APPENDIX B

Traffic Impact Assessment dated 8 March 2024

Premise

MAIDMENT GROUP

Harris Crossing Development

TRAFFIC IMPACT ASSESSMENT

Report No: P000463/R01
Rev: A
8 March 2024

DOCUMENT AUTHORISATION					
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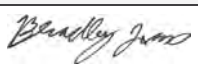
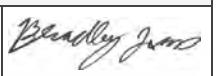
Karyn Twohill		Bradley Jones		Bradley Jones	

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EXECUTIVE SUMMARY

Premise Australia Pty Ltd (Premise) has been engaged by Maidment Land Pty Ltd (Maidment Group) to undertake an updated Traffic Impact Assessment (TIA) for the Harris Crossing residential estate in Bohle Plains, Queensland, in the municipality of Townsville City Council (TCC).

This TIA accompanies the development application submission to TCC and the Department of Transport and Main Roads (TMR) for proposed introduction of a Land Lease Community (LLC) in Harris Crossing. With the LLC, the proposed development comprises 592 low density residential lots, a childcare for 130 children, and 280 residential land lease dwellings. Development is estimated to be completed in 2030 (opening year).

A road safety risk assessment was also completed utilising TMR crash data for the study area for the last 16 years. The increase in risk score resulting from the proposed development can be mitigated by the implementation of full control of right turn movements at signalised intersections.

A road environment safety assessment also found that a road safety audit was not required for the study area. However, a road safety assessment is required and can be conducted by an accredited road safety auditor or a Registered Professional Engineer of Queensland (RPEQ).

The traffic generated by the proposed development in the design year 2040 was assessed for the existing intersection at Hervey Range Road and Hogarth Drive. It was found that the intersection performed adequately in terms of Degree of Saturation, Level of Service and lane blockage probability. Therefore any additional access points to the state-controlled network or changes or upgrades to the existing signalised intersection upgrades are not required.

1. INTRODUCTION

Premise Australia Pty Ltd (Premise) has been engaged by Maidment Land Pty Ltd (Maidment) to undertake an updated Traffic Impact Assessment (TIA) for the Harris Crossing residential estate located in Bohle Plains, Queensland, in the municipality of Townsville City Council (TCC).

This TIA accompanies Maidment's development application submission to TCC and the Department of Transport and Main Roads (TMR) for proposed changes to the internal layout of the Harris Crossing residential estate.

The TIA is to be completed in accordance with TMR's *Guide to Traffic Impact Assessment* (GTIA) and Townsville City Plan SC6.4.5.2 *Traffic Impact Assessment*.

1.1 Background

The Harris Crossing residential estate is a master planned subdivision. It is located off Hervey Range Road in Bohle Plains, Townsville, accessible at the intersection with Hogarth Drive. Harris Crossing has also been previously referred to as 'Harris, Hogarth and Goffage Land' and 'Harris and Hogarth Land'.

Originally vacant land, approval was gained through a combined Material Change of Use and Reconfiguring a Lot development application in a process involving the legacy Queensland Government Department of Main Roads and TCC. This process commenced in 2009 and Maidment Group has progressively planned and developed the site through staged releases of residential lots. Construction of some residential lots in addition to the Eden Academy childcare centre in the site's south has already been completed.

Premise, under its legacy company UDP, delivered the *Harris and Hogarth Land Traffic Operation Assessment* (PLD0200/R01revA) in 2015 as part of initial master planning for a residential estate. An updated TIA is required due to the changes to Harris Crossing's yield and internal layout associated with a proposed Land Lease Community (LLC).

This TIA has adopted 592 low-density residential lots, a childcare centre for 130 children, and 280 residential dwellings in the LLC for analysis. The proposed development layout is provided in Appendix A.

This TIA relies upon prior analyses and findings from the following traffic reports and resources.

- Institute of Transport Engineers (ITE) *Trip Generation Manual* 9th Edition 2012.
- New South Wales Roads and Traffic Authority (RTA) *Guide to Traffic Generating Developments*, 2002
- Queensland Government 2012-2022 Traffic Census data.
- Queensland Government TMR STREAMS data.
- Townsville Aimsun Integrated Model (TAIM), 2023.
- Transport for New South Wales Roads and Maritime Services (RMS) *Guide to Traffic Generating Developments Updated traffic surveys* 2013.
- UDP *Harris and Hogarth Land Traffic Operation Assessment* (PLD0200/R01revA), 2015.

1.2 Scope and Study Area

Figure 1 shows the Harris Crossing residential estate and the surrounding road network. The proposed development in its entirety comprises 592 residential lots, a childcare centre for 130 children and the proposed LLC with 280 residential dwellings. The final stage of development is expected to be completed in 2030 (the 'opening year').

Figure 1 – Impact Assessment Area (Queensland Globe)

1.3 Level of Assessment

In accordance with Townsville City Plan Clause SC6.4.5.7 Attachment A, the site is located in an urban area. Therefore, to determine the level of assessment, Townsville City Plan Table SC6.4.5.2 'Urban Area TIA Impact Level Assessment Criteria' has been utilised; the table is included in this report as Table 1.

- **Trip Generation**. The traffic generation for the proposed development is outlined in Section 4.1 of this TIA. More than 300 additional trips are generated during peak hour, therefore the impact assessment is HIGH.
- **Commercial vehicles**. It is assumed that the main commercial vehicle accessing the internal road network for Harris Crossing will be refuse collection vehicles. With the assumption that refuse collection occurs three times a fortnight (general waste weekly, and recycling fortnightly) and travels on the same street twice (to service both sides), this would amount to a maximum of six (6) commercial vehicles a fortnight. As fewer than five (5) additional commercial vehicles are generated per day in the residential area, the impact assessment is LOW.
- **Car parking**. The development will result in an increase of more than 10 onsite car park spaces; the impact assessment is MODERATE.
- **Public transport**. There are no proposed impacts to any public transport systems; the impact assessment is LOW.

- **Transport system**. An internal road network will be constructed as a part of the Harris Crossing development. Therefore, changes to the connectivity between local streets and collector roads are proposed. The impact assessment is MODERATE.

Utilising the criteria of the Townsville City Plan provided in Table 1, it is determined that a HIGH level traffic impact assessment is suitable for this development proposal.

Table 1 – Townsville City Plan Table SC6.4.5.2 'Urban Area TIA Impact Level Assessment Criteria'

Criteria	Impact		
	Low	Moderate	High
Trip Generation	New or additional trip generation in a peak hour of <20 trips directly accessing a street.	New or additional trip generation in a peak hour of 20 to 300 trips directly accessing a street. New or additional trip generation to a major collector, sub -arterial, arterial, or highway.	New or additional trip generation in a peak hour of more than 300 trips directly accessing a road system.
Commercial Vehicles	5 or less new or additional commercial vehicles per day in a residential area. Less than 10 new or additional commercial vehicles per day in a non-residential area.	More than 5 and up to 300 new or additional commercial vehicles per day in a residential area. More than 10 and up to 300 new or additional commercial vehicles per day in a non-residential area.	More than 300 new or additional commercial vehicles per day.
Car Parking	Increase or decrease of 9 or less on-site car park spaces. Loss of 2 or less line marked on-street carparks or loading zones.	Increase or decrease of 10 or more onsite car park spaces. Loss of between 3 or more line-marked on street carparks or loading zones.	
Public Transport	Relocation of any bus zone or taxi rank.	Impacts on the bus interchange or bus routes.	
Transport System	No change to existing transport network operation.	Changes to the connectivity between local streets and collector roads.	Changes to the connectivity between arterial and sub-arterial roads.

2. EXISTING CONDITIONS

2.1 Land Use and Zoning

The subject site is largely zoned as an 'Emerging Community' under the Townsville City Plan. As per the City Plan clause 6.7.1.2, this zone code is assigned to non-urban land that has been identified to be suitable for urban development. In accordance with Zoning Maps 0032 and 0039 of the Townsville City Plan, the east of the site adjacent to the Bohle River is zoned as 'Recreation and Open Space'. Figure 2 shows the land uses and zoning of the development site.

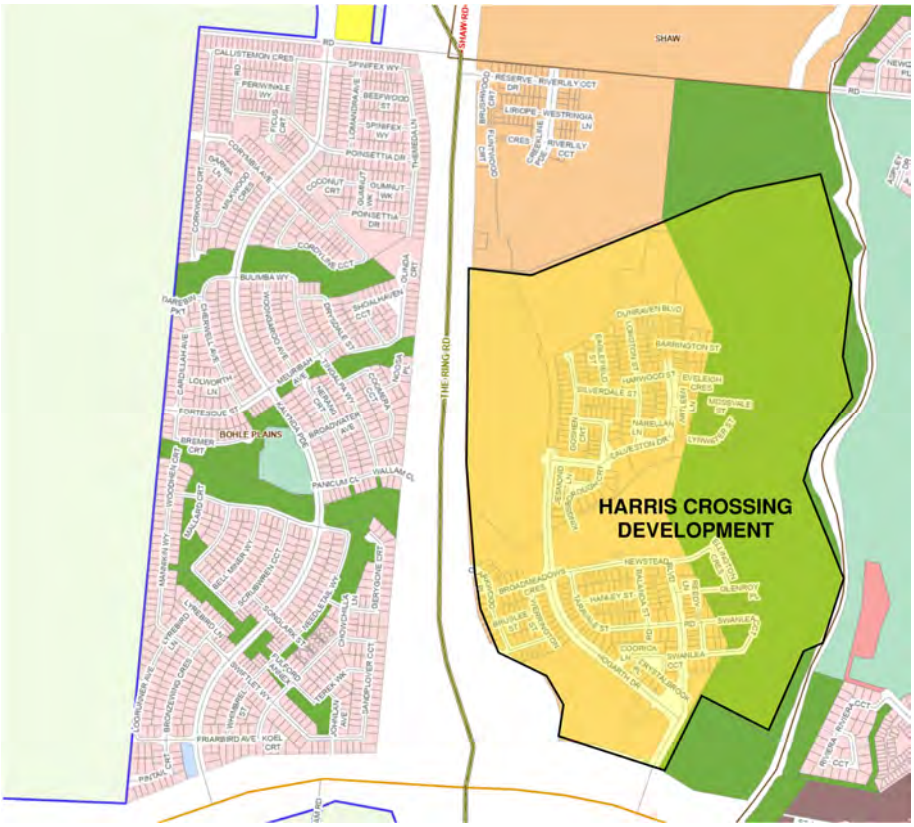

Figure 2 – Land use and zoning (Townsville City Council)

Figure 3 shows that currently the south and central area of the site is occupied by completed low-density residential dwellings. The Eden Academy operates as a childcare centre with capacity for 130 children in the site's south (refer to TCC development applications RAL21/0035 and MCU21/0057). A watercourse transects the site east-west and is immediately surrounded by open parkland. In addition to this, some of the Recreation and Open Space in the site's east is utilised as open parkland and a disc-golf course.

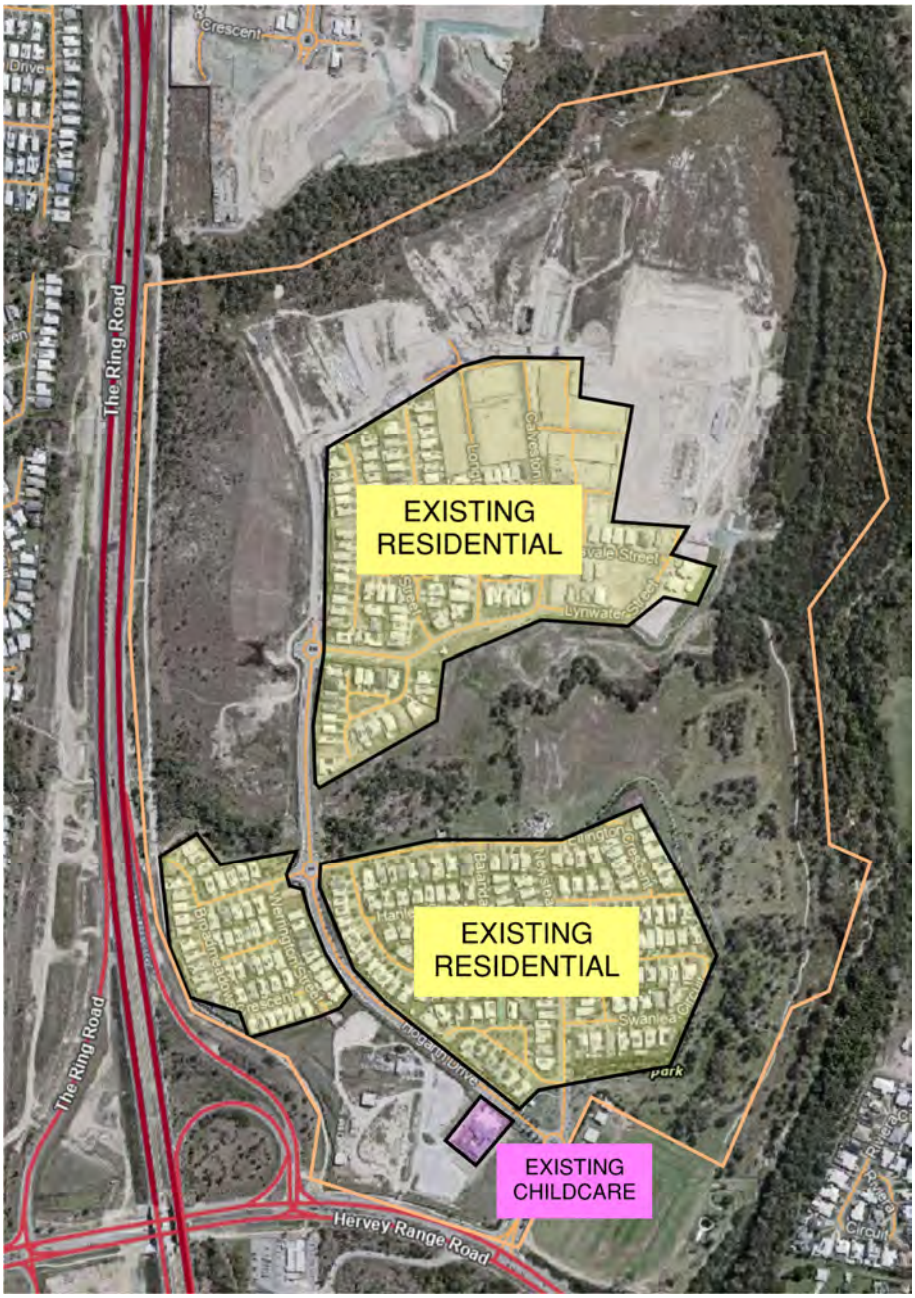

Figure 3 – Current site land use (Queensland Globe)

2.2 Adjacent Land Uses/Approvals

The surrounding land uses and zoning to the subject site is shown in Figure 2. Harris Crossing is bordered by the Bohle River to its east. To the west of the site is the road parcel for The Ring Road/Bruce Highway, with the Kalynda Chase low-density residential development further west. To the south of the site is the road parcel for the state-controlled Hervey Range Road. The north of Harris Crossing is bound by Three Mile Creek, with another residential development across the Creek, also zoned as an Emerging Community.

2.3 Surrounding Road Network Details

The subject site is in vicinity of TMR state-controlled roads and local government roads under the jurisdiction of TCC. The surrounding road network is shown by Figure 4.

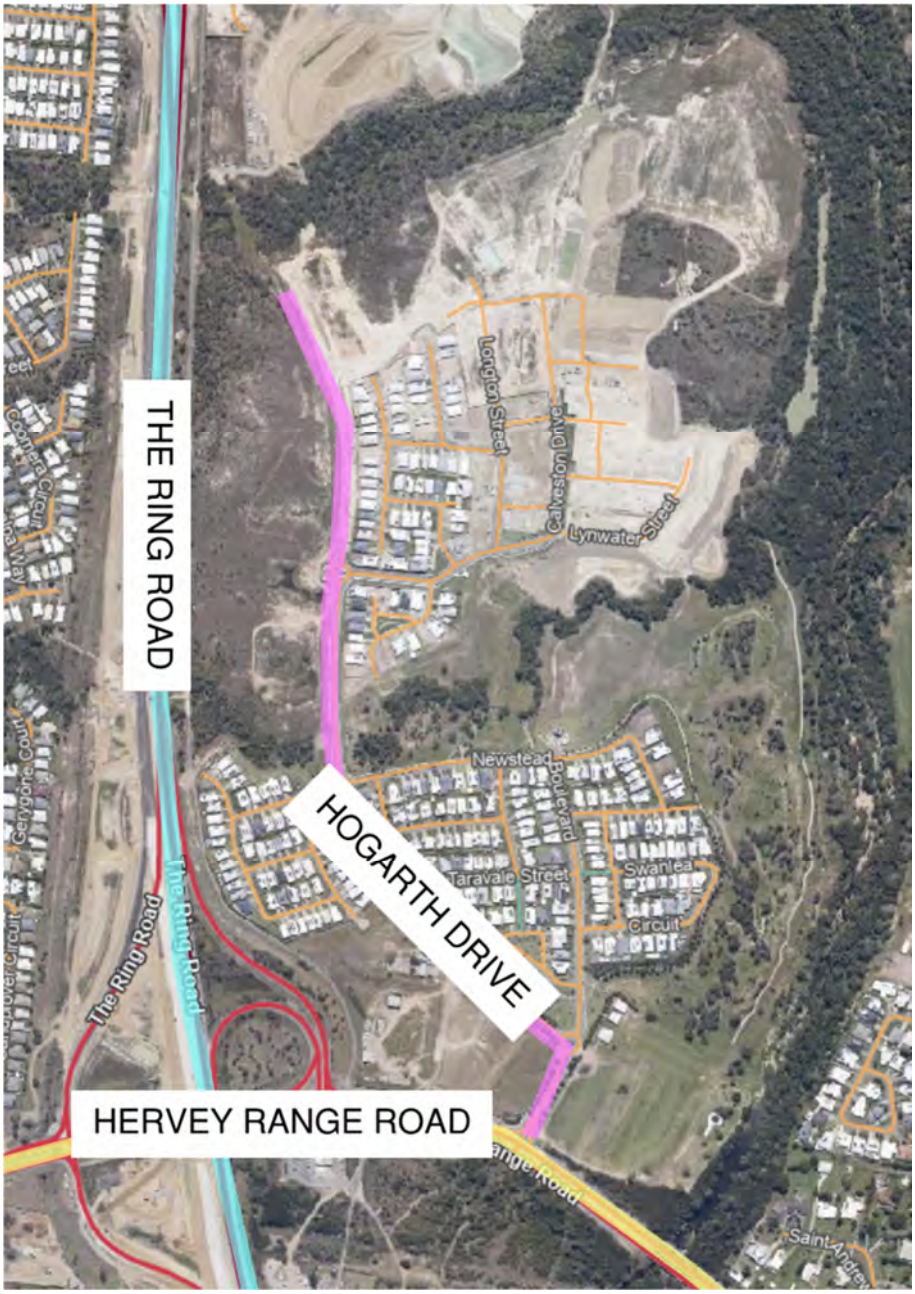

Figure 4 – Road Hierarchy Figure

2.3.1 ROADS

Roads applicable to this assessment include:

- **Hogarth Drive**. Hogarth Drive is an existing road that provides connectivity in Harris Crossing. Under the Townsville City Plan SC6.4.5.1 *Townsville Road Hierarchy*, Hogarth Drive is classified as a Type B Major Collector road. The sign posted speed limit is 60km/h.

