

A photograph of a paved road winding through a landscape with tall trees and a cloudy sky. The road is dark asphalt, and the surrounding area is filled with green and brown vegetation.

TRAFFIC IMPACT ASSESSMENT

MAISON DIEU SOLAR FARM.

**PREPARED FOR: RPS AAP CONSULTING PTY LTD
on behalf of TERRAIN SOLAR PTY LTD**

MAY 2024

22/154

TRAFFIC IMPACT ASSESSMENT
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Intersect Traffic Pty Ltd (ABN: 43 112 606 952)

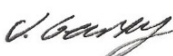
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B	09/06/23	Edit	JG
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G	06/05/24	Traffic generation change / Approved	JG

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Date 6th May 2024**Disclaimer**

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1.0 INTRODUCTION

Intersect Traffic Pty Ltd (Intersect Traffic) has been engaged by RPS AAP Consulting Pty Ltd (RPS) to conduct a traffic impact assessment of the Maison Dieu Solar Farm at Maison Dieu, near Singleton in NSW (the Project) for Terrain Solar Pty Ltd (the Applicant).

The Project will connect to Ausgrid's 66 kV/132 kV Singleton Substation located on the southern side of Maison Dieu Road. Vehicular access to the site will be via a new access road with turnaround area and car park directly off Maison Dieu Road. This entry will be approximately 900 metres east of Knodlers Lane and 5.3 km west of Dights Crossing Road. There will also be a secondary light vehicle access off Maison Dieu Road, approximately 70 metres east of Shearer's Lane.

The impacts and proposed mitigation for traffic and transport from the proposed construction, operation and decommissioning phases of the Project are addressed in this report in accordance with relevant regulatory requirements and guidelines (this assessment).

This report supports a State Significant Development (SSD) application under Part 4, Division 4.7 of the *Environmental Planning and Assessment Act 1979* (SSD-48160216), as an appendix to the Environmental Impact Statement (EIS) for the Project. The following guidelines have been considered in this assessment:

- ◆ *RTA's Guide to Traffic Generating Developments (2002).*
- ◆ *Austroads Guide to Traffic Management Part 6 – Intersections, Interchanges and Crossings Management (2020); and*
- ◆ *Singleton Shire Council DCP (2014).*

This report presents the findings of the traffic impact assessment and includes the following:

1. An outline of the existing environment near the site.
2. Assessment of the additional traffic generated by the Project including identifying a preferred delivery route and the impact on the local road network.
3. Review of the adequacy of the proposed vehicular access to the site.
4. Review of the suitability and provision of on-site car parking through assessment against Council and Australian Standards requirements.
5. Presentation of conclusions and recommendations.

This assessment addresses the SEARs and regulatory input issued for the Project as shown in **Table 1**, **Table 2** and **Table 3**.

Table 1 - SEARs Compliance Table

SEAR	Requirement	Where addressed
Transport	An assessment of the peak and average traffic generation, including over-dimensional vehicles/heavy vehicles requiring escort and construction worker transportation;	Section 7.4
Transport	An assessment of the likely transport impacts to the site access route(s), site access point(s), any Crown land, particularly in relation to the capacity and condition of the roads, road safety and intersection performance;	Section 7.7
Transport	A cumulative impact assessment of traffic from nearby developments; and	No known adjoining developments – background traffic growth rate of 2 % per annum adopted for infill

SEAR	Requirement	Where addressed
		development traffic growth. Impact of and on proposed Singleton Bypass has been considered in Section 5.0.
Transport	Provide details of measures to mitigate and / or manage potential impacts including a schedule of all required road upgrades (including resulting from heavy vehicle and over mass / over dimensional traffic haulage routes), road maintenance contributions, and any other traffic control measures, developed in consultation with the relevant road authorities;	Section 10 – No road upgrades required. Temporary construction access to be constructed with TMP in place. Other access standard rural property access.

Table 2 - Regulatory Compliance Table

Requirement	Where addressed
TfNSW requests that a Traffic Impact Assessment (TIA) be prepared by suitably qualified person/s in accordance with the Austroads Guide to Traffic Management Part 12, the complementary TfNSW Supplement and RTA Guide to Traffic Generating Developments. The TIA should include, but not necessarily be limited to, an assessment of the considerations outlined in Attachment A.	Entire report
A map of the surrounding road network identifying the site access, nearby accesses, intersections, and transport related facilities.	Figure 1
A map of the proposed transport route/s identifying all public roads proposed to obtain access from the classified (State) road/s to the development site.	Figure 2
The total impact of existing and proposed development on the road network with consideration for a 10-year horizon.	Section 7.4 (Report states future forecasting is not required due to short 18-month construction period, with only five FTEs in the year 1.5-10 horizon for operations). A 2-year horizon period assessment has been undertaken.
Identify Annual Average Daily Traffic (AADT) volumes with percentage heavy vehicles along the transport route/s and diagrammatically demonstrate AM and PM peak hour movements at key intersections.	Section 7.5
Background traffic data from published sources and/or recent survey data. The source of data and any assumptions are to be clearly explained and justified, including the growth rate applied to the future horizon. Due to the impact of COVID19 on travel patterns, traffic counts undertaken at this time may not be representative of normal volumes. Alternative approaches to understanding the impact of COVID-19 on traffic patterns should be discussed with TfNSW.	Section 7.3. As the industrial area near the site is relatively well developed a conservative 2 % per annum background growth has been adopted.
The volume and distribution of existing and proposed trips to be generated by the construction, operational and decommission phases of the development. This should identify the maximum daily and hourly demands generated by the development, particularly where they coincide with the network peak hour.	Sections 7.3, Section 7.4.
The type and frequency of design vehicles accessing the development site.	Section 7.4
Details of the road geometry and alignment along the identified transport route/s, including existing formations, crossings, intersection treatments and any identified hazards. This should include;	Section 3 and Section 7.2

Requirement	Where addressed
Available sight distances at the site access and nearby intersections and any constraint to achieving the required sight distance for the posted speed limit.	Section 7.7
Available sight distances at intersections along the proposed transport routes and any constraint to achieving the required sight distance for the posted speed limit.	Section 3.
An assessment of turn treatment warrants in accordance with the Austroads Guide to Traffic Management Part 6 and Austroads Guide to Road Design Part 4A for intersections along the identified transport route/s, identifying the existence of the minimum basic turn treatments and addressing the need for any warranted higher order treatments.	Section 7.7.
Swept path analysis demonstrating the largest design vehicle entering and leaving the development, and moving in each direction through intersections along the proposed transport route/s.	Section 7.8
Capacity analysis using SIDRA or other relevant application, to identify an acceptable Level of Service (LOS) at intersections with the classified (State) road/s, and where relevant, analysis of any other intersections along the proposed transport route/s.	Section 7.6
A review of crash data along the identified transport route/s for the most recent 5-year reporting period and a crash assessment of road safety along the proposed transport route/s considering the safe systems principles adopted under Future Transport 2056.	Section 7.8 Road Safety Audit to be prepared prior to construction if required.
Strategic (2D) design drawings of all proposed road works and the site access demonstrating scope, estimated cost and constructability of works required to mitigate the impacts of the development on road safety, traffic efficiency and the integrity of transport infrastructure. Works must be appropriately designed for the existing posted speed limit.	Section 7.7 No road works proposed. Road repair will be undertaken as needed post-construction.
Site plan demonstrating site access, internal manoeuvring, servicing, and parking areas consistent with the relevant parts of AS2890 and Council requirements.	To be provided by Civil Designers prior to construction commencing.
Details of measures to address impacts and/or provide connections for public transport services and active transport modes, such as, public and school bus services, walking and cycling.	Section 9.
Details of measures to ameliorate the impacts of road traffic noise, dust, and/or glare generated along the proposed transport route/s.	These issues are addressed in other consultant reports.
Details of any Traffic Management Plan (TMP) proposed to address the construction and operation phases of the proposed development. The TMP should be prepared and implemented in accordance with Australian Standard 1742.3 and the Work Health and Safety Regulation 2017. It is recommended that any TMP include, but not necessarily limited to, the following; - A map of the primary transport route/s highlighting critical locations. - An induction process for vehicle operators and regular toolbox meetings. - Procedures for travel through residential areas, school zones and/or bus route/s. - any proposed temporary measures such as a Traffic Guidance Scheme (TGS) - A Driver Code of Conduct for heavy vehicle operators. - A complaint resolution and disciplinary procedure	Section 7.4 TMP will be provided prior to construction commencing in accordance with any condition of consent.
Community consultation measures proposed for peak periods	Section 7.7.
Where road safety concerns are identified at a specific location along the proposed haulage routes, TfNSW suggests that the TIA be supported by a targeted Road Safety Audit undertaken by suitably qualified persons in accordance with the Austroads Guidelines.	Section 7.8.

Requirement	Where addressed
Any roadwork on classified (State/Regional) road/s is to be designed and constructed in accordance with the current Austroads Guidelines, Australian Standards and TfNSW Supplements	Noted.
The developer will be required to enter into a Works Authorisation Deed (WAD) with TfNSW for any roadwork deemed necessary on the classified (State) road. The developer will be responsible for all costs associated with the roadwork and administration for the WAD. It is recommended that developers familiarise themselves with the requirements of the WAD process. Further information can be obtained from the TfNSW website.	Noted.

Table 3 - Regulatory Compliance - Singleton Shire Council

Requirement	Where addressed
Management during the construction, noting there are to be over 300 workers on site	Section 7.7, noting that project refinements have been made since the Scoping Report, to reduce the footprint and now only 150 workers are required on-site.
Carparking	Section 8
Access	Section 7.7
Management during the life of the project (up to 8 staff)	Section 10, noting that project refinements have been made since the Scoping Report, to reduce the footprint and now only 5 operational persons on-site.
Potential impacts on the Maison Dieu and New England Highway intersection that needs to be addressed, particularly during construction phase	This intersection was recently upgraded, and all project traffic will be required to avoid use of intersection through site induction and driver code of conduct processes. Therefore, no adverse impact from the Project.

2.0 SITE AND PROJECT DESCRIPTION

The Project will involve the construction, operation and decommissioning of a photovoltaic (PV) solar farm, Battery Energy Storage System (BESS) and associated infrastructure. The Project is within the Project Area as shown on **Figure 1** and includes:

- Construction:
 - Up to 18 months with up to 150 Full Time Equivalent (FTE) personnel;
 - Hours of work generally between 7 am to 6 pm, Monday to Friday and 8 am to 1 pm, Saturday;
 - Pre-construction activities and site establishment;
 - Civil works and access upgrades;
 - Major components transported via Port of Newcastle or Port Botany;
 - PV array construction utilising external equipment;
 - Installation and use of temporary infrastructure (including office, parking, amenities, laydown, waste storage, stockpile, power supply, fencing, communications, services and utilities);
 - Ancillary activities (including import of gravel, sand and aggregate; and water);
 - Rehabilitation;
- Operation:

- Approximately 110,000 PV solar panels with a total capacity of 60 MWac;
- BESS with a capacity of 40 MW / 80 MWh;
- Electrical infrastructure including:
 - Solar PV power conversion units with inverters;
 - Substation compound and switching station;
 - Electrical reticulation grid and infrastructure connecting to the existing Ausgrid Singleton Substation;
- Site access and external transport;
- Other associated infrastructure (including retained temporary construction infrastructure and its maintenance);
- Internal and external ancillary activities;
- 24 hours a day, 7 days a week with up to 5 FTE personnel;
- Decommissioning:
 - Individual components are expected to operate for up to 30 years, after which one of the following actions will be taken:
 - Replace the existing project components within the project description and impacts assessed in this EIS and continue operations in consultation with relevant associated holders; or
 - Seek relevant approvals should technological advances not confirm the viability of Option 1; or
 - Decommission the Project and rehabilitate the site.

The Project Area is shown in **Figure 1** below as provided by RPS AAP Consulting Pty Ltd. It is located on the northern side of Maison Dieu Road, Maison Dieu approximately 6.8 km west of the New England Highway and 9.3 km north-west of the Singleton CBD. The site is vacant rural land currently used for agricultural purposes.

The Project Area for the project includes four properties as described below:

- ◆ Lot 3 DP 252505
- ◆ Lot 51 DP 11756
- ◆ Lot 1 DP 1133341
- ◆ Lot 104 DP 817010
- ◆ Lot 1 DP 616940

The Project Area covers approximately 203 ha while the disturbance footprint is 90 ha, and the site is currently zoned RU1 – Primary Production pursuant to the Singleton LEP (2013).

