APPENDIX 6

Traffic Assessment

CHRISTOPHER STAPLETON CONSULTING

Kooragang Island Fuel & BioDiesel Facility

Traffic Impact Assessment

September 2007

prepared for

Manildra Park

prepared by

Christopher Stapleton Consulting Pty Ltd

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Introduction

This report examines the access, traffic and parking issues associated with a proposal by Manildra Park for a Marine Fuel and Diesel distribution and BioDiesel production facility, in Greenleaf Road, Kooragang Island. The proposal has been classified as a major project under Part 3A of the Environmental Planning & Assessment Act, and as such this traffic assessment accompanies a broader Environmental Assessment of the project prepared by Umwelt (Australia) Pty Ltd.

The project includes three construction and operational phases, which would be completed within a 3 – 5 year period from the commencement of Phase 1 construction works. These phases comprise: -

Phase 1 **Establishment of Marine Fuel and Diesel Storage / Distribution & Ship Refuelling Facility**

- Refurbishment of the two existing 25.5 ML storage tanks located on the proposed site of the Greenleaf Road terminal, Kooragang Island
- Construction of a pipeline between the storage tanks and a wharf located on the south arm of the Hunter River
- Construction of truck loading bays
- Construction of offices and amenity buildings
- Construction of fire fighting infrastructure
- Construction of hydrocarbon and stormwater management systems

Phase 2 **Expansion of Marine Fuel and Diesel Storage / Distribution Facility**

- Construction of three new Marine Fuel and Diesel storage tanks, each with a capacity of approximately 7 ML

Phase 3 **Establishment of BioDiesel Plant**

- Construction of a new BioDiesel Plant on-site with a production capacity of approximately 52 ML per year
- Construction of one new BioDiesel vegetable oil storage tank with a capacity of approximately 5 ML and associated infrastructure

- Construction of one new BioDiesel ethanol / methanol storage tank with a capacity of approximately 0.5 ML and associated infrastructure

For the assessment of the traffic and transportation issues associated with the proposal, Christopher Stapleton Consulting Pty Ltd provides in this report an assessment of both the construction and operational impacts of each of these phases. As such, we have considered and assessed the potential traffic impacts of the following issues: -

Phase 1 **Establishment of Ship Refuelling, Marine Fuel and Diesel Storage & Distribution Facility**

- Construction impacts associated with the laying of the pipeline between the wharf and the site, i.e. impacts on Heron Road and Greenleaf Road
- Construction impacts associated with the refurbishment of on-site facilities, i.e. traffic movement impacts associated with vehicle movements to and from the site via Greenleaf Road
- Operational impacts associated with the distribution of product by heavy vehicle via the local road network

Phase 2 **Expansion of Marine Fuel and Diesel Storage & Distribution Facility**

- Construction impacts associated with the development of new on-site Marine Fuel and Diesel storage facilities
- Operational impacts associated with the distribution of product by heavy vehicle via the local road network

Phase 3 **Establishment of BioDiesel Plant**

- Construction impacts associated with the development of new on-site BioDiesel production and storage facilities
- Operational impacts associated with the distribution of product by heavy vehicle via the local road network

To properly assess the impacts associated with each of these phases, Christopher Stapleton Consulting Pty Ltd has undertaken a rigorous assessment of the existing and future operation of the local traffic network. This has included: -

- Discussions with Newcastle City Council and the Hunter Regional RTA to determine local traffic and transportation issues, as well as to consolidate the scope of the assessment.

- A review of the key traffic and transport guidelines and assessment criteria, including: -

  - RTA Guide to Traffic Generating Developments
  - RTA Road Design Guide
  - Newcastle City Council Newcastle DCP 2005
  - AS 2890.1:2004
  - AS 2890.2:2002

- On-site observations and traffic surveys

- Intersection modelling (SIDRA)

Christopher Stapleton Consulting Pty Ltd has also specifically reviewed the summary of issues and requirements provided both by the RTA (February 2007) and the Director General (May 2007).

Christopher Stapleton Consulting Pty Ltd wishes to acknowledge the assistance of both Newcastle City Council and the RTA in providing information relating to existing and potential future local traffic conditions.

1 The Existing Local Environment

1.1 The Existing Site

The site is located off Greenleaf Road Kooragang Island; previously the site was used for the storage of naphtha through the 1970's, but has not been used since the early 1980's.

More recently (1993) Ampol submitted an application for the use of the site with refurbished tanks as a distribution facility; while the application was approved, Ampol did not carry through with the proposal.

The Site in its local context is shown in **Figure 1.1**.

1.2 Kooragang Industrial Precinct

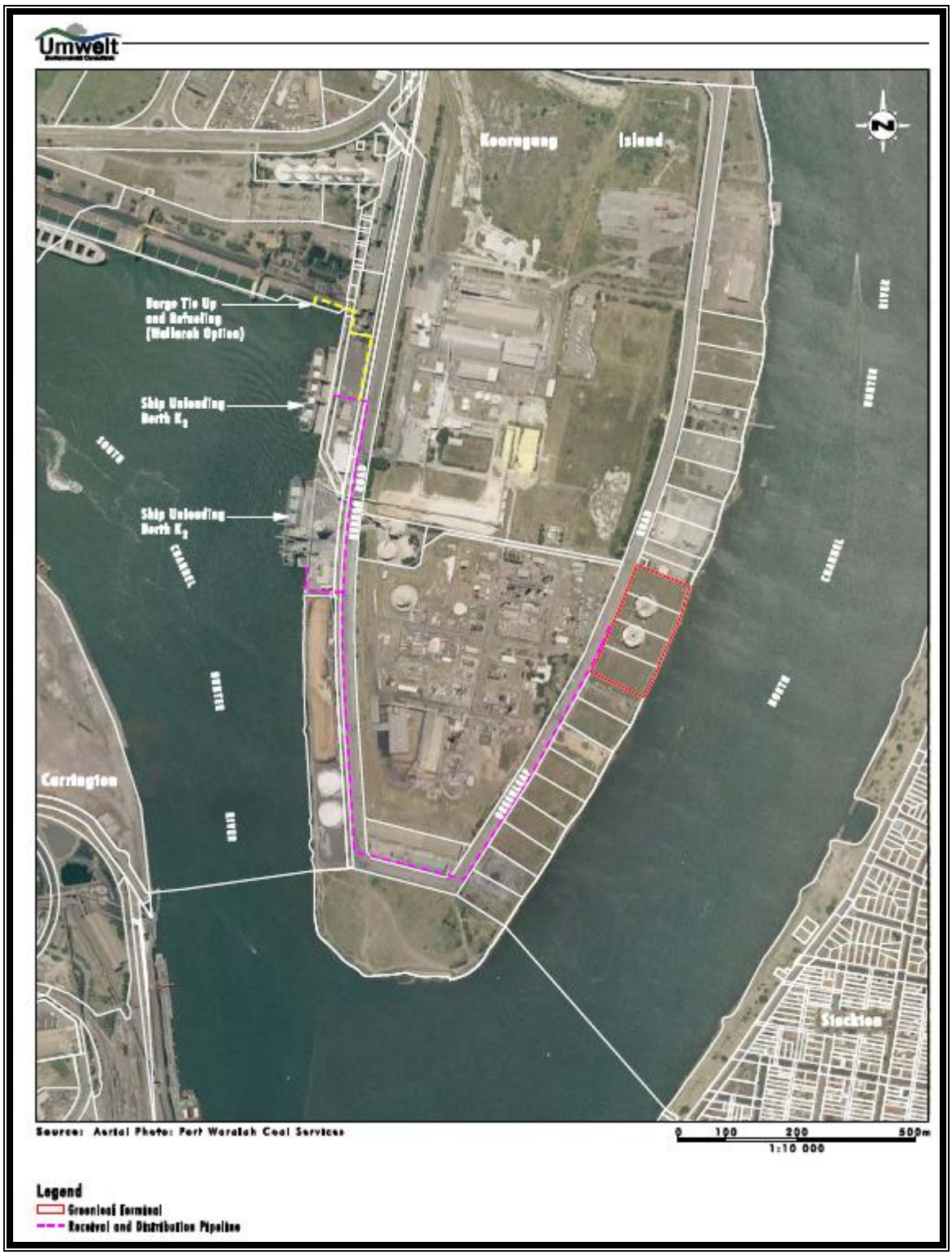
The broader area of Kooragang is a highly industrialised precinct north of Newcastle; industrial facilities revolve principally around the export of coal from the nearby coalfields and to a lesser degree storage and processing facilities.

Following the closure of the BHP facilities on the southern side of the Hunter River, new commercial, residential and [to the west] industrial sites have developed. Steel River, an industrial park development, in particular has signalled a new era in Newcastle industry.

On the northern side of the River however, and specifically sites off Cormorant Road, storage, processing and distribution sites still dominate, specifically because of the berthing facilities available on the northern side of the Hunter River.

The highly industrialised/commercialised nature of the precinct has a number of significant benefits, including: -

Figure 1.1 The Site



Source: Umwelt

- Immediate access to the regional road network - Cormorant Road and Industrial Drive - via the wide industrial feeder roads of Greenleaf and Heron Roads. These routes also have restricted access vehicle (B-Double) approval.

- No residential population. Council has identified the wider precinct for industrial development, and as such there is significant separation between the precinct and the nearest residential centres. This minimises potential impacts on residents, including noise and traffic impacts.

- Shared facilities and infrastructure. The creation and constant redefinition over many decades of Kooragang Island has culminated in a precinct that provides for all of the demands of heavy industry; this is not limited to the provision of an appropriate road and port infrastructure network, but also of feeder industries located within the precinct to make it more self-sufficient.

The available infrastructure also extends to the immediacy of the berthing areas in the Hunter River. The proximity of the site to these berths makes it feasible to provide a pipeline directly to the Greenleaf Road terminal, and therefore further reduce secondary vehicle movements and their associated impacts.

These are all important factors to consider as part of the traffic and transport assessment. While the traffic generation of the site will be minimal, there are many alternative locations where that same generation would have a significant impact on the existing local area, be it from traffic, noise or other impacts. The location of the site within the Kooragang precinct provides the greatest opportunity to minimise any such impacts.

1.3 Local Traffic Network

1.3.1 General Network

The local traffic network exhibits all the hallmarks of a successfully designed industrial area; this includes: -

- Immediate access to a sub-regional connector Cormorant Road which has itself been designed to higher industrial standards for width and weight, and provides for the movement of all vehicles including restricted access vehicles (i.e. B-Doubles over 19m).

- From Cormorant Road, immediate access to the regional road network at Industrial Drive via a well designed signalised intersection with significant capacity for existing and future traffic generation.

- Wide local access roads with broad shoulders and turning aprons to accommodate even the largest vehicles.

