Victorian Planning Authority

VICTORIA State Government | Department of Transport and Planning

# Bendigo Regional Employment Precinct

## Guideline For Preparing Shared Infrastructure Plan

August 2026

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# 1. INTRODUCTION

The Bendigo Regional Employment Precinct Guideline for Preparing a Shared Infrastructure Plan (this document) provides a framework for shared infrastructure contributions and delivery within the Bendigo Regional Employment Precinct (BREP) including:

- contributions towards State-managed transport intersections and access points.
- precinct-wide drainage infrastructure and other identified shared infrastructure and
- the preparation of the Shared Infrastructure Plan (SIP) and the precinct-wide Drainage / Stormwater Management Strategy and Intersection and Access Strategy required under Schedule 34 to the Development Plan Overlay (DPO34).

This document operates:

- As a background document under Clause 72.08 of the Greater Bendigo Planning Scheme.
- As a guide for the City of Greater Bendigo's (CoGB) preparation of a Shared Infrastructure Plan for the BREP in accordance with Clause 74.02 (Further strategic work).
- As a policy guideline under Clause 11.03-6L-04 to support the implementation of regional employment and industrial growth objectives.

The SIP will be implemented through mandatory permit conditions under DPO34 requiring landowners to enter into agreements under section 173 of the *Planning and Environment Act 1987*.

## Scope Exclusions

This document does not address matters relating to:

- Utility infrastructure, such as rural water, power, urban water, and sewerage services.
- Localised works associated with individual development plans.
- Site-specific drainage works serving only an individual landholding (as distinct from shared infrastructure).
- The operation of permit conditions under the Schedule 34 to DPO in relation to the above local infrastructure projects.

These matters will be addressed separately as part of the preparation of a development plan under Clause 43.04 (Development Plan Overlay) and via planning permit conditions, as necessary.

This document also does not determine the specific contribution amount(s) applicable to each landholding or development.

The calculation and application of contribution rates are subject to the CoGB's administration and determination process.

## 1.1 Shared Infrastructure Plan

A SIP is a simplified development delivery and contributions tool that avoids the need for the complexity and cost of a planning scheme amendment process (required for a development contributions plan), while still achieving the same outcomes.

A SIP details the essential shared infrastructure required to service a new development plan area and sets out the obligations on landowners relating to works and / or payment of funds to the CoGB. The SIP will be implemented via section 173 agreements which will be registered on titles.

A SIP is best suited to the BREP because it has a low number of landowners (which allows easier negotiation), a small to medium number of projects, and low project complexity.

Although a SIP is not governed by the requirements of the Act, the CoGB will manage the SIP in a similar manner to a development contributions plan.

## 1.2 Proposed BREP Development and Contributions Model

Planning Scheme Amendment C296gben rezoned land within the BREP from the Farming Zone (FZ) to the Industrial 1 Zone and applied DPO34 to guide future subdivision and development of the precinct.

The DPO34 contemplates that shared infrastructure will be required. DPO34 and the SIP will enable the coordinated delivery of industrial development, infrastructure, and environmental outcomes across the precinct.

### When is a SIP required?

The precinct-wide SIP will be prepared and approved by the CoGB.

The SIP will implement the precinct wide Drainage / Stormwater Management Strategy and precinct wide Intersection and Access Strategy approved under DPO34. The preparation of the SIP will ensure that development proceeds in a coordinated and fully serviced manner, consistent with this document's recommendations.

### What does a SIP address?

The SIP prepared in accordance with this Guideline must:

- Provide arrangements for coordination between landowners within the precinct and relevant authorities, outlining cost sharing and the trigger for infrastructure provision, in accordance with the Greater Bendigo Development Contributions Governance Framework.
- Implement the Intersection and Access Strategy and the Drainage / Stormwater Management Strategy prepared in accordance with the DPO34.
- Provide arrangements for the provision and staging of infrastructure, both internal and external to the precinct area, including:
  - the scope, location and staging of infrastructure items, including any land to be provided or acquired.

- the expected timing of provision of each infrastructure item and who is responsible for delivery.
- the cost of any items that are the subject of financial contributions by development rather than direct delivery by the landowners.
- any land to be vested in the City of Greater Bendigo as required for shared infrastructure delivery.
- the location of infrastructure easements or installations, where known.
- the following projects, designed in consultation with and to the satisfaction of the Head, Transport for Victoria:
    - IT2 Calder Alternative Highway / Wimmera Highway intersection (single lane roundabout treatment).
    - IT3 Calder Highway / Calder Alternative Highway intersection (signalisation).
    - IT5 Calder Highway / Allies Road intersection (signalisation);
    - AP1 Unsignalised intersection with Wimmera Highway.
    - AP4 Unsignalised T-intersection with Wimmera Highway.
    - AP5 Roundabout intersection with the Calder Alternative Highway.
- shared drainage infrastructure identified in the Drainage / Stormwater Management Strategy.
- any other projects that the responsible authority considers will benefit multiple properties within the precinct.
- specification for each infrastructure project of the scope and location (including any land acquisition or vesting), timing and staging, delivery responsibility, costs where contributions or works in kind (WIK) applies, and any cost apportionment between the developers.
- apportionment of the cost of each intersection on the basis identified in the Access and Intersection Strategy, unless otherwise agreed by the Head, Transport for Victoria.
- Apportionment of the cost of access points AP1, AP4 and AP5 100 per cent to the precinct, allocated to each property within the precinct on a share of usage basis.
- Apportionment of the cost of shared drainage infrastructure between the properties that will benefit from that shared drainage infrastructure.
- Identification of a net developable hectare (NDHa) contributions rate for each property within the precinct, and how that rate will be indexed each year.

### How is the liability determined in the SIP?

The contribution rate for development of infrastructure is calculated according to the cost of the class of development (e.g. the total of cost of State transport items, the total cost of local transport items, and the total cost of drainage infrastructure) shared across the applicable NDHa.

If shared assets are designed to serve only part of a precinct, then the cost of those assets is shared only across the benefitting land.

*Example: If an area has two drainage catchments but one catchment is planned to be serviced by assets delivered by the development at the time of development, while the other catchments includes shared assets, the shared assets will only be charged to NDHa within the catchment benefitting from the shared assets.*

### How is the SIP implemented?

As required by the DP34, the SIP will be implemented by a section 173 agreement required by a permit condition.

## 1.3 State Arterial Road and Principal Freight Networks

The BREP is strategically positioned within Bendigo's western growth corridor, adjoining several State-managed declared arterial roads that form part of Victoria's Principal Freight Network (PFN). These corridors are managed by the Department of Transport and Planning (DTP) and play a critical role in supporting industrial, logistics, and regional economic activity.

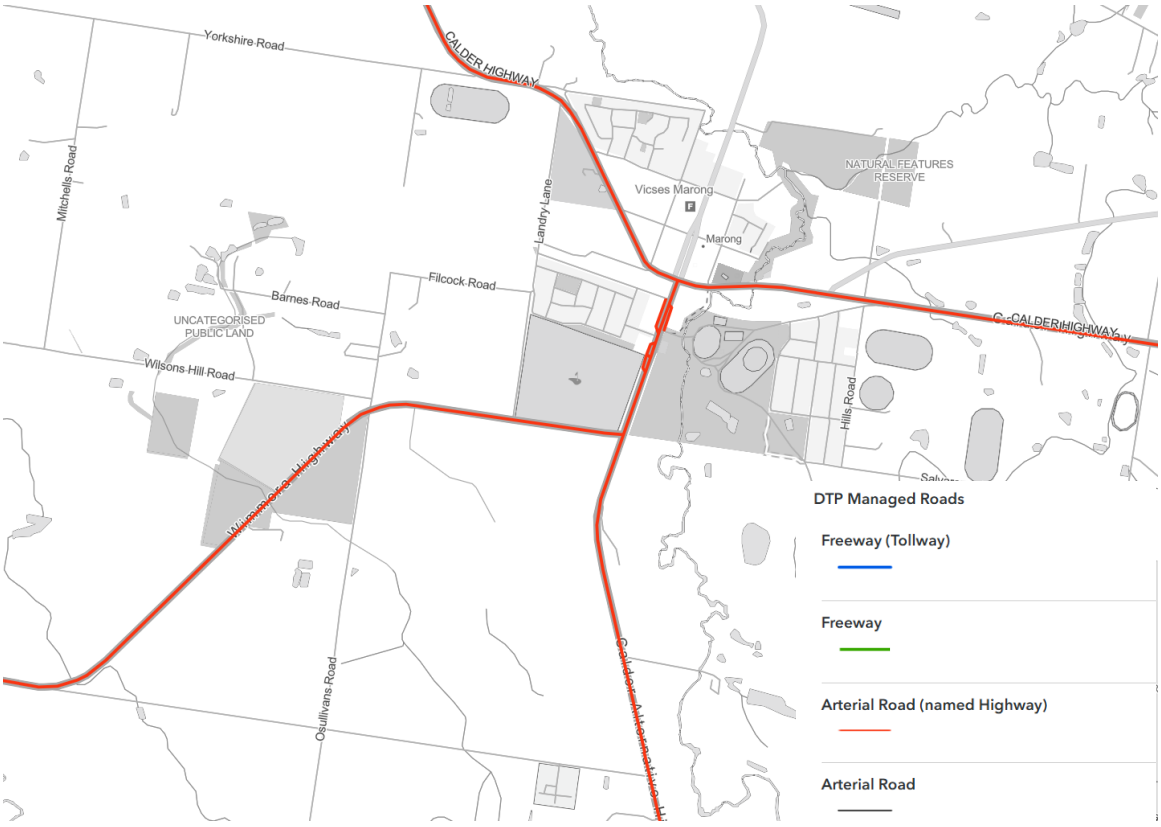



Figure 1 State-managed arterial road network

The Calder Alternative Highway and Wimmera Highway are the primary declared arterial roads adjoining the BREP which provide for the BREP access points (see **Table 1**).

The Calder Alternative Highway is a north–south freight and passenger corridor linking Bendigo to the Calder Freeway and Melbourne, and forms part of the PFN connecting regional freight generators with the national highway system.

The Wimmera Highway provides an east–west PFN connection between Marong and Newbridge, facilitating the movement of agricultural and industrial freight across western Victoria and complementing the Calder Alternative Highway for regional distribution.

These PFN corridors provide high-capacity, all-weather access for heavy vehicles and are designed to accommodate Higher Productivity Freight Vehicles (HPFVs) subject to route approval. Their designation under both the declared arterial network and the PFN underscores their state-significance in freight logistics and the importance of coordinating local access and intersection upgrades within BREP to align with DTP's long-term freight and safety strategies.

The planned Marong Western Freight Corridor (MWFC) will further strengthen this freight network by separating heavy vehicles from local traffic, improving freight efficiency, safety, and regional connectivity. The MWFC comprises the upgrade of the Wimmera Highway (the section adjoining the BREP) and intersection upgrades at McCreddons Road and the Calder Alternative Highway. These works are intended to provide a high-standard freight route supporting industrial traffic while reducing heavy vehicle movements through Marong township and adjoining local roads.

The delivery of the MWFC and associated intersection upgrades will be subject to separate State funding programs and future traffic demand assessments to determine their timing and scope. These upgrades (including the ultimate dual-lane configuration of IT2 Calder Alternative Highway / Wimmera Highway) are not included in the recommendations of this document, but will be coordinated with the BREP access points and broader regional transport planning to ensure long-term network integration and performance.




Figure 2 Preferred route of planned MWFC (DTP-Transport Services, 2024)

## 1.4 Marong Township Structure Plan 2024

The BREP and the Marong Township are functionally connected within the same State-managed transport network. The township provides the local residential base and services that support the workforce of the employment precinct, while the BREP generates freight and commuter movements that rely on the same arterial roads, particularly the Calder Highway, Calder Alternative Highway, and Wimmera Highway.

The Marong Township Structure Plan (MTSP) contemplates that shared infrastructure funding will be required to implement the recommendations of the MTSP. Some of this infrastructure will benefit both the MTSP and BREP. Accordingly, cost sharing and apportionment between the two areas needs to be considered in the preparation of the SIP.

# 2. ADOPTION OF DCP PRINCIPLES

The need for development contributions towards shared infrastructure has been determined based on the full build-out scenario of the BREP. For transport infrastructure, this will be informed by the Intersection and Access Strategy and in Table 1. For drainage infrastructure, this will be informed by the precinct-wide Drainage / Stormwater Management Strategy.

The identified projects are required to service the full development of the BREP and are therefore attributable to the precinct as a whole (or if infrastructure serves only part of the precinct, the relevant part), rather than to any single development stage or landholding. A development plan or planning permit application is not required to trigger the need for these projects in its own right.

Prior to their inclusion in DPO34, each project listed in DPO34 has been assessed to confirm its relationship or nexus to the BREP, consistent with the principles used in preparing a DCP. Any other project will be assessed as a part of SIP preparation to confirm its relationship or nexus to the BREP, consistent with the principles used in preparing a DCP.

The identified projects and their cost apportionment to BREP is guided by the key DCP principles in accordance with the Development Contributions Guidelines:

| | |
|---|---|
| **Needs** | Clearly establish the use of each project/infrastructure upgrade by new development within the BREP. |
| **Nexus** | Demonstrate the relationship between each project and the land it serves. The shared nexus is based on the entire BREP at full build-out, not just individual development. A new development is deemed to have a nexus with a project if it is expected to make use of that project. |
| **Share of Usage** | Ensure a fair and proportionate allocation of costs between benefiting land within and outside the BREP. |
| **Transparency** | Provide a clear rationale for project scope, costs and apportionment. |
| **Accountability** | Ensure governance, reporting and implementation are traceable and consistent. |

## 2.1 Charge Area

This Guideline recommend that development contributions be collected from all land within the BREP, although the SIP may specify one or more charge rates for different parts of the BREP.

This ensures that all development benefiting from the shared infrastructure contributes equitably to its funding and delivery.

## 2.2 Strategic Basis for inclusion of Drainage and Transport Infrastructure

The strategic basis for the inclusion of drainage and transport infrastructure in the SIP is informed by:

- The Planning Policy Framework as set out in the Greater Bendigo Planning Scheme.
- Regional DCP Toolkit (Victorian Planning Authority, July 2020).

- Development Contributions Guidelines (Department of Sustainability and Environment, 2007).
- Greater Bendigo Development Contribution Governance Framework.
- *Marong Township Structure Plan* (2024) and associated Shared Infrastructure Plan.
- Bendigo Regional Employment Precinct Background Report (Department of Transport and Planning, December 2025).
- Marong Transport Network Assessment (Stantec, November 2026).
- Consultation with Department of Transport and Planning - Transport Services and the City of Greater Bendigo.

These documents and works set out a broad, long-term vision for the sustainable development of the precinct and its surrounds.

# 3. DRAINAGE / STORMWATER MANAGEMENT INFRASTRUCTURE FRAMEWORK AND PRINCIPLES

The BREP encompasses two primary drainage catchments, each discharging to distinct legal points of discharge.

The Dry Creek tributary to the south-west and the Bullock Creek ephemeral tributary to the east form the principal drainage corridors of the precinct.

The drainage corridors are shown in the DPO34 Map 1 Concept Plan. Their protection and functional upgrade will be considered as part of the precinct wide Drainage / Stormwater Management Strategy.

The BREP's drainage infrastructure requirements are likely to range from site-specific works serving individual landholdings to shared corridor infrastructure serving multiple properties across the precinct. These matters will be determined through a Drainage / Stormwater Management Strategy. The DPO34 framework accommodates this variability through a tiered delivery approach, reflecting the principle that infrastructure costs should be borne proportionately by those whose development generates the need or derives a benefit.

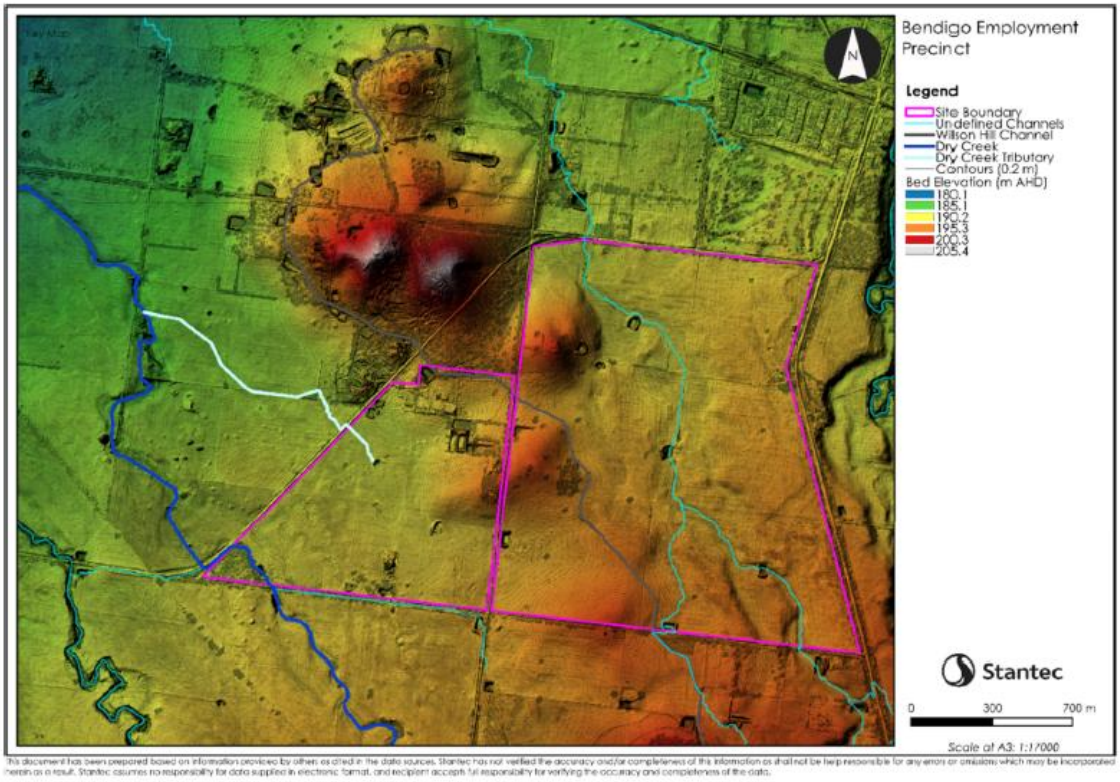



Figure 3 Existing terrain

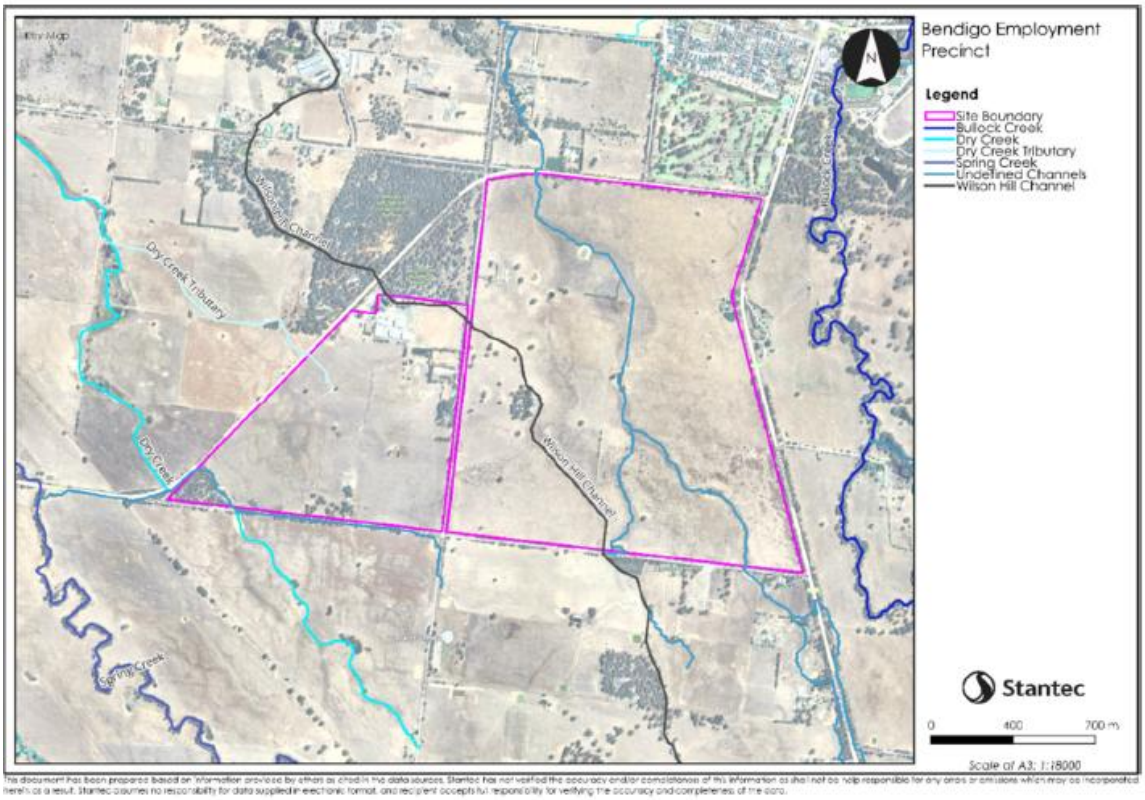



Figure 4 Existing waterways

The following principles apply to drainage infrastructure which is identified in the preparation of a Drainage / Stormwater Management Strategy in accordance with the DPO34.

- Where drainage infrastructure serves only the development of a single landholding, including such as on-site detention, water quality treatment, and local reticulation, the costs of that infrastructure are the responsibility of the relevant landowner. These obligations are to be identified through the development plan process and secured by permit conditions and, where appropriate, a section 173 agreement.
- Where drainage infrastructure serves more than one property, including such as shared drainage corridors, water quality treatment, detention basins, and outfall upgrades, the costs of that infrastructure are to be shared equitably between the benefiting properties within the catchment. The scope, staging, and cost-apportionment arrangements for shared drainage works are to be established through the Drainage / Stormwater Management Strategy and the Shared Infrastructure Plan.
- The Drainage / Stormwater Management Strategy identifies the broad drainage framework for the precinct. However, the precise nature of drainage infrastructure required to service individual landholdings, and the extent to which shared infrastructure is triggered, will depend on the industrial development intent, land use mix, staging, and impervious area of each development proposal. Drainage design assumptions and cost-apportionment arrangements are to be determined in consultation with the relevant landowners/developers and the North Central Catchment Management Authority, Coliban Water (where relevant), the City of Greater Bendigo and the Registered Aboriginal Party (where relevant to the area of cultural heritage sensitivity).

- The contribution rate for shared drainage infrastructure is to be expressed in dollars per net developable hectare ($/NDHa), consistent with the demand unit applied to transport infrastructure under this guideline. The apportionment of costs between landholdings within each drainage catchment will be determined by the precinct-wide Drainage / Stormwater Management Strategy based on relative catchment area, impervious coverage or equivalent verifiable measure, to the satisfaction of the responsible authority.
- The CoGB is the development agency for shared drainage infrastructure works, unless alternative delivery arrangements are agreed with a development proponent. The CoGB will coordinate delivery in consultation with the relevant drainage authority, the North Central Catchment Management Authority, affected landowners and, where works are required within the areas of cultural heritage sensitivity, the Registered Aboriginal Party.

# 4. TRANSPORT INFRASTRUCTURE

## 4.1 Project Justification

The Guideline identifies shared transport infrastructure projects in Table 1, including the external intersections that have a measurable relationship to the precinct-wide traffic generation and the shared access points that are required to provide access to and from the BREP.

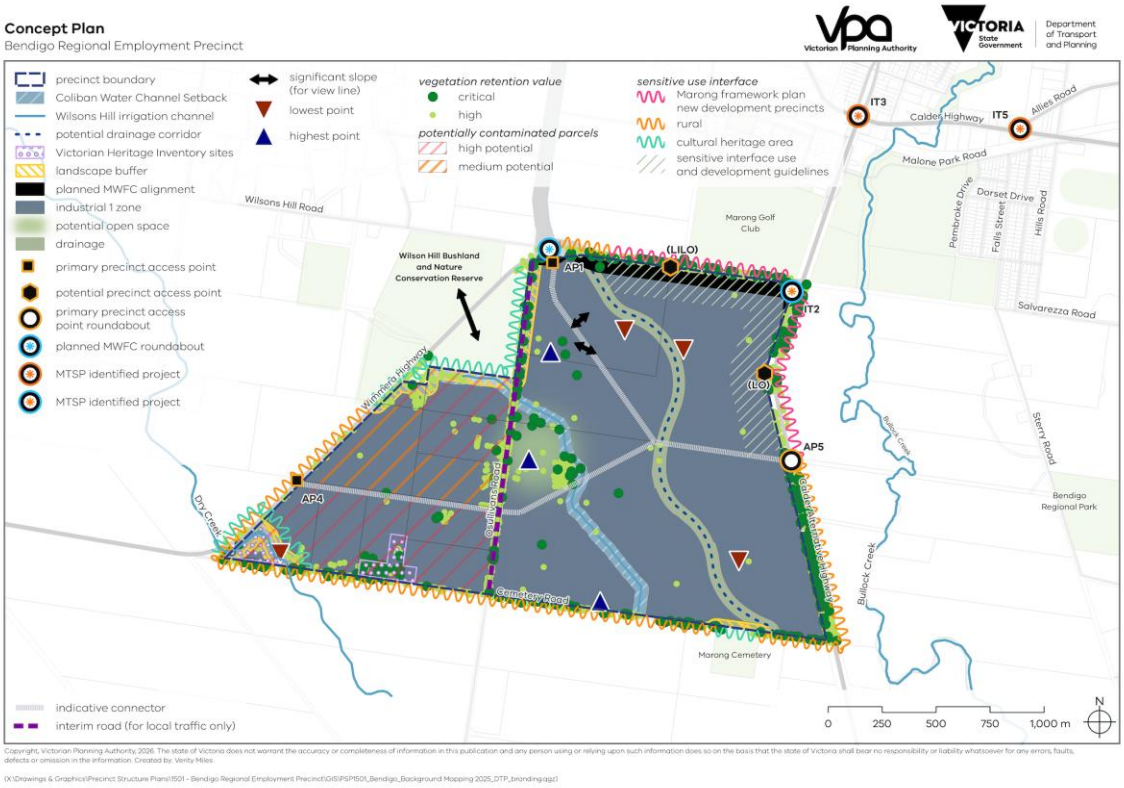



Figure 5 BREP Concept Plan

### IT2 - Calder Alternative Highway / Wimmera Highway Intersection

- **Functional Role:**
  Provides a primary access from the Marong Township, the Calder Alternative Highway corridor and the Wimmera Highway corridor (that forms part of the planned Marong Western Freight Corridor.

  The need for the connection to MTSP Precinct 2B primarily arises from adjacent residential development areas identified in the *Marong Township Structure Plan* (2024).

  While IT2 does not provide direct access to the BREP, it plays a supporting role in maintaining sufficient network capacity for vehicles travelling to and from the BREP access points via the broader road network.

  The intersection forms the key gateway linking freight and employee trips between the BREP access points, the township and the regional road network.

- **Traffic Nexus:**
  SIDRA modelling by Marong Transport Network Assessment (Stantec, 2026) indicates that IT2 will experience increased traffic volumes resulting from cumulative development within both the Marong township growth areas and the BREP.

  Although the existing T-intersection is considered to be able to accommodate meaningful additional traffic volumes before an upgrade is required, the current configuration would reach its ideal limit at 45% development level of both the township and the BREP and would not provide sufficient operational capacity and safety under full build-out traffic volumes from both the township and the BREP.

  Without the township new development traffic, the BREP generated traffic at 58% of the development level contributes directly to the intersection upgrade to a three-leg roundabout.

  The primary justification for upgrading the intersection with the new connection to MTSP Precinct 2B remains the facilitation of local and residential access within the township. The nexus for this connection i.e. the eastern leg therefore lies with the Marong Township, not the BREP.

- **Strategic Context:**
  IT2, as identified by Marong Township Structure Plan as an interim upgrade, functions as a principal access junction serving both the BREP and the Marong Township, with its operational performance directly influenced by the timing and staging of development across both areas.

  The planned Marong Western Freight Corridor (MWFC) will be a State-managed transport infrastructure project led by DTP-Transport Services.

  At the time of Planning Scheme Amendment C296gben, DTP-Transport Services had not sought contributions from the BREP towards the construction of the planned MWFC, including the ultimate dual-lane roundabout configuration at the location of IT2.

  This position may be reviewed in future to reflect any changes to the MWFC delivery program or funding arrangements.

  Accordingly, the recommendation of this document includes only the interim single-lane roundabout configuration at IT2, with no State Government funding proposed for this component.

- **Design Note:**
  The single-lane roundabout represents the interim configuration required to support BREP and Marong Township development. Further work is needed to resolve the preferred design to the satisfaction of the Head, Transport for Victoria.

  The ultimate dual-lane roundabout (or equivalent capacity treatment) will be delivered as part of the planned Marong Western Freight Corridor (MWFC) project or as required by future traffic volumes confirmed through network monitoring and updated traffic modelling.

- **Cost Apportionment**

  As existing and background growth traffic do not necessitate the upgrade of IT2, these external traffic users and the State Government are not contributors to the new transport infrastructure at IT2. The upgrade is required solely due to the needs generated by the BREP and the MTSP. Without these new developments, no upgrade would be required.

As the co-trigger for the upgrade, the BREP and MTSP are responsible for ensuring that their traffic does not cause detriment to the performance or safety of the existing State road network or to existing/background traffic volumes. While the upgrade will not provide material benefit to existing/background through-traffic on the Wimmera Highway or Calder Alternative Highway, it will improve safety and turning movements for the traffic generated by the BREP and MTSP. The upgraded design must nonetheless provide sufficient capacity to accommodate both new development traffic (960 vehicles as modelled under Stantec's 2046 PM peak modelling) and existing/background traffic (354 and 195 vehicles respectively as modelled). Accordingly, the BREP and MTSP are responsible for funding the proportion of the upgrade that accommodates existing and background traffic.

Stantec's 2046 PM peak modelling indicates that development-driven demand (the trigger traffic) totals 960 vehicles, of which the BREP contributes 800 vehicles (83.33%). Applying the same proportionate share, the BREP is responsible for 83.33% of the capacity that accommodates existing and background traffic (approximately 457 vehicles), as funding this capacity is only required because the development necessitates the upgrade.

The new eastern leg (MTSP Precinct 2B connection) is required exclusively to service the MTSP residential growth areas, as identified in the MTSP. This leg is therefore excluded from the BREP apportionment calculation.

The design and cost of IT2 will be determined through the preparation of the Intersection and Access Strategy required under the DPO34, in consultation with and to the satisfaction of the Head, Transport for Victoria.

### IT3 - Calder Alternative Highway / Calder Highway Intersection

- **Functional Role:**
  Serves as the principal junction of Marong to the wider regional highway network, including Loddon- and Melbourne-bound freight and commuter routes. This intersection is located outside the boundaries of the BREP.
- **Traffic Nexus:**
  The signalisation of IT3 is required due to multiple growth areas' traffic and will be require advanced configuration to manage the increased turning movements generated by BREP traffic merging with local and regional through-traffic. SIDRA modelling in the Marong Transport Network Assessment (Stantec, 2026) identifies that, under full build-out, delays and queue lengths would exceed acceptable thresholds without signalisation.
  Retaining the existing slip-lane configuration ensures regional freight continuity while accommodating additional BREP-related volumes.
- **Strategic Context:**
  IT3 provides the gateway connection between the BREP's freight network and the Calder Highway corridor. Its upgrade enables safe integration of industrial traffic with regional flows, ensuring both network capacity and safety.
- **Design Note:**
  The existing western and eastern slip lanes must be retained as part of the signalisation design to preserve regional through-traffic efficiency and heavy vehicle performance. Retention of these slip lanes minimises disruption to existing traffic patterns while accommodating the additional turning movements generated by BREP and Marong development.

The reference design is subject to detailed design and approvals particularly heritage. The design and cost of IT3 will be determined through the preparation of the Intersection and Access Strategy required under the DPO34 in consultation with and to the satisfaction of the Head, Transport for Victoria.

### IT5 - Calder Highway / Allies Road Intersection

- **Functional Role:**

  The IT5 intersection is located at the junction of the Calder Highway and Allies Road, forming part of the regional transport corridor east of the Marong township. This intersection is located outside the boundaries of the BREP.

  Its primary role is to maintain the efficiency and safety of the Calder Highway, which accommodates both regional freight and commuter movements connecting Bendigo with surrounding areas.

  The upgrade will ensure the Calder Highway continues to operate safely and efficiently as regional and township traffic volumes increase due to continued growth in the Marong area.

  While BREP traffic will use the Calder Highway and pass through this intersection, IT5 primarily serves the regional and township network, with BREP contributing only indirectly to its demand.

- **Traffic Nexus:**
  SIDRA modelling by Marong Transport Network Assessment (Stantec, 2026) identifies a notable increase in overall turning movements and delays at this intersection in 2046, primarily driven by background and township growth, compounded by regional redistribution of traffic flows linked to industrial and residential development in Marong. BREP-generated traffic will pass through the intersection with the shared of usage that represents a material contribution to overall network loading and performance, even though the intersection does not directly serve as an access point to the precinct.

  The intersection's upgrade to signalisation is therefore necessary to maintain safe operating conditions and overall network performance within the regional corridor.

- **Strategic Context:**
  IT5 supports industrial staging and the distribution of traffic across multiple access points, improving performance and safety of the Calder Highway corridor. Its role is essential to achieving a balanced and resilient access strategy for the BREP.

- **Design Note:**
  The signalised intersection will include dedicated turning lanes, potential pedestrian crossings (subject to road safety audit and movement and place assessment including need for central median and access to existing properties) and upgraded lighting to improve safety and network reliability along the Calder Highway corridor. Final design will be led by DTP–Transport Service, with staging coordinated to align with regional growth and corridor planning timelines.

  The design and cost of IT5 will be determined through the preparation of the Intersection and Access Strategy required under the DPO34, in consultation with and to the satisfaction of the Head, Transport for Victoria.

## AP1 - Connection into MWFC roundabout at Wimmera Highway / Wilsons Hill Road / McCreddons Road

**Functional Role:**
Prior to delivery of the planned MWFC, the AP1 will operate as a BREP access point.

Following the delivery of the MWFC, AP1 provides the primary northern access to the BREP via the planned MWFC roundabout at the intersection of Wimmera Highway, Wilsons Hill Road and McCreddons Road.

It forms the key interface between the BREP and Victoria's Principal Freight Network, enabling direct and efficient freight movement to and from the precinct while bypassing the Marong township.

This connection is critical to the long-term function of the precinct as a regional industrial hub and will provide the main freight gateway for heavy vehicle traffic in the ultimate network configuration.

**Traffic Nexus:**
Before and after delivery of the MWFC, the need for AP1 is as the northwest access point of the local connector road network connecting to the State network.

The design and cost of AP1 will be determined through the preparation of the Intersection and Access Strategy required under the DPO34, in consultation with and to the satisfaction of the Head, Transport for Victoria.

**Strategic Context:**
AP1 supports the strategic integration of the northern precinct with the State freight network and underpins the long-term transport efficiency objectives of the planned MWFC.

**Design Note:**
The design of AP1, if delivered prior to the delivery of the MWFC, will be determined through the preparation of the Intersection and Access Strategy, in consultation with and to the satisfaction of the Head, Transport for Victoria.

Under the ultimate scenario, the MWFC roundabout will be delivered and funded by DTP–Transport Services as part of the MWFC project, or as triggered by the broader network traffic, with the trigger-development plan responsible for funding and delivering the 5th leg connection if AP1 has not been constructed prior to delivery of the MWFC roundabout.

## AP4 - Controlled T-intersection at Wimmera Highway (North of Cemetery Road)

**Functional Role:**
AP4 provides the western precinct access from the Wimmera Highway. It supports the distribution of local traffic, provides supplementary access for industrial development in the southern precinct, and assists in managing freight movements without overloading the northern access points.

**Traffic Nexus:**
AP4 is required for the southern precinct's direct access to the Wimmera Highway, serves as a connection for the south-west of the precinct, and reduces reliance on AP1 and AP5.

The final configuration of AP4 to the properties within the BREP will be determined through the preparation of the Intersection and Access Strategy required under the DPO34, in consultation with and to the satisfaction of the Head, Transport for Victoria.

**Strategic Context:**
Connection between AP4 and AP5 will form the core of the east–west internal movement corridor across the Development Plan areas in the southern precinct.

**Design Note:**
The final design and cost of AP4 will be determined through the preparation of the Intersection and Access Strategy, in consultation with and to the satisfaction of the Head, Transport for Victoria.

### AP5 – Roundabout intersection at Calder Alternative Highway (Eastern Intersection)

**Functional Role:**
AP5 provides the eastern connection mid-block to BREP from the Calder Alternative Highway, forming a key entry point for freight and employee traffic.
AP5 will function as a major access supporting full turning movements to distribute traffic between regional corridors and internal road networks.

**Traffic Nexus:**
AP5 will accommodate substantial traffic volumes generated by the eastern and southern precincts. It provides direct linkage to the Principal Freight Network, supporting efficient goods movement and mitigating pressure on the Wimmera Highway access via AP1 and AP4.

The final configuration of AP5 to the properties within the BREP will be determined through the preparation of the Intersection and Access Strategy required under the DPO34, in consultation with and to the satisfaction of the Head, Transport for Victoria

**Strategic Context:**
This intersection is strategically important for long-term freight efficiency and network redundancy, ensuring the BREP maintains multiple high-capacity connections to the State road network.
**Design Note:**
The final design and cost of AP5 will be determined through the preparation of the Intersection and Access Strategy, in consultation with and to the satisfaction of the Head, Transport for Victoria.

## 4.2 Project delivery timing

Each transport infrastructure project identified in this Guideline has an assumed indicative provision trigger, which is specified in Table 1. The timing for the delivery of the intersection projects has been modelled and informed by the Marong Transport Network Assessment (Stantec, April 2026), based on the best available information at the time of preparing this document. These timing triggers may be subject to change following the preparation of the Intersection and Access Strategy required under the DPO34.

DTP-Transport Services will monitor and assess the required timing for intersection projects and have regard to its broader road network planning program.

The timing for the delivery of access points will also be determined through the Intersection and Access Strategy prepared as part of the Development Plan, ensuring that access works are delivered proportionate to the traffic demand generated by the development plan area.

The City of Greater Bendigo, in its role as collecting agency under the SIP, may consider alternatives to the priority delivery of works or land where:

- Infrastructure is to be constructed / provided by development proponents as works or land in kind, as agreed by the collecting agency and the road authority.
- Network priorities require the delivery of works or land to facilitate broader road network connections.
- The Marong Western Freight Corridor is funded for construction.

All projects will be provided as soon as is practicable and as soon as sufficient contributions are available, consistent with **Table 1**.

## Table 1 Shared Transport Infrastructure Projects

| Project Code | Project Name | Description / Scope of Works | Indicative Delivery Timing | Status / Design Basis | Indicative Cost Apportionment % |
|---|---|---|---|---|---|
| **IT2** | Calder Alternative Highway / Wimmera Highway Intersection | Construction of an interim single-lane three-leg roundabout providing long-term access for BREP. | Short term<br>(10 years or earlier) | Identified by Marong Township Structure Plan 2024<br>Note: Ultimate standard to be delivered under the Marong Western Freight Corridor (MWFC) project or as required by traffic volume (by others).<br>SIDRA-modelled intersection as recommended by Stantec 2026.<br>Concept design to be completed by the CoGB in partnership with DTP-Transport Services.<br>Identified by Marong Township Structure Plan 2024 for potential access point of MTSP Precinct 2B. | **Upgrade to the existing three-leg intersection to a roundabout:** 83.33% to BREP, based on split costs only between MTSP and BREP<br>**MTSP Precinct 2B connection (eastern leg):** 0% to BREP<br>Note: MTSP is responsible for 100% of the cost of connecting to MTSP Precinct 2B. |
| **IT3** | Calder Alternative Highway / Calder Highway Intersection | Signalisation of the existing intersection while retaining the existing slip-lane configuration. Works will include new traffic signals, upgraded pavement, lighting, line-marking and minor geometric modifications to improve safety and capacity. The intersection will continue to function as a key junction between the Calder and Calder Alternative Highways, accommodating regional through-traffic as well as BREP and Marong Township access movements | Commencement of BREP / MTSP | Identified by Marong Township Structure Plan 2024.<br>Anticipated concept design by DTP-Transport Services in 2026 | 37% to BREP, based on share of usage. |
| **IT5** | Calder Highway / Allies Road Intersection | Signalisation of intersection with right-turn lanes, potential pedestrian crossings, and access control measures. | Short term<br>(10 years or earlier) | Identified by Marong Township Structure Plan 2024.<br>SIDRA-modelled intersection as recommended by Stantec 2026.<br>Concept design to be completed by the CoGB in partnership with DTP-Transport Services. | 33% to BREP, based on share of usage. |

| Project Code | Project Name | Description / Scope of Works | Indicative Delivery Timing | Status / Design Basis | Indicative Cost Apportionment % |
|---|---|---|---|---|---|
| **AP1** | Connection into MWFC roundabout at Wimmera Highway / Wilsons Hill Road / McCreddons Road | Interim pre-MWFC: Construction of connection to Wimmera Hwy / Wilsons Hill Road / McCreddons Road subject to further SIDRA analysis and no impact on MWFC | As triggered by DP prior to MWFC | Design to be prepared as part of SIP to the satisfaction of the Head, Transport for Victoria | 100% to BREP |
| | | Ultimate post-MWFC: Construction of BREP leg connection to MWFC roundabout to service BREP north access | As triggered by DP post-MWFC | Design to be prepared as part of SIP to the satisfaction of the Head, Transport for Victoria | 100% to BREP |
| **AP4** | T-intersection at Wimmera Highway (North of Cemetery Road) | Construction of a Controlled T-intersection (no roundabout) to service BREP west access | As triggered by DP | Design to be prepared as part of SIP to the satisfaction of the Head, Transport for Victoria | 100% to BREP |
| **AP5** | Roundabout intersection at Calder Alternative Highway (Eastern intersection) | Construction of a single-lane roundabout to service BREP east access. | As triggered by DP | Design to be prepared as part of SIP to the satisfaction of the Head, Transport for Victoria | 100% to BREP |

## 4.3 Association with Marong Township Shared Infrastructure Funding Plan

The Marong Township Shared Infrastructure Funding Plan (MTSIFP) will establish the framework for funding and delivering shared transport, community, and drainage infrastructure to support growth within the township and its surrounds.

The recommendations of this document do not replace or duplicate the MTSIFP. Instead, they provide the technical basis for refining and updating relevant sections of that plan and the project descriptions to ensure clear accountability and alignment between various growth areas' infrastructure responsibilities.

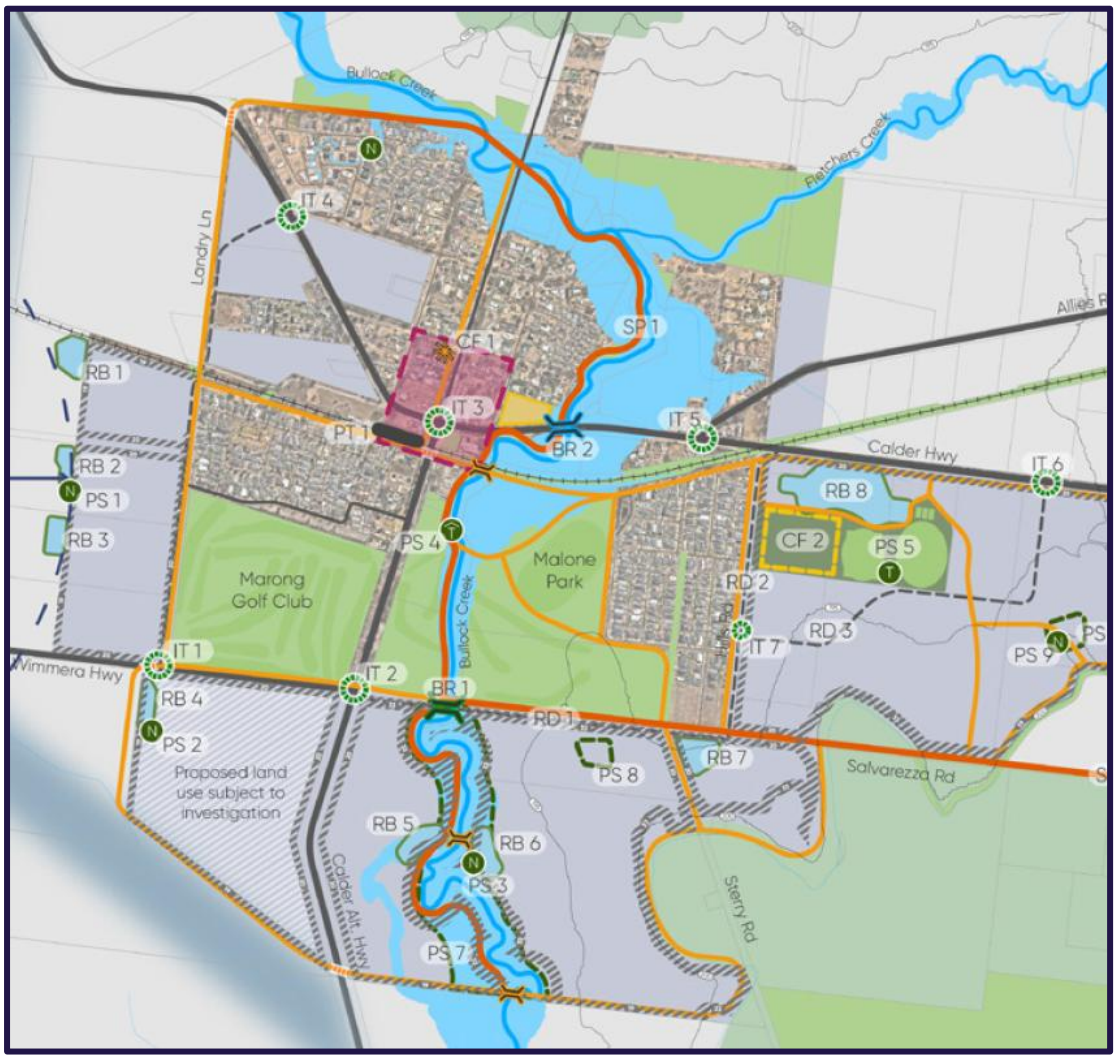



Figure 6 Transport Projects identified by Marong Township Structure Plan

This document recommends the MTSIFP to incorporate the following:

### IT2 - Calder Alternative Highway / Wimmera Highway

- The BREP and the Marong township growth areas will be responsible for any further upgrades required to service industrial development within the BREP and the residential growth, including delivery of the interim single-lane roundabout at IT2.

- The need for the eastern leg connection primarily arises from adjacent residential development areas, Precinct 2B, identified in the *Marong Township Structure Plan* (2024).
- The MTSIFP should explicitly distinguish the respective responsibilities of the BREP and township developments for its delivery and funding.
- No State Government funding is proposed for the single-lane roundabout (interim treatment) at IT2.

### IT3 - Calder Alternative Highway / Calder Highway

- The construction of a four-way signalised intersection at IT3 is to remain a Township Infrastructure project under the MTSIFP. The BREP will contribute to the works based on the share of usage.
- The MTSIFP should include the Head, Transport for Victoria approved intersection design for IT3, ensuring that the final cost estimates reflect the approved design, functional layout, and respective delivery responsibilities between CoGB and DTP-Transport Services.

### IT5 - Calder Highway / Allies Road

- The construction of a three-way signalised intersection at IT5 has been identified as a township infrastructure under the *Marong Township Structure Plan* (2024).
- The BREP will contribute to the works based on the share of usage.
- The MTSIFP should further investigate the cost apportionment to the residential growth areas for inclusion of IT5, ensuring that the final cost estimates reflect the approved design, functional layout, and respective delivery responsibilities between CoGB and DTP- Transport Services.

These inclusions will ensure that the MTSIFP and this document's recommendations for the BREP remain fully aligned by avoiding duplication of funding responsibilities and maintaining clarity between local, industrial, and State infrastructure roles.

They also provide a transparent framework for consultation with the CoGB, DTP-Transport Services, and developers on the coordinated implementation of shared intersection upgrades.

# 5. INFRASTRUCTURE CONTRIBUTION CHARGES

## 5.1 Net developable area

In the SIP, all development infrastructure contributions are payable on the net developable area (NDA) of land on any given development site. Calculations of NDA for each individual property will be determined as part of the preparation of a SIP.

The estimated NDA is expected to be in the order of 206 hectares, but will be determined by deducting the land requirements for the infrastructure items, including the conceptual open space, drainage corridors and reserves, and roads from the Gross Developable Area (GDA).

## 5.2 Standard contribution rate unit

The 'net developable hectare' (NDHa) is to be the demand unit for the SIP, applying to both transport and drainage infrastructure projects. The cost apportionment for drainage and transport projects will be determined by the Intersection and Access Strategy and the Drainage / Stormwater Management Strategy.

Once the apportioned cost is known, subject to the final cost estimate, the contribution rate is derived using the following formulas:

| Component | Formula | Units / Notes |
|---|---|---|
| **Total BREP Cost Share** | = Total Project Cost × BREP Apportionment (%) | Dollars ($) |
| **Contribution Rate** | = Total BREP Cost Share ÷ NDA | $ / NDHa |

# 6. IMPLEMENTATION NOTES

The notes below sets out how this document's recommendations should be implemented and administered through a formal SIP with the details explained under the Greater Bendigo Development Contributions Governance Framework.

## 6.1 Preparation of SIP

Preparation of a Shared Infrastructure Plan within the BREP requires close collaboration between the CoGB, DTP-Transport Services, landowners and their consultants. The following table outlines the respective responsibilities of each party.

| Party | Responsibility |
|---|---|
| **City of Greater Bendigo** | Prepare the SIP; review cost estimates and apportionment; manage contribution collection, indexation and reporting; and ensure compliance with the DPO34 and this document's recommendations. |
| **DTP-Transport Services** | Confirm design standards, intersection form, delivery timing and the State's funding share; provide technical input on transport modelling and staging. |
| **Landowners / Developers** | Will be consulted by CoGB on the preparation of the SIP and enter into section 173 agreements to give effect to the SIP.<br>.<br>. |
| **Consultants** | May prepare an Intersection and Access Strategy or Drainage / Stormwater Management Strategy under DPO34; develop cost apportionment analyses; and assist with preparation of supporting technical documentation. |

A SIP should include:

- Design descriptions and functional layouts of all infrastructure projects.
- Cost tables identifying total cost, apportioned shares and assumptions.
- Delivery timing and staging linked to network triggers.
- Governance arrangements defining administrative responsibilities.
- Indexation methodology to maintain cost currency.

As the SIP includes infrastructure shared across the precinct, it is essential that there is consultation with all relevant agencies and all landowners within the precinct.

## 6.2 Section 173 Agreement

The SIP will be implemented through section 173 agreements in accordance with DPO34.

The CoGB will be responsible for preparing the SIP, following or in conjunction with the completion of the Intersection and Access Strategy and the Drainage / Stormwater Management Strategy.

The CoGB will determine, as a part of the finalisation of the SIP, the standard contribution rate(s) in accordance with this Guideline. For transport infrastructure, this will be based on the Intersection and Access Strategy, the net developable area and traffic generation assumptions. For drainage infrastructure, this will be based on the precinct-wide Drainage / Stormwater Management Strategy and the catchment-based apportionment methodology.

At the permit stage, the responsible authority will confirm the actual payable contribution amount applicable to each application, ensuring it aligns with the approved SIP, the development proposal, and any verified demand assumptions and units for both transport and drainage.

## 6.3 Road authority

DTP-Transport Services is the road authority responsible for overseeing the design standards, approvals, and delivery coordination of State-managed arterial roads and intersections identified in the SIPs.

DTP-Transport Services will provide technical input and design endorsement to ensure all proposed works meet State Road design, safety, and access requirements.

DTP-Transport Services will also collaborate with CoGB during the detailed design and delivery phases to ensure that the timing, scope, and funding of intersection upgrades align with the approved SIP and broader State infrastructure programs.

## 6.4 Collecting agency (agency responsible for collecting infrastructure contributions)

The CoGB is the collecting agency, in accordance with the Greater Bendigo Development Contributions Governance Framework.

As the public authority to which all levies are payable, CoGB is responsible for the collection, administration, and enforcement of contributions under the approved Shared Infrastructure Plan(s) (SIPs).

CoGB must ensure that all funds are held, indexed, and expended in accordance with the Governance Framework, and that accurate financial records are maintained for audit and reporting purposes.

CoGB's obligation, as the collecting agency, is limited to administering and allocating contributions in accordance with the approved Shared Infrastructure Funding Plan and any relevant section 173 agreements.

While the CoGB is responsible for coordinating and overseeing the delivery of the identified infrastructure projects, the collecting agency is not financially liable for their delivery if the total funds collected are insufficient, or if the timing of contributions does not align with the agreed delivery triggers.

## 6.5 Development agency (agency responsible for works)

The CoGB is the default development agency responsible for delivering designated infrastructure projects funded under the SIP(s), and for managing the timing, procurement, and completion of all related works, except as specified below.

DTP-Transport Services is the development agency for IT3 and IT5, given their regional transport function and interface with the arterial road network.

The CoGB is the development agency for IT2 (single-lane roundabout interim treatment), unless alternative arrangements are made with development proponents under the MTSIFP.

The CoGB is the development agency for shared access point works (AP1, AP4 and AP5), unless alternative delivery arrangements are agreed with a development proponent.

Where appropriate, CoGB may enter into agreements with developers, the Head, Transport for Victoria, or other State agencies for the delivery of specific works-in-kind or cost-sharing arrangements consistent with the SIP.

The CoGB is the development agency for shared drainage infrastructure works, unless alternative delivery arrangements are agreed with a development proponent. The CoGB will coordinate delivery in consultation with the relevant drainage authority, the North Central Catchment Management Authority, affected landowners and, where works are required within the areas of cultural heritage sensitivity, the Registered Aboriginal Party.

## 6.6 SIP administration

The administration of contributions collected by the collecting agency under the SIP will be transparent and accountable.

All development contribution funds will be retained by the collecting agency until required for the delivery of the corresponding infrastructure projects within that class.

Detailed records of funds received, interest accrued, and expenditure will be maintained in accordance with the *Local Government Act 2020*, the *Planning and Environment Act 1987*, and the Greater Bendigo Development Contributions Governance Framework.

Capital costs of all infrastructure projects will be adjusted by the collecting agency annually for inflation.

## 6.7 Funding shortfall and delivery coordination

In the event that the total funds collected under the approved SIP are insufficient to deliver an identified infrastructure project at the time it is required or triggered, the shortfall is a shared implementation risk, managed through developer contributions, works-in-kind (WIK) arrangements and external funding sources.

The collecting and development agencies will:

- Review and confirm the estimated cost, timing and scope of the infrastructure project in consultation with the road authority and relevant stakeholders.;
- Identify and pursue alternative delivery or funding options, which may include external grants, staged or interim works, or negotiated works-in-kind arrangements with developers
- Coordinate and manage the sequencing of development and infrastructure delivery to ensure that the timing of works aligns, as far as practicable, with the availability of funds.

The collecting agency, development agency (or its delegate) and road authority are not financially liable for any funding shortfall. Delivering infrastructure project is contingent upon sufficient funds being available or an alternative delivery or funding arrangement e.g. WIK being agreed between the relevant parties.

## 6.8 Adjustment to the scope of projects

Transport projects identified in this document will be further refined through the detailed design process to the satisfaction of the Head, Transport for Victoria and the CoGB for the inclusion into the SIP.

As part of detailed design, the CoGB or a development proponent (with the consent of the relevant road authority) may amend or modify aspects of a project, provided the works remain generally consistent with the approved SIP and its intended function.

Where a development proposal results in an increased infrastructure requirement beyond what is assumed in this document, the additional cost must be met by the proponent, ensuring there is no financial impact on other contributors or agencies.

If a project scope is changed by the CoGB or DTP-Transport Services to reflect new design standards, policy updates, or coordination with other projects (such as the planned Marong Western Freight Corridor), these changes should be documented through a future review or amendment to the SIP, with any additional cost normally met by the agency initiating the change.

## 6.9 Indexation

The default methodology follows the CoGB's Development Contributions Governance Framework.

## 6.10 Works-in-kind

Under the DPO34, the collecting agency may permit development proponents to undertake works in lieu of cash payments via a section 173 agreement, providing that:

- the works constitute projects funded by the SIP.
- the road authority approves the development proponents to undertake the works-in-kind on the State network.
- the collecting agency agrees that the timing of the works would be consistent with priorities in the approved SIP associated with the development plan area.
- the development proponent complies with appropriate tendering, documentation, supervision and related provisions as required by the responsible authority.
- works must be provided to a standard that generally accords with the road authority's standard and design requirement, unless an alternative is agreed by the collecting agency and the development agency.
- detailed design must be approved by the collecting agency and the development agency and must generally accord with the layout and standards outlined in an approved SIP associated with the development plan area unless an alternative is agreed by the collecting agency and the development agency.
- the construction of works must be completed to the satisfaction of the collecting agency and the development agency.
- there should be no negative financial impact on other contributors within the BREP to the satisfaction of the collecting agency.

In particular, the works will only be accepted in lieu of a financial contribution required by an approved SIP to the extent that they constitute part, or all, of the design of the infrastructure project and reduce the cost to complete that design, to the satisfaction of the collecting agency. Temporary works will not be accepted as works in kind.

Where the collecting agency agrees that works are to be provided by a development proponent in lieu of cash contribution (subject to the arrangements specified above):

- the credit for the works provided shall equal the total cost of the works as identified in the approved SIP, considering the impact of indexation.
- the value of works provided in accordance with the principle outlined above will be offset against the development contributions liable to be paid by the development proponent.
- no further financial contributions will be required until the agreed value of any credits is used.

## Credit for over-provision

Where the collecting agency agrees that a development proponent can deliver an infrastructure project (either works and/or land), the situation may arise where the development proponent makes a contribution with a value that exceeds that required by the approved SIP associated with the development plan area.

The details of credits and reimbursements for construction shall equal the final cost of the works identified in the approved SIP, considering the impact of indexation. The value of credits and reimbursements for the transfer of land will need to be at the values that are outlined in the SIP, subject to indexation.

# APPENDIX A – REFERENCE DESIGN

FOR CONTINUATION REFER TO SHEET 03

LEGEND

- EXISTING CONDITIONS
- EXISTING BOUNDARY
- PROPOSED CONDITIONS
- PROPOSED BOUNDARY

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VACANT

CALDER ALTERNATIVE HIGHWAY

WIMMERA HIGHWAY

VACANT

FOR CONTINUATION REFER TO SHEET 02

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Client: DEPARTMENT OF TRANSPORT AND PLANNING (DTP)

Project: BENDIGO REGIONAL EMPLOYMENT PRECINCT
WIMMERA HIGHWAY/CALDER ALTERNATIVE HIGHWAY
CITY OF GREATER BENDIGO

Title: CONCEPT LAYOUT PLAN
PROPOSED ROUNDABOUT TRAFFIC TREATMENT - IT2
SHEET 1 OF 3

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MARONG GOLF CLUB

CALDER ALTERNATIVE

HIGHWAY

FOR CONTINUATION REFER TO SHEET 01

VACANT

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SHEET 3 OF 3

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# CALDER HWY/FWY
# CALDER ALTERNATIVE HWY

GREATER BENDIGO CITY
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ROAD

ALLIES

COMMERCIAL

COMMERCIAL

HIGHWAY

HIGHWAY

HIGHWAY

HIGHWAY

100m LEFT TURN DECELERATION LANE

75m LEFT TURN DECELERATION LANE

EXISTING TREES TO BE REMOVED

RETAIN EXISTING CULVERTS

125m RIGHT TURN DECELERATION LANE

MAINTAIN EXISTING RAILWAY CROSSING

84m ALIGNMENT SHIFT

30mSTRAIGHT

55mSTRAIGHT

103m ALIGNMENT SHIFT

DRIVEWAY EGRESS TO BE CONTROLLED THROUGH TRAFFIC PHASING

RESIDENTIAL

LISBURN STREET

PARNELL STREET

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# APPENDIX B – MARONG TRANSPORT NETWORK ASSESSMENT (2026)

# Marong Transport Network Assessment

This report provides a Transport Network Assessment for the Bendigo Regional Employment Precinct (BREP) within the broader Marong Township, to confirm the transport infrastructure upgrades required to support a Planning Scheme Amendment (PSA) to rezone the BREP land.

Prepared for:
Victorian Planning Authority

Date:
28 April 2026

Prepared by:
Alex Blackett

Project/File:
300305902



Stantec Australia Pty Ltd

## Revision Schedule

| Revision No. | Date | Description | Prepared by | Reviewed by | Approved by |
|---|---|---|---|---|---|
| A | 01/12/25 | Final | Alex Blackett | Marco Lucioni | Marco Lucioni |
| B | 28/04/26 | Revised Final | Alex Blackett | Alex Blackett | Alex Blackett |

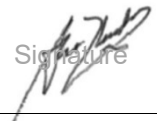
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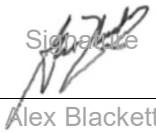
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## Acknowledgment of Country

Stantec would like to acknowledge the Traditional Owners of the lands on which this report was prepared, the Wurundjeri people of the Kulin Nation. We pay our respect to their Elders past and present, and extend that respect to all Aboriginal and Torres Strait Islander peoples.

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# 1 Introduction

## 1.1 Background

The City of Greater Bendigo (CoGB) identified through the Greater Bendigo Industrial Land Development Strategy (2024) that undeveloped industrial land availability is expected to be exhausted in the next 5 years, and there is a need for an additional 170ha of developable industrial land over the next 30 years.

As such, CoGB purchased 155ha of land in November 2021 within the 294-hectare Bendigo Regional Employment Precinct (BREP) that is located south of the Marong Township and some 15km west of central Bendigo. The BREP is proposed to deliver a State Significant Industrial Precinct (SSIP) that harnesses diverse and long-term employment opportunities for new and existing businesses with flow on benefits to the neighbouring Marong Township, Bendigo and broader Loddon-Mallee region.

In November 2022, $6M in funding was announced by the Hon Jacinta Allan MP (now Premier) to deliver key infrastructure and planning for the BREP. The Victorian Planning Authority (VPA), which is now part of the Department of Transport and Planning (DTP), was authorised as the planning authority for the BREP by the Minister for Planning. CoGB has engaged the VPA to develop and undertake a Planning Scheme Amendment (PSA) to rezone the land to Industrial 1 Zone (IN1Z).

In addition, Development Victoria (DV) was engaged by the CoGB to prepare the following for the BREP, based on an agnostic ‘best for the project’ approach:

1. An Infrastructure Strategy that identifies the infrastructure works needed to service the first stage of land release. This formed part of an overall cost-efficient servicing strategy for the total precinct.
2. A Development Strategy outlining the investment attraction strategy, recommended commercial approach, delivery model, and funding/financial model.
3. A Business Case, which culminates from the preparation of the items above.

Stantec was engaged by DV to prepare the BREP Infrastructure Strategy. This included the preparation of a Transport Impact Assessment (TIA) which, amongst other things, informed the transport access strategy for the BREP. DTP has indicated they are generally supportive of the access strategy and have requested a more detailed network level assessment to confirm its suitability and need for any external network capacity upgrades and associated development contributions.

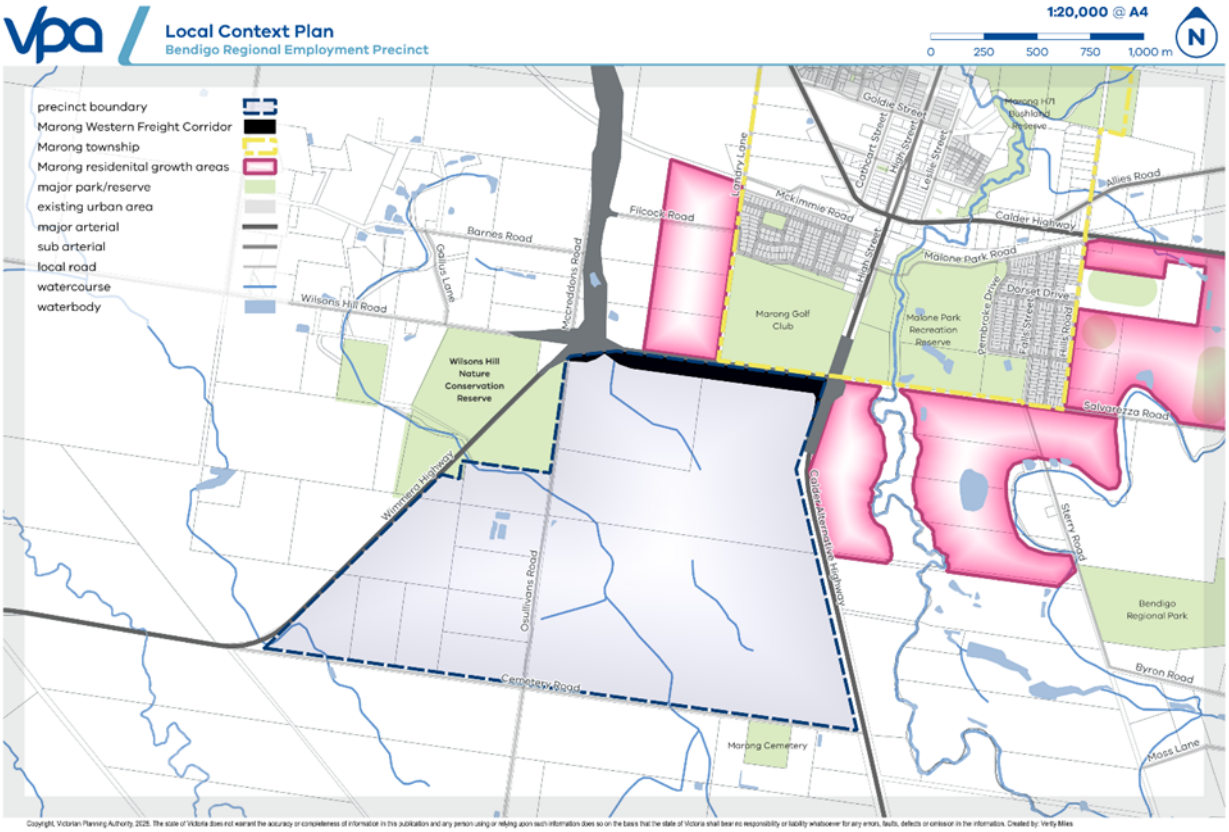
Stantec has now been engaged by the VPA to complete a network wide assessment of the Marong Township in support of the BREP PSA. This engagement includes an assessment of the surrounding transport network to ensure that it can support the planned growth in Marong, including the BREP.

## 1.2 Study Area

The extent for the Marong Transport Network Assessment is indicated in Figure 1-1. The study area includes the following key land use components:

- Marong Township, which is centred around the Calder Highway / Calder Alternative Highway intersection. It is generally bounded by Cathcart Street to the north, Hills Road to the east, Wimmera Highway to the south and Landry Lane to the west (area with the yellow dashed boundary in Figure 1-1).
- The township is expected to see significant growth over the coming decades, as set out in the Marong Township Structure Plan (MTSP), that includes an increased footprint to the east, south and west (indicated as the Marong residential growth areas in Figure 1-1).
- The BREP is a 294-hectare parcel of undeveloped land located south of the Marong Township generally bounded by Wimmera Highway to the north and west, Calder Alternative Highway to the east and Cemetery Road to the south (area with the dashed blue boundary in Figure 1-1).

*Figure 1-1: Study Area*



## 1.3 Purpose of this report

The purpose of this report is to identify the changes required to the Marong network so that it is able to support future travel patterns. It documents the scope, timing, and traffic usage based apportionment of the network upgrades necessary to support Marong development over the next 20 years.

Specifically, the report considers the following:

- Current policy context informing how the network should be managed and developed
- Existing conditions, demands and operation of the network
- Proposed development and changes to the network
- Future transport network demands and operation
- Identification of basic and essential transport network upgrades to support future demands
- Demand attribution and triggers for the identified transport network upgrades to help inform any associated development contributions and other network development activities.

Engagement with each level of government and relevant departments has occurred throughout the development of this report, with general agreement considered to be resolved with relevant authorities.

This report was first finalised in December 2025. However, based on subsequent discussions and feedback from relevant authorities, and further analysis some minor changes have been incorporated into this version of the report. The changes that have been made are set out in .

