data is provided in the following figures and tables: -

- **Table 1.3.1** provides a summary of peak hour and daily flows reported by the classifier counters, and provides a breakdown to key vehicle classes. **Figure 1.3.1** provides a summary of the AustRoads vehicle classes referenced in **Table 1.3.1**.
- **Figure 1.3.2** provides a summary of AM and PM peak hour turning movements at all key intersections as reported by the intersection surveys, as well as a more general breakdown (for the purposed of modelling) to light and heavy vehicles.
- **Table 1.3.3** provides a summary of the heavy vehicle log, and specifically provides a breakdown of flows to key vehicle types, access points and local routes to and from the Site. **Figure 1.3.3** shows the vehicles routes referenced in **Table 1.3.3**.

CSC notes that minor variations in the data arise through small differences in time periods used for the different surveys, and due to the averaging of weekly figures.

Table 1.3.1 Traffic Counter Data Results

External Network Counters	7 Day Average										5 Day Average											
	All	Class 1 & 2	%	Class 3 - 5	%	Class 6 - 9	%	Class 10 - 12	%	Unclass	%	All	Class 1 & 2	%	Class 3 - 5	%	Class 6 - 9	%	Class 10-12	%	Unclass	%
Railway St Nth of Bolong	2391	1824	76%	364	15%	129	5%	28	1%	46	2%	2791	2075	74%	470	17%	156	6%	35	1%	55	2%
Bolong Rd East of Site	8486	8020	95%	332	4%	96	1%	15	0%	22	0%	8789	8246	94%	393	4%	109	1%	17	0%	24	0%
Bolong Rd West of Railway	8688	8167	94%	394	5%	93	1%	32	0%	3	0%	9165	8519	93%	491	5%	113	1%	39	0%	3	0%
Bolong Rd East of Beinda¹	15343	14295	93%	894	6%	121	1%	29	0%	3	0%	16692	15416	92%	1093	7%	146	1%	34	0%	3	0%
Meroo Nth of Cambewarra	1677	1400	84%	153	9%	104	6%	18	1%	2	0%	1317	1074	82%	133	10%	93	7%	16	1%	1	0%
Site Access Counters	7 Day Average										5 Day Average											
	All	Class 1 & 2	%	Class 3 - 5	%	Class 6 - 9	%	Class 10 - 12	%	Unclass	%	All	Class 1 & 2	%	Class 3 - 5	%	Class 6 - 9	%	Class 10-12	%	Unclass	%
Access Point 1 (Eastern)	411	340	83%	31	8%	8	2%	1	0%	32	8%	488	406	83%	37	8%	8	2%	1	0%	36	7%
Access Point 2 (Central)	278	235	85%	22	8%	0	0%	0	0%	20	7%	323	274	85%	27	8%	0	0%	0	0%	21	7%
Access Point 3 (Western)	347	179	52%	109	32%	15	4%	4	1%	40	12%	427	220	52%	136	32%	18	4%	5	1%	48	11%
Access Point 4 CP Entry	356	275	77%	24	7%	1	0%	0	0%	56	16%	434	335	77%	30	7%	1	0%	0	0%	68	16%
Access Point 4 CP Exit	84	77	92%	7	8%	0	0%	0	0%	0	0%	117	108	92%	9	8%	0	0%	0	0%	0	0%
Shoalhaven Starches Total	1475	1106	75%	194	13%	24	2%	4	0%	147	10%	1788	1343	75%	239	13%	27	2%	6	0%	172	10%
<p><i>Note 1 The Bolong Road counter east of Beinda was punctured during the survey period; averages are provided based on available survey days.</i></p>																						

Source: Shoalhaven City Council Data, Tabulation Christopher Stapleton Consulting Pty Ltd

Figure 1.3.1 AustRoads Vehicle Classification

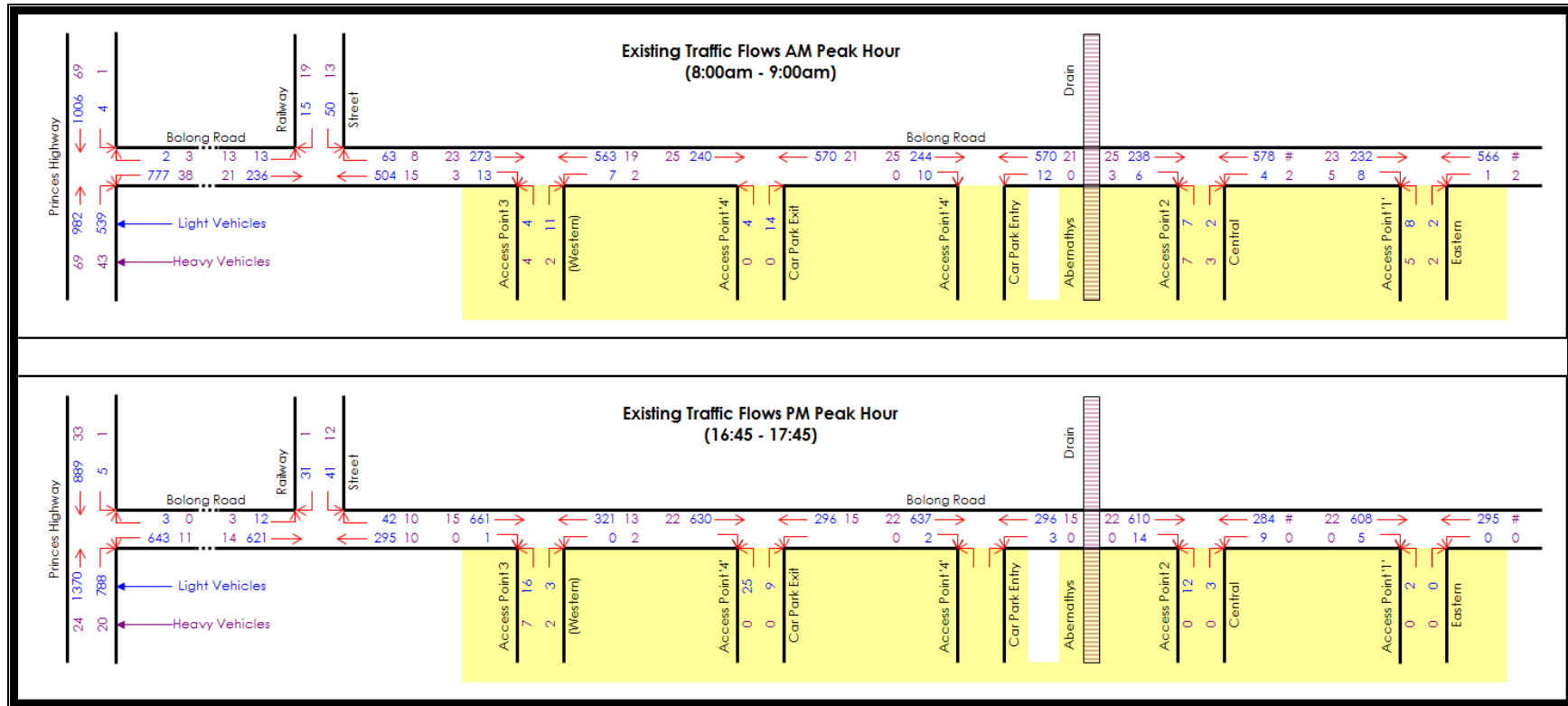
AUSTROADS Vehicle Classification System						
Level 1 Length (indicative)	Level 2 Axles and Axle Groups		Level 3 Vehicle Type	AUSTROADS Classification		
Type	Axles	Groups	Typical Description	Class	Parameters	Typical Configuration
Short up to 5.5m		1 or 2	Short Sedan, Wagon, 4WD, Utility, Light Van, Bicycle, Motorcycle, etc	1	$d(1) < 3.2m$ and axles = 2	
			Short - Towing Trailer, Caravan, Boat, etc	2	groups = 3 $d(1) \geq 2.1m$, $d(1) < 3.2m$, $d(2) \geq 2.1m$ and axles = 3, 4 or 5	
Medium 5.5m to 14.5m	3, 4 or 5	3	HEAVY VEHICLES			
			Two Axle Truck or Bus	3	$d(1) > 3.2m$ and axles = 2	
			Three Axle Truck or Bus	4	axles = 3 and groups = 2	
			Four Axle Truck	6	axles > 3 and groups = 2	
Long 11.5m to 19.0m	3	3	Three Axle Articulated Three axle articulated vehicle, or Rigid vehicle and trailer	6	$d(1) > 3.2m$, axles = 3 and groups = 3	
			Four Axle Articulated Four axle articulated vehicle, or Rigid vehicle and trailer	7	$d(2) < 2.1m$ or $d(1) < 2.1m$ or $d(1) > 3.2m$ axles = 4 and groups = 2	
			Five Axle Articulated Five axle articulated vehicle, or Rigid vehicle and trailer	8	$d(2) < 2.1m$ or $d(1) < 2.1m$ or $d(1) > 3.2m$ axles = 5 and groups = 2	
			Six Axle Articulated Six axle articulated vehicle, or Rigid vehicle and trailer	9	axles = 6 and groups > 2 or axles > 6 and groups = 3	
Medium Combination 17.5m to 35.5m	> 6	4	B Double B Double, or Heavy truck and trailer	10	groups = 4 and axles > 6	
			5 or 6	Double Road Train Double road train, or Medium articulated vehicle and one dog trailer (M.A.D.)	11	groups = 5 or 6 and axles > 6
Large Combination Over 33.0m	> 6	> 6	Triple Road Train Triple road train, or Heavy truck and three trailers	12	groups > 6 and axles > 6	

Definitions:
 Group: Axle group, where adjacent axles are less than 2.1m apart
 Groups: Number of axle groups
 Axles: Number of axles (maximum axle spacing of 10.0m)

$d(1)$: Distance between first and second axle
 $d(2)$: Distance between second and third axle

Source: AustRoads

Figure 1.3.2 Existing Peak Hour Traffic Flows



Source: Curtis Traffic Surveys

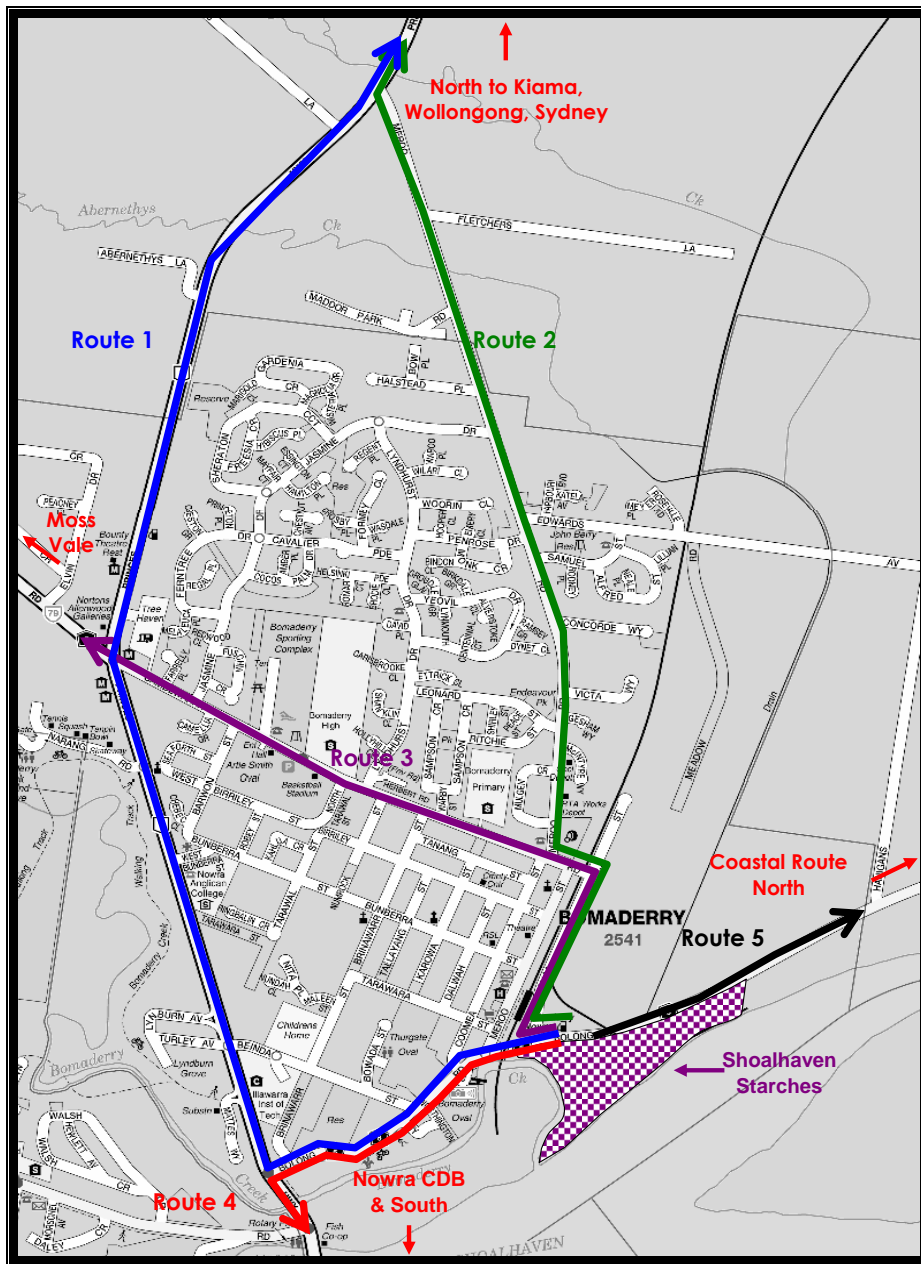
Table 1.3.3 Shoalhaven Starches Heavy Vehicle Movements Survey