- **Hervey Range Road**. Hervey Range Road is designated Queensland's State Route 72 (gazetted for Townsville to Battery) and approved for use by B-doubles up to 30m in length (PBS2B vehicles). In vicinity of the study area, Hervey Range Road is a sealed four-lane two-way road (two (2) lanes in each direction) with auxiliary lanes for turn movements. The sign posted speed limit in the vicinity of the study area is 70km/h.
- **The Ring Road**. The Ring Road is part of the A1 Bruce Highway constructed to bypass the inner metro area of Townsville. It is built to motorway standard. Bicycles are not permitted on The Ring Road which is an approved type 1 road train route (PBS3A vehicles). In the study area, The Ring Road intersects with Hervey Range Road allowing oncoming traffic and offloading traffic at the Ring Road and Hervey Range Road interchange.

Figure 5 to Figure 7 show the typical cross sections of the roads.

Figure 5 – Hogarth Drive Typical Cross Section (Google Maps)

Figure 6 – Hervey Range Road Typical Cross Section (Google Maps)

Figure 7 – The Ring Road Typical Cross Section (at Little Bohle River Bridge, Google Maps)

2.3.2 INTERSECTIONS

The intersection relevant to this assessment is the Hervey Range Road and Hogarth Drive intersection. It is a signalised T-intersection, with high angle left turn treatments. The intersection is shown in Figure 8 and Figure 9.

Figure 8 – Hervey Range Road and Hogarth Drive Intersection (Google Maps)

Figure 9 – Hervey Range Road and Hogarth Drive Intersection Aerial (Queensland Globe)

2.4 Traffic Volumes

2.4.1 QUEENSLAND GOVERNMENT TRAFFIC CENSUS DATA

Traffic census data for Queensland state-declared roads 2012-2022 was reviewed for Hervey Range Road at the site 400m east of Golf Links Drive (1.4km east of Hogarth Drive). A growth factor analysis was conducted for both directions of travel over the available census data years by applying an exponential trend line.

It was found that for both directions of travel traffic volumes increase over time, with a notable increase occurring between 2021 and 2022. This may be attributed to roadworks occurring on The Ring Road in 2022, causing traffic to be diverted to Hervey Range Road.

The average annual increase was observed to be a factor of 0.0192. Therefore, a conservative 2% growth factor per annum was adopted for the intersection.

2.4.2 TOWNSVILLE AIMSUN INTEGRATED MODEL

Annual Average Daily Traffic (AADT) volumes and annual average peak hour traffic volumes from 2023 were obtained from the Townsville Aimsun Integrated Model (TAIM) for the Hervey Range Road and Hogarth Drive intersection. Figure 10, Figure 11 and Figure 12 provide a visual summary of the AM peak hour, PM peak hour and daily average traffic volumes.

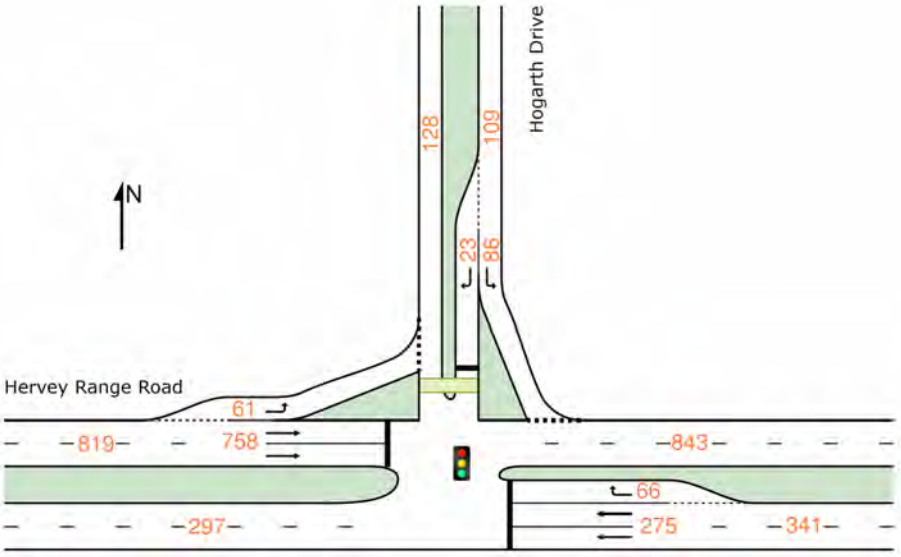

Figure 10 – Hervey Range Road and Hogarth Drive Intersection TAIM Average AM Peak Traffic Volumes 2023

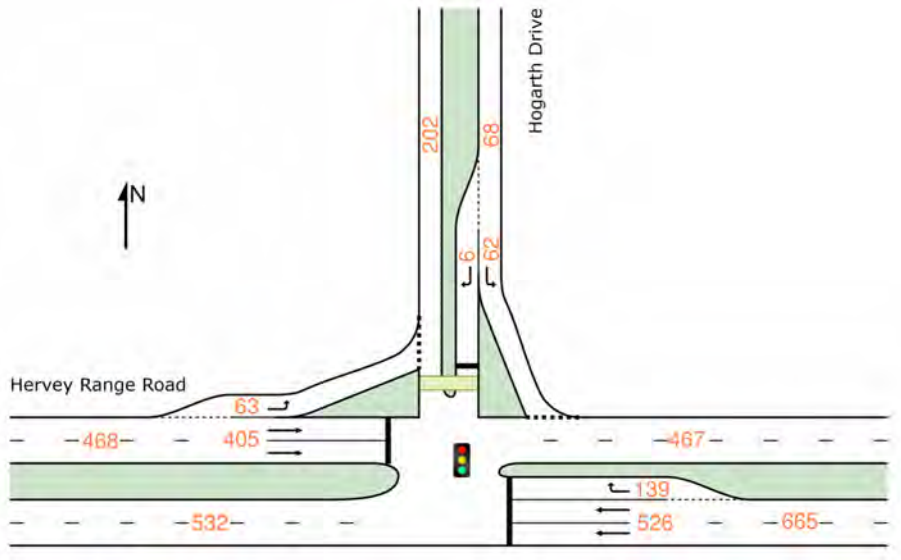

Figure 11 – Hervey Range Road and Hogarth Drive Intersection TAIM Average PM Peak Traffic Volumes 2023

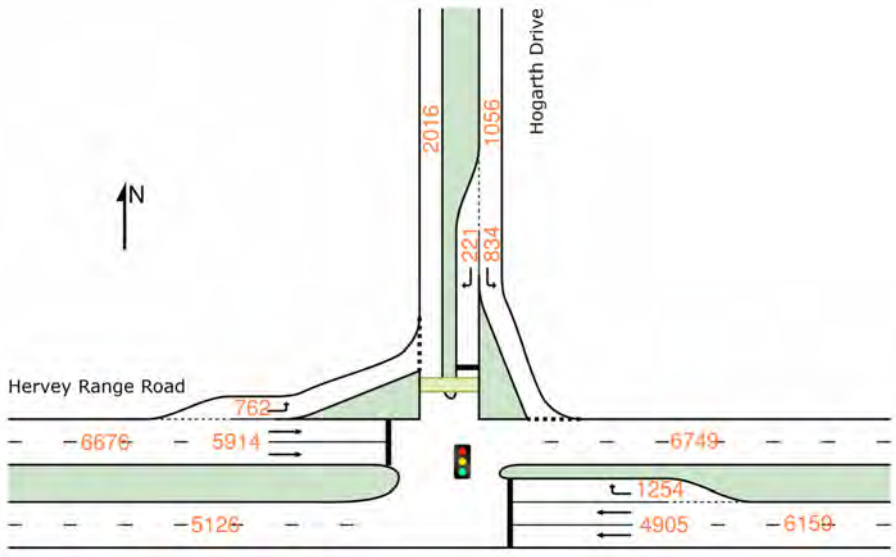

Figure 12 – Hervey Range Road and Hogarth Drive Intersection TAIM Average Daily Traffic Volumes 2023

2.4.3 STREAMS DATA

STREAMS data for the Hervey Range Road and Hogarth Drive intersection was requested from TMR for a typical weekday. The STREAMS data for Tuesday 17 October 2023 is available as Appendix B. The daily traffic volumes for different movements on 17 October 2023 are shown in Figure 13.

The AM and PM peak traffic volumes for the Hervey Range Road and Hogarth Drive intersection are shown in Figure 14 and Figure 15. The AM peak was identified to be between 7:30-8:30 and the PM peak was identified to be between 16:15-17:15.

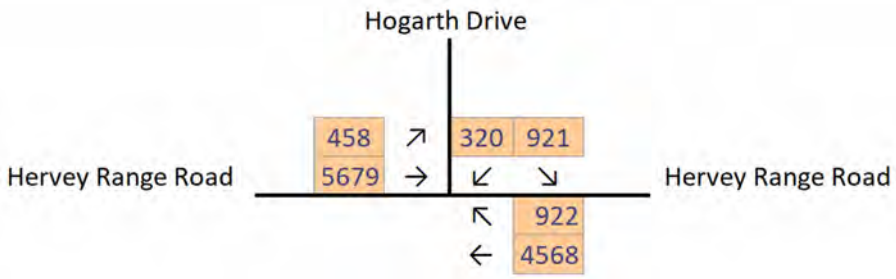

Figure 13 – Hervey Range Road and Hogarth Drive Intersection STREAMS Data Daily Traffic 17 October 2023

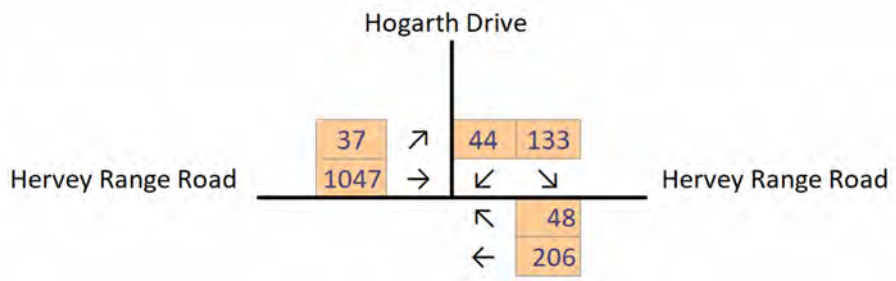

Figure 14 – Hervey Range Road and Hogarth Drive Intersection STREAMS AM Peak 17 October 2023

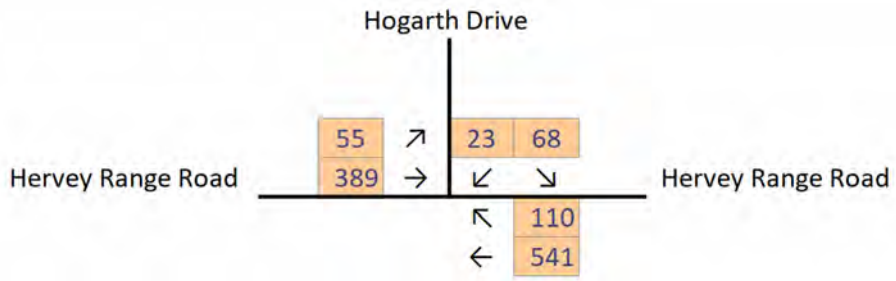

Figure 15 – Hervey Range Road and Hogarth Drive Intersection STREAMS PM Peak 17 October 2023

2.5 Road Safety Issues

Crash data was requested from TMR for the last 16 years for the study area. The study area included:

- Hervey Range Road from The Ring Road interchange to Hogarth Drive,
- The Ring Road southbound off and on ramp, and
- The existing internal road network in the Harris Crossing masterplan development.

A total of 20 crashes were identified for the requested period. A crash factor matrix and the Definitions for Coding Accidents (DCA) from Austroads *Guide to Road Safety* Part 8 are enclosed in Appendix C. Key points identifiable from the crash factor matrix are:

- 15 crashes were distinct intersection collisions (DCA codes in the 100 and 200 series). 13 were collisions between a right turning vehicle and vehicle traveling in the opposite direction (DCA code 202) occurring at the intersection of Hervey Range Road and The Ring Road southbound on and off ramps. 14 crashes occurred in dry conditions. Six (6) collisions resulted in hospitalisations, six (6) required medical treatment and three (3) crashes resulted in property damage only.
- Two (2) crashes were rear end collisions (DCA codes in the 300 series). Both crashes occurred within the Hervey Range Road and The Ring Road southbound ramp intersection, and in dry conditions. One (1) collision resulted in hospitalisation, and one (1) collision resulted in property damage only.
- Three (3) crashes were run off road collisions (DCA code 804). All three collisions occurred in dry conditions. Two (2) crashes resulted in hospitalisations, and one (1) crash resulted in property damage only.

No reported crashes were identified for the existing Harris Crossing development internal road network or at the Hervey Range Road/Hogarth Drive intersection.

2.6 Site Access

The site can be accessed from the existing Hervey Range Road and Hogarth Drive intersection.

2.7 Public Transport

Currently the study site has limited access to public transport services.

The nearest bus stop is located approximately 1.2km from the Hogarth Drive and Hervey Range Road intersection, on Golf Links Drive at Nineteenth Avenue. This bus stop is serviced by Translink Bus Route 203 *Kirwan to Townsville City bus hub*. The route also services Willows Shopping Centre, Stockland Shopping Centre and the Mater Hospital before continuing to the Townsville CBD. The route operates half-hourly from

Monday to Friday with 28 services a day. The route operates hourly on Saturday with 11 services. The route also operates hourly on Sunday with nine (9) total services.

The next closest bus stop is located approximately 1.7km from the Hogarth Drive and Hervey Range Road intersection, on Kalynda Parade at Swiflet Way. This bus stop is serviced by Translink Bus Route 211 *Bohle Plains to Willows Shopping Centre*, and would require a transfer at Willows Shopping Centre to access other services to the Townsville CBD. The route operates hourly from Monday to Saturday with 11 services a day. The route does not operate on Sunday.

2.8 Active Transport

A shared path network is provided along the west of Hogarth Drive in the development. This network connects to the path on Hervey Range Road which in turn connects to the network that runs parallel to The Ring Road and Shaw Road, providing connectivity to the suburb of Shaw to the north. The path from Hervey Range Road also continues east, providing connectivity to the suburb of Kirwan to the east.

Cyclists are accommodated on-road by dedicated cycle lanes and sealed shoulders on Hervey Range Road however, in some locations the sealed shoulder does not comply with minimum width requirements for bicycles. Bicycle riders wishing to follow the alignment of The Ring Road and Shaw Road are accommodated on the adjacent path.

3. PROPOSED DEVELOPMENT DETAILS

3.1 Development Site Plan

The proposed internal layout for Harris Crossing is available as Appendix A, including annotations regarding the land use concept. The proposed development consists of 592 low density residential lots, the existing Eden Academy childcare centre for 130 children, and 280 residential dwellings in the LLC.

3.2 Operational Details

Development of some of the residential lots in Harris Crossing has already commenced under the initial master planning. Planning, development and construction of remaining lots, including the proposed LLC, is expected to be completed in 2030 (the opening year).

3.3 Proposed Access

In accordance with *Traffic Operation Assessment* (PLD0200/R01revA), access to Harris Crossing will be from the existing Hervey Range Road/Hogarth Drive intersection (see section 2.6).

The proposed internal road network is shown in Appendix A. No major changes to the internal road network described in PLD0200/R01revA have been identified in this updated TIA.

Lot access for vehicles for individual residential lots and dwellings will be provided from the lot's respective frontage road.

4. DEVELOPMENT TRAFFIC

4.1 Traffic Generation

For this TIA, the proposed development is modelled to have traffic generated by the low-density residential lots, the residential dwellings in the LLC and the childcare centre.

4.1.1 LOW DENSITY RESIDENTIAL LOTS

As per PLD0200/R01revA, this TIA adopts a traffic generation rate of one (1) trip during morning and evening peak hours for a low-density residential lot. In total with 592 low-density residential lots, 592 trips are produced during each peak hour for a typical weekday.

As per PLD200/R01revA, an 80/20 distribution for the subject site for the AM peak (80% of traffic numbers travel away from the site during the AM peak), and a 30/70 distribution for the PM peak (30% of traffic numbers travel away from the site during the PM peak), has been adopted for this TIA.

4.1.2 LAND LEASE COMMUNITY RESIDENTIAL DWELLINGS

For the LLC, this TIA assumes that each residential dwelling generates 0.4 vehicle trips per hour for the AM peak hour and 0.6 vehicle trips per hour for the PM peak hour. These values agree with rates from Traffic Generation Data 2006-2019 (Queensland) Open Data for retirement villages, which aligns with the proposed concept for the LLC. Therefore, with 280 residential dwellings, the LLC generates 112 trips in the AM peak and 168 trips in the PM peak during a typical weekday.

For the residential dwellings in the LLC, this assessment adopts the same 80/20 distribution for the AM peak and a 30/70 distribution for the PM peak as the low-density residential lots.

4.1.3 CHILDCARE CENTRE

This TIA adopts the traffic generation rates identified in the RTA's *Guide to Traffic Generating Developments* 2002. For the AM peak, this assessment conservatively adopts a rate of 1.4 trips per child. For the PM peak, this assessment adopts the reported rate of 0.7 trips per child. With the childcare centre approved for 130 children (refer to RAL21/0035 and MCU21/0057), 182 trips are generated in the AM peak and 91 trips are generated in the PM peak.

For traffic generated by the childcare centre, this TIA adopts a 50/50 distribution for both the AM and PM peaks, assuming an even split for traffic numbers entering and exiting the development in each peak hour.

4.2 Trip Distribution

For the residential lots and dwellings, the following traffic distribution has been adopted for the subject intersection: 25% to/from the west on Hervey Range Road and 75% to/from the east on Hervey Range Road. This is based on STREAMS data for vehicle movements at the intersection of Hervey Range Road and Hogarth Drive (see Section 2.4.3).

For the childcare centre, this assessment assumes that 20% of the traffic generated by the childcare centre occurs internally in Harris Crossing and does not depart the development at the Hervey Range Road/Hogarth Drive intersection. For the AM peak, it is assumed that traffic is travelling in an eastern direction towards Townsville's CBD, meaning that 80% of the childcare centre generated traffic enters the development from the west at the Hervey Range Road/Hogarth Drive intersection, and then departs towards the east. The

reverse has been adopted for the PM peak, assuming that most traffic is then departing the CBD in the evening.

4.3 Development Traffic Volumes on the Network

Figure 16 and Figure 17 are provided as the traffic volume diagrams for the AM and PM peak respectively, for traffic entering and departing the study site at the Hervey Range Road and Hogarth Drive intersection.