*Table 1-1: Updates to the December 2025 Report*

| Section | Description | 2025 Report | This Report |
|---|---|---|---|
| 5.2.1 | Further discussion around the type, need and/or benefit of the two secondary points of access | No details on the type, need and/or benefit of the two secondary points of access | Details provided on the type, need and/or benefit of the two secondary points of access |
| 5.2.1 | Consideration of the potential shifting of the primary access point (roundabout) to the Calder Alternative Highway | No details on the potential shifting of the primary access point (roundabout) to the Calder Alternative Highway | Details provided on potentially shifting the primary access point (roundabout) to the Calder Alternative Highway |
| 6.3.3.3 | Analysis error identified with the trigger point analysis for the Calder Alternative Highway / Wimmera Highway intersection, with the double counting of traffic volumes associated the MWFC. | Trigger point analysis identified a 35% development level of the MTSP and the BREP for when the existing give-way controlled T-intersection will need to be upgraded to a single lane roundabout. | Updated trigger point analysis identified a 45% development level of the MTSP and the BREP for when the existing give-way controlled T-intersection will need to be upgraded to a single lane roundabout. |
| 6.3.3.3 | Inclusion of an additional trigger point analysis scenario that only included the BREP (excluded the MTSP) | Did not include a trigger point analysis scenario that only included the BREP (excluded the MTSP) | Included a trigger point analysis scenario that identified a 58% development level of the BREP (excluded the MTSP) for when the existing give-way controlled T-intersection will need to be upgraded to a single lane roundabout. |
| 6.3.3.3 & 6.3.4.3 | Indicate if the MWFC is needed to support the full delivery of the BREP and MTSP in 2046, noting that this specific scenario has not been modelled and the | The trigger point analysis for the Calder Highway / Calder Alternative Highway and Calder Alternative Highway / Wimmera Highway intersections indicated that the proposed upgrades | Additional commentary about the trigger point analysis for the Calder Highway / Calder Alternative Highway and Calder Alternative Highway / Wimmera Highway intersections confirming |

| Section | Description | 2025 Report | This Report |
|---|---|---|---|
| | trigger point analysis manually adjusted the traffic volumes to consider the implication of not providing the MWFC. | could accommodate the full delivery of the MTSP and the BREP in 2046 but would be operating near or at their ideal capacity. | the proposed upgrades could accommodate the full delivery of the MTSP and the BREP in 2046 but would be operating near or at their ideal capacity. |
| 6.3.4.2 | Updated SIDRA modelling results for the proposed signalised Calder Highway / Calder Alternative Highway intersection due to updated layout details provided by DTP and adoption of a 50km/h speed limit | SIDRA modelling results for the proposed signalised Calder Highway / Calder Alternative Highway intersection indicated a DOS of 0.83. | Updated SIDRA modelling results for the proposed signalised Calder Highway / Calder Alternative Highway intersection based on the updated layout details still indicated a DOS of 0.83, so no meaningful change to its expected performance. |

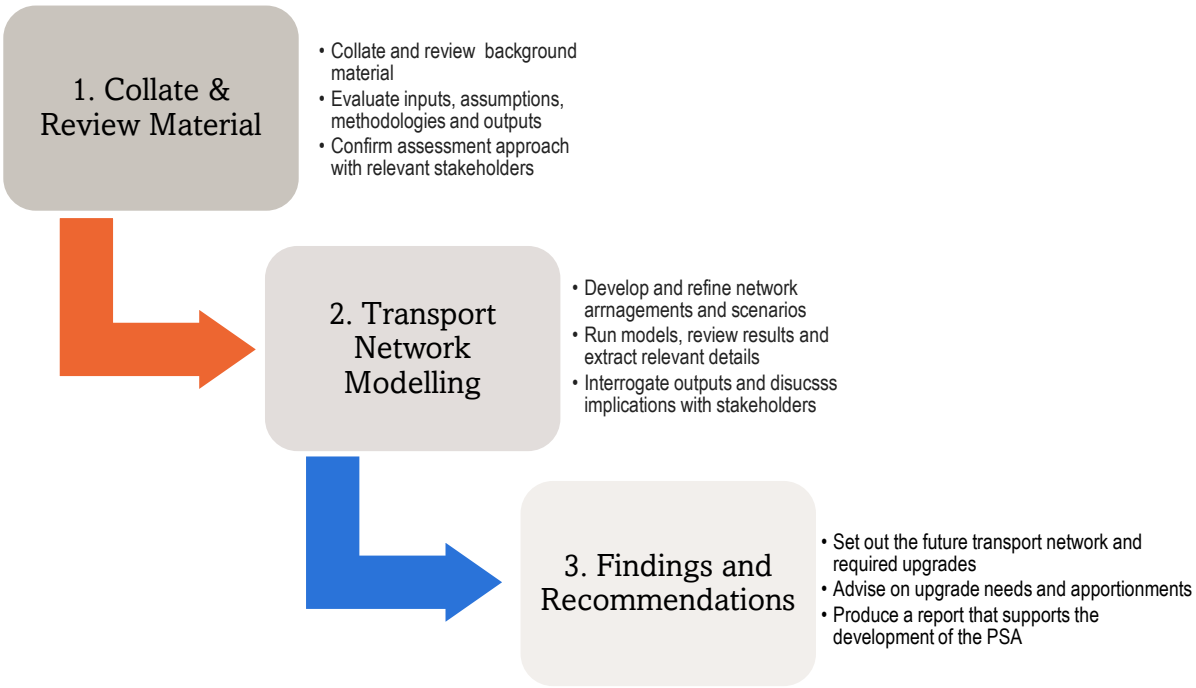
## 1.4 Study Process

The study is underpinned by transport modelling to inform the development and assessment of the BREP PSA within the context of the broader Marong Township. The modelling allows for consideration of various land use and transport network changes expected over the coming 20 years. The transport network assessment builds on the various studies completed for the area, namely the following:

- The MTSP (final), Development Contribution Framework (draft) and Shared Infrastructure Funding Plan (draft).
- The BREP Concept Plan (final), Infrastructure Plan (final) and Transport Impact Assessment (final).
- Transport Modelling, as part of the planned MWFC.

An overview of the key steps for the assessment is provided in Figure 1-2.

*Figure 1-2: Key Steps*




## 1.5 References

In preparing this report, reference has been made to the following:

- Great Bendigo Planning Scheme
- Precinct Structure Plan prepared by VPA (now part of DTP)
- Department of Transport and Planning Technical Publications
- Transport models and surveys as referenced in the context of this report
- Other documents as nominated.

# 2 Policy & Planning Context

There are a number of key State and Local Government documents applicable to the BREP and Marong, which provide guidance on how the area is expected to develop over the coming decades. Those that are most relevant to this transport network assessment are as follows:

- The BREP Vision and Purpose
- The MTSP
- The planned MWFC

These documents are discussed and summarised below, along with various other relevant planning documents in Table 2-1.

## 2.1 BREP Vision & Purpose

The VPA undertook an online vision and purpose workshop for the BREP in 2023. It built on the outcomes of the pitching sessions in 2022. Through these activities, an emerging vision and set of themes were developed, as outlined below.

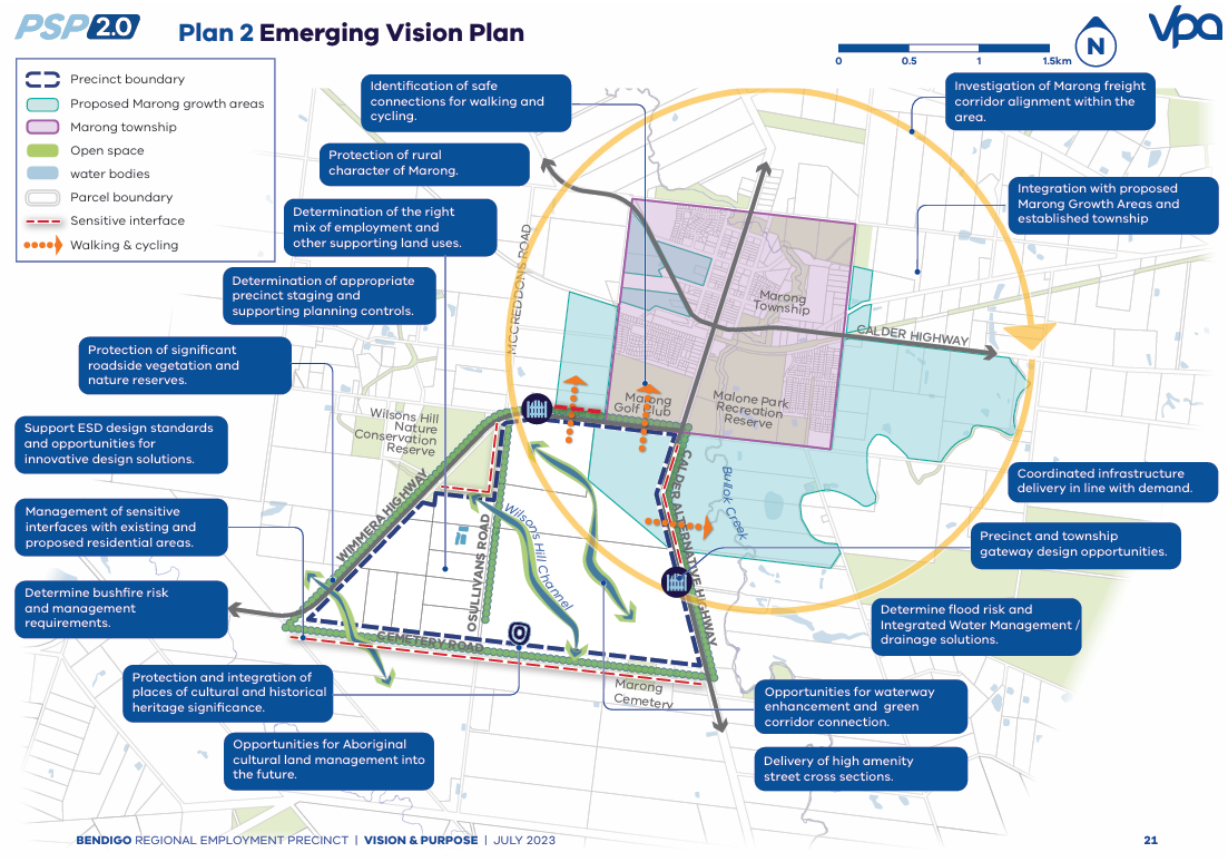
The **vision for BREP** is that it "*will become a regionally significant employment precinct, capitalising upon its strategic location on the declared freight network for Victoria. It will provide opportunities for new and existing industries to locate within a new modern, leading-edge employment precinct with a high amenity environment.*"

The following emerging five themes were also identified:

1. **Employment and land use**: A leading edge regionally significant employment precinct that harnesses diverse and long-term employment opportunities with flow on benefits to the neighbouring Marong Township and broader Loddon-Mallee region.
2. **Transport:** Being based upon an integrated transport network that will facilitate safe and efficient connections for all users including freight, workers and the Marong Community, capitalising upon its strategic location upon the declared freight network for Victoria.
3. **Water and environment:** A future precinct that delivers an integrated water and drainage strategy to manage existing and potential impacts created by new development that factors in climate change impacts. A precinct that protects and enhance significant native vegetation and biodiversity values and improved ecological outcomes.
4. **Sustainability:** Creating a sustainable and climate resilient precinct, that encouraging adoption of best practice environmentally sustainable design and circular economy outcomes that can be measured and monitored to ensure continual adherence and improvement.
5. **Character, landscape and heritage values:** As a precinct that enhances the existing landscape and visual character of Marong to seamlessly integrate with its surrounding community. As a precinct that protects and celebrates cultural values associated with the Dja Dja Wurrung and other historical heritage places and provides opportunities to weave their history into future development within the BREP.

The outcomes of these activities are summarised through the emerging vision plan, which is reproduced in Figure 2-1.

*Figure 2-1: BREP Vision and Purpose – Emerging Vision Plan*




Notably, the plan identifies walking and cycling connections from the BREP to the Calder Alternative Highway and two access points crossing the Wimmera Highway.

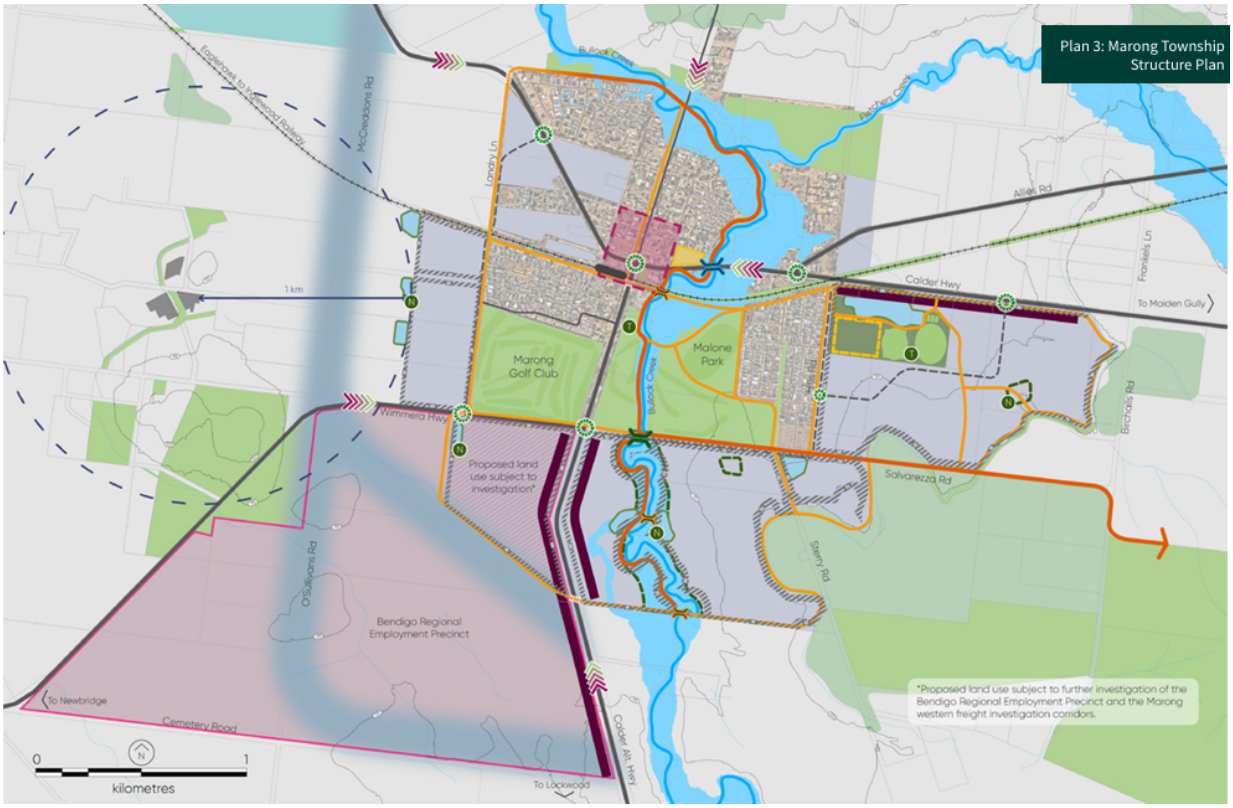
## 2.2 Marong Township Structure Plan

The MTSP is a long-term plan for future urban development of Marong as a satellite township of 8,000 people. It establishes a vision and planning framework to enable the next 25 years of growth that will be built around a vibrant community town centre and civic focus with a well serviced railway station and an outstanding public space network.

The proposed general arrangements are set out in Figure 2-2, as taken from the structure plan, noting that its development is guided by a set of key objectives for each of the following elements:

- Bushfire management
- Integrated water management
- Image and character
- Employment (refers to the BREP and its potential to accommodate 2,000 – 3,000 new jobs)
- Housing
- Community facilities and public spaces
- Marong town centre
- Movement and access (discussed further in Section 4.2.2)
- Township Infrastructure Pan and development staging

*Figure 2-2: Marong Township Structure Plan*




The MTSP outlines the following guiding principle for movement and access:

> *"New and upgraded transport infrastructure is provided to support a town of 8,000 people. As part of this transport infrastructure, a freight network is also to be provided to support the success of the Bendigo Regional Employment Precinct. The freight network is currently being considered and planned by the Department of Transport and Planning as part of the Freight Alignment and Multi-modal Connections Assessment for the Bendigo Regional Employment Precinct."*

## 2.3 Marong Western Freight Corridor

The DTP has been investigating alignment and design options for the planned MWFC[1], which aims to link the Calder Highway northwest of Marong to the Calder Alternative Highway south of Marong, removing the need for heavy vehicles to go through the Marong Township via the implementation of a more efficient and safer alternative route. The preferred alignment uses a corridor that generally aligns with McCreddons Road and the Wimmera Highway, as shown in Figure 2-3.

[1] Marong Western Freight Corridor - Transport Victoria

*Figure 2-3: Indicative Alignment for the planned MWFC*




Based on Figure 2-3, the planned MWFC will travel on the Wimmera Highway along the northern frontage of the BREP and have roundabout treatments at the Wimmera Highway / McCreddons Road / Wilsons Hill Road intersection and the Calder Alternative Highway / Wimmera Highway intersection. No roundabout intersection treatment is proposed at the Wimmera Highway / Landry Lane intersection (only left-in and/or left-out movements expected to be supported).

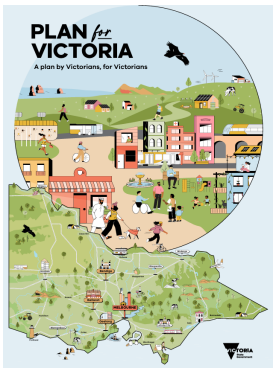
While this project is still in the planning stage with preliminary design activities occurring and no commitment for the delivery, the DTP has requested that land along the northern frontage of the BREP be set aside for it and that the proposed access arrangements for the BREP integrate with it. Moreover,

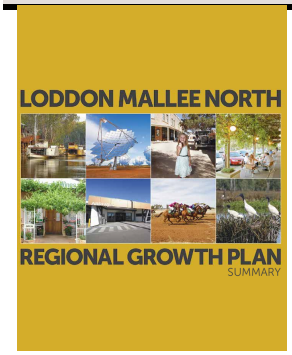
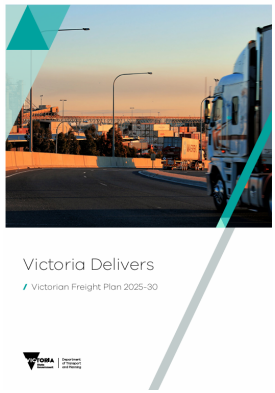
its inclusion as part of the ultimate network arrangement has been incorporated into the modelling considerations of this assessment.

## 2.4 Other Planning Documents

There are a range of other planning documents that inform the development of the BREP and Marong. Table 2-1 provides a summary review of the documents most relevant to the development of the BREP.

*Table 2-1: Other Planning Documents Summary Review*

| Document | Description | Implications |
|---|---|---|
| | **State Planning Documents** | |
| **Plan for Victoria**<br>  | **Plan for Victoria** was formally released in February 2025 and replaces Plan Melbourne 2017-2050.<br>The document presents an updated, long term and statewide strategic planning framework that outlines how Victoria will grow and evolve over time. It is designed to guide and integrate development and decision-making across the state, including metropolitan Melbourne, regional cities, and rural communities.<br>The plan is based around the vision below and five pillars:<br>**Vision:** By 2050, Victoria will be a vibrant, accessible and connected community, valued for its diverse cultures, sustainable environmental practices and respect for the First Peoples of Victoria.<br>Building a state that provides choices and opportunities for current and future generations of Victorians in quality housing, transport, employment, environment and connectivity will require input from the community, government, local businesses and industry alike.<br>We will create a society that caters to the unique needs of all Victorians, nurturing individual health through physical and cultural recreation. | **Plan for Victoria** provides strong strategic support for the BREP by reinforcing the role of regional cities like Bendigo as key hubs for population and employment growth. It underpins the need for long-term industrial land supply, which the BREP directly addresses by unlocking over 290 hectares of zoned land for manufacturing, logistics, and emerging industries.<br>The precinct's location near major transport corridors aligns with Plan for Victoria's emphasis on freight-efficient development, supporting regional economic integration and supply chain efficiency.<br>Additionally, the strategy's focus on sustainable and climate-resilient development informs the BREP's planning approach, encouraging integrated infrastructure, environmental protection, and low-emissions industry.<br>By aligning with both Plan for Victoria and the Loddon Mallee North Regional Growth Plan, the BREP is positioned as a state-supported initiative that contributes to balanced growth across Victoria. |
| **Victoria's Regional Growth Plans** | **Victoria's Regional Growth Plans** provide a strategic framework for land use, infrastructure, and economic development across the state's eight regional areas. Developed in partnership with local councils, state agencies, and communities, these plans aim to guide sustainable growth, support regional economies, and protect environmental and cultural assets. | The **Loddon Mallee North Regional Growth Plan**, part of Victoria's broader Regional Growth Plans framework, has several key implications for the BREP.<br><br>It identifies Bendigo as a major regional centre with a critical role in accommodating future population and economic growth. This supports the strategic development of the BREP as a long-term industrial and employment hub, helping to meet projected demand for |

| Document | Description | Implications |
|---|---|---|
|  | For the BREP, the relevant plan is the **Loddon Mallee North Regional Growth Plan**, which identifies Bendigo as a key regional city and supports the development of employment precincts like BREP to accommodate future population and industry growth. | industrial land and diversify the regional economy.<br>The plan also emphasises the importance of aligning land use with infrastructure investment, which reinforces the need for coordinated delivery of transport, utilities, and services within the BREP.<br>Additionally, it encourages sustainable development and protection of environmental assets, guiding the BREP's planning to integrate environmental considerations and climate resilience into its design and infrastructure. |
| **A 10-Year Plan for Industrial Land**<br>  | The 10-year plan for industrial land is Victoria's roadmap to meet the future associated demands being generated by the growing population.<br><br>The Plan sets out the actions that will be taken over the next decade to address barriers and accelerate planning processes to bring supply online sooner – supported by infrastructure – to give businesses certainty they can invest, expand and innovate with confidence in Victoria.<br><br>It identifies strategic areas for rezoning and the existing precincts to be better supported, both within metropolitan Melbourne and across regional Victoria. | The BREP is identified in the Plan as one of the 32 Regional Employment Projects and Precincts.<br><br>As such, it is expected to be a priority for rezoning and be supported by critical trunk infrastructure needed to unlock its development. |
| **Victorian Freight Plan**<br>  | The **Victorian Freight Plan**, outlines the state's long-term strategy to "*protect and strengthen Victoria's competitive advantage, to enhance Victoria's liveability and economic prosperity*."<br><br>It aims to achieve this through the following key outcomes:<br>• Ensure availability of fit for purpose freight network and gateway capacity to meet current and future need<br>• Enable more efficient and productive freight and supply chains<br>• Supporting climate and sustainability goals and liveable communities and places.<br>• Enhance the safety and resilience of Victoria's freight industry. | The **Victorian Freight Plan** supports the development of strategically located industrial precincts with strong freight connectivity, which aligns directly with the BREP's position near the Calder and Wimmera Highways. This enhances the BREP's potential as a regional logistics and manufacturing hub, capable of supporting efficient supply chains and reducing freight congestion in urban areas.<br><br>The plan's focus on improving regional freight corridors and intermodal access also strengthens the case for targeted infrastructure investment in and around the BREP.<br><br>Additionally, the plan's emphasis on sustainability and innovation in freight operations encourages the integration of low-emissions transport solutions and smart logistics infrastructure within the precinct, positioning the BREP as a future-ready industrial zone. |

| Document | Description | Implications |
|---|---|---|
| | **City of Greater Bendigo Strategic Documents** | |
| **Greater Bendigo Industrial Land Development Strategy (2024)**<br>  | The **Greater Bendigo Industrial Land Development Strategy (2024)** provides a long-term framework to guide the planning, development, and management of industrial land across the municipality. Developed in partnership with the VPA, the strategy identifies a 30-year pipeline of industrial land to meet growing demand and support economic development. It responds to a significant shortfall in industrial land compared to other regional cities and aims to attract new businesses while retaining and expanding existing ones.<br><br>The strategy outlines actions to resolve historical land use conflicts, improve the efficiency and consolidation of existing precincts, and identify suitable locations for new industrial areas based on clear criteria. It also promotes sustainable development practices, including innovative approaches to water, energy, and waste.<br><br>The delivery of the BREP is a central component of the strategy, providing much-needed employment land to support the city's growing population and industrial base | The **Greater Bendigo Industrial Land Development Strategy (2024)** has direct and substantial implications for BREP. It identifies the BREP as the primary solution to the region's critical shortage of zoned and serviced industrial land, positioning it as the cornerstone of Bendigo's long-term industrial growth.<br>The strategy supports fast-tracking the BREP's planning and infrastructure delivery to meet projected demand over the next 30 years. It also reinforces the need for coordinated development, infrastructure staging, and investment attraction, all of which are central to the BREP's implementation.<br>Additionally, the strategy's emphasis on sustainability, land use efficiency, and resolving land use conflicts informs how the BREP should be designed and delivered to align with broader economic and environmental goals. |
| City of Greater Bendigo Council Plan<br>  | The **City of Greater Bendigo Council Plan (Mir wimbul) 2025–2029** sets the strategic direction for the city over the next four years, aiming to support a growing population and deliver on the community's long-term vision.<br><br>It focuses on five key themes: being responsible, healthy, thriving, welcoming, and sustainable. The plan integrates the Municipal Public Health and Wellbeing Plan and outlines priorities such as economic development, infrastructure delivery, environmental sustainability, and inclusive community engagement.<br><br>It is designed to guide decision-making, resource allocation, and partnerships to ensure Greater Bendigo remains liveable, resilient, and prosperous as it grows toward a projected population of 200,000 by 2050 | The **City of Greater Bendigo Council Plan** has several implications for BREP. It reinforces the city's commitment to sustainable economic development, infrastructure delivery, and job creation—core objectives that the BREP is designed to fulfil.<br><br>The plan's focus on being a "thriving" and "sustainable" city supports the development of well-planned employment precincts like the BREP that can accommodate future population and industry growth. It also highlights the importance of inclusive planning and community engagement, which aligns with the BREP's collaborative planning process.<br><br>Additionally, the plan's integration of health, wellbeing, and environmental goals encourages the BREP to incorporate green infrastructure, active transport links, and climate resilience into its design and delivery. |

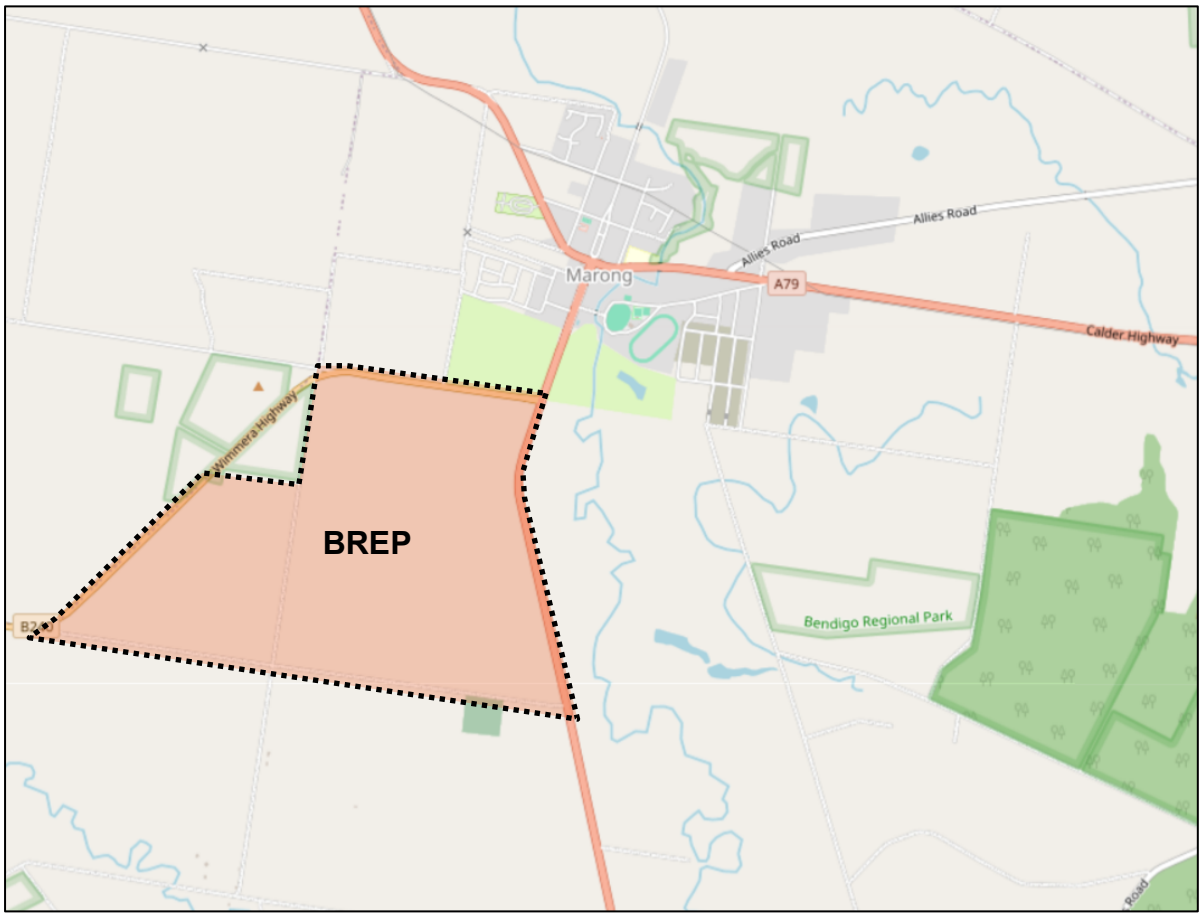
# 3 Existing Conditions

## 3.1 Subject Site

The BREP is located approximately 1.2km to the southwest of the Marong township. It is bordered by the Calder Alternative Highway to the east, the Wimmera Highway to the north and the west, and Cemetery Road to the south. The land is currently rural in nature.

The location of the site and the surrounding environs is shown in Figure 3-1.

*Figure 3-1: Subject Site and its Environs*




## 3.2 Land Use

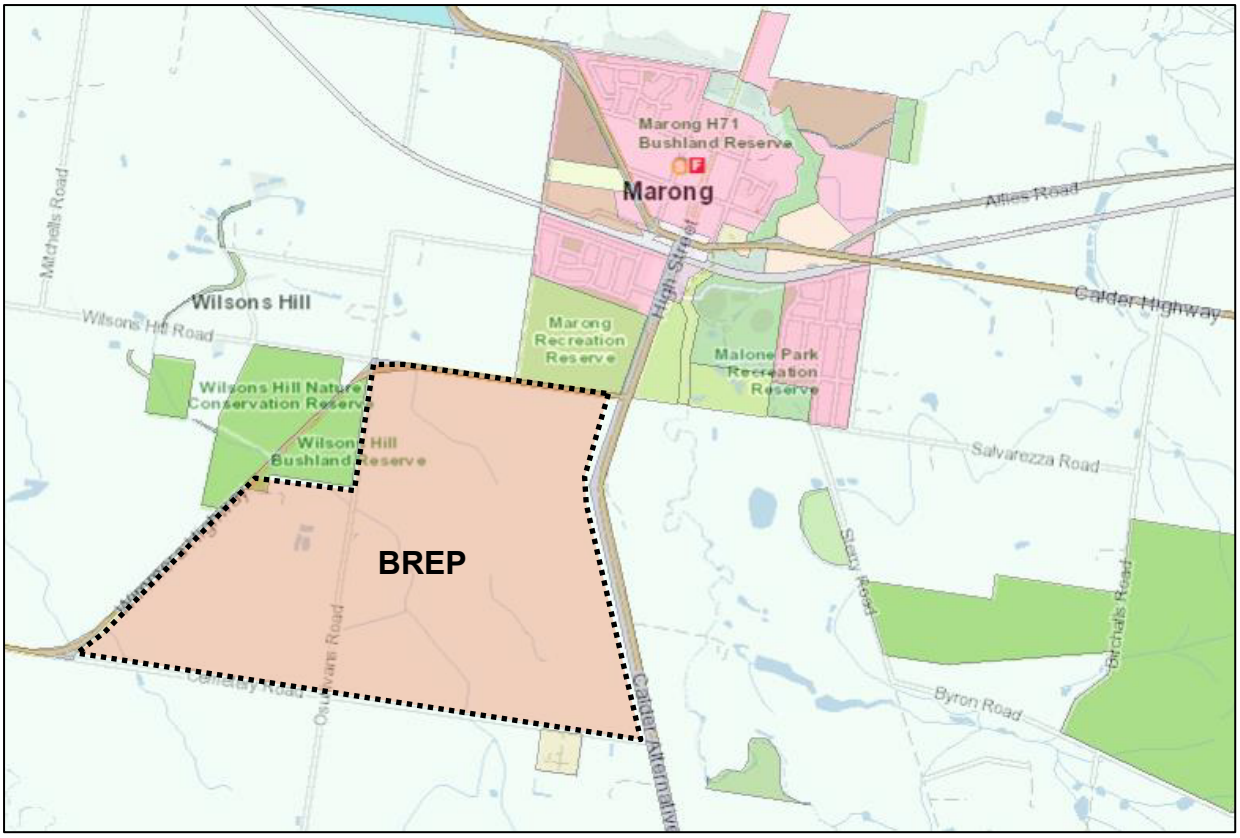
The site is located within a Farm Zone and is currently used for farming with a small number of residents. The surrounding properties are also generally located within a Farm Zone, except for the Marong Township to the north that has a mix of Town Zone, Special Use Zone and Public Park and Recreational Zone.

From a transport perspective, the majority of the local roads in the area are covered by the adjacent land use zoning, except for the Calder Highway, Calder Alternative Highway and Wimmera Highway

that have a Transport Zone 2 (TRZ2) – Principal Road Network classification, and Allies Road that has a Transport Zone 3 (TRZ3) – Significant Municipal Road classification.

The location of the site and the surrounding land zoning is shown in Figure 3-2.

*Figure 3-2: Subject Site and Land Zoning*




## 3.3 Road network

### 3.3.1 Key local roads

The existing road network internal and external to the BREP are described in Table 3-1, which generally consist of two abutting arterial roads that form part of the High Performance Freight Vehicle (HPFV) network, and various local roads that are mostly unsealed providing access to farms and associated dwellings.

*Table 3-1: Key Surrounding Roads*

| Road name | Road classification | Authority | Heavy Vehicle Classification [1] | Alignment | Carriageway width | Road reserve width |
|---|---|---|---|---|---|---|
| Calder Highway | Highway | DTP | PBS-3 / A-Triple | East-west | 11.2m | 30m |

| Road name | Road classification | Authority | Heavy Vehicle Classification [1] | Alignment | Carriageway width | Road reserve width |
|---|---|---|---|---|---|---|
| Calder Alternative Highway | Highway | DTP | PBS-3 / A-Triple | North-south | 10.2m | 56m |
| Wimmera Highway | Highway | DTP | PBS-3 / A-Triple | Northeast-southwest | 6.2m | 22m |
| Allies Road | Major road | Council | N/A | Northeast-southwest | 10.2m | 30m |
| Cemetery Road | Local road | Council | N/A | East-west | Unsealed | 22m |
| O'Sullivans Road | Local road | Council | N/A | North-south | Unsealed | 20m |
| Landry Lane | Local road | Council | N/A | North-south | Unsealed | 20m |
| McCreddons Road | Local road | Council | N/A | North-south | Unsealed | 21m |
| Wilsons Hill Road | Local road | Council | N/A | East-west | 3m | 18.5m |

[1] Performance Based Standards (PBS) | NHVR

### 3.3.2 Key intersections

The key intersections in the area include:

- Calder Highway / Calder Alternative Highway (unsignalised X-intersection)
- Calder Highway / Allies Road (unsignalised T-intersection)
- Calder Alternative Highway / Wimmera Highway (unsignalised T-intersection)
- Wimmera Highway / O'Sullivans Road / McCreddons Road / Wilsons Hill Road (two adjacent unsignalised X-intersection)
- Wimmera Highway / Landry Lane (unsignalised T-intersection)

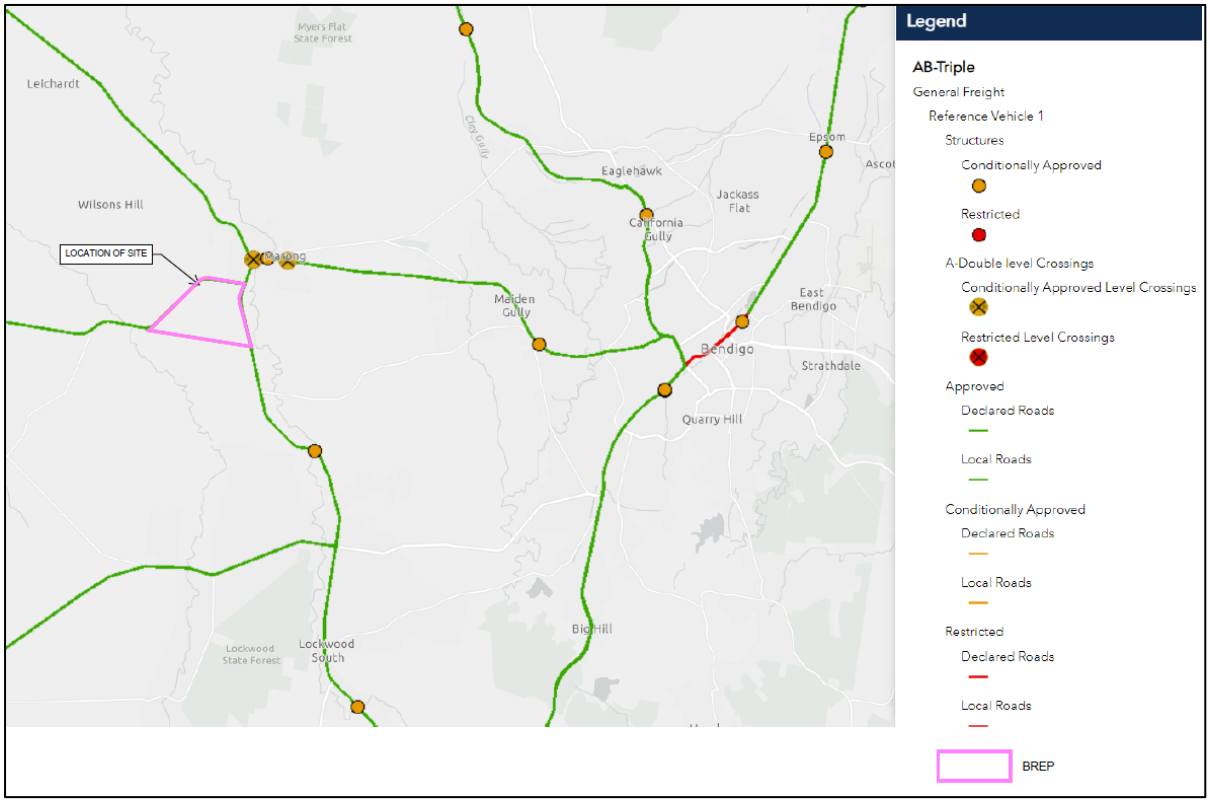
### 3.3.3 Freight network

Heavy vehicle network maps for Victoria can be viewed through the National Heavy Vehicle Regulator. These maps indicate the approved (full, partial, restricted, etc.) arterial roads for the various different heavy vehicle combinations permitted to use them. In terms of the arterial roads abutting the BREP and the broader accessing network, up to and including AB Triple vehicle combinations are permitted to use them, as shown in Figure 3-3.

However, there is a 68.5T weight restriction for the Calder Highway bridge over the Loddon River in Bridgewater, which is under the maximum weight of 103T permitted for an AB Triple vehicle combination (aligns with the maximum weight of 63T for a B-Double vehicle combination). This is the lowest weight restriction in the region along the Calder Highway and Calder Alternative Highway, but there are various others with 80T to 90T weight restrictions, including the Calder Highway bridges over the Campaspe River near Kyneton with 81T weight restrictions and the Calder Highway bridges over the Salty Creek in Macedon with an 88T weight restriction (generally align with the maximum weight of 83T permitted for an A Double vehicle combination).

These sorts of weight restrictions are fairly wide spread across the Victorian road freight network, so it is not considered to be specific to the freight routes accessing Marong. Rather, it is a network wide issue that various associated State and Federal Government programs, such as the Infrastructure Investment Program, are trying to progressively resolve. In this regard, given the much lower existing weight restriction of 68.5T for the Calder Highway bridge over the Loddon River in Bridgewater, which forms part of a key interstate freight route, it is expected that it will become a committed project in the near future, especially given the planning for the BREP and the planned MWFC.

*Figure 3-3: Heavy Vehicle Network Map*




Source: Victoria's PBS Level 3A AB-Triple General Freight Network for Reference Vehicle 1

## 3.4 Traffic Volumes

Traffic surveys were conducted by the DTP in November 2023 at various locations across Marong to inform the development of a transport network model as part of the planning for the MWFC. The resulting base year network model was calibrated and validated to within acceptable levels, so is considered to provide a suitable representation of the existing network conditions across Marong.

As such, the associated transport network model has been utilised as part of this assessment, with further details provided in Section 5.

In this regard, the existing AM and PM peak hour traffic volumes across Marong from the network model are presented in Figure 3-4 and Figure 3-5, respectively.

The following heavy vehicle percentages where identified for arterial roads in the area:

- Calder Highway: 4.5% in the AM and 6.0% in the PM peak hours (on the western approach of the intersection with Allies Road)
- Calder Alternative Highway: 23.7% in the AM and 23.8% in the PM peak hours (on the southern approach of the intersection with the Wimmera Highway)
- Wimmera Highway: 41.6% in the AM and 70.8% in the PM peak hours (on the western approach of the intersection with the Calder Alternative Highway).

*Figure 3-4: AM Peak Hour (8:15-9:15) Traffic Volumes*

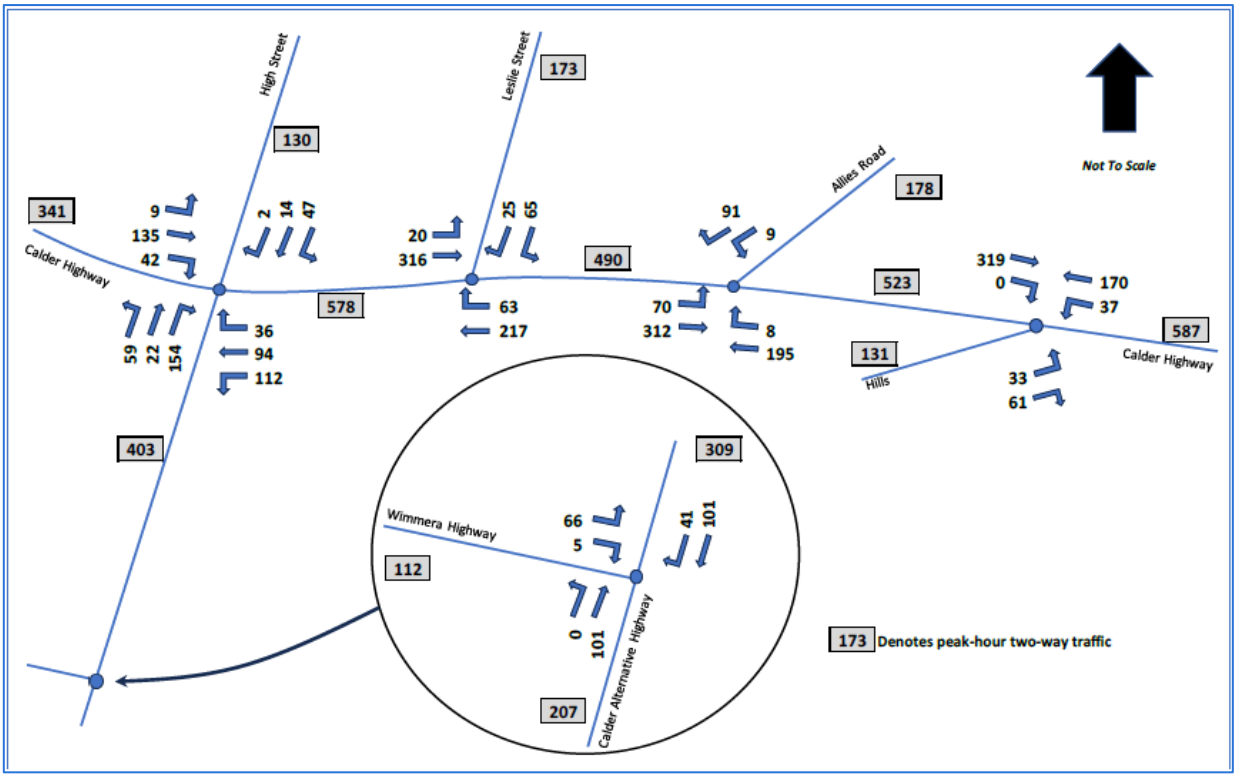
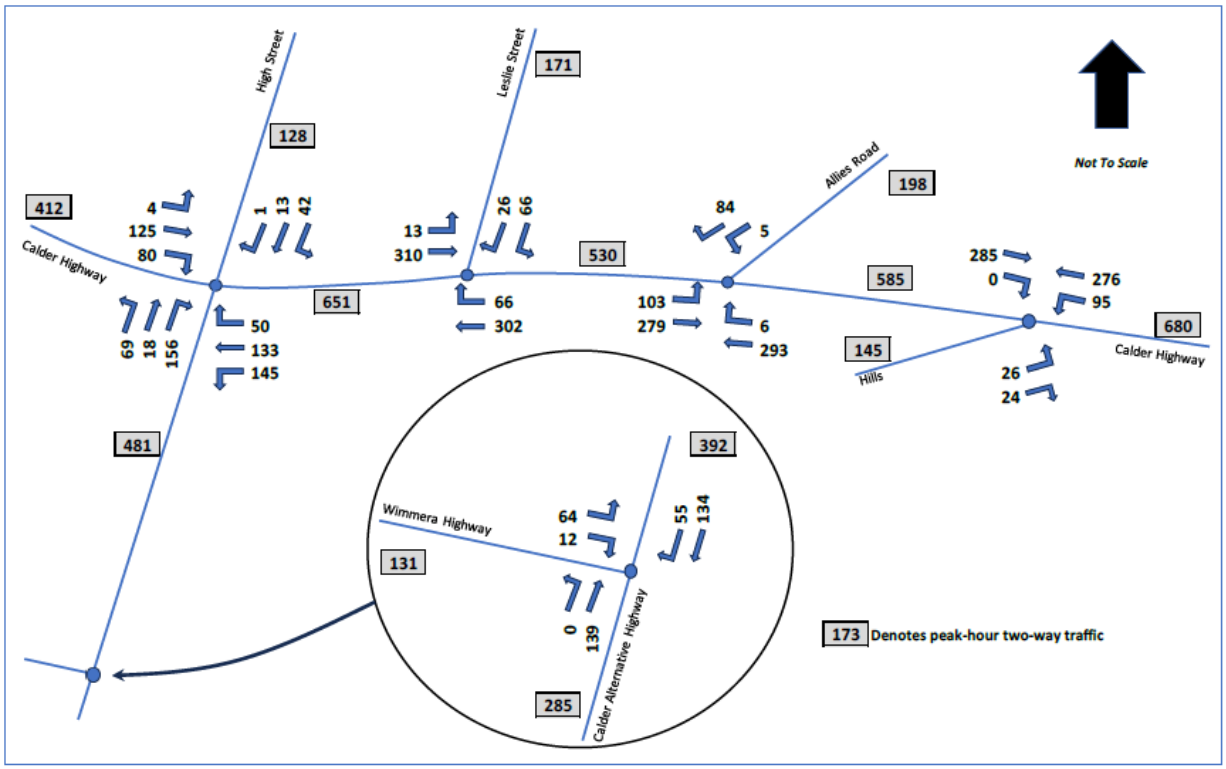


*Figure 3-5: PM Peak Hour (15:15-16:15) Traffic Volumes*




## 3.5 Active Transport

There are currently no pedestrian or bicycle facilities along the roads within, abutting or connecting the BREP with the area predominantly rural in nature. There is some basic footpath infrastructure that exists in the Marong Township, especially in the retail core, around the primary school and within some of the more recent residential sub-divisions.

## 3.6 Public Transport

There are currently no public transport services that connect with the BREP. However, within the Marong township there is a bus stop at the Calder Highway / Calder Alternative Highway intersection. Table 3-2 summarises the bus services and major destinations that can be reached from the Marong bus stop.

In addition to the road based public transport, Bendigo rail station on the Bendigo, Echuca/Moama and Swan Hill lines is located approximately 17 kilometres from the BREP. There is a disused rail station in Marong, but there are no current commitments to re-establish any train services to this station.

*Table 3-2: Bus Routes*

*Table 3. Stantec Table – Two Heading Rows. Always click "tab" before typing the caption text to create a hanging indent and flush left margin. Use color HEX #E2DDDB or RGB 226, 221, 219 for first heading row shading.*

| Route Name | Distance to Stop | Significant Destinations On Route | Frequency On/Off Peak |
|---|---|---|---|
| Bendigo – Boort via Wedderburn | 1.4 km | Bendigo Railway Station | Once a week |
| Melbourne – Sea Lake via Charlton & Bendigo | 1.4 km | Southern Cross Railway Station<br>Bendigo Railway Station | Once a day, Monday to Friday |
| Melbourne – Swan Hill via Bendigo | 1.4 km | Southern Cross Railway Station<br>Bendigo Railway Station | Twice a day, Monday to Friday |

## 3.7 Crash Statistics

Since 1 January 2020, there have been a total of 15 crashes recorded on the road network within and surrounding Marong, as presented in Figure 3-6 and Table 3-3. Four of these crashes resulted in a serious injury and the remaining 11 resulted in 'other injury'. Thirteen of these crashes occurred along the arterial roads of the Calder Highway and the Calder Alternative Highway, with six occurring at the intersection between the Calder Highway and the Calder Alternative Highway. There have been no meaningful road safety improvements in the area as a result of these incidents as far as we have been made aware of.

*Figure 3-6: Crash History (since 1 January 2020*



*Table 3-4: Casualty Accident History*

| Severity | Date | Type (DCA Code) | Location |
|---|---|---|---|
| **Serious injury** | June 8, 2023 | Right far at intersection (111) | Calder Highway / Calder Alternative Highway |
| | March 5, 2024 | Right through (121) | Calder Highway / Calder Alternative Highway |
| | February 28, 2024 | Right far at intersection (111) | Calder Highway / Calder Alternative Highway |
| | June 18, 2021 | Left off carriageway (171) | Yorkshire Road, west of Mitchells Road |
| **Other injury** | March 18, 2023 | Out of control on bend (184) | Calder Highway, west of Yorkshire Road |
| | October 30, 2024 | Off road at bend (181) | Calder Highway, west of Calder Alternative Highway |
| | January 5, 2022 | Out of control on straight (174) | Calder Highway / Calder Alternative Highway |
| | April 8, 2023 | Cross traffic at intersection (110) | Calder Highway / Calder Alternative Highway |
| | July 22, 2022 | Cross traffic at intersection (110) | Calder Highway / Calder Alternative Highway |
| | November 19, 2022 | Head on (120) | Calder Highway, east if Calder Alternative Highway |
| | March 11, 2024 | Leff off carriageway (171) | Calder Highway / Hills Road |
| | February 6, 2020 | Struck animal (167) | Calder Highway, east of Hills Road |
| | January 31, 2022 | Struck animal (167) | Calder Highway, east of Birchalls Road |
| | October 11, 2024 | Struck animal (167) | Calder Alternative Highway, south of Wimmera Highway |
| | April 9, 2024 | Vehicle collides with parked car | Dorset Drive, west of Hills Road |

## 3.8 Movement & Place

Modal priorities are classified through the Movement and Place (M&P) Framework[2]. The M&P Framework recognises that streets not only keep people and goods moving, but they are also places for people to live, work, and enjoy. In this regard, road corridors and streets are defined by the context of the interfacing land use and assigned various 'movement' and 'place' classifications. This way of thinking implies that during planning and development of our transport network, we need to consider the needs for movement and placemaking simultaneously (i.e. providing suitable levels of access to places while making them attractive for people to spend time in).

The DTP provides the M&P classifications across the Victorian transport network through an online mapping portal. The provided M&P classifications represent the current long-term aspirations, rather than the existing conditions. They are regularly updated as part of typical transport network and land

[2] Movement and Place in Victoria | vic.gov.au (www.vic.gov.au)

use planning activities, such as the development of the MTSP, the planned MWFC and the BREP PSA (the DTP has advised that updates to the Marong M&P classifications are expected to occur in the near future, so those currently available do not reflect the implications of the current referenced planning activities).

The current M&P classifications for the key roads within, abutting and connecting the BREP across Marong are provided in Table 3-4.

*Table 3-5: Movement and Place Classifications*

| Link | Walking | Cycling | General Traffic | Freight | Bus | Movement | Place |
|---|---|---|---|---|---|---|---|
| **Calder Highway** | W3 | N/A | GT2 | F1 | N/A | M1 | P4 |
| **Calder Alternative Highway** | W3 | N/A | GT2 | F1 | N/A | M1 | P4 |
| **Wimmera Highway** | W3 | N/A | GT3 | F2 | N/A | M2 | P5 |
| **Allies Road** | W4 | N/A | GT5 | F3 | N/A | M3 | P5 |
| **O'Sullivans Road** | W4 | N/A | GT5 | N/A | N/A | M5 | P5 |
| **Cemetery Road** | W5 | N/A | GT5 | N/A | N/A | M5 | P5 |

Table 3-4 indicates generally low classification for both movement and place functions, except for freight and general traffic on the Calder Highway and Calder Alternative Highway, and for freight only on the Wimmera Highway. Most notable of these is the high freight classification (F1 and F2), which based on Table 3 of DTP's Road Design Note 04-01 - Heavy Vehicle Network Access Considerations, they should support Level 3 classification under the Performance Based Standards (PBS) Scheme[1] and B-Triple heavy vehicle combinations (largest standard vehicle combination considered through the Movement and Place classifications).

It is also noted, that Table 4 of the DTP's Road Design Note 04-01 - Heavy Vehicle Network Access Considerations provides the design and check vehicle types that should be adopted as part of road design for any network upgrades and as part of the BREP's internal network.

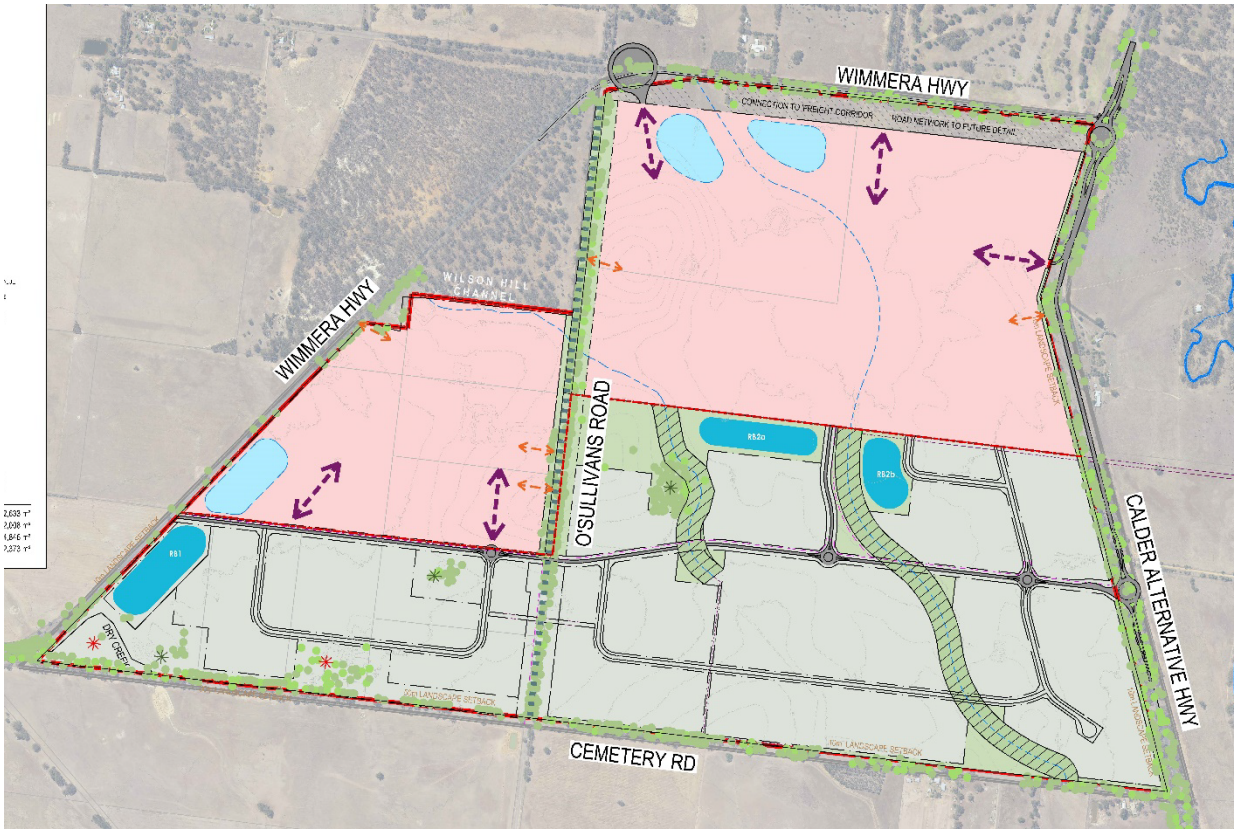
# 4 Future Conditions

## 4.1 BREP Proposal

### 4.1.1 Concept Plan

As part of the BREP Infrastructure Strategy an initial concept plan focused on the Council owned land has been developed, as presented in Figure 4-1. While the concept plan is preliminary in nature and subject to change, it provides a reasonable understanding of the general intent, especially regarding the transport arrangements within and accessing the BREP.

*Figure 4-1: BREP Concept Plan*




### 4.1.2 Land Use

The BREP is a 294-hectare parcel of land that is expected to provide the following developable areas that are expected to accommodate a total of 3,000 jobs:

- Net Developable Area: 206-hectare
- Building Floor Area: 618,000m$^2$

It is noted that the specific proportion of the Developable Area that will be covered by buildings will be dependent on the eventual occupants, which are expected to be a mix of uses, similar to what we commonly find in Industrial Estates / Business Parks. However, for the purposes of this assessment a

30% coverage of Building Floor Area to Net Developable Area has been adopted, which is considered to be generally consistent with similar large regional precincts.

### 4.1.3 Transport Elements

The key transport elements that have been incorporated into the BREP Concept Plan include:

- Three primary points of access will be provided as follows:
    - » A roundabout located along the eastern site frontage onto the Calder Alternative Highway
    - » A roundabout located in the northwest corner of the site that is expected to integrate with the planned MWFC
    - » A give-way controlled T-intersection provided to the western site frontage along the Wimmera Highway. This will support all turning movements, except for right-turns out of the site.
- Two secondary site access points will be provided as follows:
    - » A left-in / left-out only access to the northern site frontage along the Wimmera Highway generally opposite Landry Lane, and
    - » A left-out only to the eastern site frontage along the Calder Alternative Highway, some 350m south of the Wimmera Highway.
- Land along the northern site frontage of the BREP is being put aside for the planned MWFC that will connect the Calder Highway to the northwest and the Calder Alternative Highway to the south of Marong.
- Internal connector roads will extend from each primary site access intersection forming a connected network within the site. Local roads will provide property access from the Connector Road network.
- The majority of the local and connector road intersections will be give-way controlled (priority given to the connector level roads), except the first intersections within the site from the northwestern and eastern site access intersections, which are proposed to be roundabouts.
- Active transport facilities are generally proposed along all the internal roads and landscape features through separated bicycle and pedestrian paths on the connector roads, and shared paths and/or footpaths on the local roads and landscape features.
- Bus services are anticipated to access the BREP. The specific alignment of routes and locations of stops have not been identified at this time by DTP. However, all of the roads will be designed to be bus capable and the verges are sufficiently wide to accommodate bus stops.
- High Performance Freight Vehicle (HPFV) access will be supported through the design of the site access and internal intersections and roads.

## 4.2 Marong Township

### 4.2.1 Land Use

As outlined in Section 2.2, the MTSP sets out the long-term plan for the township to accommodate 8,000 people. The proposed arrangements have been formally adopted as part of Planning Scheme Amendment C263 of the Greater Bendigo Planning Scheme.

The resulting land use yields for the proposed development areas across the Marong Township are presented in Figure 4-2 and Table 4-1. It is noted that the resulting yields are lower than indicated in earlier versions of the MTSP, namely due to the removal of any residential development from Property No. 2A, which previously included 329 dwellings or 856 people (equates to an almost 14% reduction in the number of dwellings and residents than was previously proposed). Property No. 2A now forms part of the BREP and is included in the associated PSA to rezone the land accordingly.

*Figure 4-2: Marong Township Structure Plan – Land Development Areas*

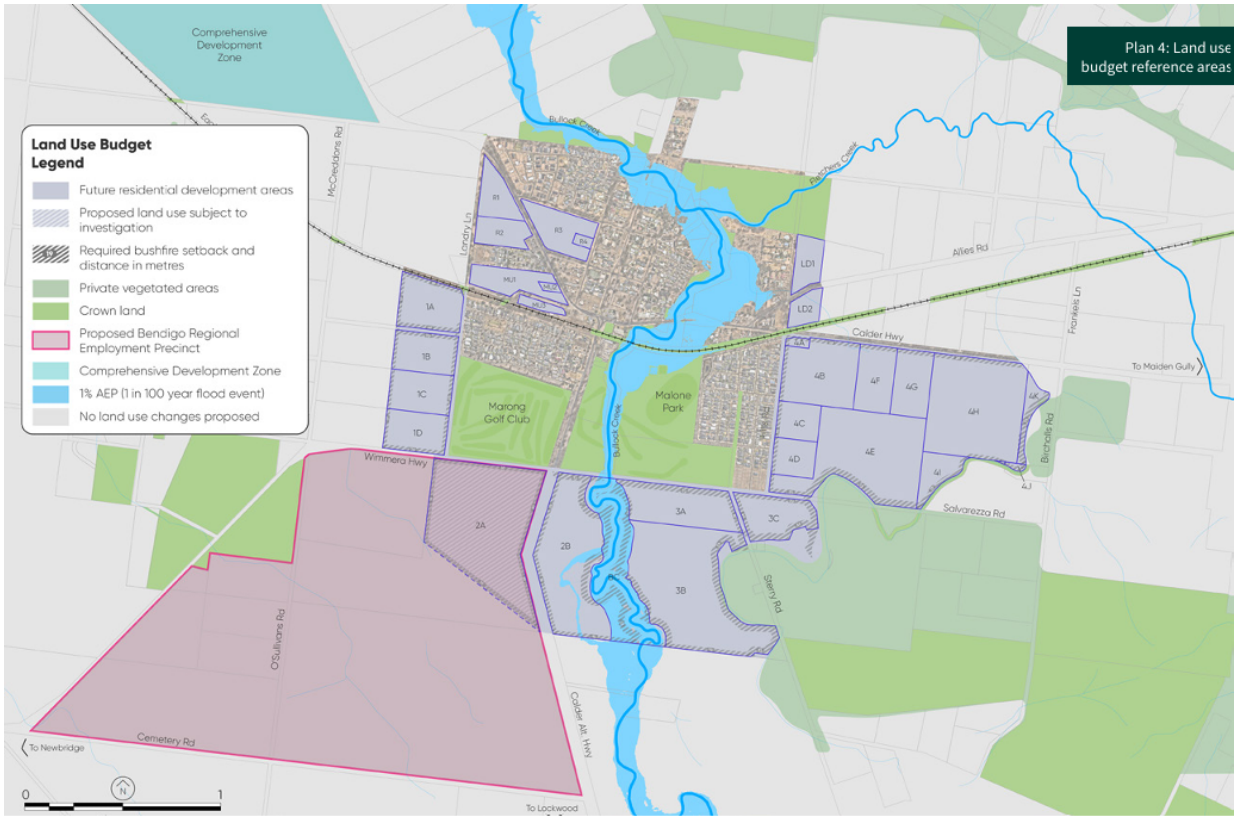


*Table 4-1: Marong Township Development Yield*

| Property No. | Property Area (Ha) | Net Developable Area (NDA ha) | Density (d/ha) | DWELLINGS Yield | Population @2.6p/d |
|---|---|---|---|---|---|
| 1A | 7.98 | 7.54 | 11 | 83 | 216 |
| 1B | 6.50 | 5.66 | 11 | 62 | 162 |
| 1C | 6.44 | 6.00 | 11 | 66 | 172 |
| 1D | 6.44 | 4.98 | 11 | 55 | 142 |
| 2A | 32.17 | 0.00 | - | 0 | 0 |
| 2B | 22.17 | 20.27 | 11 | 223 | 580 |
| 3A | 11.70 | 9.89 | 11 | 109 | 283 |
| 3B | 30.91 | 29.81 | 11 | 328 | 853 |
| 3C | 7.49 | 6.08 | 11 | 67 | 174 |
| 4A | 0.55 | 0.55 | 11 | 6 | 16 |
| 4B | 11.97 | 0.61 | 11 | 7 | 17 |
| 4C | 4.05 | 3.95 | 11 | 43 | 113 |
| 4D | 4.05 | 3.36 | 11 | 37 | 96 |
| 4E | 24.16 | 22.48 | 11 | 247 | 643 |
| 4F | 6.25 | 1.25 | 11 | 14 | 36 |
| 4G | 6.31 | 6.31 | 11 | 69 | 180 |
| 4H | 24.39 | 21.90 | 11 | 241 | 626 |
| 4I | 3.70 | 3.70 | 11 | 41 | 106 |
| 4J | 0.35 | 0.35 | 11 | 4 | 10 |
| 4K | 2.33 | 2.33 | 11 | 26 | 67 |
| R1 | 4.11 | 3.38 | 11 | 37 | 97 |
| R2 | 3.70 | 3.70 | 11 | 41 | 106 |
| R3 | 5.88 | 5.76 | 11 | 63 | 165 |
| R4 | 0.51 | 0.51 | 11 | 6 | 15 |
| MU1 | 5.12 | 5.02 | 20 | 100 | 261 |
| MU2 | 0.40 | 0.40 | 20 | 8 | 21 |
| MU3 | 1.04 | 1.04 | 20 | 21 | 54 |
| LD1 | 3.52 | 3.52 | 5 | 18 | 46 |
| LD2 | 2.43 | 2.43 | 5 | 12 | 32 |
| **Total** | **246.61** | **182.78** | | **2,033** | **5,286** |

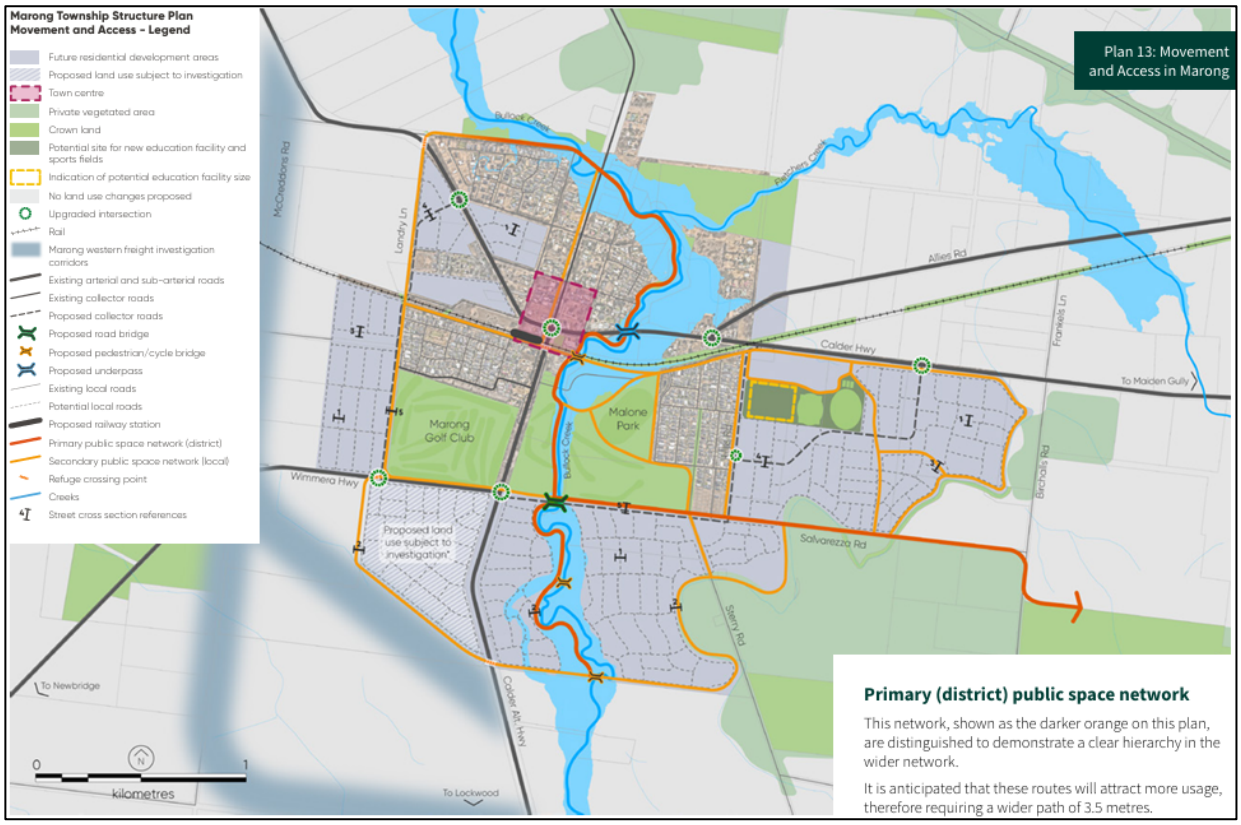
### 4.2.2 Transport Elements

The future movement and access plan from the MTSP is reproduced in Figure 4-3 and includes the following key transport elements:

- Two potential corridors for investigation of the planned MWFC that connects with the BREP (refer to Section 2.3 for further information regarding the adopted alignment).
- Primary Public Space Network extending along the Bullock Creek to the east of the BREP that will provide active transport users with a high quality trail connecting to the town centre.
- Secondary Public Space Network that goes through the BREP, with various connecting routes, such as along the Wimmera Highway, across the Calder Alternative Highway to the Bullock Creek, and along Landry Lane.
- Proposed connector road that is an extension of Salvarezza Road to the west that will connect with the Calder Alternative Highway / Wimmera Highway intersection.

- Roundabouts proposed at the Calder Alternative Highway / Wimmera Highway / Salverezza Road intersection and the Wimmera Highway / Landry Lane intersection. However, the DTP has indicated no roundabout is proposed for the Wimmera Highway / Landry Lane intersection, only left-in and left-out movements will be supported (refer to Section 2.3 for further detail).

*Figure 4-3: Marong Township Structure Plan – Movement and Access*




It is also indicated in the MTSP that a Development Contribution Framework (DCF) is being prepared by Council providing information on the crucial infrastructure projects that are to be delivered and associated funding arrangements and sources for them, including the above transport infrastructure items associated with the future movement and access plan presented in Figure 4-3.

# 5 Transport Network Model

## 5.1 Model Selection & Development

Stantec was commissioned by DTP in 2023 to develop a transport model to inform the investigations of the planned MWFC. The transport model aimed to understand the existing network conditions across Marong, how they will change into the future (2046) with anticipated development, and to undertake an assessment of the alignment and design options for the planned MWFC.

The specific modelling platform and its development methodology was required to consider the following key matters:

1. The model must be capable of representing the re-assignment of regional traffic movements to the future freight and multi-modal corridors, and in turn be sensitive to road speeds and intersection delays along competing routes.
2. The expected growth in local traffic arising from the housing and commercial/industrial development is likely to create local congestion at key intersections. Capturing the temporal demand patterns and resultant intersection operations – particularly future traffic signal operations – will be an important model capability.
3. There are some complex traffic operations within and near the town centre associated with the commercial uses and primary school, which will likely require close attention.

As such, a microsimulation model was developed using the VISSIM software package, as it provides the greatest level of detail and information richness around traffic movements, route choice and network operational implications. The resulting 2023 base model underwent a full calibration and validation process, consistent with the '*Transport Modelling Guidelines Volume 4: Simulation Modelling*' (VicRoads & Transport for Victoria, August 2019).

The application of these guidelines, and associated review and approval by DTP, helps ensure the resulting model is accurately coded and developed with consistent, quality data in accordance with good practice. It also means it is considered to be suitable for use in determining the future (2046) traffic volumes at key locations across Marong as part of this assessment.

This combined with the use of SIDRA Intersection modelling of key intersections is considered to provide a 'best practice' approach to determining and assessing the network level operations that can be expected across Marong now and into the future.

### 5.1.1 Transport network arrangements

The transport network model had a suitable base model that reflects existing conditions. There were also various 2046 future design year networks that had been developed as part of testing alignment and design options for the planned MWFC. As such, the most reflective version to what is being pursued, as outlined in Section 2.3, was adopted and the following reviews and updates made:

- Included the BREP's primary points of access and internal connector street network, as outlined in Section 4.1.3.
- Cross-checked that the key transport elements proposed as part of the MTSP, as outlined in Section 4.2.2, were included.

- Reflect the proposed ultimate corridor arrangements included in a draft concept design of the planned MWFC provided by DTP, dated 20/06/2025.

### 5.1.2 Land use inputs

**BREP**

The transport network model was developed in 2023, which was before the development of the BREP Infrastructure Strategy, Concept Plan and other associated planning activities. This has resulted in much more detail regarding the scale and form of development expected as part of the BREP. The resulting total job numbers and developable areas are provided in Section 4.1.2, which have been updated accordingly within the transport network model.