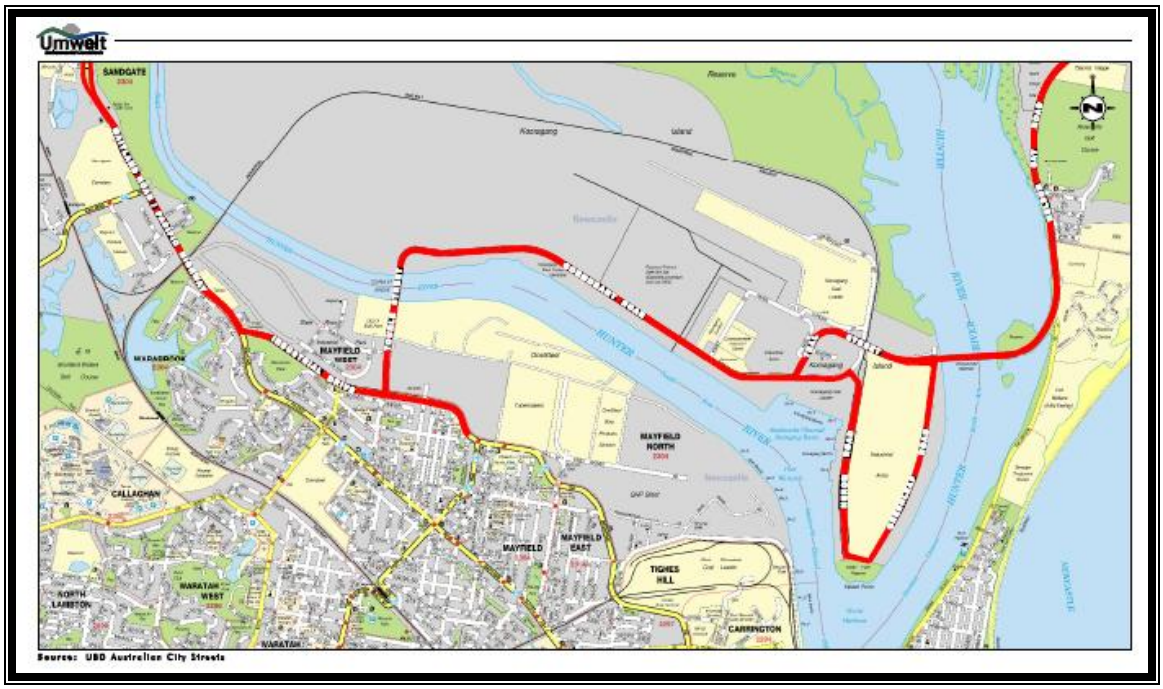
- Well designed local intersections, including internal access intersections and the junction of Cormorant Road and Teal Street, which has recently been upgraded by the RTA to provide significant spare capacity.

- Access options, with the on and off ramps from Teal Street at the Stockton Bridge providing a viable and, for this proposal, immediate alternative for sites off Greenleaf Road to the Cormorant Road roundabout. We note that the roundabout will still be a key part of the access trip between the Site and major clients to the west but that trips via the Teal Street ramps would be amalgamated within the existing major flow (Stockton to Newcastle and vice versa) which is specifically catered for by the roundabout design.

The new roundabout at the intersection of Cormorant Road and Teal Street has had the most significant positive impact on the local network. The previous priority 'T' intersection was poorly defined and did not clearly provide the swept paths necessary to accommodate the high percentage of heavy vehicles in the area.

The arterial road network which surrounds the Greenleaf Road Terminal sites can be seen in **Figure 1.3.1**

Figure 1.3.1 The Arterial Road Network



The only minor constraint in the local area is the Tourle Street bridge west of the site, which provides all access from the industrial precinct to Industrial Drive. The bridge provides two lane capacity which is generally appropriate to the traffic volumes in the area, but is in a state of some disrepair, a factor certainly not assisted by the heavy vehicle demands on the Bridge.

However, this will be rectified in the near future, with the RTA having recently called for tenders for the construction of a new bridge and approaches. Christopher Stapleton Consulting Pty Ltd does not have details of the proposed bridge, but again based on traffic flows a two lane bridge of greater width and strength for heavy vehicle movements is likely.

More importantly – based on our discussions with Council and the RTA – there are no significant capacity concerns due to the bridge width, nor would the minor traffic generation of the proposal impact on that capacity. This issue is discussed in greater detail in **Section 2**.

Christopher Stapleton Consulting Pty Ltd notes that there is more than adequate capacity on the Tourle Street approach to Industrial Drive.

1.3.2 Local Traffic Flows

In order to better define existing local traffic flows, Christopher Stapleton Consulting Pty Ltd commissioned a series of traffic surveys in the local area in December 2006; these survey were augmented by available counts commissioned for other local projects in the past few years and available publicly; and the RTA's own AADT figures.

Classified counter data was provided at the following locations: -

- Greenleaf Road south of Teal Street
- Cormorant Road West of Teal Street
- Cormorant Road east of Teal Street
- Teal Street north of Cormorant Road

Intersection surveys were conducted at the following locations: -

- Cormorant Road & Teal Street roundabout
- Teal Street on and off ramps to Greenleaf Road

A summary of the traffic survey results is provided in **Figure 1.3.2a** (AM peak) and **Figure 1.3.2b** (PM peak). Additional peak and daily flows sourced from recent reports in the local area and from the RTA are shown in **Table 1.3.2**.

Figure 1.3.2a Existing Key Local Flows AM Peak Hour

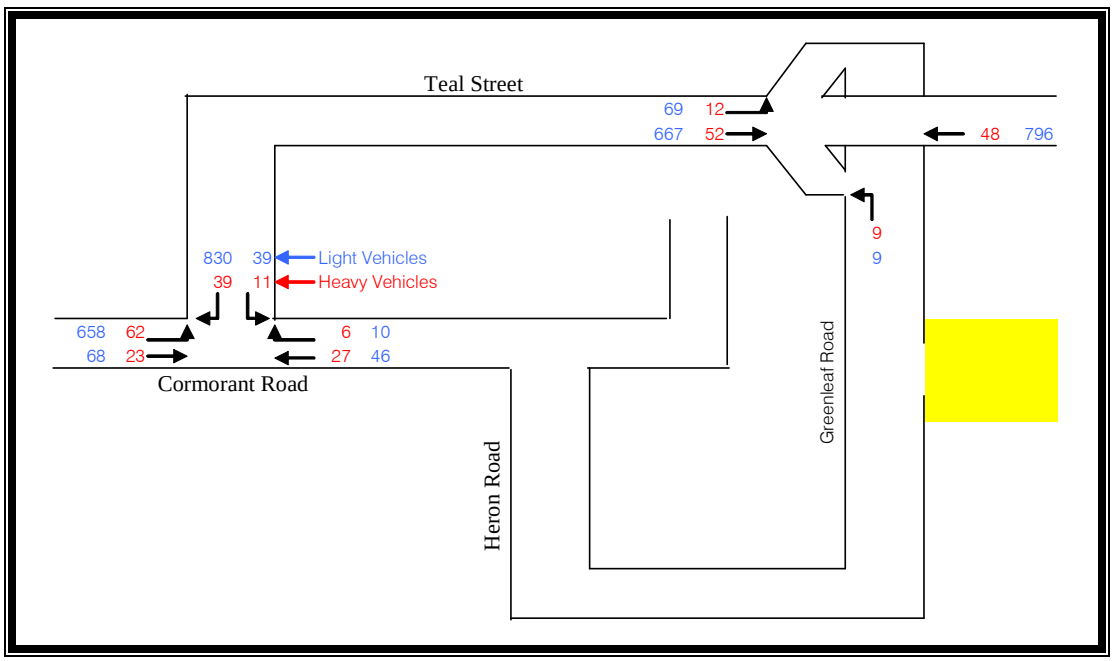


Figure 1.3.2b Existing Key Local Flows PM Peak Hour

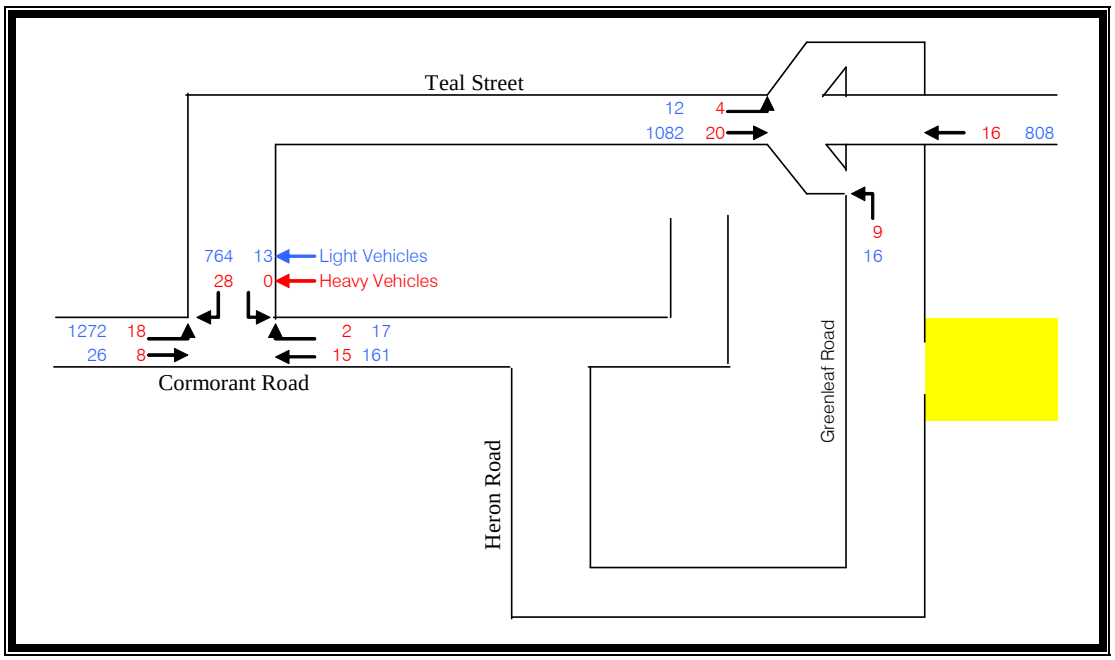


Table 1.3.2 Additional Traffic Flow Data

Location	Vehicle Type	AM Peak Hour			PM Peak Hour			Daily		
		Total	Nth/East	Sth/Wst	Total	Nth/East	Sth/Wst	Total	Nth/East	Sth/Wst
Cormorant Road east of Teal Street	Light	1602	726	876	2223	1298	925			
	Heavy	151	85	66	69	26	43			
	Total	1753	811	942	2292	1324	968	24,000		
Cormorant Road west of Teal Street	Light	267	207	60	249	58	191	2530	1106	1424
	Heavy	63	28	35	59	27	32	1137	545	593
	Total	329	234	95	308	84	223	3667	1651	2016
Teal Street north of Cormorant Street	Light	1537	668	869	2066	1289	777			
	Heavy	118	68	50	48	20	28			
	Total	1655	736	919	2114	1309	805	20,000		
Greenleaf Road south of Teal Street	Light	145	20	124	183	85	98	1455	499	957
	Heavy	12	4	8	31	12	19	313	113	200
	Total	157	24	133	214	97	117	1768	612	1157
Teal Street on-ramp	Light	69	69		12	12				
	Heavy	12	12		4	4				
	Total	81	81		16	16				
Teal Street off-ramp	Light	9		9	62		62			
	Heavy	9		9	9		9			
	Total	18		18	71		71			

Source: *Assett Management Products & Services Pty Ltd & Curtis Traffic Surveys*
Source: *RTA*

1.3.3 Existing Road & Intersection Capacity

Overall, the local network operates at a high level of service, with most roads and intersections having significant spare capacity.