The proposed main vehicular access to the site is to be located off Maison Dieu Road approximately 5.3 km west of Dights Crossing Road or 400 metres east of the existing access to Ausgrid's Singleton Sub-station (Access "A"). An optional secondary access (Access B) will be provided for light vehicles only, off Maison Dieu Road near Shearers Lane in the south-western border of the Project Area. Access to the Project Area is detailed in Section 7.7.

Deliveries to the site will use the identified delivery road shown on **Figure 1** via the New England Highway from the south-east from Sydney and Newcastle to Magpie Street at McDougall's Hill to Maison Dieu Road. Inbound Project traffic may also utilise the route off the New England Highway via Maison Dieu Road directly. Maison Dieu Road west of Enterprise Crescent is not a designated B-Double route. Approval from Council through its traffic committee will be required to be sought

prior to construction. Due to its current condition, construction, vertical and horizontal geometric alignment it is considered that Maison Dieu Road is suitable for use by B-Double vehicles, which the client Terrain Solar has advised that Council have been consulted on this matter and agreed to the acceptability for use by B-Double vehicles. **Plate 1** below shows the Project Area from Maison Dieu Road while **Plate 2** shows Maison Dieu Road near Site Access A and **Plate 3** shows Maison Dieu Road near Site Access B (See **Figure 1** for locations of these accesses).



Plate 1 - The Project Area from Maison Dieu Road



Plate 2 - Maison Dieu Road near proposed main site access A



Plate 3 - Maison Dieu Road near proposed secondary site access B.

3.0 EXISTING ROAD NETWORK

All materials and plant will be delivered to the Project Area through Access A. Deliveries will come from Newcastle or Sydney via the New England Highway. Trucks will turn off the New England Highway either directly onto Maison Dieu Road or onto Magpie Street at McDougall's Hill and then on to Maison Dieu Road.

All traffic leaving the Project Area will travel via Maison Dieu Road to Magpie Street and back to the New England Highway at the signalised intersection. There are no major road alignment issues or constraints along the transport route. The transport route is detailed in **Figure 2**.

3.1 New England Highway

The New England Highway is a classified state highway (SH9) with its primary function to connect the Pacific Highway at Newcastle (Hexham) to the Upper Hunter (Maitland, Singleton, Muswellbrook, Scone & Murrurundi) and New England (Tamworth, Armidale, Glen Innes, and Tenterfield) areas through to the Queensland border. As such it is an arterial road and a major NSW transport route from the New England area to the NSW coastal area. As a sealed rural arterial road, the New England Highway is under the care and control of Transport for NSW (TfNSW).

Near Maison Dieu the New England Highway is a two-lane two-way sealed rural road with a 13-metre-wide sealed carriageway consisting of 3.5-metre-wide travel lanes and 3-metre-wide sealed shoulders / breakdown lane. Additional turning lanes are provided at major intersections along its

length, including at the Magpie Street intersection, while a westbound overtaking lane is provided on the McDougall's Hill ascent east of Magpie Street. Near the Magpie Street intersection, the speed zoning is 80 km/h while the speed zoning through Singleton is 60 km/h and west of Magpie Street the speed zoning increases to 100 km/h. At the time of inspection, the New England Highway was observed to be in good condition as shown in **Plate 4** below.

3.2 Magpie Street

Magpie Street is a local industrial collector road running between the New England Highway and Maison Dieu Road with its primary function to collect and distribute traffic from the McDougall's Hill industrial area to the New England Highway as well as provide vehicular access to properties along its length. As a local road it is under the care and control of Singleton Shire Council and a 60 km/h speed zoning applies to Magpie Street. Note Magpie Street is a designated B-Double route.

Magpie Street is a two-lane two-way sealed road with a sealed pavement width of 13 metres between upright kerb and gutter. This allows two lanes of traffic flow, one in each direction as well as parking lanes on both sides of the road. Magpie Street is centre line marked for its full length between the New England Highway and Maison Dieu Road and as it services an industrial estate has a high percentage of heavy vehicles including B-Doubles already using it. At the time of inspection, the Magpie Street was observed to be in good condition as shown in **Plate 5**. Magpie Street intersects with the New England Highway via a large, signalised intersection as shown in **Plate 6** below. Sight distances at the intersection were observed to be in accordance with Austroad requirements and thus satisfactory for use by Project traffic.

3.3 Maison Dieu Road

Maison Dieu Road from the New England Highway is generally a local rural collector road with its primary function to collect and distribute traffic from the Maison Dieu locality to the New England Highway as well as provide vehicular access to properties along its length. As a local road it is under the care and control of Singleton Shire Council and a 50 km/h speed zoning applies from the New England Highway to 500 metres west of St David's Close after which a 100 km/h speed zoning applies through to the site. Maison Dieu Road between the New England Highway and Enterprise Crescent has a 9-metre sealed carriageway with centre line and edge line marking therefore comfortably allows two-way traffic flow for all vehicle types. Maison Dieu Road is not a designated B-Double route west of Enterprise Crescent therefore Singleton Shire Council approval is required for B-Doubles to deliver materials to the site. With the sealed width of Maison Dieu Road being 7 metres and the pavement currently in excellent condition it is considered that this section of Maison Dieu Road is satisfactory for the short-term use during construction of the Project by B-Double vehicles.

Maison Dieu Road is a two-lane road with a sealed pavement width of 7 metres with gravel shoulders and table drains both sides. This allows two lanes of traffic flow, one in each direction as well as limited breakdown areas where the roadside verges are cleared. It is compliant with Austroads standards for rural roads with an average annual daily traffic (AADT) greater than 500 vehicle trips per day (vtpd). West of Rix's Creek to the site the pavement width does narrow to 6 metres wide which still allows traffic flow in each direction and is compliant with Austroads requirements for rural roads with an AADT less than 500 vtpd. Maison Dieu Road is centre line and edge line marked from Magpie Street to Dights Crossing Road and then centreline marked to Rix's Creek. West of Rix's Creek it is not centre line marked due to the pavement width reducing to 6 metres wide. With rural activity along the road some heavy vehicle traffic would already be using the road associated with this rural activity. At the time of inspection, Maison Dieu Road was observed to be in good condition as shown in **Plate 7, Plate 8, Plate 9** and **Plate 10** which show Maison Dieu Road at certain locations along its length. Maison Dieu Road intersects with the New England Highway as a priority controlled CHR (Channelised right turn) / AUL (Auxiliary Left-turn Lane Treatment) intersection and Magpie Street via a give way priority-controlled intersection as shown in **Plate 11** and **Plate 12** below.

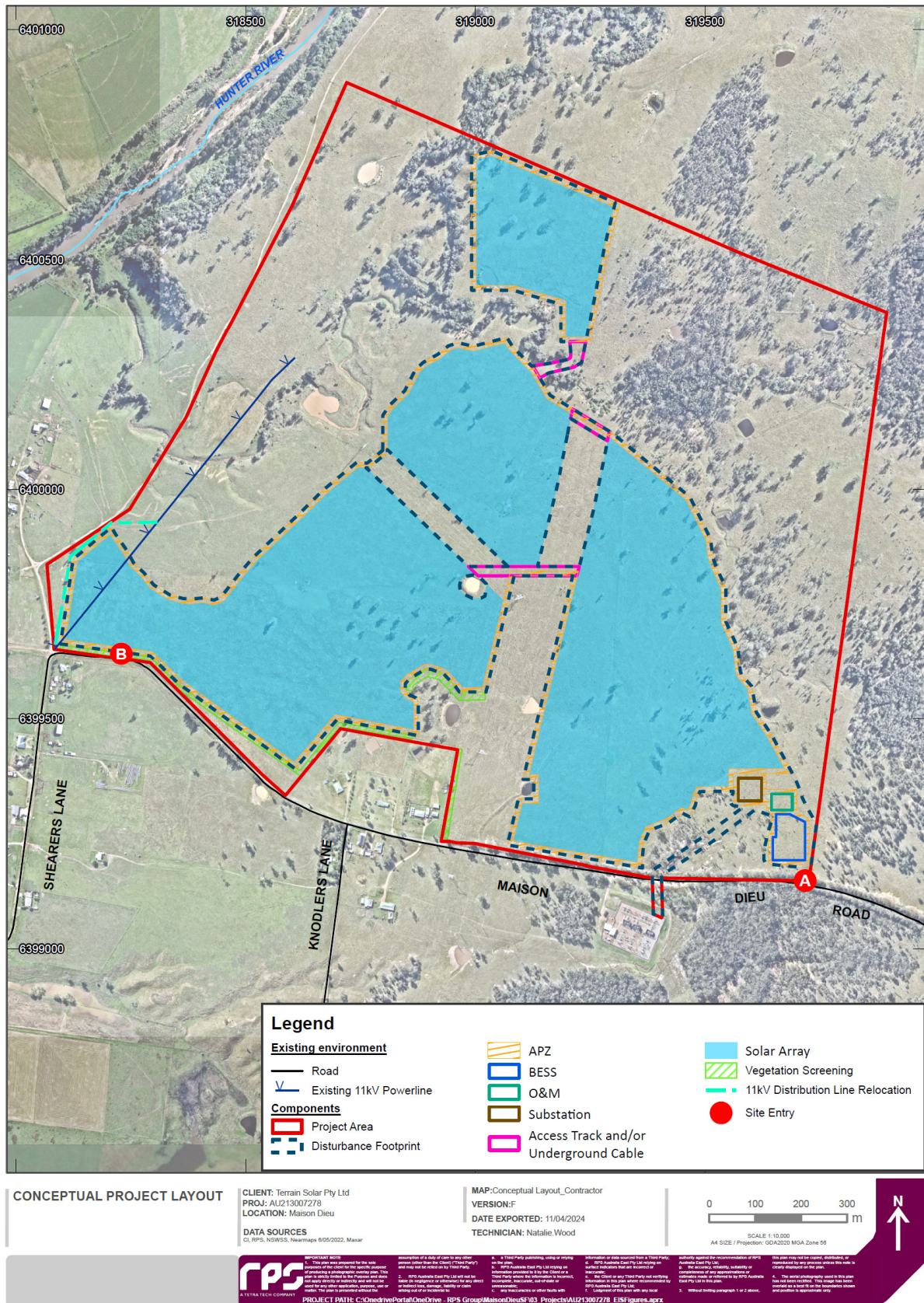


Figure 1 - Site Location



Plate 4 - New England Highway, McDougall's Hill



Plate 5 - Magpie Street, McDougall's Hill



Plate 6 - New England Highway / Magpie Street signalised intersection.



Plate 7 - Maison Dieu Road near site.



Plate 8 - Maison Dieu Road near Rix's Creek (culvert)

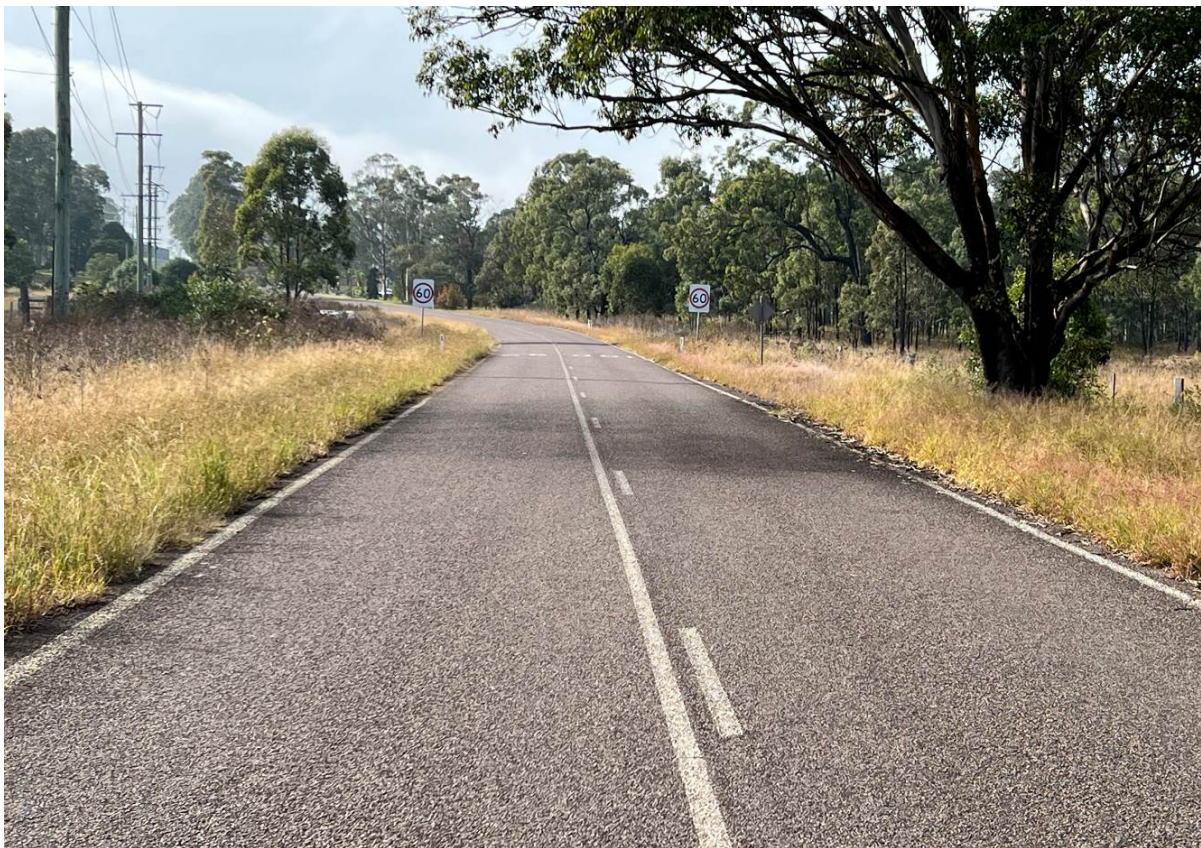


Plate 9 - Maison Dieu Road west of Magpie Street



Plate 10 - Maison Dieu Road near Magpie Street



Plate 11 - Magpie Street / Maison Dieu Road give way intersection.



