

27 September 2022

P2316 PP 259 Windermere Rd report

Perception Planning
Maitland Road,
Mayfield NSW

Attn: Erin Daniel

Dear Erin,

Proposed Residential Subdivision, 259 Windermere Road, Lochinvar, NSW.

Further to your recent email, we have now completed our site work and assessment for the proposed residential subdivision located off Windermere Road, Lochinvar. We have reviewed the documentation provided for the proposed development and are pleased to provide the following traffic impact assessment to support the development application to be submitted to Maitland City Council.

This assessment has been prepared in accordance with the Austroads Guidelines and Section 2.3 of the RTA Guide to Traffic Generating Developments (note that RTA / RMS are now renamed Transport for NSW (TfNSW)), which provides the structure for the reporting of key issues to be addressed when determining the impacts of traffic associated with a development. This guide indicates that the use of this format and checklist ensures that the most significant matters are considered by the relevant road authority.

The report has also taken into consideration the planning requirements outlined in the Maitland Development Control Plan 2011.

Site Location and Context

The proposed development is located to the east of Windermere Road within the suburb of Lochinvar as shown in Figure 1. The site has road frontage to Windermere Road only and the surrounding land use is predominantly rural with some large lot rural residential development.

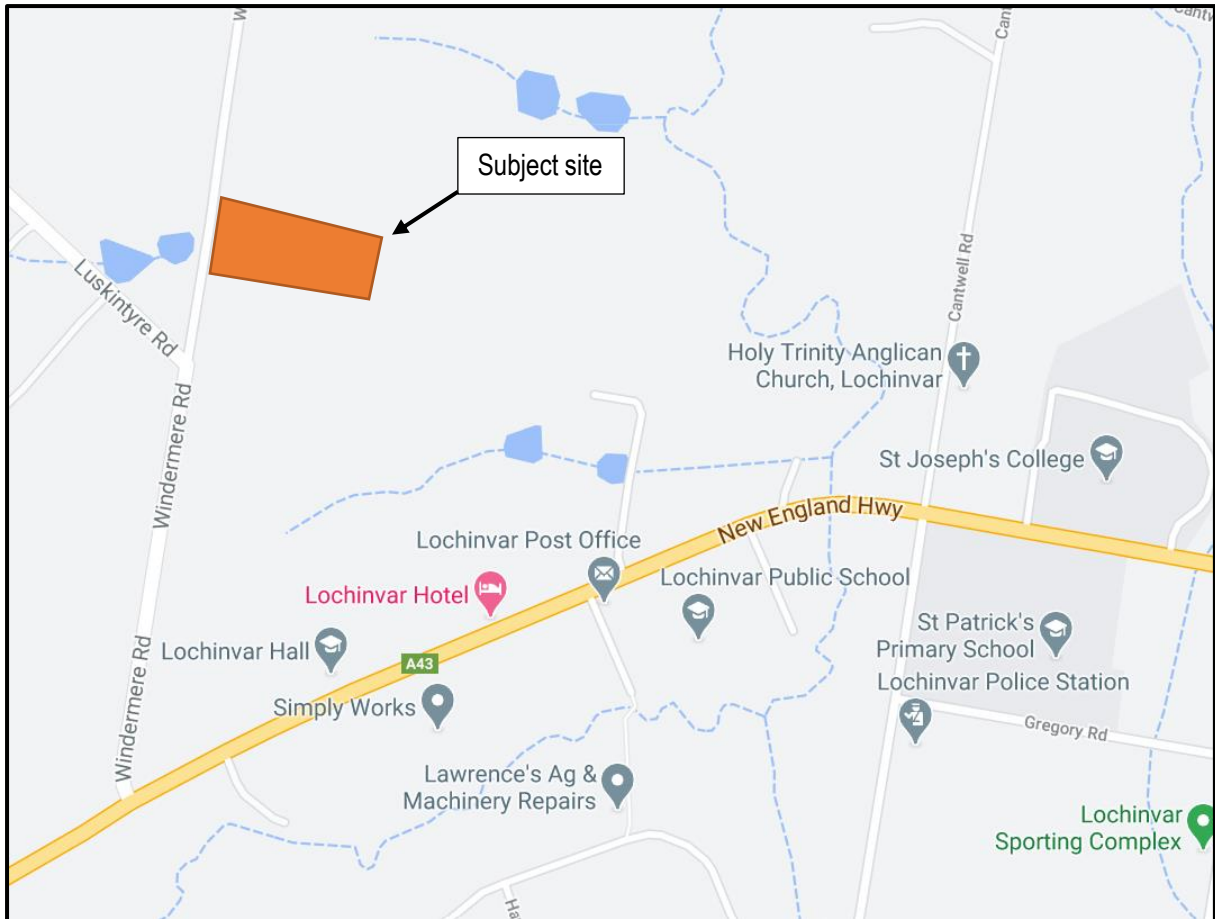


Figure 1 – Subject site in the context of the local road network

A summary of the key issues and their comments are provided below:

Item	Comment
Existing Situation	
2.1 Site Location and Access	<p>The proposed development is located to the east of Windermere Road within the suburb of Lochinvar as shown in Figure 1.</p> <p>Access to the site is provided via Windermere Road only.</p>
2.2.1 Road Hierarchy	<p>The New England Highway is the major arterial road through the locality, which forms part of the state road network (HW9) connecting Lochinvar with Greater Newcastle (via Maitland) to the east and the Upper Hunter (via Muswellbrook) to the west. Through Lochinvar, it provides a single lane of travel in each direction, with sealed shoulders to both sides and an unsealed verge. The posted speed limit on the New England Highway is 60 km/hr in this location, with a 40 km/hr school zone operating through the centre of Lochinvar.</p> <p>Since the opening of the Hunter Expressway, there has been a significant decrease in the demands for regional traffic passing through the village of Lochinvar.</p> <p>The New England Highway connects with Windermere Road via a 3-way sign-controlled intersection allowing for all turning movements, with the New</p>