A review of the traffic flows at the local intersections away from Cormorant Road indicates that these intersections operate at a good level of service; essentially, the low surveyed traffic flows coupled with excellent intersection geometry and sight distances ensures a high standard of performance at intersections including Cormorant Road & Heron Road, and the on ramp approach from Greenleaf Road to Teal Street. Since its upgrade, the roundabout intersection of Cormorant Road and Teal Street also provides significant capacity and a high standard of operation.

In order to determine the current level of service at this key local intersection, Christopher Stapleton Consulting Pty Ltd has modelled its performance using the SIDRA model. SIDRA is an RTA approved intersection performance model that determines key performance measures for 'isolated' intersections, be they priority, roundabout or signal controlled. The SIDRA analysis includes: -

- Surveyed peak hour traffic flows, speed profiles and sight distances
- Existing intersection geometry and priority control
- Existing lane availability and utilisation based on the time period and/or local conditions

The key performance measures resulting from the analysis are outlined below.

- **Level of Service**

  Level of Service (LoS) is a basic performance parameter assigned to an intersection based on average delay; we note that we have assessed the intersections using the RTA parameters which use only delay in the calculation of LoS.

  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 are provided below: -

Level of Service (RTA Method)	Control delay per vehicle in seconds (d) (including geometric delay)	
	Signals and Roundabouts	Stop and Give Way / Yield Signs
A	d < 14.5	d < 14.5
B	14.5 < d < 28.5	14.5 < d < 28.5
C	28.5 < d < 42.5	28.5 < d < 42.5
D	42.5 < d < 56.5	42.5 < d < 56.5
E	56.5 < d < 70.5	56.5 < d < 70.5
F	70.5 < d	70.5 < d

- **Degree of Saturation**

  Degree of Saturation (DoS) 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)

- **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 delay for signals and roundabouts represents an average of delays to all vehicles on all approaches, while for priority intersections the average delay for the worst approach is used.

- **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 roundabouts and priority intersections (i.e. the longest period in which no vehicles from the minor movement can enter the opposing primary flow).

In our assessment, we have included all aspects of the existing operation of the roundabout; this includes not only the existing traffic flows including heavy vehicle numbers, which essentially account for two 'light' vehicles in the modelling, but also the geometry of the intersection, lane and island widths and vehicle speeds. The results of the SIDRA analysis of the intersections are provided below in **Table 1.3.3.**

Table 1.3.3 SIDRA Results, Cormorant Road & Teal Street

Peak Period	Level of Service	Average Delay	Worst Delay	Capacity	95% Queue
AM Peak Hour	A	11 second	17 seconds	0.35	17m
PM Peak Hour	A	10 seconds	14 seconds	0.44	27m

The SIDRA analysis clearly shows that the intersection of Cormorant Road and Teal Street currently operates at a high level of service during the peak periods, with low average delays and significant spare capacity.

These results and indeed the traffic flows upon which they are based almost identically replicate the most recent studies of the intersection of which we are aware, conducted by Masson Wilson Twiney in 2006 for the *Newcastle Coal Infrastructure Group Export Terminal* EIS.

1.3.4 Additional Local Issues

Our review of the existing local traffic network shows that it currently operates at a high level of performance, with significant spare capacity; numerous available local routes; and caters for all vehicle types. There is also a significant amount of on-street parking available in both Heron Road and Greenleaf Road.

We have discussed the local area and the proposal with both the RTA (Dave Young, Land Use Development Manager) and with Newcastle City Council (Joe Gleeson, Traffic Engineer) to determined whether there are any other local issues which might have a bearing on the proposal, and more specifically areas which might be impacted by the proposal.

To this end, both the RTA and Council have indicated that the local network at present operates well, particularly following the introduction of the new roundabout at Cormorant Road & Teal Street. Additionally, downstream capacity may be further improved in the future with Cormorant Road potentially being widened to four traffic lanes, and with the reconstruction of the Tourle Street bridge.

The only issue raised related to the use of the local industrial roads by speeding vehicles after business hours, and particularly on Friday and Saturday nights. This does pose a safety issue, exacerbated by the use of large vehicles in the area, but as pointed out by Newcastle City Council, this is a matter for Council and the Police to determine.

2 The Development Proposal

Manildra Park proposes the refurbishment of the existing tanks located off Greenleaf Road, Kooragang Island for use as a diesel receival, distribution and biodiesel production facility.

As outlined in our **Introduction**, the project includes three construction and operational phases, which would be completed within a 3 – 5 year period on the commencement of Phase 1 construction works. These phases comprise: -

Phase 1 **Establishment of Marine Fuel and Diesel Storage / Distribution & Ship Refuelling Facility**

- Refurbishment of the two existing 25.5 ML storage tanks located on the proposed site of the Greenleaf Road terminal, Kooragang Island
- Construction of a pipeline between the storage tanks and a wharf located on the south arm of the Hunter River
- Construction of truck loading bays
- Construction of offices and amenity buildings
- Construction of fire fighting infrastructure
- Construction of hydrocarbon and stormwater management systems

Phase 2 **Expansion of Marine Fuel and Diesel Storage / Distribution Facility**

- Construction of three new Marine Fuel and Diesel storage tanks, each with a capacity of approximately 7 ML

Phase 3 **Establishment of BioDiesel Plant**

- Construction of a new BioDiesel Plant on-site with a production capacity of approximately 52 ML per year
- Construction of one new BioDiesel vegetable oil storage tank with a capacity of approximately 5 ML and associated infrastructure
- Construction of one new BioDiesel ethanol / methanol storage tank with a capacity of approximately 0.5 ML and associated infrastructure

For the assessment of the traffic and transportation issues associated with the proposal, Christopher Stapleton Consulting Pty Ltd has assessed both the construction and operational impacts of each of these phases in turn, and the 'generic' on-site issues which are common to all phases, including site access and parking.

2.1 Phase 1, Establishment of Ship Refuelling, Marine Fuel and Diesel Storage & Distribution Facility

2.1.1 Issues Summary

For the purpose of assessing Phase 1, Christopher Stapleton Consulting Pty Ltd has identified the following key potential construction and operating impacts: -

- Construction impacts associated with the laying of the pipeline between the wharf and the site, i.e. impacts on Heron Road and Greenleaf Road
- Construction impacts associated with the refurbishment of on-site facilities, i.e. traffic movement impacts associated with vehicle movements to and from the site via Greenleaf Road
- Operational impacts associated with the distribution of product by heavy vehicle via the local road network

2.1.2 Pipeline Construction

At this time, the full details of the route of the pipeline to the Site have yet to be finalised. Details of the berth, its operation and capacity are examined elsewhere in the Environmental Assessment (EA).

Regardless of the location of the pipeline, it is likely that at some time traffic on both Herron Road and Greenleaf Road will need to be controlled to allow for the construction of the pipeline.

The potential traffic impacts associated with the construction of the pipeline have been assessed using peak period and overnight traffic flow data. With reference to this data, traffic flows between 7:00pm and 5:00am comprise 15% of the total daily flow in Greenleaf Road, with a maximum of 58 two-way vehicle trips per hour (7:00pm – 8:00pm). This level of traffic could be accommodated by – at worst - a simple one lane 'stop-go' arrangement with little if any impact.

Indeed, even the peak period flows in Greenleaf Road (peak 214 vph between 3:00pm and 4:00pm) could be accommodated by a 'stop-go' system; depending on the construction details, this may actually be a preferable alternative as it would allow for the work to be completed within a shorter period of time with minimal disruption.

Based on the available traffic surveys and observations, flows in Heron Road are lower than those in Greenleaf Road, but comprise a higher percentage of heavy vehicles. Again, the use of a 'stop-go' system in Heron Road would have little if any impact on existing traffic flows.

Christopher Stapleton Consulting Pty Ltd has also considered the temporary closure of both roads to allow for the construction period. There are a small number of access routes that would be slightly disadvantaged by such a proposal; for example, the closure of Heron Road would require some trips to the north to use Greenleaf Road, the on-ramp to Teal Street, thence turn at the roundabout and travel back to the north.

Similarly, for a brief period the performance of the roundabout would be slightly reduced due to an increase in demand for east-west trips (through the primary west-north flow) should Greenleaf Road be closed.

However, even if all the demand were redistributed to Cormorant Street (east) the roundabout would still operate at a Level of Service "A" or "B" at worst, and again only for a very short period of time. A worst case future distribution of trips is considered in more detail in **Section 2.4** below.

We have discussed this construction period with both the RTA and Council; both agree that the low traffic demands can be accommodated temporarily by traffic management should road work to access the pipeline be required.

In conclusion, irrespective of the final details of the pipelines location, and the period of construction, our preliminary assessment indicates that either temporary closures of half or all of Heron Road and Greenleaf Road would have no significant impact on the operating efficiency of local sites, regardless of the time of the day.

2.1.2 On-Site Construction & Phase 1 Operations

For the assessment of both the Phase 1 construction and operational impacts, we have examined the total trip generation of the Phase 1 operating Site as a peak generation. This is an appropriate methodology given the available construction data (very little) and operational data (very good). Importantly, the chances of the construction phase generating more trips than the operational phase are low, particularly given that our method of analysis loads ***the total daily vehicle trip generation during a single peak hour***, a period during which construction vehicles rarely operate.

The trip generation of Phase 1 will comprise both distribution vehicles (heavy) and staff vehicles (light). It is estimated that during Phase 1 the facility will generate only a small number of daily distribution trips, with approximately 10 heavy vehicle trips (i.e. 5 truck loads arriving and departing), and trips generated by 13 full time staff.

Assuming that all the heavy vehicle trips occur during either the existing morning or afternoon peak period, and further assuming that all staff arrive or depart during these periods in individual vehicles, **the Site could generate 23 vehicle trips** in either the morning or afternoon peak hour.

From a trip distribution perspective, the majority of heavy vehicles and staff vehicles are expected to be generated to and from the west (Newcastle); additionally, a review of the survey data shows that sites in Greenleaf Road generate trips predominantly via the Teal Street ramps, not via Heron Road and Cormorant Road (east).

As for these existing trips, Christopher Stapleton Consulting Pty Ltd is of the opinion that the Teal Street ramps will provide for the majority of access demands for the Site, with only a small number of movements via the internal local roads (Greenleaf Road, Heron Road and Cormorant Road) to access the north (Stockton Bridge towards Williamtown).

Accounting for these factors provides the following distribution of the additional trips: -

- 80% of heavy vehicle trips travel between Cormorant Road (west) and the Site via Teal Street, the Teal Street ramps and Greenleaf Road.
- 80% of staff trips utilise this same Teal Street ramp route
- 20% of heavy vehicle trips travel between the north and the Site via the Stockton Bridge, Teal Street, Cormorant Road, Herron Road and Greenleaf Road
- 20% of staff trips utilise this same Heron Road route

The additional trips generated to the local road network by the Site under Phase 1 conditions are shown in **Figure 2.1.2a** (AM peak) and **Figure 2.1.2b** (PM peak). The total future flows at the key roundabout intersection of Teal Street & Cormorant Road and at the Teal Street ramps under Phase 1 conditions are shown in **Figure 2.1.2c** (AM peak) and **Figure 2.1.2d** (PM peak).