Plate 12 - New England Highway / Maison Dieu Road intersection.

4.0 ALTERNATIVE TRANSPORT MODES

Hunter Valley Buses runs public transport (bus) services within Singleton; however, these services are limited to the urban residential areas of Singleton and do not extend out to Maison Dieu. There is one school bus service running from Singleton to Maison Dieu via McDougall's Hill. The Applicant will liaise with the bus service provider to minimise interference with bus schedules during construction.

As a rural area there are no pedestrian footpaths or on / off road cycleways within the local road network. Near the Project Area, pedestrians are generally required to utilise the grass verges and road shoulders / pavement, while cyclists are required to utilise the road shoulders or share the travel lanes with other vehicles. The sealed shoulders on the New England Highway near Magpie Street are marked as an on-road cycle way but are of little benefit to construction employees associated with the Project.

5.0 ROAD NETWORK IMPROVEMENTS AND CUMULATIVE IMPACTS

The main road network improvement planned for the area is the future Singleton Bypass which runs around the western side of Singleton before connecting back to the existing New England Highway north of Magpie Street. This would be likely to reduce traffic volumes on the old highway through Singleton and in particular increase the spare capacity within the existing New England Highway / Magpie Street signalised intersection.

At this stage, the Singleton Bypass project is scheduled to be open to traffic in 2026. Maison Dieu Solar Farm is expected to be operational in 2026, before the Singleton Bypass is open. Due to the operational generation of traffic from Maison Dieu Solar Farm being so low, this project is not expected to materially contribute to cumulative impacts.

Considering the possibility that the Singleton Bypass is in place during the construction of the Project, traffic volumes on the New England Highway at the Magpie Street intersection will be significantly reduced. Therefore, the Project's impact on the local and state road network will be

less noticeable after the Singleton Bypass is opened, due to lower total traffic volumes and lower total wear and tear on roads with unchanged capacities.

The Applicant has conservatively considered the potential for the Project's construction to coincide with the proposed roundabout at the New England Highway / Maison Dieu Road intersection. If construction timing of the two projects aligns, the Applicant will liaise with TfNSW at the time with regard to management of traffic interactions during construction and operation. Construction of the southern end of the bypass and associated works is not expected to have cumulative impacts with the Project.

The Applicant will liaise with the developers of nearby projects to ensure cumulative construction and operation traffic impacts are minimised.

6.0 PROJECT

The Project involves the construction of the Maison Dieu Solar Farm with associated Battery Energy Storage System (BESS) off Maison Dieu Road, Maison Dieu. Vehicular access to the site will be via a new main combined entry / exit vehicular access with turnaround area and car park directly off Maison Dieu Road approximately 900 metres east of Knodlers Lane and 5.3 km west of Dights Crossing Road (Access 'A'). A secondary light vehicle only access off Maison Dieu Road further west near Shearers Lane will also be utilised by some light vehicles associated with construction of the Project (Access 'B').

The Project will require a team of up to 150 construction employees during peak periods of construction, generally working 7 am to 5 pm Monday to Friday and 8 am – 1 pm on Saturdays. Construction is expected to be up to 18 months. The majority of traffic movements associated with the Project will occur during the construction of the Project.

Traffic movements generated by the operation of the Project would include 5 staff light vehicle movements associated with maintenance inspections as required and specific maintenance work which would be short term and infrequent. Deliveries during construction works would be expected to be within rigid and articulated vehicles including B-Double vehicles. More detail on construction traffic is provided throughout **Section 7**.

The Project at some time in the future (approximately > 30 years) is also likely to generate additional traffic with decommissioning of the Project. At this stage decommissioning traffic generation is likely to be similar to construction traffic and would be relevantly addressed when the decommissioning time frame is known.

7.0 TRAFFIC IMPACTS

Note: - The impacts of road noise from construction of the Project will be covered in a separate noise and vibration report.

7.1 – SEARs Compliance

The majority of traffic impacts will occur during construction, with a peak workforce of up to 150 FTE attending the Project Area and frequent deliveries of materials over the construction period. Material deliveries will include solar panels, storage cells and other associated items. Plant will also be delivered to the Project Area during this time to facilitate construction. The Project may require decommissioning in approximately 30 years' time whereby traffic impacts may need to be reviewed. For this assessment, decommissioning volumes are considered similar to the construction of the Project.

The SEARs issued for the Project include requirements for addressing traffic and transport matters and these have been addressed in this report as per the details provided in **Table 1**.

7.2 – Delivery Route

The delivery route for materials to the site will be as follows and as shown in **Figure 2**. The delivery route would apply for deliveries from Newcastle, Sydney, and Singleton.

Delivery route – New England Highway from south-east to Maison Dieu Road or Magpie Street and then Maison Dieu Road to the site. The return trip would be from the site via Maison Dieu Road and Magpie Street to the New England Highway.

7.3 – Existing Road Network Traffic Volumes

To determine existing traffic volumes on the road network Northern Transport Planning and Engineering (NTPE), on behalf of Intersect Traffic, installed a traffic classifier on Maison Dieu Road west of Dights Crossing Road. This was in place for a 1-week period from Wednesday 22nd February 2023 to Tuesday 28th February 2023. This data determined the peak hour traffic periods for the local road network as 8.00 am to 9.00 am and 4.00 pm to 5.00 pm. NTPE also undertook an intersection traffic count at the New England Highway / Magpie Street signalised intersection on Thursday 23rd February 2023 during the AM and PM peak periods. This determined that the peak hour flows through the intersection were from 7.00 am to 8.00 am and 4.30 pm to 5.30 pm. The results of these traffic counts are shown in the data sheets within **Attachment A**.

To supplement this data, Intersect Traffic also undertook an intersection traffic count at the Magpie Street / Maison Dieu Road intersection on Thursday 16th May 2023 during the AM and PM peak hour periods. The results of this count are also provided in **Attachment A**.

The two-way mid-block traffic volumes for the state and local road networks from this data are provided in **Table 4**. Mid-block traffic volumes are the number of vehicle trips per hour (vtph) counted on a given road away from an intersection. The data has been used as the base existing traffic volumes on the local and state road network in this assessment. Future traffic volumes in 2025 when construction is expected to be at its peak are also shown in Table 4. Predicted traffic volumes have been based on an assumed background traffic growth rate of 2% per annum assessed as relevant for the area given the expected development growth in the area being relatively low.

Table 4 - Existing two-way mid-block peak hour traffic volumes on road network

Road	Section	2023	2023	2025	2025
		AM (vtph)	PM (vtph)	AM (vtph)	PM (vtph)
New England Highway	south of Magpie Street	1289	1818	1341	1891
New England Highway	north of Magpie Street	1130	1577	1176	1641
Magpie Street	west of New England Highway	337	447	351	465
Magpie Street	north of Maison Dieu Road	148	144	154	150
Maison Dieu Road	west of Magpie Street	104	164	108	171
Maison Dieu Road	west of Dights Crossing Road	32	35	33	36

7.4 – Traffic Generation and Trip Distribution

The TfNSW publication “*RTA’s Guide to Traffic Generating Developments (2002)*” provides advice on the traffic generating potential of different land uses. However, this document does not cover Solar Farms therefore determining traffic generation is reliant on advice from the applicant regarding construction and operation of the Project and observations from other similar solar farm developments.

From an operational perspective traffic generation is expected to be minimal with maintenance inspections carried out when necessary. Therefore, based on 1 visit per day per week a peak hour traffic generation of 10 vehicle trips per hour (vtph) has been assumed for this assessment based

on 5 personnel in 5 vehicles attending the site. There may be times when specific maintenance tasks have to be undertaken but these will be infrequent, short-term, and undertaken under a construction traffic management plan for the work. Construction traffic estimates for the Project are as follows based on advice from the client.

- ◆ Construction employees on-site – Up to a maximum of 150 during peak construction with the peak light vehicle trips being 76 vph including a small shuttle bus operating from central Singleton due to staggered working hours.
- ◆ Indicative deliveries – Mainly heavy rigid vehicles with trailers, B-Doubles, and articulated vehicles (AV). The total deliveries in the construction period (18 months) are expected to be 165 B-Double, 284 standard semi-trailer, 2 low loaders, 33 concrete agitators and 286 Truck and Dog combination vehicles.
- ◆ In terms of the solar panel and BESS material deliveries, a maximum of 8 per day but an average of 5 per day between 10 am and 4 pm is likely for the peak construction period. These deliveries are likely to mostly arrive outside the peak hour traffic generation periods associated with the arrival and departure of employees. Some deliveries may arrive during peak hours due to logistical issues which are out of the contractors' control.
- ◆ Other vehicles – Earthworks plant and road base material deliveries will be required during construction of the access. It would be expected an average frequency of 3 deliveries within a peak hour is assumed.
- ◆ There will be a total of three OSOM vehicles during construction.

Based on this advice the likely peak hour traffic generation which will occur in the AM peak coinciding with employees arriving on site and in the PM peak coinciding with employees leaving the site is calculated below. It is also noted deliveries involve 2 trips with an inbound trip and an outbound trip.

AM peak = 76 inbound employees + 3 x 2 roadworks and other plant + 1 x 2 deliveries = 84 vph (80 inbound and 4 outbound).

PM peak = 76 outbound employees + 3 x 2 roadworks and other plant + 1 x 2 deliveries = 84 vph (80 outbound and 4 inbound).

It is expected that the distribution of trips will be approximately 75 % from Singleton and Lower Hunter (Newcastle and Maitland) and 25 % from Muswellbrook for employees while all deliveries will be from Singleton and Lower Hunter. In accessing the site, the likely transportation route is shown in **Figure 2**. The likely construction traffic trip distribution for the project is shown below in **Figure 3**.

Given the construction will be completed within an 18-month period and the peak operational traffic volume from the site is only 10 vph there is no need to do a 2033 (10-year horizon period) assessment of this Project, however a 2-year horizon period (2025) may be relevant and has been undertaken in **Sections 7.5** and **7.6** below.