Weekly Trip Generation by Product Type																																										
Load	Ethanol			Glucose			Packer			Protein			Starch			Boiler			Total																							
	Truck Type	Rigid	Articulated or Truck & Dog	B-Double	Rigid	Articulated or Truck & Dog	B-Double	Rigid	Articulated or Truck & Dog	B-Double	Rigid	Articulated or Truck & Dog	B-Double	Rigid	Articulated or Truck & Dog	B-Double	Rigid	Articulated or Truck & Dog	B-Double	Rigid	Articulated or Truck & Dog	B-Double	Total																			
Access Point	Access Point 1			Arrival - Access Point 1 Departure Access Point 2			Access Point 3			Access Point 3			Access Point 3			Access Point 3			All Access Points																							
Route	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	All Routes					
8th Aug		4	2	4		2	4	14	2		6	4	4	8	2			6					12				2	18		4		2	8	4	48	18	10	12	102			
9th Aug		2		8			6	8			2	4	4					6	4	6	4	2			14	4				30	6			2	4	6	62	22	4	18	2	120
10th Aug		2		8			4	4	4		2	4	4		2			4	2		6	2	2			28					52	10	4	16	2	2	88					
11th Aug		2		4			4				2	6	4		2											12	2				14						38	6		6	52	
12th Aug				4				6					2		4			2								8						24	8		8	40						
13th Aug		4		8			10	6		2		4	4	4	6			12	6		6	2				12	2				30	4	2	2	4	72	22	22	4	2	126	
14th Aug		4		8			6	4	2		4	10	2		6			14		2	6	2	2			28		4		4		76	8	2	26	2	2	120				

Weekly Traffic Generation By Access Point																		
	Access Point 1 Arrivals			Access Point 1 Departures			Access Point 2 Arrivals			Access Point 2 Departures			Access Point 3 Arrivals			Access Point 3 Departures		
	Rigid	Articulated or Truck & Dog	B-Double	Rigid	Articulated or Truck & Dog	B-Double	Rigid	Articulated or Truck & Dog	B-Double	Rigid	Articulated or Truck & Dog	B-Double	Rigid	Articulated or Truck & Dog	B-Double	Rigid	Articulated or Truck & Dog	B-Double
8th Aug	1	13	3	0	3	2				1	10	1	4	27	3	4	27	3
9th Aug	0	8	4	0	1	4				0	7	0	3	39	6	3	39	6
10th Aug	0	7	4	0	1	4				0	6	0	1	26	6	1	26	6
11th Aug	0	3	2	0	1	2				0	2	0	1	19	1	1	19	1
12th Aug	0	3	2	0	0	2				0	3	0	0	13	2	0	13	2
13th Aug	0	10	5	0	2	4				0	8	1	2	37	9	2	37	9
14th Aug	0	7	5	0	2	4				0	5	1	2	36	10	2	36	10

Weekly Traffic Generation By Access Route													
	Route 1			Route 2			Route 3			Route 4			
	Rigid	Articulated or Truck & Dog	B-Double	Rigid	Articulated or Truck & Dog	B-Double	Rigid	Articulated or Truck & Dog	B-Double	Rigid	Articulated or Truck & Dog	B-Double	
8th Aug	2	4	12	0	48	0	0	18	0	8	10	0	
9th Aug	0	6	18	2	62	0	0	22	2	4	4	0	
10th Aug	0	0	16	0	52	2	0	10	2	2	4	0	
11th Aug	0	0	6	0	38	0	0	6	0	2	0	0	
12th Aug	0	0	8	0	24	0	0	8	0	0	0	0	
13th Aug	0	0	22	0	72	4	0	22	2	4	0	0	
14th Aug	0	0	26	0	76	2	0	8	2	4	2	0	

Figure 1.3.3 Shoalhaven Starches Heavy Vehicle Log Route Map



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1.4 Local Intersection Performance

Based on the intersection survey data outlined above, CSC has examined the performance of local intersections using the SIDRA intersection performance.

1.4.1 Key Analysis Data & Issues

Further to discussions with SCC and the RTA, CSC has included in the analysis the following: -

- Surveyed peak hour traffic flows factored to represent a 120th HH peak hour, as was considered appropriate for the assessment of a recreation such as the Princes Highway; essentially, both the RTA GTGD and AustRoads Part 3 recommend that a design hour, correlating with the 120th highest hour of year flows, be used for assessment purposes for recreational routes, where significant increases in general peak hour flows can occur.

To this end, and further to detailed consultation and analysis between CSC and SCC (Mr Scott Wells), it was determined that the surveyed flows (**Figure 1.3.2** above) represent in and of themselves a very high peak flow, but that factoring those flows (through flows along both Princes Highway and Bolong Road, both of which could be considered recreational routes) by 105% provides appropriate recreational peak data for analysis, i.e. **a worst case assessment base**.

Importantly, Site flows and minor local intersection turning movements have not been factored, as these flows do not experience these recreational peaks, but as noted in Section 1.3.4 above those flows also overrepresented standard Site operations considerably due to construction traffic.

- Existing intersection geometry and movement controls, including surveyed cycle and phasing and a review of the RTA TCS plans at the intersection of Princes Highway & Bolong Road. CSC notes that the SIDRA files for the key intersection of the Princes Highway & Bolong Road were provided to SCC, and minor amendments agreed to appropriately model the recreational peak periods and the potential impacts of large vehicles, including increased 'start loss' time for the critical right hand turn movement from Bolong Road to the Princes Highway (north); and the designation of a heavy vehicle length of 25m for the same critical movement to represent the movement of restricted access vehicles.
- **CSC notes that no more than a single restricted access vehicles was surveyed making this turn in any hour of the survey periods;** nonetheless, all heavy vehicle trips assigned to this movement are modelled with the restricted access vehicle size characteristics (25m).

- Surveyed and AustRoads gap acceptance parameters appropriate to each movement at priority intersections, with specific reference to Table 11.6 of the SIDRA User Guide; this includes a review of the lane geometry and vehicle speeds at each intersection to ensure that the modelled gap acceptance data reflects on-site conditions.

SIDRA determines key performance measures including average delays, capacity and queue lengths, which are described below.

1.4.2 Level of Service

Level of Service (LoS) is a basic performance parameter assigned to an intersection based on average delay. For signalised and roundabout intersections, LoS is based on the average delay to all vehicles, while at priority controlled intersections LoS is based on the worst approach delay. The RTA Level of Service criteria is provided below in **Table 1.4.2**.

Table 1.4.2 RTA Level of Service Criteria

Level of Service (RTA Method)	Control delay per vehicle in seconds (d) (including geometric delay)		
	Signals and Roundabouts	Rating	Stop and Give Way / Yield 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	$70.5 < d$

1.4.3 Degree of Saturation

Degree of Saturation (DS) is defined as the ratio of demand (arrival) flow to capacity. Degrees of Saturation 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 approach with the highest DoS (i.e. closest to or exceeding 1.0) is reported.

1.4.4 Delay

Delay represents the difference between interrupted and uninterrupted travel times through an 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 delays for signals and roundabouts represent an average of delays to all vehicles on all approaches, while for priority intersections the average delay for the worst approach is reported.

1.4.5 Queue Lengths

Queue length (QL) 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 priority intersections (i.e. the longest period in which no vehicle from the minor movement can enter the opposing primary flow).

1.4.6 Intersections Assessed

As agreed with SCC, CSC has assessed the following intersections: -

- Bolong Road & Access Point 1 (Eastern); Access Point 2 (Central); Access Point 3 (Western); and Access Point 4 (Car Park)
- Bolong Road & Railway Street
- Princes Highway & Bolong Road

1.4.7 Existing Intersection Performance

The results of the SIDRA testing are provided below in **Table 1.4.7**.

Table 1.4.7 Existing (120HH) Intersection Performance¹

Intersection	Level of Service		Average Delay (s)		Worst Delay (s)		Degree of Saturation		95% Back of Queue (m)	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Bolong Rd & Access 1	B	B	<10	<10	21.9	14.1	0.34	0.37	4	1
Bolong Rd & Access 2	B	B	<10	<10	21.8	16.7	0.35	0.38	29	52
Bolong Rd & Access 3	B	A	<10	<10	18.1	14.4	0.35	0.33	19	27
Bolong Rd & Access 4 (Entry)	B	A	<10	<10	15.0	13.4	0.35	0.40	15	34
Bolong Rd & Access 4 (Exit)	A	A	<10	<10	10.1	<10	0.34	0.38	1	4
Bolong Rd & Railway St	B	B	<10	<10	23.8	18.3	0.37	0.36	23	23
Princes Hwy & Bolong Rd	B	B	22.3	19.4	70.4	64.7	0.66	0.72	182	171

*Note 1 As discussed in **Section 1.4.1** above, this 'existing' performance reflects the performance under recreational peak conditions, where the surveyed traffic flows shown above in **Figure 1.3.2** have then been factored as per consultation with SCC. We again note also that the surveyed flows – particularly those at the Bolong Road Site access points - represented a period of significant additional activity at the Site, based on construction work for an earlier approved upgrade.*

The SIDRA analysis shows that the Site access points each operate at a good LoS, as does the intersection of Bolong Road & Railway Street. Average delays and queue lengths in all cases are low, and each intersection has significant spare capacity.

The intersection of the Princes Highway & Bolong Road also operates at a satisfactory level of service, with the peak delay restricted to the right hand turn movement from Bolong Road to the Princes Highway (northbound); however, the low volume of trips experiencing this delay has little impact on the average delay of the primary movements. CSC interrogation of the full survey data set (i.e. 3 hours of AM data and 3 hours of PM data) shows that the maximum number of restricted access vehicles making this 'critical' movement in any single hour was 1 vehicle, which also tallies with the classifier data provided by SCC.

SIDRA reports that the average queue lengths generated by the right hand turn trip demand are less than 6.5m in both peak periods, and as such 'fit' within the short right hand turn lane available. In reality, the length of a restricted access vehicle using this turn lane would exceed its capacity but this happens infrequently during the peaks because of the very low demand for this movement, such that for the majority of phases there is no impact on the second left hand turn lane from Bolong Road to the Princes Highway (south).

1.5 Existing Traffic Summary

1.5.1 Intersections

Even under super-peak Site and recreational design hour conditions, the key Site and local intersections operate at a good - satisfactory LoS, with low average delays and significant spare capacity. The regional intersection of the Princes Highway & Bolong Road experiences moderate delays and maintains an overall LoS "B"; the worst delay (for the right hand turn from Bolong Road) is experienced by very few vehicles.

Critically, with reference to the more detailed assessment provided below in **Section 4**, the Proposal will not add to the flows at the intersection of Princes Highway & Bolong Road by more than a few vehicles in any peak hour, and with consideration of the existing surveyed super-peak Site conditions it is probable that **the future generation of the Site under standard operating conditions will be significantly lower than the generation used in this analysis of existing conditions.**

1.5.2 Bomaderry 'Local' Flows

The traffic surveys – and specifically the Site heavy vehicle log - clearly identify preferred heavy vehicle routes through Bomaderry for access between the Site (and other local industrial development) and the north and west (and specifically the Princes Highway north). It must be acknowledged that the overwhelming majority of heavy vehicle using the local routes are fully entitled to do so.

Notwithstanding, the log survey does indicate that a small number of AustRoads Class 10 vehicles (generally restricted access vehicles) are identified using this route; information is not available to indicate whether these vehicles exceeded the limits imposed on the route, but it is our opinion that this does occur occasionally. The Class 10 movements recorded in Railway Street do not specifically indicate vehicles using the restricted route; rather, the majority of these trips have been observed to be using the approved route to/from the Princes Highway via Bolong Road, detouring to the Railway Street public weighbridge, and thence returning to Bolong Road.

Finally, it is important to note that the traffic surveys – and specifically the survey of the Bolong Road & Railway Street intersection - identify a heavy vehicle trip demand to other local industries located west of the Site, i.e. by no means is the Site the only generator of heavy vehicles in the local network, and specifically along both the local industrial route and at the intersection of the Princes Highway & Bolong Road.

2 Existing Site

2.1 Location

The Site is located on the southern side of Bolong Road, Bomaderry. The Site covers approximately 4.7ha, with the major factory components located to the east of the railway line, and more recent approved upgrades occurring in the eastern and western portions of the Site, which curves behind smaller industrial premises and emerges adjacent to the Cleary Bros Concrete site.

Approximately 1km to the east of the Site is the Environmental Farm, which comprises an area of approximately 1,000ha. While the Environmental Farm is not impacted by the Proposal from a transportation perspective, the Proposal does include the adaptive use of the approved wet weather waste water storage ponds located upon the Environmental Farm (Pond No. 7) for the proposed waste water treatment plant.

The Site is shown in **Figure 2.1**.

2.2 Operations

Manildra is one of Australia's primary ethanol producers. The Site operates 24 hours a day, 7 days a week, and employs approximately 240 - 250 people during peak operations, with approximately 150 - 175 people on-site at any one time (during the day, between 6:30am and 3:30pm). Further details of Site operations are provided elsewhere in the Environmental Assessment.