**Marong Township**

As stated previously, the transport network model was developed in 2023, before the MTSP was formally adopted as part of Planning Scheme Amendment C263 of the Greater Bendigo Planning Scheme. Through the PSA process, changes to the land uses have occurred, resulting in those set out in Section 4.2.1, which has been updated accordingly within the transport network model. This resulted in the removal of residential development within Property No. 2A, which equated to a reduction 329 dwellings or 856 people (an almost 14% reduction in the number of dwellings and residents) from what was previously expected to be delivered across Marong by 2046.

### 5.1.3 Traffic generation rates

Traffic volume growth across Marong between 2023 and 2046 is expected to occur due to the following:

1. **Marong Township:** the traffic movements anticipated to be generated by the proposed development as part of the MTSP, as outlined in Section 4.2.1.
2. **Background Traffic:** relates to the broader network and land use changes that are expected over the next 20 years that will result in additional vehicle movements that will travel through Marong without stopping.
3. **BREP:** the traffic movements anticipated to be generated by the proposed development within the BREP, as outlined in Section 4.1.2.

Traffic generation rates were identified for each of the above. Upon their review the Marong Township and Background Traffic rates used in the 2023 assessment were considered to be appropriate noting the changes that had occurred since the transport network model's development.

**BREP rates**

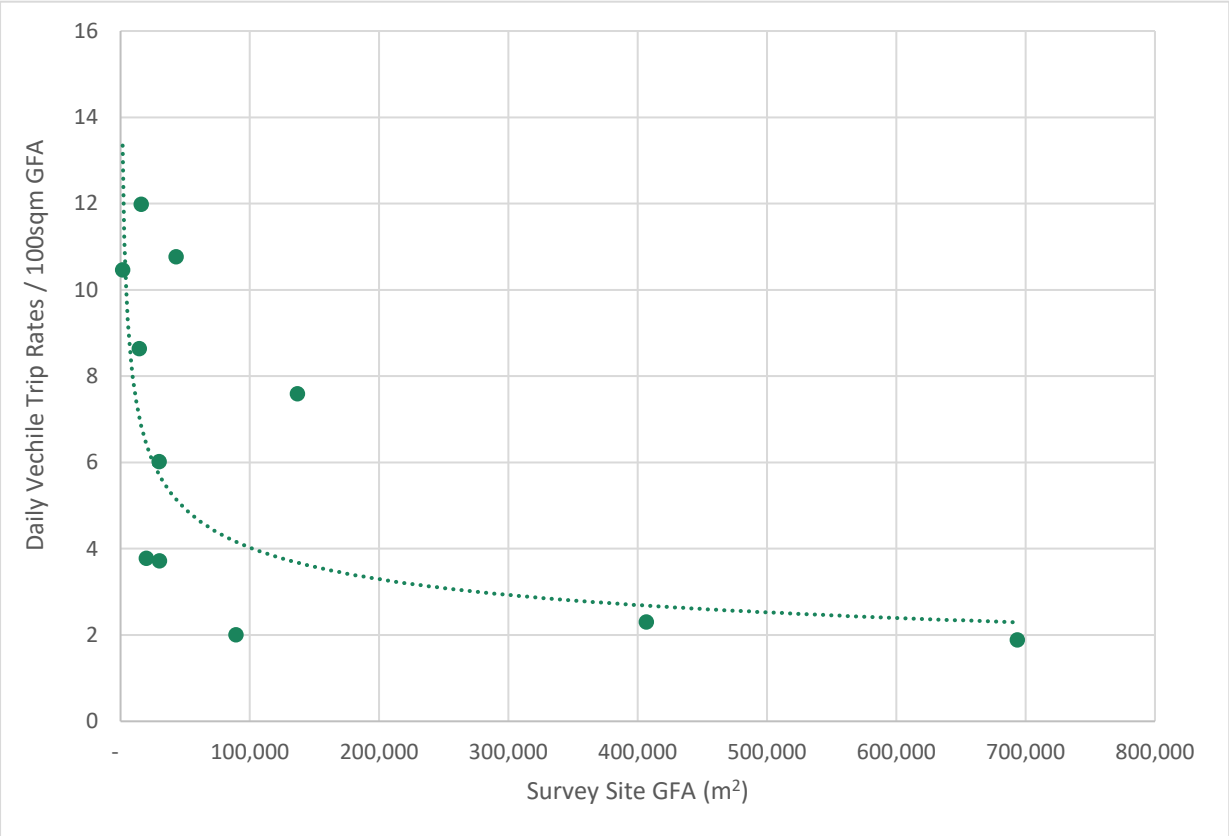
The BREP traffic generation rates were not considered to be appropriate based on the updated job and land use details outlined in Section 4.1.2. This was in part due to more information that has become available for the BREP, including building floor areas, which is a typical metric used for traffic generation rates of industrial parks.

In this regard, updated traffic generation rates were determined for the BREP based on 11 business parks and industrial estates surveyed in 2013, as published through a Technical Direction by the Transport Roads and Marine Services in New South Wales (NSW), titled Guide to Traffic Generating Developments - Updated traffic surveys.

The use of the traffic generation rates from this Technical Direction and other linked NSW practitioner guidance in Victoria is very common and accepted industry practice. However, the following is noted about these and industrial traffic generation rates in general:

- Industrial land uses have seen meaningful reductions in traffic generation rates over the past few decades, mainly due to the various technology advances that reduce the human labour requirements. This has resulted in an almost halving of the general industrial traffic generation rates set out in the above NSW guides from 1.1 (based on 1994 surveys) to 0.56 (based on 2013 surveys) vehicle trips in a peak hour per 100sqm of Gross Floor Area (GFA).
- The 2013 survey results included a meaningful range in daily and peak hour generation rates, which tend to decrease as the overall precinct size increases, as shown in Figure 5-1. This outcome is common, and applied in the above NSW guides for other land use types, such as warehousing and shopping centres – larger precincts tend to have flatter demand profiles with increasing internal trip capture and the linking of trips - reducing peak hour demand concentration and the proportion of external trips.

*Figure 5-1: Daily Traffic Generation Rates for Surveyed Industrial Precincts*




Given that the BREP is expected to comprise 618,000m$^2$ of GFA (based on a 30% coverage ratio of 206 Ha of developable land), the traffic generating characteristics of the following two industrial precincts as part of the NSW RTA traffic survey data are considered to be the most applicable:

- Erskine Park Industrial Estate, Erskine - 326.9 Ha site area with 693,605 sqm GFA
- Wonderland Business Park, Eastern Creek - 114.6 Ha site area with 406,600 sqm GFA

Table 5-1 sets out the traffic generation characteristics of these two industrial precincts.

*Table 5-1: Traffic Generation Characteristics of the two most applicable surveyed Industrial Precincts*

| Precinct | Traffic Generation Rate (vehicle movements / 100 sqm GFA) | | | |
|---|---|---|---|---|
| | Daily | AM Peak* | PM Peak* | Site Peak |
| Erskine Park Industrial Estate, Erskine | 1.89 | 0.13 | 0.14 | 0.16 |
| Wonderland Business Park, Eastern Creek | 2.31 | 0.18 | 0.18 | 0.20 |

* AM and PM Peaks relate to the adjacent road network, not the sites themselves.

Based on Table 5-1, the two most applicable industrial precincts to the BREP as part of the NSW RTA traffic survey data have relatively similar traffic generation characteristics, noting that the Erskine Park Industrial Estate has lower traffic generation rates when compared to the Wonderland Business Park. However, given that the BREP is in a regional location and slightly smaller than the Erskine Park Industrial Estate, it was recommended that the Wonderland Business Park traffic generation rates be applied to the BREP as part of the transport network modelling.

Moreover, it was recommended that the site peak hour rate be adopted for the BREP AM and PM peak hours. The site peak hour rate is only slightly higher than the AM and PM peak hour but helps account for any more regional site implications.

The resulting traffic generation rates applied to the BREP as part of the transport network modelling activities were the following:

- AM peak hour = 0.20 vehicle movements / 100 sqm GFA
- PM peak hour = 0.20 vehicle movements / 100 sqm GFA
- Daily = 2.31 vehicle movements / 100 sqm GFA

On the basis that BREP will accommodate 618,000sqm of GFA, the resulting anticipated traffic volumes that will be generated are the following:

- AM peak hour = 1,236 vehicle movements
- PM peak hour = 1,236 vehicle movements
- Daily = 14,276 vehicle movements

It is noted that the transport network model determines traffic volumes based on job numbers. As such, the job based traffic generation rates that result from the above traffic volumes and the BREP accommodating 3,000 jobs are as follows:

- AM peak hour = 0.41 vehicle movements / job
- PM peak hour = 0.41 vehicle movements / job
- Daily = 4.76 vehicle movements / job

## 5.2 Updated Modelling Inputs

### 5.2.1 Transport network arrangements

The transport network model has a suitable base model that reflects the existing conditions. However, as indicated in Section 5.1.1, there have been various changes to reflect what is expected as part of the 2046 future design year network for Marong. The resulting 2046 transport network arrangements are presented in Figure 5-2, with the key changes from the existing network arrangements highlighted.

*Figure 5-2: Transport Network Model – 2046 Network Arrangements*




It is noted that the two secondary access points have not been included in Figure 5-2, and thus not modelled. This reflects that they are not needed from a network operational capacity perspective. However, the associated benefits they do bring are discussed as follows:

- The left-in / left-out only access to the Wimmera Highway can be expected to provide the northern properties to the east of the water channel efficient access, especially in an interim arrangement if they are developed first.
- The left-out only to the Calder Alternative Highway can be expected to provide the northern properties to the east of the water channel efficient egress only access, especially in an interim arrangement before the delivery of the primary access points.

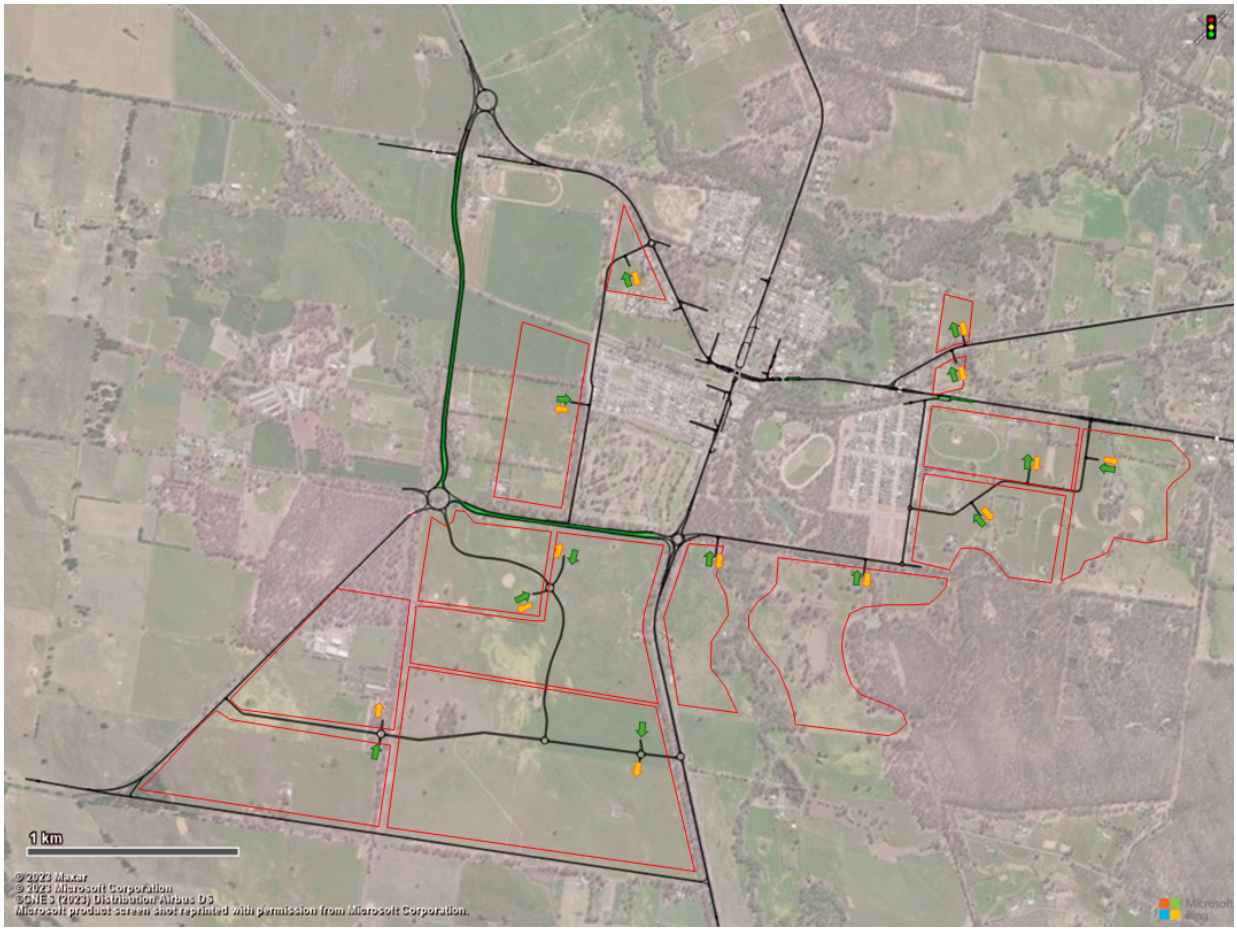
Also from a modelling perspective, the specific location of the secondary access points and the primary access point (roundabout) to the Calder Alternative Highway are not critical from a network operational capacity perspective. There is considered ability to shift their locations noting the following general advice for each:

- The left-in / left-out only access to the Wimmera Highway should ideally be in a general central BREP frontage location to maximise its benefit to the northern portion of the BREP, but as long as it doesn't get too close to the bookend intersections that it either impacts their operation or negates any of its access benefit, then its location can be shifted as needed to support development of the BREP.
- The left-out only to the Calder Alternative Highway can also generally shift as needed to be expected to support development of the BREP. However, the further north it is the more beneficial it will generally be, with the current proposed location being the closest it can be to the Calder Alternative Highway / Wimmera Highway intersection based on the proposed design as part of the MWFC.
- The primary access point (roundabout) to the Calder Alternative Highway can also generally shift as needed to be expected to support development of the BREP. Its current proposed location is to help facilitate the development of the more southern portion of BREP under Council's ownership. However, should more northern areas want to develop first then it could shift north, but ideally not more than a mid-point along the Calder Alternative Highway frontage to ensure it provides a high level of access to the entire BREP. Should the roundabout to Calder Alternative Highway shift meaningfully north of its current location, then an additional secondary access point in the form of a left-out only to the south should be considered to provide efficient access to the southeast portion of BREP.

### 5.2.2 Land use inputs

In terms of the land use inputs, these again only required changes to the 2046 future design year network for Marong. The associated changes are outlined in Section 5.1.2, with the resulting development zones and their connections on the road network presented in Figure 5-3.

*Figure 5-3: Transport Network Model – 2046 Development Zones and Zone Connectors*




A key implication of the above changes to the modelling outcomes has been the BREP development zones now connecting to the proposed internal connector street network, enabling vehicles to access BREP via the most convenient access point and travel within the network to their given internal destination. Without the internal network, modelled vehicles would need to travel around the BREP to a given zone connection to the abutting arterial road network. This change is considered to better reflect what will likely happen in the future.

Only the three primary points of access to the BREP have been included, with the two secondary left-in and left-out access points excluded. This is expected to only have minor potential implications on the distribution of some vehicle movements accessing the northeast portion of BREP, providing a conservative on the high side assessment of the BREP's three primary points of access.

### 5.2.3 Traffic generation rates

The resulting traffic generation rates adopted for the three components outlined in Section 5.1.3 that will contribute to traffic volume growth on the Marong transport network as part of the transport network model are summarised in Table 5-2.

*Table 5-2: Transport Network Model - Traffic Generation Rates*

| Component | Traffic Generation Rates | Source |
|---|---|---|
| **BREP** | AM and PM peak hour: 0.41 trips / job | Erskine Park Industrial Estate, as taken from the NSW RTA traffic survey data (refer to Section 5.1.3 for further details) |
| **Marong Township** | AM 2hr peak period: 1.07 trips / household (0.63 in the model peak hour)<br><br>PM 2hr peak period: 1.28 trip/ household (0.62 in the model peak hour) | Based on surveys of two residential areas within the study area (McKimmie / Evermore Estate and Hills Road Estate, with 353 households) |
| **Background Traffic** | AM peak period: 1.49% p.a. for cars & 1.16% p.a. for trucks<br><br>AM peak period: 1.51% p.a. for cars & 1.21% p.a. for trucks | The Bendigo Integrated Transport Model (BITM), by comparing the Marong external-to-external movements with the BITM base-year (2016) and future year (2046) demand matrices. These growth rates were then applied to the corresponding zone totals in the calibrated base-year trip matrices for Marong - a method known as 'pivoting' - to develop the 2046 through-trip estimates. |

# 6 Transport Modelling Results

## 6.1 Introduction

The transport network model has been updated to reflect the inputs and assumptions set out in Section 5. The results of this transport modelling are presented in this section of the report, with the network level analysis provided in Section 6.2 and those for the key intersections in Section 6.3.

## 6.2 Network Level

### 6.2.1 Mid-block traffic volumes

The 2023 and 2046 mid-block AM and PM peak hour traffic volumes from the transport network model are presented in Figure 6-1 to Figure 6-4.

*Figure 6-1: Mid-Block Traffic Volumes – 2023 AM Peak Hour (8:15-9:15)*



*Figure 6-2: Mid-Block Traffic Volumes – 2023 PM Peak Hour (15:15-16:15)*




*Figure 6-3: Mid-Block Traffic Volumes – 2046 AM Peak Hour (8:15-9:15)*

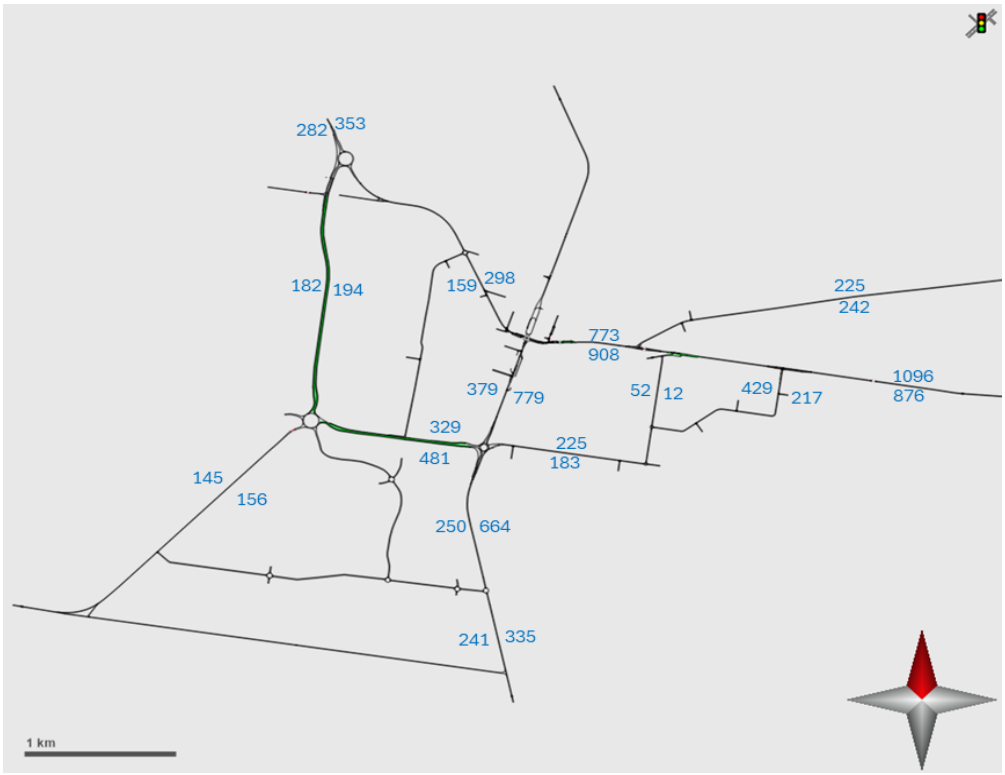


*Figure 6-4: Mid-Block Traffic Volumes – 2046 PM Peak Hour (15:15-16:15)*




There is little difference between the AM and PM peak hour traffic volumes in both 2023 and 2046. However, the PM peak hour does accommodate more traffic and represents the critical peak period.

In terms of the differences between 2023 and 2046 traffic volumes, these are meaningful, with more than doubling of traffic volumes on the existing arterial roads, especially the Calder Alternative to the east of the Marong town centre, and the Calder Alternative Highway. Where the traffic volume growth is not as large on the existing arterial roads is the Calder Alternative to the west of the Marong town centre, and the Wimmera Highway, namely due to the planned MWFC.

The following peak hour mid-block traffic volumes are expected to utilise the McCreddons Road section of the planned MWFC in 2046, as extracted from the network model:

- AM Peak Hour:
  - » Southbound = 194 total vehicles, including 156 cars and 38 heavy vehicles
  - » Northbound = 182 total vehicles, including 122 cars and 60 heavy vehicles
- PM Peak Hour:
  - » Southbound = 169 total vehicles, including 142 cars and 27 heavy vehicles
  - » Northbound = 256 total vehicles, including 170 cars and 86 heavy vehicles

### 6.2.2 Traffic speeds

The 2023 and 2046 AM and PM peak hour mid-block traffic speeds from the transport network model are presented in Figure 6-5 to Figure 6-8.

*Figure 6-5: Mid-Block Traffic Speeds – 2023 AM Peak Hour (8:15-9:15)*




*Figure 6-6: Mid-Block Traffic Speeds – 2023 PM Peak Hour (15:15-16:15)*



*Figure 6-7: Mid-Block Traffic Speeds – 2046 AM Peak Hour (8:15-9:15)*

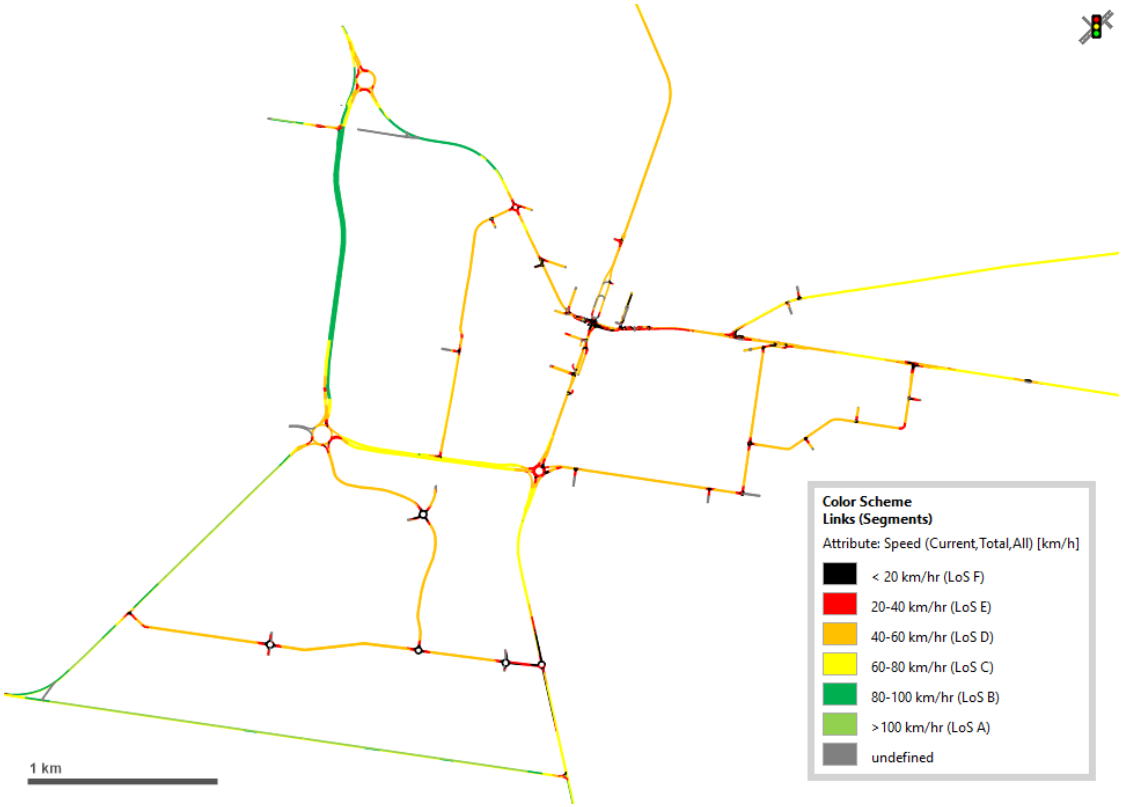
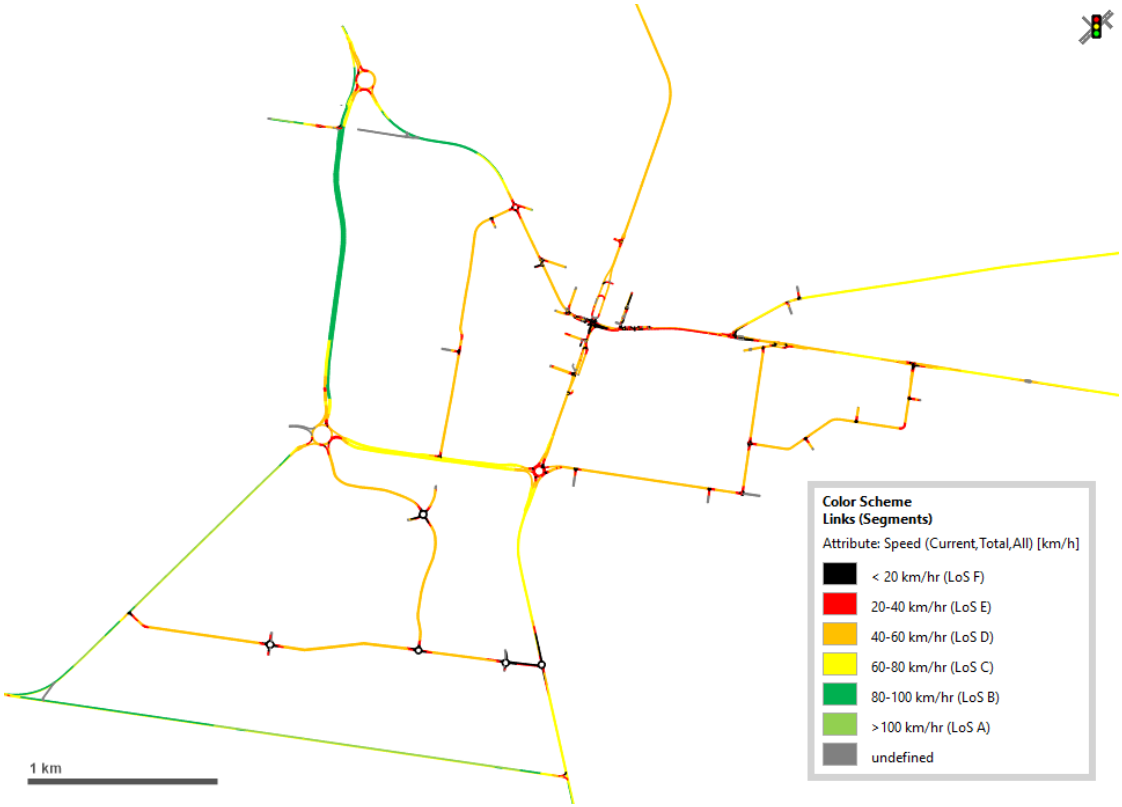


*Figure 6-8: Mid-Block Traffic Speeds – 2046 PM Peak Hour (15:15-16:15)*




Based on these traffic speed plots it can be seen that mid-block seeds tend to align with the given speed limits. However, on approach to each intersection slower speeds are indicated and would be expected. The main area of more extended areas of slow speeds is around the Calder Highway / Calder Alternative Highway intersection, namely due to it accommodating the highest traffic volumes across the Marong road network, but there also being various proximate local intersecting roads.

It is considered to be a function of the increasing number of intersections across the Marong road network that reflects main changes in speeds between 2023 and 2046. Specifically to the Calder Highway / Calder Alternative Highway intersection, it is expected to see increasing queuing due to the increasing demands and implementation of a signalised intersection.

### 6.2.3 Intersection delays

The 2023 and 2046 AM and PM peak hour intersection delays from the transport network model are presented in Figure 6-9 to Figure 6-12.




**Figure 6-9: Intersection Delays – 2023 AM Peak Hour (8:15-9:15)**




**Figure 6-10: Intersection Delays – 2023 PM Peak Hour (15:15-16:15)**




**Figure 6-11: Intersection Delays – 2046 AM Peak Hour (8:15-9:15)**

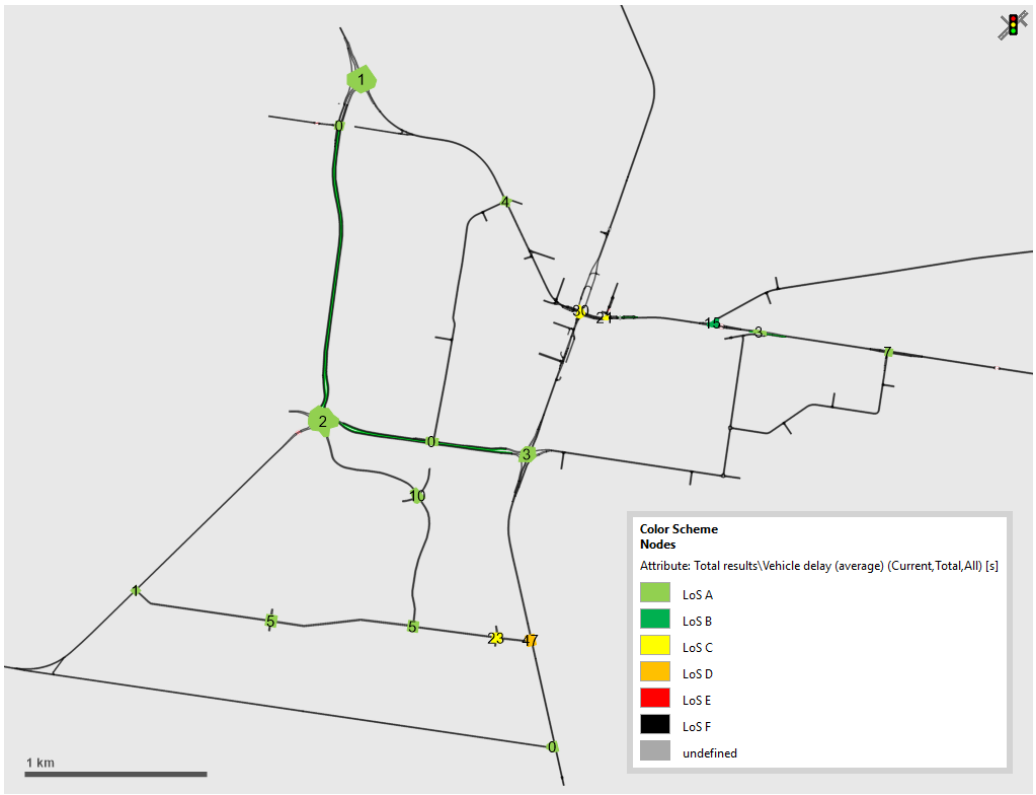



**Figure 6-12: Intersection Delays – 2046 PM Peak Hour (15:15-16:15)**

In 2023, the network model does not indicate much delay at any of the intersections along the arterial road network. However, in 2046 it indicates meaningful delays at intersections along the Calder Highway to the east of the Marong town centre, and the Calder Alternative Highway.

However, it is noted that the network model is not the best tool to determine intersection delay, and especially any required layout changes. Rather, its strength is in the distributing of traffic across a network, especially one expected to see significant change from a network and demand perspective, like with Marong. Hence why the use of SIDRA Intersection modelling has been undertaken for the key intersections along the arterial roads providing access to the BREP, and its primary site access points.

## 6.3 Key Intersections

### 6.3.1 Intersections assessed

As indicated through the network level analysis of the arterial roads providing access to the BREP, four existing and the three primary access point intersections have been assessed in more detail, to determine if, what and when upgrades are required.

An overview of the seven key intersection locations is presented in Figure 6-13, with the existing and proposed intersection types provided in Table 6-1.

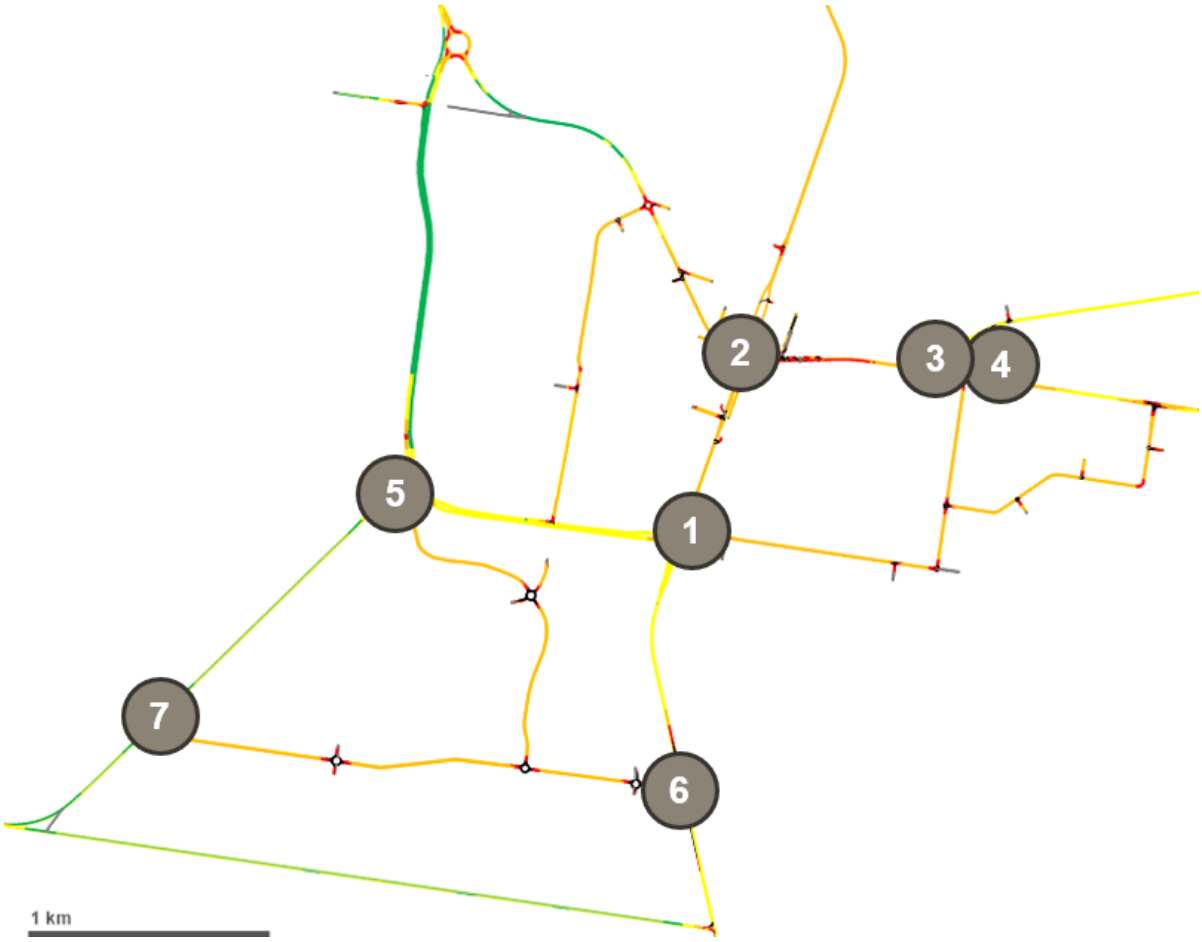



**Figure 6-13: Key Intersection Locations**

**Table 6-1: Key Intersections - Existing and Proposed Types**

| # | Location | Existing | Proposed |
|---|---|---|---|
| **1** | Calder Alternative Highway / Wimmera Highway | Give way controlled T-intersection | Roundabout with x4 approaches |
| **2** | Calder Highway / Calder Alternative Highway | Give way controlled X-intersection | Signalised X-intersection |
| **3** | Calder Highway / Allies Road* | Give way controlled T-intersection | Signalised T-intersection |
| **4** | Calder Highway / Hills Road* | Give way controlled T-intersection | *No change* |
| **5** | Wimmera Highway / McCreddons Road / Wilsons Hill Road / BREP | Give way controlled X-intersection | Roundabout with x5 approaches |
| **6** | Calder Alternative Highway / BREP | *No intersection* | Roundabout with x3 approaches |
| **7** | Wimmera Highway / BREP | *No intersection* | Give way controlled T-intersection |

* The two intersections were assessed as a network in SIDRA, but results for each intersection presented separately

With the proposed intersection types indicated in Table 6-1, these have been developed in consultation with relevant stakeholders. Further detail around any interim arrangements and triggers are provided in Sections 6.3.3 to 6.3.9.

In terms of their assessment through SIDRA Intersection modelling, the commonly used measure of intersection performance is referred to as the *Degree of Saturation* (*DOS*). The *DOS* represents the flow-to-capacity ratio for the most critical movement on each leg of the intersection. The following DOS for the various intersection types has been identified as the 'ideal' limit, beyond which queues and delays increase disproportionately[3]:

- Sign controlled intersections = 0.85 DOS
- Signalised intersection = 0.95 DOS

It is the aim of this analysis to provide sufficient network capacity to accommodate the full delivery of the MTSP and the BREP development by achieving a DOS below the above indicated 'ideal' limits for the key intersections used to access the BREP.

Further design development and detail around any proposed intersection upgrades will occur as part of subsequent design and approval steps.

[3] Refer to Table 39 in the Transport Modelling Guidelines - Volume 5: Intersection Modelling, June 2020

### 6.3.2 Intersection volumes

The AM and PM peak hour 2046 traffic volumes as taken from the transport network model that will utilise each of the seven key intersections is presented in Table 6-2 and Table 6-3, respectively. These tables include the total traffic volumes through the intersections and a breakdown of them in relation to the following sources:

- **Existing:** traffic volumes that currently use the intersection in 2023 and are not expected to use an alternative route in 2046.
- **Background:** additional through traffic volumes between 2023 and 2046 that don't have a destination within Marong.
- **Township:** traffic volumes generated by the proposed development as part of the MTSP.
- **BREP:** traffic volumes generated by the BREP (and % of the total traffic volumes through the intersection).

**Table 6-2: Key Intersections – AM Peak Hour 2046 Traffic Volumes**

| # | Location | Total | Existing | Background | Township | BREP |
|---|---|---|---|---|---|---|
| 1 | Calder Alternative Highway / Wimmera Highway | 1,527 | 287 | 180 | 178 | 882 (58%) |
| 2 | Calder Highway / Calder Alternative Highway | 1,835 | 609 | 122 | 336 | 768 (42%) |
| 3 | Calder Highway / Allies Road | 1,759 | 620 | 110 | 372 | 657 (37%) |
| 4 | Calder Highway / Hills Road | 1,474 | 575 | 60 | 337 | 502 (34%) |
| 5 | Wimmera Highway / McCreddons Road / Wilsons Hill Road / BREP | 940 | 167 | 159 | 71 | 543 (58%) |
| 6 | Calder Alternative Highway / BREP | 1,063 | 190 | 158 | 58 | 657 (62%) |
| 7 | Wimmera Highway / BREP | 389 | 106 | 55 | 24 | 204 (52%) |

**Table 6-3: Key Intersections – PM Peak Hour 2046 Traffic Volumes**

| # | Location | Total | Existing | Background | Township | BREP |
|---|---|---|---|---|---|---|
| 1 | Calder Alternative Highway / Wimmera Highway | 1,509 | 354 | 195 | 160 | 800 (53%) |
| 2 | Calder Highway / Calder Alternative Highway | 1,991 | 692 | 226 | 341 | 732 (37%) |
| 3 | Calder Highway / Allies Road | 1,909 | 730 | 218 | 331 | 630 (33%) |
| 4 | Calder Highway / Hills Road | 1,680 | 686 | 174 | 307 | 513 (31%) |
| 5 | Wimmera Highway / McCreddons Road / Wilsons Hill Road / BREP | 952 | 221 | 183 | 64 | 484 (51%) |
| 6 | Calder Alternative Highway / BREP | 1,124 | 258 | 119 | 43 | 704 (63%) |
| 7 | Wimmera Highway / BREP | 346 | 120 | 92 | 19 | 115 (33%) |

This information has been provided for use to help inform the discussion of the proposed intersection upgrade works in Sections 6.3.3 to 6.3.9.

### 6.3.3 Calder Alternative Highway / Wimmera Highway Intersection

The Calder Alternative Highway / Wimmera Highway intersection is located to the south of the Marong town centre and the northeast corner of the BREP. It is expected to form part of the planned MWFC and the MTSP indicates that as part of its upgrade to a roundabout it will include a fourth leg to the east as an extension of Salvarezza Road to help support access to the adjacent residential development areas.

SIDRA Intersection modelling has been undertaken for the following scenarios to help understand if, what and when upgrades are required at the Calder Highway / Wimmera Highway intersection:

- Existing conditions
- Future conditions, with a single lane roundabout
- Trigger point analysis for single and dual lane roundabouts.

The results and implications of the analysis of the above scenarios are set out below, with more detailed outputs for the associated SIDRA Intersection modelling included in Appendix A.

#### 6.3.3.1 Existing Conditions

Table 6-4 presents a summary of the existing AM and PM peak hour operations of the Calder Alternative Highway / Wimmera Highway intersection. This is based on the existing give way controlled T-intersection layout and the 2023 turning movement volumes extracted from the network model.

**Table 6-4: Calder Alternative Highway / Wimmera Highway Intersection – Existing Conditions**

| Peak Hour | Approach | DOS | Average Delay (sec) | 95th Percentile Queue (m) |
|---|---|---|---|---|
| **AM** | Calder Alternative Highway (South) | 0.07 | 0 sec | 0m |
| | Calder Alternative Highway (North) | 0.07 | 2 sec | 3m |
| | Wimmera Highway (West) | 0.11 # | 8 sec | 6m |
| **PM** | Calder Alternative Highway (North) | 0.10 | 0 sec | 0m |
| | Calder Alternative Highway (South) | 0.10 | 3 sec | 5m |
| | Wimmera Highway (West) | 0.15 # | 11 sec | 8m |

DOS – Degree of Saturation, # - Intersection DOS

Table 6-4 indicates that the Calder Alternative Highway / Wimmera Highway intersection currently operates well with minimal queues and delays on all approaches. The worst performing approach is the Wimmera Highway (West), as it gives way to the Calder Alternative Highway traffic movements, utilising the available gaps in the traffic stream to make the associated turns.

Given the current low DOS on the Wimmera Highway (West) approach, there is considered to be an ability to accommodate meaningful additional traffic volumes at this intersection before an upgrade is required.

#### 6.3.3.2 Future Conditions

Table 6-5 presents a summary of the future AM and PM peak hour operations of the Calder Alternative Highway / Wimmera Highway intersection. This is based on a proposed single lane roundabout and the 2046 turning movement volumes extracted from the network model.

**Table 6-5: Calder Alternative Highway / Wimmera Highway Intersection – Future Conditions – Single Lane Roundabout**

| Peak Hour | Approach | DOS | Average Delay (sec) | 95th Percentile Queue (m) |
|---|---|---|---|---|
| **AM** | Calder Alternative Highway (South) | 0.32 | 6 sec | 19m |
| | Salvarezza Road (East) | 0.31 | 12 sec | 18m |
| | Calder Alternative Highway (North) | 0.63 # | 7 sec | 49m |
| | Wimmera Highway (West) | 0.31 | 7 sec | 18m |
| **PM** | Calder Alternative Highway (South) | 0.51 # | 5 sec | 31m |
| | Salvarezza Road (East) | 0.12 | 9 sec | 6m |
| | Calder Alternative Highway (North) | 0.44 | 7 sec | 33m |
| | Wimmera Highway (West) | 0.45 | 8 sec | 28m |

DOS – Degree of Saturation, # - Intersection DOS

Table 6-5 indicates that the proposed single lane roundabout at the Calder Alternative Highway / Wimmera Highway intersection is expected to operate well with minimal queues and delays on all approaches in 2046, representing a suitable treatment to support the development associated with the MTSP and the BREP.

The worst performing approach in 2046 is the Calder Alternative Highway (North) in the AM peak hour, which relates to the primary commuter movement for those accessing the BREP from Marong and Bendigo. This primary commuter flow splits between the southern and western approaches to access the BREP. This broadly reverses in the PM peak hour with the Calder Alternative Highway (South) approach performing the worst in 2046.

#### 6.3.3.3 Trigger Point Analysis

Trigger point analysis has been undertaken to help understand when the existing arrangements at the Calder Alternative Highway / Wimmera Highway intersection will be required to be updated to the proposed single lane roundabout in the future (i.e. when the 'ideal' limit DOS is reached).

In order to undertake this analysis, the following has been assumed:

- The difference between the existing (2023) and future (2046) intersection traffic volumes as taken from the network model have been associated with the proposed development of the MTSP and the BREP (there include background traffic growth but are relatively small so not considered material for this analysis).
- The MTSP and the BREP will be delivered at the same rate for simplicity in determining the broad level development triggers for the required upgrade (and background traffic growth).

- Given the planned MWFC is not expected to be implemented in the short to medium period, the mid-block traffic volumes on the McCreddons Road section of the planned MWFC, as indicated in Section 6.2.1, have been added to the 2046 traffic volumes for this intersection, as follows:
    - Northbound movements on the planned MWFC added to the left-turn movements on the Wimmera Highway (West) approach and through movement Calder Alternative Highway (South) approach.
    - Southbound movements on the planned MWFC added to the through and right-turn movements on the Calder Alternative Highway (North) approach.
    - Proportions have been allocated based on the traffic associated with the evaluated proportions using the northern and eastern BREP access points. This is 41% north and 59% east in the AM peak, and 46% north, 54% east in the PM peak.
- Removed any traffic using the Calder Alternative Highway / Wimmera Highway intersection to access the MWFC.

By adopting the above assumptions as part of the trigger point analysis, the percentage change between the existing (2023) and future (2046) intersection traffic volumes (and thus the MTSP and the BREP development levels) have been identified for when the given existing intersection arrangement reaches its 'ideal' limit DOS and requires the proposed upgrade to a single lane roundabout.

In this regard, and during the more critical PM peak hour, 45% of the MTSP and the BREP will see the existing give-way controlled T-intersection reach the DOS associated with its 'ideal' limit, triggering the need for an upgrade of the intersection to a single lane roundabout.

Trigger point analysis was also undertaken for a scenario that only included the BREP and background traffic growth (no MTSP related development). It indicated that during the more critical PM peak hour, 58% of the BREP will see the existing give-way controlled T-intersection reach the DOS associated with its 'ideal' limit, triggering the need for an upgrade of the intersection to a single lane roundabout.

The other potential scenario that could trigger the need for the upgrade of the intersection to a single lane roundabout is to provide access via an extension of Salvarezza Road to the adjacent residential development associated with Property No. 2B, as indicated in Table 4-1.

It is also noted that based on the trigger point analysis approach that the single lane roundabout will reach its 'ideal' limit DOS at 100% of the MTSP and the BREP being delivered. This trigger point analysis assumes the planned MWFC has not been implemented, unlike the results set out in Section 6.3.3.2. This result helps support that no further upgrades beyond the implementation of a single lane roundabout at this intersection are required to support the development associated with the MTSP and the BREP. However, the delivery of the MWFC can be expected to improve the operation of this intersection and enable further development and background traffic volume growth over the longer term (beyond 2046).

### 6.3.4 Calder Highway / Calder Alternative Highway Intersection

The Calder Highway / Calder Alternative Highway intersection is located in the centre of the Marong township and to the north of the BREP. It is the intersection of the two main arterial roads that access Marong and provide the main entry point to the Marong town centre. The MTSP indicates that it will be upgraded to a signalised intersection that includes pedestrian crossing facilities, helping to provide access to the town centre. DTP has also requested that the left-turn slip lanes on the eastern and southern approaches be retained to continue to support key freight movements.

SIDRA Intersection modelling has been undertaken for the following scenarios to help understand if, what and when upgrades are required at the Calder Highway / Calder Alternative Highway intersection:

- Existing conditions
- Future conditions, with a signalised intersection (including the retained left-turn slip lanes)
- Trigger point analysis for the unsignalised and signalised intersections.

The results and implications of the analysis of the above scenarios are set out below, with more detailed outputs for the associated SIDRA Intersection modelling included in Appendix A.

#### 6.3.4.1 Existing Conditions

Table 6-6 presents a summary of the existing AM and PM peak hour operations of the Calder Highway / Calder Alternative Highway intersection. This is based on the existing give way controlled X-intersection layout and the 2023 turning movement volumes extracted from the network model.

**Table 6-6: Calder Highway / Calder Alternative Highway Intersection – Existing Conditions**

| Peak Hour | Approach | DOS | Average Delay (sec) | 95th Percentile Queue (m) |
|---|---|---|---|---|
| **AM** | Calder Alternative Highway (South) | 0.63 # | 21 sec | 31m |
| | Calder Highway (East) | 0.11 | 4 sec | 5m |
| | High Street (North) | 0.06 | 6 sec | 2m |
| | Calder Highway (West) | 0.16 | 3 sec | 7m |
| **PM** | Calder Alternative Highway (South) | 0.85 # | 35 sec | 51m |
| | Calder Highway (East) | 0.13 | 4 sec | 5m |
| | High Street (North) | 0.06 | 6 sec | 2m |
| | Calder Highway (West) | 0.20 | 4 sec | 10m |

DOS – Degree of Saturation, # - Intersection DOS

Table 6-6 indicates that the Calder Highway / Calder Alternative Highway intersection currently operates at its 'ideal' limit DOS. This is namely due to the right-turn movement from the southern approach, which has to give way to and find suitable gaps in the traffic stream along the Calder Highway.

There is some potential for the intersection to support additional traffic as right-turn vehicles from the southern approach utilise smaller gaps in the Calder Highway traffic stream. However, as this occurs an increased safety risk is expected. Given that this intersection accounted for six of the 15 recorded crashes over the last five years across Marong, its upgrade is considered necessary to support delivery of the MTSP and the BREP development.

#### 6.3.4.2 Future Conditions

Table 6-7 presents a summary of the future AM and PM peak hour operations of the Calder Highway / Calder Alternative Highway intersection. This is based on a proposed signalised intersection and the 2046 turning movement volumes extracted from the network model.

**Table 6-7: Calder Highway / Calder Alternative Highway Intersection – Future Conditions**

| Peak Hour | Approach | DOS | Average Delay (sec) | 95th Percentile Queue (m) |
|---|---|---|---|---|
| **AM** | Calder Alternative Highway (South) | 0.69 | 37 sec | 72m |
| | Calder Highway (East) | 0.76 # | 23 sec | 177m |
| | High Street (North) | 0.49 | 37 sec | 40m |
| | Calder Highway (West) | 0.69 | 36 sec | 94m |
| **PM** | Calder Alternative Highway (South) | 0.80 | 43 sec | 126m |
| | Calder Highway (East) | 0.83 # | 30 sec | 142m |
| | High Street (North) | 0.37 | 42 sec | 29m |
| | Calder Highway (West) | 0.48 | 33 sec | 67m |

DOS – Degree of Saturation, # - Intersection DOS

Table 6-7 indicates that the proposed signalisation of the Calder Highway / Calder Alternative Highway intersection is expected to operate with an acceptable level of performance with reasonable queues and delays on all approaches in 2046, representing a suitable treatment to support the development associated with the MTSP and the BREP.

While signal phasing will generally aim to balance the DOS across each approach, the worst performing approach is the eastern in both the AM and PM peak hours. This is again due to the high right-turn movement volumes from the southern approach that now holds up the through movements on the eastern approach, as the movements are fully controlled with a signalised intersection. The other high volume movement is the left-turn from the eastern approach, but this is supported by a slip lane, which if it was a stand-up left-turn lane would result in a higher DOS, likely near the 'ideal' limit.

#### 6.3.4.3 Trigger Point Analysis

As noted in Section 6.3.4.1, the existing give way controlled Calder Highway / Calder Alternative Highway intersection is operating at its 'ideal' limit DOS and will be required to be upgraded to a signalised intersection to support delivery of the MTSP and the BREP development.

In terms of the capacity of the proposed signalised intersection, it has been analysed as per the assumptions set out in Section 6.3.3.3, noting the following 2046 mid-block traffic volumes on the McCreddons Road section of the planned MWFC have been added to this intersection as follows:

- Northbound movements on the planned MWFC added to the left-turn movements on the Calder Alternative Highway (South) approach.
- Southbound movements on the planned MWFC added to the right-turn movements on the Calder Highway (West) approach.

In this regard, the proposed signalised intersection will reach its 'ideal' limit DOS at 100% of the MTSP and the BREP being delivered. This trigger point analysis assumes the planned MWFC has not been implemented, unlike the results set out in Section 6.3.4.2. This result helps support that no further upgrades beyond the implementation of a signalised intersection are required at this location to support the development associated with the MTSP and the BREP. However, the delivery of the MWFC can be

expected to improve the operation of this intersection and enable further development and background traffic volume growth over the longer term (beyond 2046).

### 6.3.5 Calder Highway / Allies Road Intersection

The Calder Highway / Allies Road intersection is located to the east of the Marong township, at the intersection of two key access routes between Marong and Bendigo. The MTSP indicates that it will be upgraded to a signalised intersection.

SIDRA Intersection modelling, in the form of a network model that includes the Calder Highway / Hills Road intersection, has been undertaken for the following scenarios to help understand if, what and when upgrades are required at the Calder Highway / Allies Road intersection:

- Existing conditions
- Future conditions, with a signalised intersection
- Trigger point analysis for the signalised intersection.

The results and implications of the analysis of the above scenarios are set out below, with more detailed outputs for the associated SIDRA Intersection modelling included in Appendix A.

#### 6.3.5.1 Existing Conditions

Table 6-8 presents a summary of the existing AM and PM peak hour operations of the Calder Highway / Allies Road intersection. This is based on the existing give way controlled T-intersection layout and the 2023 turning movement volumes extracted from the network model.

**Table 6-8: Calder Highway / Allies Road Intersection – Existing Conditions**

| Peak Hour | Approach | DOS | Average Delay (sec) | 95th Percentile Queue (m) |
|---|---|---|---|---|
| **AM** | Calder Highway (East) | 0.12 | 0 sec | 0m |
| | Allies Road (North) | 0.21 | 11 sec | 2m |
| | Calder Highway (West) | 0.22 # | 1 sec | 0m |
| **PM** | Calder Highway (East) | 0.17 | 0 sec | 0m |
| | Allies Road (North) | 0.26 # | 14 sec | 3m |
| | Calder Highway (West) | 0.23 | 1 sec | 0m |

DOS – Degree of Saturation, # - Intersection DOS

Table 6-8 indicates that the Calder Highway / Allies Road intersection currently operates well with minimal queues and delays on all approaches. The worst performing approach is the Calder Highway (West) in the AM peak hour and Allies Road (North) in the PM peak hour. While the associated DOS's are very low, the worst performing relate to the commuter tidal flow in the eastbound direction in the AM peak hour and the right-turn movement that needs to give way to Calder Highway traffic in the PM peak hour.

Given the current low DOS on all approaches, there is considered to be an ability to accommodate meaningful additional traffic volumes at this intersection before an upgrade is required.

#### 6.3.5.2 Future Conditions

Table 6-9 presents a summary of the future AM and PM peak hour operations of the Calder Highway / Allies Road intersection. This is based on a proposed signalised intersection and the 2046 turning movement volumes extracted from the network model.

**Table 6-9: Calder Highway / Allies Road Intersection – Future Conditions**

| Peak Hour | Approach | DOS | Average Delay (sec) | 95th Percentile Queue (m) |
|---|---|---|---|---|
| **AM** | Calder Highway (East) | 0.80 # | 14 sec | 71m |
| | Allies Road (North) | 0.71 | 30 sec | 25m |
| | Calder Highway (West) | 0.68 | 10 sec | 46m |
| **PM** | Calder Highway (East) | 0.89 # | 21 sec | 104m |
| | Allies Road (North) | 0.85 | 37 sec | 33m |
| | Calder Highway (West) | 0.77 | 11 sec | 63m |

DOS – Degree of Saturation, # - Intersection DOS

Table 6-9 indicates that the proposed signalisation of the Calder Highway / Allies Road intersection is expected to operate with a good level of performance with acceptable queues and delays on all approaches in 2046, representing a suitable treatment to support the development associated with the MTSP and the BREP.

While signal phasing will generally aim to balance the DOS across each approach, the worst performing approach is the eastern in both the AM and PM peak hours. This is due to the limited storage length of the right-turn lane that will see increased use in 2046 and delays due to the intersection's signalisation. However, the associated DOS is still below the 'ideal' limit, so considered suitable.

#### 6.3.5.3 Trigger Point Analysis

Trigger point analysis has been undertaken to help understand when the existing give way controlled Calder Highway / Allies Road intersection needs to be upgraded to a signalise intersection (i.e. when the 'ideal' limit DOS is reached).

This analysis has been undertaken as per the assumptions set out in Section 6.3.3.3, noting the planned MWFC is not expected to have any direct influence on the traffic volumes at this intersection.

The analysis indicates that during the more critical PM peak hour, at 25% delivery of the MTSP and the BREP, the associated signalisation upgrade at the Calder Highway / Allies Road intersection would be required.

### 6.3.6 Calder Highway / Hills Road Intersection

The Calder Highway / Hills Road intersection is located to the east of the Marong township, supporting a key access route between Marong and Bendigo, as well as local access to the Marong residential areas to the south.

No proposed upgrades to this intersection have currently been proposed in any background material, and as per the below, no upgrades are being recommended as part of this SIDRA intersection analysis.

In this regard, SIDRA Intersection modelling, in the form of a network model that included the Calder Highway / Allies Road intersection, has been undertaken for the following scenarios to help understand if, what and when upgrades are required at the Calder Highway / Hills Road intersection:

- Existing conditions
- Future conditions, with no intersection upgrade works.

The results and implications of the analysis of the above scenarios are set out below, with more detailed outputs for the associated SIDRA Intersection modelling included in Appendix A.

#### 6.3.6.1 Existing Conditions

Table 6-10 presents a summary of the existing AM and PM peak hour operations of the Calder Highway / Hills Road intersection. This is based on the existing give way controlled T-intersection layout and the 2023 turning movement volumes extracted from the network model.

**Table 6-10: Calder Highway / Hills Road Intersection – Existing Conditions**

| Peak Hour | Approach | DOS | Average Delay (sec) | 95th Percentile Queue (m) |
|---|---|---|---|---|
| **AM** | Hills Road (South) | 0.12 | 7 sec | 1 m |
| | Calder Highway (East) | 0.10 | 0 sec | 0 m |
| | Calder Highway (West) | 0.17 # | 0 sec | 0 m |
| **PM** | Hills Road (South) | 0.06 | 7 sec | 1 m |
| | Calder Highway (East) | 0.16 | 0 sec | 0 m |
| | Calder Highway (West) | 0.16 # | 0 sec | 0 m |

DOS – Degree of Saturation, # - Intersection DOS

Table 6-10 indicates that the Calder Highway / Hills Road intersection currently operates well with minimal queues and delays on all approaches.

#### 6.3.6.2 Future Conditions

Table 6-11 presents a summary of the future AM and PM peak hour operations of the Calder Highway / Hills Road intersection. This is based on the existing conditions layout and the 2046 turning movement volumes extracted from the network model.

**Table 6-11: Calder Highway / Hills Road Intersection – Future Conditions**

| Peak Hour | Approach | DOS | Average Delay (sec) | 95th Percentile Queue (m) |
|---|---|---|---|---|
| **AM** | Calder Highway (East) | 0.38 | 1 sec | 0 m |
| | Hills Road (South) | 0.41 # | 15 sec | 5 m |
| | Calder Highway (West) | 0.35 | 0 sec | 0 m |
| **PM** | Calder Highway (East) | 0.46 # | 1 sec | 0 m |
| | Hills Road (South) | 0.26 | 17 sec | 3 m |
| | Calder Highway (West) | 0.41 | 0 sec | 0 m |

DOS – Degree of Saturation, # - Intersection DOS

Table 6-11 indicates that the existing Calder Highway / Hills Road intersection is expected to operate well with minimal queues and delays on all approaches in 2046, so no upgrade is considered necessary to support the development associated with the MTSP and the BREP.

### 6.3.7 Wimmera Highway / McCreddons Road Intersection

The Wimmera Highway / McCreddons Road intersection is located to the southwest of the Marong town centre and the northwest corner of the BREP. It is expected to form part of the planned MWFC and be a primary access point for the BREP in the form of a five legged roundabout.

Given the existing traffic volumes on the road intersecting the Wimmera Highway are very low, there is not considered to be a need to assess the existing conditions. Moreover, the trigger for the upgrade to a five legged roundabout is the BREP when the northern area is developed.

As such, SIDRA Intersection modelling has only been undertaken for the future conditions at the Wimmera Highway / McCreddons Road intersection, as a single lane roundabout.

Table 6-12 presents a summary of the future AM and PM peak hour operations of the Calder Highway / Allies Road intersection. This is based on a proposed single lane roundabout and the 2046 turning movement volumes extracted from the network model. More detailed outputs for the associated SIDRA Intersection modelling included in Appendix A.

**Table 6-12: Wimmera Highway / McCreddons Road Intersection – Future Conditions**

| Peak Hour | Approach | DOS | Average Delay (sec) | 95th Percentile Queue (m) |
|---|---|---|---|---|
| **AM** | BREP Access (Southeast) | 0.16 | 9 sec | 12m |
| | Wimmera Highway (East) | 0.30 # | 7 sec | 0m |
| | McCreddons Road (North) | 0.17 | 4 sec | 9m |
| | Wilsons Hill Road (West) | 0.00 | 7 sec | 0m |
| | Wimmera Highway (Southwest) | 0.12 | 14 sec | 6m |
| **PM** | BREP Access (Southeast) | 0.36 # | 9 sec | 23m |
| | Wimmera Highway (East) | 0.23 | 8 sec | 0m |
| | McCreddons Road (North) | 0.15 | 4 sec | 8m |
| | Wilsons Hill Road (West) | 0.00 | 8 sec | 0m |
| | Wimmera Highway (Southwest) | 0.09 | 15 sec | 5m |

DOS – Degree of Saturation, # - Intersection DOS

Table 6-12 indicates that the proposed roundabout at the Calder Highway / McCreddons Road intersection is expected to operate well with minimal queues and delays on all approaches in 2046, representing a suitable treatment to support the development associated with the MTSP and the BREP.

### 6.3.8 Calder Alternative Highway / BREP Access Intersection

The Calder Alternative Highway / BREP Access intersection is proposed to be located south of the Marong town centre and the eastern side of the BREP. It is expected to be a primary access point for the BREP in the form of a three legged roundabout.

Given there is no existing intersection at this location, and the trigger for its delivery is the BREP when the southern area is developed, SIDRA Intersection modelling has only been undertaken for the future conditions at the Calder Alternative Highway / BREP Access intersection, as a single lane roundabout.

Table 6-13 presents a summary of the future AM and PM peak hour operations of the Calder Alternative Highway / BREP Access intersection. This is based on a proposed single lane roundabout and the 2046 turning movement volumes extracted from the network model. More detailed outputs for the associated SIDRA Intersection modelling included in Appendix A.

**Table 6-13: Calder Alternative Highway / BREP Access Intersection – Future Conditions**

| Peak Hour | Approach | DOS | Average Delay (sec) | 95th Percentile Queue (m) |
|---|---|---|---|---|
| **AM** | Calder Alternative Highway (South) | 0.23 | 8 sec | 13m |
| | Calder Alternative Highway (North) | 0.49 # | 11 sec | 34m |
| | BREP Access (West) | 0.21 | 7 sec | 16m |
| **PM** | Calder Alternative Highway (South) | 0.24 | 6 sec | 15m |
| | Calder Alternative Highway (North) | 0.36 | 9 sec | 24m |
| | BREP Access (West) | 0.45 # | 6 sec | 30m |

DOS – Degree of Saturation, # - Intersection DOS

Table 6-13 indicates that the proposed roundabout at the Calder Alternative Highway / BREP Access intersection is expected to operate well with minimal queues and delays on all approaches in 2046, representing a suitable treatment to support the development associated with the MTSP and the BREP.

### 6.3.9 Wimmera Highway / BREP Access Intersection

The Wimmera Highway / BREP Access intersection is proposed to be located southwest of the Marong town centre and the western side of the BREP. It is expected to be a primary access point for the BREP in the form of a give-way controlled T-intersection (all movements permitted except for the right-out from the BREP).

Given there is no existing intersection at this location, and the trigger for its delivery is the BREP when the southwestern area is developed, SIDRA Intersection modelling has only been undertaken for the future conditions at the Wimmera Highway / BREP Access intersection, as a give-way controlled T-intersection.

Table 6-14 presents a summary of the future AM and PM peak hour operations of the Wimmera Highway / BREP Access intersection. This is based on a proposed give-way controlled T-intersection and the 2046 turning movement volumes extracted from the network model. More detailed outputs for the associated SIDRA Intersection modelling included in Appendix A.

**Table 6-14: Wimmera Highway / BREP Access Intersection – Future Conditions**

| Peak Hour | Approach | DOS | Average Delay (sec) | 95th Percentile Queue (m) |
|---|---|---|---|---|
| **AM** | BREP Access (East) | 0.05 | 7 sec | 4m |
| | Wimmera Highway (Northeast) | 0.11 | 4 sec | 0m |
| | Wimmera Highway (Southwest) | 0.17 # | 4 sec | 6m |
| **PM** | BREP Access (East) | 0.07 | 8 sec | 4m |
| | Wimmera Highway (Northeast) | 0.12 # | 1 sec | 0m |
| | Wimmera Highway (Southwest) | 0.10 | 4 sec | 4m |

DOS – Degree of Saturation, # - Intersection DOS

Table 6-14 indicates that the proposed roundabout at the Wimmera Highway / BREP Access intersection is expected to operate well with minimal queues and delays on all approaches in 2046, representing a suitable treatment to support the development associated with the MTSP and the BREP.

# 7 Conclusions

Based on the analysis and discussions presented within this report, the following conclusions are made:

- There is expected to be meaningful levels of change expected to occur across Marong in the coming decades, namely through the delivery of the MTSP, the BREP and the planned MWFC.
- These changes across Marong have been considered through a suitable transport network modelling platform, providing an understanding of how the traffic volumes cross the network will likely change into the future.
- More detailed intersection modelling has been undertaken of the key intersections along the arterial roads expected to be used to access the BREP, as well as its primary access points. The intersection modelling has identified if, what and when any intersection upgrade works are required.
- A summary of the proposed intersection upgrade works, triggers and proportion of traffic volumes associated with the BREP is provided as follows:
    - » ***Calder Alternative Highway / Wimmera Highway:*** when 45% of the MTSP and the BREP have been developed, the existing give-way controlled T-intersection will reach its 'ideal' limit DOS, triggering the need for an upgrade of the intersection to a single lane roundabout (or to provide access to the adjacent residential development precinct - Property No. 2B). During the more critical PM peak hour, the BREP is expected to contribute 53% of the total traffic volumes going through this intersection in 2046.
    - » ***Calder Highway / Calder Alternative Highway:*** this intersection is currently operating at its 'ideal' limit DOS and should be upgraded to a signalised intersection to support delivery of the MTSP and the BREP development. During the critical PM peak hour, the BREP is expected to contribute 37% of the total traffic volumes passing through this intersection in 2046.
    - » ***Calder Highway / Allies Road:*** when 25% of the MTSP and the BREP have been developed the existing give-way controlled T-intersection will reach its 'ideal' limit DOS, triggering the need for an upgrade to a signalised intersection. During the more critical PM peak hour, the BREP is expected to contribute 33% of the total traffic volumes going through this intersection in 2046.
    - » ***BREP Primary Access Points:*** the three proposed primary access points for the BREP will be triggered as the associated proximate areas within the BREP are developed.
- With the implementation of the above proposed intersection upgrades, sufficient network capacity will be provided to accommodate the full delivery of the MTSP and the BREP development, noting the other transport infrastructure proposed to be delivered as part of the MTSP and the planned MWFC.