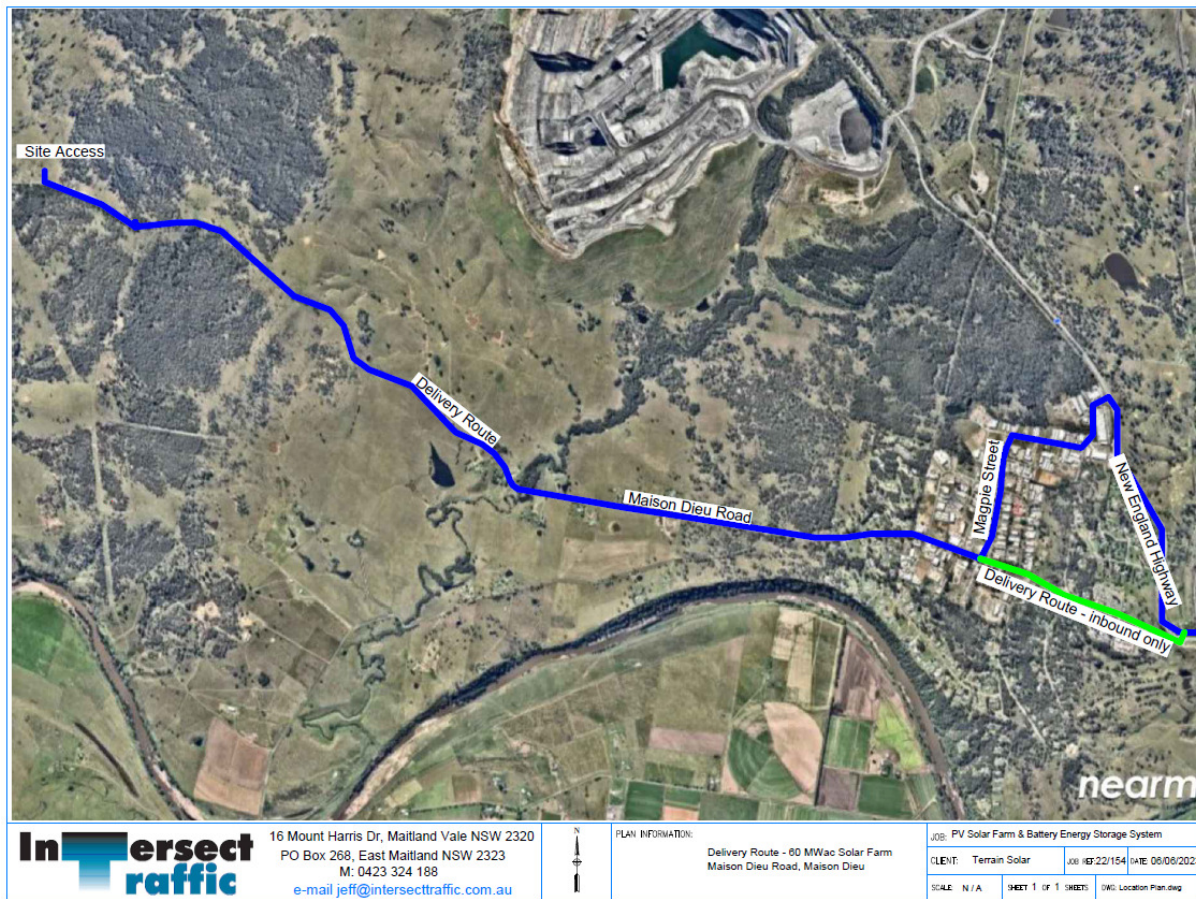


Figure 2 - Site Delivery Route

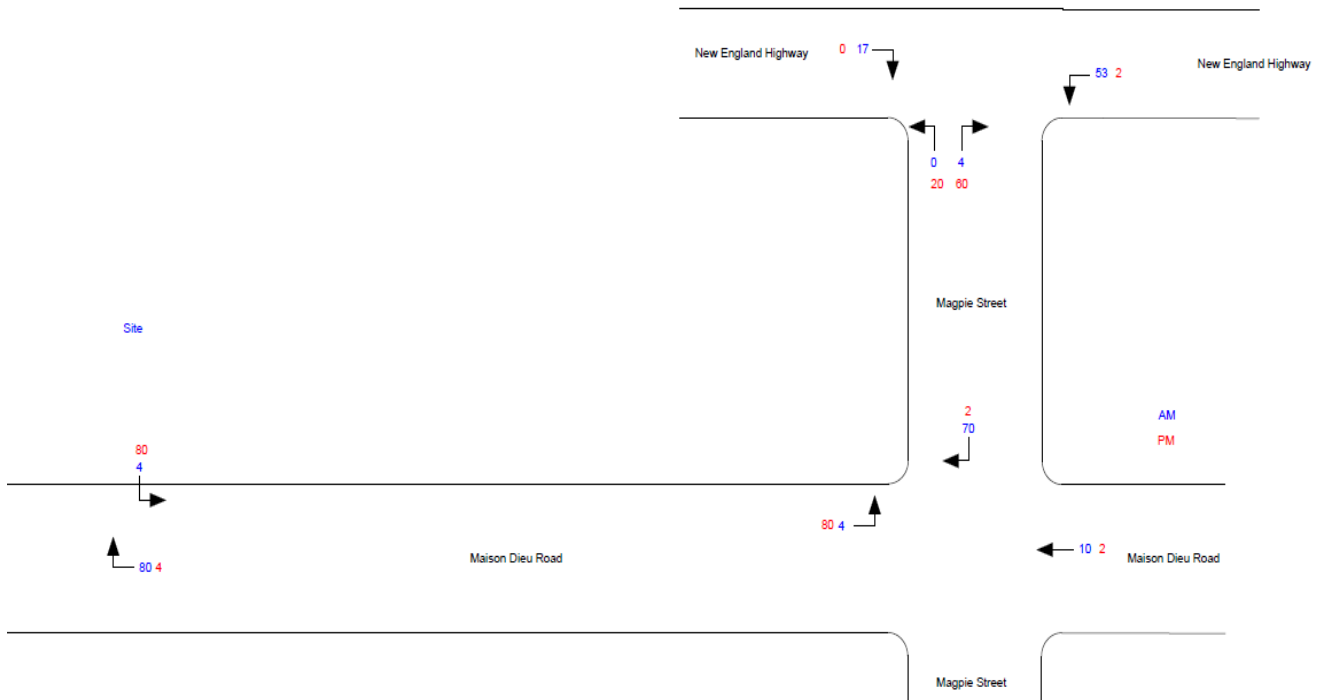


Figure 3 - Construction Traffic Trip Distribution Peak Hour

7.5 – Road Capacity

Table 4.3 of the “RTA’s Guide to Traffic Generating Developments” provides some guidance on likely mid-block capacity of two-lane two-way urban roads for a level of service (C). This table is reproduced below as **Table 5**:

Table 5 - Urban Road Mid-Block Capacity Table

Table 4.3
Typical mid-block capacities for urban roads with interrupted flow

Type of Road	One-Way Mid-block Lane Capacity (pcu/hr)	
Median or inner lane:	Divided Road	1,000
	Undivided Road	900
Outer or kerb lane:	With Adjacent Parking Lane	900
	Clearway Conditions	900
	Occasional Parked Cars	600
4 lane undivided:	Occasional Parked Cars	1,500
	Clearway Conditions	1,800
4 lane divided:	Clearway Conditions	1,900

Source: - RTA’s Guide to Traffic Generating Developments (2002)

This table indicates the one-way mid-block capacity of a single travel lane on an undivided urban road is 900 vtp. Therefore, the two-way mid-block capacity of a two-way urban road is twice this value i.e., 1,800 vtp. Therefore, the technical two-way mid-block capacity of the urban road network is 1,800 vtp. This would apply to the New England Highway (within the 80 km/h section), Magpie Street and Maison Dieu Road west of Magpie Street within the 60 km/h and 80 km/h areas. However, as the New England Highway is an arterial road it is considered acceptable that it operates with a Level of Service D (LoS D), based on SIDRA INTERSECTION ‘Level of Service’ criteria for intersection analysis, with single lane capacities of 1,100 vtp i.e., a two-way capacity of 2,200 vtp.

Maison Dieu Road west of Dights Crossing Road is a rural road and *Table 4.5 of the RTA’s Guide to Traffic Generating Developments (reproduced below as Table 6)* provides capacity data for rural roads for a LoS C and a speed zoning of 100 km/h.

Noting a speed limit of 100 km/h, a heavy vehicle percentage of approximately 5 % and rolling terrain the two-way mid-block road capacity for a LoS C determined from the table is 1,140 vtp. This is the threshold for a LoS D so all volumes below this is a LoS C or better.

Therefore, the two-way mid-block road capacity thresholds adopted in this assessment are as follows.

- ◆ New England Highway – 2,200 vtp.
- ◆ Magpie Street – 1,800 vtp.
- ◆ Maison Dieu Road – west of Magpie Street – 1,800 vtp; and
- ◆ Maison Dieu Road – west of Dights Crossing Road – 1,140 vtp.

The addition of up to 84 vtp in the AM and PM peak hours on the impacted road network will not cause any individual road’s capacity threshold to be reached. Operational peak traffic is likely to be 10 vtp associated with a weekly maintenance inspection. The road network has sufficient two-way capacity to cater for the construction and operation of the Project as shown below in **Table 7**.

Although TfNSW's submission to the Project's SEARs suggested a 10-year horizon for traffic assessment, the Project's traffic impacts will be short term and temporary. With negligible operational traffic impacts (five FTEs) following construction and a short construction period of just 18 months, a 2-year horizon was adopted for this assessment, to conservatively cover the construction impacts. A background growth rate of 2% per annum was applied considering the current growth rate of the Maison Dieu area.

Table 6 - Rural Road Two-way Mid-Block Capacity Table

Table 4.5
peak hour flow on two-lane rural roads (veh/hr)
(Design speed of 100km/hr)

Terrain	Level of Service	Percent of Heavy Vehicles			
		0	5	10	15
Level	B	630	590	560	530
	C	1030	970	920	870
	D	1630	1550	1480	1410
	E	2630	2500	2390	2290
Rolling	B	500	420	360	310
	C	920	760	650	570
	D	1370	1140	970	700
	E	2420	2000	1720	1510
Mountainous	B	340	230	180	150
	C	600	410	320	260
	D	1050	680	500	400
	E	2160	1400	1040	820

The data for Table 4.5 assumes the following criteria:

- terrain level with 20% no overtaking.
- rolling with 40% no overtaking.
- mountainous with 60% no overtaking.
- 3.7 m traffic lane width with side clearances of at least 2m.
- 60/40 directional split of traffic.

Source: - RTA's Guide to Traffic Generating Developments (2002)

Table 7 - Two-way Mid-block Road Capacity Assessment Table

Road	Section	Capacity vtph	2023	2023	2025	2025	Dev traffic	Dev traffic
			AM (vtph)	PM (vtph)	AM (vtph)	PM (vtph)	AM	PM
New England Highway	south of Magpie Street	2200	1346	1880	1398	1953	57	62
New England Highway	north of Magpie Street	2200	1147	1597	1193	1661	17	20
Magpie Street	west of New England Highway	1800	411	529	425	547	74	82
Magpie Street	north of Maison Dieu Road	1800	222	226	228	232	74	82
Maison Dieu Road	west of Magpie Street	1800	188	248	192	255	84	84
Maison Dieu Road	west of Dights Crossing Road	1140	116	119	117	120	84	84

7.6 – Intersection Capacity

The main intersections impacted by the Project are the New England Highway / Magpie Road signalised intersection and the New England Highway / Maison Dieu Road CHR / AUL priority-controlled intersection. To determine the impact of the Project on this intersection it has been modelled using the SIDRA INTERSECTION 9 software. SIDRA INTERSECTION is a micro-analytical program which identifies LoS criteria for intersection analysis which range from LoS A to LoS F. Assessment is then based on the LoS requirements of the TfNSW shown below in **Table 8**.

In undertaking this assessment, the following assumptions were made.

- ♦ The intersection is to remain as a signalised intersection.

- ◆ Traffic data used was sourced from the NTPE counts of February 2023 as shown in **Attachment B**.
- ◆ Construction traffic along the site access and delivery route was as shown in **Figure 2** and **Figure 3**; and
- ◆ As the construction period is 18 months future traffic modelling is only required through to 2025.
- ◆ A minimum cycle time of 80 seconds was specified.

The results of the modelling are summarised for the ‘all vehicles’ case with average delay and level of service within **Table 9** below while the full Sidra movement summary tables are provided in **Attachment C**.

Table 8- TfNSW Intersection performance criteria

Table 4.2
Level of service criteria for intersections

Level of Service	Average Delay per Vehicle (secs/veh)	Traffic Signals, Roundabout	Give Way & Stop Signs
A	< 14	Good operation	Good operation
B	15 to 28	Good with acceptable delays & spare capacity	Acceptable delays & spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Operating near capacity	Near capacity & accident study required
E	57 to 70	At capacity; at signals, incidents will cause excessive delays Roundabouts require other control mode	At capacity, requires other control mode

Source: - RTA's Guide to Traffic Generating Developments (2002).

