Appendix F

Traffic and Transport Impact Assessment

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AECOM

Worth Recycling Pty Ltd
01 May 2013

St Marys Waste Management Facility Expansion

Traffic and Transport Assessment

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Prepared for

Worth Recycling Pty Ltd

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01 May 2013

60283208

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DRAFT

Quality Information

Document St Marys Waste Management Facility Expansion

Ref 60283208

Date 01 May 2013

Prepared by David Bohm

Reviewed by Stuart Dalziel

Revision History

Revision	Revision Date	Details	Authorised	
			Name/Position	Signature
A	03-Apr-2013	Draft	Stuart Dalziel Associate Director	—
B	10-Apr-2013	Final	Stuart Dalziel Associate Director	—
C	01-May-2013	Draft	Stuart Dalziel Associate Director	Stuart Dalziel

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1.0 Existing Conditions

The St Marys Facility is a 1.5 hectare site within the Dunheved Industrial Precinct in the Penrith Local Government Area (LGA). The site is located at 42-46 Charles Street on Lot 300 DP 01143213, and its regional and local context is illustrated in **Figure 1**, **Figure 2**, and **Figure 3**.

In accordance with the Director General's Requirements for the proposed Development, potential traffic impacts on the capacity, efficiency and safety of the road network have been assessed. Particular consideration has been given to access arrangements, truck routes, and truck movements. In addition, measures to maintain and/or improving the capacity, efficiency and safety of the road network in the surrounding area have been described.

1.1 External road network

All vehicles travel to and from the site via Forrester Road, with access to Dunheved Industrial Precinct provided via a roundabout with Links Road. Forrester Road provides:

- Two traffic lanes per direction separated by a wide central median between Links Road and Christie Street (60km/h posted speed limit).
- Two traffic lanes per direction between Susannah Drive and Palmyra Avenue (60-70km/h posted speed limit).
- One traffic lane per direction between Links Road and Susannah Drive (60-70km/h posted speed limit).
- A continuous traffic lane on Forrester Road from north of Links Road to south of Links Road, enabling southbound through traffic to bypass the roundabout (60km/h posted speed limit).

Across the wider road network, onward connections are provided by arterial routes including the Great Western Highway, the M4 Motorway, Westlink M7 Motorway, and The Northern Road as shown in **Figure 1**.

Overall, the St Mary's Facility is well connected to Metropolitan Sydney (and beyond) via major arterial roads and motorways.

Westbus / CDC bus services 759 and 780 provide public transport connections along Forrester Road to the north and south of Links Road. Route 759 provides the following weekday services:

- Two services in each direction between St Marys and Mount Druitt between 8AM and 9AM.
- One service per hour in each direction between 10AM and 2PM.
- Approximately two services per hour in each direction between 2PM and 9PM.

Route 780 provides the following weekday services:

- Between two and three services per hour in each direction between Penrith and Mount Druitt between 5:30AM and 9AM.
- Two services per hour in each direction between 9AM and 4PM.
- Between three and four services per hour in each direction between 4PM and 7PM.
- One service per hour in each direction between 7PM and 10PM.

There are no formal bicycle provisions on Forrester Road in the vicinity of Dunheved Industrial Precinct. Dedicated footpaths are provided on Forrester Road south of Links Road; there are no formal pedestrian facilities on Forrester Road between Links Road and Lingayen Avenue (approximately 500m south of Palmyra Avenue).

1.2 Dunheved Industrial Precinct road network and site access

The site is located in Dunheved Industrial Precinct, with the road network within this precinct - including Links Road, Dunheved Circuit, and Charles Street - designed for and currently used by a high proportion of large vehicles. The posted speed limit within the precinct is generally 60km/h; there are no public transport services or formal bicycle or pedestrian facilities.

On-street parking is heavily utilised along Charles Street; this appears to be associated with staff and operational traffic generated by other industrial developments on Charles Street. These conditions are exemplified in **Figure 4** and **Figure 5**.

The site is currently configured to accommodate heavy vehicle access, egress, and internal movements. Access arrangements would not change as a result of the proposed development. Heavy vehicles currently enter and exit the site via a gated access with Charles Street, which connects to Dunheved Circuit and Links Road and on to the external road network.

Light vehicles – predominantly staff and courier deliveries - enter and exit the site via a separate entrance on Dunheved Circuit. This provides separation of heavy vehicles and light vehicles associated with the operation of the site. The site also has an additional gated light vehicle entry point to the site via Charles Street, which provides access to Car park 1 for staff and visitors.

Twenty staff parking spaces are provided in Car park 2 and Car park 3, with around nine additional spaces provided in Car park 1. Existing parking on the site exceeds the standards noted in the *Penrith City Council Development Control Plan 2010*. Specifically *Part C10 – Transport, Access and Parking* requires 'Warehouses or distribution centres' to provide 1 space per 100m^2 of gross floor area (GFA). The existing site has a GFA of 2,557m^2, which creates a requirement to provide around 25-26 parking spaces. The existing 29 spaces therefore provide suitable parking for staff and visitors, based on current activities and requirements.

1.3 Existing site traffic

The site currently operates 6 days a week (7am–10pm Mon-Friday, and 7am–1pm Saturdays). Existing operations employ around 15 full-time staff, all of whom are assumed to travel to and from the site by car, with arrival and departure times dependent on shift patterns. In addition courier activities have been assumed to generate approximately 5 light vehicle arrivals / departures per day. As a result, the site generates an estimated 20 light vehicles per weekday in addition to the heavy vehicle movements, which are described below.

The existing St Marys facility is not yet fully operational. Due to this, current operations at Worth's South Windsor facility have been used to demonstrate typical heavy traffic generated by facilities of this type.