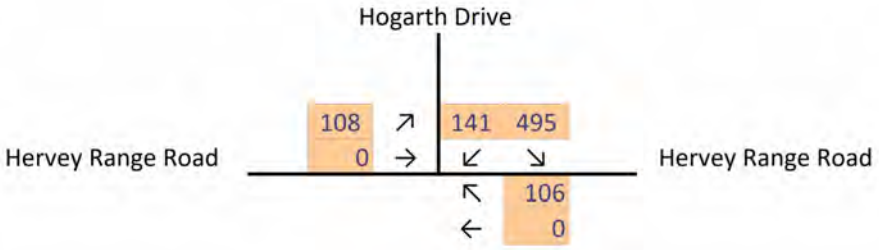

Figure 16 – AM Peak Development Traffic Volume

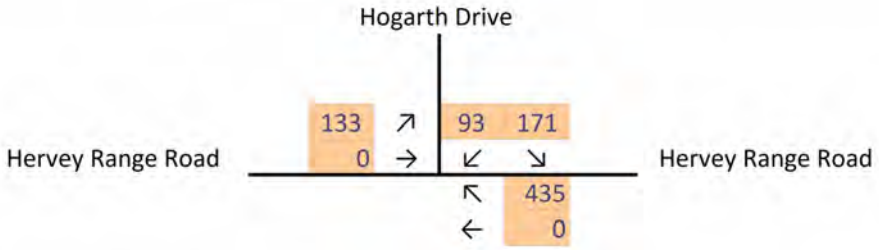

Figure 17 – PM Peak Development Traffic Volume

5. IMPACT ASSESSMENT AND MITIGATION

5.1 With and Without Development Traffic Volumes

Figure 18 and Figure 19 provide the 'without development' traffic for the AM and PM peak hours respectively, for the opening year 2023. Figure 20 and Figure 21 respectively show the AM and PM peak 'without development', for the design year 2040. These values were adopted from 2023 STREAMS data in Figure 14 and Figure 15 (also see Appendix B), with the application of the 2% growth factor calculated from Queensland Government Traffic Census data on Hervey Range Road (see Section 2.4.1).

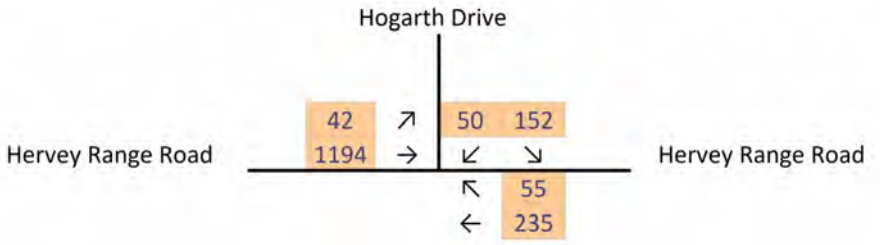

Figure 18 – 'Without Development' AM Peak Traffic Volume 2030 Diagram

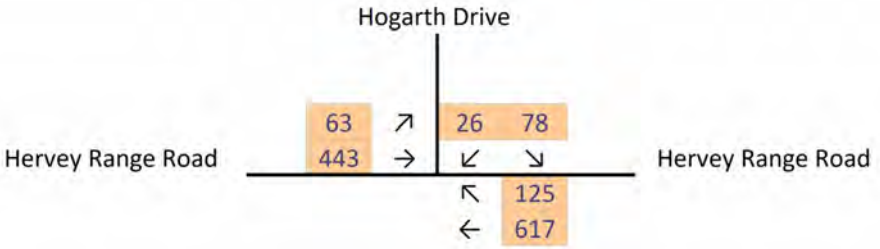

Figure 19 – 'Without Development' PM Peak Traffic Volume 2030 Diagram

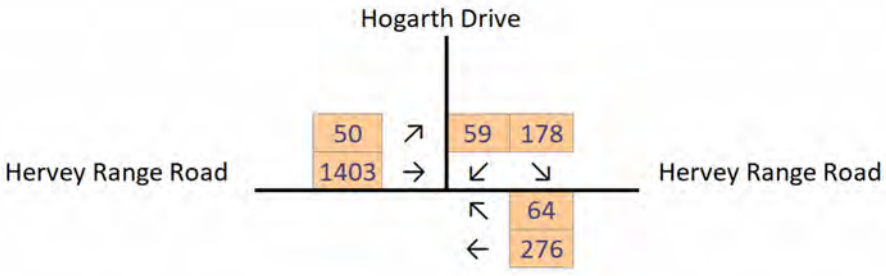

Figure 20 – 'Without Development' AM Peak Traffic Volume 2040 Diagram

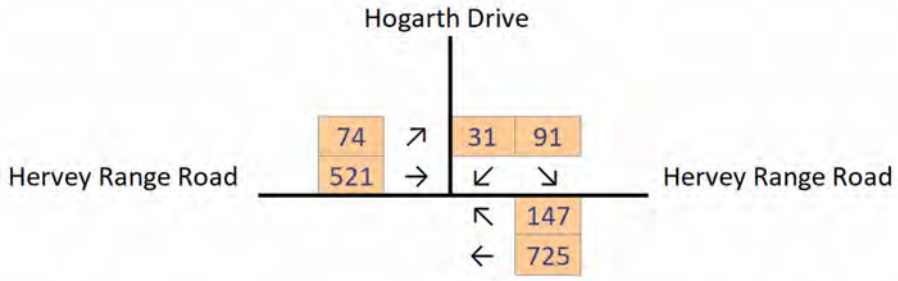

Figure 21 – 'Without Development' PM Peak Traffic Volume 2040 Diagram

The 'with development' morning peak hour traffic is shown in Figure 22 and Figure 23 for the opening year 2030 and the design year 2040 respectively. Through traffic movements are adopted from Figure 18 and Figure 20 for the respective year. Turn movements are approximated to be the 'ultimate with development' traffic shown in Figure 16, noting that the existing STREAMS data already accounts for some of the development traffic as construction of residential lots in Harris Crossing has commenced and is ongoing.

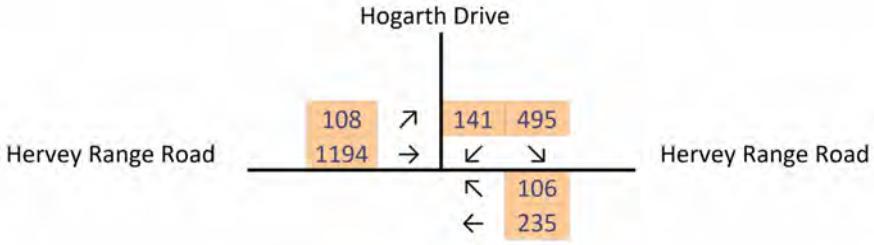

Figure 22 – 'With Development' AM Peak Traffic Volume 2030 Diagram

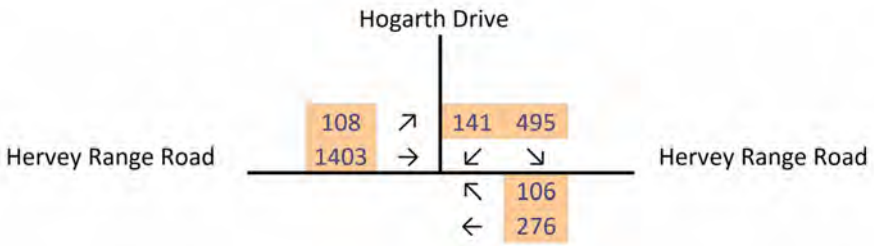

Figure 23 – 'With Development' AM Peak Traffic Volume 2040 Diagram

The 'with development' evening peak hour traffic is shown in Figure 24 and Figure 25, for the opening year 2030 and the design year 2040. Through movements are adopted from Figure 19 and Figure 21 for the respective year. Turn movements are equal to the 'with development' traffic shown in Figure 17, noting that the existing STREAMS data already accounts for some of the development traffic as construction of residential lots in Harris Crossing has commenced and is ongoing.

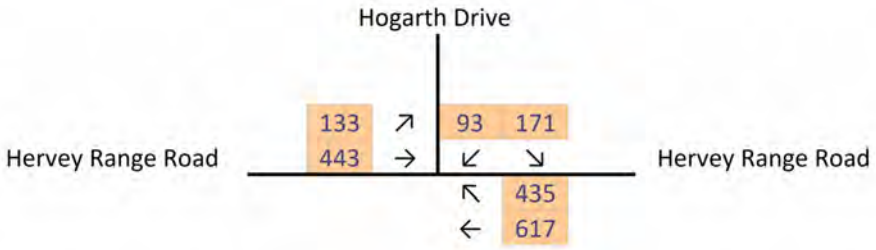

Figure 24 – 'With Development' PM Peak Traffic Volume 2030 Diagram

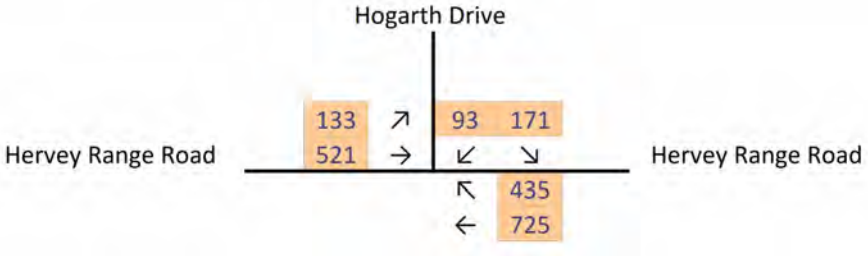

Figure 25 – 'With Development' PM Peak Traffic Volume 2040 Diagram

5.2 Road Safety Impact Assessment and Mitigation

The GTIA specifies the following two stage process for assessment of road safety impacts:

1. Road Safety Risk Assessment to determine the change in risk profile associated with existing road safety issues as a result of the development; and
2. Road Environment Safety Assessment to determine if changes to infrastructure require either a road safety audit by an accredited road safety auditor (RSA) or a road safety assessment by either an RSA or a Registered Professional Engineer of Queensland (RPEQ).

5.2.1 ROAD SAFETY RISK ASSESSMENT

A road safety risk assessment was conducted for the opening year 2030 in accordance with the risk assessment process specified by the GTIA, the risk assessment process involves the following steps for each risk item:

- Evaluate potential consequences based on accident severity from 1, property damage only, to 5, fatality;
- Evaluate potential likelihood from 1, rare, to 5, almost certain; and
- Sum the potential consequence and likelihood values to determine the risk score with scores up to and including 4 considered low risk, 5 to 7 medium risk, and 8 or greater high risk, in accordance with Figure 9.3.2(a) *Safety risk score matrix* from the GTIA.

Table 2 summarises the road safety risk assessment with further detail provided in the following sections. Hazards were identified through a crash factor matrix (included as Appendix C) utilising crash data from TMR for the study area. Also see section 2.5 of this TIA for a summary of the crash data.

Table 2 – Road Safety Risk Assessment

	Without development			With development				With development & mitigation		
Hazard	**Likelihood**	**Consequence**	**Risk Score**	**Likelihood**	**Consequence**	**Risk Score**	**Mitigation measures**	**Likelihood**	**Consequence**	**Risk Score**
Intersection collision (DCA codes in the 100 and 200 series)	3	4	M	4	4	H	Full signal control of right turns equates to a CMF of 0.6.	3	4	M
Rear end collisions (DCA codes in the 300 series)	1	4	M	2	4	M	No action required.			
Vehicle runs off road (DCA code 804)	2	4	M	3	4	M	No action required.			

5.2.1.1 Without Development Road Safety Risk Assessment

To provide an objective assessment of the potential likelihood, Premise uses the average recurrence interval/frequency criteria listed in Table 3. These criteria are more conservative than those suggested by TMR's *Guide to Traffic Impact Assessment: Frequently Asked Questions* (December 2017) but are consistent with other TMR guidelines that three (3) fatal or serious injury (potential consequence 4) accidents in five (5) years (potential likelihood 4) is high risk and should be mitigated. It was found that the highest risk scores generally resulted from consideration of the highest consequence/most severe accidents.

Table 3 – Potential Likelihood Evaluation Criteria

Potential Likelihood	Average Recurrence Interval	Accidents over 16 years
Almost Certain (5)	≤1 year	16 or more
Likely (4)	≤ 2 years	8 to 15
Moderate (3)	≤ 4 years	4 to 7
Unlikely (2)	≤ 8 years	2 or 3
Rare (1)	> 8 years	1

- 15 crashes resulted from intersection collisions. All of these occurred at the intersection of Hervey Range Road and The Ring Road southbound on and off ramp. Six (6) of the crashes resulted in hospitalisations, and six (6) crashes also resulted in medical treatment. To be conservative, a level 4 consequence rating was adopted. The average recurrence interval was less than 4 years, producing a Moderate (3) likelihood rating.
- Two (2) crashes were rear end collisions, occurring within the vicinity of an intersection on Hervey Range Road. One (1) of the two (2) collisions resulted in hospitalisation, equivalent to a level 4 consequence rating. The average recurrence interval was greater than 8 years, producing a Rare (1) likelihood rating.

- Three (3) crashes resulted from a vehicle running off the road. This occurred twice on Hervey Range Road and once on The Ring Road's southbound on-ramp. This resulted in two (2) occurrences of hospitalisation, equivalent to a level 4 consequence rating. The average recurrence interval for hospitalisations for vehicles running off the road was less than 8 years, producing an Unlikely (2) likelihood rating.

5.2.1.2 With Development Road Safety Risk Assessment

To provide an objective assessment of the potential likelihood increase, Premise uses the volume ratio of "with development" traffic and "without development" traffic ("with development" traffic divided by "without development" traffic) for the opening year 2030 listed in Table 4. The 'with development' traffic for the opening year 2030 is shown in Figure 22 and Figure 24 for the AM and PM peak hours respectively; Figure 18 and Figure 19 provide the 'without development' traffic for the opening year 2030 for the AM and PM peak hours respectively.

Table 4 – Potential Likelihood Increase Criteria

Potential Likelihood Increase	Volume Ratio (R)
+4 bands	8 < R
+3 bands	4 < R ≤ 8
+2 bands	2< R ≤ 4
+1 band	1.05 < R ≤ 2
No increase	R ≤ 1.05

In consideration that an overwhelming majority of intersection collisions occurred west of the Hervey Range Road and Hogarth Drive intersection, the combined morning and evening peak ratios were calculated for traffic west of the subject intersection. In accordance with the GTIA, the With Development Road Safey Risk Assessment is conducted for the design year (2030). The resulting volume ratio was found to be 1.1, which in accordance with Table 4, increased the likelihood rating of each hazard by one (1) band.

5.2.1.3 Mitigation

Where the 'with development' risk assessment resulted in an increase in the risk score, a mitigation measure was identified and applied for the given hazard. Appendix E of Austroads' *Guide to Road Safety Part 2: Safe Roads* (AGRS02) provides crash modification factors, CMF, of various mitigation measures.

To provide an objective assessment of the potential likelihood decrease due to proposed mitigation measures, Premise uses the crash modification factor criteria listed in Table 5.

Table 5 – Potential Likelihood Decrease Criteria

Potential Likelihood Decrease	Crash Modification Factor CMF
-1 band	0.5 < CMF < 1
-2 bands	0.25 < CMF ≤ 0.5
-3 bands	0.125 < CMF ≤ 0.25
-4 bands	CMF ≤ 0.125

- The risk score for a vehicle from the opposing direction travelling through a right turn at the Hervey Range Road and Ring Road intersection (southbound on/off ramp) increased from 'Medium' to 'High'. It was determined that in the last 16 years, full signal control of the right turn at this intersection was implemented. From Table E1 of AGRS02 for opposing turns (DCA codes 202 to 206), and for treatment type 'remodel signal', the CMF is equal to 0.6. From Table 5, this is equivalent to a decrease in potential likelihood of 1 band. This is reflected in the final 'with development and mitigation' risk score.

5.2.2 ROAD ENVIRONMENT SAFETY ASSESSMENT

In accordance with the GTIA Table 9.3.3(a) *Road environment safety rating matrix (level of risk)*, Hervey Range Road is assessed as having a MEDIUM road risk environment, with a posted speed limit of 70km/h and an AADT greater than 8,000vpd (refer to Figure 13). Harris Crossing is a Planning Act development and therefore, from Table 9.3.3(b) *Type of road safety assessment based on road environment safety rating* a road safety assessment is required.

For Hogarth Drive with AADT >8,000 (estimated by assuming that 10% of AADT occurs during a peak hour), and a posted speed limit of 60km/h, the road environment safety rating is MEDIUM from Table 9.3.3(a). Harris Crossing is a Planning Act development and therefore, from Table 9.3.3(b), a road safety audit is not required for any roads in the development. However, a road safety assessment is required.

A road safety assessment may be conducted by either an accredited road safety auditor or a RPEQ. This requirement would be satisfied by safety reports prepared in accordance with Section 295 of the Work Health and Safety Regulation 2011 as part of the design process.

5.3 Access and Frontage Impact Assessment

Access for traffic generated by Harris Crossing to the state-controlled Hervey Range Road is to be via the existing signalised intersection at Hogarth Drive. There is minimal impact to the access and frontage at Hervey Range Road and Hogarth Drive, meaning that no additional access points to the state-controlled road network, or changes to the existing signalised intersection, are required. Additionally:

- The development is not planned to generate significant amounts of heavy vehicle traffic, excepting weekly and fortnightly service vehicles for refuse.
- The existing intersection will continue to operate within performance requirements with development traffic in its opening year and design year (refer to Section 5.3.1).

The Hogarth Drive link between the Hervey Range Road and the first intersection (Newstead Boulevard) is constructed to the standard of a Type A Sub Arterial Road in consideration of the entirety of the Harris Crossing development. Refer to Section 8.2.7 of PLD0200/R01revA for further commentary on Hogarth Drive.

5.3.1 INTERSECTION ANALYSIS

In accordance with TMR's GTIA and Townsville City Plan SC6.4.5.2, intersection delay impacts were assessed for the Hervey Range Road and Hogarth intersection based on 'with development' design year 2040 traffic volumes (Figure 24 and Figure 25).

Intersection performance has been assessed using SIDRA Intersection Version 9 (SIDRA). SIDRA is an advanced micro-analytical traffic tool for evaluation of intersections. SIDRA reports intersection performance in terms of a range of parameters, which are explained in the following sections.

All movements for the road network are assumed to include 5% heavy vehicles and have the SIDRA default PFF of 95%. The intersection is set to operate at practical timing cycle.

This report contains extracts of the SIDRA results. The results were compared to desirable levels of service listed in Austroads *Guide to Traffic Management Part 12: Integrated Transport Assessments for Development,* (AGTM12) and also the Townsville City Plan under SC6.4.5.2. *Traffic Impact Assessments* for an urban road with signalised intersections.

Full SIDRA outputs are attached in Appendix D.

5.3.2 DEGREE OF SATURATION

Degree of Saturation (DOS) is the ratio of the arrival (demand) volume V to the theoretical capacity of a given road link, lane or movement. An intersection is considered to be operating at its practical capacity when the DOS reaches 0.9 for traffic signals (AGTM12). Similarly, the acceptable limit of DOS specified in the Townsville City Plan under Table SC6.4.5.6 *Desirable Service Standard for Intersection/Access Operation* for an urban signalised intersection is 0.9.

