



Kariong Sand and Soil Supplies

Jackson Planning and Environment

Traffic Impact Assessment

December 2018

SECAsolution 

Kariong Sand and Soil Supplies, Somersby
Development Application
Traffic Impact Assessment

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1. Introduction

Background

Seca Solution Pty Ltd has been commissioned by Jackson Environment and Planning Pty Ltd to provide a traffic impact assessment to support the proposal to Central Coast Council for an integrated development and a state significant development for the upgrading and increased processing capacity at the existing Kariong Sand and Soil Supplies facility located at 90 Gindurra Road, Somersby. As heavy vehicle movements to and from the site will impact on the regional and state road network the application will also be reviewed by Roads and Maritime Services (RMS) and their concurrence will be required.

Planning Context

In preparing this document, the following guides and publications were used:

- RMS Guide to Traffic Generating Developments, Version 2.2 Dated October 2002;
- RMS Technical Direction TDT 2013/ 04a Updated traffic surveys;
- Council Development Control Plan 2015;
- Australian / New Zealand Standard – Parking Facilities Part 1: Off-street car parking (AS2890.1:2004).

Proposed Development

The subject site is located at 90 Gindurra Road, Somersby as shown in Figure 1 below. The surrounding land use consists primarily of light industrial and rural residential properties.

The site is currently used for storing and screening soil and sand, which is sold for landscaping. It was originally approved as a Sand and Metal Recycling Facility on 28/02/1992 (DA 15337). As part of the original approval, only the front section of the site was approved for this use. The site's current development approval and infrastructure limits the amount of material that can be accepted and processed (screened and sorted) at the site.

The project allows for the upgrade of onsite facilities to accommodate an increase in throughput from the current 6,000 tonnes per annum to a proposed 200,000 tonnes per annum and the expansion into a best-practice recycling plant that can process a range of sand, soil and building materials. We have reviewed the SEARs that have been issued and note the requirements of the Roads and Maritime Services (RMS) for the project.

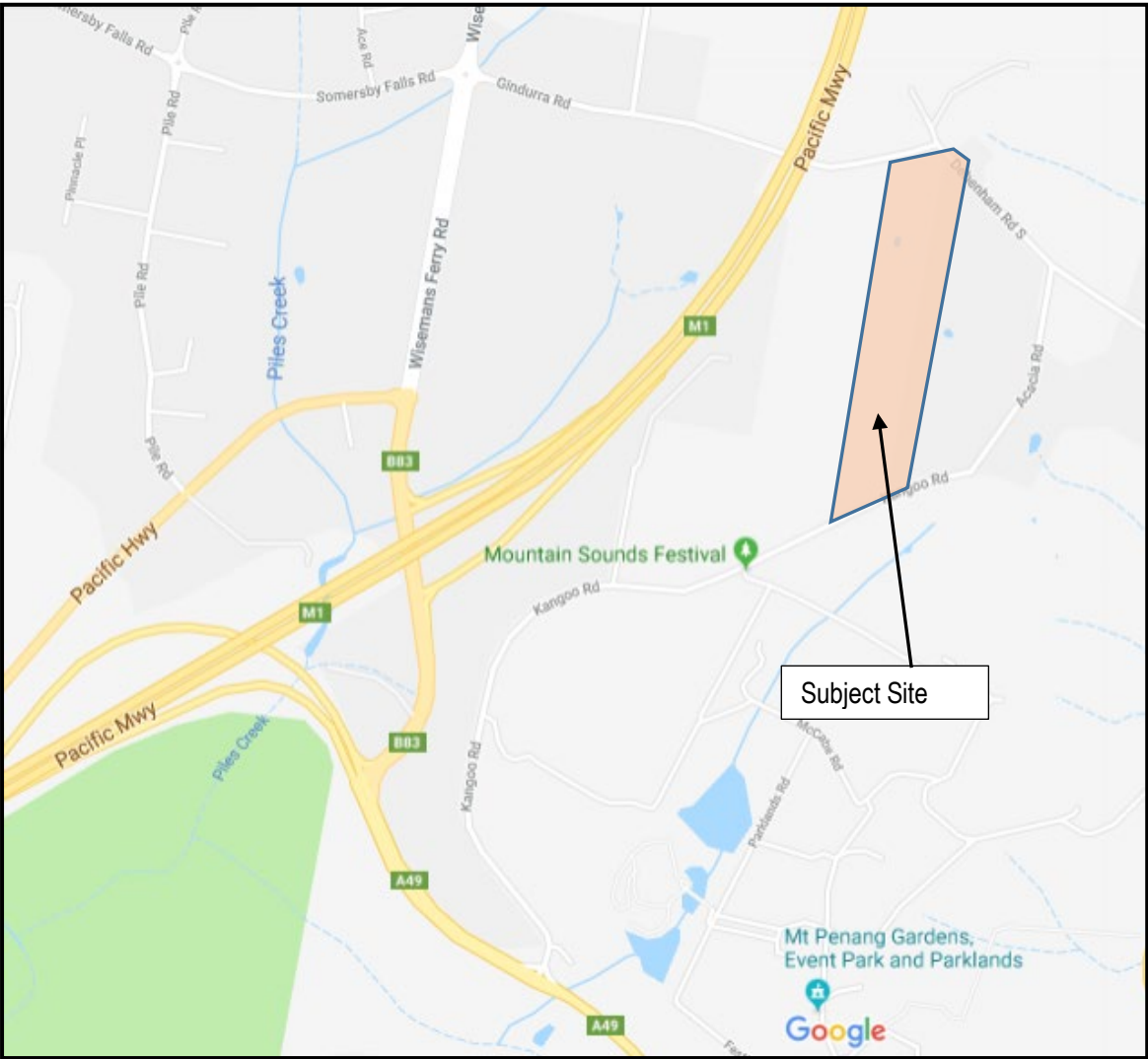


Figure 1-1 – Site Location

2. Traffic Impact Assessment Summary

The following assessment has been completed in accordance with the requirements of the RTA Guide to Traffic Generating Developments and Austroads Guidelines.

Item	Comment
Existing Situation	
2.1 Site Location and Access	The subject site is located at 90 Gindurra Road Somersby. The surrounding land use consists primarily of light industrial and rural residential properties.
2.2 Existing Road Network	
2.2.1 Road Hierarchy	<p>The main road through the locality is the Central Coast Highway (A49) which lies to the south of the subject site. This road provides a major link between the M1 Pacific Motorway to Gosford and through to the Central Coast. In the vicinity of the subject site it provides 2 lanes of travel in each direction with additional lanes provided at intersections to maintain capacity. Being an arterial road, the Central Coast Highway carries over 40,000 vehicles per day.</p> <p>Wisemans Ferry Road is a regional road connecting the Central Coast Highway with the Pacific Highway, Somersby Industrial Area and the rural residential and agricultural areas of the Somersby plateau, Mangrove Mountain, Mangrove Creek and through to Wisemans Ferry on the Hawkesbury River. At its southern end Wisemans Ferry Road connects with the Central Coast Highway via a signalised intersection at the start of the southbound on ramp to the M1 Pacific Motorway. Between the Central Coast Highway and the Pacific Highway, it passes under the M1 and connects with the southbound off ramp and the northbound on ramp. This section has a four-lane divided formation and the Pacific Highway intersection is a two-lane roundabout. North of the Pacific Highway the formation becomes two-lane divided standard up to the Gindurra Road / Somersby Falls Road intersection which is also under roundabout control. North of this intersection Wisemans Ferry Road reverts to a two-lane rural road formation. The whole section between the Central Coast Highway and Gindurra Road is designed to cater for heavy vehicles accessing the businesses within the Somersby Industrial Area. The posted speed limit is 70km/h.</p> <p>Gindurra Road is a local road providing access to businesses within the eastern section of the Somersby Industrial Area including the subject site. At its eastern end it connects with Debenham Road South which provides access to primarily rural residential properties and a few scattered light industrial developments as well as providing an alternative light traffic connection with Dyer Crescent at West Gosford. Gindurra Road was upgraded about 2 years ago to provide a 10-metre-wide asphalt pavement to cater for heavy vehicle access to the industrial developments in this area. This pavement width provides a single lane of travel in each direction with sufficient space for kerb side parking to both sides, however there is little demand for on-street parking. There are no pedestrian footpaths provided along Gindurra Road, although the grass verges on each side are wide enough to provide for pedestrian access. The posted speed limit is 50 km/hr.</p> <p>Kangoo Road is a local road that provides a connection between the Central Coast Highway and Debenham Road. It lies generally to the south-east of Gindurra Road and connects with Debenham Road about 330 metres south of Gindurra Road. It provides access primarily to light industrial businesses as well as Mount Penang Parklands and several rural residential properties. It also forms the southern boundary of the subject site, however, there is no existing access to the site from Kangoo Road. About 450 metres before it connects with Debenham Road the road name changes to Acacia Road. For a length of 1km from the Central Coast Highway, Kangoo Road has kerb and gutter along its eastern side and a pavement that varies between 9 to 10 metres wide, which is suitable for heavy vehicles servicing the adjacent industrial developments. Past this point</p>