Item	Comment																																
	<p>England Highway being the priority road and a Stop sign is provided on Windermere Road. A left turn deceleration lane is provided on the New England Highway for the left turns into Windermere Road together with a sheltered right turn lane on the New England Highway.</p> <p>Windermere Road is a local road which provides a sealed pavement in the order of 6.5-8 metres wide allowing for a single lane of travel in each direction and parking on street. A street light is provided at the intersection with the New England Highway and the road operates under the posted speed limit of 60 km/h. There is a portion of kerb at the southern end of the road on the western side only, with no kerb or gutter for the remainder of the road. There is no footpath provided along this road.</p> <p>Luskintyre Road is a local road which provides a sealed pavement in the order of 6.5-8 metres wide allowing for a single lane of travel in each direction and parking on street. It connects with Windermere Road via a simple 3-way controlled intersection with Windermere Road being the priority road. A Stop sign controls Luskintyre Road. To the north of this intersection, Windermere Road is a dead end with limited traffic movements.</p> <p>These local roads are under the control and care of Maitland City Council.</p>																																
<p>2.2.2 <i>Current and Proposed Roadworks, Traffic Management Works and Bikeways</i></p>	<p>There are no road works currently occurring or planned within the locality of the subject site.</p> <p>The Lochinvar Structure Plan has identified the intersection of the New England Highway and Windermere Road to be upgraded and the preferred option is traffic signal control.</p>																																
<p>2.3 Traffic Flows</p>	<p>Traffic surveys were completed at the intersection Windermere Road and the New England Highway on Thursday 24th March 2022 during the morning peak period (7:00am-9:00am) and in the afternoon peak period (4.00pm-6.00pm) to determine the current demands and distribution of traffic through this intersection.</p> <p>These surveys were undertaken during both the morning and afternoon with times selected to coincide with the typical commuter peak periods on the local road network. The peak hours were determined as being 8.00 to 9.00AM and 4.00-5.00PM.</p> <p>A summary of the peak hour traffic volumes obtained from these surveys is provided below, with detailed survey data presented in Attachment C.</p> <table border="1" data-bbox="582 1592 1391 1928"> <thead> <tr> <th>Location</th> <th>Peak</th> <th>Two-Way</th> <th>Eastbound / Northbound</th> <th>Westbound / Southbound</th> </tr> </thead> <tbody> <tr> <td rowspan="2">New England Highway (West of Windermere Road)</td> <td>AM</td> <td>1,271</td> <td>765</td> <td>506</td> </tr> <tr> <td>PM</td> <td>1,181</td> <td>558</td> <td>623</td> </tr> <tr> <td rowspan="2">New England Highway (East of Windermere Road)</td> <td>AM</td> <td>1,352</td> <td>823</td> <td>529</td> </tr> <tr> <td>PM</td> <td>1,241</td> <td>580</td> <td>661</td> </tr> <tr> <td rowspan="2">Windermere Road</td> <td>AM</td> <td>161</td> <td>63</td> <td>98</td> </tr> <tr> <td>PM</td> <td>122</td> <td>69</td> <td>53</td> </tr> </tbody> </table>	Location	Peak	Two-Way	Eastbound / Northbound	Westbound / Southbound	New England Highway (West of Windermere Road)	AM	1,271	765	506	PM	1,181	558	623	New England Highway (East of Windermere Road)	AM	1,352	823	529	PM	1,241	580	661	Windermere Road	AM	161	63	98	PM	122	69	53
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<p>2.3.1 <i>Daily Traffic Flows</i></p>	<p>The Austroads Guidelines indicate that peak hours represent between 8-12% of daily traffic volumes. Adopting the average of 10%, this would</p>																																

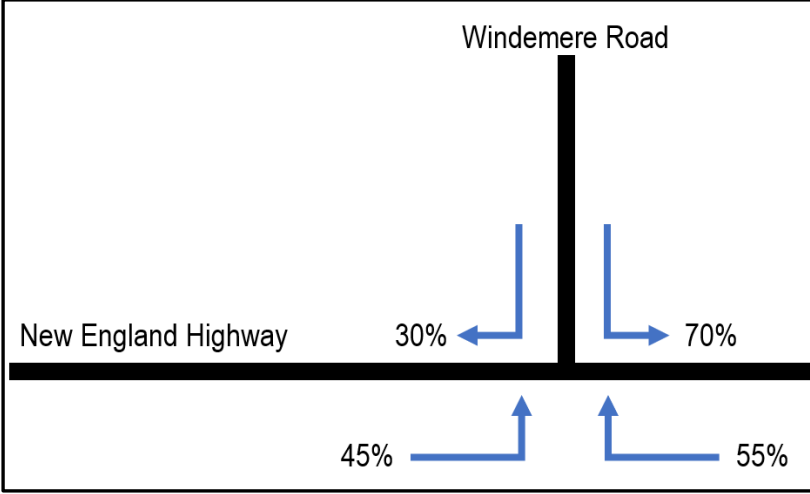
Item	Comment
	<p>indicate daily traffic volumes on the New England Highway in the order of 12,500 vehicles per day (vpd).</p> <p>Daily flows on Windermere Road would be significantly lower in the order of 1,400 vpd.</p>
2.3.2 AADT	There is no current AADT data available in the locality.
2.3.3 Daily Traffic Flow Distribution	<p>The surveys undertaken indicate a strong demand for vehicles travelling east along the New England Highway in the morning, being reflective of typical commuter demands towards local employment to the east of the site. In the afternoon peak period there is less of a distinction in terms of opposing traffic movements.</p> <p>Over the course of a day, traffic would be reasonably balanced along the New England Highway.</p> <p>Flows on Windermere Road are influenced by commuter and school trips with more traffic southbound towards the New England Highway in the AM and the opposite tidal demand in the PM peak.</p>
2.3.4 Vehicle Speeds	No speed surveys were completed as part of the study work. Observations on site indicate that traffic travels at the posted speed limit, with a fixed speed camera located on the New England Highway at the eastern entry to the town.
2.3.5 Existing Site Flows	The subject site is currently vacant and as such generates minimal existing traffic movements.
2.3.6 Heavy Vehicle Flows	<p>The New England Highway is an approved B-Double route which sees a moderate demand for heavy vehicles using this road each day. From the surveys undertaken, heavy vehicles represent approximately 8% of traffic using the New England Highway in the morning peak and 4% of traffic in the afternoon.</p> <p>Windermere Road does not provide a through route for heavy vehicles and as such experiences a low volume of heavy vehicle demands. Heavy vehicles associated with rural requirements as well as Council refuse collection vehicles would access Windermere Road.</p>
2.3.7 Current Road Network Operation	<p>Observations on site indicate that the local roads and the intersection of Windermere Road and the New England Highway typically operate to a good standard, with minor delays and queuing noted for traffic turning right out of Windermere Road.</p> <p>Performance standards for assessing the capacity of a road are described within the Guide to Traffic Generating Developments. For the New England Highway, which provides an arterial function with a single lane of travel in each direction, the mid-block capacity is indicated as 900 vehicles per hour (vph) per direction. Given the low number of intersections in this location and minimal delays for through traffic on the New England Highway, increased mid-block capacities of 1,200-1,400 vph (per direction) can be achieved, corresponding with the upper limit of a Level of Service (LoS E).</p> <p>The traffic surveys above indicate peak direction flows of 765 vph eastbound on the New England Highway in the morning peak period, which corresponds with a LoS D and is therefore within the mid-block capacity of this road.</p>