At the South Windsor facility, between 1 January and 11 March 2013 daily heavy vehicle arrival and departure data recorded an average of around 200 weighed and unweighed heavy vehicle transactions per week. This equates to an average of around 35 to 40 vehicles per day, produced by the delivery / removal of the following waste:

- 25,000 tonnes per annum (tpa) of drill muds.
- 10,000 tpa of soils (contaminated/restricted).
- 5,000 tpa of stormwater dredgings.

Solid waste is typically transported to and from the site using heavy rigid trucks. Any waste arriving that the site that has some water component (e.g. sludges, muds etc.) is transported using tankers.

Anecdotal evidence provided by Worth anticipates that when leaving/entering Dunheved Industrial Precinct:

- Approximately 80% of traffic generated by the site would travel to/from the south via Forrester Road.
- Approximately 20% of traffic generated by the site would travel to/from the north via Forrester Road.

The above is supported by intersection survey data collected during AM and PM peak hours in March 2013. These surveys indicated:

- Around 80% of heavy vehicles generated by Dunheved Industrial Precinct travel to/from the south via Forrester Road during both AM and PM peak hours.
- Around 70% of light vehicles generated by Dunheved Industrial Precinct travel to/from the south via Forrester Road during both AM and PM peak hours.

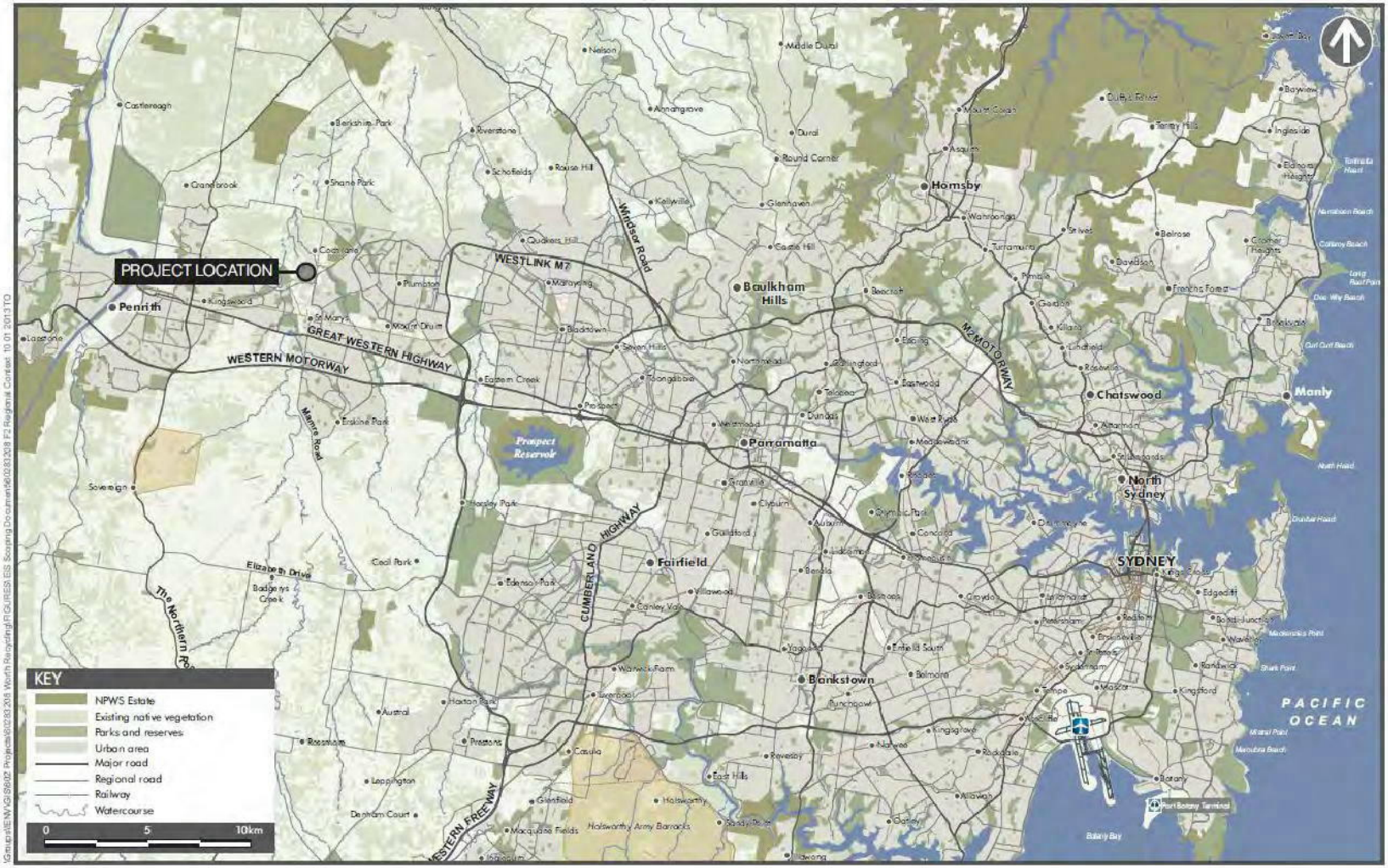


Figure 1 St Marys facility regional context

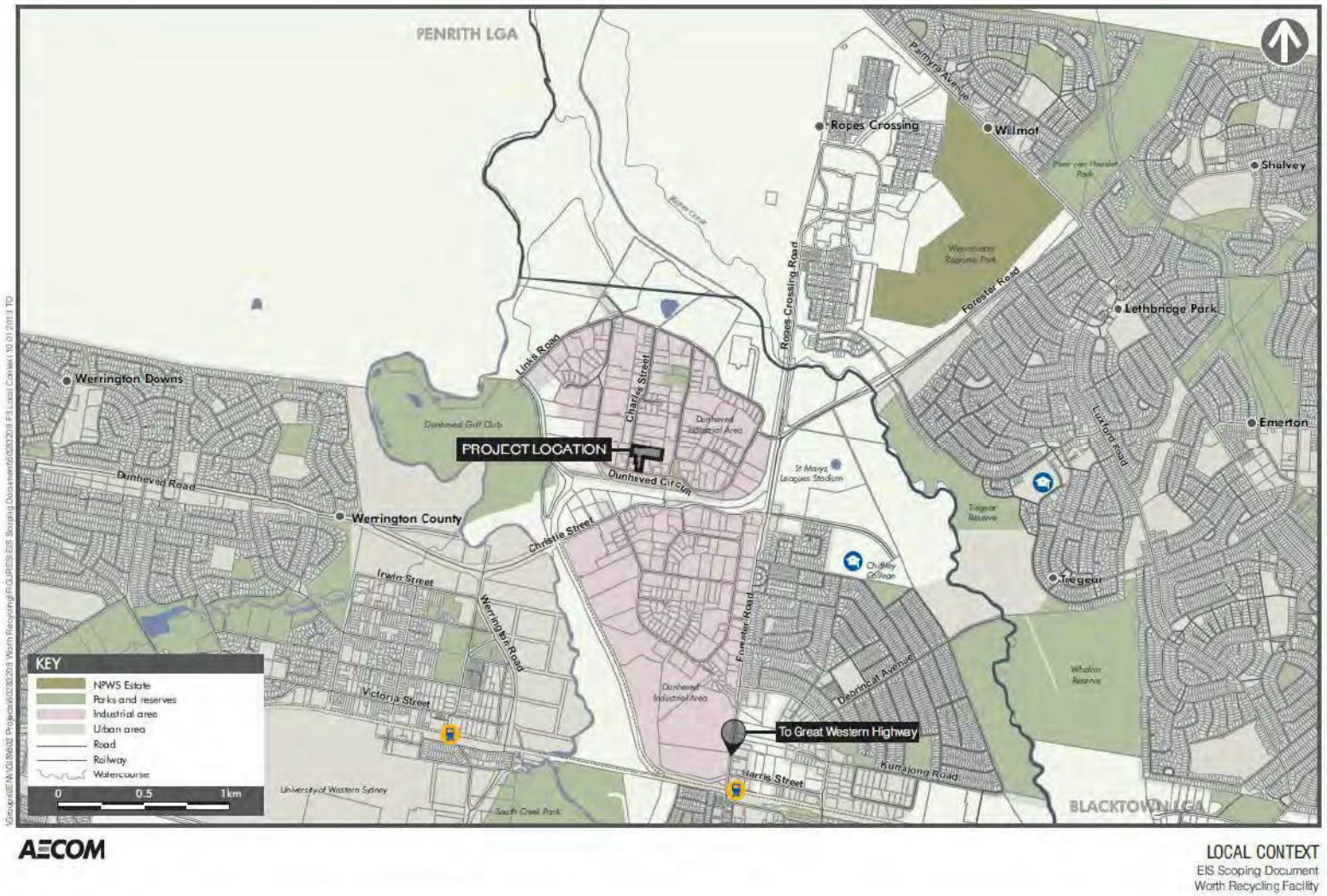


Figure 2 St Marys facility local context

Figure 3 St Marys facility existing site layout

Figure 4 **Existing on-street parking conditions example – Charles Street (view southbound)**

Figure 5 **Existing heavy vehicle movement example – Charles Street (view southbound)**