Item	Comment
	<p>and along the frontage of the subject site to Debenham Road, Kangoo Road narrows to a typical two-lane rural road standard with a pavement width of 6 metres and narrow gravel shoulders. The posted speed limit is 50km/h.</p> <p>The section of Debenham Road between Gindurra Road and Acacia Road (Kangoo Road) is a two-lane rural road with a 7-metre-wide sealed pavement and narrow gravel shoulders. The posted speed limit is 50km/h.</p>
2.2.2 Roadworks	Minor shoulder works are currently being carried out along Kangoo Road. These works do not impact on any potential access to the subject site.
2.2.3 Traffic Management Works	No traffic management works noted or planned for this area.
2.2.4 Pedestrian and Cycling Facilities	Pedestrian and cycling facilities are provided along the Central Coast Highway and a short section of Wisemans Ferry Road in the form of shared paths and on-road cycle lanes. There is no direct connection between these facilities and the subject site.
2.2.5 Public Transport	A regular bus service is provided between Gosford and Somersby by Busways with the route including Central Coast Highway, Kangoo Road, Debenham Road, Gindurra Road, Somersby Falls Road and Pile Road.
2.3 Existing Traffic Flows	
2.3.1 Daily Traffic Flows	<p>As part of the project work Seca Solution collected traffic data at the intersection of Central Coast Highway and Kangoo Road during typical weekday morning and afternoon peak periods. This survey was completed on Thursday 30 November 2017 from 6.00am to 8.00am and from 3.00pm to 6.00pm.</p> <p>Traffic surveys were also conducted at the intersection of Central Coast Highway and Wisemans Ferry Road on Thursday 7 December 2017 from 6.00am to 8.00am and 4.00pm to 6.00pm.</p> <p>Advice from the RTA Guide to Traffic Generating Developments indicates that peak hour volumes typically represent around 10% of the daily traffic volumes. During the morning peak hour (7.00am to 8.00am) the two-way traffic volumes along Central Coast Highway were 3,900 vehicles per hour and in the afternoon peak (4.45pm to 5.45pm) volumes were 4,300 vehicles per hour. Daily volumes along Central Coast Highway could therefore be in the order of 41,000 vehicles per day, reflecting both local demand as well as through traffic in this location.</p> <p>Peak hour volumes along Kangoo Road were significantly lower with two-way volumes averaging 340 vehicles per hour. This would give daily flows in the order of 3,500 vehicles per day.</p> <p>Traffic surveys were previously conducted at the Wisemans Ferry Road / Gindurra Road intersection in December 2015. During the morning peak hour (6.15am to 7.15am) the two-way traffic volumes along Wisemans Ferry Road were 453 vehicles per hour and in the afternoon peak (3.30pm to 4.30pm) volumes were 545 vehicles per hour. Daily volumes along Wisemans Ferry Road could therefore be in the order of 5,000 vehicles per day.</p> <p>Peak hour volumes along Gindurra Road were slightly lower with two-way volumes averaging 394 vehicles per hour. This would give daily flows in the order of 4,000 vehicles per day.</p> <p>A spot check of current traffic volumes was conducted at the Wisemans Ferry Road / Gindurra Road intersection on Thursday 23 November 2017 from 6.15am to 7.15am. This count indicated an increase in traffic volumes along Wisemans Ferry Road of 12% and a 17% increase in Gindurra Road since the previous count in December 2015. On this basis, the current daily traffic volumes</p>

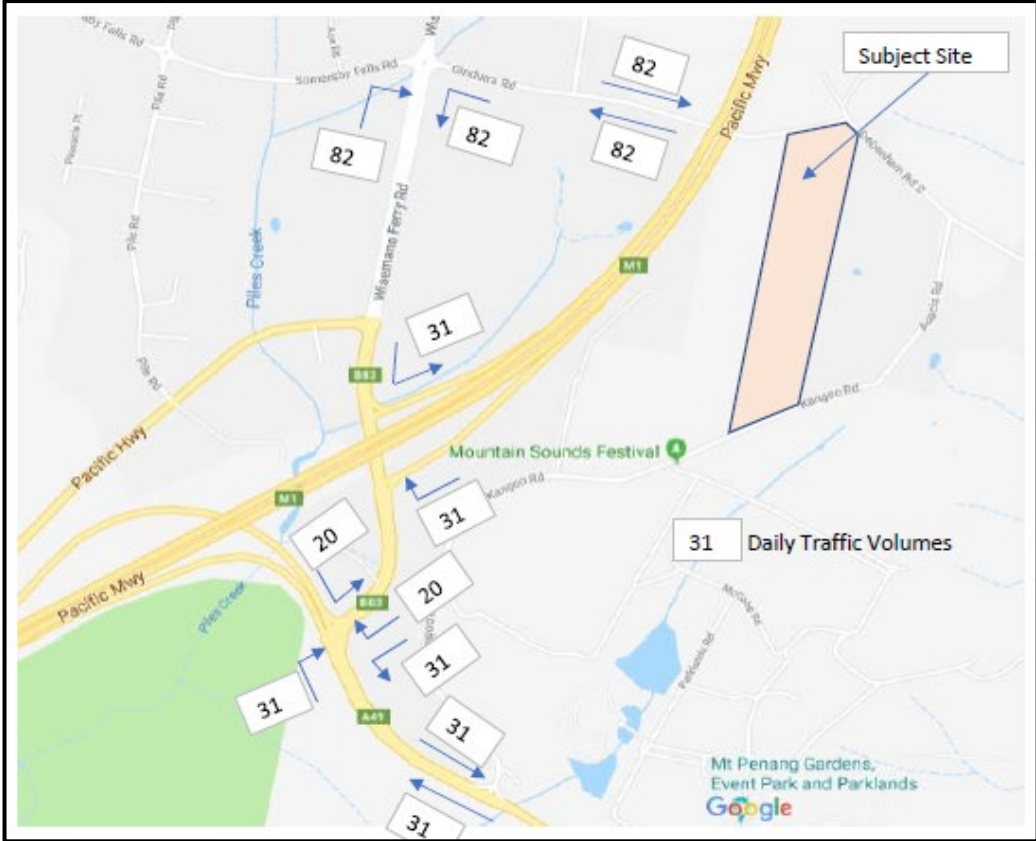
Item	Comment
	in Wisemans Ferry Road would be 5,600 vehicles per day and 4,700 vehicles per day in Gindurra Road.
2.3.2 Daily Traffic Flow Distribution	The traffic surveys conducted for this assessment indicate that there is a priority movement of 65% total traffic towards the M1 Motorway in the AM Peak and the reverse in the PM Peak.
2.3.3 Vehicle Speeds	No speed surveys were completed as part of the study work. Observations on site indicate that vehicle speeds along Gindurra Road are generally above the 50km/h posted speed limit.
2.3.4 Existing Site Flows	Based on the existing throughput of 6,000 tonnes per annum the existing traffic generated to and from the site would be a maximum of 6 trips per day.
2.3.5 Heavy Vehicle Flows	During the peak hour traffic surveys, heavy vehicle volumes accounted for around 16% of total volumes in Wisemans Ferry Road and 10% in Gindurra Road. This equates to around 800 heavy vehicle movements per day on Wisemans Ferry Road and 400 per day on Gindurra Road.
2.3.6 Current Road Network Operation	<p>Observations on site during the morning and afternoon peak periods show that the road network in the vicinity of the subject site operates well, with low delays and congestion for drivers.</p> <p>The RMS Guide to Traffic Generating Developments, Section 4 (Table 4.4) provides guidance as to the operating level of service for urban roads at various ranges of mid-block traffic volumes.</p> <p>According to Table 4.4, the roads surrounding the subject site are currently operating at the following levels of service during peak periods:</p> <ul style="list-style-type: none"> • Central Coast Highway: 2 lanes each direction, 2,150 vehicles per hour – LoS D. • Wisemans Ferry Road: 1 lane each direction, 273 vehicles per hour – LoS B. • Gindurra Road: 1 lane each direction, 200 vehicles per hour (two way) – LoS A. • Kangoo Road: 1 lane each direction, 170 vehicles per hour (two way) – LoS A.
2.4 Traffic Safety and Crash History	<p>Crash data provided by Roads and Maritime Services indicate that there have been 38 recorded crashes along the roads within the study area since January 2012. 29 of these crashes occurred along the Central Coast Highway between Kangoo Road and Wisemans Ferry Road, 5 were at the intersections of Wisemans Ferry Road and the M1 Motorway ramps, 2 were on Wisemans Ferry Road between the Pacific Highway and Gindurra Road, one on Kangoo Road 200 metres north of the Central Coast Highway and one was at the Acacia Road / Debenham Road intersection. Almost half of the crashes were rear-end crashes associated with queueing along the Central Coast Highway.</p> <p>None of these crashes resulted in a fatality, however, 21 were injury crashes with the remaining 17 being non-injury crashes.</p> <p>The crash rate along the Central Coast Highway averages at just under 5 per year over the last 6 years of recorded data which indicates a reasonably high level of safety considering the high volume of traffic travelling along this route each day. The other roads in the study area, particularly Wisemans Ferry Road, Gindurra Road and Kangoo Road are operating at a high level of safety and it is important to note that there have been no recorded crashes in the vicinity of the subject site.</p> <p>The available sight distance at the existing access to the site on Gindurra Road exceeds the Austroads requirements of 90 metres in each direction so it is reasonable to assume that, the current level of safety along Gindurra Road will continue following the development of the site.</p>
2.5 Parking Supply and Demand	
2.5.1 On-street Parking Provision	Unrestricted on-street parking is available along both sides of Gindurra Road near the site.