Christopher Stapleton Consulting Pty Ltd notes that for the Phase 1 intersection assessment we have increased existing flows by a factor of 2% over a period of 2 years to represent annual growth.

Figure 2.1.2a Phase 1 Additional Site Trips AM Peak Hour

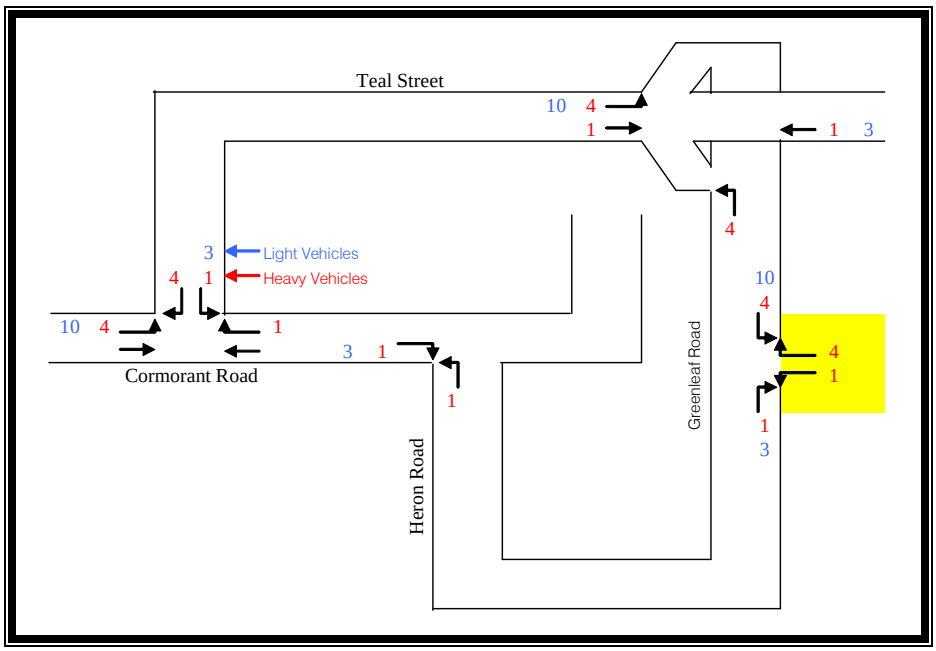


Figure 2.1.2b Phase 1 Additional Site Trips PM Peak Hour

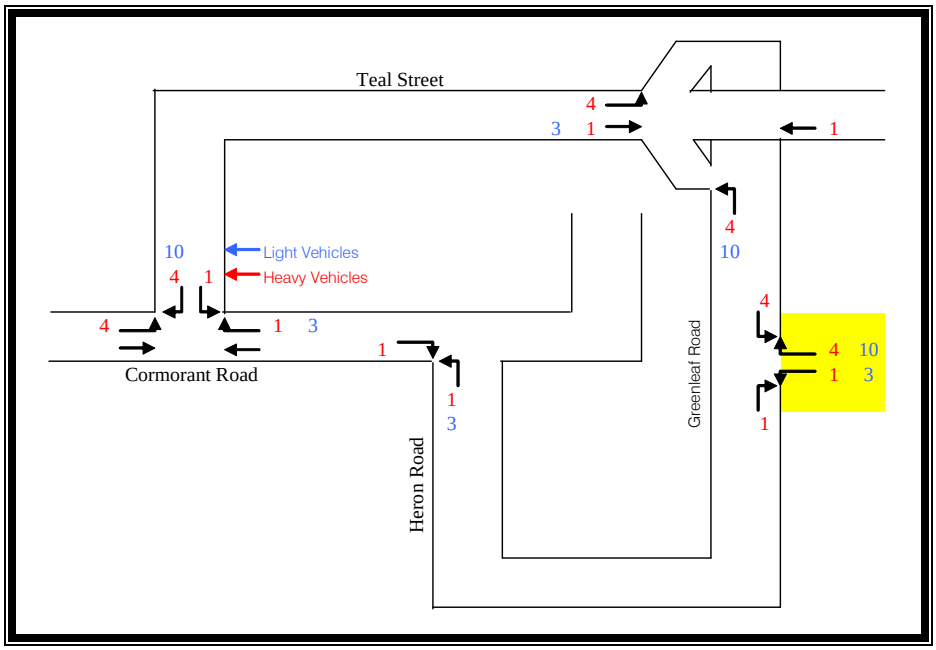


Figure 2.1.2c Phase 1 Future Local Flows AM Peak Hour

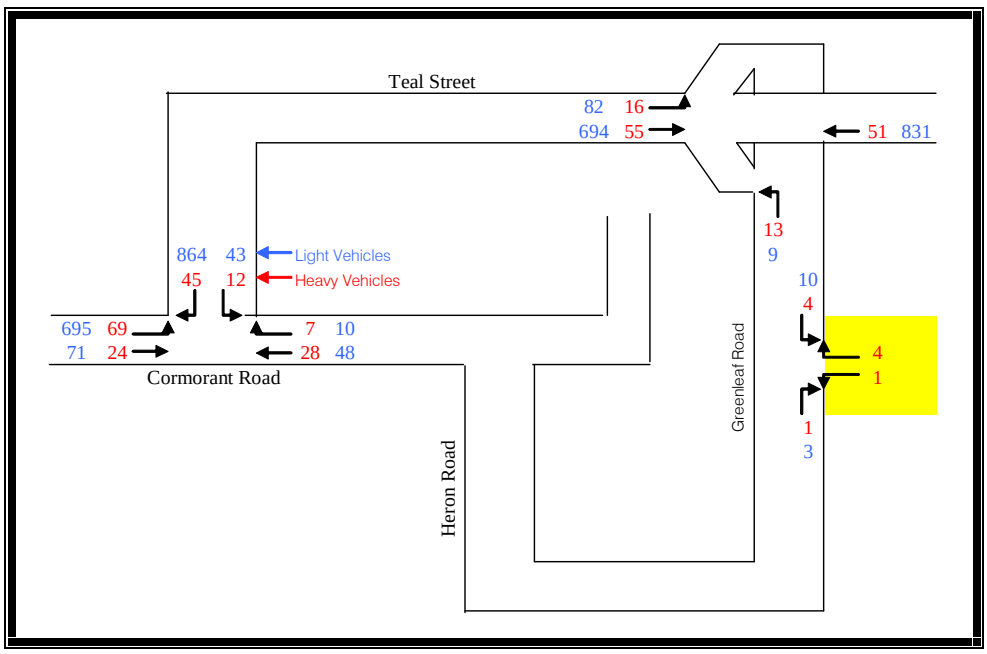
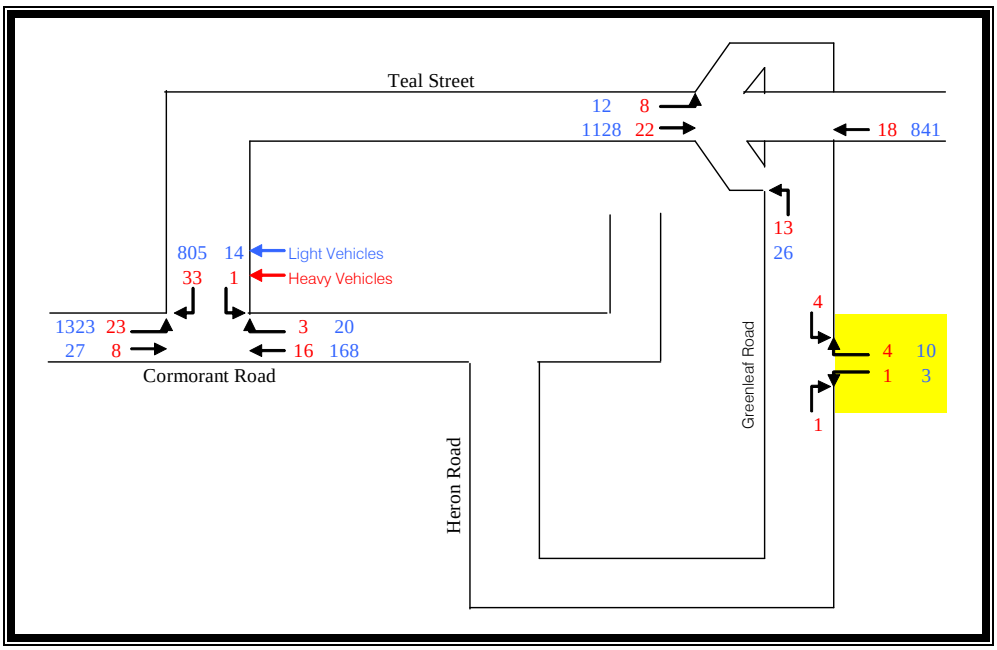


Figure 2.1.2d Phase 1 Future Local Flows PM Peak Hour



2.1.3 Future Intersection Performance

Using the future traffic flows reported above in **Section 2.1.2**, Christopher Stapleton Consulting Pty Ltd has remodelled the key intersection of Teal Street and Cormorant Road using SIDRA. The results are provided below in **Table 2.1.3**.

Table 2.1.3 Phase 1Cormorant Rd & Teal St Intersection Performance

Peak Period	Level of Service	Average Delay	Worst Delay	Capacity	Worst 95% Queue
AM Peak Hour	A	11s	17s	0.37	19m
PM Peak Hour	A	10s	14s	0.46	30m

The results of the SIDRA modelling show that even if all the Phase 1 trips were to occur during the existing peak hours, there would be no change in the existing level of service at the Cormorant Road & Teal Street intersection.

Christopher Stapleton Consulting Pty Ltd has concluded that the traffic generation of the Phase 1 operations and construction would have no impact on the existing local traffic environment, and specifically no impact on the operation of the key local intersection of Cormorant Road & Teal Street.

2.2 Phase 2, Expansion of Marine Fuel and Diesel Storage / Distribution Facility

2.2.1 Issues Summary

For the purpose of assessing Phase 2, Christopher Stapleton Consulting Pty Ltd has identified the following key potential construction and operating impacts: -

- Construction impacts associated with the development of new on-site Marine Fuel and Diesel storage facilities

- Operational impacts associated with the distribution of product by heavy vehicle via the local road network

2.2.2 On-Site Construction & Phase 2 Operations

As for the assessment of the Phase 1 traffic impacts, for the assessment of both the Phase 2 construction and operational impacts, we have examined the total trip generation of the Phase 2 operating Site as a peak generation. This again is an appropriate methodology given the construction and operational data available; again, the chances of the construction phase generating more trips than the operational phase are very low, particularly with all heavy vehicle trips assigned during a single peak hour.