# Appendices



# Appendix A SIDRA Outputs

# A.1 Calder Alternative Highway – Wimmera Highway

# USER REPORT FOR SITE

**Project: sid_x5902_marong-oct25-v7**

**Output produced by SIDRA INTERSECTION Version: 9.1.6.228** **Template: Site User Report**

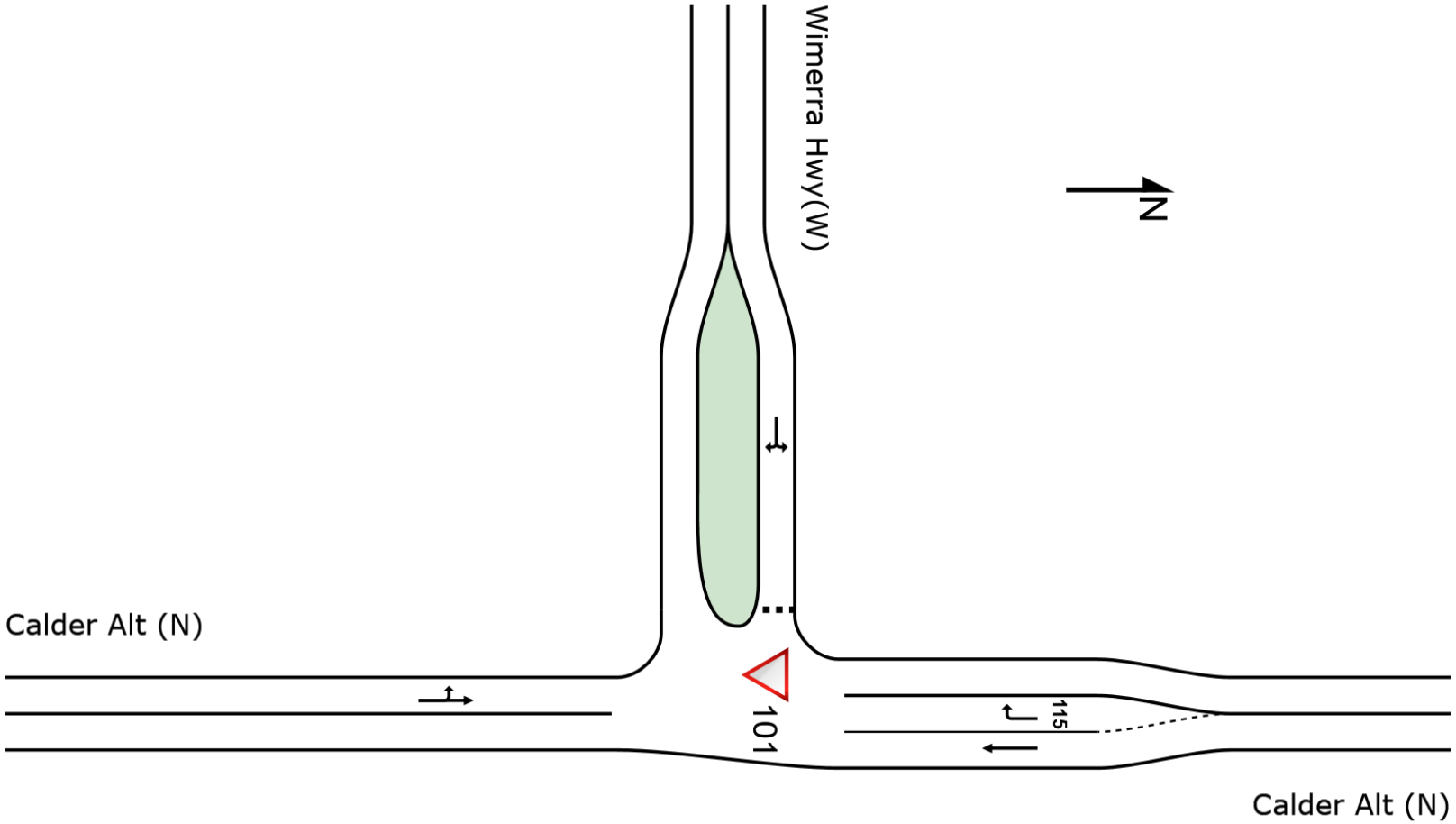
## Site: 101 [#2 - AM - Existing - 2023 Model Volumes - Revised (Site Folder: [May 2026] - Amendments to reported Sidra - Site 2)]

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

### Site Layout

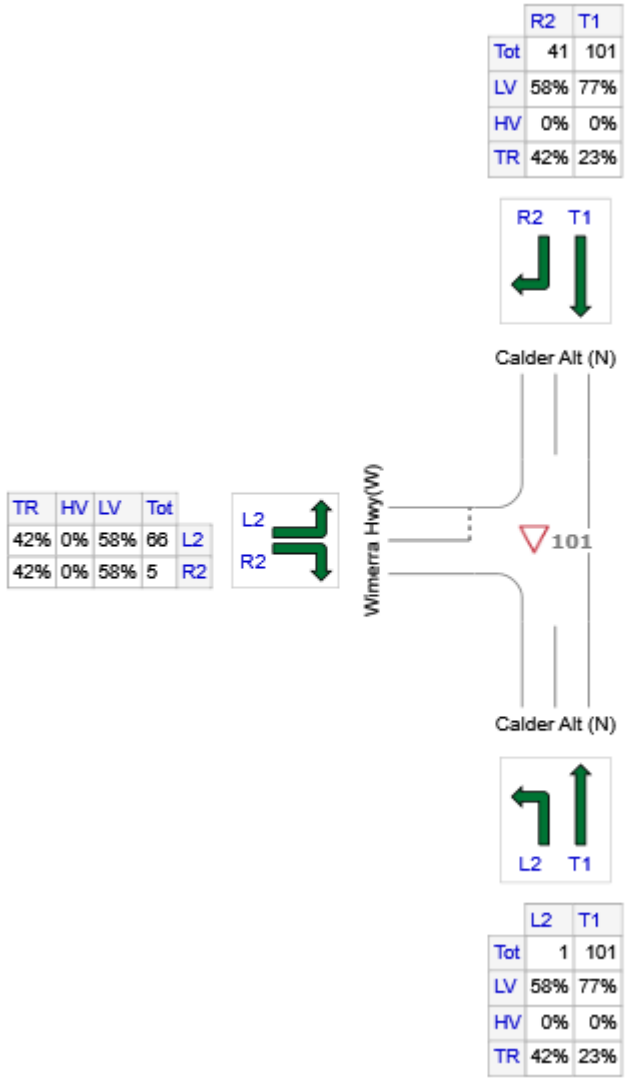
Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.

# A.2 Calder Highway – Calder Alternative Highway – Without Trigger Analysis


Wimerra Hwy(W)
N
Calder Alt (N)
101
115
Calder Alt (N)

## Input Volumes

**Volume Display Method: Total and %**




| | All MCs | Light Vehicles (LV) | Heavy Vehicles (HV) | Large Trucks (TR) |
|---|---|---|---|---|
| S: Calder Alt (N) | 102 | 78 | 0 | 24 |
| N: Calder Alt (N) | 142 | 102 | 0 | 40 |
| W: Wimerra Hwy(W) | 71 | 41 | 0 | 30 |
| Total | 315 | 221 | 0 | 94 |

## 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. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Calder Alt (N) | | | | | | | | | | | | | | | |
| Lane 1 | 107 | 23.2 | 107 | 23.2 | 1446 | 0.074 | 100 | 0.1 | LOS A | 0.0 | 0.0 | Full | 500 | 0.0 | 0.0 |
| Approach | 107 | 23.2 | 107 | 23.2 | | 0.074 | | 0.1 | NA | 0.0 | 0.0 | | | | |
| North: Calder Alt (N) | | | | | | | | | | | | | | | |
| Lane 1 | 106 | 23.0 | 106 | 23.0 | 1450 | 0.073 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 500 | 0.0 | 0.0 |
| Lane 2 | 43 | 42.0 | 43 | 42.0 | 853 | 0.051 | 100 | 7.7 | LOS A | 0.2 | 3.2 | Short | 115 | 0.0 | NA |
| Approach | 149 | 28.5 | 149 | 28.5 | | 0.073 | | 2.2 | NA | 0.2 | 3.2 | | | | |
| West: Wimerra Hwy(W) | | | | | | | | | | | | | | | |
| Lane 1 | 75 | 42.0 | 75 | 42.0 | 708 | 0.106 | 100 | 8.3 | LOS A | 0.4 | 5.9 | Full | 500 | 0.0 | 0.0 |
| Approach | 75 | 42.0 | 75 | 42.0 | | 0.106 | | 8.3 | LOS A | 0.4 | 5.9 | | | | |
| All Vehicles | 332 | 29.8 | 332 | 29.8 | | 0.106 | | 2.9 | NA | 0.4 | 5.9 | | | | |

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.
Minor Road Approach LOS values are based on average delay for all lanes.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
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 Gap.
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.

# USER REPORT FOR SITE

## Project: sid_x5902_marong-oct25-v7

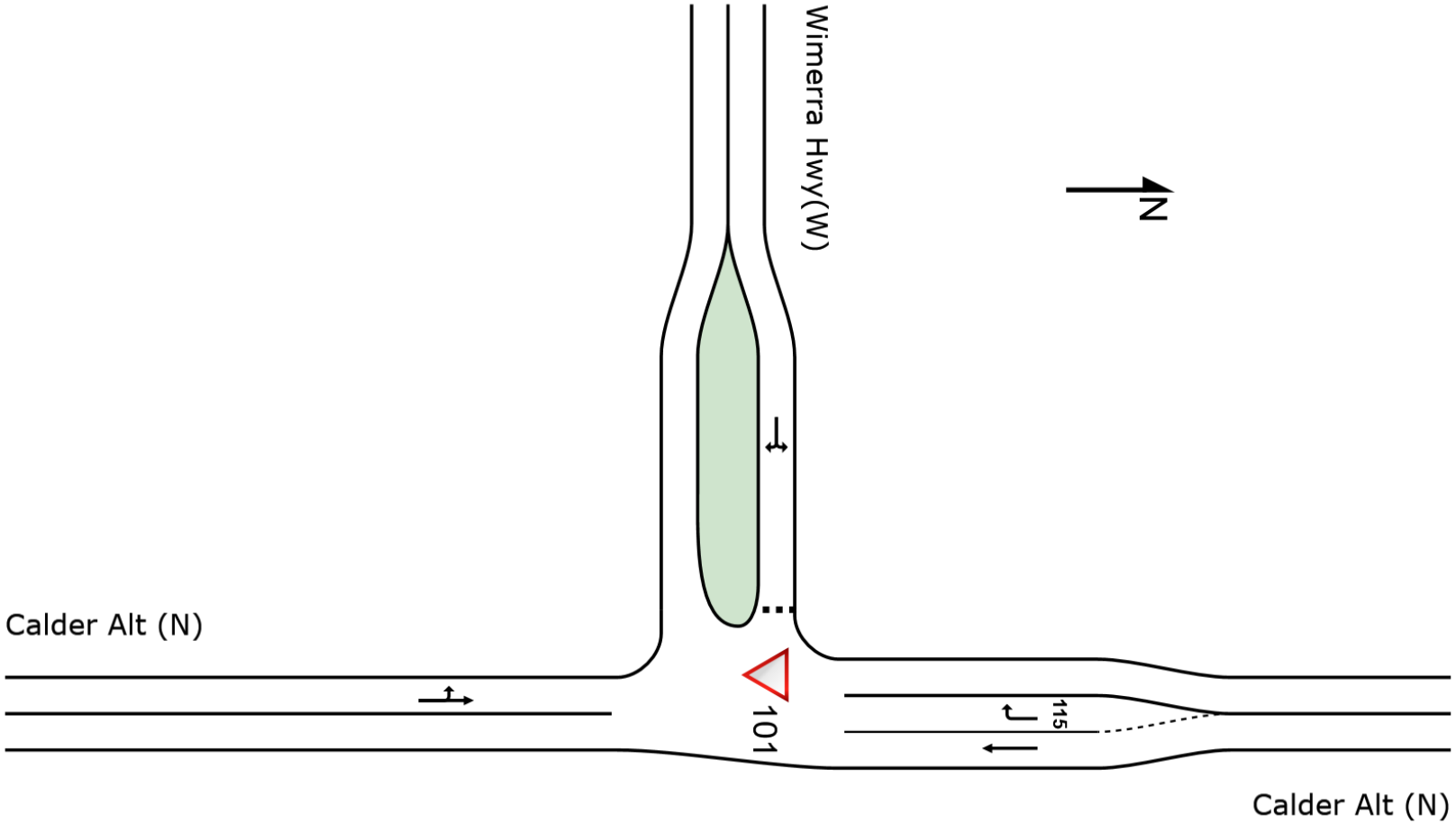
**Output produced by SIDRA INTERSECTION Version: 9.1.6.228** **Template: Site User Report**

## Site: 101 [#2 - AM - Trigger Analysis - Existing + Background + 65% BREP (Site Folder: [May 2026] - Calder Alternative / Wimmera Highway - Trigger Analysis)]

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

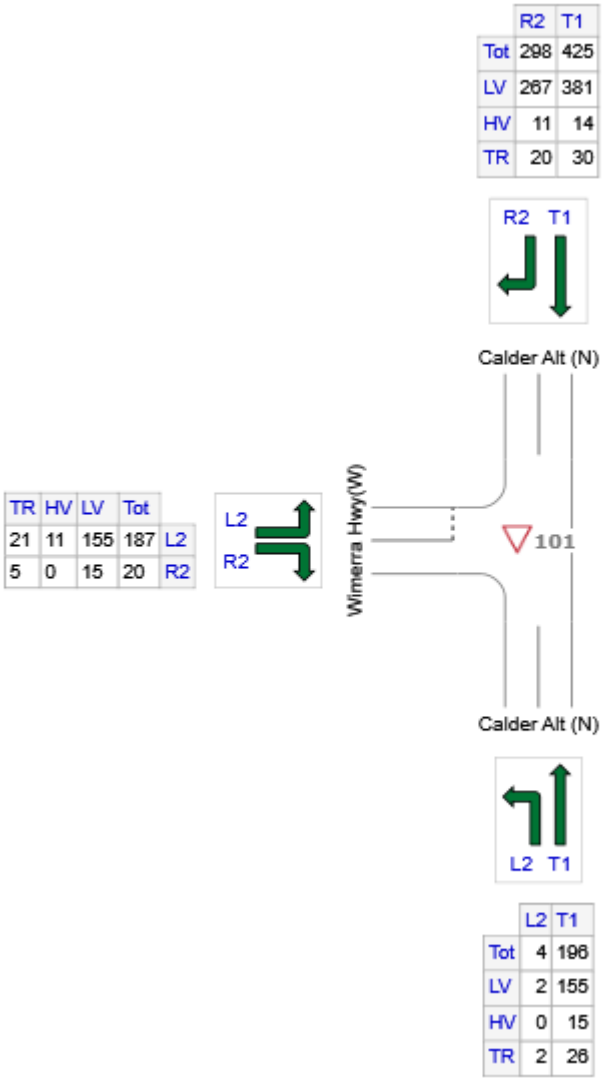
### Site Layout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.


Wimerra Hwy(W)
N
Calder Alt (N)
101
115
Calder Alt (N)

## Input Volumes

**Volume Display Method: Separate**




| | All MCs | Light Vehicles (LV) | Heavy Vehicles (HV) | Large Trucks (TR) |
|---|---|---|---|---|
| S: Calder Alt (N) | 200 | 157 | 15 | 28 |
| N: Calder Alt (N) | 723 | 648 | 25 | 50 |
| W: Wimerra Hwy(W) | 207 | 170 | 11 | 26 |
| Total | 1130 | 975 | 51 | 104 |

## 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. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Calder Alt (N) | | | | | | | | | | | | | | | |
| Lane 1 | 211 | 21.5 | 211 | 21.5 | 1546 | 0.136 | 100 | 0.2 | LOS A | 0.0 | 0.0 | Full | 500 | 0.0 | 0.0 |
| Approach | 211 | 21.5 | 211 | 21.5 | | 0.136 | | 0.2 | NA | 0.0 | 0.0 | | | | |
| North: Calder Alt (N) | | | | | | | | | | | | | | | |
| Lane 1 | 447 | 10.4 | 447 | 10.4 | 1730 | 0.259 | 100 | 0.1 | LOS A | 0.0 | 0.0 | Full | 500 | 0.0 | 0.0 |
| Lane 2 | 314 | 10.4 | 314 | 10.4 | 1173 | 0.267 | 100 | 7.3 | LOS A | 1.3 | 11.2 | Short | 115 | 0.0 | NA |
| Approach | 761 | 10.4 | 761 | 10.4 | | 0.267 | | 3.1 | NA | 1.3 | 11.2 | | | | |
| West: Wimerra Hwy(W) | | | | | | | | | | | | | | | |
| Lane 1 | 218 | 17.9 | 218 | 17.9 | 252 | 0.865 | 100 | 48.9 | LOS E | 7.5 | 71.5 | Full | 500 | 0.0 | 0.0 |
| Approach | 218 | 17.9 | 218 | 17.9 | | 0.865 | | 48.9 | LOS E | 7.5 | 71.5 | | | | |
| All Vehicles | 1189 | 13.7 | 1189 | 13.7 | | 0.865 | | 10.9 | NA | 7.5 | 71.5 | | | | |

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.
Minor Road Approach LOS values are based on average delay for all lanes.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
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 Gap.
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.

# USER REPORT FOR SITE

**Project: sid_x5902_marong-oct25-v7**

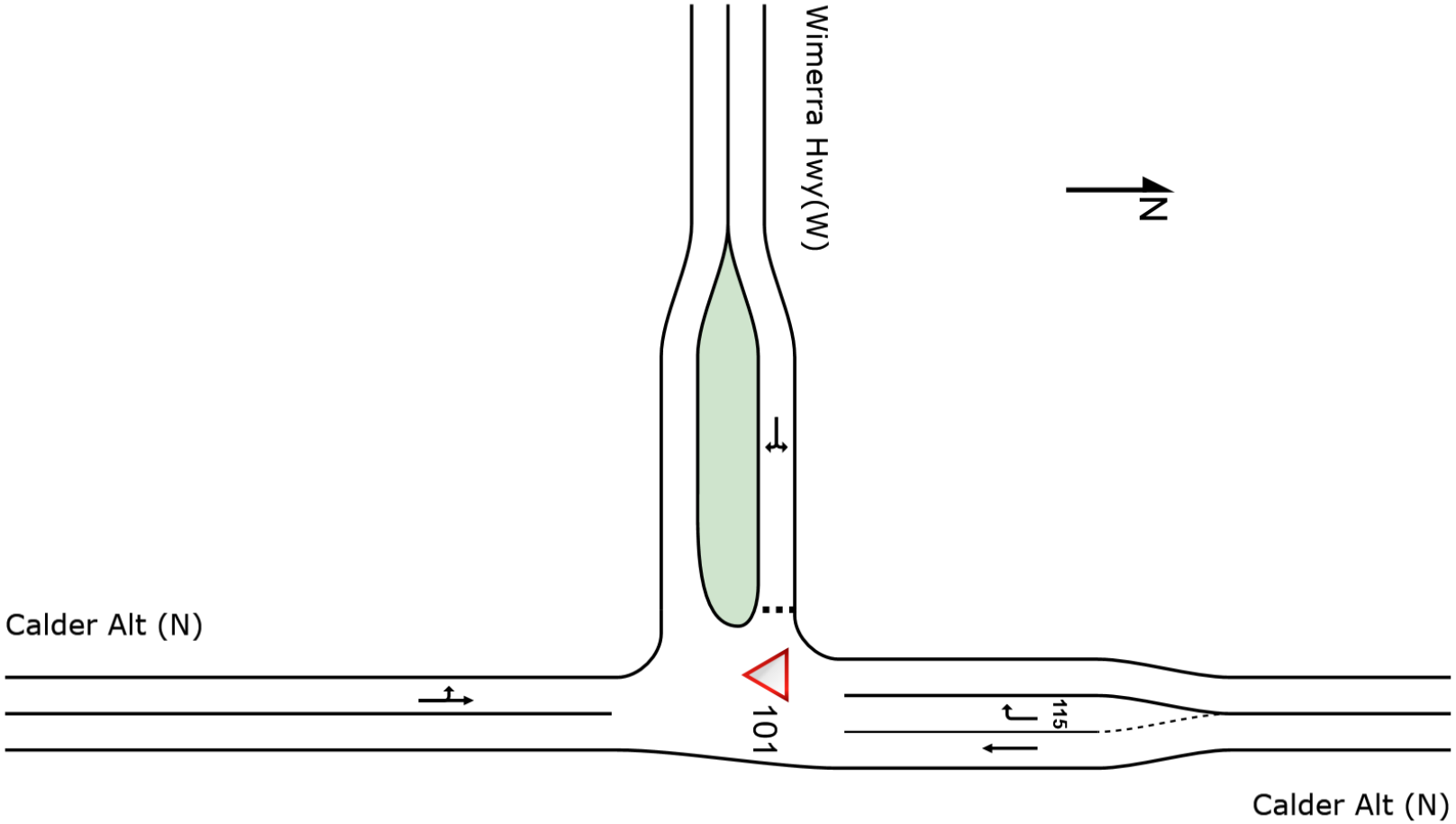
**Output produced by SIDRA INTERSECTION Version: 9.1.6.228** **Template: Site User Report**

## Site: 101 [#2 - AM - Trigger Analysis - Existing + Proportional Background & BREP 70% (Site Folder: [May 2026] - Calder Alternative / Wimmera Highway - Trigger Analysis)]

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

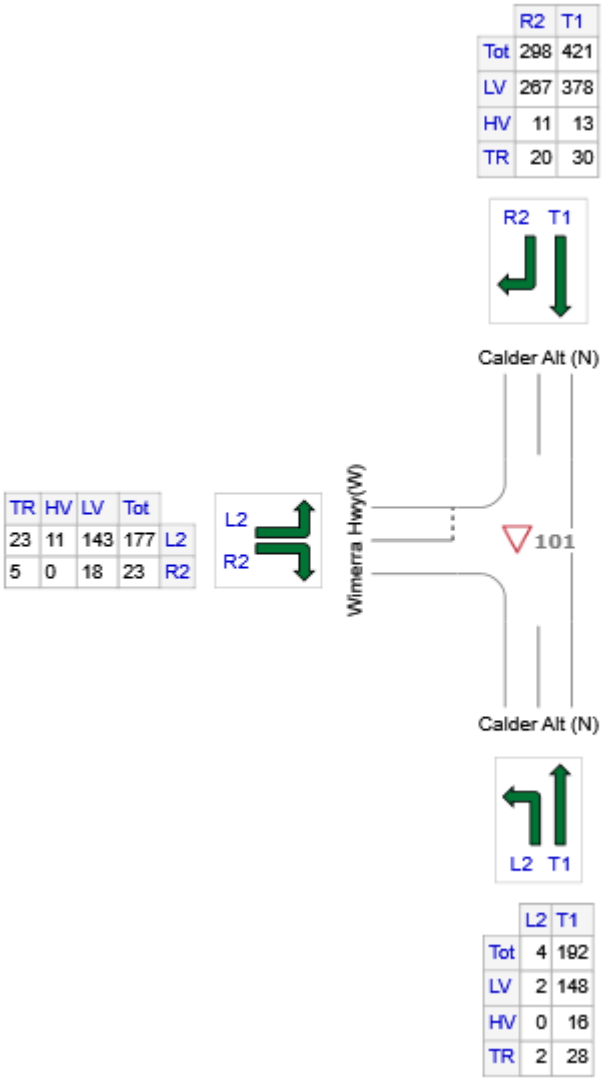
### Site Layout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.


Wimerra Hwy(W)
N
Calder Alt (N)
101
115
Calder Alt (N)

## Input Volumes

**Volume Display Method: Separate**




| | All MCs | Light Vehicles (LV) | Heavy Vehicles (HV) | Large Trucks (TR) |
|---|---|---|---|---|
| S: Calder Alt (N) | 196 | 150 | 16 | 30 |
| N: Calder Alt (N) | 719 | 645 | 24 | 50 |
| W: Wimerra Hwy(W) | 200 | 161 | 11 | 28 |
| Total | 1115 | 956 | 51 | 108 |

## 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. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Calder Alt (N) | | | | | | | | | | | | | | | |
| Lane 1 | 206 | 23.5 | 206 | 23.5 | 1517 | 0.136 | 100 | 0.2 | LOS A | 0.0 | 0.0 | Full | 500 | 0.0 | 0.0 |
| Approach | 206 | 23.5 | 206 | 23.5 | | 0.136 | | 0.2 | NA | 0.0 | 0.0 | | | | |
| North: Calder Alt (N) | | | | | | | | | | | | | | | |
| Lane 1 | 443 | 10.2 | 443 | 10.2 | 1730 | 0.256 | 100 | 0.1 | LOS A | 0.0 | 0.0 | Full | 500 | 0.0 | 0.0 |
| Lane 2 | 314 | 10.4 | 314 | 10.4 | 1174 | 0.267 | 100 | 7.3 | LOS A | 1.3 | 11.2 | Short | 115 | 0.0 | NA |
| Approach | 757 | 10.3 | 757 | 10.3 | | 0.267 | | 3.1 | NA | 1.3 | 11.2 | | | | |
| West: Wimerra Hwy(W) | | | | | | | | | | | | | | | |
| Lane 1 | 211 | 19.5 | 211 | 19.5 | 246 | 0.856 | 100 | 48.2 | LOS E | 7.0 | 68.8 | Full | 500 | 0.0 | 0.0 |
| Approach | 211 | 19.5 | 211 | 19.5 | | 0.856 | | 48.2 | LOS E | 7.0 | 68.8 | | | | |
| All Vehicles | 1174 | 14.3 | 1174 | 14.3 | | 0.856 | | 10.7 | NA | 7.0 | 68.8 | | | | |

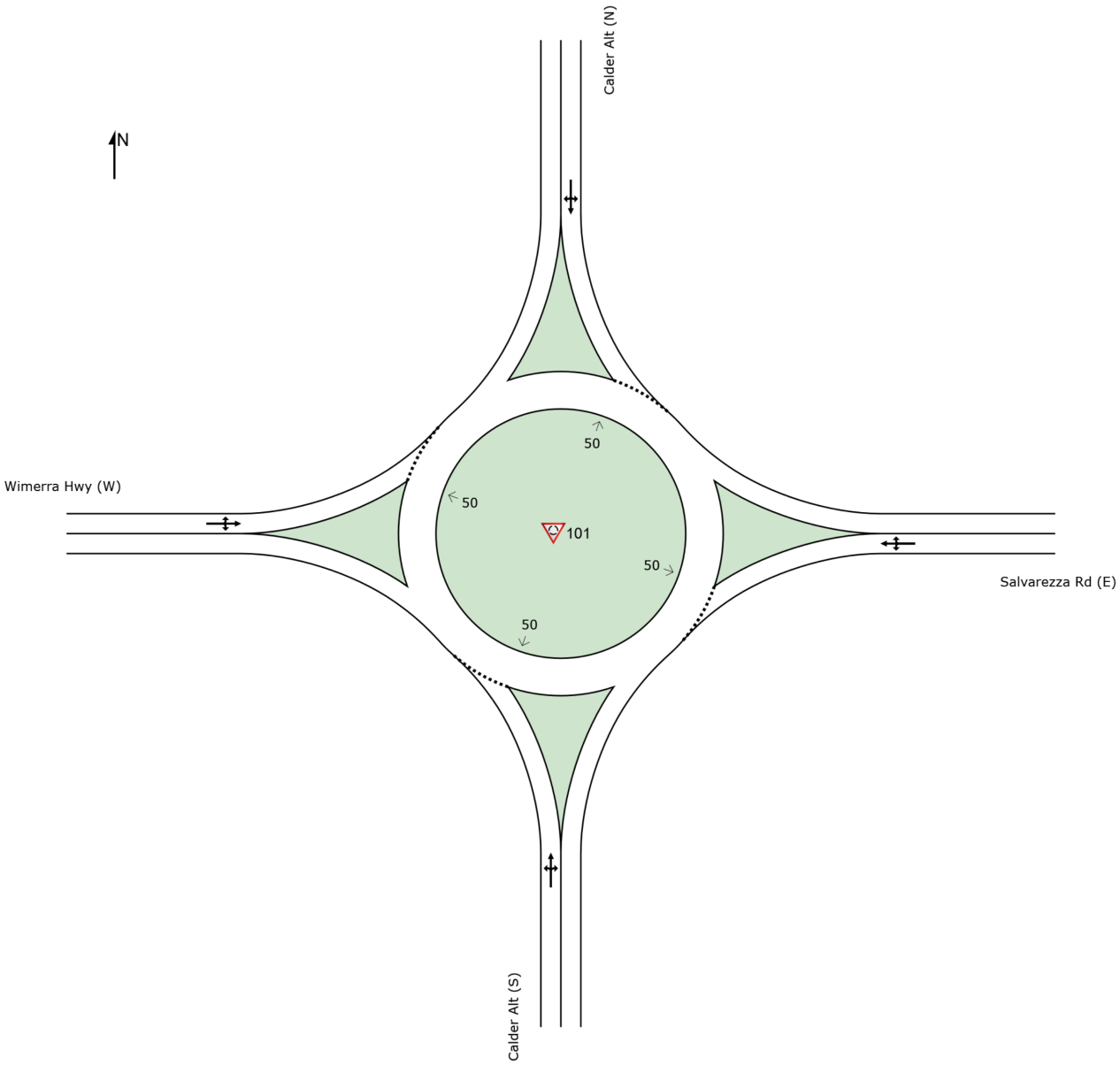
Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
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 Gap.
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.

## Site: 101 [#2 - AM - Interim - 2046 Model Volumes (w/o MWFC) - 100% Development - Revised (Site Folder: [May 2026] - Amendments to reported Sidra - Site 2)]

New Site
Site Category: (None)
Roundabout

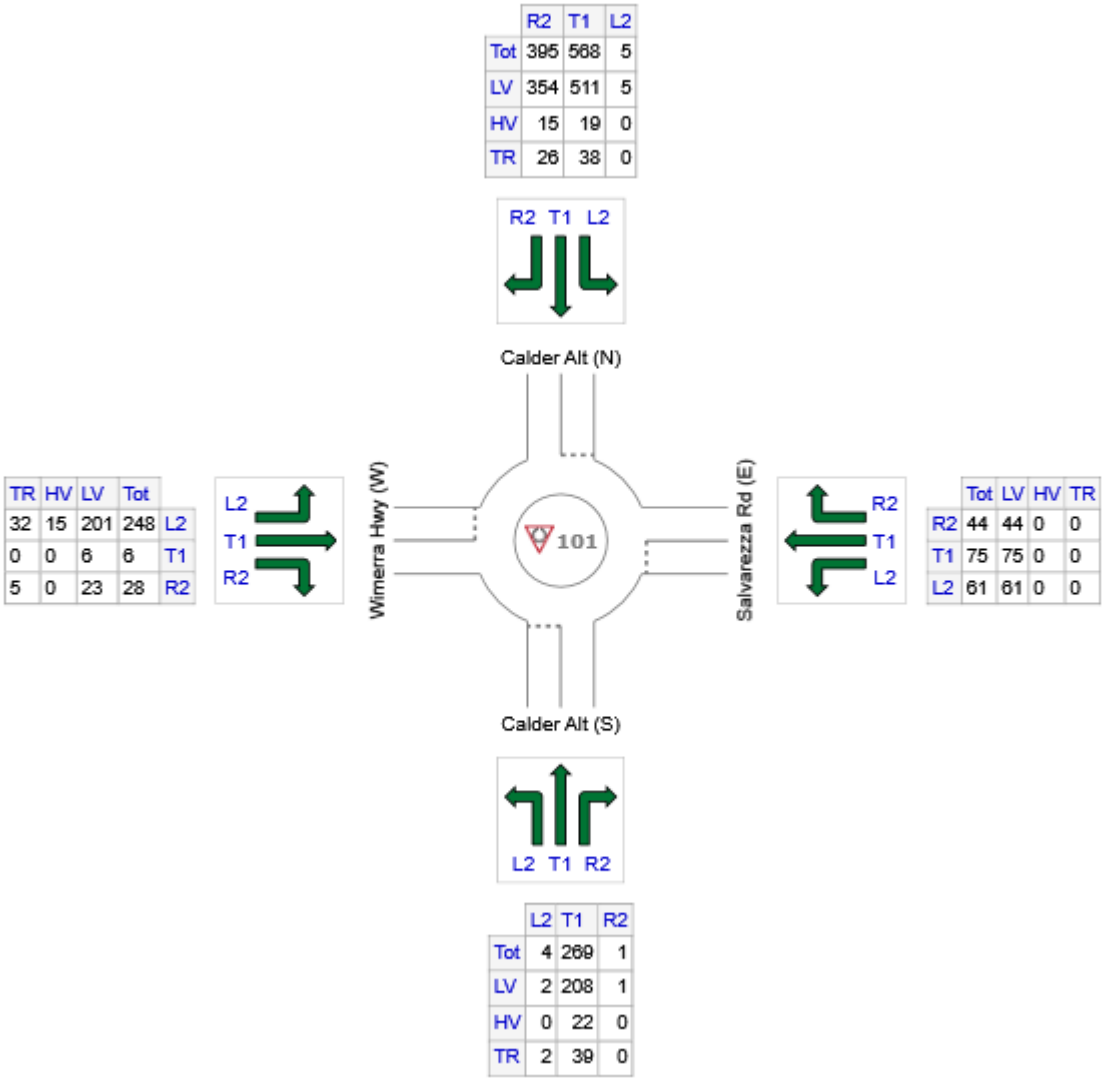
### Site Layout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



## Input Volumes

**Volume Display Method: Separate**




| | All MCs | Light Vehicles (LV) | Heavy Vehicles (HV) | Large Trucks (TR) |
|---|---|---|---|---|
| S: Calder Alt (S) | 274 | 211 | 22 | 41 |
| E: Salvarezza Rd (E) | 180 | 180 | 0 | 0 |
| N: Calder Alt (N) | 968 | 870 | 34 | 64 |
| W: Wimerra Hwy (W) | 282 | 230 | 15 | 37 |
| Total | 1704 | 1491 | 71 | 142 |

## 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. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Calder Alt (S) | | | | | | | | | | | | | | | |
| Lane 1[d] | 288 | 23.0 | 288 | 23.0 | 729 | 0.395 | 100 | 7.0 | LOS A | 2.4 | 24.8 | Full | 500 | 0.0 | 0.0 |
| Approach | 288 | 23.0 | 288 | 23.0 | | 0.395 | | 7.0 | LOS A | 2.4 | 24.8 | | | | |
| East: Salvarezza Rd (E) | | | | | | | | | | | | | | | |
| Lane 1[d] | 189 | 0.0 | 189 | 0.0 | 574 | 0.330 | 100 | 14.7 | LOS B | 2.7 | 19.0 | Full | 500 | 0.0 | 0.0 |
| Approach | 189 | 0.0 | 189 | 0.0 | | 0.330 | | 14.7 | LOS B | 2.7 | 19.0 | | | | |
| North: Calder Alt (N) | | | | | | | | | | | | | | | |
| Lane 1[d] | 1019 | 10.1 | 1019 | 10.1 | 1517 | 0.672 | 100 | 5.6 | LOS A | 8.7 | 73.1 | Full | 500 | 0.0 | 0.0 |
| Approach | 1019 | 10.1 | 1019 | 10.1 | | 0.672 | | 5.6 | LOS A | 8.7 | 73.1 | | | | |
| West: Wimerra Hwy (W) | | | | | | | | | | | | | | | |
| Lane 1[d] | 297 | 18.4 | 297 | 18.4 | 884 | 0.336 | 100 | 6.2 | LOS A | 2.2 | 21.3 | Full | 500 | 0.0 | 0.0 |
| Approach | 297 | 18.4 | 297 | 18.4 | | 0.336 | | 6.2 | LOS A | 2.2 | 21.3 | | | | |
| All Vehicles | 1794 | 12.5 | 1794 | 12.5 | | 0.672 | | 6.9 | LOS A | 8.7 | 73.1 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
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 Gap.
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.

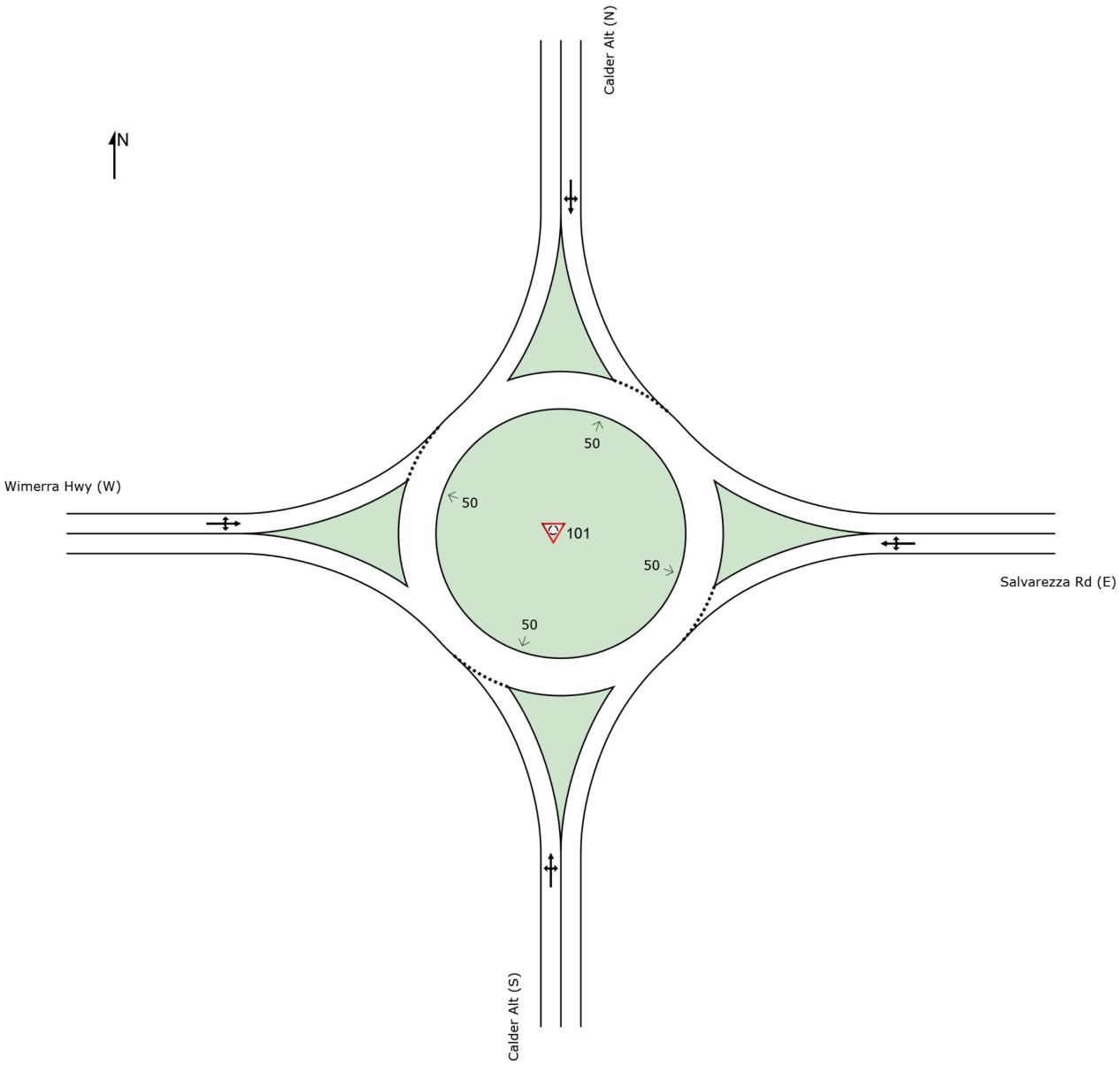
d Dominant lane on roundabout approach

## Site: 101 [#2 - AM - Interim - 2046 Model Volumes (w/ MWFC) - 100% Development (Site Folder: [Final Assessment] - Site 2 - Calder Alternative / Wimmera Hwy)]

New Site
Site Category: (None)
Roundabout

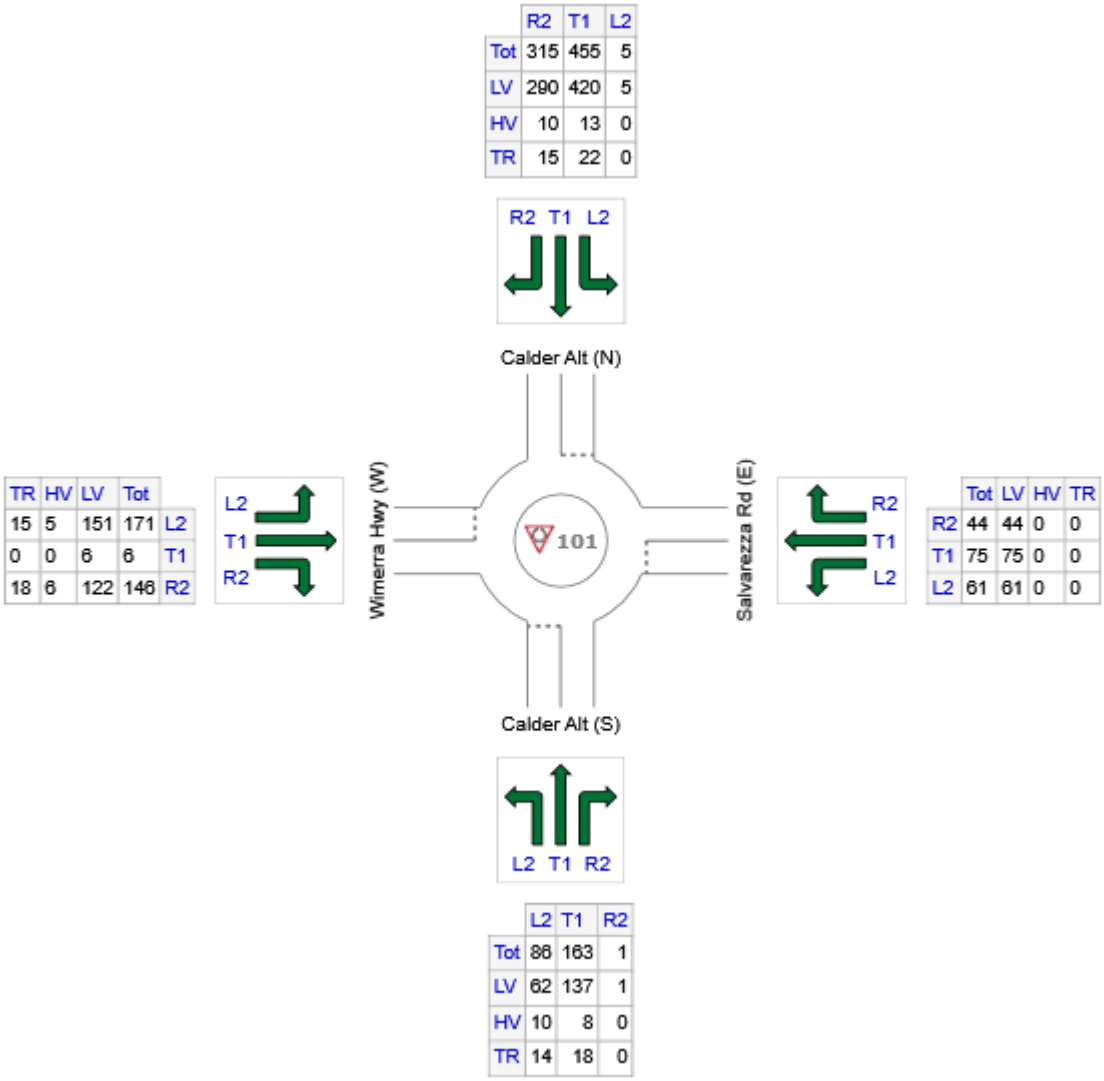
### Site Layout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



## Input Volumes

**Volume Display Method: Separate**




| | All MCs | Light Vehicles (LV) | Heavy Vehicles (HV) | Large Trucks (TR) |
|---|---|---|---|---|
| S: Calder Alt (S) | 250 | 200 | 18 | 32 |
| E: Salvarezza Rd (E) | 180 | 180 | 0 | 0 |
| N: Calder Alt (N) | 775 | 715 | 23 | 37 |
| W: Wimerra Hwy (W) | 323 | 279 | 11 | 33 |
| Total | 1528 | 1374 | 52 | 102 |

## 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. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Calder Alt (S) | | | | | | | | | | | | | | | |
| Lane 1[d] | 263 | 20.0 | 263 | 20.0 | 825 | 0.319 | 100 | 5.7 | LOS A | 2.0 | 19.2 | Full | 500 | 0.0 | 0.0 |
| Approach | 263 | 20.0 | 263 | 20.0 | | 0.319 | | 5.7 | LOS A | 2.0 | 19.2 | | | | |
| East: Salvarezza Rd (E) | | | | | | | | | | | | | | | |
| Lane 1[d] | 189 | 0.0 | 189 | 0.0 | 606 | 0.313 | 100 | 12.3 | LOS B | 2.6 | 17.9 | Full | 500 | 0.0 | 0.0 |
| Approach | 189 | 0.0 | 189 | 0.0 | | 0.313 | | 12.3 | LOS B | 2.6 | 17.9 | | | | |
| North: Calder Alt (N) | | | | | | | | | | | | | | | |
| Lane 1[d] | 816 | 7.7 | 816 | 7.7 | 1300 | 0.627 | 100 | 6.7 | LOS A | 6.1 | 48.8 | Full | 500 | 0.0 | 0.0 |
| Approach | 816 | 7.7 | 816 | 7.7 | | 0.627 | | 6.7 | LOS A | 6.1 | 48.8 | | | | |
| West: Wimerra Hwy (W) | | | | | | | | | | | | | | | |
| Lane 1[d] | 340 | 13.6 | 340 | 13.6 | 1100 | 0.309 | 100 | 7.4 | LOS A | 2.0 | 18.3 | Full | 500 | 0.0 | 0.0 |
| Approach | 340 | 13.6 | 340 | 13.6 | | 0.309 | | 7.4 | LOS A | 2.0 | 18.3 | | | | |
| All Vehicles | 1608 | 10.1 | 1608 | 10.1 | | 0.627 | | 7.3 | LOS A | 6.1 | 48.8 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
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 Gap.
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.

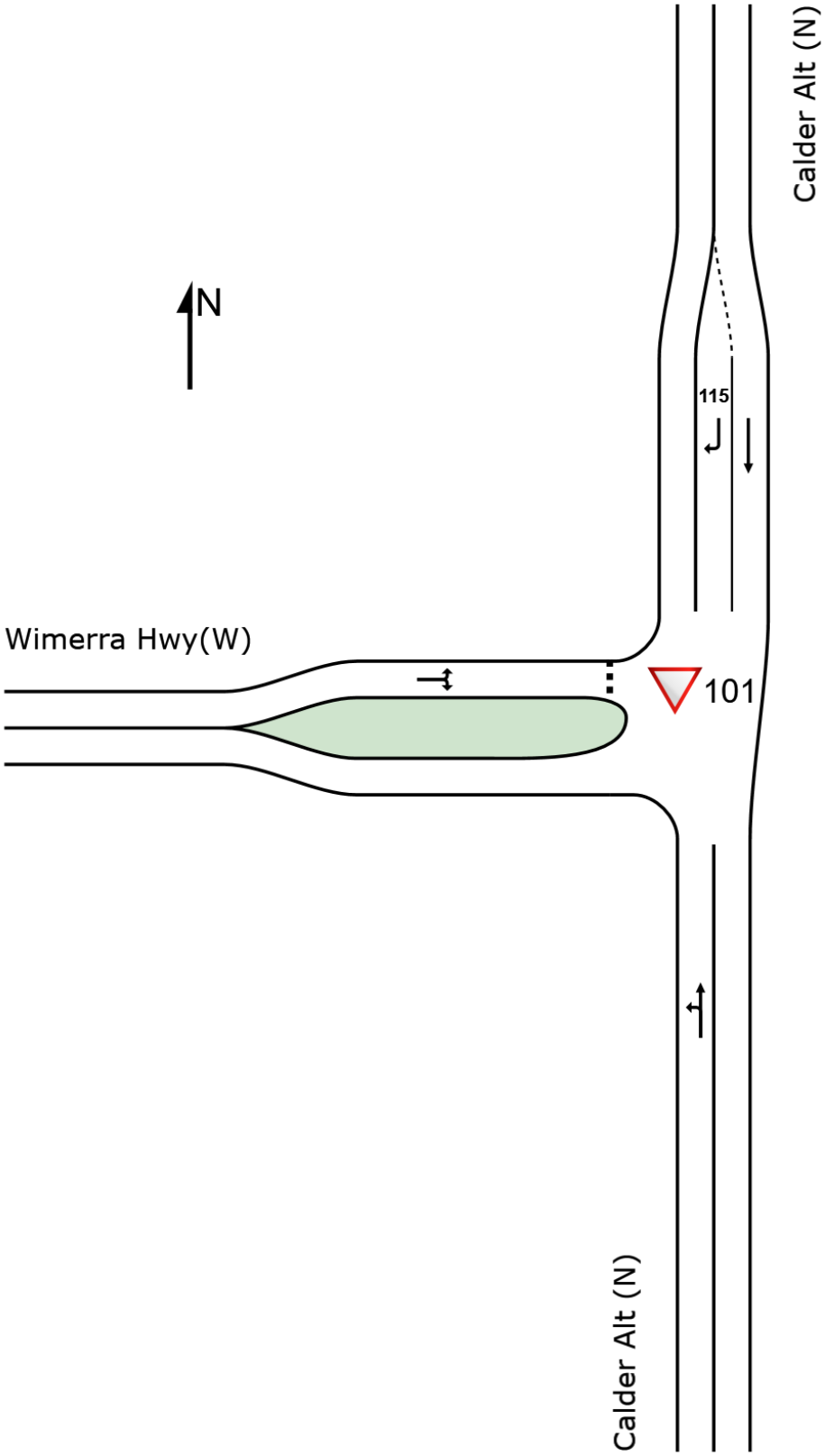
d Dominant lane on roundabout approach

## Site: 101 [#2 - PM - Existing - 2023 Model Volumes - Revised (Site Folder: [May 2026] - Amendments to reported Sidra - Site 2)]

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

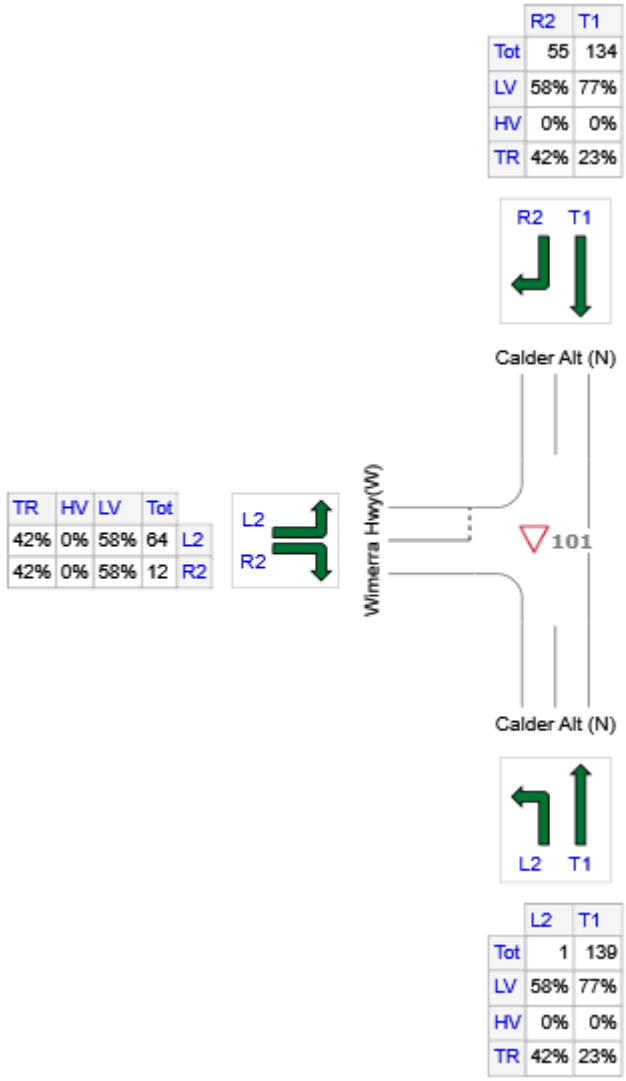
### Site Layout

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## Input Volumes

**Volume Display Method: Total and %**




| | All MCs | Light Vehicles (LV) | Heavy Vehicles (HV) | Large Trucks (TR) |
|---|---|---|---|---|
| S: Calder Alt (N) | 140 | 108 | 0 | 32 |
| N: Calder Alt (N) | 189 | 135 | 0 | 54 |
| W: Wimerra Hwy(W) | 76 | 44 | 0 | 32 |
| Total | 405 | 287 | 0 | 118 |

## 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. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Calder Alt (N) | | | | | | | | | | | | | | | |
| Lane 1 | 147 | 23.1 | 147 | 23.1 | 1447 | 0.102 | 100 | 0.1 | LOS A | 0.0 | 0.0 | Full | 500 | 0.0 | 0.0 |
| Approach | 147 | 23.1 | 147 | 23.1 | | 0.102 | | 0.1 | NA | 0.0 | 0.0 | | | | |
| North: Calder Alt (N) | | | | | | | | | | | | | | | |
| Lane 1 | 141 | 23.0 | 141 | 23.0 | 1450 | 0.097 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 500 | 0.0 | 0.0 |
| Lane 2 | 58 | 42.0 | 58 | 42.0 | 766 | 0.076 | 100 | 8.5 | LOS A | 0.3 | 4.6 | Short | 115 | 0.0 | NA |
| Approach | 199 | 28.5 | 199 | 28.5 | | 0.097 | | 2.5 | NA | 0.3 | 4.6 | | | | |
| West: Wimerra Hwy(W) | | | | | | | | | | | | | | | |
| Lane 1 | 80 | 42.0 | 80 | 42.0 | 519 | 0.154 | 100 | 10.9 | LOS B | 0.5 | 8.0 | Full | 500 | 0.0 | 0.0 |
| Approach | 80 | 42.0 | 80 | 42.0 | | 0.154 | | 10.9 | LOS B | 0.5 | 8.0 | | | | |
| All Vehicles | 426 | 29.2 | 426 | 29.2 | | 0.154 | | 3.2 | NA | 0.5 | 8.0 | | | | |

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.
Minor Road Approach LOS values are based on average delay for all lanes.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
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 Gap.
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.

# USER REPORT FOR SITE

## Project: sid_x5902_marong-oct25-v7

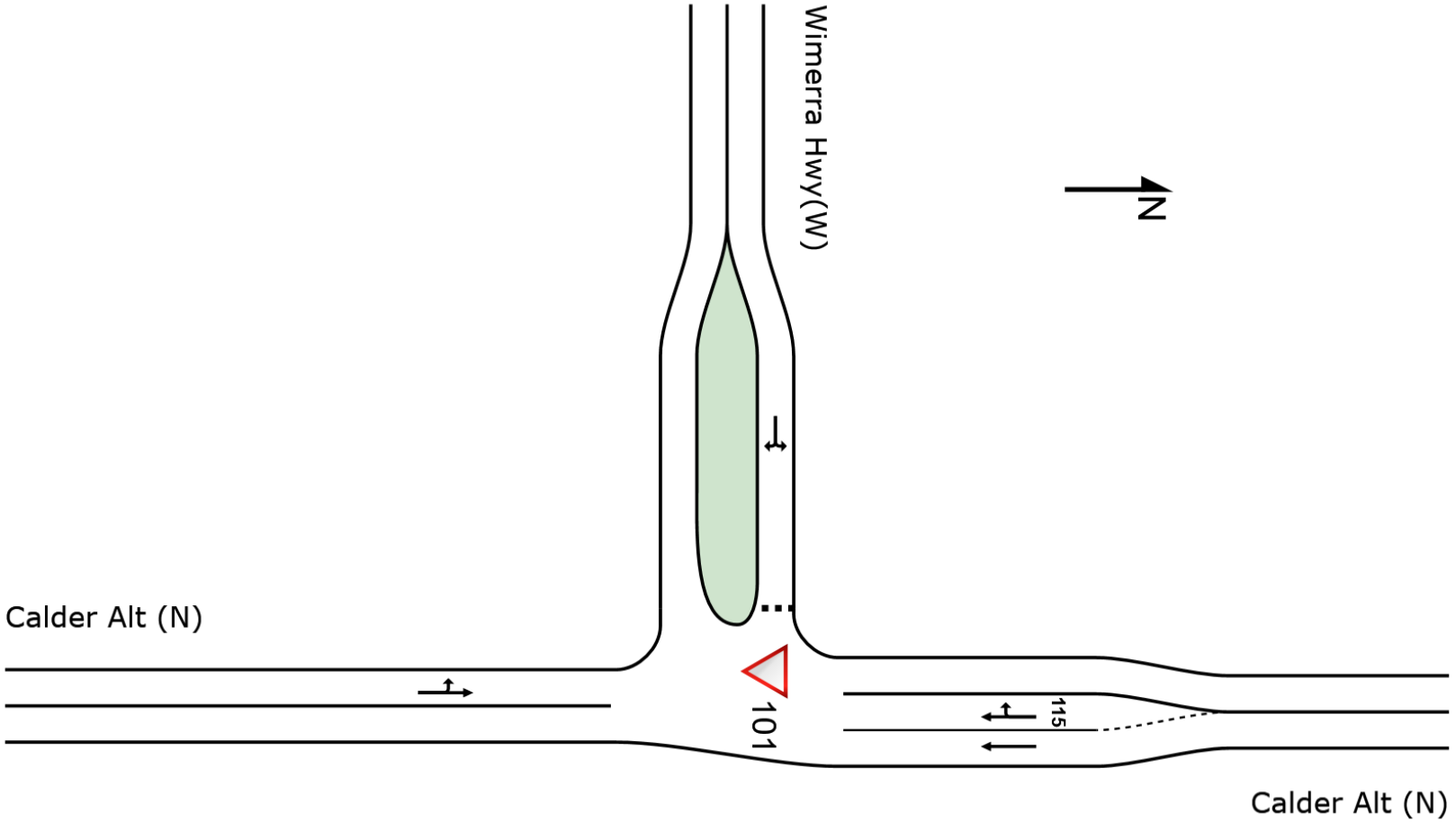
**Output produced by SIDRA INTERSECTION Version: 9.1.6.228** **Template: Site User Report**

## Site: 101 [#2 - PM - Trigger Analysis - Existing + Background + 50% BREP (Site Folder: [May 2026] - Calder Alternative / Wimmera Highway - Trigger Analysis)]

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

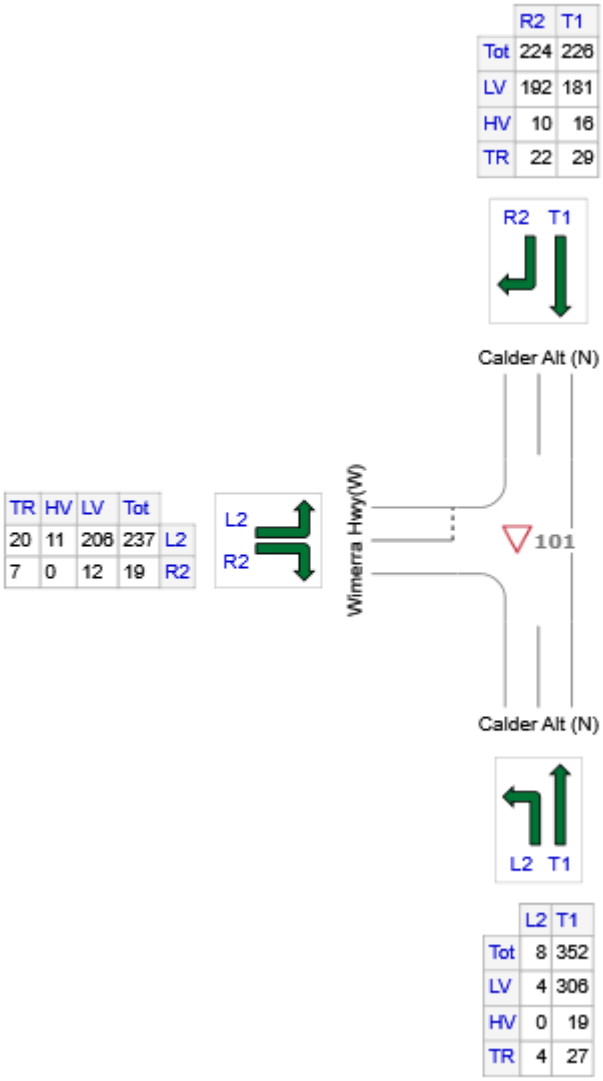
### Site Layout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.


Wimerra Hwy(W)
N
Calder Alt (N)
101
115
Calder Alt (N)

## Input Volumes

**Volume Display Method: Separate**




| | All MCs | Light Vehicles (LV) | Heavy Vehicles (HV) | Large Trucks (TR) |
|---|---|---|---|---|
| S: Calder Alt (N) | 360 | 310 | 19 | 31 |
| N: Calder Alt (N) | 450 | 373 | 26 | 51 |
| W: Wimerra Hwy(W) | 256 | 218 | 11 | 27 |
| Total | 1066 | 901 | 56 | 109 |

## 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. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Calder Alt (N) | | | | | | | | | | | | | | | |
| Lane 1 | 379 | 13.9 | 379 | 13.9 | 1672 | 0.227 | 100 | 0.2 | LOS A | 0.0 | 0.0 | Full | 500 | 0.0 | 0.0 |
| Approach | 379 | 13.9 | 379 | 13.9 | | 0.227 | | 0.2 | NA | 0.0 | 0.0 | | | | |
| North: Calder Alt (N) | | | | | | | | | | | | | | | |
| Lane 1 | 115 | 19.9 | 115 | 19.9 | 1574 | 0.073 | 20[6] | 0.0 | LOS A | 0.0 | 0.0 | Full | 500 | 0.0 | 0.0 |
| Lane 2 | 358 | 16.2 | 358 | 16.2 | 980 | 0.366 | 100 | 8.2 | LOS A | 2.4 | 21.8 | Short | 115 | 0.0 | NA |
| Approach | 474 | 17.1 | 474 | 17.1 | | 0.366 | | 6.2 | NA | 2.4 | 21.8 | | | | |
| West: Wimerra Hwy(W) | | | | | | | | | | | | | | | |
| Lane 1 | 269 | 14.8 | 269 | 14.8 | 310 | 0.869 | 100 | 37.5 | LOS E | 7.1 | 65.4 | Full | 500 | 0.0 | 0.0 |
| Approach | 269 | 14.8 | 269 | 14.8 | | 0.869 | | 37.5 | LOS E | 7.1 | 65.4 | | | | |
| All Vehicles | 1122 | 15.5 | 1122 | 15.5 | | 0.869 | | 11.7 | NA | 7.1 | 65.4 | | | | |

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.
Minor Road Approach LOS values are based on average delay for all lanes.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
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 Gap.
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.

6 Lane under-utilisation due to downstream effects

# USER REPORT FOR SITE

**Project: sid_x5902_marong-oct25-v7**

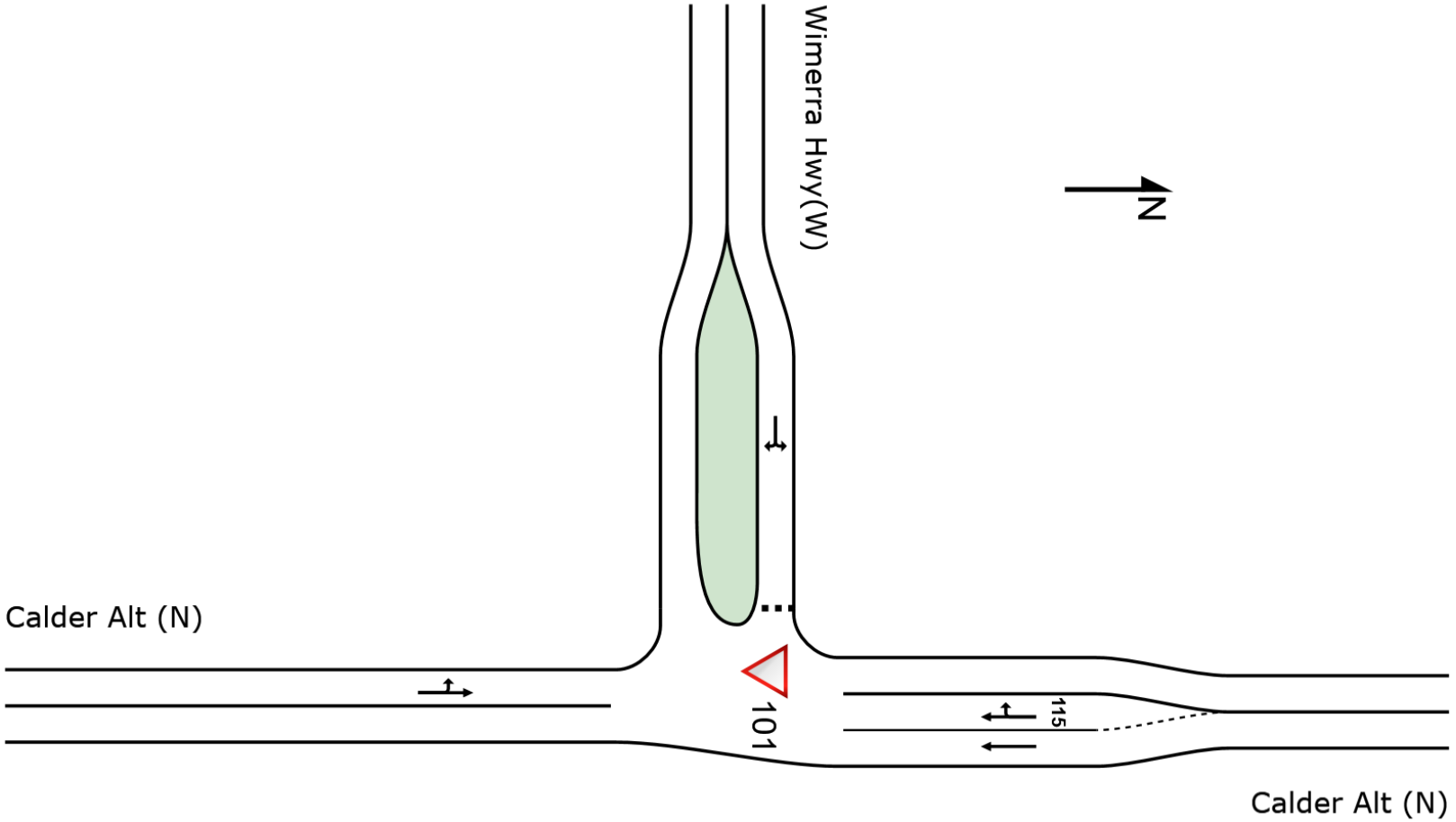
**Output produced by SIDRA INTERSECTION Version: 9.1.6.228** **Template: Site User Report**

## Site: 101 [#2 - PM - Trigger Analysis - Existing + Proportional Background & BREP 58% (Site Folder: [May 2026] - Calder Alternative / Wimmera Highway - Trigger Analysis)]

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

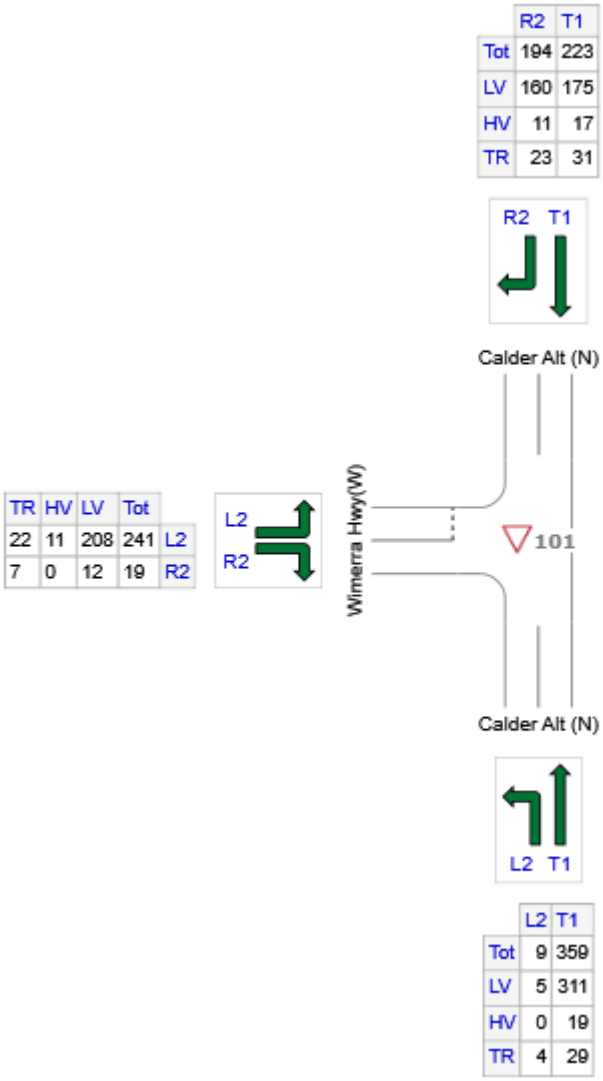
### Site Layout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.


Wimerra Hwy(W)
N
Calder Alt (N)
101
115
Calder Alt (N)

## Input Volumes

**Volume Display Method: Separate**




| | All MCs | Light Vehicles (LV) | Heavy Vehicles (HV) | Large Trucks (TR) |
|---|---|---|---|---|
| S: Calder Alt (N) | 368 | 316 | 19 | 33 |
| N: Calder Alt (N) | 417 | 335 | 28 | 54 |
| W: Wimerra Hwy(W) | 260 | 220 | 11 | 29 |
| Total | 1045 | 871 | 58 | 116 |

## 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. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Calder Alt (N) | | | | | | | | | | | | | | | |
| Lane 1 | 387 | 14.1 | 387 | 14.1 | 1665 | 0.233 | 100 | 0.2 | LOS A | 0.0 | 0.0 | Full | 500 | 0.0 | 0.0 |
| Approach | 387 | 14.1 | 387 | 14.1 | | 0.233 | | 0.2 | NA | 0.0 | 0.0 | | | | |
| North: Calder Alt (N) | | | | | | | | | | | | | | | |
| Lane 1 | 109 | 21.5 | 109 | 21.5 | 1550 | 0.071 | 20[6] | 0.0 | LOS A | 0.0 | 0.0 | Full | 500 | 0.0 | 0.0 |
| Lane 2 | 329 | 19.0 | 329 | 19.0 | 933 | 0.353 | 100 | 8.5 | LOS A | 2.2 | 21.3 | Short | 115 | 0.0 | NA |
| Approach | 439 | 19.7 | 439 | 19.7 | | 0.353 | | 6.4 | NA | 2.2 | 21.3 | | | | |
| West: Wimerra Hwy(W) | | | | | | | | | | | | | | | |
| Lane 1 | 274 | 15.4 | 274 | 15.4 | 322 | 0.851 | 100 | 35.0 | LOS D | 6.8 | 62.5 | Full | 500 | 0.0 | 0.0 |
| Approach | 274 | 15.4 | 274 | 15.4 | | 0.851 | | 35.0 | LOS D | 6.8 | 62.5 | | | | |
| All Vehicles | 1100 | 16.7 | 1100 | 16.7 | | 0.851 | | 11.3 | NA | 6.8 | 62.5 | | | | |

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.
Minor Road Approach LOS values are based on average delay for all lanes.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
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 Gap.
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.