2.3 Regional Access

In general, heavy vehicles generated by the Site use the following regional routes: -

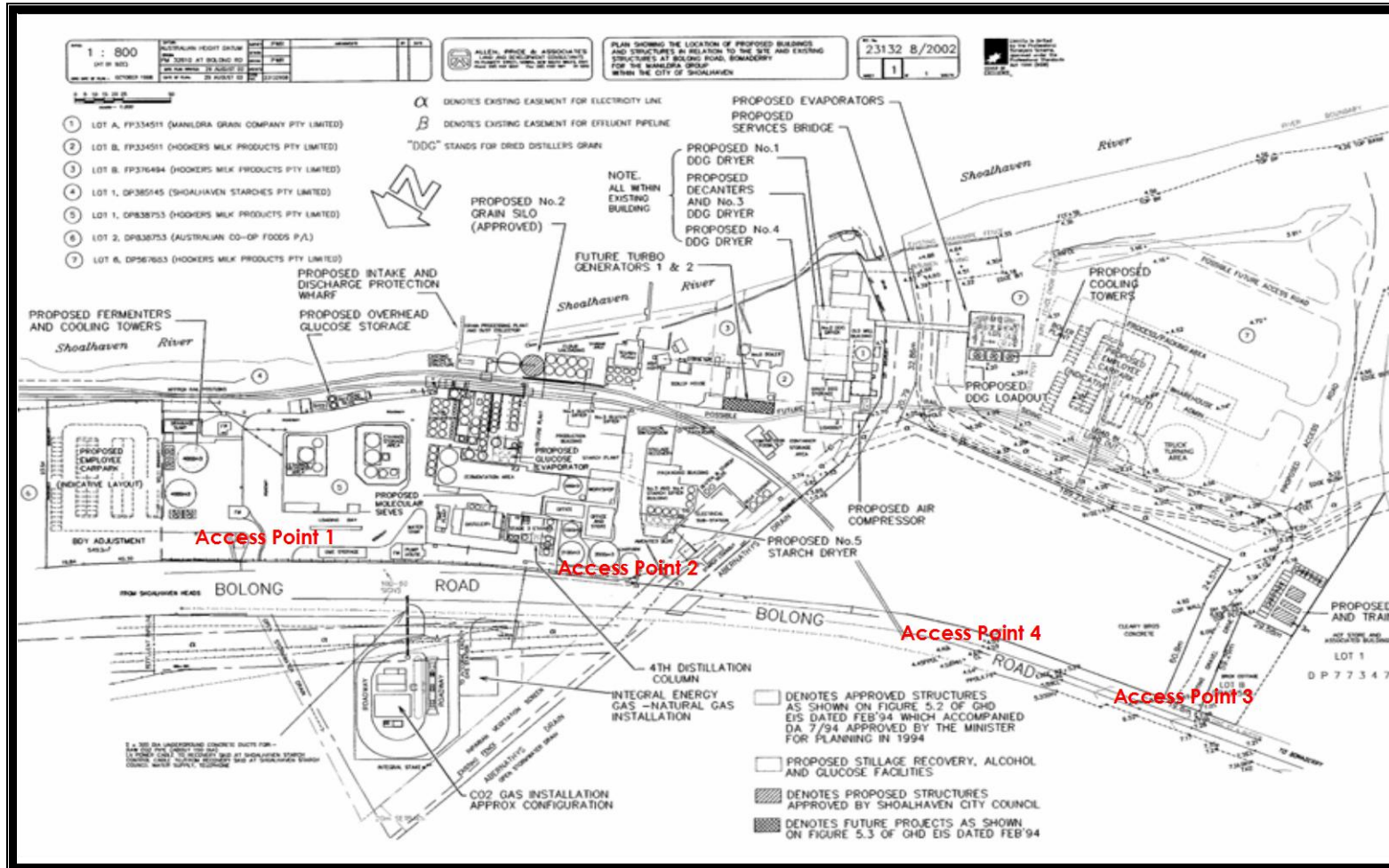
North

- Via Bolong Road, Railway Street, Cambewarra Road and Meroo Road to the Princes Highway
- Via Bolong Road and the Princes Highway (generally restricted access vehicles only)

South

- Via Bolong Road and the Princes Highway south
- Via Bolong Road, Railway Street and Cambewarra Road (through Moss Vale)
- Via Bolong Road and the Princes Highway north through Mount Ousley and Wilton (generally restricted access vehicles only)

Figure 2.1 Existing Manildra Shoalhaven Starches Site



West

- Via Bolong Road and the Princes Highway north (generally restricted access vehicles only) through Mount Ousley and Wilton
- Via Bolong Road, Railway Street and Cambewarra Road (through Moss Vale)

The percentage distribution of heavy vehicle trips to each of these routes is examined in **Table 1.3.3** above, and shows the dominance of the local Bomaderry route (Route 2 with reference to **Figure 1.3.3**) for access to and from the north. We note also that in our discussions with SCC it was agreed that generally the only vehicles using the route via the Princes Highway & Bolong Road were restricted access vehicles, i.e. in general all other vehicles from both the Site and other local industrial Sites in Bomaderry travel via the local industrial route (when travelling between Bolong Road and the north and west).

2.4 Site Access

Vehicle access to the Site is provided via four primary access points to Bolong Road (shown in **Figure 2.1**). Vehicle movements to these access points remain relatively constant throughout the week; some small access changes occur at present when a train is stopped on-site, requiring vehicles to [occasionally] depart via a different access point; the Proposal will provide additional rail siding capacity on-site, which is expected to eliminate this occasional rerouting demand.

It is also the case that at the time of the surveys, construction work on-site resulted in some rerouting of trips, as discussed in **Section 1.3.4**. This resulted in significantly higher than normal daily flows at Access Point 1, as well as the rerouting of some vehicles to Access Point 3. The standard access operating conditions which will be reinstated following the current construction period are detailed below.

2.4.1 Access Point 1 (Eastern)

Access Point 1 is located at the eastern end of the Site. The intersection of this access point and Bolong Road is designed as a Type C intersection (as described by AustRoads) and was developed after consultation with the RTA and SCC as part of a past upgrade of the Site.

The intersection design was specifically due to the access point being located in the vicinity of the transition point of speed zones in Bolong Road (60km/h – 100km/h eastbound, 100km/h – 60km/h westbound), rather than significant traffic volume or sight distance issues.

The traffic flows in **Figure 1.3.2** show clearly that flows are moderate, particularly to and from the Site, and sight distance exceeds all design requirements in both directions.

Access Point 1 provides for: -

- Ethanol trucks (arrival and departure)
- Brewers trucks (arrival and departure)
- Glucose trucks (arrival and departure)
- Starch trucks (arrival and departure)

2.4.2 Access Point 2 (Central)

Access Point 2 is located to the east of the railway line, and directly adjacent to (east of) a drainage culvert (Abernathys Creek). This intersection does not provide sufficient width to allow an eastbound vehicle to pass a vehicle turning right into the Site, and as such a turning vehicle can delay eastbound vehicles. Overall though, the intersection operates at a good LoS due to the low turning volumes, and the recent provision of a temporary pedestrian footbridge linking the pedestrian paths on the southern side of Bolong Road has significantly improved pedestrian (and general) safety.

SCC, in their recent and past correspondence relating to the Site, have referenced a previous consent condition for the Site which requires that the intersection of Access Point 2 be upgraded to provide a Type A intersection, i.e. a design which would allow an eastbound vehicle to pass a vehicle turning right into the Site. Final planning for this upgrade is currently underway, with a draft design provided in **Appendix A**. The upgrade proposal is discussed in greater detail in **Section 3** and **Section 4**.

Access Point 2 provides for: -

- Minor office and staff vehicle demand
- Brewers trucks (departure only)
- Bulk starch (arrival and departure)
- Glucose trucks (departure only)

2.4.3 Access Point 3 (Western)

Access Point 3 is located at the end of a spur that leads from the eastern portion of the Site around behind smaller industrial units to a point adjacent (west) of the Cleary Bros Concrete site. The spur continues to an intersection with Bolong Road. This Type A intersection was recently upgraded, to provide a sealed pavement of the immediate intersection and southern verge.

The access driveway from Bolong Road provides access to a small office and training building, and to a small staff car park. Further to recent upgrade approvals, Access Point 3 provides heavy vehicle access to and from the rear of the primary Site (via the spur) and to staff car parking areas. Access Point 3 also provides access for the adjacent Cleary Bros site; the driveway and intersection with Bolong Road therefore generates trips from the Site and from Cleary Bros.

Access Point 3 provides for: -

- Staff vehicles (office, training and general staff arrival and departure)
- Coal trucks (arrival and departure)
- Stillage trucks (arrival and departure)
- Cleary Bros trucks (departure and occasional arrival)

SCC, in their recent and past correspondence relating to the Site, have indicated a requirement for an extension of the sealed pavement at this intersection, and greater definition of the Access Point 3 driveway itself. Final planning for this upgrade is currently underway, with a draft design provided in **Appendix A**. The upgrade proposal is discussed in greater detail in **Section 3** and **Section 4**.

2.4.4 Access Point 4 (Car Park)

Manildra recently purchased the former Moorehouse industrial site, which is located west of the railway spur off Bolong Road. The site was specifically purchased in order to provide a central car parking location for staff, as well as ancillary storage and workshop space.

Access Point 4 provides separate ingress and egress driveways to Bolong Road. Both driveways operate at a good level of service due to the low turning demands and good sight distance.

Access Point 4 provides for: -

- Staff vehicles parking
- Minor service/workshop vehicle demands.

In our on-site discussions with SCC, no issues were raised in regard to the operation of the Access Point 4 driveways, though the surveys provided by SCC indicate that at times one of the driveway gates was closed, necessitating ingress and egress from the same driveway; this issue is discussed further in **Section 4**.

CSC also notes that these minor intersections are not formally designed as Type A intersections, but that we have observed vehicles passing a turning vehicle (ingress driveway) as per a Type A intersection due to the width of the adjacent verge.

2.4.5 Pedestrian Access

Most pedestrian access demand is met on-site, with simple connector links between the formal parking areas and the primary work locations. Internally, most areas of the Site have fixed pedestrian walkways – these are generally areas where safety around heavy equipment and machinery is paramount.

General access demand from the on-site parking areas is accommodated by internal roads and pathways. Pedestrian links between the western end of the Site (offices, training parking areas) and the primary work areas east of Abernathys Creek have been improved through recent upgrade stages.

A minor but constant pedestrian demand is also generated along Bolong Road, a demand which has recently been catered for by the construction of a temporary pedestrian footbridge over Abernathys Creek. It is proposed that this temporary footbridge will be integrated into the future upgrade of Access Point 2, and also with a proposed pedestrian overpass; this proposal is examined in more detail in **Section 4**.

2.5 Traffic Generation

As described in **Section 1.3** above, CSC commissioned a series of surveys to properly define the traffic generation of the Site (and the local area). The survey locations and peak periods were fully discussed with SCC prior to their implementation.

In summary, the Site (i.e. August 2007, standard generation plus construction generation) generated: -

- A weekday average of approximately 1,400 light vehicle trips.
- A weekday average of approximately 300 heavy vehicle trips.
- An AM commuter peak hour generation of 113 light vehicle trips and 40 heavy vehicle trips.
- A PM commuter peak hour generation of 104 light vehicle trips and 11 heavy vehicle trips.

The surveyed AM peak period generation therefore represents approximately 10% of the daily generation, while the surveyed PM peak generation represents approximately 7% of daily generation. These percentages are generally commensurate with a site that operates 24 hours a day, and specifically generates staff peaks outside of the commuter peak periods (i.e. major shift changes occur early in the morning and early in the afternoon), though it is our opinion that construction traffic demands focused in the peak periods do lead to an overrepresentation of demand in the peak hours.

Additional interrogation of the traffic data provided by SCC for the key access points (Access Point 1 and Access Point 3) shows that the generation of heavy vehicles during the commuter peak hour across the week represents less than 10% of total daily heavy vehicle generation).

As detailed in **Section 1.3.4**, it is a fact that the survey period significantly overestimated the 'standard' generation of the Site, specifically due to the high number of construction and contractor vehicle trips that were occurring during the survey period. Access Point 1 in particular, where minimal staff parking or heavy vehicle access is normally provided, showed a high light vehicle and high heavy vehicle traffic flow, both almost exclusively generated by contractors.

Based on standard staff numbers, visitor numbers, and what is a small inter-trip demand (where vehicles will simply drive from one access point to another via Bolong Road) we have estimated the following 'standard' operating traffic generation for the Site; this includes the additional 'standard' generation which will be generated following the completion of the current on-site upgrade works: -

- Approximately 800 – 900 light vehicle trips per day
- Approximately 150 heavy vehicle trips per day

These traffic flow figures are commensurate with traffic generation forecasts for the Site from past upgrade proposals.

Notwithstanding, it must again be acknowledged that CSC has assessed the existing and future operations of the local traffic network based on the higher surveyed figures that include the contractor/construction demand, and indeed these flows have also been factored (as per consultation with SCC) to represent recreational peak flows. This provides for a super peak-generation assessment of the Site, which in our opinion would therefore also provide an assessment of future construction peak demands for this current Proposal.

2.6 Light Vehicle Trip Distribution

Light vehicle trips (staff and visitors) distribute broadly to the following routes: -

- Bolong Road to the east (Shoalhaven Heads)
- Bolong Road and the Princes Highway to the south (Nowra)
- Bolong Road, Railway Street and Meroo Road to the north and Bomaderry
- Bolong Road, Railway Street and Cambewarra Road to the west and Bomaderry

While vehicle trips are concentrated at the Site – and specifically at Access Point 3 and Access Point 4 – vehicles quickly disperse from Bolong Road via local roads. The majority of staff live in the local Bomaderry and Nowra area.

2.7 Heavy Vehicle Trip Distribution

The distribution of heavy trips to the local network has been raised by SCC as an important issue in the assessment of the Proposal.

2.7.1 General Heavy Vehicle Distribution

The general distribution of trips to the local and regional road network can be determined with reference to the heavy vehicle log survey provided in **Table 1.3.3** (and with reference to **Figure 1.3.3**). The log shows the following general heavy vehicle distribution over a 24 hour period: -

- 19% of trips utilise Route 1, Bolong Road and Princes Highway, for trips to and from the north
- 58% of trips utilise Route 2, Bolong Road, Railway Street, Cambewarra Road and Meroo Road to the Princes Highway for trips to and from the north
- 16% of trips utilise Route 3, Bolong Road, Railway Street and Cambewarra Road for trips to and from the west
- 7% of trips utilise Route 4, Bolong Road and Princes Highway for trips to and from the south.

2.7.2 Restricted Access Vehicle Movements

The Site generates a number of types of heavy vehicles, being rigid trucks; semi-trailers; ‘truck and trailer’ combinations; and “B-Doubles”; AustRoads classification details of these vehicles are provided in **Figure 1.3.1**.

There is evidence that a small number of restricted access vehicles may use the restricted route. With reference to **Table 1.3.1**, and to **Table 1.3.3** (and **Figure 1.3.3**), 8 Class 10 vehicle trips were logged as utilising Route 2 for trips to and from the north over the survey week, and an additional 8 Class 10 vehicle trips were logged as utilising Route 3 for trips to and from the west over the survey week. It is possible that a percentage of these vehicles exceeded the restricted vehicle access limits.

Manildra has policies in place which detail the routes required for restricted access vehicles to access the Site; these policies specifically extend to private contractors. CSC acknowledges that these policies do not guarantee that the occasional restricted access vehicle will not use the local route to and from the Princes Highway.

Notwithstanding, the heavy vehicle log and the results of the fixed counters strongly indicate that there is no systemic use of the local routes by restricted access vehicle generated by the Site, or indeed generated by other local industrial sites.

Finally, as described in detail in **Section 1.2.3**, it is possible that a percentage of the Class 10 vehicles utilising these local routes do not qualify as restricted access vehicles, being of a length and/or weight that complies with all access permissibility.

2.7.3 VKT, Route Speed & General Transport Costs

An important issue in reviewing the current distribution of heavy vehicles through the local road network to the Princes Highway north of Bomaderry is the minimisation of vehicle kilometres travelled (VKT), and with it general emission and time costs, that the local routes provide.