The trip generation of Phase 2 will comprise both distribution vehicles (heavy) and staff vehicles (light). It is estimated that during Phase 2 the daily heavy vehicle generation of the facility will increase to approximately 16 trips (i.e. 8 loads arriving and departing), plus the generation of an additional 4 full time staff (taking the total to 17 full time staff).

Assuming that all the daily heavy vehicle trips occur during either the existing morning or afternoon peak period, and further assuming that all staff arrive or depart during these periods in individual vehicles, **the Site could generate 33 vehicle trips** in either the morning or afternoon peak hour.

The distribution of these trips would remain the same as outlined for Phase 1 in **Section 2.1** above.

The additional trips generated to the local road network by the Site under Phase 2 conditions are shown in **Figure 2.2.2a** (AM peak) and **Figure 2.2.2b** (PM peak). The total future flows at the key roundabout intersection of Teal Street and Cormorant Road and at the Teal Street ramps under Phase 2 conditions are shown in **Figure 2.2.2c** (AM peak) and **Figure 2.2.2d** (PM peak).

Christopher Stapleton Consulting Pty Ltd notes that for the Phase 2 intersection assessment we have increased existing flows by a factor of 2% over a period of 5 years.

Figure 2.2.2a Phase 2 Additional Site Trips AM Peak Hour

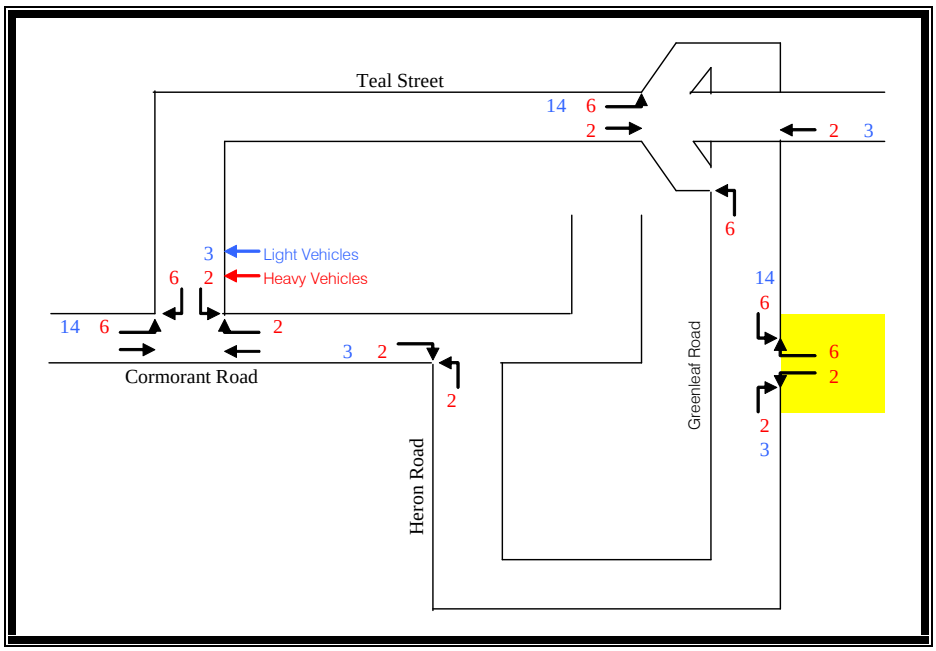


Figure 2.2.2b Phase 2 Additional Site Trips PM Peak Hour

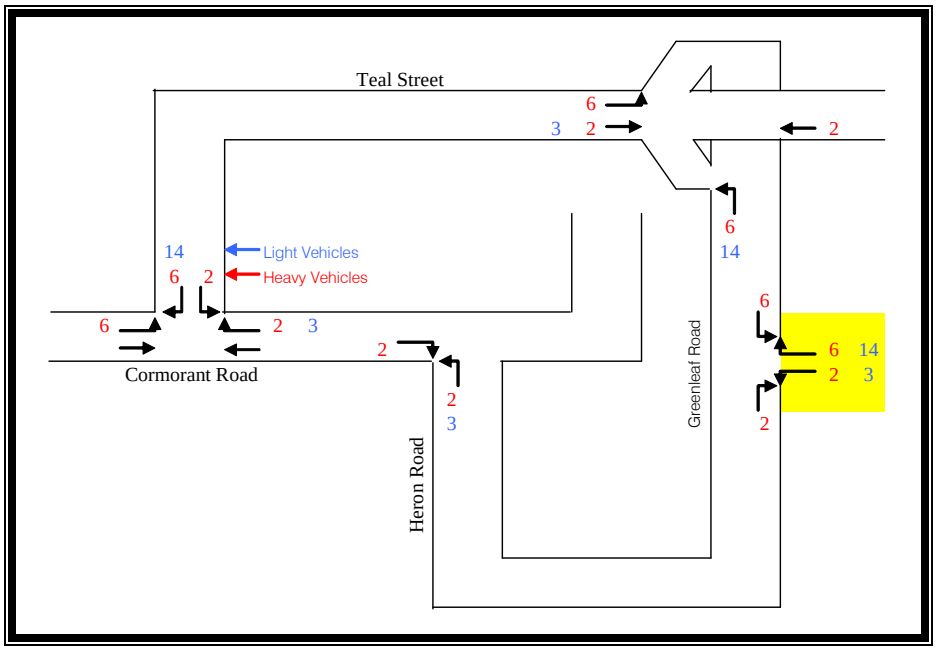


Figure 2.2.2c Phase 2 Future Local Flows AM Peak Hour

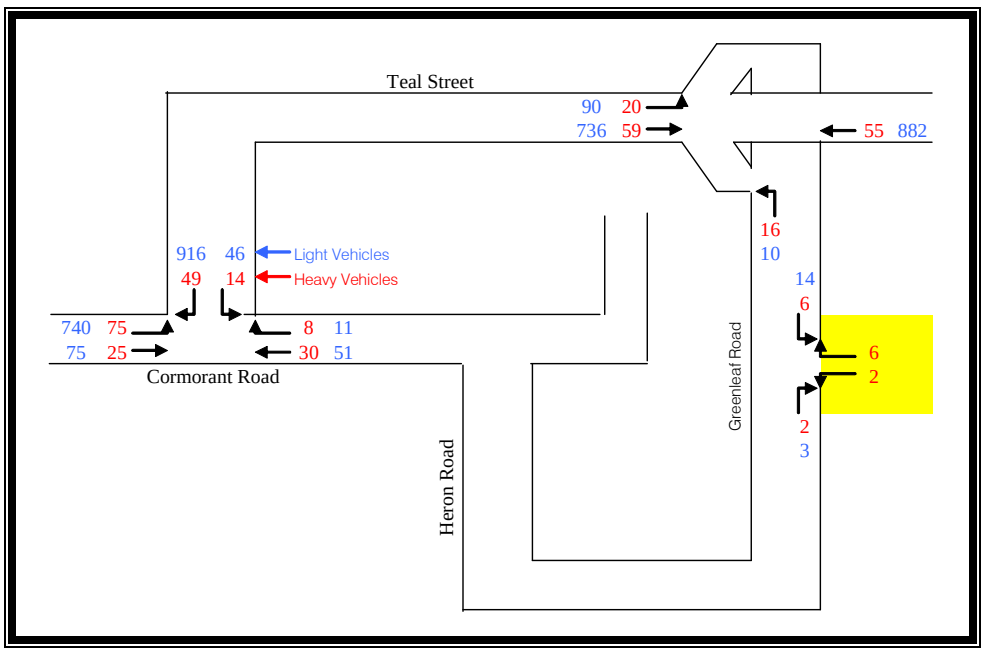
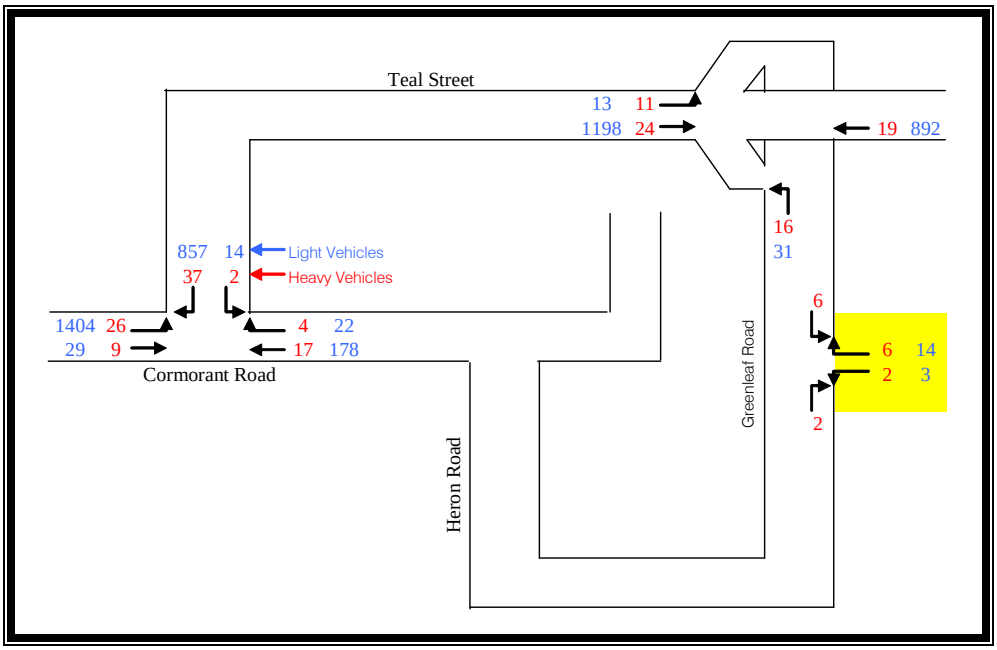


Figure 2.2.2d Phase 2 Future Local Flows PM Peak Hour



2.2.3 Future Intersection Performance

Using the future traffic flows reported above in **Section 2.2.2**, Christopher Stapleton Consulting Pty Ltd has remodelled the key intersection of Teal Street and Cormorant Road using SIDRA. The results are provided below in **Table 2.2.3**.

Table 2.2.3 Phase 2 Cormorant Rd & Teal St Intersection Performance

Peak Period	Level of Service	Average Delay	Worst Delay	Capacity	95% Queue
AM Peak Hour	A	11s	17s	0.39	21m
PM Peak Hour	A	10s	14s	0.49	33m

The results of the SIDRA modelling show that even if all the Phase 2 trips were to occur during the existing peak periods, there would be virtually no change in the existing level of service at the Cormorant Road & Teal Street intersection, with the only difference being a minor decrease in available capacity during both peak periods.

Christopher Stapleton Consulting Pty Ltd has concluded that the traffic generation of the Phase 2 operations and construction would have no impact on the existing local traffic environment, and specifically no impact on the operation of the key local intersection of Cormorant Road & Teal Street.

2.3 Phase 3, Establishment of BioDiesel Plant

2.3.1 Issues Summary

For the purpose of assessing Phase 3, Christopher Stapleton Consulting Pty Ltd has identified the following key potential construction and operating impacts: -

- Construction impacts associated with the development of a new on-site BioDiesel production and storage facility

- Operational impacts associated with the distribution of product by heavy vehicle via the local road network

2.3.2 On-Site Construction & Phase 3 Operations

As for the assessment of the Phase 1and Phase 2 traffic impacts, the assessment of the Phase 3 construction and operational impacts, have been assessed assuming the construction and operational vehicle movements as a combined peak total. Once more, this is the most appropriate methodology given the available data and the assignment of all trips during the peak hour.