Table 9 - New England Highway / Magpie Street signalised intersection – Sidra Results Summary

Model	Deg. Satn (v/c)	Average Delay (s)	Worst Level of Service (Los)	95 % back of queue length (cars)
2023 AM	0.373	14.8	B	8.1
2023 PM	0.498	19.1	B	12.0
2023 AM + construction traffic	0.408	15.5	B	8.9
2023 PM + construction traffic	0.514	20.7	B	12.6
2025 AM + construction traffic	0.425	15.6	B	9.4
2025 PM + construction traffic	0.535	21.0	B	13.3

The modelling shows that even with the additional construction traffic from the Project the intersection continues to operate satisfactorily through to 2025 with the degree of saturation, average delays, and LoS well within the acceptable guidelines set by TfNSW. The additional delay and queue length resulting from the construction traffic was less than 2 seconds and less than 2 vehicles, with no overall deterioration in LoS through to the completion of construction in 2026. Based on these results it would be reasonable to conclude the construction traffic will not adversely impact on this intersection and intersections on the wider state road network given the high level of intersection control i.e., traffic signals that exist at the major intersections of the transportation route along the New England Highway.

Traffic volumes at the Magpie Street / Maison Dieu Road intersection and the site access off Maison Dieu Road, are well below the thresholds for uninterrupted flow conditions described in the following table sourced from *Austroads Guide to Traffic Management – Part 6 – Intersections, Interchanges & Crossings* (2009). (**Table 10**). This is for both construction and operation of the Project.

Therefore, even during construction these intersections will operate with uninterrupted flow conditions and the Project will therefore have no adverse impact on the local road network.

Overall, it can be concluded that the Project will not adversely impact on the efficiency and effectiveness of the local and state road network as a result of the additional traffic generated by the Project and the construction of two temporary construction accesses to the Project site.

Table 10 - Austroads Intersection Thresholds for Uninterrupted Flow Conditions

Major road type ¹	Major road flow (vph) ²	Minor road flow (vph) ³
Two-lane	400	250
	500	200
	650	100
Four-lane	1000	100
	1500	50
	2000	25

Notes:

1. Major road is through road (i.e. has priority).
2. Major road flow includes all major road traffic with priority over minor road traffic.
3. Minor road design volumes include through and turning volumes.

Source: - *Austroads Guide to Traffic Management – Part 6 – Intersections, Interchanges & Crossings (2009)*

7.7 Access Assessment

In terms of width, access A to the Project provides access to a user class 1 (long term) car parking facility with less than 25 car spaces fronting a local road is required to be a category 1 access (Table 3.1 of the Standard). Table 3.2 of the Standard then specifies a category 1 access facility as a combined entry / exit between 3.0 to 5.5 metres wide. However, the proposed entrance width at the main combined entry / exit construction access at Maison Dieu Road (Access A) will need to be a minimum 12.5 metres wide to cater for the swept turning paths for delivery vehicles during the construction stage. This is in accordance with the requirements of Australian Standard *AS2890.1-2004 Parking Facilities – Part 1 Off-street car parking* and Australian Standard *AS2890.2-2002 Parking Facilities – Part 2 Off-street commercial vehicle facilities*. Access A will be converted to a rural property access to Singleton Shire Council requirements on completion of the Project as operational traffic at 8 vtpd during peak periods would be similar to a normal agricultural operation.

The secondary access (Access B) near Shearer's Lane is to be a light vehicle only access and will only be utilised by specific construction employees. Peak traffic volumes will be of the order of 2 vtpd and similar to traffic generation from a rural dwelling. Therefore, it is proposed to be constructed as a normal rural property access crossing to Singleton Shire Council requirements.

An assessment of turn treatment warrants under *Austroads Guide to Traffic Management Part 6 – Intersections, Interchanges and Crossings Management (2020)* determined Access A would be required to undergo basic right turn and basic left turn treatment (BAR / BAL). However, Access A is a temporary construction access and will be converted to a rural property access upon completion of the Project. Therefore, the Applicant proposes to construct access to the Project Area through Access A under traffic management i.e. traffic control, as opposed to constructing a BAR / BAL intersection.

The Applicant will manage all access to and from the site under a Construction Traffic Management Plan (CTMP) with a Traffic Control Plan (TCP). The CTMP and TCP would be provided to Singleton Shire Council as per their requirements.

The CTMP will include at least:

- A map of the primary transport route/s highlighting critical locations.
- An induction process for vehicle operators and regular toolbox meetings.

- Procedures for travel through residential areas, school zones and/or bus route/s.
- Any proposed temporary measures such as a Traffic Guidance Scheme (TGS)
- A Driver Code of Conduct for heavy vehicle operators.
- A complaint resolution and disciplinary procedure

Sight distance at Access A off Maison Dieu Road was observed to be in excess of 300 metres in each direction, therefore complies with the requirements of Figure 3.2 of Australian Standard *AS2890.1-2004 Parking Facilities – Part 1 Off-street car parking (160 metres minimum SSD for 100 km/h)* as well as *Austroads Guide to Road Design – Part 4A – Unsignalised and signalised intersections - Table 3.2 (260 metres for 100 km/h)* for safe intersection sight distance. Sight distances at the secondary access were observed to be in excess of 90 metres and therefore is compliant with the property access sight distance requirements within Australian Standard *AS2890.1-2004 Parking Facilities – Part 1 Off-street car parking*.

It is therefore concluded that the proposed site accesses are both suitably located and suitably safe for use for the Project as they comply with the requirements of Australian Standard *AS2890.1-2004 Parking Facilities – Part 1 Off-street car parking* and Australian Standard *AS2890.2-2002 Parking Facilities – Part 2 Off-street commercial vehicle facilities*.

The main issue with access for construction vehicles to the site is the suitability of the local road network to safely cater for heavy vehicle deliveries. In this regard it is noted that Maison Dieu Road has a sealed pavement a minimum 6 metres wide therefore complies with Austroads Standards for Rural Roads with less than 500 vtp/h. It would therefore allow two heavy vehicles to pass each other at reasonable speeds. Therefore, it is considered the proposed transportation route to the site is suitable to carry heavy vehicles and is suitable to cater for the construction traffic from the Project's construction. This is subject to all outbound traffic from the site using the Magpie Street traffic signals to access the New England Highway. This is further evidenced by the existing heavy vehicle traffic on the road accessing the agricultural properties around the site. There is one creek crossing along the route at Rix's Creek (see **Photograph 7** above) however this has been constructed as a reinforced concrete bridge and would be capable of handling normal highway traffic therefore would be capable of carrying the expected heavy vehicle loading from the construction of the Project.

The additional heavy vehicle loading from the construction may accelerate the deterioration in the sealed pavement along the transportation route. It is therefore recommended that a dilapidation report be prepared for the Project in regard to Maison Dieu Road, west of the McDougall's Hill industrial area (Enterprise Crescent) in consultation with Singleton Shire Council. This will identify unsatisfactory pavement damage caused by the construction of the Project and ensure the road network is repaired to Council's satisfaction post the construction stage of the Project. This will require pre and post construction stage inspections of the road pavement along the proposed transport routes.

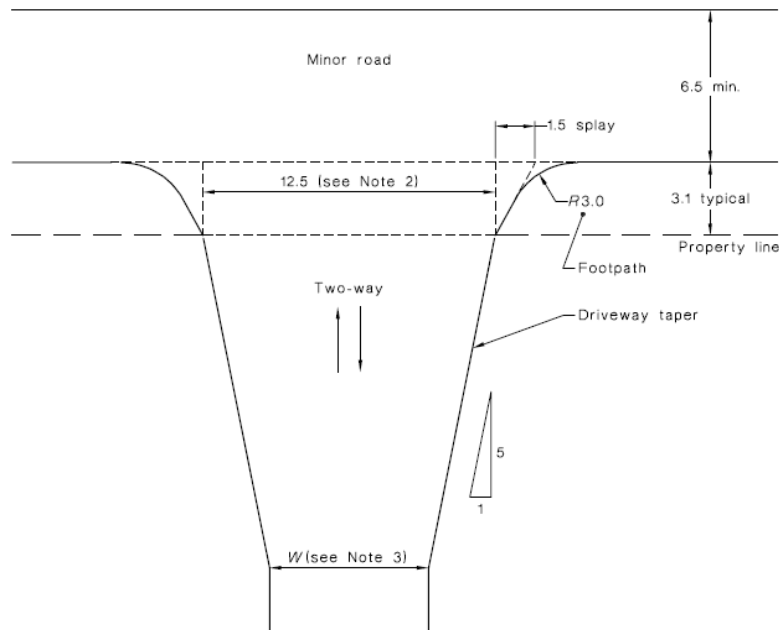
Overall, with suitable conditions of consent included for the preparation of a CTMP and road dilapidation report covering Maison Dieu Road from the New England Highway and the satisfactory repair of the local road network post construction it is considered the local and state road network would be suitable to cater for the expected construction traffic associated with the development.

7.8 Road Safety Assessment

On initial observation of the transport route to the site there were no obvious safety issues identified. However, a Road Safety Audit of the transport route to the Project site will be undertaken if required prior to the commencement of construction of the Project.

A route survey assessment for deliveries from Port of Newcastle and Port Botany has been undertaken separately to this TIA.

The main temporary construction access (site access A) is to be constructed in accordance with Figure 3.1 of Australian Standard AS2890.2-2002 reproduced below (**Figure 4**). Therefore, it is suitable for use by heavy vehicles and no swept path analysis is required.



NOTES:

- 1 In the case illustrated the HRV can turn left into the driveway from the left hand side of the public road. The design (19.0 m long) AV will take up most of the public road width when turning left into or out of the driveway, as will the HRV when turning out.
- 2 Corresponding dimensions for the MRV and SRV are 9 m and 6 m respectively. Larger vehicles may be able to use these narrower driveways depending on the width of public road available for manoeuvring in or out.
- 3 W = width of circulation roadway (see Table 3.1).

DIMENSIONS IN METRES

(Source: - AS2890.2-2002 Parking facilities Part 2 Off-street commercial vehicle facilities.)

Figure 4 - Australian Standards Minimum Design for an Access Driveway on a Minor Road Catering for RVs and AVs

The traffic accident mapping for the area has been sourced from the NSW Road Safety Centre website and is shown below in **Figure 5**. This shows that in the last 5 years there have only been two recorded accidents on the transport route to the Project both of which occurred at intersections on Magpie Street, south of the New England Highway resulting in multiple serious and moderate injuries. Statistically two accidents in a 5-year period does not represent a road safety blackspot in fact represents a relatively safe road network. Therefore, it is concluded there is no accident blackspot along the delivery route to the Project that traffic from the Project would adversely impact on.



Figure 5 - NSW Centre for Road Safety – Traffic Accident Map McDougall's Hill

8.0 ON-SITE CAR PARKING

On-site car parking for the Project will comply with the industrial development controls within Schedule 1 of the *Singleton Development Control Plan 2014* (SDCP). Adopting the industrial development rates for this Project the relevant on-site car parking provision during the operation of the Project is.

- ◆ 1 space per 75 m².

With up to 5 employees within 5 light vehicles engaged in the day-to-day operation of the Project will generate a peak parking demand of 5 on-site car parking spaces under normal operational conditions. Car parking from the construction car parking area will be retained to cater for operational parking requirements.

It is the responsibility of the applicant to also provide sufficient on-site car parking for construction employees during the duration of the construction of the Project to comply with the car parking objectives of the SDCP. Construction employee car parking will be provided on the grassed areas adjacent to the entry to the site near the operational management building and these areas are large enough to cater for the provision of at least 75 on-site car parks plus a shuttle bus laydown area for construction employees which is the expected peak parking demand for 150 employees on-site at any one time and significant ride sharing occurring with company vehicles. The Project will provide sufficient onsite parking to comply with the objectives and controls of the SDCP. There is significant overflow parking to cater for employee traffic and any specialised maintenance work that may be required during operations.

The employee car parking area would need to comply with the requirements of Australian Standard AS2890.1-2004 *Parking Facilities – Part 1 Off-street car parking* with parking bay sizes 2.4 m x 5.4 m and aisle widths of 5.8 metres. There is sufficient room on-site to ensure compliance with this requirement which could be covered by a suitable condition of consent. Overall, it is considered suitable on-site car parking can be provided for the Project ensuring all vehicle movements to and from the site off Maison Dieu Road will be undertaken in a forward direction.

9.0 ALTERNATIVE TRANSPORT MODES

The Project will not generate any increase in public transport demand during both the construction and operational phases, particularly given the site is not currently serviced by convenient public transport.

Therefore, there is no requirement for the provision of new services or improved infrastructure resulting from the Project. Similarly, the Project will not generate any additional pedestrian or cycle traffic during both the construction and operation phases therefore no requirement exists for the provision of additional pedestrian paths or cycle ways near the site.