VKT is a measurement of total trip distance, and is normally associated with a relative travel cost; over recent years, VKT has become an increasingly important measurement of 'impacts' associated with developments, and is a key consideration of the RTA, the DoP, the Department of Transport (DoT), and the Department of Environment & Climate Change (DECC).

If a vehicle is required to change to a new route that was (for example) 1km longer than an existing route, there would not be any immediate indication of a cost increase. However, considering the cost per kilometre of a trip and multiplying that cost over a year, the costs start to add up. Travel time, with consideration of congestion and other limiting factors, is also relevant.

The Site generated vehicles – and specifically heavy vehicles - use the local industrial route through Bomaderry (and particularly via Meroo Road) because it is generally faster, particularly during commuter peak periods when flows are heavier and School Zone restrictions are also in place along the Princes Highway; and because it is shorter than the Princes Highway route by approximately 1.5km. If these trips, small in number as they are, were to use the Princes Highway route during these periods, there would be a resulting increase in costs per annum, as well as increased time and emission costs.

CSC does not wish to overstate the savings provided by the local industrial route, but our review of all available data – and even a cursory look at the number of vehicles turning right at Bolong Road - shows that vehicles choose this route across the day and evening, i.e. under even light traffic conditions along the Princes Highway the local route is preferred. This is the strongest indication that the local route provides time savings.

Of course, the most important efficiency strategy implemented at the Site to reduce VKT – and indeed all traffic related costs and impacts - is the use of rail; this massively reduces the impacts of heavy vehicle generation of the Site, heavy vehicle movements in the local area, and impacts at local intersections. Rail access is further discussed in **Section 2.8** below.

CSC is of the opinion that the zoning of the Bomaderry industrial area by SCC specifically consents to the movement of industrial vehicles through the local residential areas; indeed, Meroo Road north of Cambewarra Road is specifically zoned by the RTA for even restricted access vehicles. It is therefore unrealistic to suggest that the heavy vehicle traffic generated by these local industrial sites be required to deviate significantly to avoid all residential areas.

Further, it is not appropriate in our opinion for the Site to be considered 'external' to Bomaderry; it is an integral and longstanding facility in Bomaderry, and therefore in our opinion it is incorrect to suggest that heavy vehicle trips generated to the local industrial route by the Site, and by the many other industrial sites to the east on Bolong Road, are *through trips* as stated by SCC in their correspondence to the DoP.

Finally, CSC notes that the DoP in its assessment of the SSFM Project (Report on the Assessment of Development Application No. DA-391-11-2002) specifically required that vehicles be routed by the local route: -

The Department is satisfied that the local road network would not be significantly affected by construction traffic but recommends that truck movements are undertaken, where practicable, outside peak hours and that the utilisation of the Bolong Road and Railway Street intersection is maximised (in order to minimise use of the Bolong Road / Princes Highway intersection which is busier).

Notwithstanding, there is of course an obligation to maximise amenity for local residential, and of course to ensure that the Proposal does not exacerbate impacts in the local area/intersections. **This is most critically achieved by a Proposal that will generate only up to 8 additional peak hour trips and achieves the vast majority of its existing and additional transport task using rail.**

2.8 Rail Access

The Site transports the majority of its raw materials and export product via rail; this is one of the major benefits of the Site location (by design), as it significantly reduces heavy vehicle movements that would otherwise be required. Details of rail movements and general rail issues are detailed below, with additional material provided by Mr Glen Dawe, National Manager of Rail Transport for Manildra.

The Bolong Road level crossing is used by Manildra's two rail operators to transport flour, containers, mill mix and sorghum to and from the Site. The current numbers of trains servicing the Site are:

- 7 Flour trains per week
- 2 Container trains per week
- 1 Sorghum or additional container train per week

Over the course of the year, trains transport approximately 700,000 tonnes of materials and product to and from the Site; this is the equivalent of some 28,000 heavy vehicle loads, or 56,000 heavy vehicle trips per year that are not required due to the provision of rail transport. **On an average day, rail replaces approximately 100 - 200 heavy vehicle trips that would otherwise be generated in the local area.**

The weekly 10 inbound trains also generate 10 outbound train movements, thereby totalling 20 train movements each week. However, as the sidings currently available at the Site do not accommodate full trains (i.e. the trains are longer than the available length of track on-site) there is currently a need to divide trains at Bolong Road and leave parts of the train stowed between Railway Road and Bolong Road. This shunting requirement creates a further 20 – 30 rail movements (across Bolong Road) each week.

The total weekly rail usage of the Bolong Road Level Crossing is therefore approximately 40 – 50 rail movements per week, i.e. 40 – 50 closures of Bolong Road to facilitate the movement of trains.

Manildra owns and maintains the lights and bells at Bolong Road as a major risk management mitigation measure. Notwithstanding, SCC in their recent and past correspondence relating to the Site have indicated a requirement for an upgrade of the railway crossing to provide boom-gates. Additionally, community representatives have requested information relating to the additional provision of rail services. These issues are examined in **Section 3** and **Section 4**.

2.9 Parking

The Site generates a peak parking demand through the day when it has a full complement of shift and day staff on-site, and (as is generally the case) there is also a small visitor demand. Based on our observations and a review of the survey data, it is clear that there is a relatively minor amount of car sharing and virtually no other significant car driver reduction measures (i.e. public transport) available.

Based on these factors, we have estimated that the peak parking demand of the Site during standard operating periods is for between 160 and 180 parking spaces.

As described in various sections, the capacity of on-site parking has recently been augmented by the purchase of the Moorehouse site; this area is utilised as the primary (central) car parking, and provides capacity for approximately 110 vehicles. **Along with other dedicated parking areas, the total on-site parking provision exceeds 230 parking spaces.**

The standard operating parking demand has in recent times (and during the survey period) been augmented by contractor parking, such that the construction super-peak demand may be as high as 300 parking spaces. While areas around the Site have been established by Manildra for parking to offset this temporary peak demand, it is apparent that off-site parking is (or at least until recently was) occurring.

Parking off-site (on the Bolong Street verge adjacent to Access Point 1) was observed during our Site visit with representatives of SCC. This is contractor parking, the accommodation of which is provided for by the on-site capacity and temporary parking areas, but which was still observed to be occurring.

Following our Site visit and discussions on this issue, Manildra again provided advice to all staff and contractors in regard to the availability of on-site parking, and during our subsequent Site visits no parking was observed in this area. We also note that SCC is determined to enforce the parking restrictions, a determination which CSC fully supports.

3 SCC, RTA & Community Issues

Prior to examining the specific details and potential impacts of the Proposal, it is important to review the comments of SCC in their correspondence to the Minister, in which they outline a number of issues (and specifically outstanding conditions) associated with earlier upgrade approvals for the Site, along with general issues associated with the Proposal.

These issues, along with comments provided by the RTA, are detailed in the recent DGR provided for the Site in early 2008 as part of the Part 3A assessment process.

CSC has also been provided with Consent Conditions issued for the recent (November 2007) approval for the SSFM Project; many of these conditions correspond to the outstanding conditions noted by SCC in discussing the Proposal.

Representatives of Manildra and the Proposal project managers Cowman Stoddart Pty Ltd have also recently met with representatives of the local community to discuss issues associated with the Proposal; these are also outlined below.

3.1 Shoalhaven City Council Issues

3.1.1 Outstanding Conditions

It is acknowledged by Manildra that there are currently outstanding consent conditions in relation to past approvals for the Site. CSC is not aware of the reasons for the non-compliance, but has examined each of the conditions detailed by SCC.

Pedestrian Footbridge

Conditioned works (from earlier Site upgrade proposals) include a pedestrian footbridge on the southern side of Bolong Road across Abernathys Creek.

As described in **Section 2.4.5**, this condition has recently been fulfilled with the construction of a approved temporary pedestrian footbridge linking the existing footpaths either side of Abernathys Creek. The design and construction of the footbridge was completed following consultation and approval by SCC. The footbridge will be further integrated into the design for the upgrade of Access Point 2, and a proposed pedestrian overpass.

Access Point 2

Conditioned works (from earlier Site upgrade proposals) at Access Point 2 include a requirement to increase the passing area at the intersection adjacent to Abernathys Creek, which in turn will require a widening of the culvert. Specifically, the condition requires full compliance with a Type A (AustRoads) design. This upgrade condition has been referenced also in the recent Development Consent conditions for the SSFM Project. CSC notes that in 1993 a design was prepared and approved by both the RTA and SCC for the intersection, but has not been implemented.

It is the recommendation of CSC that the retention of access (two way) at Access Point 2 – and specifically the retention of right hand turn access from Bolong Road - requires the implementation of the upgrade design of the intersection, in line with the design approved by the RTA and SCC.

This recommendation has been adopted by Manildra as part of the Proposal, and is included in the current works for the approved SSFM Project. A revised draft design – provided to CSC by Allen Price & Associates on behalf of Manildra – is shown in **Appendix A**, and will be submitted for approval as part of the SSFM Project consent agreement. CSC notes that the ingress proposal for the packaging plant is to be considered in this revised design, as is the pedestrian footbridge and pedestrian overpass.

Access Point 3

An upgrade of the intersection of Access Point 3 and Bolong Road, to provide a formal Type A intersection, was completed in 2003, but SCC has indicated (in their correspondence and during our Site inspection) that the upgrade should be extended to include the driveway and adjacent shoulder seal to *limit ongoing maintenance and safety related issues*.

Our observations at the intersection show that the seal does not extend across the northern side of the intersection (i.e. the area used by passing vehicles); while this is not essential for the implementation of a Type A design, the movement of heavy vehicles through this area can be seen to have a detrimental impact on the passing area, which would not occur if it were fully sealed.

Additionally, the junction of the driveway (Access Point 3) and Bolong Road while sealed does not extend any significant distance to the east or west of the intersection adjacent to the kerb, or indeed 'into' the Site. While this does affect the ability of the intersection provide a passing shoulder (and therefore general operation capacity as appropriate) the movement of heavy vehicles is observed to have a detrimental impact on the pavement, such that it is already in a relatively poor state of repair and – according to SCC – requires ongoing work (by SCC staff) to clear minor debris.

It is the recommendation of CSC that a full seal of the carriageway should be implemented which includes the eastbound passing verge; additionally, the access driveway for at least the distance from Bolong Road to the proposed controlled access point to the Site south of the Cleary Bros access point should be formalised, specifically as a concrete driveway similar to the adjacent Cleary Bros entry driveway from Bolong Road.

This recommendation has been adopted by Manildra as part of the Proposal, and is included in the current works for the approved SSFM Project. A draft design for this upgrade has been prepared by Allen Price & Associated and is shown in **Appendix A**; this upgrade will be implemented as part of the SSFM Project consent agreement.

Railway Crossing

SCC has indicated that there is an outstanding condition associated with a past upgrade proposal which required an upgrade of the railway crossing when traffic flows and rail movements met appropriate warrants for boom gates; it is the opinion of SCC that such warrants are currently met.

CSC does not have a professional level of expertise in the design of railway crossings, but the information provided by Mr Glen Dawe, National Manager Rail Transport of the Manildra Group, suggests that boom gates are not currently required. This opinion is based on the following: -

- Firstly, and most significantly, the Proposal will actually see a reduction in the number of rail movements at the crossing through the introduction of greater rail capacity (length) on-site south of Bolong Road, and siding capacity on the proposed packaging plant site (see **Section 4** for detail).
- The use of the Bolong Road crossing must also be considered in the light of the train operations which cross this level crossing:
 - Trains approach the crossing and STOP.
 - The crossings Lights and Bells, which have recently been upgraded to meet the appropriate Standards, are then activated.
 - Locomotives sound their Horn and are then escorted across the crossing.
 - Train speed is walking pace i.e. less than 4 km/hr.
 - As locomotives are in full view of road traffic in all directions with an approach visibility of 250 metres, and are stationary before using the crossing, full recognition of impending rail usage of the crossing is available to all motorists.
 - There are many examples elsewhere where rail movements exceed those at Bolong Road and manual crossing protection solely is provided.
 - Manildra owns and maintains the lights and bells at Bolong Road as a major risk management mitigation measure.

Further details of the means by which the Proposal will actually reduce rail movements at Bolong Road are provided below in **Section 4**.

Hannigans Lane

SCC has indicated that sight distances available at the Hannigans Lane Access Point to the Environmental Farm are marginally obstructed by adjacent foliage; while SCC has acknowledged that this is a minor issue, it is nonetheless the recommendation of CSC that pruning (or the like) be undertaken to ensure that sight distances are provided. This recommendation has been adopted by Manildra as part of the Proposal.

Packaging Plant Access

Based on our discussions with Mr Scott Wells, subsequent to the provision of comments by SCC to the DoP (and therefore not included in the DGR provided by the DoP to Manildra), SCC has indicated a preference for access to the proposed packaging plant to be provided solely from Railway Street, rather than the proposed one-way (heavy vehicle) system with ingress via Bolong Road (left turn in only) and egress to Railway Street, as shown in the Preliminary Planning documentation provided to SCC.

CSC would agree that where possible, access is better provided from an access road such as Railway Street for all movements, particularly given that Railway Street is already used for predominantly industrial traffic. Notwithstanding, we support the Bolong Road access proposal based on the provision of the safest and most efficient means of providing access to the packaging plant site while maintaining: -

- The capacity for rail movements and handling to be accommodated north of Bolong Road, and thereby allowing train movements across Bolong Road to be halved; it would be all but impossible to provide this level of rail benefit while accommodating the turning paths required from a single access point to Railway Street.
- An appropriate area for the operation of the large container forklift which will be employed on the packaging plant site; again, the size of the packaging plant site along with the handling, storage and rail requirements prevents the provision of suitable turning facilities for heavy vehicles if they were to enter from Railway Street.
- Minimal impacts on existing traffic (in Bolong Road).
- The incorporation in the design of a pedestrian overpass of Bolong Road, such that pedestrian movements between the Site and the packaging plant are appropriately accommodated.

CSC acknowledges that the Proposal will introduce a new (very minor) access point to Bolong Road. However, this left in only access point can be efficiently incorporated into the design for the Access Point 2 upgrade, and will include a short deceleration lane. Most importantly, the access point is estimated to generate only 15 daily heavy vehicle trips, with all heavy vehicle egress (along with staff ingress and egress) to Railway Street.