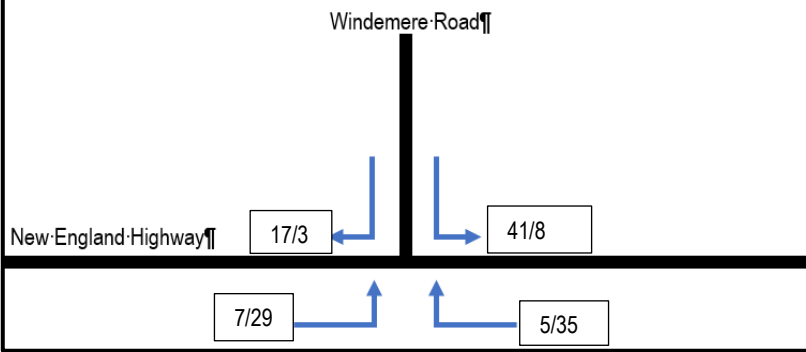
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2.4 Traffic Safety and Accident History	<p>A review of accident data provided by TfNSW shows that there has been no recorded accidents at the intersection of Windermere Road and the New England Highway over the 5 year period to June 2021.</p> <p>There has been one recorded accident on Windermere Road on the south of Luskintyre Road resulting in a fatality. This was a single vehicle accident involving running off the road and hitting an object.</p> <p>The local roads and intersections in the vicinity of the site are generally well aligned and provide an acceptable level of traffic safety as reflected in the number of accidents recorded in this location. A site inspection of the surrounding roads and intersections has not identified any significant safety concerns.</p>
2.5 Parking Supply and Demand	
2.5.1 On-street Parking Provision	Opportunities for on-street parking are available along Windermere Road with no parking restrictions noted.
2.5.2 Off-street Parking Provision	No formal off-street parking is provided in the locality.
2.5.3 Current Parking Demand and Utilisation	Minimal demands for on-street parking are noted in the immediate locality of the site with the surrounding residential lots providing for off-street parking.
2.5.4 Short term set down or pick up areas	There are no set down or pick up areas in the vicinity of the site.
2.6 Public Transport	
2.6.1 Rail Station Locations	Lochinvar Railway Station is located some 1.5km to the south of the site and accessible by Station Lane.
2.6.2 Bus Stops and Associated Facilities	The nearest bus stops are located on the New England Highway to the east of Station Lane, approximately 4 km from the site. Seating and a shelter is provided.
2.6.3 Transport Services	<p>Bus services operate along the New England Highway to the north of the site with services provided by Hunter Valley Buses including the following routes:</p> <ul style="list-style-type: none"> • Route 179: North Rothbury to Stockland Green Hills • Route 180: Singleton Heights to Stockland Green Hills <p>A number of school buses also operate throughout the locality associated with nearby schools at the northern end of Station Lane.</p>
2.7 Pedestrian Network	No pedestrian footpaths or shared pathways are provided along Windermere Road.
2.8 Other Developments	<p>There is ongoing development planned within the Lochinvar Urban Release Area which comprises 650 hectares of land with an approximate yield of 5,000 lots.</p> <p>There is an approved residential development on Windermere Road to the south of the subject site allowing for 89 residential lots which is currently seeking approval to amend the approval to 109 lots.</p> <p>There is an additional residential development to the immediate south of the site (number 48 Windermere Road) proposed as part of the approved urban release area with 237 lots and connection to Windermere Road only.</p>

Item	Comment
The Development	
3.1.1 Nature of Development	<p>The proposed development allows for a 1 into 96 lot residential subdivision with associated road and infrastructure works.</p> <p>A concept plan for the masterplan development is provided in Attachment A.</p> <p>The following assessment has been provided for the full development of up to 96 lots with access to be from Windermere Road along with the potential for connection via the developments at 26 and 48 Windermere Road.</p>
3.1.2 Access and Circulation Requirements	<p>The layout of the subdivision shall be consistent with the Maitland Development Control Plan. The internal roads within the subdivision shall connect to Windermere Road and provide stubs to connect to future land development as required.</p> <p>The subdivision layout provides well-connected options for all modes of transport with the design of pedestrian, cycle and bus routes to take precedence over vehicle routes. Future bus routes shall be considered in the design of roads.</p> <p>Internal roads shall be designed and constructed in accordance with the Austroads Guidelines, Council standard drawings and specifications.</p>
3.2 Access	<p>Access for the subdivision is proposed via a new road connection to Windermere Road. This new road connection shall be designed as intersections in accordance with the Austroads Guidelines, Council standard drawings and design specifications.</p>
3.2.1 Driveway Location	<p>Driveway locations for the various lots within the subdivision shall be determined in conjunction with the future development of each lot.</p> <p>Driveways shall be located to suit the internal site layout and designed and constructed in accordance with Council requirements and Australian Standard AS2890 (Parking Facilities).</p> <p>Several lots shall have direct access to Windermere Road and these driveways will be designed and constructed in accordance with Council requirements and subject to individual DA's.</p>
3.2.2 Sight Distances	<p>Sight distance requirements for intersections are specified by the Austroads Guide to Road Design, which requires two criteria to be met:</p> <ul style="list-style-type: none"> • Safe Intersection Sight Distance which is the minimum sight distance for the major road approaches; and • Approach Sight Distance which is the minimum sight distance for the minor road approaches. <p>For the posted speed limit of 60 km/hr along Windermere Road the Austroads Guide specifies a minimum safe intersection sight distance (SISD) of 114 metres. Windermere Road provides a mostly straight and flat road alignment, which ensures that adequate sight distance can be achieved. This will be confirmed as part of the detailed design of these intersections.</p> <p>The approach sight distance is subject to confirmation as part of the detailed design for the site. However, a review of the concept plans shows that the internal roads within the subdivision provide a relatively straight alignment</p>