The SIDRA DOS outputs for the study intersection are shown in Figure 26 for AM and PM peak hours respectively. With a practical cycle time of 60 seconds for the morning peak, all movements excepting the through traffic from the western leg operate with DOS <0.8; the eastbound through traffic operates with a DOS of 0.824. With a practical cycle time of 50 seconds for the evening peak, all movements except the right turn from the eastern leg and the through movement on the western leg operate with DOS <0.7; and the maximum DOS for any movement is 0.798 for the right turn from Hervey Range Road into Hogarth Drive. Hence, with the development traffic, the intersection operates well below the limit of 0.9 in accordance with AGTM12 and Townsville City Plan.

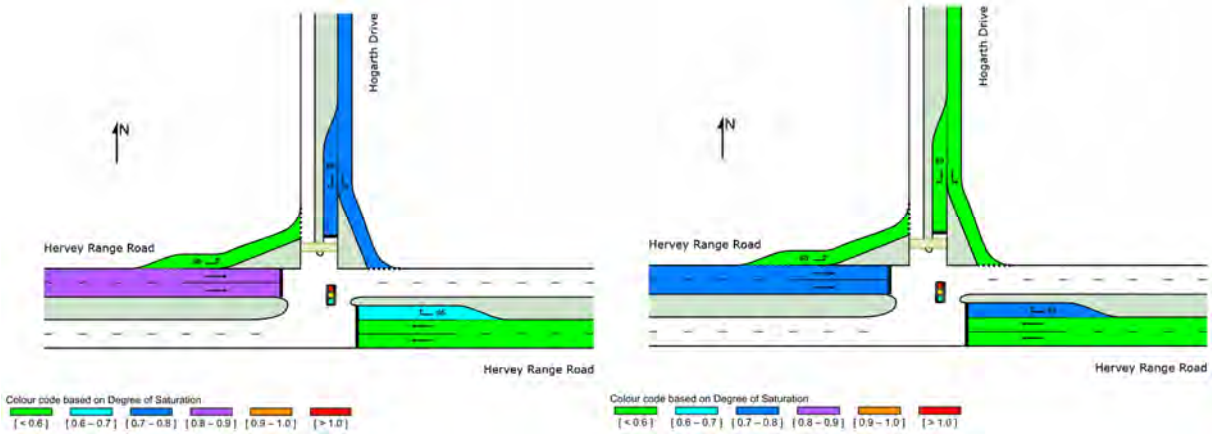

Figure 26 – 'With Development' AM and PM Peak Degree of Saturation

5.3.3 LEVEL OF SERVICE

Level of Service (LOS) is the index of the operation performance of traffic based on measures such as delay, DOS, density, speed, congestion, and travel time for a given flow period. LOS provides a quantitative performance measure of operating conditions and a driver's perception of the conditions. A description of the six different LOS is provided in Commentary 9 of AGTM12.

The SIDRA LOS outputs for the study intersection are shown in Figure 27 for AM and PM peak hours respectively. The LOS for different movements varies between the peak hours, ranging between LOS A and LOS D. The intersection in the AM peak operates at a LOS D with a 60 second practical cycle time and in the PM peak operates at a LOS C with a 50 second practical cycle time. When considering the Townsville City Plan, Table SC6.4.5.6 provides an acceptable level of LOS E for an urban signalised intersection. Therefore, the intersection adequately performs with development traffic in terms of LOS.

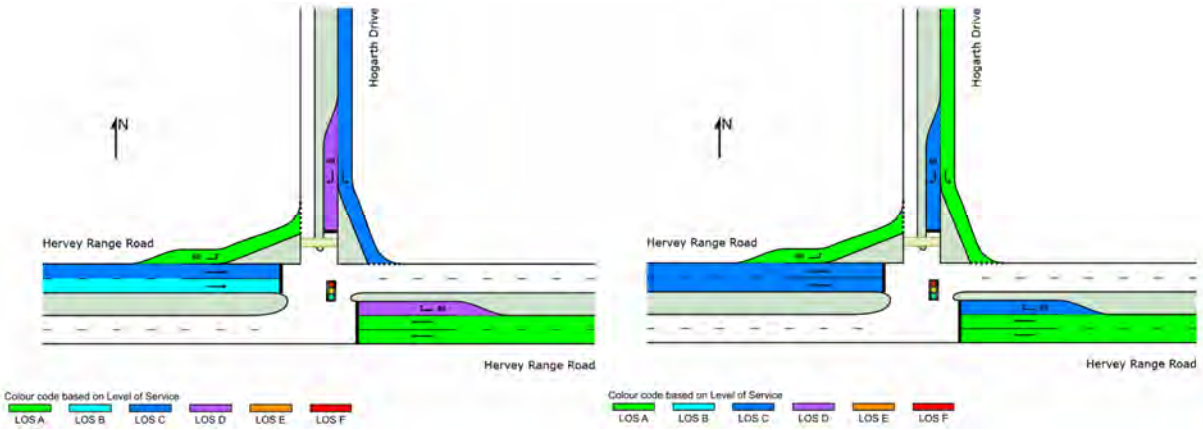

Figure 27 – 'With Development' AM and PM Peak Level of Service

5.3.4 LANE BLOCKAGE PROBABILITY

Blockage is defined as when the back of a queue downstream from an intersection extends beyond the available queue storage length (lane length) and blocks traffic movements at upstream intersection lanes, resulting in capacity losses at upstream intersection lanes.

Figure 28 shows the SIDRA outputs for lane blockage probability for the AM and PM peaks respectively. It is evident that the intersection has 0% lane blockage probability for both morning and evening peaks, which is highly desirable.

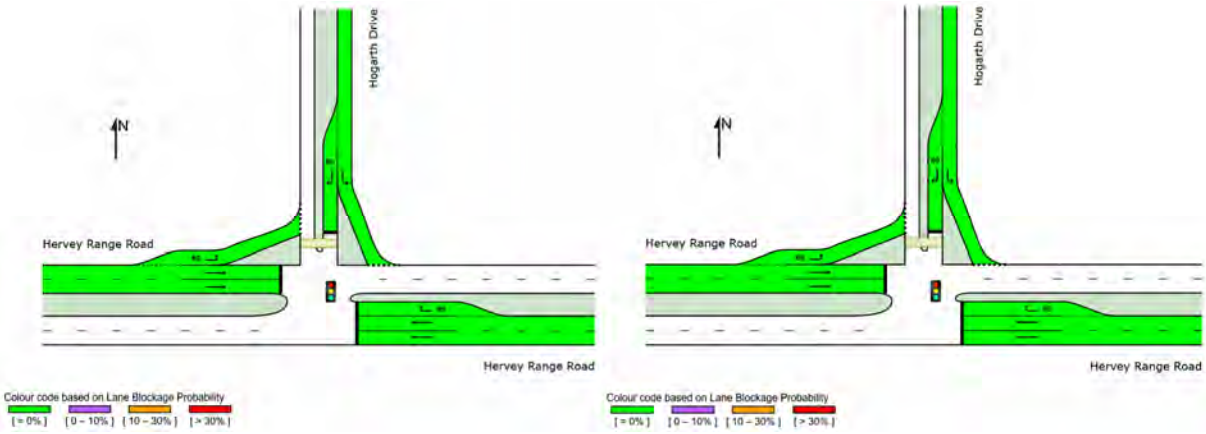

Figure 28 – 'With Development' AM and PM Peak Lane Blockage Probability

The SIDRA output movement summaries enclosed in Appendix D indicate that 95th percentile back of queue lengths can be accommodated within the short lanes. Without allowing for signal coordination the maximum queue length is the westbound through traffic queue on Hervey Range Road during the morning peak hour with the 95th percentile back of queue lengths being 22 vehicles which can be accommodated clear of the adjacent traffic signals. The 95th percentile back of queue length on Hogarth Drive is 11 vehicles which can be accommodated clear of the Newstead Boulevard roundabout.

5.3.5 SIGNAL COORDINATION

Signal coordination with the nearby intersection of Hervey Range Road and The Ring Round southbound on/off ramp would reduce queue lengths and delays for traffic approaching the Hervey Range Road and Hogarth Drive intersection from the west.

5.4 Road Link Capacity Assessment and Mitigation

5.4.1 INTERNAL ROAD NETWORK

The Harris Crossing development involves the construction of an internal road network comprised of roads with characteristics outlined in the Townsville City Plan SC6.4.5.1 *Townsville Road Hierarchy*. The proposed development road use will be no worse than the previously approved road hierarchy from PLD0200/R01revA.

5.4.2 EMERGENCY ACCESS

An existing emergency access road to the Harris Crossing development is situated approximately 140m east of the Hervey Range Road and southbound Ring Road on/off ramp intersection, and 160m west of the Hervey Range Road and Hogarth Drive intersection. The access is shown in Figure 29.

Figure 29 – Harris Crossing Emergency Access

Should the Hervey Range Road/Hogarth Drive intersection be closed during nominal flooding events, this road provides adequate emergency access. This is as since the commencement of the Harris Crossing development, the emergency access has only been closed in four events (three of which occurred during the 2019 unprecedented weather event). These occurrences are outlined below.

- Closed for 28 February 2018
- Closed 29 January 2019, reopened 30 January 2019
- Closed 31 January 2019, reopened 01 February 2019
- Closed PM 01 February 2019, reopened 03 February 2019.

Therefore, no further access points to the Harris Cross development from the state-controlled road network are required.

6. CONCLUSIONS AND RECOMMENDATIONS

6.1 Summary of Impacts and Mitigation Measures

This TIA assessed the traffic impact of the Harris Crossing residential estate in Bohle Plains, Queensland, with the proposed introduction of an LLC. The TIA was completed in accordance with TMR's GTIA and Townsville City Plan SC6.4.5.2.

The traffic generated by the proposed development in its design year 2040 was assessed utilising SIDRA for the Hervey Range Road and Hogarth Drive intersection. It was found that the network performed adequately in terms of DOS, LOS and lane blockage probability. Therefore, any additional connections to the state-controlled road network, or upgrades to the existing signalised intersection, are not required.

A road safety risk assessment was also completed, considering the crashes in the study area for the last 16 years. Introducing the development traffic resulted in an increase in the risk of intersection crashes at signalised intersections. Full control of right turns at Hervey Range Road signalised intersections mitigates the risk.

A road environment safety assessment found that a road safety audit was not required for any of the studied roads or the proposed internal road network. However, a road safety assessment is required, and can be conducted by an accredited road safety auditor or an RPEQ. This requirement would be satisfied by safety reports prepared in accordance with Section 295 of the Work Health and Safety Regulation 2011 as part of the design process.

6.2 Certification Statement and Authorisation

This report was prepared by Karyn Twohill under the direct supervision of Bradley Jones (RPEQ 19986).

The Traffic Impact Assessment Certification in accordance with the GTIA is attached in Appendix E.

APPENDIX A

HARRIS CROSSING DEVELOPMENT LAYOUT

PROPOSED
RECONFIGURATION (Concept October 2023)

Lots 1-762 & 2000-2010

Cancelling Lots 1002 on SP321630,
& 1003 on SP278255

Parish of Bohle
County of Elphinstone
City of Townsville

Harris CROSSING

0 50 100m

LAND LEASE COMMUNITY

CHILDCARE

RP891369

THE RING ROAD

HERVEY RANGE ROAD

BOHLE RIVER

Subject Site

Stage Boundaries

This plan is conceptual and for discussion purposes only. All areas, dimensions and land uses are preliminary, subject to investigation, survey, engineering, and Local Authority and Agency approvals.

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surveying | town planning | project management | mapping and GIS

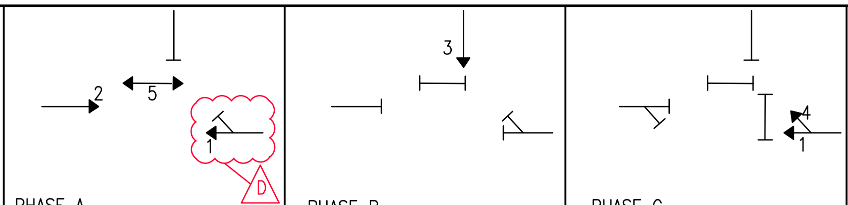
Date: 13th February, 2024
Scale: 1:5000 @ A3
Drawn: MJM
Job No: 40540/001-03
Plan No: 40540/005 O

APPENDIX B

STREAMS DATA FOR HERVEY RANGE ROAD AND HOGARTH DRIVE INTERSECTION

Data for a typical weekday (17 October 2023)

PHASE DIAGRAMS

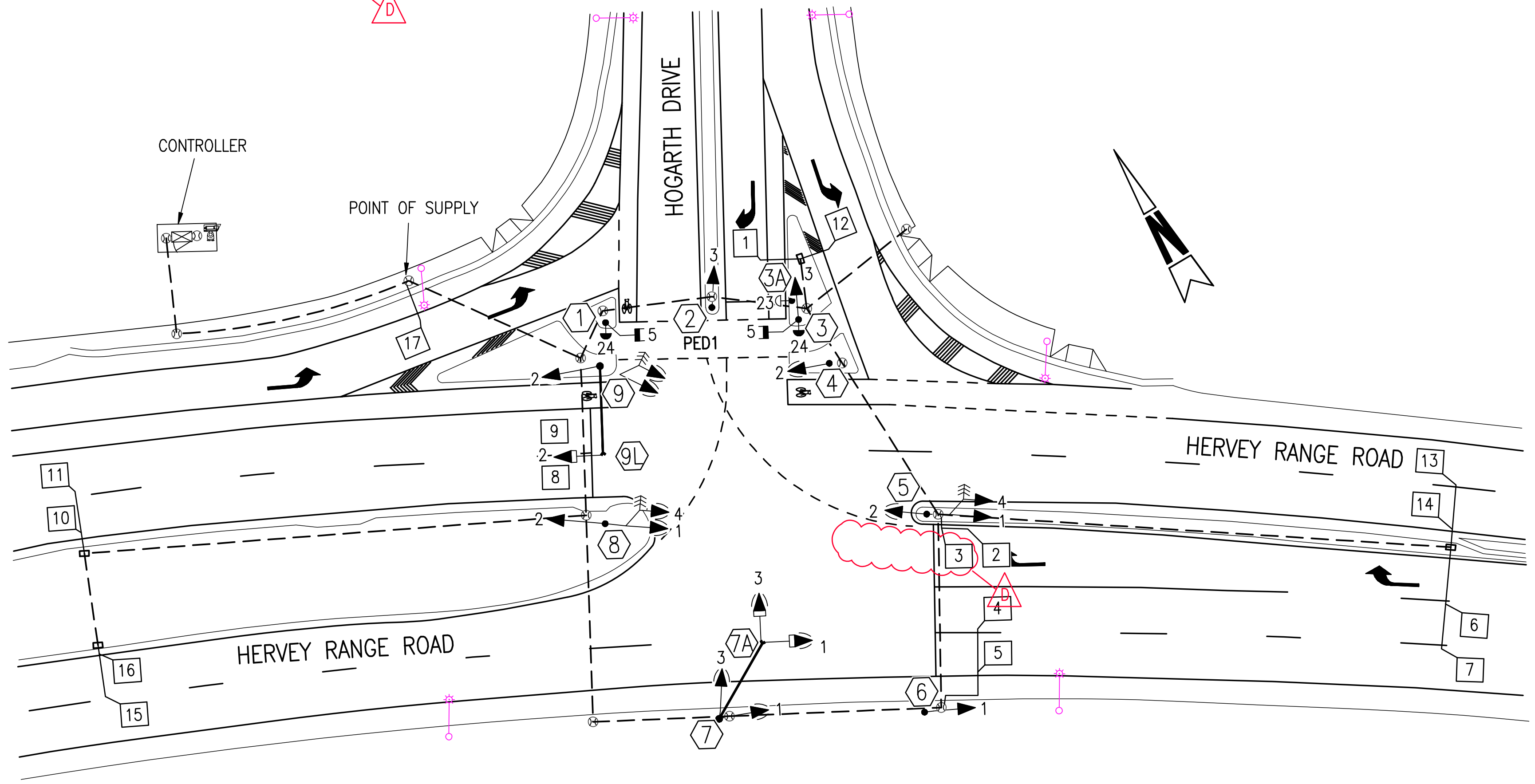


	PHASE A				PHASE B	PHASE C	
SIGNAL GROUPS	1	2	5		3	2	4
VEHICLE/PED	VG1	VG2	PG1		VG3	VG2	VG4
LOGICAL INPUT	4,5 / 6,7	8,9 / 10,11	24		1 / 23	3,4 / 5,6	2–3
CALL	X / X	X / X	X		X / X		PRES
EXTEND	X / X	X / X			X		X
INCREMENT							
SPECIAL CONDITIONS					SG3 CAN BE CALLED BY DETECTOR 23 (BIKE)		

Scope of Works:

1. Disconnection of 'Presence detector Loops (No3) at pits. Detector Loop 'Stop Bar' & 'Pres/Count' to remain connected (No3 & No2) to controller.

