

Our Ref: Mareeba
Your Ref: RAL/21/0016

15 June 2022

Chief Executive Officer
Mareeba Shire Council
PO Box 154
Mareeba QLD 4880

Sent via email: info@msc.qld.gov.au
cc- CarLE@msc.qld.gov.au
CairnsSARA@dsdilgp.qld.gov.au

Attention: Carl Ewin

Information Request Response – Application for Development Permit - Reconfiguring a Lot - Subdivision (1 into 49 Lots), Godfrey Road, Mareeba. Lot 219 on NR378.

We confirm we act on behalf of our clients (Emerald Creek Heights Pty Ltd) as owners of the abovementioned property and in accordance with Part 3 of the Development Assessment Rules we provide the following responses to all of the required information as contained in Council's Information Request dated the 29 September 2021.

Updated Layout -

The updated staging and layout plan 401302 ST-01 E is attached. The changes to the layout incorporate input and feedback from both the Assessment Manager (Mareeba Shire Council) and the State Assessment and Referral Agency (SARA). In a meeting between the applicant and the Assessment Manager on the 5th April 2022, Council raised concerns relating to the proposed open space network. With Council officers noting that their desire is that these areas (except for the Emerald Creek Riparian area) should fall under the ownership of individual landowners and not become Reserves for Council to maintain (see attached Council email). With Council noting logistical and financial issues in relation to the proposed open space network. Or, if the intention is to retain the vegetation, potentially within an environmental covenant. Council officers noted that the proposed area of Open Space in the north-eastern corner of the lot would be suitable as Open Space, as it can provide lawful access to the riparian section of Emerald Creek.

A meeting was held with SARA on the 21 May 2022. The State Government noted that they (Dept Resources) "have moved away from covenants". Noting that a vegetation management plan (VMP) could be a way to condition the development (see attached SARA email). With SARA officers noting that the areas of vegetation to be retained to be reflected in a Vegetation management plan (VMP) would need to be included in its own allotment(s) to be held by Council or the Applicant.

As a result of this position from the Assessment Manager and feedback from SARA we have further amended the layout. These changes result in 3 lots (Lot 900, 901 and 903) containing the proposed areas of remnant vegetation to be held by the applicant and identified in a future VMP from SARA. With proposed lot 904 being divested to Council to be incorporated into a Reserve for Open Space. As a result of the re-design of the layout 20 of the proposed 49 lots are under 2ha in size. However, its considered that the lots are still of a suitable size and dimension to satisfy the purpose of the Zone Code.

Item 1 - Water Infrastructure -

Please provide an engineering report, prepared by a Registered Professional Engineer of Queensland (RPEQ), demonstrating how the development is proposed to be serviced by Councils reticulated water supply infrastructure. In particular, the report should investigate the anticipated water supply demand generated by the development and investigate the proposed points of connection with Council's existing water supply network/s, ensuring this existing infrastructure is at a capacity capable of servicing the proposed development.

If any upgrades to Council's existing network are required to service the development, these should be clearly identified in the engineering report.

Applicants Response:

Our clients have engaged GHD to undertake a Water Network Modelling Analysis, seeking to address Council's RFI items in relation to reticulated water supply infrastructure. The report demonstrates that: *"Mareeba's water supply network is not anticipated to be adversely impacted by the inclusion of the proposed Emerald Creek Heights Estate development, as the existing water infrastructure was simulated to have sufficient capacity to service the expected loads of the new proposed development"*

Recommending that:

"A new water main of minimum 150mm size should be constructed along the Godfrey Road Land Parcel adjacent the development to service the proposed lots. This main is proposed to tap into the existing network at the DN300 Emerald End Road main adjacent Lot Plan 10SP211136". The full study including modeling, attachments and recommendations is attached.

It's noted that the Analysis suggests that:

"As part of the development's Operational Works Approval application that water network modelling be performed to determine the requirement of any booster pump or pumps, to service lots within the proposed estate. These investigations should investigate water quality and hydraulic considerations". It's considered that this recommendation is an appropriate condition of approval.

Item 2 – Bushfire Hazard –

The subject site contains land within both the medium potential bushfire intensity area and potential impact buffer (100 metres). In recent years, land in the proximity to the subject site has been affected by bushfire.

Please provide a detailed Bushfire Management Plan, prepared by a suitably qualified professional demonstrating compliance with PO3 and AO3.2 of the Bushfire hazard overlay code. The Bushfire Management Plan should address, in particular, whether the building envelopes included on the proposal plans are large enough and whether they will need to be fully cleared in order to comply with AO3.2.

Applicants Response:

Please find attached a Bushfire Hazard Assessment and Management Plan completed by Firecraft Environmental. It's noted in the new staging and layout plan 401302 ST-01 E that building envelopes are no longer proposed, with the sites likely to be cleared by future owners. The Bushfire Management Plan (BMP) has demonstrated compliance with PO3 of the code in that: the site can be developed, resulting in a lower bushfire risk to the future residents, reduce the risk to neighbouring properties, is responsive to the nature and extent of the risk and facilitates efficient emergency access to buildings for fire fighting appliances.

Item 3 – Traffic Impact Assessment -

Please provide a Traffic Impact Assessment, prepared by a Registered Professional Engineer of Queensland (RPEQ) investigating the existing road network proposed to service the development, in particular the intersection of Godfrey Road and the Kennedy Highway. The Traffic Impact Assessment should calculate the daily vehicle movements likely to occur at the intersection as a result of the development, inclusive of predevelopment vehicle movements, and the ability for the intersection in its current form to safely accommodate thee anticipated vehicle movements.

The Traffic Impact Assessment should identify any required or recommended upgrades to the intersection where applicable and include plans of any such upgrades.

Applicants Response:

A Traffic Impact Assessment was undertaken by GHD seeking to review and address the RFI items in relation to traffic impacts. As a result of their review, it was decided to change the proposed development site access from Godfrey Road via the Kennedy Highway to Godfrey Road via Emerald End Road. This was due to the intersection at Godfrey Road and the Kennedy Highway requiring significant augmentation, upgrades as well as likely land acquisitions.

The Assessment notes that *“This traffic impact assessment has identified that the proposed intersection on Emerald End Road and Godfrey Road will function at a high level for the forecasted 2033 traffic demands of local traffic as well as the estimated development generated traffic”.*

Also, “It is, therefore, concluded that the traffic generated by the new development is not impacting the performance of the local road network significantly.

The Kennedy Highway continues to operate at a high level of service at this intersection at the 2033 horizon, however, the analysis is indicating that the minor road legs of the Hastie Road and the Kennedy Highway intersection has very low level of performance due to the growth in traffic on the Highway. An analysis using intersection traffic counts would be required to confirm any potential performance issues.

Therefore, it can be concluded that the proposed development for the reconfiguration of Lot 219, will have negligible impact on the current and future, safety, and efficiency of the existing local road network” .

The assessment notes that: “Following the development approval, detailed design will be undertaken to confirm the road and intersection upgrades to formalise Godfrey Road as the primary access. The road formation for the existing roads and the Godfrey Road are to be accordance with FNQROC Design Manual (2019) as per Table D1.1 a) Road hierarchy classification as Residential Street with corresponding catchment size of 0 – 90 dwellings. b) Reserve width should be 16.5 m. c) Sealed width 7.5 m with 4.5 m verge width. d) Design speed 60 kmh. Based on a preliminary review of planning and road design guidelines, the following intersection requirements have been determined:

The intersection upgrade is assumed to be in accordance with FNQROC Design Manual (2019) as per Table D1.1. and AustRoads Guide to Road Design Part 4: Intersections and Crossings-General: – Intersection should reflect adjacent similar intersection of same zoning type, rural residential (Refer to Figure 2). – An unsignalised T-intersection. – Basic turn treatments for left and right turn in and out of the development (Figure 3). Its suggested that this can be utilised to form an appropriate condition of approval that detailed design be carried out as part of an Operational Works Approval.

Its considered that the above and attached addresses the matters contained in Councils Request for Information. It’s requested that Council continue in its assessment the application considering this additional information. Should you require any further information or assistance in relation to this manner, please don’t hesitate to contact James McPeake on 0481 869 671 or via email at james@jamesmcpeake.com.au

Yours sincerely,

James McPeake Bplan, UDIA
Planning Manager

Attached:

- Staging and layout plan 401302 ST-01 E
- Emerald Creek Heights Water Network Modelling Analysis, 14 April 2022, GHD, REF-12569173
- Bushfire Hazard Assessment and Management Plan, Firecraft Environmental, June 2022.
- Traffic Impact Assessment, Emerald Creek Heights – Development Application, 29 March 2022, GHD, Ref – 12569173
- SARA meeting dot points email, 29/04/2022.
- Council amended layout meeting discussion points Email, 05/04/2022
- Council RFI



ROAD

EMERALD CREEK

RP735870

Fire Buffer (20.0m Wide)

200 SP323217

100 SP306259

100 SP206170

Fire Buffer (20.0m Wide)

1 SP206170

- STAGE 1 (18 Lots)
- STAGE 2 (14 Lots)
- STAGE 3 (17 Lots)
- OPEN SPACE
- FIRE BUFFER

Godfrey Road, Mareeba
For
Emerald Creek Heights Pty Ltd

IMPORTANT NOTES:
(These notes are an integral part of this plan) This plan has been prepared for Emerald Creek Heights Pty Ltd for the purposes of subdivision. It is not to be used by any other person or corporation or for any other purposes. The Contours, boundaries, creek line, flood lines, building locations have all been scaled and should not have any reliance based on them as they are only intended as a general guide. The configuration of allotments shown on this plan is subject to Local Authority (and relevant State Government Authority) approvals, detailed design, final survey, and registration of survey plans. Any comments contained on this plan should be confirmed by the relevant authorities. The dimensions, areas and total number of lots shown hereon are subject to field survey and also to the requirements of Council and any other authority which may have requirements under any relevant legislation. In particular, no reliance should be placed on the information on this plan for any financial dealings involving the land.
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Data Sources	Survey
Cadastral Boundaries	Survey
Contours / Topographic	Survey & QLD Lidar
Aerial Images	Near Map
Town Planner	



Issue	Revisions	Date	Drawn
E	Amend Lots & Open Space	14.06.2022	TL
D	Amend Lots & Open Space	27.05.2022	KL
C	Amend Lots & Open Space	13.05.2022	KL
B	Order of Stages	24.08.2021	KL
A	Original	17.08.2021	KL

Locality:	MAREEBA
Local Authority:	MAREEBA SHIRE
Projection:	GDA 2020
Horizontal Meridian:	MGA Zone 55
Vertical Level Datum:	AHD
Level Origin:	*
Scale:	1:5000 @ A3
Surveyed:	*
Designed:	SB 15.06.2021
Drawn:	KL 27.05.2022
Checked:	BW 27.05.2022
Plot Date:	14 Jun, 2022
Computer File Ref:	401302 ST-01 Rev E.dwg

Staging Plan
Lot 219 on NR378

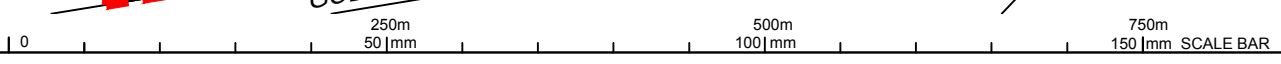
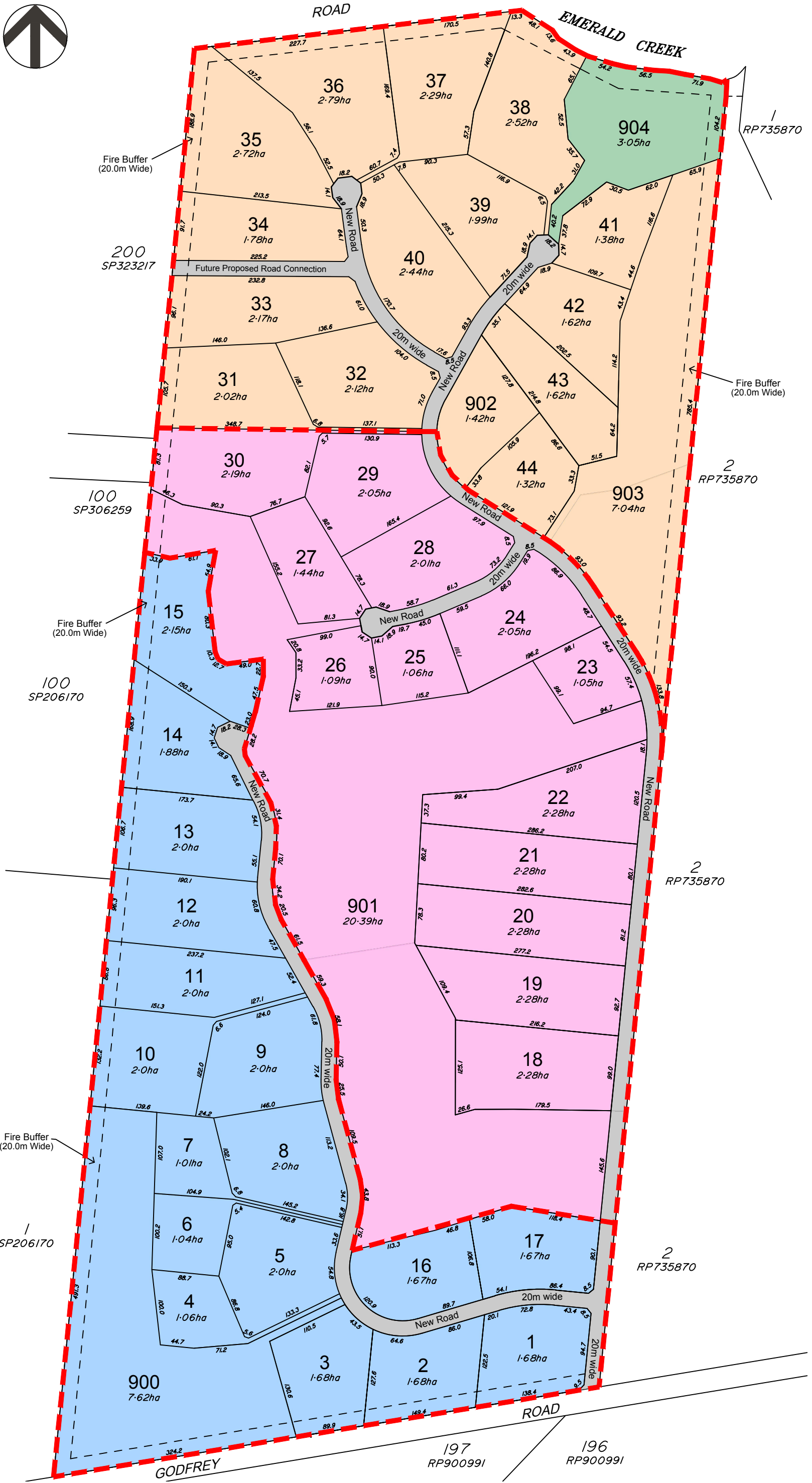


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Drawing No	Issue
401302 ST-01	E



Your ref: RAL/21/0016
Our ref: 12569173

14 April 2022

Andre de Wit
Emerald Creek Heights Pty Ltd
53-55 James Cook Dr
Kewarra Beach
QLD 4879

Emerald Creek Heights Water Network Modelling Analysis

Dear Andre,

1. Introduction

Emerald Creek Heights Pty Ltd have submitted a Development Application (DA) to Mareeba Shire Council (Council) for a proposed development, being a 49-lot subdivision adjacent the Godfrey Road Land Parcel in Mareeba (LotPlan 219NR378). Council have subsequently reviewed the application and as part of the Confirmation Notice, require additional information to appropriately assess the DA. The required information regarded investigation into water infrastructure and traffic impacts. GHD was engaged by Emerald Creek Heights Pty Ltd to investigate the following Request for Information (RFI) as provided within Council's Confirmation Notice.

1. Water Supply Investigation Report

- a. *Please provide an engineering report, prepared by a Registered Professional Engineer of Queensland (RPEQ), demonstrating how the development is proposed to be serviced by Council's reticulated water supply infrastructure. In particular, the report should investigate the anticipated water supply demand generated by the development and investigate the proposed points of connection with Council's water supply network, ensuring this existing infrastructure is at a capacity capable of servicing the proposed development.*

If any upgrades to Council's existing network are required to service the development, these should be clearly identified in the engineering report.

This report addresses the RFI by providing an assessment of the impact of the proposed development on the wider Mareeba water supply network. The report also outlines the tapping point of the new watermain and provides commentary of the minimum pipe size along the Godfrey Road Land Parcel adjacent the development. The traffic impact assessment will be addressed in a separate report.

The proposed subdivided lot layout, current zoning and Council confirmation notice is attached for reference in Appendix A, Appendix B and Appendix C respectively.

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1.1 Scope and limitations

This report: has been prepared by GHD for Emerald Creek Heights Pty Ltd and may only be used and relied on by Emerald Creek Heights Pty Ltd for the purpose agreed between GHD and Emerald Creek Heights Pty Ltd as set out in Section 1 of this report.

GHD otherwise disclaims responsibility to any person other than Emerald Creek Heights Pty Ltd arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described throughout this report. GHD disclaims liability arising from any of the assumptions being incorrect.

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GHD has prepared this report on the basis of information provided by Emerald Creek Heights Pty Ltd and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

2. Existing network model

GHD was provided with Council's most recent hydraulic model of the Mareeba water supply network which was understood to be representative of the current network performance under a peak day. Council confirmed that the model was suitable for the analysis to be undertaken.

An initial model simulation was run in its provided state with resulting areas of pressure deficiency reviewed with Council to ensure said deficiencies were expected. A table outlining said deficiencies is provided below (Table 1) with areas shown in Figure 1 below.

Model reference: EPANET model "20210614_1530_Mba_Water"

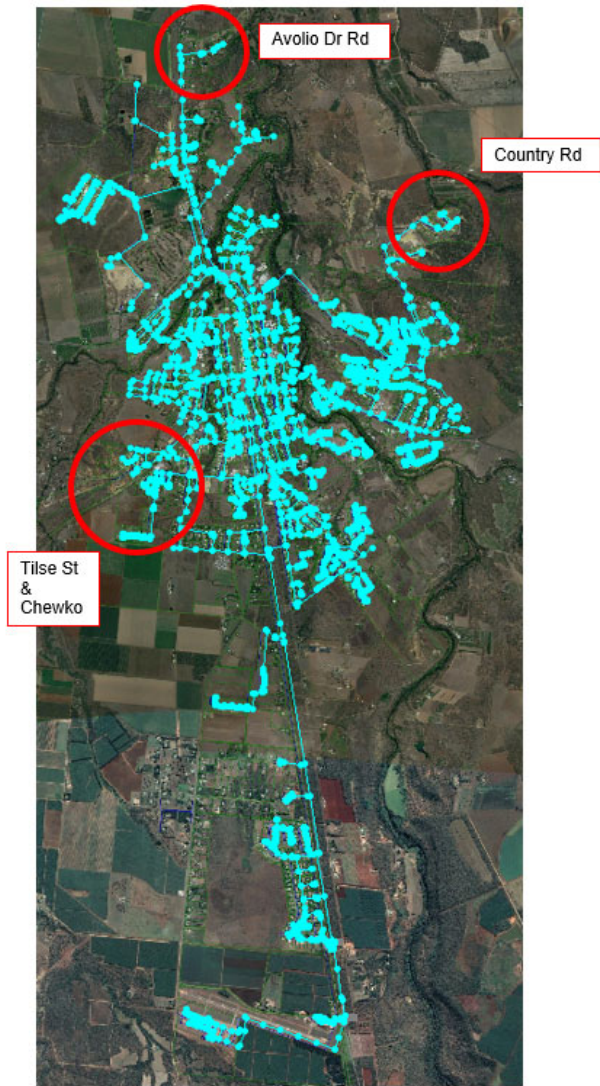
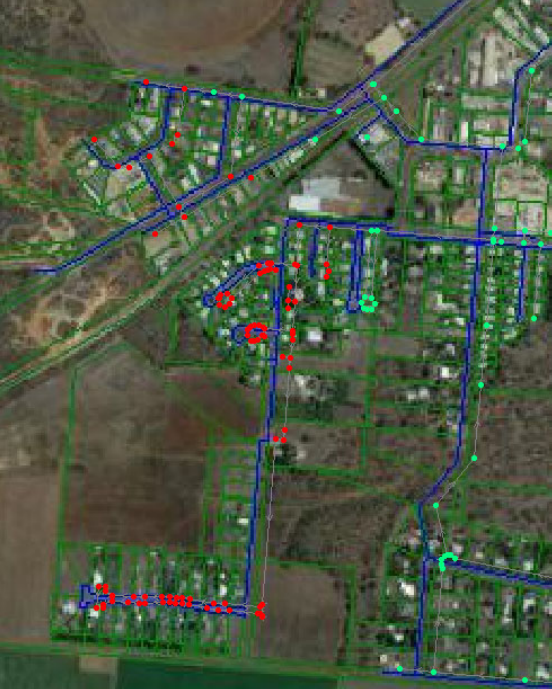




Figure 1 Existing Mareeba network model

Table 1 Existing areas of deficiency

Street Name	Minimum Pressure	Model	Council Comments
Tilse St & Chewko Rd	< 20 m		Area is within a separate water supply zone to the proposed development.
Avolio Dr	< 5 m		Area is within a separate water supply zone to the proposed development.
Country Rd	20 - 22 m (marginal)		Recent development – requires booster pumps.

3. Emerald Creek Heights demand analysis

3.1 Design basis

To determine demand for the proposed Emerald Creek Heights Estate, guidance from the Mareeba Shire Planning Scheme and FNQROC Guidelines were utilised. Specifically, the following parameters were adopted (see Table 2 below).

Table 2 Demand Parameters

Parameter	Value	Basis
Unit demands (lots > 1500 m ²)	4 EP/lot (rounded up from 3.7 EP/lot as per discussion with Council)	FNQROC
Average Daily Consumption and Peaking Factors	Average Daily Consumption (AD) – 500 L/EP/day Mean Day Max Month (MDMM) – 1.5 x AD Peak Day (PD) – 2.25 x AD Peak Hour (PH) – 4.5 x AD	FNQROC
Required Fire-fighting Flow and residual pressure	15 L/s for 2 hours (residential) 12 m residual pressure at node, 6m elsewhere.	Table 4.4.1 in Planning Scheme FNQROC
Background network demand under fire-fighting events	2/3 x PH + 15L/s Fire-fighting Flow	FNQROC
Minimum residual pressure (normal operation)	22 m minimum residual pressure	FNQROC
Maximum pressure	60 m maximum pressure	Table 4.4.1 in Planning Scheme
Hazen Williams Roughness Coefficient	140	Pipe specification

3.2 Demand calculation method

Utilising parameters outlined in Table 2, total demand was derived using the following method:

1. Review of the lot sizes to determine unit consumption rate. All lots in the proposed development were found to fall within the > 1500 m² category and were assigned a unit demand rate of 4 EP/lot. Lots assigned as open space were also assigned a unit demand rate of 4 EP/lot to allow for irrigation.
2. A consumption rate of 500 L/EP/day was applied to derive an average day demand per lot in L/s.
3. Demands were summated for the whole Estate to formulate a total average day demand.
4. MDMM, PD and PH demands were derived according to the peaking factors outlined in Table 2.
5. A maximum design demand was calculated considering fire-fighting demands.

The calculated demands for the Emerald Creek Heights Estate is summarised in Table 3 below.

Table 3 Calculated demand summary

Parameter	Demand (L/s)
AD	1.3
MDMM	1.9
PD	2.9
PH	5.8
2/3 x PH + 15 L/s fire-fighting	18.9

3.3 Demand location

The proposed subdivision is approximately 1 km from the nearest network trunk main (along Emerald End Rd). To simulate network performance following addition of the proposed lots, a new pipe and node were added into the hydraulic model (see Figure 2, red). A new main of approx. 1260m is proposed to be constructed along the Godfrey Road Land Parcel adjacent the development to service the proposed lots. Indicatively, the new main is proposed to be tapped into the existing network at the DN300 Emerald End Road main adjacent LotPlan 10SP211136.

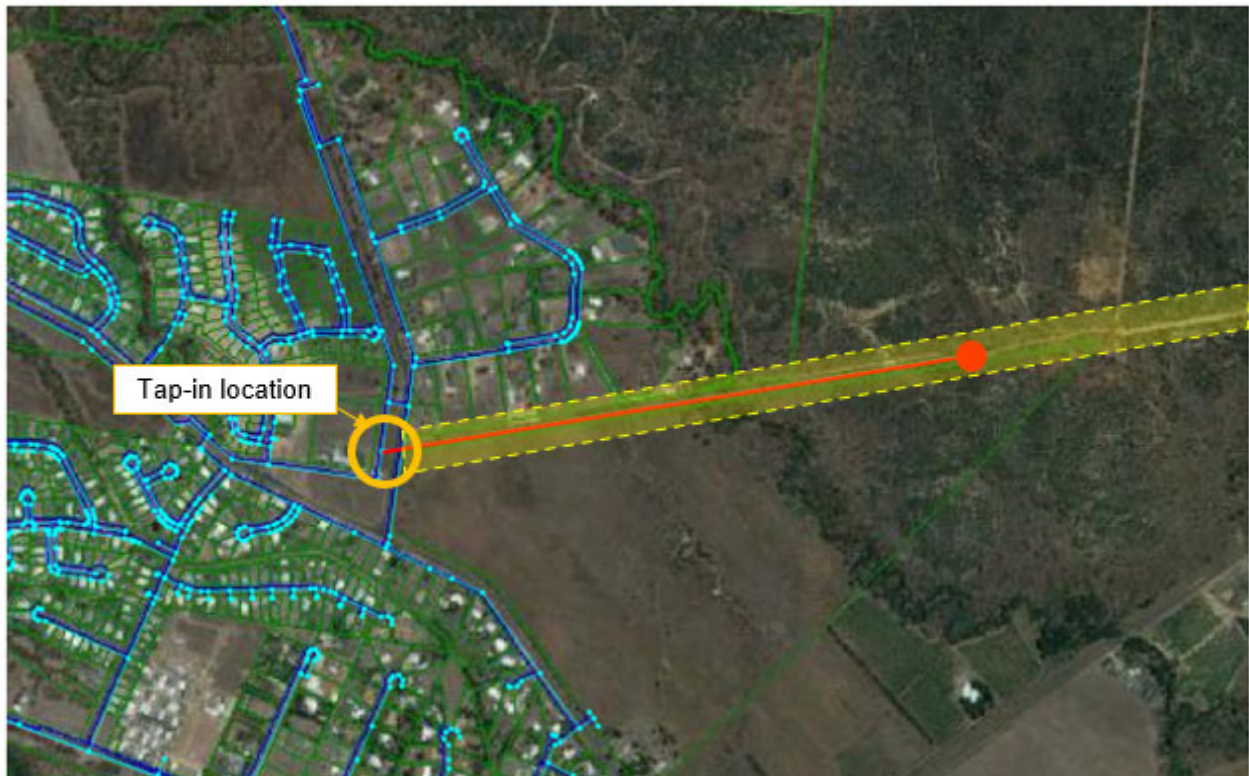


Figure 2 New infrastructure

The new 1260 m section of pipe (ID – ECH_Estate) was initially modelled as a 150mm size, connecting into the existing DN300 Emerald End Rd main. A new demand node representing the tapping location of the new development into the new Godfrey Road Land Parcel main (ID – ECH_Estate) was set to an elevation of 407 m (as per Google Earth desktop assessment of elevation). The PH demand of 5.8 L/s was applied as a static demand at this node.

It is noted that this report addresses the impact of the proposed development on the wider Mareeba water supply network only. The servicing strategy to supply the proposed estate is outside the scope of this assessment.

Topographic contours of the proposed development area are shown in Figure 3.

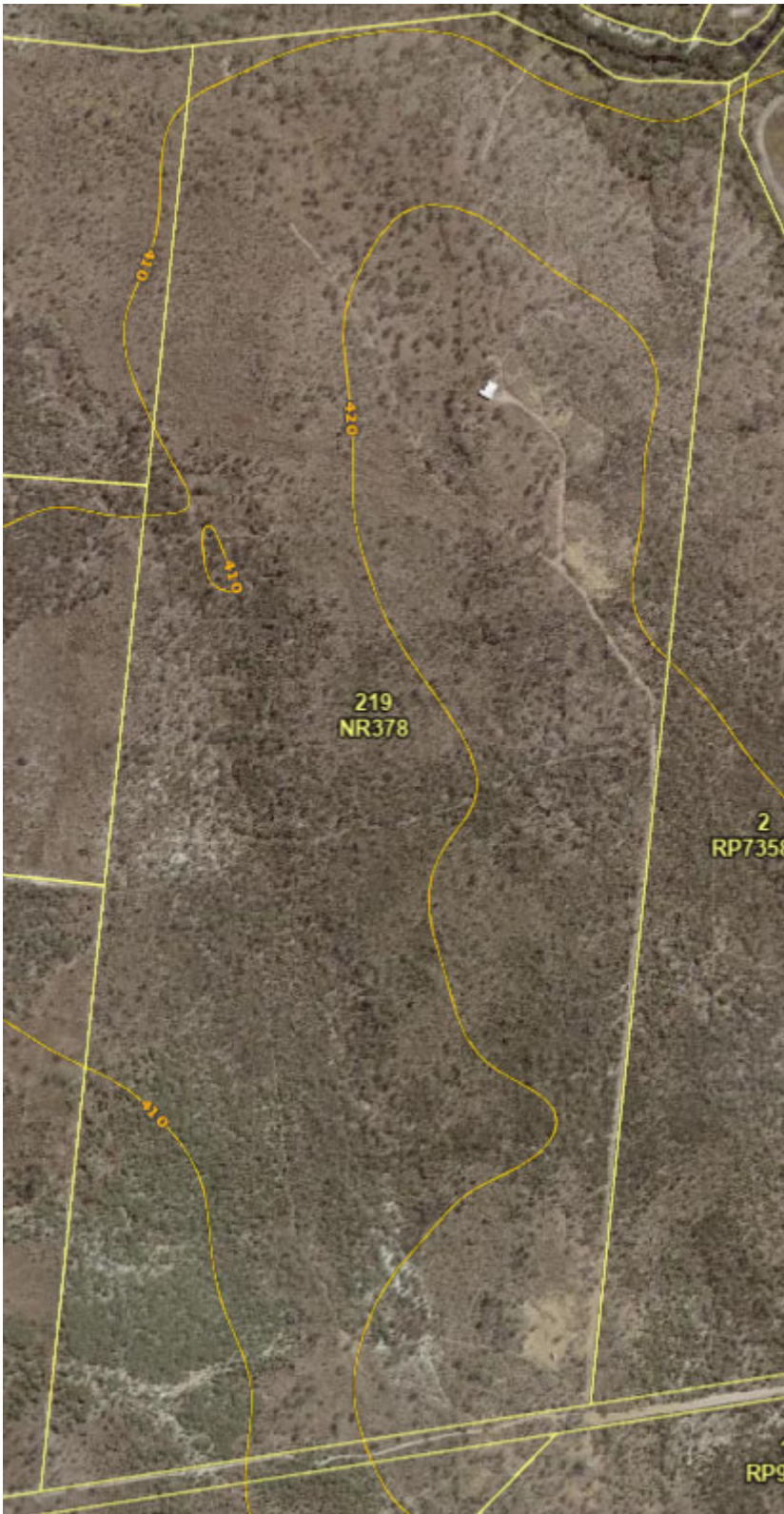


Figure 3 Proposed Development 10 m Contours (Extracted from Queensland Globe)

4. Network model analysis

4.1 System performance analysis

Simulations were run for both PH and PH + FF scenarios to determine the impact that the Emerald Creek Heights Estate had on the surrounding Mareeba water network. Specifically, minimum pressures in the network were investigated both with and without the proposed development.

4.1.1 Peak hour demand scenario

Table 4 shows locations and timesteps where minimum residual pressures fall below 22 m that were not present in the base model. Note the following legend applies:

- Pressures below 22 m (red)
- Pressures above 22 m (green)

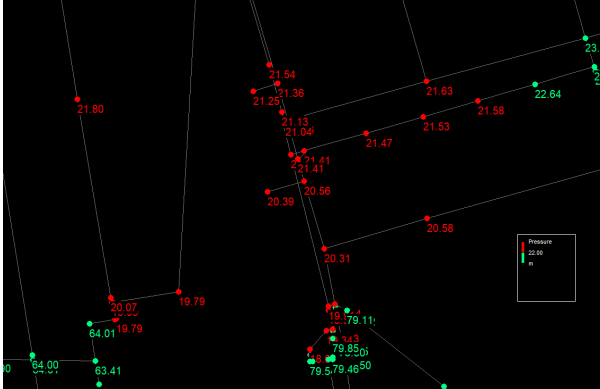
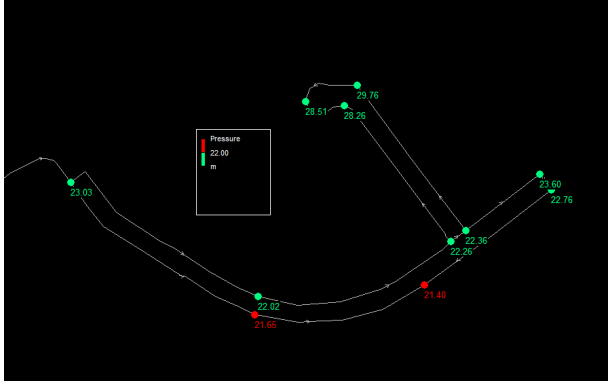
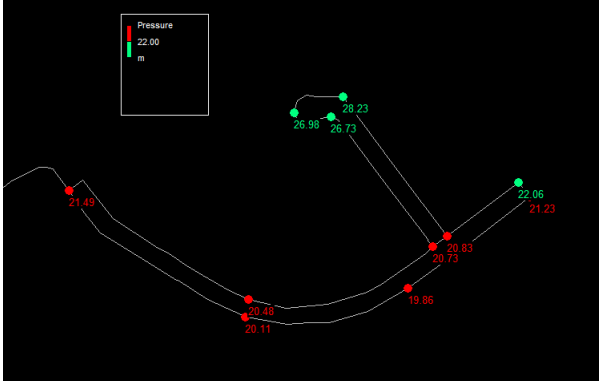
Low pressures experienced at nodes without demands allocated are excluded from this analysis.

The results at these locations were discussed with council as follows:

- Country Road is believed to be/going to be supported by a booster pump station.

Slightly lower pressures in Byrnes St and Michelina Close were not considered to be of concern as low pressures were observed in only a single 15-minute timestep and are only marginally below the 22m minimum service level requirement.

Table 4 PH Minimum Pressure Areas

Base model (<22 m)	PH Demand (<22 m)
<p>No existing low pressure issues found in base model.</p>	 <p>Timestep - 0500 hrs (Byrnes St) – occurs for a single timestep (15 minutes)</p>
 <p>Timestep – 1800 hrs (Country Rd)</p>	 <p>Timestep – 1800 hrs (Country Rd)</p>

4.1.2 Fire flow demand scenario

No areas in the network fell below 12 m pressure as a result of the addition of the Estate's fire-fighting demand.

4.1.3 Summary

The hydraulic modelling analysis indicates that the addition of the proposed development has minimal impact on the Mareeba network, as the existing water infrastructure was simulated to have sufficient capacity to service the expected loads of the new proposed development.

4.2 Pipe sizing

An analysis was undertaken to determine the minimum pipe size along the Godfrey Road Land Parcel to service the proposed development. The analysis considered:

- Whether booster pumping would be necessary to service the development;
- The minimum required pipe size to service the Emerald Creek Heights Estate;

These analyses were conducted under both PH and PH + FF demand scenarios as per Table 5 and Table 6 below.

Table 5 Pipe Size Analysis – PH Demand

PH - 5.8 L/s @ minimum pressure timestep		
Pipe internal diameter (mm)	Peak velocity (m/s)	Minimum Residual Pressure at estate tapping location along the Godfrey Road Land Parcel (m)
100	0.74	17.1
150	0.33	23.8
225	0.15	24.7
300	0.08	24.8

Table 6 Pipe Size Analysis – FF Demand

2/3 PH + FF - 18.9 L/s @ minimum pressure timestep		
Pipe internal diameter (mm)	Peak velocity (m/s)	Minimum Residual Pressure at estate tapping location along the Godfrey Road Land Parcel (m)
100	2.41	0
150	1.07	11.2
225	0.48	19.3
300	0.27	20.3

The results show that as a minimum, a 150mm pipe size along the Godfrey Road Land Parcel is required to service the proposed Emerald Creek Heights Estate. A minimum residual pressure of 11 m is expected under the maximum demand condition considering fire flows.

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The exact servicing strategy to supply the proposed lots is outside the scope of this assessment. However, a preliminary review of the topography and proposed layout of lots indicates that a booster pump, or pumps, may be required to service lots within the proposed estate. It is recommended that further investigations identify the assets that will be required to supply the proposed lots. The further study should investigate water quality and hydraulic considerations.

5. Conclusion and Recommendations

To conclude, the Mareeba water supply network is not anticipated to be adversely impacted by the inclusion of the proposed Emerald Creek Heights Estate development, as the existing water infrastructure was simulated to have sufficient capacity to service the expected loads of the new proposed development.

A new water main of minimum 150mm size should be constructed along the Godfrey Road Land Parcel adjacent the development to service the proposed lots. This main is proposed to tap into the existing network at the DN300 Emerald End Road main adjacent LotPlan 10SP211136.

GHD recommends as part of the developments' Operational Works Approval application that water network modelling be performed to determine the requirement of a booster pump, or pumps, to service lots within the proposed estate. These investigations should investigate water quality and hydraulic considerations.

Regards



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Civil Engineer

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Appendix A

Lot Layout



ROAD

EMERALD CREEK

1 RP735870

200 SP323217

100 SP306259

100 SP206170

1 SP206170

1 SP206170

2 RP735870

2 RP735870




2 RP735870

GODFREY

197 RP900991

196 RP900991

ROAD

-  STAGE 1 (18 Lots)
-  STAGE 2 (16 Lots)
-  STAGE 3 (15 Lots)

Godfrey Road, Mareeba
For
Emerald Creek Heights
Pty Ltd

IMPORTANT NOTES:
(These notes are an integral part of this plan) This plan has been prepared for Emerald Creek Heights Pty Ltd for the purposes of subdivision. It is not to be used by any other person or corporation or for any other purposes. The Contours, boundaries, creek line, flood lines, building locations have all been scaled and should not have any reliance based on them as they are only intended as a general guide. The configuration of allotments shown on this plan is subject to Local Authority (and relevant State Government Authority) approvals, detailed design, final survey, and registration of survey plans. Any comments contained on this plan should be confirmed by the relevant authorities. The dimensions, areas and total number of lots shown hereon are subject to field survey and also to the requirements of Council and any other authority which may have requirements under any relevant legislation. In particular, no reliance should be placed on the information on this plan for any financial dealings involving the land.
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Data Sources
Cadastral Boundaries Survey
Contours / Topographic Survey & QLD Lidar
Aerial Images Near Map
Town Planner



B	Order of Stages	24.08.2021	KL
A	Original	17.08.2021	KL
Issue	Revisions	Date	Drawn

Locality: MAREEBA
Local Authority: MAREEBA SHIRE
Projection: GDA 2020
Horizontal Meridian: MGA Zone 55
Vertical Level Datum: AHD
Level Origin: *
Scale: 1:5000 @ A3
Surveyed: *
Designed: SB 15.06.2021
Drawn: KL 24.08.2021
Checked: BW 24.08.2021
Plot Date: 14 Sep, 2021
Computer File Ref: 401302 ST-01 Rev B.dwg

Staging Plan

Lot 219 on NR378



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Drawing No 401302 ST-01 Issue B



















Appendix B

Lot Zoning

LEGEND

Zones

-  Centre
-  Community Facilities
-  Conservation
-  Emerging Community
-  Industry
 -  A Trades and Services Precinct
 -  B General Industry Precinct
 -  C Heavy Industry Precinct
-  Low Density Residential
-  Medium Density Residential
-  Recreation and Open Space
-  Rural
-  Rural Residential
 -  A 4,000 Square Metre Precinct
 -  B 1 Hectare Precinct
 -  C 2 Hectare Precinct

Other Elements

-  Cadastral
-  Local Plan Boundary
-  Mareeba Shire Council Boundary
-  Watercourse

Information

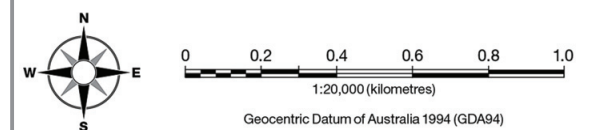
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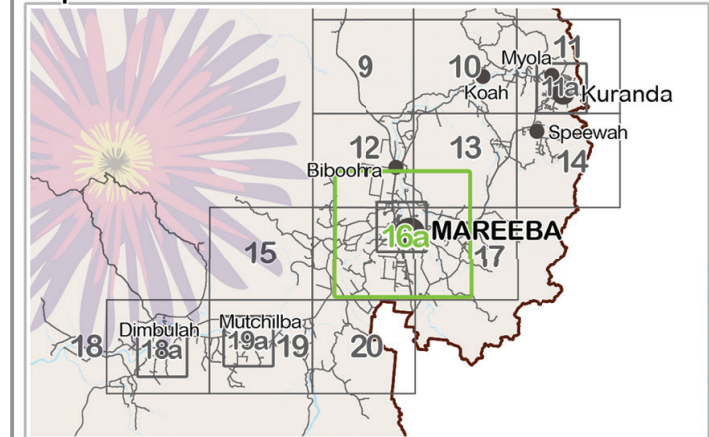
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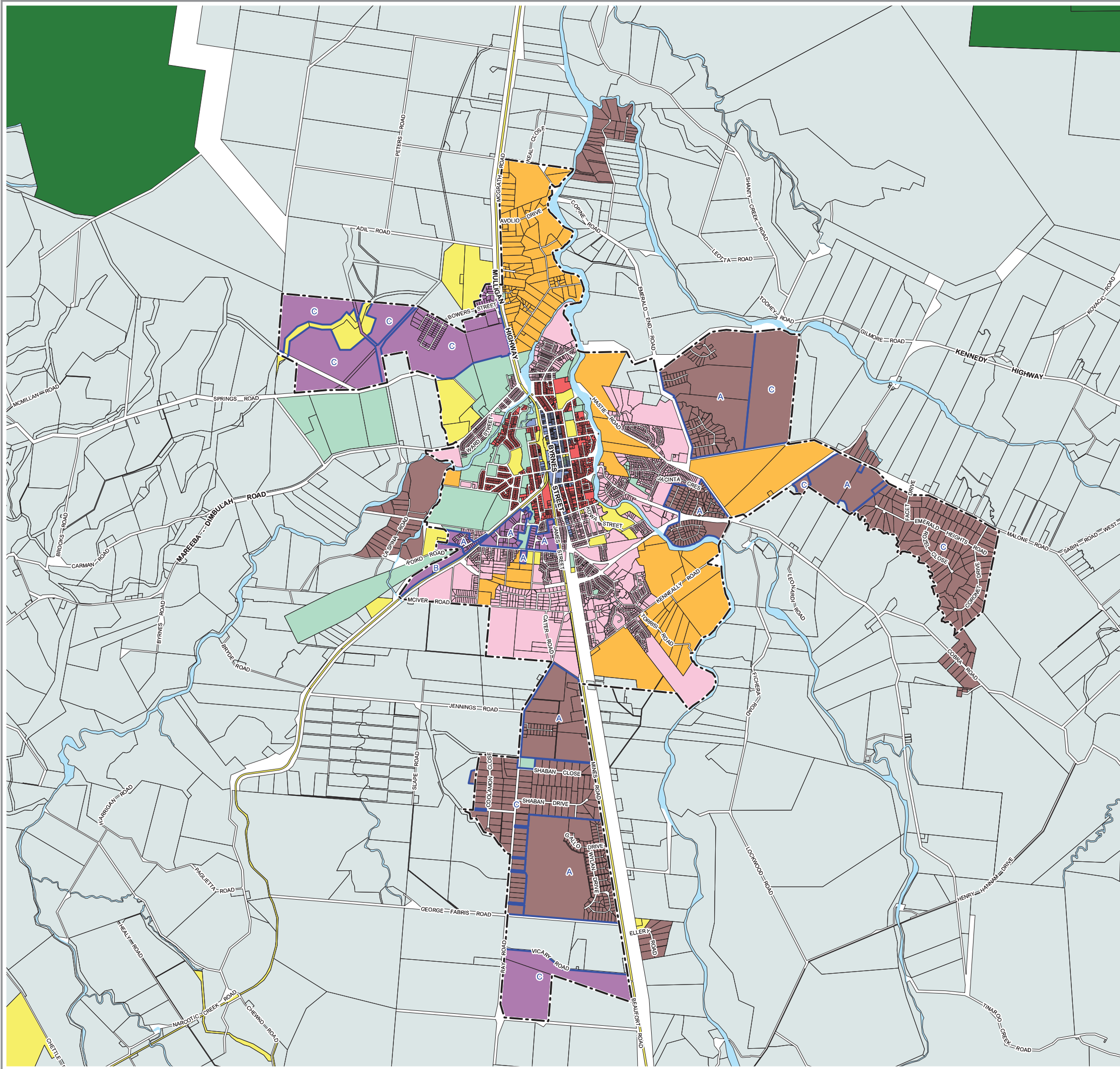


Map Index



Zone Map - Mareeba Surrounds

ZONE MAP - ZM016a



Appendix C

Confirmation Notice



29 September 2021

Council Officer: Carl Ewin
Direct Telephone: (07) 4086 4656
Our Reference: RAL/21/0016

Emerald Creek Heights Pty Ltd
C/- McPeake Town Planning
PO Box 5829
CAIRNS QLD 4870

Dear Applicants,

Confirmation Notice

Planning Act 2016

Council acknowledges receipt of your application, which was properly made on 16 September 2021.

This Confirmation Notice has been prepared in accordance with the Development Assessment Rules and contains information relevant to the processing and assessment of the application. The following details are confirmed:

APPLICATION DETAILS

Application No:	RAL/21/0016
Proposal:	Application for Development Permit for Reconfiguring a Lot - Subdivision (1 into 49 Lots)
Street Address:	Godfrey Road, Mareeba
Real Property Description:	Lot 219 on NR378
Planning Scheme:	Mareeba Shire Council Planning Scheme 2016

TYPE OF DEVELOPMENT

The application seeks development approval for:

- Reconfiguring a Lot - Subdivision (1 into 49 Lots)

SUPERSEDED PLANNING SCHEME

Is the application for development under the Superseded Planning Scheme? No

CODE ASSESSMENT

Will Code Assessment be required? Yes

The application will be assessed against the following assessment benchmarks:

- Rural residential zone code
- Agricultural land overlay code
- Airport environs overlay code
- Bushfire hazard overlay code
- Environmental significance overlay code
- Flood hazard overlay code
- Hill and slope overlay code
- Reconfiguring a lot code
- Landscaping code
- Parking and access code
- Works, services and infrastructure code

IMPACT ASSESSMENT

Will Impact Assessment be required? No

PUBLIC NOTIFICATION DETAILS

Is Public Notification Required? No

REFERRAL AGENCIES

Based on the information accompanying the lodged application, referral is required to the following referral agencies -

Reconfiguring a lot that is assessable development under s21		
<p>Development application for reconfiguring a lot that is assessable development under section 21, if—</p> <p>(a) a lot that the application relates to is 5ha or larger; and</p> <p>(b) the size of any lot created is 25ha or less; and</p> <p>(b) either —</p> <p>(i) the reconfiguration involves operational work that is assessable development under section 5, other than operational work that is only the clearing of regulated regrowth vegetation; or</p> <p>(ii) on any lot created, accepted operational work, other than operational work that is only the clearing of regulated regrowth vegetation, may be carried out</p>	<p>Schedule 10, Part 3, Division 4, Table 2</p>	<p>State Assessment & Referral Agency (SARA) PO Box 2358 Cairns QLD 4870</p> <p>CairnsSARA@dndmip.qld.gov.au</p>

In accordance with section 54(1) of the Planning Act, the applicant is required to give a copy of the application to all referral agencies within 10 days, or a further period as agreed between the applicant and the assessment manager, starting the day after the confirmation notice is issued.

INFORMATION REQUEST

Has the applicant advised on the approved form that the applicant does not agree to accept an Information Request? No

A further Information Request is made by the assessment manager, as detailed below:

1. Water Infrastructure

Please provide an engineering report, prepared by a Registered Professional Engineer of Queensland (RPEQ), demonstrating how the development is proposed to be serviced by Council's reticulated water supply infrastructure. In particular, the report should investigate the anticipated water supply demand generated by the development and investigate the proposed points of connection with Council's existing water supply network/s, ensuring this existing infrastructure is at a capacity capable of servicing the proposed development.

If any upgrades to Council's existing network are required to service the development, these should be clearly identified in the engineering report.

2. Bushfire Hazard

The subject site contains land within both the medium potential bushfire intensity area and potential impact buffer (100 metres). In recent years, land in proximity to the subject site has been affected by bushfire.

*Please provide a detailed Bushfire Management Plan, prepared by a suitably qualified professional demonstrating compliance with **PO3** and **AO3.2** of the Bushfire hazard overlay code. The Bushfire Management Plan should address, in particular, whether the building envelopes included on the proposal plans are large enough and whether they will need to be fully cleared in order to comply with AO3.2.*

3. Traffic Impact Assessment

Please provide a Traffic Impact Assessment, prepared by a Registered Professional Engineer of Queensland (RPEQ) investigating the existing road network proposed to service the development, in particular the intersection of Godfrey Road and the Kennedy Highway.

The Traffic Impact Assessment should calculate the daily vehicle movements likely to occur at the intersection as a result of the development, inclusive of pre-development vehicle movements, and the ability for the intersection in its current form to safely accommodate these anticipated vehicle movements.

The Traffic Impact Assessment should identify any required or recommended upgrades to the intersection where applicable and include plans of any such upgrades.

End of Information Request

In responding to the Information Request, *Development Assessment Rule 13* states: -

"13. Applicants Response

- 13.1 *The period for the applicant to respond to an information request is 3 months from the date the information request was made or a further period agreed between the applicant and the assessing authority that made the information request.*
- 13.2 *The applicant may respond by giving the assessing authority that made the information request, within the period stated under section 13.1 -*
- (a) all of the information requested; or*
 - (b) part of the information requested; or*
 - (c) a notice that none of the information will be provided.*
- 13.3 *For any response given in accordance with sections 13.2(b) or (c), the applicant may also advise the assessing authority that it must proceed with its assessment of the application.*
- 13.4 *An applicant must provide a copy of any response to an information request made by a referral agency to the assessment manager."*

PROJECT TEAM

The contact details of the project team for your application are provided below. Your primary point of contact for any general enquires regarding this application is the project manager.

Project Manager (Planning)

Carl Ewin

(07) 4086 4656

OTHER DETAILS

You can follow the progress of this application online at www.msc.qld.gov.au

Should you have any further queries in relation to the above, please do not hesitate to contact Council's Planning Officer, Carl Ewin on the above number.

Yours faithfully



**BRIAN MILLARD
SENIOR PLANNER**

Demand Calculation



Stage	Lot # (as per Appendix A)	Area (ha)	EP	L/s
1	1	2	4.0	0.023
	2	2.03	4.0	0.023
	3	2.2	4.0	0.023
	4	2.16	4.0	0.023
	5	2	4.0	0.023
	6	2.02	4.0	0.023
	7	2	4.0	0.023
	8	2	4.0	0.023
	9	2	4.0	0.023
	10	2	4.0	0.023
	11	2	4.0	0.023
	12	2	4.0	0.023
	13	2	4.0	0.023
	14	2	4.0	0.023
	15	2.07	4.0	0.023
	16	2	4.0	0.023
	17	2.02	4.0	0.023
	18	2	4.0	0.023
		Open Space	3.348	4.0

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Stage	Lot # (as per Appendix A)	Area (ha)	EP	L/s
2	19	2.08	4.0	0.023
	20	2.07	4.0	0.023
	21	2.09	4.0	0.023
	22	2.23	4.0	0.023
	23	2.14	4.0	0.023
	24	2.4	4.0	0.023
	25	2.56	4.0	0.023
	26	2.01	4.0	0.023
	27	2.05	4.0	0.023
	28	2.05	4.0	0.023
	29	2	4.0	0.023
	30	2	4.0	0.023
	31	2.02	4.0	0.023
	32	2.05	4.0	0.023
	33	2.19	4.0	0.023
	3	Open Space	0.8	4.0
0.89			4.0	0.023
10.12			4.0	0.023
34		2.02	4.0	0.023
35		2.13	4.0	0.023
36		2.41	4.0	0.023
37		2.02	4.0	0.023
38		2	4.0	0.023
39	2.2	4.0	0.023	
40	2.23	4.0	0.023	
41	2.48	4.0	0.023	

Stage	Lot # (as per Appendix A)	Area (ha)	EP	L/s
	42	2	4.0	0.023
	43	2.23	4.0	0.023
	44	2	4.0	0.023
	45	2	4.0	0.023
	46	2.02	4.0	0.023
	47	2.02	4.0	0.023
	48	2.06	4.0	0.023
	Open Space	1.217	4.0	0.023
		2.06	4.0	0.023
		2.509	4.0	0.023
2	49	2.01	4.0	0.023

Bushfire Hazard Assessment and Management Plan

Lot 219 on NR378 Godfrey Rd. Mareeba

For

McPeake Town Planning - on behalf of Emerald Heights Pty Ltd



firecraft

ENVIRONMENTAL

ABN: 58 376 019 759

Compiled by Jackie McLeod
Firecraft Environmental Pty Ltd.
ABN: 15 623 764 287
13th June 2022

Disclaimer -This report has been prepared solely for the use of McPeake Town Planning and Emerald Heights Pty Ltd (the clients) to provide to persons associated with the development application requirements of Lot 219 on NR378 Godfrey Road, Mareeba, Qld. Use by any other party is completely at the risk of that party. Neither Firecraft Environmental Pty Ltd nor any of its employees undertakes or accepts any liability in any way whatsoever to any party other than the above-mentioned clients, in respect of the data herein contained including any errors or omissions however caused.

In preparing this report we have assumed that all information and documents provided to us by McPeake and the client, were complete, accurate and current. Where we have obtained information from a government register or database, we have assumed that the information is current. The onus is on the applicant of the development to cross-reference this document with any conditions of consent issued by local Council or any requirements by Queensland Fire and Emergency Services following development approval.

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Executive Summary

Firecraft Environmental were engaged in September 2021 by McPeake Town Planning (McPeake), on behalf of Emerald Heights Pty Ltd (the client), to undertake a comprehensive Site-specific Bushfire Hazard Assessment and compile a Bushfire Management Plan for Lot 219 on NR378 Godfrey Road, Mareeba, Q. The site is approximately 140 hectares and located approximately 2.5 kilometers east of Mareeba township in the locality of Emerald Creek, in what could be described as a rural area.

The proposed development is a subdivision of 1 lot into 49 individual rural lots, for the purposes of a residential housing estate, is in a bushfire prone area under the local Mareeba Shire Council (MSC) Planning Scheme 2016 and State Planning Policy, 2017. This triggers the requirements for a Bushfire Hazard Assessment to determine the required setbacks and Asset Protection Zone distances between hazardous vegetation and building footprints to comply with MSC requirements. 44 of the 49 lots are to be developed and proposed to be 100% cleared of vegetation. 5 lots are to be retained by the proponent as undeveloped parcels of land supporting remnant vegetation. The development is planned to occur in 3 distinct stages.

A standardised 3-stage Bushfire Hazard Assessment (QFES, 2019) was used to undertake ground-truthing of statewide available mapping data and redefine Bushfire Prone Areas and Potential Fireline Intensity (PFI) mapping, with a particular emphasis on reviewing vegetation hazard classes (Regional Ecosystems classification and potential fuel loads) and vegetation extent. Site-specific assessments within 150 metres of site determined that vegetation on site generally followed with state-wide Regional Ecosystem data and Regulated Vegetation mapping.

Structural attributes and composition reflecting past grazing disturbance and altered fuels at all strata meant overestimation in canopy connectivity in some areas having implications for overestimated forest type vegetation extent, and underestimating woodland type presence, resulting in an overestimation of potential fuel loads and thus PFI. In contrast risk is underestimated in the vegetation classified as 'Regrowth' with these areas supporting a fuel load comparable with remnant vegetation. The results included recalculating and mapping PFI for Lot 219 with areas to the north of the property along Emerald Creek carrying a lower risk of 'Medium' PFI in areas previously mapped as 'High' PFI, and areas to the east and south on neighbouring properties carrying a higher risk of 'Medium' PFI in areas previously mapped as 'Potential Risk Buffer Zone'.

By proposing to clear 100% of developed lots in the layout, opportunity for adequate building footprint set-backs are provided for each individual dwelling in this design to achieve the MSC requirement of a radiant heat flux no greater than 29kW/m² at the building footprint. Subsequent broad Bushfire Attack Level ratings are provided for the development. However, each individual lot will need to obtain a BAL rating at the design stage. While the vegetation within 150 metres of Lot 219 is predominantly 'medium' risk, past unplanned fire events impacting the site, fuel load dynamics, and fuel connectivity beyond this cannot be discounted.

Thus, the current layout design (Figure 8) allows for adequate access for emergency services, and asset protection zones to be provided throughout the estate throughout all development stages; through road networks, firetrails and fire buffers that are maintained to be free of standing vegetation and permanent structures. The general requirements for risk management at Lot 219 are included in a comprehensive Bushfire Management Plan in Section 4 of this document. With the encompassing risk mitigation measures implemented the retention of trees >300mm in diameter, and no more than 2 tree crowns connectivity are permitted on Lots 1-44 for ecological and amenity purposes.

1. Introduction

1.1 Proposed development

Firecraft Environmental were engaged in September 2021 by McPeake Town Planning (McPeake), on behalf of Emerald Heights Pty Ltd (the client), to undertake a comprehensive Site-specific Bushfire Hazard Assessment and compile a Bushfire Management Plan for Lot 219 on NR378 Godfrey Road, Mareeba, Q.

This document has been prepared in support of the development application RAL/21/0016 for this site and in accordance with Mareeba Shire Council (MSC) requirements for reconfiguring a lot – Subdivision of 1 lot into 49 individual rural lots for the purposes of a residential housing estate. The property is identified as being in a bushfire prone area under the local Mareeba Shire Council Planning Scheme 2016 and State Planning Policy, 2017.

This report provides results of the outcomes of the bushfire hazard assessment in accordance with accepted methodology guidelines, outlines local known fire history and risk, and provides subsequent Bushfire Attack Level (BAL) rating and bushfire risk mitigative measures.

1.2 Site description

The site is approximately 140 hectares and located approximately 2.5 kilometers east of Mareeba township in the locality of Emerald Creek, in what could be described as a rural area (Figure 1). The Kennedy Highway is <650 metres to the south. The site is nestled between two permanent watercourses, Emerald Creek running just north of the northern property boundary, and Cobra creek to the south. Two minor watercourses and overflows are present on site.

Areas sharing a boundary with Lot 219 are largely undeveloped freehold land supporting the same vegetation types of 'mixed woodland and 'open woodland', and previously cleared vegetation. A more detailed description of vegetation on the property and surrounding areas are provided in section 3.2 below. Areas beyond this are predominantly primary producer farmland. Farmland to the north, east and south extend to the foothills of Bilwon Forest Reserve, Davies Creek – Dinden National Park and Danbulla West Forest reserve where frequent planned and unplanned fire episodes occur.

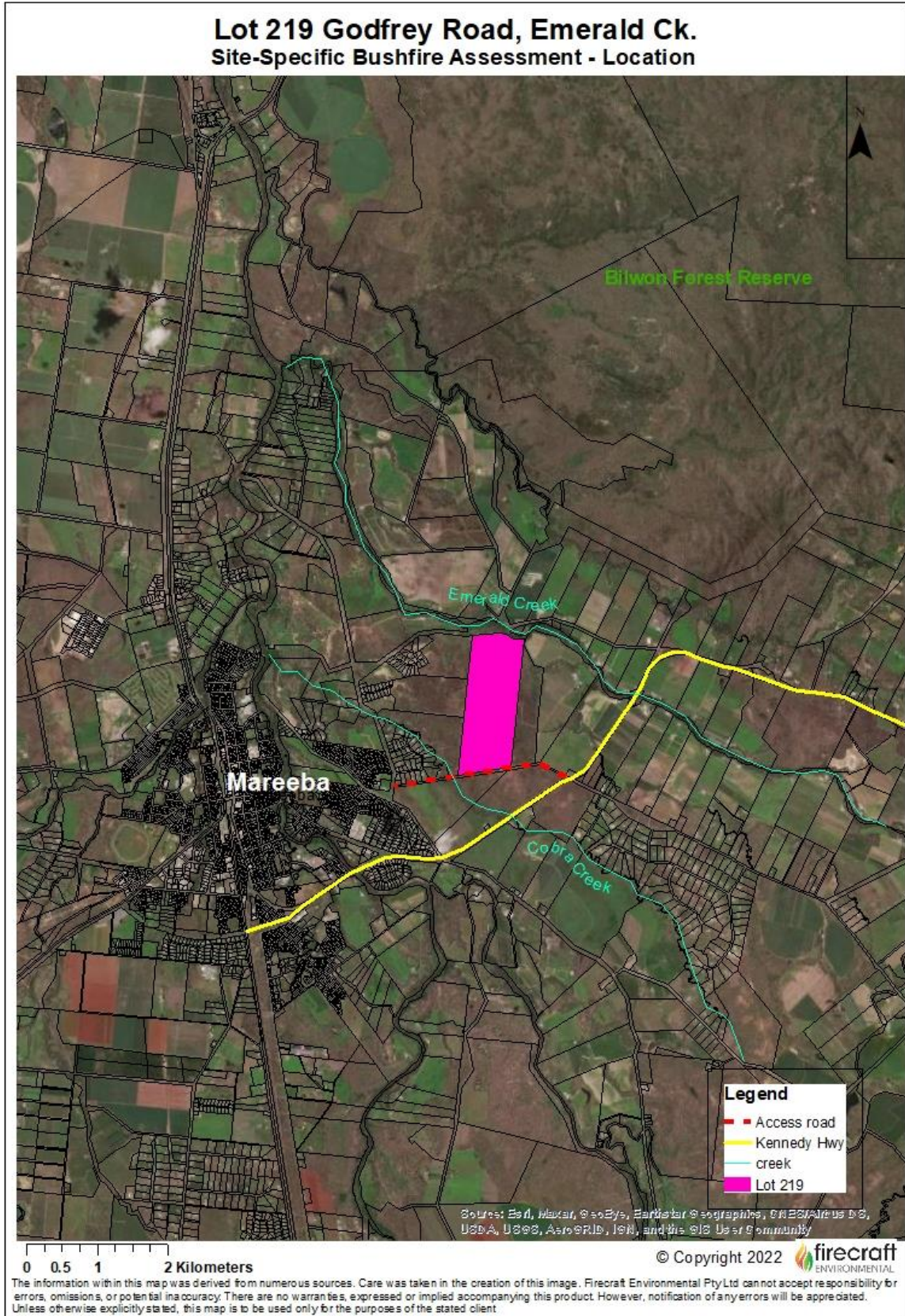


Figure 1 Map of Lot 219 Godfrey Road and surrounding areas

Key Aspects of the proposal include:

- 44 individual lots (Lot 1 to Lot 44) between approximately 1-2 hectare lots in size
- 4 discrete undeveloped areas supporting native vegetation, totalling 37, 267 hectares to be retained by the developer as 6 individual lot numbers (Lot 900 to Lot 905)
- 3 Stage development: Stage 1 = 17 lots, Stage 2 = 13 lots, Stage 3 = 14 lots
- Single road access to housing estate via new established road from the west and entrance to development in the south-eastern corner of Lot 219
- 4 x 20-metre-wide internal roads
- 6-metre-wide access handles for lots with no main street frontage
- 100% vegetation retention on undeveloped lots
- 100% vegetation removal on Lots 1-44.

Figure 2 shows the proposed development plan.

1.3 Scope

This report and plan reviews the reliability of the available data of local bushfire prone areas, by investigating any anomalies with mapping for the site, and determining a more accurate potential fire line intensity or required set-backs from residual vegetation and reference to a Bushfire Attack Level rating (BAL) rating. It provides recommendations for the proposed development to comply with legislative obligations for bushfire risk mitigation. It outlines broad ongoing mitigative measures for residual bushfire risk for the lots as a collective.

1.4 Out of Scope

The report does not include determination of precise Bushfire Attack Level (BAL) ratings at the individual lot level. All habitable structures within Stages 1-3 of the proposed development will require assessment against the Building Codes of Australia and *Australian Standard 3959:2018 – Construction of Buildings in a Bushfire Prone Area*.

Assessments on areas external to Lot 219 are based on current vegetation coverage fuel load conditions and do not factor in other proposed developments, land-use changes, vegetation clearing or installation of roads and tracks in accordance with other future developments in the area outside of the Lot 219 boundary that may be consequential to landscape-scale fire movement and risk. It does not include assessment of slope post-earthwork activity on site.

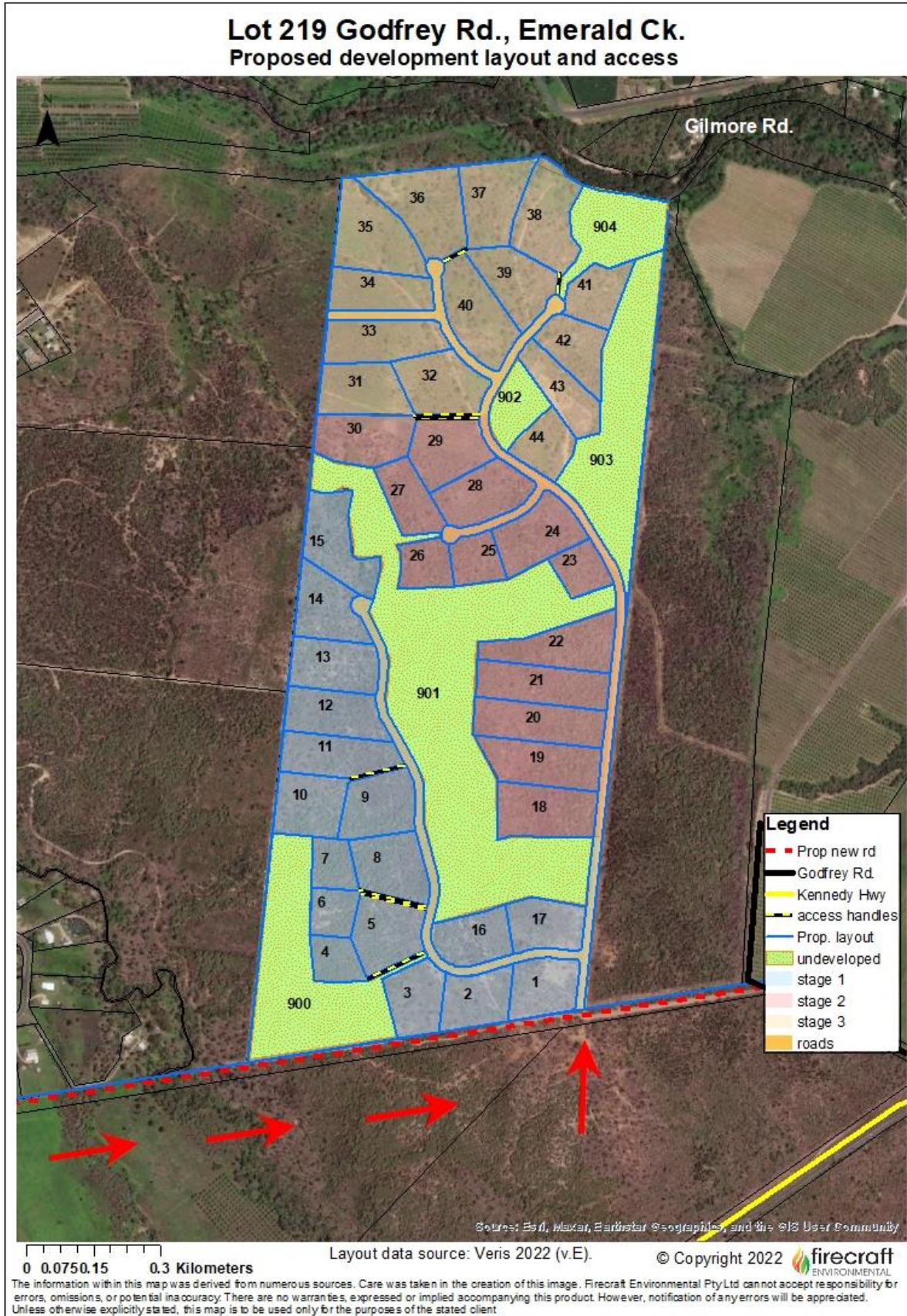


Figure 2 Proposed development layout Lot 219

2. Bushfire Regulatory framework

This section outlines the regulatory requirements associated with this assessment, and guidelines consulted.

2.1 State Planning Policy

The Queensland State Planning Policy (SPP) 2017 is a government planning instrument that sets out development assessment requirements and includes a state-wide map of Bushfire Prone Areas (BPA). A BPA is an area that is likely to support a significant bushfire or be subjected to significant impacts from a bushfire. The BPA is determined by potentially hazardous vegetation and the fire intensity expected, and subsequently the expected impacts on life and property. The expected impacts are described as fire-line intensity (difficulty to suppress fire) and are determined by the level of flame attack, radiant heat exposure, and ember attack, and smoke and heat exposure (Leonard et.al, 2014).

$$\text{Potential fuel load} \times \text{Maximum landscape slope} \times \text{fire weather severity} = \text{Potential Fire-Line Intensity}$$

From this delineation a series of baseline reference mapping overlays are created by using vegetation classifications and their potential fuel load, topography and the (Forest) Fire Danger Index for the area. The categories are described as:

- Very High Bushfire Intensity
- High Potential Intensity
- Medium Potential Intensity
- Bushfire Potential Impact Buffer

The methodology for state-wide mapping of BPA in QLD compiled by CSIRO (Leonard et. al. 2014, pp.9-12) describes the Vegetation Hazard Classes for Bushfire Prone vegetation and relatively consistent expected 'Potential Fuel Loads' for each class.

The key tools in devising the Potential Fuel Load are the **Regional Ecosystem (RE) data** (vegetation type) (DES, 2019) and **Overall Fuel Hazard Assessment (OFHA) Guidelines** (Hines et.al., 2010). Both tools are used in this assessment to classify vegetation on-ground. In addition, Queensland Fire and Emergency Services Vegetation Hazard Class tables are utilised.

Lot 219 is mapped as 'High BPA', 'Medium BPA' and 'Potential Impact Buffer' in accordance with SPP mapping (see Figure 3)

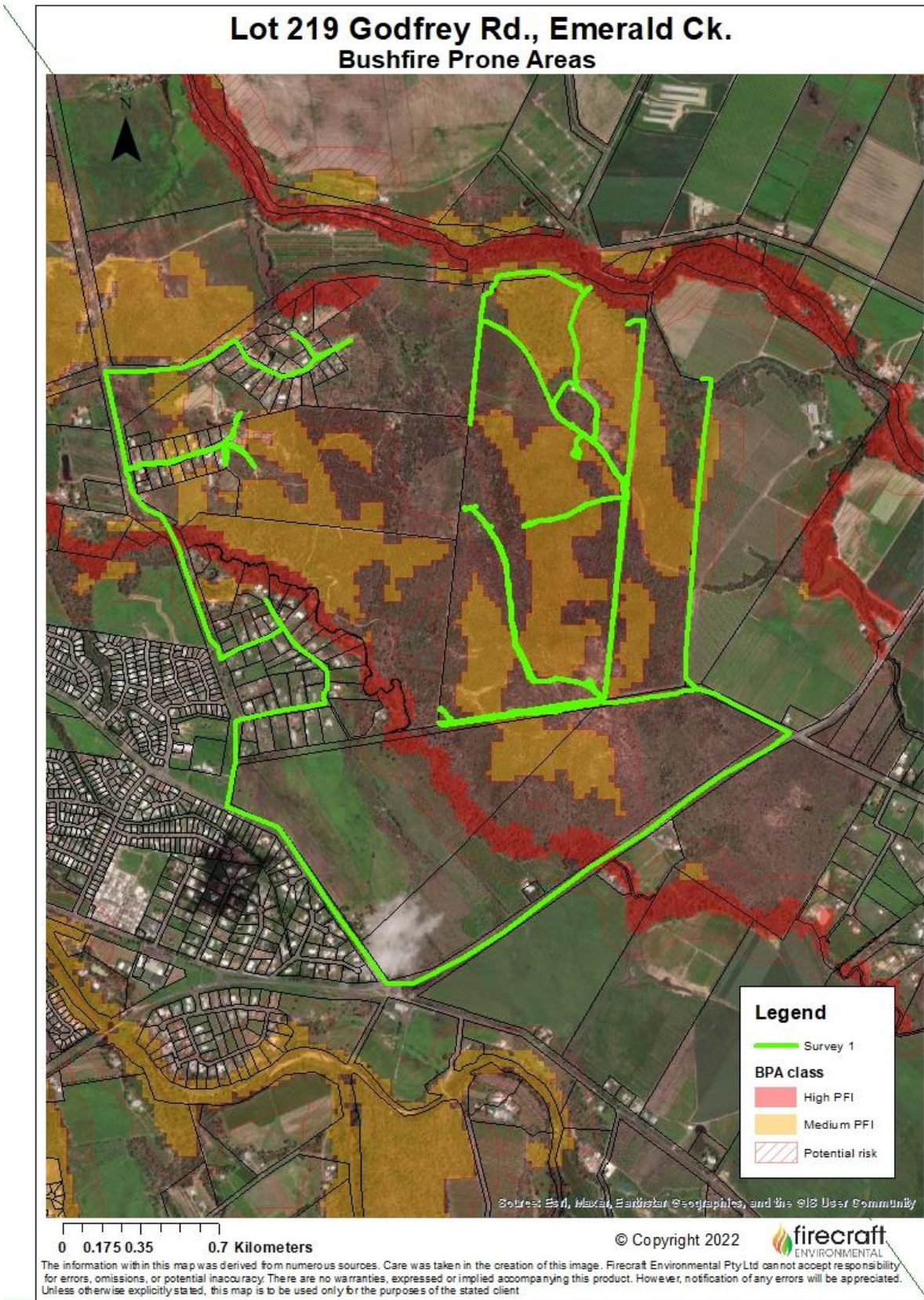


Figure 3 BPA on Lot 219 and surrounding areas

2.2 Local Council Planning Scheme

The Bushfire Overlay Codes under the SPP (2017) provide a standardised system for local governments to determine whether a development has implications for safety of people, property, and the environment. Properties deemed with Medium, High and Very High Bushfire Hazard ratings are considered ‘assessable’.

Subsequently ‘assessable’ developments, such as Lot 219, trigger requirements to satisfy ‘acceptable outcomes in Bushfire Overlay Codes by local council planning schemes.

Extract of the Mareeba Shire Council Planning Scheme 2016 Bushfire Overlay Codes compliance requirements and ‘Acceptable Outcomes’ for the development application under Section 8.2.3 (page 245):

Lot Design	
Performance outcomes	Acceptable outcomes
<p>P03 Reconfiguring a lot within a “Bushfire hazard area’ and “Potential impact buffer (100metres)’ identified on the Bushfire Overlay Maps (OM-003a-o) minimises the potential adverse impacts of bushfire on the safety of people, property and the environment through lot design that:</p> <p>(a) is responsive to the nature and extent of bushfire risk; and (b) allows efficient emergency access to buildings for fire-fighting appliances.</p> <p>Note – A bushfire hazard management plan must be prepared by suitably qualified persons in seeking to demonstrate compliance with the Performance outcome.</p>	<p>Where within a ‘Bushfire hazard area’ and ‘Potential impact buffer (100metres)’ identified on the Buhsfire hazard overlay maps (OM-003a-o)</p> <p>A03.1 No new lots are created</p> <p>Or</p> <p>A03.2</p> <p>All lots include a building envelope that achieves a radiant heat flux level of 29kW/m² at the perimeter of the building envelope.</p>

2.3 AS 3959:2018 Construction of Buildings in a Bushfire Prone Area

Having an assessable property and compliance requirements under local planning scheme overlay codes triggers the conformance to the Australian Standard (AS3959:2018) *Construction of buildings in bushfire-prone areas*. AS 3959:2018 specifies the requirements for the construction of buildings in bushfire prone areas in accordance with a determined Bushfire Attack Level (BAL). A BAL rating has implications for construction requirements for a development and are specified and addressed at the individual building design stage. Section 5 outlines the BAL ratings for the site.

2.4 Guidelines

Outcomes of the Bushfire hazard assessment inform the required set-backs and Asset Protection Zones required between buildings and hazardous vegetation to achieve the acceptable outcomes for anticipated potential radiant heat flux. To undertake this Bushfire Hazard Assessment (BHA) the following industry accepted key methodologies and tools are employed:

- *3-stage Bushfire Hazard Assessment: Bushfire Resilient Communities, Technical Reference Guide for the State Planning Policy State Interest 'Natural Hazards, Risk and Resilience – Bushfire'* (Queensland Fire and Emergency Services, 2019)
- Potential Fireline Intensity Calculator (Public Safety Business Agency)
- Leonard, J., Opie.K., Newnham.G., Blanch.R., 2014, *A new methodology for State-wide mapping of bushfire prone areas in Queensland*, CSIRO Climate Adaptation Flagship, Australia.

2.5 Suitably qualified and experienced personnel

Surveys on internal and external areas of the site were undertaken by suitability qualified and experienced consultants as per the 'Expertise' requirements at section 10.2 in *Bushfire resilient Communities* (see Appendix 1 Firecraft Environmental Pty Ltd Capability Statement).

Ecological surveys from Astrebla Ecological Services have been consulted (see Section 8 References and Sources Consulted below).

3. Bushfire Hazard Assessment

The 3-stage Bushfire Hazard Assessment guidelines (pp. 25-28, QFES, 2019) used in this assessment are:

1. Reliability assessment: Verify the reliability of Bushfire Prone Area mapping
2. Hazard assessment: redefine potential fireline intensity with the inputs of fire weather, vegetation hazard class, and slope.
3. Separation and radiant heat: calculation of radiant heat flux, set-backs/Asset Protection Zones

3.1 Fire Weather Severity

The outcome for identifying weather severity is the Forest Fire Danger Index (FFDI) rating. This is used as an input into the potential fire line intensity calculation as described in sections above. The key source for identifying the FFDI is Leonard et.al. (page 25).

Lot 219 is located inside the FFDI 50 contour and therefore the **FFDI value of 40** is used for the purposes of this report.

3.2 Vegetation Hazard Class and Potential Fuel Load

The focus of the site-specific assessment was to determine the potential bushfire risk on the property and within 150 metres of the property which included undertaking on-ground assessments for reliability of the data in Table 1 below and anomalies as detected in Figures 4 (VHC #12 and #13 north of Emerald Creek are not visible at the scale). This provided a data comparison of the expected vegetation types and potential fuel load and detected any anomalies with the data sets and thus provided focus areas for the site-specific assessment. This included

assessing the risk of transboundary fire movement, or fires both starting within the proposed housing development and igniting surrounding vegetation, and fire intrusion from neighbouring properties.

The classifications of Bushfire Prone Area (medium to very high etc.) generally follow where various regional ecosystem (RE) types (fuel types) are mapped and depend on the potential flammability and fuel load of that particular vegetation. The ‘medium’ risk bushfire overlay on Lot 219 largely follows RE types 9.5.9b and 9.5.15a. However, there are several areas where the RE type is expected but it is classified as only ‘potential’ risk/buffer zone and thus does not offer accuracy for where density of vegetation/fuel load is.

The VHC mapping does not factor in the regrowth areas shown in the regulated vegetation mapping. Typically, bushfire overlay codes do not include accurate biomass (fuel) presence on non-remnant or regrowth land which can include a significant fuel load such as grasses, weeds, and woodland, and fuel continuity. Thus, non-remnant and regrowth vegetation depiction can in cases preclude accurate bushfire risk.

Table 1. Vegetation types mapped as being present on site and within 150 metres of site from various sources

Data type	Current category
Vegetation clearing codes and regulated vegetation classification extent (DNR, 2020) present on site	Category C – Regrowth Category B – Remnant Category R – Riparian Category x – Non-remnant
Regional Ecosystem data (DES, 2019), within and 150m from the site	<p>9.5.9b: Woodland of <i>Eucalyptus leptophleba</i> (Molloy red box), <i>E. platyphylla</i> (poplar gum) and/or <i>Corymbia clarksoniana</i> (Clarkson's bloodwood) +/- <i>C. intermedia</i> (pink bloodwood) +/- <i>C. dallachiana</i> (Dallachy's gum). An open to mid-dense sub-canopy of mixed species often includes <i>Corymbia</i> spp. and <i>Melaleuca nervosa</i> (woodland paperbark). The open to mid-dense shrub layer is dominated by <i>Planchonia careya</i> (cocky apple), <i>Petalostigma pubescens</i> (quinine) and <i>Acacia</i> spp. The ground layer is dominated by <i>Themeda triandra</i> (kangaroo grass), <i>Heteropogon triticeus</i> (giant speargrass) and <i>H. contortus</i> (black speargrass).</p> <p>9.5.15a Mixed low woodland to low open forest of <i>Melaleuca monantha</i>, <i>M. viridiflora</i> (broad-leaved paperbark), <i>Callitris intratropica</i> (cypress pine) and <i>Allocasuarina luehmannii</i> +/- <i>Grevillea parallela</i> (silver oak) +/- <i>G. pteridifolia</i> (toothbrush grevillea), often with emergent <i>Eucalyptus cullenii</i> (Cullen's ironbark), <i>E. leptophleba</i> (Molloy red box), <i>Corymbia clarksoniana</i> (Clarkson's bloodwood) or <i>C. dallachiana</i> (Dallachy's gum). An open to mid-dense sub-canopy or shrub layer usually includes canopy species +/- <i>Petalostigma banksii</i> (smooth-leaved quinine), <i>Jacksonia thesioides</i> and <i>Grevillea</i> spp. The mid-dense to dense grassy ground layer is usually dominated by <i>Themeda triandra</i> (kangaroo grass).</p> <p>9.3.13 Fringing open forest to low woodland containing any combination of <i>Melaleuca argentea</i> (silver-leafed paperbark), <i>M. fluviatilis</i> (teatree) or <i>M. leucadendra</i> (weeping teatree), <i>Eucalyptus camaldulensis</i> (river red gum), <i>Casuarina cunninghamiana</i> (river sheoak). Often only one crown-width wide and susceptible to heavy weed infestations.</p> <p>9.3.3c Woodland to open woodland of <i>Eucalyptus leptophleba</i> (Molloy red box) +/- <i>E. platyphylla</i> (poplar gum) +/- <i>Corymbia clarksoniana</i> (Clarkson's bloodwood) +/- <i>E. cullenii</i> (Cullens ironbark) +/- <i>Erythrophleum chlorostachys</i> (Cooktown ironwood) +/- <i>Corymbia</i> spp. The mixed sub-canopy is sparse to mid-dense and includes canopy species, <i>Petalostigma pubescens</i> (quinine) and <i>Melaleuca</i> spp. The shrub layer is sparse. The ground layer is mid-dense to dense and is dominated by the grasses <i>Heteropogon contortus</i> (black speargrass) and <i>Themeda triandra</i> (kangaroo grass).</p>

	<p>Non-remnant Vegetation experiencing past disturbance where the structure of the ecosystem is impacted to the level where expected canopy is less than 50% capacity and averaging less than 30% of the undisturbed height, and it's composed species are uncharacteristic of the vegetation's undisturbed predominant canopy (DR, 2020).</p>
<p>Vegetation Hazard Class data and classification in ,QFES Vegetation hazard class descriptions (QFES, 2019, DNR 2015)</p>	<p>16.2 Eucalyptus dominated woodland on drainage lines and alluvial plains 18.2 Dry eucalypt woodlands on sand or depositional plains 22.1 Melaleuca open forests on seasonally inundated lowland coastal swamps 38.5 Discontinuous irrigated cropping and horticulture 40.4 Low grass or tree cover in rural areas 42.6 Nil to very low vegetation cover</p>

3.2.1 Ground-truthed vegetation within Lot 219

Surveys on internal and external areas of the site occurred on the 18.01.22 and 19.01.22 when majority of the site could be accessible between wet season rainfall events. Surveys included assessing extent of vegetation type and fuel composition and likely fire behaviour.

The general observations on site resulted in vegetation types on Lot 219 correspond with the available RE and Regulated Vegetation mapping data (see above for sources) that provide more accuracy in species presence and potential fuel load than the VHC mapping.

Remnant vegetation types

There is evidence across the majority of the property of previous disturbance such as clearing and grazing stock. This includes areas of remnant vegetation. Plates 1 and 2 show similarity of vegetation structure, species composition and elevated and understory fuels in vegetation classified as 'remnant' and 'non-remnant'. Yet the vegetation in Plate 1 is mapped as 'medium' risk, and the vegetation in Plate 2 is mapped as 'potential buffer' (lower) risk. As with all vegetation types on Lot 219, the non-remnant vegetation is fire prone and supports apparent fire scars.

While vegetation that has undergone considerable changes in structure and composition can still be classed as 'remnant' based on canopy species and age class/height, this provides difficulties with selecting broad predetermined parameters for Potential Fireline Intensity (PFI) and vegetation type (VHC) with variation in mid and understory species. Disturbed ecosystems support an understory fuel not typical of these broad descriptions, such as pasture feed and exotic grasses that promote a late season fire regime and have implications for fire intensity. The difficulty in nominating predetermined state-wide vegetation categories is particularly difficult on Lot 219 that also supports 'Mixed Woodland type', with elements of both ecosystems present (Figure 3).