The trip generation of Phase 3 will comprise both distribution vehicles (heavy) and staff vehicles (light). During Phase 3 the heavy vehicle generation of the facility will increase to approximately 64 trips per day (i.e. 32 loads arriving and departing), plus the trip generation of an additional 20 full time staff (taking the total to 37 full time staff).

Assuming that the total daily heavy vehicle trip generation could occur during [either] the existing morning or afternoon peak period, and further assuming that all staff arrive or depart during these periods in individual vehicles, **the Site could generate a 101 vehicle trips** in either the morning or afternoon peak hour.

The distribution of these trips would remain the same as outlined for Phase 1 in **Section 2.1** above.

The additional trips generated to the local road network by the Site under Phase 3 conditions are shown in **Figure 2.3.2a** (AM peak) and **Figure 2.3.2b** (PM peak). The total future flows at the key roundabout intersection of Teal Street and Cormorant Road and at the Teal Street ramps under Phase 3 conditions are shown in **Figure 2.3.2c** (AM peak) and **Figure 2.3.2d** (PM peak).

Christopher Stapleton Consulting Pty Ltd notes that for the Phase 3 intersection assessment we have increased existing flows by a factor of 2% over a period of 10 years in line with the request of the RTA.

Figure 2.3.2a Phase 3 Additional Site Trips AM Peak Hour

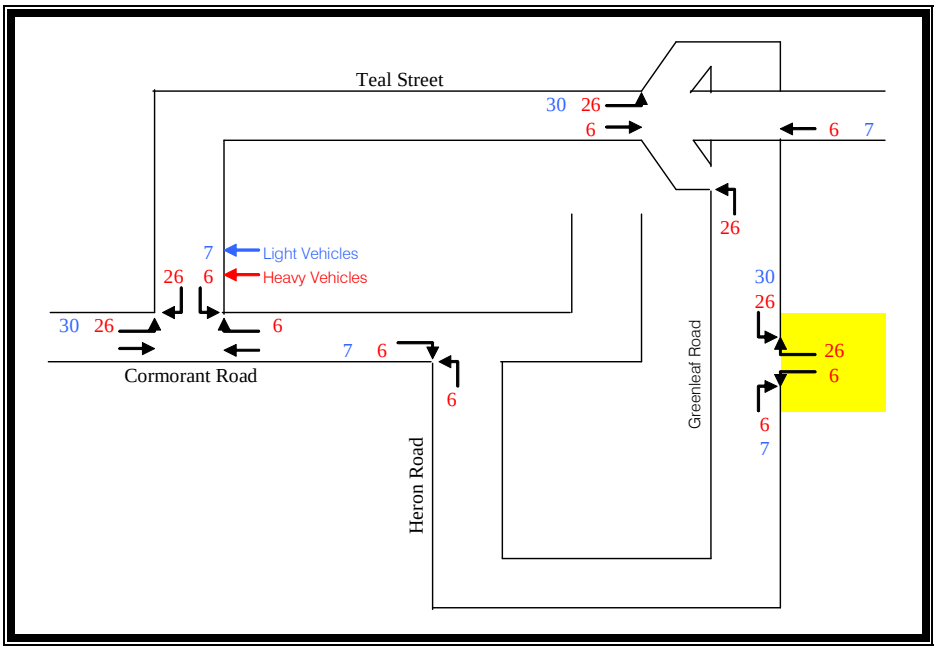


Figure 2.3.2b Phase 3 Additional Site Trips PM Peak Hour

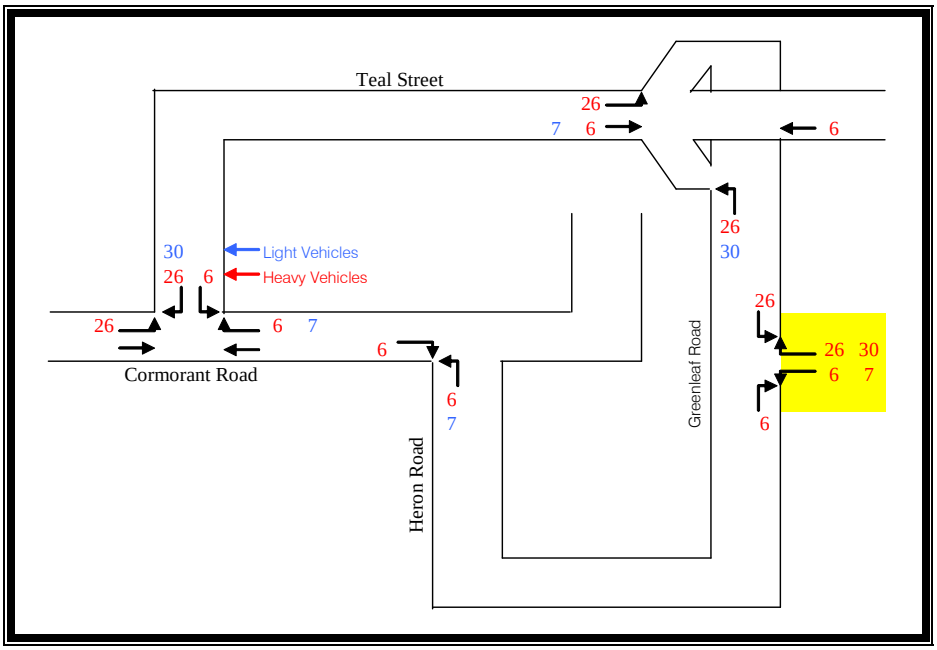


Figure 2.3.2c Phase 3 Future Local Flows AM Peak Hour

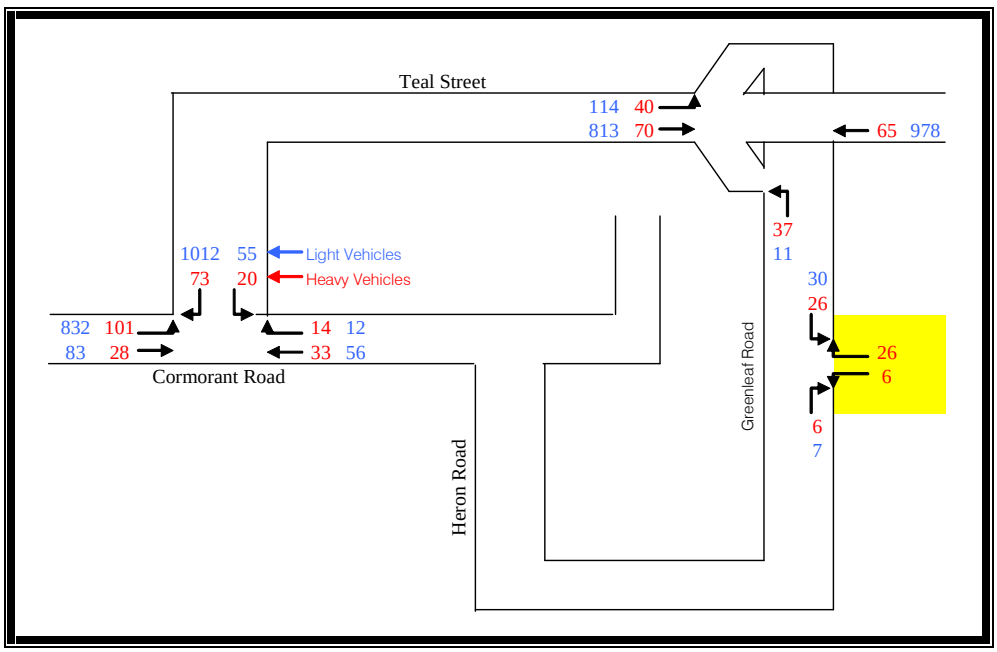
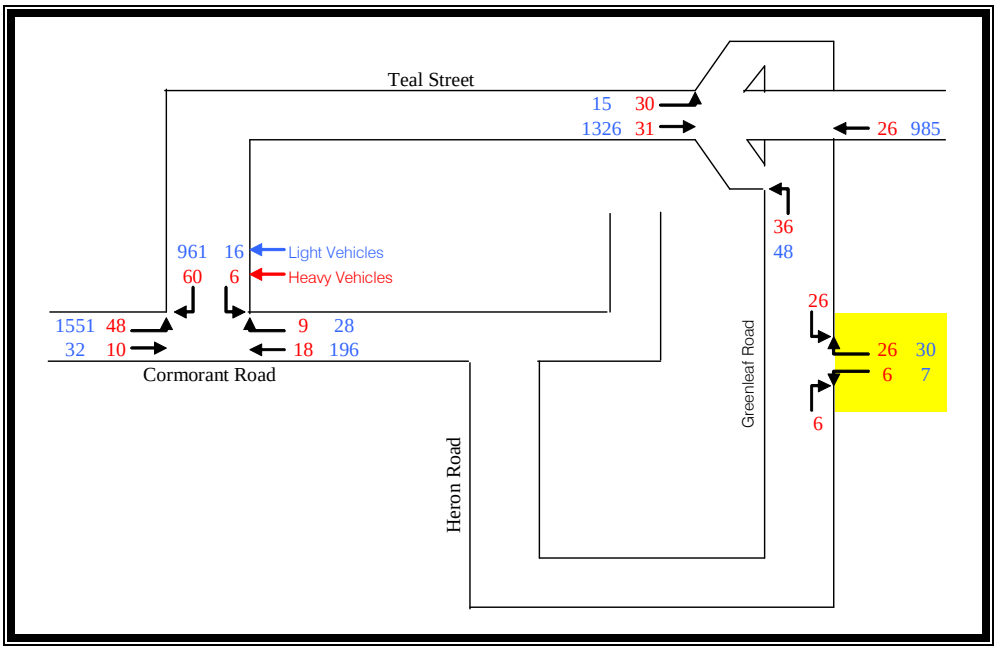


Figure 2.3.2d Phase 3 Future Local Flows PM Peak Hour



2.3.3 Future Intersection Performance

Using the future traffic flows reported above in **Section 2.3.2**, Christopher Stapleton Consulting Pty Ltd has remodelled the key intersection of Teal Street and Cormorant Road using SIDRA. The results are provided below in **Table 2.3.3**.

Table 2.3.3 Phase 3 Cormorant Rd & Teal St Intersection Performance

Peak Period	Level of Service	Average Delay	Worst Delay	Capacity	95% Queue
AM Peak Hour	A	11s	19s	0.45	27m
PM Peak Hour	A	11s	15s	0.56	43m

The results of the SIDRA modelling show that even if all the Phase 3 trips were to occur during the existing peak periods, there would still be no significant change in the existing level of service at the Cormorant Road & Teal Street intersection. Capacity would be somewhat reduced and queues lengthen, but the intersection average delays would remain virtually unchanged.

Christopher Stapleton Consulting Pty Ltd has concluded that the traffic generation of the Phase 3 operations and construction would have no impact on the existing local traffic environment, and specifically no impact on the operation of the key local intersection of Cormorant Road & Teal Street.