In summary, once the existing St Marys facility is fully operational, total vehicle movements on a typical weekday are estimated as:

- 35-40 waste vehicles (heavy vehicles).
- 15 staff vehicles (light vehicles).
- 5 courier vehicles (light vehicles).
- A total of **70-80 heavy vehicle movements** and around **40 light vehicle movements**, based on the above.

Around 70-80% of all vehicles associated with the site are expected to travel to/from the south. This route is most heavily utilised as it provides the most convenient access to the wider arterial network, via the Great Western Highway and M4 motorway.

1.4 Existing traffic volumes

All traffic travelling to and from the St Mary's Facility uses Forrester Road; historic RMS Annual Average Daily Traffic (AADT) data for Forrester Road, in addition to other major roads in the vicinity of the Dunheved Industrial Precinct is shown in **Table 1**. Surveyed traffic volumes on the local network between 1996 and 2005 increased by between 1% to 2.5% per annum.

Table 1 **Annual Average Daily Traffic growth – External road network, Dunheved Industrial Precinct area**

RMS Station number	Location	AADT (All vehicles, 2-way)				Historic growth
		1996	1999	2002	2005	Annual average – 1996 to 2005
71.075	Forrester Road, north of Links Road	12,417	15,581	15,496	15,364	2.6%
87.092	Forrester Road, south of Christie Street	13,952	16,353	13,967	15,113	0.9%
86.081	Christie Street, east of Werrington Road	12,670	15,085	15,583	15,184	2.2%
86.160	Werrington Road, south of Parkes Avenue	15,422	15,042	17,080	16,991	1.1%

Source: RMS Sydney Region Traffic Volume Data to 2005

In addition to RMS AADT data, recent additional survey data for Forrester Road, Links Road, and Ropes Crossing Boulevard was collected to enable a robust assessment of current conditions. A summary of existing weekday and weekend traffic for these roads is shown in **Table 2** and **Table 3** respectively.