Item	Comment
	<p>approaching Windermere Road which ensures that the approach sight distance requirements can be satisfied.</p>
<p>3.2.3 Service Vehicle Access</p>	<p>Future servicing of the subdivision shall include kerbside waste collection by Maitland City Council, with occasional demands for general deliveries. The internal roads within the subdivision shall be designed to cater for the swept paths of these vehicles up to a 12.5 metre heavy rigid truck in accordance with AS2890.2:2018.</p> <p>Internal roads shall be designed in accordance with Council's design requirements.</p>
<p>3.2.4 Queuing at entrance to site</p>	<p>Allowing for the access onto Windermere Road and the negligible through traffic volumes, no vehicle queues are expected at the proposed access to Windermere Road. The layout requirements for the access has been assessed against the requirements of Austroads Guide to Traffic Management Part 6: Intersections, Interchanges and Crossings and the warrants for turn treatments provided in Figure 2.26 (reproduced below).</p> <div data-bbox="587 869 1391 1227" data-label="Figure"> </div> <p>For the right turn into the site, in the AM peak the turn volume could be 15 vehicles and 49 in the PM as a worst case scenario. Traffic flows on Windermere Road to the south of the site in the PM peak were 122 two-way, with flows adjacent to the site expected to be much lower than these as there is no through traffic movements on Windermere Road north of the subject site.</p> <p>Applying the demands associated with the project and the through traffic on Windermere Road the access requires a BAR / BAL control only, with no sheltered right turn lane required. This is consistent with the proposed residential subdivisions to the immediate south of the site. As per the plans for this subdivision, Windermere Road shall be widened to provide a 7.5 m wide carriageway to allow for 2-way traffic movements.</p> <p>The intersection of Windermere Road and the New England Highway provides a high level of control with sheltered turn lanes offering adequate spare capacity to support the demands for vehicles exiting into the New England Highway. Whilst there may be some delays for vehicles turning right into or out of Windermere Road, these delays would be low and would have</p>

Item	Comment
	<p>an acceptable impact upon through traffic travelling along the New England Highway.</p> <p>Intersection modelling for the intersection of Windermere Road and the New England Highway is detailed below.</p>
3.2.5 <i>Comparison with existing site access</i>	There is just a simple gated access to the subject site currently.
3.2.6 <i>Access to Public Transport</i>	<p>The internal roads shall be designed to accommodate future bus routes as required with any bus routes to be determined with Council in consultation with the relevant bus providers.</p> <p>Rail services are available from Lochinvar station to the south of the site with services to the east to Maitland and Newcastle and to the west to Singleton and Scone.</p>
3.3 <i>Circulation</i>	
3.3.1 <i>Pattern of circulation</i>	<p>All vehicles will be able to enter and exit the site in a forward direction and travel along the internal roadways to access the residential lots. All new roads shall allow for two-way movements with access via Windermere Road.</p> <p>Dead-end roads have been avoided where possible and a single dead end is provided with a turning area to enable service vehicles to turn around as required.</p>
3.3.2 <i>Internal Road width</i>	All internal roads will be designed in accordance with the requirements of the Maitland Development Control Plan 2011.
3.3.3 <i>Internal Bus Movements</i>	No changes to bus routes are proposed in conjunction with this development. Any change to bus services shall be determined by Council in conjunction with the bus operators to meet future travel demands, with the internal roads within the subdivision to be designed to accommodate buses as appropriate.
3.3.4 <i>Service Area Layout</i>	No dedicated service area is required for this type of development.
3.4 <i>Parking</i>	
3.4.1 <i>Proposed Supply</i>	<p>The supply of parking will be within each individual lot and shall be confirmed in conjunction with the development of each lot.</p> <p>All parking will be contained within the site with no impact on the surrounding road network.</p>
3.4.2 <i>Authority Parking</i>	Maitland Development Control Plan 2011 specified a minimum parking requirement of one space per dwelling house, with this space to be located behind the building line.
3.4.3 <i>Parking Layout</i>	Driveways and garages will be designed in accordance with Council DCP requirements and AS2890.
3.4.4 <i>Parking Demand</i>	Normal parking demands will be accommodated on site in accordance with Council DCP requirements.
3.4.5 <i>Service Vehicle Parking</i>	No dedicated service vehicle parking required on site. The occasional service vehicle will be able to park on the internal roads as required to service the individual dwellings within the site.

Item	Comment
3.4.6 <i>Pedestrian and Bicycle Facilities</i>	Pedestrian and bicycle pathways shall be provided along the internal roads as outlined within the Lochinvar Urban Release Area Plan.
Traffic Assessment	
4.1 Traffic Generation	<p>Standard trip rates for low density residential development are provided within the Guide to Traffic Generating Developments and associated Technical Direction (TDT 2013/04A):</p> <ul style="list-style-type: none"> • Weekday Average Morning Peak Hour Trips: 0.71 per dwelling • Weekday Average Evening Peak Hour Trips: 0.78 per dwelling • Weekday Average Daily Trips: 7.4 per dwelling <p>The lot yield for the proposed subdivision is expected to provide 96 new residential dwellings, which equates to:</p> <ul style="list-style-type: none"> • 68 trips in the morning peak hour • 75 trips in the afternoon peak hour • 710 trips per day, split equally between 355 inbound and 355 outbound
4.1.1 <i>Daily and Seasonal Factors</i>	Limited daily and seasonal variation in traffic movements associated with the development, other than normal variation between weekdays (working days) and weekends.
4.1.2 <i>Pedestrian Movements</i>	<p>The site is located within reasonable walking distance of St Patricks Primary School, All Saints College and Lochinvar Public School, which would see demands for pedestrians to and from the south of the site.</p> <p>There may also be some demands for pedestrians accessing bus stops on the New England Highway.</p>
4.2 Hourly distribution of trips	Consistent with the typical demands for residential developments of this nature, it is assumed that 80% of trips are outbound in the morning with 20% inbound with the reverse distribution in the afternoon.
4.2.1 <i>Origin / destinations assignment</i>	<p>The distribution of traffic onto the New England Highway is expected to be consistent with the existing distributions for commuter traffic into and out of Windermere Road. The following distribution has therefore been adopted:</p> 

Item	Comment
	 <p style="text-align: center;"><i>Trip Distribution (AM / PM)</i></p>
<p>4.3 Impact on Road Safety</p>	<p>The intersection of the New England Highway / Windemere Road provides a channelised right turn lane and auxiliary left lane for vehicles turning left or right into Windemere Road. This ensures that traffic delays created by turning traffic is minimised and there is limited opportunity for rear end type accidents associated with the right turning traffic into the side road.</p> <p>Overall, it is considered that the proposed project shall have a minor and acceptable impact upon the overall road safety in the locality of the subject site. The internal roads and connections to the existing road network shall be designed and constructed in accordance with Council requirements and allow for safe and appropriate traffic movements.</p> <p>There have been a low number of crashes recorded in the immediate locality of the site, with no significant road safety concerns identified.</p>
<p>4.4 Impact of Generated Traffic</p>	
<p>4.4.1 Impact on Daily Traffic Flows</p>	<p>The overall impact upon daily traffic flows within the local road network would be reasonable and within the capacity of the local roads. The proposed subdivision could generate in the order of 710 vpd, while the two subdivisions south of the site on Windemere Road (totalling 346 lots) could generate some 2,560 vpd giving 3,285 vpd in total. The traffic movements associated with the subject site and the two sites south of the site could see daily flows on the New England Highway increase by up to 1,731 vpd to the east of Windemere Road and around 1,534 vpd to the west of Windemere Road. Flows on Windemere Road could increase by up to 3,285 vpd at its southern end allowing for the three separate development sites.</p> <p>Whilst there are no limits on daily traffic flows, the Guide to Traffic Generating Developments provides performance standards for assessing the mid-block capacity of a road based on the peak hour traffic demands. The proposed developments could increase eastbound traffic flows on the New England Highway (east of Windemere Road) by up to 175 vph. This would see peak hour flows eastbound on the New England Highway in the AM period increasing from 823 to 998 vph, which means that the level of service will alter from D (900 vehicles per hour (vph)) to E with an upper limit of 1,400 vph and is within the theoretical capacity of this road.</p> <p>Peak hour flows on Windemere Road could increase by up to 276 vph northbound in the afternoon peak to 340 vph, which is well within the capacity</p>