A draft design for the proposed access points to Bolong Road and Railway Street has been prepared by Allen Price & Associates and is shown in **Appendix A**; this upgrade will be implemented prior to the opening of the packaging plant, and is detailed further in **Section 4**.

3.1.2 Heavy Vehicles through Bomaderry

SCC has over a number of years investigated the use of heavy vehicles in local roads, particularly along the local access routes between the local industrial areas and the Princes Highway to the north-west. These specifically include Railway Street, Meroo Road and Cambewarra Road.

In our past reporting for Manildra, and in **Section 2.7** above, CSC has identified the (albeit minimal) use of local routes by restricted access vehicles. This is not appropriate, and it will be imperative that Manildra further emphasise to drivers the required route via Bolong Road and the Princes Highway; enforcement may also be required, and would be supported by CSC.

However, the local industrial routes are entirely appropriate for the vast majority of vehicles (excluding restricted access vehicles) and provide efficient routing for the majority of heavy vehicle trips, not only from the Site but from the broader Bomaderry industrial precinct to the east of the residential areas. Indeed, these local routes provide the only access for a large number of the industrial sites in Bomaderry, and as such would be virtually impossible to restrict.

As identified above in **Section 1.4**, it is also recognised that the potential resulting increases (of additional local heavy vehicle restrictions) in traffic flows at the intersection of the Princes Highway & Bolong Road may reduce its performance, such that there would be a greater potential for multiple heavy vehicle movements blocking the southbound movement from Bolong Road (based on the current intersection geometry). This would in all probability require an upgrade of the intersection, and specifically the widening of the westbound approach to provide a lengthened right hand turn lane.

CSC notes that SCC has not raised any specific traffic capacity issues in relation to the movement of heavy vehicles along the local routes, and that in discussions between the Project Team and local residents (discussed below) no specific issues were raised in regard to heavy vehicle movements. Certainly, it is possible that there may be some general amenity issues that could be raised in a review of heavy vehicle movements, but no specific issues have been defined, and SCC has provided no information relating to specific incidents or issues relating specifically to heavy vehicles in the area.

CSC has also reviewed accident data provided by the RTA for the local industrial route, and has found no evidence that heavy vehicles are in any way overrepresented in the accident data.

CSC acknowledges that a review of amenity issues – and specifically noise issues – is being completed as part of the submission. If there is evidence that the additional heavy vehicle generation of the Proposal would have a measurable impact, then we would certainly support a review of measures by which such impacts could be ameliorated.

3.1.4 Summary of SCC Issues

The issues raised by SCC have been examined as a matter of course as part of this assessment. CSC has engaged fully with SCC to ensure that all local and site specific issues have been examined appropriately.

3.2 RTA Issues

The RTA, in both their correspondence to the DoP of January 2008 and in our discussions has raised essentially the same issues as those raised by SCC. These include: -

- The fulfilment of outstanding consent conditions relating to the Bolong Road access points
- The proper design of those access points
- Any potential construction impacts

Significantly, the RTA (in both their correspondence and in our discussions) expressed no significant issue with the local heavy vehicle route, or with the operation of local intersections, particularly the intersection of the Princes Highway & Bomaderry Road. Indeed, it was generally acknowledged in our discussions that the traffic generation of the Site is a minor component of the existing (and future) traffic flow along both the Princes Highway and Bolong Road.

As with our consultation with SCC, CSC has engaged fully with the RTA to ensure that all local and site specific issues have been examined appropriately. From a regional traffic perspective, this has specifically included a review of future traffic flows along the primary regional routes; and the establishment of an appropriate forecast horizon and average growth rate for the assessment.

3.3 Community Issues

On 6th September 2007, representatives of Manildra and Cowman Stoddart met with representatives of the local community to determine local issues and concerns. CSC was not in attendance at the meeting, but we have been briefed by Cowman Stoddart in regard to the key issues discussed. It is our

understanding that the only traffic related issue arising from the meeting was the potential use of rail to convey a greater proportion of materials from the Site, and specifically a greater proportion of materials generated by the current proposal. It is acknowledged that this request would in all likelihood relate to general residential issues with the movement of heavy vehicles (in general).

In responding to this issue, CSC notes the information provided in **Section 2.8** above, i.e. that the current use of rail by Manildra allows for the removal of up to 200 heavy vehicle trips a day from local roads, and up to 56,000 heavy vehicle movements per year.

For the current proposal, the overwhelming majority of additional materials and product will also be transported by rail, resulting in up to 4 additional trains per week servicing the Site; this is estimated to represent the equivalent of a further 20,000 heavy vehicle trips per year.

The existing heavy vehicle trips generated by the Site are servicing end users not readily or practicably accessed by rail. This includes the delivery of some materials to the Site, but more importantly the transportation of product to regional and interstate centres where the use of rail is not possible (due to the time demands of product storage).

In the future, the transportation of materials and product to regional and interstate sites not readily accessible by rail will require 19 additional heavy vehicles per day, or 38 additional heavy vehicle trips per day. More details of these movements are provided below in **Section 4**.

It is important to note that 'back-loading' – where a full train arrives and unloads, and thence is reloaded before departing – is not possible due to the different carriage requirements for the transportation of materials as opposed to export product.

Container trains are loaded in and out of Nowra. Trains coming in bring in empty containers and trains departing take loaded containers by rail to Port Botany for export; this reflects Government policy, which is seeking to achieve a rail market share of 25% for all Botany/Port related movements.

3.4 Issues Summary

The issues outlined above have been to as great an extent possible discussed with the key local stakeholders, and fully detailed in this assessment.

4 The 2007 Upgrade Proposal

4.1 Key Assessment Considerations

Manildra proposes an upgrade to the Site that will improve general production and efficiency, and specifically increase the ethanol output potential of the Site from the current 126M litres per year to 300M litres per year. Additionally, current packaging operations will be moved to the northern side of Bolong Road to a new packaging plant.

The technical components/details of the upgrade are contained elsewhere in this Environmental Assessment; from an access, traffic and parking perspective, the primary issue for assessment is the potential impact of additional and redistributed staff and heavy vehicle movements through local access intersections and the local and regional road network.

A plan showing the key components of the Proposal is shown in **Figure 4.1**.

4.2 Key Upgrade Components

From an access, traffic and parking perspective, the Proposal includes the following key components: -

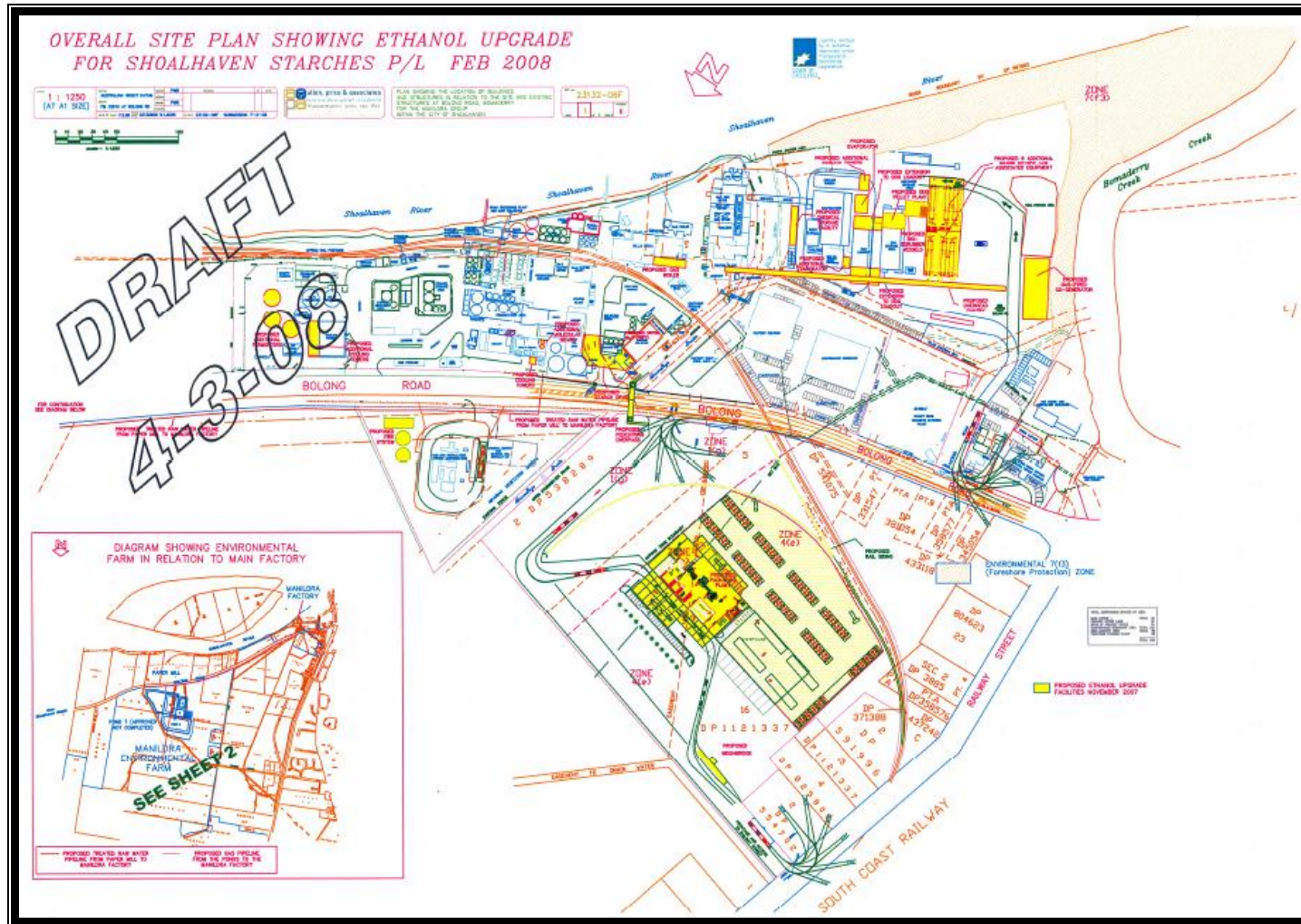
- An additional 25 staff, comprising: -
 - Up to 5 office (business hours) staff
 - Up to 10 day shift staff
 - Up to 10 night shift staff

- Up to an additional 19 heavy vehicles per day (38 movements) comprising: -
 - 15 ethanol trucks
 - 4 DDG trucks

- The redistribution of 15 packaging plant heavy vehicles and 15 staff from the packaging plant located within the existing Site to the packing plant located on the northern side of Bolong Road.

- An additional 4 trains generated per week (i.e. two in, two out), but an overall reduction in trains utilising the Bolong Road level crossing through the provision of additional rail infrastructure capacity north and south of Bolong Road.

Figure 4.1 Shoalhaven Starches Ethanol Upgrade Proposal



Further, the Proposal will: -

- Utilise the upgraded Access Point 2 and Access Point 3 (to be completed as part of the approved SSFM Project) so as to comply with past approval conditions.
- Utilise the recently constructed temporary pedestrian footbridge over Abernathys Creek, and further integrate the footbridge with a pedestrian overpass of Bolong Road, to provide for safe and efficient pedestrian movements.
- Provide a new minor left in ingress only driveway from Bolong Road, and an upgrade of the existing driveway in Railway Street, to provide appropriate access for the packaging plant.
- Maintain existing local industrial routes where permissible (i.e. conforming to current restricted access provisions through the local area) to minimise operating costs and impacts on the local traffic network.
- Route all restricted access vehicles via Bolong Road as per the appropriate restricted access vehicle route.
- Eliminate rerouting to Site access points by providing additional on-site rail siding capacity.

4.3 Site Access

The Site will retain the existing primary access points off Bolong Road, while the packaging plant will require a new ingress (left in) only driveway from Bolong Road, and an upgraded of the existing access point off Railway Street. The design and operation of each of the access points is described below.

4.3.1 Access Point 1

With reference to the traffic generation estimates provided below in **Section 4.4**, an additional 15 heavy vehicles (30 movements) will utilise Access Point 1 daily; while the heavy contractor vehicle movements surveyed in 2007 will be removed by the time standard operations commence, CSC has in the assessment retained the surveyed flows to provide a super-peak assessment which would in reality represent a significantly higher flows than under future standard operations. We note that this method of analysis does in our opinion provide a more than appropriate assessment of the future construction traffic demands for this Proposal, as it is difficult to envisage construction demands exceeding those experienced in August 2007.

Manildra and CSC have in past application requested a review of the speed limit provided in Bolong Road adjacent to Access Point 1; more specifically, it is our opinion that it would be appropriate to relocate (at Manildra's expense if required) the speed zone to the east, such that vehicles were travelling at an urban speed (60km/h) past the Site.

The Site should certainly be considered as part of the consolidated urban environment; it is difficult to reconcile the significant speed reductions provided by the RTA and SCC along other parts of the road network (including the Princes Highway and Bolong Road north of the Site) where speeds are reduced from 80km/h or even 100km/h to 40km/h or 50km/h well outside of activity zones; yet at the Site, which is clearly designated as the start of the urban (Bomaderry) environment, it has not been possible to relocate the speed thresholds to the east.

This is not an issue with the performance of the Access Point 1 intersection; rather, it is an appropriate response to the existing conditions and would appropriately establish a higher level of safety and better delineate the urban area.

4.3.2 Access Point 2

The Proposal does not [quite specifically] provide for an increase in movements at Access Point 2; nonetheless, the operation of Access Point 2 will be enhanced by the implementation of an upgraded Type A intersection as part of the approved SSFM Project.

4.3.3 Access Point 3

An additional 4 heavy vehicles (8 movements) and 10 staff vehicles (20 movements) will utilise Access Point 3 daily in association with the Proposal; conversely, 15 heavy vehicles (30 movements) and 5 staff vehicles (10 movements) will be removed from Access Point 3 daily through the relocation of the packaging plant.

In response to the identification by SCC of design issues at Access Point 3, CSC has recommended that the full carriageway (including the passing area on the northern verge) be sealed, and that a concrete driveway be constructed which extends south to the entry point to the Site, which will be controlled by a boom gate. This recommendation has been adopted by Manildra, and the upgrade will be implemented as part of the approved SSFM Project.

4.3.4 Access Point 4

The capacity of the Access 4 car park is generally fully utilised at present, though additional shift staff (outside of peak hours) would potentially be able to use the car park. As for Access Point 3, additional staff movements generated by the Proposal will largely offset by the relocation of the packaging plant.