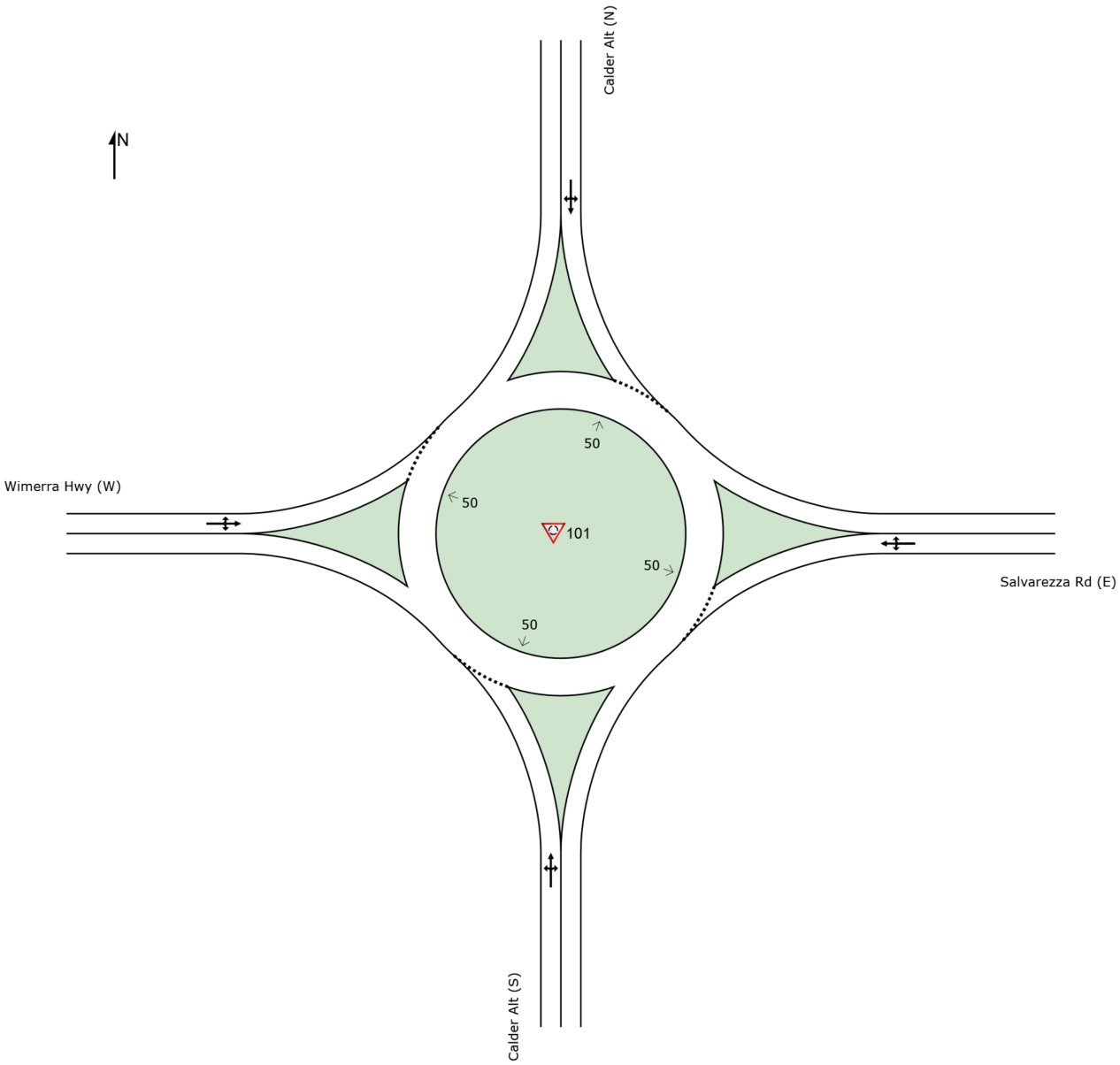
6 Lane under-utilisation due to downstream effects

## Site: 101 [#2 - PM - Interim - 2046 Model Volumes (w/o MWFC) - 100% Development - Revised (Site Folder: [May 2026] - Amendments to reported Sidra - Site 2)]

New Site
Site Category: (None)
Roundabout

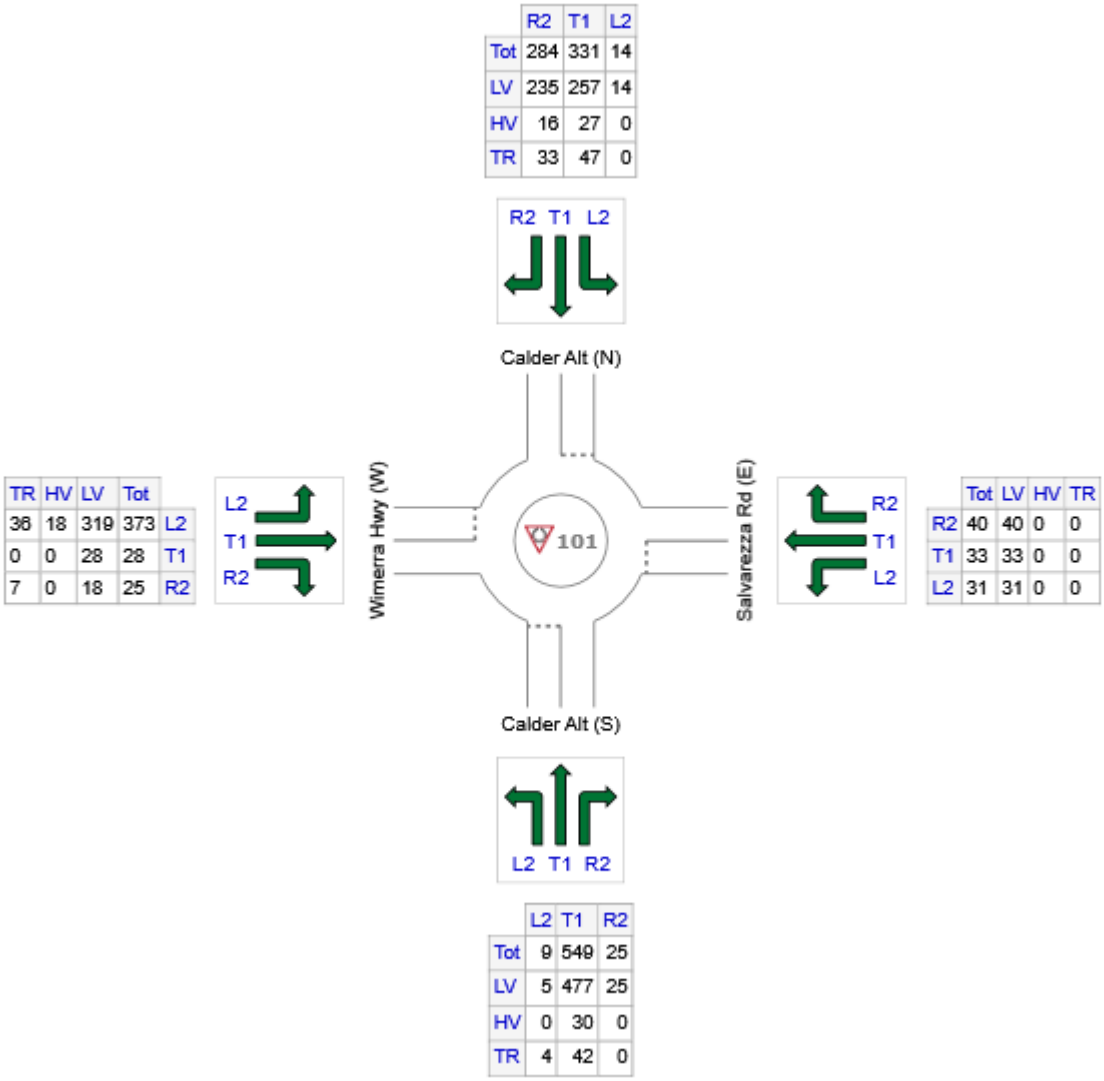
### Site Layout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



## Input Volumes

**Volume Display Method: Separate**




| | All MCs | Light Vehicles (LV) | Heavy Vehicles (HV) | Large Trucks (TR) |
|---|---|---|---|---|
| S: Calder Alt (S) | 583 | 507 | 30 | 46 |
| E: Salvarezza Rd (E) | 104 | 104 | 0 | 0 |
| N: Calder Alt (N) | 629 | 506 | 43 | 80 |
| W: Wimerra Hwy (W) | 426 | 365 | 18 | 43 |
| Total | 1742 | 1482 | 91 | 169 |

## 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. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Calder Alt (S) | | | | | | | | | | | | | | | |
| Lane 1[d] | 614 | 13.0 | 614 | 13.0 | 972 | 0.631 | 100 | 7.6 | LOS A | 6.3 | 55.3 | Full | 500 | 0.0 | 0.0 |
| Approach | 614 | 13.0 | 614 | 13.0 | | 0.631 | | 7.6 | LOS A | 6.3 | 55.3 | | | | |
| East: Salvarezza Rd (E) | | | | | | | | | | | | | | | |
| Lane 1[d] | 109 | 0.0 | 109 | 0.0 | 829 | 0.132 | 100 | 9.6 | LOS A | 0.9 | 6.5 | Full | 500 | 0.0 | 0.0 |
| Approach | 109 | 0.0 | 109 | 0.0 | | 0.132 | | 9.6 | LOS A | 0.9 | 6.5 | | | | |
| North: Calder Alt (N) | | | | | | | | | | | | | | | |
| Lane 1[d] | 662 | 19.6 | 662 | 19.6 | 1271 | 0.521 | 100 | 6.4 | LOS A | 4.9 | 47.1 | Full | 500 | 0.0 | 0.0 |
| Approach | 662 | 19.6 | 662 | 19.6 | | 0.521 | | 6.4 | LOS A | 4.9 | 47.1 | | | | |
| West: Wimerra Hwy (W) | | | | | | | | | | | | | | | |
| Lane 1[d] | 448 | 14.3 | 448 | 14.3 | 628 | 0.714 | 100 | 16.3 | LOS B | 8.3 | 75.1 | Full | 500 | 0.0 | 0.0 |
| Approach | 448 | 14.3 | 448 | 14.3 | | 0.714 | | 16.3 | LOS B | 8.3 | 75.1 | | | | |
| All Vehicles | 1834 | 14.9 | 1834 | 14.9 | | 0.714 | | 9.4 | LOS A | 8.3 | 75.1 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
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 Gap.
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.

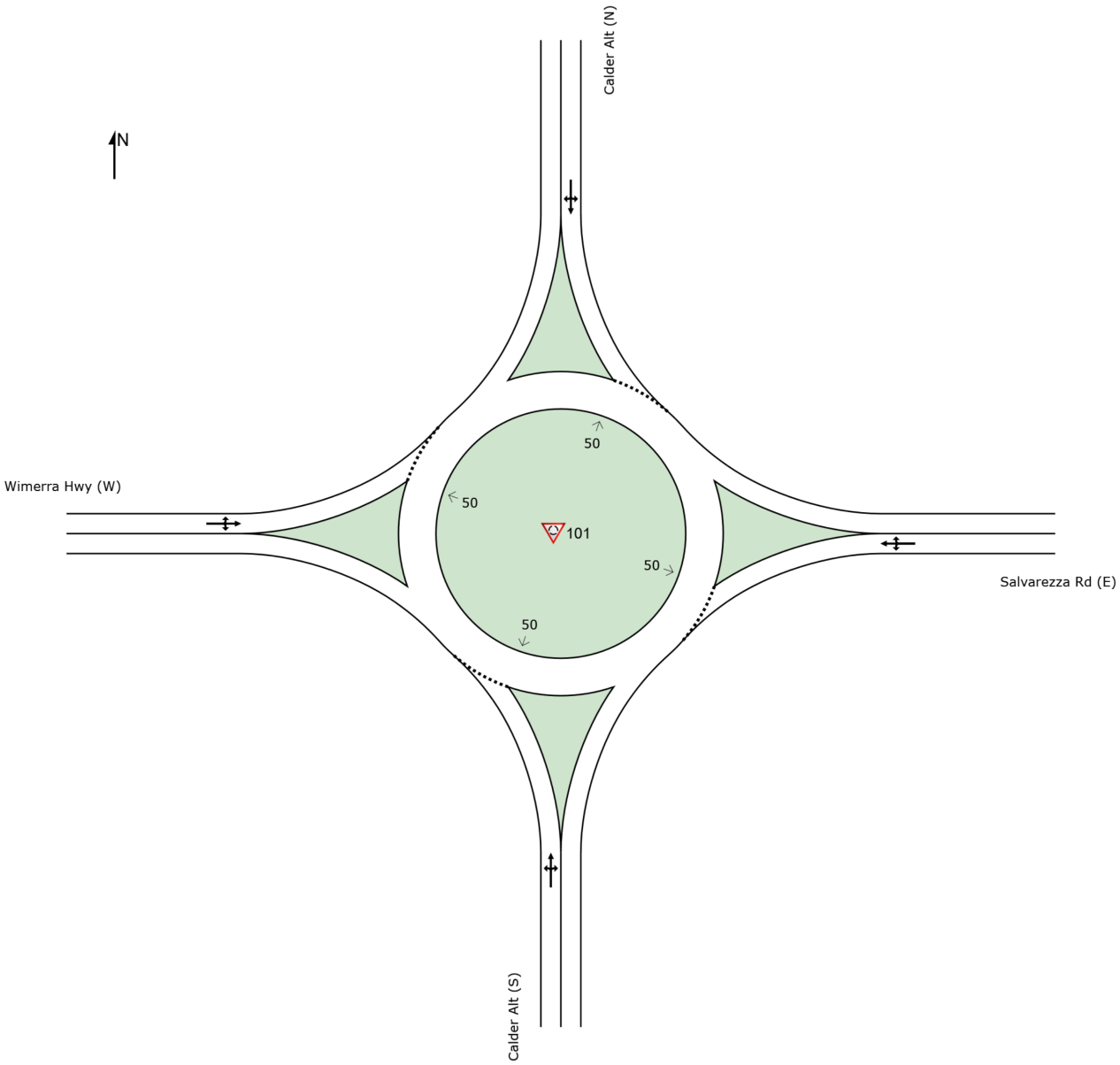
d Dominant lane on roundabout approach

## Site: 101 [#2 - PM - Interim - 2046 Model Volumes (w/MWFC) - 100% Development (Site Folder: [Final Assessment] - Site 2 - Calder Alternative / Wimmera Hwy)]

New Site
Site Category: (None)
Roundabout

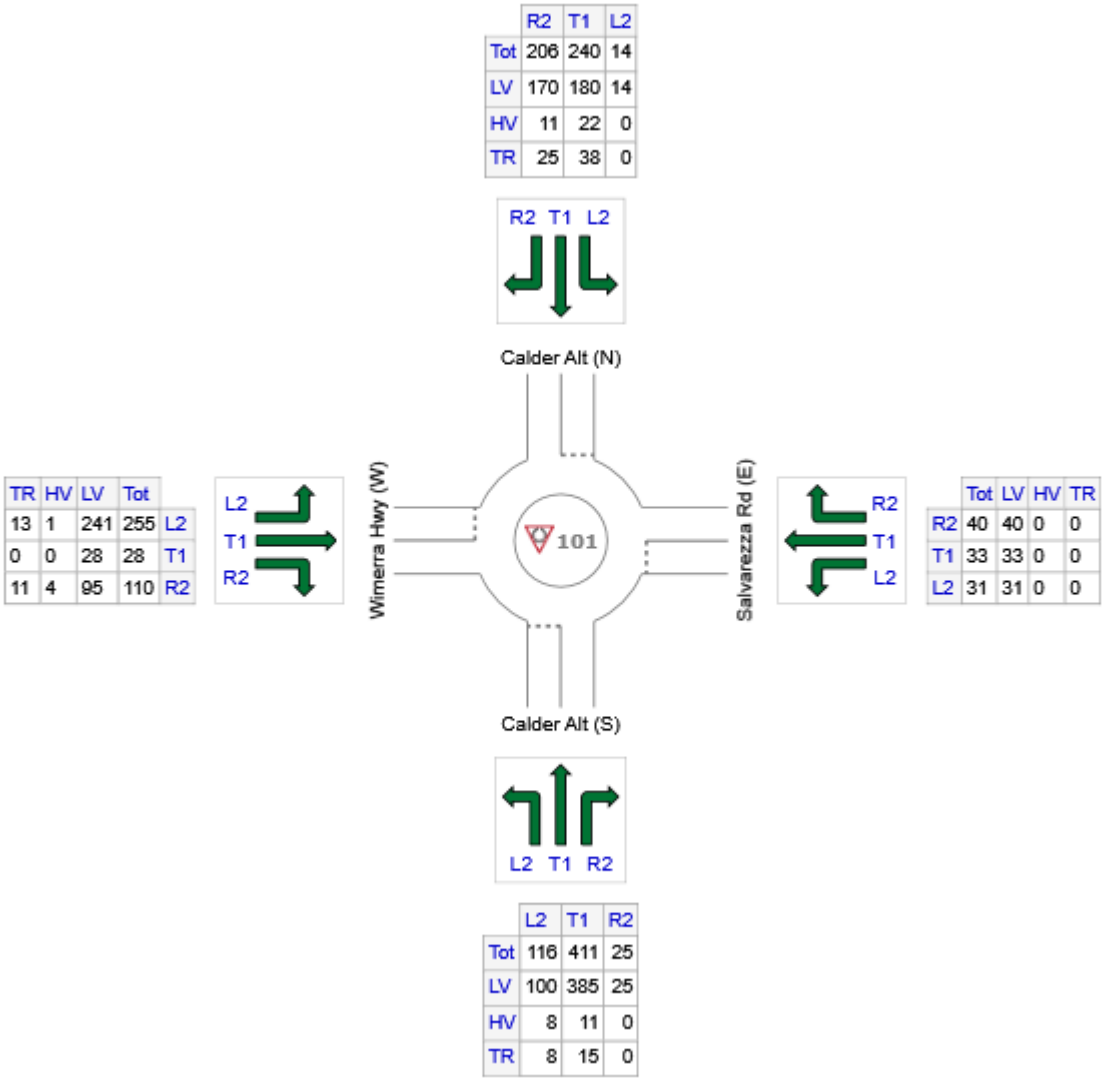
### Site Layout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



## Input Volumes

**Volume Display Method: Separate**




| | All MCs | Light Vehicles (LV) | Heavy Vehicles (HV) | Large Trucks (TR) |
|---|---|---|---|---|
| S: Calder Alt (S) | 552 | 510 | 19 | 23 |
| E: Salvarezza Rd (E) | 104 | 104 | 0 | 0 |
| N: Calder Alt (N) | 460 | 364 | 33 | 63 |
| W: Wimerra Hwy (W) | 393 | 364 | 5 | 24 |
| Total | 1509 | 1342 | 57 | 110 |

## 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. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Calder Alt (S) | | | | | | | | | | | | | | | |
| Lane 1[d] | 581 | 7.6 | 581 | 7.6 | 1141 | 0.509 | 100 | 4.8 | LOS A | 3.9 | 31.2 | Full | 500 | 0.0 | 0.0 |
| Approach | 581 | 7.6 | 581 | 7.6 | | 0.509 | | 4.8 | LOS A | 3.9 | 31.2 | | | | |
| East: Salvarezza Rd (E) | | | | | | | | | | | | | | | |
| Lane 1[d] | 109 | 0.0 | 109 | 0.0 | 923 | 0.119 | 100 | 8.6 | LOS A | 0.8 | 5.6 | Full | 500 | 0.0 | 0.0 |
| Approach | 109 | 0.0 | 109 | 0.0 | | 0.119 | | 8.6 | LOS A | 0.8 | 5.6 | | | | |
| North: Calder Alt (N) | | | | | | | | | | | | | | | |
| Lane 1[d] | 484 | 20.9 | 484 | 20.9 | 1105 | 0.438 | 100 | 7.0 | LOS A | 3.4 | 33.3 | Full | 500 | 0.0 | 0.0 |
| Approach | 484 | 20.9 | 484 | 20.9 | | 0.438 | | 7.0 | LOS A | 3.4 | 33.3 | | | | |
| West: Wimerra Hwy (W) | | | | | | | | | | | | | | | |
| Lane 1[d] | 414 | 7.4 | 414 | 7.4 | 912 | 0.454 | 100 | 8.2 | LOS A | 3.4 | 27.7 | Full | 500 | 0.0 | 0.0 |
| Approach | 414 | 7.4 | 414 | 7.4 | | 0.454 | | 8.2 | LOS A | 3.4 | 27.7 | | | | |
| All Vehicles | 1588 | 11.1 | 1588 | 11.1 | | 0.509 | | 6.6 | LOS A | 3.9 | 33.3 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
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 Gap.
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.

d Dominant lane on roundabout approach

# USER REPORT FOR SITE

**Project: sid_x5902_marong-oct25-v6**

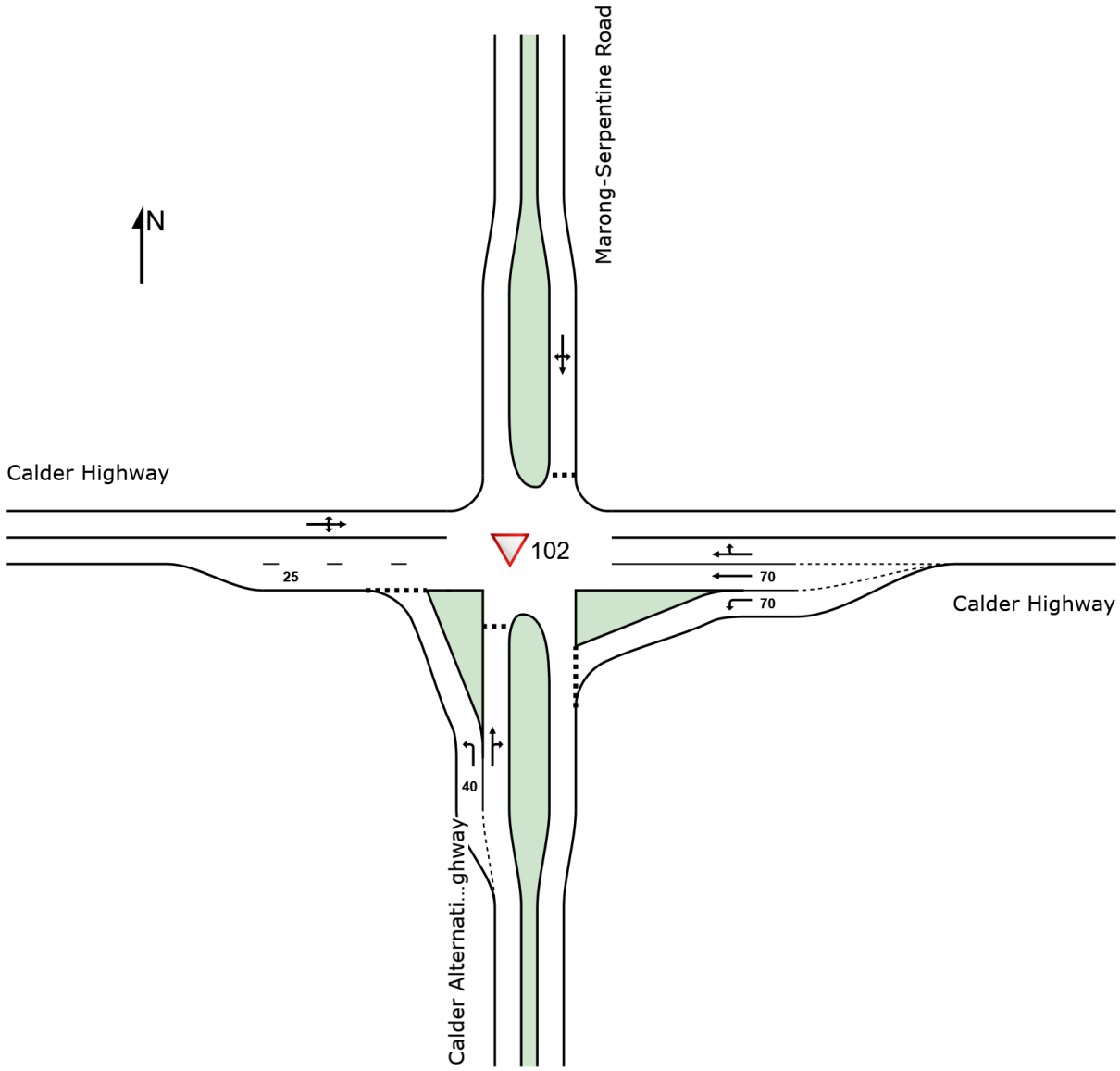
**Output produced by SIDRA INTERSECTION Version: 9.1.6.228** **Template: Site User Report**

## Site: 102 [#1 - AM - Existing - 2023 Model Volumes (Site Folder: [Final Assessment] - Site 1 - Calder Highway / Calder Alternative)]

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

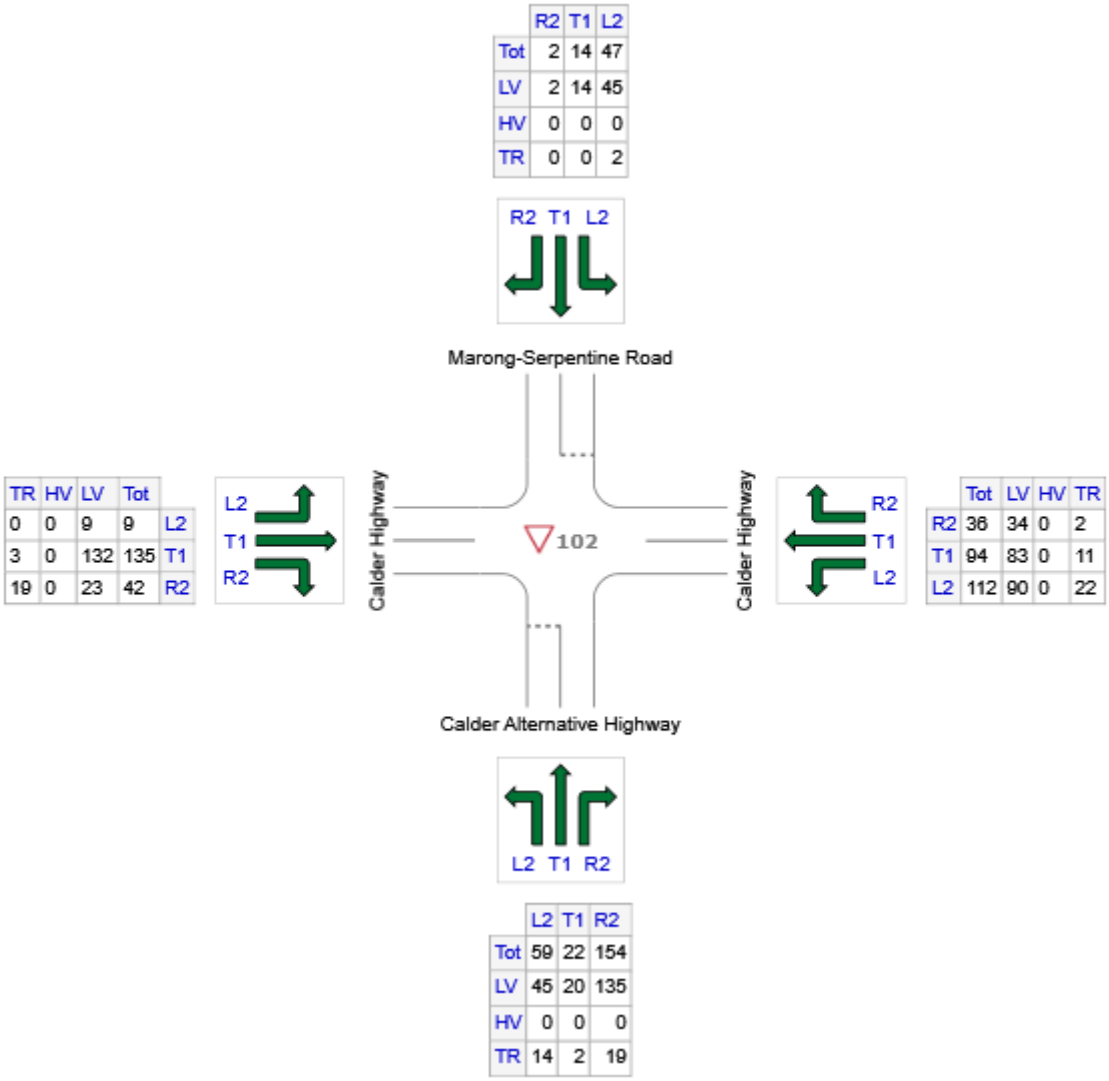
### Site Layout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



## Input Volumes

**Volume Display Method: Total and Veh**




| | All MCs | Light Vehicles (LV) | Heavy Vehicles (HV) | Large Trucks (TR) |
|---|---|---|---|---|
| S: Calder Alternative Highway | 235 | 200 | 0 | 35 |
| E: Calder Highway | 242 | 207 | 0 | 35 |
| N: Marong-Serpentine Road | 63 | 61 | 0 | 2 |
| W: Calder Highway | 186 | 164 | 0 | 22 |
| Total | 726 | 632 | 0 | 94 |

## 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. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Calder Alternative Highway | | | | | | | | | | | | | | | |
| Lane 1 | 62 | 23.7 | 62 | 23.7 | 1156 | 0.054 | 100 | 6.2 | LOS A | 0.2 | 2.5 | Short | 40 | 0.0 | NA |
| Lane 2 | 185 | 11.9 | 185 | 11.9 | 296 | 0.627 | 100 | 25.7 | LOS D | 3.4 | 31.2 | Full | 500 | 0.0 | 0.0 |
| Approach | 247 | 14.9 | 247 | 14.9 | | 0.627 | | 20.8 | LOS C | 3.4 | 31.2 | | | | |
| East: Calder Highway | | | | | | | | | | | | | | | |
| Lane 1 | 118 | 19.6 | 118 | 19.6 | 1123 | 0.105 | 100 | 6.4 | LOS A | 0.4 | 4.6 | Short | 70 | 0.0 | NA |
| Lane 2 | 27 | 11.7 | 27 | 11.7 | 1659 | 0.017 | 24[6] | 0.0 | LOS A | 0.0 | 0.0 | Short | 70 | 0.0 | NA |
| Lane 3 | 109 | 9.6 | 109 | 9.6 | 1571 | 0.070 | 100 | 2.4 | LOS A | 0.2 | 2.1 | Full | 130 | 0.0 | 0.0 |
| Approach | 255 | 14.5 | 255 | 14.5 | | 0.105 | | 4.0 | LOS A | 0.4 | 4.6 | | | | |
| North: Marong-Serpentine Road | | | | | | | | | | | | | | | |
| Lane 1 | 66 | 3.2 | 66 | 3.2 | 1110 | 0.060 | 100 | 5.5 | LOS A | 0.2 | 1.8 | Full | 500 | 0.0 | 0.0 |
| Approach | 66 | 3.2 | 66 | 3.2 | | 0.060 | | 5.5 | LOS A | 0.2 | 1.8 | | | | |
| West: Calder Highway | | | | | | | | | | | | | | | |
| Lane 1 | 196 | 11.8 | 196 | 11.8 | 1236 | 0.158 | 100 | 2.8 | LOS A | 0.7 | 6.8 | Full | 140 | 0.0 | 0.0 |
| Approach | 196 | 11.8 | 196 | 11.8 | | 0.158 | | 2.8 | NA | 0.7 | 6.8 | | | | |
| All Vehicles | 764 | 12.9 | 764 | 12.9 | | 0.627 | | 9.3 | NA | 3.4 | 31.2 | | | | |

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.
Minor Road Approach LOS values are based on average delay for all lanes.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
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 Gap.
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.

6 Lane under-utilisation due to downstream effects

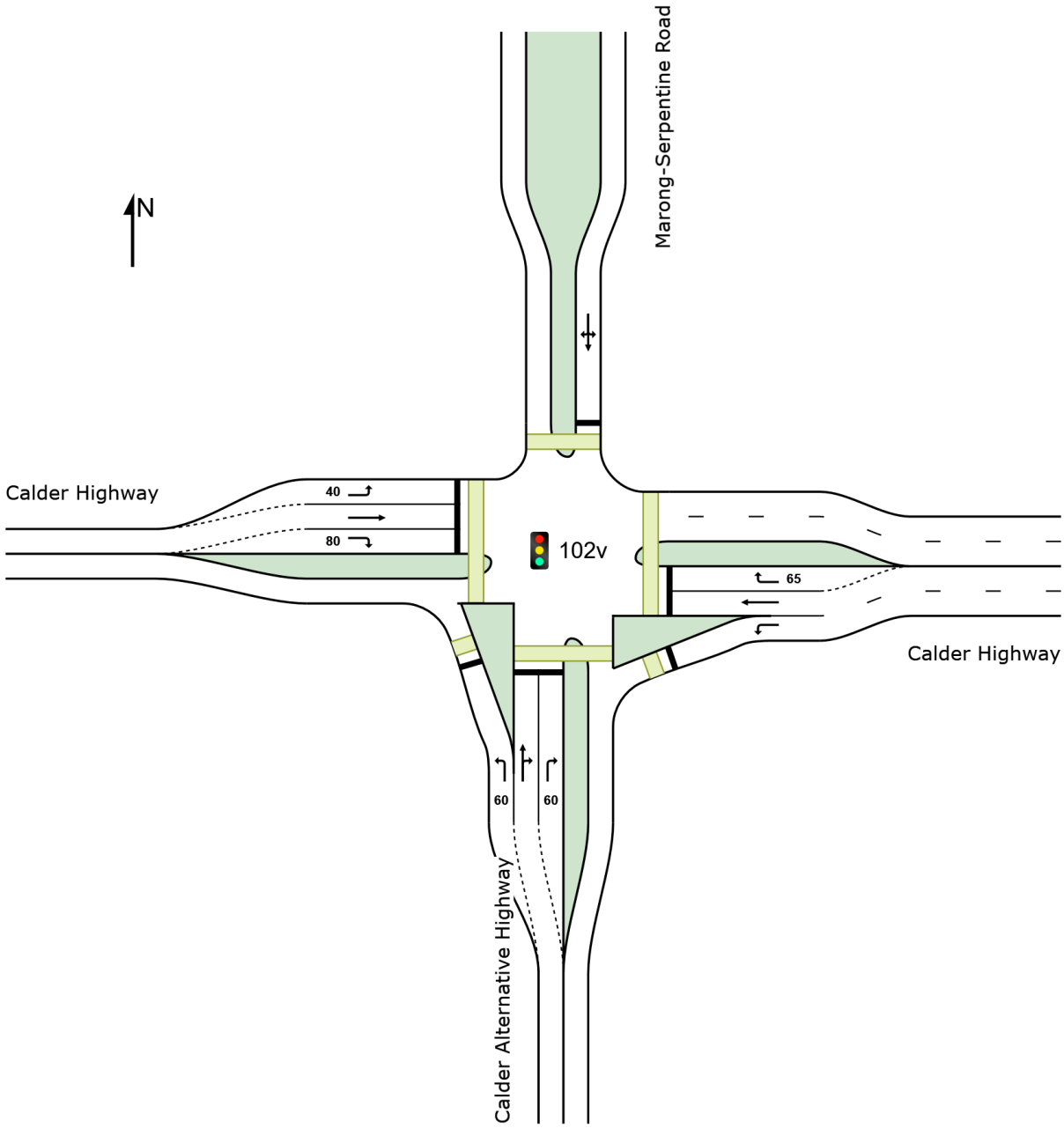
## Site: 102v [#1 - AM - Ultimate - 2046 Model Volumes (w/o MWFC) - 100% Development - (DTP Comments) (Site Folder: [May 2026] - Amendments to reported Sidra - Site 1)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated  Cycle Time = 90 seconds (Site Practical Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

**Timings based on settings in the Site Phasing & Timing dialog**
**Phase Times determined by the program**
**Phase Sequence: Diamond**
**Input Phase Sequence: A, B, C, D*, D1*, D2***
**Output Phase Sequence: A, B, C, D***
**Reference Phase: Phase A**
(* Variable Phase)

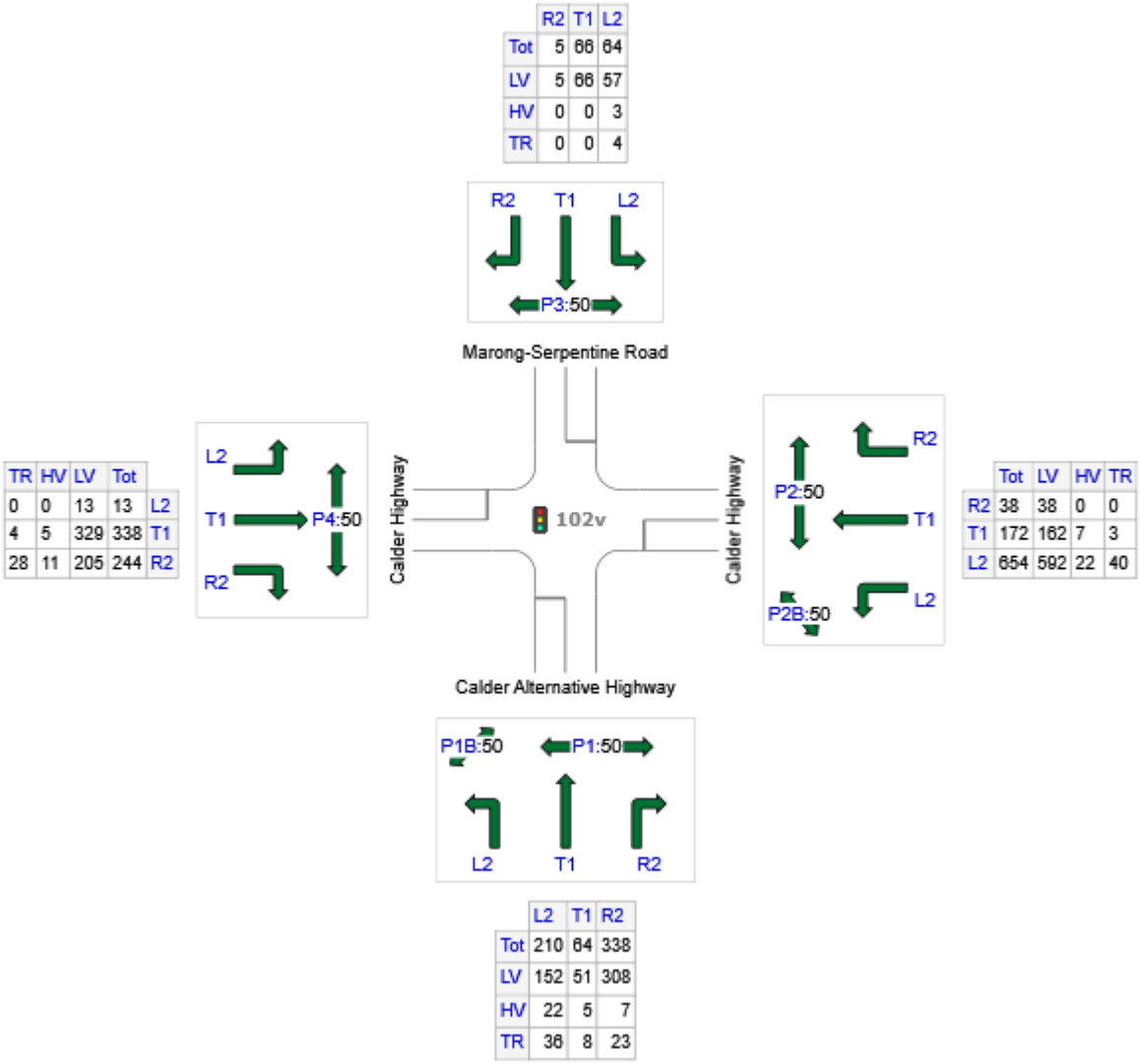
### Site Layout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



## Input Volumes

**Volume Display Method: Separate**



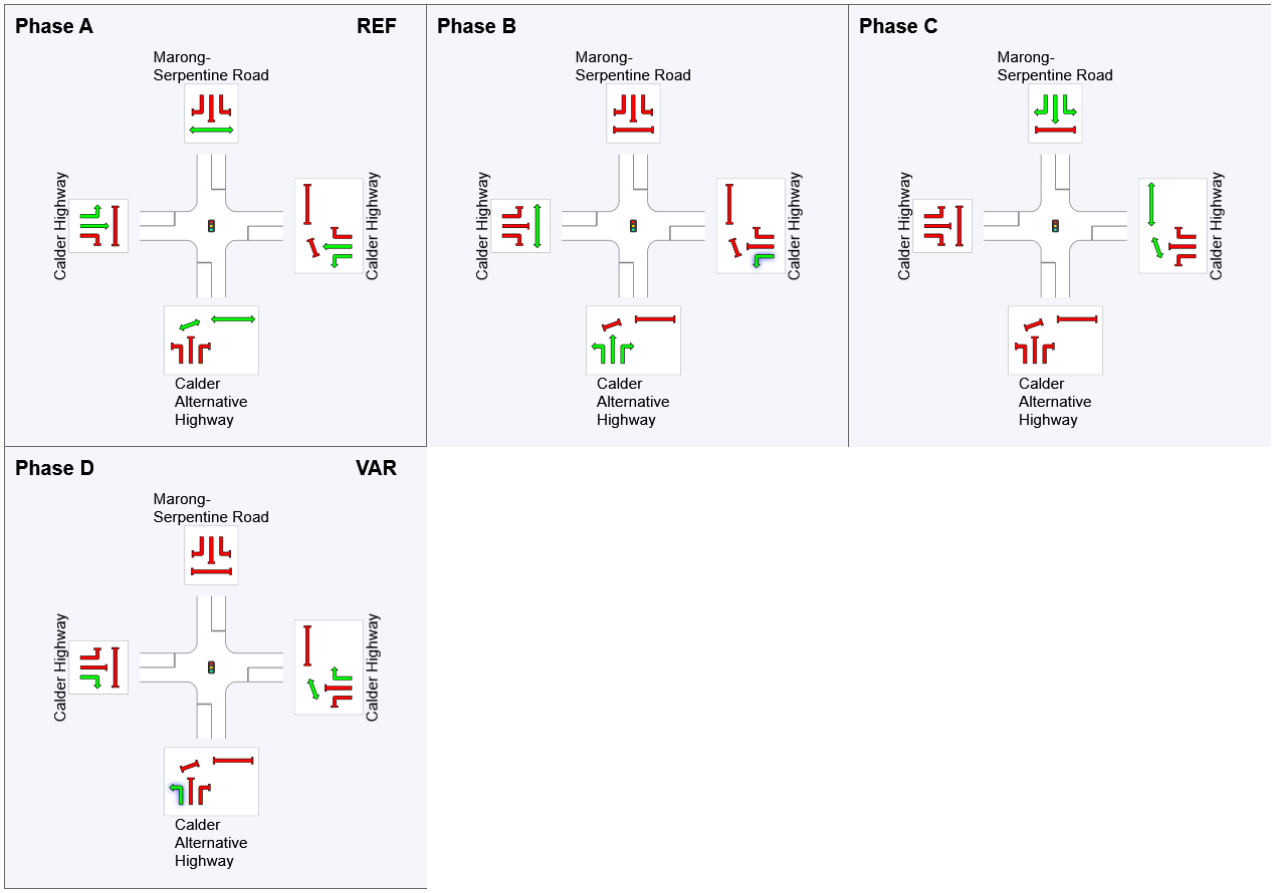

| | All MCs | Light Vehicles (LV) | Heavy Vehicles (HV) | Large Trucks (TR) |
|---|---|---|---|---|
| S: Calder Alternative Highway | 612 | 511 | 34 | 67 |
| E: Calder Highway | 864 | 792 | 29 | 43 |
| N: Marong-Serpentine Road | 135 | 128 | 3 | 4 |
| W: Calder Highway | 595 | 547 | 16 | 32 |
| Total | 2206 | 1978 | 82 | 146 |

## Phase Timing Summary

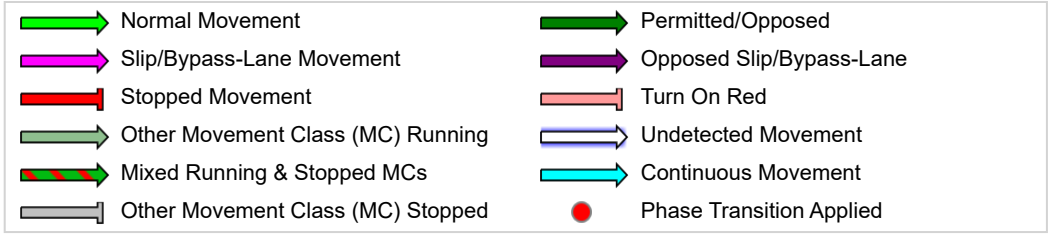
| Phase | A | B | C | D |
|---|---|---|---|---|
| Phase Change Time (sec) | 0 | 26 | 48 | 67 |
| Green Time (sec) | 21 | 15 | 13 | 17 |
| Phase Time (sec) | 28 | 21 | 19 | 22 |
| Phase Split | 31% | 23% | 21% | 24% |
| Phase Frequency (%) | 100.0 | 100.0 | 100.0 | 100.0 |

See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

## Output Phase Sequence




REF: Reference Phase
VAR: Variable Phase



## 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. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Calder Alternative Highway | | | | | | | | | | | | | | | |
| Lane 1 | 221 | 27.6 | 221 | 27.6 | 490 | 0.451 | 100 | 17.7 | LOS B | 4.5 | 48.1 | Short | 60 | 0.0 | NA |
| Lane 2 | 210 | 12.5 | 210 | 12.5 | 271 | 0.774 | 100 | 46.3 | LOS D | 9.7 | 85.5 | Full | 500 | 0.0 | 0.0 |
| Lane 3 | 213 | 8.9 | 213 | 8.9 | 276 | 0.774 | 100 | 47.5 | LOS D | 9.9 | 82.4 | Short | 60 | 0.0 | NA |
| Approach | 644 | 16.5 | 644 | 16.5 | | 0.774 | | 36.9 | LOS D | 9.9 | 85.5 | | | | |
| East: Calder Highway | | | | | | | | | | | | | | | |
| Lane 1 | 688 | 9.5 | 688 | 9.5 | 791 | 0.870 | 100 | 36.6 | LOS D | 32.0 | 265.9 | Full | 130 | 0.0 | 71.5 |
| Lane 2 | 181 | 5.8 | 181 | 5.8 | 432 | 0.419 | 100 | 32.1 | LOS C | 6.9 | 52.0 | Full | 130 | 0.0 | 0.0 |
| Lane 3 | 40 | 0.0 | 40 | 0.0 | 351 | 0.114 | 100 | 36.8 | LOS D | 1.5 | 10.3 | Short | 65 | 0.0 | NA |
| Approach | 909 | 8.3 | 909 | 8.3 | | 0.870 | | 35.7 | LOS D | 32.0 | 265.9 | | | | |
| North: Marong-Serpentine Road | | | | | | | | | | | | | | | |
| Lane 1 | 142 | 5.2 | 142 | 5.2 | 258 | 0.551 | 100 | 42.5 | LOS D | 6.0 | 46.4 | Full | 500 | 0.0 | 0.0 |
| Approach | 142 | 5.2 | 142 | 5.2 | | 0.551 | | 42.5 | LOS D | 6.0 | 46.4 | | | | |
| West: Calder Highway | | | | | | | | | | | | | | | |
| Lane 1 | 14 | 0.0 | 14 | 0.0 | 433 | 0.032 | 100 | 44.5 | LOS D | 0.5 | 3.2 | Short | 40 | 0.0 | NA |
| Lane 2 | 356 | 2.7 | 356 | 2.7 | 437[1] | 0.814 | 100 | 51.8 | LOS D | 16.4 | 119.5 | Full | 140 | 0.0 | 0.0 |
| Lane 3 | 257 | 16.0 | 257 | 16.0 | 289 | 0.890 | 100 | 55.8 | LOS E | 13.5 | 125.6 | Short | 80 | 0.0 | NA |
| Approach | 626 | 8.1 | 626 | 8.1 | | 0.890 | | 53.2 | LOS D | 16.4 | 125.6 | | | | |
| All Vehicles | 2322 | 10.3 | 2322 | 10.3 | | 0.890 | | 41.2 | LOS D | 32.0 | 265.9 | | | | |

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.

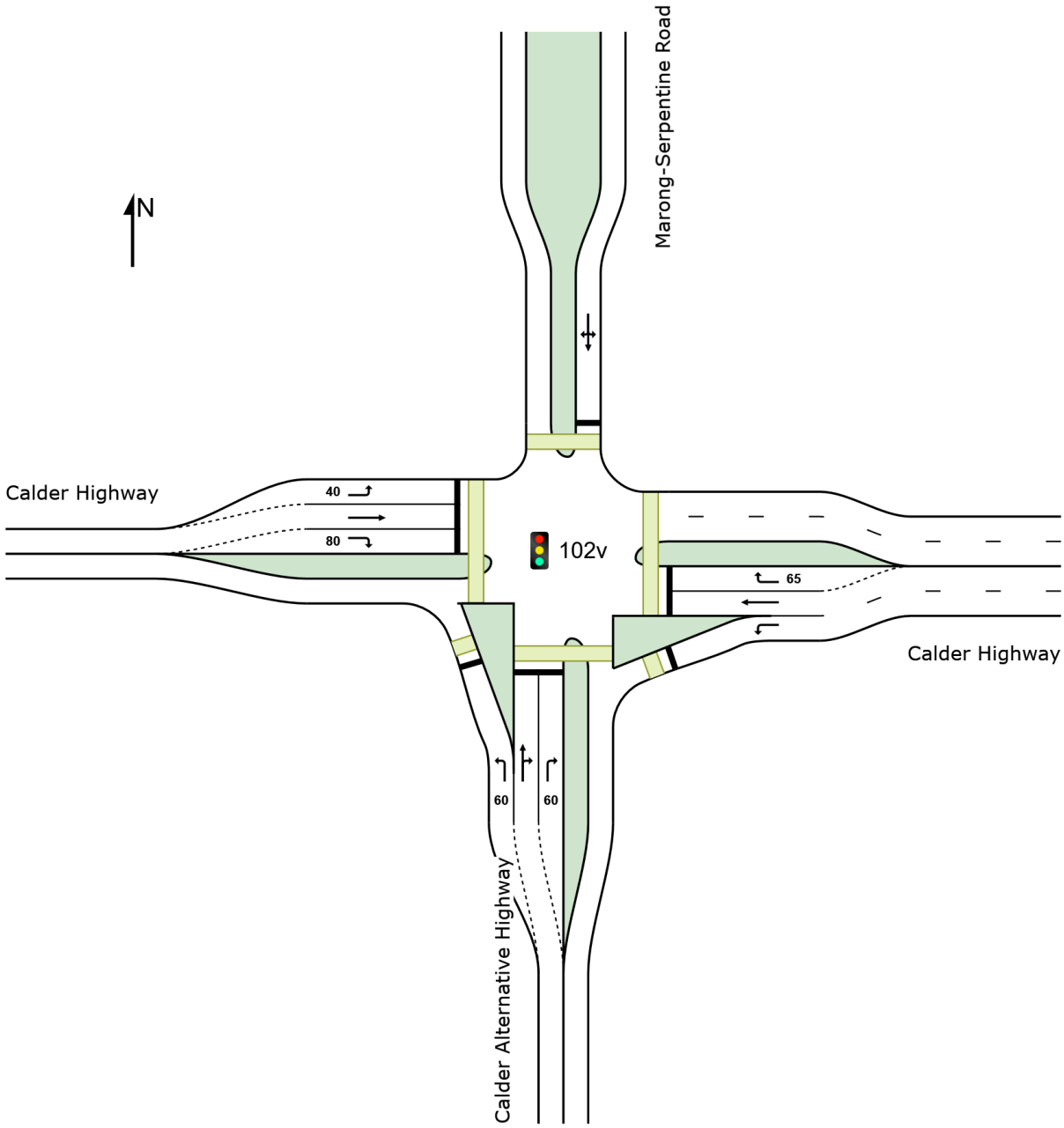
## Site: 102v [#1 - AM - Ultimate - 2046 Model Volumes (w/MWFC) - 100% Development - (DTP Comments) (Site Folder: [May 2026] - Amendments to reported Sidra - Site 1)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated  Cycle Time = 80 seconds (Site Practical Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

**Timings based on settings in the Site Phasing & Timing dialog**
**Phase Times determined by the program**
**Phase Sequence: Diamond**
**Input Phase Sequence: A, B, C, D*, D1*, D2***
**Output Phase Sequence: A, B, C, D***
**Reference Phase: Phase A**
(* Variable Phase)

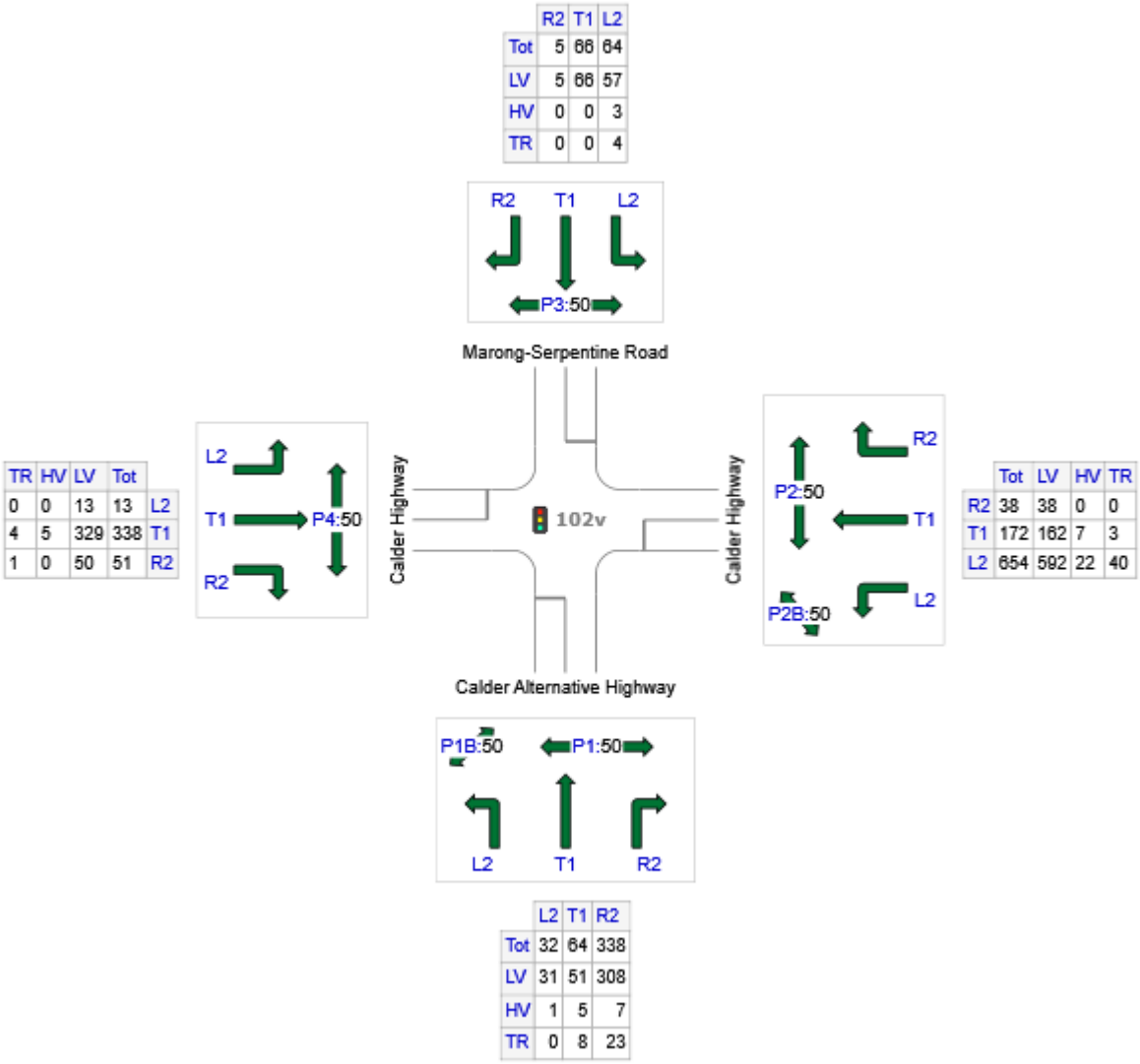
### Site Layout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



## Input Volumes

**Volume Display Method: Separate**



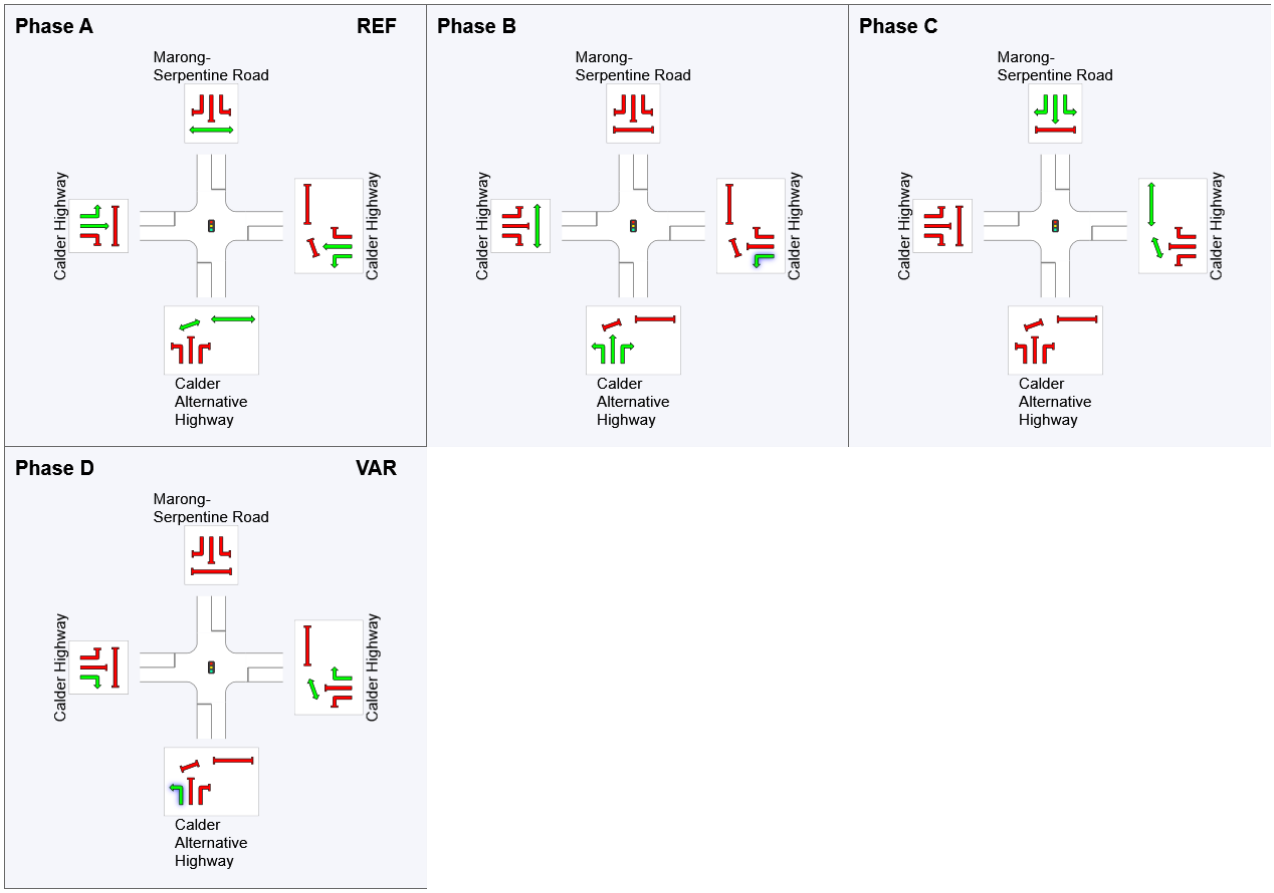

| | All MCs | Light Vehicles (LV) | Heavy Vehicles (HV) | Large Trucks (TR) |
|---|---|---|---|---|
| S: Calder Alternative Highway | 434 | 390 | 13 | 31 |
| E: Calder Highway | 864 | 792 | 29 | 43 |
| N: Marong-Serpentine Road | 135 | 128 | 3 | 4 |
| W: Calder Highway | 402 | 392 | 5 | 5 |
| Total | 1835 | 1702 | 50 | 83 |

## Phase Timing Summary

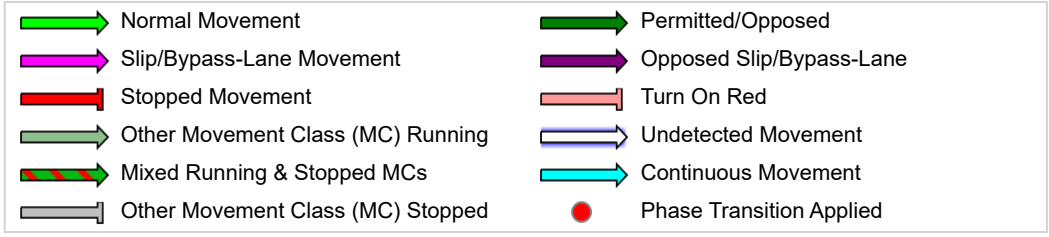
| Phase | A | B | C | D |
|---|---|---|---|---|
| Phase Change Time (sec) | 0 | 27 | 49 | 68 |
| Green Time (sec) | 22 | 15 | 13 | 6 |
| Phase Time (sec) | 29 | 21 | 19 | 11 |
| Phase Split | 36% | 26% | 24% | 14% |
| Phase Frequency (%) | 100.0 | 100.0 | 100.0 | 100.0 |

See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

## Output Phase Sequence




REF: Reference Phase
VAR: Variable Phase



## 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. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Calder Alternative Highway | | | | | | | | | | | | | | | |
| Lane 1 | 34 | 3.1 | 34 | 3.1 | 477 | 0.071 | 100 | 17.2 | LOS B | 0.6 | 4.2 | Short | 60 | 0.0 | NA |
| Lane 2 | 210 | 12.5 | 210 | 12.5 | 305 | 0.688 | 100 | 38.0 | LOS D | 8.2 | 72.0 | Full | 500 | 0.0 | 0.0 |
| Lane 3 | 213 | 8.9 | 213 | 8.9 | 310 | 0.688 | 100 | 39.2 | LOS D | 8.3 | 69.4 | Short | 60 | 0.0 | NA |
| Approach | 457 | 10.1 | 457 | 10.1 | | 0.688 | | 37.0 | LOS D | 8.3 | 72.0 | | | | |
| East: Calder Highway | | | | | | | | | | | | | | | |
| Lane 1 | 688 | 9.5 | 688 | 9.5 | 911 | 0.756 | 100 | 20.5 | LOS C | 21.4 | 177.3 | Full | 130 | 0.0 | 33.3 |
| Lane 2 | 181 | 5.8 | 181 | 5.8 | 509 | 0.355 | 100 | 25.5 | LOS C | 5.8 | 43.6 | Full | 130 | 0.0 | 0.0 |
| Lane 3 | 40 | 0.0 | 40 | 0.0 | 139 | 0.287 | 100 | 44.2 | LOS D | 1.6 | 11.1 | Short | 65 | 0.0 | NA |
| Approach | 909 | 8.3 | 909 | 8.3 | | 0.756 | | 22.5 | LOS C | 21.4 | 177.3 | | | | |
| North: Marong-Serpentine Road | | | | | | | | | | | | | | | |
| Lane 1 | 142 | 5.2 | 142 | 5.2 | 290 | 0.490 | 100 | 36.6 | LOS D | 5.3 | 40.3 | Full | 500 | 0.0 | 0.0 |
| Approach | 142 | 5.2 | 142 | 5.2 | | 0.490 | | 36.6 | LOS D | 5.3 | 40.3 | | | | |
| West: Calder Highway | | | | | | | | | | | | | | | |
| Lane 1 | 14 | 0.0 | 14 | 0.0 | 511 | 0.027 | 100 | 33.1 | LOS C | 0.4 | 2.7 | Short | 40 | 0.0 | NA |
| Lane 2 | 356 | 2.7 | 356 | 2.7 | 517[1] | 0.688 | 100 | 34.8 | LOS C | 12.9 | 93.8 | Full | 140 | 0.0 | 0.0 |
| Lane 3 | 54 | 2.0 | 54 | 2.0 | 135 | 0.397 | 100 | 45.0 | LOS D | 2.2 | 15.9 | Short | 80 | 0.0 | NA |
| Approach | 423 | 2.5 | 423 | 2.5 | | 0.688 | | 36.0 | LOS D | 12.9 | 93.8 | | | | |
| All Vehicles | 1932 | 7.2 | 1932 | 7.2 | | 0.756 | | 29.9 | LOS C | 21.4 | 177.3 | | | | |

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.

# USER REPORT FOR SITE

**Project: sid_x5902_marong-oct25-v6**

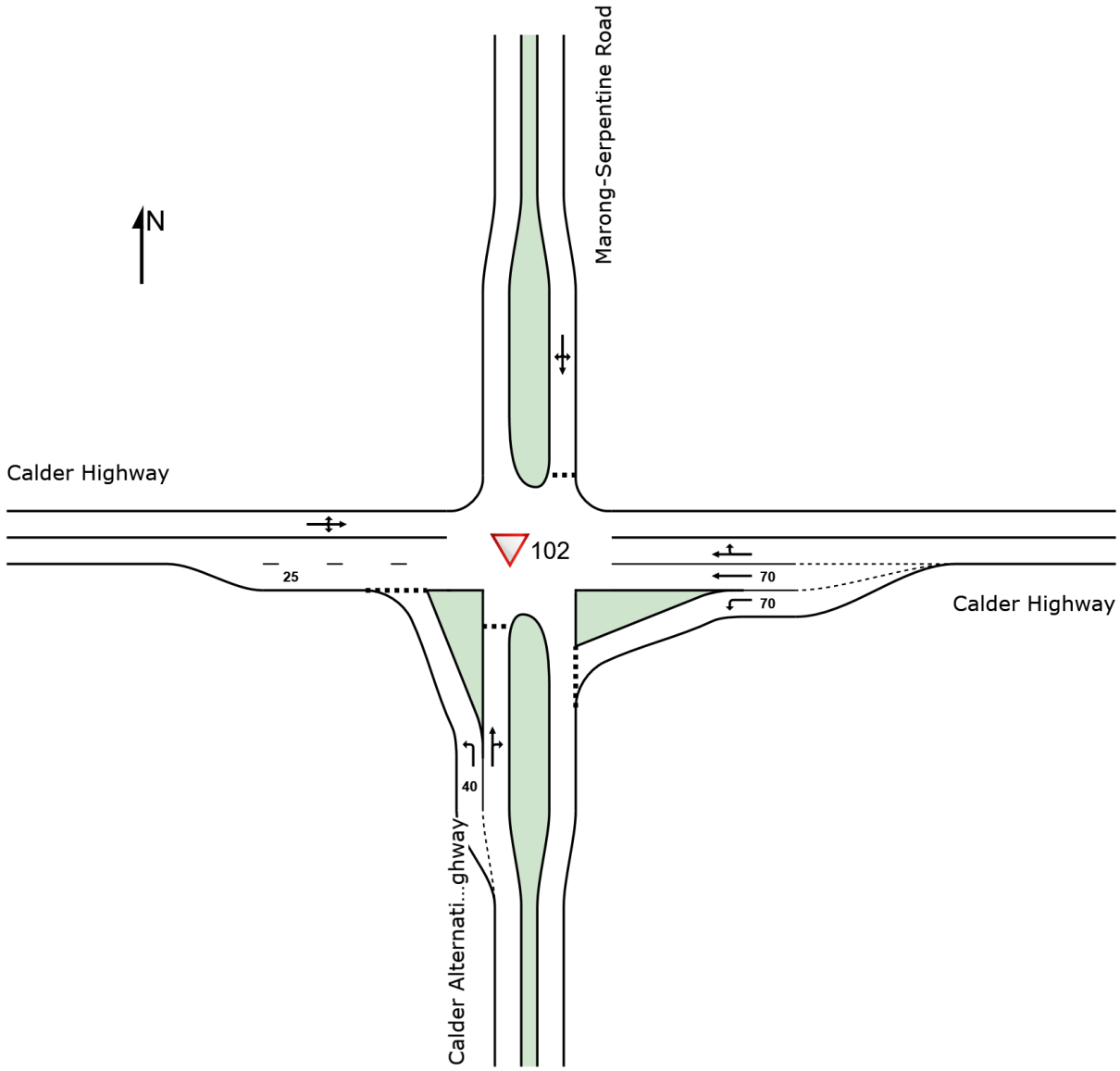
**Output produced by SIDRA INTERSECTION Version: 9.1.6.228** **Template: Site User Report**

## Site: 102 [#1 - PM - Existing - 2023 Model Volumes (Site Folder: [Final Assessment] - Site 1 - Calder Highway / Calder Alternative)]

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

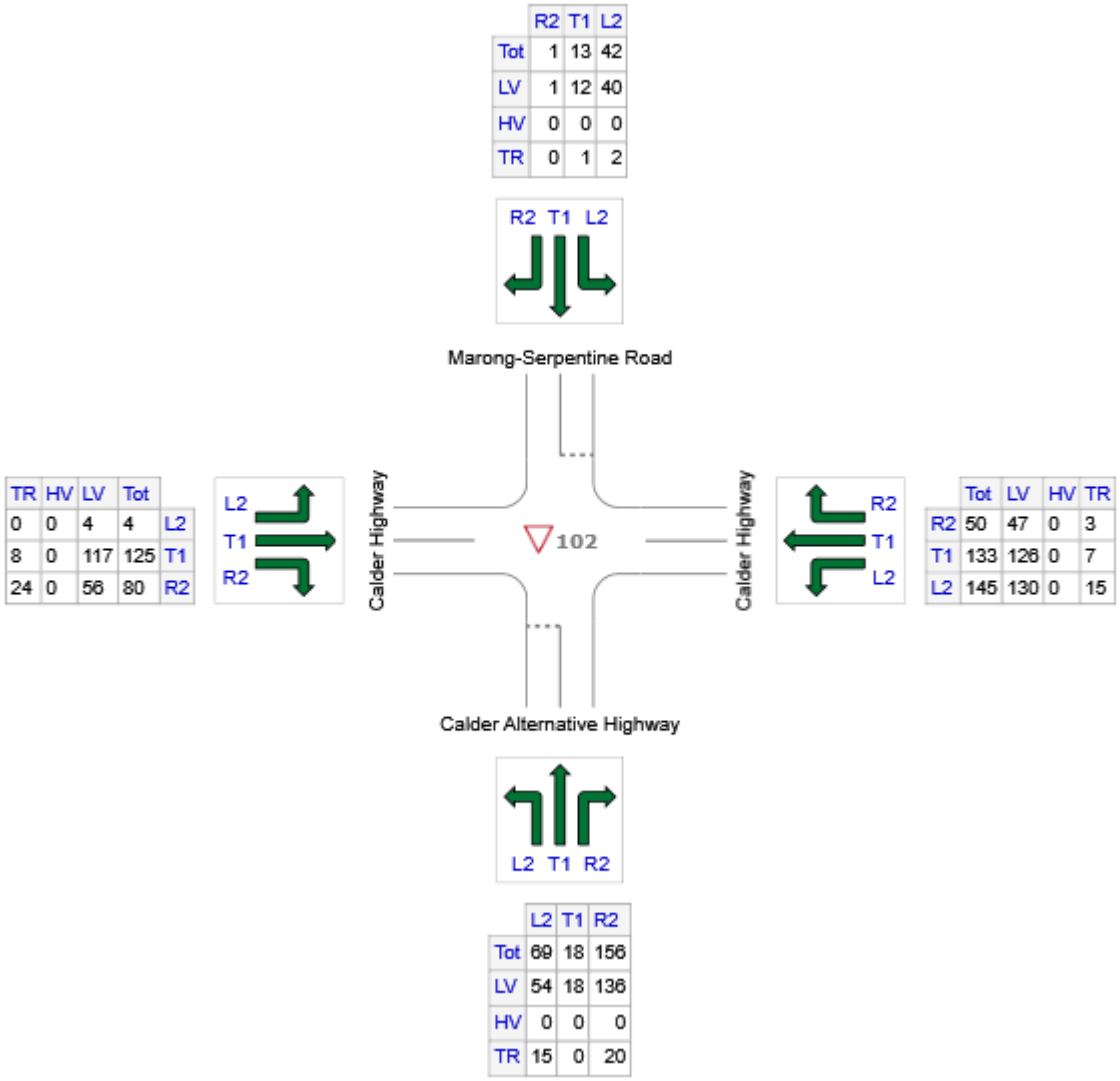
### Site Layout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



## Input Volumes

**Volume Display Method: Total and Veh**




| | All MCs | Light Vehicles (LV) | Heavy Vehicles (HV) | Large Trucks (TR) |
|---|---|---|---|---|
| S: Calder Alternative Highway | 243 | 208 | 0 | 35 |
| E: Calder Highway | 328 | 303 | 0 | 25 |
| N: Marong-Serpentine Road | 56 | 53 | 0 | 3 |
| W: Calder Highway | 209 | 177 | 0 | 32 |
| Total | 836 | 741 | 0 | 95 |

## 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. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Calder Alternative Highway | | | | | | | | | | | | | | | |
| Lane 1 | 73 | 21.7 | 73 | 21.7 | 1167 | 0.062 | 100 | 6.2 | LOS A | 0.3 | 2.8 | Short | 40 | 0.0 | NA |
| Lane 2 | 183 | 11.5 | 183 | 11.5 | 215 | 0.851 | 100 | 46.3 | LOS E | 5.6 | 50.7 | Full | 500 | 0.0 | 0.0 |
| Approach | 256 | 14.4 | 256 | 14.4 | | 0.851 | | 34.9 | LOS D | 5.6 | 50.7 | | | | |
| East: Calder Highway | | | | | | | | | | | | | | | |
| Lane 1 | 153 | 10.3 | 153 | 10.3 | 1207 | 0.126 | 100 | 6.5 | LOS A | 0.5 | 4.7 | Short | 70 | 0.0 | NA |
| Lane 2 | 40 | 5.3 | 40 | 5.3 | 1807 | 0.022 | 24[6] | 0.0 | LOS A | 0.0 | 0.0 | Short | 70 | 0.0 | NA |
| Lane 3 | 152 | 5.5 | 152 | 5.5 | 1624 | 0.094 | 100 | 2.4 | LOS A | 0.3 | 2.8 | Full | 130 | 0.0 | 0.0 |
| Approach | 345 | 7.6 | 345 | 7.6 | | 0.126 | | 3.9 | LOS A | 0.5 | 4.7 | | | | |
| North: Marong-Serpentine Road | | | | | | | | | | | | | | | |
| Lane 1 | 59 | 5.4 | 59 | 5.4 | 918 | 0.064 | 100 | 6.4 | LOS A | 0.2 | 1.9 | Full | 500 | 0.0 | 0.0 |
| Approach | 59 | 5.4 | 59 | 5.4 | | 0.064 | | 6.4 | LOS A | 0.2 | 1.9 | | | | |
| West: Calder Highway | | | | | | | | | | | | | | | |
| Lane 1 | 220 | 15.3 | 220 | 15.3 | 1107 | 0.199 | 100 | 4.0 | LOS A | 1.0 | 9.7 | Full | 140 | 0.0 | 0.0 |
| Approach | 220 | 15.3 | 220 | 15.3 | | 0.199 | | 4.0 | NA | 1.0 | 9.7 | | | | |
| All Vehicles | 880 | 11.4 | 880 | 11.4 | | 0.851 | | 13.1 | NA | 5.6 | 50.7 | | | | |

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.
Minor Road Approach LOS values are based on average delay for all lanes.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
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 Gap.
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.