Item	Comment
2.5.3 Parking Demand and Utilisation	There is limited parking demand in the general locality of the subject.
2.5.4 Set down or pick up areas	There are no dedicated set down or pick up areas near the site.
2.6 Public Transport	
2.6.1 Rail Station Locations	The closest railway station is located at Gosford some 6kms from the site.
2.6.2 Bus Stops and Associated Facilities	Local bus services are available from a bus stop in Gindurra Road about 500 metres to the south of the site.
2.6.3 Pedestrians	There are no concrete footpaths along Gindurra Road but pedestrian access is available via a wide grass verge along the southern side of the road.
2.7 Other Proposed Developments	There is limited potential for further developments within the Somersby Industrial area but primarily to the west of Wisemans Ferry Road. Any future developments in this area will contribute traffic to the Wisemans Ferry Road / Somersby Falls Road / Gindurra Road intersection but will have only a minor impact on the operation of the subject site.
The Development	
3.1.1 Nature of Development	<p>The Kariong Sand and Soil Supplies (KSSS) site will be developed to receive, process and store up to 200,000 tonnes per annum of soil, sand and building materials. The complete development would require:</p> <ul style="list-style-type: none"> • installation of security fencing; • construction of a hardstand area for processing material; • construction of storage bays for processed material; • construction of on-site roads suitable for large vehicles; • construction of a truck parking area; • construction of an office and maintenance workshop. <p>It is anticipated that a total final area of the developed operational area on the site will be approximately 39,000m². The development would need to be consistent with the Gosford Local Environmental Plan 2014 and the Gosford Development Control Plan 2013. As a State Significant Development, the development will also need to be consistent with any conditions attached to the development approval by the State Government. The upgrade of the site will be conducted in two stages. The first stage will be construction work at the front of the site, involving demolition of the existing buildings, construction of a front office and workshop, front parking areas and install the security fencing. The second stage involves clearing of vegetation, earthworks to facilitate on-site drainage, construction of on-site roads, construction of a hardstand area, construction of a stormwater management system, construction of a noise barrier and construction of product storage bays.</p> <p>Processed product shall be exported from site.</p> <p>Additionally, there is in the order of 10,000 tonnes of landscaping product however this does not constitute part of the DA.</p>

Item	Comment
3.1.2 Access and Circulation Requirements	All vehicles shall be able to enter and exit in a forward direction. Access and internal circulation are to be designed in accordance with AS2890 and Council's DCP.
3.2 Access	
3.2.1 Driveway Location	Vehicular access will be provided off Gindurra Road in a similar location to the existing access driveway. Access to the site shall be controlled by a secure gate which will be located a sufficient distance within the property so that a single vehicle can store without interrupting traffic flows in Gindurra Road. This gate shall remain open during the day when the site is operational to ensure unrestricted access for heavy vehicles associated with general operations.
3.2.2 Sight Distances	<p>The posted speed limit along Gindurra Road is 50 km/h. According to Austroads Guide to Road Design the sight distance requirement to approaching vehicles for a left turning driver is 69 metres at an approach speed of 50km/h.</p> <p>We note that development consent for Stage 1 development works for the site was provided by Central Coast Council on 17/11/2017 under DA52541/2017, specifically for construction of a 'New Shed with Offices, Amenities and Driveway'. Under Condition 2.8a of DA52541/2017, it is noted that Central Coast Council requires that the '...vehicle crossing shall be located approximately 14m west of the existing vehicle crossing to achieve the minimum sight distance of 69m in accordance with Figure 3.3 of AS 2890.2:2002'. Seca Solution has reviewed this advice, and we recommend the proposed entrance design and location is satisfactory for the SSD proposal, with a sight distance of 55m being satisfactory given vehicle speeds approaching the site from the east are likely to be travelling less than 40 km/hr due to the right angle turn from Debenham Road.</p>
3.2.3 Service Vehicle Access	Service vehicle access will be available via the main entry / exit off Gindurra Road.
3.2.4 Queuing at entrance to site	It is proposed to adjust the existing centreline in Gindurra Road to provide a right turn lane for vehicles entering the site. No Stopping signs will also be required along the frontage of the site. The access point will be designed to ensure vehicles can enter the site with minimal delays to other road users.
3.2.5 Comparison with existing site access	The existing access to the site will be modified to ensure that heavy vehicles up to a B-Double can enter and exit safely.
3.2.6 Access to Public Transport	Local bus services are available from a bus stop in Gindurra Road about 500 metres to the south of the site. This service provides access to and from Gosford railway station.
3.3 Circulation	
3.3.1 Pattern of circulation	<p>All vehicles will be able to enter and exit the site in a forward direction, with the internal parking layout to be designed at the detailed design stage in accordance with Council requirements and AS/NZS 2890.1:2004 Parking facilities Off-street car parking.</p> <p>The internal roads will allow heavy vehicles to circulate within the site to load or unload and exit onto Gindurra Road in a forward direction. A weighbridge is to be provided adjacent to the recycling plant with boom gate controls and traffic signals to be installed on each approach to control traffic movements across the weighbridge. Two waiting bays shall also be provided within the site for vehicles to queue whilst waiting to use the weighbridge.</p> <p>Swept paths have been prepared by others to confirm the ability of large trucks, up to a B-Double combination, to manoeuvre within the site and enter and exit onto Gindurra Road in a forward direction.</p>
3.3.2 Road width	The accesses, internal roads and parking aisles will be designed in accordance with AS/NZS 2890.1:2004 Parking facilities, Part 1: Off-street car parking and AS 2890.2:2002 Parking facilities, Part 2: Off-street commercial vehicle facilities.

Item	Comment
3.3.3 Internal Bus Movements	No internal bus movement will be required for this development.
3.3.4 Service Area Layout	Service vehicle access will be available via the main entry / exit off Gindurra Road.
3.4 Parking	
3.4.1 Proposed Supply	<p>As the site will not be open to the public it is proposed to provide 18 parking spaces on site, which will accommodate the parking demands for employees only.</p> <p>A parking area for heavy vehicles is also proposed within the site near the main entrance off Gindurra Road.</p>
3.4.2 Authority Parking	Neither the Gosford DCP nor the RMS guidelines provide parking requirements for this type of development. Parking has therefore been determined with regards to the anticipated parking demands and the various discussions with Council in relation to this development.
3.4.3 Parking Layout	<p>The parking layout shall be designed in accordance with AS/NZS 2890.1:2004 Parking facilities Off-street car parking.</p> <p>Parking Class: 1A (residential, staff).</p> <ul style="list-style-type: none"> • Bay lengths: 5.4 metres • Bay widths: 2.4 metres • Aisle widths: 5.8 metres (note additional clearance may be required where parking is provided on a single side only and the other side is bounded by a wall or other vertical obstruction).
3.4.4 Parking Demand	The operational analysis indicates that staff will total a maximum of 11, therefore the proposed 18 parking spaces that will be provided on site will be sufficient for expected staffing needs.
3.4.5 Service Vehicle Parking	Service vehicle parking will be accommodated on site within the servicing and loading / unloading area near the main building.
3.4.6 Pedestrian and Bicycle Facilities	Internal pedestrian access will be provided from the main gate to the main building.
Traffic Assessment	
4.1 Traffic Generation	<p>Kariong Sand and Soil Supplies has provided details of their operational analysis for the proposed development of the site which includes estimates of the traffic volumes that will be generated at various stages of development. A copy of the traffic generation analysis is included at AppendixA.</p> <p>At full development (expected to be in 2025) the site will be capable of receiving, processing and storing up to 200,000 tonnes per annum of soil, sand and building materials. It is also expected to supply and deliver up to 10,000 tonnes per annum of landscape supplies.</p> <p>This level of operation is estimated to generate up to 164 vehicle trips per day (82 inbound and 82 outbound) consisting of:</p> <ul style="list-style-type: none"> • staff operational vehicles x 20 • 12 tonne tippers x 77 • 32 tonne truck and dog or semi trailers x 41 • 40 tonne B-Doubles x 14 • Landscaping x 12 <p>Averaged over an 8 hour working day this equates to 21 trips per hour.</p>
4.1.1 Daily and Seasonal Factors	<p>The facility shall operate 6 days per week (Monday – Saturday)</p> <p>Limited annual variation expected except for holiday periods.</p>