The majority of remnant vegetation on site supports 'Mixed woodland' - both RE 9.5.9b and 9.5.15a. However, descriptions for vegetation assemblage and structure and particularly potential fuel load in 9.5.15 are more analogous than RE 9.5.15a. The QFES VHC category 18.2 with 11t/ha underestimates the fuel load and species composition of the ecosystems on Lot 219.

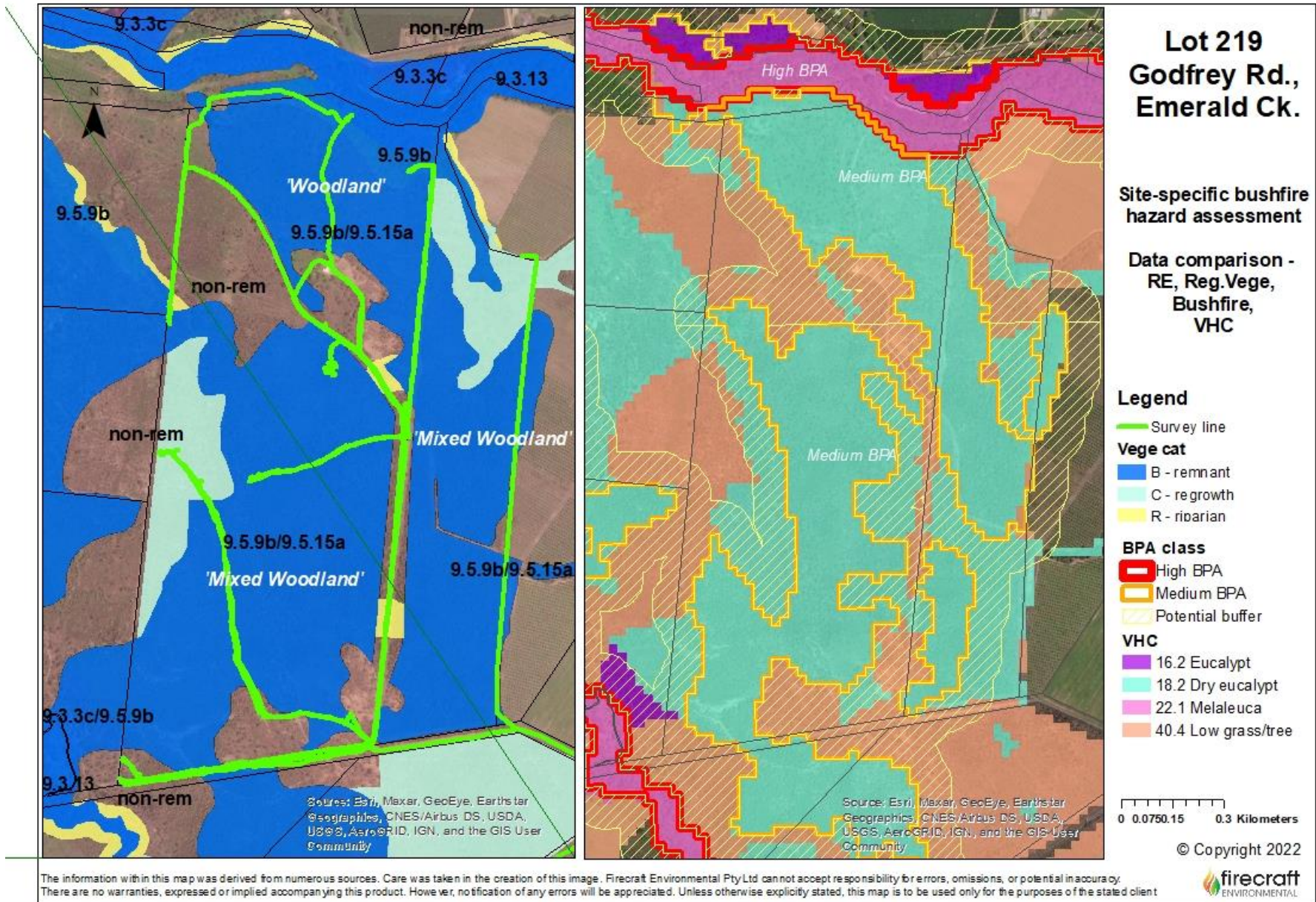


Figure 4 Data comparison of vegetation types and potential fuel loads on Lot 219

There is a high representation of *Melaleuca* species and *Callitris* with a presence of Ironbark, *Corymbia* and *Eucalyptus*. Structure throughout is generally open with a grassy understory, interspersed with mid-story species such as quinine, grevilia and *Jacksonia* with a canopy height under 10 metres.

There are pockets of true RE 9.5.15 throughout where vegetation here has a mid-dense mid-story and upper-story and greater percent closed-canopy (low forest). These pockets have a higher presence of Cypress Pine (due to lower intensity fire penetration in this area in past wildfire events). Grasses are absent with surface fuels comprised of leaf litter and cypress needles. Canopies are approximately 3-4 metre high with >80% cover, and good connectivity. Majority of vegetation has a trunk diameter of <300mm in this area (Plate 3).

The remnant vegetation in the north-western portion of the property, north of the existing shed, is open-structure woodland with mature emergent *Eucalyptus leptophleba* and *E. platyphylla*. Also previously grazed, along with native grasses it supports a high representation of *Stylo* species (pasture feed). There is no mid-story presence of other expected shrubby species such as cocky apple and quinine. (Plate 4). The canopy trees in this area generally range from 6-12 metres with canopies <15% cover. Majority of vegetation has a trunk diameter of >300mm in diameter and can be described as RE 9.5.9b.

The vegetation in the north-eastern corner of Lot 219, that extends beyond the boundary and is situated along the riparian corridor of Emerald Creek, has a 'high' BPA and is classified in QFES tables as VHC 22.1. While canopy trees here have a greater height of >12metres, as typical with this RE type the width of vegetation here running along Emerald Creek corridor is no more than 1-2 tree crowns. There is minimal crown connectivity with standing trees in Lot 219, and understory fuels are comprised mainly of weeds (Plate 5).

The powerline easement running along the northern boundary and crossing the watercourse contributes to the significant weed infestation in the corridor in general. The descriptions in QFES VHC are more comparable with VHC 22.2 and a fuel load of 19.7 t/Ha that supports a canopy reflecting woodland descriptions as opposed to forest descriptions in the mapping. This is further supported by descriptions in RE 9.3.13 and RE 9.3.3c Leonard et.al descriptions for vegetation hazard class #7 Open-forests/woodlands – grassy, with 19t/Ha potential fuel load

All remnant vegetation types within site are analogous with RE descriptions and Leonard et.al descriptions for vegetation hazard class #7 Open-forests/woodlands – grassy, with 19t/Ha potential fuel load.

Regrowth and non-remnant vegetation types

VHC 40.4 in Figure 4, corresponds with the regulated vegetation 'regrowth' and 'non-remnant' RE data, with a low fuel load (<5t/Ha). **Majority of this vegetation on site will be cleared to facilitate individual lots, road networks and fire buffers, and is not included in this bushfire hazard assessment.** However, the risk of fire incursion in the same vegetation types outside of Lot 219 is apparent based on fire history. Thus, recommendations and mitigation must be cognisant of this risk and follow in sections below.

Vegetation along the western and southern boundary in Lot 219 has been cleared previously to facilitate a firebreak. Along these boundaries there are no standing trees from the boundary fenceline for approximately 12 metres (Plate 6). Along the eastern boundary the graded firebreak is 20 metres in width from the boundary fenceline to vegetation (Plate 7). This vegetation is also classified as 40.4 VHC.

3.2.2 Vegetation up to 150 metres from the boundary

As per standard accepted methodologies for bushfire hazard assessment, vegetation up to 150 metres from the boundary must be included in assessments. **The general observations are that the areas of remnant vegetation types follow with descriptions above with a vegetation hazard class of #7 Open-forests/woodlands – grassy, with 19t/Ha potential fuel load.**

Areas supporting ‘regrowth’ vegetation to the south and east in the neighbouring properties are made up of previously disturbed/cleared areas where majority of them now support sufficient fuel to carry a fire and support firescars. VHC data is from 2014 and vegetation present at the time may have been supporting a lower hazard is a plausible explanation.

9.5.9b and 9.5.15 mixed woodland vegetation types are present, and whilst vary in structure (mid story and canopy species not as dense as remnant vegetation), near surface fuel is greater thus lower canopy density is inconsequential to lowering the risk of fire to carry to adjacent vegetation types with greater risk.

North

The vegetation to the north of Lot 219 supports RE 9.3.13 and RE 9.3.3c, and ‘Mixed Woodland’ as per descriptions above with a weedy understory and a 19 t/Ha PFL. Beyond this, on the northern side of Emerald Creek both VHC 38.5 and 42.6 are mapped as present within 150 metres that form Gilmore Road and farmland and are inconsequential to bushfire hazard risk. VHC 38.5 in the QFES descriptions is analogous to RE VHC class #13 Cropping and horticulture and potential fuel load of 5t/Ha. VHC 42.6 in the QFES tables is analogous to RE VHC #12 Rural class mainly grassland.

South

The southern area of Lot 219 is bounded by an external unsealed road that connects with Godfrey Road to the east. To the south of the road is vegetation previously disturbed by grazing in the neighbouring property. The vegetation generally contains a mixture woodland type of RE 9.5.9b /9.5.15 similar to Lot 219 remnant vegetation (Plate 8). There are pockets of denser vegetation in this block to the east along Godfrey Road than what is mapped in the QFES VHC categories. Comparable with internal areas of Lot 219, the vegetation in this area follows more closely with the RE regrowth vegetation. See plates 9 & 10 that show a contrast in vegetation types both mapped as 40.4 VHC ‘low grass or tree cover’ with a 5t/Ha potential fuel load, and Low or zero BPA rating.

Majority of vegetation is confirmed in this southern area as #7 Open-forests/woodlands – grassy, with 19t/Ha potential fuel load, with a greater fire risk than what is depicted in BPA mapping. <33% of vegetation in this area is non-remnant - 40.4 with a 5t/Ha potential fuel load or VHC 12 Mixture of rural classes mainly grassland.

East

The **'regrowth and remnant' vegetation to the east of Lot 219 is confirmed as #7 Open-forests/woodlands – grassy, with 19t/Ha potential fuel load** with little evidence of past disturbance as viewed from external boundaries and analysed in various satellite imagery sources. There is an unmaintained firebreak running along the shared boundary with Lot 219 approximately 20 metres in width (Plate 10). Thus, the cumulative width from standing timber between properties is approximately 40 metres.

West

While the mapping data shows RE 9.3.3c just outside of the boundary of Lot 219 along Cobra Creek and within 150 metres, the vegetation type is difficult to distinguish, and the area small in scale. The potential fuel load of this vegetation is analogous with **#7 Open-forests/woodlands – grassy, with 19t/Ha potential fuel load**.

Majority of the vegetation within 150 metres from Lot 219 western boundary, although supporting predominantly grassy fuels and mapped as VHC 40.4/non-remnant, and therefore a lower bushfire potential intensity and thus impact on infrastructure; there is 100% connectivity immediately beyond this with a much greater percentage of higher risk vegetation at a landscape-scale. These neighbouring parcels of land do not currently support maintained firebreaks and the likelihood of transboundary fire movement from these grassy areas into the internal vegetation corridors of Lot 219 with a greater PFL must be mitigated.

Areas of vegetation mapped as 'non-remnant' are confirmed in this western area as QFES VHC 40.4 low grass/tree cover or VHC #12. Mixture of rural classes mainly grassland with a 5t/Ha potential fuel load.

As the elements of the VHC mapping and BPA inputs have been reclassified a VHC map post development has been compiled (Figure 5)



Plate 1 ‘Remnant’ vegetation in Lot 219 supporting elements of RE 9.5.9/9.5.15, representatives in upper to mid-strata. Introduced pasture feed in understory – Buffel grass, *Brachiaria*, Wynn cassia, and *Stylo* spp. having implications for fuel and fire behaviour.



Plate 2 Northern patch of ‘non-remnant’ RE onsite supporting 2020 firescars (1.5 years since burnt) and tree canopy consumption providing an indication of fire type and potential intensity, (southern aspect from existing internal track, north-west).



Plate 3 Area along internal watercourse and ‘remnant’ RE dominated by Cypress. Minimal understory fuel and predominantly a single-age class as can be seen by trees in the background of similar size. Foreground tree >300mm in diameter (approx. location is within proposed Lots 25&26)



Plate 4 RE 9.5.9b *Eucalyptus leptophleba* (Molloy red box), *E. platyphylla* (poplar gum) and *Corymbia clarksoniana* (Clarkson's bloodwood) and *C. dallachiana* (Dallachy's gum) canopy species, and absence of expected of mid-story species and structure. Understory native grasses – giant spear grass, black spear grass, kangaroo grass, and pasture weeds - *Stylo* species etc., indicating previous grazing in ‘remnant’ vegetation.



Plate 5 Riparian vegetation to the north, and downslope of Lot 219, northern aspect supporting RE 9.3.13 dominated by Melaleuca species. Reclassified as VHC 22.2/ #7. A 50 metre wide swathe of hyptis and other weeds separate the vegetation between RE 9.3.13 and Lot 219.



Plate 6: Western firebreak at point of watercourse crossing and Category R reg. vegetation, 12metres from boundary (at right) to vegetation (at left). An absence of 'remnant vegetation is evident. Southern aspect.



Plate 7: Eastern firebreak southern aspect. Neighbouring property to East (left in photo), and current internal firebreak. Showing 40-metre-wide distance between standing timber (woodland) on each site.



Plate 8: Area to the south of Lot 219, south of Godrey Road supporting open low mixed woodland with canopy height <10.



Plate 9: Vegetation to the south-east of Lot 219 mapped as VHC 40.4 that shows a well-developed understory of species such as cypress and melaleuca spp., and ironbark and poplar gum canopy trees, and more closely follows with RE regrowth mapping.



Plate 10: Vegetation to the west of Lot 219 mapped as 40.4, western aspect and comparable with non-rem RE found within Lot 219 with sparse standing timber and grassy and weedy under story vegetation (1.5 years since burnt).

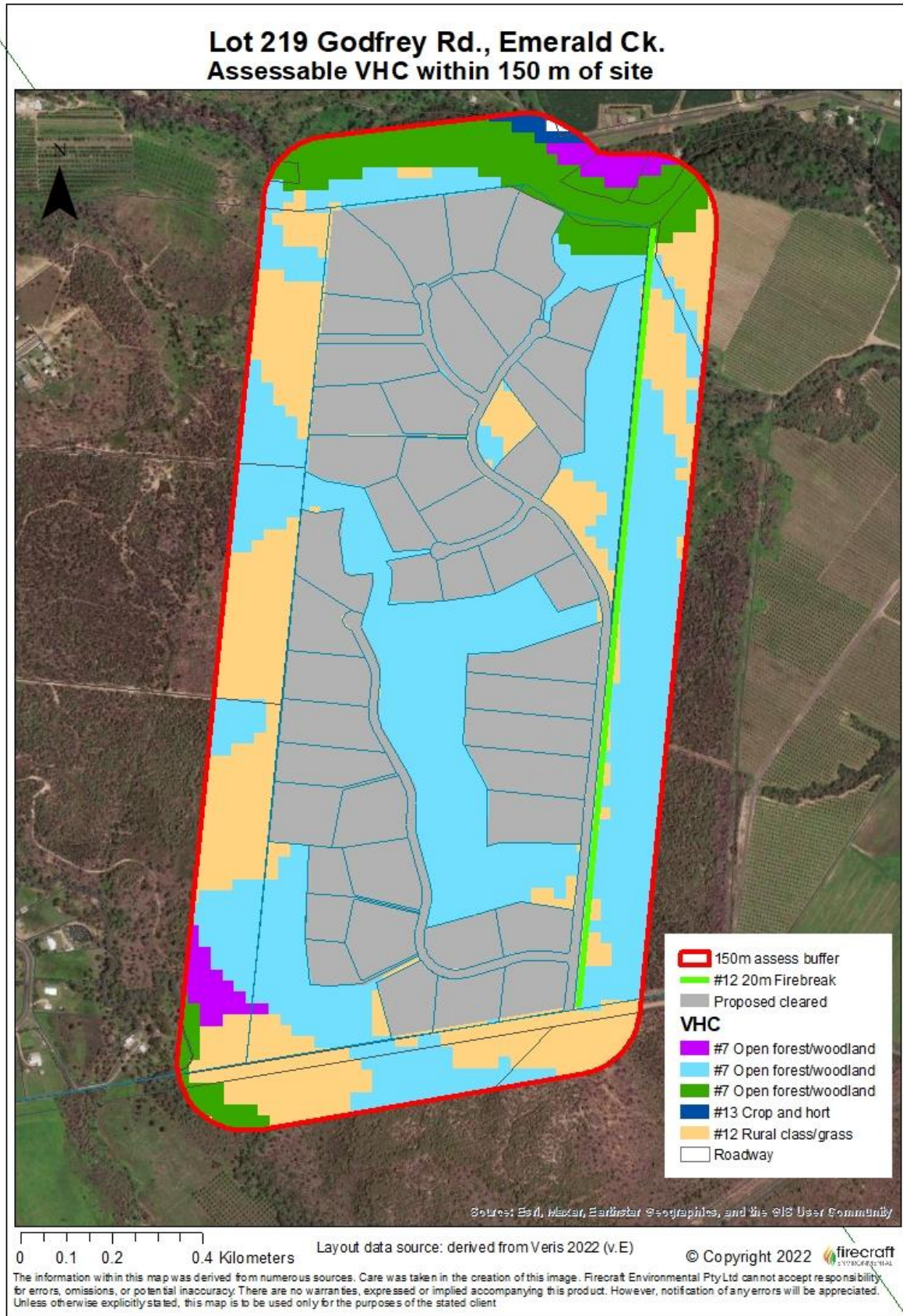


Figure 5 VHC types present on site and within 150 metres

3.3 Other considerations

Methodologies, broad vegetation hazard classes, and potential fire weather severity and Forest Fire Danger Index models are guidelines to assessing potential fuel load on site. But there are limitations particularly with anticipating fire behaviour (as described in section 3.2 above).

Other key factors that contribute to apparent risk on the property are below.

Fire History

Under MSC DA RAL/21/0016 information requests in relation to bushfire hazards on site and in particular “land in proximity to the subject site has been affected by bushfire” (29.09.21, page 3), local historical fire events were explored.

North Australia and Rangeland Fire Information (NAFI) satellite imagery between the years of 2000 and 2021 were analysed to provide a snapshot of the fire regime in the area. Fire regime includes the intensity of fires, the frequency they occur, the time of year and extent of impact. The Emerald Creek and Mareeba areas broadly have a 3–5-year fire interval, or the tendency for fires to carry in vegetation types at a minimum of every 5 years.

Generally small-scale and low intensity fires are not detected by the satellite and absent from NAFI data. What is evident is the majority of the property was impacted by fire from a series of recent fire events; in 2017 between September and December, and in November 2020 where fires swept to the northwest and were of a high intensity. It indicates the fires despite being small in scale were of adequate intensity to be detected by satellite (Figure 6).

Analyses of firescars on site during the surveys determined the fire impacted majority of the site with the exception of small pockets of unburnt areas off the central track running roughly east-west and fire was of moderate intensity. Fire carried throughout all vegetation compositions on site including vegetation classified as ‘non-remnant’ and those with lower VHC.

Data analysed and information sources included:

- Firescars by year 2000 to 2021,
- Fire frequency and interval 2000 to 2021
- Past fire events on Lot 219 and adjacent areas
- Chaplain D., 2022, Queensland Fire and Emergency Services (urban division) Mareeba,

It is likely that development of Lot 219 in reducing the percentage of unoccupied and unmanaged land in the locality, will reduce the number of trespassing and unplanned fire events contributing to the fire risk in the area.

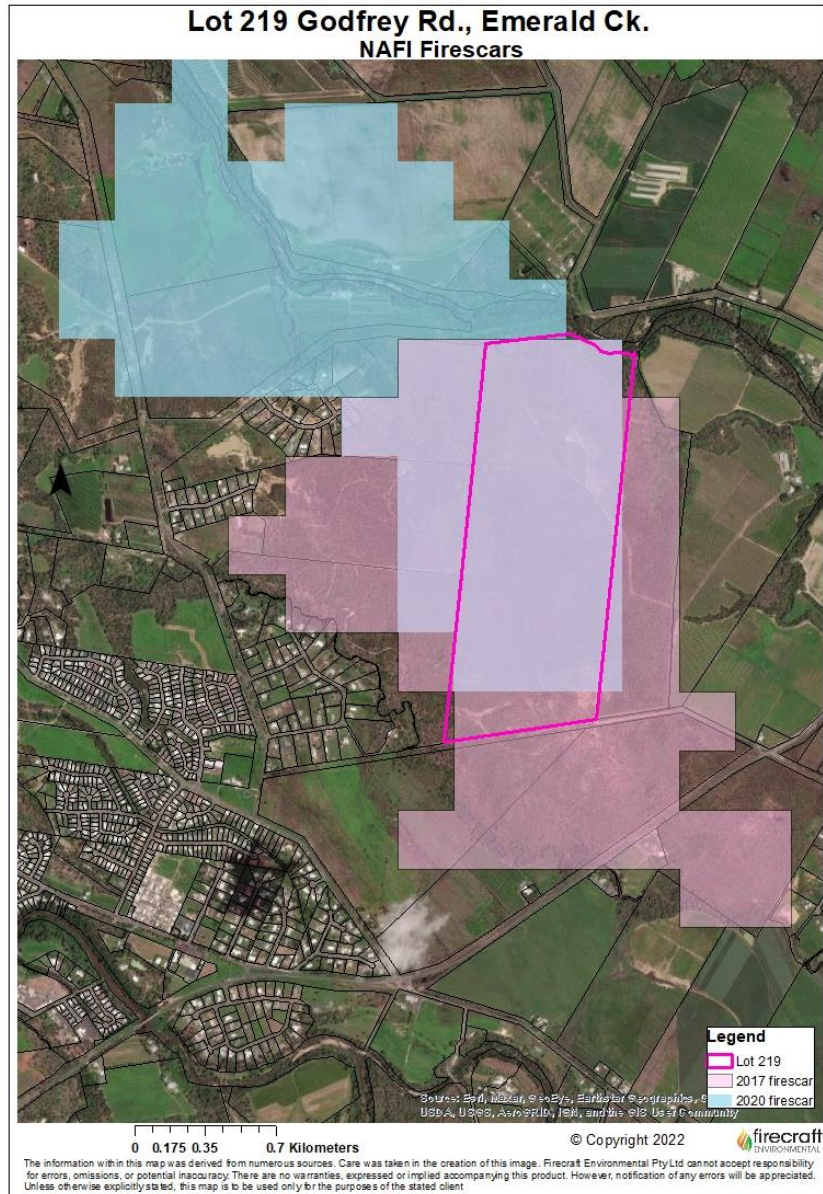


Figure 6 NAFI firescars across Lot 219

Fuel dynamics

Fuel strata examined were bark, elevated, near surface and surface fuels. The survey results follow with what would be expected from a recently burnt area (November 2020) and fuel accumulation comparisons were made with firescars in the neighbouring property to the east and south (in areas where they last burnt approximately 2017). Thus, the fuel across the property is supporting 1 years' growth and fuel loads are currently in a reduced state as compared with their potential load under the current regime (3-5 year interval).

Fuel types have implications for fire behaviour and fire risk. Vegetation of open structure and grassy understory fuels have a high surface and near surface fuel layer, and minimal presence of bark types that

will permit fire to climb trees. Thus, the fire is likely to be a grass fire, low in flame height with a very short residence time.

Vegetation that is closed in structure with majority of fine fuels elevated in the bark and leaves (RE 9.5.15) will dictate a higher flame height. Bark types and oil content in leaves will have implications for firebrands (floaters) to ignite adjacent unburnt areas. Thus, firebrands or embers will be the likely ignition source from areas outside of Lot 219 as opposed to falling timber at the boundary. This has implications for recommendations of breaking up continuous fuel loads (fire corridors) within undeveloped/vegetated areas in the proposed layout and reducing the capacity for fire momentum, and specifications for cleared boundaries.

In summary the bushfire risk over Lot 219 for fire intrusion from external properties, and across the site in terms of vegetation present, fuel types, and potential fire behaviour based on fuel type and prevailing seasonal conditions is consistent in most areas as 'Medium' risk and areas classified as 'regrowth' have a higher risk rating than what is depicted in the MSC Bushfire Overlay codes.

3.4 Slope

Two slope inputs are required to determine PFI and subsequently asset protection zones and set-backs. 'Site slope' refers to the slope between the site boundary and the assessable (hazardous) vegetation. The second input is 'effective slope' and refers to the topography under the hazardous vegetation. Effective slope has direct influence on fire haviour and rate of spread. For every 10° of uphill slope rate of spread doubles. Thus, whether hazardous vegetation is upslope or downslope has implications for potential fireline intensity ratings. As vegetation is to be retained both within Lot 219 and external to 219, potentially fireline intensity has been calculated accordingly for all effective slope.

Slope was determined using various GIS sources of contour data at 1-10metre intervals and run over rise calculator tools used to calculate under hazardous vegetation. Lot 219 is located on an undulating plain at between 400 metres and 435 metres elevation. With the highest degree of elevation in proposed Lot 903 in the northern portion of the site. The greatest degree of slope is extending down from the northern boundary at Lot 905 to the riparian corridor, with a maximum effective slope of 17°.

Majority of eastern areas of the site are at approximately 420 metres elevation sloping down to the western boundary and creek lines ranging from 0° to 6° in slope. Vegetation that is upslope assumes a value of 0°, and includes Lot 903. Majority of Lots as part of Stage 1, where vegetation in undeveloped areas to the east is upslope or flat, individual BAL rating for these lots will generally be lower than some Lots in Stage 2 where the same corridor of vegetation is downslope.

Maximum effective slope must be used in the remodelling of potential fireline intensity calculations. The maximum effective slope of Lot 219 is therefore taken to be 6°, with the exception of the north-eastern area within Lot 905 where maximum effective slope is 17° under hazardous vegetation.

3.5 Potential Fireline Intensity

The requirements set out in AS3959:218 and guideline documentation for changes in the distribution or classification of VHC within the assessment area require PFI to be recalculated and mapped. (Equations for calculating PFL are in Section 2 above).

The potential fireline intensity ranges in kilowatts per metre and bushfire hazard classes are:

- Very high = 40,000+ kW/m
- High = 20,000 – 40,000 kW/m
- Medium = 4,000 – 20,000 kW/m
- Low = 0 - 4,000 kW/m

The PFI values and corresponding Potential Bushfire Intensity Classes were calculated for all post-development vegetation types within 150 metres of Lot 219 using the Potential Bushfire Intensity Calculator (PBSA). Results are in Table 2 and Figure 7 below.

In summary areas of ‘Medium’ PFI are of greater extent than what is calculated in state-wide mapping resources. Areas classified as ‘regrowth’ in regulated vegetation mapping and ‘potential buffer’ risk in SPP mapping have been increased and recalculated to ‘Medium’ with a PFI value of 13,544 kW/m. Areas along Emerald and Cobra Creek classified in QFES VHC as ‘closed forest’, and ‘high’ PFL in SPP mapping have been reclassified to ‘open forest’, and in areas where slope is <10°, the PFI has been reduced to ‘medium’ and PFI of 28,932 kW/m.

Table 2. Potential Fireline Intensity classes within 150 metres of site.

RE code	RE Label	Fire Regime Group	Vegetation Hazard Class	Potential Fuel Load (t/ha)	Fire Weather Severity (FFDI)	Maximum Landscape Slope (degrees)	Potential Fireline Intensity (kw/m) *	Potential Bushfire Intensity *
9.3.13	Melaleuca spp., Eucalyptus camaldulensis and Casuarina cunninghamiana fringing open forest on streams and channels	Fringing woodlands	07. Open forests / woodlands - grassy	19	40	6	13,544	Medium
9.3.3c	Eucalyptus leptophleba ± Corymbia spp. ± Erythrophleum chlorostachys	Eucalypt communities - grassy	07. Open forests / woodlands - grassy	19	40	6	13,544	Medium

	woodland on alluvial plains and terraces							
9.5.9b	Eucalyptus leptophleba and E. platyphylla and/or Corymbia clarksoniana woodland on plains	Eucalypt communities - grassy	07. Open forests / woodlands - grassy	19	40	6	13,544	Medium
9.5.15	Melaleuca monantha ± M. viridiflora ± Callitris intratropica mixed low woodland on valley infill	Eucalypt communities - grassy	07. Open forests / woodlands - grassy	19	40	6	13,544	Medium
9.5.15	Melaleuca monantha ± M. viridiflora ± Callitris intratropica mixed low woodland on valley infill	Eucalypt communities - grassy	07. Open forests / woodlands - grassy	19	40	17	28,933	High
Non-rem	N/A	Cleared	12. Mixture of rural classes mainly grassland	5	40	6	N/A	Low
Non-rem	N/A	Cleared	13. Cropping and horticulture	5	40	6	N/A	Low

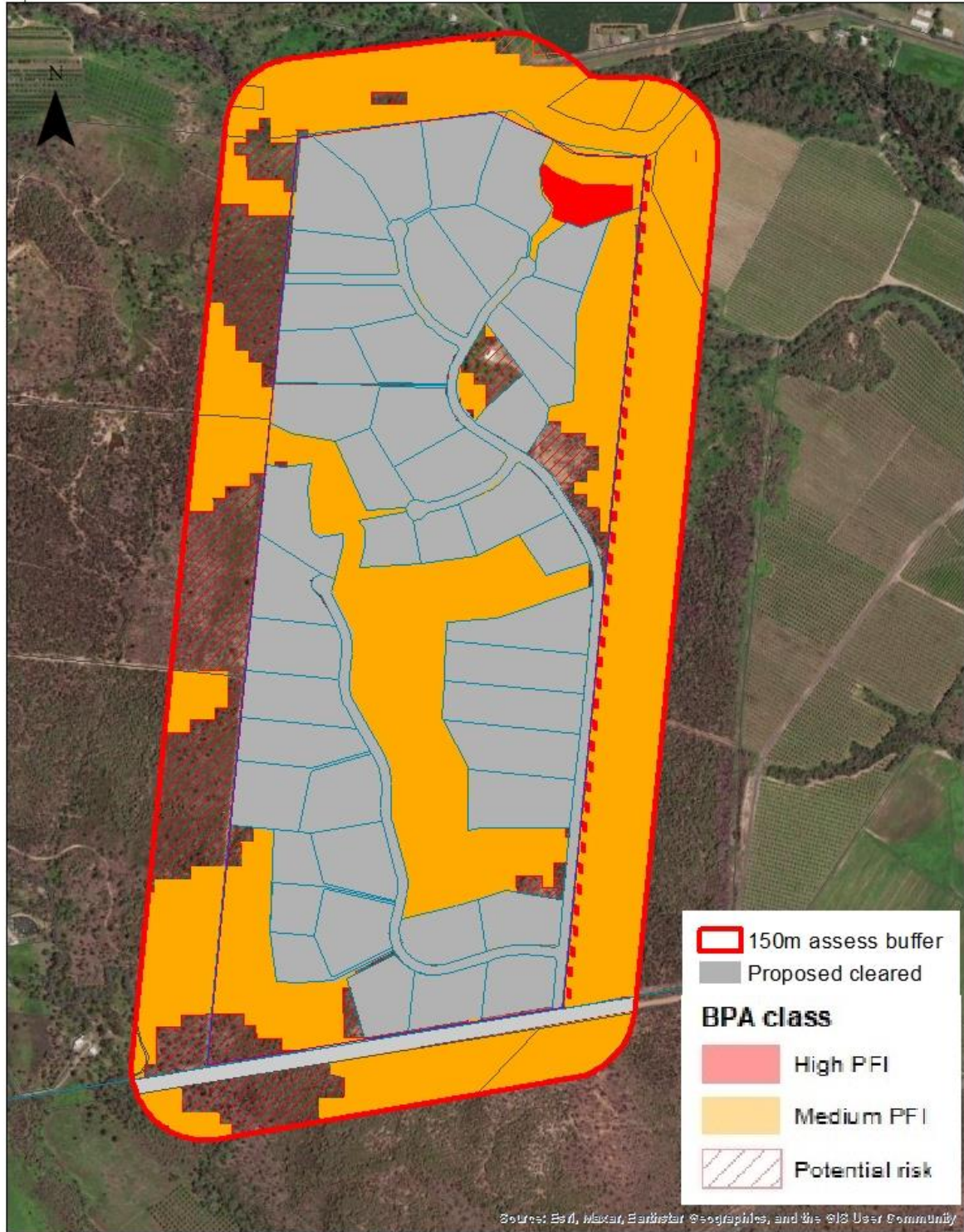
(Leonard et.al. 2014)

3.6 Setbacks and Asset Protection Zones (APZ)

Set-backs and APZ refer to the manageable interface between bushfire hazard areas infrastructure/assets and defensible areas. Areas with a Bushfire Prone Area rating, including potential buffer zones, are defined as a Bushfire Hazard Area. Set-backs are calculated as the horizontal distance between the edge of vegetation, and for subdivisions, the closest point on a lot boundary or building footprint. Set-backs determined by PFI values provide an appropriate level of protection from exposure to radiant heat, ember attack, flame contact. The APZ is between the construction and the hazardous vegetation, and is established and maintained as a defensible area.

Tolerances for distance from vegetation will vary with the development application of each individual dwelling design. The intention is to achieve approval for the subdivision application by obtaining a minimum requirement of vegetation clearing that will satisfy all parcels with highest potential radiant heat flux. **In accordance with MSC DA requirements for Lot 219 proposed development all lots must have a building footprint that achieves a radiant heat flux level of 29kW/m² at the perimeter of the building footprint.**

Lot 219 Godfrey Rd., Emerald Ck. Post-development Potential Fireline Intensity



0 0.1 0.2 0.4 Kilometers Layout data source: derived from Veris 2022 (v.E) © Copyright 2022 firecraft ENVIRONMENTAL

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Figure 7 Potential Fireline Intensity classes - Lot 219

3.7 Bushfire Attack Level (BAL)

All habitable buildings must be designed and constructed in accordance with the determined Bushfire Attack Level (BAL) ratings and associated clauses in AS3959:2018 and the Building Code of Australia. The specific requirements to achieve compliance at each Lot is beyond the scope for this assessment and will need to be confirmed prior to each individual development application.

There are six levels of the BAL rating in accordance with the standard. They are listed from lowest to highest:

1. BAL Low
2. BAL 12.5
3. BAL 19
4. BAL 29
5. BAL 40
6. BAL FZ

Set-backs and asset protection zone distances above have been determined using maximum slope across the property. Thus, a lower BAL rating will be achievable for Lots with 0 - <5° slope, and where greater set-back distances from are achieved within the Lot.

Table 3. Minimum distances between vegetation and building footprint

	Medium PFI areas	High PFI areas
BAL 29 (minimum)	13-<19 metres	21- <31 metres
BAL rating 19	19-<28 metres	31- <42 metres
BAL rating 12.5	28-<100 metres	42-<100 metres

4. Bushfire Management Plan

Where it is not possible to avoid developing in a bushfire prone area the SSP requires development mitigates bushfire risk to people, property including emergency service providers. The requirements to achieve acceptable levels of exposure to risk are detailed in a Bushfire Management Plan (see Figure 8).

The overall aim for reducing bushfire risk and impacts on life and property in an area is to reduce PFI as described in sections above. This encompasses reducing the potential for a fire sufficient in momentum, scale and intensity to create a fire-front or multiple fire-fronts by breaking-up continuous fuel loads across the landscape. Hazardous vegetation is both the beyond the external boundary of Lot 219 and within proposed Lots 900 to 905.

4.1 Responsibilities of the proponent

- All retained vegetation within proposed undeveloped Lots 900 to 905 is maintained in a way that it does not impact on the risk of individual lots or access and egress on roadways
- Any vegetation within the footprint of Lot 219, outside of individual lots 1-44
- All fire buffers as per this plan are maintained.
- Ensuring within each Stages 1-3 of development there is an adequate fire buffer (asset protection zone) of the minimum required widths to achieve a radiant heat flux of 29kw/m at the perimeter of all established building footprint throughout all development stages.
- Ensuring within each Stages 1-3 of development there is adequate emergency access and egress to all established lots, throughout all development stages.
- All roadways and access handles are designed to meet the specifications within in this plan
- Provision of water supply and hydrants for emergency response throughout all stages of development
- Ensure the copy of this report is on hand at site
- Maintain any firetrails within Lots 900 to 905
- Lots 1-44 are cleared of vegetation in each development stage in accordance with this plan

4.2 Responsibilities of the owner/occupier of Lots

- All vegetation and landscaping within the individual lot is maintained in accordance with asset protection Zone requirements in this plan
- All driveways and access handles are clear of obstacles and overhanging vegetation to enable effective emergency vehicle access and egress
- All lots that have access from the main roadway via an access handle and/or have a driveway that is greater than 30 metres from fire hydrants on the main roadway must have a 10,000 litre water tank with fittings compatible for emergency vehicle access and turnaround capability within the lot for emergency vehicles in accordance with this plan. Alternatively access to a swimming pool with >10,000 litre capacity is acceptable.
- All buildings are in accordance with specific BAL ratings and AS 3559 construction requirements
- All residents to develop a site-specific bushfire plan

- Fencing construction

4.3 Separation and Asset Protection Zones

As it is proposed to clear 100% of Lots 1-44, adequate asset protection zones that achieve the minimum distance set-backs as per Section 3 above are achievable. In addition, an asset protection zone between undeveloped lots retaining vegetation and hazardous vegetation in neighbouring properties must be established and maintained to provide an area of reduced fuel load.

Asset Protection Zones include:

- Where there are no sealed 20-metre-wide roadways at Lot 219 perimeters a 20-metre-wide fire buffer that has 100% of standing trees (dead and alive) removed must be established and maintained by the owner/occupier.
- The building footprint must be outside of the fire buffer footprint. Thus lots 10-15 and 30-38 that share an external boundary to the development must ensure set-backs are greater than 20 metres at a minimum regardless of BAL requirements. No permanent structures shall be established in this fire buffer.
- APZ must be established between individual main dwellings and buildings within 6 metres of main dwellings (such as sheds). Distance set-backs must be in accordance with Section 3 above.

4.4 Vegetation management

Managing vegetation in a low-risk condition in Asset Protection Zones is critical for bushfire risk mitigation.

Fire Buffer

- 20-metre-wide fire buffers in accordance with Figure 8 must have no standing timber (dead or alive), and grassy fuels and shrubs kept clear/regularly maintained at no higher than 500mm.

Building footprints

- Lots 1-44 are proposed to be 100% cleared. Standing living trees >300 millimetres in diameter that do not have more than two tree crowns connectivity are permitted to be retained. Majority of trees in residual vegetation are expected to have a diameter <300mm, thus minimal connectivity between residual trees is expected. Trees retained will provide some wildlife habitat, ecological values, and landscape values.

Undeveloped areas

- Fire buffers and APZ are in accordance with above descriptions.
- Vegetation must be maintained in such a way to ensure the minimum set-backs and APZ are maintained as per minimum distances in Section 3 above. This may include brush-cutting, slashing and trimming hazardous vegetation around boundaries adjacent to Lots 1-44.

Firetrails and roadways

- All vehicle access areas must be kept free from vegetation so the full extent of the area is accessible
 - 20 metres for roadways
 - 6 metres for access handles
 - 6 metres for firetrails

Firetrails and roadways

- All vehicle access areas must be kept free from vegetation so the full extent of the area is accessible

Asset Protection Zones

- Vegetation around buildings and infrastructure must be maintained in such a way to ensure the asset protection zones are maintained as per Section 3 above and for individual lot BAL rating assessments.
 - No continuous tree canopies between hazardous vegetation and buildings
 - Maintain a lawn area to a height <300mm
 - Establish a reticulated watering system
 - Ensure a cleared ground layer by regularly raking fine fuels such as leaves and twigs
 - Garden beds should be retained as islands rather than continuous strips and cover no more than 50% of the APZ
 - Regular watering and maintenance of landscaped areas
- Follow and landscaping recommendations in Section 8 *Bushfire Resilient Communities, Technical Reference Guide for the State Planning Policy State Interest 'Natural Hazards, Risk and Resilience – Bushfire'* (Queensland Fire and Emergency Services, 2019)
- Fencing material is rural style mesh fencing with minimal timber use or concrete/non-flammable materials

4.5 Siting

Position buildings so that elements of the development that are least vulnerable to fire impacts are situated to the highest bushfire risk areas. This includes driveways, fire-resistant landscaping, areas free of vegetation. Ensure APZ are accessible by emergency vehicles and water resources are located within the APZ.

4.6 Roadways and firetrails

Given that is not proposed to establish a road network around the entire perimeter of Lot 219, the key recommendations for mitigating risk at Lot 219 Godfrey Road will be to ensure adequate APZ are along perimeters to prevent transboundary fire movement, and provision of adequate access to defensible space and emergency resources in internal areas. Vegetation type and consequently anticipated fire behaviour, on-ground conditions and wind channelling, and known fire behaviour from

past fire events has implications for fire to spread with firebrands allowing the passage of fire in proposed Lots 901 and 902

Roadways

- All main access roads are constructed in accordance with *QFES 2019 Fire Hydrant and Vehicle Access Guidelines* and relevant associated government legislation
- Main access roads are 20-metres in width
- Access handles are to be no less than 6 metres in cleared width and no less than 4 metres in formed width and be constructed to accommodate emergency response tankers in accordance with *QFES 2019 Fire Hydrant and Vehicle Access Guideline*
- There must be adequate clearance overhead on access handles greater than 4 metres in height
- Unimpeded emergency access on roadways throughout all stages of development is required
- All termination points of roadways must have an adequate turn-around for general urban firefighting response tankers. 8 metre radius is the minimum requirement for the proposed layout in bowl head termination points.

Fire trails

- A fire trail that provides access in the corridor of vegetation throughout the centre of undeveloped areas is necessary for accessing defensible areas and breaking up continuous hazardous fuel loads
- A fire trail that follows the northern boundary of proposed stage 1 will not require further vegetation removal, and maintained as a firetrail accessible into the future will provide access to Rural Fire Service 4x4 attack vehicles for backburning and response as required.
- A fire trail will also provide access to the proponents for maintenance of vegetation as required.
- Fire trails are to be no less than 6 metres in cleared width and no less than 4 metres in formed width and be constructed with a stabilised gravel surface and maintained to provide continuous access for 4x4 vehicles.

4.7 Water supply and utilities

- Reticulated water supply is available that provides hydrant/outlets along the road network no more than 120 metres apart
- All hydrant are positioned in accordance with *QFES 2019 Fire Hydrant and Vehicle Access Guidelines* and relevant associated government legislation and signed on roadways
- All lots that have access from the main roadway via an access handle and/or have a driveway that is greater than 50 metres from fire hydrants on the main roadway must have a 10,000 litre water tank with fittings compatible for emergency vehicle access and turnaround capability within the lot. Alternatively access to a swimming pool with >10,000 litre capacity is acceptable.
- Underground power is proposed. Gas facilities and storage must be within the Asset Protection Zone.

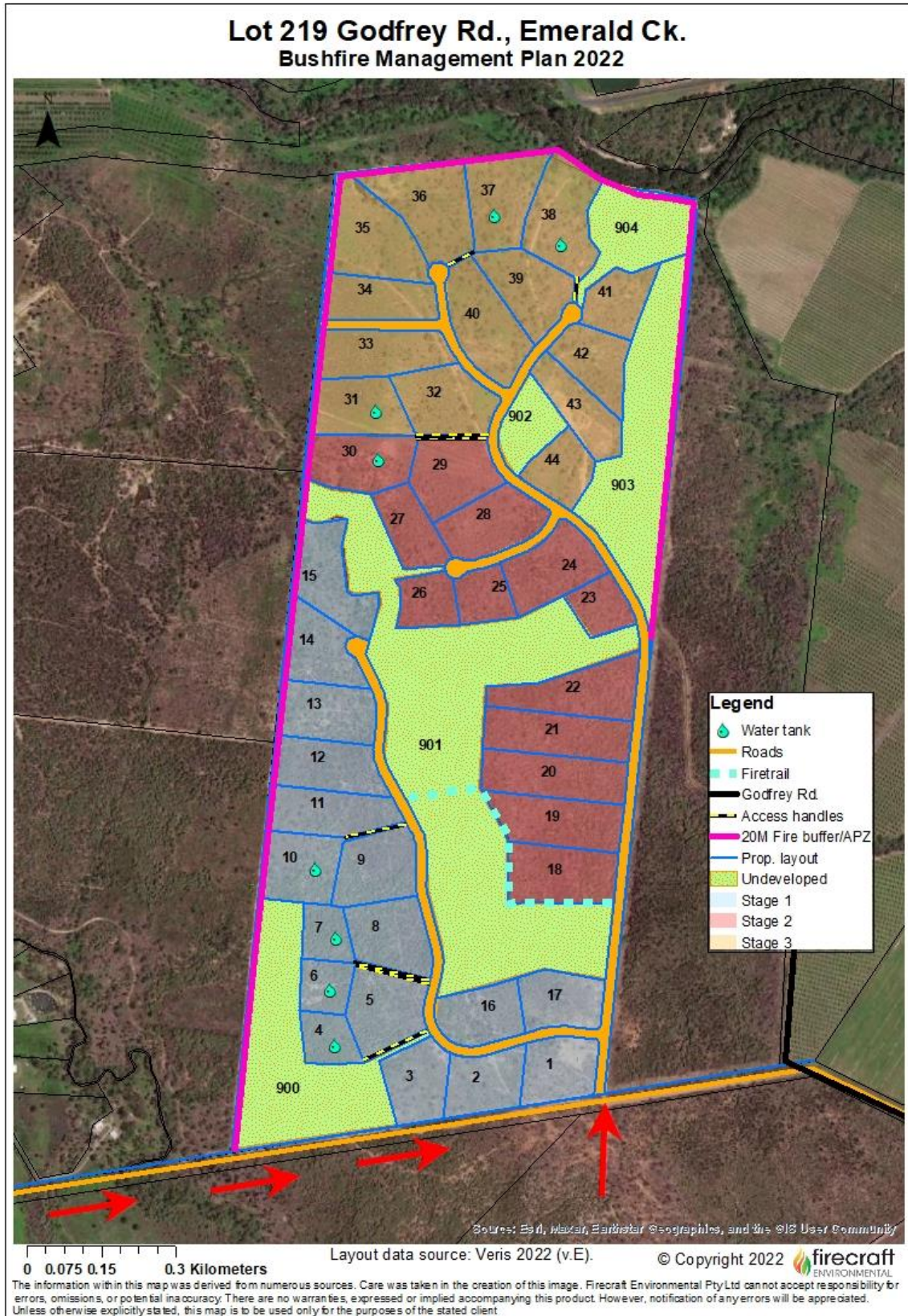


Figure 8 Bushfire Management Plan and APZ requirements

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6. Appendix 1 : Firecraft Environmental Capability Statement



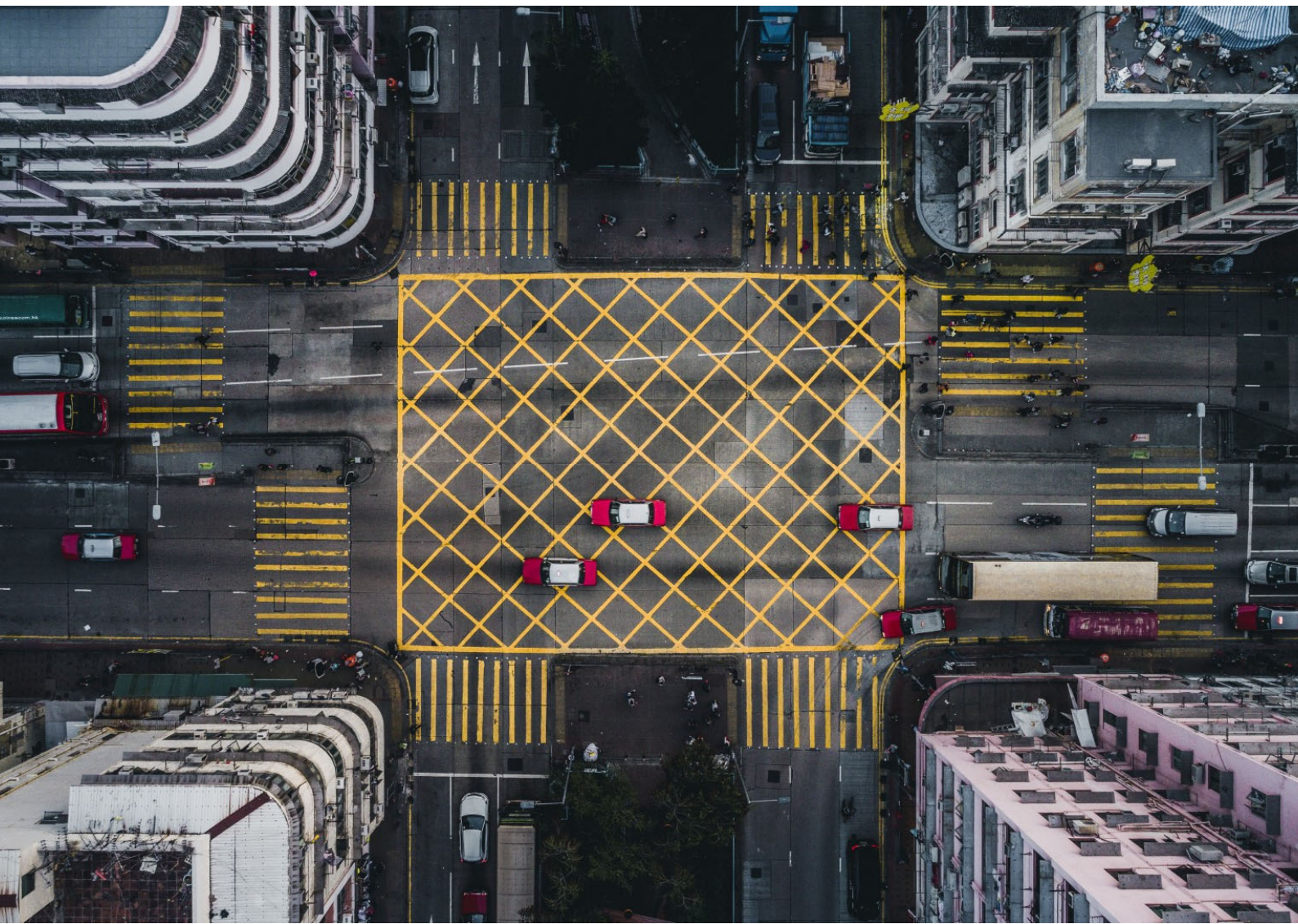
Traffic Impact Assessment

Emerald Creek Heights – Development Application

Yellow Bridge Alliances

29 March 2022

→ The Power of Commitment



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1. Introduction

1.1 Project background

Yellow Bridge Alliances engaged GHD to prepare a Traffic Impact Assessment (TIA) as response to a Mareeba Shire Council MSC (MSC) Notice for an Application for Development Permit for Reconfiguring a Lot – Subdivision (1 into 49 Lots) (Application No. RAL/21/0016). The proposed development is Emerald Creek Heights, is located on Lot 219, Godfrey Road in Mareeba. The land for the proposed development is zoned rural residential as per the Mareeba Shire MSC Planning Scheme 2016. The development application is for a reconfiguration of a lot, producing 49 allotments with a minimum lot size of two hectares.

The location of the proposed development is indicated in Figure 1, with the inset indicating the proposed primary access for the development being the intersection of the Godfrey Road reserve (unformed) with Emerald End Road.

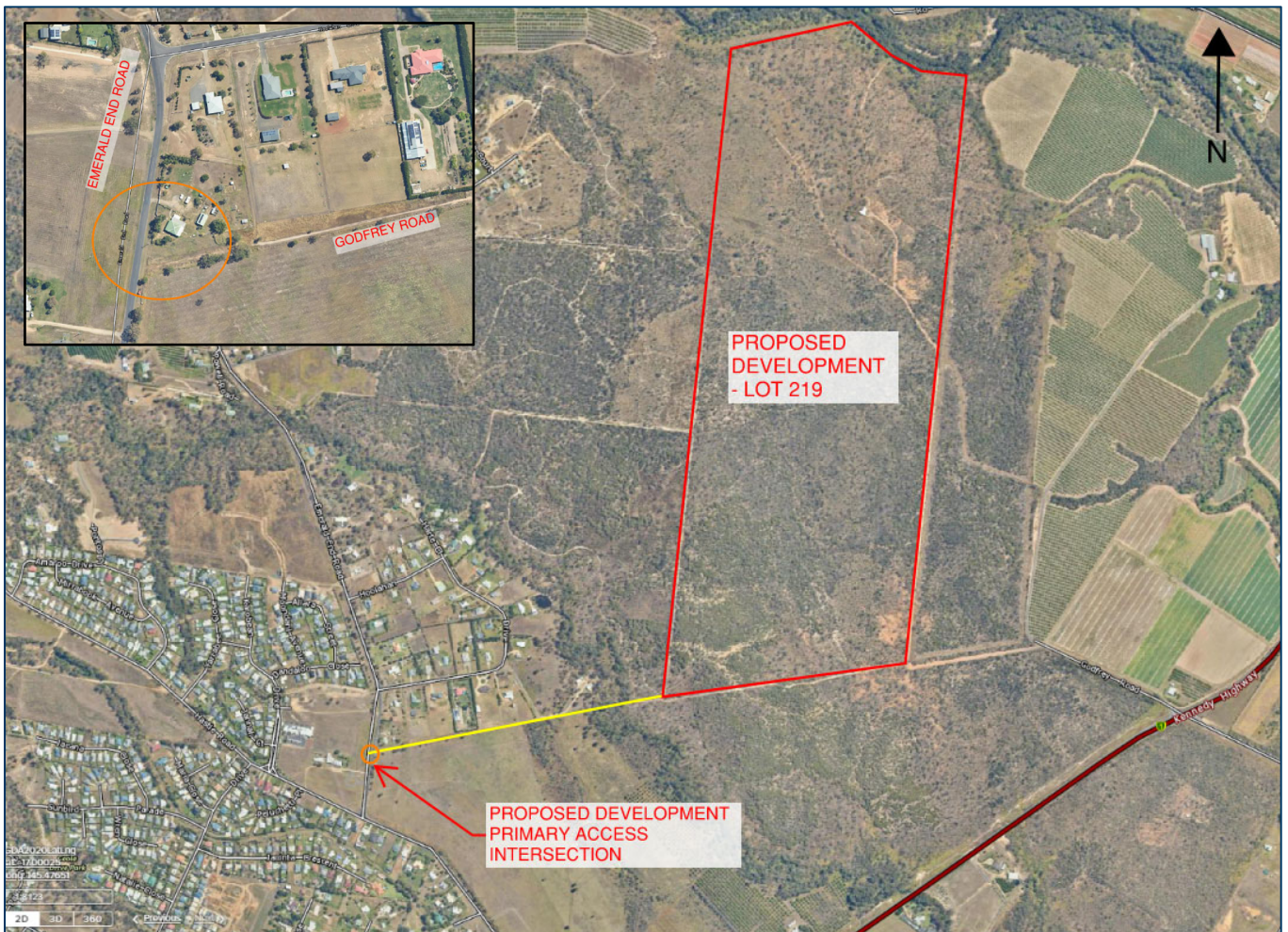


Figure 1 Proposed development locality (Qld Globe 2022)

1.2 Purpose of this report

The purpose of this report is to respond to the Request for Information from the MSC as requested by the client Emerald Creek Pty Ltd.

This TIA identifies the anticipated traffic volumes, assumptions, traffic modelling, results, and analysis to determine likely impacts on the safety and efficiency of the adjoining local roads, and any mitigation actions (if required). The assessment provides a comparison of estimated traffic for the local road network between the “without development traffic” and “with development traffic” scenarios in order to ascertain the impacts of the development.

1.3 Assumptions

The assumptions made in undertaking the traffic impact assessment were as follows:

- The traffic volumes are generated based on existing traffic data provided by the MSC and TMR Average Annual daily Traffic (AADT) count information, as well as assumptions made on the traffic movements.
- No intersection traffic counts were provided for GHD to base this TIA upon.
- In the absence of intersection counts, the traffic modelling is based upon estimated distribution of traffic to individual movements at the intersection from the line counters in the AM and PM peak hours.
- The traffic modelling assesses future growth horizon for local traffic for a 10-year horizon (2033) from the expected date of land release.
- The peak day for traffic volumes was assumed to be a weekday.

1.4 Scope and limitations

This report has been prepared by GHD for Yellow Bridge Alliances and may only be used and relied on by Yellow Bridge Alliances for the purpose agreed between GHD and Yellow Bridge Alliances as set out in this report.

GHD otherwise disclaims responsibility to any person or entity other than Yellow Bridge Alliances arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

GHD has received traffic information from third party sources which has not been independently verified by GHD to be correct.

GHD has prepared this report on the basis of information provided by Yellow Bridge Alliances and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

2. Primary Access for Development

The project team discussed with MSC the preferred primary access for the proposed development site. Deliberation with the Client confirmed the primary access should be via the Godfrey Road reserve, which connects the proposed development site to the Emerald End Road. Currently Godfrey Road is not constructed from the proposed development to Emerald End Road. Following the development approval, detailed design will be undertaken to confirm the road and intersection upgrades to formalise Godfrey Road as the primary access. The road formation for the existing roads and the Godfrey Road are to be accordance with FNQROC Design Manual (2019) as per Table D1.1

- Road hierarchy classification as Residential Street with corresponding catchment size of 0 – 90 dwellings.
- Reserve width should be 16.5 m.
- Sealed width 7.5 m with 4.5 m verge width.
- Design speed 60 kmh.

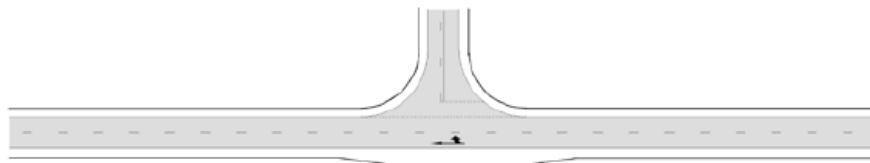
Based on a preliminary review of planning and road design guidelines, the following intersection requirements have been determined:

- The intersection upgrade is assumed to be in accordance with FNQROC Design Manual (2019) as per Table D1.1. and AustRoads Guide to Road Design Part 4: Intersections and Crossings-General:
 - Intersection should reflect adjacent similar intersection of same zoning type, rural residential (Refer to Figure 2).
 - An unsignalised T-intersection.
 - Basic turn treatments for left and right turn in and out of the development (Figure 3).

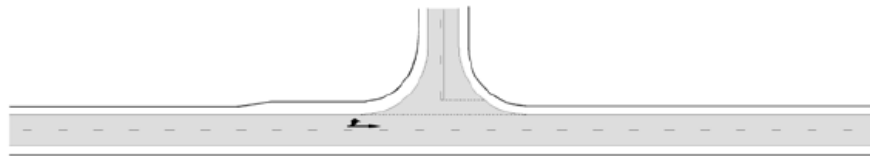


Figure 2 Emerald End Road and Hoolahan Dr Intersection - Google Earth Street View Image 2022

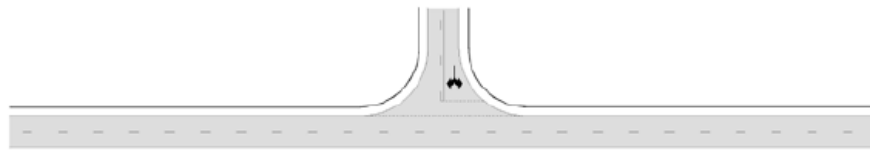
Figure A 2: Rural basic BA turn treatments



**Basic right turn (BAR)
on the major road (two-lane, two-way road)**



**Basic left turn (BAL)
on the major road**



**Basic left turn (BAL)
on the minor road**

Note: Arrows indicate movements relevant to the turn type. They do not represent actual pavement markings.

Source: Department of Main Roads (2006)¹⁵.

Figure 3 AustRoads Part 4 Intersections Extract – Figure A2

3. Traffic Modelling

3.1 Modelling approach

To demonstrate the impacts the development will have on the existing local traffic network, four traffic scenarios were modelled a Base Case and Future Case, as detailed below:

- Base Case (2023) – Existing traffic network **without** new development intersection, traffic data reflective of the year 2023 to align with anticipated completion year of the development.
- Base Case (2023) – Existing traffic network **with** new development intersection, traffic data reflective of the year 2023 to align with anticipated completion year of the development.
- Future Case (2033) – Existing traffic network **without** new development intersection, traffic data reflective of the year 2033 to align with a 10-year planning horizon.
- Future Case (2033) – Existing traffic network **with** new development intersection, traffic data reflective of the year 2033 to align with a 10-year planning horizon.

The intersections included in the assessment of the existing network were:

- Intersection 1 – Godfrey Road (new) and Emerald End Road
- Intersection 2 – Emerald End Road and Hastie Road
- Intersection 3 – Hastie Road and Kennedy Highway

The intersections identified in Figure 4 were modelled as unsignalised two-way give-way/yield intersections.



Figure 4 Intersections included in traffic modelling assessment (Qld Globe 2022)

Modelling these three intersections using estimated traffic volumes provided an understanding of the potential impact from the development on the surrounding network, initially and in future years, as traffic grows. The traffic modelling overview is detailed in the following section.

3.2 Modelling overview

The approach to the traffic modelling for this traffic study was to assess the existing and potential future network performance using SIDRA Intersection 9 (SIDRA). SIDRA has the capacity to connect several intersections (known as sites) to create a network and to analyse the impacts from a whole network perspective, as well as individual sites. This was undertaken for both the base case and future case scenarios. The intersection and network configurations and lane geometry were determined based on aerial imagery, local knowledge, and assumptions (namely approach lane length).

3.2.1 SIDRA analysis criteria

SIDRA default parameters were assumed in the base case and future intersection upgrade analysis. The intersections and networks were analysed and evaluated in terms of the three core performance elements: Degree of Saturation (DoS), Level of Service (LoS), and 95 % Back of Queue Distance. The definition of these performance criteria and quantified acceptable levels are detailed below.

3.2.1.1 Degree of Saturation (DoS)

Degree of saturation is defined as the ratio of demand (arrival) flow to capacity, (also known as volume / capacity, v / c ratio). Key metrics for DoS are:

- DoS > 1.0 oversaturated conditions (demand flow exceeds capacity)
- DoS < 1.0 undersaturated conditions (demand flows are below capacity)

NSW RMS *Traffic Modelling Guidelines* (2013) identify a maximum practical degree of saturation for different intersection types as seen in the extract in Figure 5.

Table 14.2 Maximum practical degree of saturation

Intersection type	Maximum practical degree of saturation
Signals	0.90
Roundabouts	0.85
Sign-controlled	0.80
Continuous lanes	0.98

Figure 5 Extract from RMS Traffic Modelling Guidelines

3.2.1.2 Level of Service (LoS)

Level of Service is based on the average control delay (overall delay with geometric delay) as the LoS measure for unsignalised intersection. SIDRA Intersection output includes LoS results based on the concept described in the US Highway Capacity Manual (HCM). The HCM method identifies the following range of average control delay and corresponding Level of Service this represents, as indicated in Figure 6.

Table 2. Level of Service Criteria for Unsignalized Intersections

Level of Service	Average Control Delay (seconds/vehicle)
A	0 – 10
B	>10 – 15
C	>15 – 25
D	>25 – 35
E	>35 – 50
F ¹	>50

Source: *Highway Capacity Manual 2010*, Transportation Research Board, 2010.

1. If the volume-to-capacity (v/c) ratio exceeds 1.0, LOS F is assigned an individual lane group for all unsignalized intersections, or minor street approach at two-way stop-controlled intersections. Overall intersection LOS is determined solely by control delay.

Figure 6 Extract from HCM Traffic Modelling

The LoS A is most desirable and LoS F the least acceptable. However, levels of service can be accepted given the context of the traffic modelling. AUSTROADS' Guide to Traffic Management Part 3: Traffic Studies and Analysis describes Levels of Service and are outlined in the Table 13 for reference.

This traffic study will consider LoS of D or above as acceptable. Any LoS outside this range may be deemed acceptable, depending on the criteria justifying the LOS rating. This is identified throughout the assessment.

The order of desirable level of service is from A through to F, with LoS A being most desirable and LoS F the least. However, levels of service can be accepted given the context of the traffic modelling. AUSTROADS' Guide to Traffic Management Part 3: Traffic Studies and Analysis describes Levels of Service and are outlined in the Table 1 for reference.

This traffic study will consider LoS of C or above as acceptable. Any LoS outside this range may be deemed unacceptable, depending on the criteria justifying the LOS rating. This is identified throughout the assessment.

Table 1 AUSTROADS' definition of Level of Service

Level of Service	AUSTROADS' Definition
LoS A	A condition of free flow in which individual drivers are virtually unaffected by the presence of others in the traffic stream. Freedom to select desired speeds and to manoeuvre within the traffic stream is extremely high, and the general level of comfort and convenience provided is excellent.
LoS B	In the zone of stable flow where drivers still have reasonable freedom to select their desired speed and to manoeuvre within the traffic stream. The general level of comfort and convenience is a little less than with level of service A.
LoS C	Also, in the zone of stable flow, but most drivers are restricted to some extent in their freedom to select their desired speed and to manoeuvre within the traffic stream. The general level of comfort and convenience declines noticeably at this level.
LoS D	Close to the limit of stable flow and approaching unstable flow. All drivers are severely restricted in their freedom to select their desired speed and to manoeuvre within the traffic stream. The general level of comfort and convenience is poor, and small increases in traffic flow will generally cause operational problems.
LoS E	Traffic volumes are at or close to capacity, and there is virtually no freedom to select desired speeds or to manoeuvre within the traffic stream. Flow is unstable and minor disturbances within the traffic stream will cause breakdown.

LoS F

In the zone of forced flow, where the amount of traffic approaching the point under consideration exceeds that which can pass it. Flow breakdown occurs, and queuing and delays result

3.2.2 95 per cent back of queue distance

A percentile queue length is a value below which the specified percentage of the average queue length values observed for the individual cycles fall. For example, the 95th percentile queue length is the value below which 95 per cent of all observed cycle queue lengths fall, or five percent of all observed queue lengths exceed. SIDRA intersection uses the 95% value of the back of queue. This value also represents the storage length of a lane and forms part of the overall lane length.

- 95% average back of queue storage ratio > 1.0 the queue exceeds the storage capacity.
- 95% average back of queue storage ratio < 1.0 the queue does not exceed the storage capacity.

3.3 Modelling assumptions

SIDRA has a 5% increase buffer on all traffic volumes. This is an inert function of the program applied to all intersection analysis to ensure a factor of safety.

4. Traffic Volumes

4.1 Traffic data sources

The traffic data used to determine the traffic volume for the modelling, was provided form existing traffic records. No specific traffic counts or surveys were undertaken for the purpose of this traffic impact assessment.

4.1.1 MSC provided traffic data

The traffic data sources included:

- MSC provided weekly traffic counts, assumed to be tube counters (i.e. not intersection counts). Traffic counts provided and included to inform the volumes were:
 - Emerald End Road Ch. 165, captured November 2020
 - Hastie Road Ch. 95, captured November 2020
 - Hastie Road Ch. 1505, captured November 2020

The locations of the traffic counts are identified in the Figure 7.



Figure 7 MSC provided traffic counts, locations. Nov 2020. (Qld Globe 2022)

MSC provided weekly traffic counters for locations within the Mareeba local road network. These weekly counts were used to determine the peak periods for the network modelling as well as provide the local traffic volume inputs to determine the traffic modelling volumes and projections.

The weekly vehicle counts provided, were undertaken for a 7-day period for 24-hours. Review of the data found the following:

- Average AM Peak period is 07:00-08:00 AM

- Average PM Peak period is 5:00 – 6:00 PM
- Wednesday is the most consistent day (reflect the average day as does not include irregular movements associated with weekends, or Monday's and Friday's).

From this review, the following assumptions were used to generate the traffic volumes, based on the weekly traffic counts.

- Total volume for Wednesday AM and PM peak was used as the traffic volume contributing to a particular intersection.
- Volumes were assumed to be bidirectional and so assumptions were made to determine the split of movements.

4.1.2 TMR provided traffic data

TMR provided traffic information on the Kennedy Highway (32A) at Site 111679 – Anzac Avenue, 100 m East of Anzac Avenue 45.96 km. Review of the data identified the following:

- 2020 bidirectional AADT is 8055 veh/day
- Assumed a 10-year growth in AADT of 1.5% based off TMR AADT growth data (1-year growth 1.04% and 5-year growth 1.1%).
- 2023 bidirectional AADT was calculated as 8423 veh/day
- Assumed 10% of AADT is peak hour traffic volume, calculated as 842 veh/hour.

The following assumptions were made to determine the traffic volume inputs for the local traffic.

- Bidirectional AADT (2023) can be split 50/50 for the northbound and southbound through traffic on the Kennedy Highway.
- AADT taken from a weekday AADT average to align with regular local traffic movement.
- Peaks to be 07:00-08:00 AM and 5:00 – 6:00 PM to align with MSC provided data peaks.

4.1.3 Development generated traffic

The traffic generated from the development was determined using the following documents:

- The Transport Roads Maritime Services (TRMS) Guide to Traffic Generating Developments (2013) Section 3 - Land Use Traffic Generation, Table 3.7 Summary Table of Land Use Traffic Generation.
 - RTA User Generation for a Residential Dwelling states Per Dwelling: 9 Daily vehicle trips and Peak Hour Rate 0.85.
- Local Government Infrastructure Plan (LGIP) (Jacobs 2017) Table SC3.3a Planned density and demand generation rate for a trunk infrastructure network. This table sourced from the Transport Planning Assumptions and Projections used to develop the LGIP 2017.
 - For a rural residential development (2 ha Precinct) assume 4.75 vpd/dev ha.

Based on the two sources, and due to this development being a rural-residential development, a compromise of the two were assumed to provide the following development traffic generation:

- Per Dwelling: 5 Daily vehicle trips and Peak Hour Rate 0.65.

This corresponding to a total traffic movement in the peak hour of 159, for 49 Lots.

4.2 Growth rate and projected traffic

The growth rate used to determine the projected road network traffic for the 2023 and 2033 traffic scenarios was determined based on the LGIP (2017) data and planning projections.

The LGIP identifies the population and employment growth assumptions 15-year period, from 2016 through to 2031 at 5-year increments. The growth assumptions are based on each projection area and LGIP development type category for residential and non-residential developments. The LGIP identifies the existing and project populations based on a relationship between the development category and development types and uses, and the

most recent census data at the time, 2016. The detail is identified in the extract in Figure 8. This information was used to determine an annual growth rate which was potentially applied to determine the traffic volumes.

Schedule 3 Local Government Infrastructure Plan Mapping and Tables

SC3.1 Planning assumption tables

Table SC3. 1 Existing and Projected Population

PIA Projection Area	Existing and projected population			
	2016	2021	2026	2031
CHILLAGOE	188	195	203	212
DIMBULAH	372	386	402	419
KURANDA	1,906	1,978	2,062	2,146
MAREEBA	8,902	9,241	9,631	10,022
Total PIA	11,368	11,801	12,299	12,798
Total outside PIA	10,189	10,804	11,263	11,724
Total for area of Planning Scheme	21,557	22,605	23,562	24,522

Figure 8 Table SC3.1 Existing and Project Population (LGIP, 2017)

The population growth rate for Mareeba based on the figures from the LGIP were determined as highlighted in Table 2.

Table 2 Population growth rates determined from LGIP population projections for Mareeba

Year		Growth rate over 5 years	Growth rate / year
2016	8902	3.67 %	0.73 %
2021	9241	4.05 %	0.81 %
2026	9631	3.90 %	0.78 %
2031	10022	3.67 %	0.73 %

Based on the review of populations statistics, it was determined that there was a consistent growth rate across population and corresponding traffic demands demonstrated in the LGIP (JACOBS, 2017). Approximately 4% growth rate over a 5-year period, with approximately 0.8% growth rate per year. This is a very low growth rate. As the traffic modelling has been based off existing traffic data and movement assumptions, the growth rate applied was conservative.

The traffic modelling has applied a low growth rate of 1.5% per year.

4.3 Assumptions and movement splits

Assumed traffic distributions were applied to the existing bidirectional volume counts to use as a basis for the intersection modelling. The corresponding volume for each traffic movement at each intersection and assumptions used to derive them are detailed in Appendix B.

4.4 Traffic volumes for modelling

Based on the review of provided traffic data, assumed generated traffic data, and assumptions made for the volume and movement distribution, the following volumes were determined for each movement at the intersection:

- Table 3 and Table 4 – results for Base Case (2023) and Future Case (2033) without development for the AM and PM Peaks, respectively
- Table 5 and Table 6 results for Base Case (2023) and Future Case (2033) with the development for the AM and PM Peaks, respectively.

Table 3 Generated and Projected Traffic Volumes for Base and Future Case WITHOUT DEVELOPMENT - AM Peak

INTERSECTION 2 - EXISTING INTERSECTION - HASTIE ROAD AND EMERALD END ROAD			
Approach	Turn	Base Case (2023)	Future Case (2033)
Hastie Road (West)	Left	3	3
	Through	24	28
Emerald End Road	Right	23	27
	Left	23	27
Hastie Road (East)	Right	2	2
	Through	18	21
INTERSECTION 3 - EXISTING INTERSECTION - KENNEDY HIGHWAY AND HASTIE ROAD			
Approach	Turn	Base Case (2023)	Future Case (2033)
Hastie Road (West)	Left	32	37
	Right	32	37
Kennedy Highway (Nth)	Right	63	73
	Through	337	391
	Left	21	24
Kennedy Highway (Sth)	Right	21	24
	Through	337	391
	Left	63	73
Tinaroo Creek (East)	Right	25	29
	Left	25	29

Table 4 Generated and Projected Traffic Volumes for Base and Future Case WITHOUT DEVELOPMENT – PM Peak

INTERSECTION 2 - EXISTING INTERSECTION - HASTIE ROAD AND EMERALD END ROAD			
Approach	Turn	Base Case (2023)	Future Case (2033)
Hastie Road (West)	Left	22	26
	Through	24	28
Emerald End Road	Right	3	3
	Left	3	3
Hastie Road (East)	Right	22	26
	Through	26	30
INTERSECTION 3 - EXISTING INTERSECTION - KENNEDY HIGHWAY AND HASTIE ROAD			
Approach	Turn	Base Case (2023)	Future Case (2033)
Hastie Road (West)	Left	63	73
	Right	63	73
Kennedy Highway (Nth)	Right	43	50

	Through	337	391
	Left	25	29
Kennedy Highway (Sth)	Right	25	29
	Through	337	391
	Left	43	50
Tinaroo Crk (East)	Right	21	24
	Left	21	24

Table 5 Generated and Projected Traffic Volumes for Base and Future Case WITH DEVELOPMENT - AM Peak

INTERSECTION 1 - NEW INTERSECTION - EMERALD END ROAD AND GODFREY ROAD			
Approach	Turn	Base Case (2023)	Future Case (2033)
Emerald End Road (North)	Left	4	5
	Through	47	54
Godfrey Road	Right	16	18
	Left	56	65
Emerald End Road (South)	Right	4	5
	Through	47	54
INTERSECTION 2 - EXISTING INTERSECTION - HASTIE ROAD AND EMERALD END ROAD			
Approach	Turn	Base Case (2023)	Future Case (2033)
Hastie Road (West)	Left	3	3
	Through	24	28
Emerald End Road	Right	51	59
	Left	51	59
Hastie Road (East)	Right	2	2
	Through	18	21
INTERSECTION 3 - EXISTING INTERSECTION - KENNEDY HIGHWAY AND HASTIE ROAD			
Approach	Turn	Base Case (2023)	Future Case (2033)
Hastie Road (West)	Left	54	63
	Right	54	63
Kennedy Highway (Nth)	Right	63	73
	Through	337	391
	Left	21	24
Kennedy Highway (Sth)	Right	21	24
	Through	337	391
	Left	63	73
Tinaroo Crk (East)	Right	25	29
	Left	25	29

Table 6 Generated and Projected Traffic Volumes for Base and Future Case WITH DEVELOPMENT - PM Peak

INTERSECTION 1 - NEW INTERSECTION - EMERALD END ROAD AND GODFREY ROAD			
Approach	Turn	Base Case (2023)	Future Case (2033)
Emerald End Road (North)	Left	16	18
	Through	44	52

Godfrey Road	Right	4	5
	Left	4	5
Emerald End Road (South)	Right	56	65
	Through	44	52
INTERSECTION 2 - EXISTING INTERSECTION - HASTIE ROAD AND EMERALD END ROAD			
Approach	Turn	Base Case (2023)	Future Case (2033)
Hastie Road (West)	Left	24	28
	Through	24	28
Emerald End Road	Right	3	3
	Left	3	3
Hastie Road (East)	Right	24	28
	Through	26	30
INTERSECTION 3 - EXISTING INTERSECTION - KENNEDY HIGHWAY AND HASTIE ROAD			
Approach	Turn	Base Case (2023)	Future Case (2033)
Hastie Road (West)	Left	63	73
	Right	63	73
Kennedy Highway (Nth)	Right	65	76
	Through	337	391
	Left	25	29
Kennedy Highway (Sth)	Right	25	29
	Through	337	391
	Left	65	76
Tinaroo Crk (East)	Right	21	24
	Left	21	24

These volumes were modelled into SIDRA and assessed as individual sites / intersections as well as a whole network. The volumes as inputted into SIDRA demonstrating the percentage volume distribution of traffic movements are identified in Appendix C. SIDRA Analysis and Results.

5. SIDRA Analysis and Results

5.1 Sites and network layout

5.1.1 Without development cases

The Base Case and Future Case scenarios without the development, the network was made up of Intersection 2 (Emerald End Road and Hastie Road) and Intersection 3 (Kennedy Highway and Hastie Road) were modelled as individual sites, unsignalised two-way give-way/yield intersections. SIDRA 9 also allows the function to link sites into an overall network. The layout of the network as modelled in SIDRA is shown in Figure 9.

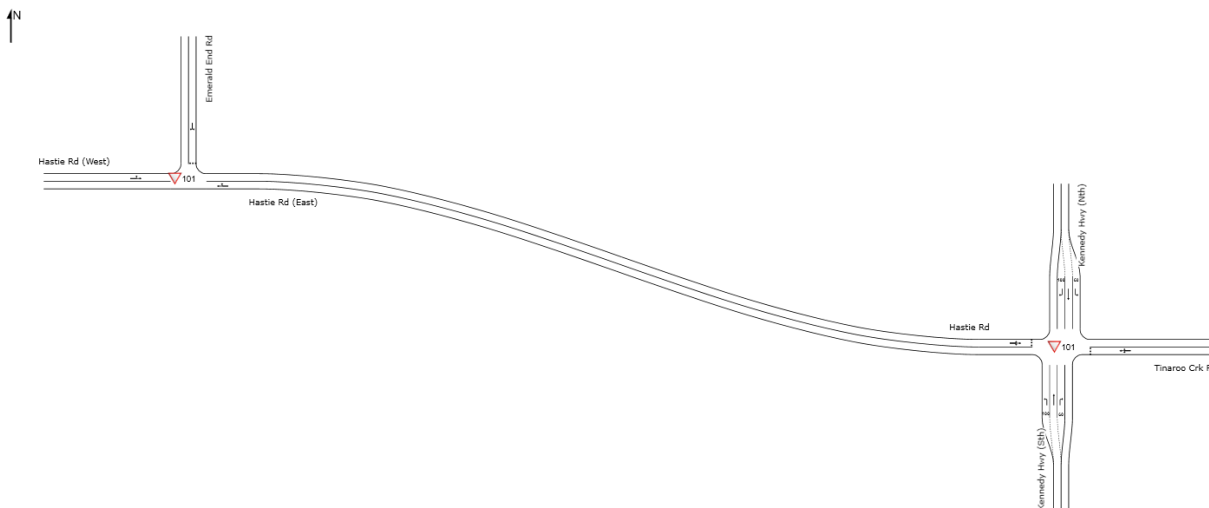


Figure 9 Existing Case Network Layout with Intersection 2 and Intersection 3

5.1.2 With development cases

The Base Case and Future Case scenarios with the development, the network is made up of the three intersections were modelled as individual sites, unsignalised two-way give-way/yield intersections. Intersection 1 (Godfrey Rd and Emerald End Rd) and Intersection 2 and 3 as mentioned previously were the three intersections. SIDRA 9 also allows the function to link sites into an overall network. The layout of the network as modelled in SIDRA is shown in Figure 10.

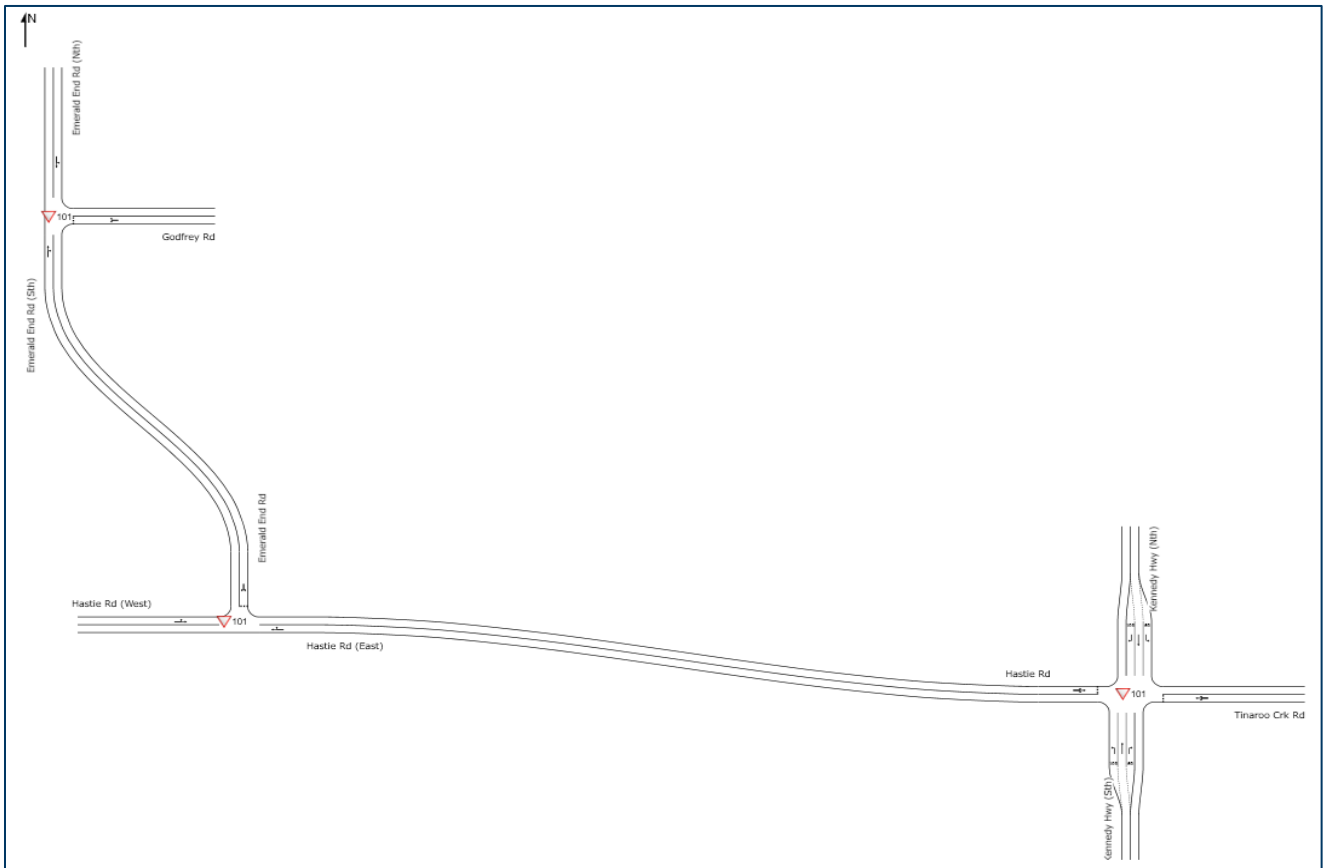


Figure 10 Network layout with the three intersections

5.2 Results and analysis

Anticipated results and key analysis criteria to consider when assessing and reviewing the results are detailed as follows.

5.2.1 Intersection LoS

The major through road for each intersection will demonstrate a high Level of Service in both the inbound and outbound lanes, for all traffic scenarios. This is because the intersection has been modelled as an unsignalised two-way give way/yield intersection, giving the priority movement the major road. There is no opportunity to cause delay or queuing on the through road as the analysis favours this movement.

It is anticipated that in most cases, the results will demonstrate a high level of functionality due to the low volume and growth. It is however worth identifying results from performance-based criteria including queuing and lane delay to demonstrate the high functionality of the intersection and the extents of which it can operate or identify the criteria that is underperforming and causing a lower level of service.

5.2.2 Relevant performance-based criteria results

The relevant performance criteria are as follows:

- Queue (average): This performance criteria gives the average back of queue distance in metres for any lane.
 - Queue (percentile): This performance criteria gives the largest 95% back of queue distance in number of vehicles for any lane.
- Note: In the context of this analysis, the only lane that is impacted is the minor road.
- Delay (control): This performance criteria determines the average control delay per vehicle in seconds.

5.3 Base Case (2023) and Future Case (2033) Without Development

The SIDRA analysis results for the Base Case (2023) Without Development for AM and PM Peak have been identified in Table 7 and Table 8 and the Future Case (2033) Without Development for AM and PM Peak are identified in Table 9 and Table 10. The results are showing the Level of Service and the Key Performance Criteria for each minor approach as this is the critical approach for unsignalised giveway/yield intersections. For all SIDRA analysis results refer to Appendix D for the Base Case and Future Case Without Development AM Peak and Appendix E for the PM Peak.