Table 2 **Existing weekday traffic – Forrester Road | Links Road | Ropes Crossing Boulevard**

Location	2013 Weekday traffic			
	Daily traffic (All vehicles, 2-way)	% Heavy vehicles	AM peak hour traffic (All vehicles, 2-way)	PM peak hour traffic (All vehicles, 2-way)
Forrester Road, south of Links Road	25,840	11.3%	1,920 (7-8AM)	2,170 (3-4PM)
Forrester Road, north of Links Road	16,650	8.2%	1,220 (8-9AM)	1,440 (4-5PM)
Links Road, west of Forrester Road	8,430	17.4%	660 (7-8AM)	740 (3-4PM)

Source: (Based on) Austraffic Traffic Survey Data (2013); Penrith City Council Traffic Survey Data (2011-2012)

Table 3 Existing weekend traffic – Forrester Road | Links Road | Ropes Crossing Boulevard

Location	2013 Weekend traffic			
	Daily traffic (All vehicles, 2-way)	% Heavy vehicles	AM peak hour traffic (All vehicles, 2-way)	PM peak hour traffic (All vehicles, 2-way)
Forrester Road, south of Links Road	13,300	4.6%	1,090 (11AM-12PM)	1,070 (12PM-1PM)
Forrester Road, north of Links Road	11,500	3.3%	910 (11AM-12PM)	920 (12PM-1PM)
Links Road, west of Forrester Road	1,950	12.3%	190 (11AM-12PM)	160 (12PM-1PM)

Source: (Based on) Austraffic Traffic Survey Data (2013); Penrith City Council Traffic Survey Data (2011-2012)

Key features of existing traffic volumes on the external road network are as follows:

- Recent long-term traffic growth on key routes in the Dunheved Industrial Precinct area – including Forrester Road - has been between 1% to 2.5% per annum.
- Daily and peak hourly traffic on Forrester Road and Links Road is significantly higher during weekdays than weekends.
- The proportion of heavy vehicles on Forrester Road and Links Road is significantly higher during weekdays than weekends.
- Weekday traffic on Forrester Road and Links Road peaks between:
  - 7-9AM in typical AM peak conditions.
  - 3-5PM in typical PM peak conditions.
- Total traffic throughput at the Forrester Road | Links Road | Ropes Crossing Boulevard roundabout peaks at 7-8AM and 3-4PM in typical AM and PM peak weekday conditions respectively.
- Traffic on Forrester Road is significantly higher south of Links Road than north of Links Road; the majority of traffic travelling to and from the Dunheved Industrial Precinct follows a route to/from south of the precinct.

Traffic surveys undertaken in March 2013 noted that during the busiest AM and PM weekday peak periods, the Forrester Road | Links Road | Ropes Crossing Boulevard roundabout operated with little delay and minimal congestion. The performance and safety of this roundabout is aided by the provision of the continuous southbound traffic lane on Forrester Road, which separates this major through traffic movement from other traffic entering and exiting the roundabout.

1.5 Crash history

Analysis of recent crash history for Forrester Road between Palmyra Avenue to the north and Glossop Street to the south was undertaken using recently available RMS data (2006 to 2011). The crash history for this section of Forrester Road shows:

- A total of 76 reported accidents.
- 1 (~1%) fatal crash (NSW average ~1%[1]).
- 33 (43%) injury crashes (NSW average 46%).
- 42 (55%) non-injury crashes (NSW average 53%).

The above crash record indicates that the crash history (severity) for Forrester Road is slightly better than the NSW average, with a lower proportion of injury crashes and higher proportion of non-injury crashes.

[1] NSW averages taken from *Road Traffic Crashes in New South Wales*, TfNSW / RMS 2011

Further assessment of these crashes shows that:

- Only 2 (3%) of these crashes occurred at the Forrester Road | Links Road | Ropes Crossing Boulevard roundabout – this is the main conflict point between Dunheved Industrial Precinct and non-precinct traffic.
- 22 accidents (29%) involved trucks (NSW average 27%).

One of the two crashes occurring at the Forrester Road | Links Road | Ropes Crossing Boulevard roundabout involved only a single vehicle (ute); only one crash occurred at the roundabout involving a conflict between two vehicles.

The crash records also indicate that 29% of crashes involved a truck of some description, which is consistent with the NSW average. The generation of truck movements is a key impact of the majority of developments within Dunheved Industrial Precinct.

In summary, historic crash data for Forrester Road does not indicate any negative road safety trends associated with traffic generated by developments within the Dunheved Industrial Precinct; this includes traffic generated by existing operations at the St Mary's Facility. The crash history for this road is generally consistent with NSW averages.

2.0 Potential Impacts

2.1 Construction

Traffic movements associated with the construction of the proposed development would comprise both heavy and light vehicles, although impacts from construction activities are expected to be minimal given the current condition and function of the site.

The following assumptions have been adopted to estimate traffic generated by construction, and assess the impacts of this traffic for a 'worst-case' scenario:

- Construction duration is estimated to include two months for civil works, three months for construction and one month for commissioning; all of which would take place during standard construction hours.
- Target completion date for construction is December 2013, although it is acknowledged that this would be subject to approvals and hence may extend into early 2014.
- Although it is likely that construction would be staged to minimise impacts (and due to future market demand), it is assumed that construction would occur simultaneously for all proposed components.
- As a result three construction crews, each consisting of approximately five personnel, have been assumed to operate simultaneously during the construction period.
- Construction traffic would follow similar routes to existing operational traffic on the wider road network, described generally throughout **Chapter 1**.
- Construction traffic would gain access to and from the site via existing site entrance and exit points, described in **Section 1.2**.
- Following arrival, construction traffic would be contained within the existing site boundaries.

Construction traffic would be generated by the following sources:

- Light vehicle movements would be generated mainly by construction crews travelling to and from the site.
- Heavy vehicle movements would be generated by the delivery / removal of:
    - Construction plant and equipment:
        - 1 crane of at least 100 tonnes and 1 small franna crane.
        - Excavators and other earth moving equipment.
        - Scissor lifts and mobile cranes.
        - Concrete pumps and delivery trucks.
    - General construction supplies and equipment.
    - Removal of waste from demolition, excavation, and/or other construction activities.

In a 'worst-case' scenario, peak construction traffic generation would coincide with existing weekday traffic peaks. The main conflict point would be located where construction traffic adds to / conflicts with traffic on Forrester Road, specifically at the Forrester Road | Links Road | Ropes Crossing Boulevard roundabout. As noted in **Section 1.4**, traffic at this roundabout peaks during weekdays between 7-8AM and 3-4PM.