Item	Comment
4.1.2 Pedestrian Movements	The development is not expected to generate a high level of pedestrian activity. Possibly some staff who may travel by public transport.
4.2 Traffic Distribution and Assignments	
4.2.1 Origin / destinations assignment	<p>The site operator is anticipating that 25% of materials entering the site will come from Sydney while the remainder will be sourced locally on the Central Coast. It is expected that 100% of the products leaving the site will be used in the local area. These will be bulk loads transported in the various heavy vehicle classes listed above. There will be no sales direct to the public.</p> <p>Vehicles accessing and egressing the site at Gindurra Road will travel to and from the Central Coast Highway and M1 Motorway via Wisemans Ferry Road and Gindurra Road. According to the operational details provided these vehicles will be distributed to the network as follows:</p> <ul style="list-style-type: none"> • M1 Motorway south – 40 trips per day (20 inbound, 20 outbound). <ul style="list-style-type: none"> ➢ Inbound Route: M1 Motorway northbound off-ramp, Central Coast Highway, Wisemans Ferry Road, Gindurra Road. ➢ Outbound Route: Gindurra Road, Wisemans Ferry Road, Central Coast Highway, M1 southbound on-ramp. • M1 Motorway north – 62 trips per day (31 inbound, 31 outbound). <ul style="list-style-type: none"> ➢ Inbound Route: M1 Motorway southbound off-ramp, Wisemans Ferry Road, Gindurra Road ➢ Outbound Route: Gindurra Road, Wisemans Ferry Road, M1 Motorway northbound on-ramp. • Central Coast Highway – 62 trips per day (31 inbound, 31 outbound). <ul style="list-style-type: none"> ➢ Inbound Route: Central Coast Highway, Wisemans Ferry Road, Gindurra Road. ➢ Outbound Route: Gindurra Road, Wisemans Ferry Road, Central Coast Highway. <p>This distribution of trips is shown diagrammatically in Figure 2 below.</p>

Item	Comment
	 <p>Figure 2 – Predicted traffic distribution at full development – Gindurra Road Access (Source: Google Maps).</p>
4.3 Impact on Road Safety	<p>The major impact of the development will be increased traffic movements along Gindurra Road and Wisemans Ferry Road.</p> <p>Due to the low volumes of additional traffic that will be generated from this development and the low incidence of crashes it is considered that the additional traffic movements at this intersection will have a minimal impact upon road safety.</p>
4.4 Impact of Generated Traffic	
4.4.1 Impact on the capacity of the existing road network.	<p>Current daily traffic volumes in the other major roads in the network area:</p> <ul style="list-style-type: none"> Central Coast Highway – 41,000 vehicles per day Wisemans Ferry Road - 5,600 vehicles per day. Gindurra Road – 4,700 vehicles per day. Kangoo Road - 3,500 vehicles per day. <p>The RMS Guide to Traffic Generating Developments, Section 4 (Table 4.4) provides guidance as to the operating level of service for urban roads at various ranges of mid-block traffic volumes.</p> <p>According to Table 4.4, the roads surrounding the subject site are currently operating at the following levels of service during peak periods:</p> <ul style="list-style-type: none"> Central Coast Highway: 2 lanes each direction, 2,150 vehicles per hour – LoS D. Wisemans Ferry Road: 1 lane each direction, 273 vehicles per hour – LoS B. Gindurra Road: 1 lane each direction, 200 vehicles per hour (two way) – LoS A. Kangoo Road: 1 lane each direction, 170 vehicles per hour (two way) – LoS A.

Item	Comment
	The additional 21 trips per hour that will be generated by the full development will have only a minor impact on the LoS of each of these roads as they will still be operating within their existing capacity.
<i>4.4.2 Peak Hour Impacts on Intersections</i>	The key intersections have been assessed below in Chapter 3 using Sidra intersection modelling.
<i>4.4.3 Impact of Construction Traffic</i>	<p>Most of the construction work will be contained within the site so minimal impact is expected upon the external road network. There will be a requirement for construction machinery and traffic associated with workers to access the site. A Traffic Management Plan will be required for work on site and to provide access controls. This will be completed as part of the design process by the contractor on site.</p> <p>During the construction of the site access there will be a need to manage traffic flows along Gindurra Road. The Traffic Control Plan for this work will be prepared as part of the detailed design stage of the project.</p>
<i>4.4.4 Other Developments</i>	There are no other sites in the area currently being developed that will impact on this site.
4.5 Public Transport	
<i>4.5.1 Options for improving services</i>	Current bus services in the area are adequate.
<i>4.5.2 Pedestrian Access to Bus Stops</i>	This proposal will not impact on pedestrian access to bus services.
4.6 Recommended Works	
<i>4.6.1 Improvements to Access and Circulation</i>	The access to the site and internal roads will be designed for the safe and efficient movement of all vehicles entering and exiting the site.
<i>4.6.2 Improvements to External Road Network</i>	To facilitate the right turn movement into the site it is recommended that the existing centre line marking in Gindurra Road be relocated a minimum of 3 metres south (towards the site) to provide sufficient width for a right turn lane into the site. The right turn lane should be a minimum of 60 metres in length to provide sufficient storage for two B-Doubles. The site access should be designed to ensure that the largest vehicle entering or exiting the site is able to do so without encroaching on the opposite lane in Gindurra Road. No Stopping signs would need to be installed on both sides of Gindurra Road for the full length of the right turn lane.
<i>4.6.3 Improvements to Pedestrian and Cyclist Facilities</i>	No improvements are recommended as the existing facilities are adequate.
<i>4.6.4 Effect of Recommended Works on Adjacent Developments</i>	No impact on adjacent development.
<i>4.6.5 Effect of Recommended</i>	Nil

Item	Comment
<i>Works on Public Transport Services</i>	
<i>4.6.6 Provision of LATM Measures</i>	None required
<i>4.6.7 Funding</i>	All recommended works shall be funded by the developer.

Site Photos



Photo 1 Existing access off Gindurra Road



Photo 2 View to right for drivers exiting the subject site onto Gindurra Road



Photo 3 – View left for drivers exiting the subject site onto Gindurra Road

3. Sidra Assessment

The intersections at Central Coast Highway / Wisemans Ferry Road and Wisemans Ferry Road / Gindurra Road have been modelled using Sidra 7 software to assess their existing operational performance during morning and afternoon peak. The results of the modelling are shown below.

Intersection		Level of Service	Average Delay (s)	95% Queue (m)
Central Coast Hwy / Wisemans Ferry Rd				
Central Coast Hwy (east)	Through	B / A	17.7 / 14.2	302.5 / 65.3
	Right Turn	E / E	64.4 / 58.6	97.9 / 152.6
Wisemans Ferry Road	Right Turn	F / E	72.3 / 70.2	48.8 / 20.2
Central Coast Hwy (west)	Through	A / B	10.1 / 23.6	53.8 / 313.0
Overall		B / C	26.4 / 31.6	302.5 / 313.0

Intersection		Level of Service	Average Delay (s)	95% Queue (m)
Wisemans Ferry Rd / Gindurra Rd				
Wisemans Ferry Road (south)	Right Turn	A / A	10.0 / 9.6	11.2 / 8.0
Gindurra Road	Right Turn	A / A	9.6 / 10.0	9.6 / 8.1
Wisemans Ferry Road (south)	Right Turn	A / A	10.4 / 11.3	4.1 / 5.6
Somersby Falls Road	Right Turn	A / A	11.2 / 10.2	3.1 / 6.6
Overall		A / A	6.3 / 6.3	11.2 / 8.1

The above results indicate that, overall, these intersections are currently operating at a satisfactory level of service, particularly the roundabout at Wisemans Ferry Road / Gindurra Road. Some of the movements at the Central Coast Highway intersection are experiencing low levels of service but these are the minor movements turning right to and from Wisemans Ferry Road. However, the queue lengths are acceptable and do not exceed the available lengths of the right turn lanes.

Furthermore, the major through movements on the Central Coast Highway are operating at LoS A or B and the queue lengths do not block adjacent intersections as there is at least 500 metre separation between Woy Woy Road, Kangoo Road and Wisemans Ferry Road.

Sidra modelling has also been completed for the intersection of the Central Coast Highway and Wisemans Ferry Road allowing for the additional traffic generated by the development. The results of this are provided below.

Intersection		Level of Service	Average Delay (s)	95% Queue (m)
Central Coast Hwy / Wisemans Ferry Rd				
Central Coast Hwy (east)	Through	B / A	19.2 / 14.2	314.1 / 65.3
	Right Turn	E / E	65.5 / 59.4	100.8 / 155.8
Wisemans Ferry Road	Right Turn	E / F	69.4 / 70.9	50.1 / 23.0
Central Coast Hwy (west)	Through	A / B	10.6 / 23.7	55.1 / 313.8
Overall		B / C	27.4 / 31.8	314.1 / 313.8

The above results indicate that the additional trips that will be generated by the development will have a negligible impact upon the operation of this intersection during the peak hours with very minimal increase to the average delays or queueing on each approach.

The intersection of Wisemans Ferry Road / Gindurra Road / Somersby Falls Road currently operated well within the acceptable levels of service and has sufficient spare capacity to cater for the additional 21 trips per hour generated by the development.

4. Conclusion

The Kariong Sand and Soil supplies site is located at 90 Gindurra Road, Somersby (Lot 4 DP 227279) and is currently used for storing and screening soil and sand, which is sold for landscaping. It is proposed to develop the site over the next 7 years to receive, process and store up to 200,000 tonnes per annum of soil, sand and building materials with all materials then being exported from the site.

This level of operation, by 2025, is estimated to generate up to 164 vehicle trips per day consisting of staff operational vehicles, 12 tonne tippers, 32 tonne truck and dog or semi-trailers and 40 tonne B-Doubles. Over an average 8 hour working day this equates to 21 trips per hour.

The site operator is anticipating that 25% of materials entering the site will come from Sydney while the remainder will be sourced locally on the Central Coast. It is expected that 100% of the products leaving the site will be used in the local area. These will be bulk loads transported in the various heavy vehicle classes listed above. There will be no sales direct to the public.