5.3.1 Base Case (2023) Without Development

Table 7 Base Case (2023) Without Development AM Peak Intersection Analysis Results

Criteria	Intersection 2 – Emerald End Road (Minor)	Intersection 3 – Hastie Road (Minor)	Intersection 3 – Tinaroo Crk Road (Minor)
LoS	A	C	C
Queue (Veh)	0.1	0.9	0.6
Queue (Dist. m)	0.9	6.1	4.3
Delay (sec)	5.6	18.2	16.8

Table 8 Base Case (2023) Without Development PM Peak Intersection Analysis Results

Criteria	Intersection 2 – Emerald End Road (Minor)	Intersection 3 – Hastie Road (Minor)	Intersection 3 – Tinaroo Crk Road (Minor)
LoS	A	C	C
Queue (Veh)	0.0	0.5	2.1
Queue (Dist. m)	0.1	3.7	15.1
Delay (sec)	5.7	17.1	21.6

As can be seen in Table 7 and Table 8 Intersection 2 is demonstrating a high LoS A and supporting performance criteria demonstrating low to non-existent delays and queuing.

Intersection 3 is displaying some performance issues with minor delay and queuing on the minor roads, both approaches Hastie Road and Tinaroo Creek Road demonstrating a LoS C. This is an acceptable level of service but should be monitored for change for future year traffic volumes.

It is noted that queuing is worse in the PM for the minor east approach of Intersection 3, Tinaroo Creek Road intersection with Kennedy Highway.

5.3.2 Future Case (2033) Without Development

Table 9 Future Case (2033) Without Development AM Peak Intersection Analysis Results

Criteria	Intersection 2 – Emerald End Road (Minor)	Intersection 3 – Hastie Road (Minor)	Intersection 3 – Tinaroo Crk Road (Minor)
LoS	A	E	C
Queue (Veh)	0.1	1.5	0.8
Queue (Dist. M)	1.0	10.2	5.3
Delay (sec)	5.6	26.6	17.4

Table 10 Future Case (2033) Without Development PM Peak Intersection Analysis Results

Criteria	Intersection 2 – Emerald End Road (Minor)	Intersection 3 – Hastie Road (Minor)	Intersection 3 – Tinaroo Crk Road (Minor)
LoS	A	E	C
Queue (Veh)	0.0	4.1	0.8
Queue (Dist. M)	0.1	28.5	5.9
Delay (sec)	5.7	37.7	23.4

As can be seen in Table 9 and Table 10, Intersection 2 is still demonstrating a high LoS A and supporting performance criteria demonstrating low to non-existent delays and queuing.

Intersection 3 is still displaying worsening performance issues with the background growth in traffic volumes from 2023 to the 2033 projected volumes. There is significant delay and queuing on the minor roads, particularly the Hastie Road approach with approximately 28 m of queuing and 37 sec of delay. Hastie Road approach is exhibiting a LoS E and Tinaroo Creek Road demonstrating a LoS C. This level of service on the west minor approach is suggesting performance issues that should be investigated further. The through approaches to the intersection on the Kennedy Highway is still demonstrating a high level of performance with LoS A.

It is noted that queuing is worse in the AM for the minor west approach of Intersection 3, Hastie Road intersection with Kennedy Highway.

Overall, the Base Case and Future Case scenarios without the development are demonstrating Intersection 2 functions at a high level of service, while Intersection 3 is demonstrating very low performance on the minor approaches.

5.3.3 Base Case (2023) With Development

The SIDRA analysis results for the Base Case (2023) with the development for AM and PM peaks have been identified in Table 11 and Table 12. The results are showing the Level of Service and the Key Performance Criteria for each minor approach as this is the critical approach for unsignalised giveway/yield intersections. For all SIDRA analysis results refer to Appendix F for the Base Case and Future Case with the development for the AM Peak and Appendix G for the PM Peak.

Table 11 Base Case (2023) With Development AM Peak - Intersection Analysis Results

Criteria	Intersection 1 – Godfrey Road (Minor)	Intersection 2 – Emerald End Road (Minor)	Intersection 3 – Hastie Road (Minor)	Intersection 3 – Tinaroo Crk Road (Minor)
LoS	A	A	C	C
Queue (Veh)	0.2	0.3	1.8	0.6
Queue (Dist. m)	1.4	2	12.7	4.5
Delay (sec)	5.7	5.6	21.6	17.5

Table 12 Base Case (2023) With the Development PM Peak - Intersection Analysis Results

Criteria	Intersection 1 – Godfrey Road (Minor)	Intersection 2 – Emerald End Road (Minor)	Intersection 3 – Hastie Road (Minor)	Intersection 3 – Tinaroo Crk Road (Minor)
LoS	A	A	C	C
Queue (Veh)	0	0	2.3	0.6
Queue (Dist. m)	0.2	0.1	16.2	3.9
Delay (sec)	5.8	5.7	23.5	17.8

As can be seen in Table 6 and 7, very low queuing and delays are occurring for Intersection 1 and 2 and the intersections are operating at a high Level of Service A, in both the AM and PM peak periods. As Intersection 1 is the new intersection as part of the development, it can be assumed that the development generated traffic will have no negative impact on the existing local traffic. This is seen similarly in Intersection 2 which is the next flow on intersection. These are expected results as generally the traffic volumes are low.

Intersection 3 is demonstrating a lower Level of Service C, however this is still considered acceptable, as queues and delays are still considerably low. This decrease in performance at Intersection 3 is likely a result of the high traffic volume on the through road (Kennedy Highway) which has in approximate AADT of 8000 movements. This is the same level of service as demonstrated in the Base Case (2023) without the development for the AM and PM suggesting the added development traffic has not caused this to worsen.

As can be seen in the results, the PM peak for the Hastie Road approach is demonstrating the lowest level of performance. It is still operating at a considerable level but is likely to worsen as the traffic volumes increase as part of the future growth.

The level of service demonstrated at Intersection 3 has not worsened with the introduction of the development generated traffic as the existing case at this intersection was demonstrating the same level of service, C.

In the context of safe and efficient traffic operation, the levels of queuing delay at the intersections are considered immaterial to the performance of the intersection, and therefore are acceptable.

5.4 Future Case (2033) With Development

The SIDRA analysis results for the Future Case (2033) with the development for the AM and PM Peak have been identified in Table 13 and Table 14. The results are showing the LoS and the Key Performance Criteria for each minor approach as this is the critical approach for unsignalised giveway/yield intersections. For all SIDRA analysis results refer to Appendix F for the Base Case and Future Case with the development for the AM Peak and Appendix G for the Base Case and Future Case PM Peak.

Table 13 Future Case (2033) With Development AM Peak - Intersection Analysis Results

Criteria	Intersection 1 – Godfrey Road (Minor)	Intersection 2 – Emerald End Road (Minor)	Intersection 3 – Hastie Road (Minor)	Intersection 3 – Tinaroo Crk Road (Minor)
LoS	A	A	E	D
Queue (Veh)	0.2	0.3	3.4	1.1
Queue (Dist. m)	1.6	2.3	23.6	7.6
Delay (sec)	5.7	5.6	36.7	25.1

Table 14 Future Case (2033) With Development PM Peak - Intersection Analysis Results

Criteria	Intersection 1 – Godfrey Road (Minor)	Intersection 2 – Emerald End Road (Minor)	Intersection 3 – Hastie Road (Minor)	Intersection 3 – Tinaroo Crk Road (Minor)
LoS	A	A	E	D
Queue (Veh)	0.0	0.0	4.7	0.9
Queue (Dist. m)	0.2	0.1	33.2	6.3
Delay (sec)	5.9	5.7	45.3	25.0

As can be seen in Table 8 and 9, very low queuing and delays are still occurring for Intersection 1 and 2 and the intersections are still operating at a high LoS A, in both the AM and PM peak periods. These intersections are still operating at a high level as the low growth rate of 1.5% over 10 years has not added large amounts of volume, and hence has not contributed to decreasing the performance. This is demonstrating that the new intersection and the next flow on intersection will continue to have no negative impact on the local traffic network for future years so long as the low growth rate is consistent.

Intersection 3 is seeing a significant decline with a Level of Service E and D on both minor approaches. This is an expected result as the growth has resulted in increased volumes in already low performing areas. Comparison to the Future Case (2033) without development for the AM and PM peaks, shows that the overall level of performance of the intersection approaches has not deteriorated with the addition of the development generated traffic. The Hastie Road approach for the Future Case (2033) without development demonstrated a LoS E as did the Future Case (2033) with the development generated traffic.

This traffic assessment has provided an indication that the performance of this intersection of Hastie Street and the Kennedy Highway requires further review, particularly in the longer term. This traffic analysis is based on the supplied data including existing line counter data and AADT data from TMR. With the intersection movement data estimated from the data provided, it cannot be confirmed from this traffic analysis whether this level of performance represents actual on ground performance. To confirm the performance of the intersection more accurately, detailed intersection traffic counts and survey should be undertaken, and further traffic analysis and modelling completed.

It can be concluded that the new development generated traffic is not contributing to this severe decrease in performance on the minor approaches at Intersection 3 as this is highlighted in the Base and Future Cases without the development, as an existing issue. It is also seen that the initial flow on impact at Intersection 1 and 2 is negligible as the Intersections 1 and 2 are operating at a high LoS, A. Ultimately, the low traffic volumes have not contributed to a decrease level of service.

6. Conclusions

This traffic impact assessment and analysis provides a comparative assessment of performance for the scenarios “without development” and “with development” traffic based on line counter traffic data. Traffic volumes were derived from the existing line traffic counts using assumed movement distribution at the intersections.

Emerald End Road - Godfrey Road Intersection

This traffic impact assessment has identified that the proposed intersection on Emerald End Road and Godfrey Road will function at a high level for the forecasted 2033 traffic demands of local traffic as well as the estimated development generated traffic.

Hastie Road - Kennedy Highway Intersection

The intersection of Hastie Road and the Kennedy Highway perform similarly with and without development traffic in both the 2023 and 2033 time horizons. In 2023 when the development comes online, the analysis indicates that all legs of the intersection are performing with the same acceptable levels of service with and without development traffic.

Applying the background traffic growth to the Kennedy Highway for the 2033 horizon, the LoS for the Hastie Road leg of the intersection also remains the same with and without development applied to the intersection, with slightly lower performance figures for the with development scenario. Therefore, the controlling issue is the background growth on the Kennedy Highway rather than an increase in traffic on Hastie Road due to the development.

The performance of the Tinaroo Creek Road leg of the intersection, however, declines from LoS C to Los D with the development traffic applied to the 2033 scenario. When reviewing the metrics from the traffic assessment (Table 15), the decreases in performance are very minor and apply to only one vehicle queued at the intersection.

Table 15 Kennedy Highway Intersection - Tinaroo Creek Road leg 2033 Performance

Metric	AM Without Development	AM With Development	PM Without Development	PM With Development
LoS	C	D	C	D
Queue (Vehs)	0.8	1.1	0.8	0.9
Queue (Dist. m)	5.3	7.6	5.9	6.3
Delay (sec)	17.4	25.1	23.4	25.0

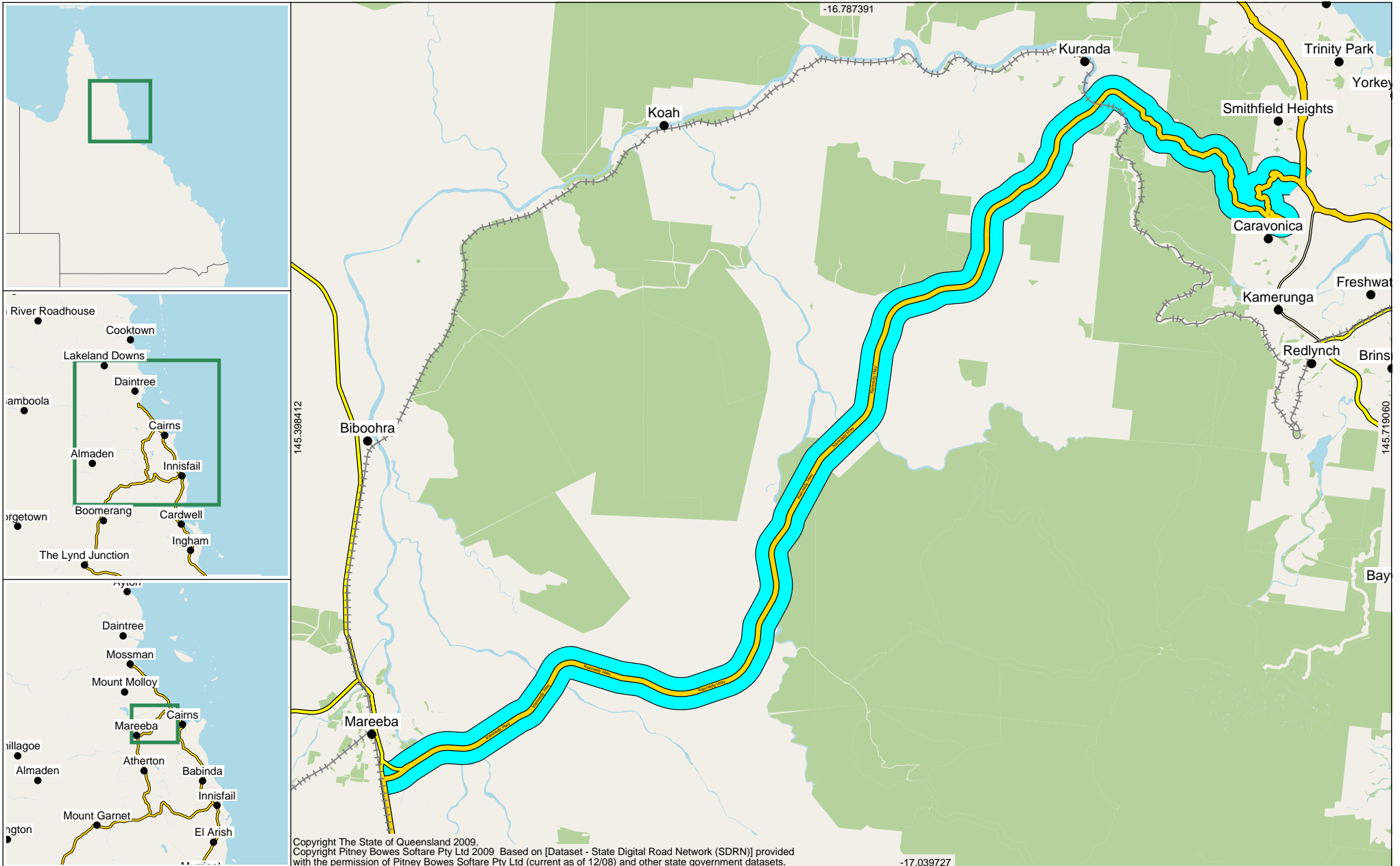
From the metrics above, the delay for the queued vehicle is increased by between 2 and 5 seconds. This is only a negligible impact on the traffic in this leg of the intersection at the 2033 horizon.

It is, therefore, concluded that the traffic generated by the new development is not impacting the performance of the local road network significantly. The Kennedy Highway continues to operate at a high level of service at this intersection at the 2033 horizon, however, the analysis is indicating that the minor road legs of the Hastie Road and the Kennedy Highway intersection has very low level of performance due to the growth in traffic on the Highway. An analysis using intersection traffic counts would be required to confirm any potential performance issues.

Therefore, it can be concluded that the proposed development for the reconfiguration of Lot 219, will have negligible impact on the current and future, safety, and efficiency of the existing local road network.

Appendix A

Traffic Data



Traffic Analysis and Reporting System
AADT Segment Analysis Report (Complete)
 Road Section 32A - KENNEDY HIGHWAY (CAIRNS - MAREEBA)
 Traffic Year 2020

Road Segments Summary - All Vehicles

Region	Segment Start Tdist	Segment End Tdist	Site	Site Tdist	Description	AADT			VKT (Millions)			Data Year	Page
						G	A	B	G	A	B		
403	0.000 km	13.992 km	110005	0.485 km	Smithfield, 500m west of Capt'n Cook Hwy	4,010	3,899	7,909	20.47939	19.91250	40.39190	2020	2
403	13.992 km	42.085 km	111606	29.643 km	WiM Site Davies Creek (as 09-dec-2009)	3,079	3,041	6,120	31.57190	31.18225	62.75414	2018	3
403	42.085 km	48.844 km	111679	45.960 km	100m east of Anzac Avenue	4,036	4,019	8,055	9.95695	9.91501	19.87197	2020	4
								Totals	62.00824	61.00977	123.01801		

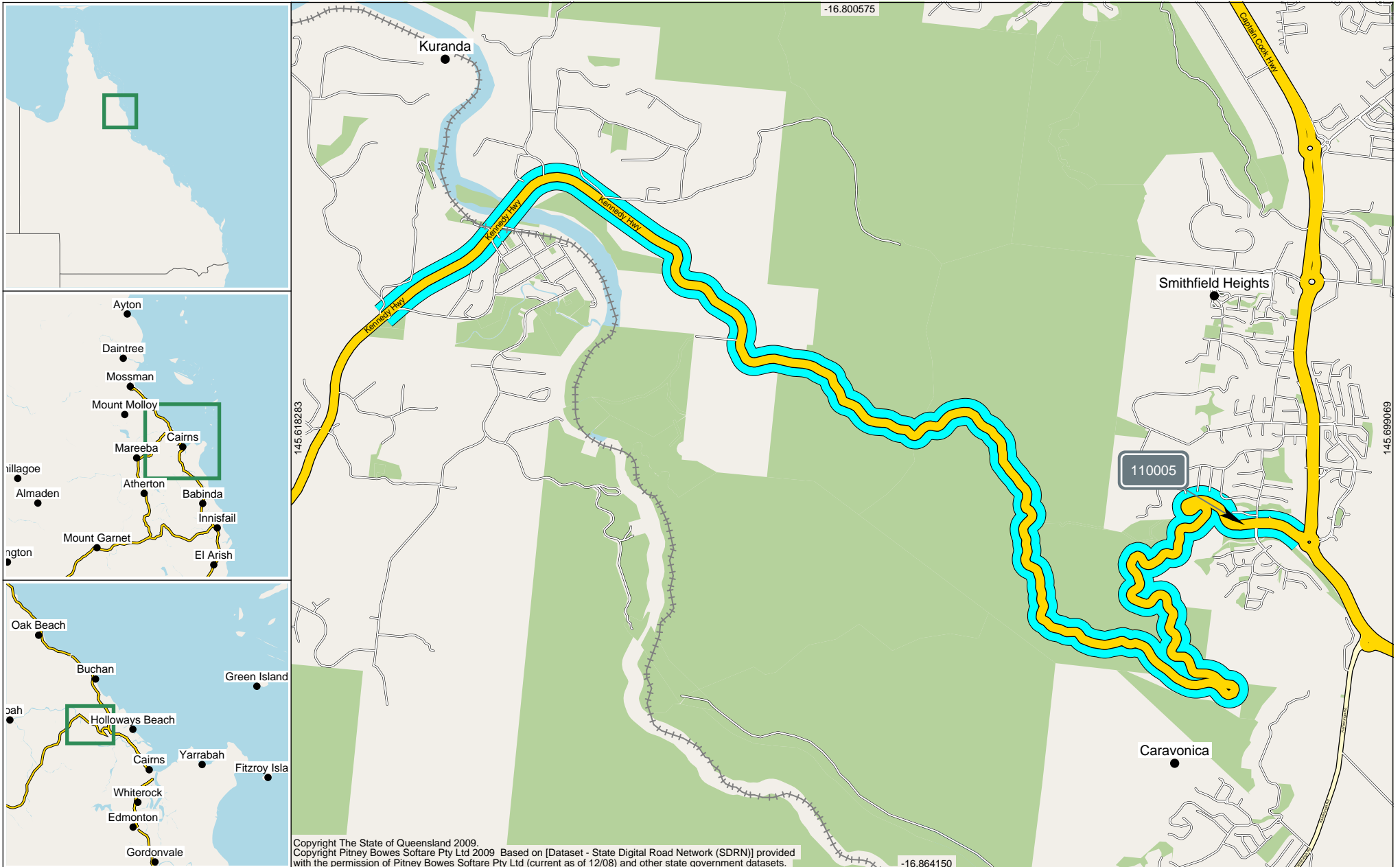
Road Segments Summary - Heavy Vehicles only

VKT totals are calculated only if traffic class data is available for all sites.

Region	Segment Start Tdist	Segment End Tdist	Site	Site Tdist	Description	HV AADT						HV VKT (Millions)			Data Year	Page	
						G		A		B		HV VKT (Millions)					
						AADT	HV %	AADT	HV %	AADT	HV %	G	A	B			
403	0.000 km	13.992 km	110005	0.485 km	Smithfield, 500m west of Capt'n Cook Hwy	503	12.54%	574	14.72%	1,077	13.62%	2.56886	2.93146	5.50033	2020	2	
403	13.992 km	42.085 km	111606	29.643 km	WiM Site Davies Creek (as 09-dec-2009)	125	4.06%	278	9.14%	403	6.58%	1.28174	2.85060	4.13234	2018	3	
403	42.085 km	48.844 km	111679	45.960 km	100m east of Anzac Avenue	442	10.95%	438	10.90%	880	10.92%	1.09043	1.08056	2.17099	2020	4	
												Totals	4.94103	6.86262	11.80366		

AADT Segment Analysis Report (Complete)

Area 403 - Far North District Road Section 32A - KENNEDY HIGHWAY (CAIRNS - MAREEBA)
Traffic Year 2020 - Data Collection Year 2020



ADT Segment Analysis Report (Complete)

Site 110005. Point 310018173. Smithfield, 500m west of Capt'n Cook Hwy.

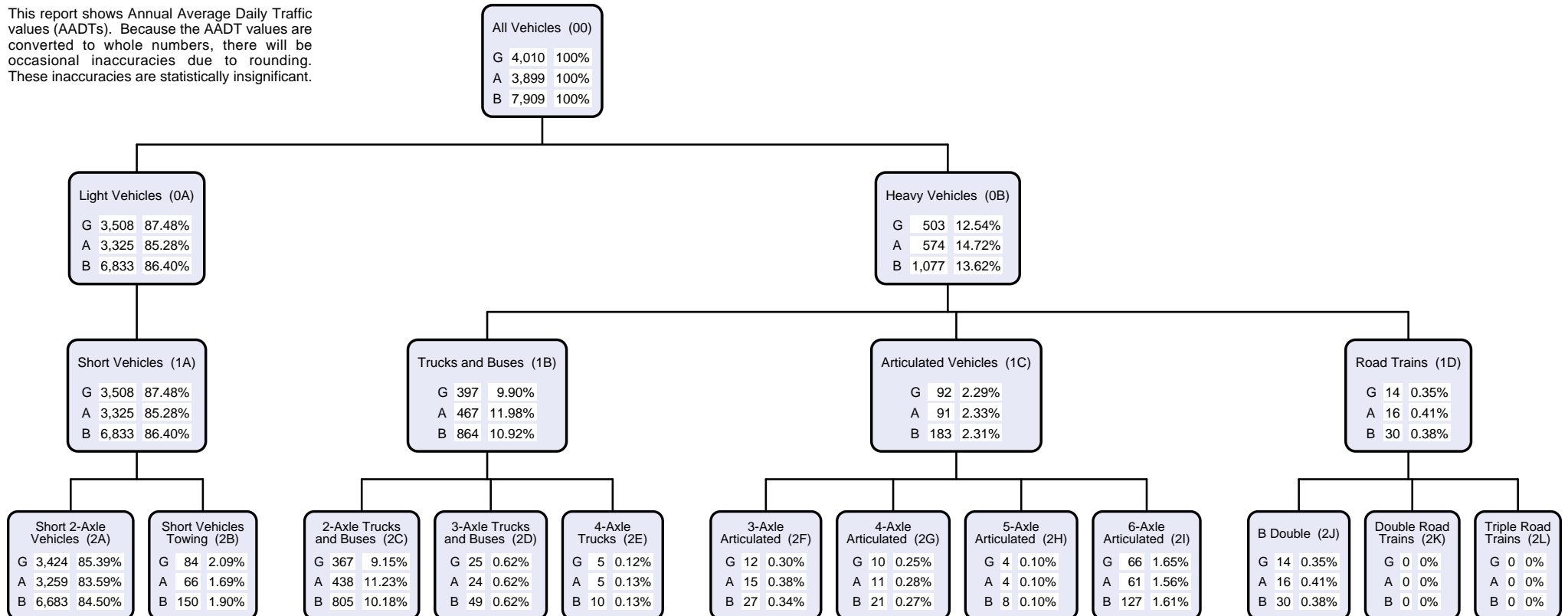
0.48 km

0.00 km
Start Point 310018172. Kennedy Hwy to Kuranda @ Cook Hwy.

13.99 km
End Point 310018088. Int 32A & Myola Rd/Veivers St.

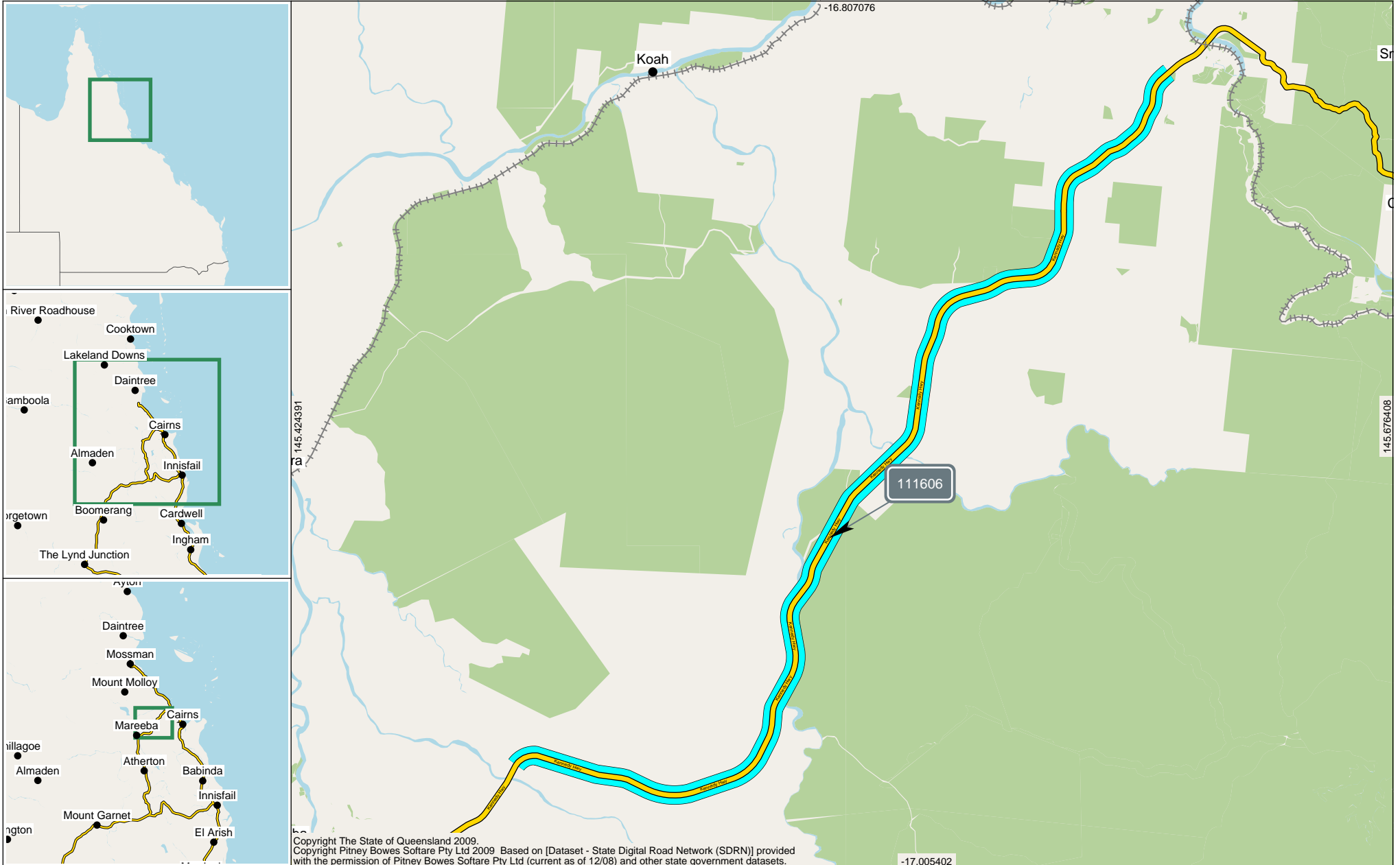
The width of each Road Segment is proportional to its AADT.

This report shows Annual Average Daily Traffic values (AADTs). Because the AADT values are converted to whole numbers, there will be occasional inaccuracies due to rounding. These inaccuracies are statistically insignificant.



AADT Segment Analysis Report (Complete)

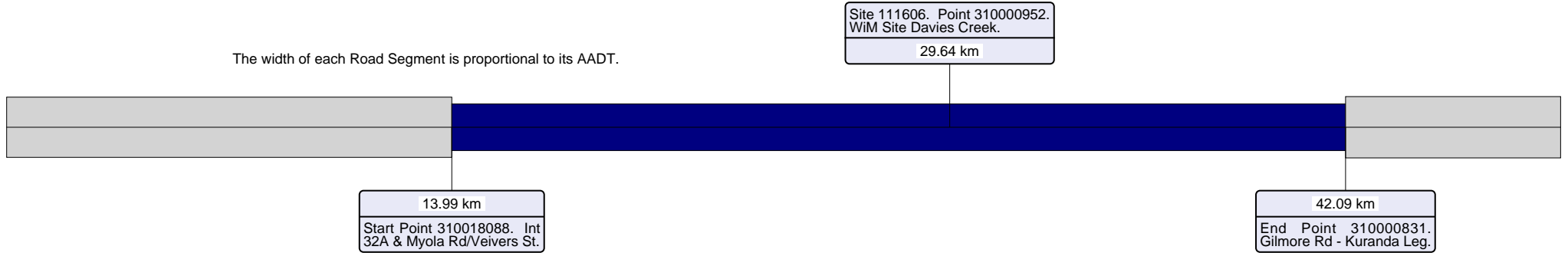
Area 403 - Far North District Road Section 32A - KENNEDY HIGHWAY (CAIRNS - MAREEBA)
Traffic Year 2020 - Data Collection Year 2018



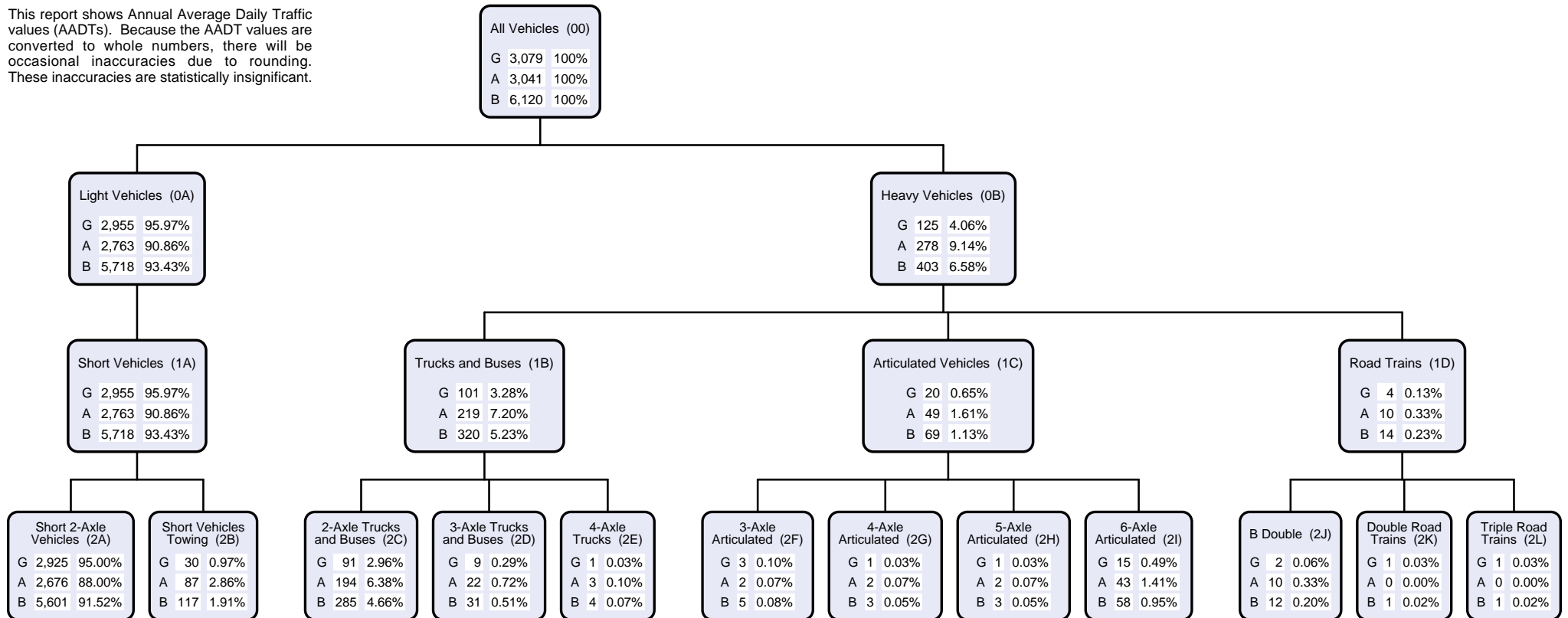
AADT Segment Analysis Report (Complete)

Area 403 - Far North District Road Section 32A - KENNEDY HIGHWAY (CAIRNS - MAREEBA)
Traffic Year 2020 - Data Collection Year 2018

The width of each Road Segment is proportional to its AADT.

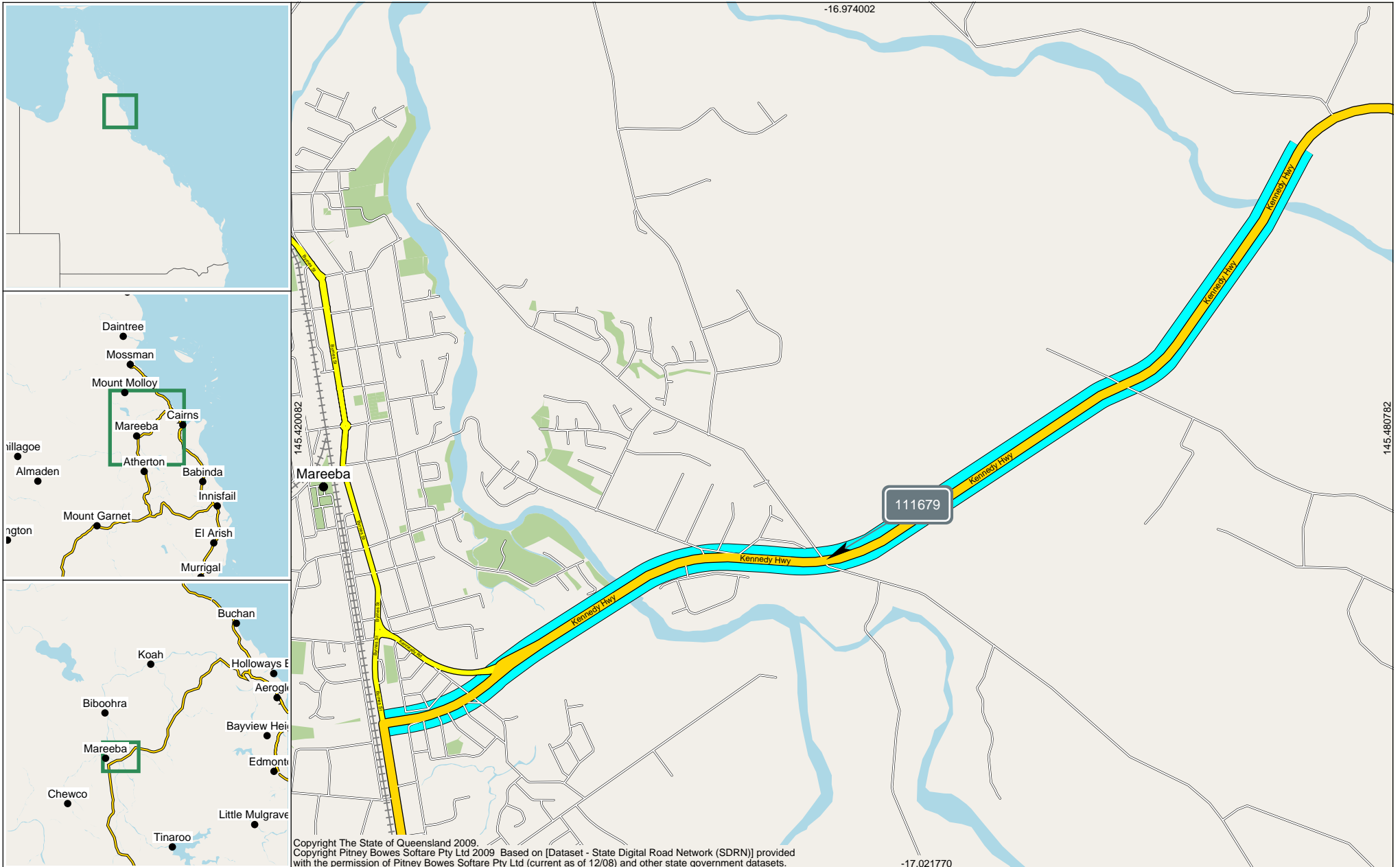


This report shows Annual Average Daily Traffic values (AADTs). Because the AADT values are converted to whole numbers, there will be occasional inaccuracies due to rounding. These inaccuracies are statistically insignificant.



AADT Segment Analysis Report (Complete)

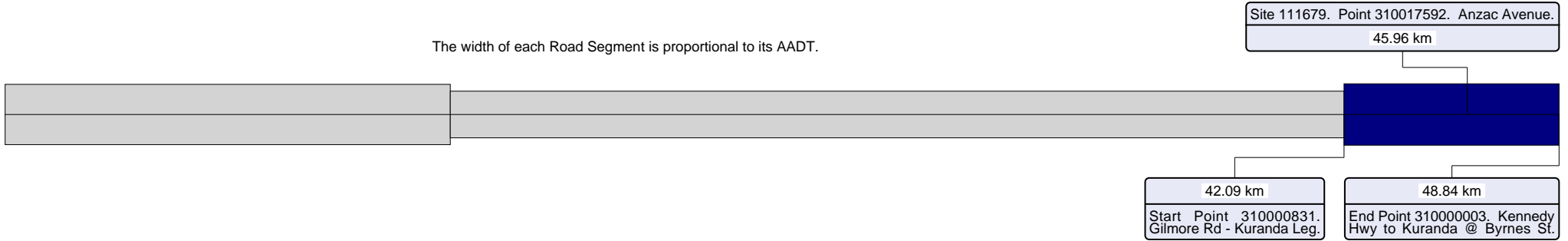
Area 403 - Far North District Road Section 32A - KENNEDY HIGHWAY (CAIRNS - MAREEBA)
Traffic Year 2020 - Data Collection Year 2020



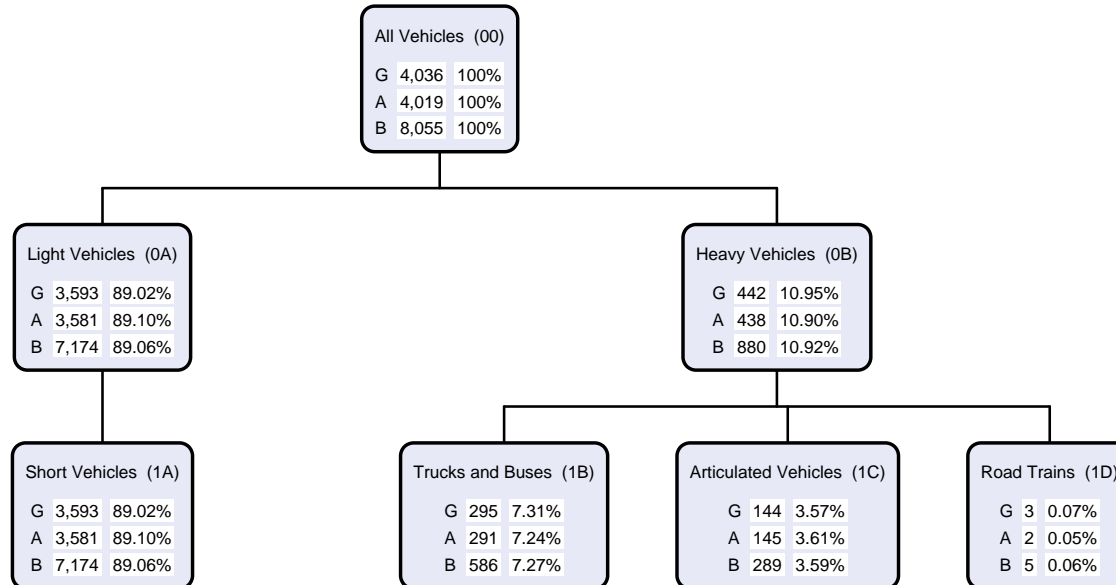
AADT Segment Analysis Report (Complete)

Area 403 - Far North District Road Section 32A - KENNEDY HIGHWAY (CAIRNS - MAREEBA)
Traffic Year 2020 - Data Collection Year 2020

The width of each Road Segment is proportional to its AADT.



This report shows Annual Average Daily Traffic values (AADTs). Because the AADT values are converted to whole numbers, there will be occasional inaccuracies due to rounding. These inaccuracies are statistically insignificant.



AADT Segment Report

Provides AADT Segment details for a Road Section together with the traffic flow data collected at the related Site. Traffic data is reported by the start and end Through Distance of the AADT Segments on each section of road. The road segments are represented diagrammatically with AADT data including:

AADT by direction of traffic flow
 VKT Vehicle Kilometres Travelled
 %VC Percentage Vehicle Class as per the Austroads vehicle classification scheme

Annual Average Daily Traffic (AADT)

Annual Average Daily Traffic (AADT) is the number of vehicles passing a point on a road in a 24 hour period, averaged over a calendar year.

AADT Segment

Is a subdivision of a Road Section. The boundaries of an AADT Segment are its Start Point and End Point (or Start and End Through Distance (TDist)) within the Road Section. These distances are measured in kilometres from the beginning of the Road Section in Gazettal Direction. AADT Segments are determined by the traffic volume, collected at a count Site, located within the limits of each AADT Segment.

Annual Segment Growth (when displayed)

A percentage that represents the increase or decrease in AADT for the AADT Segment, using an exponential fit, calculated over a 1, 5 or 10 year period.

Area

For administration purposes the Department of Transport and Main Roads has divided Queensland into 12 Districts. The Area field in TSDM reports displays the District Name and Number.

District Name	District
Central West District	401
Darling Downs District	402
Far North District	403
Fitzroy District	404
Mackay/Whitsunday District	405
Metropolitan District	406
North Coast District	407
North West District	409
Northern District	408
South Coast District	410
South West District	411
Wide Bay/Burnett District	412

Data Year

The most recent year the traffic data was collected for this AADT Segment.

Gazettal Direction

The Gazettal Direction is the direction of the traffic flow. It can be easily recognised by referring to the name of the road eg. Road Section: 10A Brisbane - Gympie denotes that the gazettal direction is from Brisbane to Gympie.

- G Traffic flowing in Gazettal Direction
- A Traffic flowing against Gazettal Direction
- B The combined traffic flow in both Directions

Road Section

Is the Gazetted road from which the traffic data is collected. Each Road Section is given a code, allocated sequentially in Gazettal Direction. Larger roads are broken down into sections and identified by an ID code with a suffix for easier data collection and reporting (eg. 10A, 10B, 10C). Road Sections are then broken into AADT Segments which are determined by traffic volume.

Site

The physical location of a traffic counting device. Sites are located at a specified Through Distance along a Road Section.

Site TDist

The Through Distance in gazettal direction from the start of the Road Section at which the site is located.

Site Description

The description of the physical location of the traffic counting device.

Start and End Point

The unique identifier for the Through Distance along a Road Section.

Through Distance

The distance, in kilometres, from the beginning of the Road Section in Gazettal Direction.

Traffic Class

Is the 12 Austroads vehicle categories or classes into which vehicles are placed or binned. Traffic classes are formed in a hierarchical format.

Volume or All Vehicles

00 = 0A + 0B

Light Vehicles

0A = 1A

1A = 2A + 2B

Heavy Vehicles

0B = 1B + 1C + 1D

1B = 2C + 2D + 2E

1C = 2F + 2G + 2H + 2I

1D = 2J + 2K + 2L

The following classes are the categories for which data can be captured:

Volume

00 All vehicles.

2-Bin

0A Light vehicles

0B Heavy vehicles

4-Bin

1A Short vehicles

1B Truck or bus

1C Articulated vehicles

1D Road train

12-Bin

2A Short 2 axle vehicles

2B Short vehicles towing

2C 2 axle truck or bus

2D 3 axle truck or bus

2E 4 axle truck

2F 3 axle articulated vehicle

2G 4 axle articulated vehicle

2H 5 axle articulated vehicle

2I 6 axle articulated vehicle

2J B double

2K Double road train

2L Triple road train

Vehicle Kilometres Travelled (VKT)

Daily VKT is a measure of the traffic demand. It is calculated by the length of an AADT Segment in kilometres multiplied by its AADT. The yearly VKT is the daily VKT multiplied by 365 days.

AADT Segment Summary - All Vehicles

The Total VKT can be used to gauge the demand on an entire Road Section.

AADT Segment Summary - Heavy Vehicles only

A blank field indicates that vehicle classification data was not collected for this AADT Segment.

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MetroCount Traffic Executive Class Speed Matrix

ClassMatrix-252 -- English (ENA)

Datasets:

Site: [Emerald End Rd] Intersection Hastie Rd @ Ch 165 <80>
Attribute: Mareeba
Direction: 7 - North bound A>B, South bound B>A. **Lane:** 0
Survey Duration: 12:47 Friday, 20 November 2020 => 12:14 Friday, 27 November 2020,
Zone:
File: Emerald End Rd 0 2020-11-27 1215.EC0 (Plus)
Identifier: FN47XFS5 MC56-L5 [MC55] (c)Microcom 19Oct04
Algorithm: Factory default axle (v5.07)
Data type: Axle sensors - Paired (Class/Speed/Count)

Profile:

Filter time: 12:48 Friday, 20 November 2020 => 12:14 Friday, 27 November 2020 (6.97693)
Included classes: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
Speed range: 10 - 160 km/h.
Direction: North, East, South, West (bound), P = North, Lane = 0-16
Separation: Headway > 0 sec, Span 0 - 100 metre
Name: Default Profile
Scheme: Vehicle classification (AustRoads94)
Units: Metric (metre, kilometre, m/s, km/h, kg, tonne)
In profile: Vehicles = 6754 / 6755 (99.99%)

Class Speed Matrix

ClassMatrix-252

Site: Emerald End Rd.0.1NS
Description: Intersection Hastie Rd @ Ch 165 <80>
Filter time: 12:48 Friday, 20 November 2020 => 12:14 Friday, 27 November 2020
Scheme: Vehicle classification (AustRoads94)
Filter: Cls(1-12) Dir(NESW) Sp(10,160) Headway(>0) Span(0 - 100) Lane(0-16)

km/h	Class												Total	
	SV 1	SVT 2	TB2 3	TB3 4	T4 5	ART3 6	ART4 7	ART5 8	ART6 9	BD 10	DRT 11	TRT 12		
10- 20	6	.	.	.	.	.	.	.	.	.	.	.	6	0.1%
20- 30	8	.	1	1	.	.	.	.	1	.	.	.	11	0.2%
30- 40	50	1	8	8	.	1	.	.	1	.	.	.	69	1.0%
40- 50	345	27	53	20	1	5	3	2	6	.	.	.	462	6.8%
50- 60	1951	80	214	28	6	16	7	1	4	2	.	.	2309	34.2%
60- 70	2387	62	225	10	3	4	10	.	2	2	.	.	2705	40.1%
70- 80	915	17	77	.	.	.	.	.	.	.	.	.	1009	14.9%
80- 90	128	2	22	.	.	.	.	.	.	.	.	.	152	2.3%
90-100	17	.	3	.	.	.	.	.	.	.	.	.	20	0.3%
100-110	9	.	.	.	.	.	.	.	.	.	.	.	9	0.1%
110-120	2	.	.	.	.	.	.	.	.	.	.	.	2	0.0%
120-130	.	.	.	.	.	.	.	.	.	.	.	.	0	0.0%
130-140	.	.	.	.	.	.	.	.	.	.	.	.	0	0.0%
140-150	.	.	.	.	.	.	.	.	.	.	.	.	0	0.0%
150-160	.	.	.	.	.	.	.	.	.	.	.	.	0	0.0%
Total	5818	189	603	67	10	26	20	3	14	4	0	0	6754	
	86.1%	2.8%	8.9%	1.0%	0.1%	0.4%	0.3%	0.0%	0.2%	0.1%	0.0%	0.0%		
ESA	0.0	0.0	1206.0	134.0	20.0	78.0	60.0	9.0	42.0	16.0	0.0	0.0	1565.0	
Raw axle	11636	672	1206	201	40	78	80	15	84	28	0	0	14040	
Single	11442	462	1206	67	0	78	40	3	18	4	0	0	13320	
T steer	1	0	0	0	10	0	0	0	0	0	0	0	11	
Double	103	105	0	67	10	0	20	6	18	12	0	0	341	
Triple	0	0	0	0	0	0	0	0	10	0	0	0	10	
Quad+	0	0	0	0	0	0	0	0	0	0	0	0	0	

Total vehicles = 6754, Total heavies = 747 (11.06%), Average ESA per heavy = 2.10
 Twinsteers = 1.47% of heavies, 0.16% of total.

MetroCount Traffic Executive Weekly Vehicle Counts (Virtual Week)

VirtWeeklyVehicle-251 -- English (ENA)

Datasets:

Site: [Emerald End Rd] Intersection Hastie Rd @ Ch 165 <80>
Attribute: Mareeba
Direction: 7 - North bound A>B, South bound B>A. **Lane:** 0
Survey Duration: 12:47 Friday, 20 November 2020 => 12:14 Friday, 27 November 2020,
Zone:
File: Emerald End Rd 0 2020-11-27 1215.EC0 (Plus)
Identifier: FN47XFS5 MC56-L5 [MC55] (c)Microcom 19Oct04
Algorithm: Factory default axle (v5.07)
Data type: Axle sensors - Paired (Class/Speed/Count)

Profile:

Filter time: 12:48 Friday, 20 November 2020 => 12:14 Friday, 27 November 2020 (6.97693)
Included classes: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
Speed range: 10 - 160 km/h.
Direction: North, East, South, West (bound), P = North, Lane = 0-16
Separation: Headway > 0 sec, Span 0 - 100 metre
Name: Default Profile
Scheme: Vehicle classification (AustRoads94)
Units: Metric (metre, kilometre, m/s, km/h, kg, tonne)
In profile: Vehicles = 6754 / 6755 (99.99%)

Weekly Vehicle Counts (Virtual Week)

VirtWeeklyVehicle-251

Site: Emerald End Rd.0.1NS
Description: Intersection Hastie Rd @ Ch 165 <80>
Filter time: 12:48 Friday, 20 November 2020 => 12:14 Friday, 27 November 2020
Scheme: Vehicle classification (AustRoads94)
Filter: Cls(1-12) Dir(NESW) Sp(10,160) Headway(>0) Span(0 - 100) Lane(0-16)

Hour	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Averages	
								1 - 5	1 - 7
0000-0100	0.0	0.0	0.0	0.0	0.0	1.0	3.0	0.0	0.6
0100-0200	2.0	2.0	1.0	2.0	1.0	0.0	7.0	1.6	2.1
0200-0300	0.0	1.0	0.0	0.0	2.0	0.0	2.0	0.6	0.7
0300-0400	0.0	0.0	1.0	2.0	1.0	0.0	0.0	0.8	0.6
0400-0500	5.0	8.0	5.0	3.0	3.0	1.0	1.0	4.8	3.7
0500-0600	27.0	27.0	25.0	21.0	25.0	9.0	4.0	25.0	19.7
0600-0700	47.0	51.0	47.0	52.0	50.0	23.0	9.0	49.4	39.9
0700-0800	98.0	82.0	89.0	98.0	84.0	41.0	22.0	90.2	73.4
0800-0900	100.0	109.0	78.0	88.0	95.0	66.0	44.0	94.0	82.9
0900-1000	67.0	62.0	59.0	62.0	76.0	72.0	71.0	65.2	67.0
1000-1100	70.0	91.0	61.0	88.0	64.0	86.0	72.0	74.8	76.0
1100-1200	70.0	81.0	53.0	68.0	83.0	75.0	66.0	71.0	70.9
1200-1300	63.0	54.0	60.0	52.0	7.0	55.0	61.0	40.5	44.9
1300-1400	59.0	66.0	57.0	68.0	74.0	58.0	39.0	64.8	60.1
1400-1500	63.0	66.0	76.0	59.0	73.0	60.0	54.0	67.4	64.4
1500-1600	82.0	79.0	83.0	88.0	95.0	50.0	56.0	85.4	76.1
1600-1700	97.0	88.0	79.0	82.0	82.0	66.0	59.0	85.6	79.0
1700-1800	92.0	97.0	85.0	92.0	77.0	53.0	53.0	88.6	78.4
1800-1900	47.0	48.0	49.0	48.0	57.0	55.0	42.0	49.8	49.4
1900-2000	16.0	28.0	24.0	40.0	31.0	21.0	26.0	27.8	26.6
2000-2100	11.0	18.0	11.0	21.0	18.0	20.0	18.0	15.8	16.7
2100-2200	9.0	17.0	19.0	6.0	16.0	27.0	10.0	13.4	14.9
2200-2300	3.0	2.0	4.0	3.0	12.0	18.0	5.0	4.8	6.7
2300-2400	1.0	2.0	0.0	1.0	10.0	10.0	2.0	2.8	3.7
Totals									
0700-1900	908.0	923.0	829.0	893.0	867.0	737.0	639.0	877.3	822.6
0600-2200	991.0	1037.0	930.0	1012.0	982.0	828.0	702.0	983.7	920.6
0600-0000	995.0	1041.0	934.0	1016.0	1004.0	856.0	709.0	991.3	931.0
0000-0000	1029.0	1079.0	966.0	1044.0	1036.0	867.0	726.0	1024.1	958.4
AM Peak	0800	0800	0700	0700	0800	1000	1000		
	100.0	109.0	89.0	98.0	95.0	86.0	72.0		
PM Peak	1600	1700	1700	1700	1500	1600	1200		
	97.0	97.0	85.0	92.0	95.0	66.0	61.0		

* - No data.

MetroCount Traffic Executive Class Speed Matrix

ClassMatrix-222 -- English (ENA)

Datasets:

Site: [Hastie Road] Intersection Kennedy Hwy @ Ch 95 <60>
Attribute: Mareeba
Direction: 7 - North bound A>B, South bound B>A. **Lane:** 0
Survey Duration: 13:32 Friday, 13 November 2020 => 11:50 Friday, 20 November 2020,
Zone:
File: Hastie Road 0 2020-11-20 1151.EC0 (Plus)
Identifier: TC57E7YJ MC5900-X13 (c)MetroCount 09Nov16
Algorithm: Factory default axle (v5.07)
Data type: Axle sensors - Paired (Class/Speed/Count)

Profile:

Filter time: 13:33 Friday, 13 November 2020 => 11:50 Friday, 20 November 2020 (6.92887)
Included classes: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
Speed range: 10 - 160 km/h.
Direction: North, East, South, West (bound), P = North, Lane = 0-16
Separation: Headway > 0 sec, Span 0 - 100 metre
Name: Default Profile
Scheme: Vehicle classification (AustRoads94)
Units: Metric (metre, kilometre, m/s, km/h, kg, tonne)
In profile: Vehicles = 7076 / 7081 (99.93%)

Class Speed Matrix

ClassMatrix-222

Site: Hastie Road.0.1NS
Description: Intersection Kennedy Hwy @ Ch 95 <60>
Filter time: 13:33 Friday, 13 November 2020 => 11:50 Friday, 20 November 2020
Scheme: Vehicle classification (AustRoads94)
Filter: Cls(1-12) Dir(NESW) Sp(10,160) Headway(>0) Span(0 - 100) Lane(0-16)

km/h	Class												Total	
	SV 1	SVT 2	TB2 3	TB3 4	T4 5	ART3 6	ART4 7	ART5 8	ART6 9	BD 10	DRT 11	TRT 12		
10- 20	68	.	5	1	.	.	.	.	.	.	.	.	74	1.0%
20- 30	126	1	5	5	.	.	.	.	1	.	.	.	138	2.0%
30- 40	165	14	48	26	9	1	4	1	7	.	.	.	275	3.9%
40- 50	1709	99	252	43	18	6	13	4	10	2	.	.	2156	30.5%
50- 60	3202	81	308	9	3	8	5	3	1	.	.	.	3620	51.2%
60- 70	690	18	48	.	1	.	.	.	.	.	.	.	757	10.7%
70- 80	41	.	6	.	.	.	.	.	.	.	.	.	47	0.7%
80- 90	4	.	1	.	.	.	.	.	.	.	.	.	5	0.1%
90-100	3	.	.	.	.	.	.	.	.	.	.	.	3	0.0%
100-110	1	.	.	.	.	.	.	.	.	.	.	.	1	0.0%
110-120	.	.	.	.	.	.	.	.	.	.	.	.	0	0.0%
120-130	.	.	.	.	.	.	.	.	.	.	.	.	0	0.0%
130-140	.	.	.	.	.	.	.	.	.	.	.	.	0	0.0%
140-150	.	.	.	.	.	.	.	.	.	.	.	.	0	0.0%
150-160	.	.	.	.	.	.	.	.	.	.	.	.	0	0.0%
Total	6009	213	673	84	31	15	22	8	19	2	0	0	7076	
	84.9%	3.0%	9.5%	1.2%	0.4%	0.2%	0.3%	0.1%	0.3%	0.0%	0.0%	0.0%		
ESA	0.0	0.0	1346.0	168.0	62.0	45.0	66.0	24.0	57.0	8.0	0.0	0.0	1776.0	
Raw axle	12018	723	1346	252	125	45	88	40	114	14	0	0	14765	
Single	11800	555	1346	84	0	45	44	8	26	2	0	0	13910	
T steer	1	0	0	0	31	0	0	0	0	2	0	0	34	
Double	112	84	1	84	30	0	22	16	26	4	0	0	379	
Triple	0	0	0	0	1	0	0	0	12	0	0	0	13	
Quad+	0	0	0	0	0	0	0	0	0	0	0	0	0	

Total vehicles = 7076, Total heavies = 854 (12.07%), Average ESA per heavy = 2.08
 Twinsteers = 3.98% of heavies, 0.48% of total.

MetroCount Traffic Executive Weekly Vehicle Counts (Virtual Week)

VirtWeeklyVehicle-223 -- English (ENA)

Datasets:

Site: [Hastie Road] Intersection Kennedy Hwy @ Ch 95 <60>
Attribute: Mareeba
Direction: 7 - North bound A>B, South bound B>A. **Lane:** 0
Survey Duration: 13:32 Friday, 13 November 2020 => 11:50 Friday, 20 November 2020,
Zone:
File: Hastie Road 0 2020-11-20 1151.EC0 (Plus)
Identifier: TC57E7YJ MC5900-X13 (c)MetroCount 09Nov16
Algorithm: Factory default axle (v5.07)
Data type: Axle sensors - Paired (Class/Speed/Count)

Profile:

Filter time: 13:33 Friday, 13 November 2020 => 11:50 Friday, 20 November 2020 (6.92887)
Included classes: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
Speed range: 10 - 160 km/h.
Direction: North, East, South, West (bound), P = North, Lane = 0-16
Separation: Headway > 0 sec, Span 0 - 100 metre
Name: Default Profile
Scheme: Vehicle classification (AustRoads94)
Units: Metric (metre, kilometre, m/s, km/h, kg, tonne)
In profile: Vehicles = 7076 / 7081 (99.93%)

Weekly Vehicle Counts (Virtual Week)

VirtWeeklyVehicle-223

Site: Hastie Road.0.1NS
Description: Intersection Kennedy Hwy @ Ch 95 <60>
Filter time: 13:33 Friday, 13 November 2020 => 11:50 Friday, 20 November 2020
Scheme: Vehicle classification (AustRoads94)
Filter: Cls(1-12) Dir(NESW) Sp(10,160) Headway(>0) Span(0 - 100) Lane(0-16)

Hour	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Averages	
								1 - 5	1 - 7
0000-0100	1.0	0.0	0.0	6.0	4.0	3.0	0.0	2.2	2.0
0100-0200	1.0	0.0	1.0	1.0	0.0	2.0	6.0	0.6	1.6
0200-0300	1.0	1.0	1.0	0.0	1.0	2.0	5.0	0.8	1.6
0300-0400	2.0	3.0	3.0	3.0	1.0	0.0	3.0	2.4	2.1
0400-0500	8.0	6.0	9.0	7.0	8.0	6.0	3.0	7.6	6.7
0500-0600	31.0	37.0	46.0	34.0	31.0	8.0	11.0	35.8	28.3
0600-0700	69.0	81.0	71.0	71.0	73.0	29.0	18.0	73.0	58.9
0700-0800	80.0	79.0	77.0	89.0	59.0	39.0	26.0	76.8	64.1
0800-0900	76.0	69.0	90.0	79.0	86.0	63.0	48.0	80.0	73.0
0900-1000	64.0	56.0	70.0	59.0	64.0	88.0	88.0	62.6	69.9
1000-1100	47.0	46.0	60.0	77.0	73.0	87.0	83.0	60.6	67.6
1100-1200	37.0	63.0	78.0	46.0	28.0	79.0	77.0	50.4	58.3
1200-1300	47.0	61.0	47.0	57.0	*	64.0	59.0	53.0	55.8
1300-1400	44.0	49.0	58.0	69.0	35.0	44.0	57.0	51.0	50.9
1400-1500	64.0	60.0	66.0	59.0	70.0	54.0	82.0	63.8	65.0
1500-1600	69.0	86.0	101.0	95.0	86.0	61.0	71.0	87.4	81.3
1600-1700	87.0	102.0	97.0	99.0	104.0	75.0	82.0	97.8	92.3
1700-1800	123.0	102.0	103.0	89.0	112.0	73.0	52.0	105.8	93.4
1800-1900	57.0	61.0	69.0	55.0	63.0	42.0	59.0	61.0	58.0
1900-2000	24.0	29.0	23.0	31.0	37.0	33.0	29.0	28.8	29.4
2000-2100	38.0	15.0	21.0	21.0	22.0	22.0	20.0	23.4	22.7
2100-2200	8.0	19.0	22.0	12.0	31.0	25.0	11.0	18.4	18.3
2200-2300	6.0	14.0	20.0	5.0	12.0	18.0	8.0	11.4	11.9
2300-2400	3.0	7.0	9.0	3.0	6.0	11.0	2.0	5.6	5.9
Totals									
0700-1900	795.0	834.0	916.0	873.0	*	769.0	784.0	850.2	829.5
0600-2200	934.0	978.0	1053.0	1008.0	*	878.0	862.0	993.8	958.8
0600-0000	943.0	999.0	1082.0	1016.0	*	907.0	872.0	1010.8	976.5
0000-0000	987.0	1046.0	1142.0	1067.0	*	928.0	900.0	1060.2	1018.8
AM Peak	0700	0600	0800	0700	0800	0900	0900		
	80.0	81.0	90.0	89.0	86.0	88.0	88.0		
PM Peak	1700	1700	1700	1600	*	1600	1600		
	123.0	102.0	103.0	99.0	*	75.0	82.0		

* - No data.

MetroCount Traffic Executive Class Speed Matrix

ClassMatrix-225 -- English (ENA)

Datasets:

Site: [Hastie Road] Intersection Kennedy Hwy @ Ch. 1505 <50>
Attribute: Mareeba
Direction: 7 - North bound A>B, South bound B>A. **Lane:** 0
Survey Duration: 13:52 Friday, 13 November 2020 => 11:47 Friday, 20 November 2020,
Zone:
File: Hastie Road 0 2020-11-20 1148.EC0 (Plus)
Identifier: N2222EFP MC56-L5 [MC55] (c)Microcom 19Oct04
Algorithm: Factory default axle (v5.07)
Data type: Axle sensors - Paired (Class/Speed/Count)

Profile:

Filter time: 13:53 Friday, 13 November 2020 => 11:47 Friday, 20 November 2020 (6.91307)
Included classes: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
Speed range: 10 - 160 km/h.
Direction: North, East, South, West (bound), P = North, Lane = 0-16
Separation: Headway > 0 sec, Span 0 - 100 metre
Name: Default Profile
Scheme: Vehicle classification (AustRoads94)
Units: Metric (metre, kilometre, m/s, km/h, kg, tonne)
In profile: Vehicles = 7073 / 7077 (99.94%)

Class Speed Matrix

ClassMatrix-225

Site: Hastie Road.0.1NS
Description: Intersection Kennedy Hwy @ Ch. 1505 <50>
Filter time: 13:53 Friday, 13 November 2020 => 11:47 Friday, 20 November 2020
Scheme: Vehicle classification (AustRoads94)
Filter: Cls(1-12) Dir(NESW) Sp(10,160) Headway(>0) Span(0 - 100) Lane(0-16)

km/h	Class												Total	
	SV 1	SVT 2	TB2 3	TB3 4	T4 5	ART3 6	ART4 7	ART5 8	ART6 9	BD 10	DRT 11	TRT 12		
10- 20	55	.	5	3	.	.	.	.	.	.	.	.	63	0.9%
20- 30	106	2	25	1	1	.	.	.	.	.	.	.	135	1.9%
30- 40	404	7	40	.	.	1	2	.	1	.	.	.	455	6.4%
40- 50	2705	48	206	5	.	7	3	.	5	.	.	.	2979	42.1%
50- 60	2625	36	245	1	.	6	5	2	.	.	.	.	2920	41.3%
60- 70	433	6	41	.	.	.	2	.	.	.	.	.	482	6.8%
70- 80	30	1	6	.	.	.	.	.	.	.	.	.	37	0.5%
80- 90	2	.	.	.	.	.	.	.	.	.	.	.	2	0.0%
90-100	.	.	.	.	.	.	.	.	.	.	.	.	0	0.0%
100-110	.	.	.	.	.	.	.	.	.	.	.	.	0	0.0%
110-120	.	.	.	.	.	.	.	.	.	.	.	.	0	0.0%
120-130	.	.	.	.	.	.	.	.	.	.	.	.	0	0.0%
130-140	.	.	.	.	.	.	.	.	.	.	.	.	0	0.0%
140-150	.	.	.	.	.	.	.	.	.	.	.	.	0	0.0%
150-160	.	.	.	.	.	.	.	.	.	.	.	.	0	0.0%
Total	6360	100	568	10	1	14	12	2	6	0	0	0	7073	
	89.9%	1.4%	8.0%	0.1%	0.0%	0.2%	0.2%	0.0%	0.1%	0.0%	0.0%	0.0%		
ESA	0.0	0.0	1136.0	20.0	2.0	42.0	36.0	6.0	18.0	0.0	0.0	0.0	1260.0	
Raw axle	12720	343	1136	30	4	42	48	10	36	0	0	0	14369	
Single	12514	257	1136	10	0	42	24	2	6	0	0	0	13991	
T steer	0	0	0	0	1	0	0	0	0	0	0	0	1	
Double	106	43	0	10	1	0	12	4	6	0	0	0	182	
Triple	0	0	0	0	0	0	0	0	6	0	0	0	6	
Quad+	0	0	0	0	0	0	0	0	0	0	0	0	0	

Total vehicles = 7073, Total heavies = 613 (8.67%), Average ESA per heavy = 2.06
 Twinsteers = 0.16% of heavies, 0.01% of total.

MetroCount Traffic Executive Weekly Vehicle Counts (Virtual Week)

VirtWeeklyVehicle-224 -- English (ENA)

Datasets:

Site: [Hastie Road] Intersection Kennedy Hwy @ Ch. 1505 <50>
Attribute: Mareeba
Direction: 7 - North bound A>B, South bound B>A. **Lane:** 0
Survey Duration: 13:52 Friday, 13 November 2020 => 11:47 Friday, 20 November 2020,
Zone:
File: Hastie Road 0 2020-11-20 1148.EC0 (Plus)
Identifier: N2222EFP MC56-L5 [MC55] (c)Microcom 19Oct04
Algorithm: Factory default axle (v5.07)
Data type: Axle sensors - Paired (Class/Speed/Count)

Profile:

Filter time: 13:53 Friday, 13 November 2020 => 11:47 Friday, 20 November 2020 (6.91307)
Included classes: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
Speed range: 10 - 160 km/h.
Direction: North, East, South, West (bound), P = North, Lane = 0-16
Separation: Headway > 0 sec, Span 0 - 100 metre
Name: Default Profile
Scheme: Vehicle classification (AustRoads94)
Units: Metric (metre, kilometre, m/s, km/h, kg, tonne)
In profile: Vehicles = 7073 / 7077 (99.94%)

Weekly Vehicle Counts (Virtual Week)

VirtWeeklyVehicle-224

Site: Hastie Road.0.1NS
Description: Intersection Kennedy Hwy @ Ch. 1505 <50>
Filter time: 13:53 Friday, 13 November 2020 => 11:47 Friday, 20 November 2020
Scheme: Vehicle classification (AustRoads94)
Filter: Cls(1-12) Dir(NESW) Sp(10,160) Headway(>0) Span(0 - 100) Lane(0-16)

Hour	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Averages	
								1 - 5	1 - 7
0000-0100	0.0	0.0	0.0	2.0	2.0	1.0	0.0	0.8	0.7
0100-0200	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.1
0200-0300	0.0	0.0	2.0	0.0	0.0	0.0	1.0	0.4	0.4
0300-0400	0.0	2.0	0.0	2.0	1.0	0.0	1.0	1.0	0.9
0400-0500	8.0	5.0	8.0	6.0	7.0	7.0	0.0	6.8	5.9
0500-0600	23.0	21.0	39.0	31.0	24.0	10.0	6.0	27.6	22.0
0600-0700	41.0	36.0	48.0	40.0	43.0	25.0	12.0	41.6	35.0
0700-0800	74.0	77.0	68.0	80.0	78.0	51.0	12.0	75.4	62.9
0800-0900	96.0	99.0	101.0	117.0	122.0	68.0	34.0	107.0	91.0
0900-1000	74.0	73.0	54.0	71.0	65.0	94.0	80.0	67.4	73.0
1000-1100	61.0	58.0	56.0	66.0	78.0	103.0	77.0	63.8	71.3
1100-1200	67.0	60.0	65.0	81.0	43.0	74.0	75.0	63.2	66.4
1200-1300	68.0	63.0	72.0	57.0	*	95.0	38.0	65.0	65.5
1300-1400	61.0	42.0	60.0	68.0	9.0	67.0	43.0	48.0	50.0
1400-1500	72.0	67.0	92.0	63.0	75.0	56.0	50.0	73.8	67.9
1500-1600	69.0	94.0	100.0	93.0	97.0	49.0	65.0	90.6	81.0
1600-1700	95.0	74.0	74.0	90.0	92.0	73.0	70.0	85.0	81.1
1700-1800	95.0	117.0	111.0	121.0	107.0	69.0	57.0	110.2	96.7
1800-1900	64.0	103.0	82.0	57.0	96.0	51.0	61.0	80.4	73.4
1900-2000	23.0	39.0	25.0	34.0	39.0	34.0	34.0	32.0	32.6
2000-2100	24.0	24.0	20.0	26.0	19.0	10.0	15.0	22.6	19.7
2100-2200	12.0	15.0	10.0	9.0	7.0	16.0	7.0	10.6	10.9
2200-2300	5.0	9.0	4.0	3.0	4.0	12.0	9.0	5.0	6.6
2300-2400	2.0	6.0	4.0	4.0	9.0	7.0	2.0	5.0	4.9
Totals									
0700-1900	896.0	927.0	935.0	964.0	*	850.0	662.0	929.8	880.2
0600-2200	996.0	1041.0	1038.0	1073.0	*	935.0	730.0	1036.6	978.4
0600-0000	1003.0	1056.0	1046.0	1080.0	*	954.0	741.0	1046.6	989.8
0000-0000	1034.0	1084.0	1095.0	1121.0	*	972.0	750.0	1083.2	1019.8
AM Peak	0800	0800	0800	0800	0800	1000	0900		
	96.0	99.0	101.0	117.0	122.0	103.0	80.0		
PM Peak	1700	1700	1700	1700	*	1200	1600		
	95.0	117.0	111.0	121.0	*	95.0	70.0		

* - No data.



Emerald End Rd - TC Location Ch 165

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Hastie Rd - TC Location Ch 95

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Hastie Rd - TC Location Ch 1505

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Appendix B

Generated Traffic Volumes and Assumptions

WITH DEVELOPMENT - AM PEAK - TRAFFIC GENERATION AND MOVEMENT SPLIT ASSUMPTIONS

APPROACH	Traffic Count Bidirectional	% Bidirectional Contributing	No. Bidirectional Contributing	% Vol entering intersection	No. Vol entering intersection	% of Vol corresponding to Movements	IN				Out				Through NB / EB		Through SB / WB		IN		Out	
							Left		Right		Left		Right		% No.	% No.	% No.	% No.	Left		Right	
							%	No.	%	No.	%	No.	%	No.					%	No.	%	No.
INTERSECTION 1 - NEW INTERSECTION - EMERALD END ROAD AND GODFREY ROAD																						
Proposed development traffic	159	100%	159	50%	79.5	AM 70% Left Out 20% Right Out 5% Left In 5% Right In	5%	4	5%	4	70%	56	20%	16								
Existing Emerald End Road Traffic both directions	93	100%	93	100%	93	50% North bound 50% South bound									50%	47	50%	47				
INTERSECTION 2 - EXISTING INTERSECTION - HASTIE ROAD AND EMERALD END ROAD																						
Coming from Intersection 1 Through traffic from Emerald End Rd and Left out of new Development Godfrey Rd	102	100%	102	100%	102	50% right out 50% Left out					50%	51	50%	51								
Hastie Rd 1505 TC 50% enter intersection, rest go to Ceola Dr	106	50%	53	50%	26	90% through EB 10% Left in	10%	3							90%	24						
Hastie Rd 95 TC 50% enter intersection, rest go to Kennedy Hwy	81	50%	40	50%	20	90% through WB 10% Right In			10%	2						90%	18					
INTERSECTION 3 - EXISTING INTERSECTION - KENNEDY HWY AND HASTIE ROAD																						
Coming from South (Peak Hour AADT/2)	842.3	50%	421.15	100%	421.15	80% though SB 5% left into Tinaroo Ck 15% right into Hastie Rd			15%	63					80%	337	5%	21				
Coming from North (Peak Hour AADT/2)	842.3	50%	421.15	100%	421.15	80% though NB 5% right into Tinaroo Ck 15% left into Hastie Rd	15%	63						80%	337			5%	21			
Hastie Rd 95 TC 80% enter intersection, rest go to Mareeba Town	136	80%	109	100%	109	50% left onto Kennedy Hwy (Nth) 50% right onto Kennedy Hwy (Sth)					50%	54	50%	54								
Tinaroo Crk	50	100%	50	100%	50	50% left onto Kennedy Hwy (Sth) 50% right onto Kennedy Hwy (Nth)													50%	25	50%	25

WITH DEVELOPMENT - PM PEAK - TRAFFIC GENERATION AND MOVEMENT SPLIT ASSUMPTIONS

APPROACH	Traffic Count Bidirectional	% Bidirectional Contributing	No. Bidirectional Contributing	% Vol entering intersection	No. Vol entering intersection	% of Vol corresponding to Movements	IN				Out				Through NB / EB		Through SB / WB		IN				Out			
							Left		Right		Left		Right		% No.	% No.	Left		Right		% No.	% No.	Left		Right	
							%	No.	%	No.	%	No.	%	No.			%	No.	%	No.			%	No.	%	No.	%	No.
INTERSECTION 1 - NEW INTERSECTION - EMERALD END ROAD AND GODFREY ROAD																										
Proposed development traffic	159	100%	159	50%	79.5	AM 5% Left Out 5% Right Out 20% Left In 70% Right In	20%	16	70%	56	5%	4	5%	4												
Existing Emerald End Road Traffic both directions	89	100%	89	100%	89	50% North bound 50% South bound								50%	44	50%	44									
INTERSECTION 2 - EXISTING INTERSECTION - HASTIE ROAD AND EMERALD END ROAD																										
Coming from Intersection 1 Through traffic from Emerald End Rd and Left out of new Development Godfrey Rd	48	100%	48	100%	48	50% Right in 50% Left in	50%	24	50%	24																
Hastie Rd 1505 TC 50% enter intersecion, rest go to Ceola Dr	116	50%	58	50%	29	90% through WB 10% Right out					10%	3				90%	26									
Hastie Rd 95 TC 50% enter intersecion, rest go to Kennedy Hwy	108	50%	54	50%	27	90% through EB 10% Left out				10%	3			90%	24											
INTERSECTION 3 - EXISTING INTERSECTION - KENNEDY HWY AND HASTIE ROAD																										
Coming from South (Peak Hour AADT/2)	842.3	50%	421.15	100%	421.15	80% through NB 5% left into Tinaroo Ck 15% right into Hastie Rd				15%	63			80%	337					5%	21					
Coming from North (Peak Hour AADT/2)	842.3	50%	421.15	100%	421.15	80% through SB 5% left out of Tinaroo Ck 15% right out of Hastie Rd					15%	63			80%	337				5%	21					
Hastie Rd 95 TC 80% enter intersecion, rest go to Mareeba Town	163	80%	131	100%	131	50% left into Hastie Rd 50% right into Hastie Rd	50%	65	50%	65																
Tinaroo Crk	50	100%	50	100%	50	50% left into Tinaroo Crk 50% right into Tinaroo Crk											50%	25	50%	25						

WITH DEVELOPMENT - AM PEAK - GENERATED AND PROJECTED TRAFFIC VOLUMES

INTERSECTION 1 - NEW INTERSECTION - EMERALD END ROAD AND GODFREY ROAD			
Approach	Turn	Base Case (2023)	Future Case (2033)
Emerald End Rd (North)	Left	4	5
	Through	47	54
Godfrey Rd	Right	16	18
	Left	56	65
Emerald End Rd (South)	Right	4	5
	Through	47	54
INTERSECTION 2 - EXISTING INTERSECTION - HASTIE ROAD AND EMERALD END ROAD			
Approach	Turn	Base Case (2023)	Future Case (2033)
Hastie Rd (West)	Left	3	3
	Through	24	28
Emerald End Rd	Right	51	59
	Left	51	59
Hastie Rd (East)	Right	2	2
	Through	18	21
INTERSECTION 3 - EXISTING INTERSECTION - KENNEDY HWY AND HASTIE ROAD			
Approach	Turn	Base Case (2023)	Future Case (2033)
Hastie Rd (West)	Left	54	63
	Right	54	63
Kennedy Hwy (Nth)	Right	63	73
	Through	337	391
	Left	21	24
Kennedy Hwy (Sth)	Right	21	24
	Through	337	391
	Left	63	73
Tinaroo Crk (East)	Right	25	29
	Left	25	29

WITH DEVELOPMENT - PM PEAK - GENERATED AND PROJECTED TRAFFIC VOLUMES			
INTERSECTION 1 - NEW INTERSECTION - EMERALD END ROAD AND GODFREY ROAD			
Approach	Turn	Base Case (2023)	Future Case (2033)
Emerald End Rd (North)	Left	16	18
	Through	44	52
Godfrey Rd	Right	4	5
	Left	4	5
Emerald End Rd (South)	Right	56	65
	Through	44	52
INTERSECTION 2 - EXISTING INTERSECTION - HASTIE ROAD AND EMERALD END ROAD			
Approach	Turn	Base Case (2023)	Future Case (2033)
Hastie Rd (West)	Left	24	28
	Through	24	28
Emerald End Rd	Right	3	3
	Left	3	3
Hastie Rd (East)	Right	24	28
	Through	26	30
INTERSECTION 3 - EXISTING INTERSECTION - KENNEDY HWY AND HASTIE ROAD			
Approach	Turn	Base Case (2023)	Future Case (2033)
Hastie Rd (West)	Left	63	73
	Right	63	73
Kennedy Hwy (Nth)	Right	65	76
	Through	337	391
	Left	25	29
Kennedy Hwy (Sth)	Right	25	29
	Through	337	391
	Left	65	76
Tinaroo Crk (East)	Right	21	24
	Left	21	24

WITHOUT DEVELOPMENT CASE - AM PEAK - TRAFFIC GENERATION AND MOVEMENT SPLIT

APPROACH	Traffic Count Bidirectional	% Bidirectional Contributing	No. Bidirectional Contributing	% Vol entering intersection	No. Vol entering intersection	% of Vol corresponding to Movements	IN				Out				Through NB / EB		Through SB / WB		IN				Out			
							Left		Right		Left		Right		% No.	% No.	% No.	% No.	Left		Right		Left		Right	
							%	No.	%	No.	%	No.	%	No.					%	No.	%	No.	%	No.	%	No.
INTERSECTION 2 - EXISTING INTERSECTION - HASTIE ROAD AND EMERALD END ROAD																										
Coming from Intersection 1 Through traffic from Emerald End Rd and Left out of new Development Godfrey Rd	47	100%	47	100%	47	50% right out 50% Left out					50%	23	50%	23												
Hastie Rd 1505 TC 50% enter intersection, rest go to Ceola Dr	106	50%	53	50%	26	90% through EB 10% Left in	10%	3							90%	24										
Hastie Rd 95 TC 50% enter intersection, rest go to Kennedy Hwy	81	50%	40	50%	20	90% through WB 10% Right In			10%	2							90%	18								
INTERSECTION 3 - EXISTING INTERSECTION - KENNEDY HWY AND HASTIE ROAD																										
Coming from South (Peak Hour AADT/2)	842.3	50%	421.15	100%	421.15	80% though SB 5% left into Tinaroo Ck 15% right into Hastie Rd			15%	63					80%	337			5%	21						
Coming from North (Peak Hour AADT/2)	842.3	50%	421.15	100%	421.15	80% though NB 5% right into Tinaroo Ck 15% left into Hastie Rd	15%	63						80%	336.92					5%	21					
Hastie Rd 95 TC 80% enter intersection, rest go to Mareeba Town	81	80%	64	100%	64	50% left onto Kennedy Hwy (Nth) 50% right onto Kennedy Hwy (Sth)					50%	32	50%	32												
Tinaroo Crk	50	100%	50	100%	50	50% left onto Kennedy Hwy (Sth) 50% right onto Kennedy Hwy (Nth)														50%	25	50%	25			

WITHOUT DEVELOPMENT CASE - PM PEAK - TRAFFIC GENERATION AND MOVEMENT SPLIT

APPROACH	Traffic Count Bidirectional	% Bidirectional Contributing	No. Bidirectional Contributing	% Vol entering intersection	No. Vol entering intersection	% of Vol corresponding to Movements	IN				Out				Through NB / EB		Through SB / WB		IN				Out			
							Left		Right		Left		Right		%	No.	%	No.	Left		Right		Left		Right	
							%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.
INTERSECTION 2 - EXISTING INTERSECTION - HASTIE ROAD AND EMERALD END ROAD																										
Coming from Intersection 1 Through traffic from Emerald End Rd and Left out of new Development Godfrey Rd	44	100%	44	100%	44	50% Right in 50% Left in	50%	22	50%	22																
Hastie Rd 1505 TC 50% enter intersection, rest go to Ceola Dr	116	50%	58	50%	29	90% through WB 10% Right out					10%	3				90%	26									
Hastie Rd 95 TC 50% enter intersection, rest go to Kennedy Hwy	108	50%	54	50%	27	90% through EB 10% Left out				10%	3			90%	24											
INTERSECTION 3 - EXISTING INTERSECTION - KENNEDY HWY AND HASTIE ROAD																										
Coming from South (Peak Hour AADT/2)	842.3	50%	421.15	100%	421	80% through NB 5% left into Tinaroo Ck 15% right into Hastie Rd				15%	63			80%	337					5%	21					
Coming from North (Peak Hour AADT/2)	842.3	50%	421.15	100%	421.15	80% through SB 5% left out of Tinaroo Ck 15% right out of Hastie Rd				15%	63			80%	337					5%	21					
Hastie Rd 95 TC 80% enter intersection, rest go to Mareeba Town	108	80%	86	100%	86	50% left into Hastie Rd 50% right into Hastie Rd	50%	43	50%	43																
Tinaroo Crk	50	100%	50	100%	50	50% left into Tinaroo Crk 50% right into Tinaroo Crk										50%	25	50%	25							

WITHOUT DEVELOPMENT CASE - AM PEAK - GENERATED AND PROJECTED TRAFFIC VOLUMES

INTERSECTION 2 - EXISTING INTERSECTION - HASTIE ROAD AND EMERALD END ROAD			
Approach	Turn	Base Case (2023)	Future Case (2033)
Hastie Rd (West)	Left	3	3
	Through	24	28
Emerald End Rd	Right	23	27
	Left	23	27
Hastie Rd (East)	Right	2	2
	Through	18	21
INTERSECTION 3 - EXISTING INTERSECTION - KENNEDY HWY AND HASTIE ROAD			
Approach	Turn	Base Case (2023)	Future Case (2033)
Hastie Rd (West)	Left	32	37
	Right	32	37
Kennedy Hwy (Nth)	Right	63	73
	Through	337	391
	Left	21	24
Kennedy Hwy (Sth)	Right	21	24
	Through	337	391
	Left	63	73
Tinaroo Crk (East)	Right	25	29
	Left	25	29

WITHOUT DEVELOPMENT CASE - PM PEAK - GENERATED AND PROJECTED TRAFFIC VOLUMES

INTERSECTION 2 - EXISTING INTERSECTION - HASTIE ROAD AND EMERALD END ROAD			
Approach	Turn	Base Case (2023)	Future Case (2033)
Hastie Rd (West)	Left	22	26
	Through	24	28
Emerald End Rd	Right	3	3
	Left	3	3
Hastie Rd (East)	Right	22	26
	Through	26	30
INTERSECTION 3 - EXISTING INTERSECTION - KENNEDY HWY AND HASTIE ROAD			
Approach	Turn	Base Case (2023)	Future Case (2033)
Hastie Rd (West)	Left	63	73
	Right	63	73
Kennedy Hwy (Nth)	Right	43	50
	Through	337	391
	Left	25	29
Kennedy Hwy (Sth)	Right	25	29
	Through	337	391
	Left	43	50
Tinaroo Crk (East)	Right	21	24
	Left	21	24

Appendix C

Traffic Volumes and Movements Diagrams

MOVEMENT FLOWS FOR SITE (INPUT)

Approach movement input flow rates (veh/h)

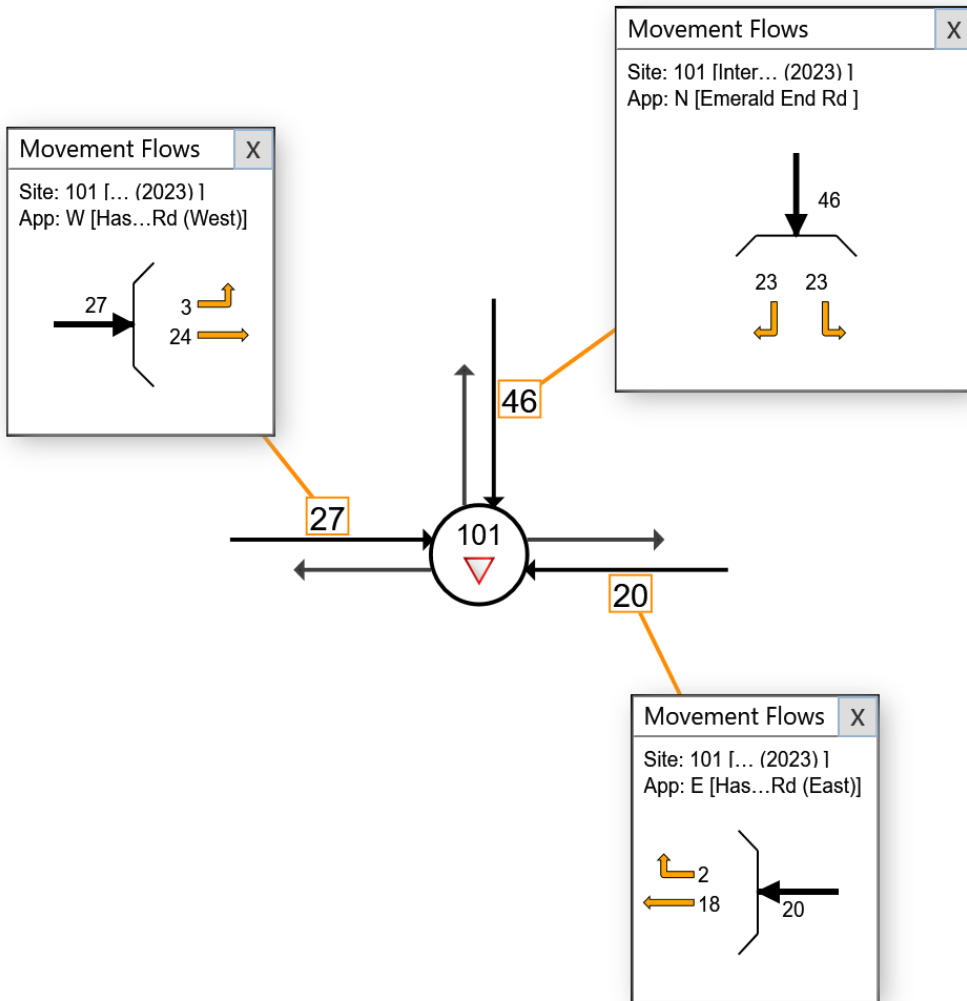
All Movement Classes

▼ Site: 101 [Intersection 2 - Emerald End Rd and Hastie Rd (2023) (Site Folder: Base Case (Without) 2023 - AM Peak)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Use the button below to open or close all popup boxes. Click value labels to open selected ones.
Click and drag popup boxes to move to preferred positions.