D



CONFLICT TABLE (X INDICATES CONFLICT)

		VEHICLE GROUPS 1	2	3	4	5	6	7	8	9	10	11	12	PED GROUPS 1	2	3	4
VEHICLE GROUPS	1	\		X													
	2		\	X	X												
	3	X	X	\	X									X			
	4		X	X	\									X			
	5					\											
	6						\										
	7							\									
	8								\								
	9									\							
	10										\						
	11											\					
	12												\				
PED GROUPS	1			X	X												
	2																
	3																
	4																

DETECTOR TABLE

PHYSICAL LABEL	CONTROLLER TERMINAL	LOGICAL INPUT	LOOP/PB CONFIGURATION	DIST TO STOP LINE
LOOP 1	P1	1	STOP LINE	4m
LOOP 2	P2	2	PRES/COUNT	STD DRG
LOOP 3	P3	3	STOP LINE	4m
LOOP 4	P4	4	STOP LINE	4m
LOOP 5	P5	5	STOP LINE	4m
LOOP 6	P6	6	ADVANCE	45m
LOOP 7	P7	7	ADVANCE	45m
LOOP 8	P8	8	STOP LINE	4m
LOOP 9	Q9	9	STOP LINE	4m
LOOP 10	Q10	10	ADVANCE	45m
LOOP 11	Q11	11	ADVANCE	45m
LOOP 12	Q12	12	COUNT	—
LOOP 13	Q13	13	COUNT	—
LOOP 14	Q14	14	COUNT	—
LOOP 15	Q15	15	COUNT	—
LOOP 16	Q16	16	COUNT	—
LOOP 17	R17	17	COUNT	—
		18		
		19		
		20		
		21		
		22		
EXT2	E6	23	PB2 – BIKE	
EXT1	E5	24	PB1– AUDIO	
		25		
		26		
		27		
		28		
		29		
		30		
		31		
		32		

D

SIGNAL GROUPS	FUNCTION	CONTROLLER TERMINALS	FINIAL TERMINALS	RUN 1 CONNECTS (1, 3, 2, 3, 3A, 4, 5) CORES USED		FINIAL TERMINALS	RUN 2 CONNECTS (9, 9, 7, 8, 7, 9L, 7L, 6) CORES USED			FINIAL TERMINALS	RUN 3 CONNECTS CORES USED	
1	RED	A5	1	1		1	1		1			
	YELLOW	A4	2	2		2	2		2			
	GREEN	A3	3	3		3	3		3			
2	RED	A8	4	4		4	4	4				
	YELLOW	A7	5	5		5	5	5				
	GREEN	A6	6	6		6	6	6				
3	RED	A11	7	7		7	7		7			
	YELLOW	A10	8	8		8	8		8			
	GREEN	A9	9	9		9	9		9			
4	RED	A14	10	10		10	10					
	YELLOW	A13	11	11		11	11					
	GREEN	A12	12	12		12	12					
5	RED DW	B5	13	13								
	PED1											
	GREEN W	B3	15	15								
	EXT1 DET23 (BIKE)	E6	P2	P2	1							
	EXT 1 DET 24	E5	P1	P1								
	240V	A2	A	RD		A	RD					
	DET COMMON	E3	PR	GY	2							
	NEUTRAL	A1,B1 C1,D1	NL	BK	BK	NL	BK	BK	BK			
	SPARE CORES TO EARTH		/	19–23, 26, 27, P2–P4, OG	3,4	/	19–23, P1, P4, OG, GY	1–3 7 TO GY	4–6 10 TO GY	/		
	CABLE SIZE			36	6+E		36	19	19			

CONTROLLER TYPE TYCO ECLIPSE EC1–62–8 + TOP HAT

HARRISON INFRASTRUCTURE GROUP

HIG REF NO: P10674

	Revisions/Descriptions	Drawn	Checked	Signed	Date
D	REMOVE FILTERING FROM SG4	JWR	D Suter 11567	[signature]	25/05/2021
C	BICYCLE PB POST ADDED. Aϕ & Cϕ SPECIAL CONDITIONS MODIFIED	TEM	TEM		11/05/2021
B	KERB RAMPS REPLACED WITH 'CUT-THROUGHS'. STATIONS 1&3 SHIFTED.	TEM		J.N. CHUONG	21/01/2016
A	Original Issue				

CAD FILES C:\12dS\data\TWB-DM01\P10674 – Townsville 45_1748\4.0 Drawings\4.1_Dwg\15GCS0015-01 OPERATION & ELECTRICAL 3366.dwg

Associated Job Nos

Auxiliary Drg Nos

Survey Data: Horiz. Datum / Horiz. Grid / Height Datum / Survey Books

Scales 0 2 4 6 8 10m

ORIGINAL SIZE A3

Dimensions shown in metres except where shown otherwise

TOWNSVILLE CITY

HERVEY'S RANGE DEVELOPMENT ROAD

HERVEY RANGE ROAD & HOGARTH DRIVE

Reference Points

Preceding RP	Dist. to start of job (km)	From start to end of job	From end to Following RP	Following RP

Through Chainage from

TRAFFIC SIGNAL INSTALLATION OPERATIONS & ELECTRICAL

Site Number M3366

Drawn T.E. MARTYR
Designed T.E. MARTYR
Checked T.E. MARTYR

ENGINEERING CERTIFICATION (RPEQ)

ENG. AREA	NAME	SIGNATURE	No.	DATE
ELECTRICAL	J.N. CHUONG	Original Signed By	2696	11/12/15

Queensland Government

Job No.

Contract No.

Drawing No. 15GCS0015 D

Series Number 1 of 2

Last Modified :- Jun 17, 2021 – 11:36am XREFS :- MR_LIGHT_H_TB.dwg

Report Type	SelDate	Server	ObjType	Det_Desc	SubPercent
DAILY	17/10/2023	TMR QRS S	Detector	M3366/VD1	0

Time	Qtr1	Qtr2	Qtr3	Qtr4	TotalHour
00:00 - 01:00	0	0	0	0	0
01:00 - 02:00	0	0	0	0	0
02:00 - 03:00	0	0	0	0	0
03:00 - 04:00	0	0	1	1	2
04:00 - 05:00	1	3	0	1	5
05:00 - 06:00	1	4	3	6	14
06:00 - 07:00	3	4	20	6	33
07:00 - 08:00	10	7	15	13	45
08:00 - 09:00	9	7	7	6	29
09:00 - 10:00	1	2	2	3	8
10:00 - 11:00	5	6	3	4	18
11:00 - 12:00	8	3	4	3	18
12:00 - 13:00	2	3	2	1	8
13:00 - 14:00	6	4	1	7	18
14:00 - 15:00	3	0	10	7	20
15:00 - 16:00	10	5	6	7	28
16:00 - 17:00	7	5	9	4	25
17:00 - 18:00	5	8	5	3	21
18:00 - 19:00	3	1	4	2	10
19:00 - 20:00	2	2	2	3	9
20:00 - 21:00	2	2	0	0	4
21:00 - 22:00	0	1	1	0	2
22:00 - 23:00	1	0	0	0	1
23:00 - 00:00	1	0	1	0	2

Description	Volume	Time
Maximum AM 15-minute volume	20	06:30 - 06:45
Maximum PM 15-minute volume	10	14:30 - 14:45
Total Volume 12 Hours	248	07:00 - 19:00
Total Volume 24 Hours	320	00:00 - 00:00

Report Type	SelDate	Server	ObjType	Det_Desc	SubPercent
DAILY	17/10/2023	TMR QRS STF	Detector	M3366/VD2	0

Time	Qtr1	Qtr2	Qtr3	Qtr4	TotalHour
00:00 - 01:00	0	1	0	0	1
01:00 - 02:00	2	0	0	0	2
02:00 - 03:00	0	0	0	0	0
03:00 - 04:00	0	0	0	0	0
04:00 - 05:00	1	0	0	0	1
05:00 - 06:00	0	3	1	4	8
06:00 - 07:00	11	8	9	9	37
07:00 - 08:00	5	13	10	17	45
08:00 - 09:00	14	12	17	11	54
09:00 - 10:00	9	9	11	11	40
10:00 - 11:00	19	11	13	11	54
11:00 - 12:00	13	13	13	17	56
12:00 - 13:00	16	9	5	11	41
13:00 - 14:00	17	13	9	8	47
14:00 - 15:00	19	8	9	16	52
15:00 - 16:00	32	26	22	22	102
16:00 - 17:00	29	18	25	31	103
17:00 - 18:00	31	21	28	29	109
18:00 - 19:00	21	15	21	15	72
19:00 - 20:00	15	15	11	4	45
20:00 - 21:00	9	9	9	6	33
21:00 - 22:00	8	5	6	6	25
22:00 - 23:00	1	0	2	4	7
23:00 - 00:00	2	6	1	0	9

Description	Volume	Time
Maximum AM 15-minute volume	19	10:00 - 10:15
Maximum PM 15-minute volume	32	15:00 - 15:15
Total Volume 12 Hours	775	07:00 - 19:00
Total Volume 24 Hours	943	00:00 - 00:00

Report Type	SelDate	Server	ObjType	Det_Desc	SubPercent
DAILY	17/10/2023	TMR QRS S	Detector	M3366/VD3	0

Time	Qtr1	Qtr2	Qtr3	Qtr4	TotalHour
00:00 - 01:00	0	1	0	0	1
01:00 - 02:00	2	0	1	0	3
02:00 - 03:00	0	0	1	0	1
03:00 - 04:00	0	0	0	0	0
04:00 - 05:00	1	0	0	0	1
05:00 - 06:00	1	3	2	4	10
06:00 - 07:00	10	8	5	11	34
07:00 - 08:00	6	14	9	17	46
08:00 - 09:00	10	12	14	12	48
09:00 - 10:00	9	10	13	11	43
10:00 - 11:00	21	12	13	11	57
11:00 - 12:00	12	11	12	15	50
12:00 - 13:00	16	7	8	10	41
13:00 - 14:00	17	13	8	9	47
14:00 - 15:00	18	8	10	16	52
15:00 - 16:00	25	25	21	24	95
16:00 - 17:00	29	23	28	29	109
17:00 - 18:00	30	19	27	28	104
18:00 - 19:00	22	15	18	15	70
19:00 - 20:00	15	12	11	5	43
20:00 - 21:00	5	6	7	6	24
21:00 - 22:00	6	6	7	6	25
22:00 - 23:00	3	0	2	4	9
23:00 - 00:00	1	6	1	1	9

Description	Volume	Time
Maximum AM 15-minute volume	21	10:00 - 10:15
Maximum PM 15-minute volume	30	17:00 - 17:15
Total Volume 12 Hours	762	07:00 - 19:00
Total Volume 24 Hours	922	00:00 - 00:00

Report Type	SelDate	Server	ObjType	Det_Desc	SubPercent
DAILY	17/10/2023	TMR QRS S	Detector	M3366/VD4	0

Time	Qtr1	Qtr2	Qtr3	Qtr4	TotalHour
00:00 - 01:00	4	2	2	0	8
01:00 - 02:00	1	0	0	0	1
02:00 - 03:00	1	1	1	0	3
03:00 - 04:00	0	0	2	0	2
04:00 - 05:00	0	2	0	3	5
05:00 - 06:00	4	8	4	7	23
06:00 - 07:00	12	12	18	19	61
07:00 - 08:00	19	16	25	18	78
08:00 - 09:00	38	41	56	44	179
09:00 - 10:00	26	38	36	32	132
10:00 - 11:00	38	33	54	27	152
11:00 - 12:00	41	36	41	35	153
12:00 - 13:00	42	38	38	32	150
13:00 - 14:00	50	38	36	37	161
14:00 - 15:00	38	39	42	65	184
15:00 - 16:00	88	119	81	67	355
16:00 - 17:00	86	75	70	92	323
17:00 - 18:00	88	79	72	76	315
18:00 - 19:00	60	50	35	28	173
19:00 - 20:00	29	25	22	33	109
20:00 - 21:00	23	8	20	17	68
21:00 - 22:00	16	13	8	6	43
22:00 - 23:00	8	5	2	4	19
23:00 - 00:00	1	4	3	3	11

Description	Volume	Time
Maximum AM 15-minute volume	56	08:30 - 08:45
Maximum PM 15-minute volume	119	15:15 - 15:30
Total Volume 12 Hours	2355	07:00 - 19:00
Total Volume 24 Hours	2708	00:00 - 00:00

Report Type	SelDate	Server	ObjType	Det_Desc	SubPercent
DAILY	17/10/2023	TMR QRS S	Detector	M3366/VD5	0

Time	Qtr1	Qtr2	Qtr3	Qtr4	TotalHour
00:00 - 01:00	0	0	0	0	0
01:00 - 02:00	1	0	0	0	1
02:00 - 03:00	0	0	0	0	0
03:00 - 04:00	0	0	0	0	0
04:00 - 05:00	0	0	0	3	3
05:00 - 06:00	0	1	0	12	13
06:00 - 07:00	19	17	11	23	70
07:00 - 08:00	17	17	21	22	77
08:00 - 09:00	22	19	24	21	86
09:00 - 10:00	29	35	30	25	119
10:00 - 11:00	26	32	23	28	109
11:00 - 12:00	27	26	38	18	109
12:00 - 13:00	37	27	23	28	115
13:00 - 14:00	28	26	19	24	97
14:00 - 15:00	31	26	26	33	116
15:00 - 16:00	45	55	54	49	203
16:00 - 17:00	51	43	52	62	208
17:00 - 18:00	59	50	43	45	197
18:00 - 19:00	60	36	29	26	151
19:00 - 20:00	19	23	19	22	83
20:00 - 21:00	17	13	12	14	56
21:00 - 22:00	9	5	6	3	23
22:00 - 23:00	8	2	3	4	17
23:00 - 00:00	0	2	2	3	7

Description	Volume	Time
Maximum AM 15-minute volume	38	11:30 - 11:45
Maximum PM 15-minute volume	62	16:45 - 17:00
Total Volume 12 Hours	1587	07:00 - 19:00
Total Volume 24 Hours	1860	00:00 - 00:00

Report Type	SelDate	Server	ObjType	Det_Desc	SubPercent
DAILY	17/10/2023	TMR QRS S	Detector	M3366/VD6	0

Time	Qtr1	Qtr2	Qtr3	Qtr4	TotalHour
00:00 - 01:00	4	2	1	0	7
01:00 - 02:00	2	0	0	0	2
02:00 - 03:00	1	1	1	0	3
03:00 - 04:00	0	0	2	0	2
04:00 - 05:00	1	2	0	2	5
05:00 - 06:00	5	5	4	12	26
06:00 - 07:00	12	14	26	22	74
07:00 - 08:00	21	21	27	16	85
08:00 - 09:00	40	40	57	45	182
09:00 - 10:00	31	38	36	31	136
10:00 - 11:00	40	35	53	29	157
11:00 - 12:00	42	43	42	33	160
12:00 - 13:00	45	41	40	31	157
13:00 - 14:00	47	41	34	40	162
14:00 - 15:00	43	39	40	68	190
15:00 - 16:00	91	115	89	67	362
16:00 - 17:00	87	74	77	91	329
17:00 - 18:00	93	85	78	76	332
18:00 - 19:00	64	51	42	28	185
19:00 - 20:00	35	28	23	33	119
20:00 - 21:00	22	12	18	18	70
21:00 - 22:00	17	12	11	9	49
22:00 - 23:00	8	4	2	4	18
23:00 - 00:00	2	4	3	3	12

Description	Volume	Time
Maximum AM 15-minute volume	57	08:30 - 08:45
Maximum PM 15-minute volume	115	15:15 - 15:30
Total Volume 12 Hours	2437	07:00 - 19:00
Total Volume 24 Hours	2824	00:00 - 00:00

Report Type	SelDate	Server	ObjType	Det_Desc	SubPercent
DAILY	17/10/2023	TMR QRS S	Detector	M3366/VD7	0

Time	Qtr1	Qtr2	Qtr3	Qtr4	TotalHour
00:00 - 01:00	0	0	0	0	0
01:00 - 02:00	1	0	0	0	1
02:00 - 03:00	0	0	0	0	0
03:00 - 04:00	0	0	0	0	0
04:00 - 05:00	0	0	0	3	3
05:00 - 06:00	2	1	0	12	15
06:00 - 07:00	22	17	12	23	74
07:00 - 08:00	17	16	22	14	69
08:00 - 09:00	23	17	23	28	91
09:00 - 10:00	30	32	27	23	112
10:00 - 11:00	27	34	23	31	115
11:00 - 12:00	27	28	39	16	110
12:00 - 13:00	35	25	23	32	115
13:00 - 14:00	25	27	17	26	95
14:00 - 15:00	32	26	23	37	118
15:00 - 16:00	44	56	54	47	201
16:00 - 17:00	52	40	47	63	202
17:00 - 18:00	50	52	47	46	195
18:00 - 19:00	60	36	30	29	155
19:00 - 20:00	22	22	20	23	87
20:00 - 21:00	22	11	12	16	61
21:00 - 22:00	11	5	4	3	23
22:00 - 23:00	8	1	3	4	16
23:00 - 00:00	0	2	1	3	6

Description	Volume	Time
Maximum AM 15-minute volume	39	11:30 - 11:45
Maximum PM 15-minute volume	63	16:45 - 17:00
Total Volume 12 Hours	1578	07:00 - 19:00
Total Volume 24 Hours	1864	00:00 - 00:00

Report Type	SelDate	Server	ObjType	Det_Desc	SubPercent
DAILY	17/10/2023	TMR QRS S	Detector	M3366/VD8	0

Time	Qtr1	Qtr2	Qtr3	Qtr4	TotalHour
00:00 - 01:00	0	1	1	1	3
01:00 - 02:00	0	0	0	0	0
02:00 - 03:00	0	0	0	0	0
03:00 - 04:00	0	0	0	0	0
04:00 - 05:00	0	4	6	6	16
05:00 - 06:00	3	3	8	14	28
06:00 - 07:00	18	24	26	33	101
07:00 - 08:00	42	58	103	95	298
08:00 - 09:00	98	100	59	32	289
09:00 - 10:00	23	31	33	21	108
10:00 - 11:00	34	21	28	26	109
11:00 - 12:00	27	22	21	30	100
12:00 - 13:00	15	25	17	15	72
13:00 - 14:00	22	19	21	18	80
14:00 - 15:00	30	30	37	26	123
15:00 - 16:00	28	30	34	35	127
16:00 - 17:00	32	38	38	48	156
17:00 - 18:00	28	27	25	22	102
18:00 - 19:00	16	19	18	13	66
19:00 - 20:00	19	16	10	11	56
20:00 - 21:00	8	7	12	6	33
21:00 - 22:00	1	4	1	1	7
22:00 - 23:00	1	0	0	0	1
23:00 - 00:00	2	1	0	0	3

Description	Volume	Time
Maximum AM 15-minute volume	103	07:30 - 07:45
Maximum PM 15-minute volume	48	16:45 - 17:00
Total Volume 12 Hours	1630	07:00 - 19:00
Total Volume 24 Hours	1878	00:00 - 00:00

Report Type	SelDate	Server	ObjType	Det_Desc	SubPercent
DAILY	17/10/2023	TMR QRS S	Detector	M3366/VD9	0

Time	Qtr1	Qtr2	Qtr3	Qtr4	TotalHour
00:00 - 01:00	2	2	0	2	6
01:00 - 02:00	0	0	0	0	0
02:00 - 03:00	0	1	2	1	4
03:00 - 04:00	0	0	2	0	2
04:00 - 05:00	5	6	13	12	36
05:00 - 06:00	11	14	22	23	70
06:00 - 07:00	33	39	43	50	165
07:00 - 08:00	52	82	113	137	384
08:00 - 09:00	130	122	88	57	397
09:00 - 10:00	65	56	49	52	222
10:00 - 11:00	55	45	38	49	187
11:00 - 12:00	46	42	43	42	173
12:00 - 13:00	32	44	42	40	158
13:00 - 14:00	33	25	41	39	138
14:00 - 15:00	52	61	62	65	240
15:00 - 16:00	44	45	44	62	195
16:00 - 17:00	42	49	48	55	194
17:00 - 18:00	40	32	37	45	154
18:00 - 19:00	29	35	37	23	124
19:00 - 20:00	31	23	17	14	85
20:00 - 21:00	19	13	10	6	48
21:00 - 22:00	5	10	8	8	31
22:00 - 23:00	2	1	4	3	10
23:00 - 00:00	0	2	1	0	3

Description	Volume	Time
Maximum AM 15-minute volume	137	07:45 - 08:00
Maximum PM 15-minute volume	65	14:45 - 15:00
Total Volume 12 Hours	2566	07:00 - 19:00
Total Volume 24 Hours	3026	00:00 - 00:00

Report Type	SelDate	Server	ObjType	Det_Desc	SubPercent
DAILY	17/10/2023	TMR QRS S	Detector	M3366/VD10	0