In our review of the survey data provided for the car park by SCC, it was determined that the ingress point was at times also being used for egress; it was the observation of Mr Scott Wells of SCC that on some occasions the egress driveway gate was closed, requiring egress from the 'ingress' driveway. CSC notes that the intersection surveys did not record this occurring during the peak periods (presumably because both ingress and egress gates were open).

It is the recommendation of CSC that both the ingress and egress gates be open at all times to allow for the separation of ingress and egress; this recommendation has been adopted by Manildra as part of the Proposal, and has already been implemented.

4.3.5 Packaging Plant Access

As discussed in **Section 3.1**, access to the packaging plant is proposed via a one way system with ingress for heavy vehicles via Bolong Road (left turn in only) and egress to Railway Street; staff vehicles will enter and depart from Railway Street.

This access proposal has been adopted as it provides the greatest level of safety and efficiency for both vehicles generated to and past the access points, while retaining the capacity on-site (packaging plant) to maximise operational safety and efficiency by removing conflicts between heavy vehicles and forklifts servicing the container loading area adjacent to the proposed packing plant.

The packaging plant access design proposal does not necessitate the provision of large turning paths (on-site) such as would be required to accommodate heavy vehicles accessing the packaging plant solely from Railway Street. With a one-way system in place between Bolong Road and Railway Street, the design provides for: -

- The accommodation of significant additional rail infrastructure, including siding, handling and loading facilities. By providing the means to split (and store) trains north of Bolong Road (i.e. on the packaging plant site) the Proposal will halve the number of rail movement across Bolong Road daily.
- An appropriate area for the operation of the large container forklift, which will be employed on the packaging plant site.
- A restricted level of access provision (left turn in only for heavy vehicles only) that would not impact the existing Bolong Road traffic flows.

CSC acknowledges that the proposal will introduce a minor access point to Bolong Road. However, this left in only access point can be efficiently incorporated into the design for the Access Point 2 upgrade, and will include an appropriately designed deceleration lane. Most importantly, the access point will generate only 15 daily vehicle trips, with all egress (along with staff ingress and egress) to Railway Street.

A draft design for the proposed Bolong Road ingress point has been prepared by Allen Price & Associated and is shown in **Appendix A**; this upgrade will be implemented following RTA and SCC approval of the design proposal, and prior to operations commencing at the packaging plant.

An existing driveway is located on the southern boundary of the packaging plant site to Railway Street; this driveway will be upgraded to conform to AS 2890.2:2002, specifically to allow for the movement of heavy vehicles from the Site. Access for staff vehicles (ingress and egress) will also be provided via the Railway Street driveway.

4.4 Traffic Generation

As discussed above, the Proposal will see only a very minor increase in the light and heavy vehicle traffic generation of the Site, with the majority of the extra (and existing) transport task accomplished by rail.

Indeed, with consideration of the 'existing' Site traffic surveyed in August 2007, it is the opinion of CSC that the additional operational trips that would be generated by the Proposal are significantly fewer than the additional contractor/construction trips included in the surveys (and in our analysis). Notwithstanding, our assessment has used the super-peak conditions as base flows, factored through movements to recreation peak conditions, and then added the trips which would be generated by the Proposal. These trips are considered below.

4.4.1 Rail Transport

The Proposal will generate an additional 4 trains per week to the Site. As discussed in **Section 2.8** and **Section 3.5**, the use of rail already saves the generation of up to 56,000 heavy vehicle trips per year; for the Proposal, the provision of 4 additional trains per week is estimated to eliminate some 20,000 heavy vehicle trips per year, or 50 - 100 heavy vehicle trips daily.

The packaging plant (incorporating the packaging facility, warehouse and container storage area) will be served by a new siding between Railway Road and Bolong Road. This facility, with its dedicated siding, will eliminate container related train and shunting movements from Bolong Road level crossing, i.e. eliminate the [existing] demand for access to the primary Bolong Road Site.

Additionally, the rail siding capacity on the existing Site will include the lengthening of the current siding and the creation of a new loop siding south of Bolong Road. This will eliminate the need for flour and sorghum trains to divide at Bolong Road to allow for unloading at their respective receival pits. As a result of these siding works, trains will be able to be accommodated on-site south of Bolong Road without a requirement for shunting, with requisite siding space to allow unloading without impinging on Bolong Road.

The net result of these proposals will be a reduction in train movements across the Bolong Road level crossing by up to 26 movements per week, including 8 – 10 fewer container movements (facilitated by the new packaging plant infrastructure) and 16 fewer shunting movements (facilitated by the new Site rail siding infrastructure).

Therefore while the Site will increase the amount of materials moved by train, thereby maintaining the minimum heavy vehicle trip demand, the total usage of the Bolong Road level crossing will be 16 – 24 movements per week. This represents approximately a 50% reduction in the current crossings of Bolong Road.

The precise timing of these movements to and from the Site – requiring a closure of Bolong Road – are not known at this time, as the movements will require scheduling with the rail network demands and are controlled by rail authorities and therefore out of the control of Manildra. However, it is our opinion that the closure of Bolong Road for the short period of time for the train to cross wholly into the Site will continue to have no significant impact on flows in Bolong Road. CSC recommends that the movements – as far as possible – continue to occur outside of peak periods.

As detailed in **Section 3.1**, it is the opinion of Mr Dawe that under the circumstances outlined above there are no Warrants or Standards which require the provision of boom gates at the Bolong Road railway crossing. Along with the proposal to halve existing rail movements at Bolong Road, the crossing of Bolong Road by rail traffic must be considered in the light of controlled nature of train operations which cross this level crossing:

- Trains approach the crossing and STOP.
- The crossings Lights and Bells which have recently been upgraded to meet Standards are then activated.
- Locomotives sound their Horn and are escorted across the crossing by Manildra staff.
- Train speed is walking pace i.e. less than 4 km/hr.
- As locomotives are in full view of road traffic in all directions with an approach visibility of 250 metres, and are stationary before using the crossing; full recognition of impending rail usage of the crossing is available to all motorists.
- There are many examples elsewhere where rail movements exceed those at Bolong Road and manual crossing protection solely is provided.

- Manildra owns and maintains the lights and bells at Bolong Road as a major risk management mitigation measure.

Based on our own review of the available warrants provided by SCC, it is also our opinion that the warrants specifically refer to faster moving (i.e. suburban) trains, and certainly not circumstances where the movement is at such a slow pace, with good sight distance and accompanied by lights and bells as for the existing crossing.

4.4.2 Road Transport Demand & Staff Trips

For those materials and products not deliverable by rail, heavy vehicle transport will be required. The Proposal will marginally increase heavy vehicle and staff movements to the Site, though these movements (to the Site itself) will be largely off-set by the relocation of the packaging plant and its associated movements.

4.4.3 Daily trips

The Site traffic generation is expected to increase as follows: -

- An additional 30 daily ethanol heavy vehicle trips via Access Point 1. Based on existing and future ethanol delivery vehicle demands, it is estimated that approximately 50% of these vehicles will be articulated vehicles, and 50% restricted access vehicles.
- An additional 8 daily DDG heavy vehicle trips to Access Point 3, off-set entirely by the relocation of 30 daily heavy vehicle trips to the proposed off-site packaging plant. Heavy vehicle trips to Access Point 3 would therefore decrease from current levels by approximately 22 trips per day. Based on existing and future characteristics DDG delivery vehicle demands, it is estimated that majority of these vehicles will be articulated vehicles.
- An additional 50 daily staff vehicle trips across Access Points 3 and 4, off-set significantly by the relocation of 30 daily packaging plant staff trips (i.e. a net increase of approximately 20 trips daily).
- A total of 30 - 50 light vehicles and 30 heavy vehicles accessing the packaging plant daily, with 15 heavy vehicle ingress trips daily from Bolong Road, and 15 heavy vehicle trips along with 30 - 50 staff trips daily to Railway Street. Based on existing and future packaging demands, it is estimated that the majority of these vehicles will be articulated vehicles.

4.4.4 Future Peak Hour Trips

With reference to the existing peak hour movements (**Figure 1.3.2**), and a review of distribution patterns (time) of the ethanol and DDG components of the existing Site (and indeed all heavy vehicle distribution patterns, which overwhelmingly show a propensity for trips outside of the peak periods as is standard based on operational peaks at a site operating 24 hours a day), **CSC has estimated that the Proposal could generate an additional 8 vehicles to the local network during a peak hour, including up to 4 heavy vehicles and 4 light (staff) vehicles).**

These generation characteristics tally also with the daily/hourly data breakdown from the classifier counter surveys provided by SCC.

4.5 Trip Distribution

As discussed above, the Proposal will see additional heavy vehicle trips being generated to Access Point 1 but a reduction in trips to Access Point 3; additional light vehicle trips will also be generated to Access Point 4 and other on-site parking areas accessed from Access Point 3.

Based on the peak periods as discussed above in **Section 4.4** and accounting for a small additional redistribution of staff parking trips and the other access points for general parking CSC has determined the following distribution profile: -

- Access Point 1 would generate up to a maximum 4 additional heavy vehicle trips in the peak hour, being 2 ingress and 2 egress trips.
- Access Point 2 would generate no additional vehicle trips in the peak hour.
- Access Point 3 would generate up to a maximum 2 additional light vehicle trips but up to 5 fewer heavy vehicle trip in the peak hour.
- Access Point 4 would generate up to a maximum 2 additional light vehicle trips in the peak hour.
- The packaging plant access point in Bolong Road would generate up to 3 heavy vehicle trips and the Railway Street access point up to 2 heavy vehicle trips and 3 light vehicle trips in the peak hour.

Away from the Site, the additional trips are expected to distribute to the local road network in an identical manner to the current distribution. With ethanol deliveries utilising both articulated vehicles and restricted access vehicles, and DDG deliveries primarily articulated vehicles, **the potential exists for up to 2 restricted access vehicles to be generated during a peak hour**, i.e. to be generated to the key regional intersection of the Princes Highway & Bolong Road.

CSC again notes that at present no more than a single restricted access vehicle was surveyed making the critical right hand turn movement from Bolong Road to the Princes Highway in any single hour.

The remaining trips would be distributed via the local industrial route.

Staff vehicles will be distributed to the general local area via all available routes in the peak hours, resulting in an additional 2 - 4 vehicles at the intersection of Bolong Street & Railway Street, and 1 - 2 vehicles at the intersection of Princes Highway & Bolong Road.

4.6 Annual Growth

Prior to examining the impact of these additional trips, CSC has examined the trends in average annual trips along the Princes Highway and along Bolong Road so as to provide a suitable forecast increase in existing movements.

With reference to the RTA's AADT data for the Princes Highway available on the RTA website, and further to our discussions relating to future growth areas in the region with the RTA's Mr Danny Bernadetti and Mr Chris Millet, and as agreed with Mr Scott Wells of SCC, we have uniformly increased through flows by 2% per year along both the Princes Highway and Bolong Road over a period of 10 years. This increase has been applied to both light and heavy vehicle flows, using as a base the 120HH recreational peak flows as described in **Section 1.4**.

This annual increase is higher than the AADT data would suggest (approximately 1.5% per year, with some years showing a decrease in flows) but reflects the greater potential for additional regional development based on current State and Federal policies. CSC also notes (as per our discussions with Mr Scott Wells of SCC) that these growth estimates are more likely to occur along the Princes Highway following an upgrade of the Highway corridor (current being planned by the RTA) between Gerringong and Bomaderry). Such an upgrade would – it is agreed with SCC and the RTA – also have significant impacts on the local Bomaderry and Nowra traffic network, particularly on the approached to the Shoalhaven River crossing.

4.7 Future Flows

To provide a valid assessment of the potential impacts of the additional Proposal traffic as opposed to the impacts of the annual average increases as described above in **Section 4.6**, CSC has provided two sets of data for analysis.

Figure 4.7.1 shows the future local traffic peak hour flows based solely on 10 years annual growth from a base of the 120HH recreational peak flows (as used in the assessment of existing conditions in **Section 1.4** above), i.e. it does not load the additional traffic generated by the Proposal.

Figure 4.7.2 shows these future peak hour flows plus the additional traffic generated by the Proposal.

4.8 Future Intersection Performance

Even a cursory review of the additional traffic generation potential of the Proposal strongly indicates that the Proposal will have little impact in and of itself on the future road network.

The estimated maximum increase in peak hour traffic flows – a total of 8 vehicle trips – is dwarfed by the average annual increases in local flows reported in **Figure 4.7.1**, such that the total additional trips generated by the Proposal represent only a minor proportion of a single year's average growth in flows along Bolong Road.

CSC notes that average growth forecasts are in themselves based on the additional minor generation of local areas, as well as broader new generators; that annual growth is further based on a super-peak recreational flow that is appropriate for design purposes, but significantly exceeds average weekday traffic flows.

Additionally, CSC would again stress that the Site generated traffic flows used in the assessment are themselves a significant overstatement of standard operations, given that they include a large number of contractor vehicles working on earlier approved Site upgrades. **The generation of these contractors alone during the survey period represents a significantly higher peak period generation than which would be generated by the Proposal**, i.e. the 'existing' conditions represent a Site generation significantly in excess of the standard operations upon which traffic impacts would generally be assessed, and significantly in excess of the standard operations which will prevail following the implementation of the Proposal works.

Notwithstanding, CSC has examined the future intersection performance using SIDRA. Following advice from SCC, CSC has in the analysis modelled a higher cycle time to reflect the operations of the RTA in accommodating additional traffic demands at key regional intersections; the cycle time has been increased from 110 seconds to 130 seconds for the critical AM peak hour.

Additionally, the operations at the intersection of Bolong Road & Access Point 2 are based on the provision of a Type A intersection as has been adopted by Manildra for this intersection.