Close All Popups



MOVEMENT FLOWS FOR SITE (INPUT)

Approach movement input flow rates (veh/h)

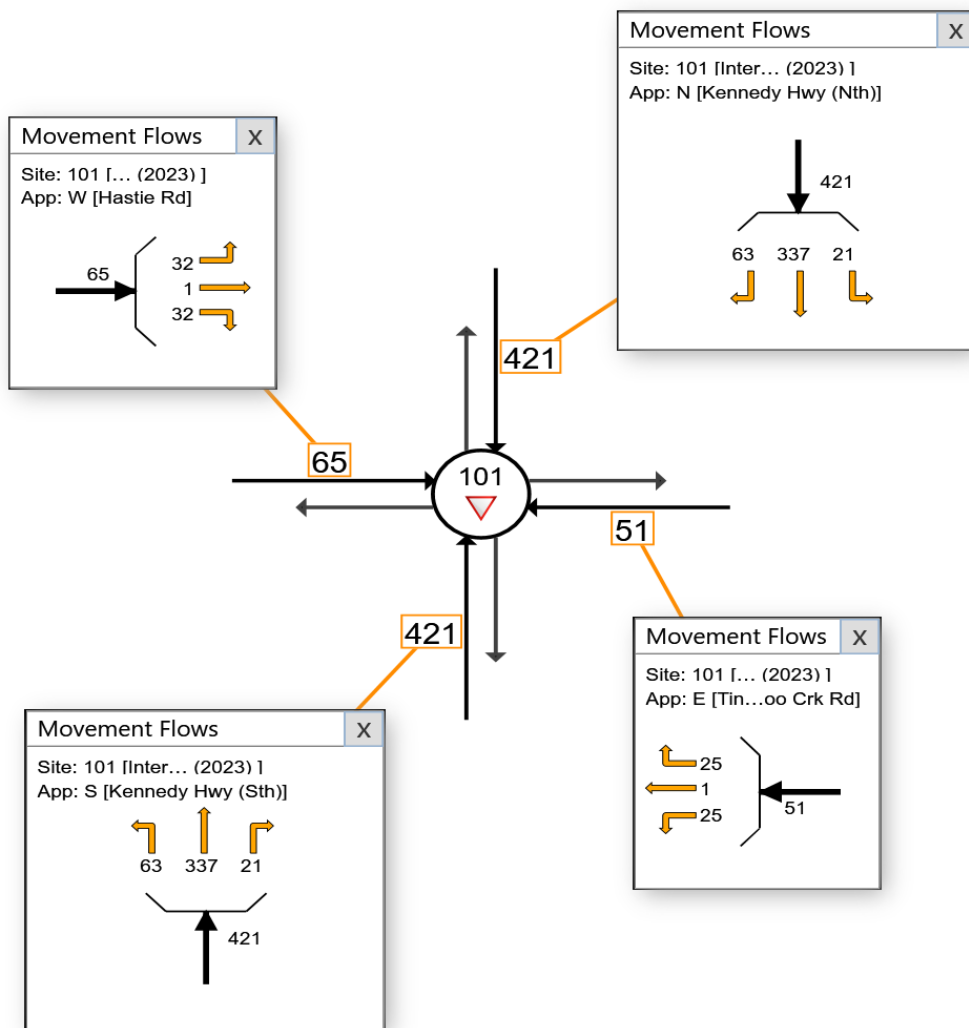
All Movement Classes

▼ Site: 101 [Intersection 3 - Kennedy Hwy and Hastie Rd (2023)]
(Site Folder: Base Case (Without) 2023 - AM Peak)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Use the button below to open or close all popup boxes. Click value labels to open selected ones.
Click and drag popup boxes to move to preferred positions.

Close All Popups



MOVEMENT FLOWS FOR SITE (INPUT)

Approach movement input flow rates (veh/h)

All Movement Classes

▼ Site: 101 [Intersection 2 - Emerald End Rd and Hastie Rd (2033) (Site Folder: Future Case (Without) 2033 - AM Peak)]

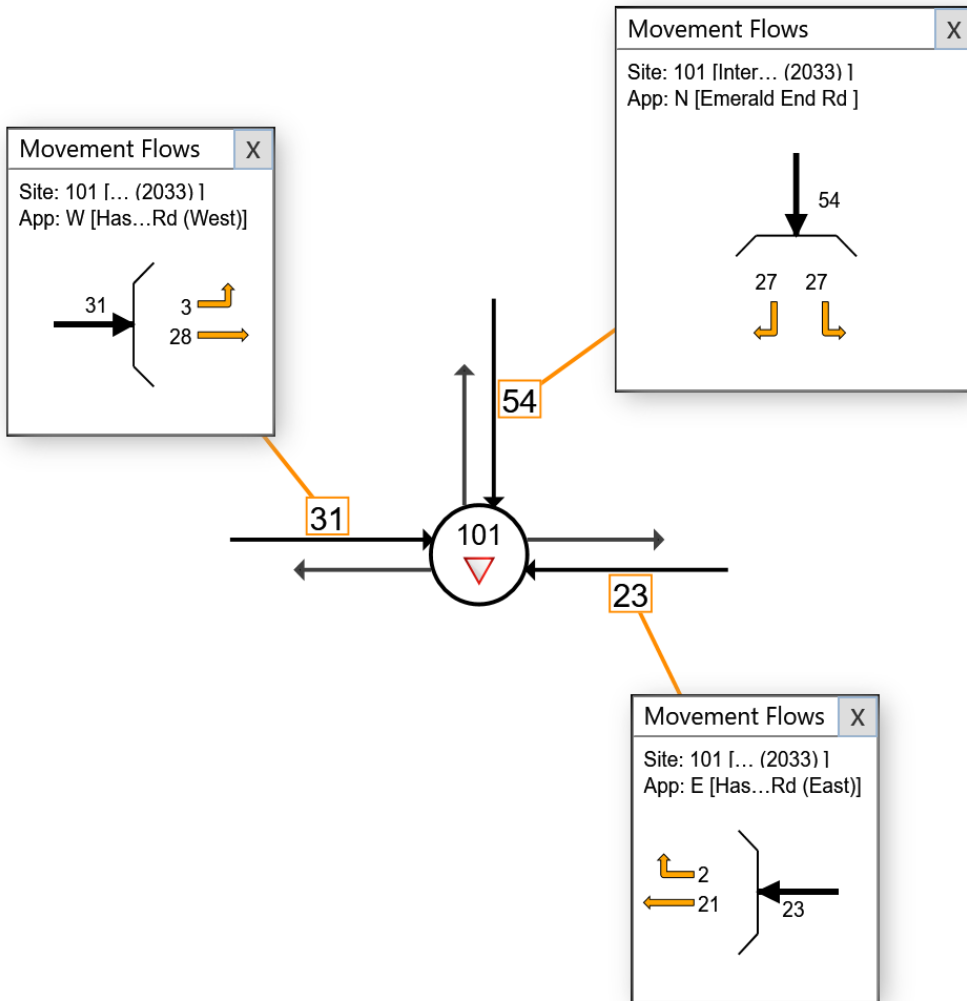
New Site

Site Category: (None)

Give-Way (Two-Way)

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MOVEMENT FLOWS FOR SITE (INPUT)

Approach movement input flow rates (veh/h)

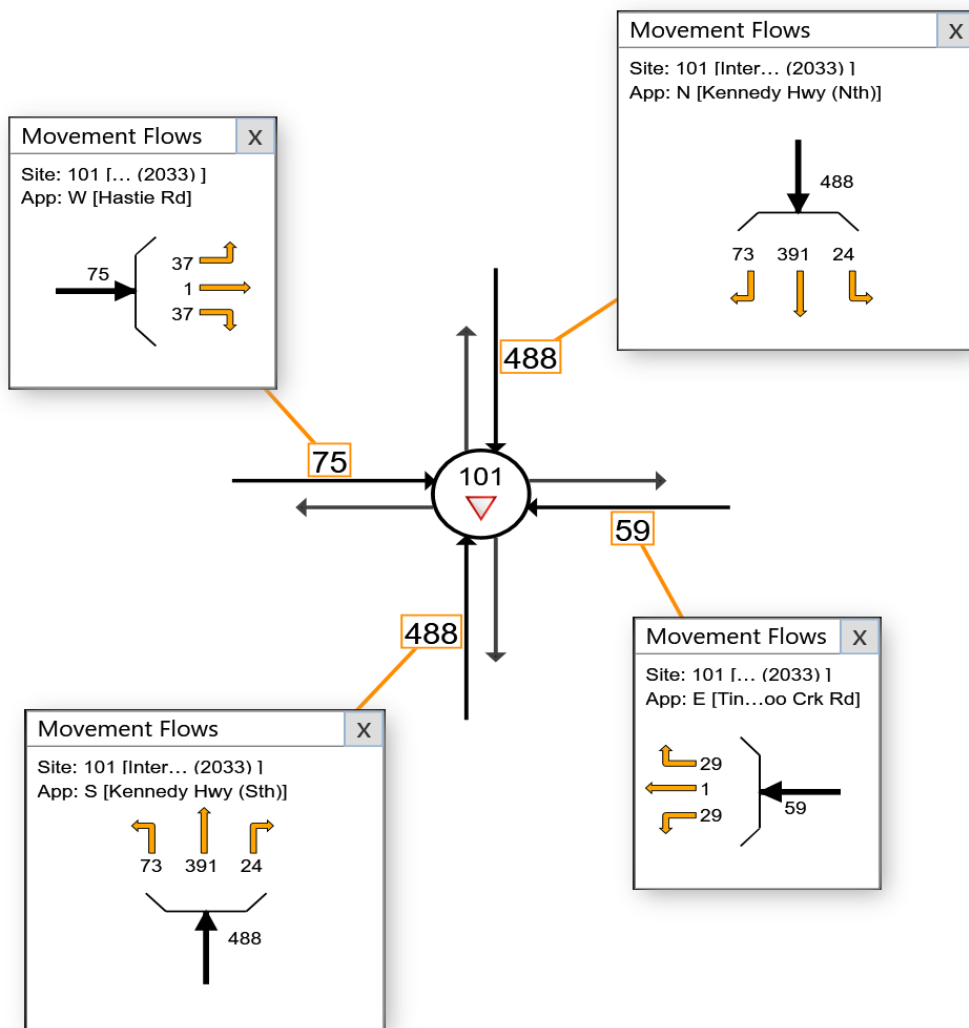
All Movement Classes

▼ Site: 101 [Intersection 3 - Kennedy Hwy and Hastie Rd (2033)]
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Give-Way (Two-Way)

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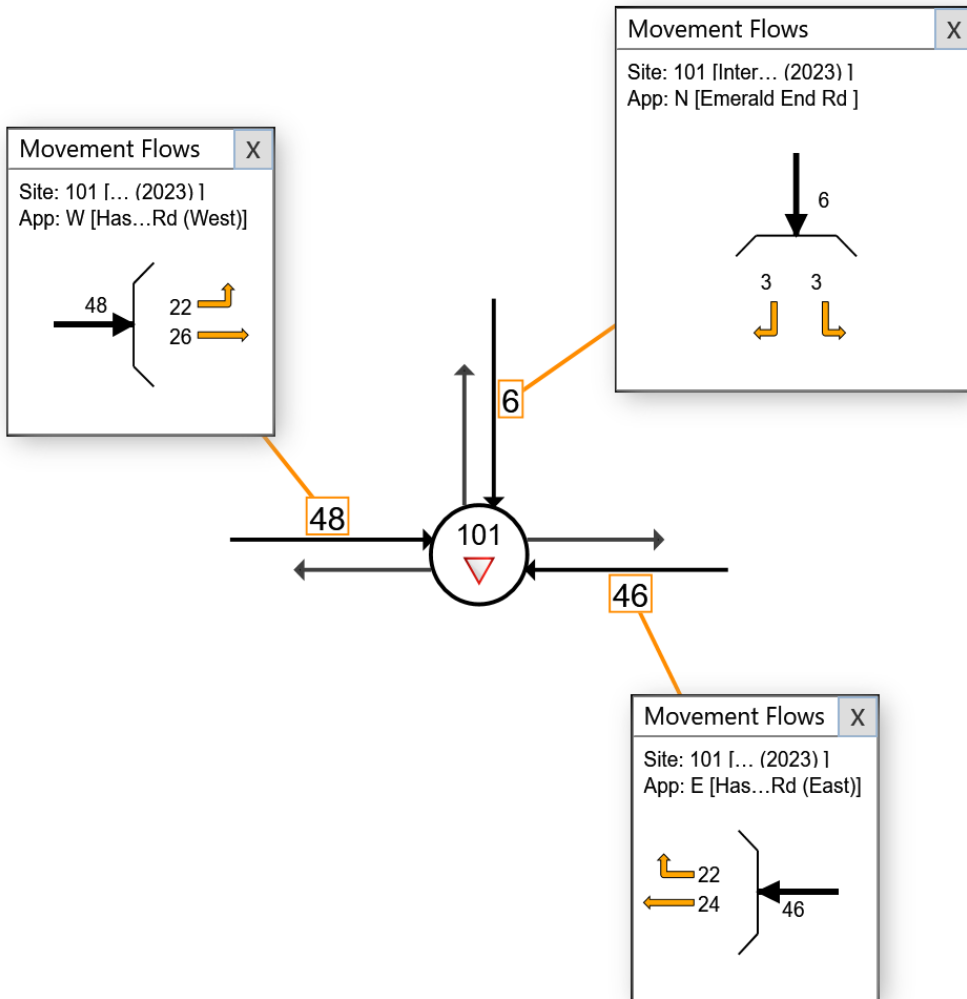
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Site Category: (None)
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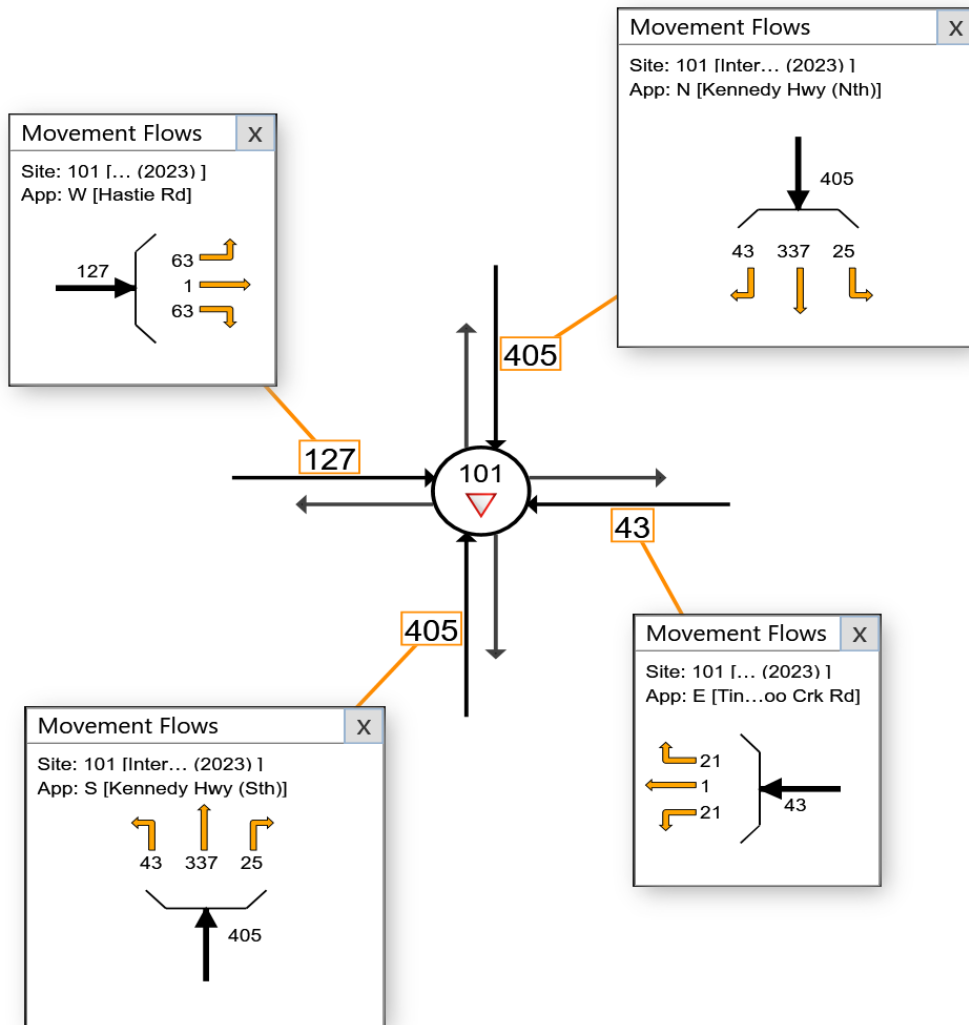
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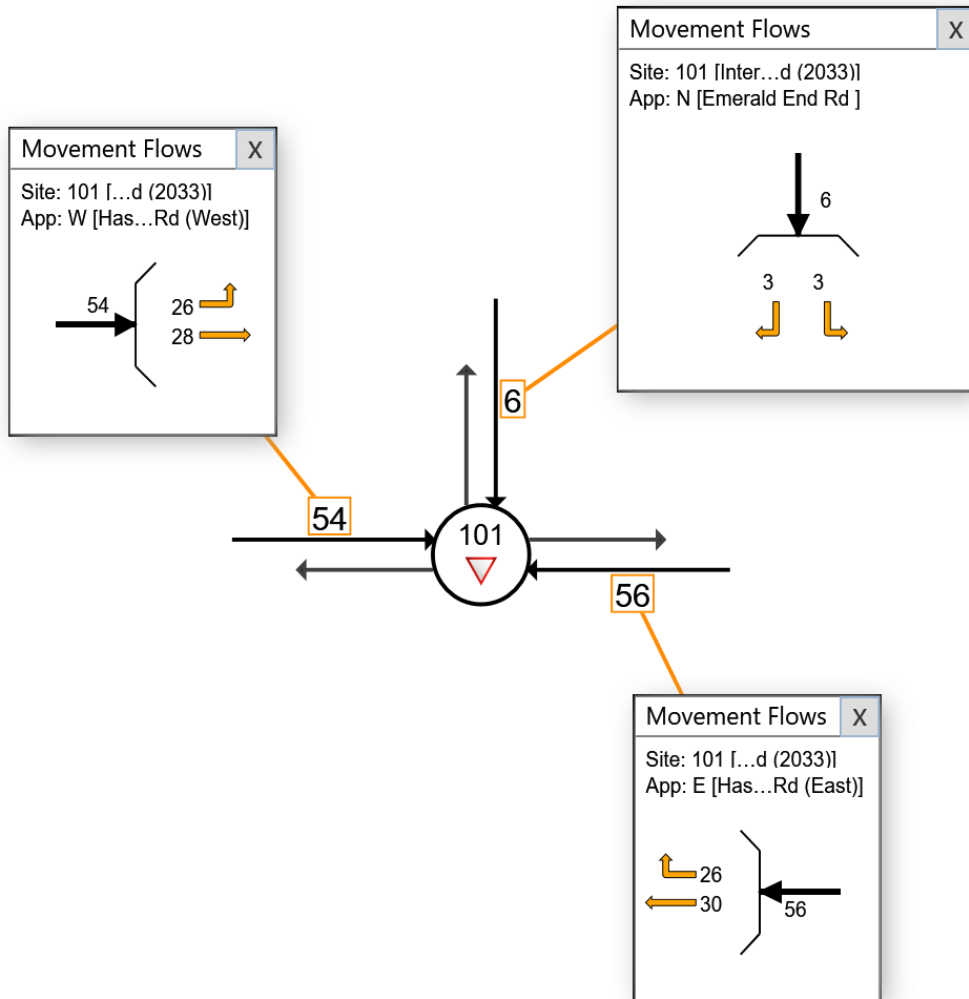
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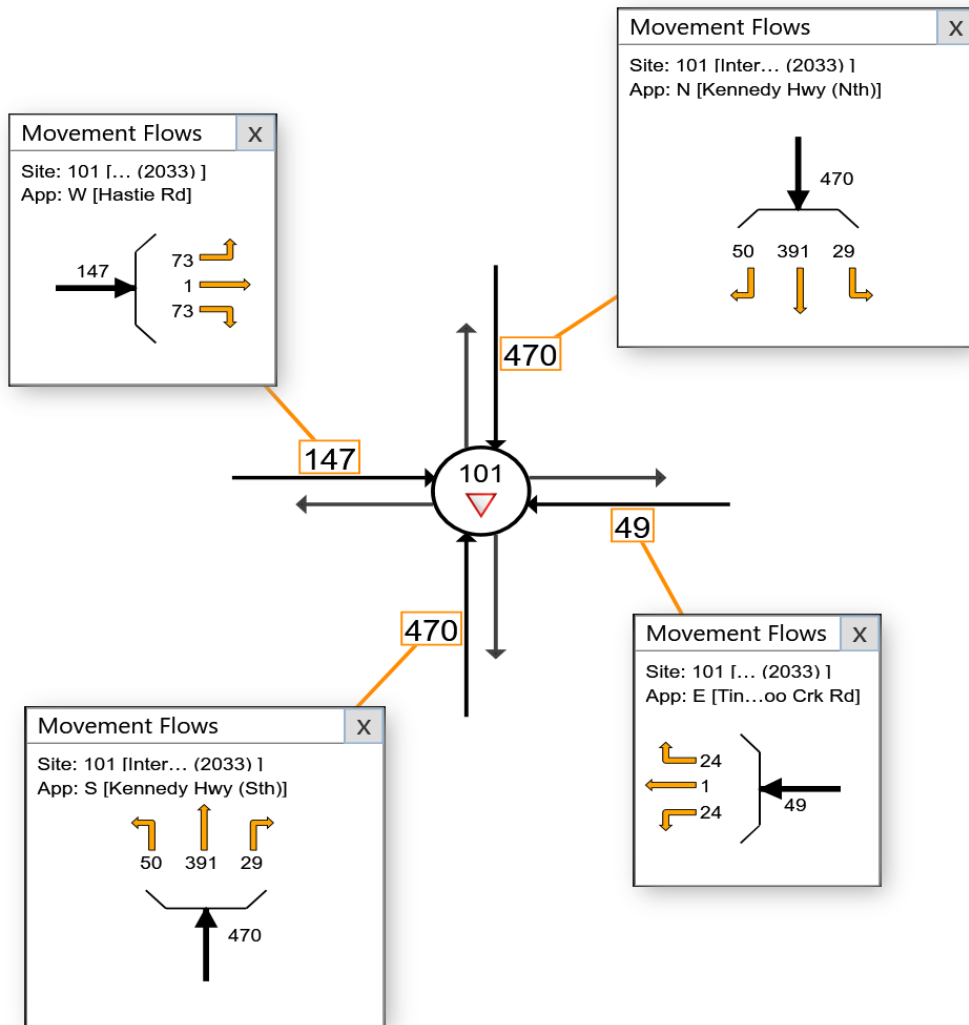
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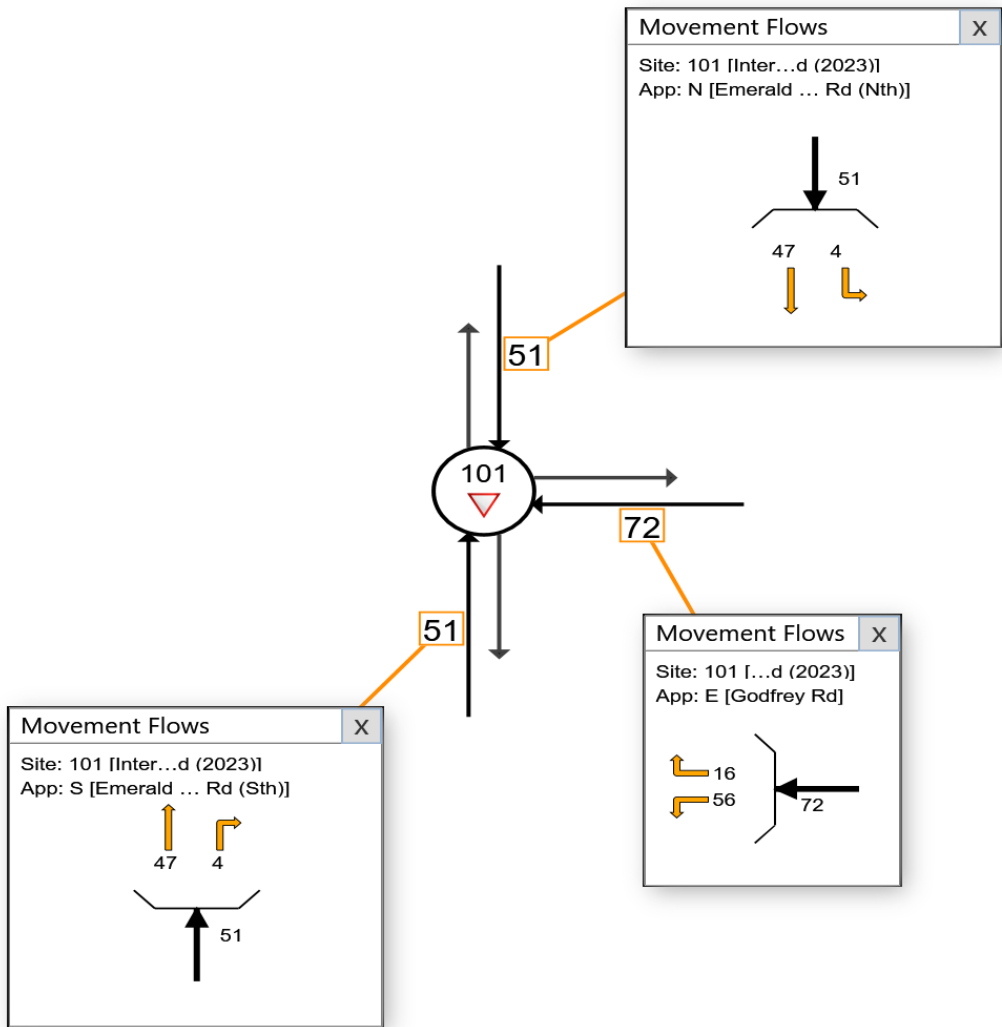
All Movement Classes

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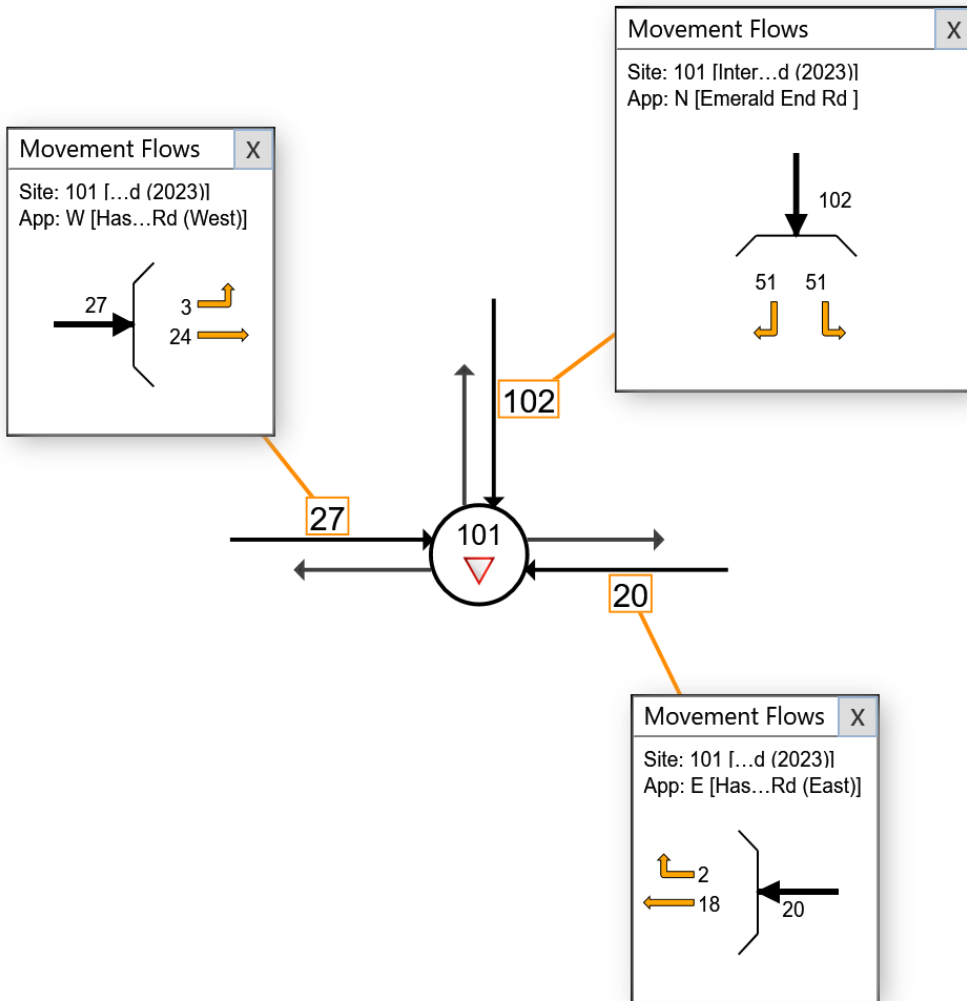
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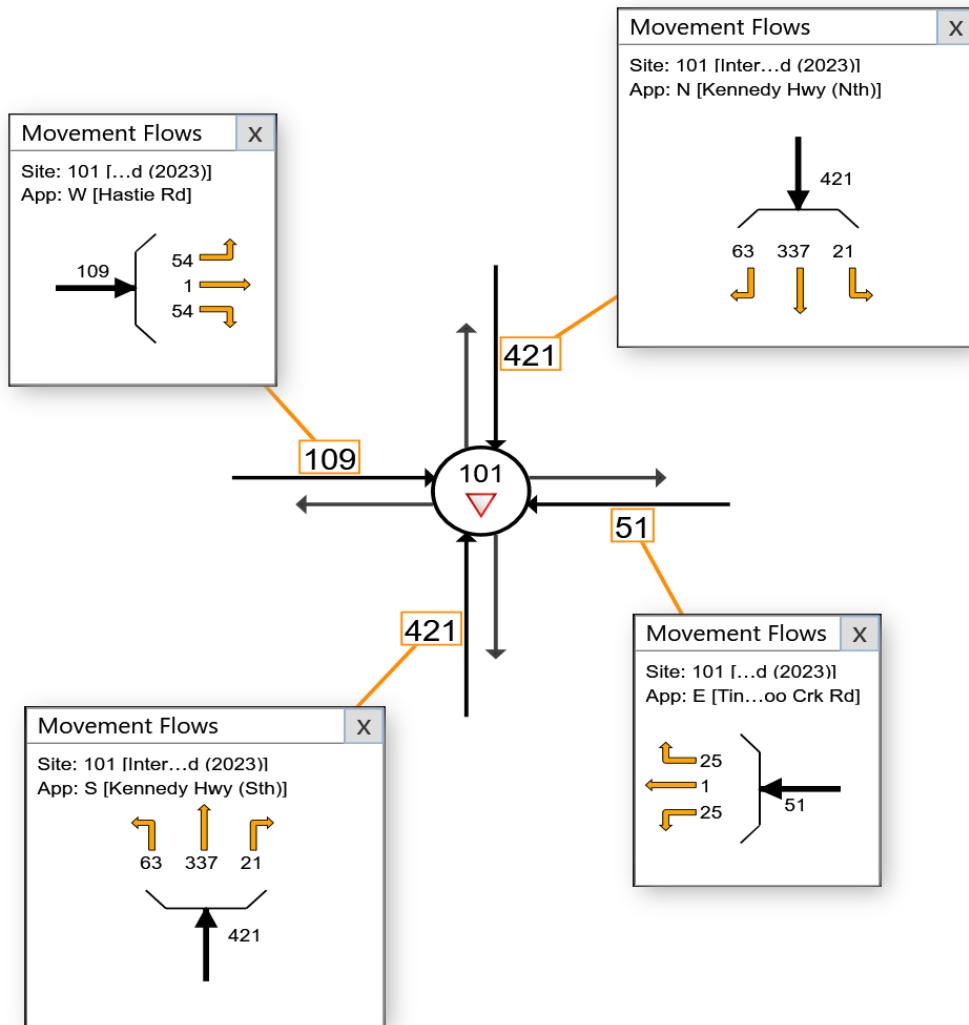
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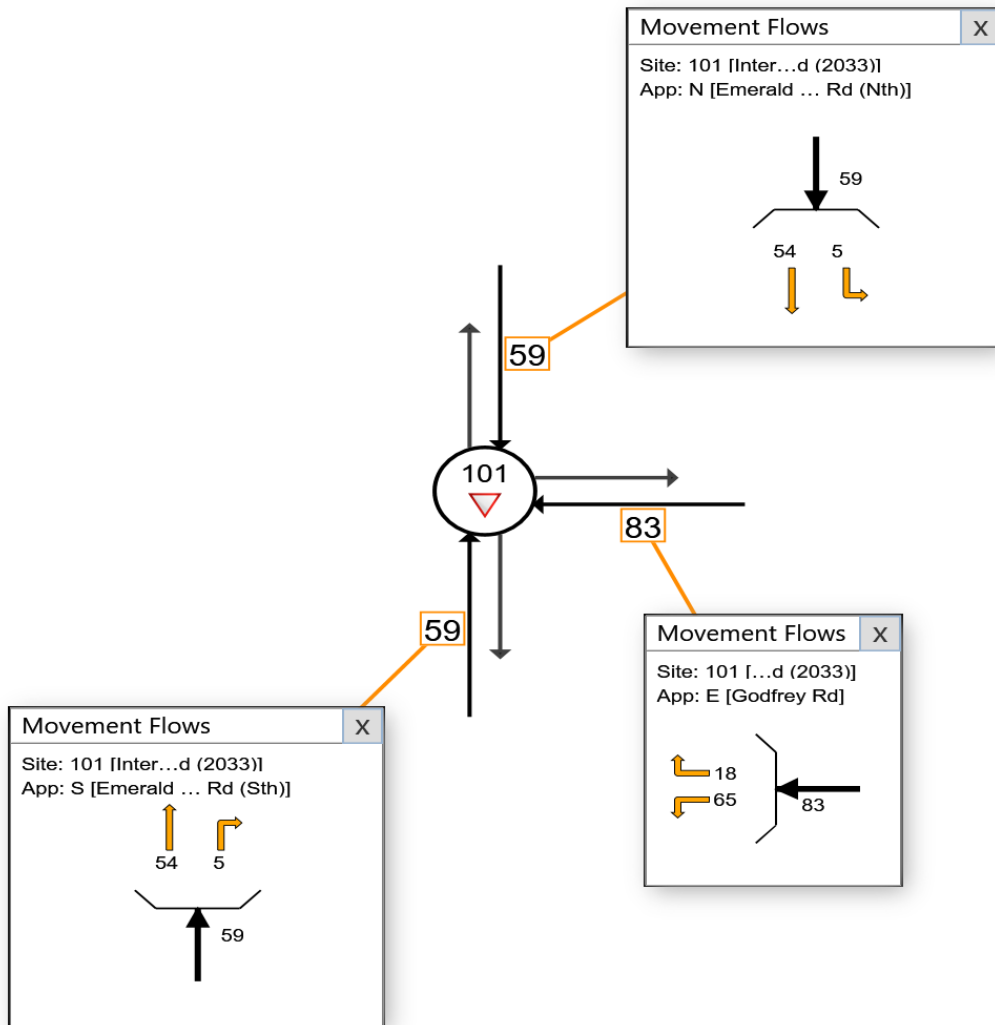
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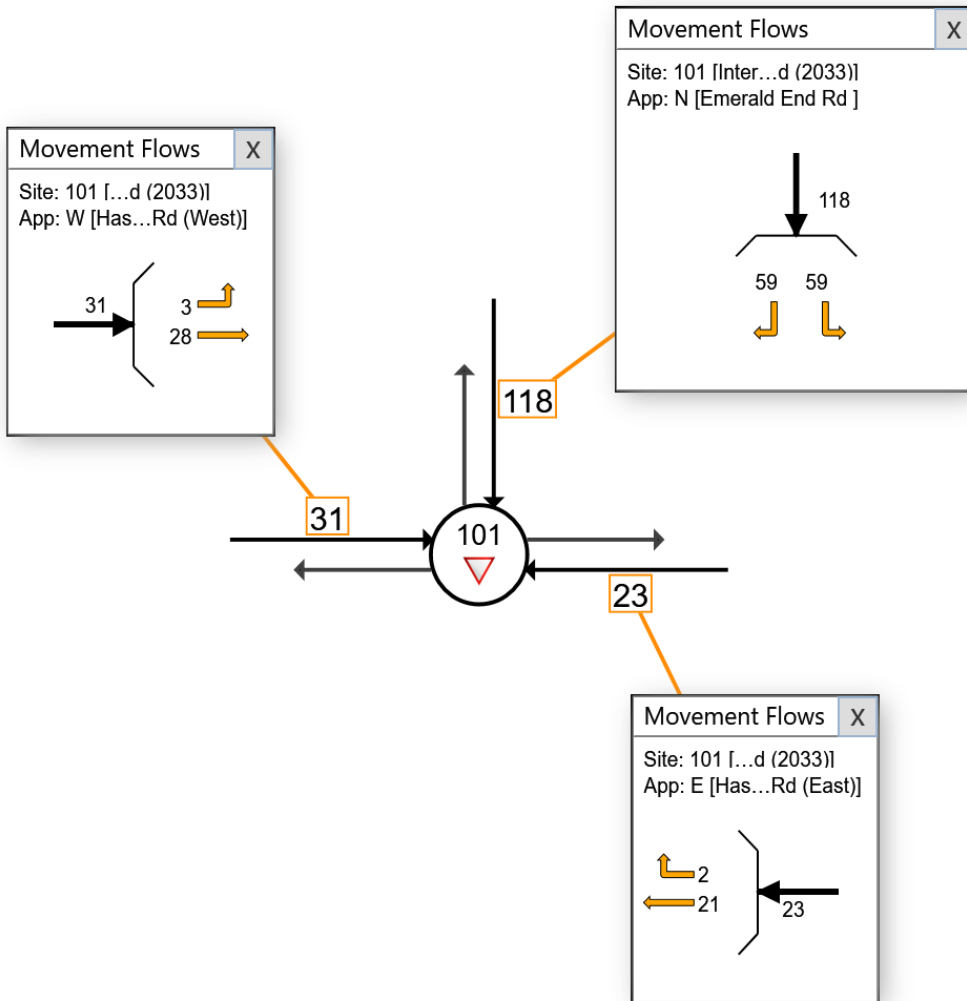
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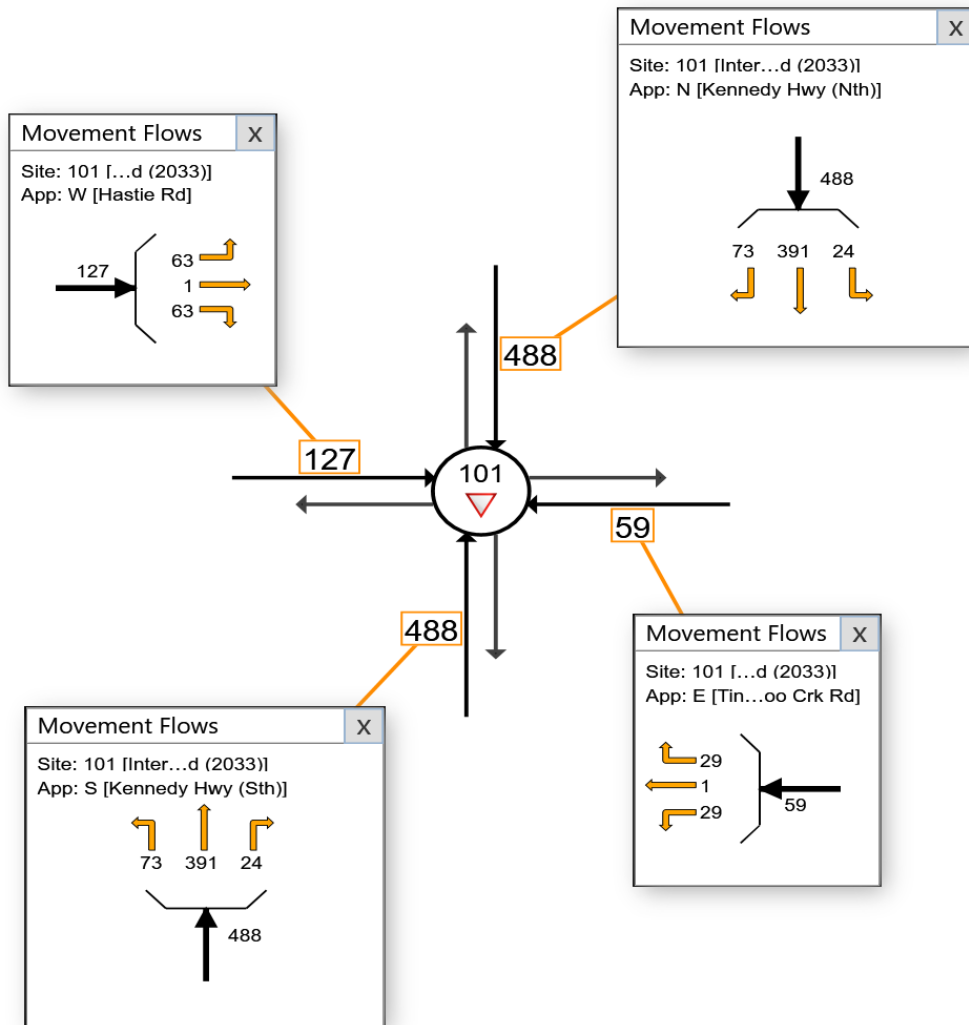
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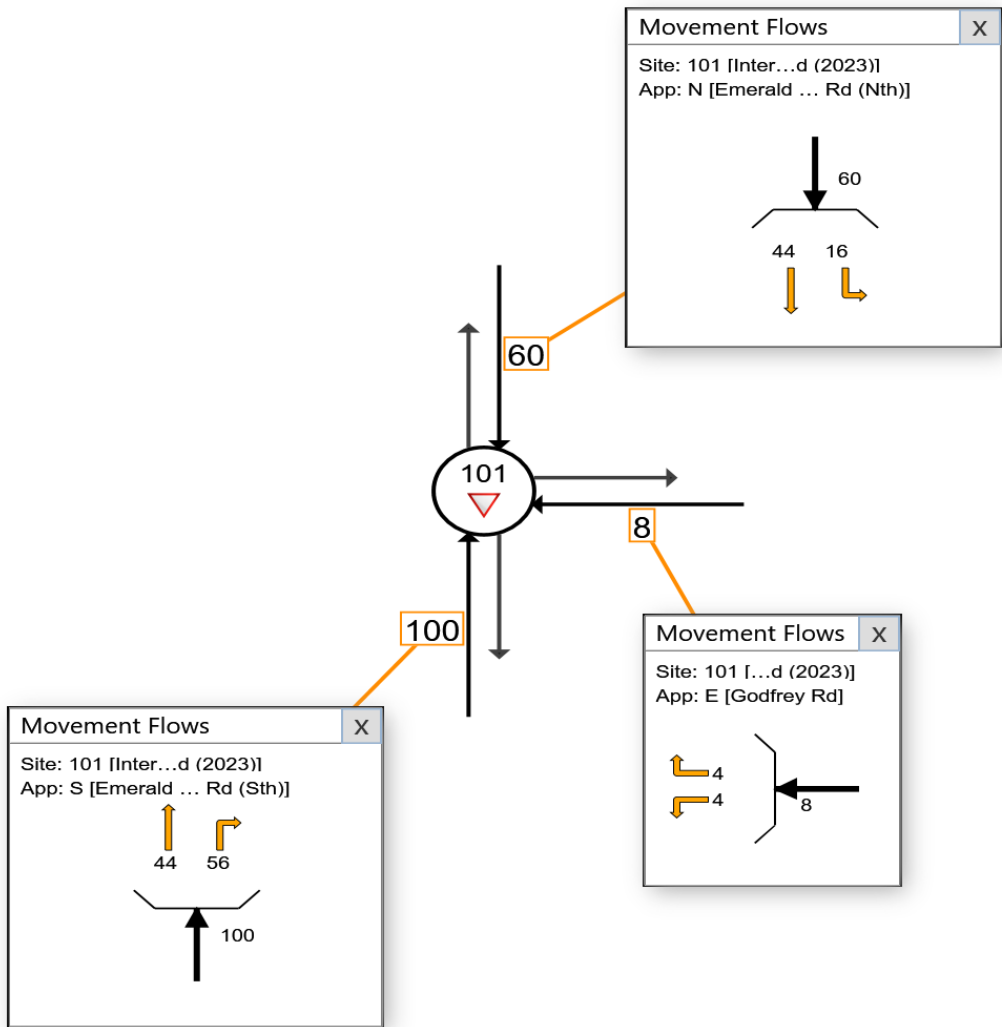
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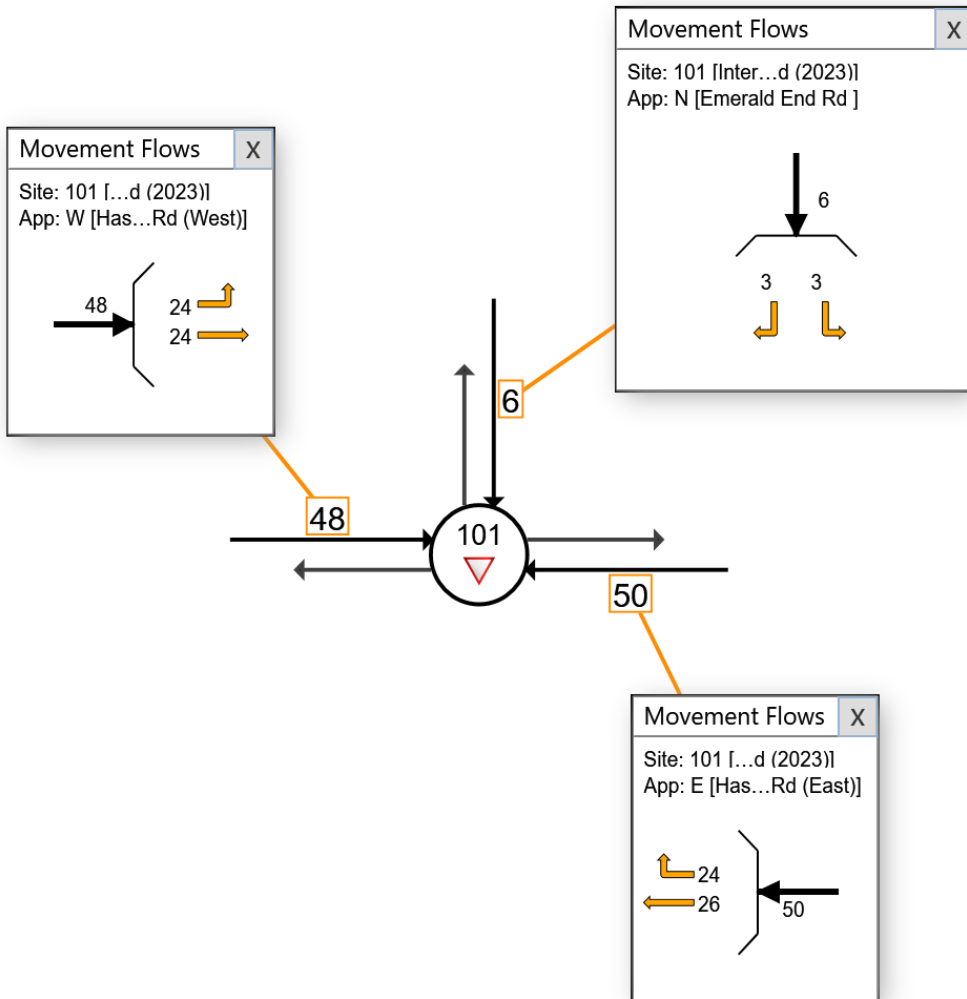
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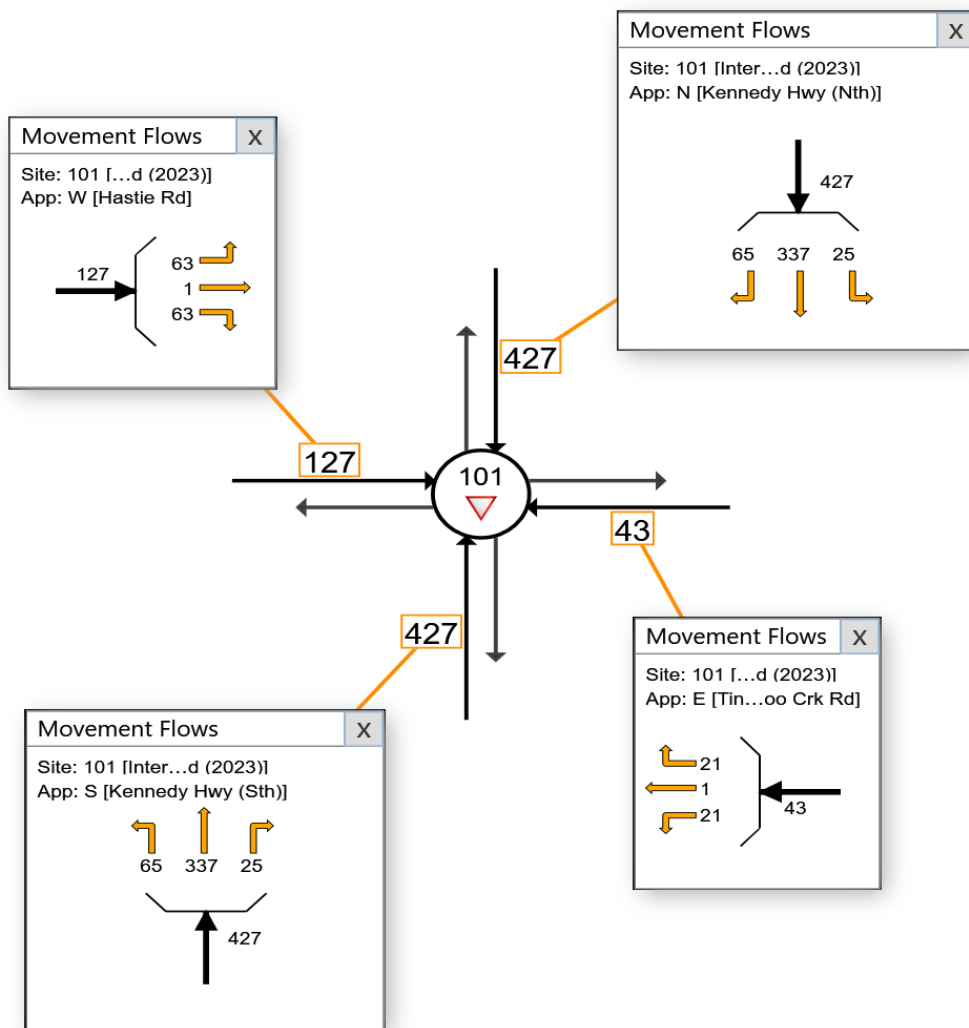
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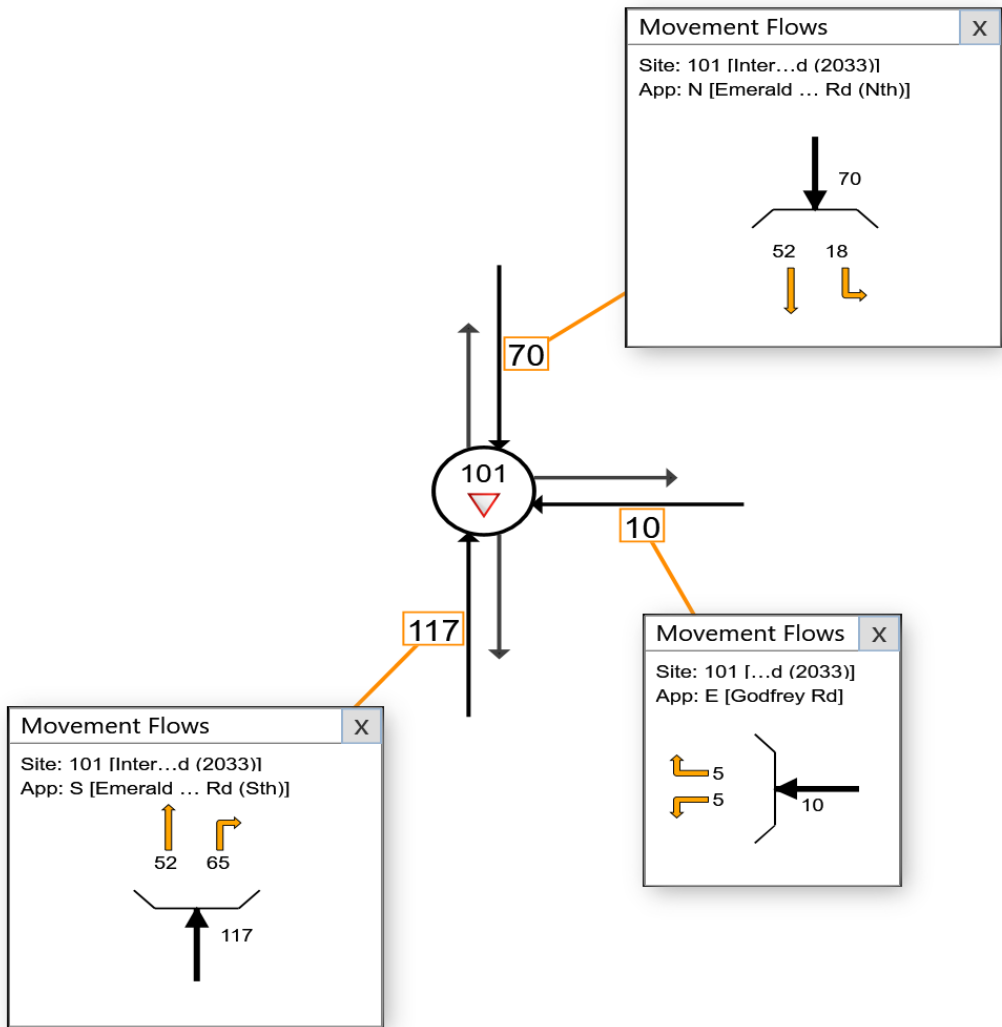
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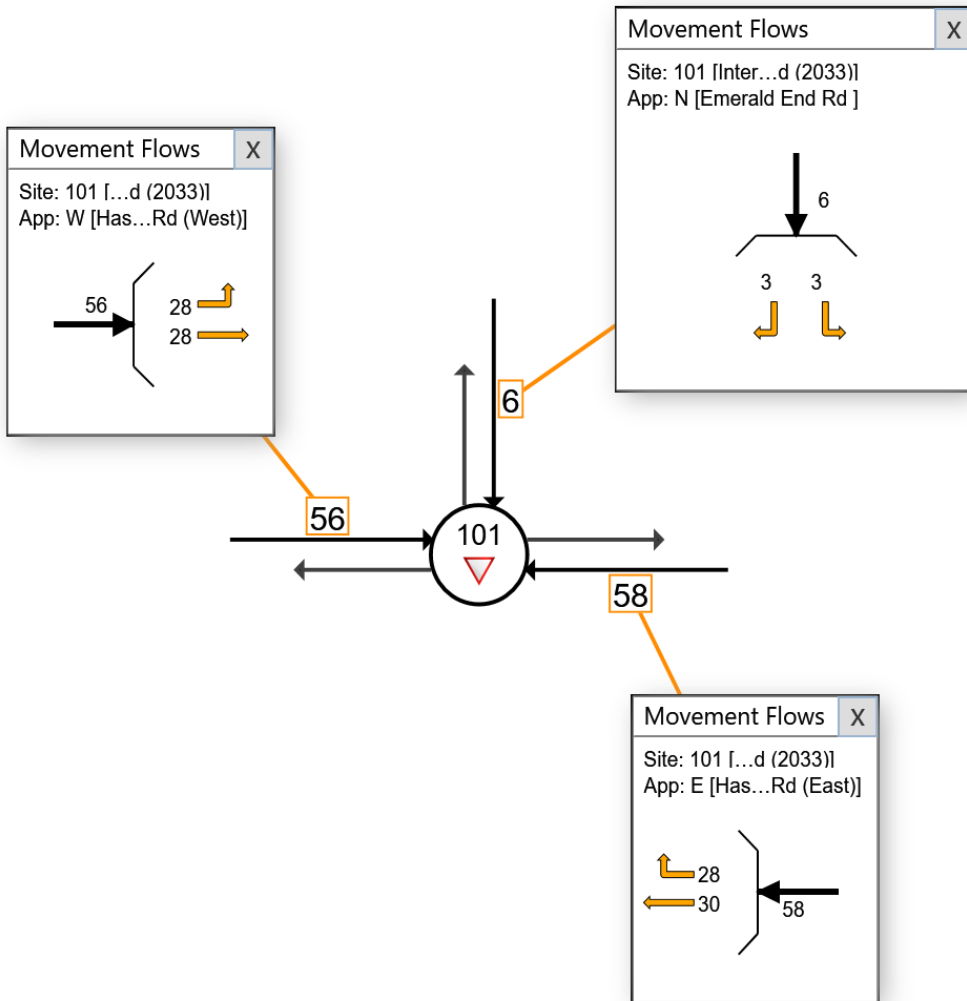
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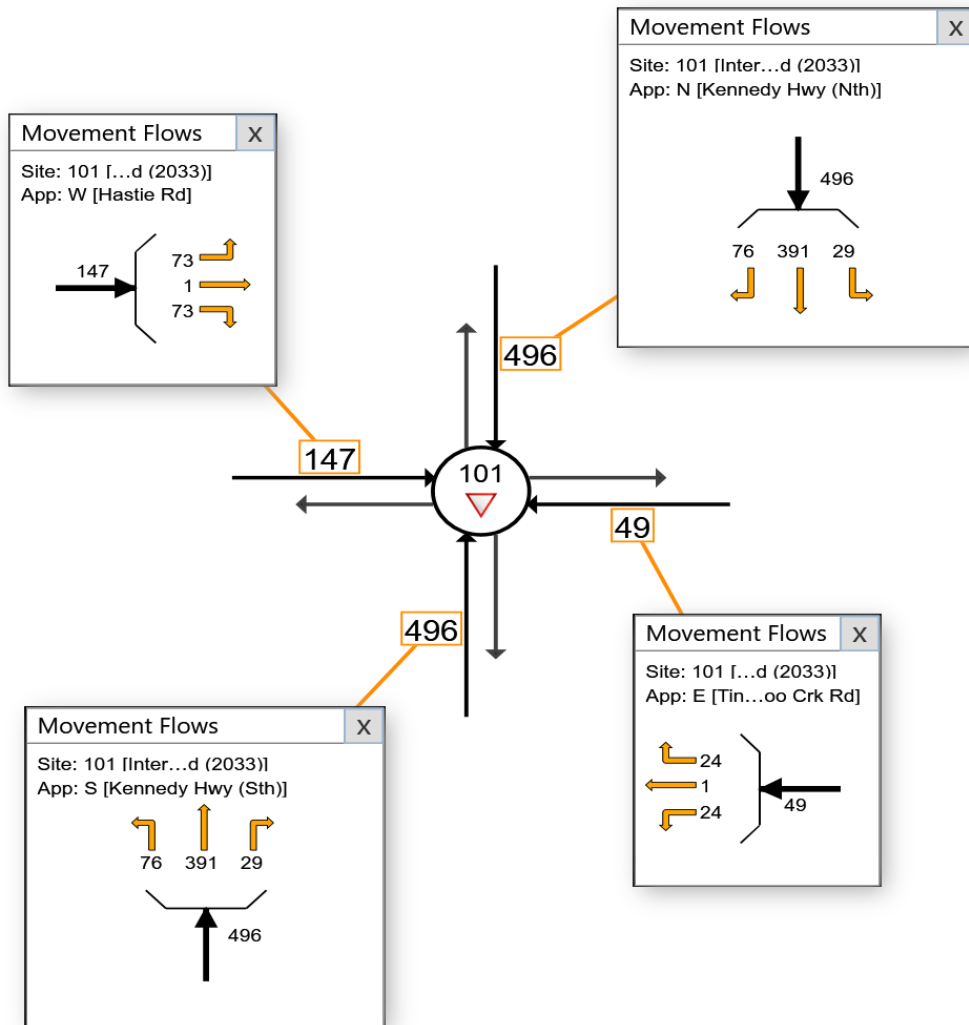
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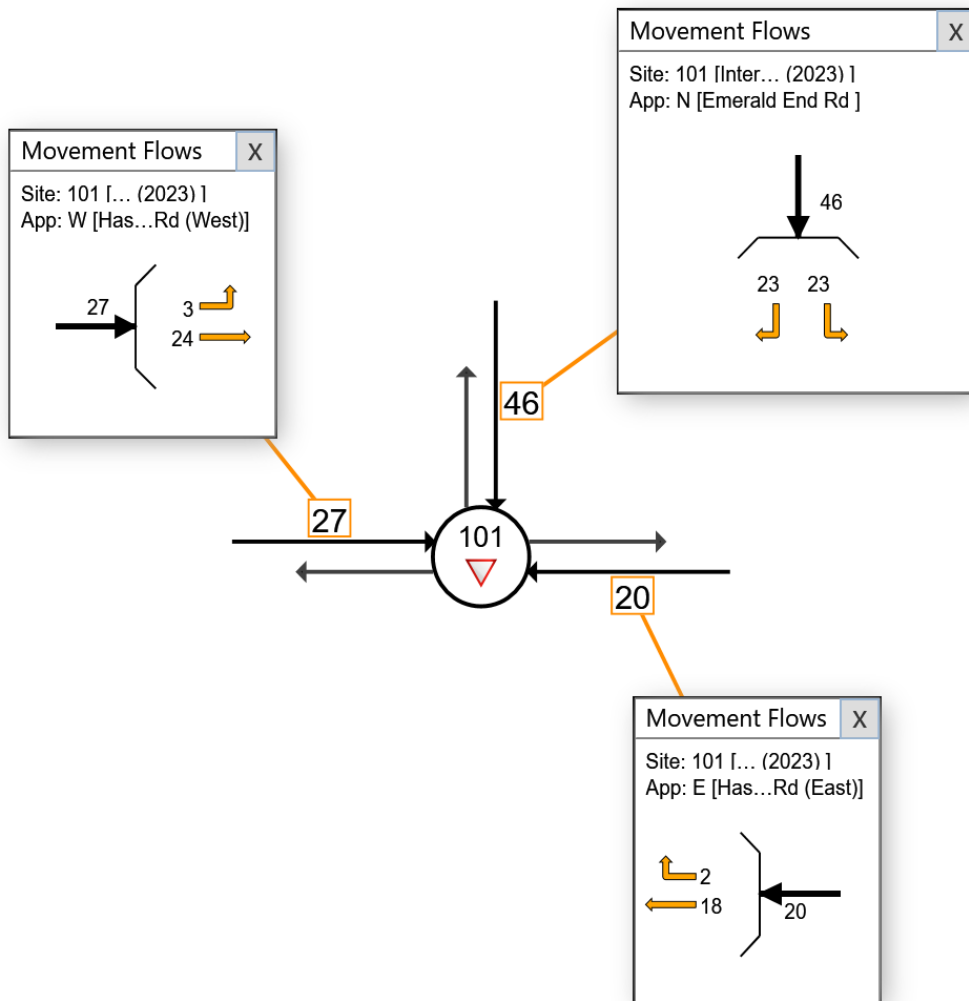
New Site

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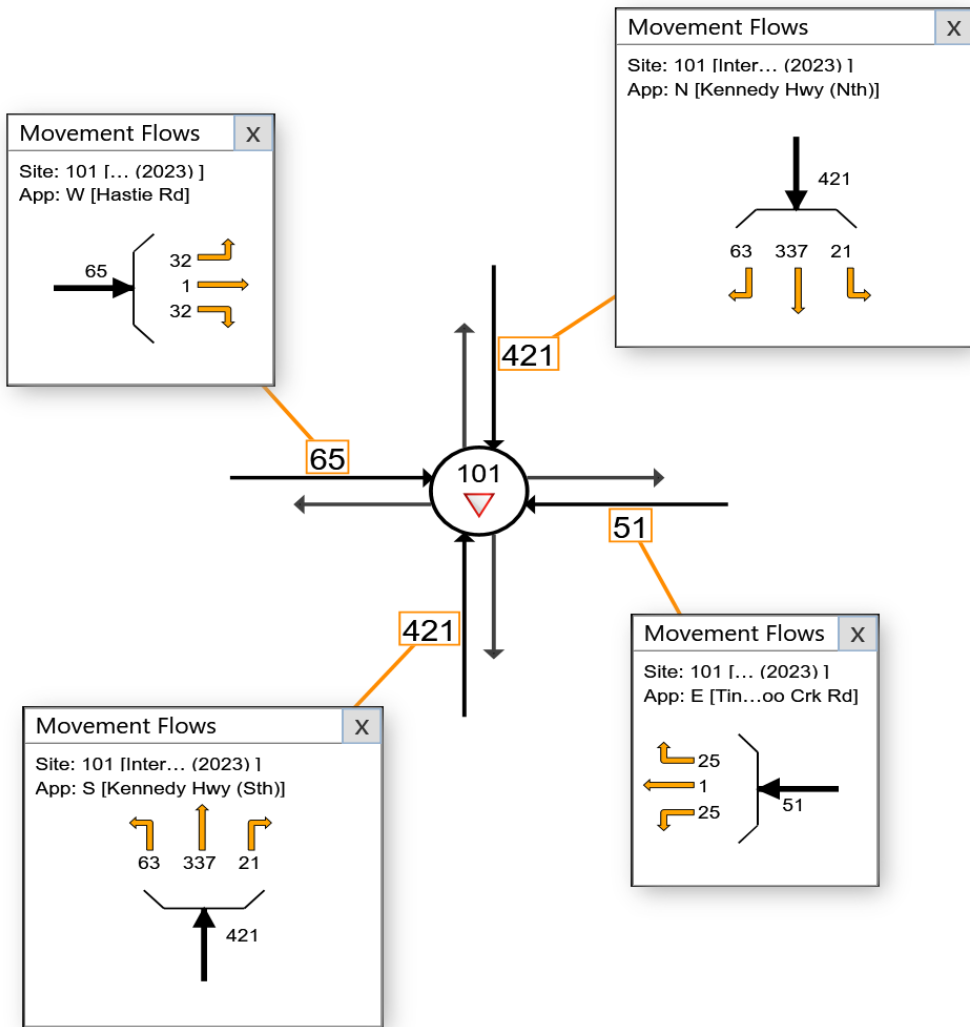
All Movement Classes

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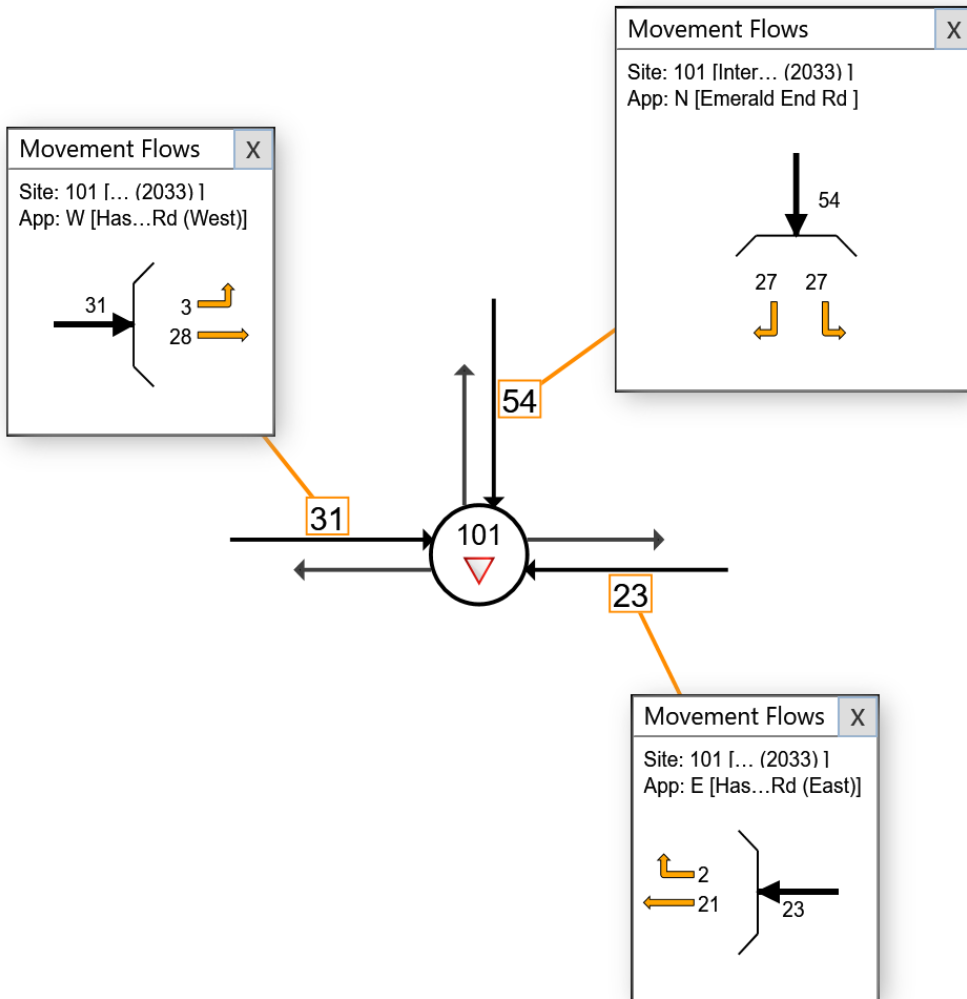
New Site