Time	Qtr1	Qtr2	Qtr3	Qtr4	TotalHour
00:00 - 01:00	0	2	1	1	4
01:00 - 02:00	0	0	0	0	0
02:00 - 03:00	0	0	0	0	0
03:00 - 04:00	0	0	0	0	0
04:00 - 05:00	0	3	6	6	15
05:00 - 06:00	4	3	9	14	30
06:00 - 07:00	21	23	30	36	110
07:00 - 08:00	40	59	102	98	299
08:00 - 09:00	96	99	58	37	290
09:00 - 10:00	29	26	27	25	107
10:00 - 11:00	29	18	29	26	102
11:00 - 12:00	27	25	19	30	101
12:00 - 13:00	17	24	20	16	77
13:00 - 14:00	22	18	21	17	78
14:00 - 15:00	32	28	36	27	123
15:00 - 16:00	26	27	33	39	125
16:00 - 17:00	33	39	36	47	155
17:00 - 18:00	25	26	24	23	98
18:00 - 19:00	17	20	18	13	68
19:00 - 20:00	18	17	9	11	55
20:00 - 21:00	8	6	11	6	31
21:00 - 22:00	1	4	1	1	7
22:00 - 23:00	1	0	1	0	2
23:00 - 00:00	2	1	0	1	4

Description	Volume	Time
Maximum AM 15-minute volume	102	07:30 - 07:45
Maximum PM 15-minute volume	47	16:45 - 17:00
Total Volume 12 Hours	1623	07:00 - 19:00
Total Volume 24 Hours	1881	00:00 - 00:00

Report Type	SelDate	Server	ObjType	Det_Desc	SubPercent
DAILY	17/10/2023	TMR QRS S	Detector	M3366/VD11	0

Time	Qtr1	Qtr2	Qtr3	Qtr4	TotalHour
00:00 - 01:00	2	4	1	2	9
01:00 - 02:00	0	0	0	0	0
02:00 - 03:00	0	1	2	1	4
03:00 - 04:00	0	0	3	0	3
04:00 - 05:00	5	10	16	18	49
05:00 - 06:00	12	12	26	34	84
06:00 - 07:00	46	56	67	69	238
07:00 - 08:00	73	122	166	169	530
08:00 - 09:00	165	152	114	74	505
09:00 - 10:00	78	57	59	60	254
10:00 - 11:00	69	58	48	57	232
11:00 - 12:00	58	51	49	49	207
12:00 - 13:00	42	42	41	46	171
13:00 - 14:00	38	29	42	44	153
14:00 - 15:00	58	57	66	75	256
15:00 - 16:00	62	53	51	73	239
16:00 - 17:00	53	62	54	74	243
17:00 - 18:00	52	46	51	53	202
18:00 - 19:00	43	46	45	31	165
19:00 - 20:00	47	34	23	26	130
20:00 - 21:00	25	16	20	12	73
21:00 - 22:00	6	12	11	8	37
22:00 - 23:00	2	1	4	3	10
23:00 - 00:00	1	1	1	1	4

Description	Volume	Time
Maximum AM 15-minute volume	169	07:45 - 08:00
Maximum PM 15-minute volume	75	14:45 - 15:00
Total Volume 12 Hours	3157	07:00 - 19:00
Total Volume 24 Hours	3798	00:00 - 00:00

Report Type	SelDate	Server	ObjType	Det_Desc	SubPercent
DAILY	17/10/2023	TMR QRS S	Detector	M3366/VD12	0

Time	Qtr1	Qtr2	Qtr3	Qtr4	TotalHour
00:00 - 01:00	0	0	0	0	0
01:00 - 02:00	0	0	0	0	0
02:00 - 03:00	0	1	0	0	1
03:00 - 04:00	0	0	2	0	2
04:00 - 05:00	0	1	6	6	13
05:00 - 06:00	9	4	6	9	28
06:00 - 07:00	8	19	13	16	56
07:00 - 08:00	25	23	25	38	111
08:00 - 09:00	45	25	14	16	100
09:00 - 10:00	16	21	18	4	59
10:00 - 11:00	13	14	11	6	44
11:00 - 12:00	8	7	7	13	35
12:00 - 13:00	8	16	10	11	45
13:00 - 14:00	9	10	15	17	51
14:00 - 15:00	17	10	16	14	57
15:00 - 16:00	23	14	15	19	71
16:00 - 17:00	15	18	16	15	64
17:00 - 18:00	19	17	15	12	63
18:00 - 19:00	9	14	18	8	49
19:00 - 20:00	8	11	5	10	34
20:00 - 21:00	2	3	5	6	16
21:00 - 22:00	1	9	1	3	14
22:00 - 23:00	1	3	2	0	6
23:00 - 00:00	0	1	1	0	2

Description	Volume	Time
Maximum AM 15-minute volume	45	08:00 - 08:15
Maximum PM 15-minute volume	23	15:00 - 15:15
Total Volume 12 Hours	749	07:00 - 19:00
Total Volume 24 Hours	921	00:00 - 00:00

Report Type	SelDate	Server	ObjType	Det_Desc	SubPercent
DAILY	17/10/2023	TMR QRS S	Detector	M3366/VD13	0

Time	Qtr1	Qtr2	Qtr3	Qtr4	TotalHour
00:00 - 01:00	2	1	0	1	4
01:00 - 02:00	0	0	0	0	0
02:00 - 03:00	0	2	1	1	4
03:00 - 04:00	0	0	4	0	4
04:00 - 05:00	5	6	16	15	42
05:00 - 06:00	18	18	24	35	95
06:00 - 07:00	42	59	54	58	213
07:00 - 08:00	71	105	131	155	462
08:00 - 09:00	171	134	106	72	483
09:00 - 10:00	81	69	59	59	268
10:00 - 11:00	72	62	50	51	235
11:00 - 12:00	58	50	54	56	218
12:00 - 13:00	42	55	49	49	195
13:00 - 14:00	43	36	49	55	183
14:00 - 15:00	60	64	79	79	282
15:00 - 16:00	73	57	52	71	253
16:00 - 17:00	55	71	63	67	256
17:00 - 18:00	59	46	51	47	203
18:00 - 19:00	40	49	48	32	169
19:00 - 20:00	33	34	20	26	113
20:00 - 21:00	19	17	16	12	64
21:00 - 22:00	6	11	9	9	35
22:00 - 23:00	5	2	6	3	16
23:00 - 00:00	0	2	2	1	5

Description	Volume	Time
Maximum AM 15-minute volume	171	08:00 - 08:15
Maximum PM 15-minute volume	79	14:30 - 14:45
Total Volume 12 Hours	3207	07:00 - 19:00
Total Volume 24 Hours	3802	00:00 - 00:00

Report Type	SelDate	Server	ObjType	Det_Desc	SubPercent
DAILY	17/10/2023	TMR QRS S	Detector	M3366/VD14	0

Time	Qtr1	Qtr2	Qtr3	Qtr4	TotalHour
00:00 - 01:00	0	1	1	1	3
01:00 - 02:00	0	0	0	0	0
02:00 - 03:00	0	0	0	0	0
03:00 - 04:00	0	0	0	0	0
04:00 - 05:00	1	4	8	7	20
05:00 - 06:00	6	5	12	15	38
06:00 - 07:00	18	27	29	35	109
07:00 - 08:00	43	61	109	93	306
08:00 - 09:00	110	109	66	37	322
09:00 - 10:00	33	33	39	27	132
10:00 - 11:00	34	22	29	30	115
11:00 - 12:00	27	26	22	32	107
12:00 - 13:00	15	27	20	18	80
13:00 - 14:00	25	19	25	21	90
14:00 - 15:00	36	33	42	33	144
15:00 - 16:00	27	32	34	44	137
16:00 - 17:00	32	39	43	53	167
17:00 - 18:00	30	29	28	23	110
18:00 - 19:00	20	21	25	14	80
19:00 - 20:00	21	18	11	12	62
20:00 - 21:00	7	6	12	8	33
21:00 - 22:00	1	7	1	1	10
22:00 - 23:00	1	2	1	0	4
23:00 - 00:00	2	1	0	0	3

Description	Volume	Time
Maximum AM 15-minute volume	110	08:00 - 08:15
Maximum PM 15-minute volume	53	16:45 - 17:00
Total Volume 12 Hours	1790	07:00 - 19:00
Total Volume 24 Hours	2072	00:00 - 00:00

Report Type	SelDate	Server	ObjType	Det_Desc	SubPercent
DAILY	17/10/2023	TMR QRS S	Detector	M3366/VD15	0

Time	Qtr1	Qtr2	Qtr3	Qtr4	TotalHour
00:00 - 01:00	2	2	1	0	5
01:00 - 02:00	2	0	0	0	2
02:00 - 03:00	1	0	0	0	1
03:00 - 04:00	0	0	2	1	3
04:00 - 05:00	0	4	0	5	9
05:00 - 06:00	3	6	5	19	33
06:00 - 07:00	26	23	32	26	107
07:00 - 08:00	28	25	40	37	130
08:00 - 09:00	37	40	49	37	163
09:00 - 10:00	42	47	46	27	162
10:00 - 11:00	34	42	36	33	145
11:00 - 12:00	43	37	47	32	159
12:00 - 13:00	45	37	30	38	150
13:00 - 14:00	46	41	28	45	160
14:00 - 15:00	41	37	42	51	171
15:00 - 16:00	73	83	81	53	290
16:00 - 17:00	70	66	75	93	304
17:00 - 18:00	78	71	63	56	268
18:00 - 19:00	78	46	47	38	209
19:00 - 20:00	35	32	32	29	128
20:00 - 21:00	33	18	14	21	86
21:00 - 22:00	16	10	13	7	46
22:00 - 23:00	10	3	4	4	21
23:00 - 00:00	2	3	4	4	13

Description	Volume	Time
Maximum AM 15-minute volume	49	08:30 - 08:45
Maximum PM 15-minute volume	93	16:45 - 17:00
Total Volume 12 Hours	2311	07:00 - 19:00
Total Volume 24 Hours	2765	00:00 - 00:00

Report Type	SelDate	Server	ObjType	Det_Desc	SubPercent
DAILY	17/10/2023	TMR QRS S	Detector	M3366/VD16	0

Time	Qtr1	Qtr2	Qtr3	Qtr4	TotalHour
00:00 - 01:00	4	2	2	0	8
01:00 - 02:00	1	0	0	0	1
02:00 - 03:00	0	1	1	0	2
03:00 - 04:00	0	0	2	1	3
04:00 - 05:00	0	3	0	4	7
05:00 - 06:00	4	12	8	13	37
06:00 - 07:00	14	16	40	25	95
07:00 - 08:00	27	24	41	39	131
08:00 - 09:00	43	52	66	46	207
09:00 - 10:00	31	38	40	31	140
10:00 - 11:00	38	34	53	32	157
11:00 - 12:00	47	41	43	41	172
12:00 - 13:00	45	42	39	34	160
13:00 - 14:00	52	45	38	46	181
14:00 - 15:00	43	43	49	63	198
15:00 - 16:00	93	129	92	71	385
16:00 - 17:00	93	83	75	96	347
17:00 - 18:00	101	85	79	81	346
18:00 - 19:00	64	51	39	34	188
19:00 - 20:00	32	26	22	33	113
20:00 - 21:00	25	13	18	15	71
21:00 - 22:00	15	13	13	6	47
22:00 - 23:00	11	6	2	4	23
23:00 - 00:00	2	4	2	3	11

Description	Volume	Time
Maximum AM 15-minute volume	66	08:30 - 08:45
Maximum PM 15-minute volume	129	15:15 - 15:30
Total Volume 12 Hours	2612	07:00 - 19:00
Total Volume 24 Hours	3030	00:00 - 00:00

Report Type	SelDate	Server	ObjType	Det_Desc	SubPercent
DAILY	17/10/2023	TMR QRS S	Detector	M3366/VD17	0

Time	Qtr1	Qtr2	Qtr3	Qtr4	TotalHour
00:00 - 01:00	0	0	0	2	2
01:00 - 02:00	0	0	0	0	0
02:00 - 03:00	0	0	0	1	1
03:00 - 04:00	0	1	0	0	1
04:00 - 05:00	0	0	1	0	1
05:00 - 06:00	0	2	0	4	6
06:00 - 07:00	10	5	7	3	25
07:00 - 08:00	2	8	9	10	29
08:00 - 09:00	12	6	6	6	30
09:00 - 10:00	10	9	4	5	28
10:00 - 11:00	4	5	2	5	16
11:00 - 12:00	8	6	2	12	28
12:00 - 13:00	6	4	7	6	23
13:00 - 14:00	6	3	3	5	17
14:00 - 15:00	4	1	6	8	19
15:00 - 16:00	14	17	14	17	62
16:00 - 17:00	9	21	7	18	55
17:00 - 18:00	9	11	8	10	38
18:00 - 19:00	7	12	10	7	36
19:00 - 20:00	3	8	1	1	13
20:00 - 21:00	6	2	3	1	12
21:00 - 22:00	2	4	2	2	10
22:00 - 23:00	0	2	0	1	3
23:00 - 00:00	2	1	0	0	3

Description	Volume	Time
Maximum AM 15-minute volume	12	08:00 - 08:15
Maximum PM 15-minute volume	21	16:15 - 16:30
Total Volume 12 Hours	381	07:00 - 19:00
Total Volume 24 Hours	458	00:00 - 00:00

APPENDIX C

CRASH FACTOR MATRIX AND QLD DCA CODES

P000463
Crash Factor Matrix

Number of crashes each year

DCA Code	Direction of key vehicle	Total	Crash Refs	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Hervey Range Road																				
104	East	1	#13				1													
202	West	13	#5, #6, #7, #8, #9, #11, #12, #18, #29, #30, #33, #35, #49				2	1			1	1		2	1		2	1	2	
207	West	1	#43						1											
301	West	1	#3				1													
301	East	1	#48														1			
301	**SUM**	**2**		**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**
804	West	2	#19, #26							1									1	
Total				**0**	**0**	**0**	**3**	**1**	**1**	**1**	**1**	**1**	**0**	**2**	**1**	**0**	**3**	**1**	**3**	**0**
Ring Road On Ramp (S)																				
804	South	1	#2					1												
Total				**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

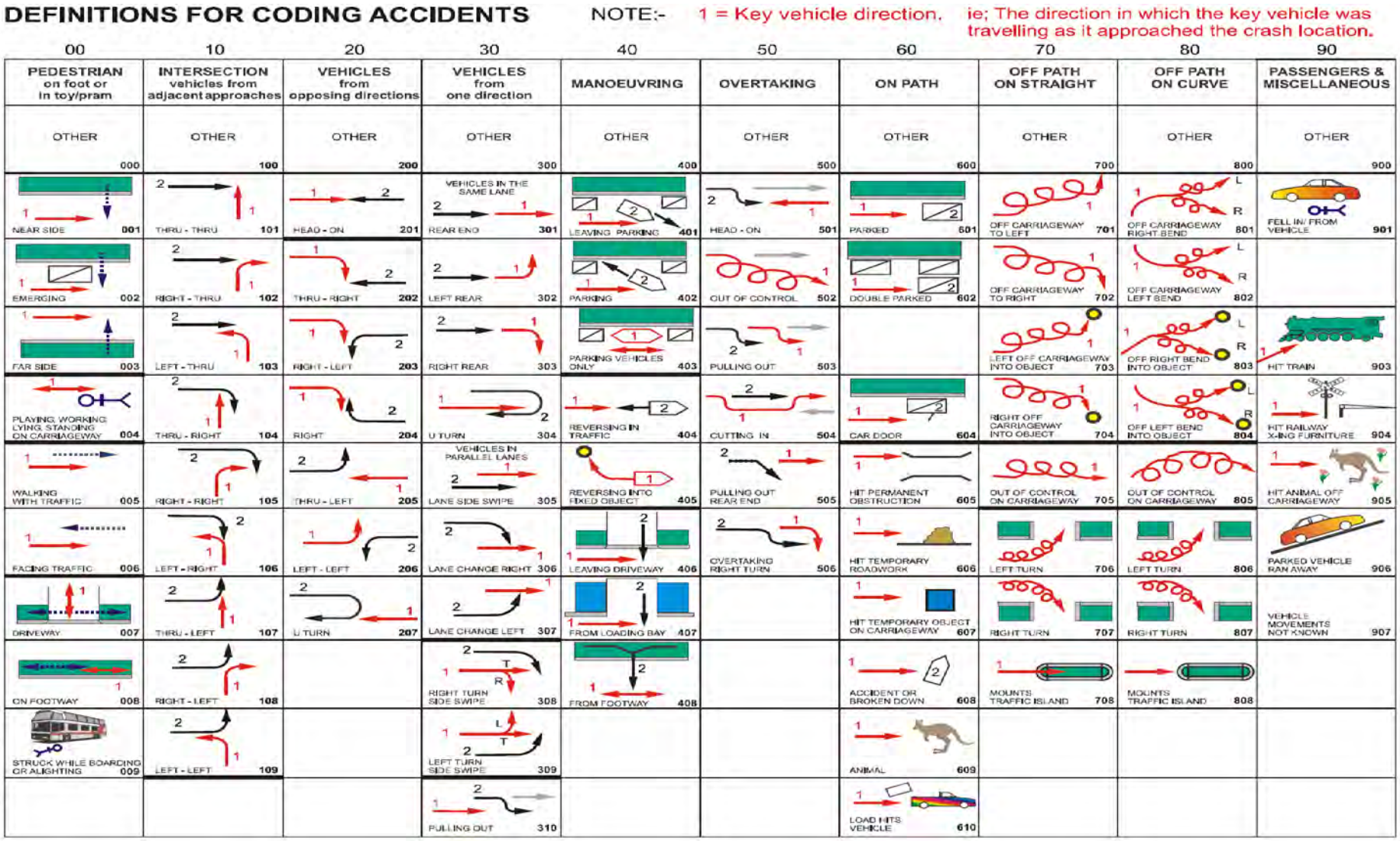
Direction of opposing vehicles / Type of road users / Surface conditi

DCA Code	Direction of key vehicle	North	East	South	West	No Primary	Animal - other	Animal - stock	Pedestrian	Bicycle	Bus/Coach	Moped	Motorcycle	Car/Station wagon	Utility/Panel van	Rigid truck	Articulated truck	Road train/B-double/Triple	Special Purpose Vehicle	Railway stock	Towed device	Other	Sealed - Dry	Sealed - Wet
Hervey Range Road																								
104	East			1										1	1								1	
202	West		15										1	20	6	1							13	1
207	West		1											2									1	
301	West				1									1	1								1	
301	East		2											3									1	
301	**SUM**	**0**	**2**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**4**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**0**
804	West					2								1	1									1
Total		**0**	**18**	**0**	**1**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**27**	**8**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**16**	**2**
Ring Road On Ramp (S)																								
804	South					1								1									1	
Total		**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**