The existing road network and major intersections are currently operating at a good level of service with spare capacity and the traffic generated by the proposed development will be distributed to the road network over an 8 hour working day. The additional traffic is expected to have only a minor impact on the LoS of each of these roads and they will still be operating within their existing capacity.

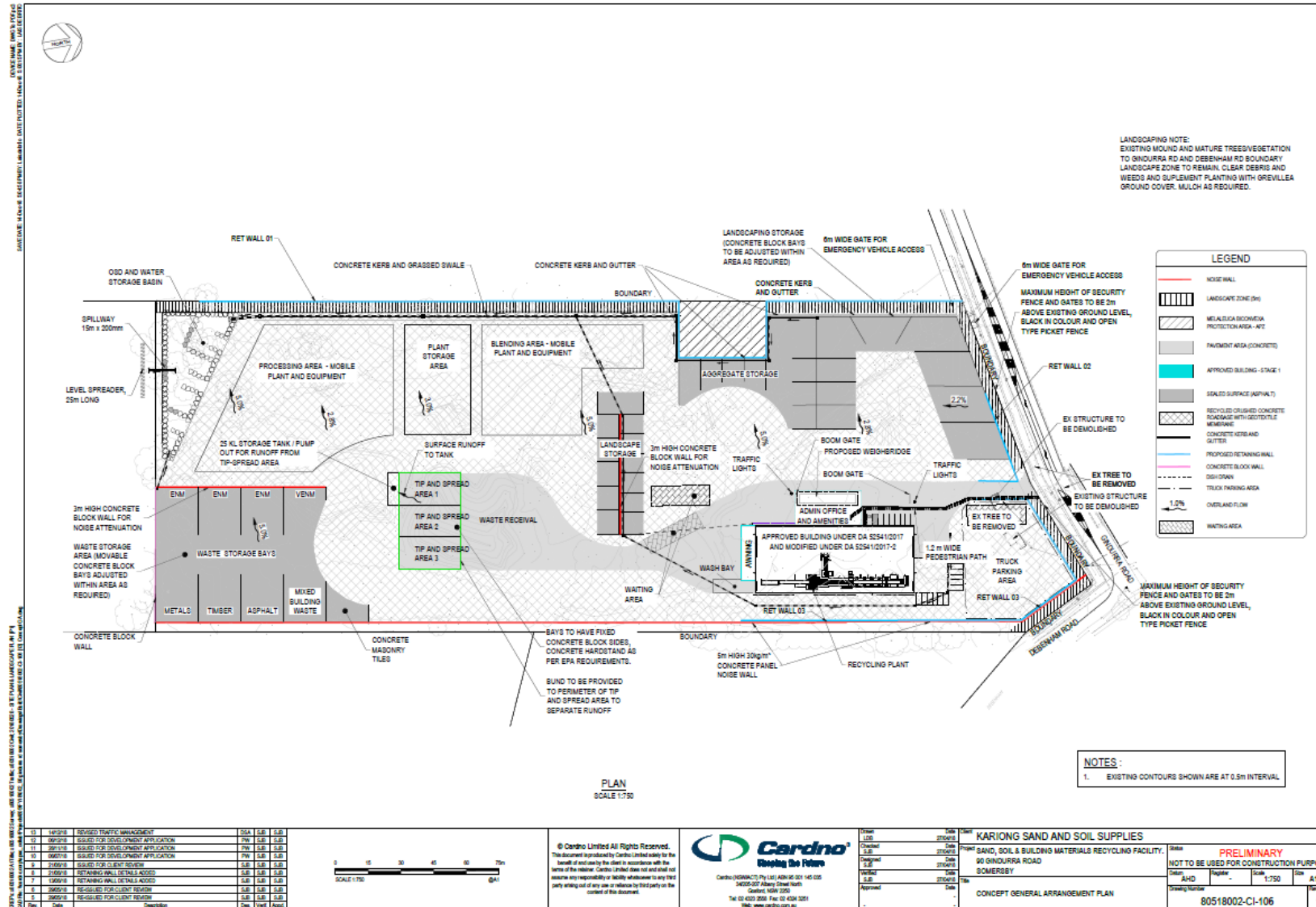
From the route nominated it is also clear that these additional trips will not have any significant impact on the operational performance of the intersections at Central Coast Highway / Kangoo Road. The intersections of the Central Coast Highway / Wisemans Ferry Road and Wisemans Ferry Road / Gindurra Road have been assessed and as each of these intersections is currently operating at acceptable levels of service with sufficient spare capacity to cater for the additional traffic generated by this proposed development the impact on the future development is acceptable.

The existing access has been reviewed on site and given the 90 degree bend at Debenham Road reducing vehicle speeds to less than 40km/hr sight lines at this location are appropriate.

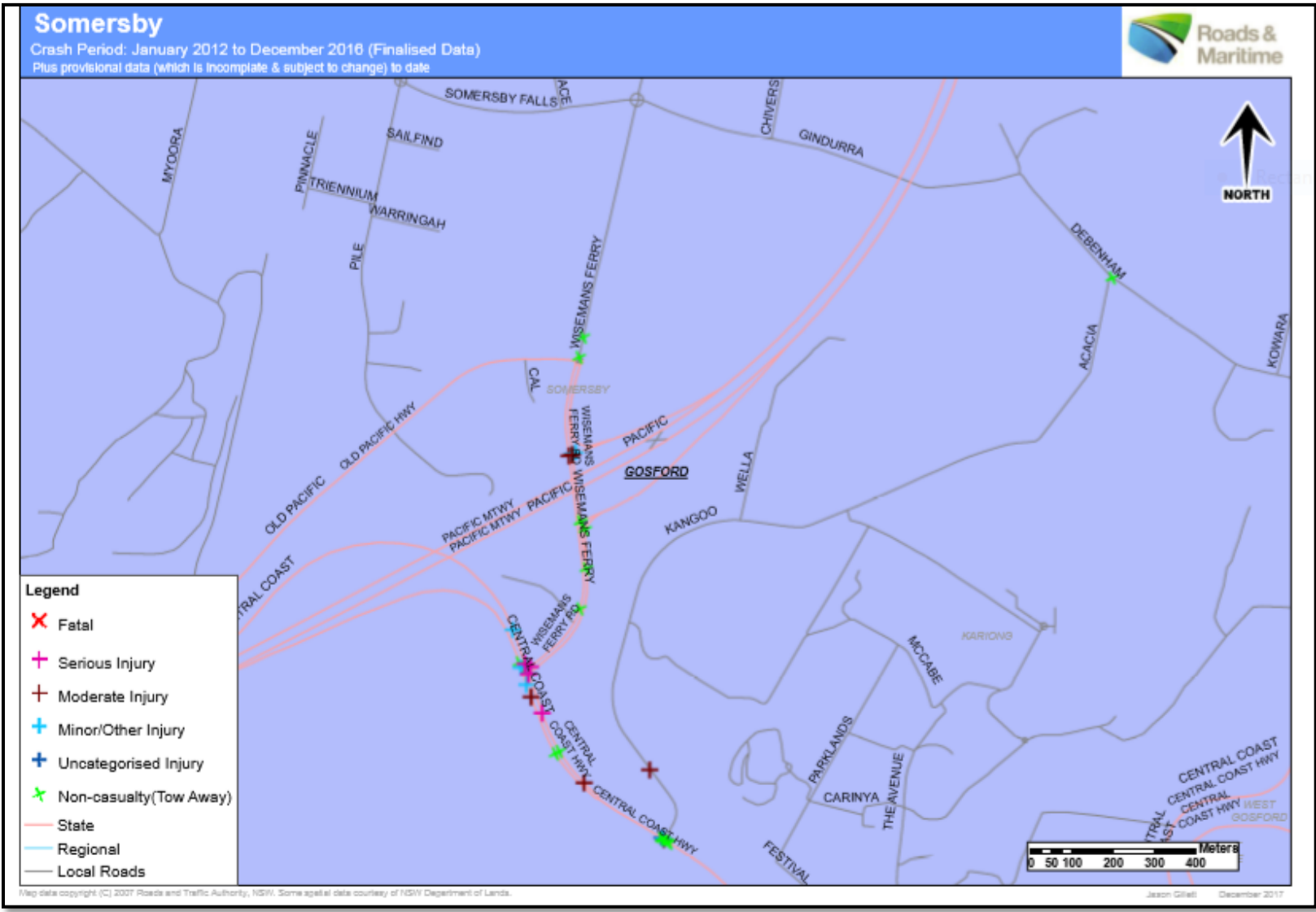
To facilitate the right turn movement into the site it is recommended that the existing centre line marking in Gindurra Road be relocated a minimum of 3 metres south (towards the site) to provide sufficient width for a right turn lane into the site. The right turn lane shall provide sufficient storage for two B-Doubles (60 metres) with No Stopping signs installed.

It is therefore recommended that with the minor works at the access that the proposed development be approved due to the minimal impact on traffic, access and safety.

Appendix A Site Plan



Appendix B Crash Data



Centre for Road Safety

[illegible]

Percentages are percentages of all crashes. Unknown values for each category are not shown on this report.