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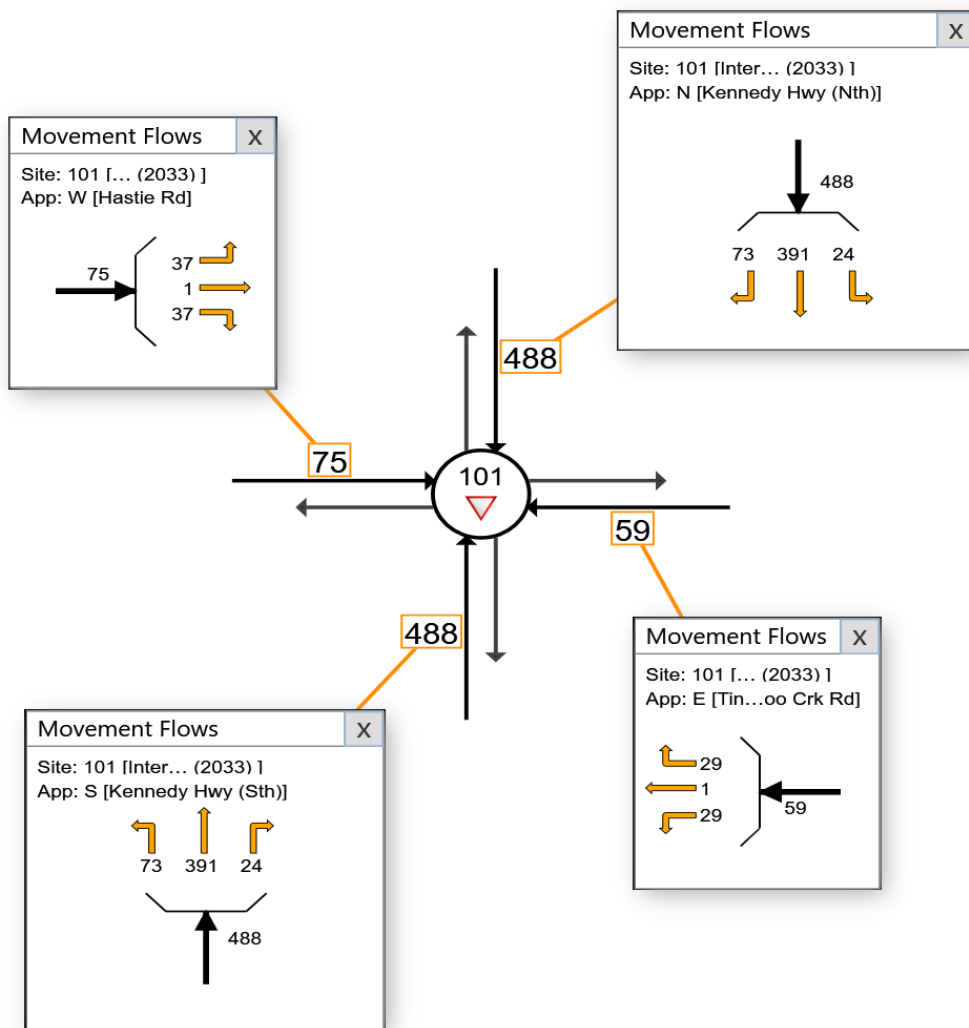
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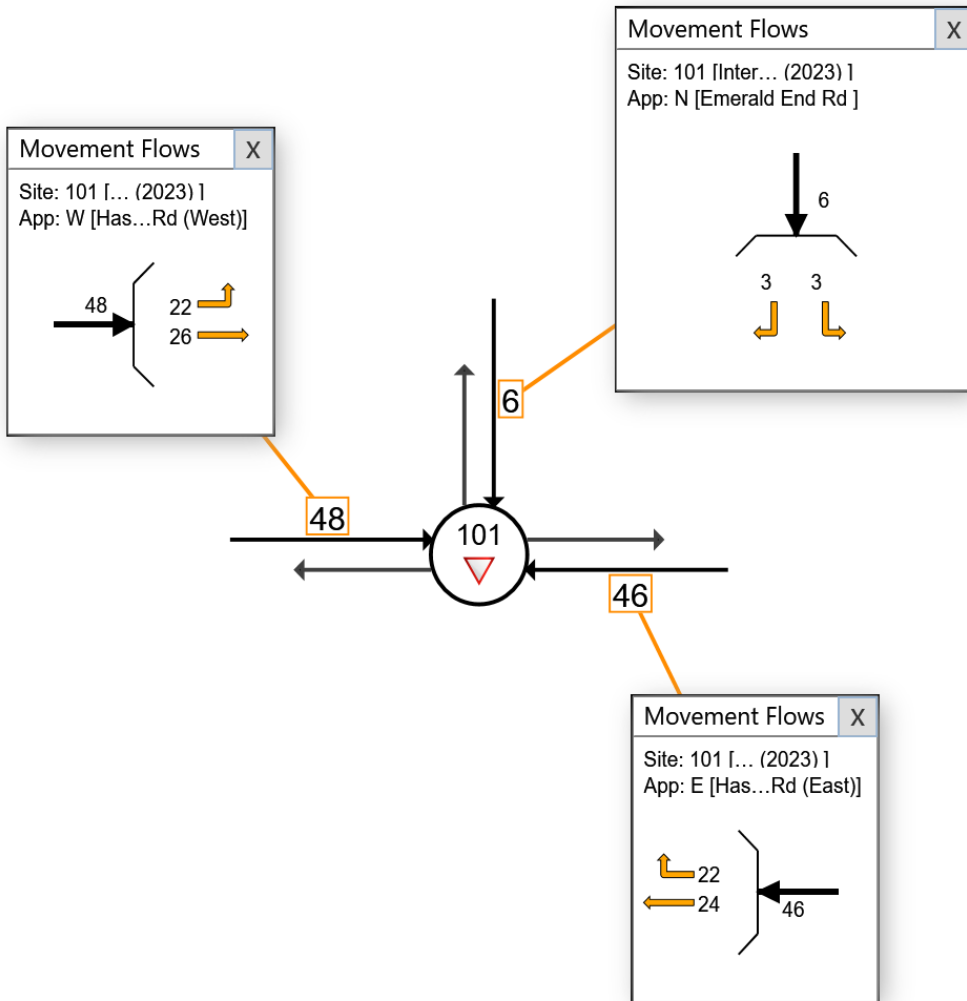
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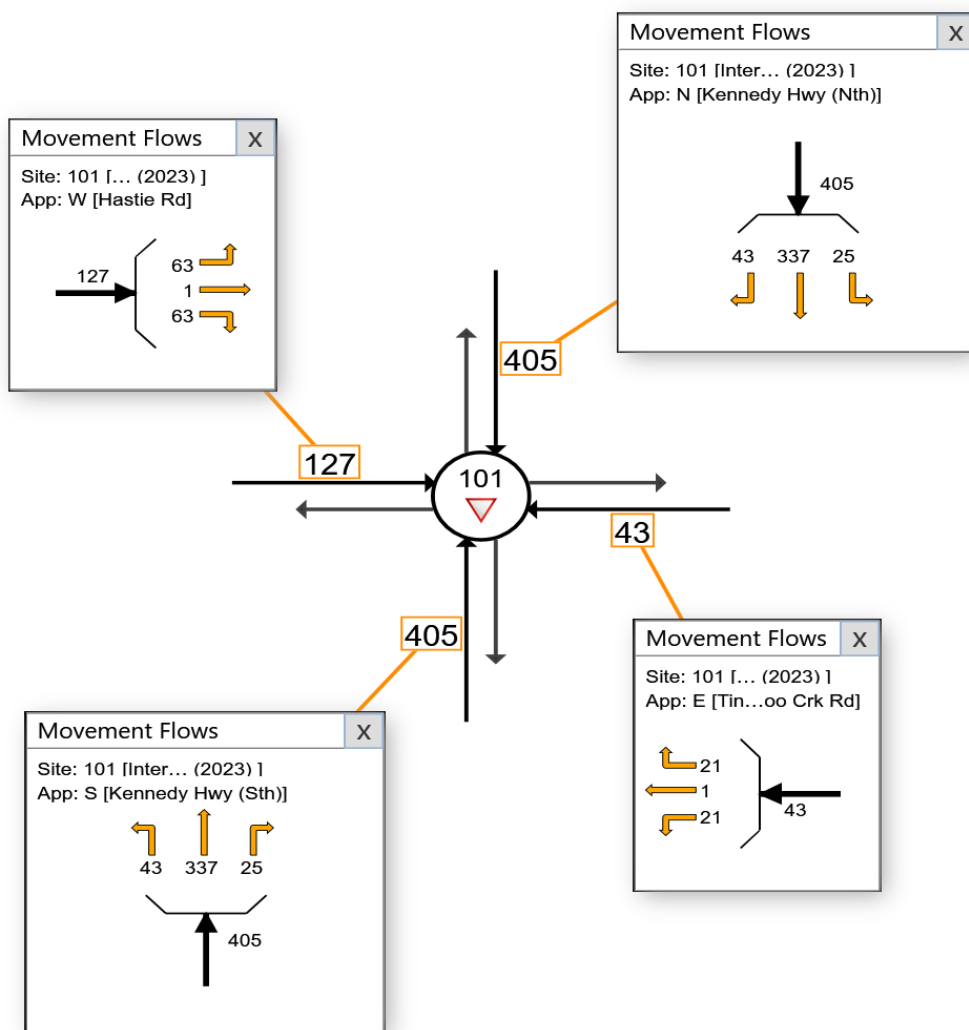
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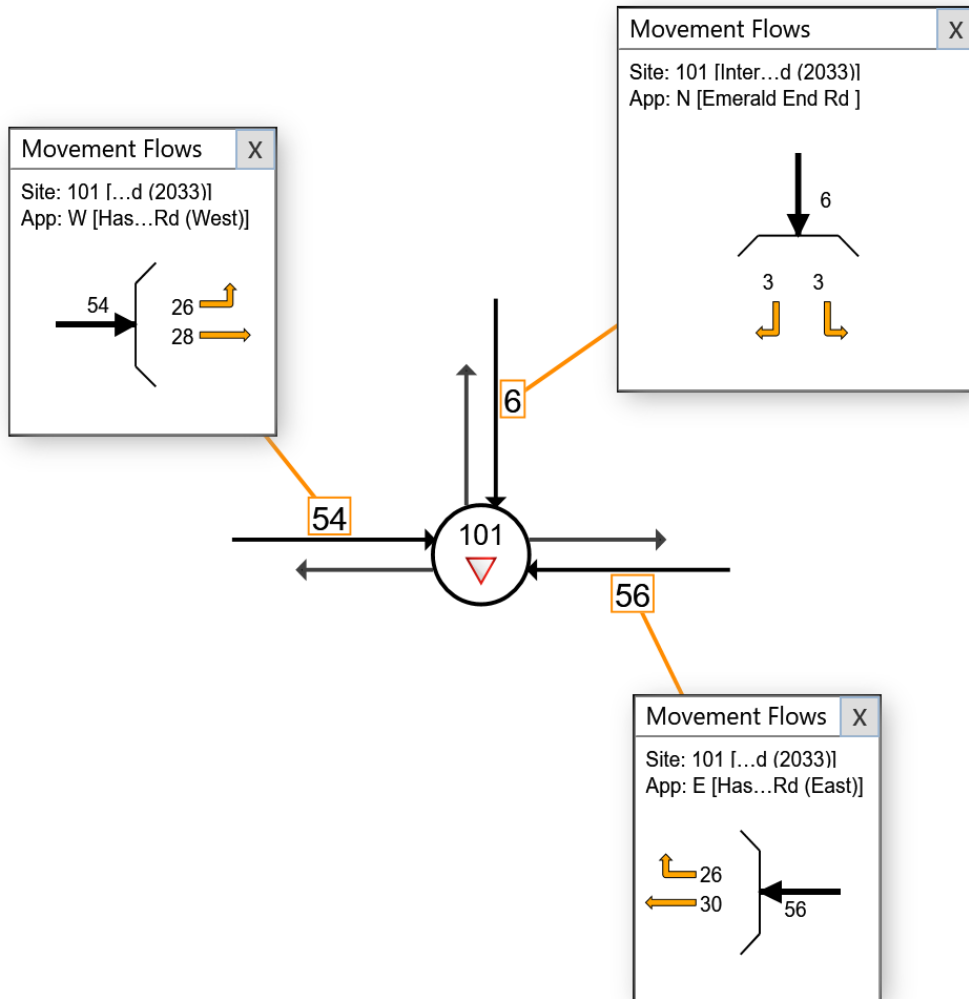
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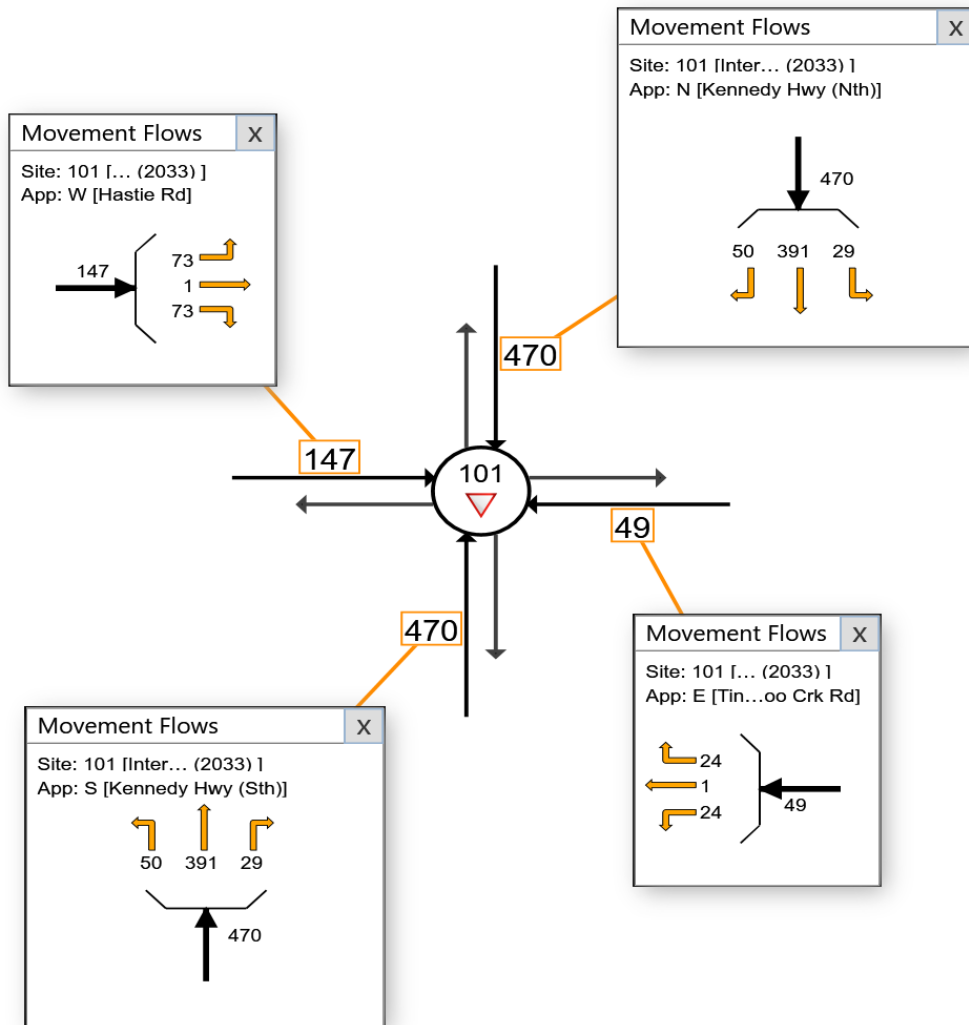
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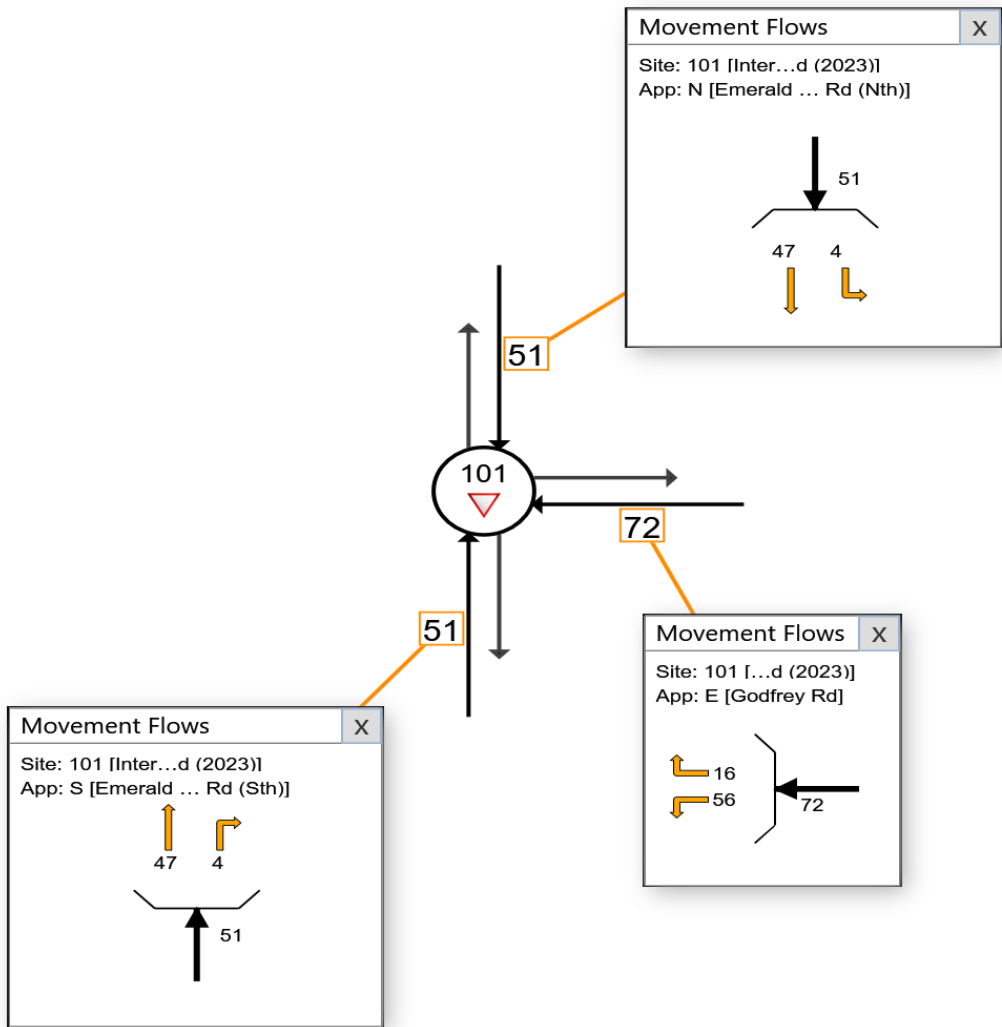
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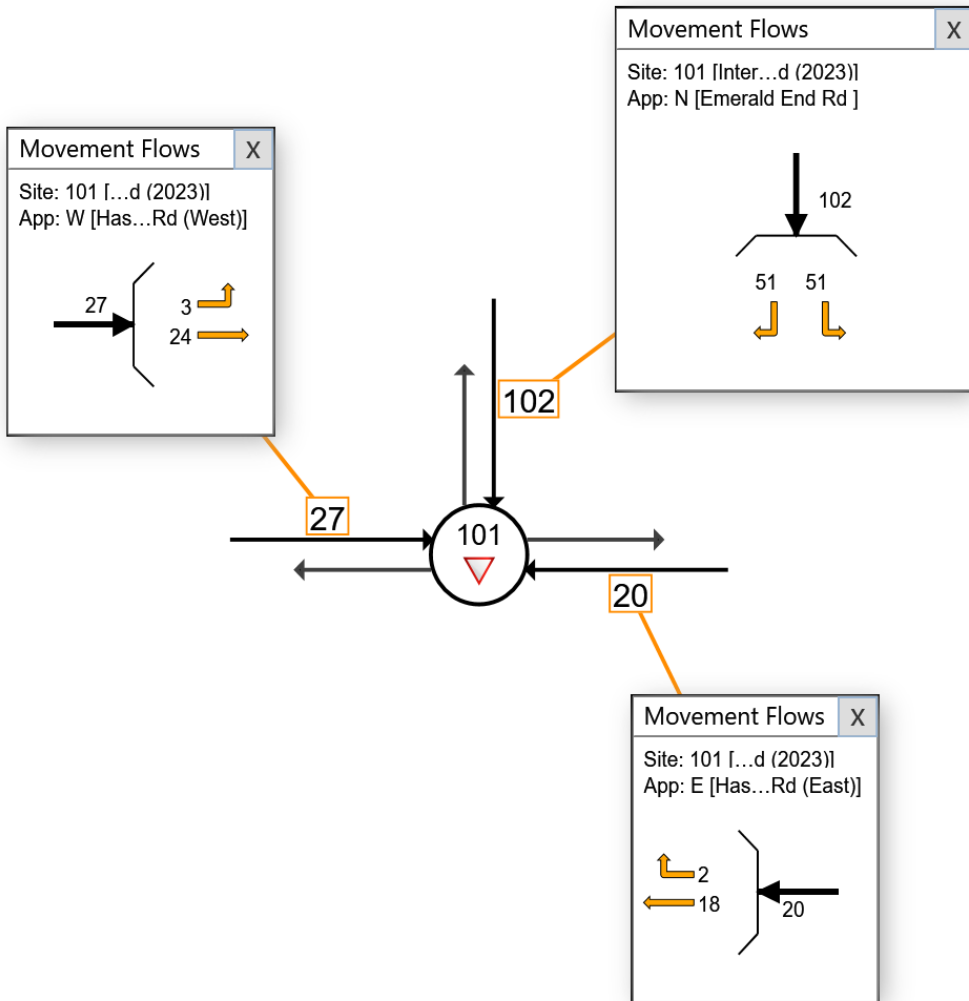
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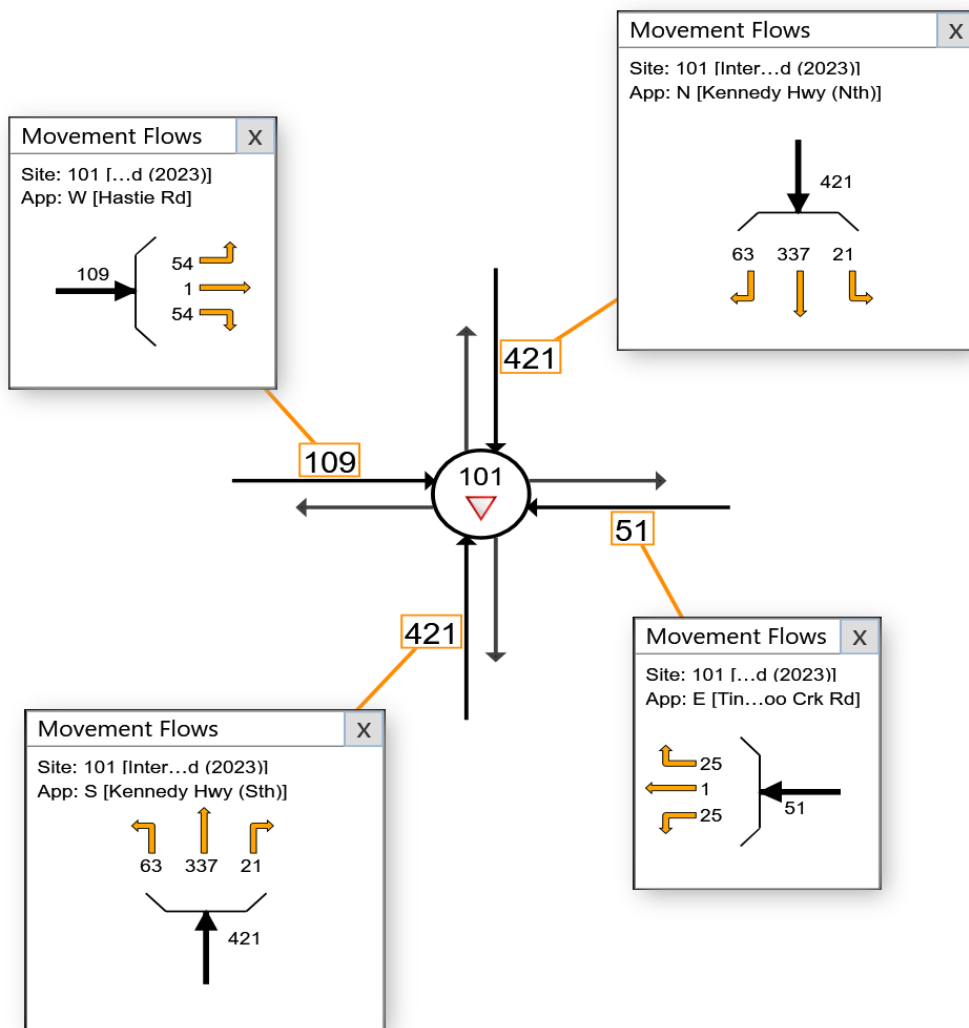
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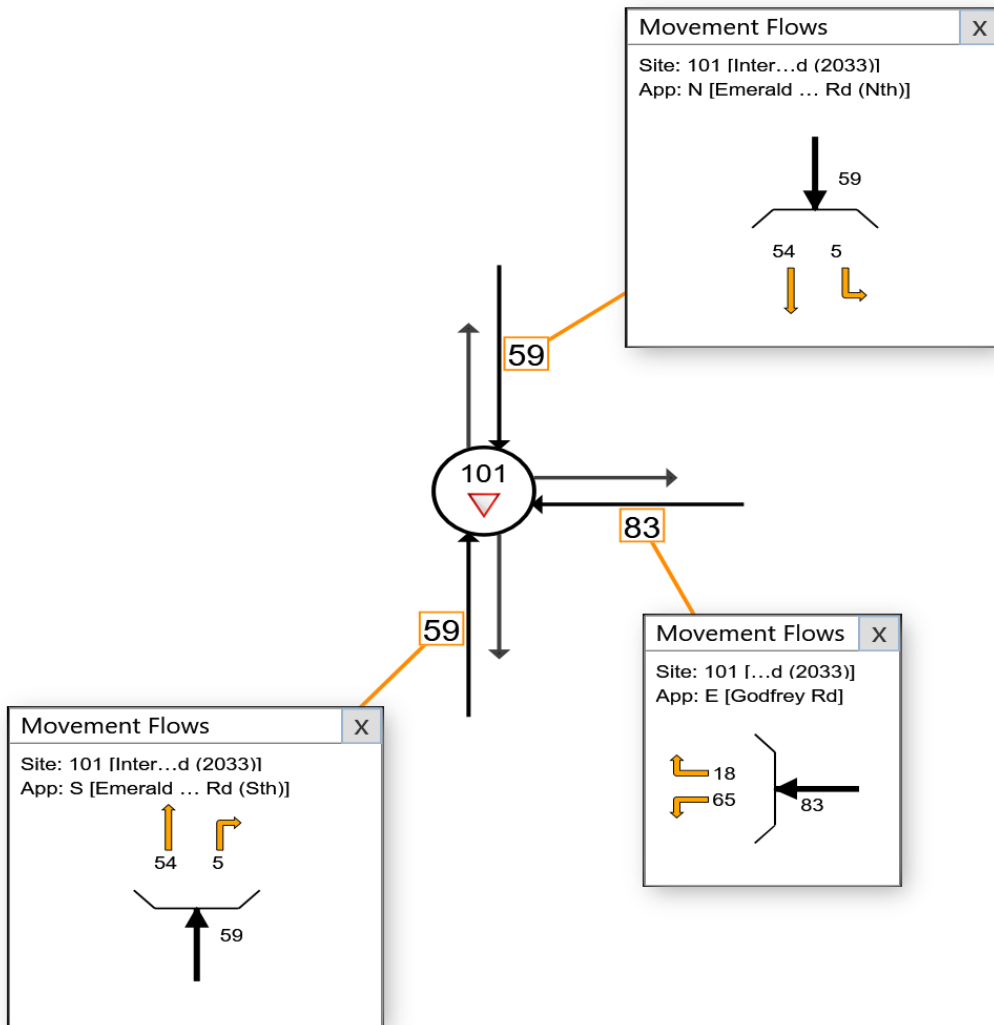
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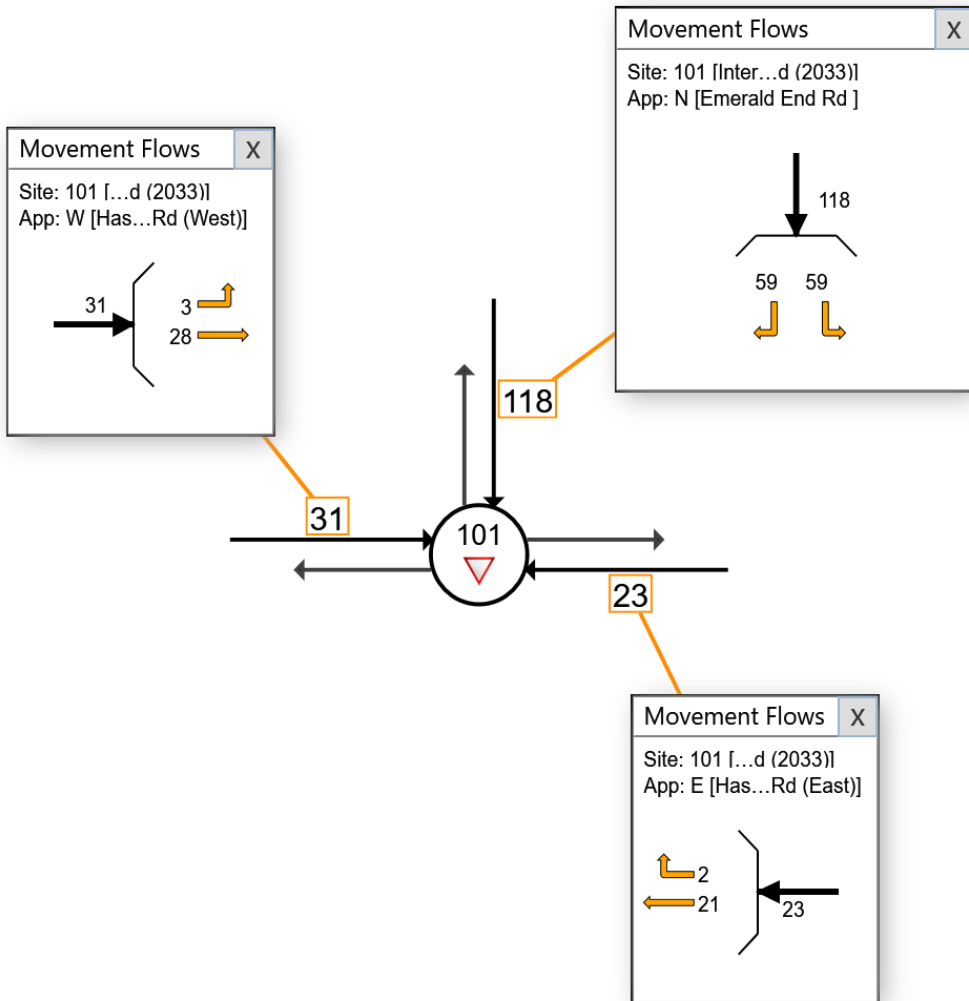
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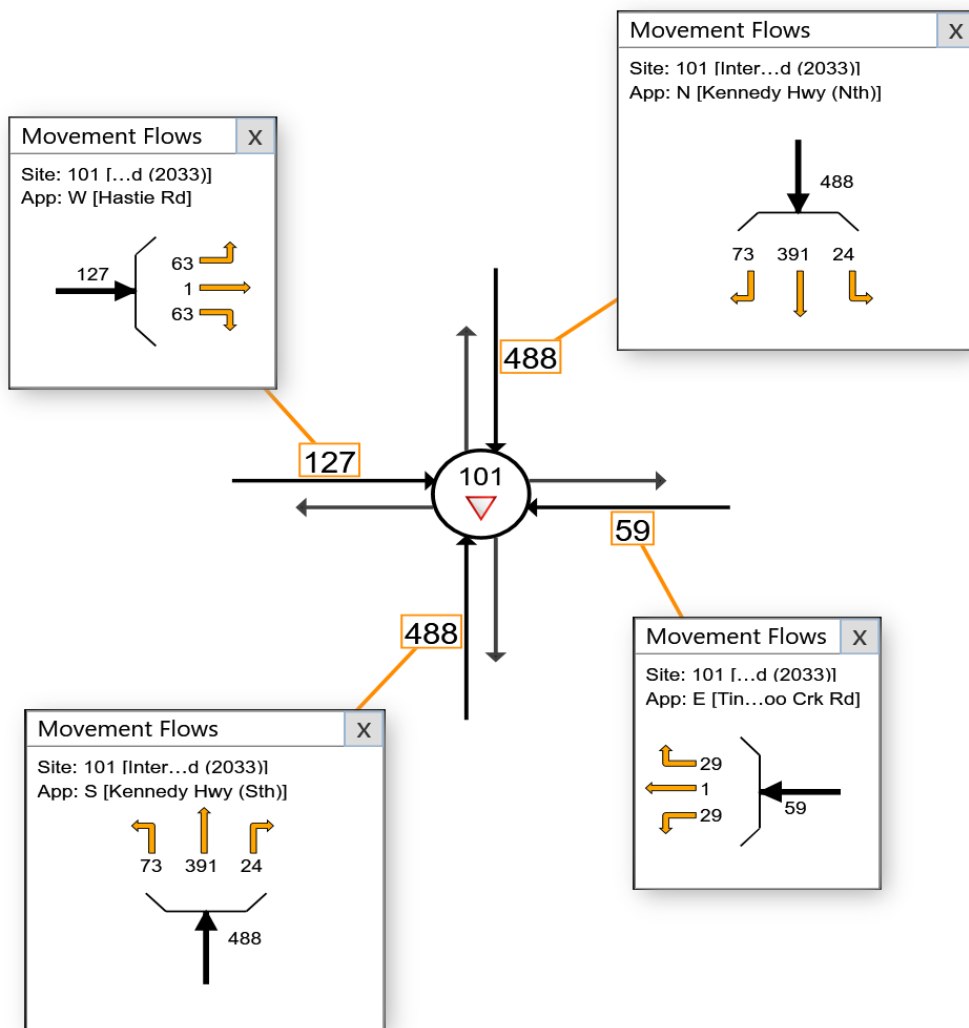
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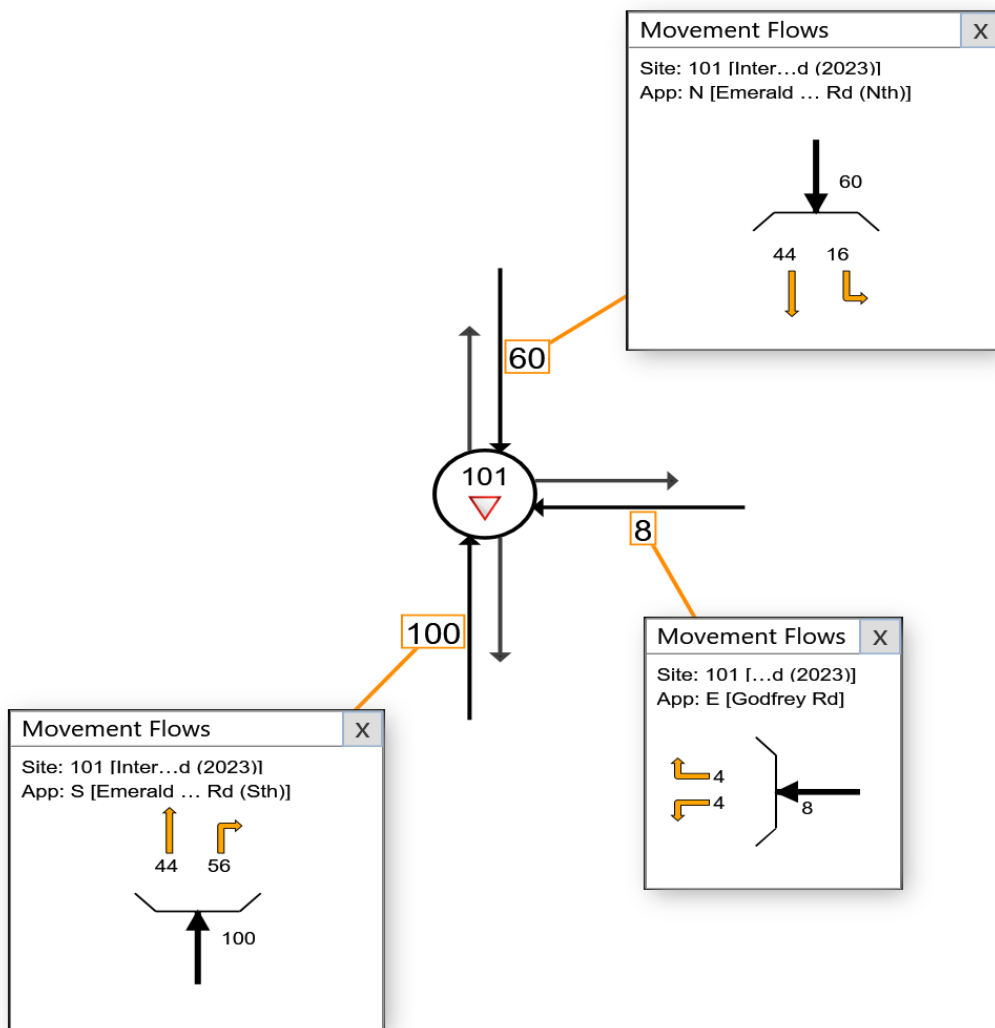
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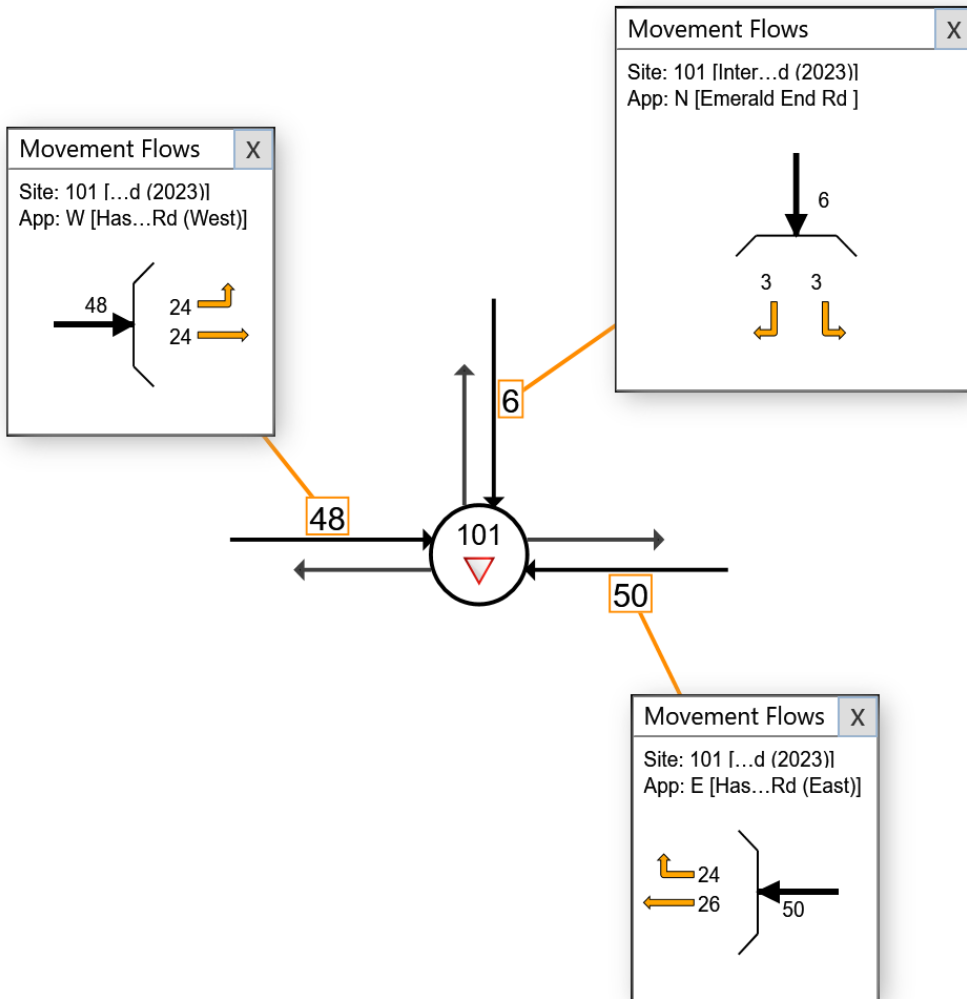
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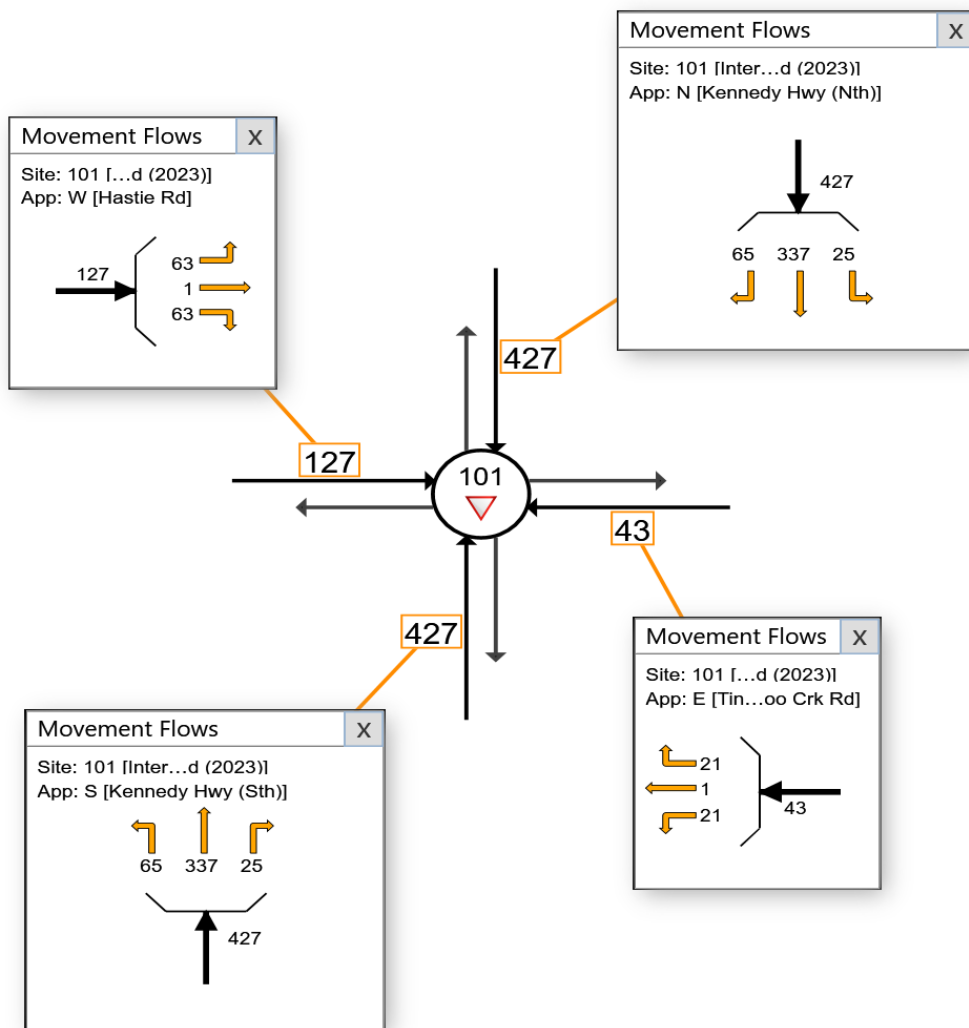
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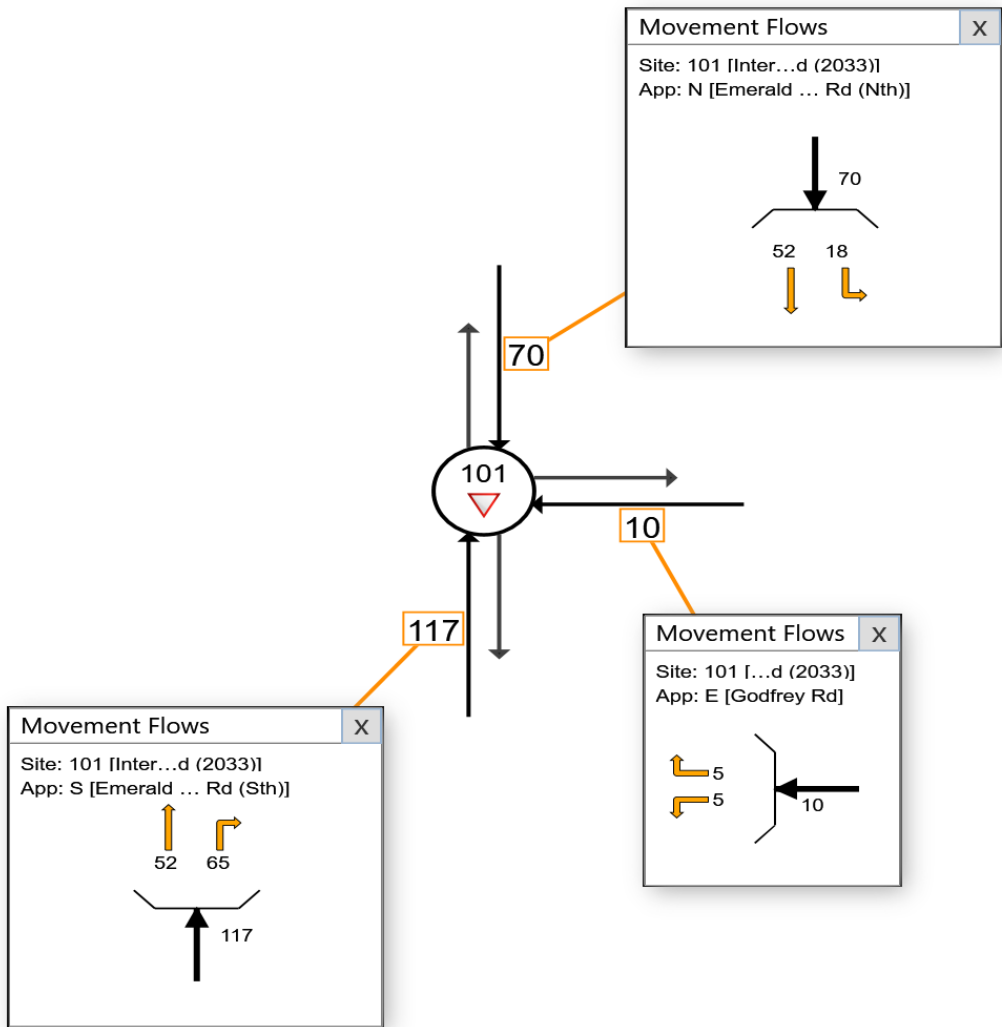
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All Movement Classes

▼ Site: 101 [Intersection 2 - Emerald End Rd and Hastie Rd (2033) (Site Folder: Future Case 2033 - PM Peak)]

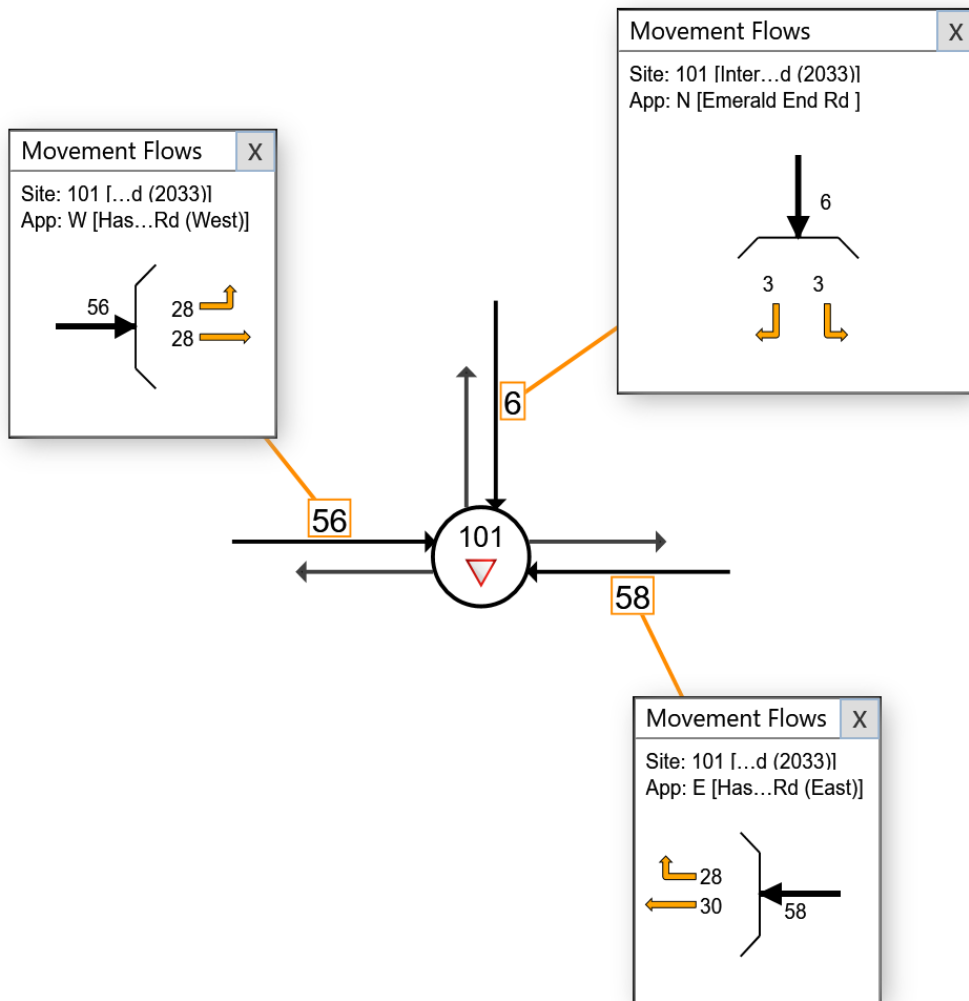
New Site

Site Category: (None)

Give-Way (Two-Way)

Use the button below to open or close all popup boxes. Click value labels to open selected ones.
Click and drag popup boxes to move to preferred positions.

Close All Popups



MOVEMENT FLOWS FOR SITE (INPUT)

Approach movement input flow rates (veh/h)

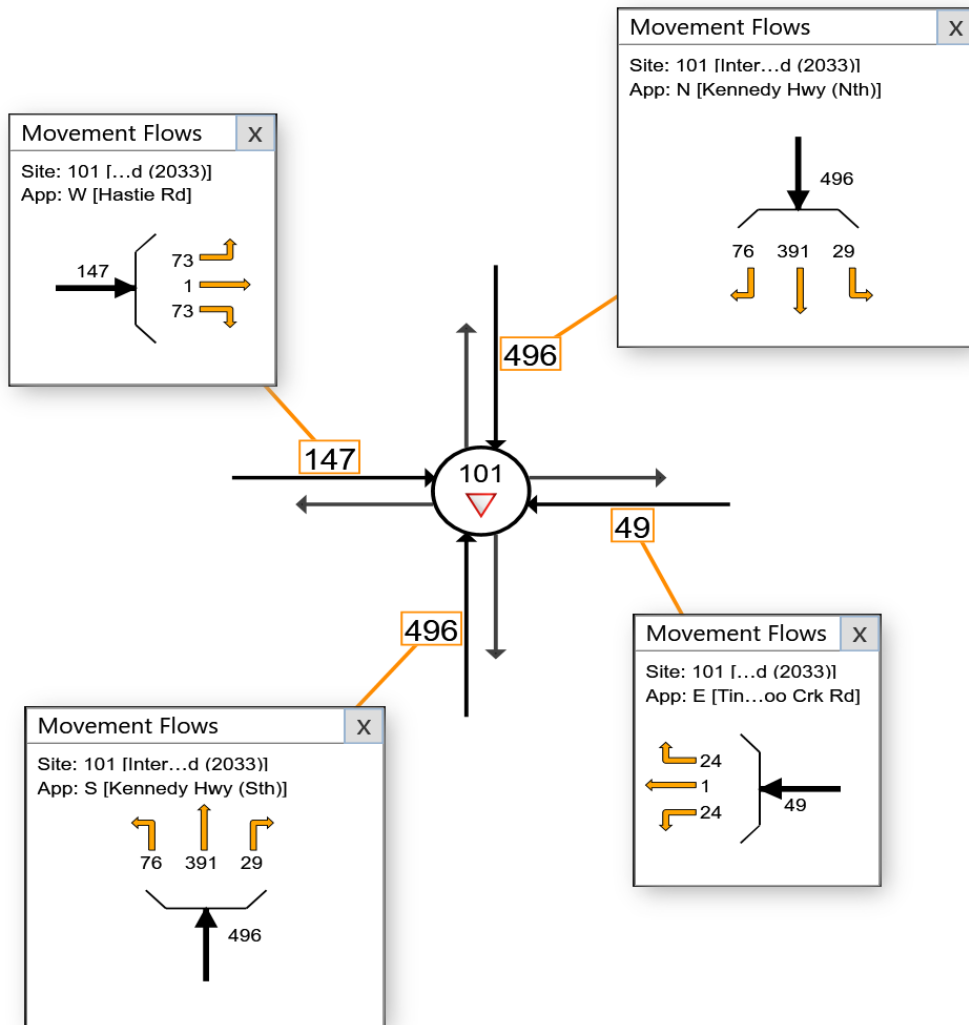
All Movement Classes

▼ Site: 101 [Intersection 3 - Kennedy Hwy and Hastie Rd (2033)]
(Site Folder: Future Case 2033 - PM Peak)

New Site
Site Category: (None)
Give-Way (Two-Way)

Use the button below to open or close all popup boxes. Click value labels to open selected ones.
Click and drag popup boxes to move to preferred positions.

Close All Popups



Appendix D

**Base Case (2023) and Future Case (2033)
Without Development AM Peak SIDRA
Results**

MOVEMENT SUMMARY

▼ Site: 101 [Intersection 2 - Emerald End Rd and Hastie Rd (2023) (Site Folder: Base Case (Without) 2023 - AM Peak)]

New Site
 Site Category: (None)
 Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h]	[HV %]	[Total veh/h]	[HV %]				[Veh. veh]	[Dist m]				
East: Hastie Rd (East)														
5	T1	18	0.0	19	0.0	0.011	0.0	LOS A	0.0	0.1	0.02	0.06	0.02	59.4
6	R2	2	0.0	2	0.0	0.011	5.5	LOS A	0.0	0.1	0.02	0.06	0.02	56.1
Approach		20	0.0	21	0.0	0.011	0.6	NA	0.0	0.1	0.02	0.06	0.02	59.1
North: Emerald End Rd														
7	L2	23	0.0	24	0.0	0.035	5.6	LOS A	0.1	0.9	0.09	0.56	0.09	51.1
9	R2	23	0.0	24	0.0	0.035	5.6	LOS A	0.1	0.9	0.09	0.56	0.09	50.4
Approach		46	0.0	48	0.0	0.035	5.6	LOS A	0.1	0.9	0.09	0.56	0.09	50.8
West: Hastie Rd (West)														
10	L2	3	0.0	3	0.0	0.015	5.5	LOS A	0.0	0.0	0.00	0.07	0.00	56.9
11	T1	24	0.0	25	0.0	0.015	0.0	LOS A	0.0	0.0	0.00	0.07	0.00	59.4
Approach		27	0.0	28	0.0	0.015	0.6	NA	0.0	0.0	0.00	0.07	0.00	59.2
All Vehicles		93	0.0	98	0.0	0.035	3.1	NA	0.1	0.9	0.05	0.31	0.05	55.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
 Vehicle movement LOS values are based on average delay per movement.
 Minor Road Approach LOS values are based on average delay for all vehicle movements.
 NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
 Delay Model: SIDRA Standard (Geometric Delay is included).
 Queue Model: SIDRA Standard.
 Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
 HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Intersection 3 - Kennedy Hwy and Hastie Rd (2023)]
 (Site Folder: Base Case (Without) 2023 - AM Peak)

New Site
 Site Category: (None)
 Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h]	[HV %]	[Total veh/h]	[HV %]				[Veh. veh]	[Dist m]				
South: Kennedy Hwy (Sth)														
1	L2	63	0.0	66	0.0	0.036	5.5	LOS A	0.0	0.0	0.00	0.58	0.00	53.6
2	T1	337	0.0	355	0.0	0.182	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
3	R2	21	0.0	22	0.0	0.023	7.1	LOS A	0.1	0.6	0.42	0.63	0.42	51.9
Approach		421	0.0	443	0.0	0.182	1.2	NA	0.1	0.6	0.02	0.12	0.02	58.4
East: Tinaroo Crk Rd														
4	L2	25	0.0	26	0.0	0.192	7.2	LOS A	0.6	4.3	0.66	0.80	0.66	46.0
5	T1	1	0.0	1	0.0	0.192	22.9	LOS C	0.6	4.3	0.66	0.80	0.66	46.4
6	R2	25	0.0	26	0.0	0.192	26.2	LOS D	0.6	4.3	0.66	0.80	0.66	46.1
Approach		51	0.0	54	0.0	0.192	16.8	LOS C	0.6	4.3	0.66	0.80	0.66	46.1
North: Kennedy Hwy (Nth)														
7	L2	21	0.0	22	0.0	0.012	5.5	LOS A	0.0	0.0	0.00	0.58	0.00	53.6
8	T1	337	0.0	355	0.0	0.183	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
9	R2	63	0.0	66	0.0	0.071	7.4	LOS A	0.3	1.9	0.46	0.68	0.46	51.7
Approach		421	0.0	443	0.0	0.183	1.4	NA	0.3	1.9	0.07	0.13	0.07	58.2
West: Hastie Rd														
10	L2	32	0.0	34	0.0	0.251	8.0	LOS A	0.9	6.1	0.68	0.83	0.75	45.2
11	T1	1	0.0	1	0.0	0.251	23.1	LOS C	0.9	6.1	0.68	0.83	0.75	45.6
12	R2	32	0.0	34	0.0	0.251	28.2	LOS D	0.9	6.1	0.68	0.83	0.75	45.3
Approach		65	0.0	68	0.0	0.251	18.2	LOS C	0.9	6.1	0.68	0.83	0.75	45.3
All Vehicles		958	0.0	1008	0.0	0.251	3.3	NA	0.9	6.1	0.12	0.21	0.13	56.4

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
 Vehicle movement LOS values are based on average delay per movement.
 Minor Road Approach LOS values are based on average delay for all vehicle movements.
 NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
 Delay Model: SIDRA Standard (Geometric Delay is included).
 Queue Model: SIDRA Standard.
 Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
 HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

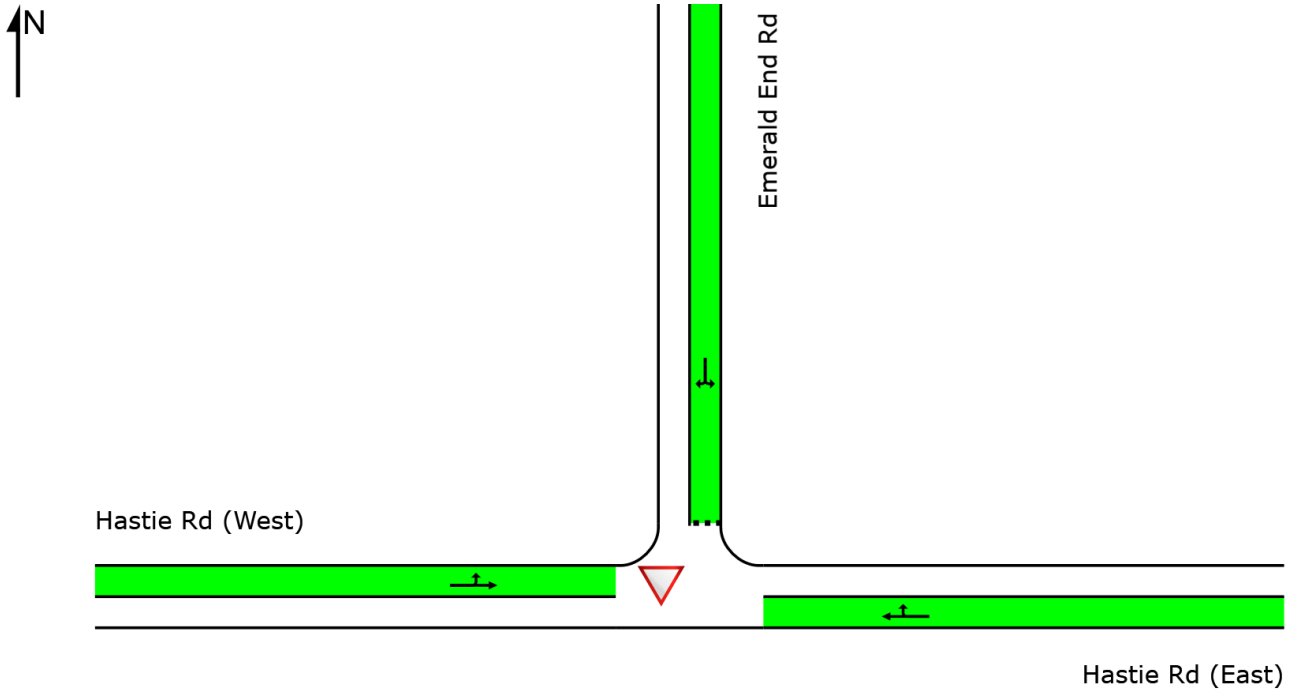
DEGREE OF SATURATION

Ratio of Demand Volume to Capacity, v/c ratio per lane

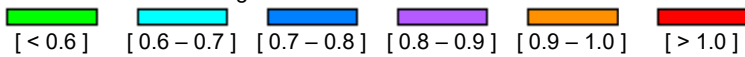
▽ Site: 101 [Intersection 2 - Emerald End Rd and Hastie Rd (2023) (Site Folder: Base Case (Without) 2023 - AM Peak)]

New Site
 Site Category: (None)
 Give-Way (Two-Way)

	Approaches			Intersection
	East	North	West	
Degree of Saturation	0.01	0.03	0.01	0.03



Colour code based on Degree of Saturation



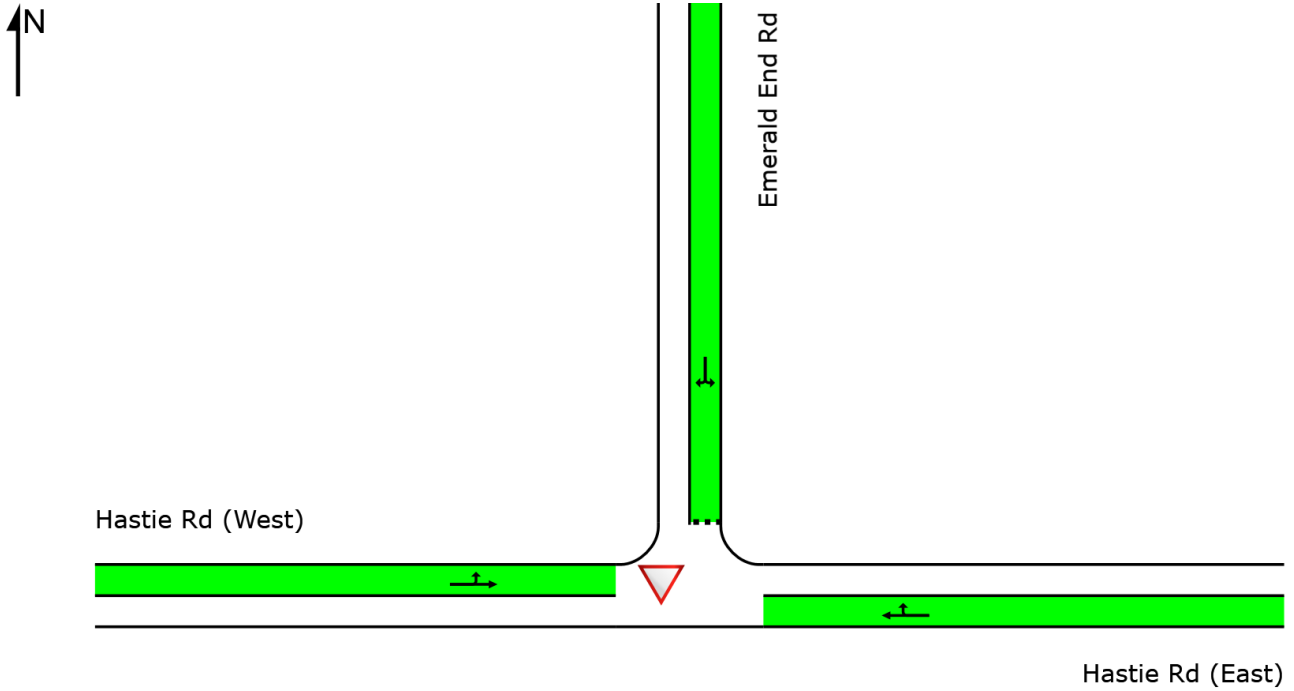
LEVEL OF SERVICE

Lane Level of Service

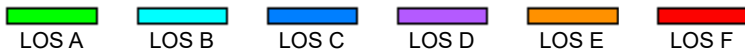
▽ Site: 101 [Intersection 2 - Emerald End Rd and Hastie Rd (2023) (Site Folder: Base Case (Without) 2023 - AM Peak)]

New Site
 Site Category: (None)
 Give-Way (Two-Way)

	Approaches			Intersection
	East	North	West	
LOS	NA	A	NA	NA



Colour code based on Level of Service



Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
 NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
 Delay Model: SIDRA Standard (Geometric Delay is included).

QUEUE STORAGE RATIO (PERCENTILE)

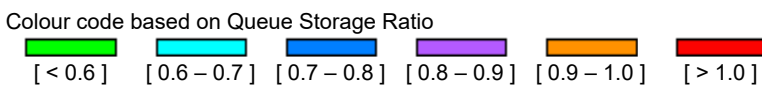
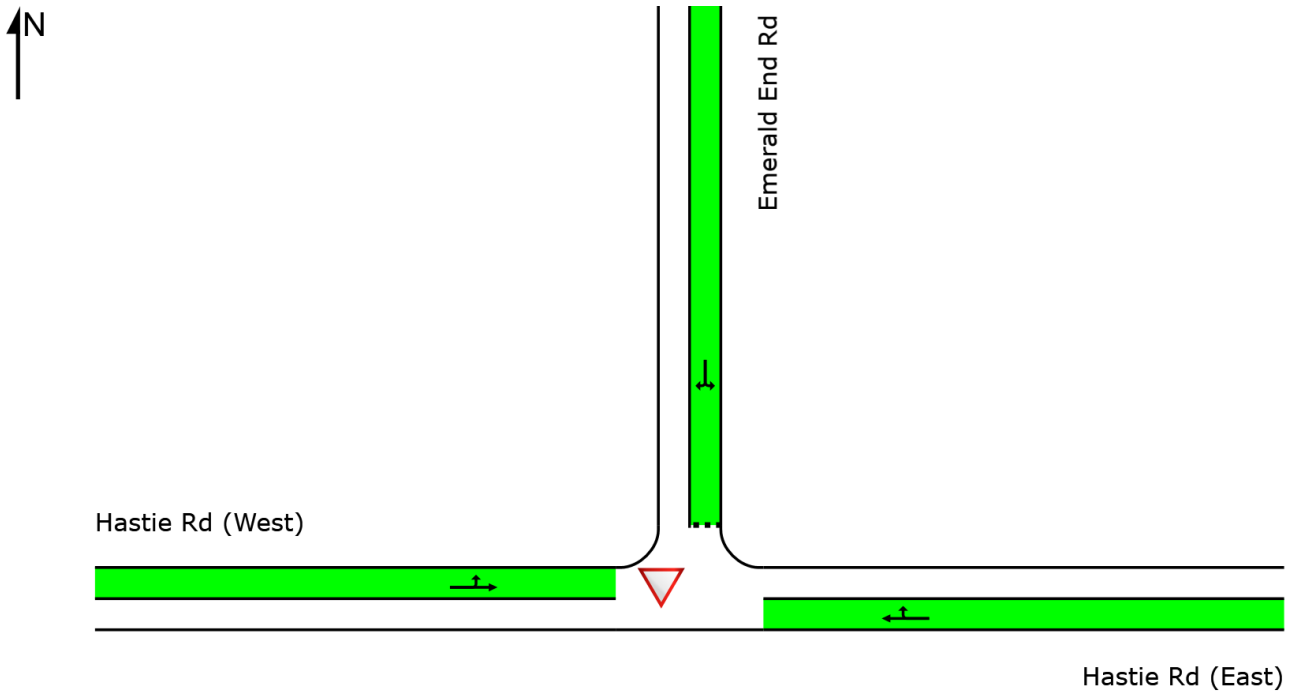
Ratio of the 95% Back of Queue Distance to the available queue storage distance per lane

▽ Site: 101 [Intersection 2 - Emerald End Rd and Hastie Rd (2023) (Site Folder: Base Case (Without) 2023 - AM Peak)]

New Site
 Site Category: (None)
 Give-Way (Two-Way)

	Approaches			Intersection
	East	North	West	
Queue Storage Ratio (%ile)	0.00	0.00	0.00	0.00

Short Lanes not included in determining Approach Queue Storage Ratios.



Queue Model: SIDRA Standard.

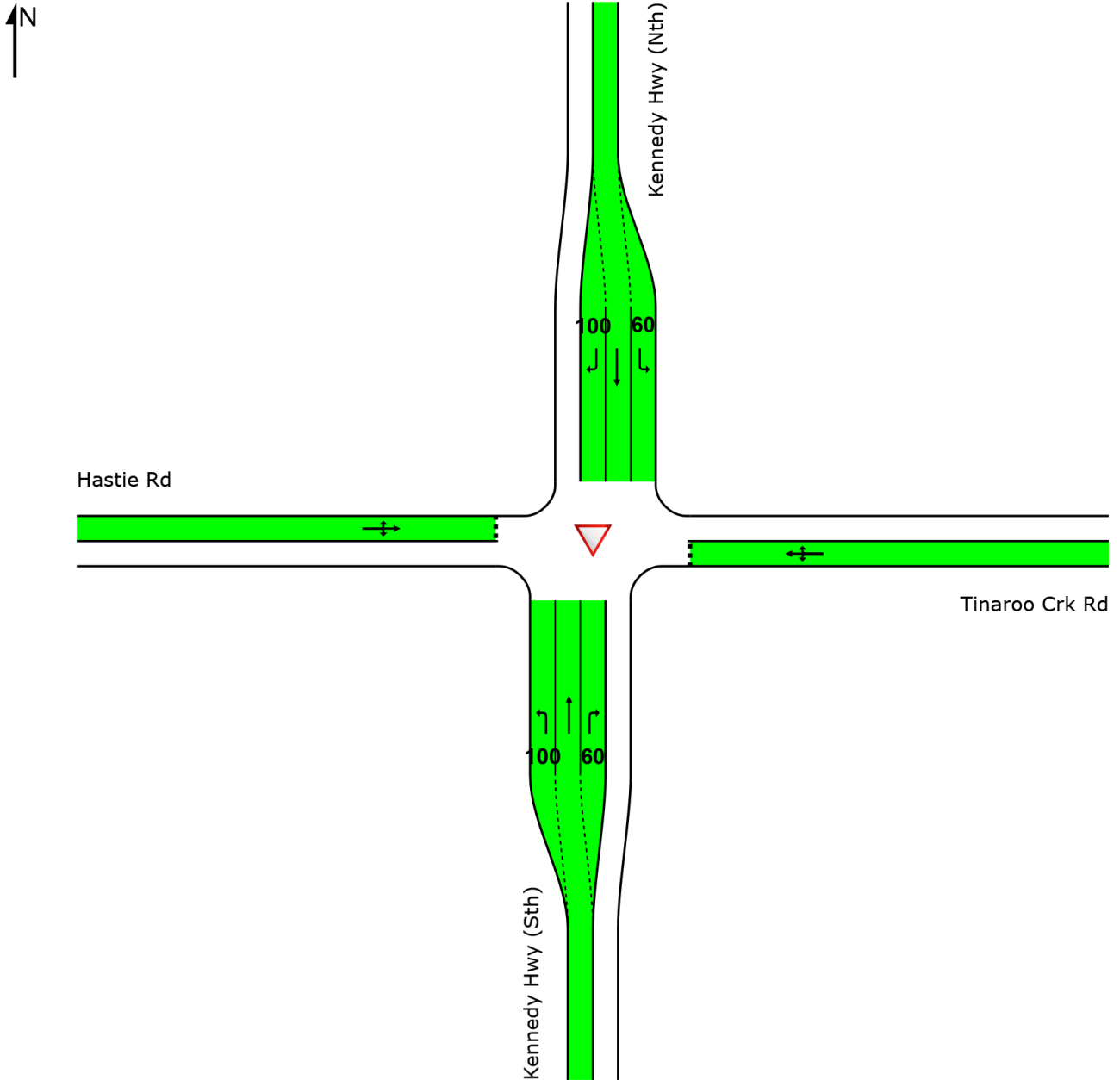
DEGREE OF SATURATION

Ratio of Demand Volume to Capacity, v/c ratio per lane

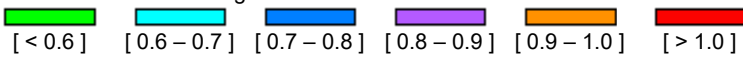
▽ Site: 101 [Intersection 3 - Kennedy Hwy and Hastie Rd (2023)]
 (Site Folder: Base Case (Without) 2023 - AM Peak)

New Site
 Site Category: (None)
 Give-Way (Two-Way)

	Approaches				Intersection
	South	East	North	West	
Degree of Saturation	0.18	0.19	0.18	0.25	0.25



Colour code based on Degree of Saturation



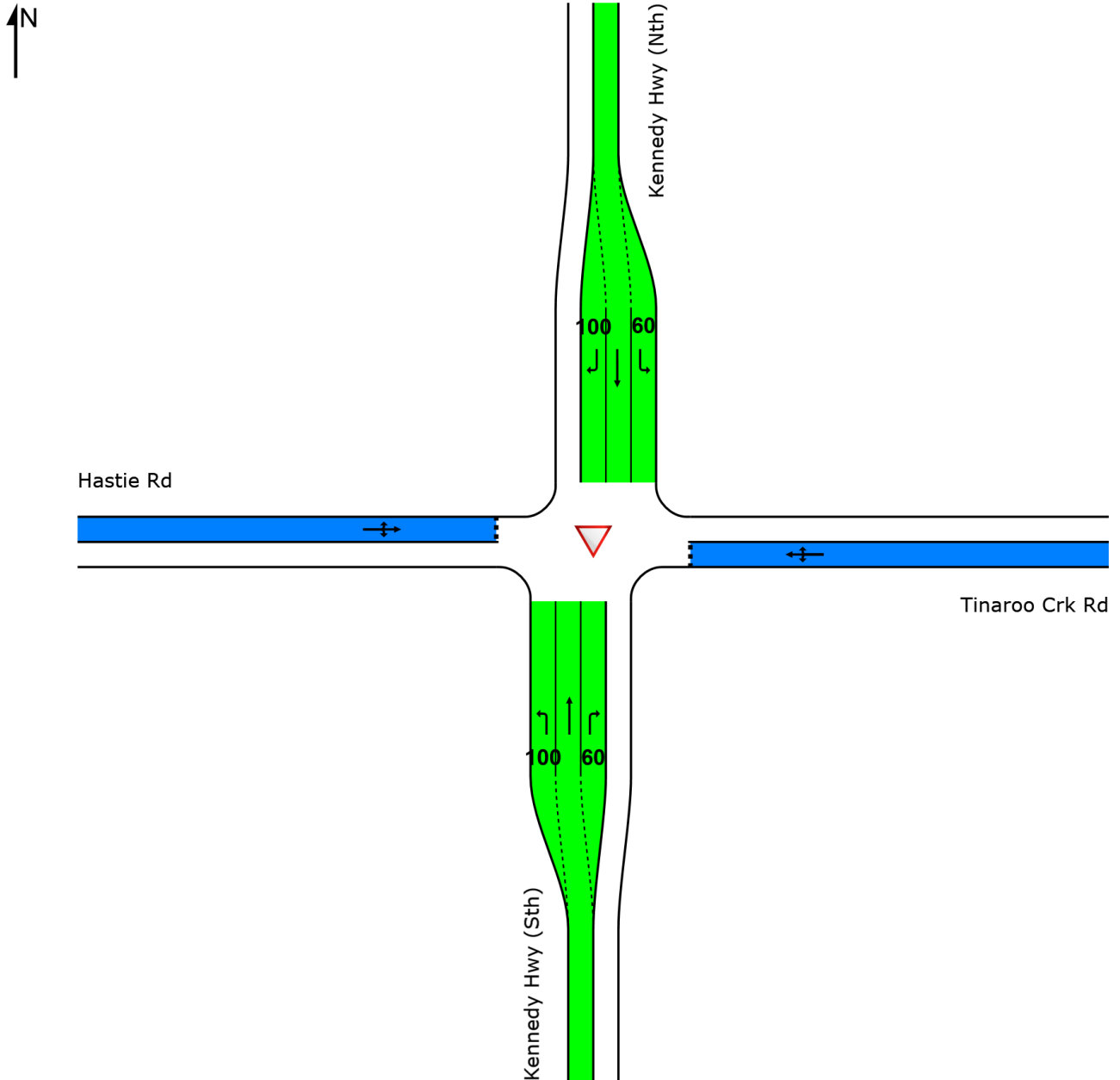
LEVEL OF SERVICE

Lane Level of Service

▽ Site: 101 [Intersection 3 - Kennedy Hwy and Hastie Rd (2023)]
 (Site Folder: Base Case (Without) 2023 - AM Peak]

New Site
 Site Category: (None)
 Give-Way (Two-Way)

	Approaches				Intersection
	South	East	North	West	
LOS	NA	C	NA	C	NA



Colour code based on Level of Service



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

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

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

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Project: \\ghdnet\GHD\AU\Cairns\Projects\42\12569173\Tech\Design\Traffic\SIDRA\Emerald Creek Heights AM Base and Future Case.sip9

QUEUE STORAGE RATIO (PERCENTILE)

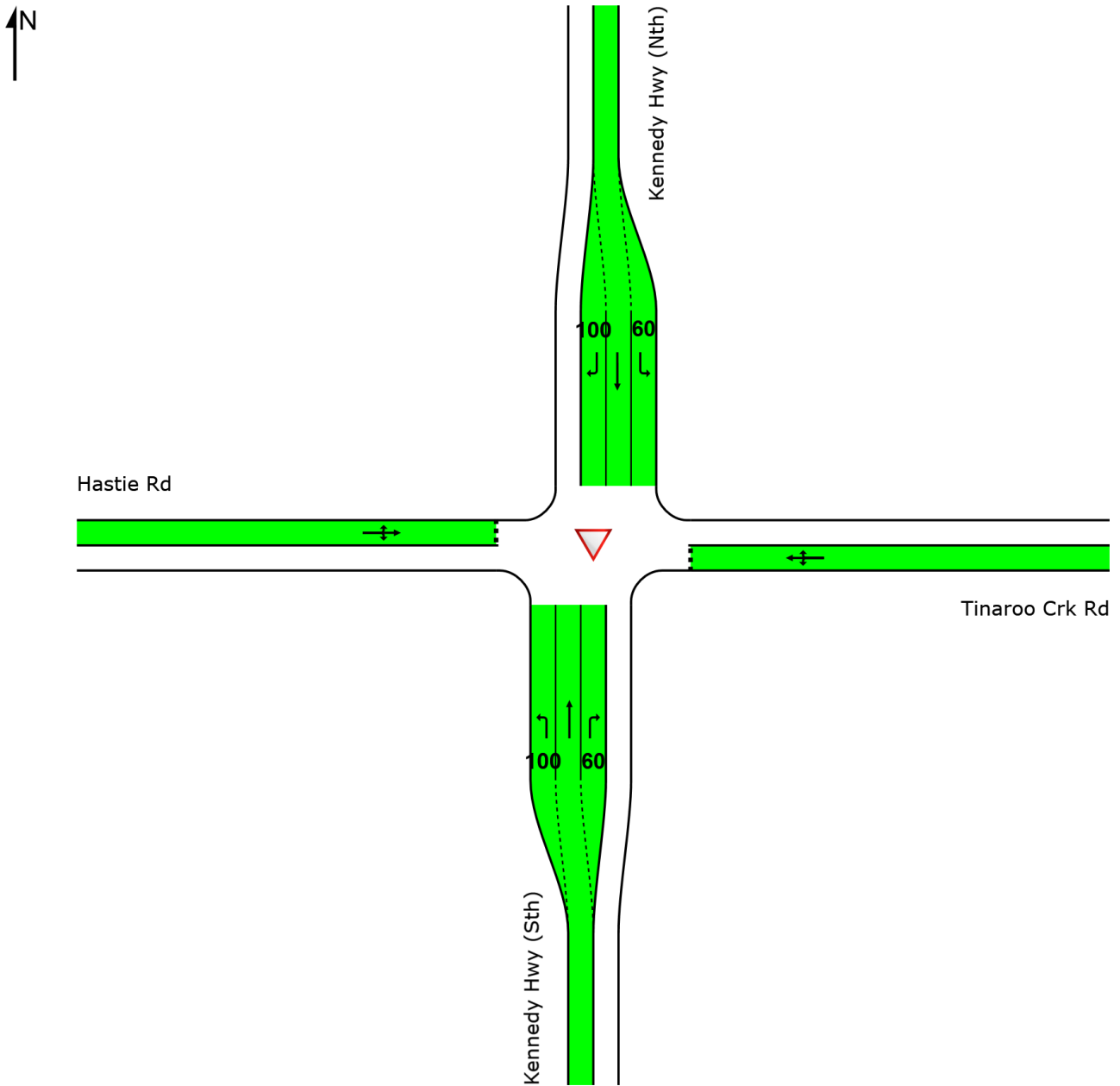
Ratio of the 95% Back of Queue Distance to the available queue storage distance per lane

▽ Site: 101 [Intersection 3 - Kennedy Hwy and Hastie Rd (2023)]
 (Site Folder: Base Case (Without) 2023 - AM Peak)

New Site
 Site Category: (None)
 Give-Way (Two-Way)

	Approaches				Intersection
	South	East	North	West	
Queue Storage Ratio (%ile)	0.00	0.01	0.00	0.01	0.01

Short Lanes not included in determining Approach Queue Storage Ratios.



Colour code based on Queue Storage Ratio

[< 0.6]	[0.6 – 0.7]	[0.7 – 0.8]	[0.8 – 0.9]	[0.9 – 1.0]	[> 1.0]

Queue Model: SIDRA Standard.

MOVEMENT SUMMARY

Site: 101 [Intersection 2 - Emerald End Rd and Hastie Rd (2033) (Site Folder: Future Case (Without) 2033 - AM Peak)]

New Site
 Site Category: (None)
 Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h]	[HV %]	[Total veh/h]	[HV %]				[Veh. veh]	[Dist m]				
East: Hastie Rd (East)														
5	T1	21	0.0	22	0.0	0.013	0.0	LOS A	0.0	0.1	0.02	0.05	0.02	59.4
6	R2	2	0.0	2	0.0	0.013	5.5	LOS A	0.0	0.1	0.02	0.05	0.02	56.2
Approach		23	0.0	24	0.0	0.013	0.5	NA	0.0	0.1	0.02	0.05	0.02	59.2
North: Emerald End Rd														
7	L2	27	0.0	28	0.0	0.041	5.6	LOS A	0.1	1.0	0.10	0.56	0.10	51.1
9	R2	27	0.0	28	0.0	0.041	5.6	LOS A	0.1	1.0	0.10	0.56	0.10	50.4
Approach		54	0.0	57	0.0	0.041	5.6	LOS A	0.1	1.0	0.10	0.56	0.10	50.7
West: Hastie Rd (West)														
10	L2	3	0.0	3	0.0	0.017	5.5	LOS A	0.0	0.0	0.00	0.06	0.00	57.0
11	T1	28	0.0	29	0.0	0.017	0.0	LOS A	0.0	0.0	0.00	0.06	0.00	59.5
Approach		31	0.0	33	0.0	0.017	0.5	NA	0.0	0.0	0.00	0.06	0.00	59.3
All Vehicles		108	0.0	114	0.0	0.041	3.1	NA	0.1	1.0	0.05	0.31	0.05	55.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
 Vehicle movement LOS values are based on average delay per movement.
 Minor Road Approach LOS values are based on average delay for all vehicle movements.
 NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
 Delay Model: SIDRA Standard (Geometric Delay is included).
 Queue Model: SIDRA Standard.
 Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
 HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Intersection 3 - Kennedy Hwy and Hastie Rd (2033)]
 (Site Folder: Future Case (Without) 2033 - AM Peak)

New Site
 Site Category: (None)
 Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h]	[HV %]	[Total veh/h]	[HV %]				[Veh. veh]	[Dist m]				
South: Kennedy Hwy (Sth)														
1	L2	73	0.0	77	0.0	0.041	5.6	LOS A	0.0	0.0	0.00	0.58	0.00	53.6
2	T1	391	0.0	412	0.0	0.212	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
3	R2	24	0.0	25	0.0	0.028	7.4	LOS A	0.1	0.7	0.46	0.65	0.46	51.6
Approach		488	0.0	514	0.0	0.212	1.2	NA	0.1	0.7	0.02	0.12	0.02	58.4
East: Tinaroo Crk Rd														
4	L2	29	0.0	31	0.0	0.292	9.6	LOS A	1.0	7.2	0.75	0.90	0.89	42.4
5	T1	1	0.0	1	0.0	0.292	32.8	LOS D	1.0	7.2	0.75	0.90	0.89	42.7
6	R2	29	0.0	31	0.0	0.292	37.1	LOS E	1.0	7.2	0.75	0.90	0.89	42.5
Approach		59	0.0	62	0.0	0.292	23.5	LOS C	1.0	7.2	0.75	0.90	0.89	42.5
North: Kennedy Hwy (Nth)														
7	L2	24	0.0	25	0.0	0.014	5.5	LOS A	0.0	0.0	0.00	0.58	0.00	53.6
8	T1	391	0.0	412	0.0	0.213	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
9	R2	73	0.0	77	0.0	0.090	7.9	LOS A	0.3	2.4	0.50	0.72	0.50	51.3
Approach		488	0.0	514	0.0	0.213	1.5	NA	0.3	2.4	0.07	0.14	0.07	58.1
West: Hastie Rd														
10	L2	37	0.0	39	0.0	0.383	11.6	LOS B	1.5	10.2	0.78	0.96	1.02	41.0
11	T1	1	0.0	1	0.0	0.383	33.8	LOS D	1.5	10.2	0.78	0.96	1.02	41.3
12	R2	37	0.0	39	0.0	0.383	41.3	LOS E	1.5	10.2	0.78	0.96	1.02	41.0
Approach		75	0.0	79	0.0	0.383	26.6	LOS D	1.5	10.2	0.78	0.96	1.02	41.0
All Vehicles		1110	0.0	1168	0.0	0.383	4.2	NA	1.5	10.2	0.13	0.22	0.16	55.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
 Vehicle movement LOS values are based on average delay per movement.
 Minor Road Approach LOS values are based on average delay for all vehicle movements.
 NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
 Delay Model: SIDRA Standard (Geometric Delay is included).
 Queue Model: SIDRA Standard.
 Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
 HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

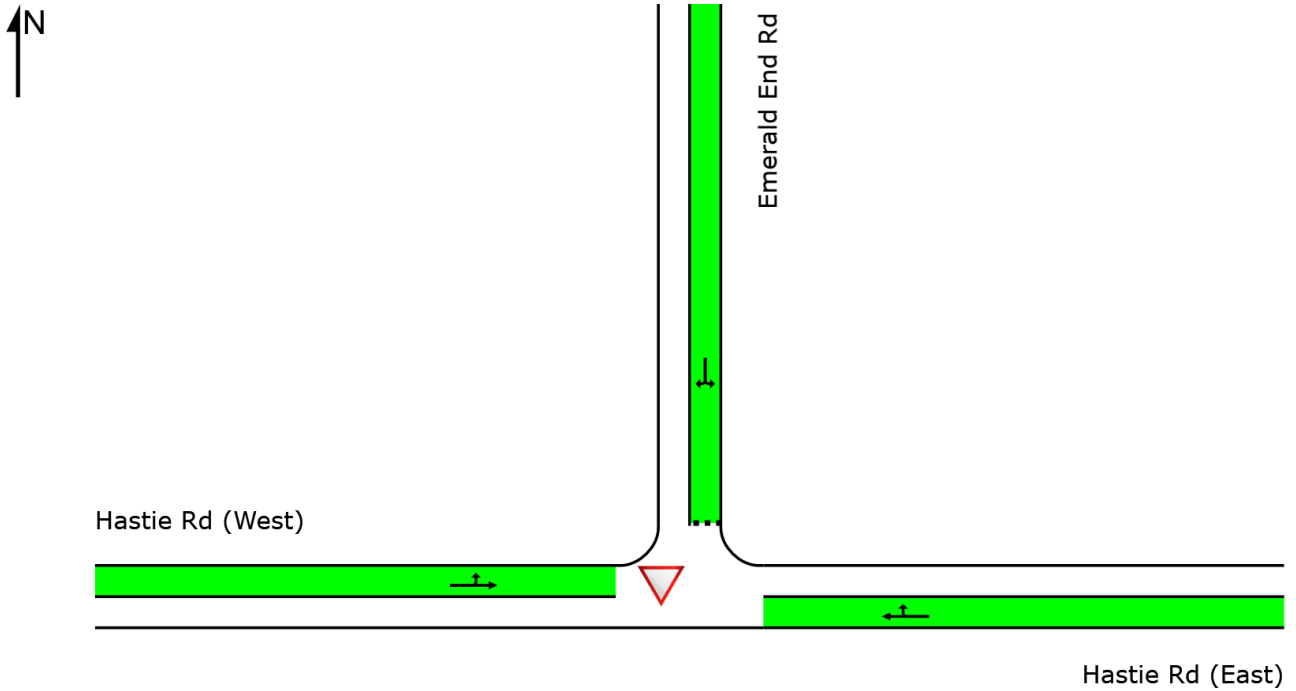
DEGREE OF SATURATION

Ratio of Demand Volume to Capacity, v/c ratio per lane

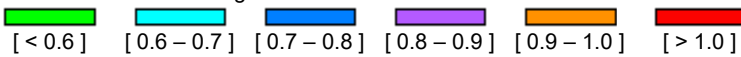
▽ Site: 101 [Intersection 2 - Emerald End Rd and Hastie Rd (2033) (Site Folder: Future Case (Without) 2033 - AM Peak)]

New Site
 Site Category: (None)
 Give-Way (Two-Way)

	Approaches			Intersection
	East	North	West	
Degree of Saturation	0.01	0.04	0.02	0.04



Colour code based on Degree of Saturation



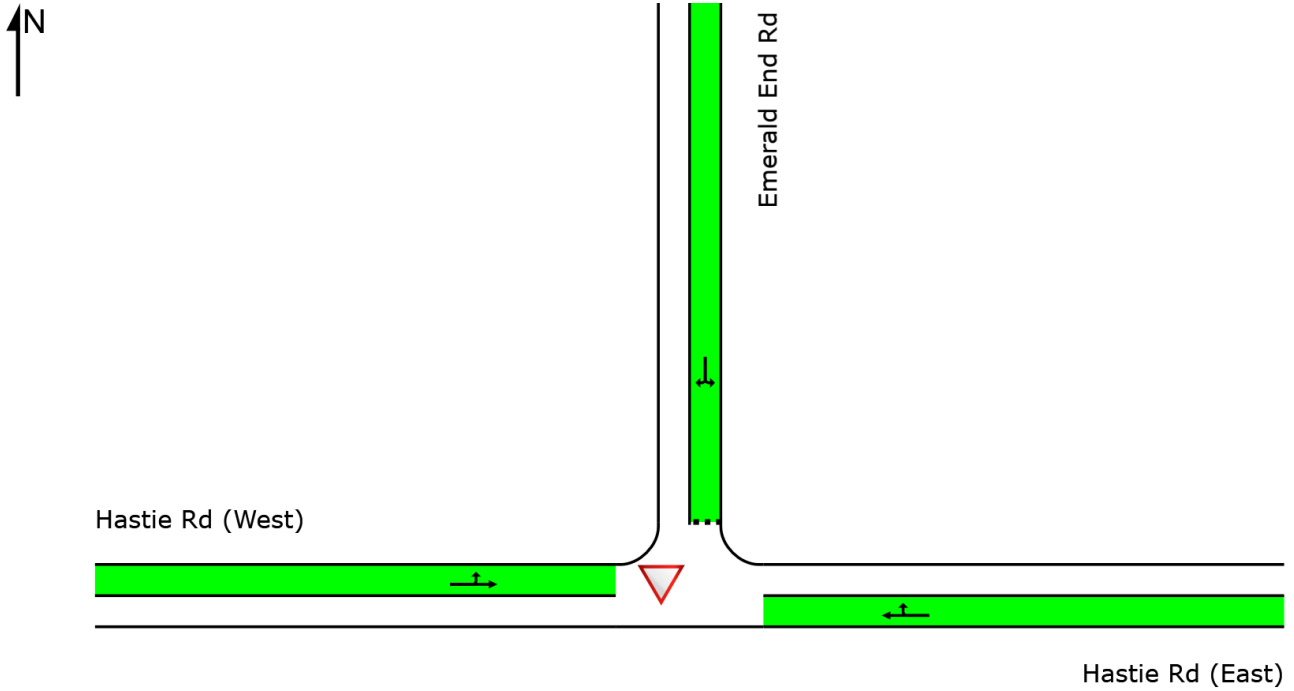
LEVEL OF SERVICE

Lane Level of Service

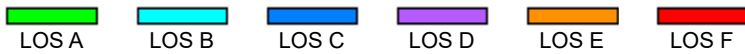
▽ Site: 101 [Intersection 2 - Emerald End Rd and Hastie Rd (2033) (Site Folder: Future Case (Without) 2033 - AM Peak)]

New Site
 Site Category: (None)
 Give-Way (Two-Way)

	Approaches			Intersection
	East	North	West	
LOS	NA	A	NA	NA



Colour code based on Level of Service



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

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

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

QUEUE STORAGE RATIO (PERCENTILE)

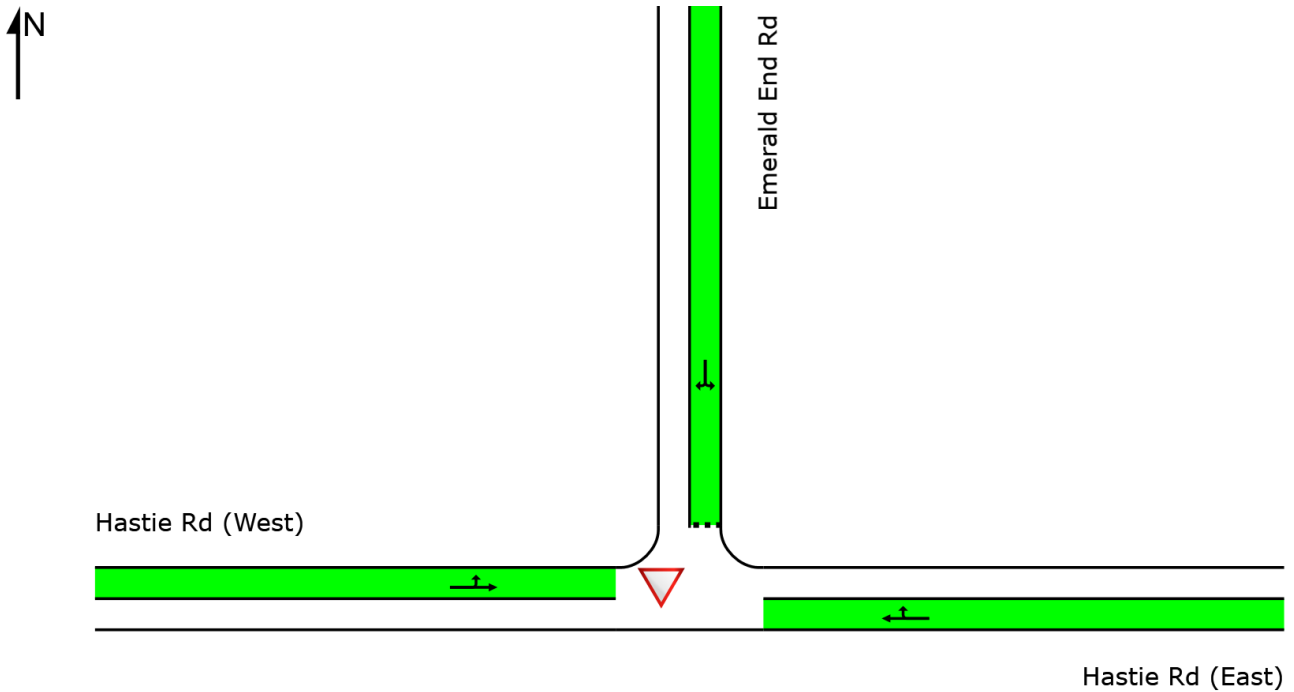
Ratio of the 95% Back of Queue Distance to the available queue storage distance per lane

▽ Site: 101 [Intersection 2 - Emerald End Rd and Hastie Rd (2033) (Site Folder: Future Case (Without) 2033 - AM Peak)]

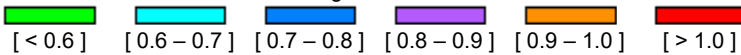
New Site
 Site Category: (None)
 Give-Way (Two-Way)

	Approaches			Intersection
	East	North	West	
Queue Storage Ratio (%ile)	0.00	0.00	0.00	0.00

Short Lanes not included in determining Approach Queue Storage Ratios.



Colour code based on Queue Storage Ratio



Queue Model: SIDRA Standard.