Time-of-day / Intersecting Road Name / Severity

DCA Code	Direction of key vehicle	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Bruce Highway / Ring Road	Hogarth Drive	Internal Road Network	N/A	Property damage only	Minor injury	Medical treatment	Hospitalisation	Fatal
Hervey Range Road																																		
104	East																	1								1				1				
202	West						1	1	1			1	1			3	1		2	1		1				12				2		5	6	
207	West														1											1						1		
301	West																		1							1				1				
301	East																								1	1							1	
301	**SUM**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**1**	**2**	**0**	**0**	**0**	**1**	**0**	**0**	**1**	**0**
804	West			1			1																						2				2	
Total		**0**	**0**	**1**	**0**	**0**	**2**	**1**	**1**	**0**	**0**	**1**	**1**	**0**	**1**	**3**	**1**	**0**	**3**	**1**	**0**	**1**	**0**	**0**	**1**	**15**	**0**	**0**	**2**	**3**	**0**	**6**	**9**	**0**
Ring Road On Ramp (S)																																		
804	South																		1											1				
Total		**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**

Figure B 3: Department of Transport and Main Roads Queensland



APPENDIX D

HARRIS CROSSING DEVELOPMENT SIDRA OUTPUTS

MOVEMENT SUMMARY

Site: W AM [HRR and Hogarth AM (Site Folder: 2040 Residential + Childcare)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Hervey Range Road and Hogarth Drive
Morning Peak
With Development 2040
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 60 seconds (Site Practical Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
East: Hervey Range Road															
5	T1	All MCs	292	5.0	292	5.0	0.113	3.5	LOS A	1.5	10.6	0.36	0.30	0.36	56.8
6	R2	All MCs	112	5.0	112	5.0	* 0.622	36.6	LOS D	3.5	25.3	1.00	0.82	1.11	36.5
Approach			403	5.0	403	5.0	0.622	12.6	LOS B	3.5	25.3	0.54	0.44	0.57	49.2
North: Hogarth Drive															
7	L2	All MCs	521	5.0	521	5.0	0.708	21.2	LOS C	10.5	77.0	0.89	0.95	0.93	43.3
9	R2	All MCs	148	5.0	148	5.0	* 0.709	36.8	LOS D	4.7	34.2	1.00	0.88	1.19	36.6
Approach			669	5.0	669	5.0	0.709	24.6	LOS C	10.5	77.0	0.91	0.93	0.99	41.6
West: Hervey Range Road															
10	L2	All MCs	114	5.0	114	5.0	0.082	9.4	LOS A	0.6	4.2	0.28	0.61	0.28	52.0
11	T1	All MCs	1478	5.0	1478	5.0	* 0.824	20.7	LOS C	22.1	161.3	0.92	0.94	1.07	45.5
Approach			1592	5.0	1592	5.0	0.824	19.9	LOS B	22.1	161.3	0.88	0.91	1.01	45.2
All Vehicles			2664	5.0	2664	5.0	0.824	20.0	LOS B	22.1	161.3	0.84	0.85	0.94	44.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
North: Hogarth Drive												
P3	Full	50	53	24.4	LOS C	0.1	0.1	0.90	0.90	178.2	200.0	1.12
All Pedestrians		50	53	24.4	LOS C	0.1	0.1	0.90	0.90	178.2	200.0	1.12

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

Organisation: PREMISE GROUP SERVICES PTY LTD | Licence: NETWORK / 1PC | Processed: Thursday, 22 February 2024 9:28:06 AM
Project: C:\12dS\data\12dSynergy\P000463 Harris Crossing LLC Development_16227\14. Engineering - Traffic\02. SIDRA\P000463 240219 Traffic Check.sip9

LANE SUMMARY

Site: W AM [HRR and Hogarth AM (Site Folder: 2040 Residential + Childcare)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Hervey Range Road and Hogarth Drive
Morning Peak
With Development 2040
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 60 seconds (Site Practical Cycle Time)

Lane Use and Performance

	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
East: Hervey Range Road															
Lane 1	146	5.0	146	5.0	1291	0.113	100	3.5	LOS A	1.5	10.6	Full	500	0.0	0.0
Lane 2	146	5.0	146	5.0	1291	0.113	100	3.5	LOS A	1.5	10.6	Full	500	0.0	0.0
Lane 3	112	5.0	112	5.0	179	0.622	100	36.6	LOS D	3.5	25.3	Short	95	0.0	NA
Approach	403	5.0	403	5.0		0.622		12.6	LOS B	3.5	25.3				
North: Hogarth Drive															
Lane 1	521	5.0	521	5.0	736	0.708	100	21.2	LOS C	10.5	77.0	Full	500	0.0	0.0
Lane 2	148	5.0	148	5.0	209	0.709	100	36.8	LOS D	4.7	34.2	Short	60	0.0	NA
Approach	669	5.0	669	5.0		0.709		24.6	LOS C	10.5	77.0				
West: Hervey Range Road															
Lane 1	114	5.0	114	5.0	1390	0.082	100	9.4	LOS A	0.6	4.2	Short	60	0.0	NA
Lane 2	725	5.0	725	5.0	880[1]	0.824	100	22.1	LOS C	21.4	156.2	Full	500	0.0	0.0
Lane 3	752	5.0	752	5.0	913	0.824	100	19.3	LOS B	22.1	161.3	Full	500	0.0	0.0
Approach	1592	5.0	1592	5.0		0.824		19.9	LOS B	22.1	161.3				
All Vehicles	2664	5.0	2664	5.0		0.824		20.0	LOS B	22.1	161.3				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Delay and stops experienced by drivers upstream of short lane entry have been accounted for.

Approach Lane Flows (veh/h)

East: Hervey Range Road

Mov. From E To Exit:	T1 W	R2 N	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	146	-	146	5.0	1291	0.113	100	NA	NA
Lane 2	146	-	146	5.0	1291	0.113	100	NA	NA
Lane 3	-	112	112	5.0	179	0.622	100	0.0	2
Approach	292	112	403	5.0		0.622			

North: Hogarth Drive

Mov. From N To Exit:	L2 E	R2 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.

Lane 1	521	-	521	5.0	736	0.708	100	NA	NA
Lane 2	-	148	148	5.0	209	0.709	100	0.0	1
Approach	521	148	669	5.0		0.709			
West: Hervey Range Road									
Mov. From W To Exit:	L2 N	T1 E	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	114	-	114	5.0	1390	0.082	100	0.0	2
Lane 2	-	725	725	5.0	880[1]	0.824	100	NA	NA
Lane 3	-	752	752	5.0	913	0.824	100	NA	NA
Approach	114	1478	1592	5.0		0.824			
	Total	%HV	Deg.Satn (v/c)						
All Vehicles	2664	5.0	0.824						

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

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Delay and stops experienced by drivers upstream of short lane entry have been accounted for.

Merge Analysis

	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate veh/h	Critical Gap pcu/h	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
There are no Exit Short Lanes for Merge Analysis at this Site.											

Variable Demand Analysis

	Initial Queued Demand veh	Residual Queued Demand veh	Time for Residual Demand to Clear sec	Duration of Oversatn sec
East: Hervey Range Road				
Lane 1	0.0	0.0	0.0	0.0
Lane 2	0.0	0.0	0.0	0.0
Lane 3	0.0	0.0	0.0	0.0
North: Hogarth Drive				
Lane 1	0.0	0.0	0.0	0.0
Lane 2	0.0	0.0	0.0	0.0
West: Hervey Range Road				
Lane 1	0.0	0.0	0.0	0.0
Lane 2	0.0	0.0	0.0	0.0
Lane 3	0.0	0.0	0.0	0.0

DEGREE OF SATURATION

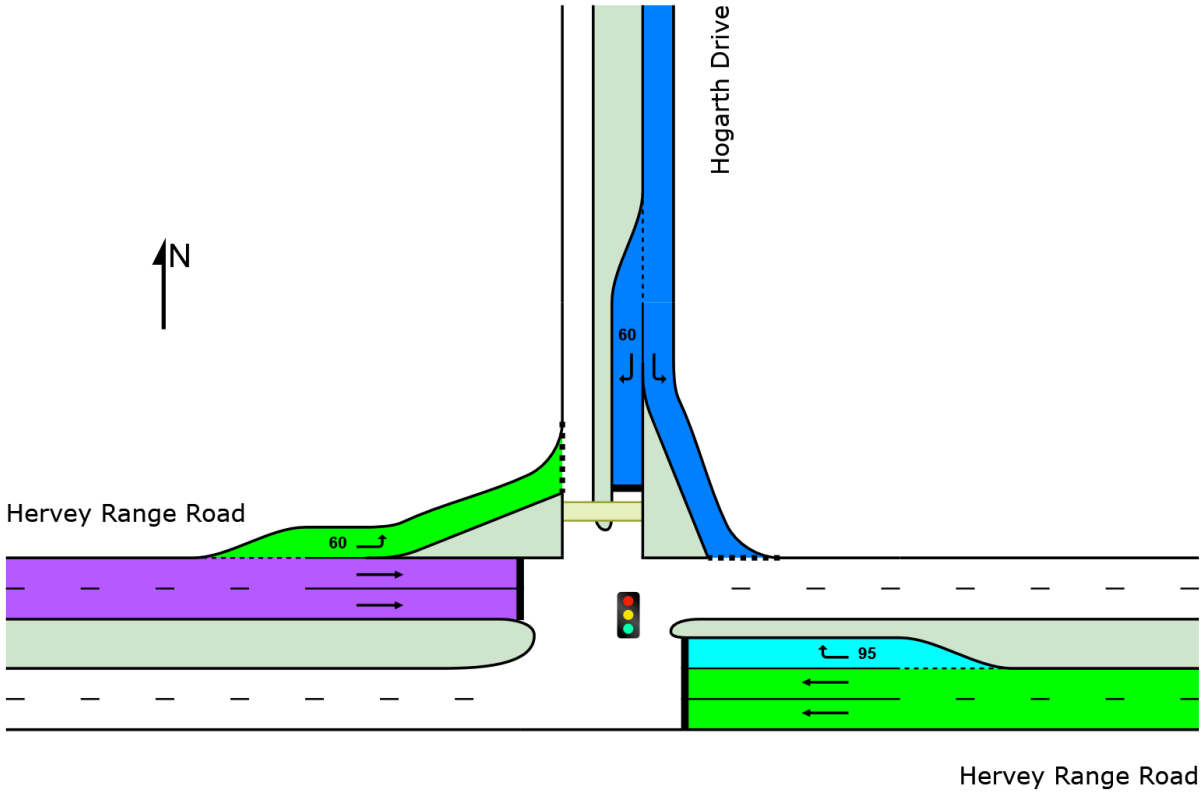
Ratio of Arrival Flow to Capacity, v/c ratio per lane

Site: W AM [HRR and Hogarth AM (Site Folder: 2040 Residential + Childcare)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Hervey Range Road and Hogarth Drive
Morning Peak
With Development 2040
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 60 seconds (Site Practical Cycle Time)

	Approaches			Intersection
	East	North	West	
Degree of Saturation	0.62	0.71	0.82	0.82



Colour code based on Degree of Saturation

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

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LEVEL OF SERVICE

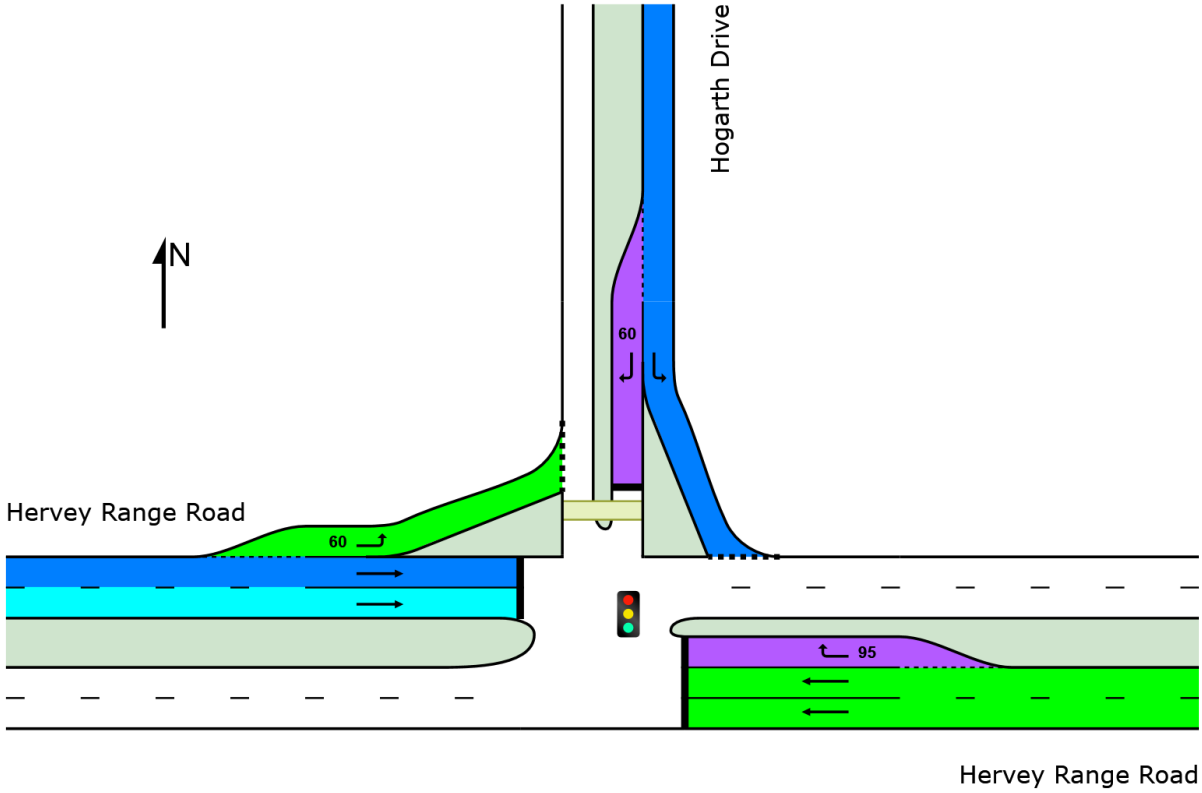
Lane Level of Service

Site: W AM [HRR and Hogarth AM (Site Folder: 2040 Residential + Childcare)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Hervey Range Road and Hogarth Drive
Morning Peak
With Development 2040
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 60 seconds (Site Practical Cycle Time)

	Approaches			Intersection
	East	North	West	
LOS	B	C	B	B



Colour code based on Level of Service

LOS A | LOS B | LOS C | LOS D | LOS E | LOS F

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Organisation: PREMISE GROUP SERVICES PTY LTD | Licence: NETWORK / 1PC | Processed: Thursday, 22 February 2024 9:28:06 AM
Project: C:\12dS\data\12dSynergy\P000463 Harris Crossing LLC Development_16227\14. Engineering - Traffic\02. SIDRA\P000463 240219 Traffic Check.sip9

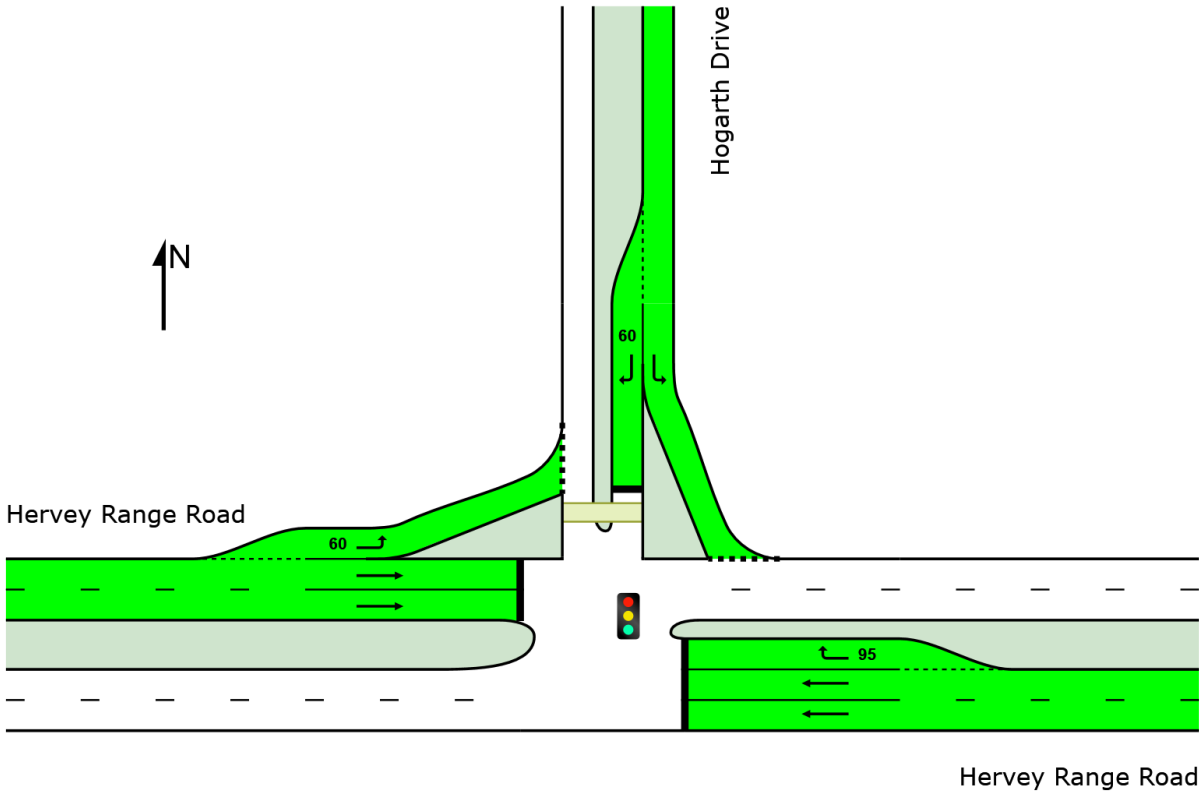
LANE BLOCKAGE PROBABILITY

Probability of blockage of upstream Site lanes by the subject lane

Site: W AM [HRR and Hogarth AM (Site Folder: 2040 Residential + Childcare)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Hervey Range Road and Hogarth Drive
Morning Peak
With Development 2040
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 60 seconds (Site Practical Cycle Time)



Colour code based on Lane Blockage Probability

[= 0%] [0 – 10%] [10 – 30%] [> 30%]

Organisation: PREMISE GROUP SERVICES PTY LTD | Licence: NETWORK / 1PC | Processed: Thursday, 22 February 2024 9:28:06 AM
Project: C:\12dS\data\12dSynergy\P000463 Harris Crossing LLC Development_16227\14. Engineering - Traffic\02. SIDRA\P000463 240219 Traffic Check.sip9