Item	Comment
<p>4.4.2 Peak Hour Impacts on Intersections</p>	<p>of this road (900 vph per direction) and shall therefore have a negligible impact upon its overall operation.</p> <p>The key intersection that could be impacted upon by the development is the intersection of the New England Highway and Windermere Road. This intersection has been modelled with Sidra and the results are presented and discussed below.</p> <p>This modelling has also allowed for the approved and planned residential subdivisions to the south of the site with 109 lots and 237 lots respectively. The traffic flows associated with this residential development have been determined in a similar manner to the traffic for the subject site and the same distribution as per Section 4.2.1 above for the subject site. The total flows are shown below.</p> <div data-bbox="584 752 1402 1104" data-label="Diagram"> </div> <p><i>Trip distribution (AM / PM) for subject site plus 26 Windermere Road (109 lots) and 48 Windermere Road (237 lots)</i></p>
<p>4.4.3 Impact of Construction Traffic</p>	<p>All construction work associated with the proposed subdivision will be located on site with minimal impacts to the surrounding road network. There may be some external disruptions to Windermere Road associated with the connection of services and construction of the new access points, however these would be short term works and subject to the preparation of a construction traffic management plan which outlines the necessary traffic control to complete these works. This shall be prepared by the contractors at the commencement of work on site to the satisfaction of Council.</p> <p>The construction traffic will be significantly less than that associated with the proposed subdivision and shall therefore have an acceptable impact upon the external road network.</p> <p>No significant earthworks involving the importation or removal of fill is anticipated for the site.</p>
<p>4.4.4 Other Developments</p>	<p>There is ongoing residential development within the Lochinvar Urban Release Area. All necessary road and intersection upgrades to support this development have been documented within Lochinvar Structure Plan and Lochinvar S94 Contributions Plan 2014.</p>
<p>4.5 Public Transport</p>	
<p>4.5.1 Options for improving services</p>	<p>No proposal to improve services in conjunction with this development.</p>

Item	Comment
4.5.2 <i>Pedestrian Access to Bus Stops</i>	Internal roads within the subdivision shall be designed to accommodate future bus routes as appropriate.
4.6 Recommended Works	
4.6.1 <i>Improvements to Access and Circulation</i>	Ensure access and internal roads / driveways are designed and constructed in accordance with Council requirements.
4.6.2 <i>Improvements to External Road Network</i>	Upgrade of Windermere Road along the site frontage in accordance with Council design requirements.
4.6.3 <i>Improvements to Pedestrian Facilities</i>	None required.
4.6.4 <i>Effect of Recommended Works on Adjacent Developments</i>	Nil.
4.6.5 <i>Effect of Recommended Works on Public Transport Services</i>	Nil.
4.6.6 <i>Provision of LATM Measures</i>	Nil.
4.6.7 <i>Funding</i>	Works associated with the subdivision shall be funded by the developer. Intersection upgrades at New England Highway subject to Council funding arrangements.

Sidra Intersection Modelling

New England Highway / Windermere Road

The intersection of New England Highway / Windermere Road has been modelled using *Sidra Intersection 9* to assess its current operation and quantify the potential impacts associated with the proposed residential development. The following scenarios have been included within the model:

- 2022 Baseline Assessment – Current situation allowing for surveyed traffic volumes;
- 2022 With 75% Development – Allowing for surveyed traffic volumes together with development traffic;
- 2027 with 75% Development – existing intersection controls (point of failure)
- 2027 with upgrade to traffic signals and full development on Windermere Road
- 2032 with upgrade to traffic signals and full development on Windermere Road

The results of the above assessment are summarised below.

Table 1 - Sidra Results – 2022 Baseline Assessment (AM/PM)

Approach	Turn Movement	Level of Service (LoS)	Ave. Delay (s)	95% Queue (m)
New England Highway (Westbound)	Right	A / A	11.0 / 7.2	3.2 / 2.1
Windemere Road	Left	B / A	15.8 / 12.2	6.7 / 2.5
	Right *	B / B *	24.8 / 18.5 *	6.7 / 2.5 *
New England Highway (Eastbound)	Left	A / A	5.6 / 5.6	0 / 0

Notes: * Results are representative of two staged movement.

The above results demonstrate that the current traffic demands, and intersection controls are adequate.

The intersection was then assessed with 75% of the development flows associated with the subject site and the two sites to the south of the project site also connecting to Windemere Road. The Sidra modelling demonstrates that the current intersection controls are adequate for this scenario, however in the AM peak the approach on Windemere Road is approaching capacity with a level of service of C.

Table 2 - Sidra Results – 2022 With 75% of Development of 431 lots in total (AM/PM)

Approach	Turn Movement	Level of Service (LoS)	Ave. Delay (s)	95% Queue (m)
New England Highway (Westbound)	Right	A / A	11.1 / 8.7	4.8 / 8.3
Windemere Road	Left	B / A	22.6 / 12.0	31.6 / 5.0
	Right *	B / B *	23.6 / 22.4 *	31.6 / 5.0 *
New England Highway (Eastbound)	Left	A / A	5.6 / 5.5	0 / 0

Notes: * Results are representative of two staged movement.

It can be seen that the current layout of the intersection has capacity for growth of residential land on Windemere Road, but beyond around 320 lots the intersection will need to be upgraded to the future layout of traffic signal control.

The above assessment for 75% of the total development of the residential lots on Windemere Road has been assessed for the future design year of 2027, allowing for 1.5% background growth on the New England Highway. The Sidra modelling shows that the intersection has capacity for this scenario, however the actual numeric growth rate of residential development on Windemere Road needs to be considered. The lot release and occupancy would need to be 86 per year over the next 5 years to realise this scenario.