Figure 4.7.1 2017 120th HH Traffic Flows

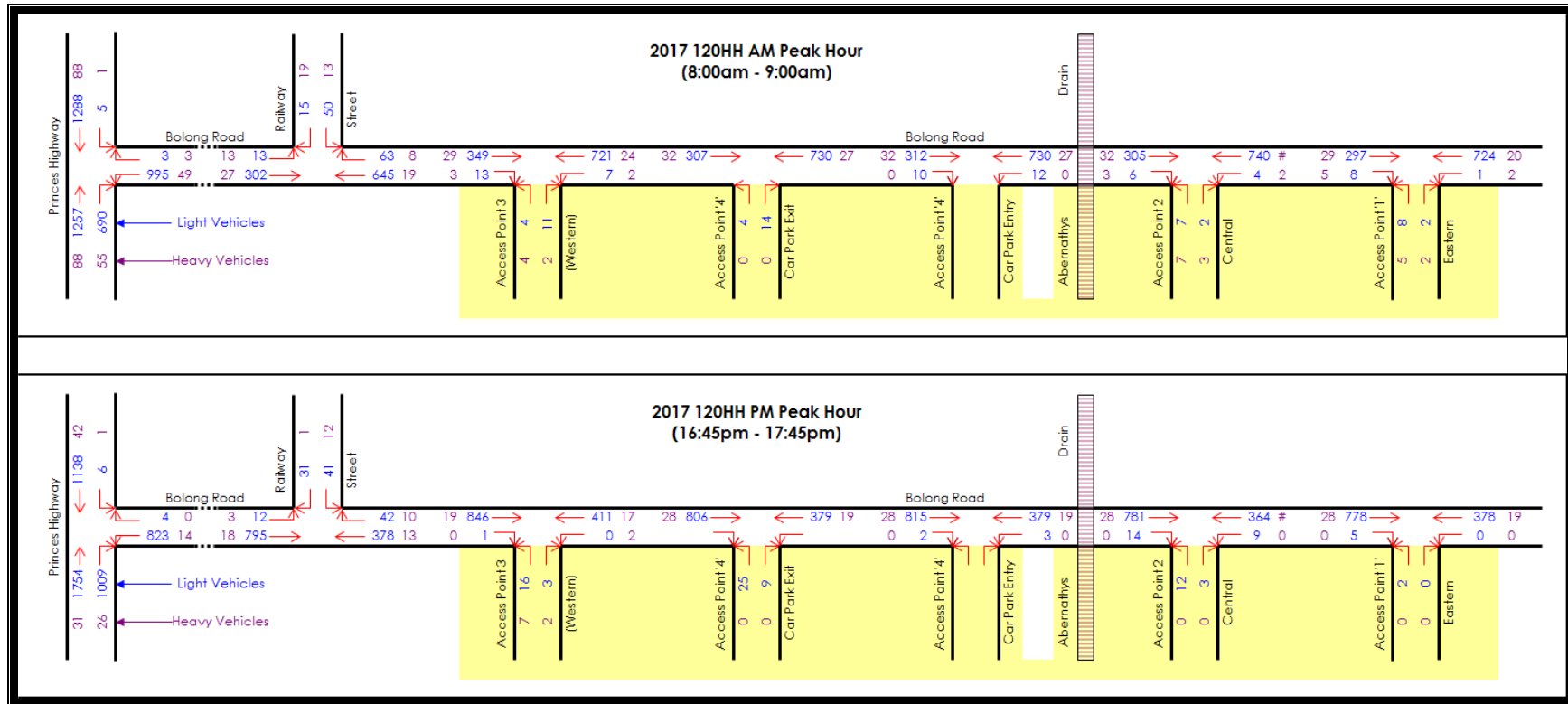


Figure 4.7.2 2017 120th HH Traffic Flows & Proposal

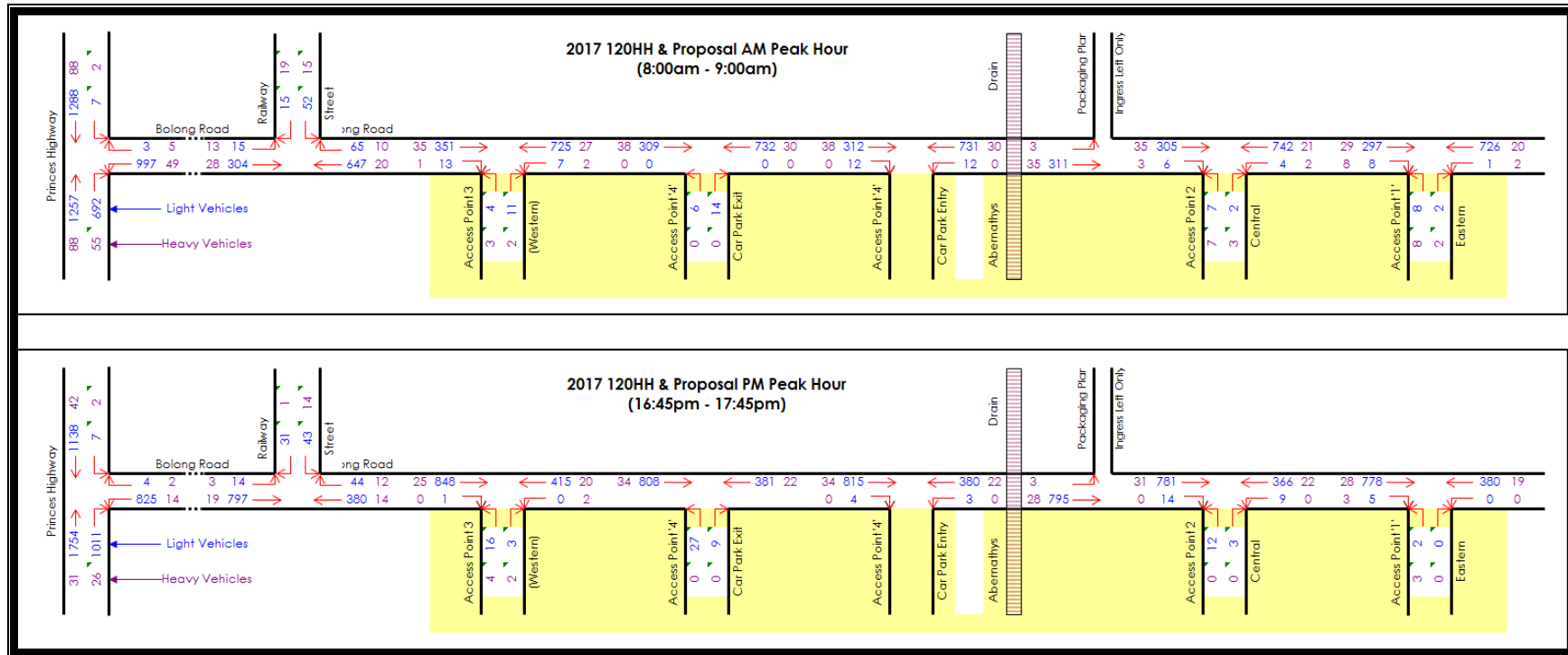


Table 4.8.1 shows the future intersection performance based simply on 10 years average growth in primary flows, while **Table 4.8.2** shows the future intersection performance based on 10 years average growth plus the generation of the Proposal.

Table 4.8.1 Intersection Performance, 2017 120HH Peak Hour

Intersection	Level of Service		Average Delay (s)		Worst Delay (s)		Degree of Saturation		95% Back of Queue (m)	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Bolong Rd & Access 1	C	B	<10	<10	35.6	14.4	0.43	0.44	7	0
Bolong Rd & Access 2	C	A	<10	<10	24.9	12.7	0.43	0.45	4	1
Bolong Rd & Access 3	B	B	<10	<10	22.0	14.9	0.42	0.37	30	45
Bolong Rd & Access 4 (Entry)	B	B	<10	<10	17.1	14.9	0.43	0.50	24	59
Bolong Rd & Access 4 (Exit)	A	A	<10	<10	14.5	10.8	0.42	0.46	2	5
Bolong Rd & Railway St	C	B	<10	<10	37.9	26.2	0.53	0.43	27	38
Bolong Rd & Princes Hwy	C	B	34.3	24.7	66.0	64.9	0.91	0.88	368	249

Table 4.8.2 Intersection Performance, 2017 120HH Peak Hour & Proposal

Intersection	Level of Service		Average Delay		Worst Delay		Degree of Saturation		95% Back of Queue	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Bolong Rd & Access 1	C	B	<10	<10	39.1	17.5	0.43	0.44	9	1
Bolong Rd & Access 2	B	A	<10	<10	25.3	12.7	0.43	0.45	5	1
Bolong Rd & Access 3	B	B	<10	<10	19.1	15.0	0.43	0.38	25	47
Bolong Rd & Access 4 (Entry)	B	B	<10	<10	17.3	15.0	0.43	0.50	25	61
Bolong Rd & Access 4 (Exit)	A	A	<10	<10	14.5	10.9	0.42	0.47	2	5
Bolong Rd & Railway St	C	B	<10	<10	38.6	27.6	0.55	0.44	27	41
Bolong Rd & Princes Hwy	C	B	34.3	24.7	66.5	67.4	0.91	0.88	368	249

4.9 SIDRA Results – 2017 120HH

The SIDRA results in **Table 4.8.1** (for future conditions under annual average growth only) show that the additional traffic loading for the 10 year forecast has a relatively significant impact on local intersections; while the local and Site intersections generally retain their existing service levels, capacity is reduced across all intersections, and queue lengths increased. This has the effect of changing LoS during the AM peak at the intersections of Bolong Road & Access Point 1, and Bolong Road & Railway Street (from LoS "B" to "C" in each case).

While the future performance of Access Point 1 is expected to be significantly better than that shown by the results (as it was Access Point 1 which generated the most significant contractor flows shown in the surveys, i.e. flows well in excess of standard operations) it is the case that even minor increases in general traffic flows at the Bolong Road & Railway Street intersection could affect its performance; notwithstanding, a LoS C is still an acceptable operational level resulting from such high annual growth demands over 10 years for 120th HH design conditions (as per the RTA GTGD).

The results show that the intersection of the Princes Highway & Bolong Road also continues to operate at a satisfactory LoS, but it also clear (with reference specifically to DoS and queue lengths) that average traffic increases will have an impact on operations. With the additional growth estimates provided for the Princes Highway a distinct possibility (as a result of the Gerringong to Bomaderry Upgrade, and to general population forecasts for the southern region), and significant growth expected west of the Princes Highway, there is no doubt that there will be a need for significant local works on the approaches to Nowra.

SCC has informed us that they are continuing to work with the RTA to develop options by which capacity and efficiency in this section of the network can be improved to accommodate these forecast traffic increases, and it is our opinion that ultimately a second or upgraded crossing of the Shoalhaven River will be required.

CSC has also reviewed submissions made by SCC (and the NRMA amongst others) seeking AUSLINK funding for critical upgrades in the region, although to our knowledge funding has not been provided as part of AUSLINK. Finally, to our knowledge the RTA does not have any upgrades of the local network scheduled in its current works program.

4.10 SIDRA Results – 2017 120HH & Proposal

The SIDRA results in **Table 4.8.2** (for future conditions under annual average growth plus traffic generated by the Proposal) show that the additional traffic generated by the Proposal has no significant impact on the operation of local intersections. LoS remains unchanged, and there are no major impacts in regard to DoS or queue lengths, or to worst delays.

This is of course not surprising, as the Proposal simply does not generate a level of traffic which would have an impact on local conditions in and of itself.

Clearly, the addition of a handful of additional trips along the two key routes – Bolong Road to the Princes Highway, and along the local industrial route – is virtually indistinguishable from the high flow increases arising from average annual route increases over a 10 year period. Additionally, CSC would again stress that the flows modelled already represent flows significantly higher than those which will be generated under standard operating conditions in the future, i.e. the generation of the Site will be lower in the future than the generation reported by the surveys.

If there is a single key movement in the local network, it is the right hand turn movement from Bolong Road to the Princes Highway. As acknowledged by SCC during our consultations, the only vehicles which would be generated to this route by the Proposal would be restricted access vehicles, and the two trips we have assigned to this movement represents a tripling of the surveyed maximum number of restricted access vehicles in any single hour. The impact of these additional trips is to increase average delay to this movement by between 1 and 3 seconds, but there is no impact on overall average delays. Further, there is no resultant increase in the average queue length in Bolong Road as a result of assigning additional restricted access vehicles to this movement.

As per our conclusions in **Section 1.4**, it will remain the case that during a small number of phases a heavy vehicle will reduce the capacity of the second left hand turn lane from Bolong Road to the Princes Highway; however, as per the existing situation, this will continue to happen very infrequently and does not in and of itself compromise average operations at the intersection.

Finally, CSC has concluded that the minimal generation of both the packaging plant ingress (from Bolong Road) and packaging plant ingress/egress (Railway Street) would, with reference to AustRoads Part 5 delay calculations, have no significant impact on local traffic movements; both would operate at a LoS "A" or "B" during even super-peak periods.

4.11 Minimising General Traffic Impacts

The most important works to be undertaken by Manildra to minimise any potential impacts arising from upgrades of the Site are the outstanding upgrade works at Access Point 2 and Access Point 3; these are critical to the provision of safe and efficient access for the Site into the future. Additionally, the provision of new rail infrastructure will significantly reduce the demand for rail movements across Bolong Road to the benefit of motorists.

As discussed in detail in numerous sections of this assessment, SCC has raised the potential of limiting or potentially excluding heavy vehicle from the local industrial route through Bomaderry.

SCC has in the past committed to heavy vehicle projects which have not eventuated. For example, a heavy vehicle bypass (along, we understand, the alignment of Meroo Road and then Railway Street) was proposed in the late 1990's but has now been abandoned; more recently, SCC indicated a proposal to upgrade the pavement surfaces along the route (for, we understand, noise attenuation and potentially some widening benefits), but this project has yet to be confirmed. SCC has also acknowledged that it would be virtually impossible to impose load limits in the local roads given that they service areas zoned for industrial development.

It is the opinion of CSC that at this time there are no compelling reasons to impose such restrictions, particularly as these local routes are recognised and essential to the provision of industrial access for the Bomaderry industrial precinct, which certainly extends to the Site. Additionally: -

- There is no apparent mechanism by which it would be possible to limit the use of the local road by some industrial sites, yet retain their use by other industrial sites.
- There would be potential impacts at the intersection of the Princes Highway & Bolong Road due to an increase in the number of vehicles – and specifically heavy vehicles – making the right hand turn movement to the north. It is our opinion that these impacts could be reduced by an upgrade of the intersection (increasing the right hand turn lane capacity) but it would be unreasonable for SCC to force vehicles (from all local sites) to use this route and then impose costs on those site operators. Further, there is not currently in place any mechanism by which a contribution could be provided.
- It is certainly the case that if the Site traffic (or indeed traffic from any specific development) were to have a demonstrable impact, some action would be required. However, this is not the case; there is no evidence that the few additional trips generated by the Proposal have any significant impact on its operation, with the most significant potential for additional delay occurring simply as a result of additional traffic flows (average annual growth) along the Princes Highway and along Bolong Road.