To assess the worst-case impacts of construction traffic, the following traffic generation assumptions have been made:

- Light vehicles:
  - All construction crews arrive between 7-8AM, and depart between 3-4PM on a typical weekday.
  - 15 personnel would travel to/from the site during peak hours, with 2 personnel per vehicle.
  - As a result, construction would generate up to 8 light vehicle arrivals and 8 light vehicle departures during AM and PM peak times respectively.
- Heavy vehicles:
  - Heavy vehicle arrivals and departures would be generated by the sources listed above; it is assumed that – although unlikely - in a 'worst-case' scenario a maximum of 4 heavy vehicle arrivals and 4 corresponding departures would occur during any peak hour.
  - As a result, construction would generate approximately 8 heavy vehicle movements (arrivals and departures) during AM and PM peak hours.

Existing and 'worst-case' construction traffic throughput at the Forrester Road | Links Road | Ropes Crossing Boulevard intersection during peak hours is shown in **Table 4**.

Table 4 Forrester Road | Links Road | Ropes Crossing Boulevard roundabout throughput - Construction

Time period	2013 Weekday traffic			
	Light / Heavy	Existing traffic (All vehicle movements)	Construction traffic (All vehicle movements)	Construction traffic (% existing traffic)
AM peak hour (7-8AM)	Light	1,850	8	0.4%
	Heavy	260	8	3.1%
PM peak hour (3-4PM)	Light	2,160	8	0.4%
	Heavy	230	8	3.5%

Although it is anticipated that construction of the proposed development would increase both light and heavy traffic travelling to and from the site, **Table 4** indicates the small relative level of this increase (less than 3.5% of existing traffic). Construction activities would not be expected to significantly change traffic volumes, patterns or composition (i.e. noticeably increase the proportion of heavy vehicles travelling to and from the site).

Given that construction traffic impacts would be limited to a small increase to existing traffic, and the existing high level of performance of the Forrester Road | Links Road | Ropes Crossing Boulevard roundabout, construction activities would not be expected to have any noticeable effect on road network performance or safety at this (or any other) location.

Given that there are no formal pedestrian or bicycle facilities within Dunheved Industrial Precinct and pedestrian facilities on Forrester Road are only provided south of Links Road, existing pedestrian and cycling activity in the area is extremely limited. As a result construction activities would not be expected to have any noticeable effect on pedestrian or bicycle safety or amenity.

In addition it is anticipated that there would be adequate parking space within the site for construction vehicles based on existing provisions (see **Section 1.2**); additional parking requirements would not be expected to impact on the local road network.

2.2 Operation

2.2.1 Traffic generation

As a result of the proposed development, traffic movements to and from the site would include additional heavy vehicles associated with the delivery and subsequent removal of treated waste, plus any movements associated with support services provided at the existing South Windsor Facility (namely waste water treatment).

The proposed capacity of the expanded facility would be 99,400 tonnes per year, operating primarily between 6am and 6pm Monday to Friday, and 8am-2pm on Saturdays; the site has existing approval to operate between these hours. To provide flexibility to Worth to respond to major peak periods, it is proposed that 24 hour operations would occasionally be undertaken to process waste streams and to receive project deliveries or deliveries from regional areas/interstate. As an example, extended hours of operation would enable Worth to respond to demands from major construction activities in the Sydney metropolitan area.

The following assumptions have been adopted to estimate the typical volume of heavy vehicles generated during operations at full development:

- 99,400 tonnes per year would equate to an average of 318 tonnes per day, based on 313 operational days per year (6 days per week operations).
- Assuming an average vehicle payload of 15 tonnes, 318 tonnes would result in 21 heavy vehicles travelling to and from the site per day (42 vehicle movements per day).
- Assuming 12 hour operations on a typical weekday, and an even distribution of traffic over this time, this equates to less than 4 heavy vehicle movements per hour, on average. Existing heavy vehicle movements at the facility are typically between 3-4 heavy vehicle movements per peak hour, as described in **Section 1.3** and summarised in **Table 5**.
- It is noted that 1 additional tanker movement would occur on a weekly basis, transporting waste water between the South Windsor and St Mary's sites.

It is difficult to specifically identify daily and weekly heavy vehicle movements as they would fluctuate considerably during a campaign. Average vehicle generation described above has been adopted for the purpose of the quantitative assessment in **Section 2.2.3**. However it is acknowledged that the site may generate between 1 truck per hour to up to 10 trucks per hour, and the effects of this have been qualitatively considered.

It is anticipated that additional heavy vehicles generated by the development would be similar to existing vehicle types which deliver and remove waste to and from the site. As a result, no change to the composition of heavy vehicles – for example longer or heavier vehicles – is expected as a result of the development.

Light vehicles would be generated by additional staff and courier vehicles travelling to and from the site. The proposed development, when fully operational, would generate approximately 15 additional full time equivalent positions. This would be in addition to the 15 full time positions associated with the current site operations at St Marys, and includes the transfer of seven full time positions from the South Windsor Facility.

The 15 additional staff associated with the development has been assumed to travel to and from the site alone by car, with arrivals and departures based on anticipated shift patterns provided by Worth. In addition, courier activity has been assumed to generate around 1 light vehicle per hour between 9AM-5PM, on average. Based on these assumptions, the expanded facility would be expected to generate an additional 23 light vehicle arrivals and departures from the site over the course of a typical day. Existing light vehicle arrivals and departures at the site are estimated to be around 40 per typical weekday day as described in **Section 1.3** and summarised in **Table 5**.