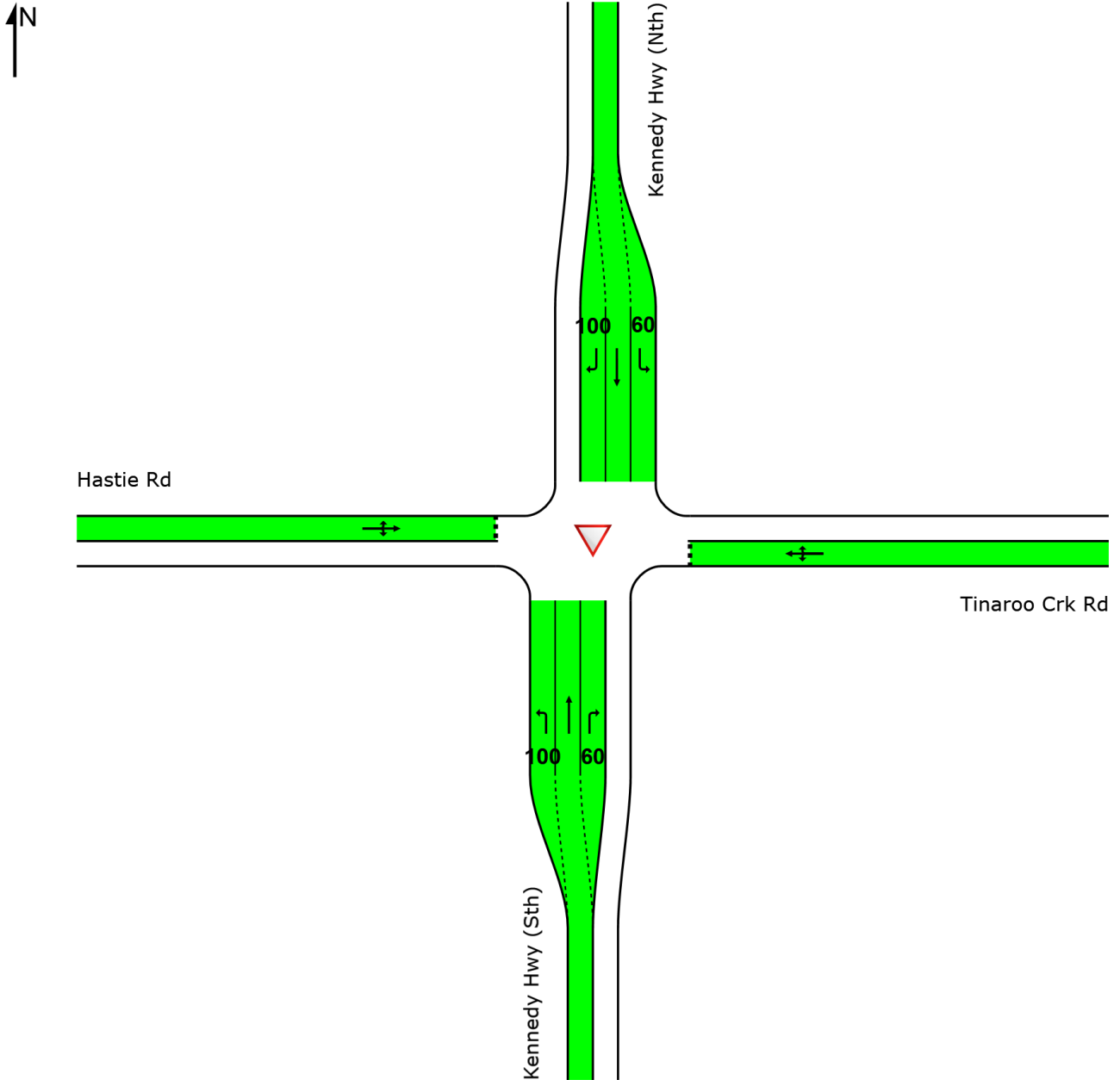
DEGREE OF SATURATION

Ratio of Demand Volume to Capacity, v/c ratio per lane

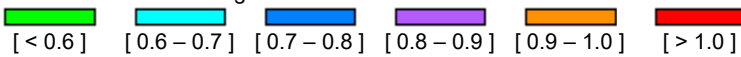
▽ Site: 101 [Intersection 3 - Kennedy Hwy and Hastie Rd (2033)]
 (Site Folder: Future Case (Without) 2033 - AM Peak)

New Site
 Site Category: (None)
 Give-Way (Two-Way)

	Approaches				Intersection
	South	East	North	West	
Degree of Saturation	0.21	0.29	0.21	0.38	0.38



Colour code based on Degree of Saturation



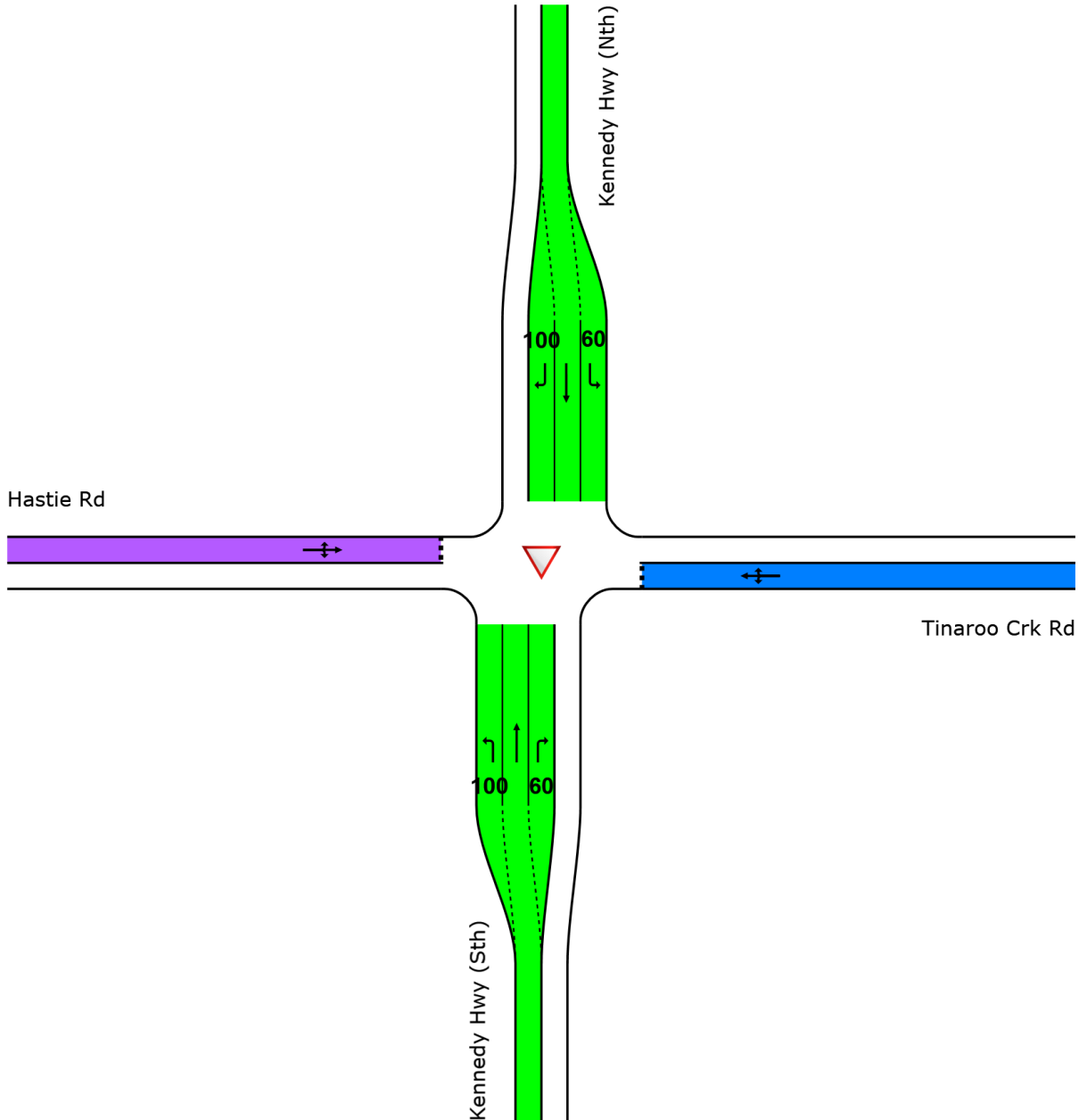
LEVEL OF SERVICE

Lane Level of Service

▽ Site: 101 [Intersection 3 - Kennedy Hwy and Hastie Rd (2033)]
 (Site Folder: Future Case (Without) 2033 - AM Peak)

New Site
 Site Category: (None)
 Give-Way (Two-Way)

	Approaches				Intersection
	South	East	North	West	
LOS	NA	C	NA	D	NA



Colour code based on Level of Service



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

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

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

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Project: \\ghdnet\GHD\AU\Cairns\Projects\42\12569173\Tech\Design\Traffic\SIDRA\Emerald Creek Heights AM Base and Future Case.sip9

QUEUE STORAGE RATIO (PERCENTILE)

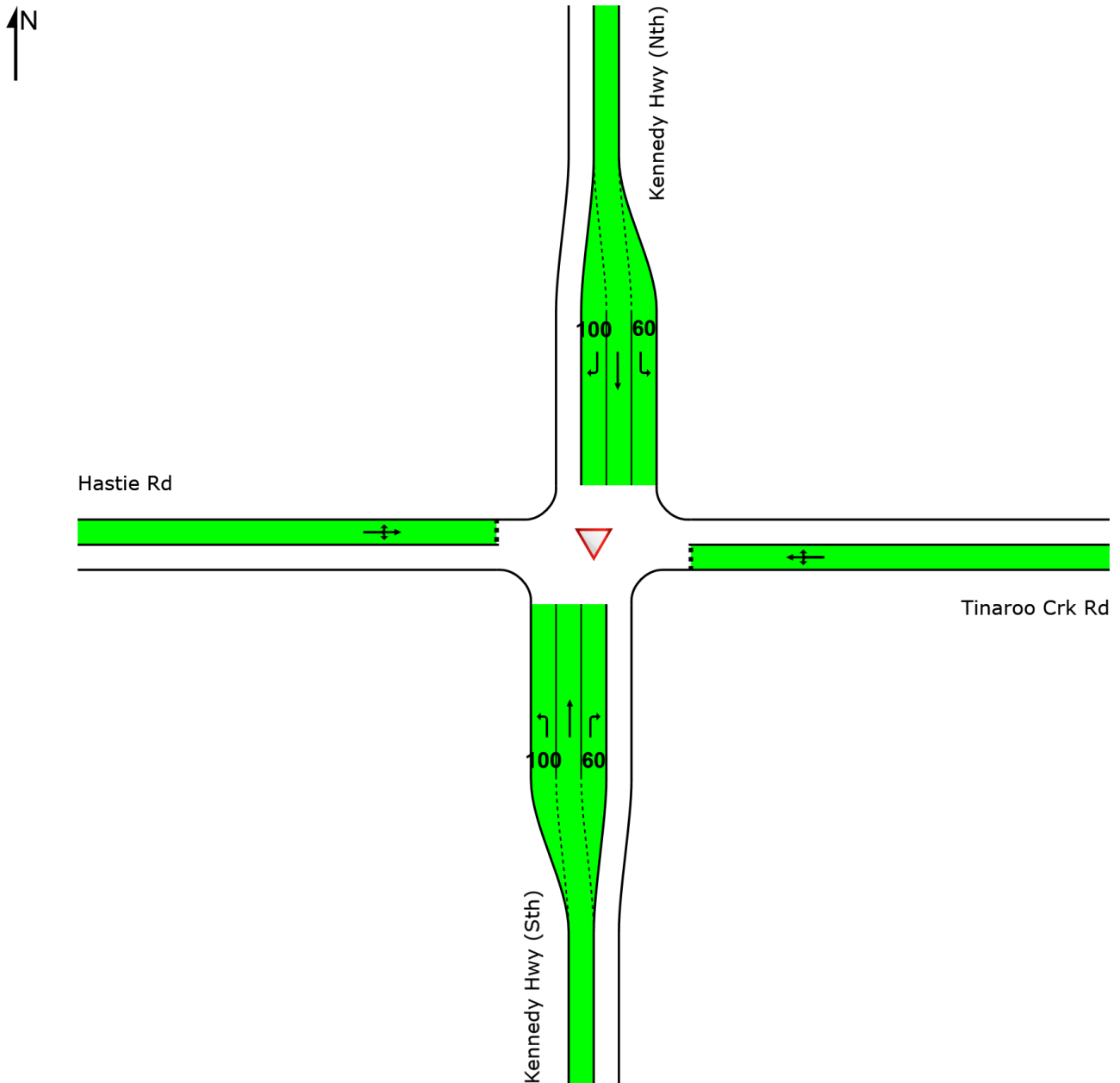
Ratio of the 95% Back of Queue Distance to the available queue storage distance per lane

▽ Site: 101 [Intersection 3 - Kennedy Hwy and Hastie Rd (2033)]
 (Site Folder: Future Case (Without) 2033 - AM Peak)

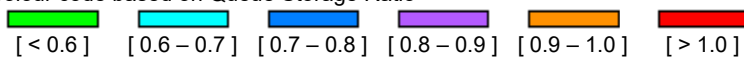
New Site
 Site Category: (None)
 Give-Way (Two-Way)

	Approaches				Intersection
	South	East	North	West	
Queue Storage Ratio (%ile)	0.00	0.01	0.00	0.02	0.02

Short Lanes not included in determining Approach Queue Storage Ratios.



Colour code based on Queue Storage Ratio



Queue Model: SIDRA Standard.

Appendix E

**Base Case (2023) and Future Case (2033)
Without Development PM Peak SIDRA
Results**

MOVEMENT SUMMARY

Site: 101 [Intersection 2 - Emerald End Rd and Hastie Rd (2023) (Site Folder: Base Case (Without) 2023 - PM Peak)]

New Site
 Site Category: (None)
 Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV %	[Total veh/h	HV %				[Veh. veh	Dist] m				
East: Hastie Rd (East)														
5	T1	24	0.0	25	0.0	0.027	0.1	LOS A	0.1	0.8	0.11	0.27	0.11	57.1
6	R2	22	0.0	23	0.0	0.027	5.6	LOS A	0.1	0.8	0.11	0.27	0.11	53.3
Approach		46	0.0	48	0.0	0.027	2.7	NA	0.1	0.8	0.11	0.27	0.11	55.5
North: Emerald End Rd														
7	L2	3	0.0	3	0.0	0.005	5.6	LOS A	0.0	0.1	0.09	0.56	0.09	51.1
9	R2	3	0.0	3	0.0	0.005	5.7	LOS A	0.0	0.1	0.09	0.56	0.09	50.4
Approach		6	0.0	6	0.0	0.005	5.7	LOS A	0.0	0.1	0.09	0.56	0.09	50.8
West: Hastie Rd (West)														
10	L2	22	0.0	23	0.0	0.027	5.5	LOS A	0.0	0.0	0.00	0.27	0.00	54.6
11	T1	26	0.0	27	0.0	0.027	0.0	LOS A	0.0	0.0	0.00	0.27	0.00	57.6
Approach		48	0.0	51	0.0	0.027	2.5	NA	0.0	0.0	0.00	0.27	0.00	56.4
All Vehicles		100	0.0	105	0.0	0.027	2.8	NA	0.1	0.8	0.06	0.29	0.06	55.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
 Vehicle movement LOS values are based on average delay per movement.
 Minor Road Approach LOS values are based on average delay for all vehicle movements.
 NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
 Delay Model: SIDRA Standard (Geometric Delay is included).
 Queue Model: SIDRA Standard.
 Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
 HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Intersection 3 - Kennedy Hwy and Hastie Rd (2023)]
 (Site Folder: Base Case (Without) 2023 - PM Peak)

New Site
 Site Category: (None)
 Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h]	[HV %]	[Total veh/h]	[HV %]				[Veh. veh]	[Dist m]				
South: Kennedy Hwy (Sth)														
1	L2	43	0.0	45	0.0	0.024	5.5	LOS A	0.0	0.0	0.00	0.58	0.00	53.6
2	T1	337	0.0	355	0.0	0.183	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
3	R2	25	0.0	26	0.0	0.027	7.1	LOS A	0.1	0.7	0.42	0.63	0.42	51.9
Approach		405	0.0	426	0.0	0.183	1.1	NA	0.1	0.7	0.03	0.10	0.03	58.6
East: Tinaroo Crk Rd														
4	L2	21	0.0	22	0.0	0.167	7.2	LOS A	0.5	3.7	0.66	0.80	0.66	45.9
5	T1	1	0.0	1	0.0	0.167	21.3	LOS C	0.5	3.7	0.66	0.80	0.66	46.2
6	R2	21	0.0	22	0.0	0.167	26.8	LOS D	0.5	3.7	0.66	0.80	0.66	45.9
Approach		43	0.0	45	0.0	0.167	17.1	LOS C	0.5	3.7	0.66	0.80	0.66	45.9
North: Kennedy Hwy (Nth)														
7	L2	25	0.0	26	0.0	0.014	5.5	LOS A	0.0	0.0	0.00	0.58	0.00	53.6
8	T1	337	0.0	355	0.0	0.183	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
9	R2	43	0.0	45	0.0	0.048	7.2	LOS A	0.2	1.3	0.44	0.66	0.44	51.8
Approach		405	0.0	426	0.0	0.183	1.2	NA	0.2	1.3	0.05	0.11	0.05	58.5
West: Hastie Rd														
10	L2	63	0.0	66	0.0	0.462	11.3	LOS B	2.1	15.0	0.71	0.96	1.07	43.4
11	T1	1	0.0	1	0.0	0.462	27.1	LOS D	2.1	15.0	0.71	0.96	1.07	43.7
12	R2	63	0.0	66	0.0	0.462	31.8	LOS D	2.1	15.0	0.71	0.96	1.07	43.4
Approach		127	0.0	134	0.0	0.462	21.6	LOS C	2.1	15.0	0.71	0.96	1.07	43.4
All Vehicles		980	0.0	1032	0.0	0.462	4.5	NA	2.1	15.0	0.15	0.24	0.20	55.4

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
 Vehicle movement LOS values are based on average delay per movement.
 Minor Road Approach LOS values are based on average delay for all vehicle movements.
 NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
 Delay Model: SIDRA Standard (Geometric Delay is included).
 Queue Model: SIDRA Standard.
 Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
 HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

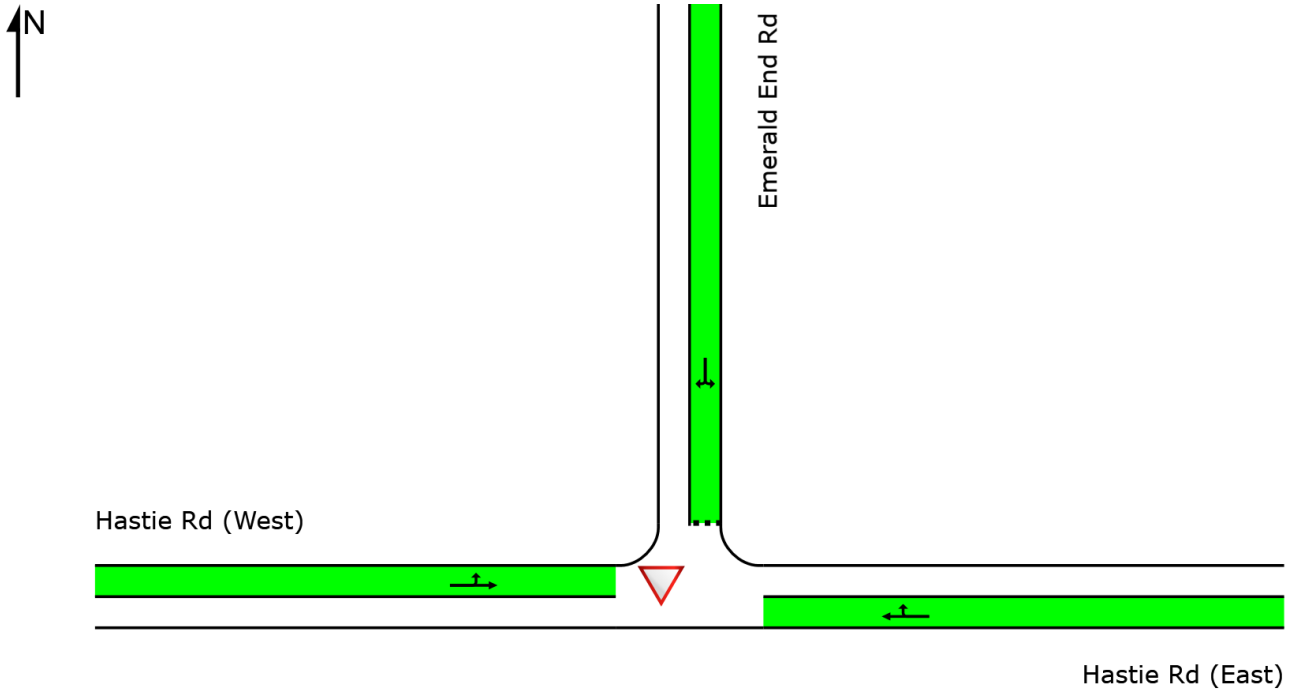
DEGREE OF SATURATION

Ratio of Demand Volume to Capacity, v/c ratio per lane

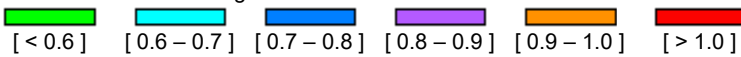
▽ Site: 101 [Intersection 2 - Emerald End Rd and Hastie Rd (2023) (Site Folder: Base Case (Without) 2023 - PM Peak)]

New Site
Site Category: (None)
Give-Way (Two-Way)

	Approaches			Intersection
	East	North	West	
Degree of Saturation	0.03	0.00	0.03	0.03



Colour code based on Degree of Saturation



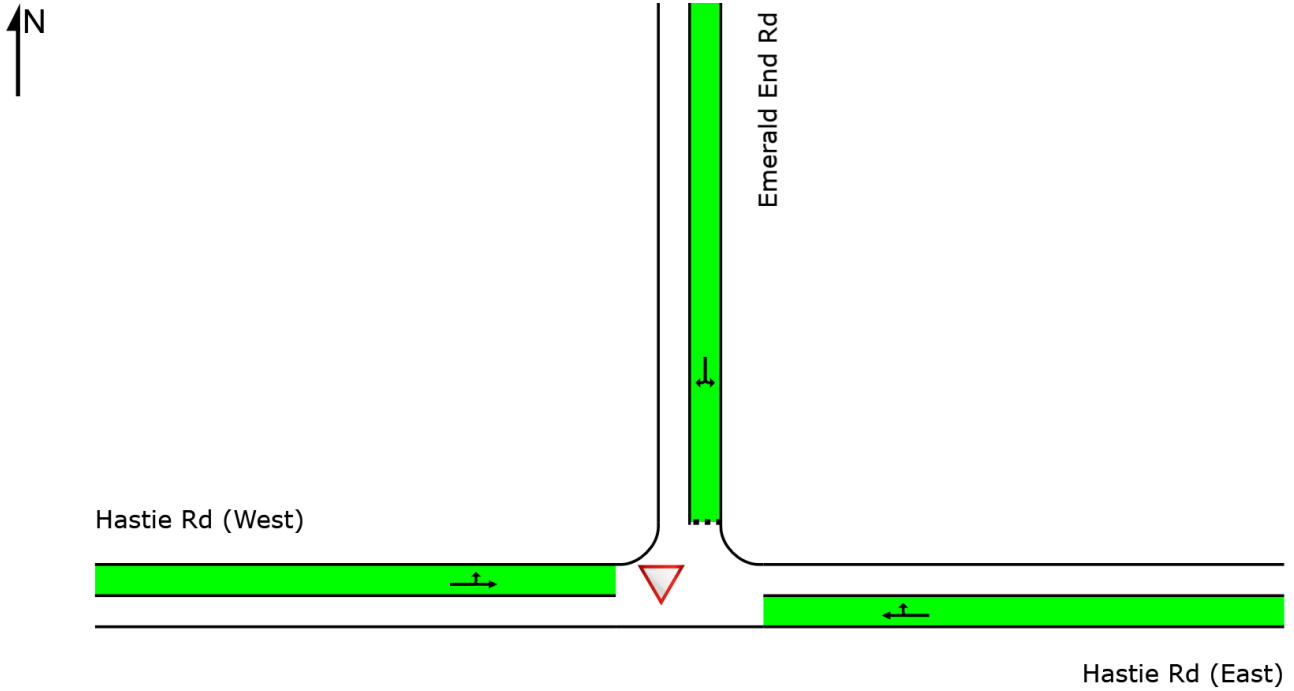
LEVEL OF SERVICE

Lane Level of Service

▽ Site: 101 [Intersection 2 - Emerald End Rd and Hastie Rd (2023) (Site Folder: Base Case (Without) 2023 - PM Peak)]

New Site
 Site Category: (None)
 Give-Way (Two-Way)

	Approaches			Intersection
	East	North	West	
LOS	NA	A	NA	NA



Colour code based on Level of Service



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

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

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

QUEUE STORAGE RATIO (PERCENTILE)

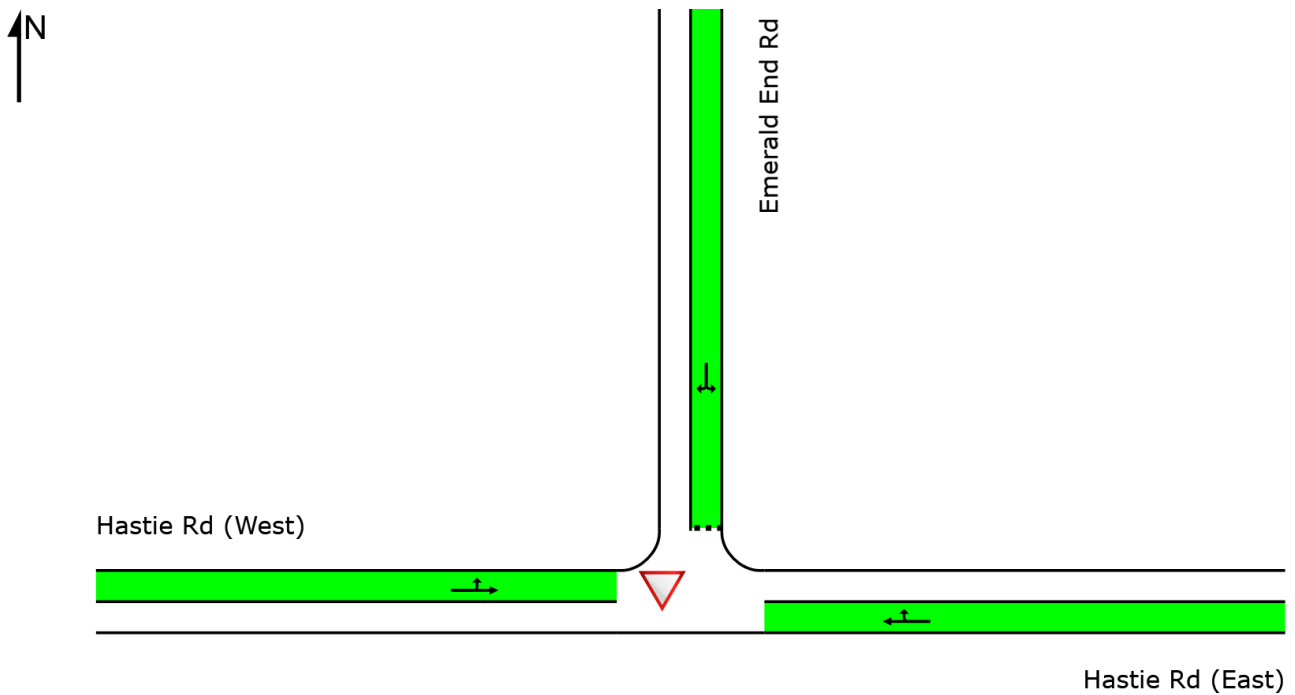
Ratio of the 95% Back of Queue Distance to the available queue storage distance per lane

▽ Site: 101 [Intersection 2 - Emerald End Rd and Hastie Rd (2023) (Site Folder: Base Case (Without) 2023 - PM Peak)]

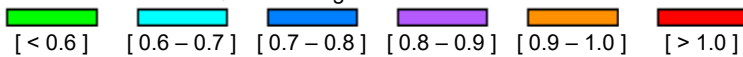
New Site
 Site Category: (None)
 Give-Way (Two-Way)

	Approaches			Intersection
	East	North	West	
Queue Storage Ratio (%ile)	0.00	0.00	0.00	0.00

Short Lanes not included in determining Approach Queue Storage Ratios.



Colour code based on Queue Storage Ratio



Queue Model: SIDRA Standard.

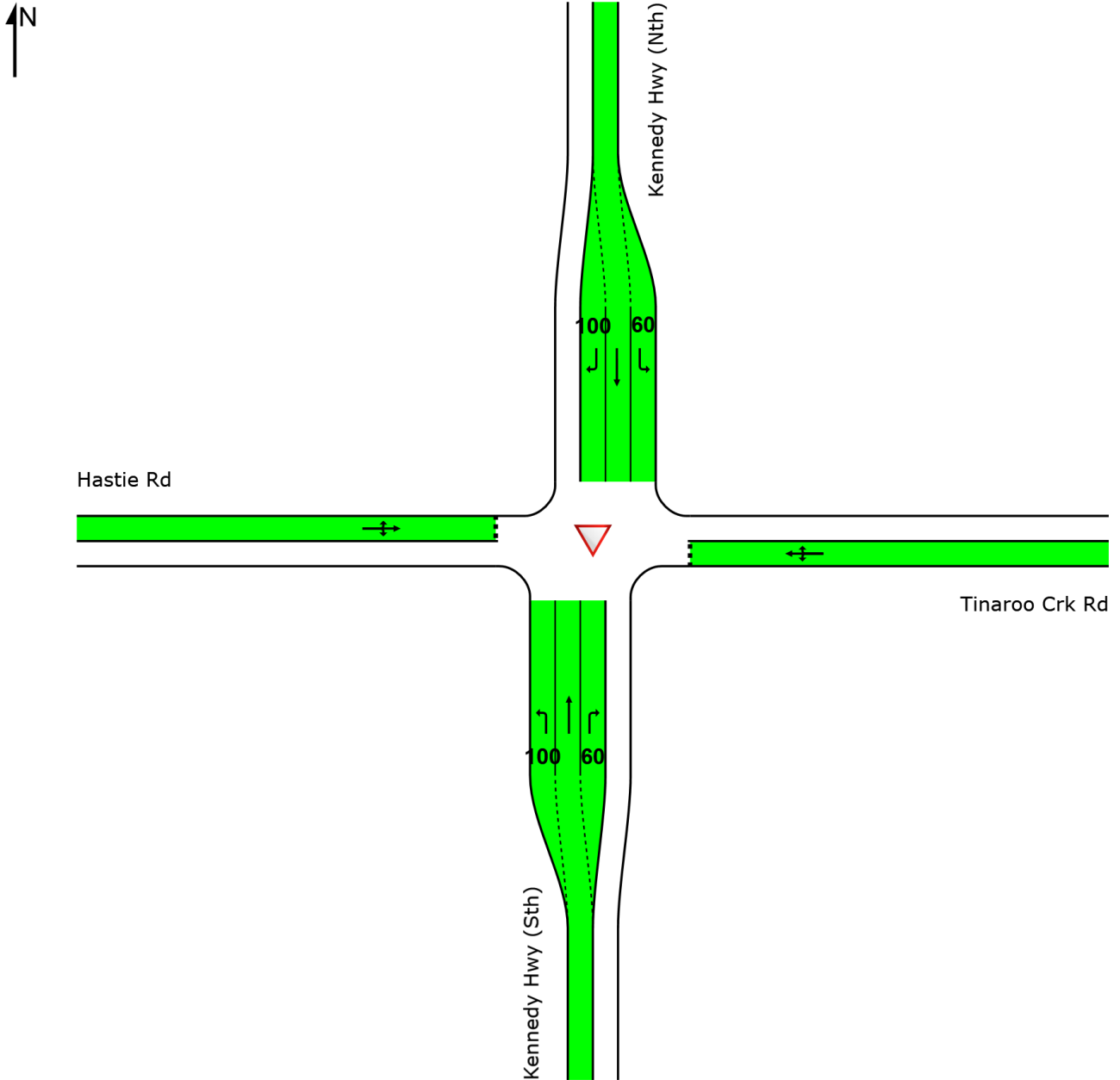
DEGREE OF SATURATION

Ratio of Demand Volume to Capacity, v/c ratio per lane

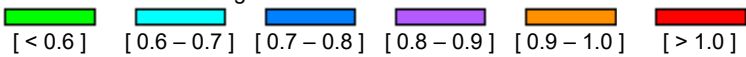
▽ Site: 101 [Intersection 3 - Kennedy Hwy and Hastie Rd (2023)]
 (Site Folder: Base Case (Without) 2023 - PM Peak)

New Site
 Site Category: (None)
 Give-Way (Two-Way)

	Approaches				Intersection
	South	East	North	West	
Degree of Saturation	0.18	0.17	0.18	0.46	0.46



Colour code based on Degree of Saturation



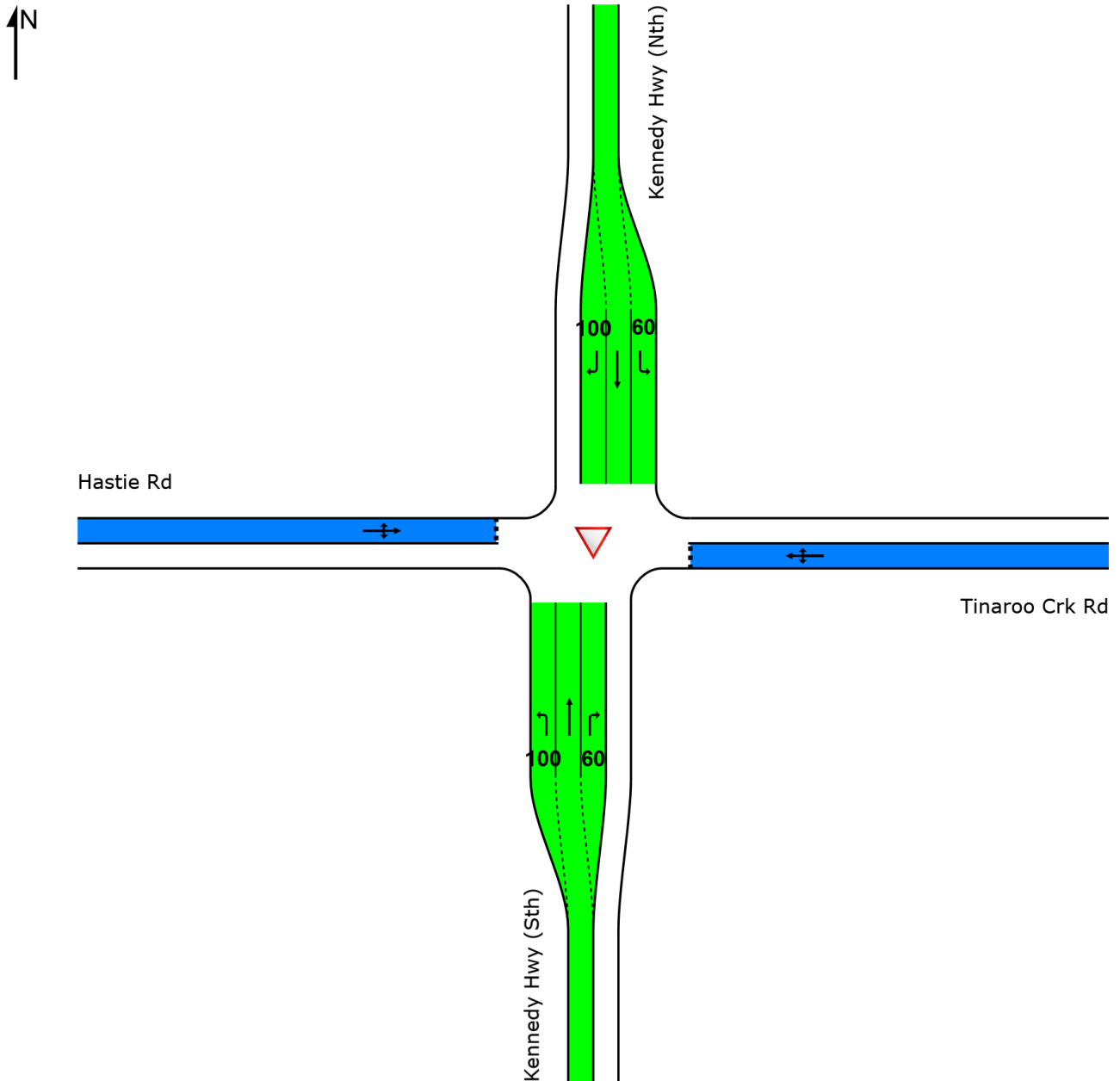
LEVEL OF SERVICE

Lane Level of Service

▽ Site: 101 [Intersection 3 - Kennedy Hwy and Hastie Rd (2023)]
 (Site Folder: Base Case (Without) 2023 - PM Peak]

New Site
 Site Category: (None)
 Give-Way (Two-Way)

	Approaches				Intersection
	South	East	North	West	
LOS	NA	C	NA	C	NA



Colour code based on Level of Service



Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Delay Model: SIDRA Standard (Geometric Delay is included).

QUEUE STORAGE RATIO (PERCENTILE)

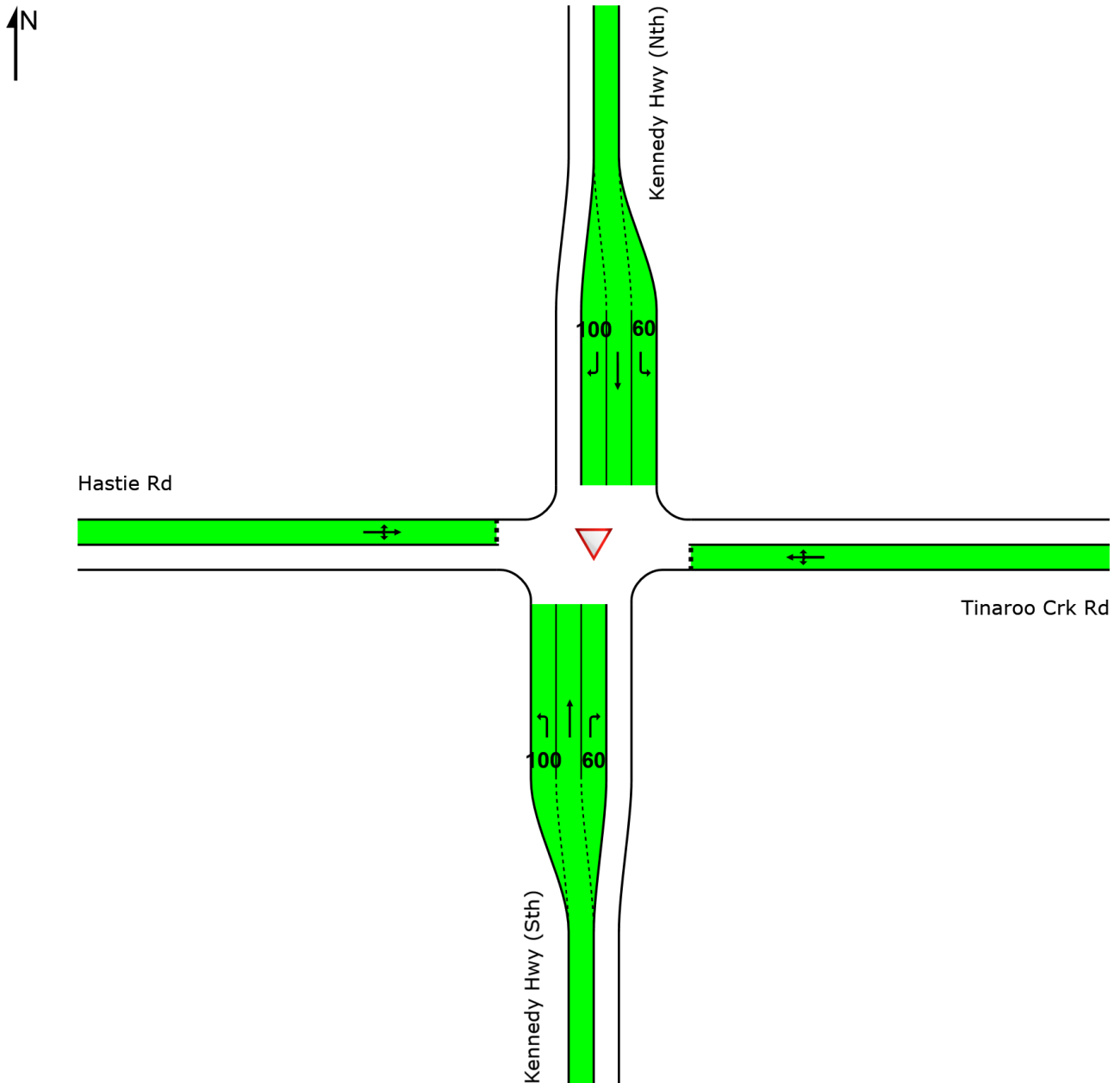
Ratio of the 95% Back of Queue Distance to the available queue storage distance per lane

▽ Site: 101 [Intersection 3 - Kennedy Hwy and Hastie Rd (2023)]
 (Site Folder: Base Case (Without) 2023 - PM Peak)

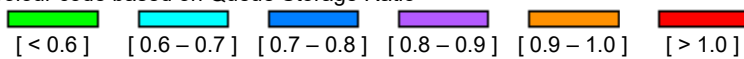
New Site
 Site Category: (None)
 Give-Way (Two-Way)

	Approaches				Intersection
	South	East	North	West	
Queue Storage Ratio (%ile)	0.00	0.01	0.00	0.03	0.03

Short Lanes not included in determining Approach Queue Storage Ratios.



Colour code based on Queue Storage Ratio



Queue Model: SIDRA Standard.

MOVEMENT SUMMARY

▽ Site: 101 [Intersection 2 - Emerald End Rd and Hastie Rd (2033) (Site Folder: Future Case (Without) 2033 - PM Peak)]

New Site
 Site Category: (None)
 Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h]	[HV %]	[Total veh/h]	[HV %]				[Veh. veh]	[Dist m]				
East: Hastie Rd (East)														
5	T1	30	0.0	32	0.0	0.033	0.1	LOS A	0.1	0.9	0.12	0.27	0.12	57.2
6	R2	26	0.0	27	0.0	0.033	5.6	LOS A	0.1	0.9	0.12	0.27	0.12	53.3
Approach		56	0.0	59	0.0	0.033	2.7	NA	0.1	0.9	0.12	0.27	0.12	55.6
North: Emerald End Rd														
7	L2	3	0.0	3	0.0	0.005	5.6	LOS A	0.0	0.1	0.09	0.56	0.09	51.1
9	R2	3	0.0	3	0.0	0.005	5.8	LOS A	0.0	0.1	0.09	0.56	0.09	50.4
Approach		6	0.0	6	0.0	0.005	5.7	LOS A	0.0	0.1	0.09	0.56	0.09	50.8
West: Hastie Rd (West)														
10	L2	26	0.0	27	0.0	0.030	5.5	LOS A	0.0	0.0	0.00	0.28	0.00	54.5
11	T1	28	0.0	29	0.0	0.030	0.0	LOS A	0.0	0.0	0.00	0.28	0.00	57.5
Approach		54	0.0	57	0.0	0.030	2.7	NA	0.0	0.0	0.00	0.28	0.00	56.2
All Vehicles		116	0.0	122	0.0	0.033	2.8	NA	0.1	0.9	0.06	0.29	0.06	55.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
 Vehicle movement LOS values are based on average delay per movement.
 Minor Road Approach LOS values are based on average delay for all vehicle movements.
 NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
 Delay Model: SIDRA Standard (Geometric Delay is included).
 Queue Model: SIDRA Standard.
 Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
 HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Intersection 3 - Kennedy Hwy and Hastie Rd (2033)]
 (Site Folder: Future Case (Without) 2033 - PM Peak)

New Site
 Site Category: (None)
 Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h]	[HV %]	[Total veh/h]	[HV %]				[Veh. veh]	[Dist m]				
South: Kennedy Hwy (Sth)														
1	L2	50	0.0	53	0.0	0.028	5.5	LOS A	0.0	0.0	0.00	0.58	0.00	53.6
2	T1	391	0.0	412	0.0	0.212	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
3	R2	29	0.0	31	0.0	0.034	7.5	LOS A	0.1	0.9	0.46	0.66	0.46	51.6
Approach		470	0.0	495	0.0	0.212	1.1	NA	0.1	0.9	0.03	0.10	0.03	58.6
East: Tinaroo Crk Rd														
4	L2	24	0.0	25	0.0	0.253	8.9	LOS A	0.8	5.9	0.75	0.89	0.84	42.5
5	T1	1	0.0	1	0.0	0.253	29.5	LOS D	0.8	5.9	0.75	0.89	0.84	42.8
6	R2	24	0.0	25	0.0	0.253	37.7	LOS E	0.8	5.9	0.75	0.89	0.84	42.5
Approach		49	0.0	52	0.0	0.253	23.4	LOS C	0.8	5.9	0.75	0.89	0.84	42.5
North: Kennedy Hwy (Nth)														
7	L2	29	0.0	31	0.0	0.016	5.5	LOS A	0.0	0.0	0.00	0.58	0.00	53.6
8	T1	391	0.0	412	0.0	0.213	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
9	R2	50	0.0	53	0.0	0.060	7.7	LOS A	0.2	1.6	0.48	0.69	0.48	51.5
Approach		470	0.0	495	0.0	0.213	1.2	NA	0.2	1.6	0.05	0.11	0.05	58.4
West: Hastie Rd														
10	L2	73	0.0	77	0.0	0.701	22.6	LOS C	4.1	28.5	0.83	1.22	1.77	36.4
11	T1	1	0.0	1	0.0	0.701	46.0	LOS E	4.1	28.5	0.83	1.22	1.77	36.6
12	R2	73	0.0	77	0.0	0.701	52.8	LOS F	4.1	28.5	0.83	1.22	1.77	36.5
Approach		147	0.0	155	0.0	0.701	37.7	LOS E	4.1	28.5	0.83	1.22	1.77	36.4
All Vehicles		1136	0.0	1196	0.0	0.701	6.8	NA	4.1	28.5	0.17	0.28	0.30	53.4

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
 Vehicle movement LOS values are based on average delay per movement.
 Minor Road Approach LOS values are based on average delay for all vehicle movements.
 NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
 Delay Model: SIDRA Standard (Geometric Delay is included).
 Queue Model: SIDRA Standard.
 Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
 HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

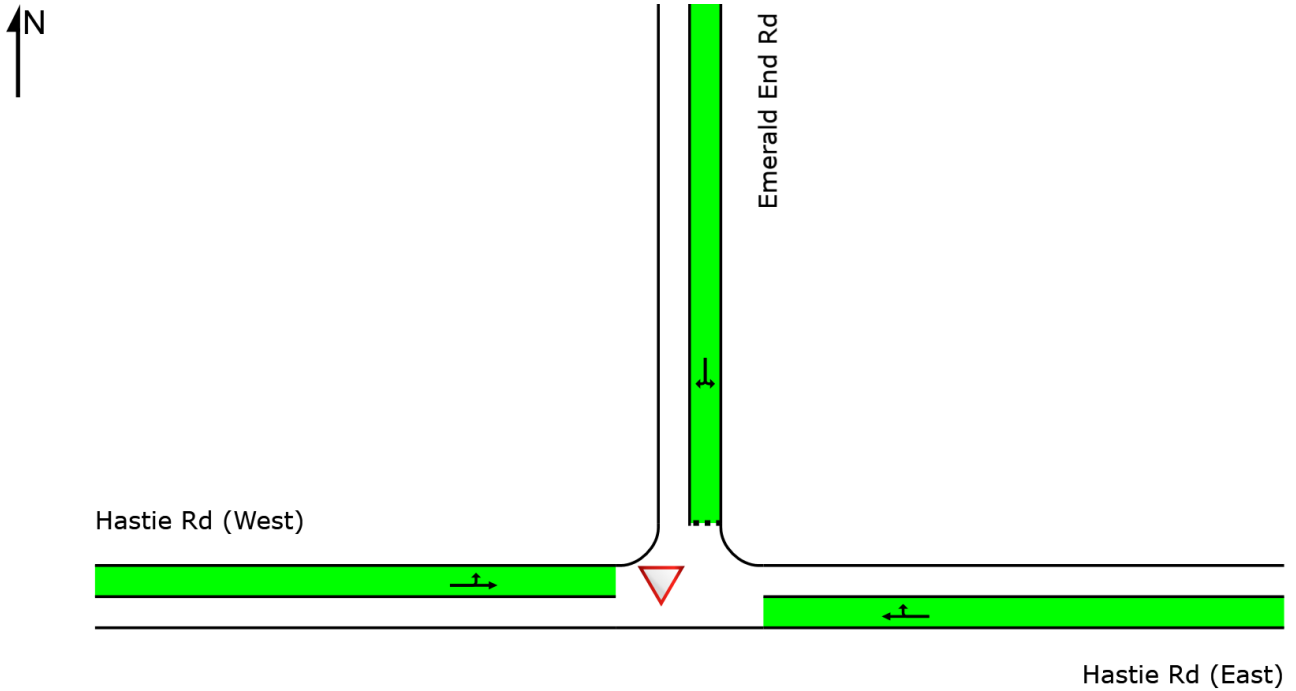
DEGREE OF SATURATION

Ratio of Demand Volume to Capacity, v/c ratio per lane

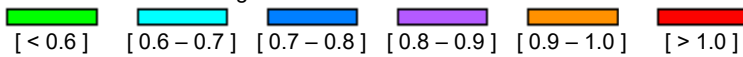
▽ Site: 101 [Intersection 2 - Emerald End Rd and Hastie Rd (2033) (Site Folder: Future Case (Without) 2033 - PM Peak)]

New Site
 Site Category: (None)
 Give-Way (Two-Way)

	Approaches			Intersection
	East	North	West	
Degree of Saturation	0.03	0.00	0.03	0.03



Colour code based on Degree of Saturation



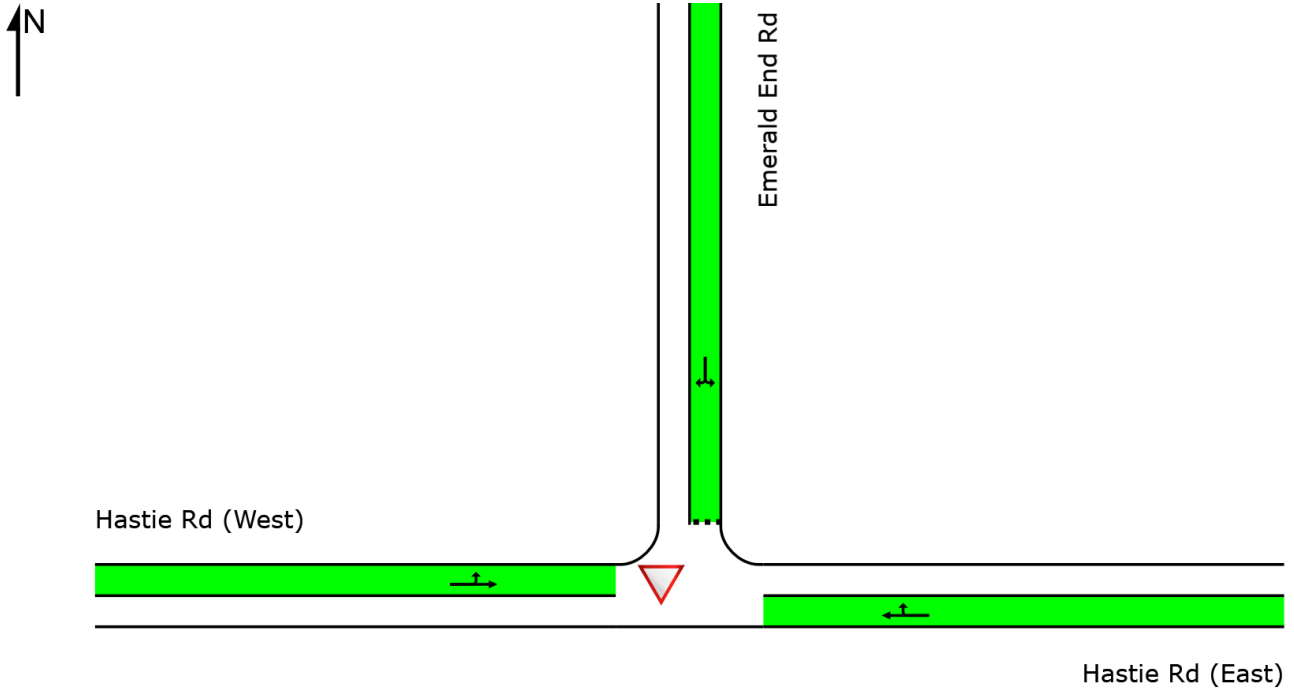
LEVEL OF SERVICE

Lane Level of Service

▽ Site: 101 [Intersection 2 - Emerald End Rd and Hastie Rd (2033) (Site Folder: Future Case (Without) 2033 - PM Peak)]

New Site
 Site Category: (None)
 Give-Way (Two-Way)

	Approaches			Intersection
	East	North	West	
LOS	NA	A	NA	NA



Colour code based on Level of Service



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

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

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

QUEUE STORAGE RATIO (PERCENTILE)

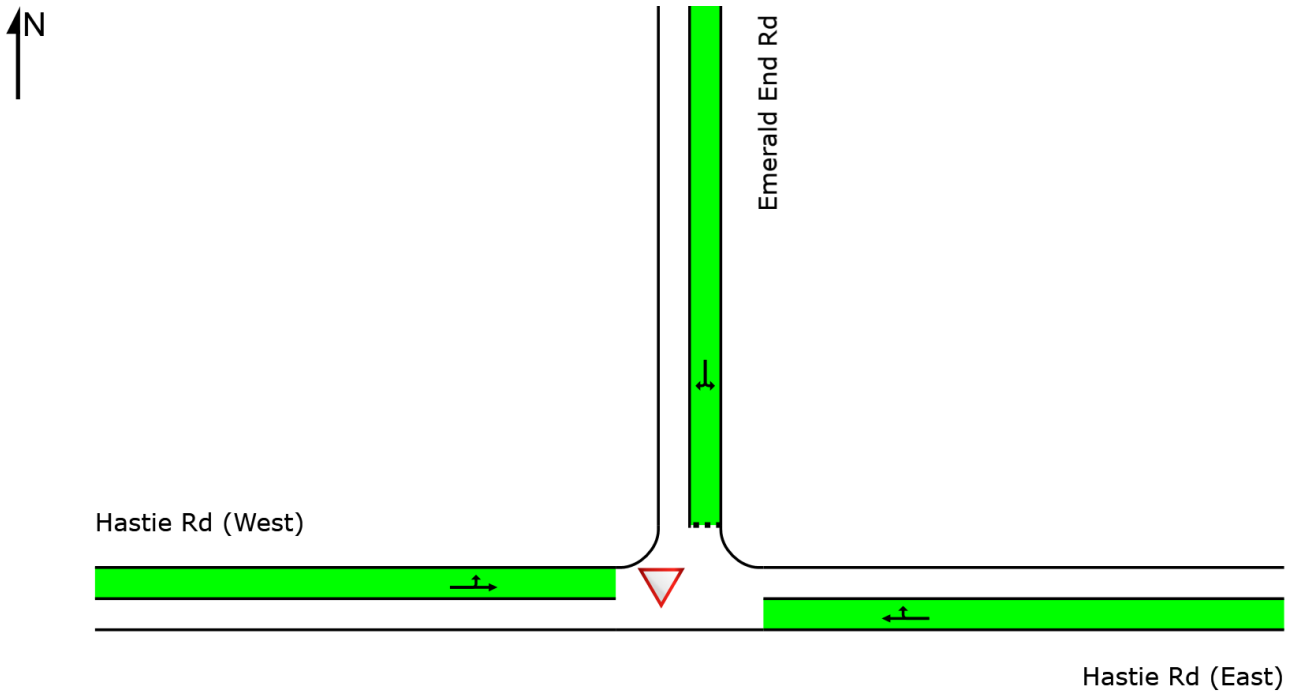
Ratio of the 95% Back of Queue Distance to the available queue storage distance per lane

▽ Site: 101 [Intersection 2 - Emerald End Rd and Hastie Rd (2033) (Site Folder: Future Case (Without) 2033 - PM Peak)]

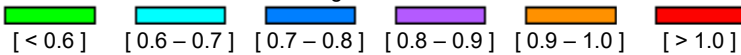
New Site
 Site Category: (None)
 Give-Way (Two-Way)

	Approaches			Intersection
	East	North	West	
Queue Storage Ratio (%ile)	0.00	0.00	0.00	0.00

Short Lanes not included in determining Approach Queue Storage Ratios.



Colour code based on Queue Storage Ratio



Queue Model: SIDRA Standard.

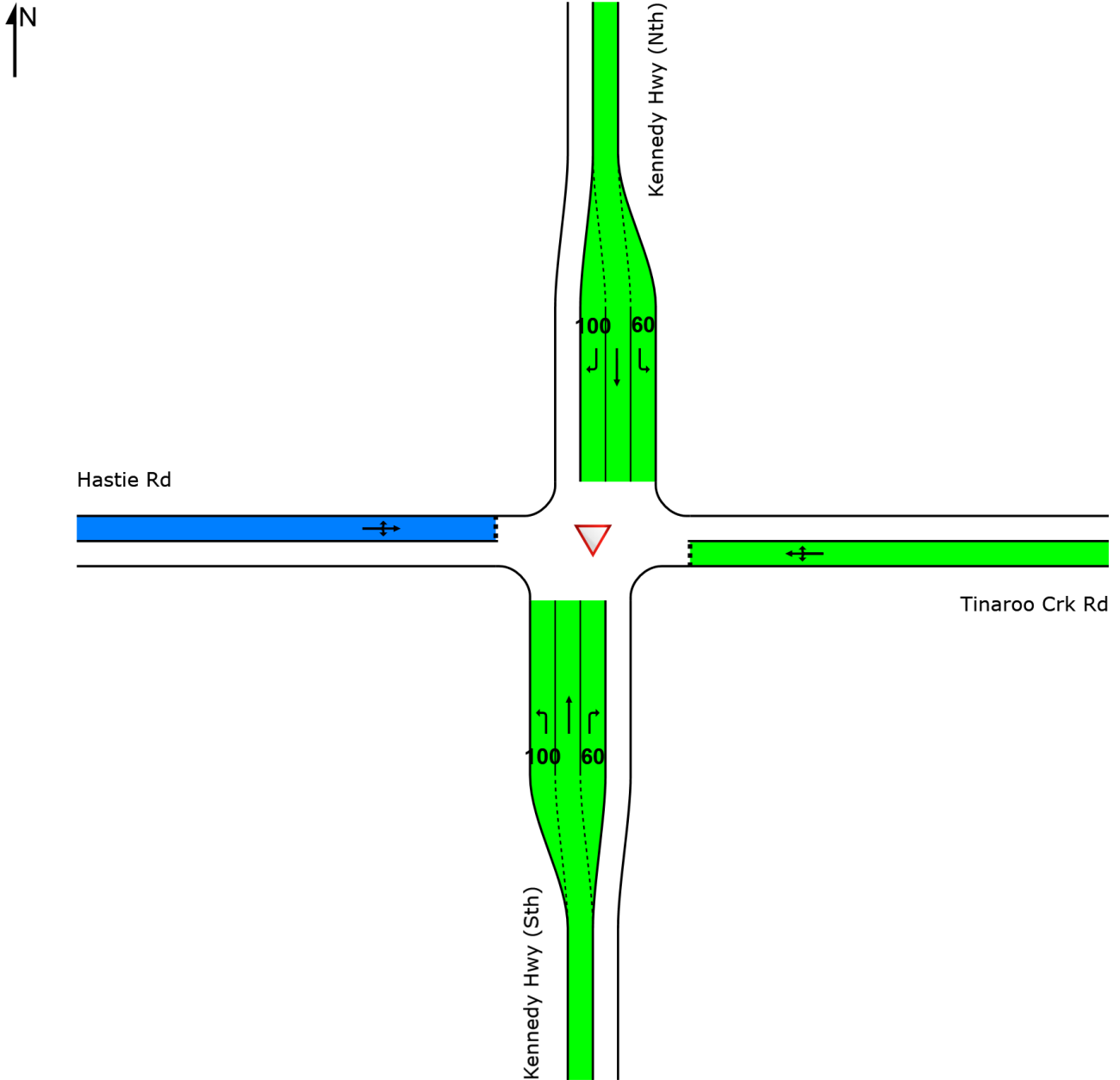
DEGREE OF SATURATION

Ratio of Demand Volume to Capacity, v/c ratio per lane

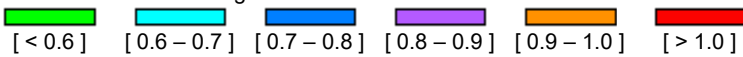
▽ Site: 101 [Intersection 3 - Kennedy Hwy and Hastie Rd (2033)]
 (Site Folder: Future Case (Without) 2033 - PM Peak)

New Site
 Site Category: (None)
 Give-Way (Two-Way)

	Approaches				Intersection
	South	East	North	West	
Degree of Saturation	0.21	0.25	0.21	0.70	0.70



Colour code based on Degree of Saturation



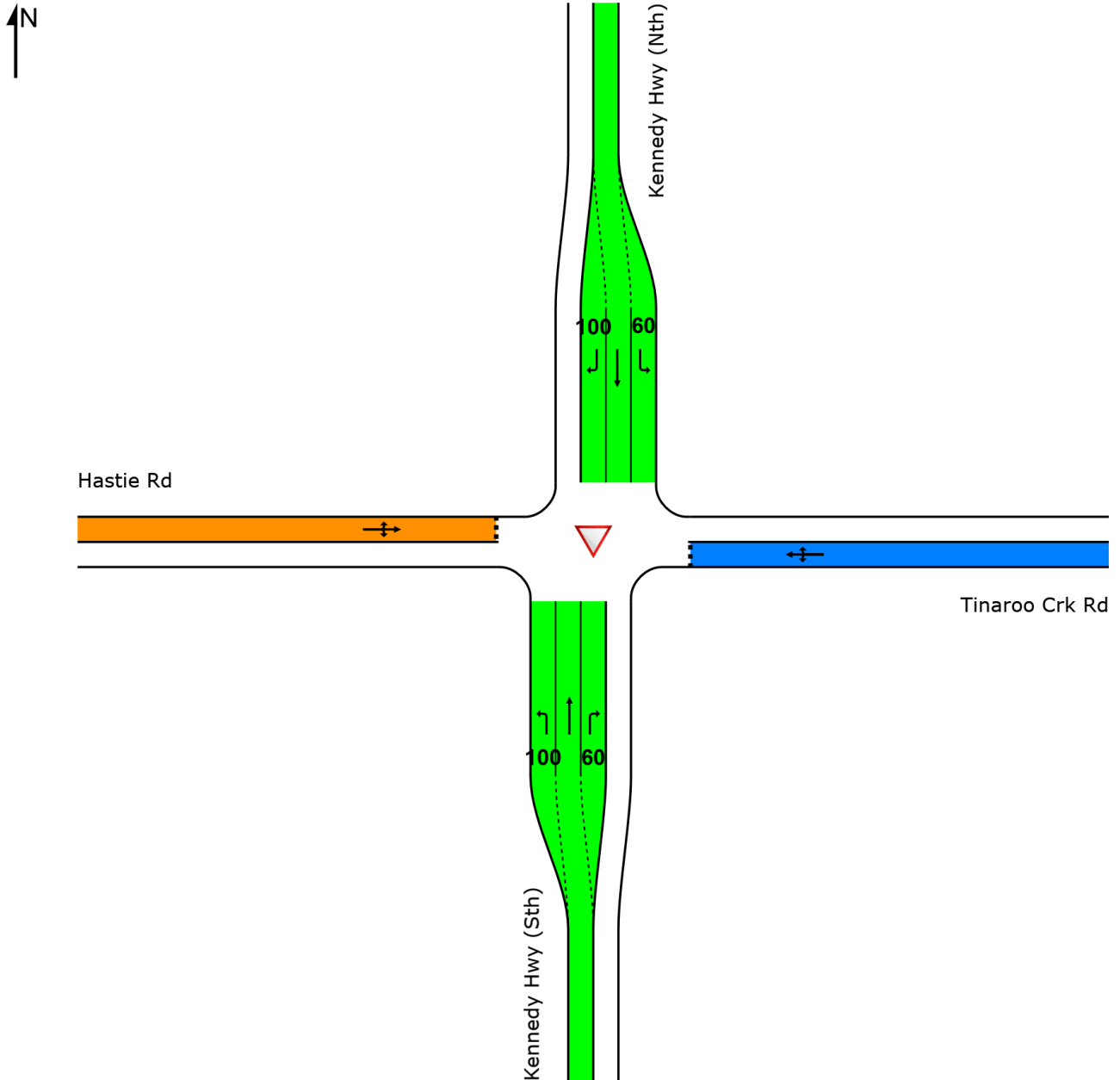
LEVEL OF SERVICE

Lane Level of Service

▽ Site: 101 [Intersection 3 - Kennedy Hwy and Hastie Rd (2033)]
 (Site Folder: Future Case (Without) 2033 - PM Peak)

New Site
 Site Category: (None)
 Give-Way (Two-Way)

	Approaches				Intersection
	South	East	North	West	
LOS	NA	C	NA	E	NA



Colour code based on Level of Service



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

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

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

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Project: \\ghdnet\GHD\AU\Cairns\Projects\42\12569173\Tech\Design\Traffic\SIDRA\Emerald Creek Heights PM Base and Future Case.sip9

QUEUE STORAGE RATIO (PERCENTILE)

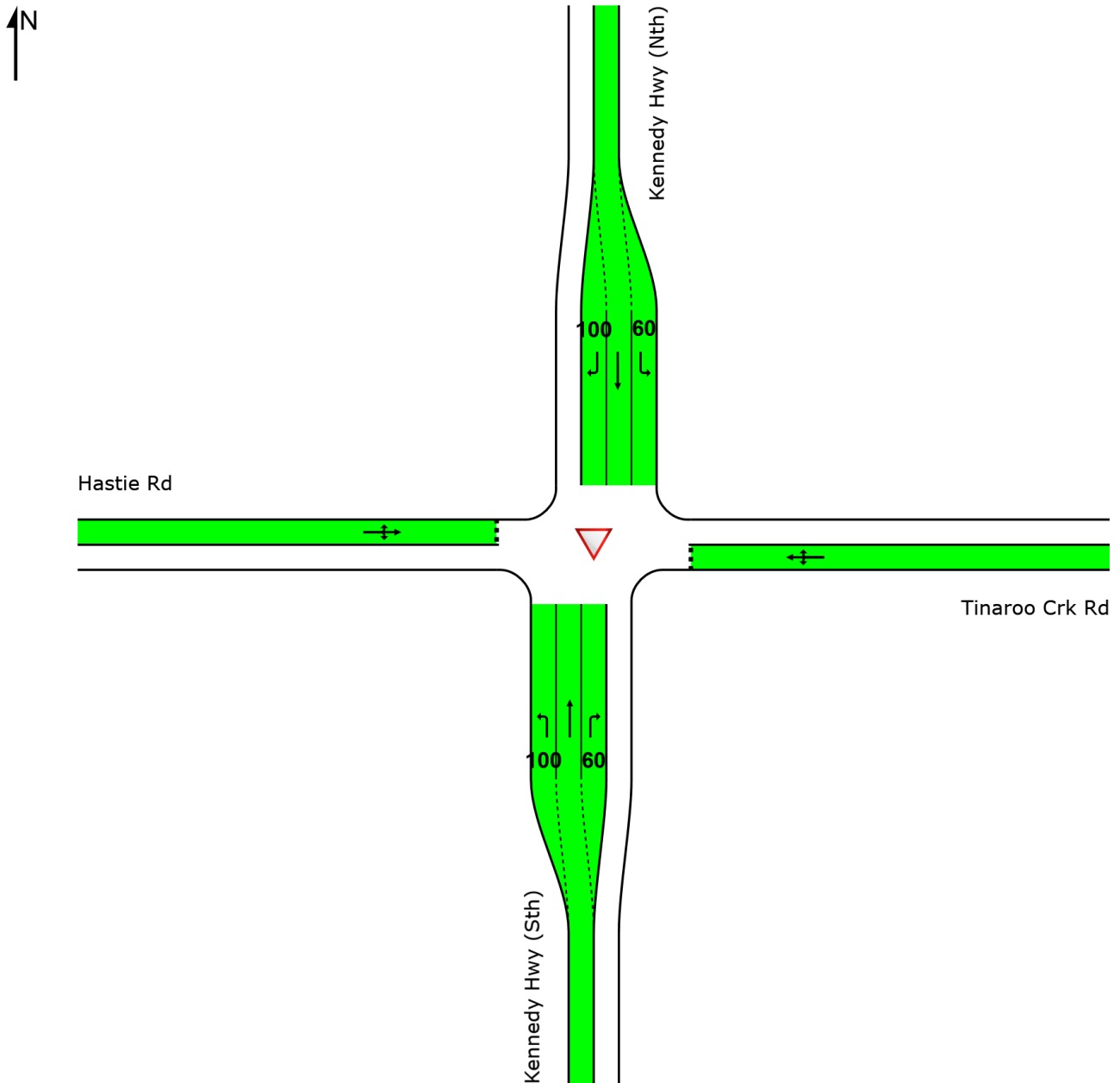
Ratio of the 95% Back of Queue Distance to the available queue storage distance per lane

▽ Site: 101 [Intersection 3 - Kennedy Hwy and Hastie Rd (2033)
(Site Folder: Future Case (Without) 2033 - PM Peak)]

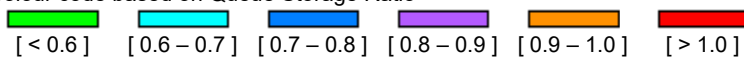
New Site
Site Category: (None)
Give-Way (Two-Way)

	Approaches				Intersection
	South	East	North	West	
Queue Storage Ratio (%ile)	0.00	0.01	0.00	0.06	0.06

Short Lanes not included in determining Approach Queue Storage Ratios.



Colour code based on Queue Storage Ratio



Queue Model: SIDRA Standard.

Appendix F

**Base Case (2023) and Future Case (2033)
With Development PM Peak SIDRA
Results**

MOVEMENT SUMMARY

▽ Site: 101 [Intersection 2 - Emerald End Rd and Hastie Rd (2023) (Site Folder: Base Case (With) 2023 - AM Peak)]

New Site
 Site Category: (None)
 Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h]	[HV %]	[Total veh/h]	[HV %]				[Veh. veh]	[Dist m]				
East: Hastie Rd (East)														
5	T1	18	0.0	19	0.0	0.011	0.0	LOS A	0.0	0.1	0.02	0.06	0.02	59.4
6	R2	2	0.0	2	0.0	0.011	5.5	LOS A	0.0	0.1	0.02	0.06	0.02	56.1
Approach		20	0.0	21	0.0	0.011	0.6	NA	0.0	0.1	0.02	0.06	0.02	59.1
North: Emerald End Rd														
7	L2	51	0.0	54	0.0	0.077	5.6	LOS A	0.3	2.0	0.09	0.56	0.09	51.1
9	R2	51	0.0	54	0.0	0.077	5.6	LOS A	0.3	2.0	0.09	0.56	0.09	50.4
Approach		102	0.0	107	0.0	0.077	5.6	LOS A	0.3	2.0	0.09	0.56	0.09	50.8
West: Hastie Rd (West)														
10	L2	3	0.0	3	0.0	0.015	5.5	LOS A	0.0	0.0	0.00	0.07	0.00	56.9
11	T1	24	0.0	25	0.0	0.015	0.0	LOS A	0.0	0.0	0.00	0.07	0.00	59.4
Approach		27	0.0	28	0.0	0.015	0.6	NA	0.0	0.0	0.00	0.07	0.00	59.2
All Vehicles		149	0.0	157	0.0	0.077	4.0	NA	0.3	2.0	0.07	0.40	0.07	53.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
 Vehicle movement LOS values are based on average delay per movement.
 Minor Road Approach LOS values are based on average delay for all vehicle movements.
 NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
 Delay Model: SIDRA Standard (Geometric Delay is included).
 Queue Model: SIDRA Standard.
 Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
 HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Intersection 1 - Emerald End Rd and Godfrey Rd (2023) (Site Folder: Base Case (With) 2023 - AM Peak)]

New Site
 Site Category: (None)
 Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV %	[Total veh/h	HV %				[Veh. veh	Dist] m				
South: Emerald End Rd (Sth)														
2	T1	47	0.0	49	0.0	0.028	0.0	LOS A	0.0	0.2	0.02	0.05	0.02	59.3
3	R2	4	0.0	4	0.0	0.028	5.6	LOS A	0.0	0.2	0.02	0.05	0.02	56.2
Approach		51	0.0	54	0.0	0.028	0.5	NA	0.0	0.2	0.02	0.05	0.02	59.0
East: Godfrey Rd														
4	L2	56	0.0	59	0.0	0.052	5.7	LOS A	0.2	1.4	0.13	0.55	0.13	50.9
6	R2	16	0.0	17	0.0	0.052	5.8	LOS A	0.2	1.4	0.13	0.55	0.13	52.7
Approach		72	0.0	76	0.0	0.052	5.7	LOS A	0.2	1.4	0.13	0.55	0.13	51.4
North: Emerald End Rd (Nth)														
7	L2	4	0.0	4	0.0	0.028	5.5	LOS A	0.0	0.0	0.00	0.05	0.00	58.0
8	T1	47	0.0	49	0.0	0.028	0.0	LOS A	0.0	0.0	0.00	0.05	0.00	59.4
Approach		51	0.0	54	0.0	0.028	0.4	NA	0.0	0.0	0.00	0.05	0.00	59.2
All Vehicles		174	0.0	183	0.0	0.052	2.6	NA	0.2	1.4	0.06	0.26	0.06	55.5

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
 Vehicle movement LOS values are based on average delay per movement.
 Minor Road Approach LOS values are based on average delay for all vehicle movements.
 NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
 Delay Model: SIDRA Standard (Geometric Delay is included).
 Queue Model: SIDRA Standard.
 Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
 HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Intersection 3 - Kennedy Hwy and Hastie Rd (2023)]
 (Site Folder: Base Case (With) 2023 - AM Peak)

New Site
 Site Category: (None)
 Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h]	[HV %]	[Total veh/h]	[HV %]				[Veh. veh]	[Dist m]				
South: Kennedy Hwy (Sth)														
1	L2	63	0.0	66	0.0	0.036	5.5	LOS A	0.0	0.0	0.00	0.58	0.00	53.6
2	T1	337	0.0	355	0.0	0.182	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
3	R2	21	0.0	22	0.0	0.023	7.1	LOS A	0.1	0.6	0.42	0.63	0.42	51.9
Approach		421	0.0	443	0.0	0.182	1.2	NA	0.1	0.6	0.02	0.12	0.02	58.4
East: Tinaroo Crk Rd														
4	L2	25	0.0	26	0.0	0.200	7.2	LOS A	0.6	4.5	0.67	0.80	0.67	45.7
5	T1	1	0.0	1	0.0	0.200	23.0	LOS C	0.6	4.5	0.67	0.80	0.67	46.0
6	R2	25	0.0	26	0.0	0.200	27.5	LOS D	0.6	4.5	0.67	0.80	0.67	45.7
Approach		51	0.0	54	0.0	0.200	17.5	LOS C	0.6	4.5	0.67	0.80	0.67	45.7
North: Kennedy Hwy (Nth)														
7	L2	21	0.0	22	0.0	0.012	5.5	LOS A	0.0	0.0	0.00	0.58	0.00	53.6
8	T1	337	0.0	355	0.0	0.183	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
9	R2	63	0.0	66	0.0	0.071	7.4	LOS A	0.3	1.9	0.46	0.68	0.46	51.7
Approach		421	0.0	443	0.0	0.183	1.4	NA	0.3	1.9	0.07	0.13	0.07	58.2
West: Hastie Rd														
10	L2	54	0.0	57	0.0	0.419	10.7	LOS B	1.8	12.7	0.71	0.94	1.01	43.4
11	T1	1	0.0	1	0.0	0.419	27.0	LOS D	1.8	12.7	0.71	0.94	1.01	43.7
12	R2	54	0.0	57	0.0	0.419	32.4	LOS D	1.8	12.7	0.71	0.94	1.01	43.4
Approach		109	0.0	115	0.0	0.419	21.6	LOS C	1.8	12.7	0.71	0.94	1.01	43.4
All Vehicles		1002	0.0	1055	0.0	0.419	4.4	NA	1.8	12.7	0.15	0.25	0.18	55.4

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

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

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

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

Queue Model: SIDRA Standard.

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

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

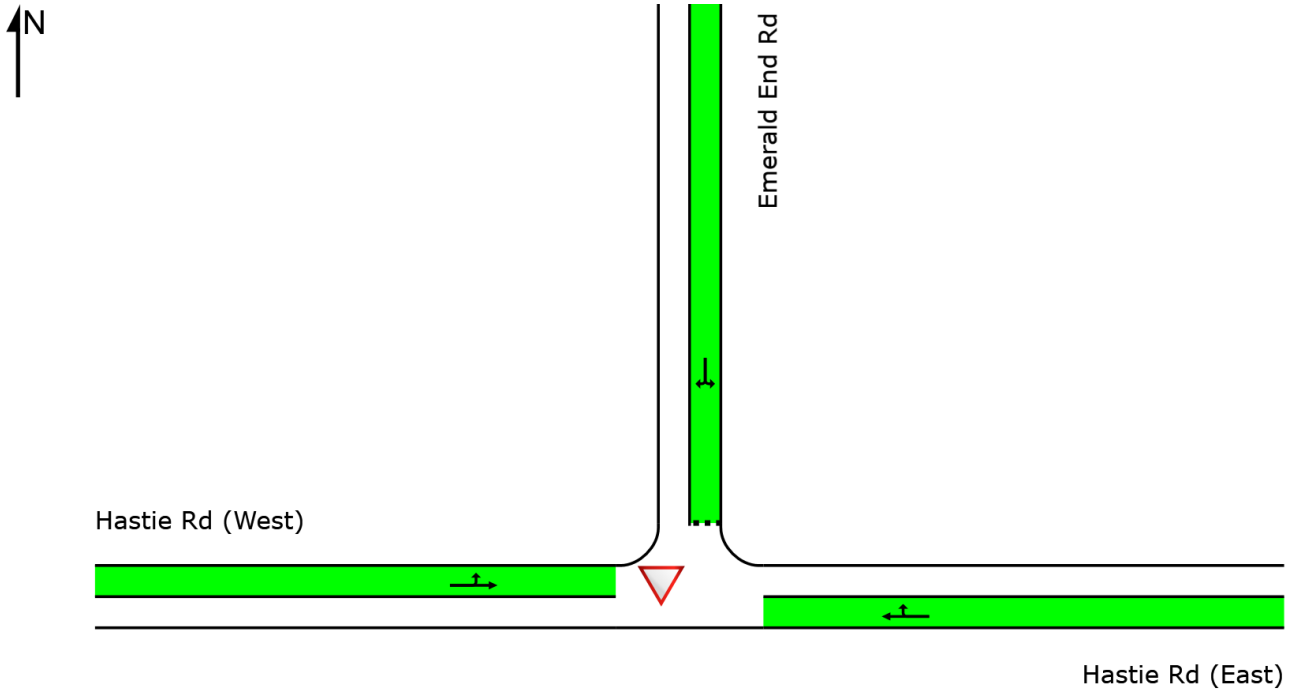
DEGREE OF SATURATION

Ratio of Demand Volume to Capacity, v/c ratio per lane

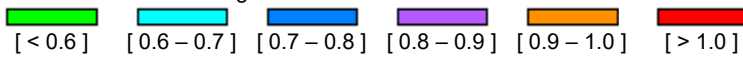
▽ Site: 101 [Intersection 2 - Emerald End Rd and Hastie Rd (2023) (Site Folder: Base Case (With) 2023 - AM Peak)]

New Site
 Site Category: (None)
 Give-Way (Two-Way)

	Approaches			Intersection
	East	North	West	
Degree of Saturation	0.01	0.08	0.01	0.08



Colour code based on Degree of Saturation



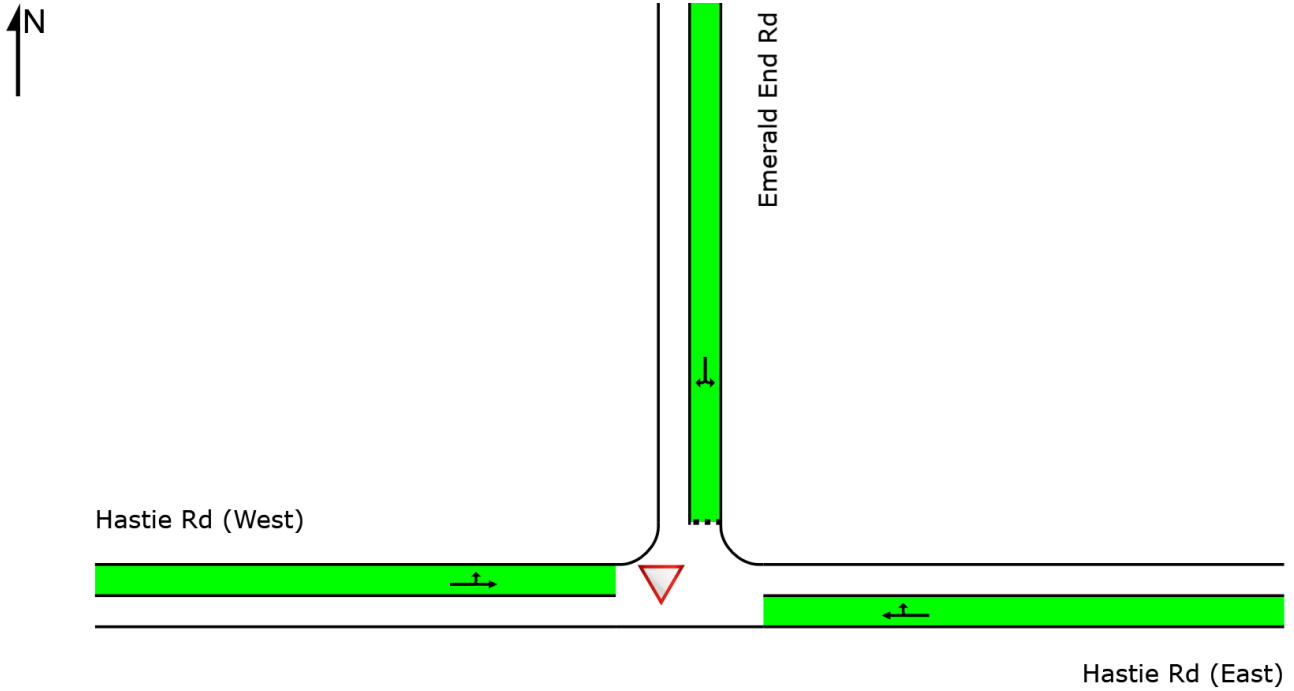
LEVEL OF SERVICE

Lane Level of Service

▽ Site: 101 [Intersection 2 - Emerald End Rd and Hastie Rd (2023) (Site Folder: Base Case (With) 2023 - AM Peak)]

New Site
 Site Category: (None)
 Give-Way (Two-Way)

	Approaches			Intersection
	East	North	West	
LOS	NA	A	NA	NA



Colour code based on Level of Service



Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
 NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
 Delay Model: SIDRA Standard (Geometric Delay is included).

QUEUE STORAGE RATIO (PERCENTILE)

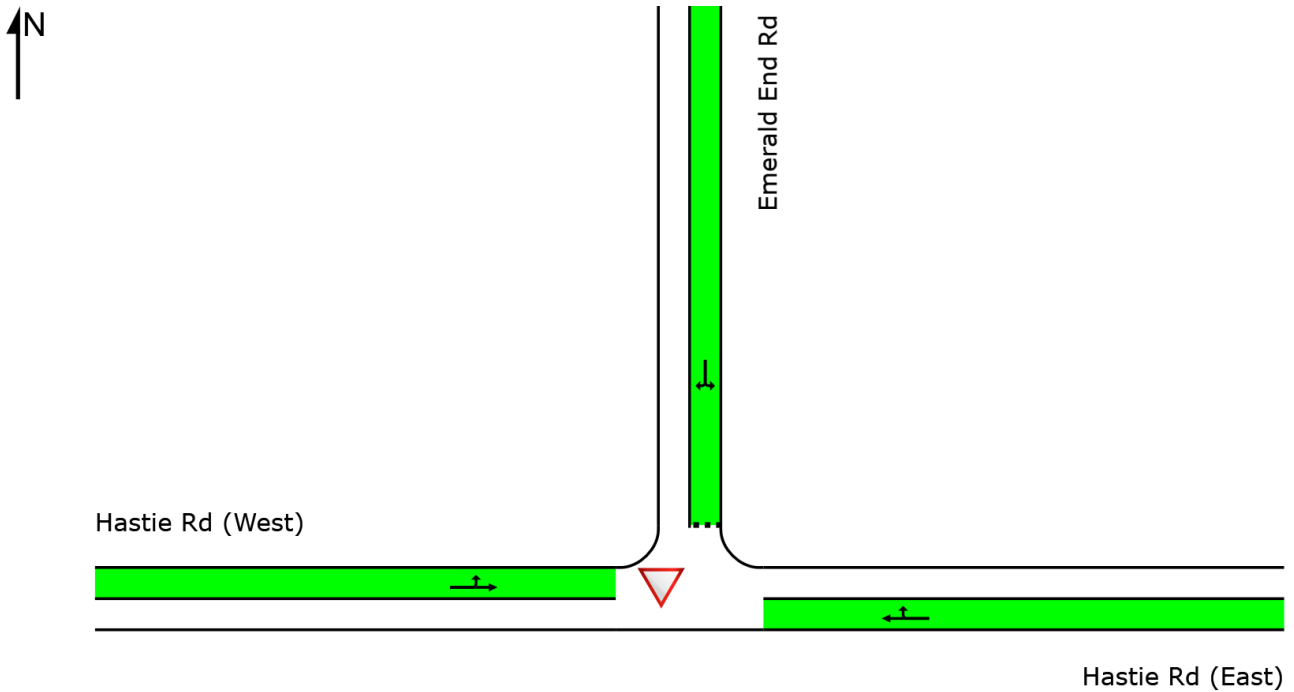
Ratio of the 95% Back of Queue Distance to the available queue storage distance per lane

▽ Site: 101 [Intersection 2 - Emerald End Rd and Hastie Rd (2023) (Site Folder: Base Case (With) 2023 - AM Peak)]

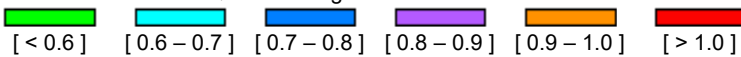
New Site
 Site Category: (None)
 Give-Way (Two-Way)

	Approaches			Intersection
	East	North	West	
Queue Storage Ratio (%ile)	0.00	0.01	0.00	0.01

Short Lanes not included in determining Approach Queue Storage Ratios.