6 Lane under-utilisation due to downstream effects

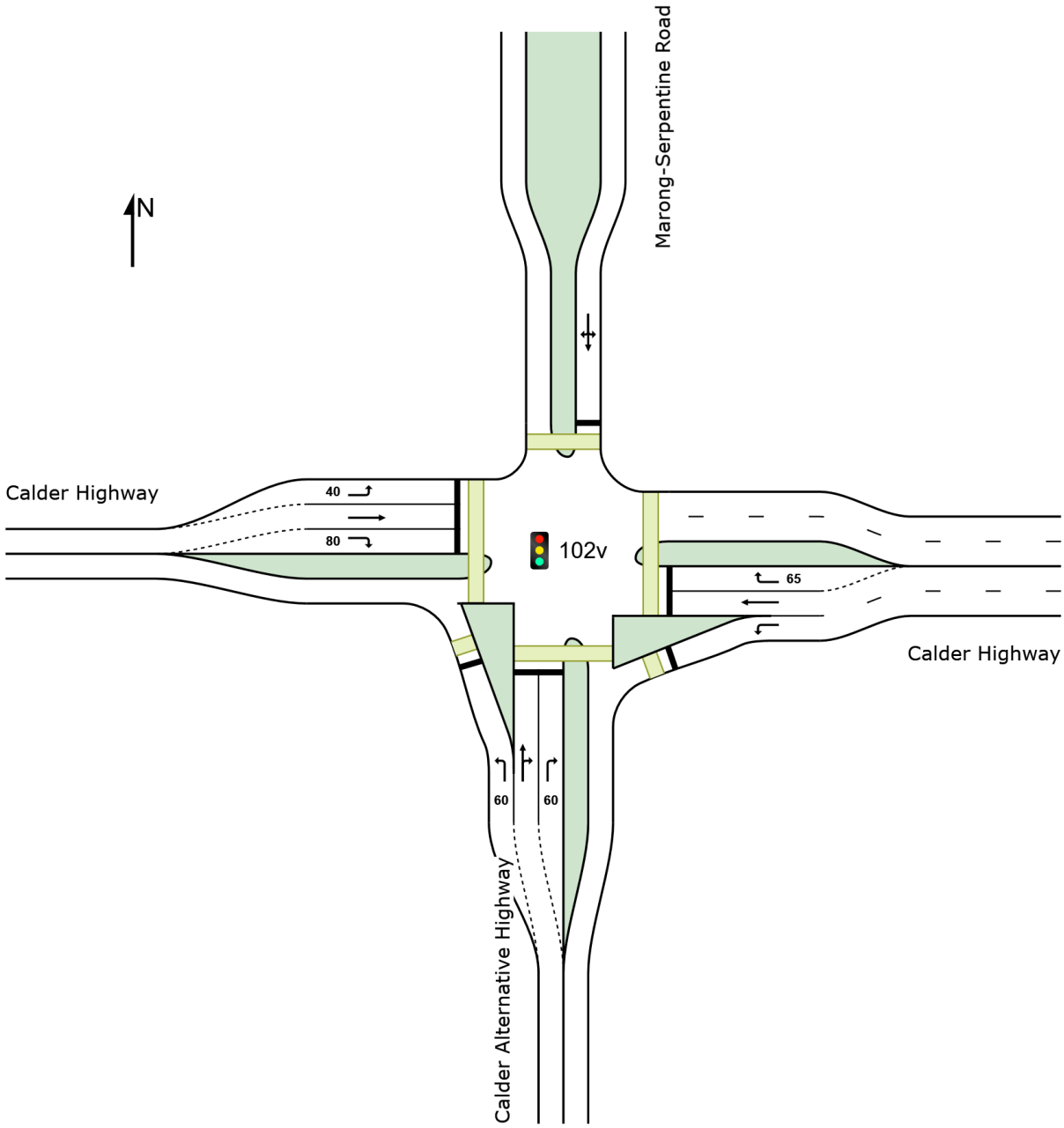
## Site: 102v [#1 - PM - Ultimate - 2046 Model Volumes (w/o MWFC) - 100% Development - (DTP Comments) (Site Folder: [May 2026] - Amendments to reported Sidra - Site 1)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated  Cycle Time = 120 seconds (Site Practical Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

**Timings based on settings in the Site Phasing & Timing dialog**
**Phase Times determined by the program**
**Phase Sequence: Diamond**
**Input Phase Sequence: A, B, C, D*, D1*, D2***
**Output Phase Sequence: A, B, C, D***
**Reference Phase: Phase A**
(* Variable Phase)

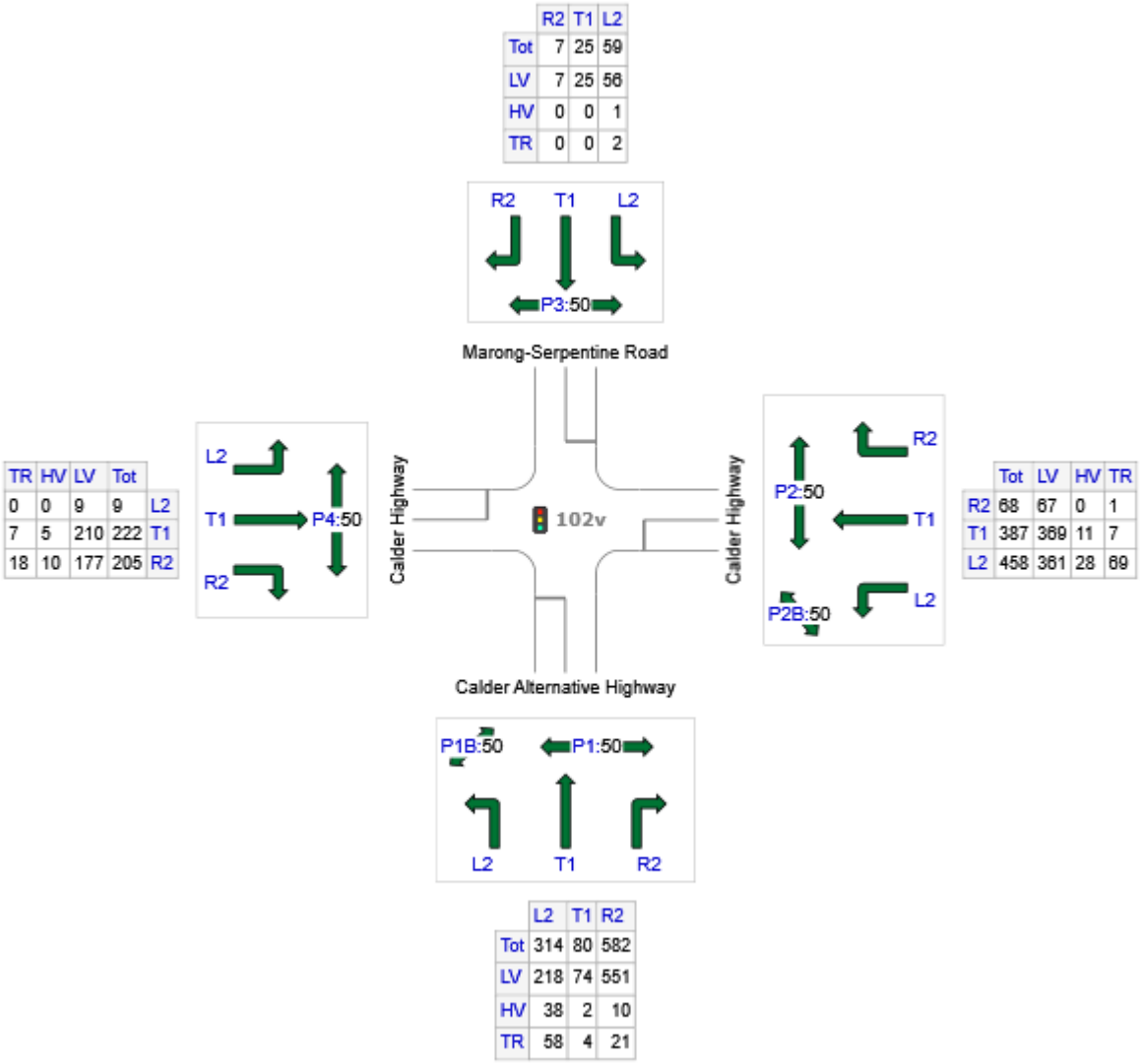
### Site Layout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



## Input Volumes

**Volume Display Method: Separate**



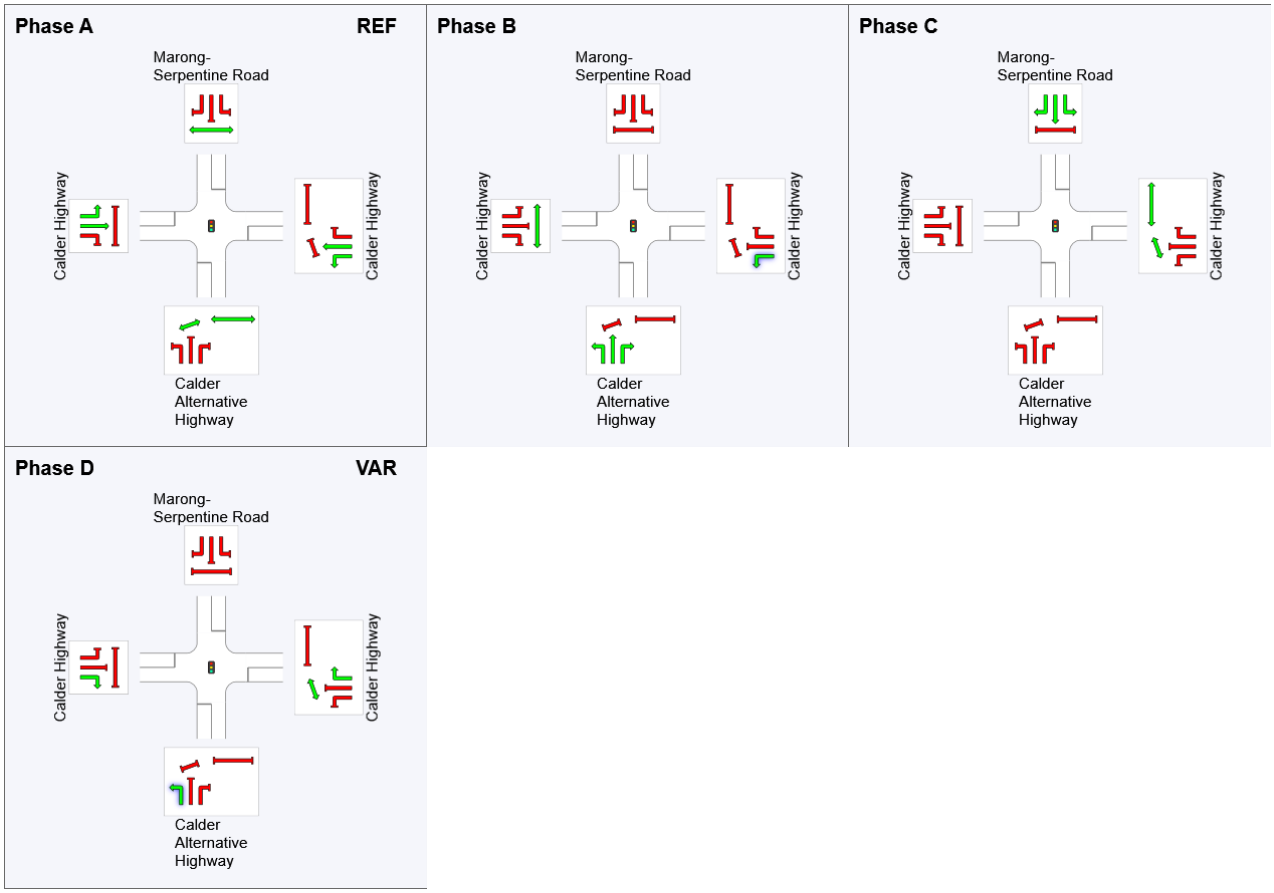

| | All MCs | Light Vehicles (LV) | Heavy Vehicles (HV) | Large Trucks (TR) |
|---|---|---|---|---|
| S: Calder Alternative Highway | 976 | 843 | 50 | 83 |
| E: Calder Highway | 913 | 797 | 39 | 77 |
| N: Marong-Serpentine Road | 91 | 88 | 1 | 2 |
| W: Calder Highway | 436 | 396 | 15 | 25 |
| Total | 2416 | 2124 | 105 | 187 |

## Phase Timing Summary

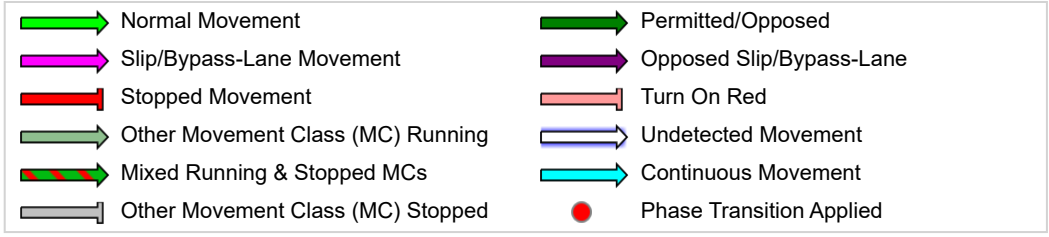
| Phase | A | B | C | D |
|---|---|---|---|---|
| Phase Change Time (sec) | 0 | 35 | 77 | 96 |
| Green Time (sec) | 30 | 35 | 13 | 18 |
| Phase Time (sec) | 37 | 41 | 19 | 23 |
| Phase Split | 31% | 34% | 16% | 19% |
| Phase Frequency (%) | 100.0 | 100.0 | 100.0 | 100.0 |

See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

## Output Phase Sequence




REF: Reference Phase
VAR: Variable Phase



## 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. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Calder Alternative Highway | | | | | | | | | | | | | | | |
| Lane 1 | 331 | 30.6 | 331 | 30.6 | 594 | 0.556 | 100 | 29.0 | LOS C | 9.1 | 101.1 | Short | 60 | 0.0 | NA |
| Lane 2 | 340 | 5.9 | 340 | 5.9 | 369[1] | 0.923 | 100 | 80.8 | LOS F | 24.3 | 190.0 | Full | 500 | 0.0 | 0.0 |
| Lane 3 | 356 | 5.3 | 356 | 5.3 | 386[1] | 0.923 | 100 | 81.3 | LOS F | 25.3 | 196.4 | Short | 60 | 0.0 | NA |
| Approach | 1027 | 13.6 | 1027 | 13.6 | | 0.923 | | 64.3 | LOS E | 25.3 | 196.4 | | | | |
| East: Calder Highway | | | | | | | | | | | | | | | |
| Lane 1 | 482 | 21.2 | 482 | 21.2 | 868 | 0.555 | 100 | 20.1 | LOS C | 16.8 | 169.2 | Full | 130 | 0.0 | 29.0 |
| Lane 2 | 407 | 4.7 | 407 | 4.7 | 440[1] | 0.927 | 100 | 80.9 | LOS F | 28.5 | 213.5 | Full | 130 | 0.0 | 50.6 |
| Lane 3 | 72 | 1.5 | 72 | 1.5 | 272 | 0.263 | 100 | 68.0 | LOS E | 3.8 | 27.4 | Short | 65 | 0.0 | NA |
| Approach | 961 | 12.7 | 961 | 12.7 | | 0.927 | | 49.4 | LOS D | 28.5 | 213.5 | | | | |
| North: Marong-Serpentine Road | | | | | | | | | | | | | | | |
| Lane 1 | 96 | 3.3 | 96 | 3.3 | 195 | 0.490 | 100 | 59.6 | LOS E | 5.5 | 40.9 | Full | 500 | 0.0 | 0.0 |
| Approach | 96 | 3.3 | 96 | 3.3 | | 0.490 | | 59.6 | LOS E | 5.5 | 40.9 | | | | |
| West: Calder Highway | | | | | | | | | | | | | | | |
| Lane 1 | 9 | 0.0 | 9 | 0.0 | 464 | 0.020 | 100 | 49.2 | LOS D | 0.4 | 2.9 | Short | 40 | 0.0 | NA |
| Lane 2 | 234 | 5.4 | 234 | 5.4 | 455[1] | 0.514 | 100 | 50.6 | LOS D | 11.8 | 91.3 | Full | 140 | 0.0 | 0.0 |
| Lane 3 | 216 | 13.7 | 216 | 13.7 | 237 | 0.910 | 100 | 74.7 | LOS E | 14.9 | 132.4 | Short | 80 | 0.0 | NA |
| Approach | 459 | 9.2 | 459 | 9.2 | | 0.910 | | 61.9 | LOS E | 14.9 | 132.4 | | | | |
| All Vehicles | 2543 | 12.1 | 2543 | 12.1 | | 0.927 | | 58.1 | LOS E | 28.5 | 213.5 | | | | |

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.

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.

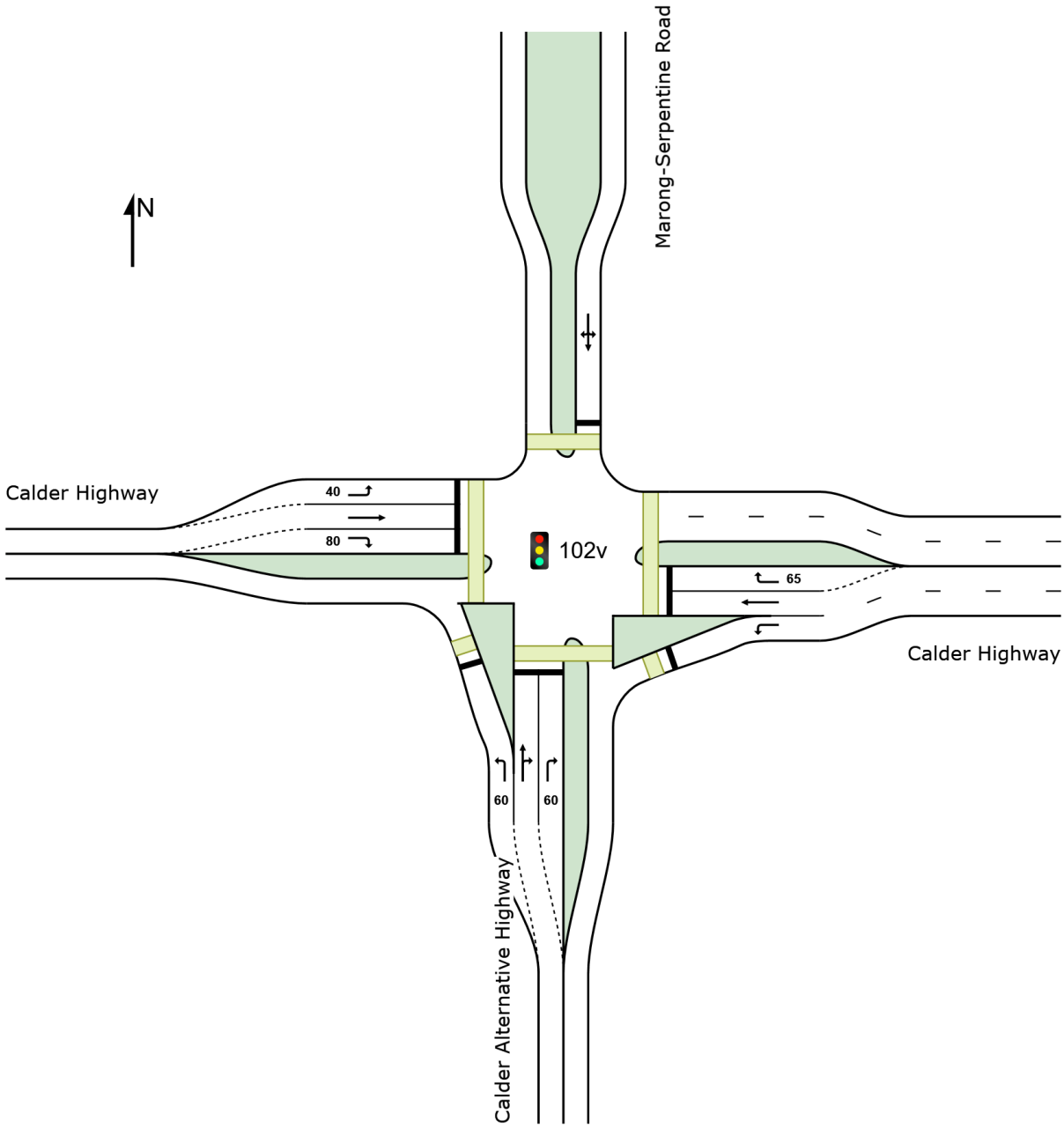
## Site: 102v [#1 - PM - Ultimate - 2046 Model Volumes (w/MWFC) - 100% Development - (DTP Comments) (Site Folder: [May 2026] - Amendments to reported Sidra - Site 1)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated  Cycle Time = 90 seconds (Site Practical Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

**Timings based on settings in the Site Phasing & Timing dialog**
**Phase Times determined by the program**
**Phase Sequence: Diamond**
**Input Phase Sequence: A, B, C, D*, D1*, D2***
**Output Phase Sequence: A, B, C, D***
**Reference Phase: Phase A**
(* Variable Phase)

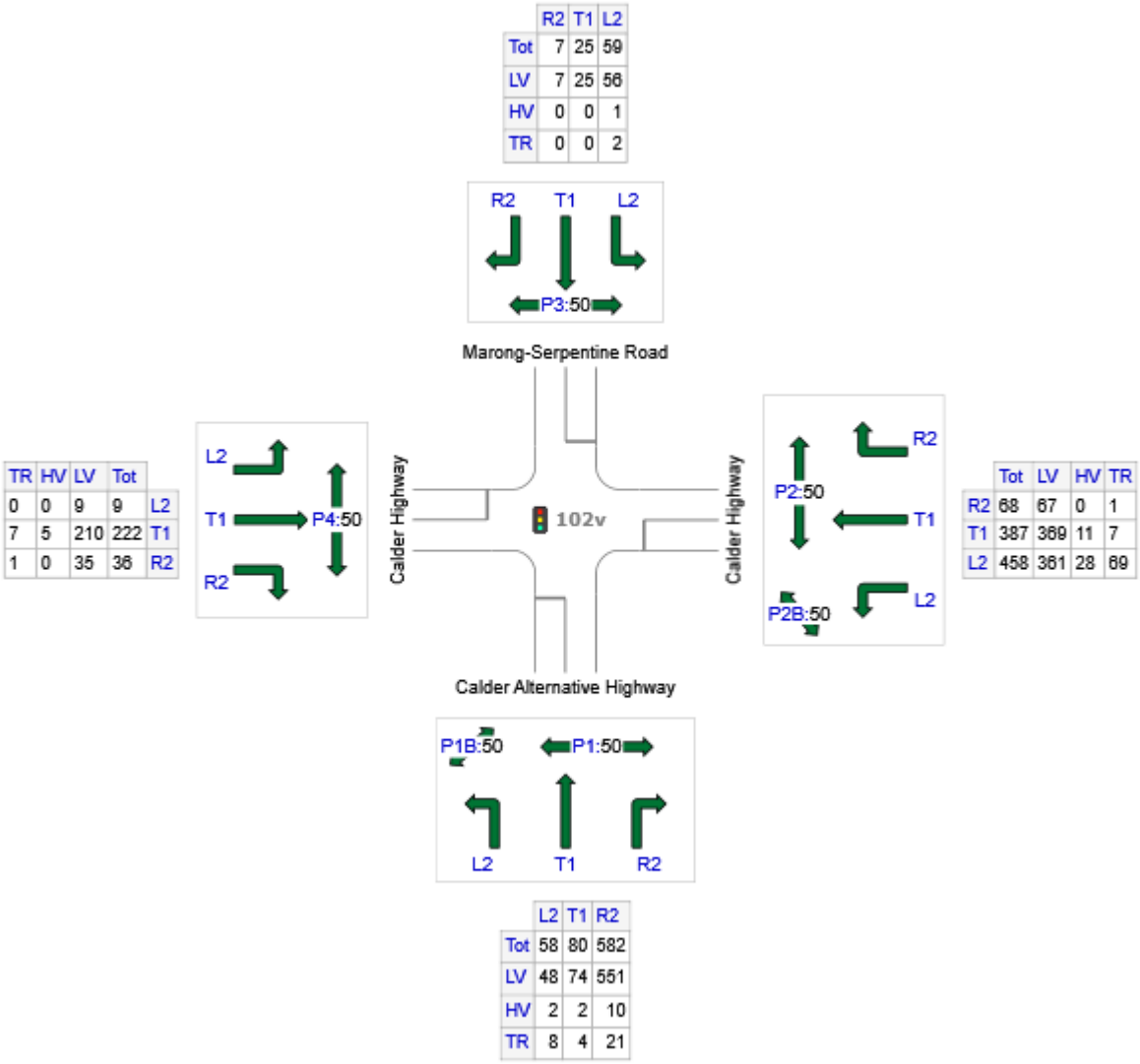
### Site Layout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



## Input Volumes

**Volume Display Method: Separate**



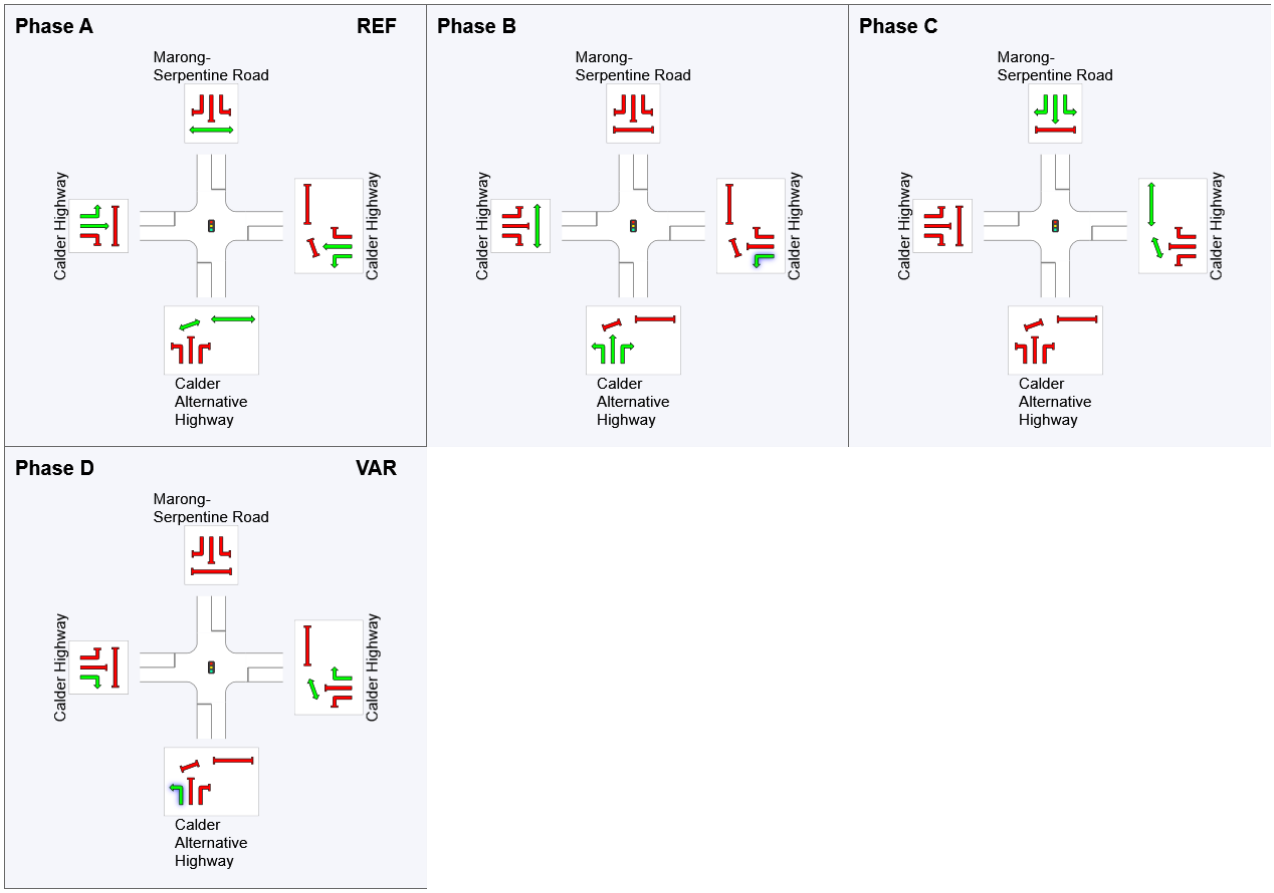

| | All MCs | Light Vehicles (LV) | Heavy Vehicles (HV) | Large Trucks (TR) |
|---|---|---|---|---|
| S: Calder Alternative Highway | 720 | 673 | 14 | 33 |
| E: Calder Highway | 913 | 797 | 39 | 77 |
| N: Marong-Serpentine Road | 91 | 88 | 1 | 2 |
| W: Calder Highway | 267 | 254 | 5 | 8 |
| Total | 1991 | 1812 | 59 | 120 |

## Phase Timing Summary

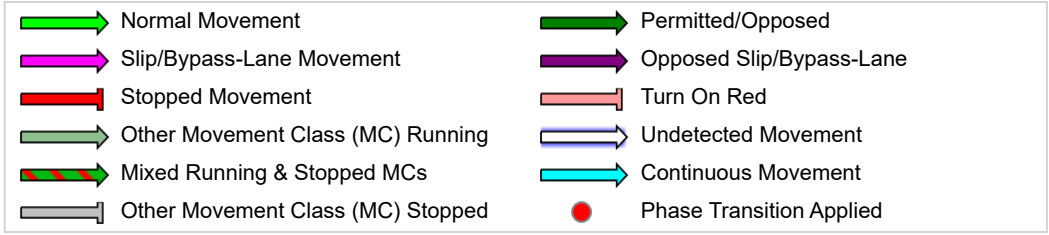
| Phase | A | B | C | D |
|---|---|---|---|---|
| Phase Change Time (sec) | 0 | 29 | 59 | 78 |
| Green Time (sec) | 24 | 23 | 13 | 6 |
| Phase Time (sec) | 31 | 29 | 19 | 11 |
| Phase Split | 34% | 32% | 21% | 12% |
| Phase Frequency (%) | 100.0 | 100.0 | 100.0 | 100.0 |

See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

## Output Phase Sequence




REF: Reference Phase
VAR: Variable Phase



## 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. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Calder Alternative Highway | | | | | | | | | | | | | | | |
| Lane 1 | 61 | 17.2 | 61 | 17.2 | 481 | 0.127 | 100 | 19.5 | LOS B | 1.1 | 11.0 | Short | 60 | 0.0 | NA |
| Lane 2 | 354 | 5.8 | 354 | 5.8 | 440[1] | 0.803 | 100 | 44.3 | LOS D | 16.1 | 125.8 | Full | 500 | 0.0 | 0.0 |
| Lane 3 | 343 | 5.3 | 343 | 5.3 | 427[1] | 0.803 | 100 | 45.3 | LOS D | 15.6 | 121.0 | Short | 60 | 0.0 | NA |
| Approach | 758 | 6.5 | 758 | 6.5 | | 0.803 | | 42.7 | LOS D | 16.1 | 125.8 | | | | |
| East: Calder Highway | | | | | | | | | | | | | | | |
| Lane 1 | 482 | 21.2 | 482 | 21.2 | 868 | 0.555 | 100 | 16.3 | LOS B | 12.7 | 128.1 | Full | 130 | 0.0 | 3.7 |
| Lane 2 | 407 | 4.7 | 407 | 4.7 | 490[1] | 0.832 | 100 | 42.6 | LOS D | 18.9 | 141.9 | Full | 130 | 0.0 | 12.9 |
| Lane 3 | 72 | 1.5 | 72 | 1.5 | 121 | 0.592 | 100 | 54.6 | LOS D | 3.3 | 24.2 | Short | 65 | 0.0 | NA |
| Approach | 961 | 12.7 | 961 | 12.7 | | 0.832 | | 30.3 | LOS C | 18.9 | 141.9 | | | | |
| North: Marong-Serpentine Road | | | | | | | | | | | | | | | |
| Lane 1 | 96 | 3.3 | 96 | 3.3 | 260 | 0.368 | 100 | 42.2 | LOS D | 3.9 | 29.4 | Full | 500 | 0.0 | 0.0 |
| Approach | 96 | 3.3 | 96 | 3.3 | | 0.368 | | 42.2 | LOS D | 3.9 | 29.4 | | | | |
| West: Calder Highway | | | | | | | | | | | | | | | |
| Lane 1 | 9 | 0.0 | 9 | 0.0 | 495 | 0.019 | 100 | 30.5 | LOS C | 0.3 | 2.1 | Short | 40 | 0.0 | NA |
| Lane 2 | 234 | 5.4 | 234 | 5.4 | 490 | 0.477 | 100 | 30.3 | LOS C | 8.8 | 67.4 | Full | 140 | 0.0 | 0.0 |
| Lane 3 | 38 | 2.8 | 38 | 2.8 | 119 | 0.320 | 100 | 50.4 | LOS D | 1.7 | 12.8 | Short | 80 | 0.0 | NA |
| Approach | 281 | 4.9 | 281 | 4.9 | | 0.477 | | 33.0 | LOS C | 8.8 | 67.4 | | | | |
| All Vehicles | 2096 | 9.0 | 2096 | 9.0 | | 0.832 | | 35.7 | LOS D | 18.9 | 141.9 | | | | |

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.

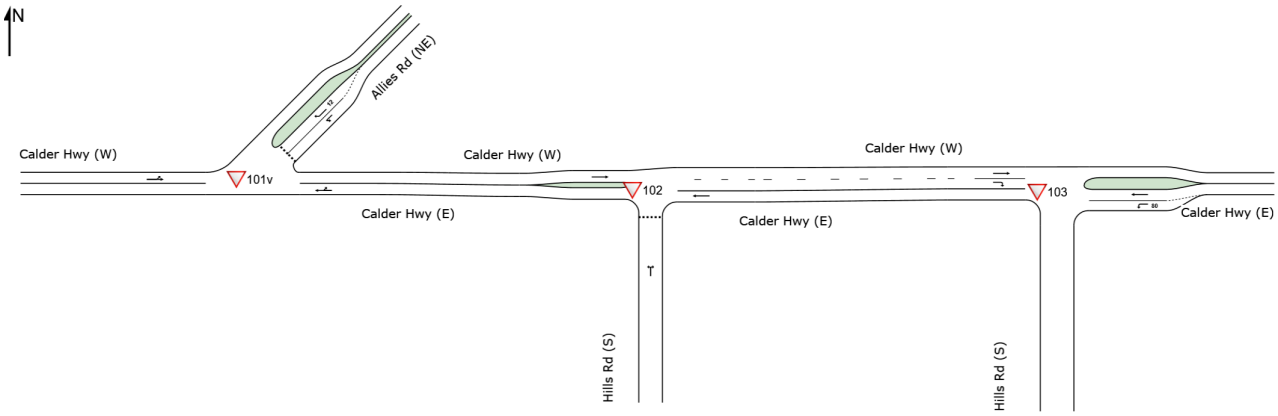
# A.3 Calder Highway – Allies Road

# NETWORK LAYOUT

## Network: N101 [Existing Network - AM - Model 2023 Volumes (Network Folder: [Final Assessment])]

New Network
Network Category: (None)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.




| SITES IN NETWORK | | |
|---|---|---|
| **Site ID** | **CCG ID** | **Site Name** |
| ▽101v | NA | #5 - AM - Existing - 2023 Model Volumes |
| ▽102 | NA | #6A - AM - Existing - 2023 Model Volumes |
| ▽103 | NA | #6B - AM - Existing - 2023 Model Volumes |

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# USER REPORT FOR NETWORK SITE

**Project: sid_x5902_marong-oct25-v6**

**Output produced by SIDRA INTERSECTION Version: 9.1.6.228** **Template: Site User Report**

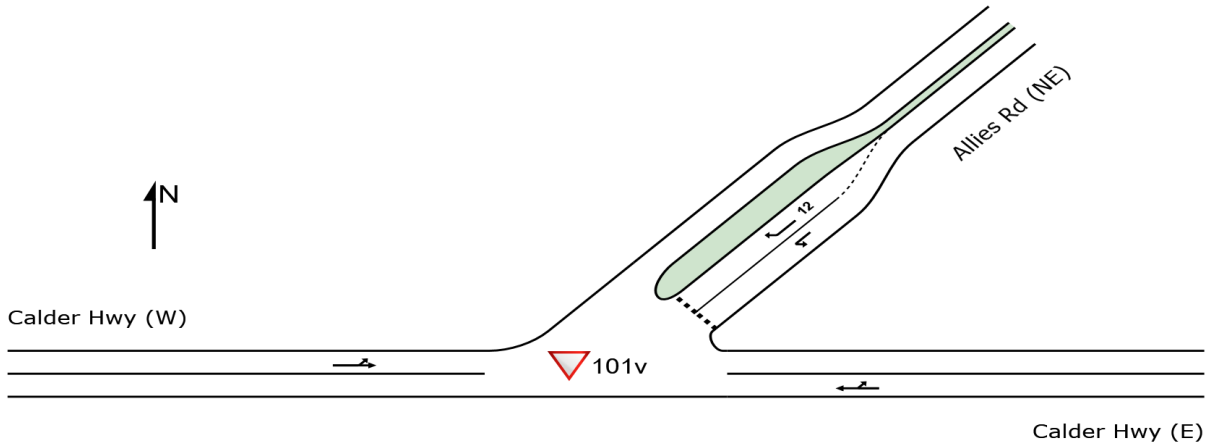
## Site: 101v [#5 - AM - Existing - 2023 Model Volumes (Site Folder: [Final Assessment] - Sites 5 & 6 - Calder Highway / Allies Road / Hills Road)]

## Network: 7 [Existing Network - AM - Model 2023 Volumes (Network Folder: [Final Assessment])]

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

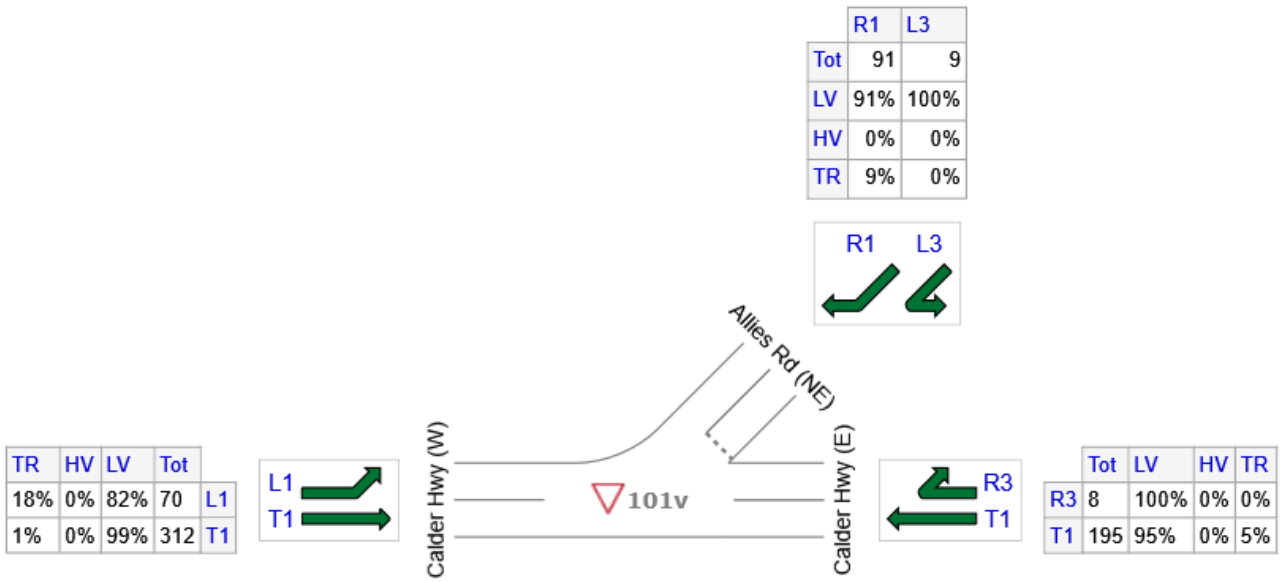
### Site Layout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



## Input Volumes

**Volume Display Method: Total and %**




| | All MCs | Light Vehicles (LV) | Heavy Vehicles (HV) | Large Trucks (TR) |
|---|---|---|---|---|
| E: Calder Hwy (E) | 203 | 192 | 0 | 11 |
| NE: Allies Rd (NE) | 100 | 91 | 0 | 9 |
| W: Calder Hwy (W) | 382 | 365 | 0 | 17 |
| Total | 685 | 649 | 0 | 36 |

## 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 | Aver. Back Of Queue [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Calder Hwy (E) | | | | | | | | | | | | | | | |
| Lane 1 | 214 | 5.3 | 214 | 5.3 | 1758 | 0.122 | 100 | 0.4 | LOS A | 0.0 | 0.2 | Full | 210 | 0.0 | 0.0 |
| Approach | 214 | 5.3 | 214 | 5.3 | | 0.122 | | 0.4 | NA | 0.0 | 0.2 | | | | |
| NorthEast: Allies Rd (NE) | | | | | | | | | | | | | | | |
| Lane 1 | 9 | 0.0 | 9 | 0.0 | 1202 | 0.008 | 100 | 7.5 | LOS A | 0.0 | 0.1 | Full | 500 | 0.0 | 0.0 |
| Lane 2 | 96 | 9.5 | 96 | 9.5 | 456 | 0.210 | 100 | 11.4 | LOS B | 0.2 | 2.1 | Short | 12 | 0.0 | NA |
| Approach | 105 | 8.6 | 105 | 8.6 | | 0.210 | | 11.1 | LOS B | 0.2 | 2.1 | | | | |
| West: Calder Hwy (W) | | | | | | | | | | | | | | | |
| Lane 1 | 402 | 4.5 | 402 | 4.5 | 1815 | 0.222 | 100 | 1.0 | LOS A | 0.0 | 0.0 | Full | 500 | 0.0 | 0.0 |
| Approach | 402 | 4.5 | 402 | 4.5 | | 0.222 | | 1.0 | NA | 0.0 | 0.0 | | | | |
| All Vehicles | 721 | 5.3 | 721 | 5.3 | | 0.222 | | 2.3 | NA | 0.2 | 2.1 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Lane LOS values are based on average delay per lane.

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

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

Two-Way Sign Control Capacity Model: SIDRA Standard.

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 Gap.

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

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

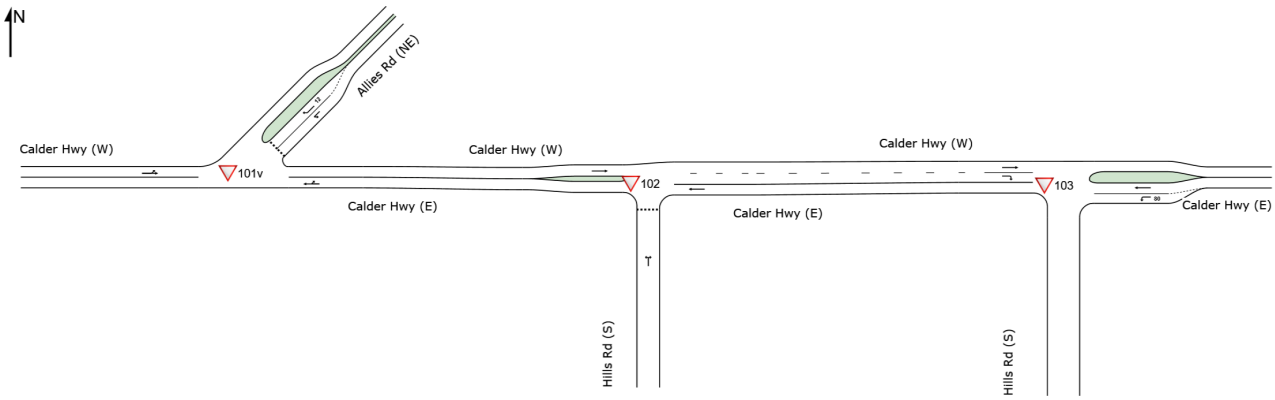
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

# NETWORK LAYOUT

## Network: N101 [Existing Network - AM - Trigger Point Analysis - 45% Development (Network Folder: [Final Assessment])]

New Network
Network Category: (None)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.




| SITES IN NETWORK | | |
|---|---|---|
| **Site ID** | **CCG ID** | **Site Name** |
| ▽101v | NA | #5 - AM - Existing - Trigger Point Analysis - 45% Development |
| ▽102 | NA | #6A - AM - Existing - Trigger Point Analysis - 45% Development |
| ▽103 | NA | #6B - AM - Existing - Trigger Point Analysis - 45% Development |

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# USER REPORT FOR NETWORK SITE

**Project: sid_x5902_marong-oct25-v4**

**Output produced by SIDRA INTERSECTION Version: 9.1.6.228** **Template: Site User Report**

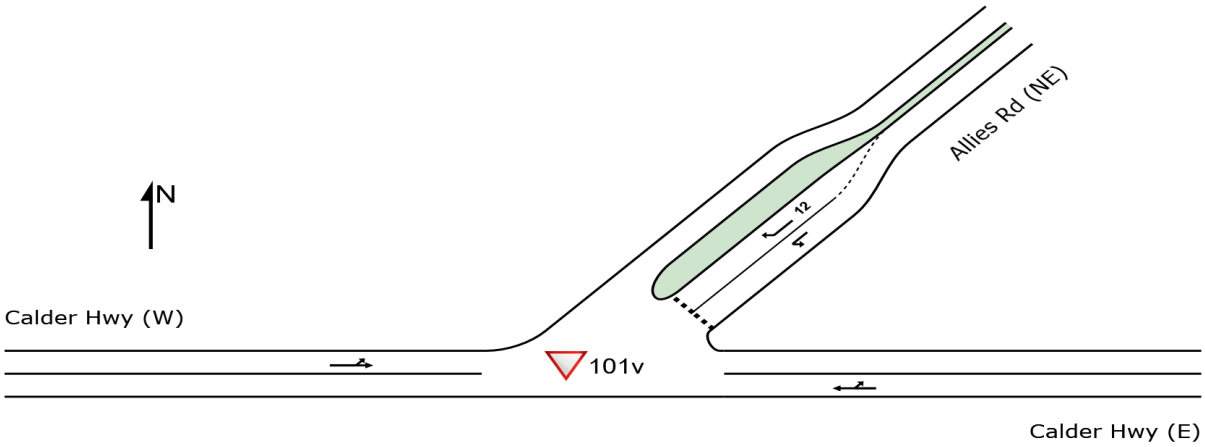
## Site: 101v [#5 - AM - Existing - Trigger Point Analysis - 45% Development (Site Folder: [Final Assessment] - Sites 5 & 6 - Calder Highway / Allies Road / Hills Road)]

## Network: 8 [Existing Network - AM - Trigger Point Analysis - 45% Development (Network Folder: [Final Assessment])]

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

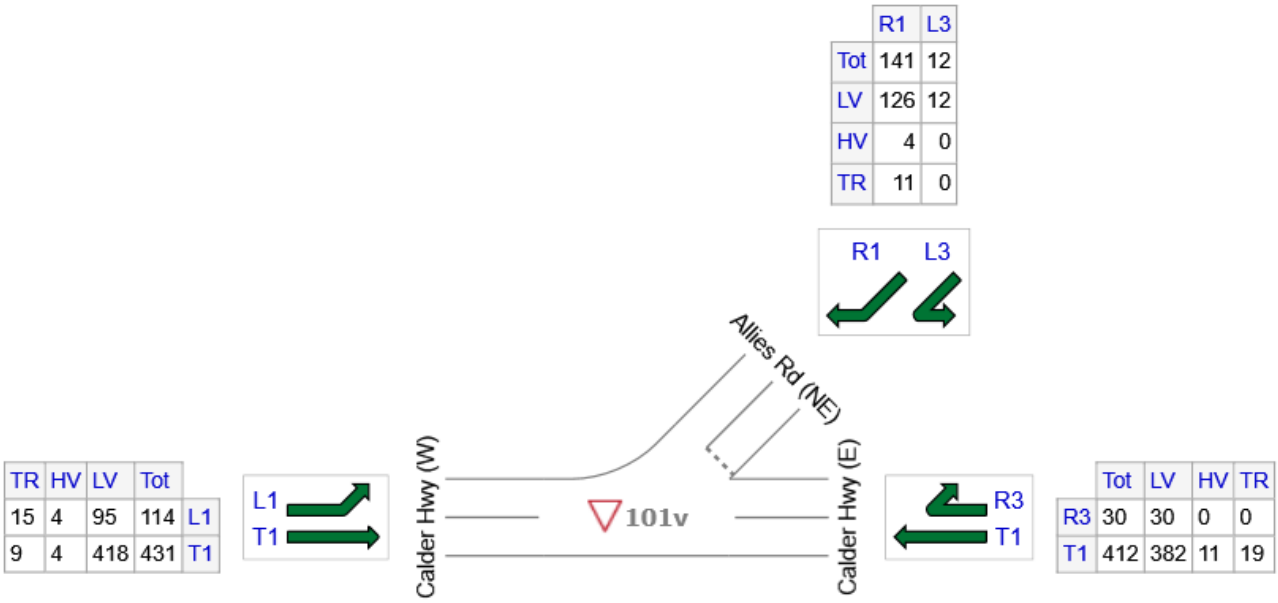
### Site Layout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



## Input Volumes

**Volume Display Method: Separate**




| | All MCs | Light Vehicles (LV) | Heavy Vehicles (HV) | Large Trucks (TR) |
|---|---|---|---|---|
| E: Calder Hwy (E) | 442 | 412 | 11 | 19 |
| NE: Allies Rd (NE) | 153 | 138 | 4 | 11 |
| W: Calder Hwy (W) | 545 | 513 | 8 | 24 |
| Total | 1140 | 1063 | 23 | 54 |

## 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 | Aver. Back Of Queue [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Calder Hwy (E) | | | | | | | | | | | | | | | |
| Lane 1 | 465 | 6.8 | 465 | 6.8 | 1677 | 0.277 | 100 | 1.0 | LOS A | 0.2 | 1.3 | Full | 210 | 0.0 | 0.0 |
| Approach | 465 | 6.8 | 465 | 6.8 | | 0.277 | | 1.0 | NA | 0.2 | 1.3 | | | | |
| NorthEast: Allies Rd (NE) | | | | | | | | | | | | | | | |
| Lane 1 | 13 | 0.0 | 13 | 0.0 | 1034 | 0.012 | 100 | 8.1 | LOS A | 0.0 | 0.1 | Full | 500 | 0.0 | 0.0 |
| Lane 2 | 148 | 10.6 | 148 | 10.6 | 173 | 0.859 | 100 | 44.4 | LOS E | 1.3 | 11.1 | Short | 12 | 0.0 | NA |
| Approach | 161 | 9.8 | 161 | 9.8 | | 0.859 | | 41.6 | LOS E | 1.3 | 11.1 | | | | |
| West: Calder Hwy (W) | | | | | | | | | | | | | | | |
| Lane 1 | 574 | 5.9 | 574 | 5.9 | 1800 | 0.319 | 100 | 1.1 | LOS A | 0.0 | 0.0 | Full | 500 | 0.0 | 0.0 |
| Approach | 574 | 5.9 | 574 | 5.9 | | 0.319 | | 1.1 | NA | 0.0 | 0.0 | | | | |
| All Vehicles | 1200 | 6.8 | 1200 | 6.8 | | 0.859 | | 6.5 | NA | 1.3 | 11.1 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Lane LOS values are based on average delay per lane.

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

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

Two-Way Sign Control Capacity Model: SIDRA Standard.

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 Gap.

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

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

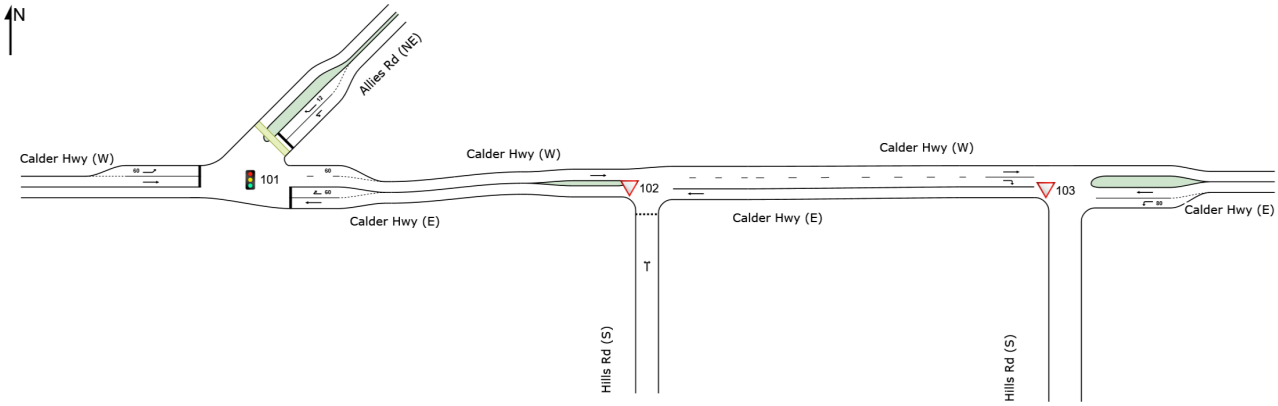
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

# NETWORK LAYOUT

## Network: N101 [Ultimate Network - AM - 2046 Model Volumes (w/o MWFC) - 100% Development (Network Folder: [Final Assessment])]

New Network
Network Category: (None)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.




| SITES IN NETWORK | | |
|---|---|---|
| **Site ID** | **CCG ID** | **Site Name** |
| 101 | NA | #5 - AM - Ultimate - 2046 Model Volumes (w/MWFC) - 100% Development |
| 102 | NA | #6A - AM - Ultimate - 2046 Model Volumes (w/MWFC) - 100% Development |
| 103 | NA | #6B - AM - Ultimate - 2046 Model Volumes (w/MWFC) - 100% Development |

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# USER REPORT FOR NETWORK SITE

**Project: sid_x5902_marong-oct25-v4**

**Output produced by SIDRA INTERSECTION Version: 9.1.6.228** **Template: Site User Report**

## Site: 101 [#5 - AM - Ultimate - 2046 Model Volumes (w/MWFC) - 100% Development (Site Folder: [Final Assessment] - Sites 5 & 6 - Calder Highway / Allies Road / Hills Road)]

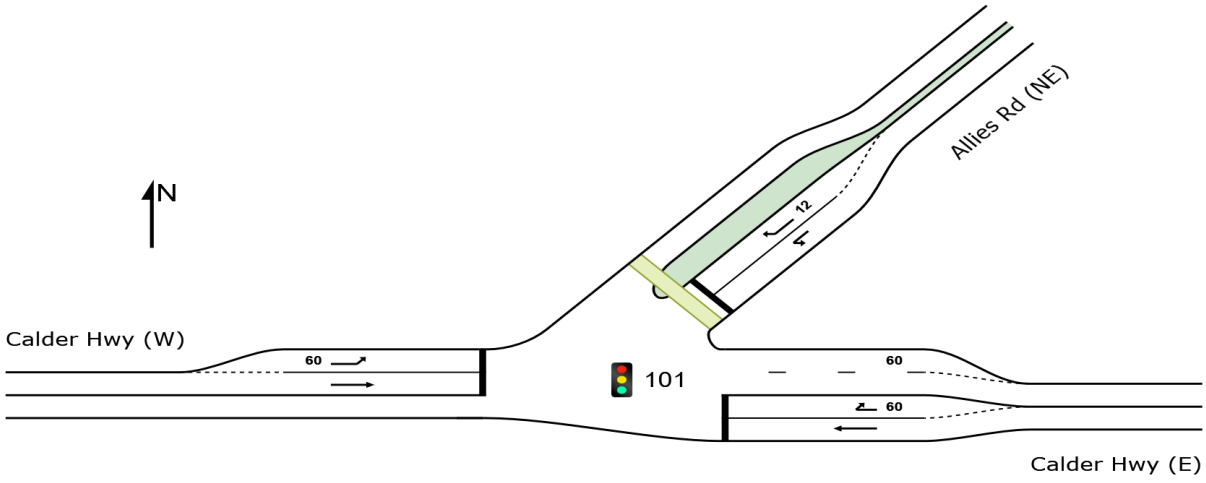
## Network: 9 [Ultimate Network - AM - 2046 Model Volumes (w/o MWFC) - 100% Development (Network Folder: [Final Assessment])]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 40 seconds (Site Practical Cycle Time)

**Timings based on settings in the Site Phasing & Timing dialog**
**Phase Times determined by the program**
**Downstream lane blockage effects included in determining phase times**
**Phase Sequence: Four-Phase Leading Right Turns**
**Input Phase Sequence: A, B, C***
**Output Phase Sequence: A, B**
**Reference Phase: Phase A**
**Offset: NA**
(* Variable Phase)

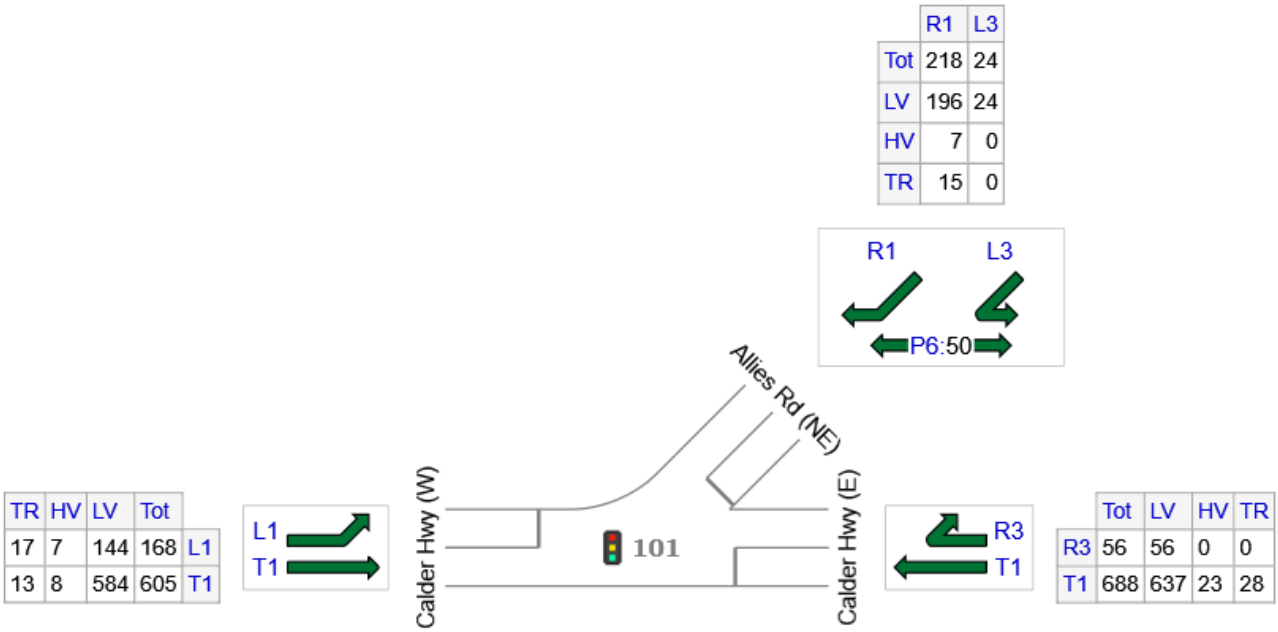
## Site Layout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



## Input Volumes

**Volume Display Method: Separate**



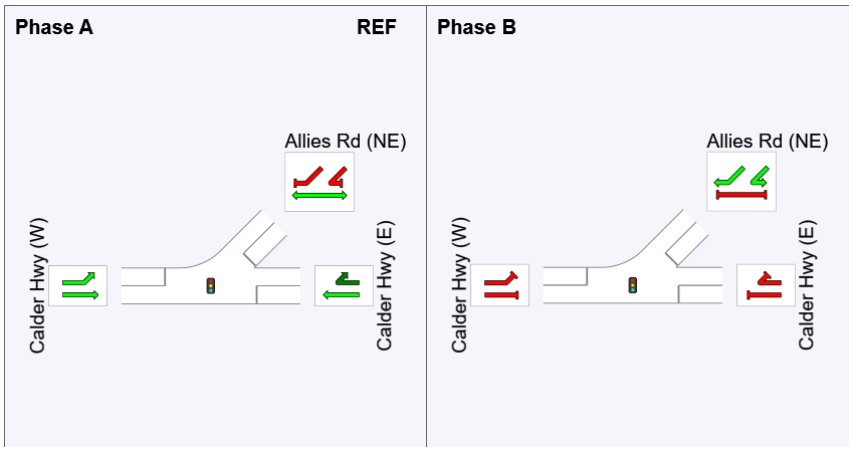

| | All MCs | Light Vehicles (LV) | Heavy Vehicles (HV) | Large Trucks (TR) |
|---|---|---|---|---|
| E: Calder Hwy (E) | 744 | 693 | 23 | 28 |
| NE: Allies Rd (NE) | 242 | 220 | 7 | 15 |
| W: Calder Hwy (W) | 773 | 728 | 15 | 30 |
| Total | 1759 | 1641 | 45 | 73 |

## Phase Timing Summary

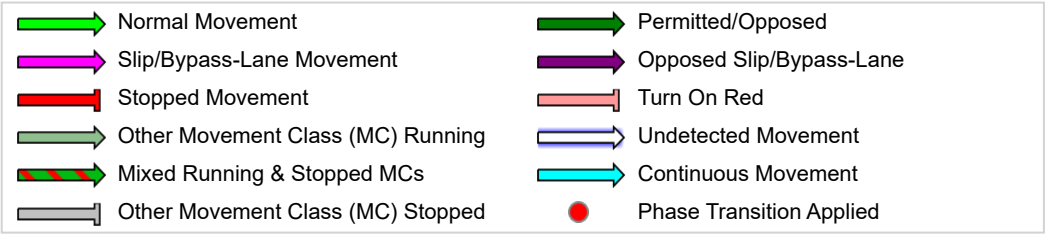
| Phase | A | B |
|---|---|---|
| Phase Change Time (sec) | 0 | 26 |
| Green Time (sec) | 20 | 8 |
| Phase Time (sec) | 26 | 14 |
| Phase Split | 65% | 35% |
| Phase Frequency (%) | 100.0 | 100.0 |

See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

## Output Phase Sequence




REF: Reference Phase
VAR: Variable Phase



## 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 | Aver. Back Of Queue [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Calder Hwy (E) | | | | | | | | | | | | | | | |
| Lane 1 | 724 | 7.4 | 724 | 7.4 | 900 | 0.804 | 100 | 13.4 | LOS B | 8.9 | 70.9 | Full | 210 | 0.0 | 0.0 |
| Lane 2 | 59 | 0.0 | 59 | 0.0 | 280 | 0.211 | 100 | 20.3 | LOS C | 0.6 | 4.2 | Short | 60 | 0.0 | NA |
| Approach | 783 | 6.9 | 783 | 6.9 | | 0.804 | | 14.0 | LOS B | 8.9 | 70.9 | | | | |
| NorthEast: Allies Rd (NE) | | | | | | | | | | | | | | | |
| Lane 1 | 25 | 0.0 | 25 | 0.0 | 325 | 0.078 | 100 | 27.2 | LOS C | 0.3 | 1.8 | Full | 500 | 0.0 | 0.0 |
| Lane 2 | 229 | 10.1 | 229 | 10.1 | 323[1] | 0.710 | 100 | 29.7 | LOS C | 2.9 | 24.8 | Short | 12 | 0.0 | NA |
| Approach | 255 | 9.1 | 255 | 9.1 | | 0.710 | | 29.5 | LOS C | 2.9 | 24.8 | | | | |
| West: Calder Hwy (W) | | | | | | | | | | | | | | | |
| Lane 1 | 177 | 14.3 | 177 | 14.3 | 804 | 0.220 | 100 | 11.2 | LOS B | 1.2 | 11.1 | Short | 60 | 0.0 | NA |
| Lane 2 | 637 | 3.5 | 637 | 3.5 | 937 | 0.680 | 100 | 8.9 | LOS A | 6.1 | 45.9 | Full | 500 | 0.0 | 0.0 |
| Approach | 814 | 5.8 | 814 | 5.8 | | 0.680 | | 9.4 | LOS A | 6.1 | 45.9 | | | | |
| All Vehicles | 1852 | 6.7 | 1852 | 6.7 | | 0.804 | | 14.1 | LOS B | 8.9 | 70.9 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Override Site Data 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.

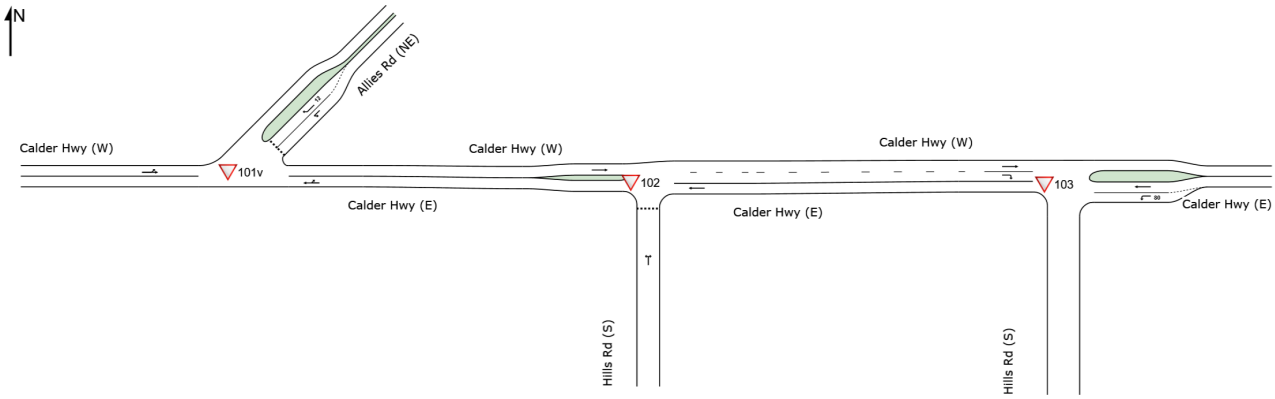
1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Delay and stops experienced by drivers upstream of short lane entry have been accounted for.