The site would employ approximately 30 full-time staff following full development of the site, with GFA expanded to 2,668m^2. As noted in **Section 1.2** the *Penrith City Council Development Control Plan 2010, Part C10 – Transport, Access and Parking* requires 'Warehouses or distribution centres' to provide 1 space per 100m^2 of gross floor area (GFA). The site currently provides around 29 spaces, which is therefore expected to continue to provide sufficient parking for staff and visitors based on proposed activities and requirements at full development.

In summary, the approved St Marys Facility would be expected to generate around 40-45 heavy vehicle movements and a similar volume of light vehicle movements per day during peak operations. During a typical weekday, 3 light vehicle and 4 heavy vehicle movements would be expected in the AM peak (7-8AM). In the PM peak (3-4PM) 5 light vehicle and 4 heavy vehicle movements are anticipated.

2.2.2 Site access and traffic distribution

Following development any additional vehicles would use existing access points to enter and exit the site. Across the wider road network, traffic is expected to follow similar patterns and routes to existing traffic travelling to and from the site. These access arrangements and traffic patterns are described in **Chapter 1**.

The majority – around 70-80% based on existing conditions - of both heavy and light vehicles generated by the development would be expected to continue to approach and leave Dunheved Industrial Precinct via Forrester Road to the south of Links Road, which provides onward connections to the Great Western Highway and M4 motorway.

To manage traffic movements within Dunheved Industrial Precinct, it is proposed that heavy vehicles travel to the site via Dunheved Circuit and Charles Street from the south. This would maintain existing conditions in terms of vehicle arrivals. On exit heavy vehicles would travel via Charles Street northbound, joining Links Road to return to Forrester Road. This circulating arrangement would minimise conflicts caused by turning and opposing vehicle movements on Charles Street and Dunheved Circuit.

Within the site heavy vehicles delivering waste would enter via Weighbridge 1. Before entering the operational areas of the Site, the driver would provide details of the delivery (including the nature of the waste) at the gated security checkpoint using an intercom and security cameras. Following verification, staff would direct the driver to the delivery point, with signage at the gate providing additional directional support.

Heavy vehicles would generally circulate the site in a clockwise direction, and exit via the gated Weighbridge 2. Both weighbridges would record the weight of the heavy vehicle at the point of entry and exit, and have the ability to count axle loads. Information obtained at the entry and exit gates would be entered into the software RAMSPRO, which is maintained by Worth to track waste delivered to the site and transported offsite.

In light of the proposed continued use of existing access arrangements and traffic routes, and the recommended implementation of the circulating arrangement described above, access to the proposed Development during operation is not expected to significantly impact upon the capacity and efficiency of the local road network.

Table 5 summarises expected vehicle generation and distribution as a result of operations following full development of the site.

Table 5 Operational traffic generation and distribution

Time period	Weekday traffic – full development			
	Light / Heavy	Total (All vehicle movements)	To/from north (All vehicle movements)	To/from south (All vehicle movements)
Daily traffic	Light	**46**	13	33
	Heavy	**42**	9	34
AM peak hour (7-8AM)	Light	**3**	1	2
	Heavy	**4**	1	3
PM peak hour (3-4PM)	Light	**5**	1	4
	Heavy	**4**	1	3

2.2.3 Road network impacts and performance

It is assumed that the proposed development would be fully operational by 2015. Forecast background and additional operational traffic as a result of this development at the Forrester Road | Links Road | Ropes Crossing Boulevard roundabout during peak hours is shown in **Table 6**. Forecast background traffic has assumed an annual growth rate of around 2% per annum, consistent with historic growth in the area.

Table 6 Forrester Road | Links Road | Ropes Crossing Boulevard roundabout throughput – Full operations

Time period	2015 Weekday traffic			
	Light / Heavy	Background traffic (All vehicle movements)	Operational traffic (All vehicle movements)	Operational traffic (% background traffic)
AM peak hour (7-8AM)	Light	1,928	3	0.2%
	Heavy	271	4	1.5%
PM peak hour (3-4PM)	Light	2,246	5	0.2%
	Heavy	235	4	1.7%

As for construction, operation of the proposed development would increase both light and heavy traffic travelling to and from the site. **Table 6** indicates the small level of this increase (less than 1.7%) when compared to existing background traffic in the vicinity of Dunheved Industrial Precinct. Traffic generated by the operation of the proposed development would not be expected to significantly change traffic patterns, behaviours or heavy vehicle types travelling to and from the site.

To quantify the impacts of this increase in traffic, SIDRA intersection modelling has been undertaken. Modelling was undertaken based on the existing roundabout configuration, shown in **Figure 6**. Traffic volumes used to assess the performance with and without ('Do nothing') the proposed development during weekday AM and PM peaks are shown in **Table 8**.