2.4 Alternative Distribution Model

For the purpose of assessing a worst case scenario, Christopher Stapleton Consulting Pty Ltd has run an additional SIDRA model where all heavy vehicle and staff trips utilise the critical approaches of the Cormorant Road & Teal Street roundabout. We have completed this assessment using the Phase 3 maximum generation, and have included 10 years annual increase in existing flows.

The additional trips generated to the local road network by the Site under the worst case conditions are shown in **Figure 2.4.2a** (AM peak) and **Figure 2.4.2b** (PM peak). The total future flows at the key roundabout intersection of Teal Street and Cormorant Road and at the Teal Street ramps under these worst case conditions are shown in **Figure 2.4.2c** (AM peak) and **Figure 2.4.2d** (PM peak).

Figure 2.4.2a Worst Case Additional Site Trips AM Peak Hour

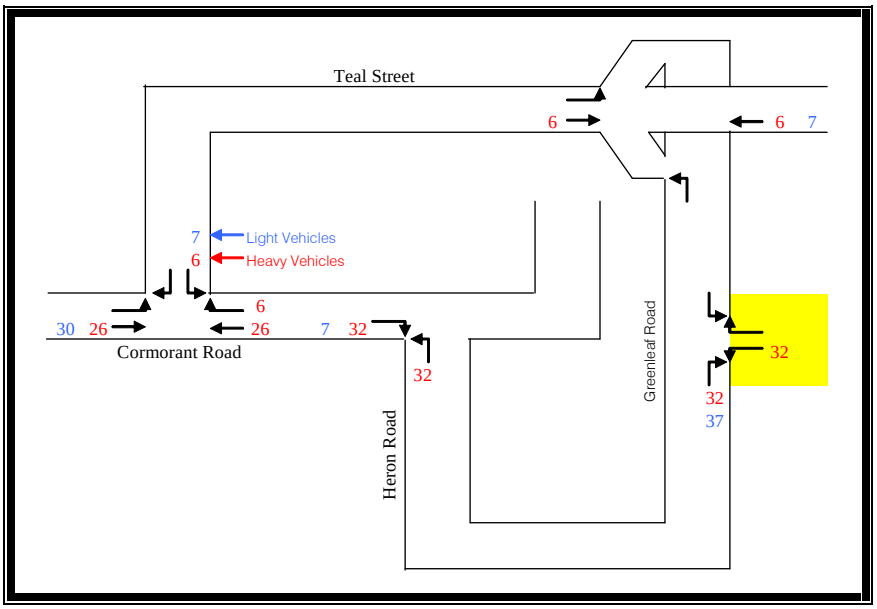


Figure 2.4.2b Worst Case Additional Site Trips PM Peak Hour

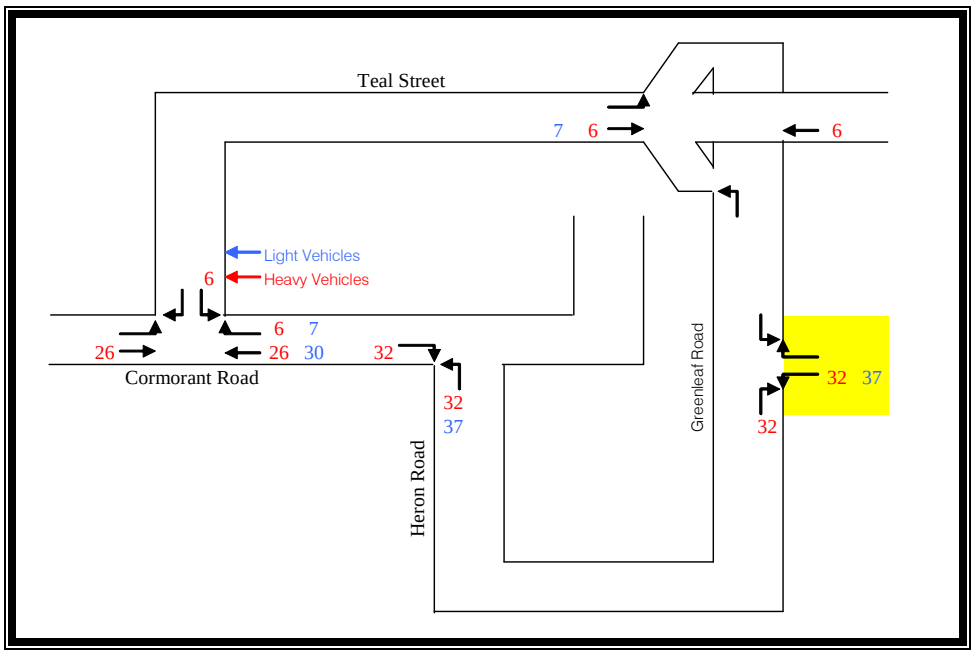


Figure 2.4.2c Worst Case Future Local Flows AM Peak Hour

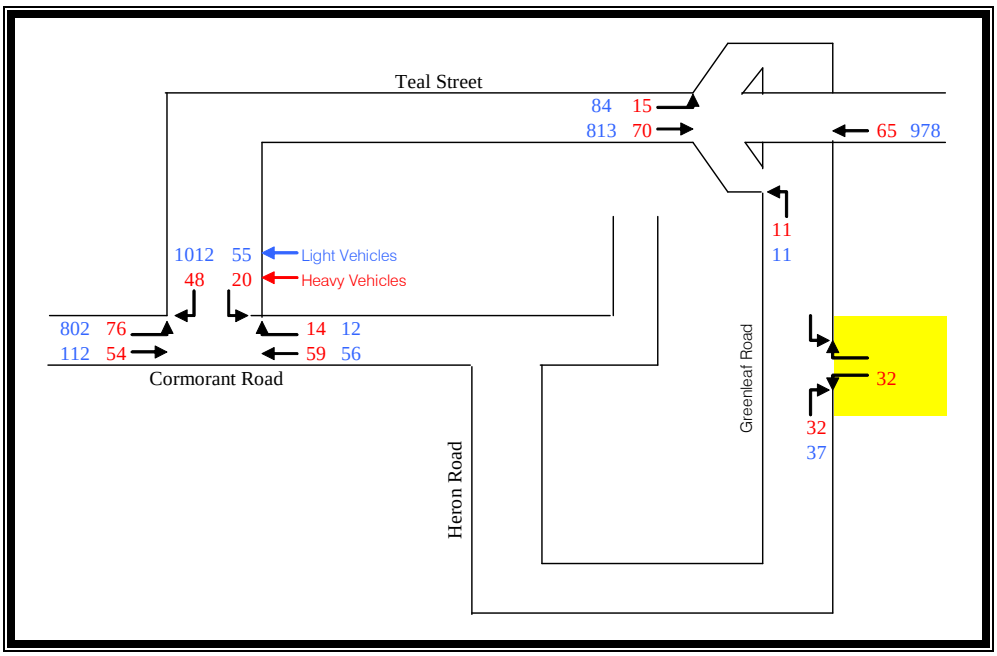
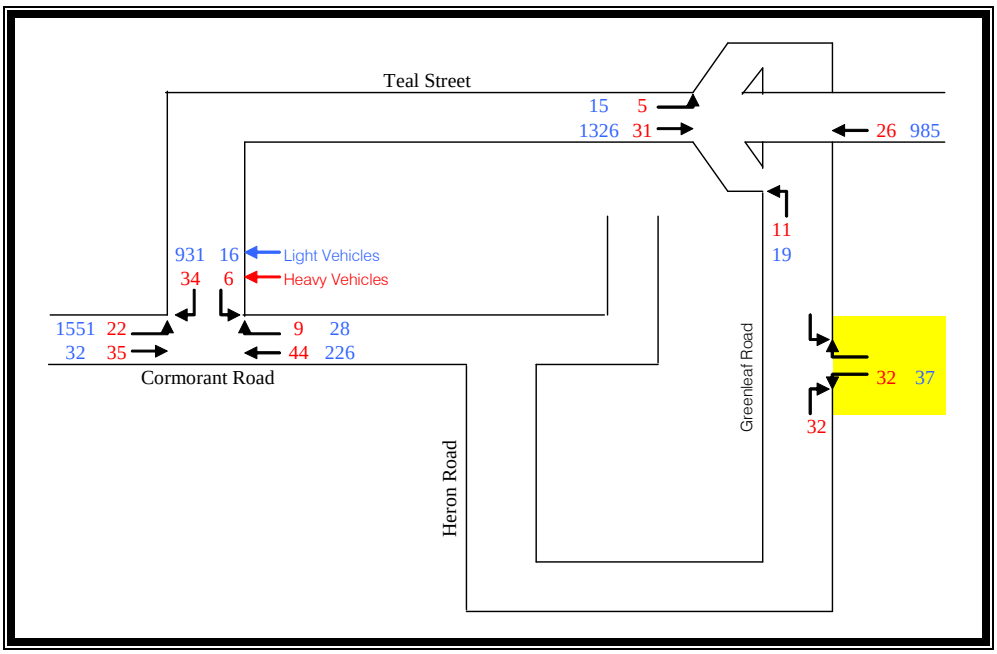


Figure 2.4.2d Worst Case Future Local Flows PM Peak Hour



2.4.3 Future Intersection Performance

Using the future worst case traffic flows reported above in **Section 2.4.2**, Christopher Stapleton Consulting Pty Ltd has remodelled the key intersection of Teal Street and Cormorant Road using SIDRA. The results are provided below in **Table 2.4.3**.

Table 2.4.3 Worst Case Cormorant Rd & Teal St Intersection Performance

Peak Period	Level of Service	Average Delay	Worst Delay	Capacity	95% Queue
AM Peak Hour	A	11s	20s	0.47	27m
PM Peak Hour	A	10s	14s	0.57	45m

The results of the SIDRA modelling show that even under worst case distribution and 10 years average growth in major flows, conditions at the roundabout at Cormorant Road & Teal Street intersection remain virtually unchanged.

Simply, even under these conditions the traffic flows to and from Cormorant Road (east) have no significant impact on the major north-west movements, and therefore do not affect delays.

Christopher Stapleton Consulting Pty Ltd has concluded that the traffic generation of the site under capacity operating conditions, even with an adverse distribution of trips and annual growth, has little if any impact on the existing local traffic environment, and specifically no significant impact on the operation of the key local intersection of Cormorant Road & Teal Street.

2.5 Site Access

Access to the Site itself from Greenleaf Road is a relevant issue to all phases of development, and indeed will need to be properly established as part of Phase 1. A plan of the Site showing the key access points is provided below in **Figure 2.5**.

2.5.1 Access from Greenleaf Road

Vehicles will access the terminal from Greenleaf Road via a gate located at the northern end of the site and exits the site via a separate gate located approximately 50 metres from the southern boundary of the site as shown in **Figure 2.5** above. This conceptual configuration provides a one way traffic route for the movement of road tanker through the site. A service road is also located around the perimeter and access to the tank farm / bunded area is via a ramp to be designed with reference to AS 2890.2:2002 for the maximum vehicle accessing this area.