10.0 CONCLUSION

This traffic impact assessment for the Project has determined the following:

- ◆ The Project during construction will generate up to an additional 84 vehicle movements to and from the Project Area during the weekday AM and PM peak periods.
- ◆ The Project will generate only 10 vtpd in peak periods during the operation of the Project.
- ◆ The existing peak traffic volumes on the local road network are below the two-way mid-block capacity threshold of 2,200 vtpd for the New England Highway (LoS D) and 1,800

vtp/h for Magpie Street and Maison Dieu Road (LoS C) as well as the rural two-way mid-block capacity of 1,140 vtp/h for Maison Dieu Road west of Dights Crossing Road. Traffic volumes will remain below these thresholds during the construction and operation of the Project.

- ◆ Sidra Intersection modelling has shown the construction and operation of the Project does not adversely impact on the operation of the New England Highway / Magpie Street signalised intersection with increased average delays and queue lengths being less than 2 seconds and 2 vehicles respectively and no loss of overall LoS for the intersection.
- ◆ Sidra modelling has not been undertaken for the New England Highway / Maison Dieu Road CHR/AUL intersection. The delivery route will only include left turn movements from the New England Highway onto Maison Dieu Road. This movement has been observed as operating with uninterrupted flow conditions during the road network peak periods. The relatively small increase in traffic from the Project will not adversely impact on this movement or the operation of the intersection.
- ◆ The right turn movement out of Maison Dieu Road onto the Highway already operates with significant delay in the road network peak periods and most traffic accessing the New England Highway and heading southbound would utilise the New England Highway / Magpie Street traffic signals. Any additional traffic from the Project is likely to increase the existing delay, therefore it is recommended that within the CTMP for the Project, all outbound traffic should be required to use the Magpie Street traffic signals to access the New England Highway.
- ◆ The Project will not adversely impact on the intersections within the wider state road network given the high levels of intersection control on the major intersections.
- ◆ The largest delivery to the site will be the transformer from Sydney or Newcastle. The Traffic and Transport report for a similar solar farm at Muswellbrook has already assessed the delivery route to Singleton as satisfactory therefore this would also apply to this development.
- ◆ The Magpie Street / Maison Dieu Road give way-controlled intersection and the two site accesses off Maison Dieu Road will operate with uninterrupted flow conditions during construction and operation of the Project due to the relatively low traffic volumes on Maison Dieu Road.
- ◆ The additional construction and operational traffic generated by the Project will not adversely impact on the efficiency or effectiveness of the local and state road network.
- ◆ The proposed site accesses are suitable for use for construction and operation of the Project being compliant with Australian Standard and Austroads requirements and considered suitably safe with the operation of a CTMP during construction works.
- ◆ With the preparation of a CTMP, Road Safety Audit and Road Dilapidation report covering Maison Dieu Road west of the New England Highway to the site and the satisfactory repair of the local road network post construction it is considered the local and state road network would be suitable to cater for the expected construction traffic associated with the Project.
- ◆ There is no accident blackspot along the delivery route to the Project that traffic from the Project would adversely impact on.
- ◆ There is sufficient area on-site to accommodate the expected peak parking demand generated by the Project during both construction and operation with the provision of an AS2890.1-2004 compliant car park within the site adjacent to the construction laydown area for a minimum 50 spaces.
- ◆ The Project will not generate any increase in public transport demand therefore no nexus exists for the provision of new services or improved infrastructure resulting from the Project. Similarly, the Project will not generate any additional pedestrian or cycle traffic therefore no nexus exists for the provision of additional pedestrian paths or cycle ways near the site.

11.0 RECOMMENDATIONS

- ◆ To mitigate safety concerns at the site accesses, it is proposed to prepare a CTMP and TCP for the site access to ensure a suitable level of safety exists at the proposed site access during construction of the Project.
- ◆ Within the CTMP for the Project, all outbound traffic should be required to use the Magpie Street traffic signals to access the New England Highway.
- ◆ The secondary site access (Access B) off Maison Dieu Road at the western end of the site near Shearer's Lane can be constructed as a normal rural property access crossing to Singleton Shire Council's requirements as it will be only for use by specific light vehicles during construction of the Project e.g., surveyors, project managers, contractors etc.
- ◆ A Road Safety Audit and Road Dilapidation report covering Maison Dieu Road west of the New England Highway to the site and the satisfactory repair of the local road network post construction should be conducted.

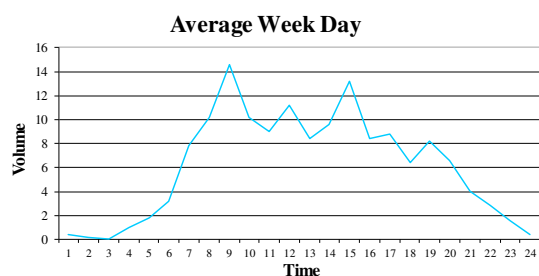


JR Garry BE (Civil), Masters of Traffic
Director
Intersect Traffic Pty Ltd

ATTACHMENT A TRAFFIC COUNT DATA

Site 1 Maison Dieu Rd 150m W of Dights Crossing Rd [100]
Eastbound

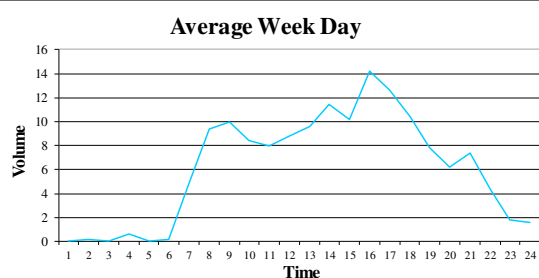
Day Time	Wed 22/02/23	Thu 23/02/2023	Fri 24/02/2023	Sat 25/02/2023	Sun 26/02/2023	Mon 27/02/2023	Tue 28/02/2023	W/Day Ave.	W/End Ave.	7 Day Ave
0:00	1	0	0	1	0	1	0	0	1	0
1:00	0	0	0	0	0	0	1	0	0	0
2:00	0	0	0	1	0	0	0	0	1	0
3:00	2	1	0	1	0	1	1	1	1	1
4:00	2	1	2	2	3	2	2	2	3	2
5:00	1	3	5	3	2	1	6	3	3	3
6:00	7	6	8	3	1	10	8	8	2	6
7:00	9	9	7	3	0	17	9	10	2	8
8:00	16	12	16	3	1	16	13	15	2	11
9:00	7	11	14	6	8	7	12	10	7	9
10:00	9	8	11	14	13	8	9	9	14	10
11:00	13	11	11	3	5	10	11	11	4	9
12:00	10	12	5	7	5	8	7	8	6	8
13:00	5	14	7	8	5	13	9	10	7	9
14:00	10	15	13	6	4	14	14	13	5	11
15:00	9	9	6	5	3	8	10	8	4	7
16:00	3	16	7	8	4	8	10	9	6	8
17:00	8	4	6	7	9	8	6	6	8	7
18:00	5	10	7	2	3	8	11	8	3	7
19:00	7	3	4	6	4	6	13	7	5	6
20:00	3	2	3	5	4	6	6	4	5	4
21:00	1	5	4	4	3	0	4	3	4	3
22:00	0	0	3	0	0	1	4	2	0	1
23:00	0	0	2	3	1	0	0	0	2	1
Total	128	152	141	101	78	153	166	148	90	131


Summary

	from	to	
AM Peak	7:00 AM	8:00 AM	17
PM Peak	4:00 PM	5:00 PM	16
Week Day Average			148
Weekend Day Average			89
7 Day Average			131

Site 1 Maison Dieu Rd 150m W of Dights Crossing Rd [100]
Westbound

Day Time	Wed 22/02/23	Thu 23/02/2023	Fri 24/02/2023	Sat 25/02/2023	Sun 26/02/2023	Mon 27/02/2023	Tue 28/02/2023	W/Day Ave.	W/End Ave.	7 Day Ave
0:00	0	0	0	1	3	0	0	0	2	1
1:00	0	0	0	0	0	0	1	0	0	0
2:00	0	0	0	1	0	0	0	0	1	0
3:00	1	0	0	0	1	1	1	1	1	1
4:00	0	0	0	0	0	0	0	0	0	0
5:00	1	0	0	2	1	0	0	0	2	1
6:00	6	1	5	3	0	7	5	5	2	4
7:00	6	9	7	1	2	12	13	9	2	7
8:00	8	8	9	4	3	16	9	10	4	8
9:00	9	11	12	5	3	3	7	8	4	7
10:00	6	8	9	5	7	7	10	8	6	7
11:00	10	10	8	6	4	9	7	9	5	8
12:00	8	10	8	5	5	12	10	10	5	8
13:00	7	12	11	8	7	14	13	11	8	10
14:00	6	12	9	5	5	16	8	10	5	9
15:00	16	12	13	7	6	12	18	14	7	12
16:00	7	19	8	12	4	13	16	13	8	11
17:00	12	12	10	6	8	7	11	10	7	9
18:00	8	6	5	6	4	9	11	8	5	7
19:00	9	7	5	7	8	3	7	6	8	7
20:00	5	6	10	5	4	8	8	7	5	7
21:00	3	4	5	5	4	3	7	4	5	4
22:00	0	2	3	3	2	3	1	2	3	2
23:00	1	3	2	1	1	0	2	2	1	1
Total	129	152	139	98	82	155	165	148	90	131


Summary

	from	to	
AM Peak	8:00 AM	9:00 AM	16
PM Peak	4:00 PM	5:00 PM	19
Week Day Average			148
Weekend Day Average			90
7 Day Average			131

23/2/2023 - NEW ENGLAND HWY / MAGPIE ST, McDOUGALLS HILL

8:00 <<< HOUR ENDING

Thursday

Summary:

NEW ENGLAND HWY / MAGPIE ST

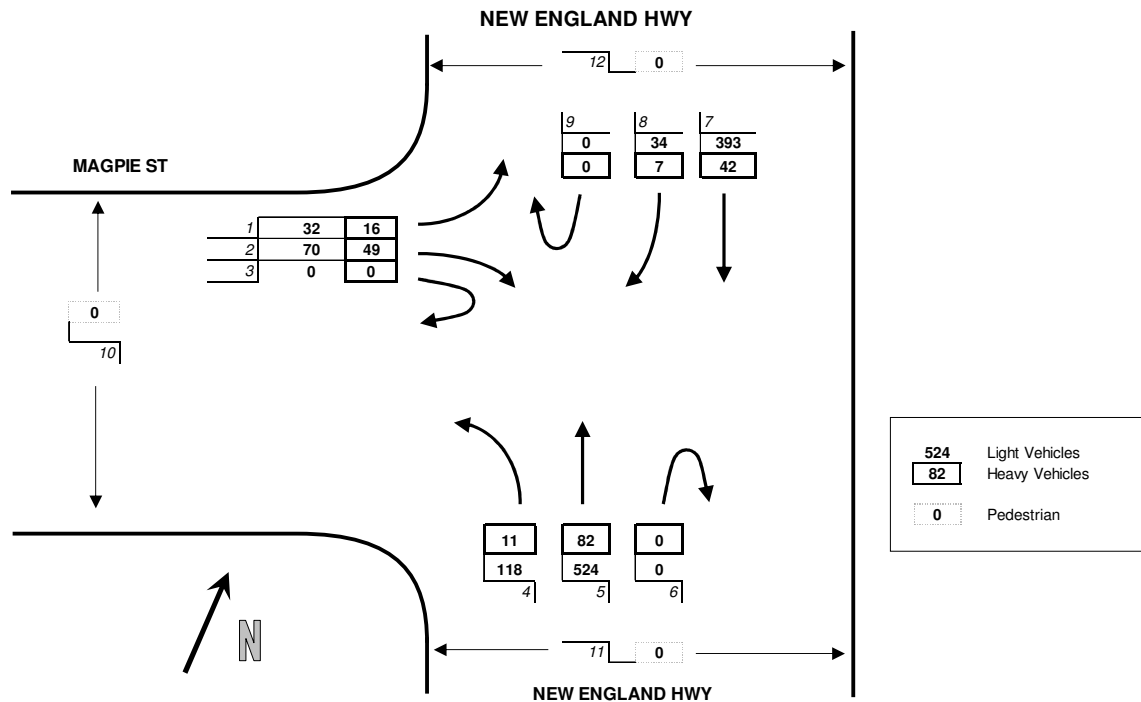
1171 Total Light Vehicles

207 Total Heavy Vehicles

0 Total Pedestrians



Quality Surveys
233650



23/2/2023 - NEW ENGLAND HWY / MAGPIE ST, McDOUGALLS HILL

17:30 <<< HOUR ENDING

Thursday

16:00-17:30 - Northbound heavy queuing due to lane merge queuing through the intersection. Also traffic out of Magpie St could not fully empty during a single green phase.