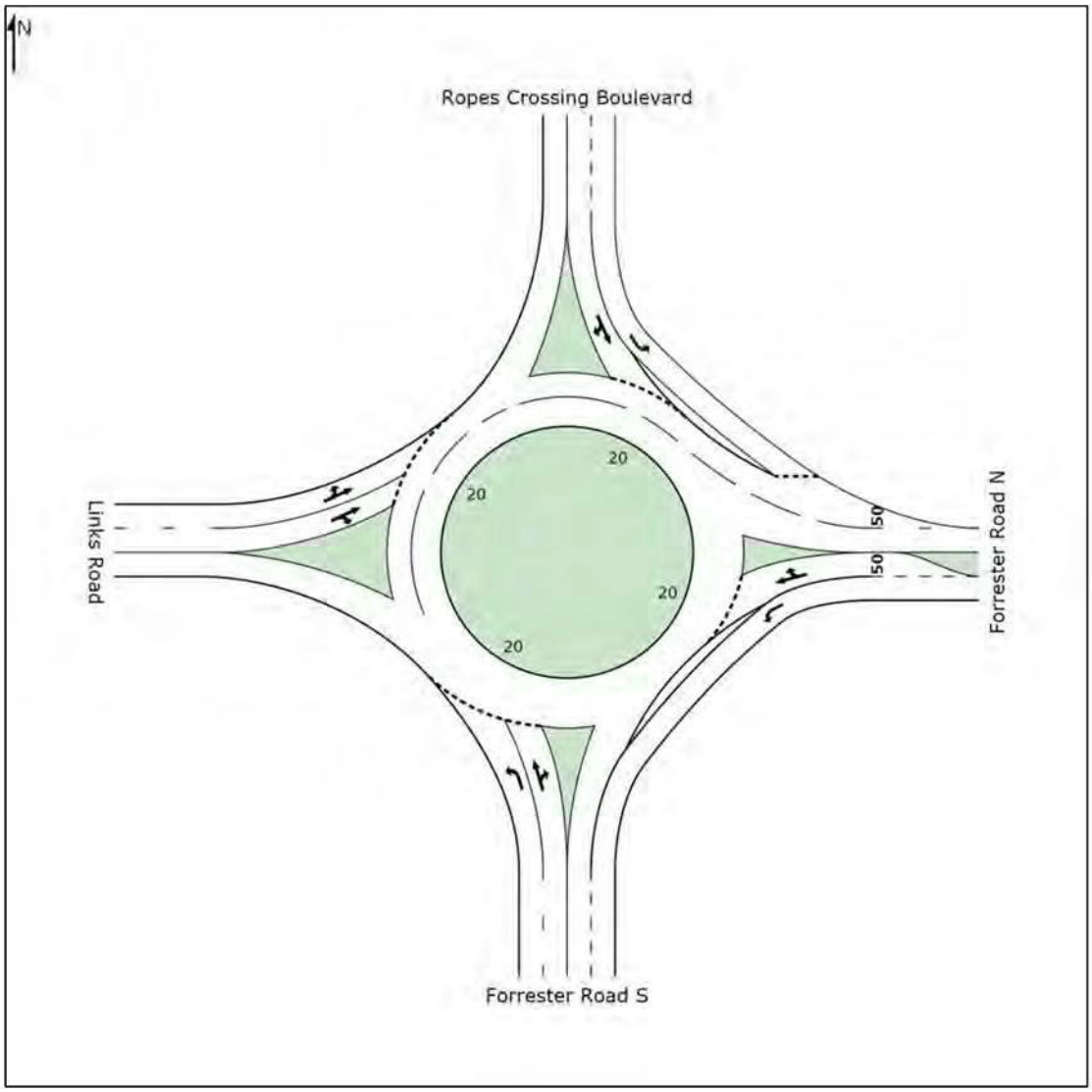
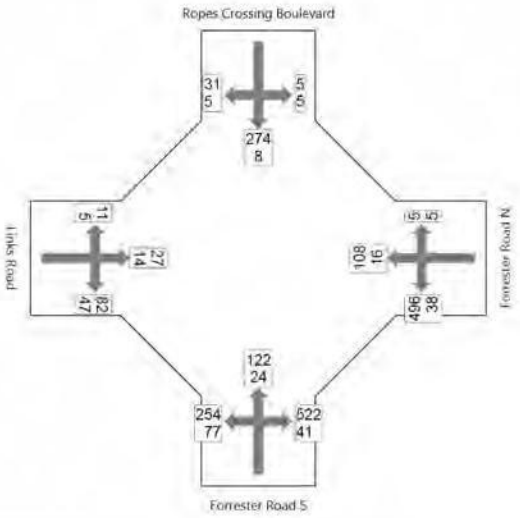
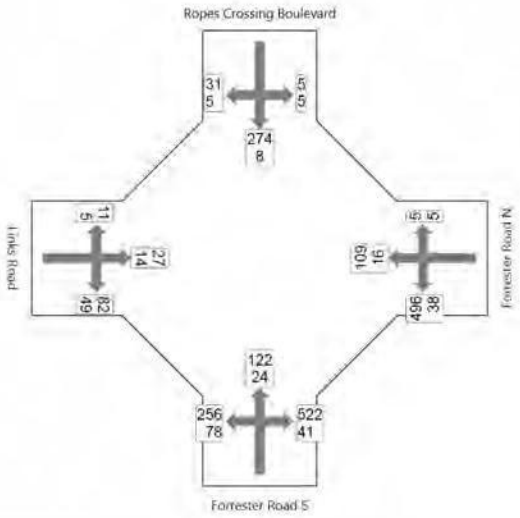
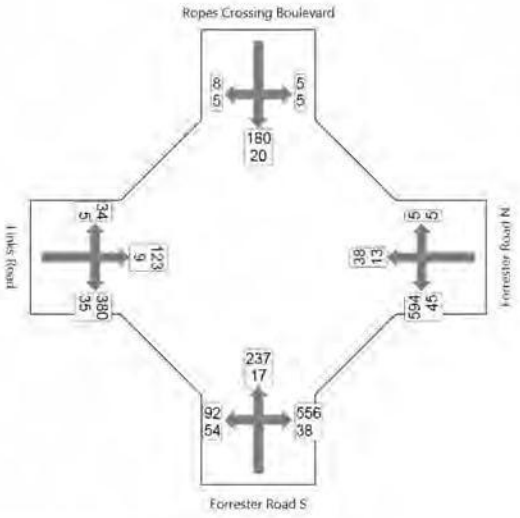
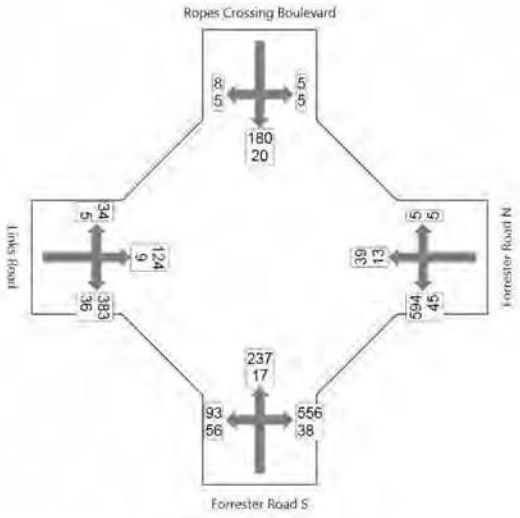