# NETWORK LAYOUT

## Network: N101 [Existing Network - PM - Model 2023 Volumes (Network Folder: [Final Assessment])]

New Network
Network Category: (None)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.




| SITES IN NETWORK | | |
|---|---|---|
| **Site ID** | **CCG ID** | **Site Name** |
| ▽101v | NA | #5 - PM - Existing - 2023 Model Volumes |
| ▽102 | NA | #6A - PM - Existing - 2023 Model Volumes |
| ▽103 | NA | #6B - PM - Existing - 2023 Model Volumes |

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# USER REPORT FOR NETWORK SITE

**Project: sid_x5902_marong-oct25-v6**

**Output produced by SIDRA INTERSECTION Version: 9.1.6.228** **Template: Site User Report**

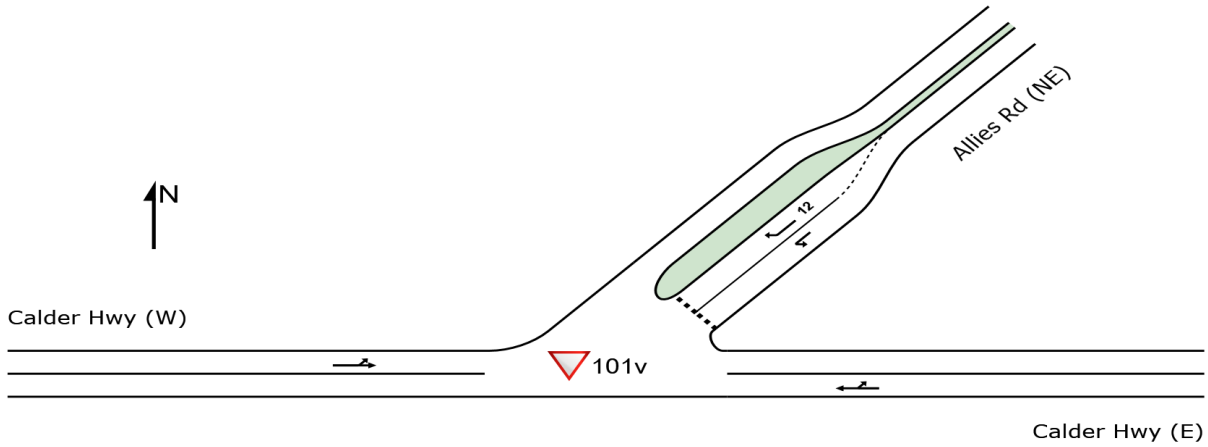
## Site: 101v [#5 - PM - Existing - 2023 Model Volumes (Site Folder: [Final Assessment] - Sites 5 & 6 - Calder Highway / Allies Road / Hills Road)]

## Network: 10 [Existing Network - PM - Model 2023 Volumes (Network Folder: [Final Assessment])]

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

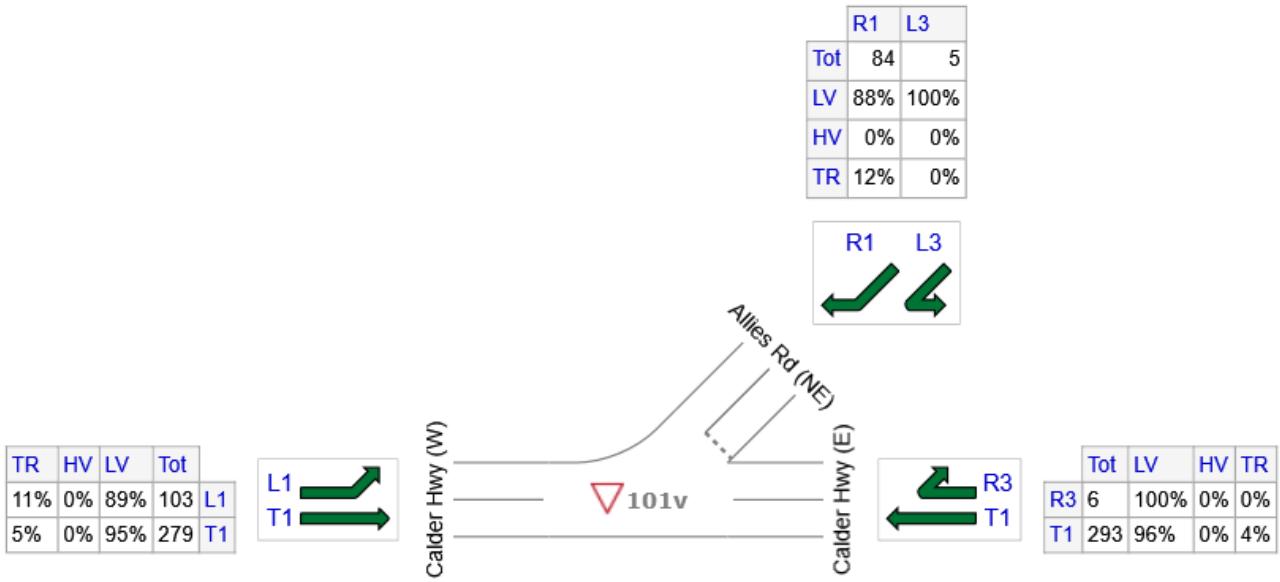
### Site Layout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



## Input Volumes

**Volume Display Method: Total and %**




| | All MCs | Light Vehicles (LV) | Heavy Vehicles (HV) | Large Trucks (TR) |
|---|---|---|---|---|
| E: Calder Hwy (E) | 299 | 287 | 0 | 12 |
| NE: Allies Rd (NE) | 89 | 79 | 0 | 10 |
| W: Calder Hwy (W) | 382 | 358 | 0 | 24 |
| Total | 770 | 724 | 0 | 46 |

## 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 | Aver. Back Of Queue [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Calder Hwy (E) | | | | | | | | | | | | | | | |
| Lane 1 | 315 | 4.0 | 315 | 4.0 | 1811 | 0.174 | 100 | 0.2 | LOS A | 0.0 | 0.2 | Full | 210 | 0.0 | 0.0 |
| Approach | 315 | 4.0 | 315 | 4.0 | | 0.174 | | 0.2 | NA | 0.0 | 0.2 | | | | |
| NorthEast: Allies Rd (NE) | | | | | | | | | | | | | | | |
| Lane 1 | 5 | 0.0 | 5 | 0.0 | 1229 | 0.004 | 100 | 7.4 | LOS A | 0.0 | 0.0 | Full | 500 | 0.0 | 0.0 |
| Lane 2 | 88 | 11.6 | 88 | 11.6 | 347 | 0.255 | 100 | 14.8 | LOS B | 0.3 | 2.5 | Short | 12 | 0.0 | NA |
| Approach | 94 | 10.9 | 94 | 10.9 | | 0.255 | | 14.4 | LOS B | 0.3 | 2.5 | | | | |
| West: Calder Hwy (W) | | | | | | | | | | | | | | | |
| Lane 1 | 402 | 6.4 | 402 | 6.4 | 1765 | 0.228 | 100 | 1.4 | LOS A | 0.0 | 0.0 | Full | 500 | 0.0 | 0.0 |
| Approach | 402 | 6.4 | 402 | 6.4 | | 0.228 | | 1.4 | NA | 0.0 | 0.0 | | | | |
| All Vehicles | 811 | 6.0 | 811 | 6.0 | | 0.255 | | 2.4 | NA | 0.3 | 2.5 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Lane LOS values are based on average delay per lane.

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

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

Two-Way Sign Control Capacity Model: SIDRA Standard.

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 Gap.

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

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

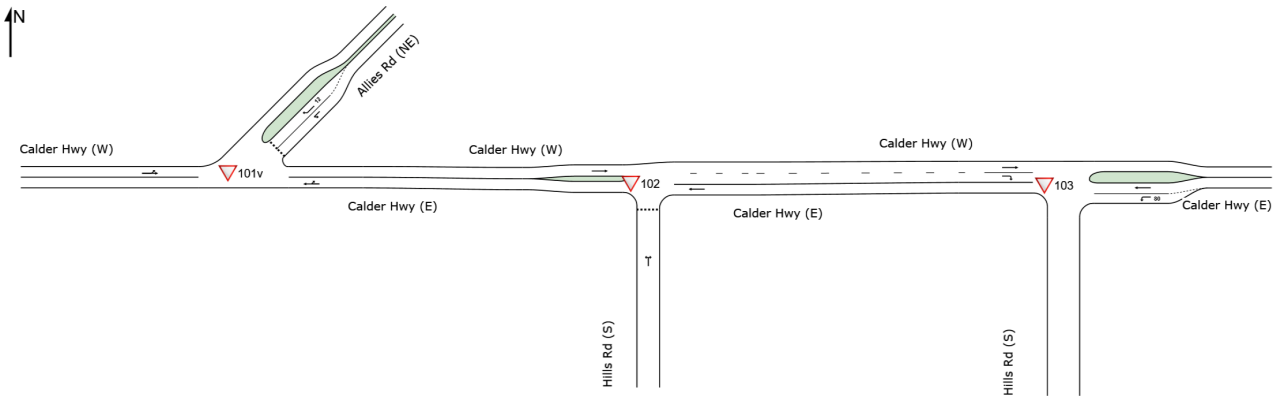
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

# NETWORK LAYOUT

## Network: N101 [Existing Network - PM - Trigger Point Analysis - 25% Development (Network Folder: [Final Assessment])]

New Network
Network Category: (None)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.




| SITES IN NETWORK | | |
|---|---|---|
| **Site ID** | **CCG ID** | **Site Name** |
| ▽101v | NA | #5 - PM - Existing - Trigger Point Analysis - 25% Development |
| ▽102 | NA | #6A - PM - Existing - Trigger Point Analysis - 25% Development |
| ▽103 | NA | #6B - PM - Existing - Trigger Point Analysis - 25% Development |

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# USER REPORT FOR NETWORK SITE

**Project: sid_x5902_marong-oct25-v4**

**Output produced by SIDRA INTERSECTION Version: 9.1.6.228** **Template: Site User Report**

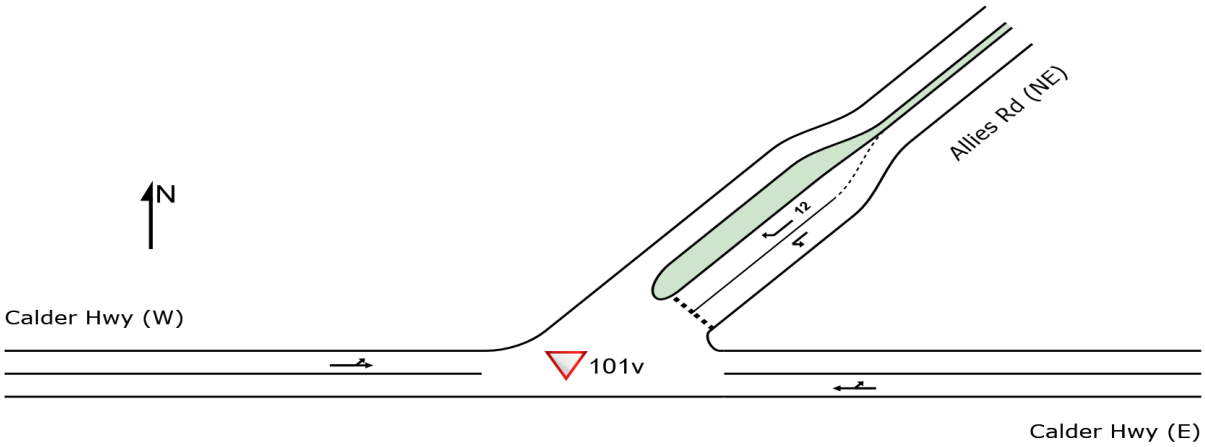
## Site: 101v [#5 - PM - Existing - Trigger Point Analysis - 25% Development (Site Folder: [Final Assessment] - Sites 5 & 6 - Calder Highway / Allies Road / Hills Road)]

## Network: 11 [Existing Network - PM - Trigger Point Analysis - 25% Development (Network Folder: [Final Assessment])]

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

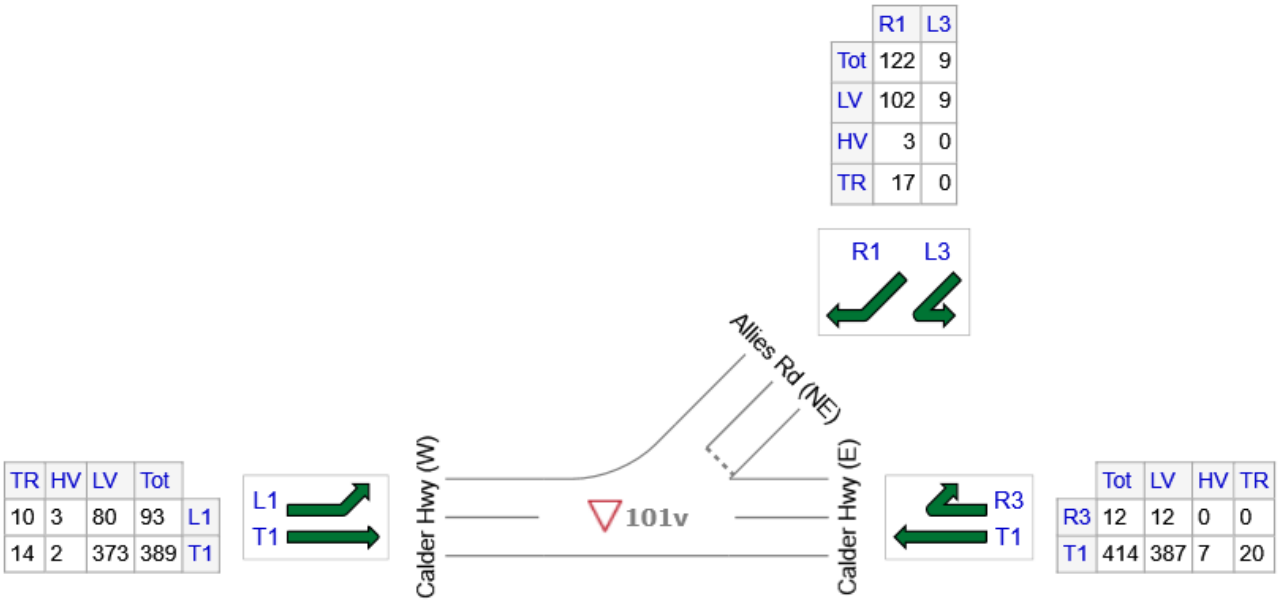
### Site Layout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



## Input Volumes

**Volume Display Method: Separate**




| | All MCs | Light Vehicles (LV) | Heavy Vehicles (HV) | Large Trucks (TR) |
|---|---|---|---|---|
| E: Calder Hwy (E) | 426 | 399 | 7 | 20 |
| NE: Allies Rd (NE) | 131 | 111 | 3 | 17 |
| W: Calder Hwy (W) | 482 | 453 | 5 | 24 |
| Total | 1039 | 963 | 15 | 61 |

## 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 | Aver. Back Of Queue [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Calder Hwy (E) | | | | | | | | | | | | | | | |
| Lane 1 | 448 | 6.3 | 448 | 6.3 | 1757 | 0.255 | 100 | 0.4 | LOS A | 0.1 | 0.5 | Full | 210 | 0.0 | 0.0 |
| Approach | 448 | 6.3 | 448 | 6.3 | | 0.255 | | 0.4 | NA | 0.1 | 0.5 | | | | |
| NorthEast: Allies Rd (NE) | | | | | | | | | | | | | | | |
| Lane 1 | 9 | 0.0 | 9 | 0.0 | 1080 | 0.009 | 100 | 7.9 | LOS A | 0.0 | 0.1 | Full | 500 | 0.0 | 0.0 |
| Lane 2 | 128 | 16.4 | 128 | 16.4 | 154 | 0.835 | 100 | 46.3 | LOS E | 1.1 | 10.7 | Short | 12 | 0.0 | NA |
| Approach | 138 | 15.3 | 138 | 15.3 | | 0.835 | | 43.7 | LOS E | 1.1 | 10.7 | | | | |
| West: Calder Hwy (W) | | | | | | | | | | | | | | | |
| Lane 1 | 507 | 6.0 | 507 | 6.0 | 1793 | 0.283 | 100 | 1.0 | LOS A | 0.0 | 0.0 | Full | 500 | 0.0 | 0.0 |
| Approach | 507 | 6.0 | 507 | 6.0 | | 0.283 | | 1.0 | NA | 0.0 | 0.0 | | | | |
| All Vehicles | 1094 | 7.3 | 1094 | 7.3 | | 0.835 | | 6.1 | NA | 1.1 | 10.7 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Lane LOS values are based on average delay per lane.

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

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

Two-Way Sign Control Capacity Model: SIDRA Standard.

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 Gap.

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

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

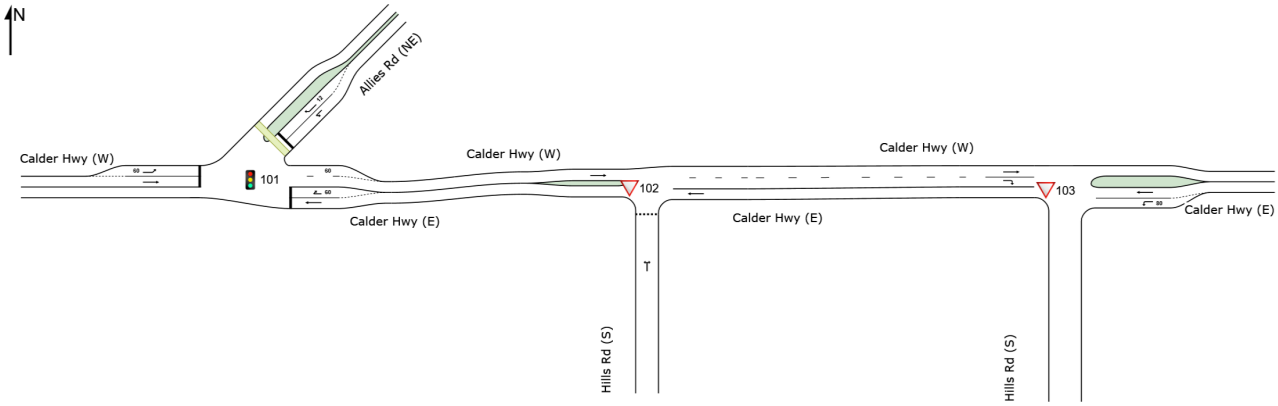
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

# NETWORK LAYOUT

## Network: N101 [Ultimate Network - PM - 2046 Model Volumes (w/o MWFC) - 100% Development (Network Folder: [Final Assessment])]

New Network
Network Category: (None)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.




| SITES IN NETWORK | | |
|---|---|---|
| **Site ID** | **CCG ID** | **Site Name** |
| 101 | NA | #5 - PM - Ultimate - 2046 Model Volumes (w/MWFC) - 100% Development |
| 102 | NA | #6A - PM - Ultimate - 2046 Model Volumes (w/MWFC) - 100% Development |
| 103 | NA | #6B - PM - Ultimate - 2046 Model Volumes (w/MWFC) - 100% Development |

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# USER REPORT FOR NETWORK SITE

**Project: sid_x5902_marong-oct25-v4**

**Output produced by SIDRA INTERSECTION Version: 9.1.6.228** **Template: Site User Report**

**Site: 101 [#5 - PM - Ultimate - 2046 Model Volumes (w/MWFC) - 100% Development (Site Folder: [Final Assessment] - Sites 5 & 6 - Calder Highway / Allies Road / Hills Road)]**

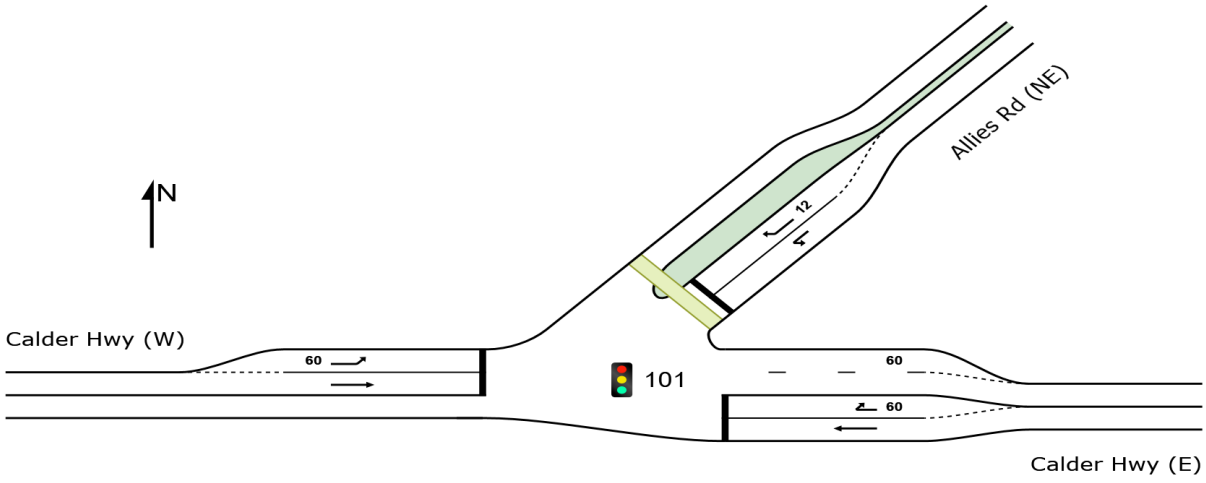
**Network: 12 [Ultimate Network - PM - 2046 Model Volumes (w/o MWFC) - 100% Development (Network Folder: [Final Assessment])]**

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 40 seconds (Site Practical Cycle Time)

**Timings based on settings in the Site Phasing & Timing dialog**
**Phase Times determined by the program**
**Downstream lane blockage effects included in determining phase times**
**Phase Sequence: Four-Phase Leading Right Turns**
**Input Phase Sequence: A, B, C***
**Output Phase Sequence: A, B**
**Reference Phase: Phase A**
**Offset: NA**
(* Variable Phase)

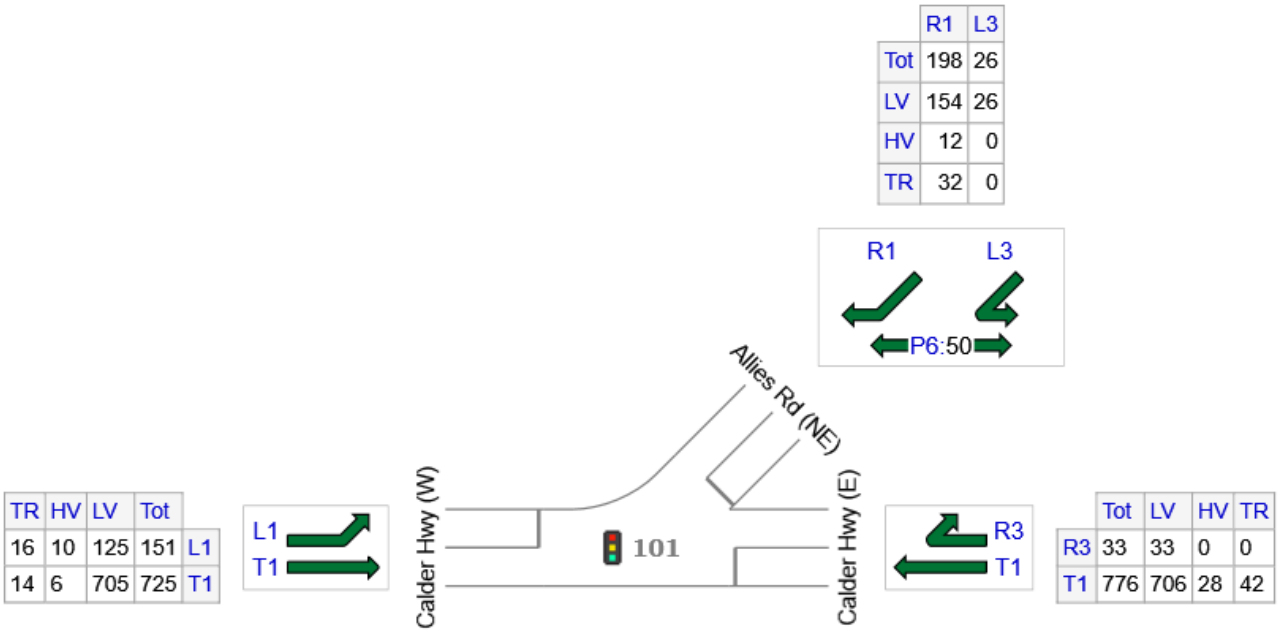
## Site Layout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



## Input Volumes

**Volume Display Method: Separate**



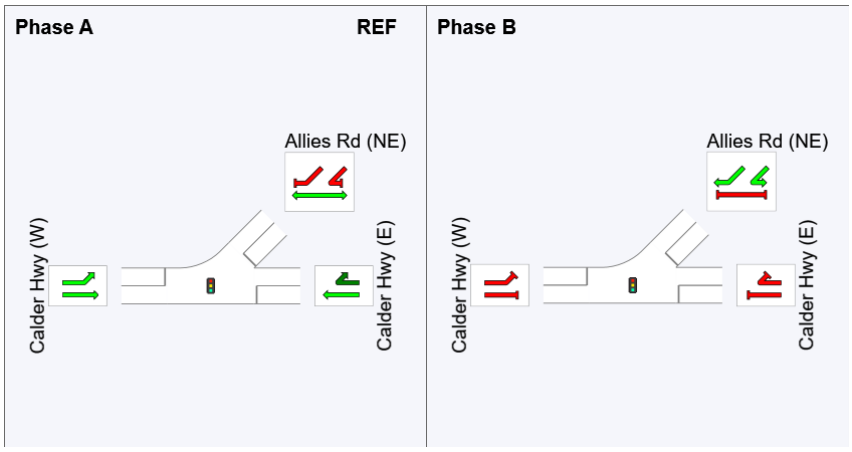

| | All MCs | Light Vehicles (LV) | Heavy Vehicles (HV) | Large Trucks (TR) |
|---|---|---|---|---|
| E: Calder Hwy (E) | 809 | 739 | 28 | 42 |
| NE: Allies Rd (NE) | 224 | 180 | 12 | 32 |
| W: Calder Hwy (W) | 876 | 830 | 16 | 30 |
| Total | 1909 | 1749 | 56 | 104 |

## Phase Timing Summary

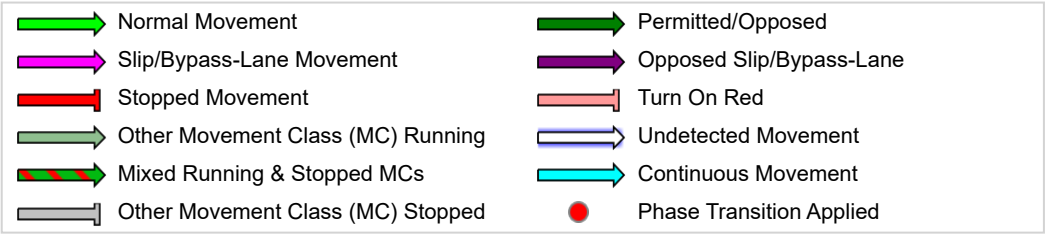
| Phase | A | B |
|---|---|---|
| Phase Change Time (sec) | 0 | 27 |
| Green Time (sec) | 21 | 7 |
| Phase Time (sec) | 27 | 13 |
| Phase Split | 68% | 33% |
| Phase Frequency (%) | 100.0 | 100.0 |

See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

## Output Phase Sequence




REF: Reference Phase
VAR: Variable Phase



## 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 | Aver. Back Of Queue [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Calder Hwy (E) | | | | | | | | | | | | | | | |
| Lane 1 | 817 | 9.0 | 817 | 9.0 | 921[1] | 0.887 | 100 | 21.0 | LOS C | 12.7 | 104.3 | Full | 210 | 0.0 | 0.0 |
| Lane 2 | 35 | 0.0 | 35 | 0.0 | 249 | 0.140 | 100 | 21.7 | LOS C | 0.4 | 2.5 | Short | 60 | 0.0 | NA |
| Approach | 852 | 8.7 | 852 | 8.7 | | 0.887 | | 21.0 | LOS C | 12.7 | 104.3 | | | | |
| NorthEast: Allies Rd (NE) | | | | | | | | | | | | | | | |
| Lane 1 | 27 | 0.0 | 27 | 0.0 | 284 | 0.096 | 100 | 30.0 | LOS C | 0.3 | 2.1 | Full | 500 | 0.0 | 0.0 |
| Lane 2 | 208 | 22.2 | 208 | 22.2 | 244[1] | 0.854 | 100 | 37.8 | LOS D | 3.2 | 32.4 | Short | 12 | 0.0 | NA |
| Approach | 236 | 19.6 | 236 | 19.6 | | 0.854 | | 36.9 | LOS D | 3.2 | 32.4 | | | | |
| West: Calder Hwy (W) | | | | | | | | | | | | | | | |
| Lane 1 | 159 | 17.2 | 159 | 17.2 | 827 | 0.192 | 100 | 10.5 | LOS B | 1.0 | 9.6 | Short | 60 | 0.0 | NA |
| Lane 2 | 763 | 2.8 | 763 | 2.8 | 990 | 0.771 | 100 | 11.0 | LOS B | 8.5 | 63.0 | Full | 500 | 0.0 | 0.0 |
| Approach | 922 | 5.3 | 922 | 5.3 | | 0.771 | | 10.9 | LOS B | 8.5 | 63.0 | | | | |
| All Vehicles | 2009 | 8.4 | 2009 | 8.4 | | 0.887 | | 18.2 | LOS B | 12.7 | 104.3 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Override Site Data 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.

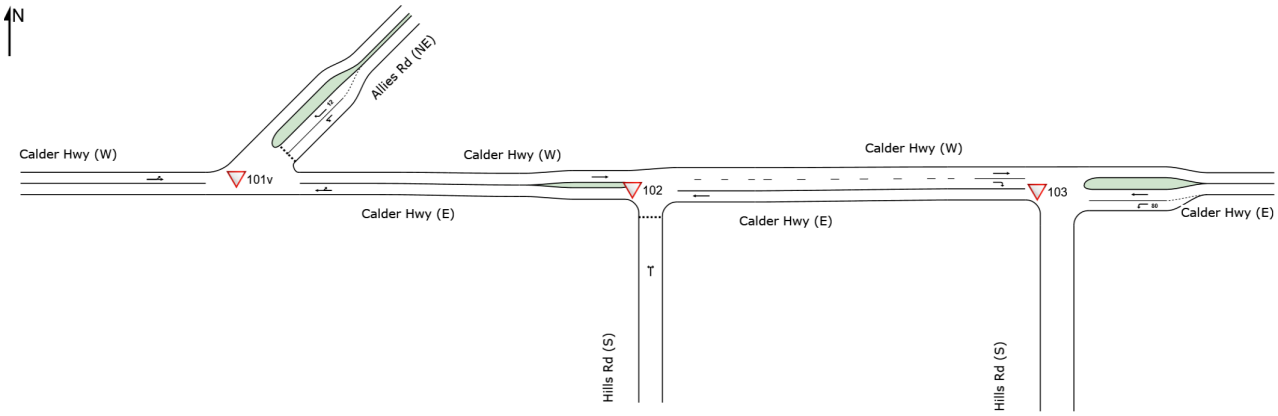
# A.4 Calder Highway – Hills Road

# NETWORK LAYOUT

## Network: N101 [Existing Network - AM - Model 2023 Volumes (Network Folder: [Final Assessment])]

New Network
Network Category: (None)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.




| SITES IN NETWORK | | |
|---|---|---|
| **Site ID** | **CCG ID** | **Site Name** |
| ▽101v | NA | #5 - AM - Existing - 2023 Model Volumes |
| ▽102 | NA | #6A - AM - Existing - 2023 Model Volumes |
| ▽103 | NA | #6B - AM - Existing - 2023 Model Volumes |

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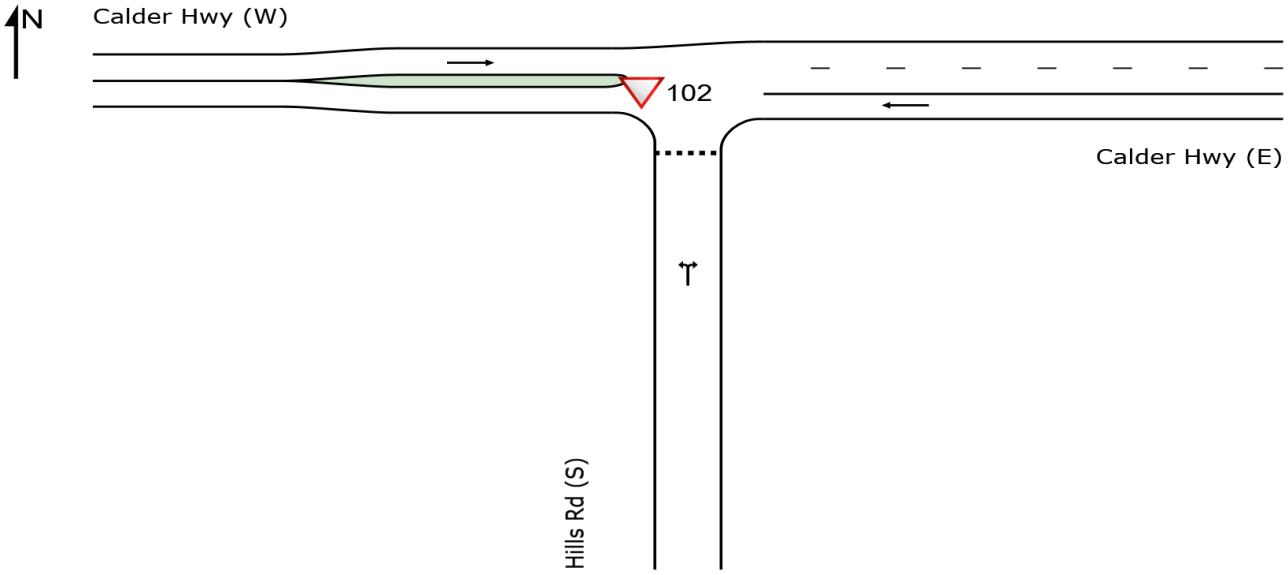
## Site: 102 [#6A - AM - Existing - 2023 Model Volumes (Site Folder: [Final Assessment] - Sites 5 & 6 - Calder Highway / Allies Road / Hills Road)]

## Network: 7 [Existing Network - AM - Model 2023 Volumes (Network Folder: [Final Assessment])]

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

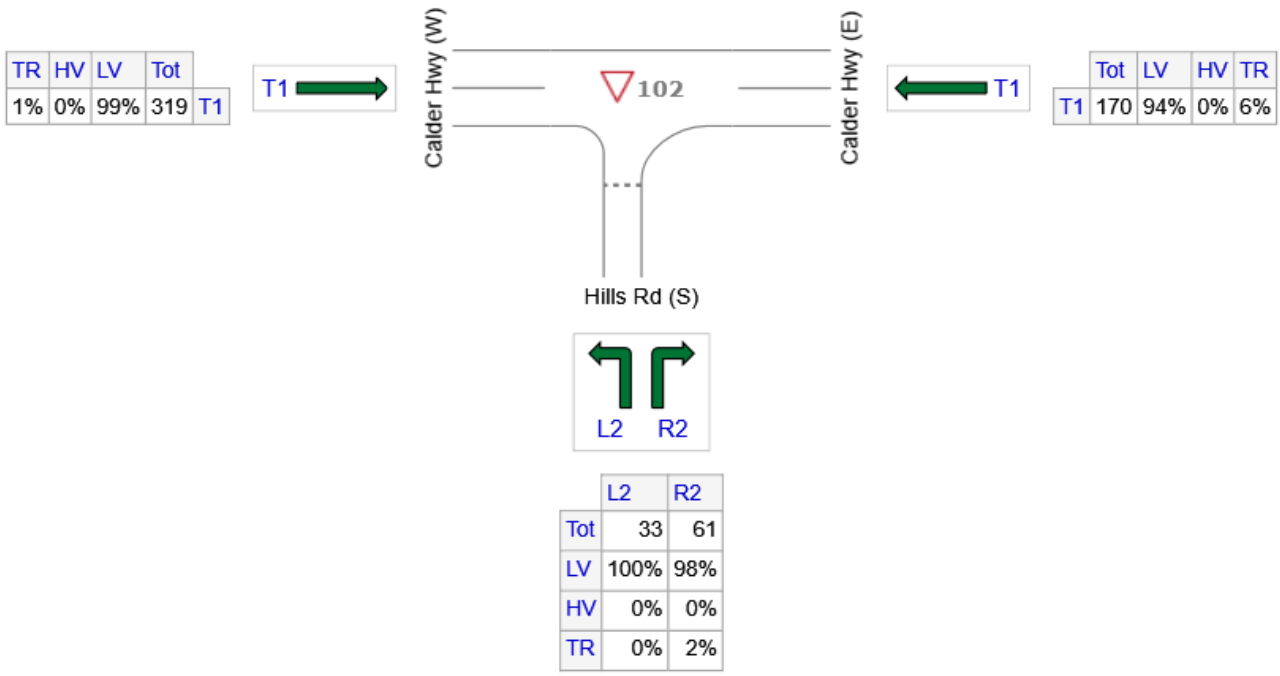
### Site Layout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



## Input Volumes

**Volume Display Method: Total and %**




| | All MCs | Light Vehicles (LV) | Heavy Vehicles (HV) | Large Trucks (TR) |
|---|---|---|---|---|
| S: Hills Rd (S) | 94 | 93 | 0 | 1 |
| E: Calder Hwy (E) | 170 | 159 | 0 | 11 |
| W: Calder Hwy (W) | 319 | 315 | 0 | 4 |
| Total | 583 | 567 | 0 | 16 |

## 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 | Aver. Back Of Queue [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Hills Rd (S) | | | | | | | | | | | | | | | |
| Lane 1 | 99 | 1.1 | 99 | 1.1 | 858 | 0.115 | 100 | 6.9 | LOS A | 0.2 | 1.1 | Full | 500 | 0.0 | 0.0 |
| Approach | 99 | 1.1 | 99 | 1.1 | | 0.115 | | 6.9 | LOS A | 0.2 | 1.1 | | | | |
| East: Calder Hwy (E) | | | | | | | | | | | | | | | |
| Lane 1 | 179 | 6.4 | 179 | 6.4 | 1780 | 0.101 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 60 | 0.0 | 0.0 |
| Approach | 179 | 6.4 | 179 | 6.4 | | 0.101 | | 0.0 | NA | 0.0 | 0.0 | | | | |
| West: Calder Hwy (W) | | | | | | | | | | | | | | | |
| Lane 1 | 336 | 1.4 | 336 | 1.4 | 1930 | 0.174 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 210 | 0.0 | 0.0 |
| Approach | 336 | 1.4 | 336 | 1.4 | | 0.174 | | 0.0 | NA | 0.0 | 0.0 | | | | |
| All Vehicles | 614 | 2.8 | 614 | 2.8 | | 0.174 | | 1.1 | NA | 0.2 | 1.1 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Lane LOS values are based on average delay per lane.

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

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

Two-Way Sign Control Capacity Model: SIDRA Standard.

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 Gap.

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.

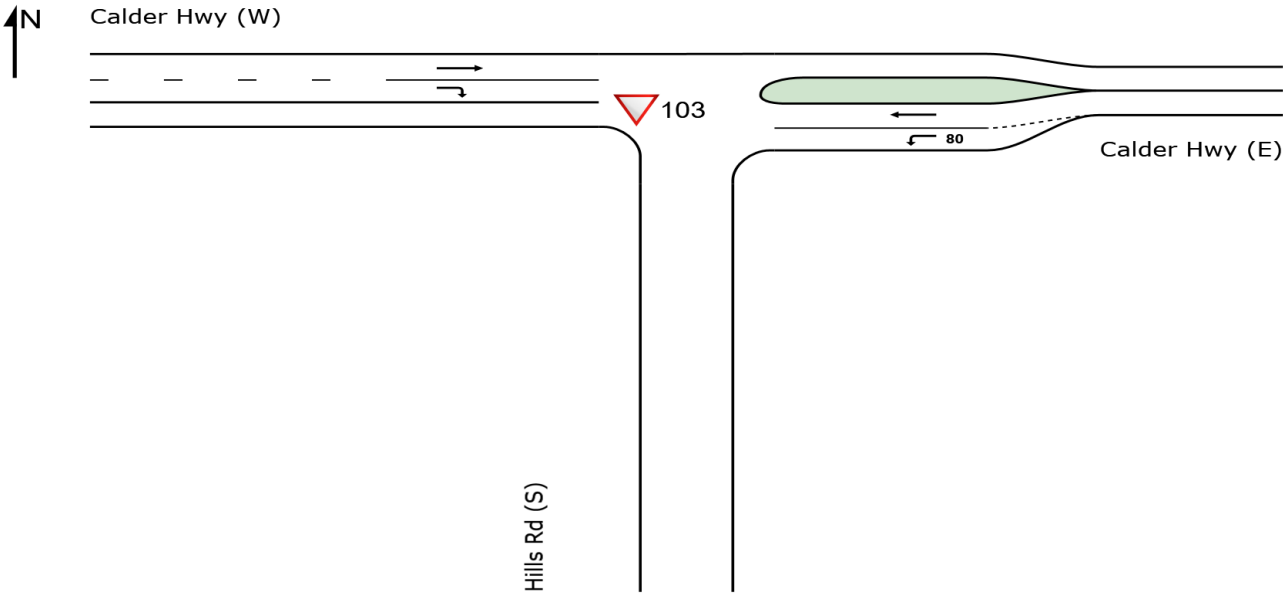
## Site: 103 [#6B - AM - Existing - 2023 Model Volumes (Site Folder: [Final Assessment] - Sites 5 & 6 - Calder Highway / Allies Road / Hills Road)]

## Network: 7 [Existing Network - AM - Model 2023 Volumes (Network Folder: [Final Assessment])]

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

### Site Layout

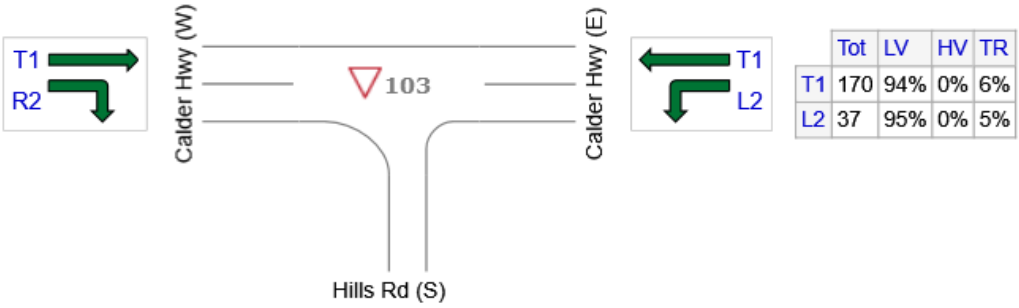
Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



## Input Volumes

**Volume Display Method: Total and %**

| TR | HV | LV | Tot | |
|---|---|---|---|---|
| 1% | 0% | 99% | 319 | T1 |
| 0% | 0% | 100% | 1 | R2 |




| | Tot | LV | HV | TR |
|---|---|---|---|---|
| T1 | 170 | 94% | 0% | 6% |
| L2 | 37 | 95% | 0% | 5% |

| | All MCs | Light Vehicles (LV) | Heavy Vehicles (HV) | Large Trucks (TR) |
|---|---|---|---|---|
| E: Calder Hwy (E) | 207 | 194 | 0 | 13 |
| W: Calder Hwy (W) | 320 | 315 | 0 | 5 |
| Total | 527 | 510 | 0 | 17 |

## 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 | Aver. Back Of Queue [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Calder Hwy (E) | | | | | | | | | | | | | | | |
| Lane 1 | 39 | 5.4 | 39 | 5.4 | 1683 | 0.023 | 100 | 5.6 | LOS A | 0.0 | 0.0 | Short | 80 | 0.0 | NA |
| Lane 2 | 179 | 6.4 | 179 | 6.4 | 1780 | 0.101 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 500 | 0.0 | 0.0 |
| Approach | 218 | 6.2 | 218 | 6.2 | | 0.101 | | 1.0 | NA | 0.0 | 0.0 | | | | |
| West: Calder Hwy (W) | | | | | | | | | | | | | | | |
| Lane 1 | 336 | 1.4 | 336 | 1.4 | 1929 | 0.174 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 60 | 0.0 | 0.0 |
| Lane 2 | 1 | 0.0 | 1 | 0.0 | 1141 | 0.001 | 100 | 5.1 | LOS A | 0.0 | 0.0 | Full | 60 | 0.0 | 0.0 |
| Approach | 337 | 1.4 | 337 | 1.4 | | 0.174 | | 0.0 | NA | 0.0 | 0.0 | | | | |
| All Vehicles | 555 | 3.3 | 555 | 3.3 | | 0.174 | | 0.4 | NA | 0.0 | 0.0 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Lane LOS values are based on average delay per lane.

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

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

Two-Way Sign Control Capacity Model: SIDRA Standard.

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 Gap.

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

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

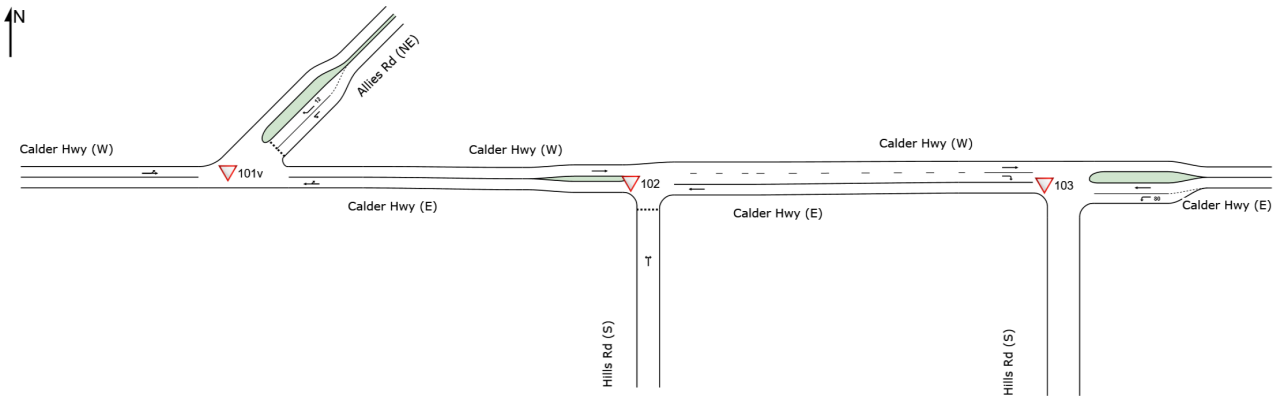
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

# NETWORK LAYOUT

## Network: N101 [Existing Network - AM - Trigger Point Analysis - 45% Development (Network Folder: [Final Assessment])]

New Network
Network Category: (None)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.




| SITES IN NETWORK | | |
|---|---|---|
| **Site ID** | **CCG ID** | **Site Name** |
| ▽101v | NA | #5 - AM - Existing - Trigger Point Analysis - 45% Development |
| ▽102 | NA | #6A - AM - Existing - Trigger Point Analysis - 45% Development |
| ▽103 | NA | #6B - AM - Existing - Trigger Point Analysis - 45% Development |

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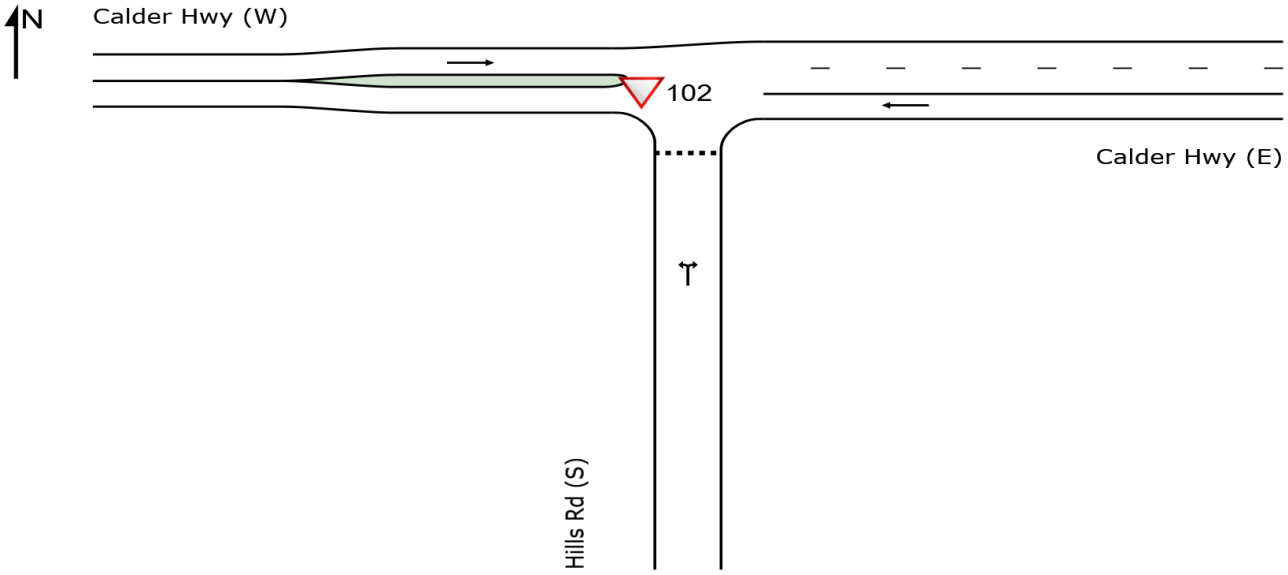
## Site: 102 [#6A - AM - Existing - Trigger Point Analysis - 45% Development (Site Folder: [Final Assessment] - Sites 5 & 6 - Calder Highway / Allies Road / Hills Road)]

## Network: 8 [Existing Network - AM - Trigger Point Analysis - 45% Development (Network Folder: [Final Assessment])]

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

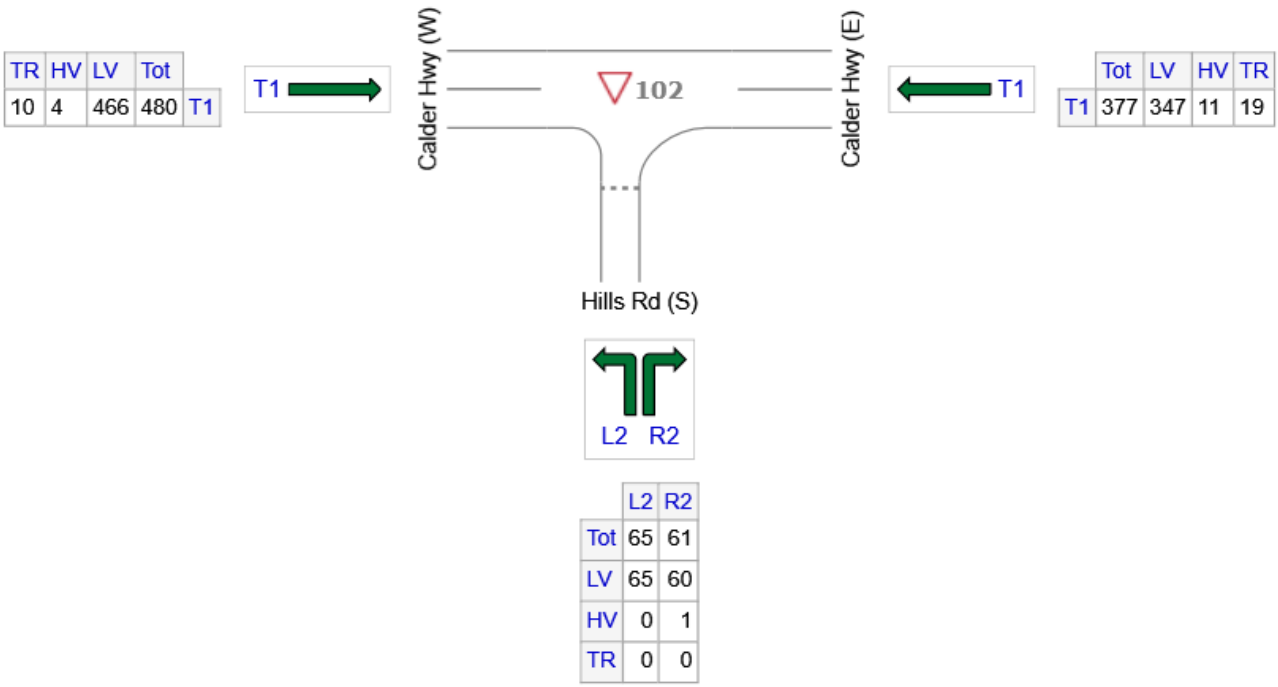
### Site Layout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



## Input Volumes

**Volume Display Method: Separate**




| | L2 | R2 |
|---|---|---|
| Tot | 65 | 61 |
| LV | 65 | 60 |
| HV | 0 | 1 |
| TR | 0 | 0 |

| | All MCs | Light Vehicles (LV) | Heavy Vehicles (HV) | Large Trucks (TR) |
|---|---|---|---|---|
| S: Hills Rd (S) | 126 | 125 | 1 | 0 |
| E: Calder Hwy (E) | 377 | 347 | 11 | 19 |
| W: Calder Hwy (W) | 480 | 466 | 4 | 10 |
| Total | 983 | 938 | 16 | 29 |

## 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 | Aver. Back Of Queue [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Hills Rd (S) | | | | | | | | | | | | | | | |
| Lane 1 | 133 | 0.8 | 133 | 0.8 | 642 | 0.206 | 100 | 9.0 | LOS A | 0.3 | 2.1 | Full | 500 | 0.0 | 0.0 |
| Approach | 133 | 0.8 | 133 | 0.8 | | 0.206 | | 9.0 | LOS A | 0.3 | 2.1 | | | | |
| East: Calder Hwy (E) | | | | | | | | | | | | | | | |
| Lane 1 | 397 | 8.0 | 397 | 8.0 | 1782 | 0.223 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 60 | 0.0 | 0.0 |
| Approach | 397 | 8.0 | 397 | 8.0 | | 0.223 | | 0.0 | NA | 0.0 | 0.0 | | | | |
| West: Calder Hwy (W) | | | | | | | | | | | | | | | |
| Lane 1 | 505 | 2.9 | 505 | 2.9 | 1901 | 0.266 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 210 | 0.0 | 0.0 |
| Approach | 505 | 2.9 | 505 | 2.9 | | 0.266 | | 0.0 | NA | 0.0 | 0.0 | | | | |
| All Vehicles | 1035 | 4.6 | 1035 | 4.6 | | 0.266 | | 1.2 | NA | 0.3 | 2.1 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Lane LOS values are based on average delay per lane.

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

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

Two-Way Sign Control Capacity Model: SIDRA Standard.

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 Gap.

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.

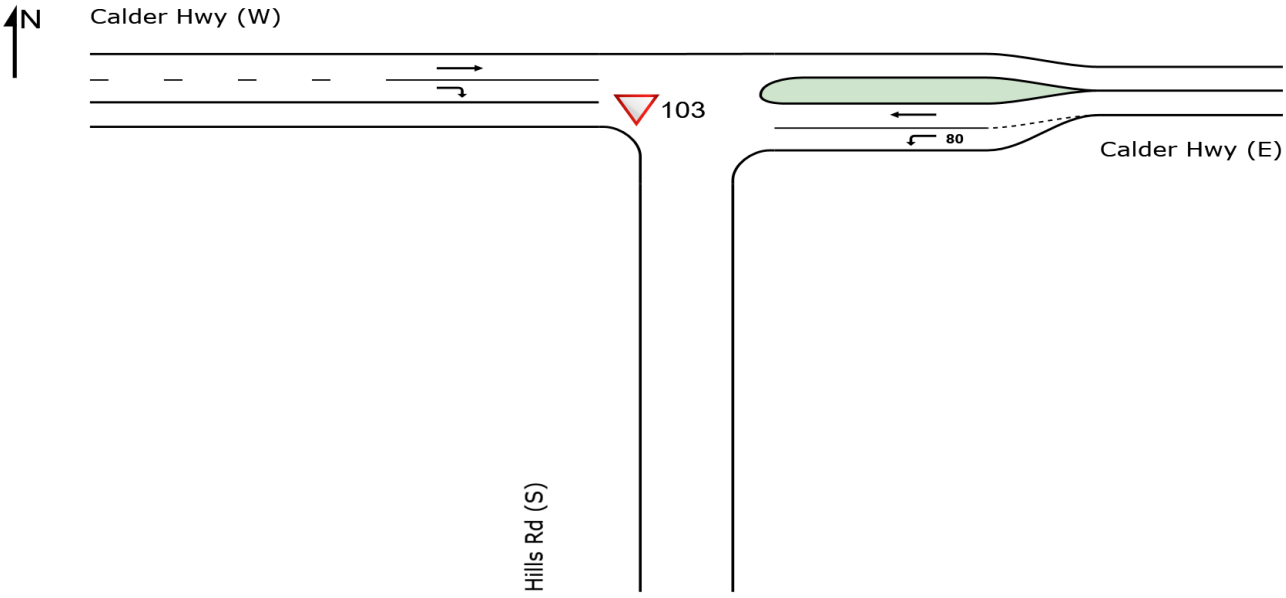
## Site: 103 [#6B - AM - Existing - Trigger Point Analysis - 45% Development (Site Folder: [Final Assessment] - Sites 5 & 6 - Calder Highway / Allies Road / Hills Road)]

## Network: 8 [Existing Network - AM - Trigger Point Analysis - 45% Development (Network Folder: [Final Assessment])]

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

### Site Layout

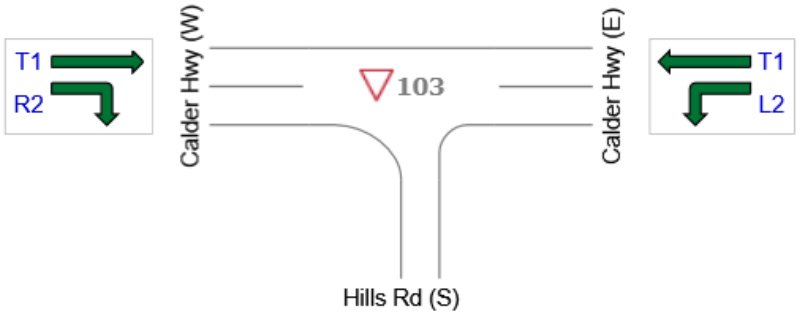
Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



## Input Volumes

**Volume Display Method: Separate**

| TR | HV | LV | Tot | |
|---|---|---|---|---|
| 10 | 4 | 460 | 474 | T1 |
| 0 | 0 | 6 | 6 | R2 |




| | Tot | LV | HV | TR |
|---|---|---|---|---|
| T1 | 377 | 347 | 11 | 19 |
| L2 | 37 | 35 | 0 | 2 |

| | All MCs | Light Vehicles (LV) | Heavy Vehicles (HV) | Large Trucks (TR) |
|---|---|---|---|---|
| E: Calder Hwy (E) | 414 | 382 | 11 | 21 |
| W: Calder Hwy (W) | 480 | 466 | 4 | 10 |
| Total | 894 | 848 | 15 | 31 |

## 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 | Aver. Back Of Queue [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Calder Hwy (E) | | | | | | | | | | | | | | | |
| Lane 1 | 39 | 5.4 | 39 | 5.4 | 1683 | 0.023 | 100 | 5.6 | LOS A | 0.0 | 0.0 | Short | 80 | 0.0 | NA |
| Lane 2 | 397 | 8.0 | 397 | 8.0 | 1782 | 0.223 | 100 | 0.1 | LOS A | 0.0 | 0.0 | Full | 500 | 0.0 | 0.0 |
| Approach | 436 | 7.7 | 436 | 7.7 | | 0.223 | | 0.6 | NA | 0.0 | 0.0 | | | | |
| West: Calder Hwy (W) | | | | | | | | | | | | | | | |
| Lane 1 | 499 | 3.0 | 499 | 3.0 | 1900 | 0.263 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 60 | 0.0 | 0.0 |
| Lane 2 | 6 | 0.0 | 6 | 0.0 | 866 | 0.007 | 100 | 6.4 | LOS A | 0.0 | 0.1 | Full | 60 | 0.0 | 0.0 |
| Approach | 505 | 2.9 | 505 | 2.9 | | 0.263 | | 0.1 | NA | 0.0 | 0.1 | | | | |
| All Vehicles | 941 | 5.1 | 941 | 5.1 | | 0.263 | | 0.3 | NA | 0.0 | 0.1 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Lane LOS values are based on average delay per lane.

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

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

Two-Way Sign Control Capacity Model: SIDRA Standard.

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 Gap.

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

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

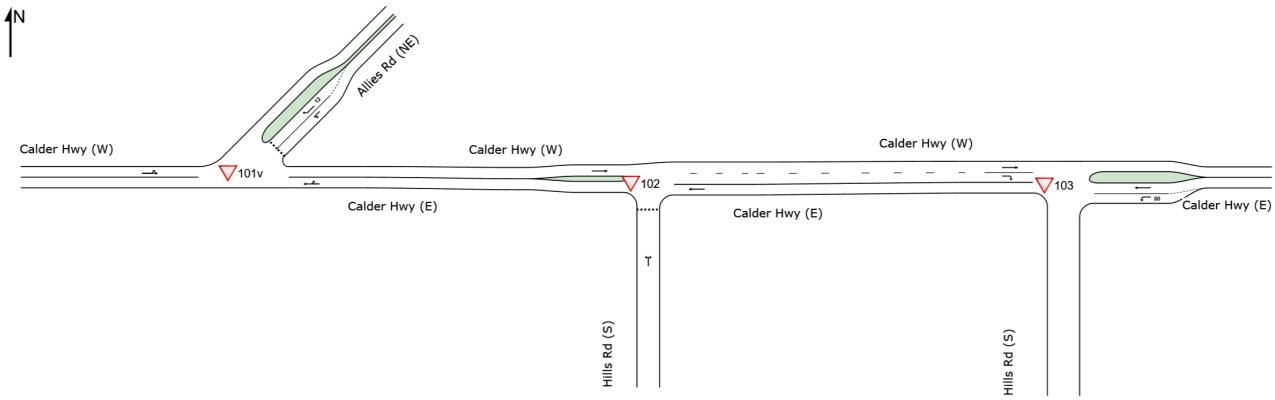
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

# NETWORK LAYOUT

## Network: N101 [Existing Network - AM - Trigger Point Analysis - 45% Development (Network Folder: [Final Assessment])]

New Network
Network Category: (None)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.




| SITES IN NETWORK | | |
|---|---|---|
| **Site ID** | **CCG ID** | **Site Name** |
| ▽101v | NA | #5 - AM - Existing - Trigger Point Analysis - 45% Development |
| ▽102 | NA | #6A - AM - Existing - Trigger Point Analysis - 45% Development |
| ▽103 | NA | #6B - AM - Existing - Trigger Point Analysis - 45% Development |

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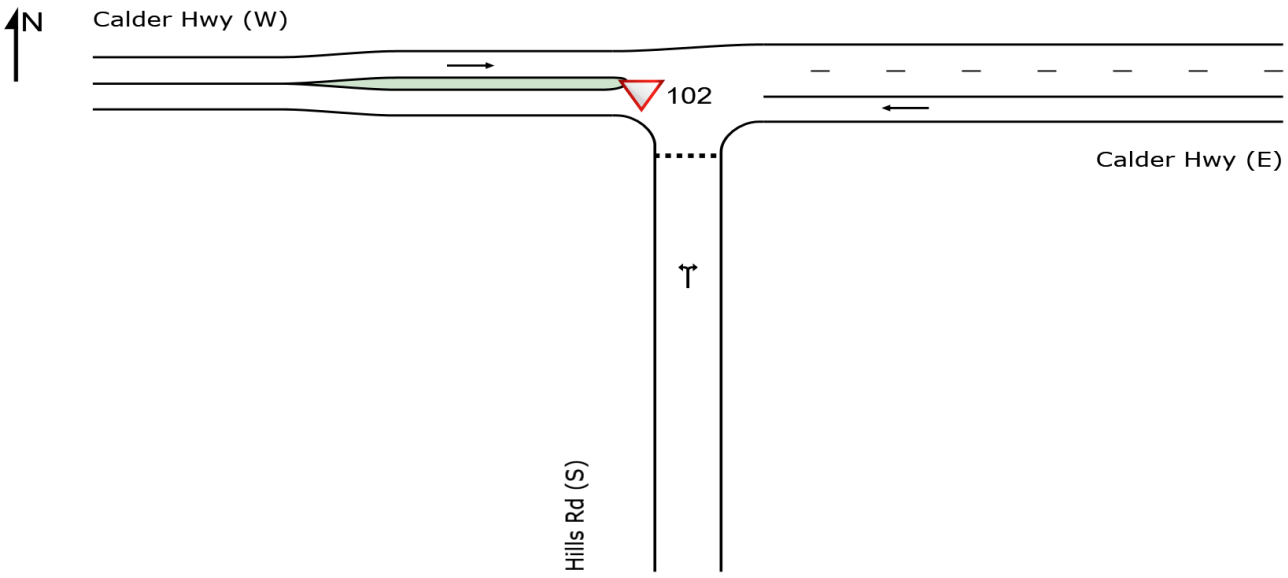
## Site: 102 [#6A - AM - Ultimate - 2046 Model Volumes (w/MWFC) - 100% Development (Site Folder: [Final Assessment] - Sites 5 & 6 - Calder Highway / Allies Road / Hills Road)]

## Network: 9 [Ultimate Network - AM - 2046 Model Volumes (w/o MWFC) - 100% Development (Network Folder: [Final Assessment])]

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

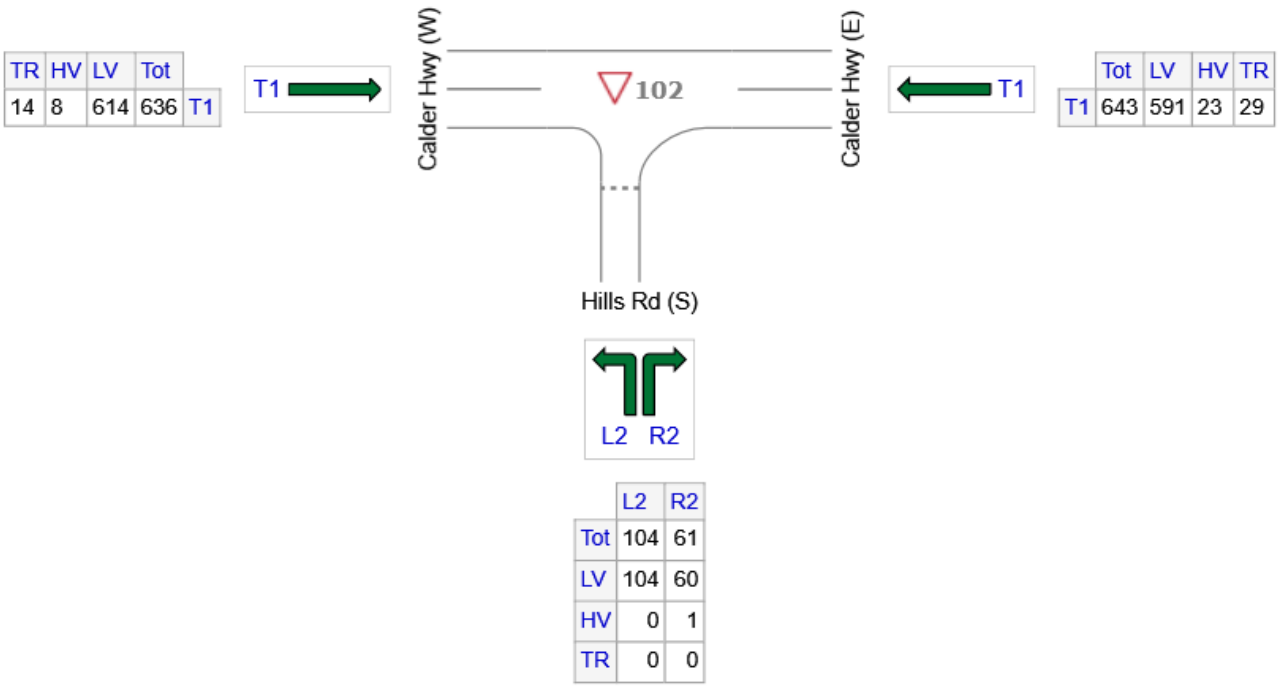
### Site Layout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



## Input Volumes

**Volume Display Method: Separate**




| | L2 | R2 |
|---|---|---|
| Tot | 104 | 61 |
| LV | 104 | 60 |
| HV | 0 | 1 |
| TR | 0 | 0 |

| | All MCs | Light Vehicles (LV) | Heavy Vehicles (HV) | Large Trucks (TR) |
|---|---|---|---|---|
| S: Hills Rd (S) | 165 | 164 | 1 | 0 |
| E: Calder Hwy (E) | 643 | 591 | 23 | 29 |
| W: Calder Hwy (W) | 636 | 614 | 8 | 14 |
| Total | 1444 | 1369 | 32 | 43 |

| 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 | Aver. Back Of Queue [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
| South: Hills Rd (S) | | | | | | | | | | | | | | | |
| Lane 1 | 174 | 0.6 | 174 | 0.6 | 427 | 0.407 | 100 | 14.5 | LOS B | 0.7 | 4.8 | Full | 500 | 0.0 | 0.0 |
| Approach | 174 | 0.6 | 174 | 0.6 | | 0.407 | | 14.5 | LOS B | 0.7 | 4.8 | | | | |
| East: Calder Hwy (E) | | | | | | | | | | | | | | | |
| Lane 1 | 677 | 8.1 | 677 | 8.1 | 1788 | 0.379 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 60 | 0.0 | 0.0 |
| Approach | 677 | 8.1 | 677 | 8.1 | | 0.379 | | 0.0 | NA | 0.0 | 0.0 | | | | |
| West: Calder Hwy (W) | | | | | | | | | | | | | | | |
| Lane 1 | 669 | 3.5 | 669 | 3.5 | 1892 | 0.354 | 100 | 0.1 | LOS A | 0.0 | 0.0 | Full | 210 | 0.0 | 0.0 |
| Approach | 669 | 3.5 | 669 | 3.5 | | 0.354 | | 0.1 | NA | 0.0 | 0.0 | | | | |
| All Vehicles | 1520 | 5.2 | 1520 | 5.2 | | 0.407 | | 1.7 | NA | 0.7 | 4.8 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Lane LOS values are based on average delay per lane.

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

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

Two-Way Sign Control Capacity Model: SIDRA Standard.

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 Gap.

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.