The access driveway, and internal access roads, will be designed to conform to Australian Standard AS 2890.2 – 2002, which provides details of the width, gradient and general characteristics based on the type and frequency of vehicles accessing the site; in this case, it is likely that the primary distribution vehicles will be tanker trucks (articulated vehicles), with maximum dimensions as described in Figure 2.1 of AS 2890.2:2002.

Benefiting the Site is the available width in Greenleaf Road, which will allow for the use of minimum permitted driveway widths. There may be a need to relocate existing informal parking from Greenleaf Road in the vicinity of the access points, but this would not have any impact on existing parking which is freely available.

Newcastle City Council's Newcastle DCP 2005 (Section 7.4) supports the minimisation of access points, setting a range of 6m to 9m for access points, admittedly assuming separate ingress and egress. Christopher Stapleton Consulting Pty Ltd is of the opinion that a 6m driveway, paired with the turning width available in Greenleaf Road, would cater for all vehicles in a safe and efficient manner.

2.5.2 On-Site Access

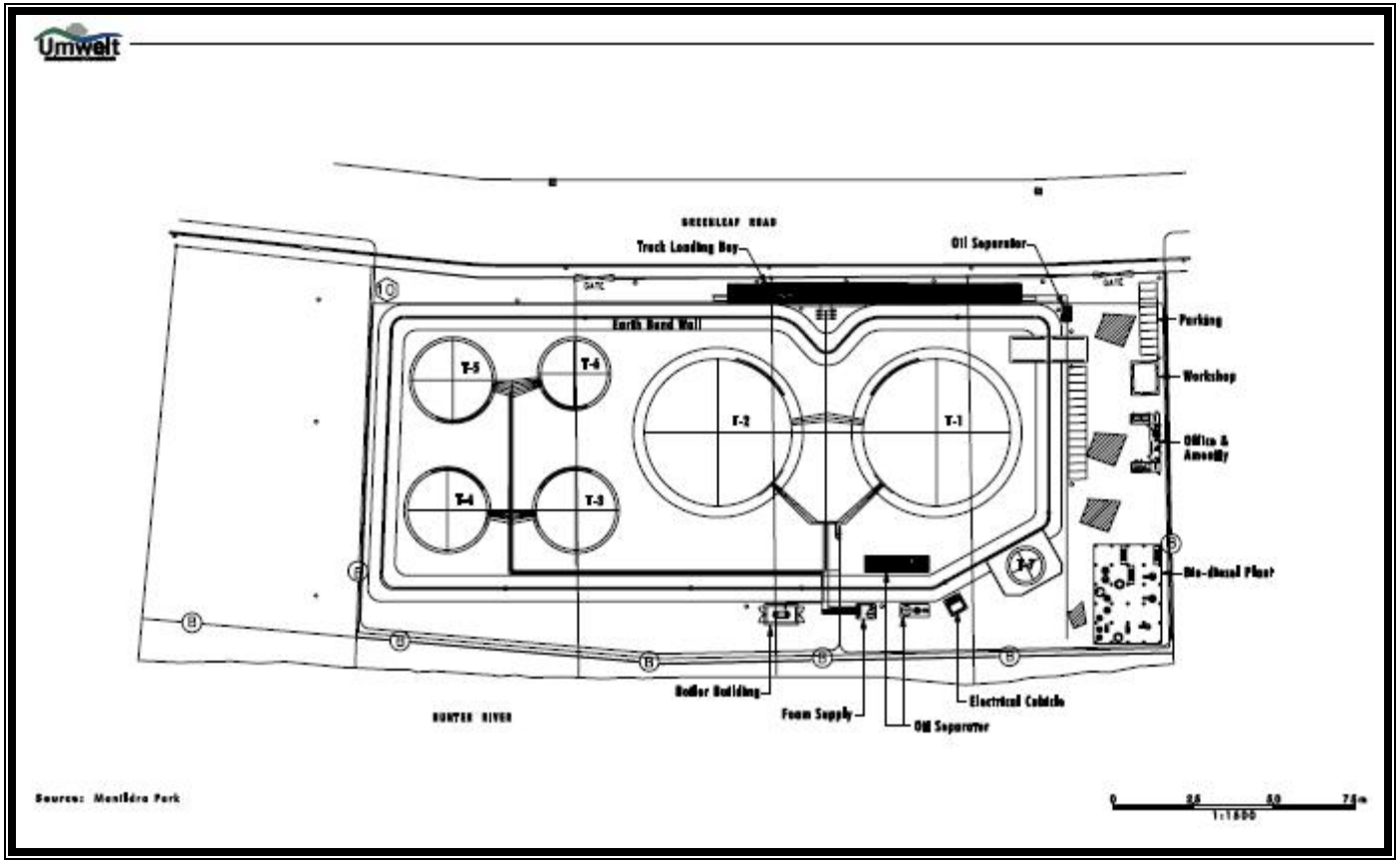
All on-site service areas – be they refuelling, service or maintenance bays - will be designed with reference to Figure 4.1 of AS 2890.2:2002; through bays will be utilised where the vehicles do not need to manoeuvre on either approach or departure to the service area.

All turning movements will be contained on-site so that all vehicles enter and depart Greenleaf Road in a forward direction, and any on-site manoeuvring is done under controlled conditions.

2.5.3 Special Access Conditions

The distribution of BioDiesel may also attract additional conditions (i.e. for hazardous materials). General conditions are detailed in AS 2809.2 – Tankers for Flammable Liquids, and where appropriate Manildra Park would be required to adhere strictly to these standards.

Figure 2.5 Site Access



2.6 Site Parking

Newcastle DCP 2005 provides parking requirements in Element 4.1; for industrial development, it prescribes a rate of 1 space per 100m^2 GFA, or 1 space per 2 employees whichever is the greater. While Christopher Stapleton Consulting Pty Ltd acknowledges that the nature of the project (under Part 3A) means that it is not directly assessed with reference to the DCP, the DCP nonetheless provides a suitable reference for parking for the site.

Based on the employment of 37 staff, the Site would 'require' 18 parking spaces.

Parking spaces may be provided on-site or (with reference to Element 7.1 of the Newcastle DCP 2005) on-street given that "*there is on-street parking available adjacent to the site and traffic safety and efficiency will not be unreasonably compromised*". This is certainly the case in Greenleaf Road; even with the relatively high demand for on-street parking from other industrial development located on Greenleaf Road, there is significant capacity in Greenleaf Road for additional on-street parking which would not compromise safety or traffic efficiency.

It is noted that the Site design (**Figure 2.5**) provides 23 on site car parking spaces, located adjacent to the office and amenity building. On-site parking for employees, is always preferable if it can be achieved. Christopher Stapleton Consulting Pty Ltd notes that for the level of parking required, and giving consideration to the number of heavy vehicle movements, there is no reason why staff could not use the same access points and circulation road as the heavy vehicles.

We also note that if the referenced level of parking was to be provided (i.e. 23 space for 37 employees) it is still possible that some additional on-street parking may occur; however, this would have no adverse consequences in Greenleaf Road.

In conclusion, Christopher Stapleton Consulting Pty Ltd notes that sufficient car parking spaces have been provided on site to conform to Newcastle DCP 2005 which is the most appropriate reference for Site parking. The DCP also provides for these spaces to be located on-street, which is certainly possible given the available capacity in Greenleaf Road adjacent to the Site.

Finally, Christopher Stapleton Consulting Pty Ltd acknowledges the potential for distribution vehicles to be parked at the Site overnight. If this is the case, we would recommend that they be contained on-site, not on-street.

2.7 Pedestrian, Cyclists and Public Transport Facilities

While Christopher Stapleton Consulting Pty Ltd strives in all our work to identify (and indeed maximise) the use of public transport, cycle and walk trips as a means of sharing the transport task (and therefore specifically reducing car trips) it is prudent to state that in the case of the Site these alternative modes of travel are unlikely to play a significant role. This is a function of the location of the Site, and the fact that access (via car) is provided with relative ease along roads with significant spare capacity.

The only bus option for staff is provided by the Hunter Valley Bus Company Route 135, which operates between Stockton and Newcastle; however, services are extremely limited, and there is no formal stop in close proximity to the Site.

Cycle choices are better, with on road cycle lanes from Newcastle linking to Cormorant Road and thence over the Stockton Bridge to the north; only a short distance of the trip (between the Site and Teal Street) would be made without a dedicated lane or path, but given the wide local carriageways and excellent sight distance safe passage for cyclists would be available.

Overall, Christopher Stapleton Consulting Pty Ltd does not believe that these alternative travel modes provide sufficient choice and efficiency to attract any significant use; however, with further development in the local area we would hope that local transport authorities, Council and bus companies might re-examine the potential for public transport services to what is an important industrial and employment centre.

3 Conclusions & Recommendations

3.1 Conclusions

While some of the details relating to the construction phases (construction methodology for the pipeline) are yet to be finalised, Christopher Stapleton Consulting Pty Ltd has concluded that the construction and operation of the proposed Manildra Park Marine Fuel and Diesel distribution and BioDiesel production facility in Greenleaf Road, Kooragang Island, will have no significantly adverse impacts on the local access and traffic environment.

Specifically, Christopher Stapleton Consulting Pty Ltd has concluded that: -

- The traffic generation of the Site through the early phases to final capacity operations will be relatively low, representing only a small percentage of daily and peak period flows through the local network.

- The additional traffic flows – even if generated during a single peak hour – would not affect the existing classification of local roads, nor impact upon the existing performance of local intersections.

- This is particularly the case at the key local intersection of Cormorant Road & Teal Street; even under worst case conditions, the intersection accommodates the additional traffic generation of the Site without any change in Level of Service or to key movement delays.

- A period of traffic management in Heron Road and Greenleaf Road may be required to construct/modify the pipeline between the berth on the Hunter River and the Greenleaf Road Terminal. This traffic management – involving either a temporary partial or full closure of one or both roads – can be completed without adversely impacting existing [low volume] traffic flows.

- Site access will be provided with reference to Newcastle DCP 2005, and to AS 2890.2:2002, as these references provide the most appropriate guidelines for safe and efficient design. This will include the provision of appropriate access driveways and circulation roadways, as well as loading areas which ensure that all manoeuvring occurs on-site.

- Parking for staff has been provided at a rate above that required with reference to the Newcastle DCP 2005, and any additional parking demand can be met on street without impacting the safety or capacity of Greenleaf Road.

3.2 Recommendations

Christopher Stapleton Consulting Pty Lt has concluded that the potential impacts of the Site on the local traffic environment are essentially minimised simply due to the low traffic generation of the Site paired with a traffic system with significant spare capacity. Nonetheless, to minimise any potential impacts we provide the following recommendations: -

1. That where possible heavy vehicles use the route via Greenleaf Road and the Teal Street on and off ramps for access movements to and from the west.

2. That as far as possible heavy vehicle movements occur outside of the commuter peak periods.

3. That to as great an extent as possible overnight heavy vehicle parking occurs on site.

4. That Manildra Park consults with traffic management operators, Newcastle City Council, the RTA and other local industries to determine the most effective management proposal for the construction of the pipeline in Heron Road and Greenleaf Road.