Colour code based on Queue Storage Ratio



Queue Model: SIDRA Standard.

DEGREE OF SATURATION

Ratio of Demand Volume to Capacity, v/c ratio per lane

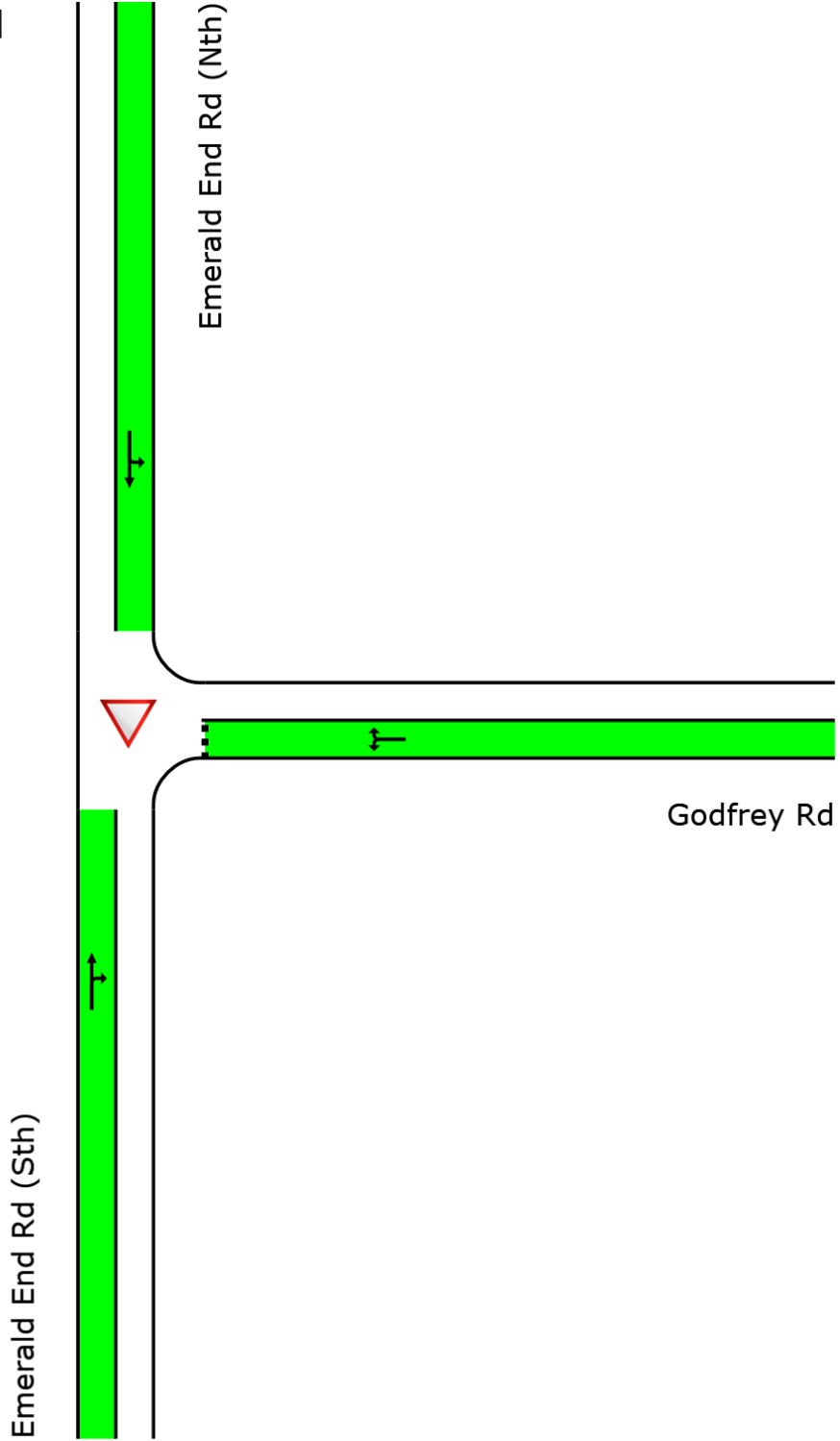
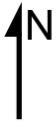
▽ Site: 101 [Intersection 1 - Emerald End Rd and Godfrey Rd
(2023) (Site Folder: Base Case (With) 2023 - AM Peak)]

New Site

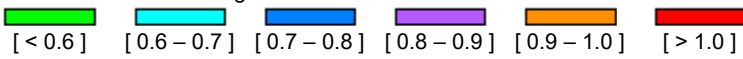
Site Category: (None)

Give-Way (Two-Way)

	Approaches			Intersection
	South	East	North	
Degree of Saturation	0.03	0.05	0.03	0.05



Colour code based on Degree of Saturation



LEVEL OF SERVICE

Lane Level of Service

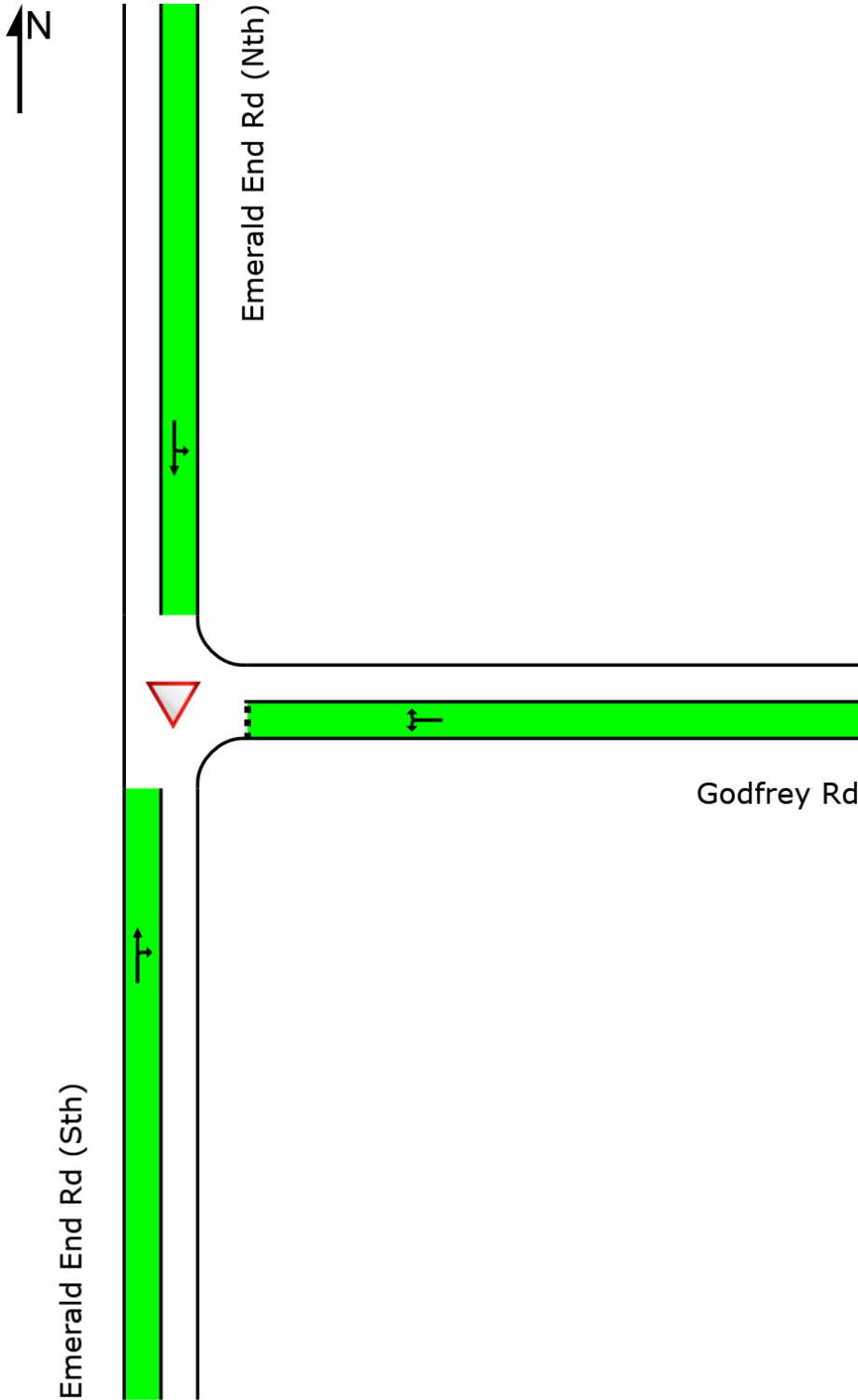
▽ Site: 101 [Intersection 1 - Emerald End Rd and Godfrey Rd
(2023) (Site Folder: Base Case (With) 2023 - AM Peak)]

New Site

Site Category: (None)

Give-Way (Two-Way)

	Approaches			Intersection
	South	East	North	
LOS	NA	A	NA	NA



Colour code based on Level of Service



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

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

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

QUEUE STORAGE RATIO (PERCENTILE)

Ratio of the 95% Back of Queue Distance to the available queue storage distance per lane

▽ Site: 101 [Intersection 1 - Emerald End Rd and Godfrey Rd (2023) (Site Folder: Base Case (With) 2023 - AM Peak)]

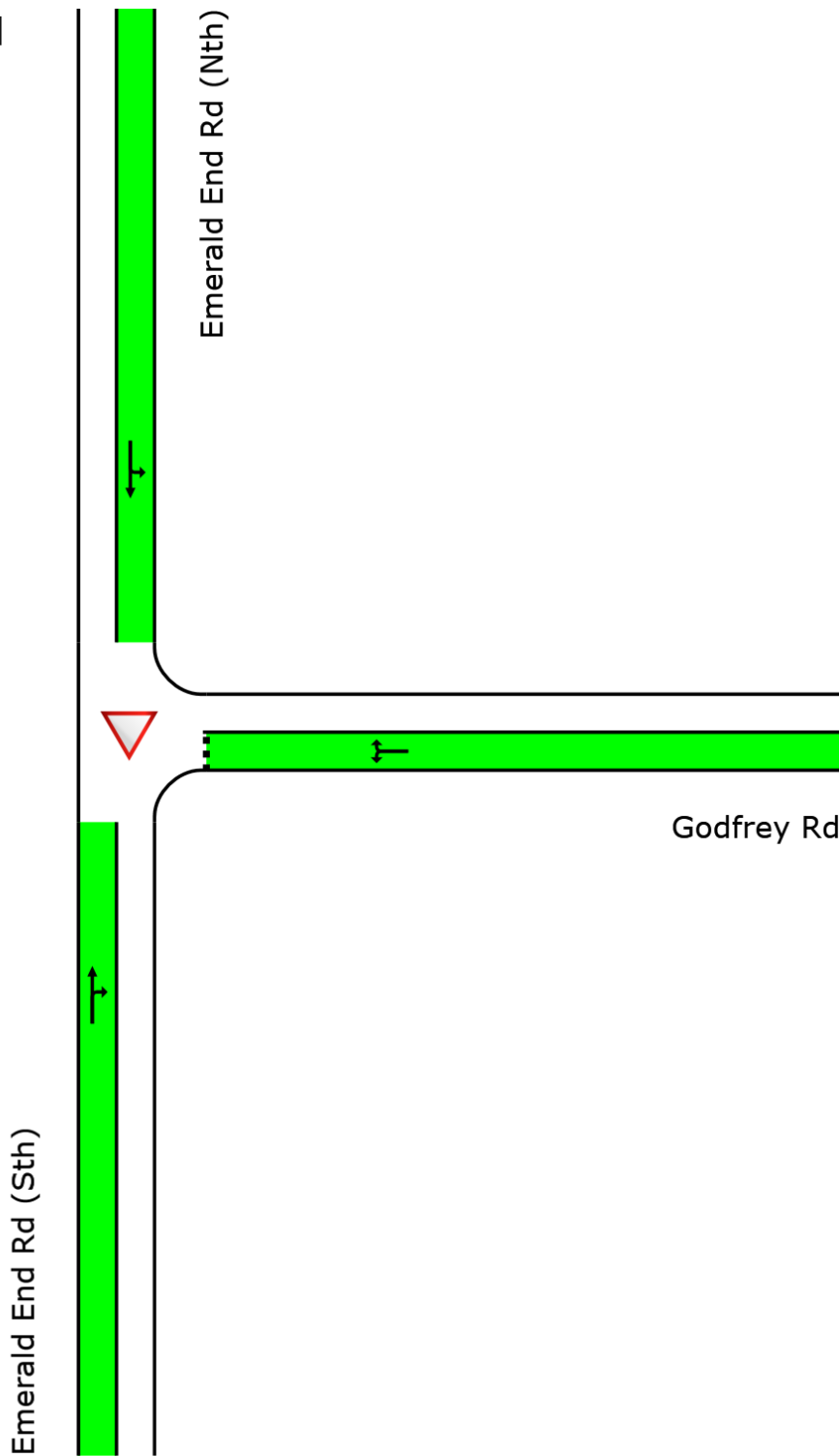
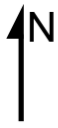
New Site

Site Category: (None)

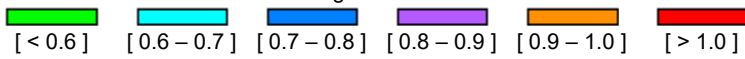
Give-Way (Two-Way)

	Approaches			Intersection
	South	East	North	
Queue Storage Ratio (%ile)	0.00	0.00	0.00	0.00

Short Lanes not included in determining Approach Queue Storage Ratios.



Colour code based on Queue Storage Ratio



Queue Model: SIDRA Standard.

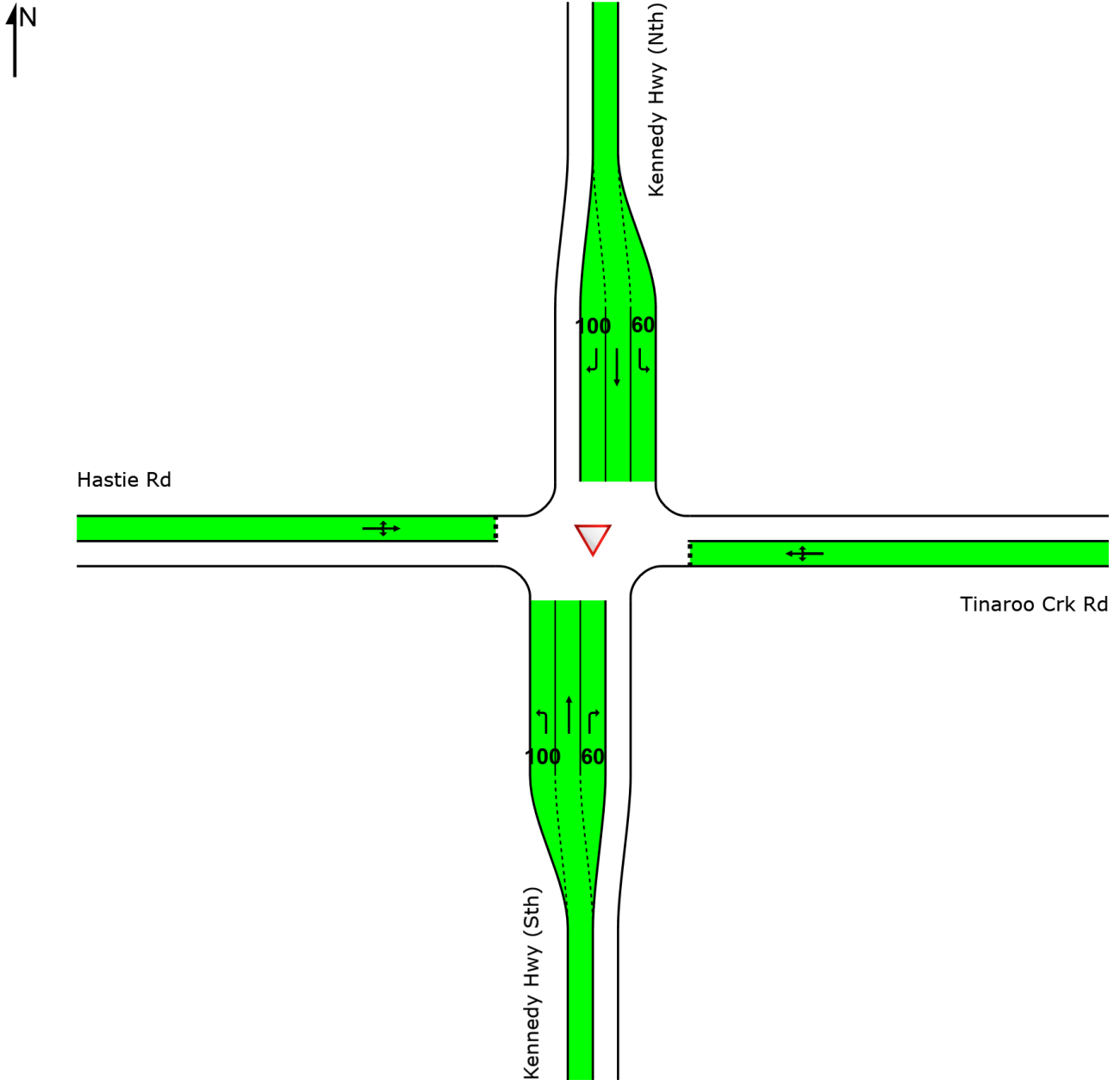
DEGREE OF SATURATION

Ratio of Demand Volume to Capacity, v/c ratio per lane

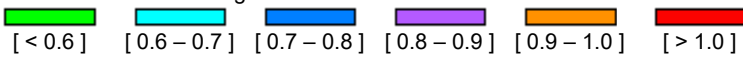
▽ Site: 101 [Intersection 3 - Kennedy Hwy and Hastie Rd (2023)]
 (Site Folder: Base Case (With) 2023 - AM Peak)

New Site
 Site Category: (None)
 Give-Way (Two-Way)

	Approaches				Intersection
	South	East	North	West	
Degree of Saturation	0.18	0.20	0.18	0.42	0.42



Colour code based on Degree of Saturation



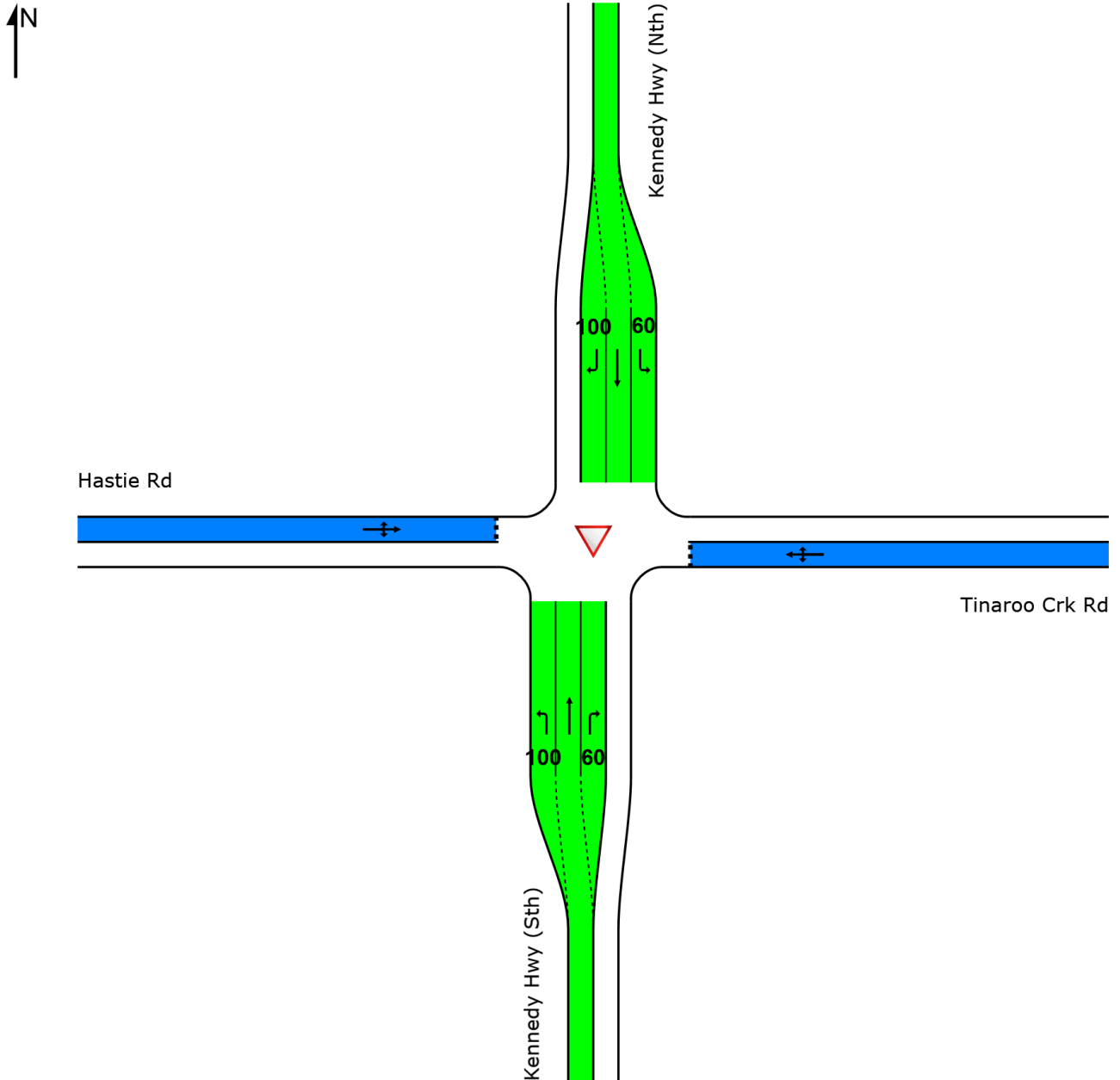
LEVEL OF SERVICE

Lane Level of Service

▽ Site: 101 [Intersection 3 - Kennedy Hwy and Hastie Rd (2023)]
 (Site Folder: Base Case (With) 2023 - AM Peak)

New Site
 Site Category: (None)
 Give-Way (Two-Way)

	Approaches				Intersection
	South	East	North	West	
LOS	NA	C	NA	C	NA



Colour code based on Level of Service



Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Delay Model: SIDRA Standard (Geometric Delay is included).

QUEUE STORAGE RATIO (PERCENTILE)

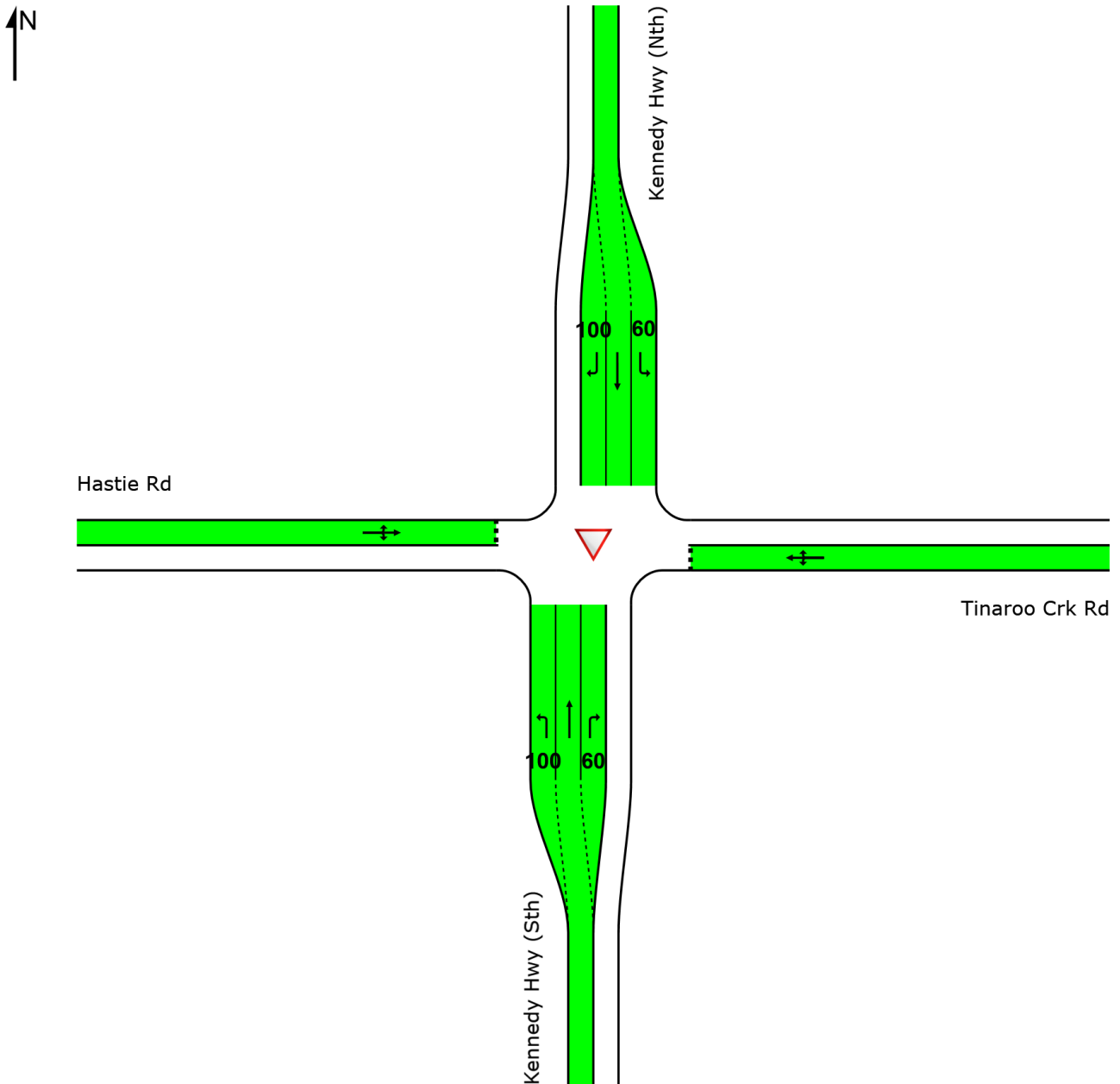
Ratio of the 95% Back of Queue Distance to the available queue storage distance per lane

▽ Site: 101 [Intersection 3 - Kennedy Hwy and Hastie Rd (2023)]
 (Site Folder: Base Case (With) 2023 - AM Peak)

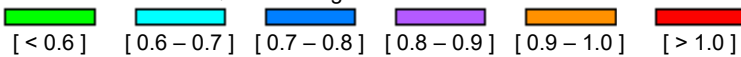
New Site
 Site Category: (None)
 Give-Way (Two-Way)

	Approaches				Intersection
	South	East	North	West	
Queue Storage Ratio (%ile)	0.00	0.01	0.00	0.03	0.03

Short Lanes not included in determining Approach Queue Storage Ratios.



Colour code based on Queue Storage Ratio



Queue Model: SIDRA Standard.

MOVEMENT SUMMARY

Site: 101 [Intersection 1 - Emerald End Rd and Godfrey Rd (2033) (Site Folder: Future Case (With) 2033 - AM Peak)]

New Site
 Site Category: (None)
 Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV %	[Total veh/h	HV %				[Veh. veh	Dist] m				
South: Emerald End Rd (Sth)														
2	T1	54	0.0	57	0.0	0.032	0.0	LOS A	0.0	0.2	0.03	0.05	0.03	59.2
3	R2	5	0.0	5	0.0	0.032	5.6	LOS A	0.0	0.2	0.03	0.05	0.03	56.1
Approach		59	0.0	62	0.0	0.032	0.5	NA	0.0	0.2	0.03	0.05	0.03	58.9
East: Godfrey Rd														
4	L2	65	0.0	68	0.0	0.060	5.7	LOS A	0.2	1.6	0.14	0.55	0.14	50.9
6	R2	18	0.0	19	0.0	0.060	5.9	LOS A	0.2	1.6	0.14	0.55	0.14	52.7
Approach		83	0.0	87	0.0	0.060	5.7	LOS A	0.2	1.6	0.14	0.55	0.14	51.4
North: Emerald End Rd (Nth)														
7	L2	5	0.0	5	0.0	0.032	5.5	LOS A	0.0	0.0	0.00	0.05	0.00	57.9
8	T1	54	0.0	57	0.0	0.032	0.0	LOS A	0.0	0.0	0.00	0.05	0.00	59.3
Approach		59	0.0	62	0.0	0.032	0.5	NA	0.0	0.0	0.00	0.05	0.00	59.2
All Vehicles		201	0.0	212	0.0	0.060	2.7	NA	0.2	1.6	0.07	0.26	0.07	55.5

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
 Vehicle movement LOS values are based on average delay per movement.
 Minor Road Approach LOS values are based on average delay for all vehicle movements.
 NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
 Delay Model: SIDRA Standard (Geometric Delay is included).
 Queue Model: SIDRA Standard.
 Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
 HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Intersection 2 - Emerald End Rd and Hastie Rd (2033) (Site Folder: Future Case (With) 2033 - AM Peak)]

New Site
 Site Category: (None)
 Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV %	[Total veh/h	HV %				[Veh. veh	Dist] m				
East: Hastie Rd (East)														
5	T1	21	0.0	22	0.0	0.013	0.0	LOS A	0.0	0.1	0.02	0.05	0.02	59.4
6	R2	2	0.0	2	0.0	0.013	5.5	LOS A	0.0	0.1	0.02	0.05	0.02	56.2
Approach		23	0.0	24	0.0	0.013	0.5	NA	0.0	0.1	0.02	0.05	0.02	59.2
North: Emerald End Rd														
7	L2	59	0.0	62	0.0	0.089	5.6	LOS A	0.3	2.3	0.10	0.56	0.10	51.1
9	R2	59	0.0	62	0.0	0.089	5.6	LOS A	0.3	2.3	0.10	0.56	0.10	50.4
Approach		118	0.0	124	0.0	0.089	5.6	LOS A	0.3	2.3	0.10	0.56	0.10	50.7
West: Hastie Rd (West)														
10	L2	3	0.0	3	0.0	0.017	5.5	LOS A	0.0	0.0	0.00	0.06	0.00	57.0
11	T1	28	0.0	29	0.0	0.017	0.0	LOS A	0.0	0.0	0.00	0.06	0.00	59.5
Approach		31	0.0	33	0.0	0.017	0.5	NA	0.0	0.0	0.00	0.06	0.00	59.3
All Vehicles		172	0.0	181	0.0	0.089	4.0	NA	0.3	2.3	0.07	0.40	0.07	53.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
 Vehicle movement LOS values are based on average delay per movement.
 Minor Road Approach LOS values are based on average delay for all vehicle movements.
 NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
 Delay Model: SIDRA Standard (Geometric Delay is included).
 Queue Model: SIDRA Standard.
 Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
 HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Intersection 3 - Kennedy Hwy and Hastie Rd (2033)]
 (Site Folder: Future Case (With) 2033 - AM Peak)

New Site
 Site Category: (None)
 Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h]	[HV %]	[Total veh/h]	[HV %]				[Veh. veh]	[Dist m]				
South: Kennedy Hwy (Sth)														
1	L2	73	0.0	77	0.0	0.041	5.6	LOS A	0.0	0.0	0.00	0.58	0.00	53.6
2	T1	391	0.0	412	0.0	0.212	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
3	R2	24	0.0	25	0.0	0.028	7.4	LOS A	0.1	0.7	0.46	0.65	0.46	51.6
Approach		488	0.0	514	0.0	0.212	1.2	NA	0.1	0.7	0.02	0.12	0.02	58.4
East: Tinaroo Crk Rd														
4	L2	29	0.0	31	0.0	0.309	10.1	LOS B	1.1	7.6	0.77	0.92	0.92	41.7
5	T1	1	0.0	1	0.0	0.309	33.3	LOS D	1.1	7.6	0.77	0.92	0.92	42.0
6	R2	29	0.0	31	0.0	0.309	39.8	LOS E	1.1	7.6	0.77	0.92	0.92	41.7
Approach		59	0.0	62	0.0	0.309	25.1	LOS D	1.1	7.6	0.77	0.92	0.92	41.7
North: Kennedy Hwy (Nth)														
7	L2	24	0.0	25	0.0	0.014	5.5	LOS A	0.0	0.0	0.00	0.58	0.00	53.6
8	T1	391	0.0	412	0.0	0.213	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
9	R2	73	0.0	77	0.0	0.090	7.9	LOS A	0.3	2.4	0.50	0.72	0.50	51.3
Approach		488	0.0	514	0.0	0.213	1.5	NA	0.3	2.4	0.07	0.14	0.07	58.1
West: Hastie Rd														
10	L2	63	0.0	66	0.0	0.648	20.6	LOS C	3.4	23.6	0.82	1.16	1.58	36.8
11	T1	1	0.0	1	0.0	0.648	44.7	LOS E	3.4	23.6	0.82	1.16	1.58	37.0
12	R2	63	0.0	66	0.0	0.648	52.8	LOS F	3.4	23.6	0.82	1.16	1.58	36.8
Approach		127	0.0	134	0.0	0.648	36.7	LOS E	3.4	23.6	0.82	1.16	1.58	36.8
All Vehicles		1162	0.0	1223	0.0	0.648	6.4	NA	3.4	23.6	0.17	0.28	0.26	53.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
 Vehicle movement LOS values are based on average delay per movement.
 Minor Road Approach LOS values are based on average delay for all vehicle movements.
 NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
 Delay Model: SIDRA Standard (Geometric Delay is included).
 Queue Model: SIDRA Standard.
 Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
 HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

DEGREE OF SATURATION

Ratio of Demand Volume to Capacity, v/c ratio per lane

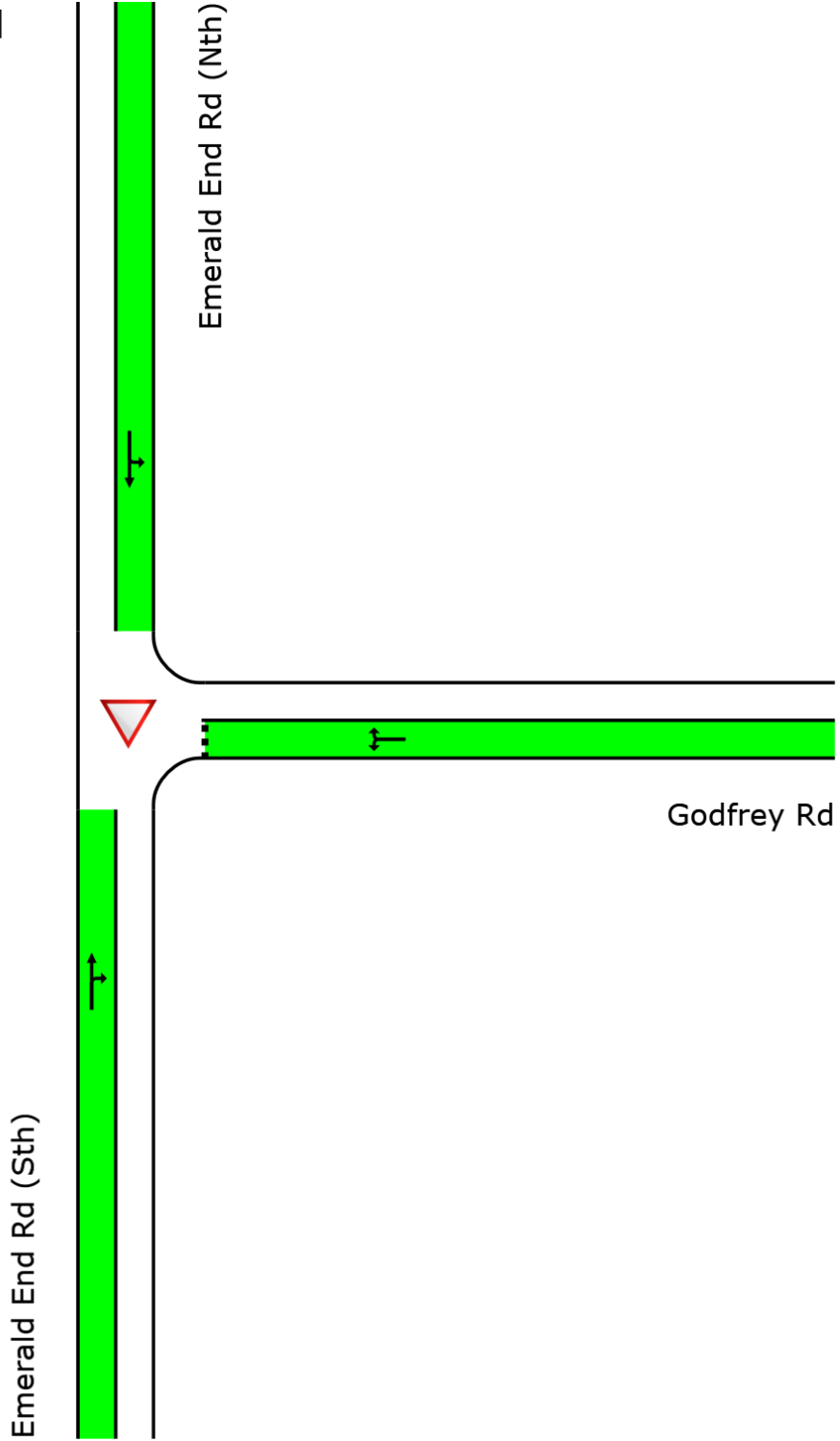
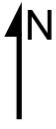
▽ Site: 101 [Intersection 1 - Emerald End Rd and Godfrey Rd
(2033) (Site Folder: Future Case (With) 2033 - AM Peak)]

New Site

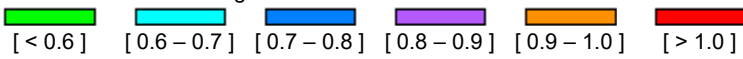
Site Category: (None)

Give-Way (Two-Way)

	Approaches			Intersection
	South	East	North	
Degree of Saturation	0.03	0.06	0.03	0.06



Colour code based on Degree of Saturation



LEVEL OF SERVICE

Lane Level of Service

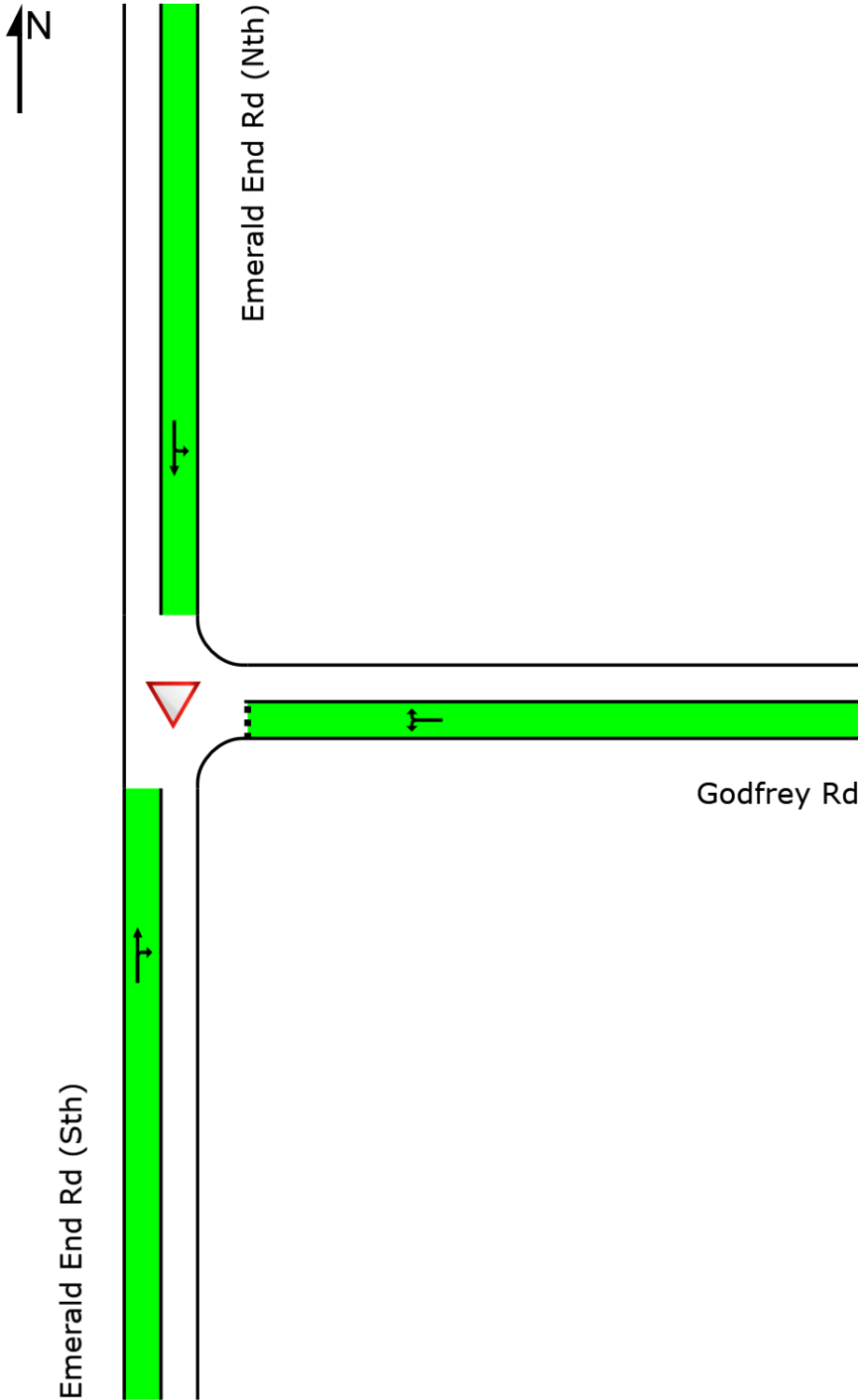
▽ Site: 101 [Intersection 1 - Emerald End Rd and Godfrey Rd (2033) (Site Folder: Future Case (With) 2033 - AM Peak)]

New Site

Site Category: (None)

Give-Way (Two-Way)

	Approaches			Intersection
	South	East	North	
LOS	NA	A	NA	NA



Colour code based on Level of Service



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

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

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

QUEUE STORAGE RATIO (PERCENTILE)

Ratio of the 95% Back of Queue Distance to the available queue storage distance per lane

▽ Site: 101 [Intersection 1 - Emerald End Rd and Godfrey Rd (2033) (Site Folder: Future Case (With) 2033 - AM Peak)]

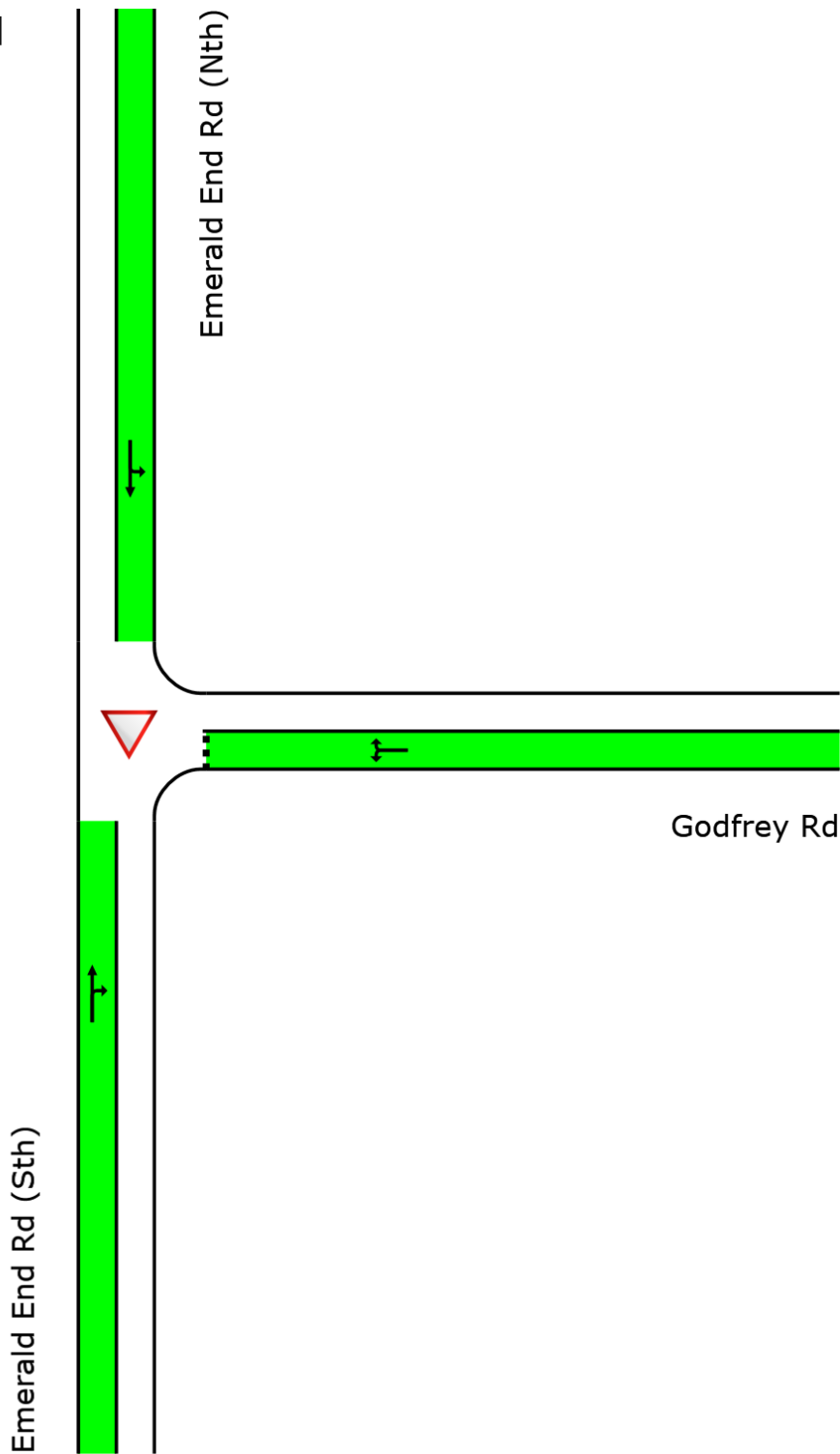
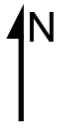
New Site

Site Category: (None)

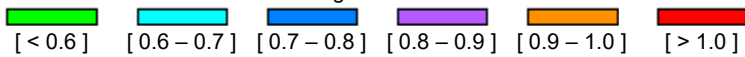
Give-Way (Two-Way)

	Approaches			Intersection
	South	East	North	
Queue Storage Ratio (%ile)	0.00	0.00	0.00	0.00

Short Lanes not included in determining Approach Queue Storage Ratios.



Colour code based on Queue Storage Ratio



Queue Model: SIDRA Standard.

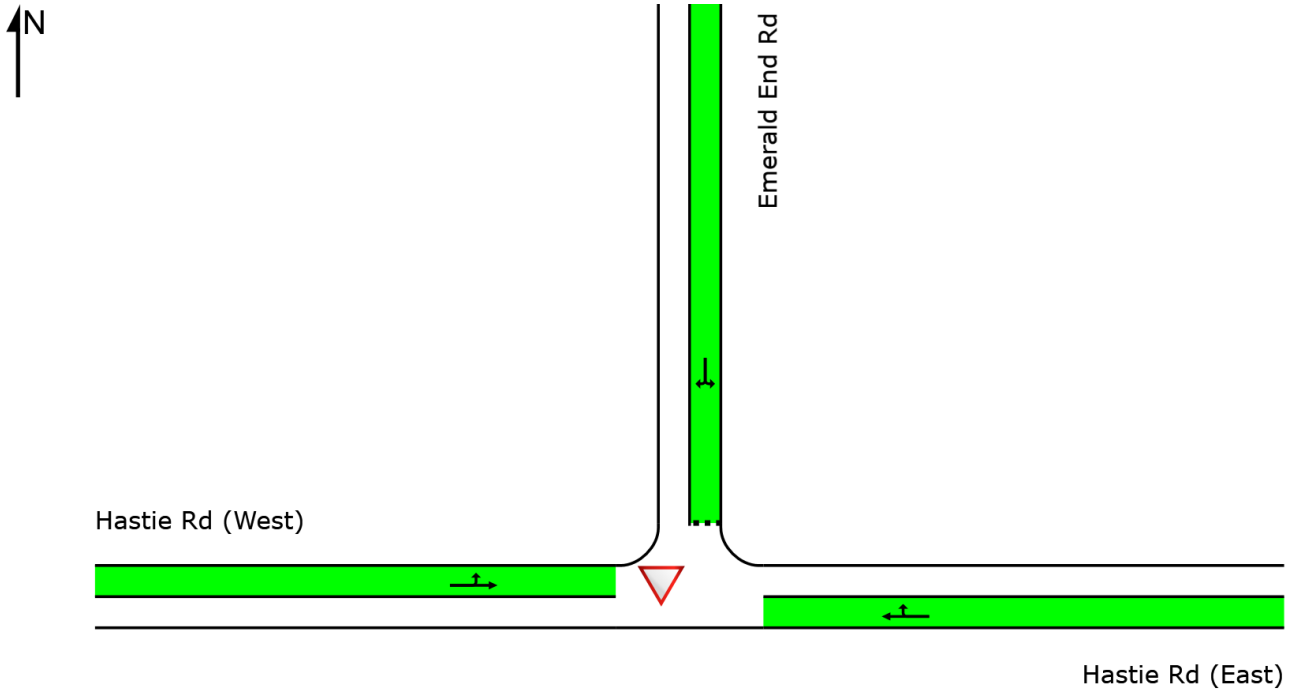
DEGREE OF SATURATION

Ratio of Demand Volume to Capacity, v/c ratio per lane

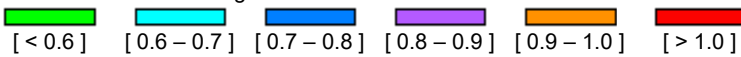
▽ Site: 101 [Intersection 2 - Emerald End Rd and Hastie Rd (2033) (Site Folder: Future Case (With) 2033 - AM Peak)]

New Site
 Site Category: (None)
 Give-Way (Two-Way)

	Approaches			Intersection
	East	North	West	
Degree of Saturation	0.01	0.09	0.02	0.09



Colour code based on Degree of Saturation



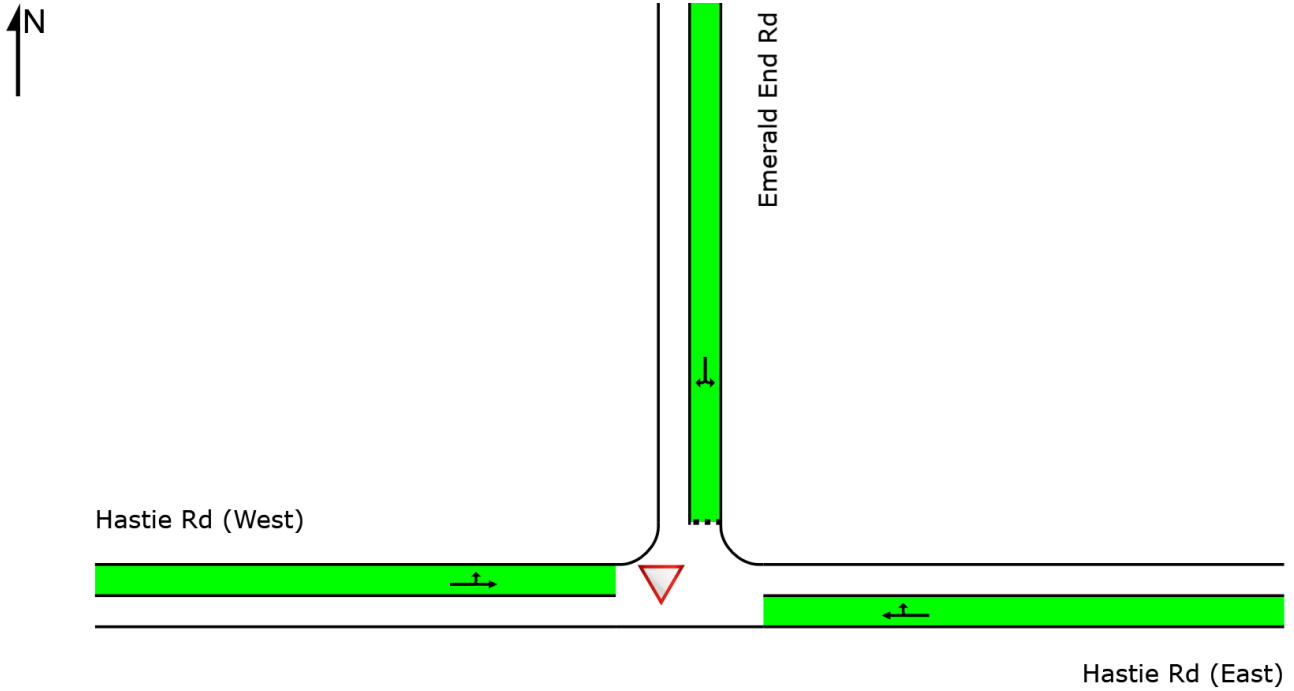
LEVEL OF SERVICE

Lane Level of Service

▽ Site: 101 [Intersection 2 - Emerald End Rd and Hastie Rd (2033) (Site Folder: Future Case (With) 2033 - AM Peak)]

New Site
 Site Category: (None)
 Give-Way (Two-Way)

	Approaches			Intersection
	East	North	West	
LOS	NA	A	NA	NA



Colour code based on Level of Service



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

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

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

QUEUE STORAGE RATIO (PERCENTILE)

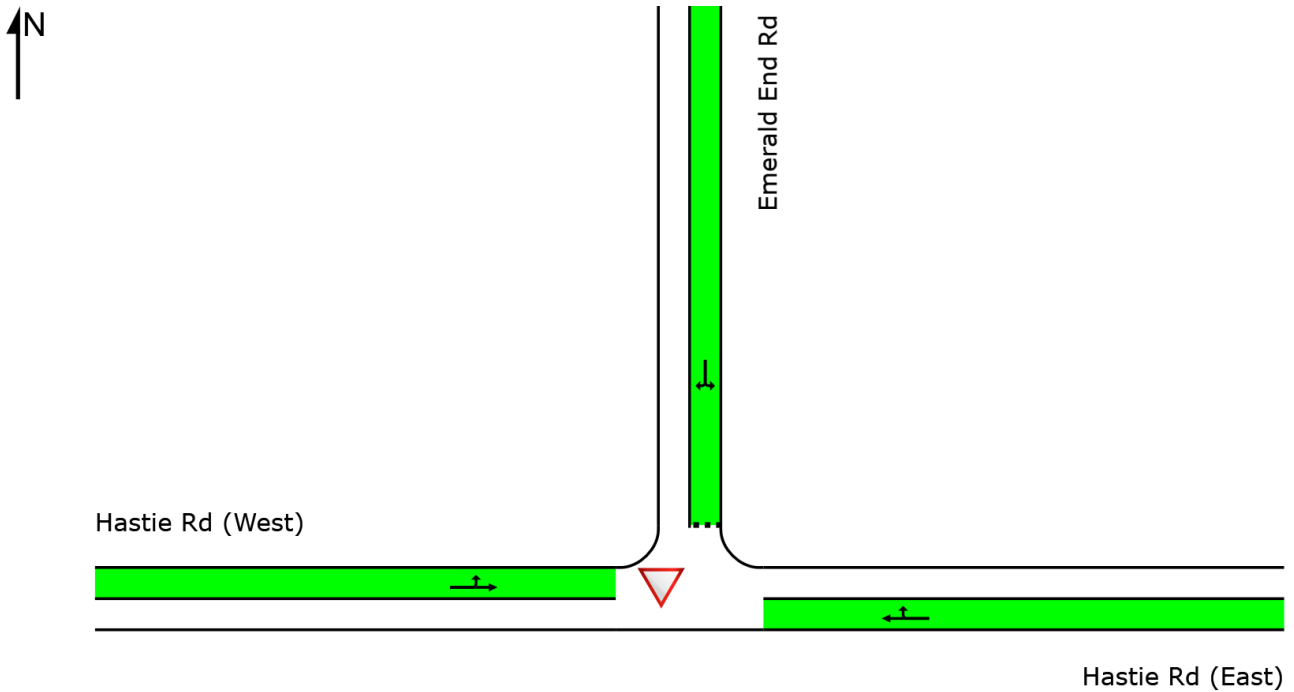
Ratio of the 95% Back of Queue Distance to the available queue storage distance per lane

▽ Site: 101 [Intersection 2 - Emerald End Rd and Hastie Rd (2033) (Site Folder: Future Case (With) 2033 - AM Peak)]

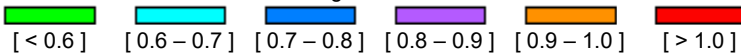
New Site
 Site Category: (None)
 Give-Way (Two-Way)

	Approaches			Intersection
	East	North	West	
Queue Storage Ratio (%ile)	0.00	0.01	0.00	0.01

Short Lanes not included in determining Approach Queue Storage Ratios.



Colour code based on Queue Storage Ratio



Queue Model: SIDRA Standard.

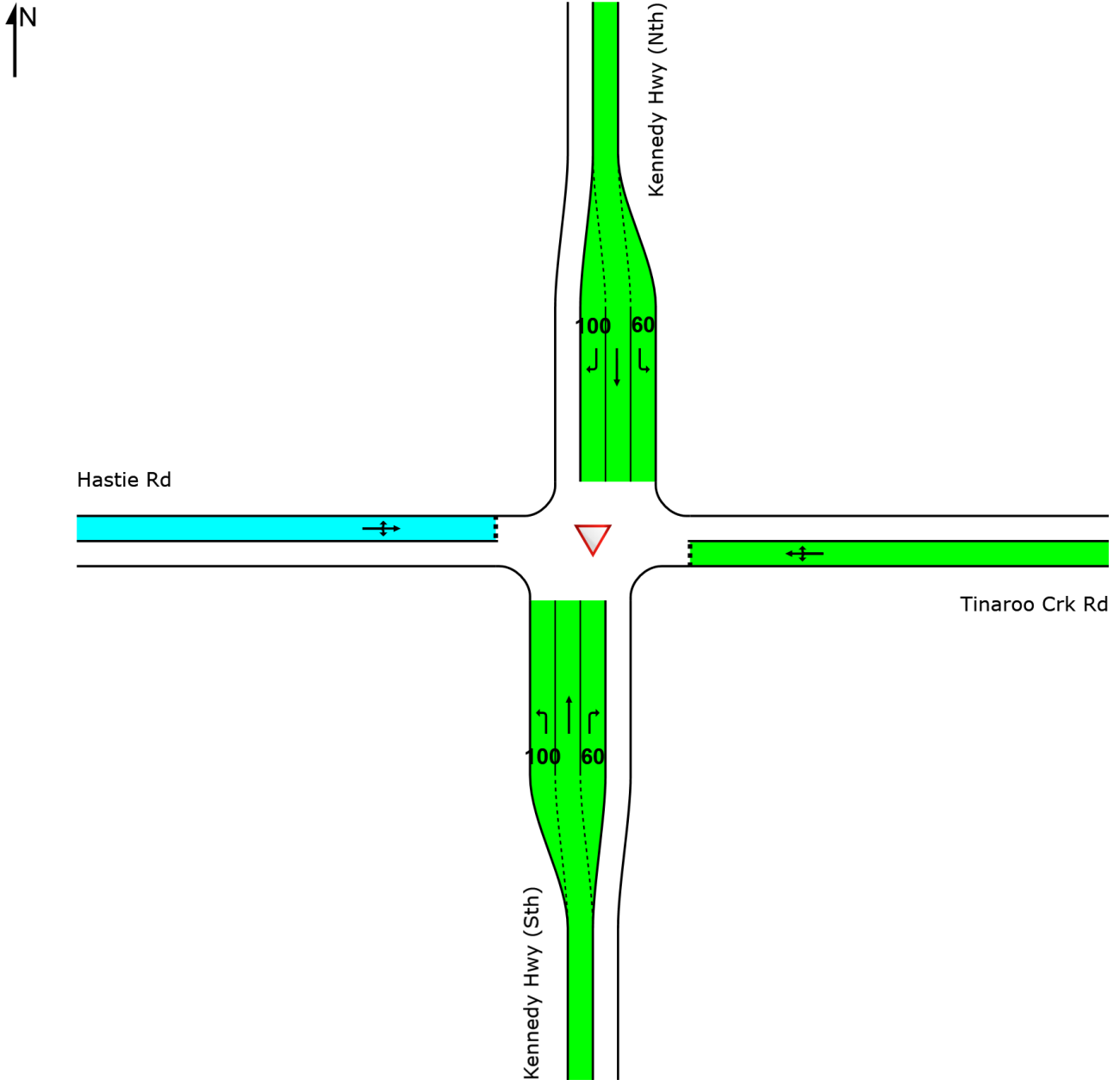
DEGREE OF SATURATION

Ratio of Demand Volume to Capacity, v/c ratio per lane

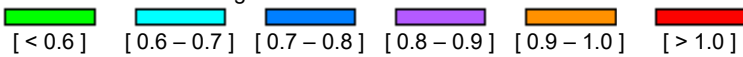
▽ Site: 101 [Intersection 3 - Kennedy Hwy and Hastie Rd (2033)]
 (Site Folder: Future Case (With) 2033 - AM Peak)

New Site
 Site Category: (None)
 Give-Way (Two-Way)

	Approaches				Intersection
	South	East	North	West	
Degree of Saturation	0.21	0.31	0.21	0.65	0.65



Colour code based on Degree of Saturation



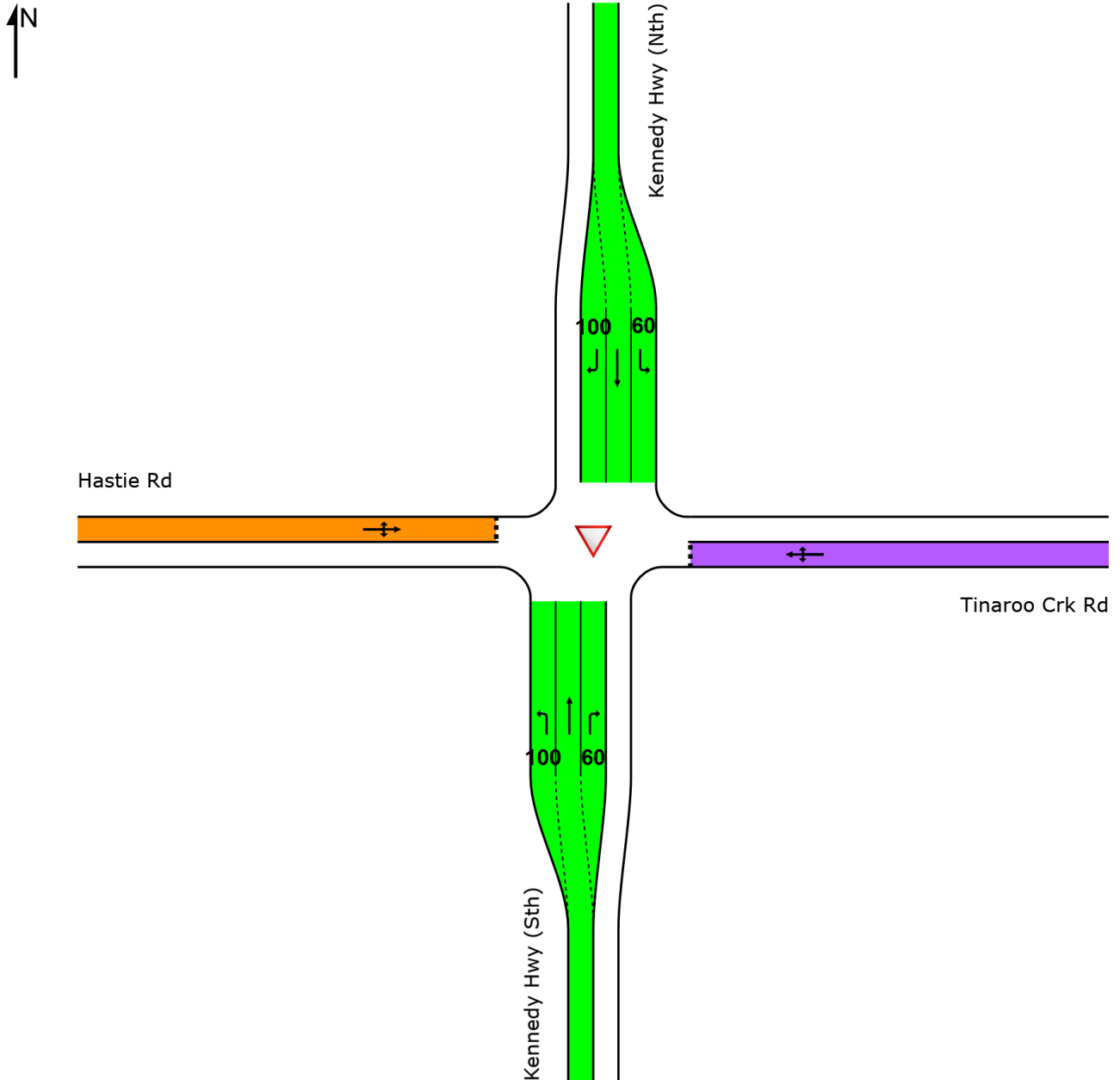
LEVEL OF SERVICE

Lane Level of Service

▽ Site: 101 [Intersection 3 - Kennedy Hwy and Hastie Rd (2033)]
 (Site Folder: Future Case (With) 2033 - AM Peak)

New Site
 Site Category: (None)
 Give-Way (Two-Way)

	Approaches				Intersection
	South	East	North	West	
LOS	NA	D	NA	E	NA



Colour code based on Level of Service



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

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

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

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Project: \\ghdnet\GHD\AU\Cairns\Projects\42\12569173\Tech\Design\Traffic\SIDRA\Emerald Creek Heights AM Base and Future Case.sip9

QUEUE STORAGE RATIO (PERCENTILE)

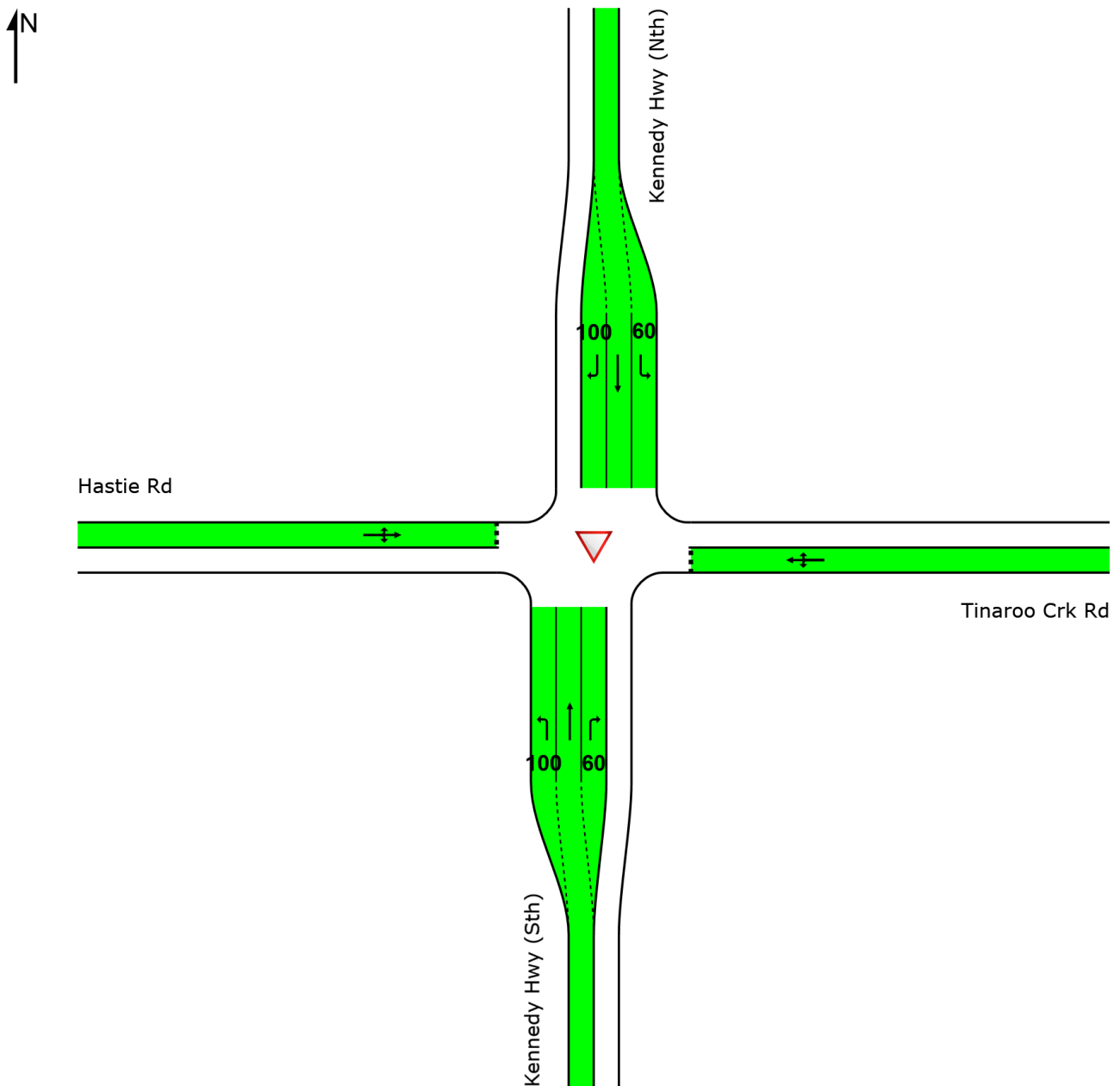
Ratio of the 95% Back of Queue Distance to the available queue storage distance per lane

▽ Site: 101 [Intersection 3 - Kennedy Hwy and Hastie Rd (2033)]
 (Site Folder: Future Case (With) 2033 - AM Peak)

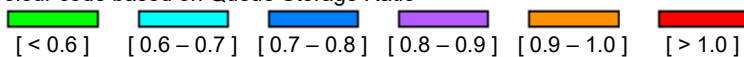
New Site
 Site Category: (None)
 Give-Way (Two-Way)

	Approaches				Intersection
	South	East	North	West	
Queue Storage Ratio (%ile)	0.00	0.02	0.00	0.05	0.05

Short Lanes not included in determining Approach Queue Storage Ratios.



Colour code based on Queue Storage Ratio



Queue Model: SIDRA Standard.

Appendix G

**Base Case (2023) and Future Case (2033)
With Development PM Peak SIDRA
Results**

MOVEMENT SUMMARY

Site: 101 [Intersection 2 - Emerald End Rd and Hastie Rd (2023) (Site Folder: Base Case (With) 2023 - PM Peak)]

New Site
 Site Category: (None)
 Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h]	[HV %]	[Total veh/h]	[HV %]				[Veh. veh]	[Dist m]				
East: Hastie Rd (East)														
5	T1	26	0.0	27	0.0	0.029	0.1	LOS A	0.1	0.8	0.11	0.28	0.11	57.1
6	R2	24	0.0	25	0.0	0.029	5.6	LOS A	0.1	0.8	0.11	0.28	0.11	53.3
Approach		50	0.0	53	0.0	0.029	2.7	NA	0.1	0.8	0.11	0.28	0.11	55.5
North: Emerald End Rd														
7	L2	3	0.0	3	0.0	0.005	5.6	LOS A	0.0	0.1	0.09	0.56	0.09	51.1
9	R2	3	0.0	3	0.0	0.005	5.7	LOS A	0.0	0.1	0.09	0.56	0.09	50.5
Approach		6	0.0	6	0.0	0.005	5.7	LOS A	0.0	0.1	0.09	0.56	0.09	50.8
West: Hastie Rd (West)														
10	L2	24	0.0	25	0.0	0.027	5.5	LOS A	0.0	0.0	0.00	0.30	0.00	54.4
11	T1	24	0.0	25	0.0	0.027	0.0	LOS A	0.0	0.0	0.00	0.30	0.00	57.4
Approach		48	0.0	51	0.0	0.027	2.8	NA	0.0	0.0	0.00	0.30	0.00	56.1
All Vehicles		104	0.0	109	0.0	0.029	2.9	NA	0.1	0.8	0.06	0.30	0.06	55.5

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
 Vehicle movement LOS values are based on average delay per movement.
 Minor Road Approach LOS values are based on average delay for all vehicle movements.
 NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
 Delay Model: SIDRA Standard (Geometric Delay is included).
 Queue Model: SIDRA Standard.
 Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
 HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Intersection 1 - Emerald End Rd and Godfrey Rd (2023) (Site Folder: Base Case (With) 2023 - PM Peak)]

New Site
 Site Category: (None)
 Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV %	[Total veh/h	HV %				[Veh. veh	Dist] m				
South: Emerald End Rd (Sth)														
2	T1	44	0.0	46	0.0	0.059	0.1	LOS A	0.3	1.8	0.14	0.32	0.14	55.4
3	R2	56	0.0	59	0.0	0.059	5.6	LOS A	0.3	1.8	0.14	0.32	0.14	52.7
Approach		100	0.0	105	0.0	0.059	3.2	NA	0.3	1.8	0.14	0.32	0.14	53.8
East: Godfrey Rd														
4	L2	4	0.0	4	0.0	0.006	5.7	LOS A	0.0	0.2	0.13	0.56	0.13	51.0
6	R2	4	0.0	4	0.0	0.006	6.0	LOS A	0.0	0.2	0.13	0.56	0.13	52.7
Approach		8	0.0	8	0.0	0.006	5.8	LOS A	0.0	0.2	0.13	0.56	0.13	52.0
North: Emerald End Rd (Nth)														
7	L2	16	0.0	17	0.0	0.033	5.5	LOS A	0.0	0.0	0.00	0.16	0.00	57.0
8	T1	44	0.0	46	0.0	0.033	0.0	LOS A	0.0	0.0	0.00	0.16	0.00	58.0
Approach		60	0.0	63	0.0	0.033	1.5	NA	0.0	0.0	0.00	0.16	0.00	57.7
All Vehicles		168	0.0	177	0.0	0.059	2.7	NA	0.3	1.8	0.09	0.27	0.09	55.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
 Vehicle movement LOS values are based on average delay per movement.
 Minor Road Approach LOS values are based on average delay for all vehicle movements.
 NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
 Delay Model: SIDRA Standard (Geometric Delay is included).
 Queue Model: SIDRA Standard.
 Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
 HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Intersection 3 - Kennedy Hwy and Hastie Rd (2023)]
 (Site Folder: Base Case (With) 2023 - PM Peak)

New Site
 Site Category: (None)
 Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h]	[HV %]	[Total veh/h]	[HV %]				[Veh. veh]	[Dist m]				
South: Kennedy Hwy (Sth)														
1	L2	65	0.0	68	0.0	0.037	5.5	LOS A	0.0	0.0	0.00	0.58	0.00	53.6
2	T1	337	0.0	355	0.0	0.182	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
3	R2	25	0.0	26	0.0	0.027	7.1	LOS A	0.1	0.7	0.42	0.63	0.42	51.9
Approach		427	0.0	449	0.0	0.182	1.3	NA	0.1	0.7	0.02	0.12	0.02	58.3
East: Tinaroo Crk Rd														
4	L2	21	0.0	22	0.0	0.175	7.2	LOS A	0.6	3.9	0.67	0.80	0.67	45.5
5	T1	1	0.0	1	0.0	0.175	23.2	LOS C	0.6	3.9	0.67	0.80	0.67	45.8
6	R2	21	0.0	22	0.0	0.175	28.2	LOS D	0.6	3.9	0.67	0.80	0.67	45.5
Approach		43	0.0	45	0.0	0.175	17.8	LOS C	0.6	3.9	0.67	0.80	0.67	45.5
North: Kennedy Hwy (Nth)														
7	L2	25	0.0	26	0.0	0.014	5.5	LOS A	0.0	0.0	0.00	0.58	0.00	53.6
8	T1	337	0.0	355	0.0	0.183	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
9	R2	65	0.0	68	0.0	0.074	7.4	LOS A	0.3	2.0	0.46	0.68	0.46	51.6
Approach		427	0.0	449	0.0	0.183	1.5	NA	0.3	2.0	0.07	0.14	0.07	58.1
West: Hastie Rd														
10	L2	63	0.0	66	0.0	0.491	12.2	LOS B	2.3	16.2	0.73	0.99	1.14	42.4
11	T1	1	0.0	1	0.0	0.491	29.5	LOS D	2.3	16.2	0.73	0.99	1.14	42.7
12	R2	63	0.0	66	0.0	0.491	34.7	LOS D	2.3	16.2	0.73	0.99	1.14	42.5
Approach		127	0.0	134	0.0	0.491	23.5	LOS C	2.3	16.2	0.73	0.99	1.14	42.5
All Vehicles		1024	0.0	1078	0.0	0.491	4.8	NA	2.3	16.2	0.16	0.27	0.21	55.0

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

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

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

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

Queue Model: SIDRA Standard.

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

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

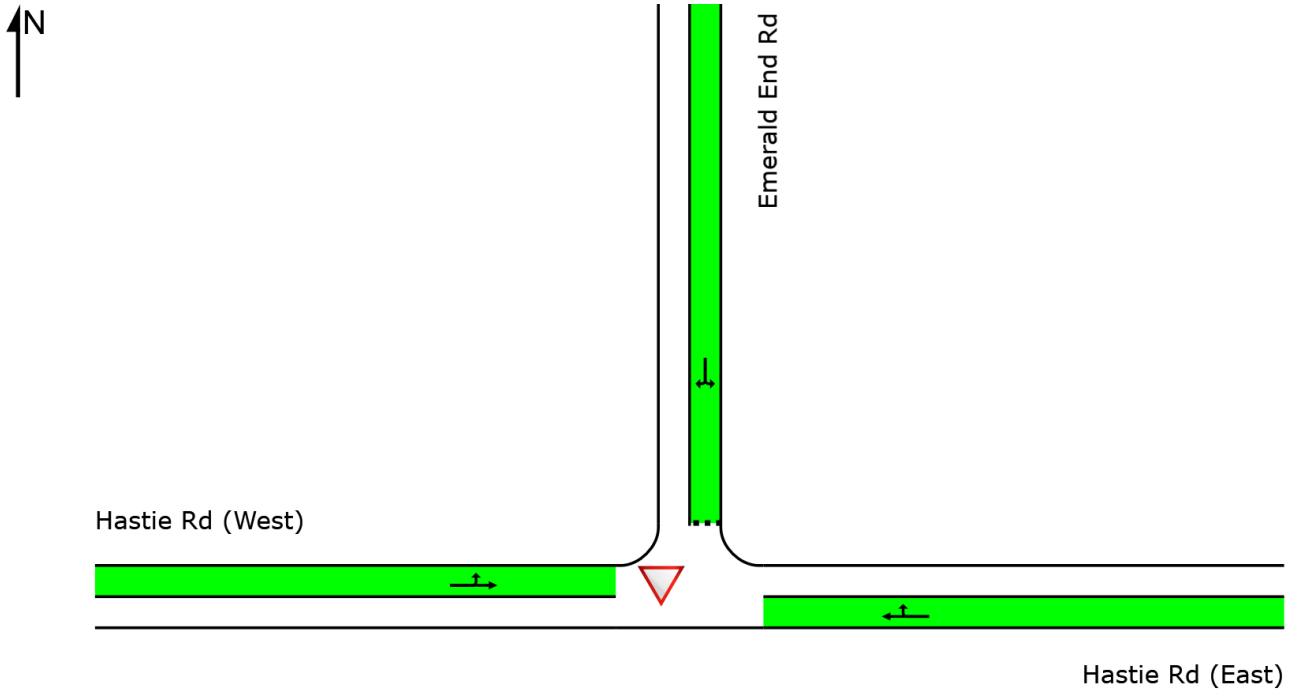
DEGREE OF SATURATION

Ratio of Demand Volume to Capacity, v/c ratio per lane

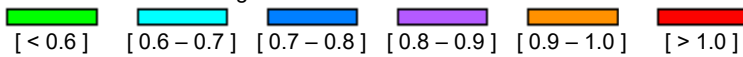
▽ Site: 101 [Intersection 2 - Emerald End Rd and Hastie Rd (2023) (Site Folder: Base Case (With) 2023 - PM Peak)]

New Site
Site Category: (None)
Give-Way (Two-Way)

	Approaches			Intersection
	East	North	West	
Degree of Saturation	0.03	0.00	0.03	0.03



Colour code based on Degree of Saturation



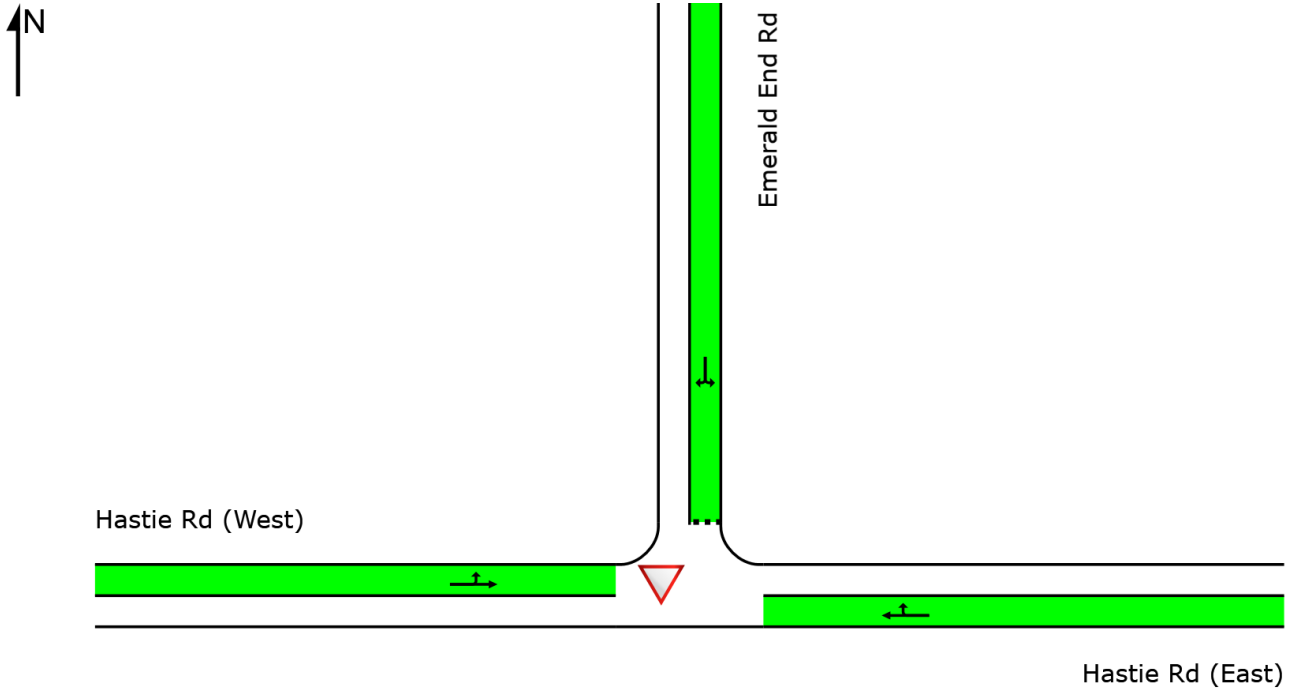
LEVEL OF SERVICE

Lane Level of Service

▽ Site: 101 [Intersection 2 - Emerald End Rd and Hastie Rd (2023) (Site Folder: Base Case (With) 2023 - PM Peak)]

New Site
 Site Category: (None)
 Give-Way (Two-Way)

	Approaches			Intersection
	East	North	West	
LOS	NA	A	NA	NA



Colour code based on Level of Service



Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
 NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
 Delay Model: SIDRA Standard (Geometric Delay is included).