Appendix C Operational Analysis

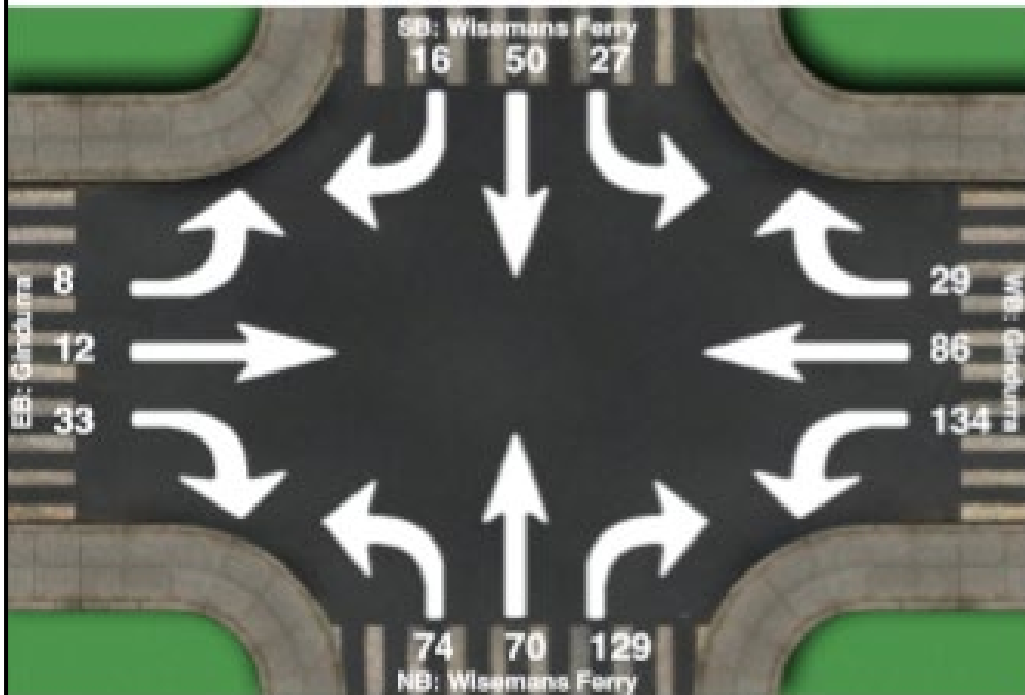
Kariong Sand and Soil Supplies - Preliminary Traffic Generation Assessment

Phase of development	2018 1				2021 4				2025 8			
Annual waste received (tpa)	20000				80000				200000			
	Vehicles (staff)	12 t tipper	32 t T&D or semi	40 t B-double	Vehicles (staff)	12 t tipper	32 t T&D or semi	40 t B-double	Vehicles (staff)	12 t tipper	32 t T&D or semi	40 t B-double
Operation												
Staff operational vehicles	1,152				2,304				2,880			
WASTE RECEIVAL												
Excavated Natural Material (soil)		222	83	67		889	333	667		2,222	833	667
Virgin Excavated Natural Material (VENM) (soil)		56	21	17		222	83	167		556	208	167
Asphalt		56	21	17		222	83	167		556	208	167
Metal		33	-	-		133	-	-		333	-	-
Timber, stumps and rootballs (clean, non-treated and non-painted separated timber and woody tree material)		167	-	-		667	-	-		1,667	-	-
Concrete / tiles / masonry		128	48	38		511	192	383		1,278	479	383
Mixed building waste		28	10	8		111	42	83		278	104	83
PRODUCT SALES												
Virgin Excavated Natural Material (VENM) (soil)		33	49	-		131	196	-		327	490	-
Asphalt		33	49	-		131	196	-		327	490	-
Metal		-	-	10		-	-	40		-	-	100
Timber mulch		150	-	-		600	-	-		1,500	-	-
Excavated Natural Material (ENM)		131	196	-		523	784	-		1,307	1,960	-
Crushed concrete		74	111	-		296	444	-		740	1,110	-
DISPOSAL OF RESIDUAL WASTE TO LANDFILL												
Landfill				40				160				400
Total vehicles per day												
Staff operational vehicles				3.69				7.38				10.00
12 t tipper				3.55				14.22				38.50
32 t T&D or semi				1.89				7.54				20.43
40 t B-double				0.63				5.34				6.83
				9.76				34.49				75.76
Assumptions									Landscape supplies		6	
1. Data is for trucks accessing the facility on a yearly basis											81.76	trucks
2. Assume ENM, VENM, asphalt, deliveries, equally split between tippers, semis and b-doubles												
3. Metals and timber delivered in rigid trucks only												
4. Staffing - Truck drivers full time (4); plus operation staff of 7 staff total - increasing from 4 by 1 employee every 2 years; assume 48 week per year working duration, 6 days per week)												
5. 80% of VENM, ENM, asphalt and crushed concrete transported out of the site in Truck & Dog loads directly from 'Processing Area'; 20% is transported out of the site from the 'Landscaping Supplies Area' in tipper trucks.												
Truck type	Load (tonnes)											
Tipper	12											
Truck & dog or semi	32											
B-double	40											

Appendix D Traffic Survey Results

Intersection Peak Hour

Location: Wisemans Ferry at Gindarra, Somersby
 GPS Coordinates: Lat=-33.413178, Lon=151.200261
 Date: 2017-11-23
 Day of week: Thursday
 Weather:
 Analyst: Rob



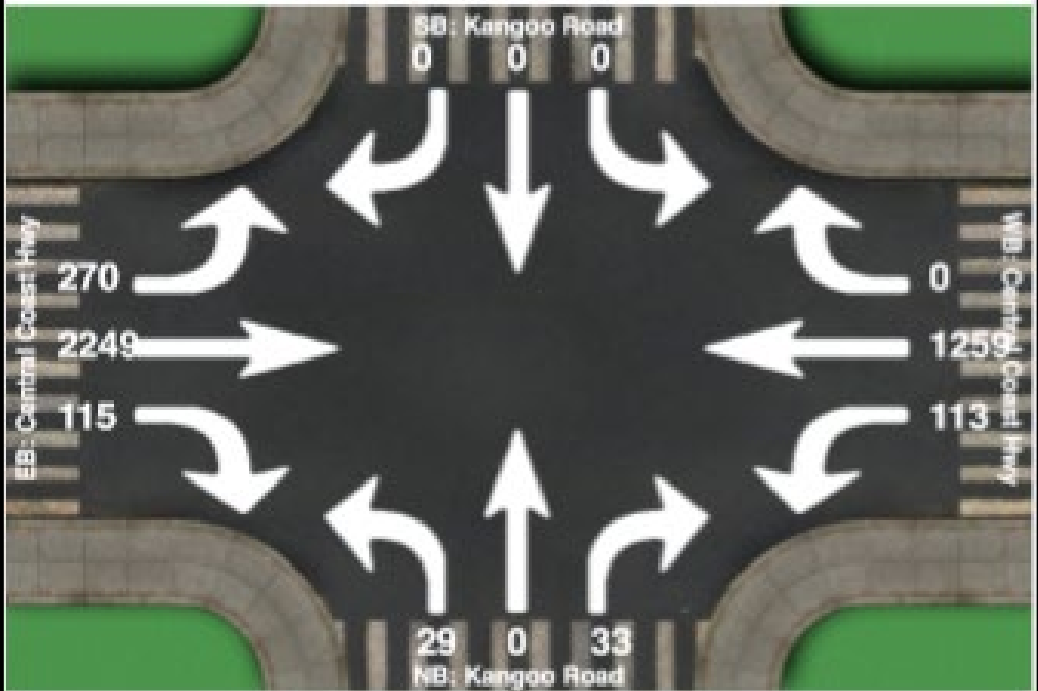
Intersection Peak Hour

06:15 - 07:15

	Southbound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Vehicles Total	27	50	16	134	86	29	74	70	129	8	12	33	688
Factor	0.84	0.74	0.67	0.74	0.40	0.66	0.66	0.82	0.66	0.20	0.75	0.62	0.62
Approach Factor	0.80			0.66			0.68			0.66			

Intersection Peak Hour

Location: Kangoo Road at Central Coast Hwy, Kariong
GPS Coordinates:
Date: 2017-11-30
Day of week: Thursday
Weather:
Analyst: Rob