It is the recommendation of CSC that Manildra commits to be involved in any future consultation with the RTA and SCC that examines the use of heavy vehicles throughout the entire area, as it is certainly the case that Manildra is a significant generator of heavy vehicle trips. However, it is inappropriate to suggest that Manildra is the lone generator, with the traffic surveys clearly showing a significant local heavy vehicle generation not directed to/from the Site.

It is further our recommendation that should additional studies relating to more general amenity issues (currently being completed for inclusion in the Environmental Assessment) show that the additional trips generated by the Proposal do have an impact (on amenity) then additional impact minimisation measures must be assessed by Manildra in consultation with SCC, the RTA and the local community.

Finally, CSC would strongly support the enforcement of the existing restricted access vehicle route restrictions. While there are transport benefits associated with the use of restricted access vehicles, it is nonetheless the case that their operation along non-approved routes is inappropriate. Manildra is committed to the further education of drivers to ensure that the acknowledged restricted access vehicle movements along the local routes, though few, are redirected to the approved route via Bolong Road and the Princes Highway.

4.12 Parking

The Site currently provides approximately 230 formal parking spaces, including: -

- 110 spaces in the Moorehouse car park accessed from Access Point 4
- 21 spaces adjacent to the main office located off Bolong Road west of Access Point 3
- 26 spaces in a staff car park immediately south of Access Point 3 (behind the training facilities) and a further 50 spaces off the primary access driveway leading from Access Point 3 (DDG).
- A minimum of 20 parking spaces will also be provided on the packaging plant site, again providing in excess of the peak staff and visitor demand.

Additional visitor and short-term spaces are provided off the Access Point 2 driveway (approximately 10 spaces) and off Access Point 1 (approximately 10 spaces).

As discussed in **Section 2.9**, CSC has estimated the current peak parking demand – based on staff on-site and minimal car driver reduction opportunities – at 180 parking spaces.

While an additional 15 staff would be on-site at any one time (5 office staff and 10 shift staff) the Proposal will also see 15 staff relocated to the new packaging plant, and as such there is unlikely to be any significant increase in on-site parking demand; the 230 parking spaces provided on-site will therefore continue to provide in excess of peak demand.

The parking currently available on-site would also accommodate the bulk of additional demand that could be generated during super-peak periods, such as during a construction period. Under some circumstances it may be necessary for Manildra to provide additional temporary parking to ensure there is no demand overspill to Bolong Road. This can be provided in the south-western portion of the Site, and would only be required under exceptional peak circumstances.

Given that parking areas will therefore be available on-site in excess of the combined demand of both standard staff requirements plus contractor requirements, there is no reason for parking to be generated off-site, and specifically in Bolong Road. CSC would support any enforcement initiatives aimed at eliminating any remnant parking demand in Bolong Road in contravention of existing parking restrictions.

5 Conclusions & Recommendations

5.1 Conclusions

CSC has prepared a detailed and independent assessment of the access, traffic and parking issues associated with the Proposal, utilising available data, design standards and traffic analysis models. We have concluded that: -

- Manildra is committed to the implementation of outstanding development consent conditions at the Site. These include a significant upgrade of Access Point 2 to full compliance with a Type A intersection; and a further upgrade of Access Point 3 to limit ongoing maintenance.
- The Proposal will continue to utilise rail as a primary mode of transport, eliminating an additional demand for approximately 400 heavy vehicle trips per week in the local area. While the number of trains servicing the Site will increase (by 4 trains), the packaging plant on the northern side of Bolong Road, along with additional on-site railway siding capacity, will reduce movements across Bolong Road to approximately half current the levels, i.e. halve the number of closures of Bolong Road at the existing railway crossing.
- The Proposal will generate up to 88 additional vehicle trips daily (24 hours) to the local road network; the additional peak hour generation of the Proposal to the local road network would be a maximum of 8 vehicle trips. **These are very minor traffic increases**, which can be accommodated by the same conditioned local road upgrades as required for the recent SSFM Project, **and will have no significant impact on the local traffic network.**
- The provision of a one-way access system from Bolong Road to Railway Street for heavy vehicles accessing the packaging plant is required to provide for safe on-site access and handling, and to incorporate greater rail capacity which in turn will reduce rail crossings of Bolong Road.
- The utilisation of local industrial access routes by heavy vehicles is entirely appropriate and provides VKT, emission and time cost savings, as well as reducing impacts at key intersections.
- Parking is provided on-site and for the packaging plant in excess of the peak staff parking demand.

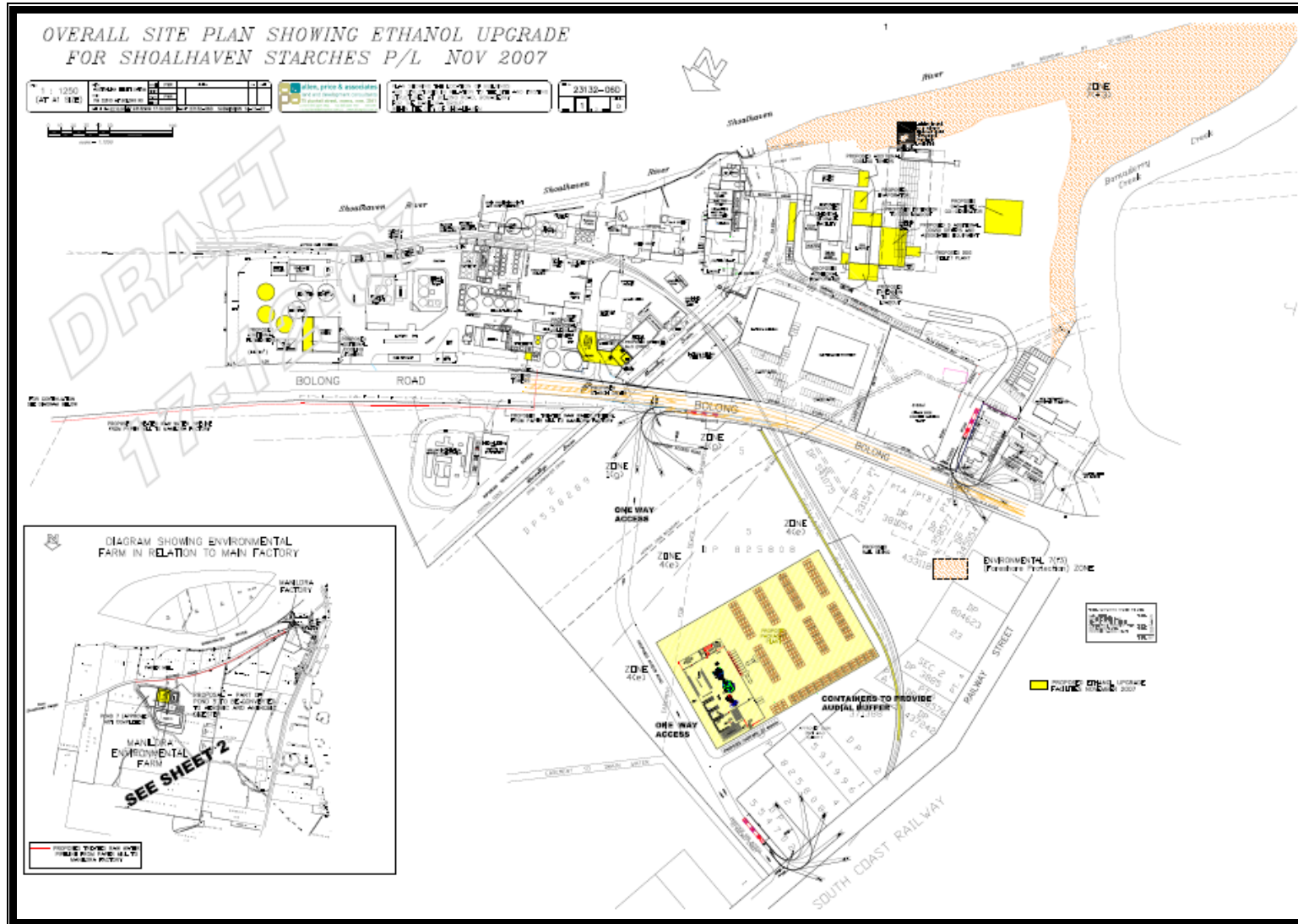
5.2 Recommendations

CSC has made the following recommendations to Manildra to achieve appropriate transport outcomes. These recommendations have been adopted by Manildra as part of the Proposal: -

- i. Access Point 2 will be upgraded following approval of final design plans by the relevant local authorities. The upgrade will be implemented as part of the approved SSFM Project, and completed prior to the commencement of the operations provided for by this Proposal.
- ii. Access Point 3 will be upgraded following approval of final design plans by the relevant local authorities. The upgrade will be implemented as part of the approved SSFM Project, and completed prior to the commencement of the operations provided for by this Proposal.
- iii. A new left in only ingress driveway will be provided from Bolong Road to the packaging plant following approval of final design plans by the relevant local authorities.
- iv. The packaging plant driveway to Railway Street will be upgraded to full compliance with the appropriate AS 2890.2:2002 design standards.
- v. A new pedestrian overpass of Bolong Road immediately west of Abernathys Creek will be developed following approval of final design plans by the relevant local authorities.
- vi. The gates providing access to the primary Site car park (Access Point 4) will remain open at all times to allow for the separation of ingress and egress movements; this recommendation has already been implemented by Manildra.
- vii. That rail movements continue to be – as far as practicable – scheduled outside of local peak periods, and specifically outside of the morning and afternoon commuter peak periods, though it is acknowledged that Manildra does not have direct control over the scheduling of rail movements.
- viii. That Manildra continues to provide heavy vehicle drivers with information and training in regard to the use of the designated restricted access vehicle route by restricted access vehicles, and the availability of on-site parking areas.
- ix. That Manildra works constructively with SCC, the RTA and local community through any future implementation of local heavy vehicle route changes; this may include changes to the use of the local industrial vehicle route and key regional routes.

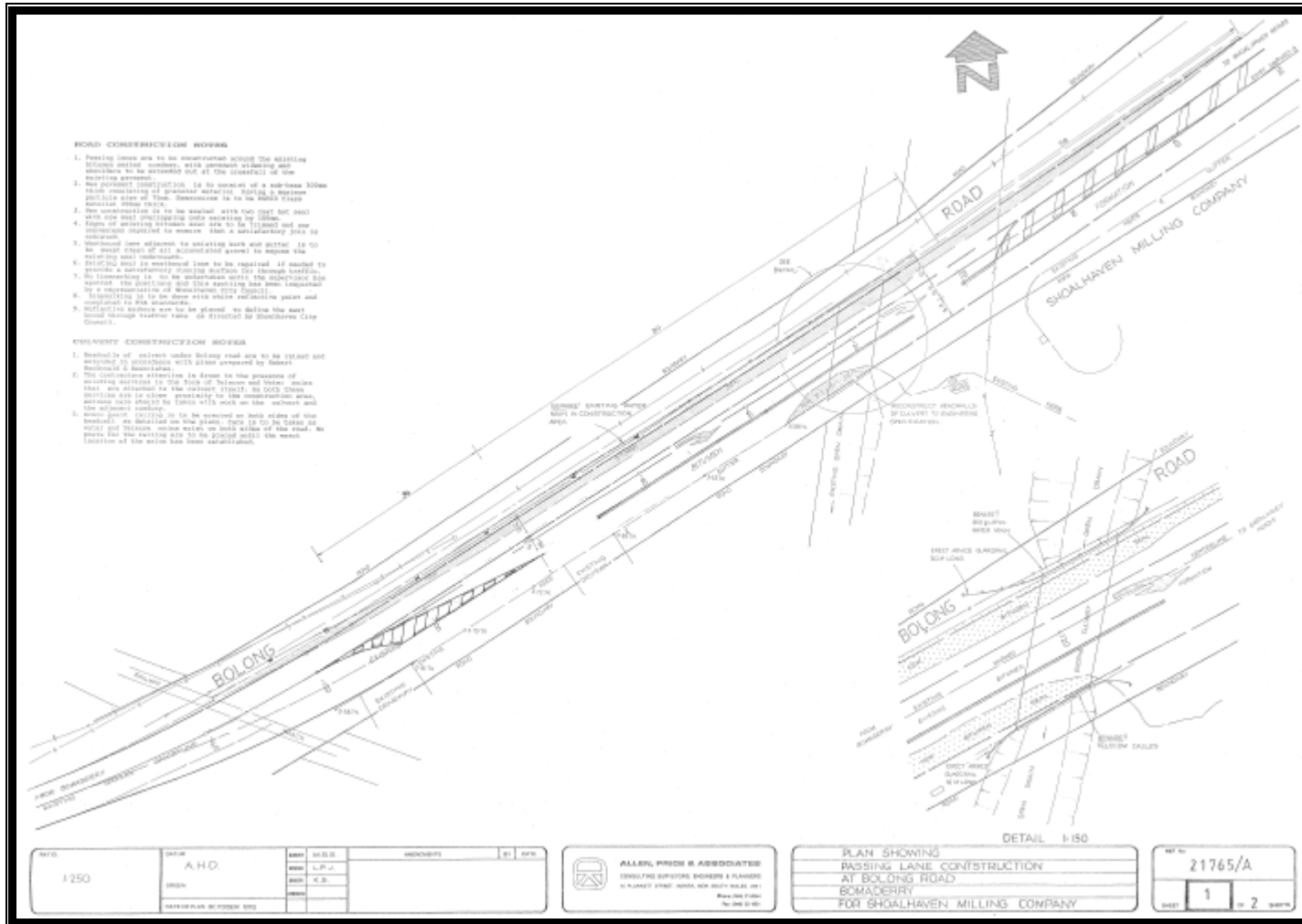
Following our assessment of the key issues associated with the Proposal, and with the application of the recommendations outlined above, CSC has concluded that the Proposal is supportable from an access, traffic and parking perspective.

Appendix A Draft Design Proposal, Access Point 2 and Packaging Plant Ingress



Source: Allan Price & Associates

Appendix A Original Design Proposal, Access Point 2 (1994)



Source: Allan Price & Associates