MOVEMENT SUMMARY

Site: W PM [HRR and Hogarth PM (Site Folder: 2040 Residential + Childcare)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Hervey Range Road and Hogarth Drive
Evening Peak
With Development 2040
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 50 seconds (Site Practical Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
East: Hervey Range Road															
5	T1	All MCs	764	5.0	764	5.0	0.316	4.4	LOS A	4.2	30.9	0.48	0.42	0.48	56.0
6	R2	All MCs	458	5.0	458	5.0	* 0.798	26.9	LOS C	12.0	87.5	0.97	0.95	1.19	40.4
Approach			1222	5.0	1222	5.0	0.798	12.8	LOS B	12.0	87.5	0.67	0.62	0.75	48.9
North: Hogarth Drive															
7	L2	All MCs	180	5.0	180	5.0	0.152	8.0	LOS A	1.3	9.3	0.41	0.65	0.41	51.1
9	R2	All MCs	98	5.0	98	5.0	* 0.455	29.7	LOS C	2.4	17.7	0.97	0.77	0.97	39.4
Approach			278	5.0	278	5.0	0.455	15.6	LOS B	2.4	17.7	0.61	0.69	0.61	46.3
West: Hervey Range Road															
10	L2	All MCs	140	5.0	140	5.0	0.141	9.8	LOS A	1.4	10.0	0.52	0.67	0.52	49.9
11	T1	All MCs	549	5.0	549	5.0	* 0.727	23.0	LOS C	7.0	51.3	0.99	0.90	1.16	43.5
Approach			689	5.0	689	5.0	0.727	20.3	LOS C	7.0	51.3	0.89	0.85	1.03	44.7
All Vehicles			2189	5.0	2189	5.0	0.798	15.5	LOS B	12.0	87.5	0.73	0.70	0.82	47.2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
North: Hogarth Drive												
P3	Full	50	53	19.4	LOS B	0.1	0.1	0.88	0.88	173.2	200.0	1.15
All Pedestrians		50	53	19.4	LOS B	0.1	0.1	0.88	0.88	173.2	200.0	1.15

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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LANE SUMMARY

Site: W PM [HRR and Hogarth PM (Site Folder: 2040 Residential + Childcare)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Hervey Range Road and Hogarth Drive
Evening Peak
With Development 2040
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 50 seconds (Site Practical Cycle Time)

Lane Use and Performance

	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
East: Hervey Range Road															
Lane 1	382	5.0	382	5.0	1209	0.316	100	4.4	LOS A	4.2	30.9	Full	500	0.0	0.0
Lane 2	382	5.0	382	5.0	1209	0.316	100	4.4	LOS A	4.2	30.9	Full	500	0.0	0.0
Lane 3	458	5.0	458	5.0	574	0.798	100	26.9	LOS C	12.0	87.5	Short	95	0.0	NA
Approach	1222	5.0	1222	5.0		0.798		12.8	LOS B	12.0	87.5				
North: Hogarth Drive															
Lane 1	180	5.0	180	5.0	1184	0.152	100	8.0	LOS A	1.3	9.3	Full	500	0.0	0.0
Lane 2	98	5.0	98	5.0	215	0.455	100	29.7	LOS C	2.4	17.7	Short	60	0.0	NA
Approach	278	5.0	278	5.0		0.455		15.6	LOS B	2.4	17.7				
West: Hervey Range Road															
Lane 1	140	5.0	140	5.0	990	0.141	100	9.8	LOS A	1.4	10.0	Short	60	0.0	NA
Lane 2	275	5.0	275	5.0	378	0.727	100	23.0	LOS C	7.0	51.3	Full	500	0.0	0.0
Lane 3	275	5.0	275	5.0	378	0.727	100	23.0	LOS C	7.0	51.3	Full	500	0.0	0.0
Approach	689	5.0	689	5.0		0.727		20.3	LOS C	7.0	51.3				
All Vehicles	2189	5.0	2189	5.0		0.798		15.5	LOS B	12.0	87.5				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Approach Lane Flows (veh/h)

East: Hervey Range Road

Mov. From E To Exit:	T1 W	R2 N	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	382	-	382	5.0	1209	0.316	100	NA	NA
Lane 2	382	-	382	5.0	1209	0.316	100	NA	NA
Lane 3	-	458	458	5.0	574	0.798	100	0.0	2
Approach	764	458	1222	5.0		0.798			

North: Hogarth Drive

Mov. From N To Exit:	L2 E	R2 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	180	-	180	5.0	1184	0.152	100	NA	NA

Lane 2	-	98	98	5.0	215	0.455	100	0.0	1
Approach	180	98	278	5.0		0.455			
West: Hervey Range Road									
Mov. From W To Exit:	L2 N	T1 E	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	140	-	140	5.0	990	0.141	100	0.0	2
Lane 2	-	275	275	5.0	378	0.727	100	NA	NA
Lane 3	-	275	275	5.0	378	0.727	100	NA	NA
Approach	140	549	689	5.0		0.727			
	Total	%HV	Deg.Satn (v/c)						
All Vehicles	2189	5.0	0.798						

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

Merge Analysis

	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
There are no Exit Short Lanes for Merge Analysis at this Site.												

Variable Demand Analysis

	Initial Queued Demand veh	Residual Queued Demand veh	Time for Residual Demand to Clear sec	Duration of Oversatn sec
East: Hervey Range Road				
Lane 1	0.0	0.0	0.0	0.0
Lane 2	0.0	0.0	0.0	0.0
Lane 3	0.0	0.0	0.0	0.0
North: Hogarth Drive				
Lane 1	0.0	0.0	0.0	0.0
Lane 2	0.0	0.0	0.0	0.0
West: Hervey Range Road				
Lane 1	0.0	0.0	0.0	0.0
Lane 2	0.0	0.0	0.0	0.0
Lane 3	0.0	0.0	0.0	0.0

DEGREE OF SATURATION

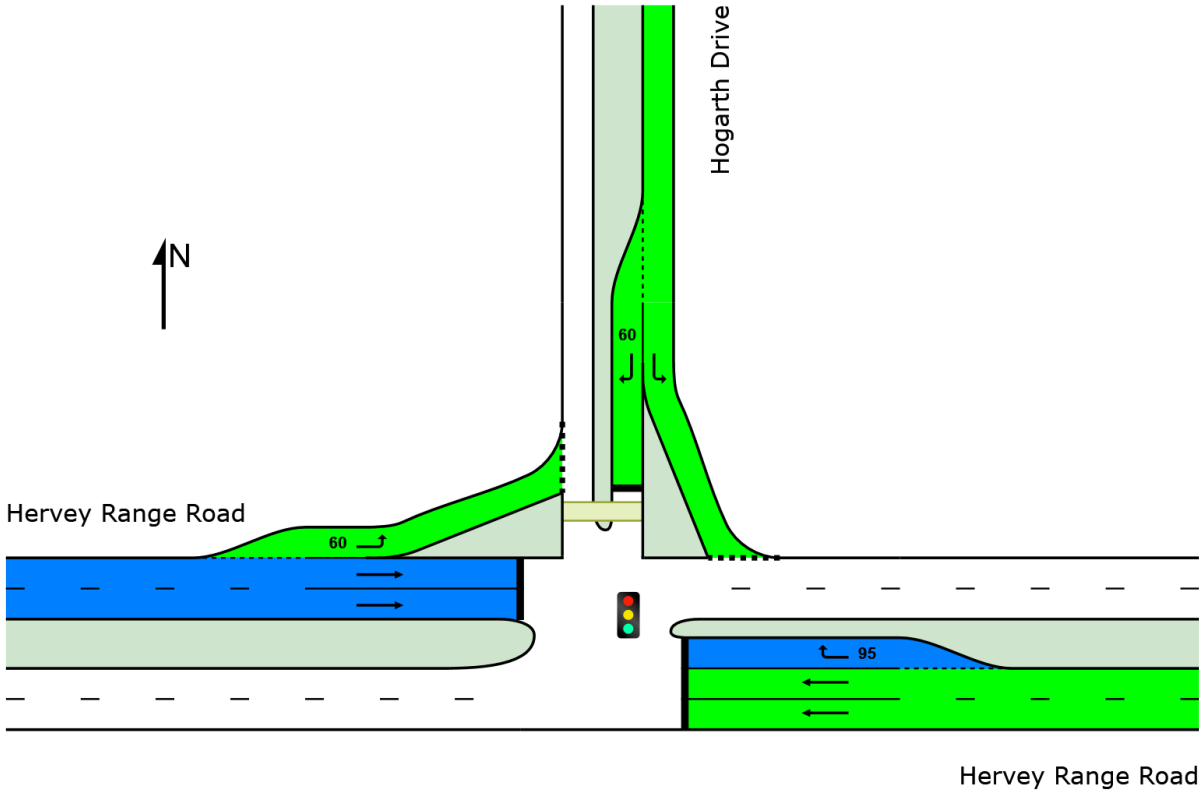
Ratio of Arrival Flow to Capacity, v/c ratio per lane

Site: W PM [HRR and Hogarth PM (Site Folder: 2040 Residential + Childcare)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Hervey Range Road and Hogarth Drive
Evening Peak
With Development 2040
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 50 seconds (Site Practical Cycle Time)

	Approaches			Intersection
	East	North	West	
Degree of Saturation	0.80	0.45	0.73	0.80



Colour code based on Degree of Saturation

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

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LEVEL OF SERVICE

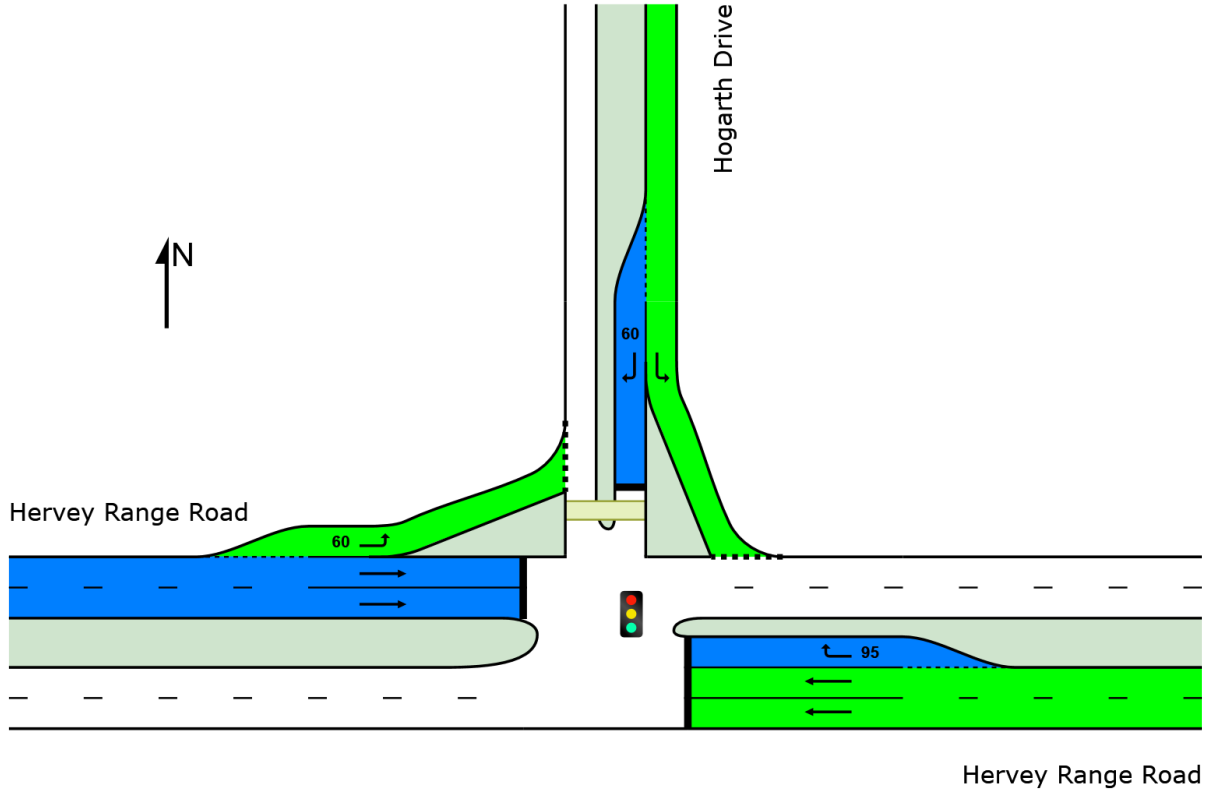
Lane Level of Service

Site: W PM [HRR and Hogarth PM (Site Folder: 2040 Residential + Childcare)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Hervey Range Road and Hogarth Drive
Evening Peak
With Development 2040
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 50 seconds (Site Practical Cycle Time)

	Approaches			Intersection
	East	North	West	
LOS	B	B	C	B



Colour code based on Level of Service

LOS A | LOS B | LOS C | LOS D | LOS E | LOS F

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

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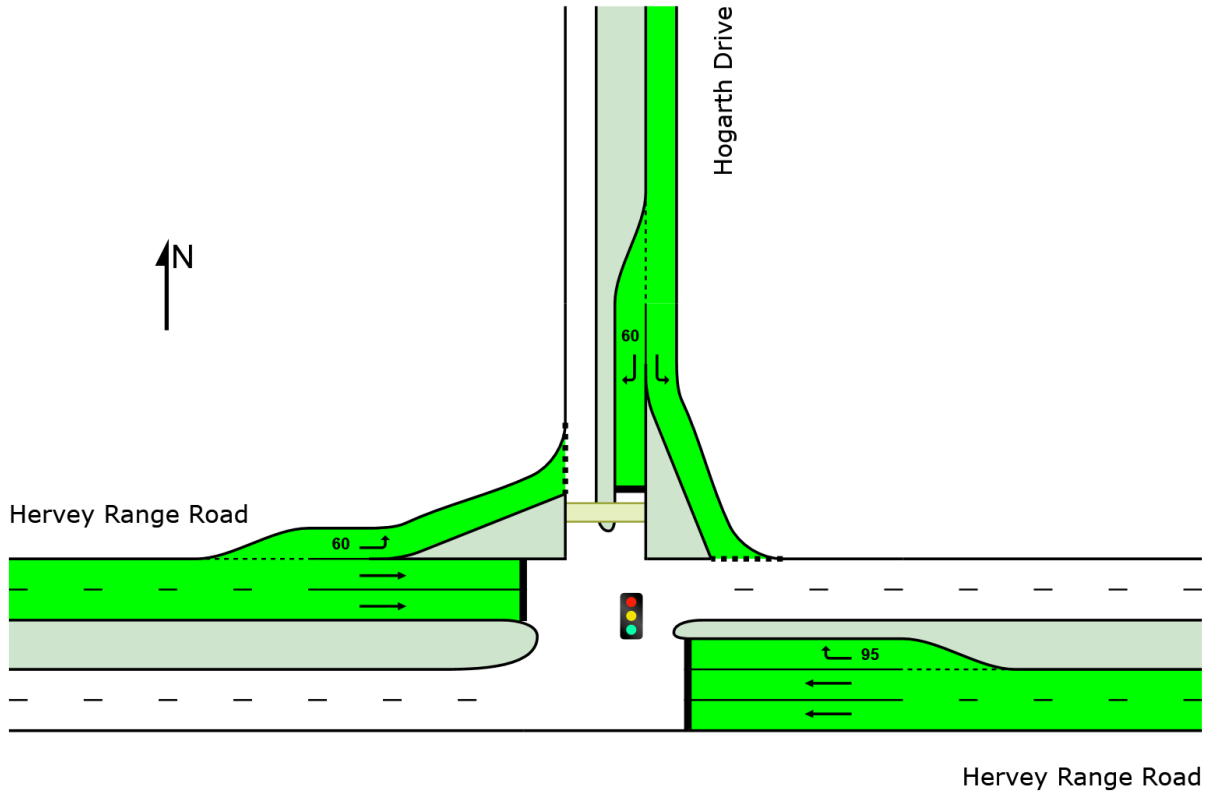
LANE BLOCKAGE PROBABILITY

Probability of blockage of upstream Site lanes by the subject lane

Site: W PM [HRR and Hogarth PM (Site Folder: 2040 Residential + Childcare)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Hervey Range Road and Hogarth Drive
Evening Peak
With Development 2040
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 50 seconds (Site Practical Cycle Time)



Colour code based on Lane Blockage Probability

[= 0%] [0 – 10%] [10 – 30%] [> 30%]

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APPENDIX E

TRAFFIC IMPACT ASSESSMENT CERTIFICATION

CERTIFICATION OF TRAFFIC IMPACT ASSESSMENT REPORT

REGISTERED PROFESSIONAL ENGINEER OF QUEENSLAND

FOR

Project Title	MAIDMENT GROUP HARRIS CROSSING DEVELOPMENT

As a professional engineer registered by the Board of Professional Engineers of Queensland pursuant to the Professional Engineers Act 2002 as competent in my areas of nominated expertise, I understand and recognise:

- The significant role of engineering as a profession; and that
- The community has a legitimate expectation that my certification affixed to this engineering work can be trusted; and that
- I am responsible for ensuring its preparation has satisfied all necessary standards, conduct and contemporary practice.

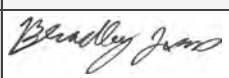
As the responsible RPEQ, I certify:

i) I am satisfied that all submitted components comprising this traffic impact assessment, listed in the following table, have been completed in accordance with the Guide to Traffic Impact Assessment published by the Queensland Department of Transport and Main Roads and using sound engineering principles; and

ii) Where specialised areas of work have not been under my direct supervision, I have reviewed the outcomes of the work and consider the work and its outcomes as suitable for the purposes of this traffic impact assessment; and that

iii) The outcomes of this traffic impact assessment are a true reflection of results of assessment; and that

iv) I believe the strategies recommended for mitigating impacts by this traffic impact assessment, embrace contemporary practice initiatives and will deliver the desired outcomes.

Name	Bradley Jones
RPEQ No.	19986
RPEQ Competencies	Civil Engineering
Email	bradley.jones@premise.com.au
Postal Address	Premise, 84 Denham Street TOWNSVILLE QLD 4810
Signature	
Date	29/02/2024

Traffic impact assessment components to which this certification applies	☒
1. Introduction	
Background	☒
Scope and study area	☒
Pre-lodgement meeting notes	☐
2. Existing Conditions	
Land use and zoning	☒
Adjacent land uses / approvals	☒
Surrounding road network details	☒
Traffic volumes	☒
Intersection and network performance	☐
Road safety issues	☒
Site access	☒
Public transport (if applicable)	☒
Active transport (if applicable)	☒
Parking (if applicable)	☐
Pavement (if applicable)	☐
Transport infrastructure (if applicable)	☐
3. Proposed Development Details	
Development site plan	☒
Operational details (including year of opening each stage and any relevant catchment / market analysis)	☒
Proposed access and parking	☒
4. Development Traffic	
Traffic generation (by development stage if relevant and considering light and heavy vehicle trips)	☒
Trip distribution	☒
Development traffic volumes on the network	☒
5. Impact Assessment and Mitigation	
With and without development traffic volumes	☒
Construction traffic impact assessment and mitigation (if applicable)	☐
Road safety impact assessment and mitigation	☒
Access and frontage impact assessment and mitigation	☒
Intersection delay impact assessment and mitigation	☒
Road link capacity assessment and mitigation	☒
Pavement impact assessment and mitigation	☐
Transport infrastructure impact assessment and mitigation	☐
Other impacts assessment relevant to the specific development type / location (if applicable)	☐
6. Conclusions and Recommendations	
Summary of impacts and mitigation measures proposed	☒
Certification statement and authorisation	☒

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