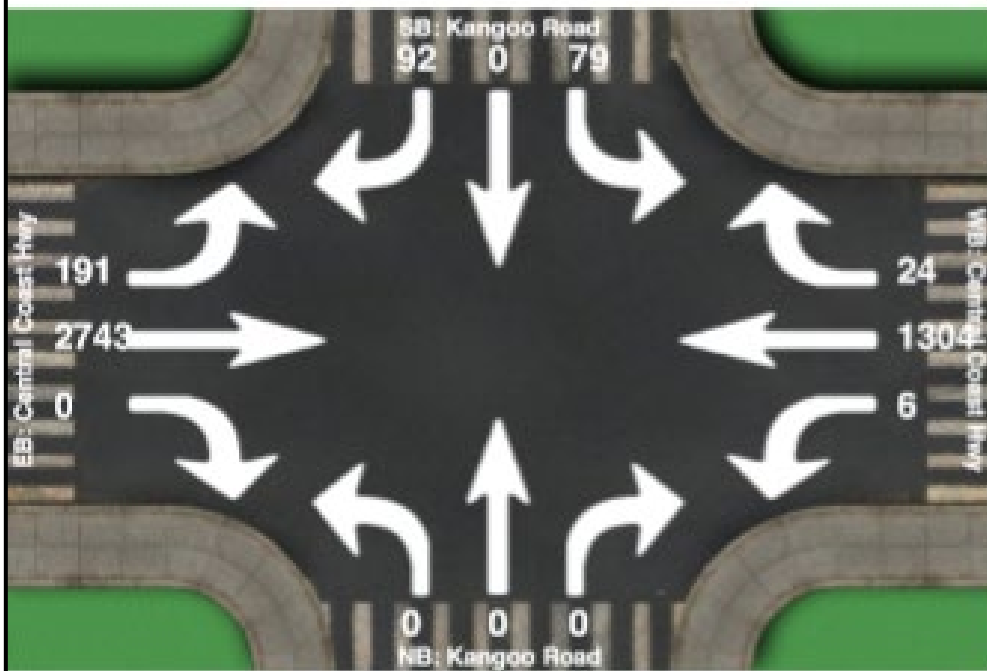
Intersection Peak Hour

07:00 - 08:00

	Southbound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Vehicle Total	0	0	0	113	1259	0	29	0	33	270	2249	115	4066
Factor	0.00	0.00	0.00	0.72	0.83	0.00	0.66	0.00	0.82	0.67	0.67	0.66	0.66
Approach Factor	0.00			0.62			0.62			0.67			

Intersection Peak Hour

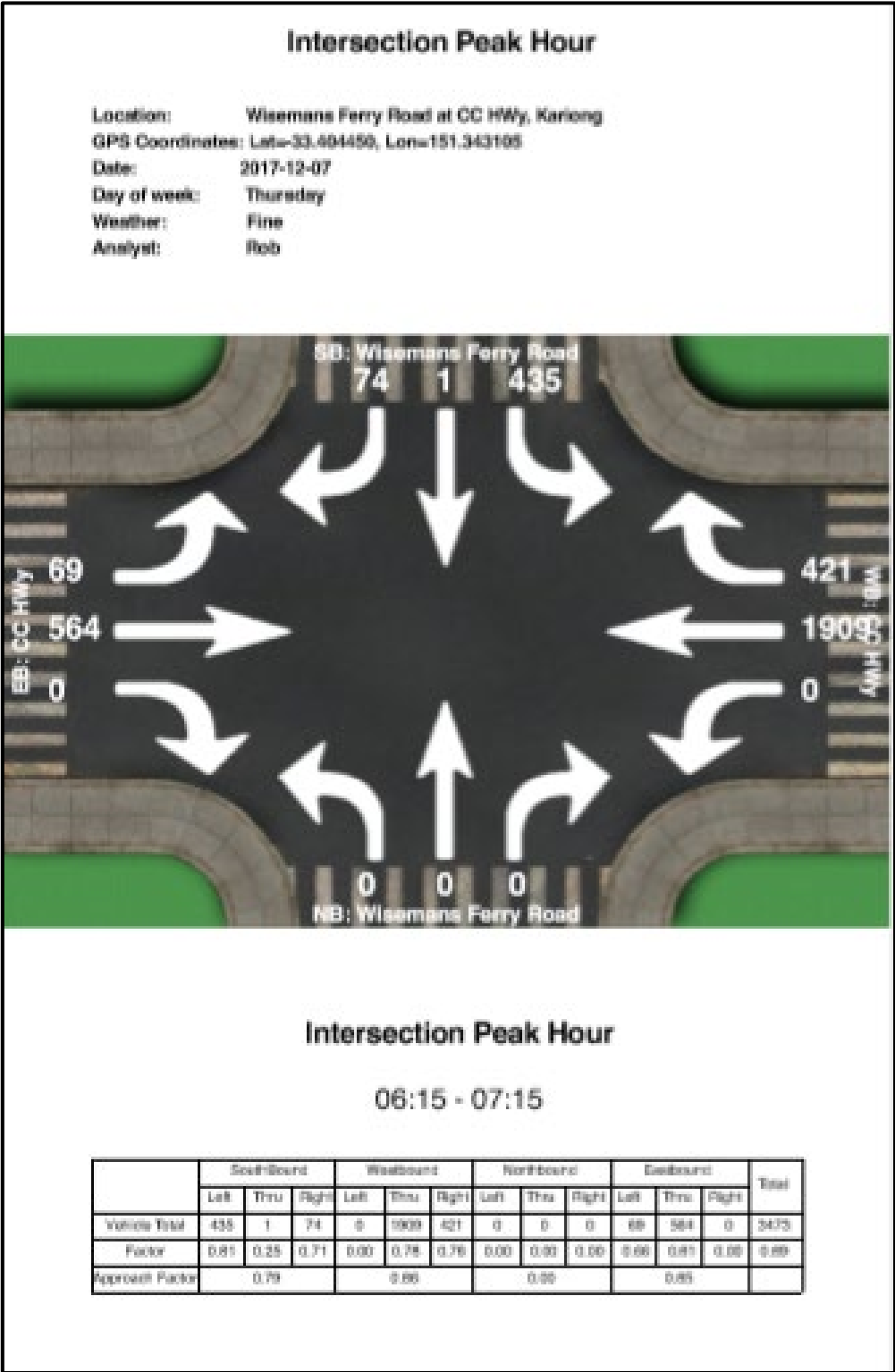
Location: Kangoo Road at Central Coast Hwy, Kariong
 GPS Coordinates: Lat=-33.429411, Lon=151.291675
 Date: 2017-11-30
 Day of week: Thursday
 Weather:
 Analyst: Rob



Intersection Peak Hour

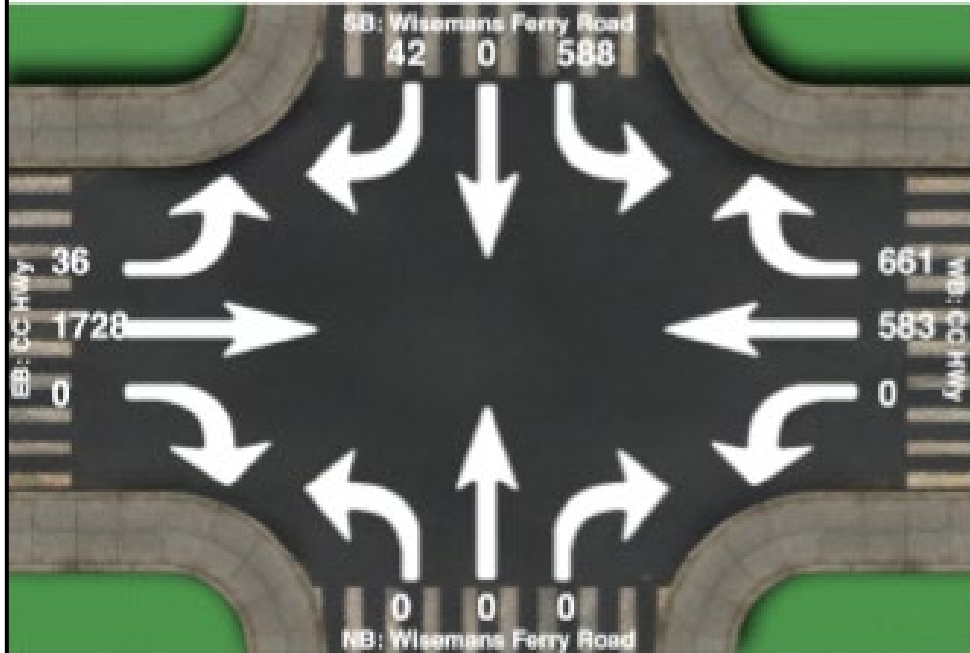
16:45 - 17:45

	Southbound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Vehicle Total	79	0	92	6	1304	24	0	0	0	191	2743	0	4439
Factor	0.62	0.00	0.66	0.30	0.93	0.67	0.00	0.00	0.00	0.61	0.97	0.00	0.96
Approach Factor	0.65			0.60			0.00			0.97			



Intersection Peak Hour

Location: Wisemans Ferry Road at CC HWy, Kiriong
 GPS Coordinates: Lat=33.404450, Lon=151.343105
 Date: 2017-12-07
 Day of week: Thursday
 Weather: Fine
 Analyst: Rob



Intersection Peak Hour

17:00 - 18:00

	Southbound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Vehicle Total	588	0	42	0	583	661	0	0	0	36	1728	0	3608
Factor	0.03	0.00	0.55	0.00	0.88	0.87	0.00	0.00	0.00	0.75	0.83	0.00	0.91
Approach Factor	0.05			0.09			0.00			0.84			

Appendix E Sidra Results

Criteria for interpreting results of SIDRA

1-Level of Service (LoS)

LoS	Traffic Signals and Roundabouts	Give Way and Stop Signs
A	Good	Good
B	Good, with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	Satisfactory	Satisfactory, but requires accident study
D	Operating near capacity	Near capacity and requires accident study
E	At capacity, excessive delay: roundabout requires other control method	At capacity, requires other control mode
F	Unsatisfactory, requires other control mode or additional capacity	Unsatisfactory, requires other control mode

2-Average Vehicle Delay (AVD)

The AVD is a measure of operational performance of an intersection relating to its LoS. The average delay should be taken as a guide only for an average intersection. Longer delays may be tolerated at some intersections where delays are expected by motorists (e.g. those in inner city areas or major arterial roads).