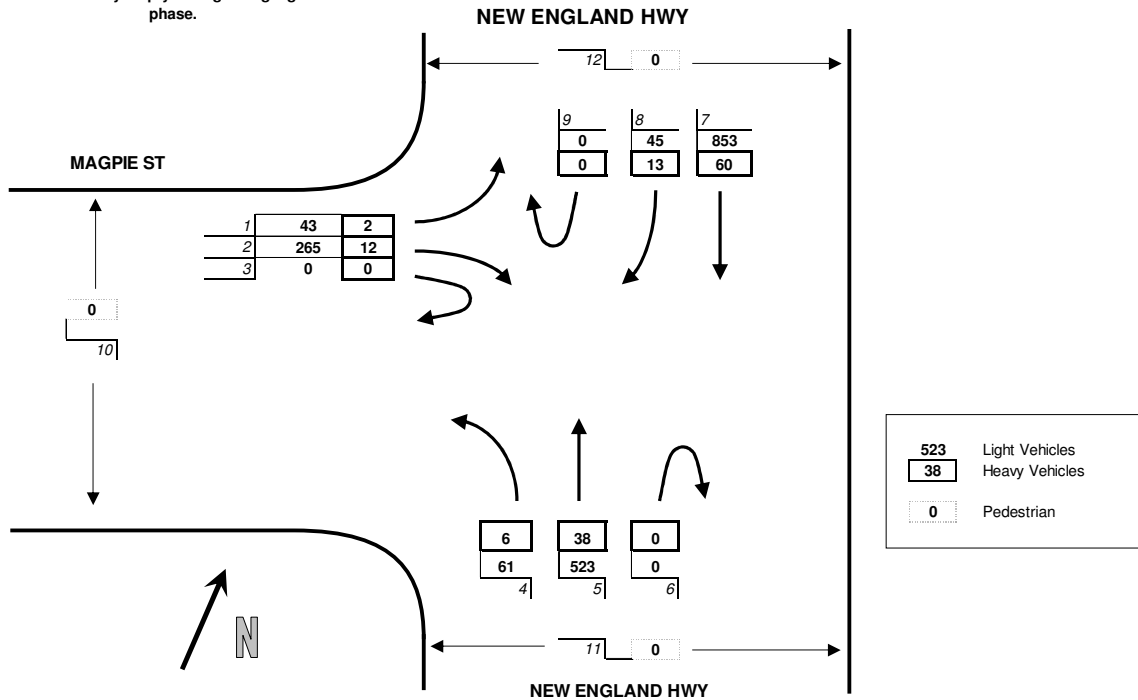
Summary:

NEW ENGLAND HWY / MAGPIE ST

1790	Total Light Vehicles
131	Total Heavy Vehicles
0	Total Pedestrians

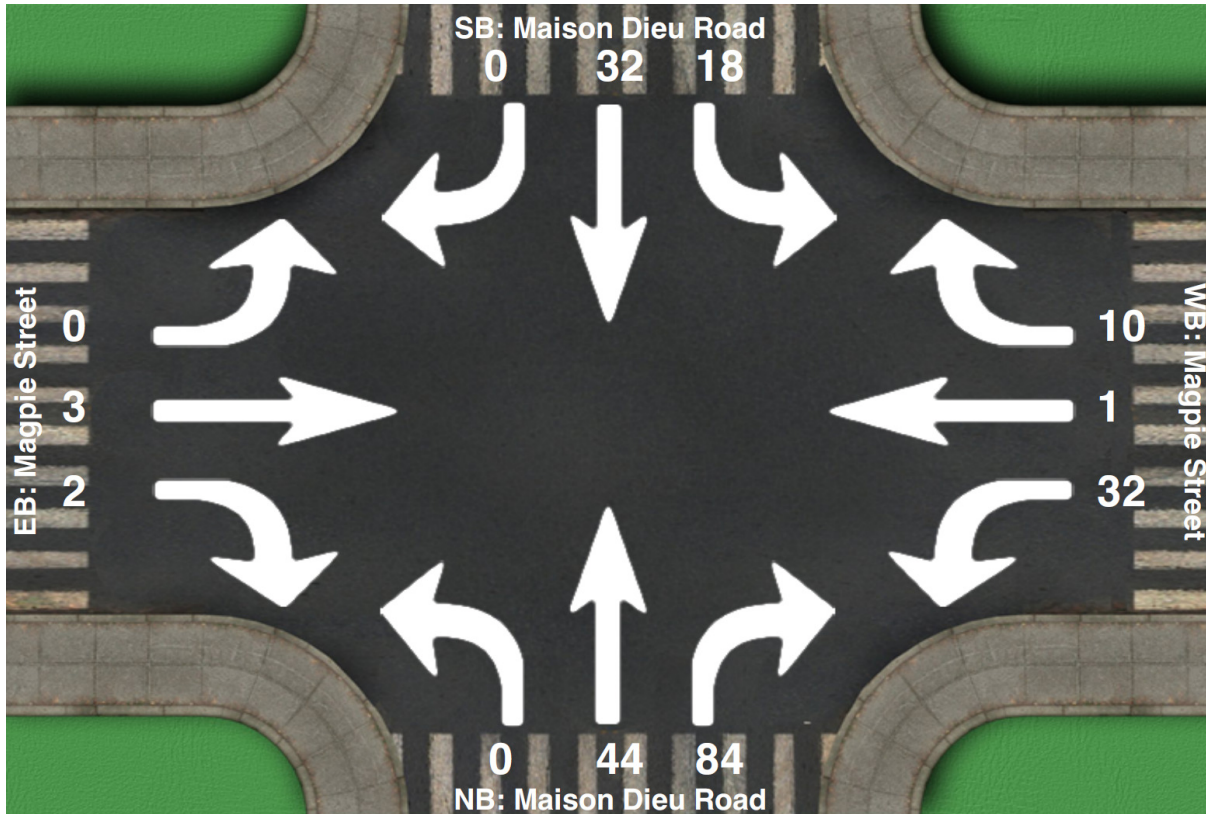


Quality Surveys
233650



Intersection Peak Hour

Location: Maison Dieu Road at Magpie Street, Singleton
 GPS Coordinates: Lat=-32.550848, Lon=151.140661
 Date: 2023-05-16
 Day of week: Tuesday
 Weather:
 Analyst: Jeff



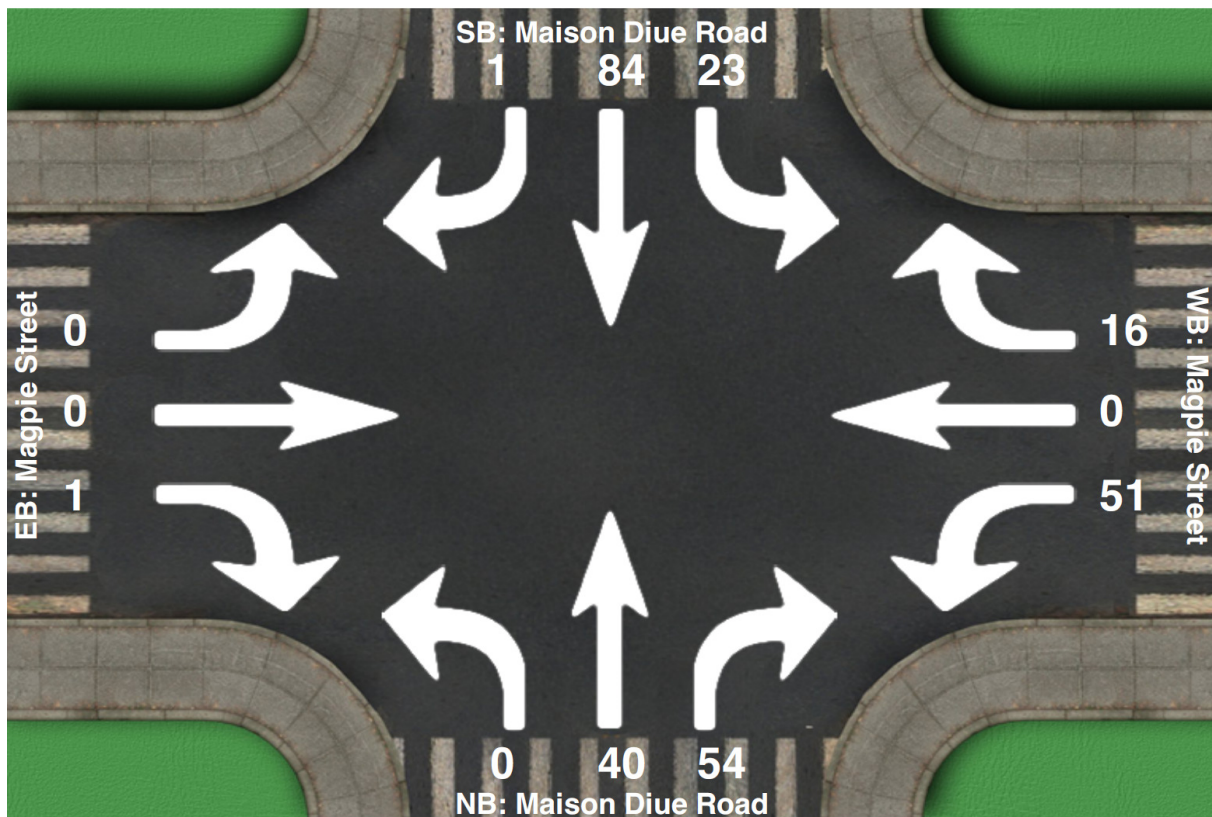
Intersection Peak Hour

08:00 - 09:00

	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Vehicle Total	18	32	0	32	1	10	0	44	84	0	3	2	226
Factor	0.50	0.80	0.00	0.73	0.25	0.50	0.00	0.73	0.62	0.00	0.38	0.25	0.83
Approach Factor	0.66			0.83			0.65			0.62			

Intersection Peak Hour

Location: Maison Dieu Road at Magpie Street, Singleton
 GPS Coordinates: Lat=-32.549968, Lon=151.141383
 Date: 2023-05-16
 Day of week: Tuesday
 Weather:
 Analyst: Jeff



Intersection Peak Hour

16:00 - 17:00

	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Vehicle Total	23	84	1	51	0	16	0	40	54	0	0	1	270
Factor	0.57	0.57	0.25	0.80	0.00	0.67	0.00	0.91	0.71	0.00	0.00	0.25	0.83
Approach Factor	0.56			0.76			0.78			0.25			

ATTACHMENT B

SIDRA SUMMARY TABLES

MOVEMENT SUMMARY

 **Site: 101 [2023 AM (Site Folder: General)]**

Output produced by SIDRA INTERSECTION Version: 9.1.4.221

New England Highway / Magpie Street McDougalls Hill

February 2023 counts

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 80 seconds (Site Optimum Cycle Time - Minimum Delay)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows [Total HV] veh/h %		Arrival Flows [Total HV] veh/h %		Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh] Dist] m		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Magpie Street															
1	L2	All MCs	51	33.3	51	33.3	0.122	30.9	LOS C	1.5	13.5	0.78	0.72	0.78	38.6
3	R2	All MCs	125	41.2	125	41.2	* 0.349	43.1	LOS D	2.4	22.6	0.95	0.76	0.95	33.8
Approach			176	38.9	176	38.9	0.349	39.6	LOS C	2.4	22.6	0.91	0.75	0.91	35.1
East: New England Highway															
4	L2	All MCs	136	8.5	136	8.5	0.373	8.9	LOS A	7.8	60.1	0.55	0.58	0.55	48.8
5	T1	All MCs	638	13.5	638	13.5	* 0.373	11.1	LOS A	8.1	63.0	0.57	0.53	0.57	51.4
Approach			774	12.7	774	12.7	0.373	10.7	LOS A	8.1	63.0	0.57	0.54	0.57	50.9
West: New England Highway															
11	T1	All MCs	458	9.7	458	9.7	0.217	9.2	LOS A	4.3	32.6	0.52	0.44	0.52	52.4
12	R2	All MCs	43	17.1	43	17.1	* 0.348	46.8	LOS D	1.7	13.9	0.99	0.74	0.99	33.1
Approach			501	10.3	501	10.3	0.348	12.5	LOS A	4.3	32.6	0.56	0.46	0.56	49.9
All Vehicles			1451	15.0	1451	15.0	0.373	14.8	LOS B	8.1	63.0	0.60	0.54	0.60	48.0

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

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.