QUEUE STORAGE RATIO (PERCENTILE)

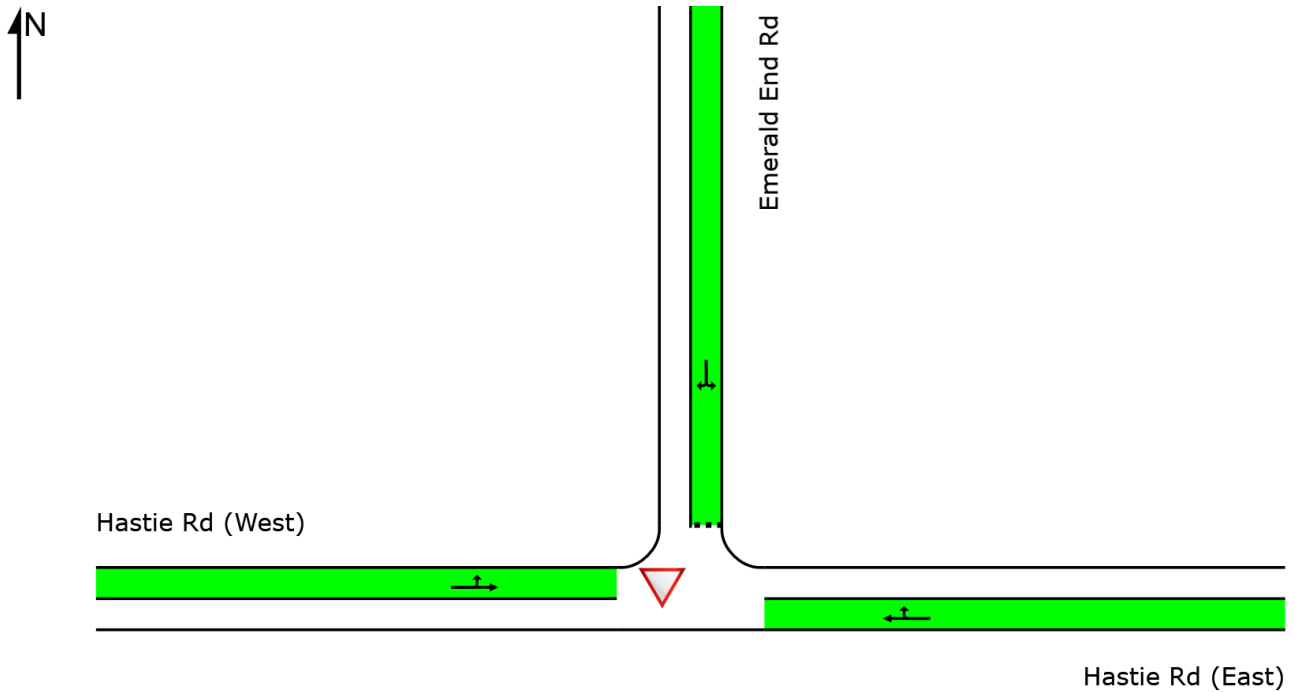
Ratio of the 95% Back of Queue Distance to the available queue storage distance per lane

▽ Site: 101 [Intersection 2 - Emerald End Rd and Hastie Rd (2023) (Site Folder: Base Case (With) 2023 - PM Peak)]

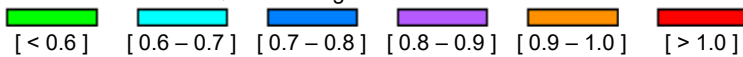
New Site
 Site Category: (None)
 Give-Way (Two-Way)

	Approaches			Intersection
	East	North	West	
Queue Storage Ratio (%ile)	0.00	0.00	0.00	0.00

Short Lanes not included in determining Approach Queue Storage Ratios.



Colour code based on Queue Storage Ratio



Queue Model: SIDRA Standard.

DEGREE OF SATURATION

Ratio of Demand Volume to Capacity, v/c ratio per lane

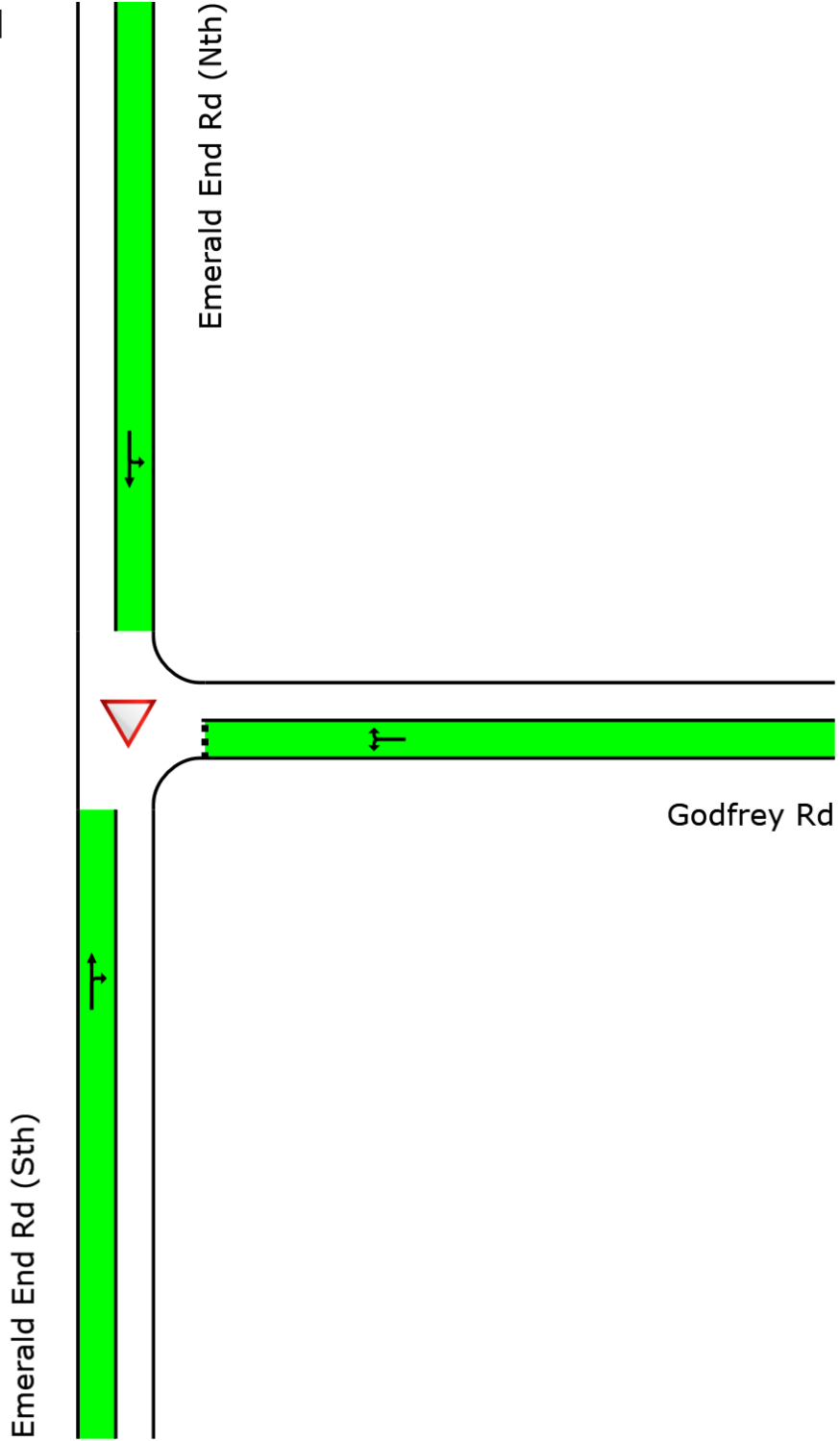
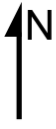
▽ Site: 101 [Intersection 1 - Emerald End Rd and Godfrey Rd
(2023) (Site Folder: Base Case (With) 2023 - PM Peak)]

New Site

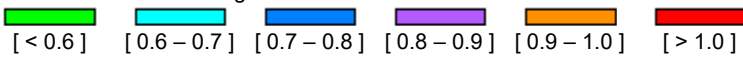
Site Category: (None)

Give-Way (Two-Way)

	Approaches			Intersection
	South	East	North	
Degree of Saturation	0.06	0.01	0.03	0.06



Colour code based on Degree of Saturation



LEVEL OF SERVICE

Lane Level of Service

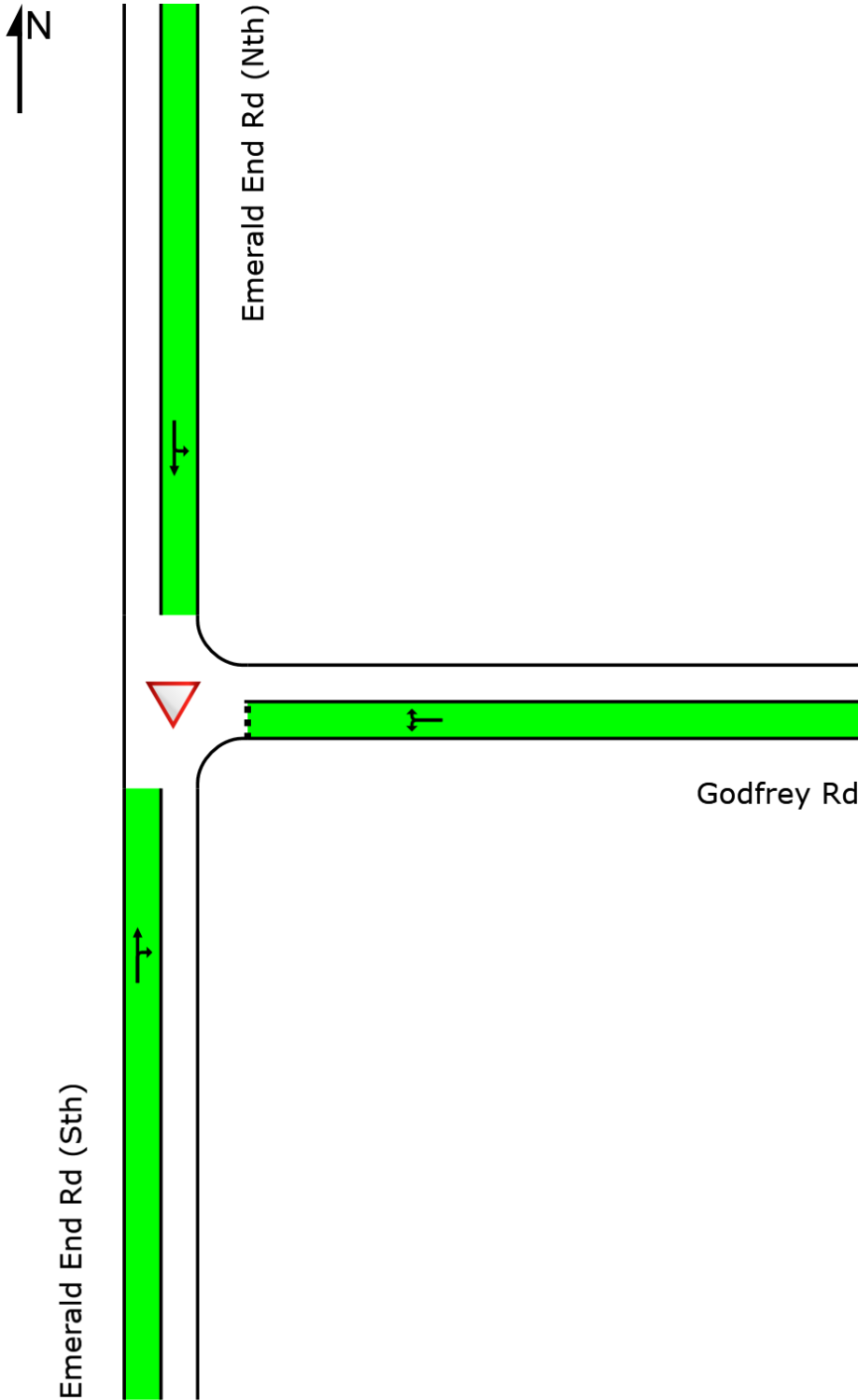
▽ Site: 101 [Intersection 1 - Emerald End Rd and Godfrey Rd
(2023) (Site Folder: Base Case (With) 2023 - PM Peak)]

New Site

Site Category: (None)

Give-Way (Two-Way)

	Approaches			Intersection
	South	East	North	
LOS	NA	A	NA	NA



Colour code based on Level of Service



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

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

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

QUEUE STORAGE RATIO (PERCENTILE)

Ratio of the 95% Back of Queue Distance to the available queue storage distance per lane

▽ Site: 101 [Intersection 1 - Emerald End Rd and Godfrey Rd (2023) (Site Folder: Base Case (With) 2023 - PM Peak)]

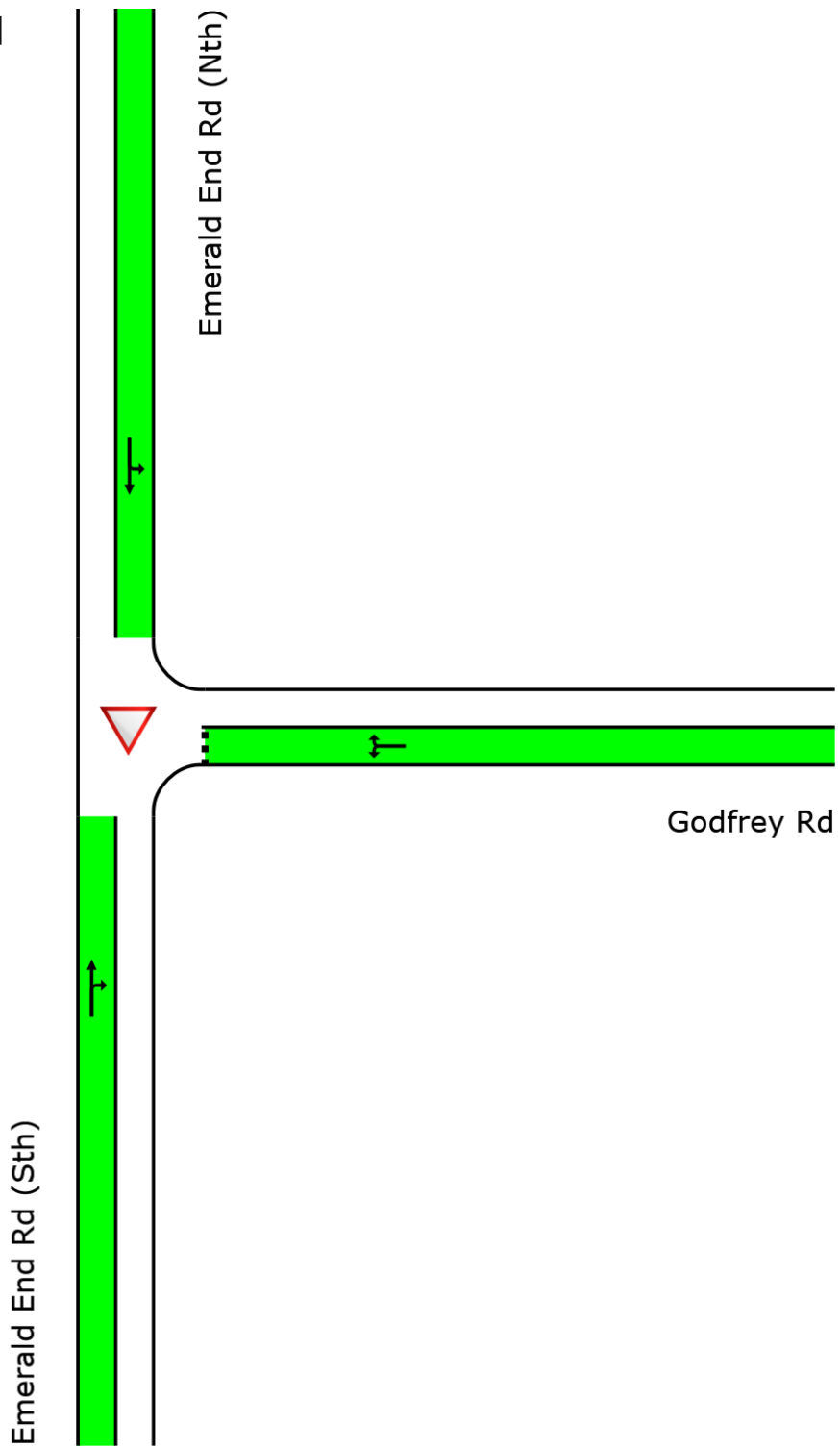
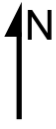
New Site

Site Category: (None)

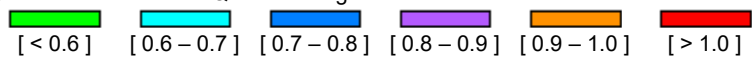
Give-Way (Two-Way)

	Approaches			Intersection
	South	East	North	
Queue Storage Ratio (%ile)	0.01	0.00	0.00	0.01

Short Lanes not included in determining Approach Queue Storage Ratios.



Colour code based on Queue Storage Ratio



Queue Model: SIDRA Standard.

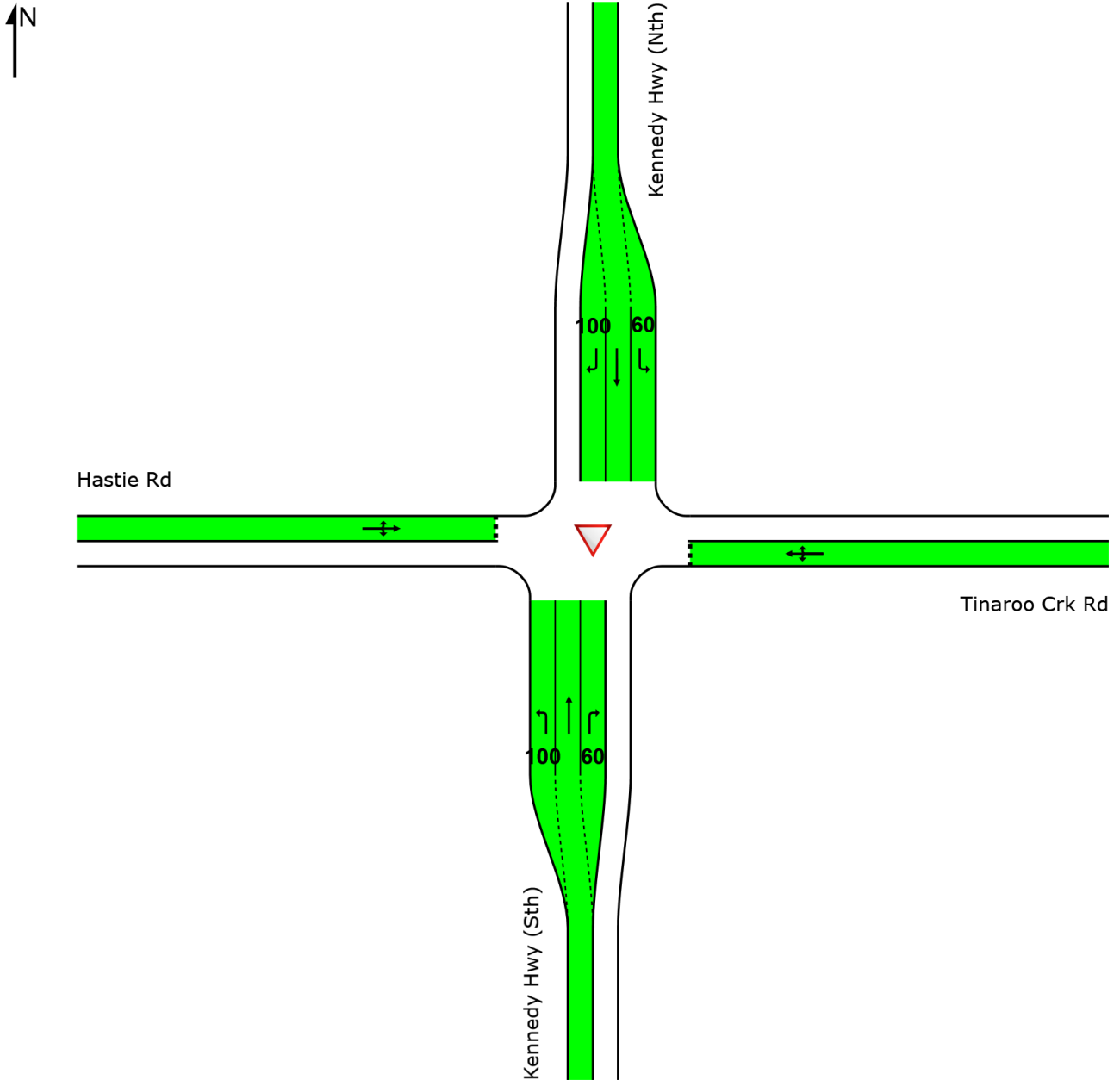
DEGREE OF SATURATION

Ratio of Demand Volume to Capacity, v/c ratio per lane

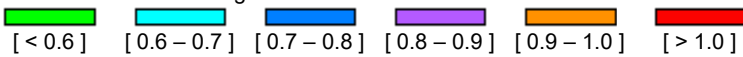
▽ Site: 101 [Intersection 3 - Kennedy Hwy and Hastie Rd (2023)]
 (Site Folder: Base Case (With) 2023 - PM Peak)]

New Site
 Site Category: (None)
 Give-Way (Two-Way)

	Approaches				Intersection
	South	East	North	West	
Degree of Saturation	0.18	0.17	0.18	0.49	0.49



Colour code based on Degree of Saturation



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Project: \\ghdnet\GHD\AU\Cairns\Projects\42\12569173\Tech\Design\Traffic\SIDRA\Emerald Creek Heights PM Base and Future Case.sip9

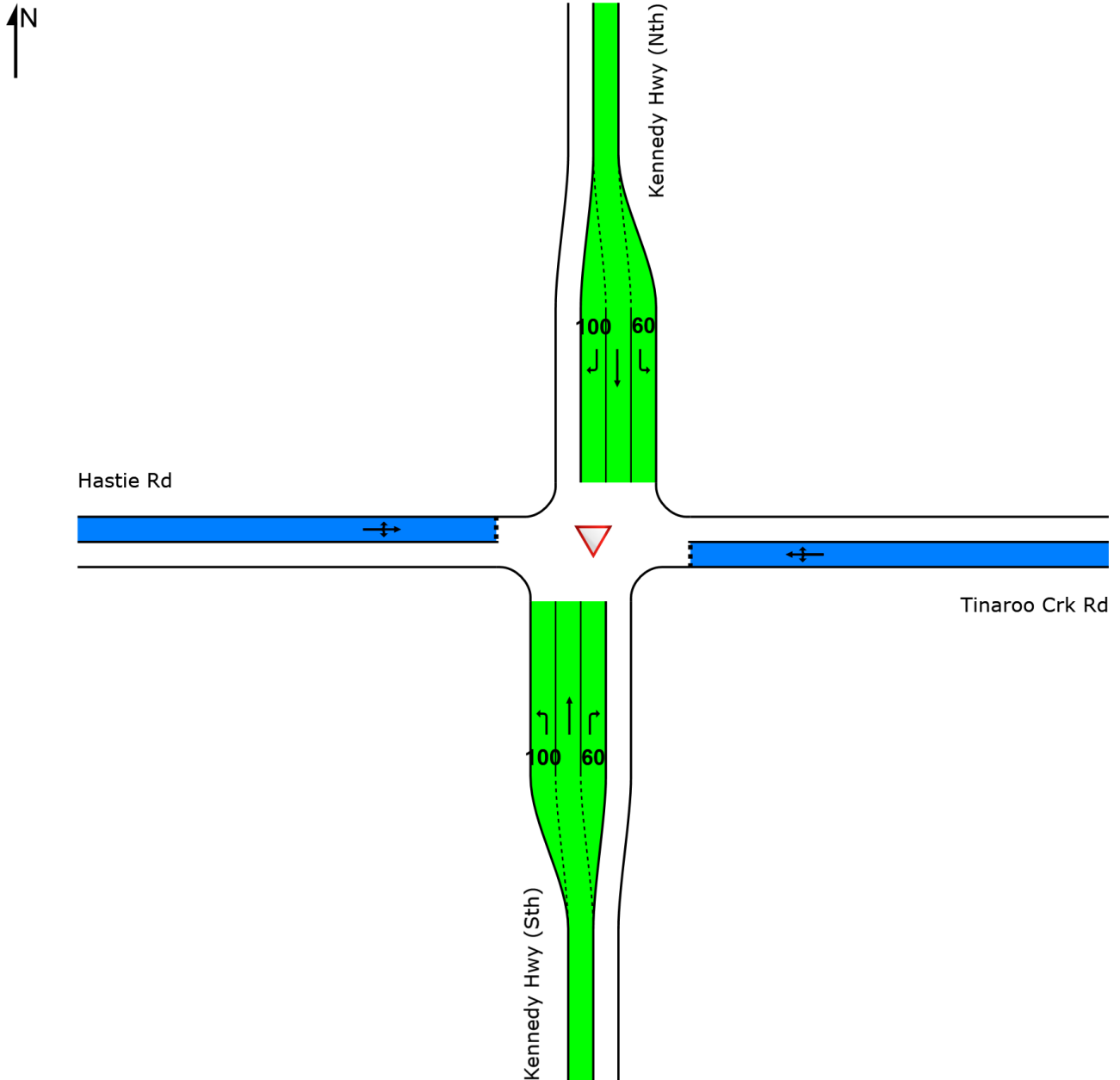
LEVEL OF SERVICE

Lane Level of Service

▽ Site: 101 [Intersection 3 - Kennedy Hwy and Hastie Rd (2023)]
(Site Folder: Base Case (With) 2023 - PM Peak)]

New Site
Site Category: (None)
Give-Way (Two-Way)

	Approaches				Intersection
	South	East	North	West	
LOS	NA	C	NA	C	NA



Colour code based on Level of Service



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

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

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

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Project: \\ghdnet\GHD\AU\Cairns\Projects\42\12569173\Tech\Design\Traffic\SIDRA\Emerald Creek Heights PM Base and Future Case.sip9

QUEUE STORAGE RATIO (PERCENTILE)

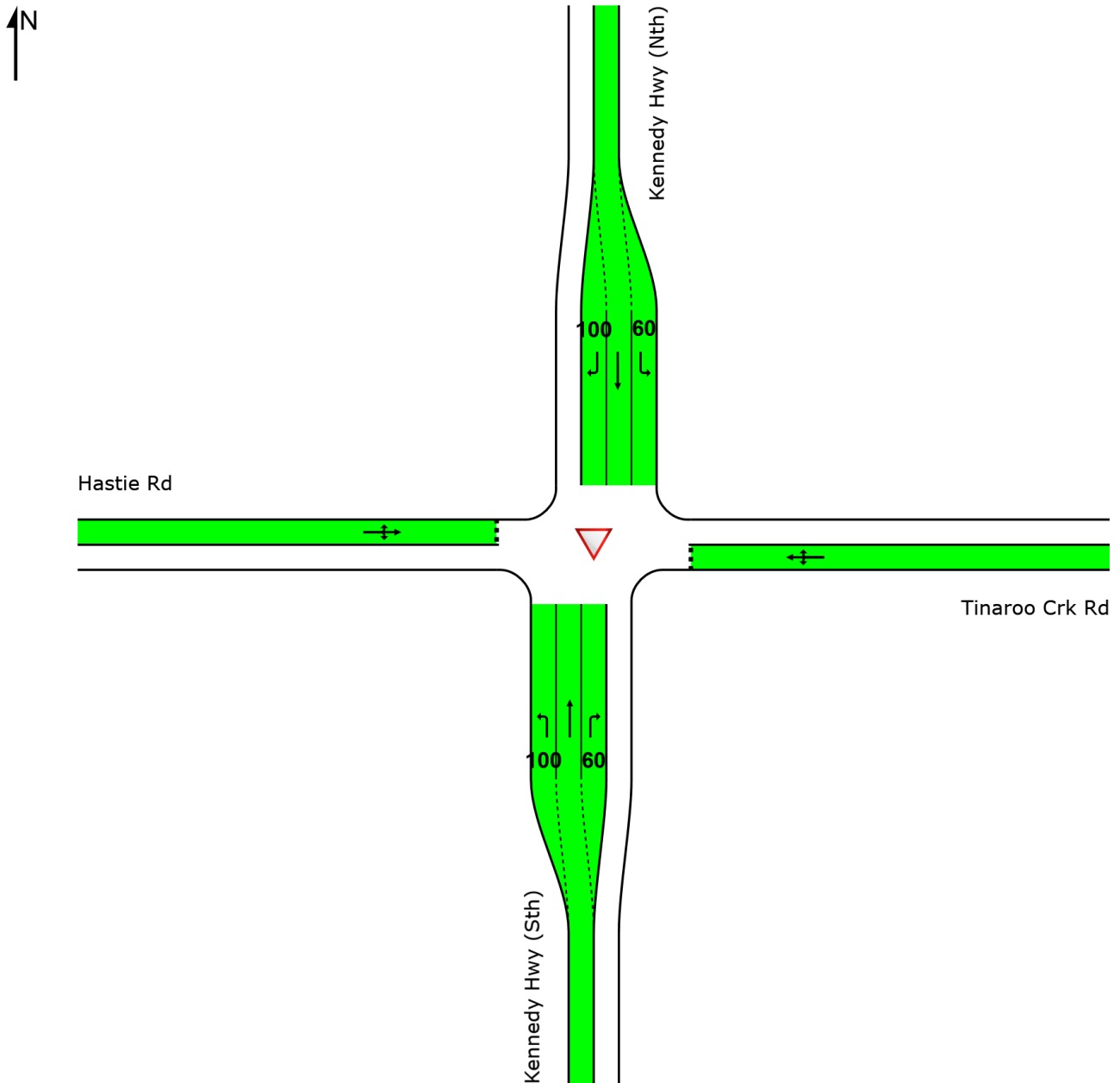
Ratio of the 95% Back of Queue Distance to the available queue storage distance per lane

▽ Site: 101 [Intersection 3 - Kennedy Hwy and Hastie Rd (2023)]
 (Site Folder: Base Case (With) 2023 - PM Peak)

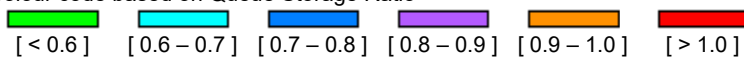
New Site
 Site Category: (None)
 Give-Way (Two-Way)

	Approaches				Intersection
	South	East	North	West	
Queue Storage Ratio (%ile)	0.00	0.01	0.00	0.03	0.03

Short Lanes not included in determining Approach Queue Storage Ratios.



Colour code based on Queue Storage Ratio



Queue Model: SIDRA Standard.

MOVEMENT SUMMARY

▼ Site: 101 [Intersection 1 - Emerald End Rd and Godfrey Rd (2033) (Site Folder: Future Case (With) 2033 - PM Peak)]

New Site
 Site Category: (None)
 Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h]	[HV %]	[Total veh/h]	[HV %]				[Veh. veh]	[Dist m]				
South: Emerald End Rd (Sth)														
2	T1	52	0.0	55	0.0	0.069	0.2	LOS A	0.3	2.2	0.16	0.32	0.16	55.3
3	R2	65	0.0	68	0.0	0.069	5.7	LOS A	0.3	2.2	0.16	0.32	0.16	52.7
Approach		117	0.0	123	0.0	0.069	3.2	NA	0.3	2.2	0.16	0.32	0.16	53.8
East: Godfrey Rd														
4	L2	5	0.0	5	0.0	0.008	5.7	LOS A	0.0	0.2	0.14	0.56	0.14	50.9
6	R2	5	0.0	5	0.0	0.008	6.1	LOS A	0.0	0.2	0.14	0.56	0.14	52.7
Approach		10	0.0	11	0.0	0.008	5.9	LOS A	0.0	0.2	0.14	0.56	0.14	51.9
North: Emerald End Rd (Nth)														
7	L2	18	0.0	19	0.0	0.038	5.5	LOS A	0.0	0.0	0.00	0.15	0.00	57.0
8	T1	52	0.0	55	0.0	0.038	0.0	LOS A	0.0	0.0	0.00	0.15	0.00	58.1
Approach		70	0.0	74	0.0	0.038	1.4	NA	0.0	0.0	0.00	0.15	0.00	57.7
All Vehicles		197	0.0	207	0.0	0.069	2.7	NA	0.3	2.2	0.10	0.27	0.10	55.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
 Vehicle movement LOS values are based on average delay per movement.
 Minor Road Approach LOS values are based on average delay for all vehicle movements.
 NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
 Delay Model: SIDRA Standard (Geometric Delay is included).
 Queue Model: SIDRA Standard.
 Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
 HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

▽ Site: 101 [Intersection 2 - Emerald End Rd and Hastie Rd (2033) (Site Folder: Future Case (With) 2033 - PM Peak)]

New Site
 Site Category: (None)
 Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h]	[HV %]	[Total veh/h]	[HV %]				[Veh. veh]	[Dist m]				
East: Hastie Rd (East)														
5	T1	30	0.0	32	0.0	0.034	0.1	LOS A	0.1	1.0	0.13	0.28	0.13	57.1
6	R2	28	0.0	29	0.0	0.034	5.6	LOS A	0.1	1.0	0.13	0.28	0.13	53.2
Approach		58	0.0	61	0.0	0.034	2.8	NA	0.1	1.0	0.13	0.28	0.13	55.5
North: Emerald End Rd														
7	L2	3	0.0	3	0.0	0.005	5.6	LOS A	0.0	0.1	0.09	0.56	0.09	51.1
9	R2	3	0.0	3	0.0	0.005	5.8	LOS A	0.0	0.1	0.09	0.56	0.09	50.4
Approach		6	0.0	6	0.0	0.005	5.7	LOS A	0.0	0.1	0.09	0.56	0.09	50.8
West: Hastie Rd (West)														
10	L2	28	0.0	29	0.0	0.031	5.5	LOS A	0.0	0.0	0.00	0.30	0.00	54.4
11	T1	28	0.0	29	0.0	0.031	0.0	LOS A	0.0	0.0	0.00	0.30	0.00	57.4
Approach		56	0.0	59	0.0	0.031	2.8	NA	0.0	0.0	0.00	0.30	0.00	56.1
All Vehicles		120	0.0	126	0.0	0.034	2.9	NA	0.1	1.0	0.07	0.30	0.07	55.5

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

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

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

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

Queue Model: SIDRA Standard.

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

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

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MOVEMENT SUMMARY

Site: 101 [Intersection 3 - Kennedy Hwy and Hastie Rd (2033)]
 (Site Folder: Future Case (With) 2033 - PM Peak)

New Site
 Site Category: (None)
 Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV %	[Total veh/h	HV %				[Veh. veh	Dist] m				
South: Kennedy Hwy (Sth)														
1	L2	76	0.0	80	0.0	0.043	5.6	LOS A	0.0	0.0	0.00	0.58	0.00	53.6
2	T1	391	0.0	412	0.0	0.212	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
3	R2	29	0.0	31	0.0	0.034	7.5	LOS A	0.1	0.9	0.46	0.66	0.46	51.6
Approach		496	0.0	522	0.0	0.212	1.3	NA	0.1	0.9	0.03	0.13	0.03	58.3
East: Tinaroo Crk Rd														
4	L2	24	0.0	25	0.0	0.268	9.3	LOS A	0.9	6.3	0.77	0.90	0.87	41.7
5	T1	1	0.0	1	0.0	0.268	33.1	LOS D	0.9	6.3	0.77	0.90	0.87	42.0
6	R2	24	0.0	25	0.0	0.268	40.3	LOS E	0.9	6.3	0.77	0.90	0.87	41.8
Approach		49	0.0	52	0.0	0.268	25.0	LOS D	0.9	6.3	0.77	0.90	0.87	41.7
North: Kennedy Hwy (Nth)														
7	L2	29	0.0	31	0.0	0.016	5.5	LOS A	0.0	0.0	0.00	0.58	0.00	53.6
8	T1	391	0.0	412	0.0	0.213	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
9	R2	76	0.0	80	0.0	0.094	7.9	LOS A	0.4	2.5	0.50	0.72	0.50	51.3
Approach		496	0.0	522	0.0	0.213	1.6	NA	0.4	2.5	0.08	0.14	0.08	58.0
West: Hastie Rd														
10	L2	73	0.0	77	0.0	0.756	28.5	LOS D	4.7	33.2	0.85	1.30	2.02	33.9
11	T1	1	0.0	1	0.0	0.756	54.5	LOS F	4.7	33.2	0.85	1.30	2.02	34.1
12	R2	73	0.0	77	0.0	0.756	62.0	LOS F	4.7	33.2	0.85	1.30	2.02	33.9
Approach		147	0.0	155	0.0	0.756	45.3	LOS E	4.7	33.2	0.85	1.30	2.02	33.9
All Vehicles		1188	0.0	1251	0.0	0.756	7.9	NA	4.7	33.2	0.18	0.31	0.33	52.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
 Vehicle movement LOS values are based on average delay per movement.
 Minor Road Approach LOS values are based on average delay for all vehicle movements.
 NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
 Delay Model: SIDRA Standard (Geometric Delay is included).
 Queue Model: SIDRA Standard.
 Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
 HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

DEGREE OF SATURATION

Ratio of Demand Volume to Capacity, v/c ratio per lane

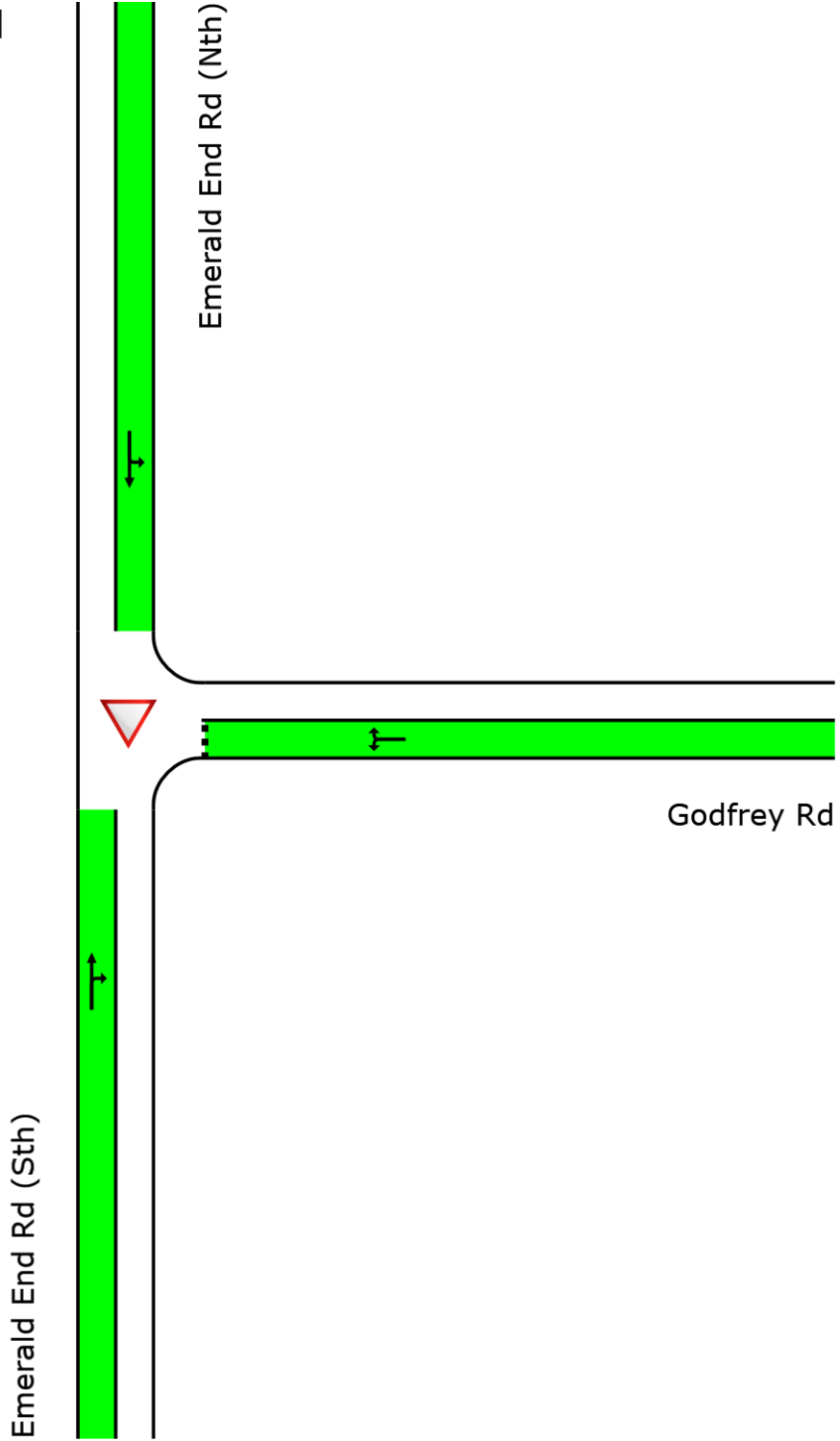
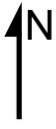
▽ Site: 101 [Intersection 1 - Emerald End Rd and Godfrey Rd
(2033) (Site Folder: Future Case (With) 2033 - PM Peak)]

New Site

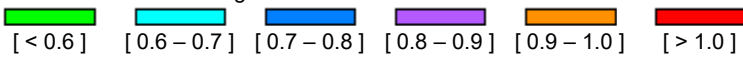
Site Category: (None)

Give-Way (Two-Way)

	Approaches			Intersection
	South	East	North	
Degree of Saturation	0.07	0.01	0.04	0.07



Colour code based on Degree of Saturation



LEVEL OF SERVICE

Lane Level of Service

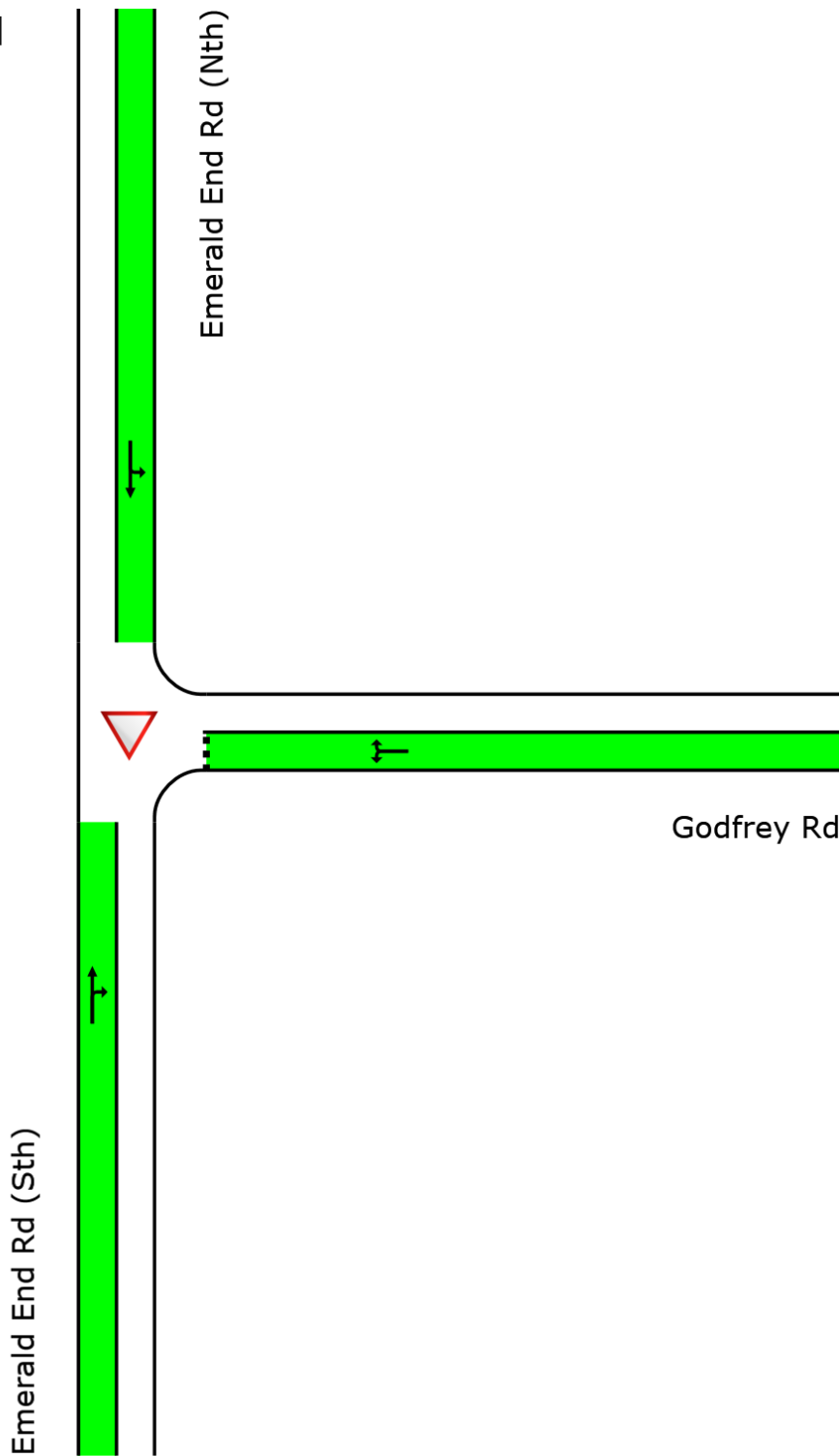
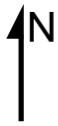
▽ Site: 101 [Intersection 1 - Emerald End Rd and Godfrey Rd (2033) (Site Folder: Future Case (With) 2033 - PM Peak)]

New Site

Site Category: (None)

Give-Way (Two-Way)

	Approaches			Intersection
	South	East	North	
LOS	NA	A	NA	NA



Colour code based on Level of Service



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

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

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

QUEUE STORAGE RATIO (PERCENTILE)

Ratio of the 95% Back of Queue Distance to the available queue storage distance per lane

▽ Site: 101 [Intersection 1 - Emerald End Rd and Godfrey Rd (2033) (Site Folder: Future Case (With) 2033 - PM Peak)]

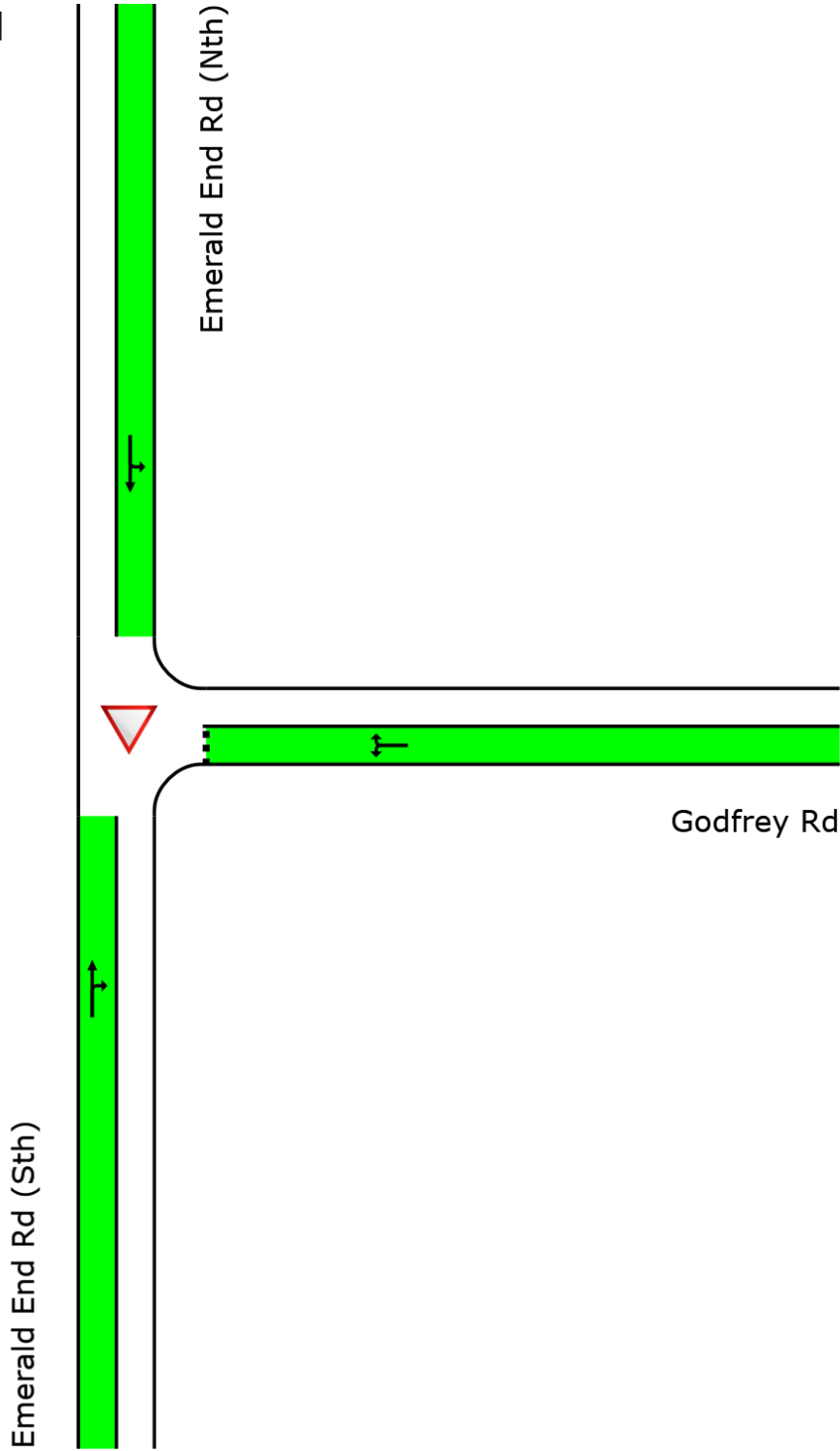
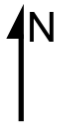
New Site

Site Category: (None)

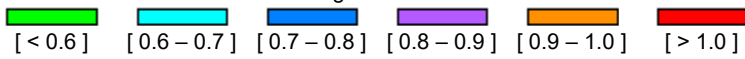
Give-Way (Two-Way)

	Approaches			Intersection
	South	East	North	
Queue Storage Ratio (%ile)	0.01	0.00	0.00	0.01

Short Lanes not included in determining Approach Queue Storage Ratios.



Colour code based on Queue Storage Ratio



Queue Model: SIDRA Standard.

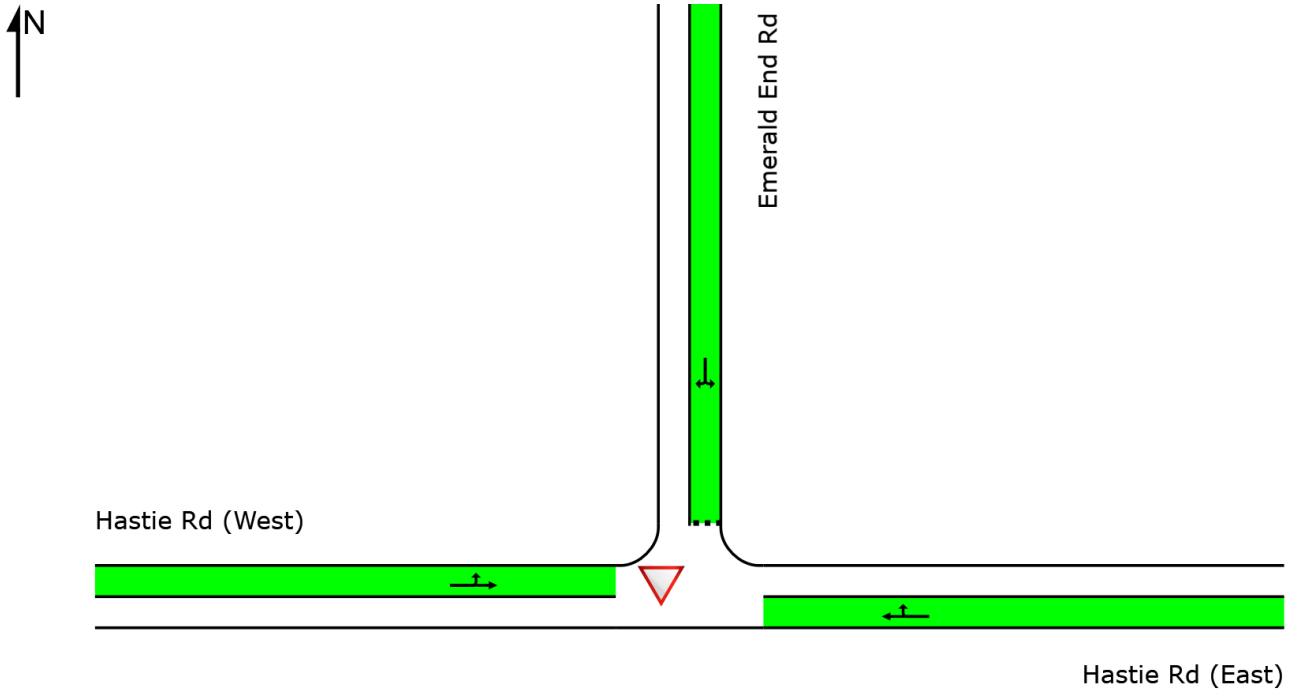
DEGREE OF SATURATION

Ratio of Demand Volume to Capacity, v/c ratio per lane

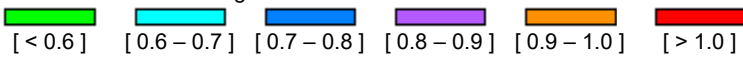
▽ Site: 101 [Intersection 2 - Emerald End Rd and Hastie Rd (2033) (Site Folder: Future Case (With) 2033 - PM Peak)]

New Site
 Site Category: (None)
 Give-Way (Two-Way)

	Approaches			Intersection
	East	North	West	
Degree of Saturation	0.03	0.00	0.03	0.03



Colour code based on Degree of Saturation



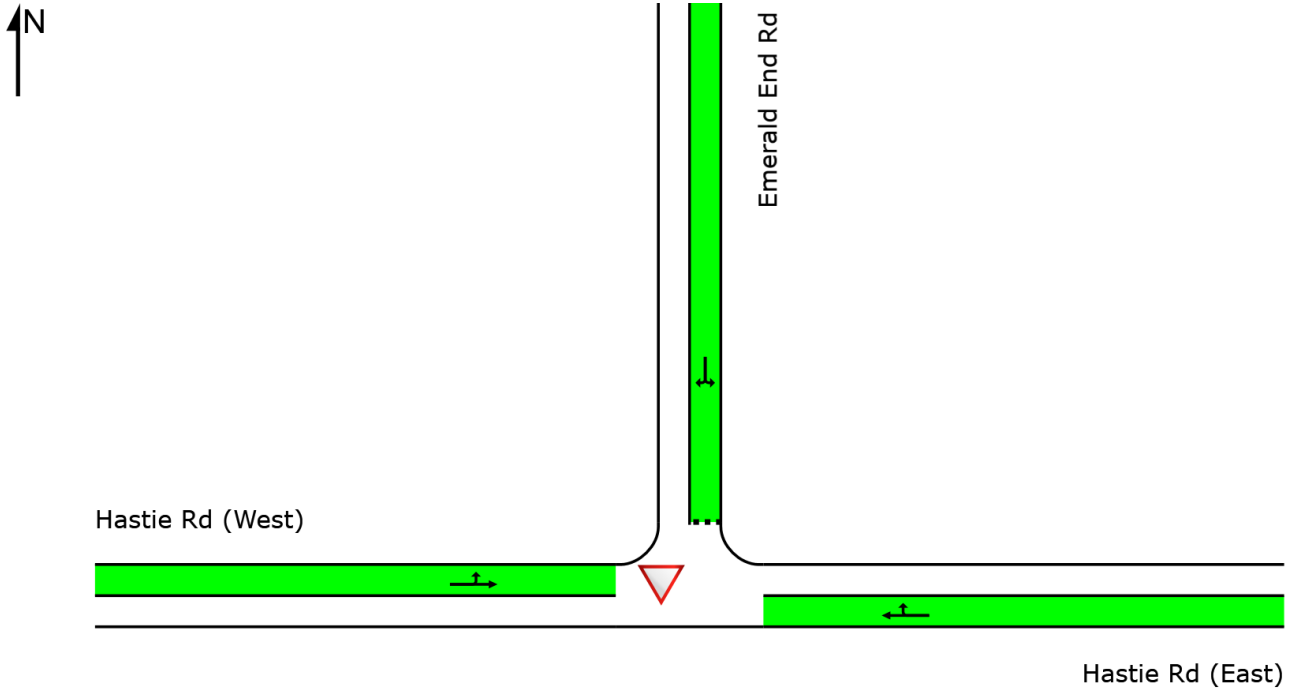
LEVEL OF SERVICE

Lane Level of Service

▽ Site: 101 [Intersection 2 - Emerald End Rd and Hastie Rd (2033) (Site Folder: Future Case (With) 2033 - PM Peak)]

New Site
 Site Category: (None)
 Give-Way (Two-Way)

	Approaches			Intersection
	East	North	West	
LOS	NA	A	NA	NA



Colour code based on Level of Service



Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
 NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
 Delay Model: SIDRA Standard (Geometric Delay is included).

QUEUE STORAGE RATIO (PERCENTILE)

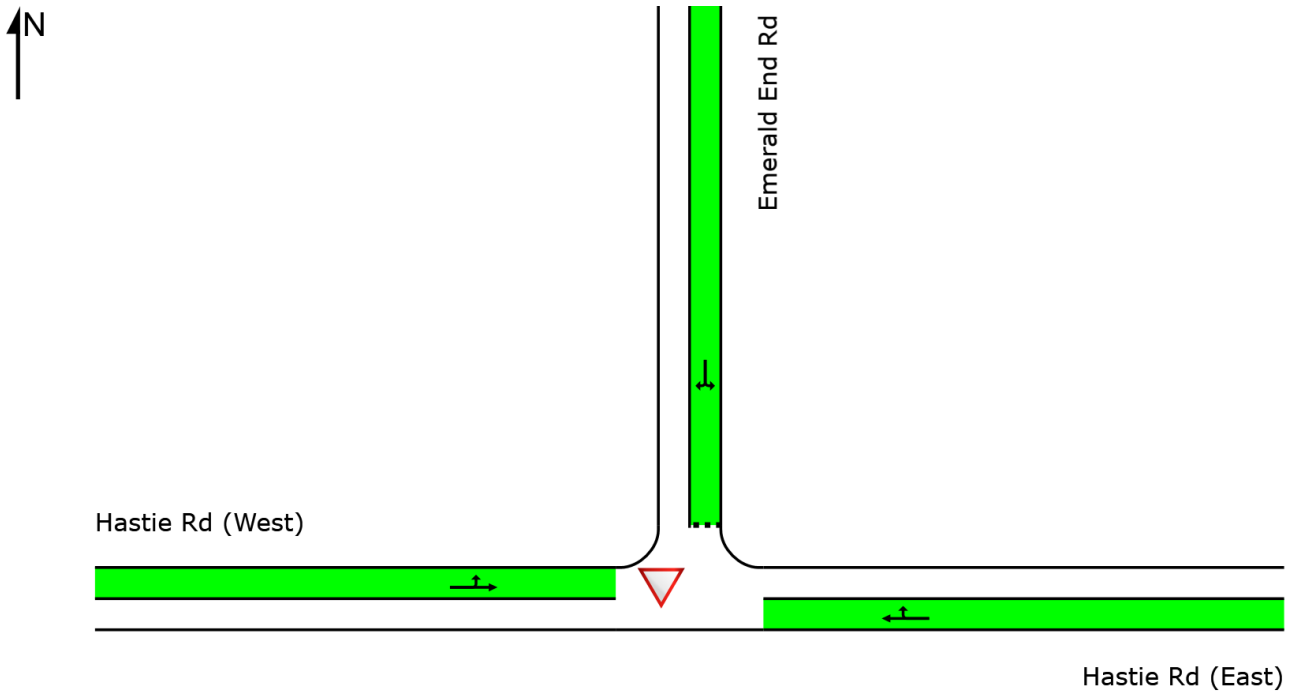
Ratio of the 95% Back of Queue Distance to the available queue storage distance per lane

▽ Site: 101 [Intersection 2 - Emerald End Rd and Hastie Rd (2033) (Site Folder: Future Case (With) 2033 - PM Peak)]

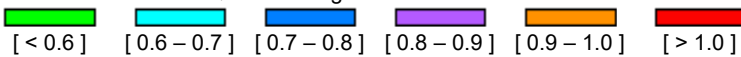
New Site
 Site Category: (None)
 Give-Way (Two-Way)

	Approaches			Intersection
	East	North	West	
Queue Storage Ratio (%ile)	0.00	0.00	0.00	0.00

Short Lanes not included in determining Approach Queue Storage Ratios.



Colour code based on Queue Storage Ratio



Queue Model: SIDRA Standard.

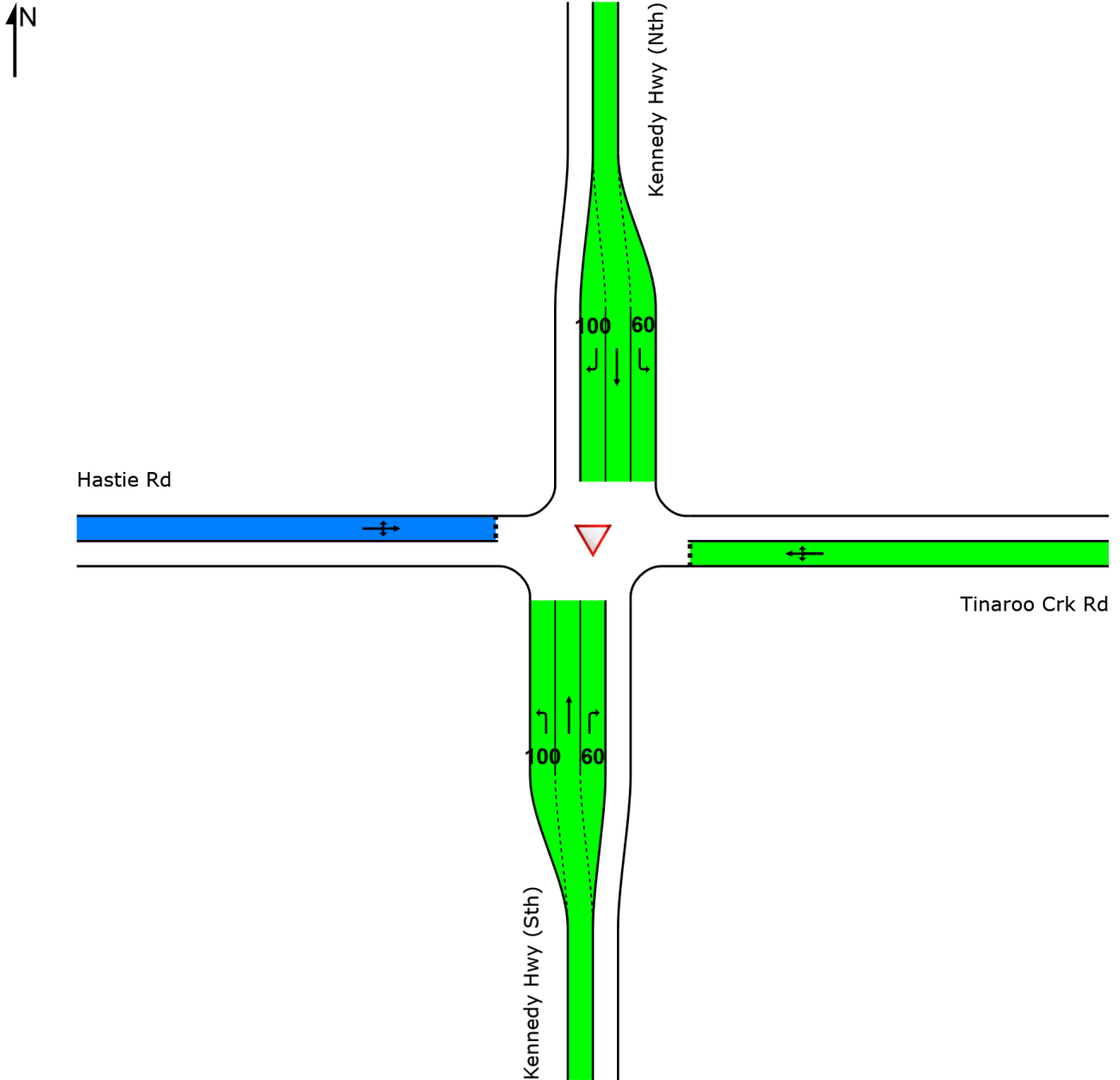
DEGREE OF SATURATION

Ratio of Demand Volume to Capacity, v/c ratio per lane

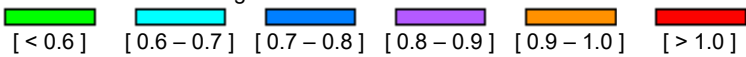
▽ Site: 101 [Intersection 3 - Kennedy Hwy and Hastie Rd (2033)]
 (Site Folder: Future Case (With) 2033 - PM Peak)

New Site
 Site Category: (None)
 Give-Way (Two-Way)

	Approaches				Intersection
	South	East	North	West	
Degree of Saturation	0.21	0.27	0.21	0.76	0.76



Colour code based on Degree of Saturation



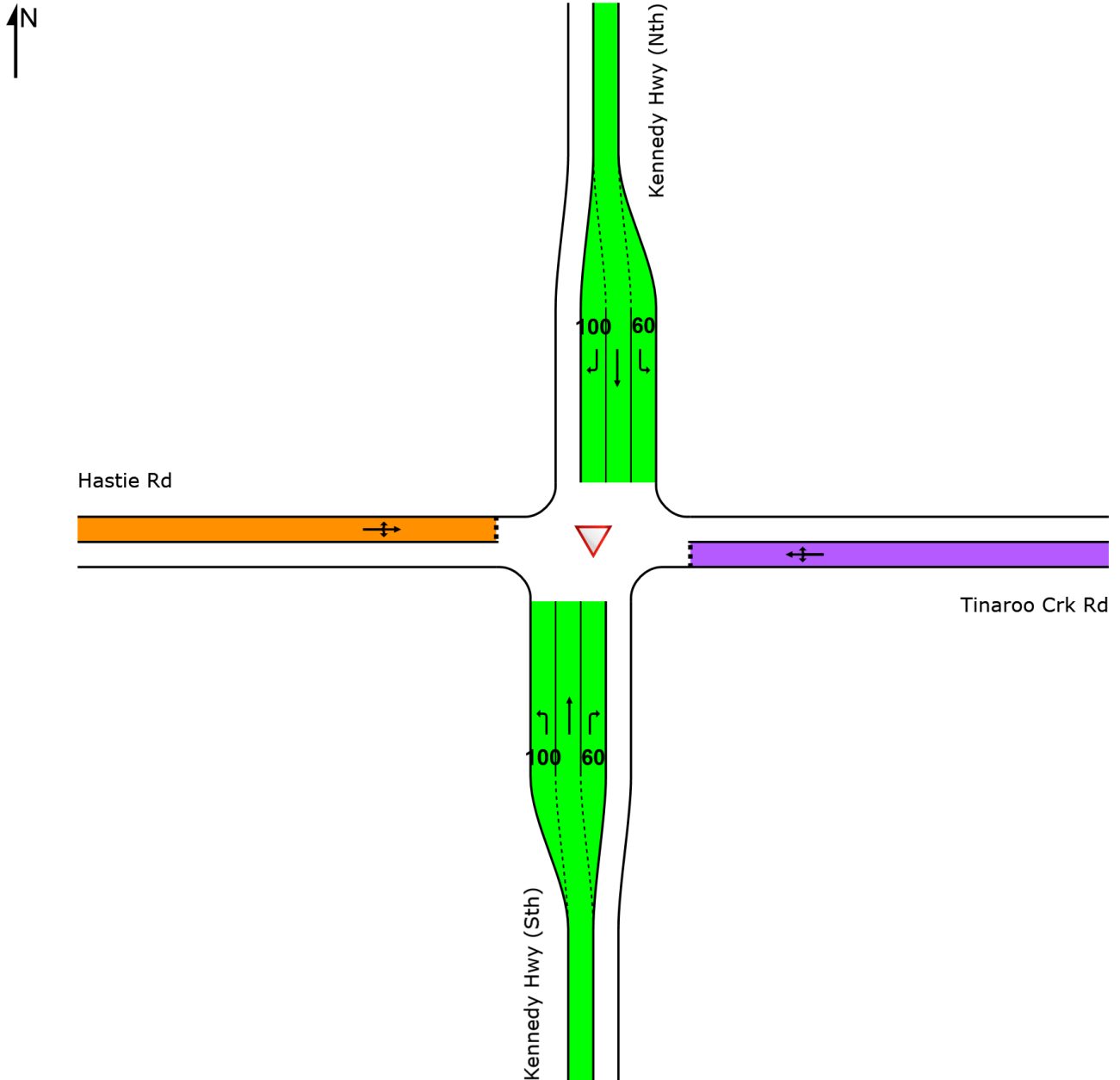
LEVEL OF SERVICE

Lane Level of Service

▽ Site: 101 [Intersection 3 - Kennedy Hwy and Hastie Rd (2033)]
 (Site Folder: Future Case (With) 2033 - PM Peak)

New Site
 Site Category: (None)
 Give-Way (Two-Way)

	Approaches				Intersection
	South	East	North	West	
LOS	NA	D	NA	E	NA



Colour code based on Level of Service



Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Delay Model: SIDRA Standard (Geometric Delay is included).

QUEUE STORAGE RATIO (PERCENTILE)

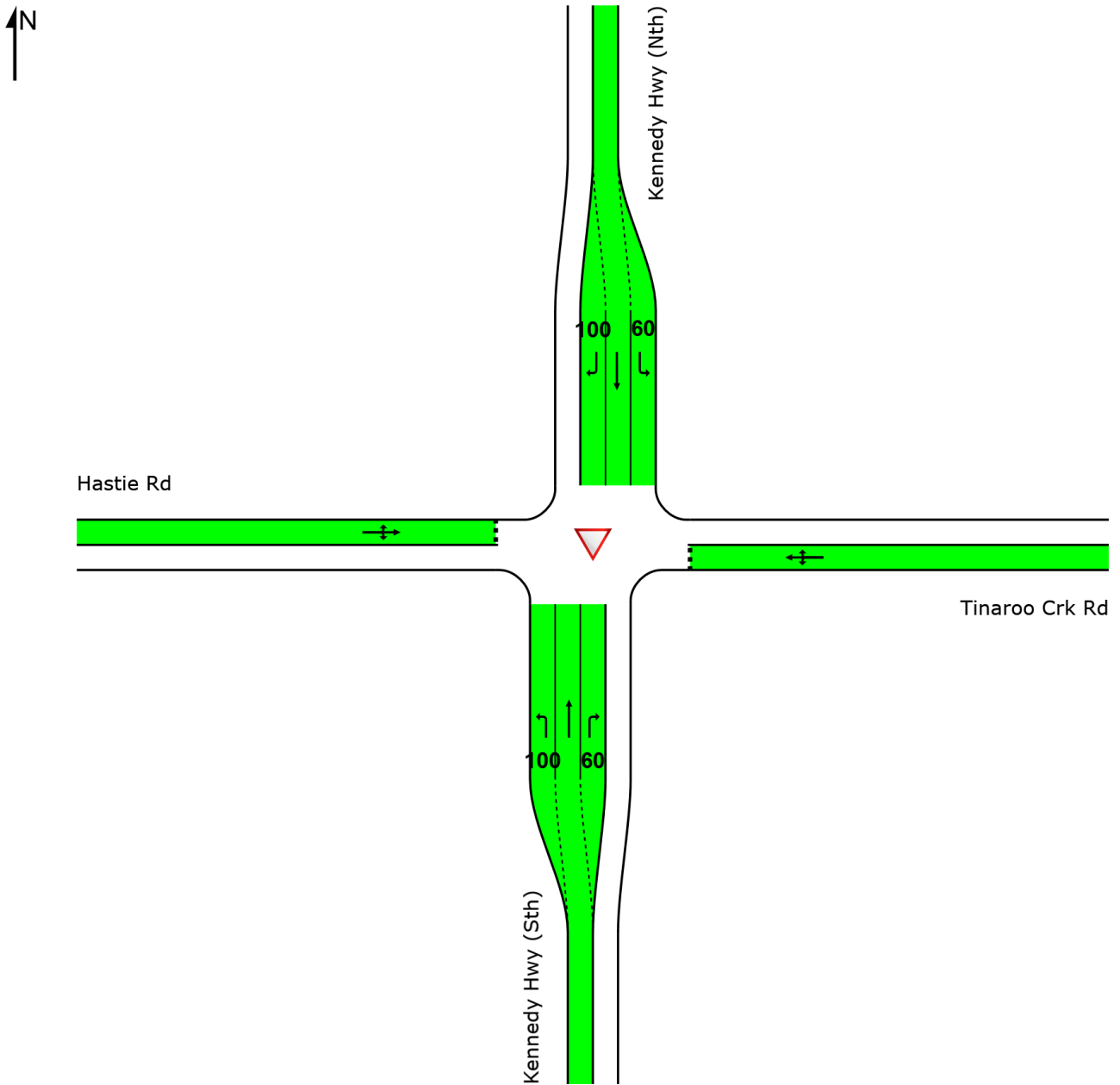
Ratio of the 95% Back of Queue Distance to the available queue storage distance per lane

▽ Site: 101 [Intersection 3 - Kennedy Hwy and Hastie Rd (2033)]
 (Site Folder: Future Case (With) 2033 - PM Peak)

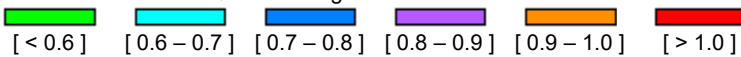
New Site
 Site Category: (None)
 Give-Way (Two-Way)

	Approaches				Intersection
	South	East	North	West	
Queue Storage Ratio (%ile)	0.00	0.01	0.00	0.07	0.07

Short Lanes not included in determining Approach Queue Storage Ratios.



Colour code based on Queue Storage Ratio



Queue Model: SIDRA Standard.



ghd.com

→ **The Power of Commitment**

James McPeake

From: Sue Lockwood <Sue.Lockwood@dildilgp.qld.gov.au>
Sent: Friday, 29 April 2022 4:09 PM
To: James McPeake
Cc: Andrew Collins
Subject: 2110-25236 SRA RAL (1 lot into 49 lots) 85 Godfrey Rd, Mareeba, Lot 219 on NR378
Attachments: Remnant Vegetation Retention and Open Space Areas.pdf

Follow Up Flag: Follow up
Flag Status: Flagged

Good afternoon James,

2110-25236 SRA RAL (1 lot into 49 lots) 85 Godfrey Rd, Mareeba, Lot 219 on NR378

Please find the meeting dot points (held 21 April 2022, 10am) below. My apologies for the delay in getting these to you.

Attendees:

James McPeake - McPeake Town Planning

Andre de Wit - Yellow Bridge Alliances

Andrew Collins – Department of Resources

Sue Lockwood – Department of State Development, Infrastructure, Local Government and Planning

- James requested this meeting to discuss an updated concept plan (attached) in response to the information request (issued by SARA on 29 October 2021).
- As a result of Mareeba Shire Council's (council) RFI James engaged GHD to provide a traffic impact report. Access is now proposed from the south west of Godfrey Road and the water mains are proposed within the road reserve.
- The proposed open space areas (in the updated concept plan) proposed to increase vegetation protection to 38 hectares (previously 18 hectares).
- Council have concerns about the open space reserves (they do not wish to maintain them).
- Therefore (for discussion in this meeting) James proposed environmental covenants over the open space areas.
- The State (Resources) have moved away from covenants. These are now only used in limited circumstances. Covenants are a lengthy process and it is not the States intention to lock up areas forever as planning needs change over time.
- There are potentially two ways to condition the development by way of a vegetation management plan (VMP) previously referred to as a technical agency response plan (TARP) or referral agency response plan (RARP):
 - Where clearing can occur (depicted as Area A), or
 - Where clearing cannot occur (depicted as Area B) and/or where particular built infrastructure cannot be constructed (Area C). This avoided if possible.
 - A VMP may include all of the above.
- Or
 - We can condition to a plan in accordance with an approved mapping standard (refer to the DA forms guide: Relevant plans on the Queensland Government planning website: <https://dsdmipprd.blob.core.windows.net/general/DAFormsguide-Relevantplans.pdf>)
- ACTIONS:

- James - Identify where clearing would need to occur (for the developer) i.e., services, fire management lines, roads, etc.
- If you are going to sell the blocks vegetated, future clearing will be up to the new landowner.
- Keep in mind that the technical assessment is calculated on clearing that can occur as a result of a reconfiguring a lot, even if there is no clearing proposed as part of the development application. Refer to the Glossary of terms in State code 16: Native vegetation clearing of the State Development Assessment Provisions: <https://planning.statedevelopment.qld.gov.au/planning-framework/state-assessment-and-referral-agency/state-development-assessment-provisions-sdap>
- Provide shape files to SARA – this will enable Resources to condition a VMP appropriately.

With kind regards,



Sue Lockwood

Senior Planning Officer
Planning and Development Services
Department of State Development, Infrastructure,
Local Government and Planning

Microsoft teams – [meet now](#)

P 4037 3222
Ground Floor, Ports North Building, Cnr Grafton &
Hartley Streets, Cairns QLD 4870
PO Box 2358, Cairns QLD 4870
<https://planning.statedevelopment.qld.gov.au/>



*I acknowledge the traditional custodians of the lands and waters of Queensland.
I offer my respect to elders past, present and emerging as we work towards a just,
equitable and reconciled Australia.*



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James McPeake

From: Carl Ewin <CarlE@msc.qld.gov.au>
Sent: Tuesday, 5 April 2022 9:36 AM
To: Andre de Wit (Yellow Bridge Alliances)
Cc: James McPeake; wallacequarrying@activ8.net.au; Sam Wakeford; Brian Millard
Subject: RE: Emerald Creek Heights - Amended Layout v2
Attachments: Open Space Footprint Rev 2.pdf

Andre,

Just a heads up for discussion this afternoon.

A significant concern we have with the revised lot layout is the open space network. I believe we clearly articulated our desire for these areas to be included within the 48/49 individual lots themselves and covered by drainage easements (potentially environmental covenants if the intention is to retain the vegetation).

Our desire is that these areas (except for the Emerald Creek Riparian area – discussed below) should fall under the ownership of individual landowners and not become Reserves for Council to maintain, which to be completely honest would be a logistical and financial nightmare for Council. We certainly don't want to be responding to requests from individual landowners to maintain (mow, fix erosion, remove hazardous vegetation etc.) these areas of open space.

The requirement to provide 10% of the site as open space is generally satisfied by paying a parks contribution in lieu and not providing the space (which has been Council's preference for a long time, particularly with these outlying rural residential estates.

For the benefit of Estate residents, Council does see merit in maintain "Open Space 6" which will provide residents with lawful access to a riparian section of Emerald Creek.

We'll see you this afternoon to discuss further.

Regards,

Carl Ewin
Planning Officer



Phone: 1300 308 461 | **Direct:** 07 4086 4656 | **Fax:** 07 4092 3323
Email: carle@msc.qld.gov.au | **Website:** www.msc.qld.gov.au
65 Rankin St, Mareeba | PO Box 154, Mareeba, Queensland, Australia, 4880

From: Andre de Wit (Yellow Bridge Alliances) <adewit@yellowbridge.com.au>
Sent: Tuesday, 5 April 2022 8:54 AM
To: Carl Ewin <CarlE@msc.qld.gov.au>
Cc: 'James McPeake' <james@jamesmcpoke.com.au>; wallacequarrying@activ8.net.au
Subject: RE: Emerald Creek Heights - Amended Layout v2

Good morning Carl.

For discussion at our meeting today, please see attached the document called "Open Space Footprint Rev 2" which shows the proposed revised lot configuration. This configuration is in draft and to be finalised by our surveyor. I have

also attached the original configuration called “Stage layout plan – 401302 ST-01 Rev B”. The lots were mainly reduced to be in a position to retain 30% of the overall lot’s remnant vegetation as I believe this is a requirement under the code. As a result, the lots were reduced and the areas added to proposed open space or non-clearing areas.

There will likely be some further finetuning for instance Lots 4, 5, 6, 7 and 8 and make then all approximate the same sizes. The same applies to Lots 1, 2 and 3 and Lots 19, 20, 21, 22, 23, 24 and 25. The Lots that were changed in size are shown in the attached spreadsheet with their amended size. As could be noted, the original sizes were 2 hectares and more where the lots that were amended holds sizes of 1 hectare and more.

If you have any questions, please let me know.

Regards

Andre de Wit | Yellow Bridge Alliances | ACN 155 612 310 | ABN 78 792 431 643

Director - FIEAust CPEng EngExec RPEQ NER APEC Engineer IntET(Aus)

Mob: 0428 400 530

Email: adewit@yellowbridge.com.au

Address: 53-55 James Cook Dr, Kewarra Beach, Qld, 4879





29 September 2021

Council Officer: Carl Ewin
Direct Telephone: (07) 4086 4656
Our Reference: RAL/21/0016

Emerald Creek Heights Pty Ltd
C/- McPeake Town Planning
PO Box 5829
CAIRNS QLD 4870

Dear Applicants,

Confirmation Notice

Planning Act 2016

Council acknowledges receipt of your application, which was properly made on 16 September 2021.

This Confirmation Notice has been prepared in accordance with the Development Assessment Rules and contains information relevant to the processing and assessment of the application. The following details are confirmed:

APPLICATION DETAILS

Application No:	RAL/21/0016
Proposal:	Application for Development Permit for Reconfiguring a Lot - Subdivision (1 into 49 Lots)
Street Address:	Godfrey Road, Mareeba
Real Property Description:	Lot 219 on NR378
Planning Scheme:	Mareeba Shire Council Planning Scheme 2016

TYPE OF DEVELOPMENT

The application seeks development approval for:

- Reconfiguring a Lot - Subdivision (1 into 49 Lots)

SUPERSEDED PLANNING SCHEME

Is the application for development under the Superseded Planning Scheme? No

CODE ASSESSMENT

Will Code Assessment be required? Yes

The application will be assessed against the following assessment benchmarks:

- Rural residential zone code
- Agricultural land overlay code
- Airport environs overlay code
- Bushfire hazard overlay code
- Environmental significance overlay code
- Flood hazard overlay code
- Hill and slope overlay code
- Reconfiguring a lot code
- Landscaping code
- Parking and access code
- Works, services and infrastructure code

IMPACT ASSESSMENT

Will Impact Assessment be required? No

PUBLIC NOTIFICATION DETAILS

Is Public Notification Required? No

REFERRAL AGENCIES

Based on the information accompanying the lodged application, referral is required to the following referral agencies -

Reconfiguring a lot that is assessable development under s21		
<p>Development application for reconfiguring a lot that is assessable development under section 21, if—</p> <p>(a) a lot that the application relates to is 5ha or larger; and</p> <p>(b) the size of any lot created is 25ha or less; and</p> <p>(b) either —</p> <p>(i) the reconfiguration involves operational work that is assessable development under section 5, other than operational work that is only the clearing of regulated regrowth vegetation; or</p> <p>(ii) on any lot created, accepted operational work, other than operational work that is only the clearing of regulated regrowth vegetation, may be carried out</p>	<p>Schedule 10, Part 3, Division 4, Table 2</p>	<p>State Assessment & Referral Agency (SARA) PO Box 2358 Cairns QLD 4870</p> <p>CairnsSARA@dndmip.qld.gov.au</p>

In accordance with section 54(1) of the Planning Act, the applicant is required to give a copy of the application to all referral agencies within 10 days, or a further period as agreed between the applicant and the assessment manager, starting the day after the confirmation notice is issued.

INFORMATION REQUEST

Has the applicant advised on the approved form that the applicant does not agree to accept an Information Request? No

A further Information Request is made by the assessment manager, as detailed below:

1. Water Infrastructure

Please provide an engineering report, prepared by a Registered Professional Engineer of Queensland (RPEQ), demonstrating how the development is proposed to be serviced by Council's reticulated water supply infrastructure. In particular, the report should investigate the anticipated water supply demand generated by the development and investigate the proposed points of connection with Council's existing water supply network/s, ensuring this existing infrastructure is at a capacity capable of servicing the proposed development.

If any upgrades to Council's existing network are required to service the development, these should be clearly identified in the engineering report.

2. Bushfire Hazard

The subject site contains land within both the medium potential bushfire intensity area and potential impact buffer (100 metres). In recent years, land in proximity to the subject site has been affected by bushfire.

*Please provide a detailed Bushfire Management Plan, prepared by a suitably qualified professional demonstrating compliance with **PO3** and **AO3.2** of the Bushfire hazard overlay code. The Bushfire Management Plan should address, in particular, whether the building envelopes included on the proposal plans are large enough and whether they will need to be fully cleared in order to comply with AO3.2.*

3. Traffic Impact Assessment

Please provide a Traffic Impact Assessment, prepared by a Registered Professional Engineer of Queensland (RPEQ) investigating the existing road network proposed to service the development, in particular the intersection of Godfrey Road and the Kennedy Highway.

The Traffic Impact Assessment should calculate the daily vehicle movements likely to occur at the intersection as a result of the development, inclusive of pre-development vehicle movements, and the ability for the intersection in its current form to safely accommodate these anticipated vehicle movements.

The Traffic Impact Assessment should identify any required or recommended upgrades to the intersection where applicable and include plans of any such upgrades.

End of Information Request

In responding to the Information Request, *Development Assessment Rule 13* states: -

"13. Applicants Response

- 13.1 *The period for the applicant to respond to an information request is 3 months from the date the information request was made or a further period agreed between the applicant and the assessing authority that made the information request.*
- 13.2 *The applicant may respond by giving the assessing authority that made the information request, within the period stated under section 13.1 -*
- (a) all of the information requested; or*
 - (b) part of the information requested; or*
 - (c) a notice that none of the information will be provided.*
- 13.3 *For any response given in accordance with sections 13.2(b) or (c), the applicant may also advise the assessing authority that it must proceed with its assessment of the application.*
- 13.4 *An applicant must provide a copy of any response to an information request made by a referral agency to the assessment manager."*

PROJECT TEAM

The contact details of the project team for your application are provided below. Your primary point of contact for any general enquires regarding this application is the project manager.

Project Manager (Planning)

Carl Ewin

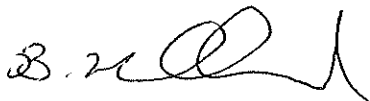
(07) 4086 4656

OTHER DETAILS

You can follow the progress of this application online at www.msc.qld.gov.au

Should you have any further queries in relation to the above, please do not hesitate to contact Council's Planning Officer, Carl Ewin on the above number.

Yours faithfully



**BRIAN MILLARD
SENIOR PLANNER**