LoS	Average Delay / Vehicle (secs)	Traffic Signals and Roundabouts	Give Way and Stop Signs
A	Less than 15	Good operation	Good operation
B	15 to 28	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	28 to 42	Satisfactory	Satisfactory but accident study required
D	42 to 56	Operating near capacity	Near capacity, accident study required
E	56 to 70	At capacity, excessive delays: roundabout requires other control mode	At capacity; requires other control mode
F	Exceeding 70	Unsatisfactory, requires additional capacity	Unsatisfactory, requires other control mode

3-Degree of Saturation (D/S)

The D/S of an intersection is usually taken as the highest ratio of traffic volumes on an approach to an intersection compared with the theoretical capacity, and is a measure of the utilisation of available green time. For intersections controlled by traffic signals, both queues and delays increase rapidly as DS approaches 1.0. An intersection operates satisfactorily when its D/S is kept below 0.75. When D/S exceeds 0.9, queues are expected.

MOVEMENT SUMMARY



Site: 101 [Wisemans Ferry / Gindurra 2017 AM]

Wisemans Ferry / Gindurra 2017 AM
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Wisemans Ferry Road											
1	L2	78	13.5	0.239	4.5	LOS A	1.4	11.2	0.36	0.55	52.7
2	T1	74	20.0	0.239	4.7	LOS A	1.4	11.2	0.36	0.55	54.1
3	R2	136	17.1	0.239	10.0	LOS A	1.4	11.2	0.36	0.55	54.0
Approach		287	16.8	0.239	7.1	LOS A	1.4	11.2	0.36	0.55	53.7
East: Gindurra Road											
4	L2	141	24.6	0.213	4.5	LOS A	1.2	9.6	0.32	0.48	53.7
5	T1	91	5.8	0.213	4.4	LOS A	1.2	9.6	0.32	0.48	55.8
6	R2	31	3.4	0.213	9.6	LOS A	1.2	9.6	0.32	0.48	56.0
Approach		262	15.7	0.213	5.1	LOS A	1.2	9.6	0.32	0.48	54.7
North: Wisemans Ferry Road											
7	L2	28	11.1	0.093	4.7	LOS A	0.5	4.1	0.39	0.51	53.6
8	T1	53	36.0	0.093	5.2	LOS A	0.5	4.1	0.39	0.51	54.7
9	R2	17	25.0	0.093	10.4	LOS A	0.5	4.1	0.39	0.51	54.6
Approach		98	26.9	0.093	5.9	LOS A	0.5	4.1	0.39	0.51	54.4
West: Somersby Falls Road											
10	L2	8	62.5	0.063	5.9	LOS A	0.3	3.1	0.44	0.59	50.8
11	T1	13	33.3	0.063	5.4	LOS A	0.3	3.1	0.44	0.59	53.1
12	R2	35	51.5	0.063	11.2	LOS A	0.3	3.1	0.44	0.59	52.0
Approach		56	49.1	0.063	9.1	LOS A	0.3	3.1	0.44	0.59	52.1
All Vehicles		703	20.4	0.239	6.3	LOS A	1.4	11.2	0.35	0.52	54.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Project: C:\Sidra folders\CCHwy Kangoo.sip7

MOVEMENT SUMMARY



Site: 101 [Wisemans Ferry / Gindurra 2017 PM]

Wisemans Ferry / Gindurra 2017 PM Peak
Roundabout

Movement Performance - Vehicles												
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h	
South: Wisemans Ferry Road												
1	L2	32	26.7	0.172	4.2	LOS A	1.0	8.0	0.25	0.50	52.8	
2	T1	96	24.2	0.172	4.3	LOS A	1.0	8.0	0.25	0.50	54.5	
3	R2	91	17.4	0.172	9.6	LOS A	1.0	8.0	0.25	0.50	54.5	
Approach		218	21.7	0.172	6.5	LOS A	1.0	8.0	0.25	0.50	54.2	
East: Gindurra Road												
4	L2	178	4.1	0.199	4.6	LOS A	1.1	8.1	0.39	0.54	54.1	
5	T1	24	4.3	0.199	4.7	LOS A	1.1	8.1	0.39	0.54	55.6	
6	R2	37	2.9	0.199	10.0	LOS A	1.1	8.1	0.39	0.54	55.8	
Approach		239	4.0	0.199	5.5	LOS A	1.1	8.1	0.39	0.54	54.5	
North: Wisemans Ferry Road												
7	L2	49	0.0	0.137	4.8	LOS A	0.7	5.6	0.45	0.53	54.1	
8	T1	87	12.0	0.137	5.2	LOS A	0.7	5.6	0.45	0.53	55.3	
9	R2	12	45.5	0.137	11.3	LOS A	0.7	5.6	0.45	0.53	54.0	
Approach		148	10.6	0.137	5.5	LOS A	0.7	5.6	0.45	0.53	54.8	
West: Somersby Falls Road												
10	L2	14	30.8	0.162	5.3	LOS A	0.9	6.6	0.42	0.59	51.8	
11	T1	77	13.7	0.162	5.1	LOS A	0.9	6.6	0.42	0.59	53.7	
12	R2	91	4.7	0.162	10.2	LOS A	0.9	6.6	0.42	0.59	54.0	
Approach		181	10.5	0.162	7.7	LOS A	0.9	6.6	0.42	0.59	53.7	
All Vehicles		786	11.6	0.199	6.3	LOS A	1.1	8.1	0.37	0.54	54.3	

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akcelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Project: C:\Sidra folders\CCHwy Kangoo.sip7

MOVEMENT SUMMARY

Site: 101 [CC Hwy / Wisemans Ferry 2017 AM]

CC Hwy / Wisemans Ferry Road 2017 AM Peak

Signals - Fixed Time Isolated Cycle Time = 115 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Central Coast Hwy											
5	T1	2009	0.6	0.826	17.7	LOS B	43.0	302.5	0.84	0.78	46.6
6	R2	443	4.8	0.834	64.4	LOS E	13.4	97.9	1.00	0.93	28.8
Approach		2453	1.3	0.834	26.1	LOS B	43.0	302.5	0.87	0.81	41.9
North: Wisemans Ferry Road											
7	L2	458	8.7	0.486	44.0	LOS D	10.9	81.8	0.89	0.81	34.6
9	R2	79	46.7	0.814	72.3	LOS F	5.0	48.8	1.00	0.93	26.8
Approach		537	14.3	0.814	48.1	LOS D	10.9	81.8	0.91	0.83	33.2
West: Central Coast Hwy											
10	L2	73	33.3	0.072	9.8	LOS A	0.8	6.9	0.37	0.63	50.2
11	T1	594	6.9	0.254	10.1	LOS A	7.3	53.8	0.48	0.41	51.5
Approach		666	9.8	0.254	10.1	LOS A	7.3	53.8	0.46	0.44	51.4
All Vehicles		3656	4.8	0.834	26.4	LOS B	43.0	302.5	0.80	0.74	41.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians									
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped	
P3	North Full Crossing	5	11.8	LOS B	0.0	0.0	0.45	0.45	
P3S	North Slip/Bypass Lane Crossing	5	9.6	LOS A	0.0	0.0	0.41	0.41	
P4S	West Slip/Bypass Lane Crossing	5	51.7	LOS E	0.0	0.0	0.95	0.95	
All Pedestrians		16	24.3	LOS C			0.60	0.60	

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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MOVEMENT SUMMARY

Site: 101 [CC Hwy / Wisemans Ferry 2017 PM]

CC Hwy / Wisemans Ferry Road 2017 PM Peak

Signals - Fixed Time Isolated Cycle Time = 120 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Central Coast Hwy											
5	T1	614	3.1	0.283	14.2	LOS A	9.1	65.3	0.55	0.48	48.7
6	R2	696	3.9	0.825	58.6	LOS E	21.1	152.6	1.00	0.92	30.2
Approach		1309	3.5	0.825	37.8	LOS C	21.1	152.6	0.79	0.71	36.8
North: Wisemans Ferry Road											
7	L2	619	6.8	0.524	40.4	LOS C	14.6	108.4	0.86	0.82	35.8
9	R2	44	7.1	0.500	70.2	LOS E	2.7	20.2	1.00	0.74	27.6
Approach		663	6.8	0.524	42.4	LOS C	14.6	108.4	0.87	0.81	35.1
West: Central Coast Hwy											
10	L2	38	19.4	0.037	10.9	LOS A	0.6	4.5	0.40	0.63	49.9
11	T1	1819	1.2	0.835	23.6	LOS B	44.3	313.0	0.89	0.83	43.3
Approach		1857	1.5	0.835	23.4	LOS B	44.3	313.0	0.88	0.83	43.4
All Vehicles		3829	3.1	0.835	31.6	LOS C	44.3	313.0	0.85	0.78	39.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians									
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped	
P3	North Full Crossing	5	15.5	LOS B	0.0	0.0	0.51	0.51	
P3S	North Slip/Bypass Lane Crossing	5	13.1	LOS B	0.0	0.0	0.47	0.47	
P4S	West Slip/Bypass Lane Crossing	5	54.2	LOS E	0.0	0.0	0.95	0.95	
All Pedestrians		16	27.6	LOS C			0.64	0.64	

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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Appendix F Concept Access Design and Swept Paths