Table 3 - Sidra Results – 2027 75% Development and Background Growth on the New England Highway (AM/PM)

Approach	Turn Movement	Level of Service (LoS)	Ave. Delay (s)	95% Queue (m)
New England Highway (Westbound)	Right	A / A	12.9 / 9.9	6.0 / 10.3
Windemere Road	Left	C / A	39.8 / 12.6	64.1 / 5.7
	Right *	D / B *	50.6 / 22.8 *	64.1 / 5.7 *
New England Highway (Eastbound)	Left	A / A	5.6 / 5.5	0 / 0

Notes: * Results are representative of two staged movement.

The above results show that in the AM peak the current intersection controls are not adequate beyond 2027 with 75% of the development and the future proposed upgrade to allow for the traffic signals will be required. The assumed schematic layout for the traffic signals is shown below. Note that the assessment has allowed for a pedestrian crossing on each leg as per TfNSW requirements. It is considered that the western leg may not require a pedestrian crossing as the commercial centre of Lochinvar is located to the east of this location.

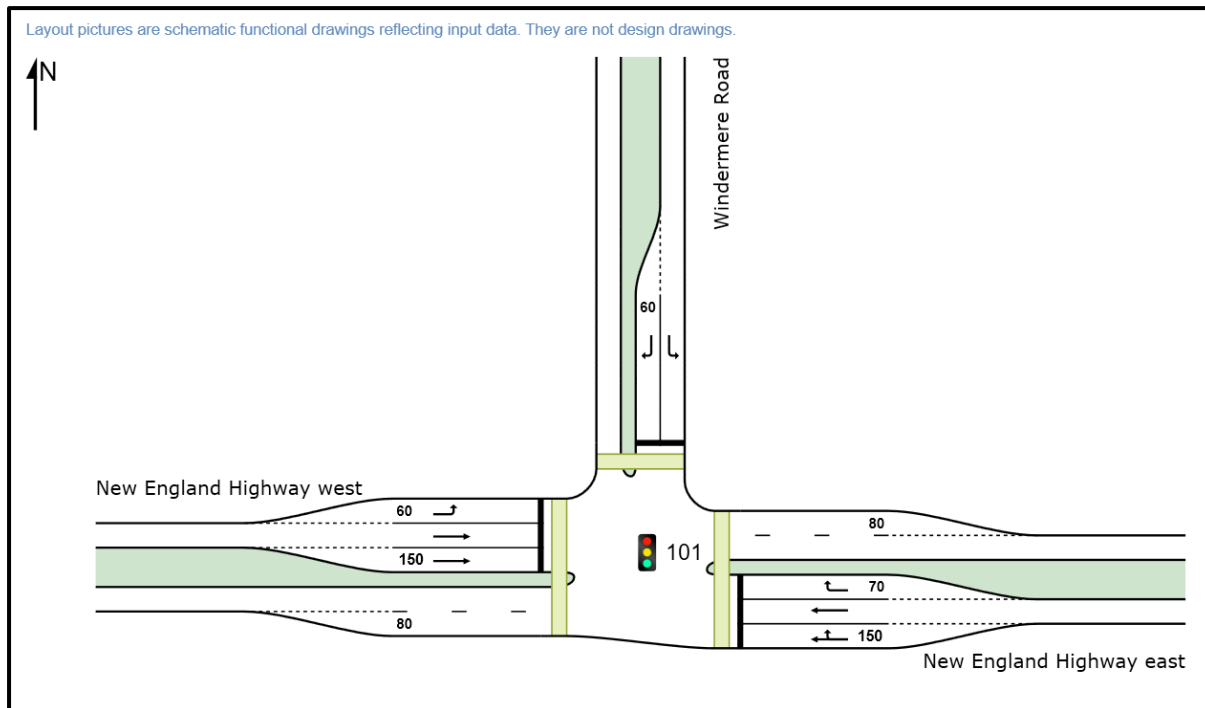


Figure 2 – Indicative future traffic signal layout at Windermere Road and New England Highway

Table 4 - Sidra Results – 2032 With full Development of subject site (85 lots) and 237 lots (48 Windermere) + 109 lots (26 Windermere Road) (AM/PM)

Approach	Turn Movement	Level of Service (LoS)	Ave. Delay (s)	95% Queue (m)
New England Highway (Westbound)	Approach	A / B (D right turn)	8.3 / 15.5 (45.0 right turn)	64.8 / 124.8 (49.5 right turn)
Windermere Road	Left	A / B	10.0 / 27.6	27.1 / 20.2
	Right	D / D	46.9 / 45.0	33.1 / 11.2
New England Highway (Eastbound)	Left turn	D / B	46.3 / 20.5	13.7 / 26.9
	Through	C / B	38.4 / 18.0	0.3 / 113.0

The Sidra modelling above indicates that full development of the subject site and the land at both 26 and 48 Windermere Road can be developed with the provision of the upgrade at the intersection of Windermere Road and the New England Highway to traffic signal control through to the future design year of 2032. The existing intersection controls at this location are adequate for approximately 75% of the full development of these three sites until around 2027, depending upon the land sale and occupancy rate in this area. The continual growth within the Lochinvar area and background growth along the New England Highway will require the future upgrade of the intersection with Windermere Road to traffic-signal control in accordance with the Structure Plan. The above assessment has allowed for the full development of these three sites over a 10 year timeframe, allowing for the upgrade of this intersection to traffic signal control in line with the S94 plan to occur beyond the approval date for this project.

Site Photos



Photo 1 – Windermere Road on approach to the New England Highway.





Photo 2 – View to right for driver exiting Windermere Road



Photo 3 – View to left for driver exiting Windermere Road



Photo 4 – Existing length of Windermere Road adjacent to the subject site



Photo 5 – View to left for driver exiting Luskintyre Road

Conclusion

From the above assessment and the review of the proposed development for 96 residential lots against the requirements of the Guide to Traffic Generating Developments and Austroads Guide to Traffic Management, it is considered that the proposed development should be approved on traffic and access grounds. The subject land is part of the Lochinvar Urban Release Area and as such has been included in the Structure Plan for the area. This Structure Plan includes road upgrade requirements which allow for traffic signals to be installed at the intersection of Windermere Road and the New England Highway.

The additional traffic movements generated by the new residential development will have an acceptable impact short term upon the surrounding road network with no road upgrades required. The major impact shall be at the intersection of Windermere Road and the New England Highway and the Sidra modelling demonstrates that this intersection has adequate capacity to cater for the traffic flows associated with the subject site together with the land at 26 and 48 Windermere Road, without the immediate need to upgrade this intersection to signal control as per the Structure Plan for Lochinvar. Advice from the study team indicates the development and occupancy of the lots could take 5 or more years to achieve and by this time, the background traffic growth along the New England Highway generated by other land within the Lochinvar release land south of the New England Highway could require the upgrade of this intersection to traffic signal control, as per the Structure Plan. The upgrade of this intersection to traffic signals to allow for the identified lot yields and development within Lochinvar will need to be implemented at this time, as it is the background growth along the New England Highway (partially associated with the Lochinvar release land) that will require the upgrade of this intersection to traffic signals and not the traffic generated by the residential development on Windermere Road.