Figure 6 Forrester Road | Links Road | Ropes Crossing Boulevard roundabout layout (schematic)

Table 7 Forrester Road | Links Road | Ropes Crossing Boulevard forecast traffic volumes – 2015 peak hours

Do nothing	With development
2015 Weekday AM peak (7-8AM)	
	
2015 Weekday PM peak (3-4PM)	
	

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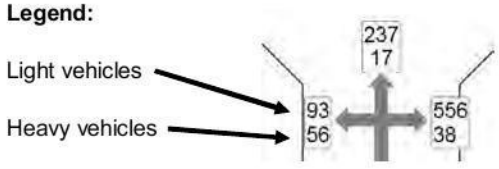

The results of this assessment are shown in **Table 7**, which indicates that the relatively small level of additional traffic generated by the development would have no noticeable effect on the efficient operation, or reduce the significant spare capacity of the Forrester Road | Links Road | Ropes Crossing Boulevard roundabout; this is the main potential conflict point in the vicinity of the site.

Table 8 Forrester Road | Links Road | Ropes Crossing Boulevard roundabout throughput – Full operations

Scenario	Vehicle movements	Level of Service	Degree of saturation (v/c)	Average delay (seconds)	Max queue length (m)
2015 Weekday AM peak (7-8AM)					
Do nothing	2,221	A	0.50	9.7	31
With development	2,228	A	0.50	9.7	31
2015 Weekday PM peak (3-4PM)					
Do nothing	2,503	A	0.66	11.8	53
With development	2,512	A	0.67	11.9	54

Within Dunheved Industrial Precinct, the road network generally consists of wide, industrial-standard roads which are frequented by heavy vehicles. At present traffic volumes on this road network are relatively low, resulting in a large amount of spare capacity. Due to this the small increase in traffic as a result of the development would have little effect on the capacity or efficiency of this road network in the vicinity of the site.

On the external road network Forrester Road operates efficiently with little congestion in the vicinity of Dunheved Industrial Precinct. Again the increase in traffic would have little effect on its capacity or efficiency. On the wider arterial road network – for example the Great Western Highway or M4 Motorway - the traffic generated by the development would be negligible when compared to background traffic and have no meaningful effect on performance.

Section 2.2.1 notes that heavy vehicle generation as a result of the proposed development could rise as high as 10 vehicles in an hour. Considering the high level of performance of the road network under typical conditions, this further small increase (when compared to background traffic in the area) would easily be accommodated with no meaningful impact on safety or efficiency.

Given that there are no formal pedestrian or bicycle facilities within Dunheved Industrial Precinct and pedestrian facilities on Forrester Road are only provided south of Links Road, existing pedestrian and cycling activity in the area is extremely limited. As a result operations would not be expected to have any noticeable effect on pedestrian or bicycle safety or amenity.

In summary, operational traffic impacts would be limited to a relatively small amount of additional traffic. As a result the existing high level of performance of the Forrester Road | Links Road | Ropes Crossing Boulevard roundabout and surrounding road network would not be affected; operations would not be expected to have any noticeable effect on road network performance or safety at this (or any other) location.

2.3 Management of Impacts

2.3.1 Construction

Construction activity impacts are expected to be limited to only a small increase to existing traffic travelling to and from the site. Due to this no explicit mitigation measures are proposed to maintain or improve the safety, capacity or efficiency of the road network at the site or in the surrounding area.

Construction activities would generally be contained within the site. Despite this, if and when necessary a construction traffic management plan (CTMP) would be prepared. This would include guidelines, general requirements and procedures to be used when construction activities would have a potential impact on existing traffic arrangements. It would ensure that delays and disruptions are kept to a minimum, and proactively identify and respond to any changes in road safety as a result of construction works.

2.3.2 Operation

The operational assessment undertaken in **Section 2.2.3** indicates that the existing road network would operate safely and efficiently in the future with or without the proposed development. Due to this no physical mitigation measures or upgrades are believed necessary to maintain or improve the safety, capacity or efficiency of the road network and access points at the site or in the surrounding area following construction.

However, to improve the safety and efficiency of the road network in Dunheved Industrial Precinct, a circulating arrangement for heavy vehicles using Charles Street, Links Road and Dunheved Circuit would be adopted as described in **Section 2.2.2**.

In the case that other mitigation measures or upgrades are subsequently deemed necessary as part of the development, these would be undertaken in accordance with RMS and Council standards, requirements and guidelines.

No infrastructure upgrades are proposed to mitigate the specific impacts of this development. However, it is acknowledged that strategic planning has previously identified two key modifications to the existing road network which would directly affect traffic and transport operations and movements at Dunheved Industrial Precinct:

- The provision of a second direct road connection (in addition to Links Road) between Christie Road and the precinct.
- The upgrade (including signalisation and bus priority provision) of the Forrester Road | Links Road | Ropes Crossing Boulevard roundabout.

It is understood that these upgrades are part of longer-term planning strategies for the development of Dunheved Industrial Precinct and its surroundings. These upgrades have been identified to accommodate traffic generated by major developments and land use changes including the various precincts within the St Marys Release Area, namely: Western Precinct; Central Precinct; Eastern Precinct; Ropes Creek Precinct, and; North and South Dunheved Precincts.

The timing of these upgrades will likely be triggered by the staged development of these precincts (and other major developments) in the future. These upgrades are not expected to create or worsen any adverse impacts associated with the proposed Worth St Marys development, or create a need for any major additional mitigation measures.