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

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		[Ped ped	Dist] m			sec	m	m/sec
South: Magpie Street												
P1	Full	1	1	34.2	LOS D	0.0	0.0	0.93	0.93	188.1	200.0	1.06
West: New England Highway												
P4	Full	1	1	34.2	LOS D	0.0	0.0	0.93	0.93	188.1	200.0	1.06
All Pedestrians		2	2	34.2	LOS D	0.0	0.0	0.93	0.93	188.1	200.0	1.06

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.

MOVEMENT SUMMARY

Site: 101 [2023 AM + development (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New England Highway / Magpie Street McDougalls Hill

February 2023 counts

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 80 seconds (Site Optimum Cycle Time - Minimum Delay)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh.]	[Dist]				km/h
South: Magpie Street															
1	L2	All MCs	51	33.3	51	33.3	0.122	31.0	LOS C	1.5	13.5	0.78	0.72	0.78	38.6
3	R2	All MCs	129	43.1	129	43.1	* 0.405	44.6	LOS D	2.5	24.2	0.97	0.76	0.97	33.4
Approach			180	40.4	180	40.4	0.405	40.8	LOS C	2.5	24.2	0.92	0.75	0.92	34.7
East: New England Highway															
4	L2	All MCs	202	7.8	202	7.8	0.401	9.8	LOS A	8.7	66.8	0.56	0.62	0.56	48.3
5	T1	All MCs	638	13.5	638	13.5	* 0.401	11.7	LOS A	8.9	69.4	0.58	0.55	0.58	51.1
Approach			840	12.2	840	12.2	0.401	11.2	LOS A	8.9	69.4	0.58	0.57	0.58	50.4
West: New England Highway															
11	T1	All MCs	458	9.7	458	9.7	0.217	9.2	LOS A	4.3	32.6	0.52	0.44	0.52	52.4
12	R2	All MCs	61	12.1	61	12.1	* 0.408	45.7	LOS D	2.4	18.7	0.98	0.75	0.98	33.5
Approach			519	9.9	519	9.9	0.408	13.5	LOS A	4.3	32.6	0.57	0.47	0.57	49.2
All Vehicles			1539	14.7	1539	14.7	0.408	15.5	LOS B	8.9	69.4	0.62	0.56	0.62	47.5

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

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.

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

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		[Ped]	[Dist]			sec	m	m/sec
South: Magpie Street												
P1	Full	1	1	34.2	LOS D	0.0	0.0	0.93	0.93	188.1	200.0	1.06
West: New England Highway												
P4	Full	1	1	34.2	LOS D	0.0	0.0	0.93	0.93	188.1	200.0	1.06
All Pedestrians		2	2	34.2	LOS D	0.0	0.0	0.93	0.93	188.1	200.0	1.06

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.

MOVEMENT SUMMARY

Site: 101 [2025 AM + development (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New England Highway / Magpie Street McDougalls Hill

February 2023 counts

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 80 seconds (Site User-Given Cycle Time)

Design Life Analysis (Final Year): Results for 2 years

Vehicle Movement Performance													
Mov ID	Turn	Mov Class	Demand Flows [Total HV] veh/h	Arrival Flows [Total HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh.]	Dist [m]	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Magpie Street													
1	L2	All MCs	53 33.3	53 33.3	0.127	31.1	LOS C	1.6	14.1	0.78	0.73	0.78	38.6
3	R2	All MCs	135 43.1	135 43.1	* 0.421	44.7	LOS D ¹¹	2.6	25.2	0.97	0.76	0.97	33.3
Approach			187 40.4	187 40.4	0.421	40.9	LOS C	2.6	25.2	0.92	0.75	0.92	34.7
East: New England Highway													
4	L2	All MCs	210 7.8	210 7.8	0.418	9.9	LOS A	9.2	70.4	0.57	0.62	0.57	48.2
5	T1	All MCs	664 13.5	664 13.5	* 0.418	11.9	LOS A	9.4	73.1	0.59	0.56	0.59	51.0
Approach			874 12.2	874 12.2	0.418	11.4	LOS A	9.4	73.1	0.59	0.58	0.59	50.3
West: New England Highway													
11	T1	All MCs	476 9.7	476 9.7	0.226	9.3	LOS A	4.5	34.1	0.52	0.44	0.52	52.4
12	R2	All MCs	64 12.1	64 12.1	* 0.425	45.8	LOS D ¹¹	2.5	19.5	0.99	0.75	0.99	33.5
Approach			540 9.9	540 9.9	0.425	13.6	LOS A	4.5	34.1	0.57	0.48	0.57	49.1
All Vehicles			1601 14.7	1601 14.7	0.425	15.6	LOS B	9.4	73.1	0.62	0.56	0.62	47.4

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

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.

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

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

¹¹ Level of Service is worse than the Level of Service Target specified in the Parameter Settings dialog.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped]	Dist [m]	Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Magpie Street												
P1	Full	1	1	34.2	LOS D	0.0	0.0	0.93	0.93	188.1	200.0	1.06
West: New England Highway												
P4	Full	1	1	34.2	LOS D	0.0	0.0	0.93	0.93	188.1	200.0	1.06
All Pedestrians		2	2	34.2	LOS D	0.0	0.0	0.93	0.93	188.1	200.0	1.06

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.

MOVEMENT SUMMARY

 **Site: 101 [2023 PM (Site Folder: General)]**

Output produced by SIDRA INTERSECTION Version: 9.1.4.221

New England Highway / Magpie Street McDougalls Hill

February 2023 counts

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 80 seconds (Site Optimum Cycle Time - Minimum Delay)

Vehicle Movement Performance														
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh. Dist]				km/h
South: Magpie Street														
1	L2	All MCs	47	4.4	47	4.4	0.081	26.6	LOS B	1.3	9.3	0.72	0.71	40.8
3	R2	All MCs	292	4.3	292	4.3	*0.498	41.6	LOS C	5.4	39.2	0.96	0.79	35.3
Approach			339	4.3	339	4.3	0.498	39.5	LOS C	5.4	39.2	0.93	0.78	36.0
East: New England Highway														
4	L2	All MCs	71	9.0	71	9.0	0.337	9.0	LOS A	7.3	53.9	0.60	0.57	47.9
5	T1	All MCs	591	6.8	591	6.8	0.337	12.8	LOS A	7.4	55.0	0.61	0.55	50.1
Approach			661	7.0	661	7.0	0.337	12.4	LOS A	7.4	55.0	0.61	0.55	49.9
West: New England Highway														
11	T1	All MCs	961	6.6	961	6.6	*0.489	14.8	LOS B	12.0	88.5	0.69	0.60	49.4
12	R2	All MCs	61	22.4	61	22.4	*0.436	46.1	LOS D	2.4	20.4	0.99	0.75	33.2
Approach			1022	7.5	1022	7.5	0.489	16.7	LOS B	12.0	88.5	0.70	0.61	48.0
All Vehicles			2022	6.8	2022	6.8	0.498	19.1	LOS B	12.0	88.5	0.71	0.62	46.0

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

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.

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

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance											
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff. Stop Rate	Travel Time	Aver. Speed
		ped/h	ped/h	sec		[Ped ped	Dist]			sec	m m/sec
South: Magpie Street											
P1	Full	1	1	34.2	LOS D	0.0	0.0	0.93	0.93	188.1	1.06
West: New England Highway											
P4	Full	1	1	34.2	LOS D	0.0	0.0	0.93	0.93	188.1	1.06
All Pedestrians		2	2	34.2	LOS D	0.0	0.0	0.93	0.93	188.1	1.06

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.

MOVEMENT SUMMARY

 Site: 101 [2023 PM + development (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New England Highway / Magpie Street McDougalls Hill

February 2023 counts

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 80 seconds (Site Optimum Cycle Time - Minimum Delay)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]		[Total HV]					[Veh. veh	Dist]				
			veh/h	%	veh/h	%	v/c	sec			m				km/h
South: Magpie Street															
1	L2	All MCs	68	3.1	68	3.1	0.108	25.3	LOS B	1.8	13.0	0.71	0.72	0.71	41.5
3	R2	All MCs	355	4.7	355	4.7	* 0.494	39.2	LOS C	6.4	46.3	0.94	0.80	0.94	36.2
Approach			423	4.5	423	4.5	0.494	37.0	LOS C	6.4	46.3	0.90	0.79	0.90	37.0
East: New England Highway															
4	L2	All MCs	75	14.1	75	14.1	0.358	8.8	LOS A	7.7	57.8	0.64	0.60	0.64	46.9
5	T1	All MCs	591	6.8	591	6.8	0.358	14.4	LOS A	7.9	58.7	0.64	0.58	0.64	49.2
Approach			665	7.6	665	7.6	0.358	13.8	LOS A	7.9	58.7	0.64	0.58	0.64	49.0
West: New England Highway															
11	T1	All MCs	961	6.6	961	6.6	* 0.514	16.5	LOS B	12.6	93.4	0.72	0.64	0.72	48.5
12	R2	All MCs	61	22.4	61	22.4	* 0.508	47.8	LOS D	2.5	20.9	1.00	0.76	1.02	32.7
Approach			1022	7.5	1022	7.5	0.514	18.4	LOS B	12.6	93.4	0.74	0.64	0.74	47.1
All Vehicles			2111	6.9	2111	6.9	0.514	20.7	LOS B	12.6	93.4	0.74	0.65	0.74	45.2

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

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.

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

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		[Ped ped]	[Dist]			sec	m	m/sec
South: Magpie Street												
P1	Full	1	1	34.2	LOS D	0.0	0.0	0.93	0.93	188.1	200.0	1.06
West: New England Highway												
P4	Full	1	1	34.2	LOS D	0.0	0.0	0.93	0.93	188.1	200.0	1.06
All Pedestrians		2	2	34.2	LOS D	0.0	0.0	0.93	0.93	188.1	200.0	1.06

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.

MOVEMENT SUMMARY

Site: 101 [2025 PM + development (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New England Highway / Magpie Street McDougalls Hill

February 2023 counts

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 80 seconds (Site User-Given Cycle Time)

Design Life Analysis (Final Year): Results for 2 years

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows [Total HV] veh/h %		Arrival Flows [Total HV] veh/h %		Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh Dist] veh m		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Magpie Street															
1	L2	All MCs	71	3.1	71	3.1	0.112	25.4	LOS B	1.9	13.5	0.71	0.72	0.71	41.4
3	R2	All MCs	369	4.7	369	4.7	*0.514	39.7	LOS C	6.6	48.4	0.94	0.80	0.94	36.2
Approach			440	4.5	440	4.5	0.514	37.4	LOS C	6.6	48.4	0.90	0.79	0.90	36.9
East: New England Highway															
4	L2	All MCs	78	14.1	78	14.1	0.372	8.8	LOS A	8.1	60.7	0.64	0.60	0.64	46.8
5	T1	All MCs	614	6.8	614	6.8	0.372	14.5	LOS B	8.3	61.6	0.65	0.58	0.65	49.2
Approach			692	7.6	692	7.6	0.372	13.9	LOS A	8.3	61.6	0.65	0.59	0.65	48.9
West: New England Highway															
11	T1	All MCs	1000	6.6	1000	6.6	*0.535	17.0	LOS B	13.3	98.5	0.73	0.65	0.73	48.4
12	R2	All MCs	64	22.4	64	22.4	*0.529	47.9	LOS D ¹¹	2.6	21.9	1.00	0.77	1.03	32.7
Approach			1063	7.5	1063	7.5	0.535	18.9	LOS B	13.3	98.5	0.75	0.65	0.75	47.0
All Vehicles			2196	6.9	2196	6.9	0.535	21.0	LOS B	13.3	98.5	0.75	0.66	0.75	45.1

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

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.

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

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

¹¹ Level of Service is worse than the Level of Service Target specified in the Parameter Settings dialog.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		[Ped ped	Dist] m			sec	m	m/sec
South: Magpie Street												
P1	Full	1	1	34.2	LOS D	0.0	0.0	0.93	0.93	188.1	200.0	1.06
West: New England Highway												
P4	Full	1	1	34.2	LOS D	0.0	0.0	0.93	0.93	188.1	200.0	1.06
All Pedestrians		2	2	34.2	LOS D	0.0	0.0	0.93	0.93	188.1	200.0	1.06

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.