Suitable access can be provided to the proposed subdivision off Windermere Road with this connection to be designed in accordance with the Austroads Guidelines and Council requirements. Adequate sight lines can be achieved at the access in accordance with the Austroads Guide to Road Design.

The proposal can meet the requirements of the Development Control Plan in relation to traffic, parking and access as well as the overall planning for the subject site.

Please feel free to contact our office on 4032 7979, should you have any queries.

Yours sincerely,

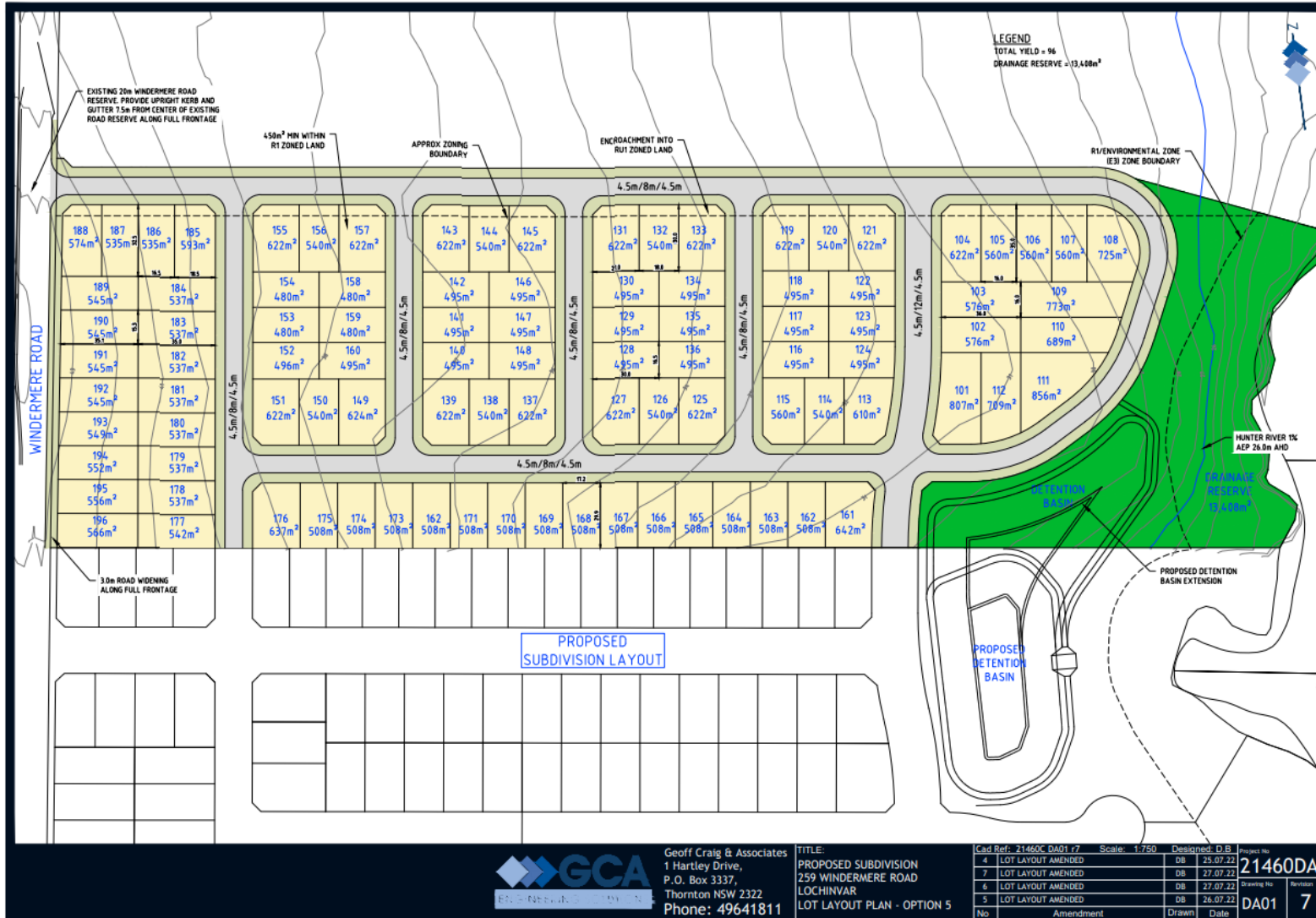


Sean Morgan

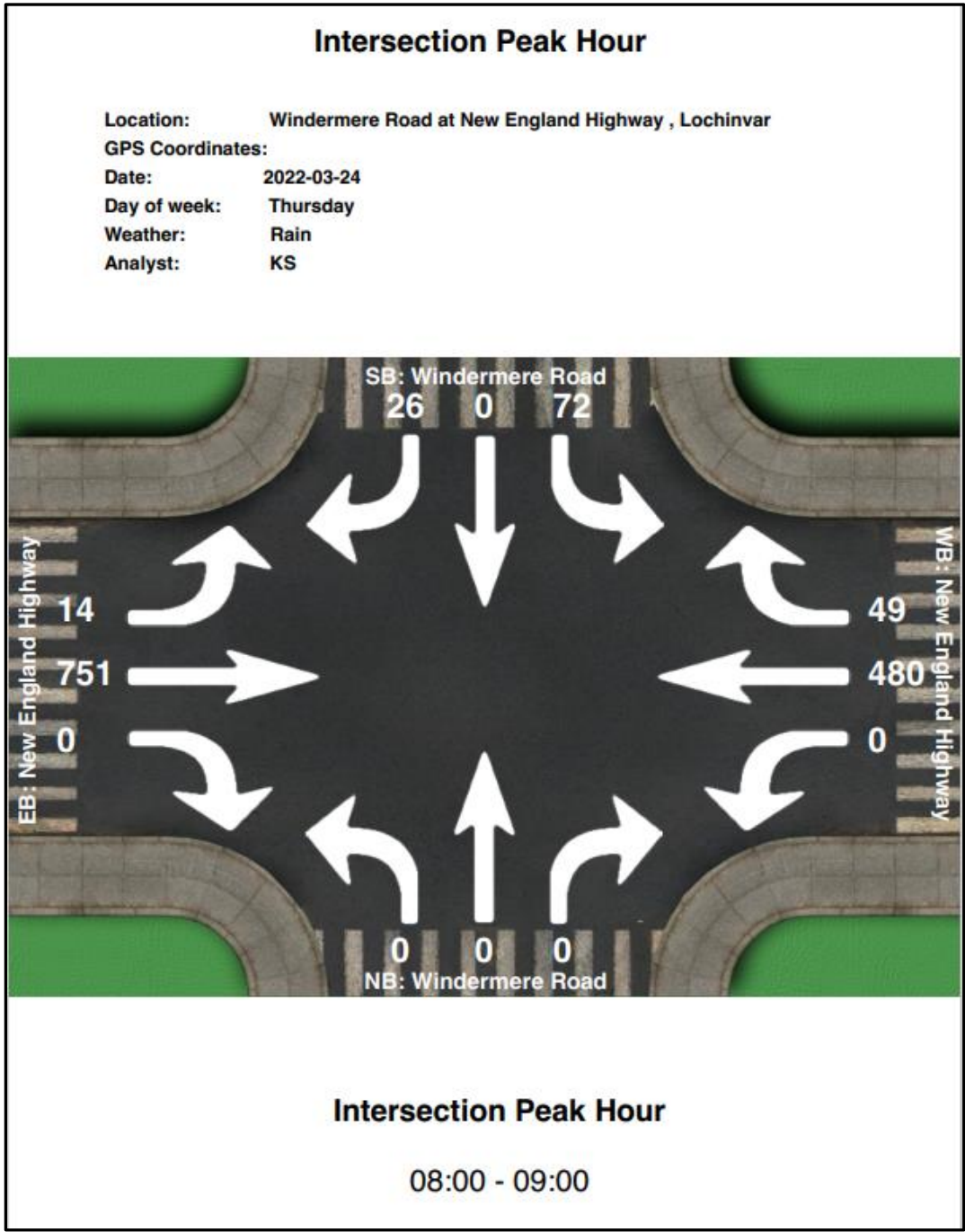
Director

Attached: A – Site Plan
 B – Survey Data
 C - Criteria for Interpreting Sidra Results
 D - Extract from Lochinvar Urban Release Area Plan

Attachment A Concept Site Plan

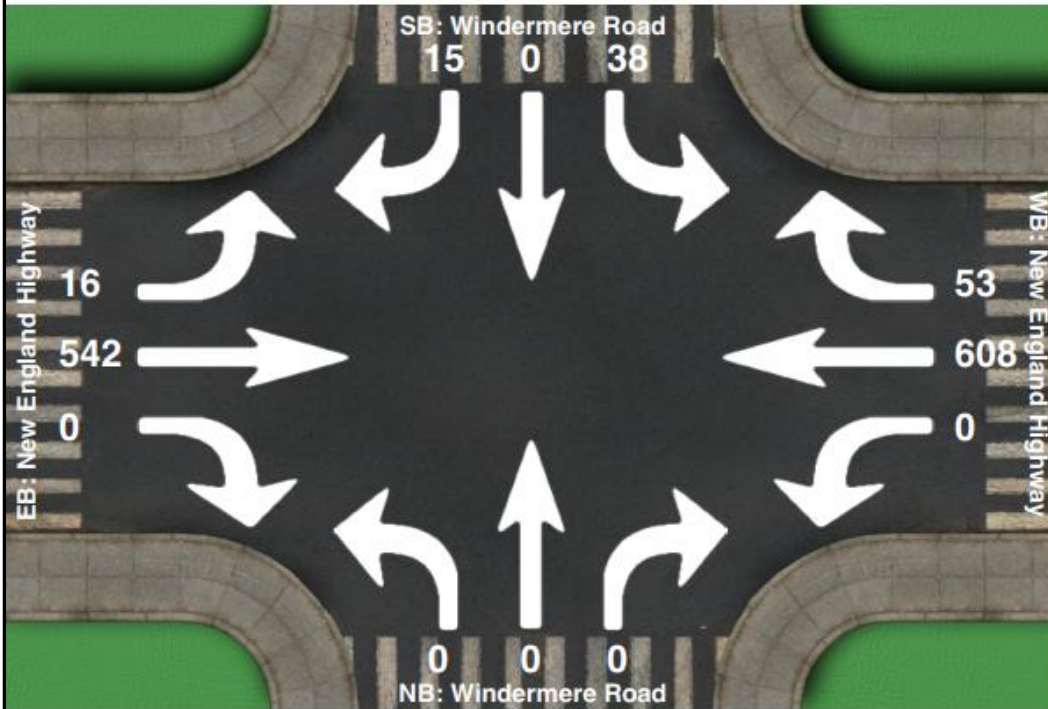


Attachment B Survey data



Intersection Peak Hour

Location: Windermere Road at New England Highway , Lochinvar
GPS Coordinates:
Date: 2022-03-24
Day of week: Thursday
Weather: Overcast
Analyst: KS



Intersection Peak Hour

16:00 - 17:00

Attachment C Criteria for Interpreting Sidra Results

The capacity of an urban road is typically limited by the overall performance of the various intersections. The RMS Guide to Traffic Generating Developments specifies delays and queuing as the key performance measures for assessing the effectiveness of both signalised and unsignalised intersections. Degree of saturation is also recommended for assessing the performance of roundabouts and traffic signals.

A summary of the key criteria for assessing the operation of signalised and unsignalised intersections is provided below.

Average Delays

The level of service criteria for each intersection type is outlined below.

Level of Service	Average Delay per Vehicle (secs)	Traffic Signals, Roundabouts	Give Way & Stop Signs
A	$d \leq 14.5$	Good operation.	Good operation.
B	$14.5 \leq d \leq 28.5$	Good with acceptable delays and spare capacity.	Acceptable delays and spare capacity.
C	$28.5 \leq d \leq 42.5$	Satisfactory.	Satisfactory, accident study required.
D	$42.5 \leq d \leq 56.5$	Operating near capacity.	Near capacity, accident study required.
E	$56.5 \leq d \leq 70.5$	At capacity; at signals, incidents will cause excessive delays. Roundabout requires other control mode.	At capacity, requires other control mode.
F	$70.5 < d$	Failure.	Failure.

Degree of Saturation

Degree of Saturation (DoS) is another measure for assessing the performance of an intersection. It is usually calculated based on as the highest ratio of traffic volumes on an approach to its theoretical capacity and is a measure of the utilisation of available green time at traffic signals.

For intersections controlled by traffic signals, both queues and delays increase rapidly as the DoS approaches 1.0, with overflow queuing starting to become a problem at around 0.8-0.85. A satisfactory level of operation is generally achieved when DoS is kept below 0.75

Attachment D Extract from Lochinvar URA Plan