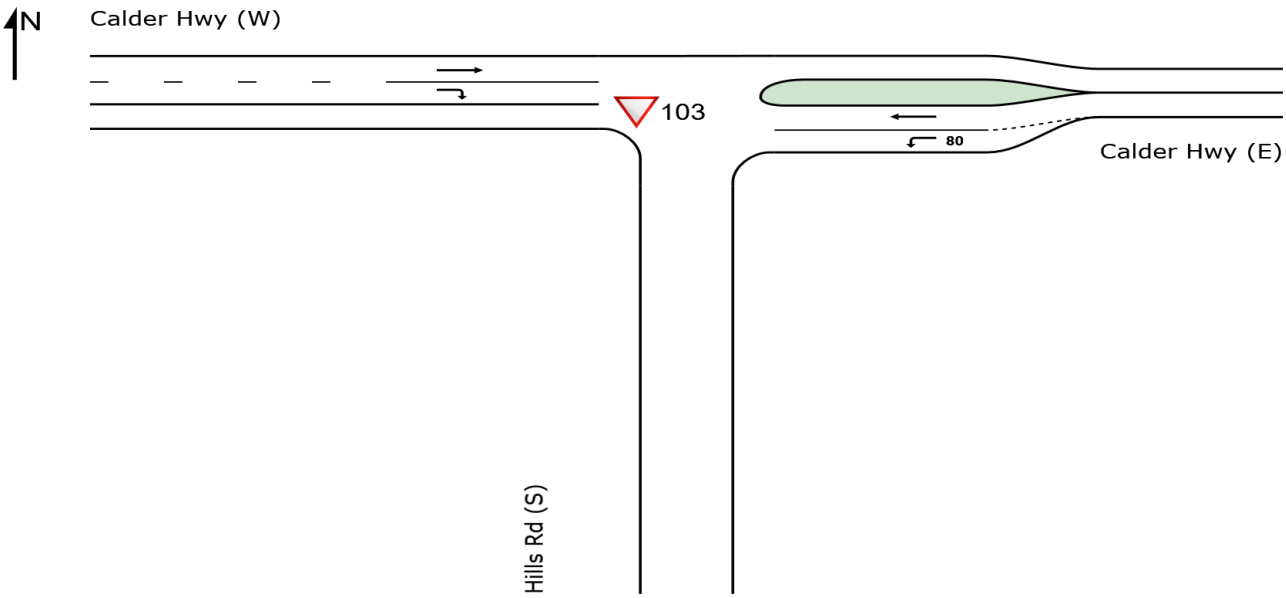
## Site: 103 [#6B - AM - Ultimate - 2046 Model Volumes (w/MWFC) - 100% Development (Site Folder: [Final Assessment] - Sites 5 & 6 - Calder Highway / Allies Road / Hills Road)]

## Network: 9 [Ultimate Network - AM - 2046 Model Volumes (w/o MWFC) - 100% Development (Network Folder: [Final Assessment])]

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

### Site Layout

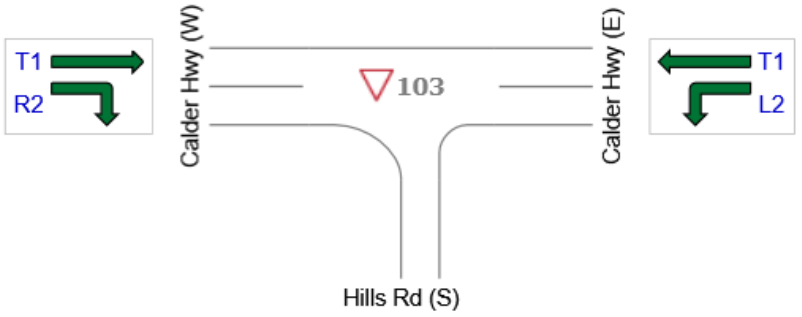
Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



## Input Volumes

**Volume Display Method: Separate**

| TR | HV | LV | Tot | |
|---|---|---|---|---|
| 14 | 8 | 602 | 624 | T1 |
| 0 | 0 | 12 | 12 | R2 |




| | Tot | LV | HV | TR |
|---|---|---|---|---|
| T1 | 643 | 591 | 23 | 29 |
| L2 | 30 | 28 | 0 | 2 |

| | All MCs | Light Vehicles (LV) | Heavy Vehicles (HV) | Large Trucks (TR) |
|---|---|---|---|---|
| E: Calder Hwy (E) | 673 | 619 | 23 | 31 |
| W: Calder Hwy (W) | 636 | 614 | 8 | 14 |
| Total | 1309 | 1233 | 31 | 45 |

## 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 | Aver. Back Of Queue [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Calder Hwy (E) | | | | | | | | | | | | | | | |
| Lane 1 | 32 | 6.7 | 32 | 6.7 | 1652 | 0.019 | 100 | 5.7 | LOS A | 0.0 | 0.0 | Short | 80 | 0.0 | NA |
| Lane 2 | 677 | 8.1 | 677 | 8.1 | 1788 | 0.379 | 100 | 0.1 | LOS A | 0.0 | 0.0 | Full | 500 | 0.0 | 0.0 |
| Approach | 708 | 8.0 | 708 | 8.0 | | 0.379 | | 0.4 | NA | 0.0 | 0.0 | | | | |
| West: Calder Hwy (W) | | | | | | | | | | | | | | | |
| Lane 1 | 657 | 3.5 | 657 | 3.5 | 1891 | 0.347 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 60 | 0.0 | 0.0 |
| Lane 2 | 13 | 0.0 | 13 | 0.0 | 558 | 0.023 | 100 | 9.1 | LOS A | 0.0 | 0.2 | Full | 60 | 0.0 | 0.0 |
| Approach | 669 | 3.5 | 669 | 3.5 | | 0.347 | | 0.2 | NA | 0.0 | 0.2 | | | | |
| All Vehicles | 1378 | 5.8 | 1378 | 5.8 | | 0.379 | | 0.3 | NA | 0.0 | 0.2 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Lane LOS values are based on average delay per lane.

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

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

Two-Way Sign Control Capacity Model: SIDRA Standard.

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 Gap.

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

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

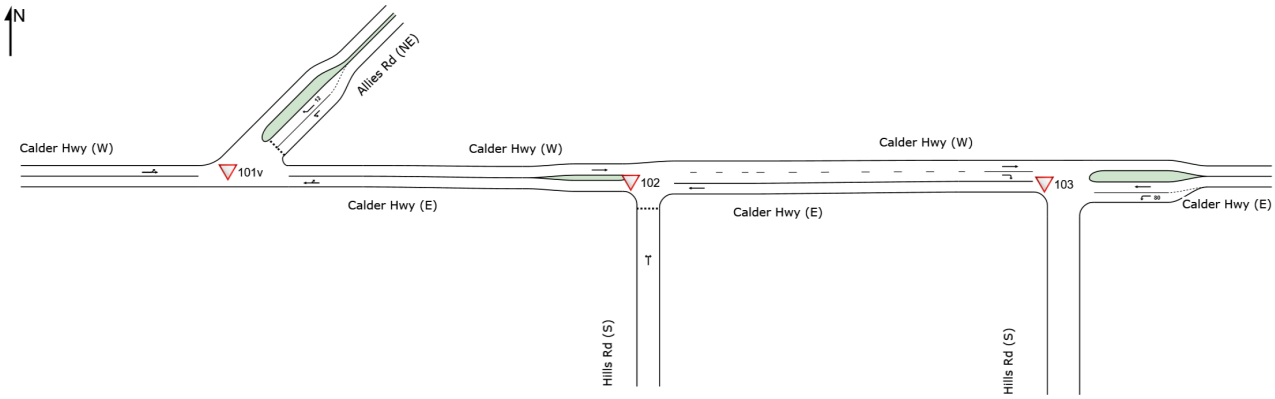
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

# NETWORK LAYOUT

## Network: N101 [Existing Network - PM - Model 2023 Volumes (Network Folder: [Final Assessment])]

New Network
Network Category: (None)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.




| SITES IN NETWORK | | |
|---|---|---|
| **Site ID** | **CCG ID** | **Site Name** |
| ▽101v | NA | #5 - PM - Existing - 2023 Model Volumes |
| ▽102 | NA | #6A - PM - Existing - 2023 Model Volumes |
| ▽103 | NA | #6B - PM - Existing - 2023 Model Volumes |

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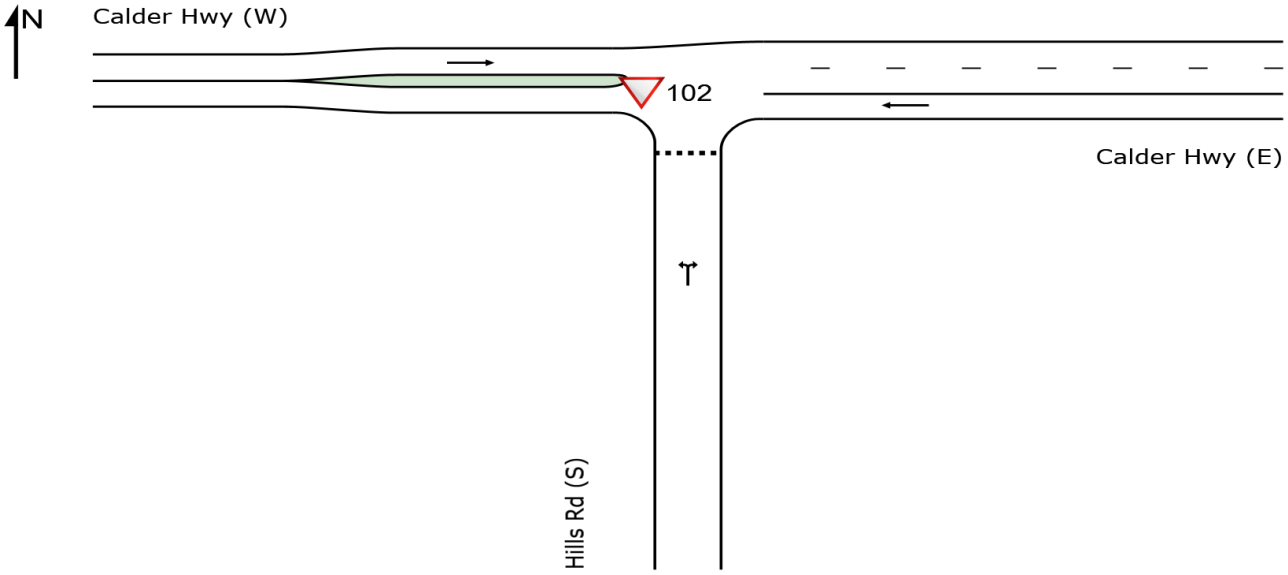
## Site: 102 [#6A - PM - Existing - 2023 Model Volumes (Site Folder: [Final Assessment] - Sites 5 & 6 - Calder Highway / Allies Road / Hills Road)]

## Network: 10 [Existing Network - PM - Model 2023 Volumes (Network Folder: [Final Assessment])]

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

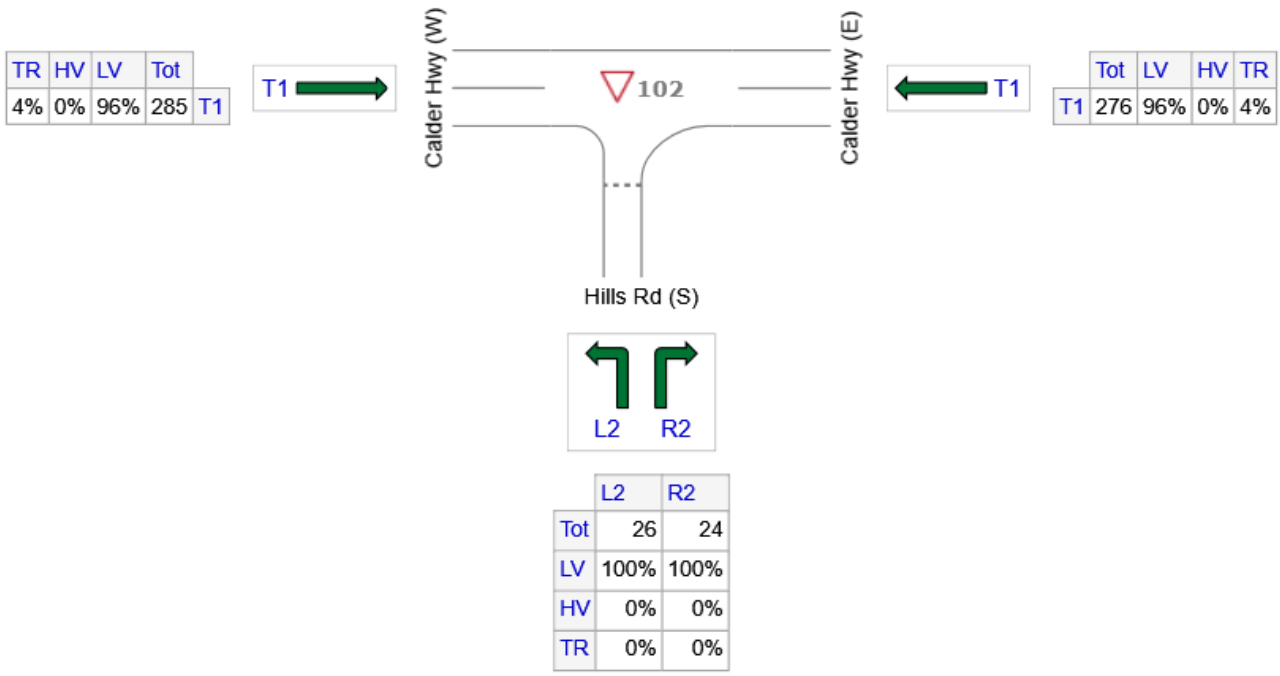
### Site Layout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



## Input Volumes

**Volume Display Method: Total and %**




| | All MCs | Light Vehicles (LV) | Heavy Vehicles (HV) | Large Trucks (TR) |
|---|---|---|---|---|
| S: Hills Rd (S) | 50 | 50 | 0 | 0 |
| E: Calder Hwy (E) | 276 | 265 | 0 | 11 |
| W: Calder Hwy (W) | 285 | 273 | 0 | 12 |
| Total | 611 | 587 | 0 | 24 |

## 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 | Aver. Back Of Queue [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Hills Rd (S) | | | | | | | | | | | | | | | |
| Lane 1 | 53 | 0.0 | 53 | 0.0 | 906 | 0.058 | 100 | 6.7 | LOS A | 0.1 | 0.6 | Full | 500 | 0.0 | 0.0 |
| Approach | 53 | 0.0 | 53 | 0.0 | | 0.058 | | 6.7 | LOS A | 0.1 | 0.6 | | | | |
| East: Calder Hwy (E) | | | | | | | | | | | | | | | |
| Lane 1 | 291 | 4.0 | 291 | 4.0 | 1838 | 0.158 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 60 | 0.0 | 0.0 |
| Approach | 291 | 4.0 | 291 | 4.0 | | 0.158 | | 0.0 | NA | 0.0 | 0.0 | | | | |
| West: Calder Hwy (W) | | | | | | | | | | | | | | | |
| Lane 1 | 300 | 4.4 | 300 | 4.4 | 1849 | 0.162 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 210 | 0.0 | 0.0 |
| Approach | 300 | 4.4 | 300 | 4.4 | | 0.162 | | 0.0 | NA | 0.0 | 0.0 | | | | |
| All Vehicles | 643 | 3.9 | 643 | 3.9 | | 0.162 | | 0.6 | NA | 0.1 | 0.6 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Lane LOS values are based on average delay per lane.

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

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

Two-Way Sign Control Capacity Model: SIDRA Standard.

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 Gap.

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.

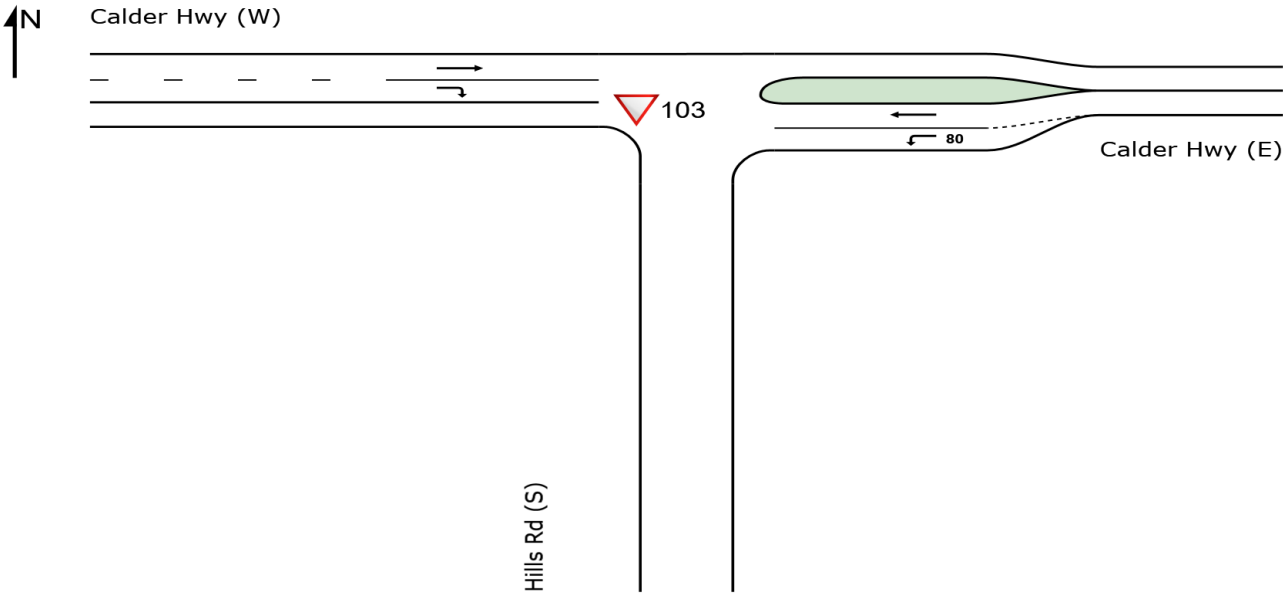
## Site: 103 [#6B - PM - Existing - 2023 Model Volumes (Site Folder: [Final Assessment] - Sites 5 & 6 - Calder Highway / Allies Road / Hills Road)]

## Network: 10 [Existing Network - PM - Model 2023 Volumes (Network Folder: [Final Assessment])]

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

### Site Layout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.

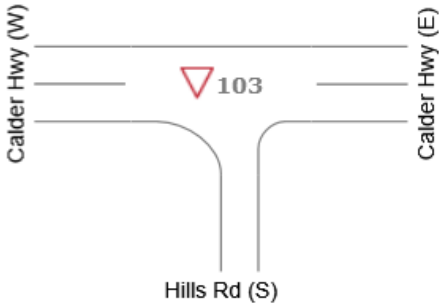


## Input Volumes

**Volume Display Method: Total and %**

| TR | HV | LV | Tot | |
|---|---|---|---|---|
| 4% | 0% | 96% | 285 | T1 |
| 0% | 0% | 100% | 1 | R2 |







| | Tot | LV | HV | TR |
|---|---|---|---|---|
| T1 | 276 | 96% | 0% | 4% |
| L2 | 95 | 97% | 0% | 3% |

| | All MCs | Light Vehicles (LV) | Heavy Vehicles (HV) | Large Trucks (TR) |
|---|---|---|---|---|
| E: Calder Hwy (E) | 371 | 357 | 0 | 14 |
| W: Calder Hwy (W) | 286 | 273 | 0 | 13 |
| Total | 657 | 630 | 0 | 27 |

## 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 | Aver. Back Of Queue [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Calder Hwy (E) | | | | | | | | | | | | | | | |
| Lane 1 | 100 | 3.2 | 100 | 3.2 | 1739 | 0.058 | 100 | 5.6 | LOS A | 0.0 | 0.0 | Short | 80 | 0.0 | NA |
| Lane 2 | 291 | 4.0 | 291 | 4.0 | 1838 | 0.158 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 500 | 0.0 | 0.0 |
| Approach | 391 | 3.8 | 391 | 3.8 | | 0.158 | | 1.5 | NA | 0.0 | 0.0 | | | | |
| West: Calder Hwy (W) | | | | | | | | | | | | | | | |
| Lane 1 | 300 | 4.4 | 300 | 4.4 | 1848 | 0.162 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 60 | 0.0 | 0.0 |
| Lane 2 | 1 | 0.0 | 1 | 0.0 | 942 | 0.001 | 100 | 5.9 | LOS A | 0.0 | 0.0 | Full | 60 | 0.0 | 0.0 |
| Approach | 301 | 4.4 | 301 | 4.4 | | 0.162 | | 0.0 | NA | 0.0 | 0.0 | | | | |
| All Vehicles | 692 | 4.1 | 692 | 4.1 | | 0.162 | | 0.8 | NA | 0.0 | 0.0 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Lane LOS values are based on average delay per lane.

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

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

Two-Way Sign Control Capacity Model: SIDRA Standard.

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 Gap.

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

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

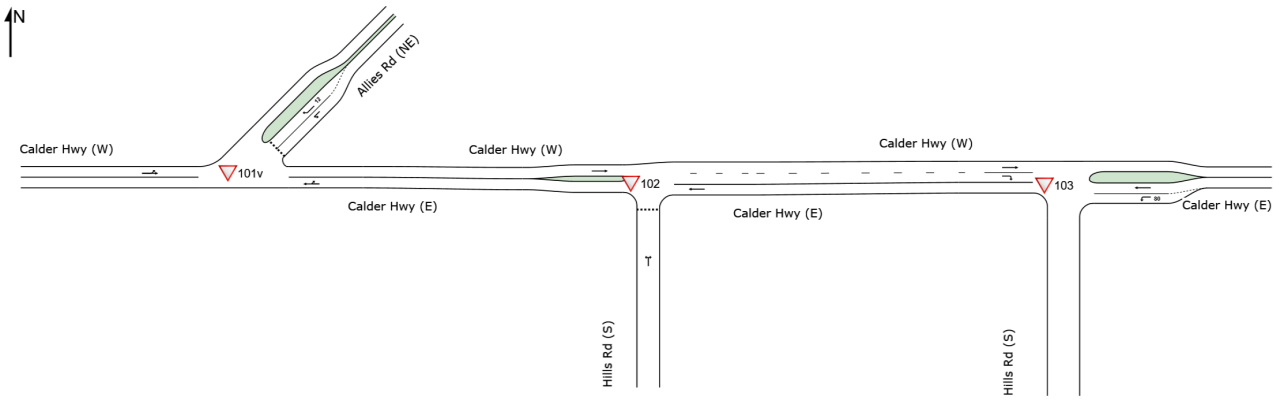
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

# NETWORK LAYOUT

## Network: N101 [Existing Network - PM - Trigger Point Analysis - 25% Development (Network Folder: [Final Assessment])]

New Network
Network Category: (None)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.




| SITES IN NETWORK | | |
|---|---|---|
| **Site ID** | **CCG ID** | **Site Name** |
| ▽101v | NA | #5 - PM - Existing - Trigger Point Analysis - 25% Development |
| ▽102 | NA | #6A - PM - Existing - Trigger Point Analysis - 25% Development |
| ▽103 | NA | #6B - PM - Existing - Trigger Point Analysis - 25% Development |

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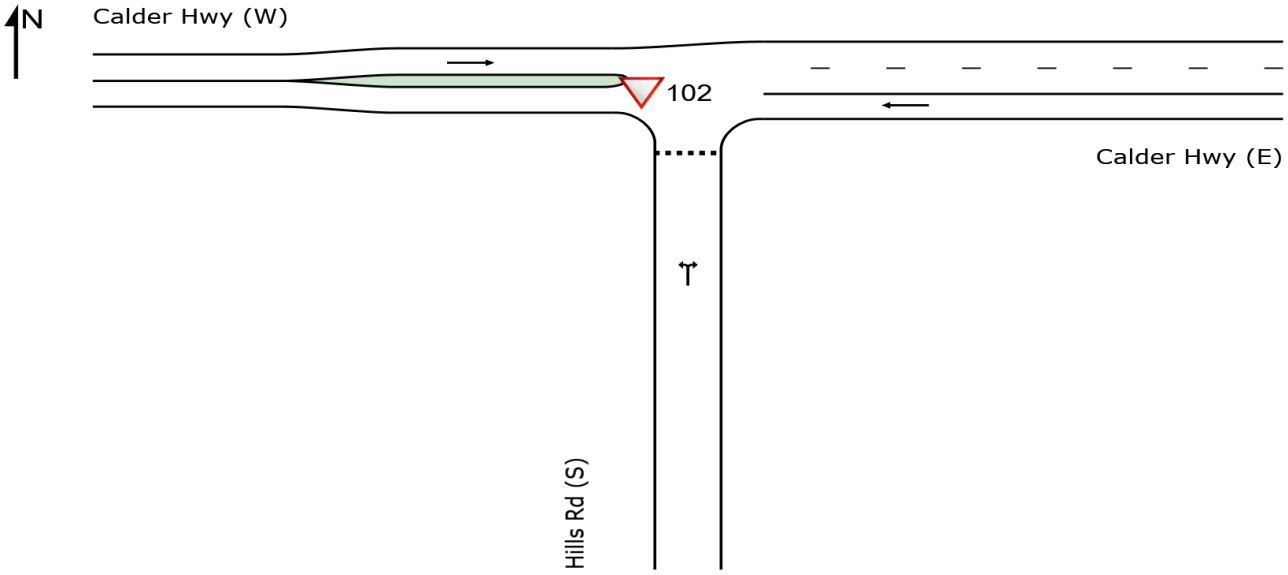
## Site: 102 [#6A - PM - Existing - Trigger Point Analysis - 25% Development (Site Folder: [Final Assessment] - Sites 5 & 6 - Calder Highway / Allies Road / Hills Road)]

## Network: 11 [Existing Network - PM - Trigger Point Analysis - 25% Development (Network Folder: [Final Assessment])]

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

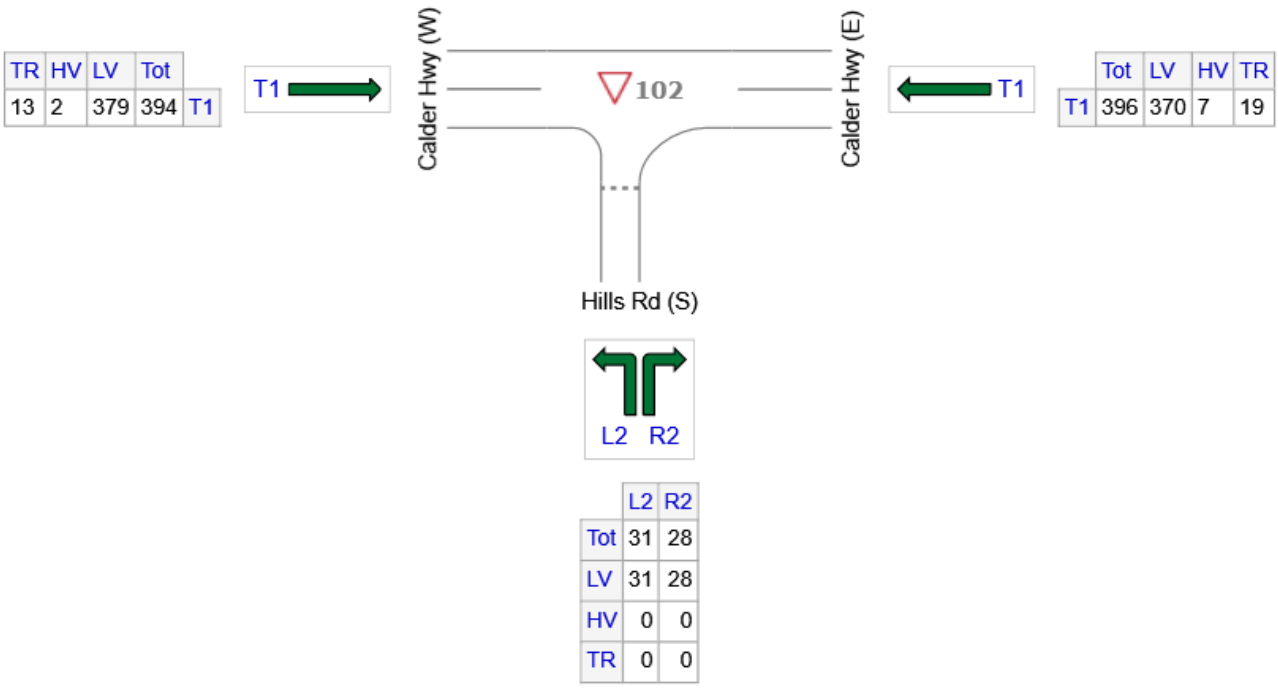
### Site Layout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



## Input Volumes

**Volume Display Method: Separate**




| | L2 | R2 |
|---|---|---|
| Tot | 31 | 28 |
| LV | 31 | 28 |
| HV | 0 | 0 |
| TR | 0 | 0 |

| | All MCs | Light Vehicles (LV) | Heavy Vehicles (HV) | Large Trucks (TR) |
|---|---|---|---|---|
| S: Hills Rd (S) | 59 | 59 | 0 | 0 |
| E: Calder Hwy (E) | 396 | 370 | 7 | 19 |
| W: Calder Hwy (W) | 394 | 379 | 2 | 13 |
| Total | 849 | 808 | 9 | 32 |

## 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 | Aver. Back Of Queue [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Hills Rd (S) | | | | | | | | | | | | | | | |
| Lane 1 | 62 | 0.0 | 62 | 0.0 | 702 | 0.088 | 100 | 8.1 | LOS A | 0.1 | 0.8 | Full | 500 | 0.0 | 0.0 |
| Approach | 62 | 0.0 | 62 | 0.0 | | 0.088 | | 8.1 | LOS A | 0.1 | 0.8 | | | | |
| East: Calder Hwy (E) | | | | | | | | | | | | | | | |
| Lane 1 | 417 | 6.6 | 417 | 6.6 | 1800 | 0.232 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 60 | 0.0 | 0.0 |
| Approach | 417 | 6.6 | 417 | 6.6 | | 0.232 | | 0.0 | NA | 0.0 | 0.0 | | | | |
| West: Calder Hwy (W) | | | | | | | | | | | | | | | |
| Lane 1 | 415 | 3.8 | 415 | 3.8 | 1871 | 0.222 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 210 | 0.0 | 0.0 |
| Approach | 415 | 3.8 | 415 | 3.8 | | 0.222 | | 0.0 | NA | 0.0 | 0.0 | | | | |
| All Vehicles | 894 | 4.8 | 894 | 4.8 | | 0.232 | | 0.6 | NA | 0.1 | 0.8 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Lane LOS values are based on average delay per lane.

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

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

Two-Way Sign Control Capacity Model: SIDRA Standard.

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 Gap.

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.

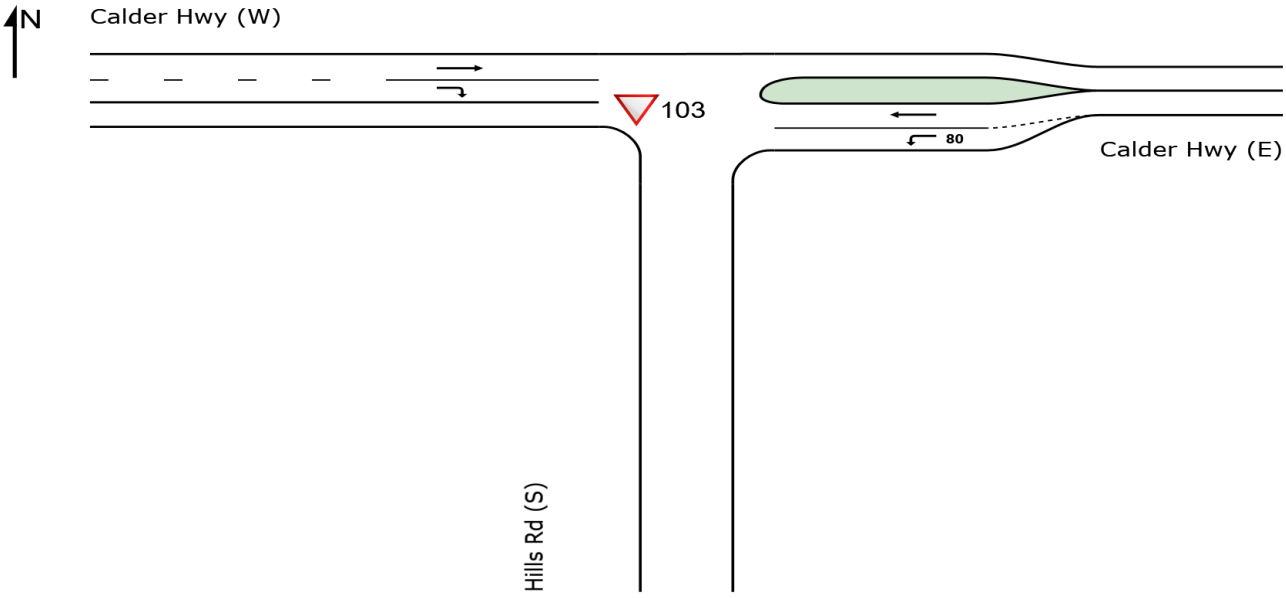
## Site: 103 [#6B - PM - Existing - Trigger Point Analysis - 25% Development (Site Folder: [Final Assessment] - Sites 5 & 6 - Calder Highway / Allies Road / Hills Road)]

## Network: 11 [Existing Network - PM - Trigger Point Analysis - 25% Development (Network Folder: [Final Assessment])]

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

### Site Layout

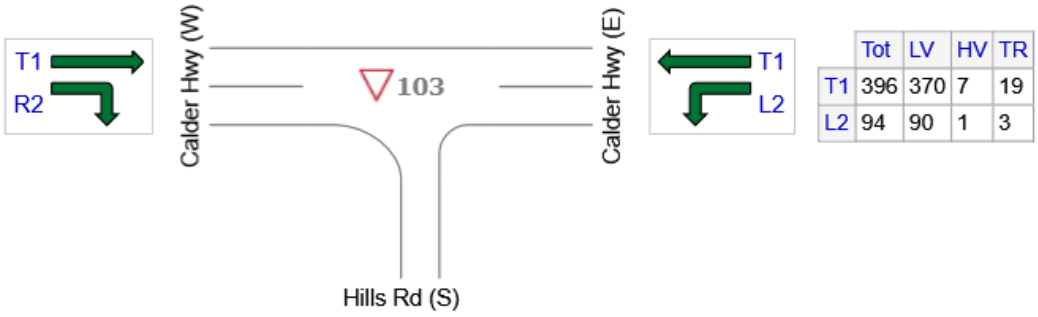
Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



## Input Volumes

**Volume Display Method: Separate**

| TR | HV | LV | Tot | |
|---|---|---|---|---|
| 13 | 2 | 374 | 389 | T1 |
| 0 | 0 | 5 | 5 | R2 |




| | Tot | LV | HV | TR |
|---|---|---|---|---|
| T1 | 396 | 370 | 7 | 19 |
| L2 | 94 | 90 | 1 | 3 |

| | All MCs | Light Vehicles (LV) | Heavy Vehicles (HV) | Large Trucks (TR) |
|---|---|---|---|---|
| E: Calder Hwy (E) | 490 | 460 | 8 | 22 |
| W: Calder Hwy (W) | 394 | 379 | 2 | 13 |
| Total | 884 | 839 | 10 | 35 |

## 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 | Aver. Back Of Queue [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Calder Hwy (E) | | | | | | | | | | | | | | | |
| Lane 1 | 99 | 4.3 | 99 | 4.3 | 1727 | 0.057 | 100 | 5.6 | LOS A | 0.0 | 0.0 | Short | 80 | 0.0 | NA |
| Lane 2 | 417 | 6.6 | 417 | 6.6 | 1800 | 0.232 | 100 | 0.1 | LOS A | 0.0 | 0.0 | Full | 500 | 0.0 | 0.0 |
| Approach | 516 | 6.1 | 516 | 6.1 | | 0.232 | | 1.1 | NA | 0.0 | 0.0 | | | | |
| West: Calder Hwy (W) | | | | | | | | | | | | | | | |
| Lane 1 | 409 | 3.9 | 409 | 3.9 | 1870 | 0.219 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 60 | 0.0 | 0.0 |
| Lane 2 | 5 | 0.0 | 5 | 0.0 | 787 | 0.007 | 100 | 6.9 | LOS A | 0.0 | 0.1 | Full | 60 | 0.0 | 0.0 |
| Approach | 415 | 3.8 | 415 | 3.8 | | 0.219 | | 0.1 | NA | 0.0 | 0.1 | | | | |
| All Vehicles | 931 | 5.1 | 931 | 5.1 | | 0.232 | | 0.7 | NA | 0.0 | 0.1 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Lane LOS values are based on average delay per lane.

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

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

Two-Way Sign Control Capacity Model: SIDRA Standard.

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 Gap.

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

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

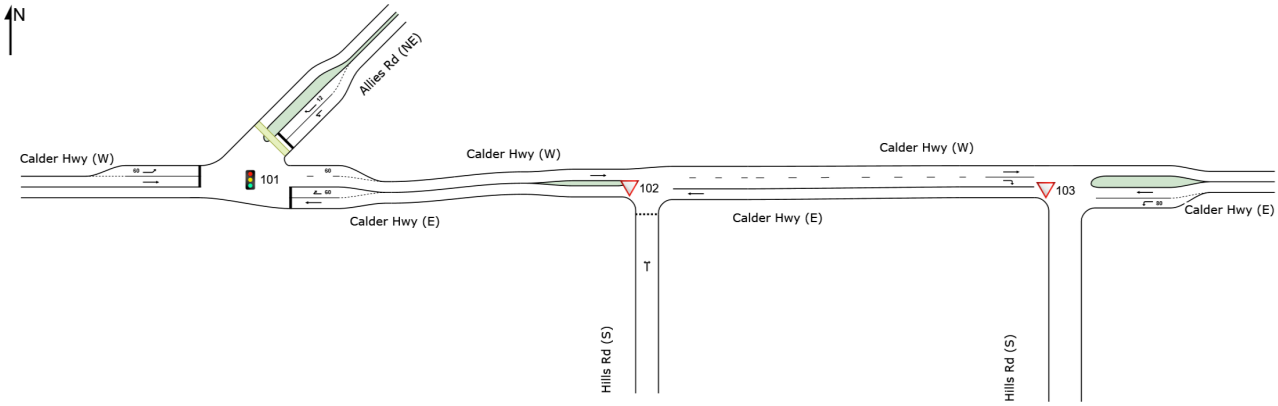
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

# NETWORK LAYOUT

## Network: N101 [Ultimate Network - PM - 2046 Model Volumes (w/o MWFC) - 100% Development (Network Folder: [Final Assessment])]

New Network
Network Category: (None)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.




| SITES IN NETWORK | | |
|---|---|---|
| **Site ID** | **CCG ID** | **Site Name** |
| 101 | NA | #5 - PM - Ultimate - 2046 Model Volumes (w/MWFC) - 100% Development |
| 102 | NA | #6A - PM - Ultimate - 2046 Model Volumes (w/MWFC) - 100% Development |
| 103 | NA | #6B - PM - Ultimate - 2046 Model Volumes (w/MWFC) - 100% Development |

**SIDRA INTERSECTION 9.1 | Copyright © 2000-2024 Akcelik and Associates Pty Ltd | sidrasolutions.com**

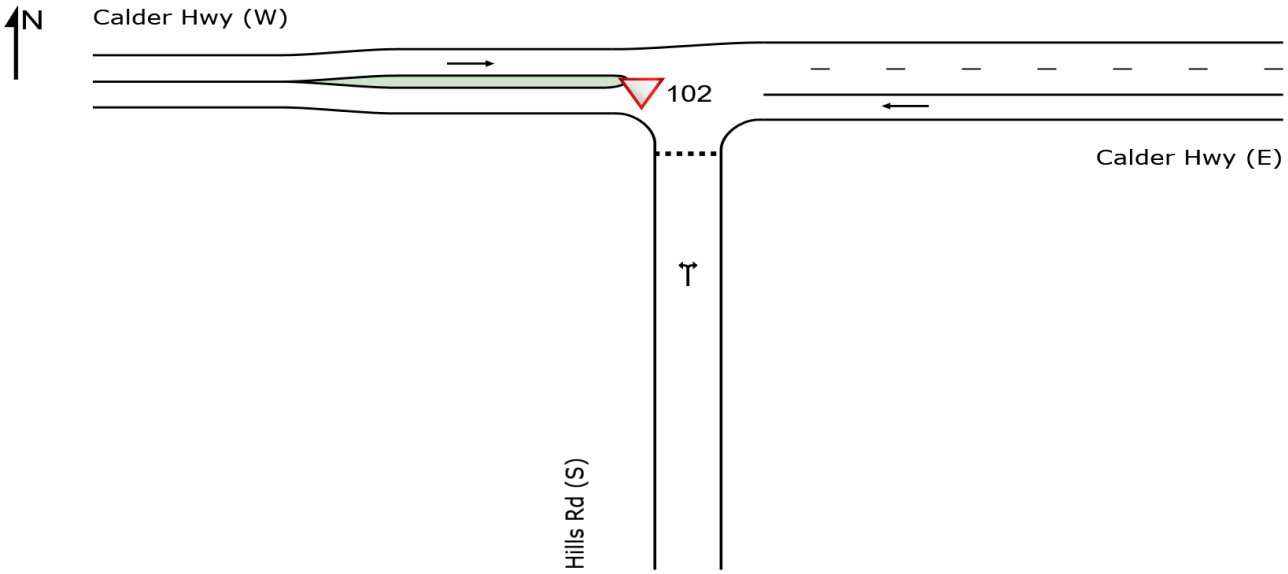
## Site: 102 [#6A - PM - Ultimate - 2046 Model Volumes (w/MWFC) - 100% Development (Site Folder: [Final Assessment] - Sites 5 & 6 - Calder Highway / Allies Road / Hills Road)]

## Network: 12 [Ultimate Network - PM - 2046 Model Volumes (w/o MWFC) - 100% Development (Network Folder: [Final Assessment])]

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

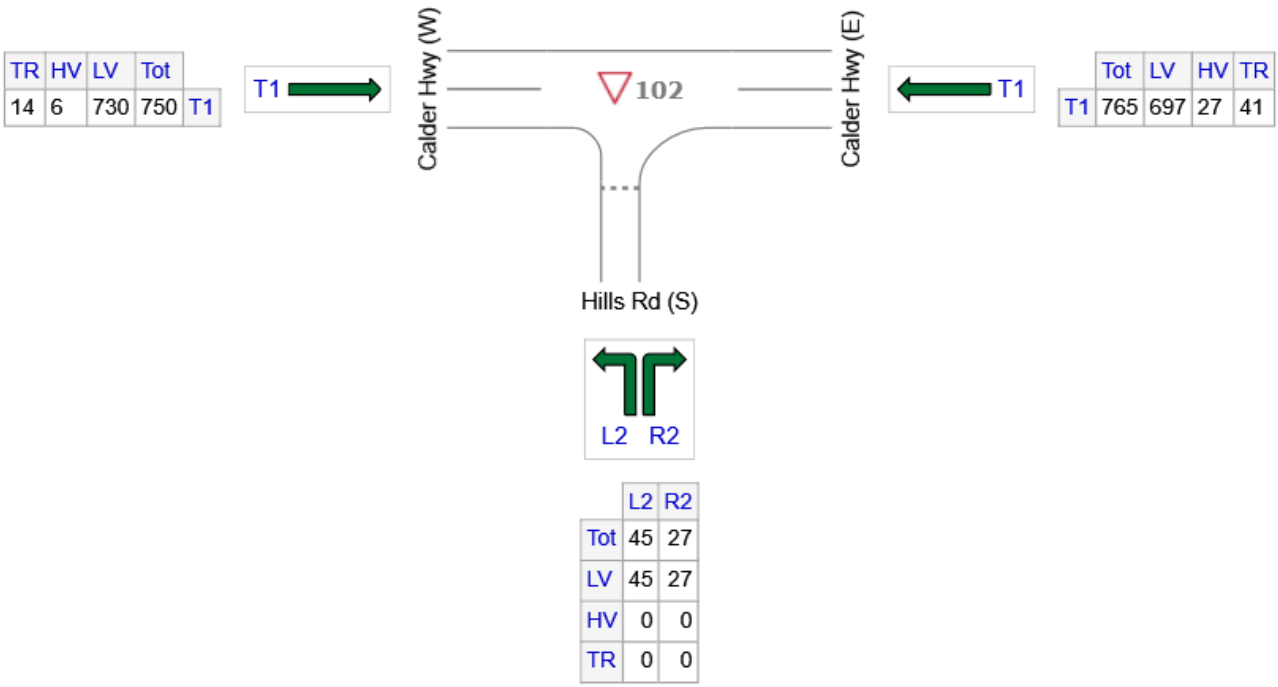
### Site Layout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



## Input Volumes

**Volume Display Method: Separate**




| | All MCs | Light Vehicles (LV) | Heavy Vehicles (HV) | Large Trucks (TR) |
|---|---|---|---|---|
| S: Hills Rd (S) | 72 | 72 | 0 | 0 |
| E: Calder Hwy (E) | 765 | 697 | 27 | 41 |
| W: Calder Hwy (W) | 750 | 730 | 6 | 14 |
| Total | 1587 | 1499 | 33 | 55 |

## 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 | Aver. Back Of Queue [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Hills Rd (S) | | | | | | | | | | | | | | | |
| Lane 1 | 76 | 0.0 | 76 | 0.0 | 294 | 0.258 | 100 | 17.2 | LOS C | 0.3 | 2.4 | Full | 500 | 0.0 | 0.0 |
| Approach | 76 | 0.0 | 76 | 0.0 | | 0.258 | | 17.2 | LOS C | 0.3 | 2.4 | | | | |
| East: Calder Hwy (E) | | | | | | | | | | | | | | | |
| Lane 1 | 805 | 8.9 | 805 | 8.9 | 1767 | 0.456 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 60 | 0.0 | 0.0 |
| Approach | 805 | 8.9 | 805 | 8.9 | | 0.456 | | 0.0 | NA | 0.0 | 0.0 | | | | |
| West: Calder Hwy (W) | | | | | | | | | | | | | | | |
| Lane 1 | 789 | 2.7 | 789 | 2.7 | 1907 | 0.414 | 100 | 0.1 | LOS A | 0.0 | 0.0 | Full | 210 | 0.0 | 0.0 |
| Approach | 789 | 2.7 | 789 | 2.7 | | 0.414 | | 0.1 | NA | 0.0 | 0.0 | | | | |
| All Vehicles | 1671 | 5.5 | 1671 | 5.5 | | 0.456 | | 0.8 | NA | 0.3 | 2.4 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Lane LOS values are based on average delay per lane.

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

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

Two-Way Sign Control Capacity Model: SIDRA Standard.

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 Gap.

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.

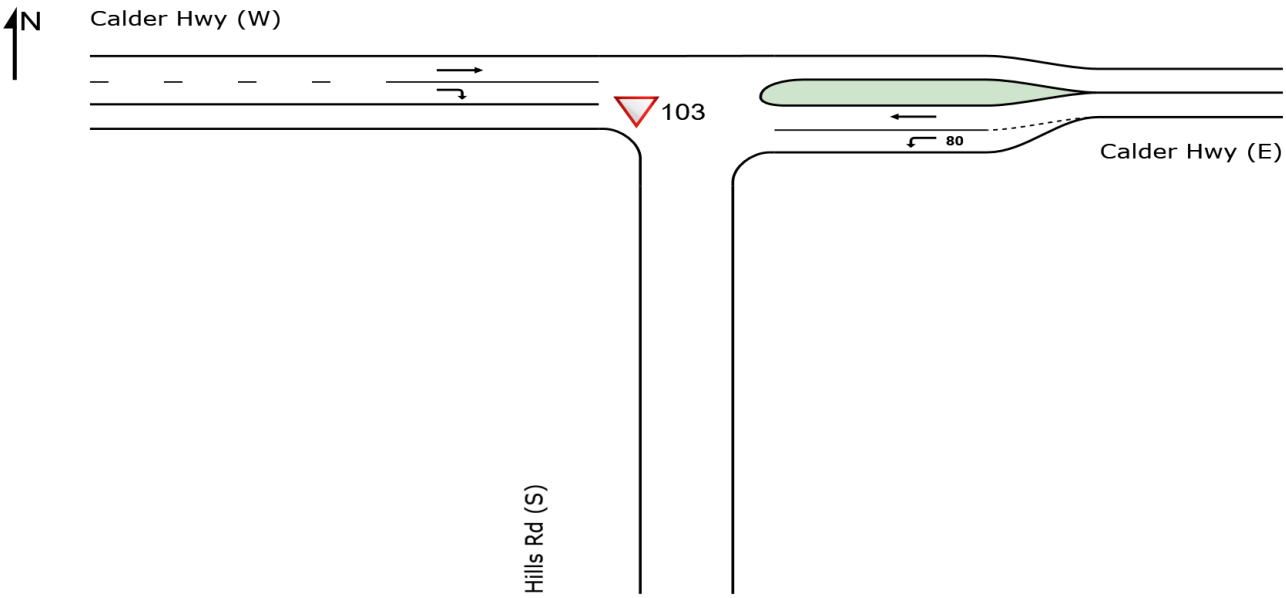
## Site: 103 [#6B - PM - Ultimate - 2046 Model Volumes (w/MWFC) - 100% Development (Site Folder: [Final Assessment] - Sites 5 & 6 - Calder Highway / Allies Road / Hills Road)]

## Network: 12 [Ultimate Network - PM - 2046 Model Volumes (w/o MWFC) - 100% Development (Network Folder: [Final Assessment])]

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

### Site Layout

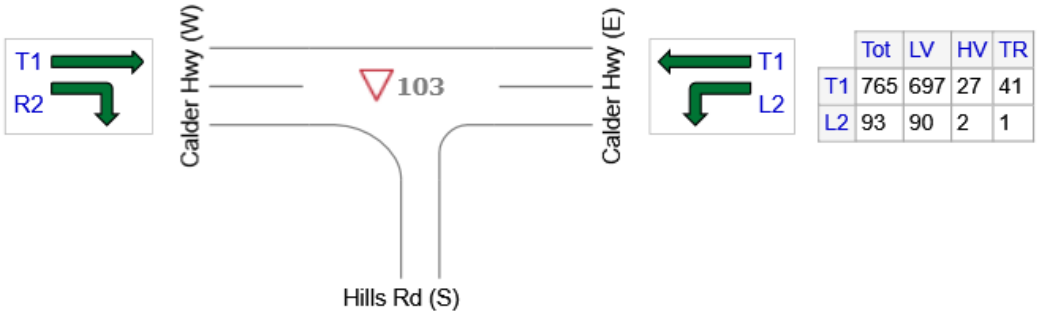
Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



## Input Volumes

**Volume Display Method: Separate**

| TR | HV | LV | Tot | |
|---|---|---|---|---|
| 14 | 6 | 713 | 733 | T1 |
| 0 | 0 | 17 | 17 | R2 |




| | Tot | LV | HV | TR |
|---|---|---|---|---|
| T1 | 765 | 697 | 27 | 41 |
| L2 | 93 | 90 | 2 | 1 |

| | All MCs | Light Vehicles (LV) | Heavy Vehicles (HV) | Large Trucks (TR) |
|---|---|---|---|---|
| E: Calder Hwy (E) | 858 | 787 | 29 | 42 |
| W: Calder Hwy (W) | 750 | 730 | 6 | 14 |
| Total | 1608 | 1517 | 35 | 56 |

## 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 | Aver. Back Of Queue [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Calder Hwy (E) | | | | | | | | | | | | | | | |
| Lane 1 | 98 | 3.2 | 98 | 3.2 | 1771 | 0.055 | 100 | 5.6 | LOS A | 0.0 | 0.0 | Short | 80 | 0.0 | NA |
| Lane 2 | 805 | 8.9 | 805 | 8.9 | 1767 | 0.456 | 100 | 0.2 | LOS A | 0.0 | 0.0 | Full | 500 | 0.0 | 0.0 |
| Approach | 903 | 8.3 | 903 | 8.3 | | 0.456 | | 0.8 | NA | 0.0 | 0.0 | | | | |
| West: Calder Hwy (W) | | | | | | | | | | | | | | | |
| Lane 1 | 772 | 2.7 | 772 | 2.7 | 1906 | 0.405 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 60 | 0.0 | 0.0 |
| Lane 2 | 18 | 0.0 | 18 | 0.0 | 388 | 0.046 | 100 | 12.4 | LOS B | 0.1 | 0.4 | Full | 60 | 0.0 | 0.0 |
| Approach | 789 | 2.7 | 789 | 2.7 | | 0.405 | | 0.3 | NA | 0.1 | 0.4 | | | | |
| All Vehicles | 1693 | 5.7 | 1693 | 5.7 | | 0.456 | | 0.6 | NA | 0.1 | 0.4 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Lane LOS values are based on average delay per lane.

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

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

Two-Way Sign Control Capacity Model: SIDRA Standard.

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 Gap.

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.

# A.5 Wimmera Highway – McCreddons Road – BREP Access

# USER REPORT FOR SITE

## Project: sid_x5902_marong-oct25-v4

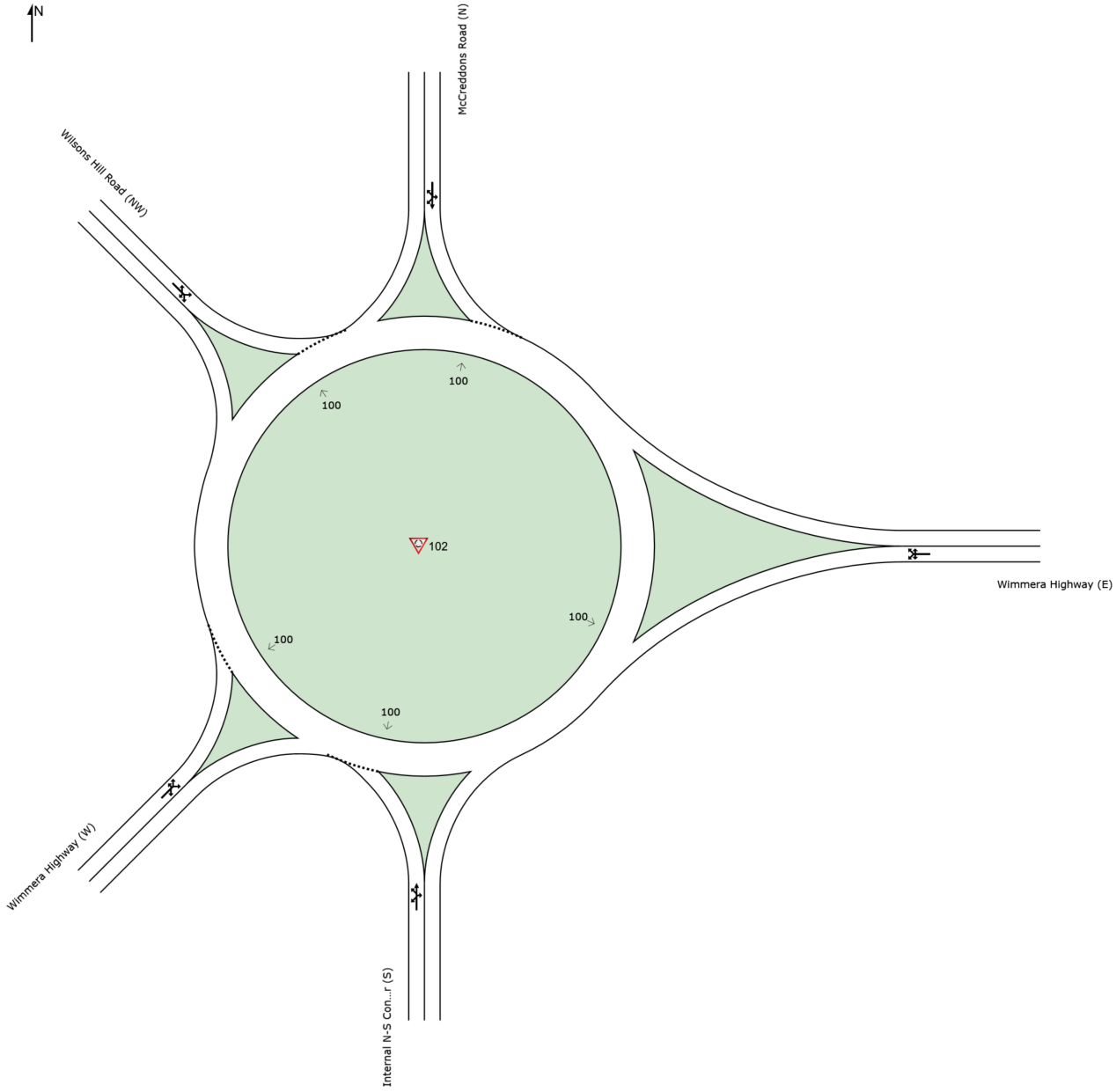
**Output produced by SIDRA INTERSECTION Version: 9.1.6.228** **Template: Site User Report**

## Site: 102 [#3 - AM - Interim - 2046 Model Volumes (w/MWFC) - 100% Development (Site Folder: [Final Assessment] - Site 3 - Wimmera Hwy / BREP (/MWFC))]

2034 AM - Wimmera Hwy / Landry Ln
Site Category: NA
Roundabout

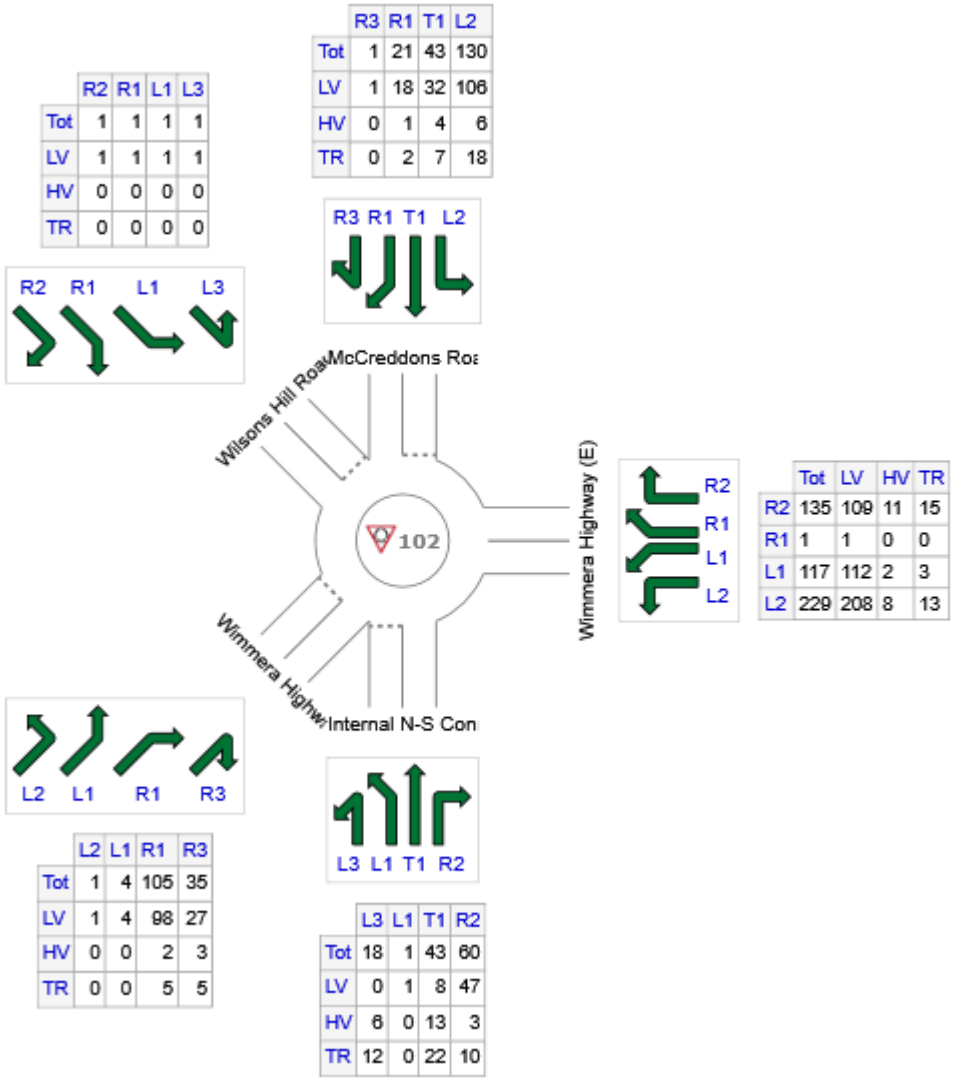
### Site Layout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



## Input Volumes

**Volume Display Method: Separate**




| | All MCs | Light Vehicles (LV) | Heavy Vehicles (HV) | Large Trucks (TR) |
|---|---|---|---|---|
| S: Internal N-S Connector (S) | 122 | 56 | 22 | 44 |
| E: Wimmera Highway (E) | 482 | 430 | 21 | 31 |
| N: McCreddons Road (N) | 195 | 157 | 11 | 27 |
| NW: Wilsons Hill Road (NW) | 4 | 4 | 0 | 0 |
| SW: Wimmera Highway (W) | 145 | 130 | 5 | 10 |
| Total | 948 | 777 | 59 | 112 |

## 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. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Internal N-S Connector (S) | | | | | | | | | | | | | | | |
| Lane 1[d] | 128 | 54.1 | 128 | 54.1 | 789 | 0.163 | 100 | 8.6 | LOS A | 0.8 | 11.6 | Full | 500 | 0.0 | 0.0 |
| Approach | 128 | 54.1 | 128 | 54.1 | | 0.163 | | 8.6 | LOS A | 0.8 | 11.6 | | | | |
| East: Wimmera Highway (E) | | | | | | | | | | | | | | | |
| Lane 1[d] | 507 | 10.8 | 507 | 10.8 | 1709 | 0.297 | 100 | 7.1 | LOS A | 0.0 | 0.0 | Full | 500 | 0.0 | 0.0 |
| Approach | 507 | 10.8 | 507 | 10.8 | | 0.297 | | 7.1 | LOS A | 0.0 | 0.0 | | | | |
| North: McCreddons Road (N) | | | | | | | | | | | | | | | |
| Lane 1[d] | 205 | 19.5 | 205 | 19.5 | 1181 | 0.174 | 100 | 3.9 | LOS A | 1.0 | 9.4 | Full | 500 | 0.0 | 0.0 |
| Approach | 205 | 19.5 | 205 | 19.5 | | 0.174 | | 3.9 | LOS A | 1.0 | 9.4 | | | | |
| NorthWest: Wilsons Hill Road (NW) | | | | | | | | | | | | | | | |
| Lane 1[d] | 4 | 0.0 | 4 | 0.0 | 1355 | 0.003 | 100 | 6.8 | LOS A | 0.0 | 0.1 | Full | 500 | 0.0 | 0.0 |
| Approach | 4 | 0.0 | 4 | 0.0 | | 0.003 | | 6.8 | LOS A | 0.0 | 0.1 | | | | |
| SouthWest: Wimmera Highway (W) | | | | | | | | | | | | | | | |
| Lane 1[d] | 153 | 10.3 | 153 | 10.3 | 1255 | 0.122 | 100 | 14.1 | LOS B | 0.7 | 5.6 | Full | 500 | 0.0 | 0.0 |
| Approach | 153 | 10.3 | 153 | 10.3 | | 0.122 | | 14.1 | LOS B | 0.7 | 5.6 | | | | |
| All Vehicles | 998 | 18.0 | 998 | 18.0 | | 0.297 | | 7.7 | LOS A | 1.0 | 11.6 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
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 Gap.
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.

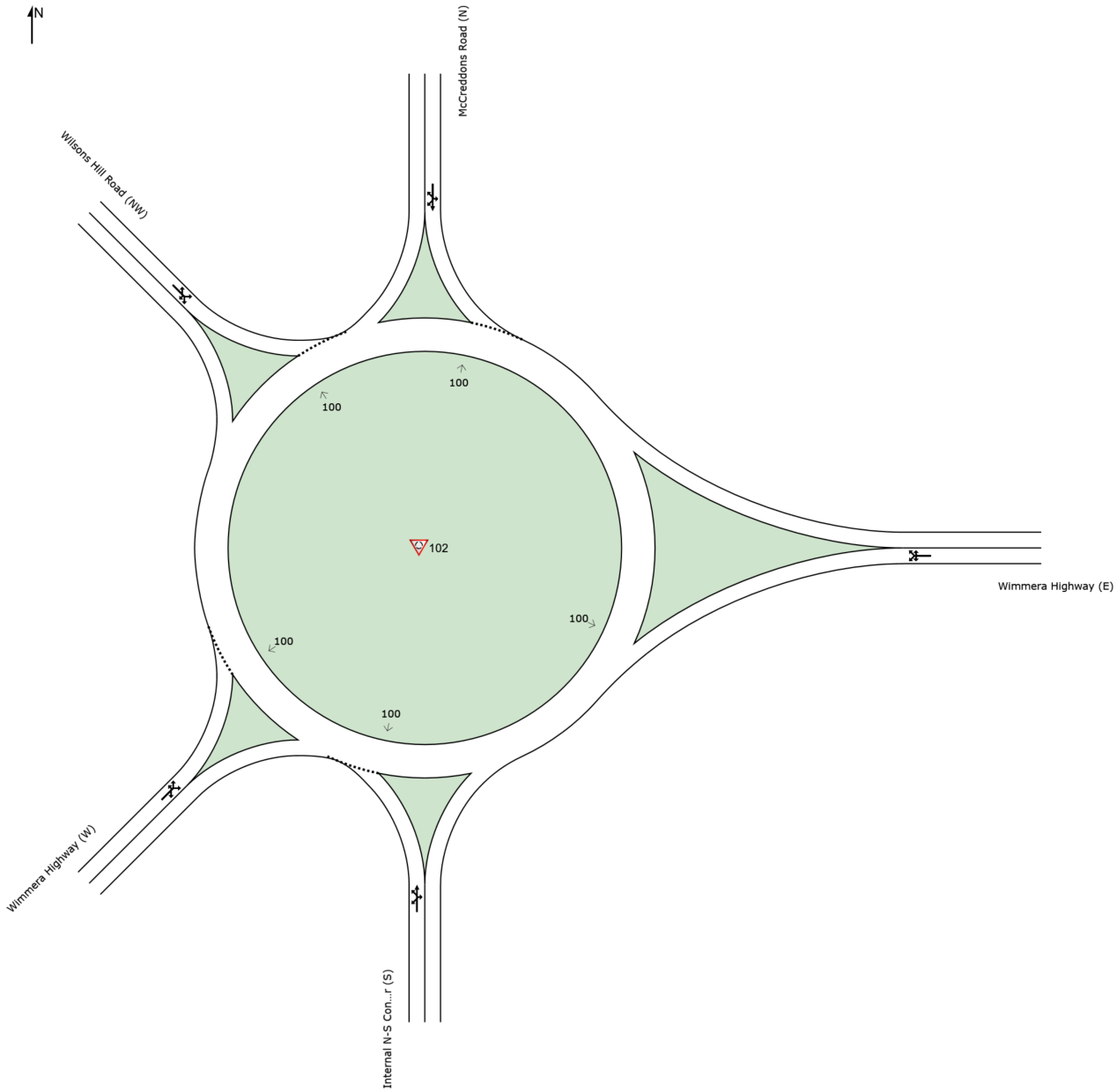
d Dominant lane on roundabout approach

## Site: 102 [#3 - PM - Interim - 2046 Model Volumes (w/MWFC) - 100% Development (Site Folder: [Final Assessment] - Site 3 - Wimmera Hwy / BREP (/MWFC))]

2034 AM - Wimmera Hwy / Landry Ln
Site Category: NA
Roundabout

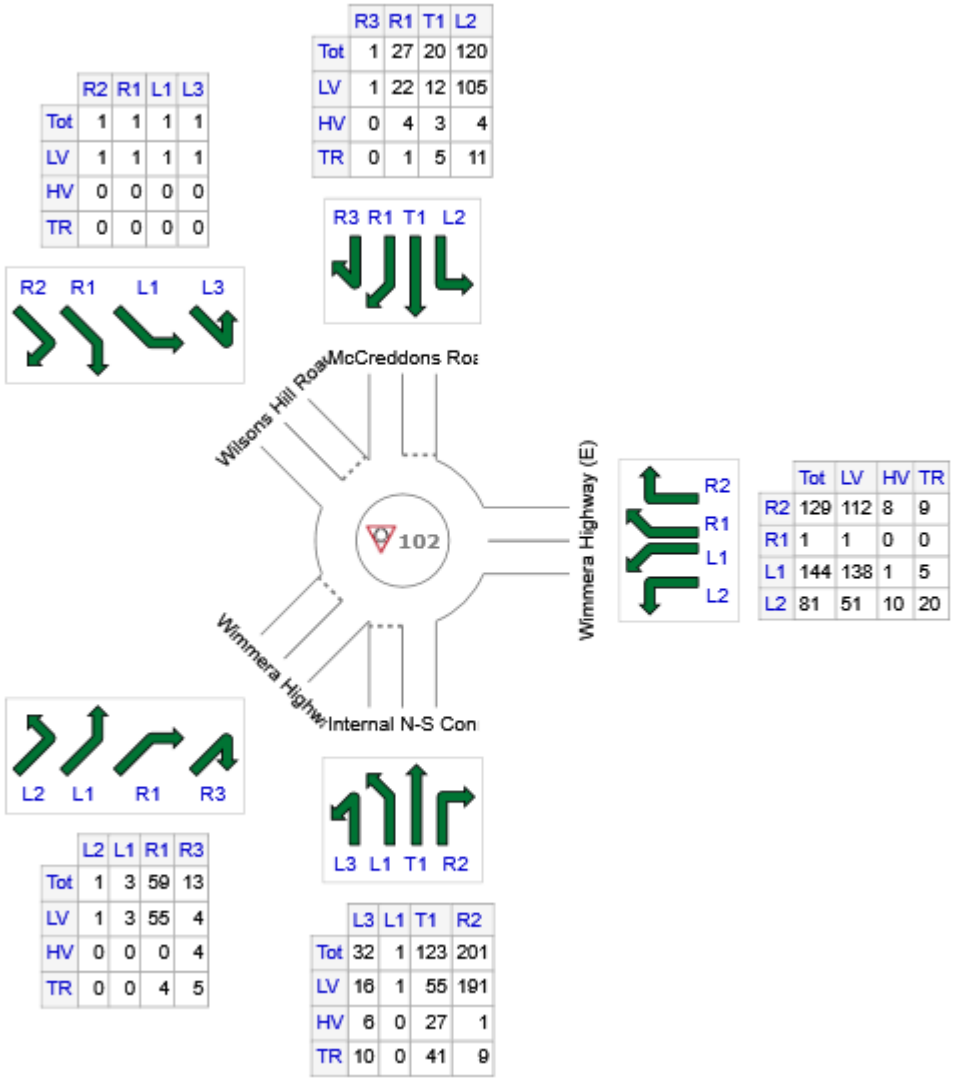
### Site Layout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



## Input Volumes

**Volume Display Method: Separate**




| | All MCs | Light Vehicles (LV) | Heavy Vehicles (HV) | Large Trucks (TR) |
|---|---|---|---|---|
| S: Internal N-S Connector (S) | 357 | 263 | 34 | 60 |
| E: Wimmera Highway (E) | 355 | 302 | 19 | 34 |
| N: McCreddons Road (N) | 168 | 140 | 11 | 17 |
| NW: Wilsons Hill Road (NW) | 4 | 4 | 0 | 0 |
| SW: Wimmera Highway (W) | 76 | 63 | 4 | 9 |
| Total | 960 | 772 | 68 | 120 |

## 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. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Internal N-S Connector (S) | | | | | | | | | | | | | | | |
| Lane 1[d] | 376 | 26.3 | 376 | 26.3 | 1035 | 0.363 | 100 | 8.7 | LOS A | 2.2 | 23.0 | Full | 500 | 0.0 | 0.0 |
| Approach | 376 | 26.3 | 376 | 26.3 | | 0.363 | | 8.7 | LOS A | 2.2 | 23.0 | | | | |
| East: Wimmera Highway (E) | | | | | | | | | | | | | | | |
| Lane 1[d] | 374 | 14.9 | 374 | 14.9 | 1634 | 0.229 | 100 | 7.9 | LOS A | 0.0 | 0.0 | Full | 500 | 0.0 | 0.0 |
| Approach | 374 | 14.9 | 374 | 14.9 | | 0.229 | | 7.9 | LOS A | 0.0 | 0.0 | | | | |
| North: McCreddons Road (N) | | | | | | | | | | | | | | | |
| Lane 1[d] | 177 | 16.7 | 177 | 16.7 | 1165 | 0.152 | 100 | 4.4 | LOS A | 0.9 | 7.9 | Full | 500 | 0.0 | 0.0 |
| Approach | 177 | 16.7 | 177 | 16.7 | | 0.152 | | 4.4 | LOS A | 0.9 | 7.9 | | | | |
| NorthWest: Wilsons Hill Road (NW) | | | | | | | | | | | | | | | |
| Lane 1[d] | 4 | 0.0 | 4 | 0.0 | 1159 | 0.004 | 100 | 7.6 | LOS A | 0.0 | 0.2 | Full | 500 | 0.0 | 0.0 |
| Approach | 4 | 0.0 | 4 | 0.0 | | 0.004 | | 7.6 | LOS A | 0.0 | 0.2 | | | | |
| SouthWest: Wimmera Highway (W) | | | | | | | | | | | | | | | |
| Lane 1[d] | 80 | 17.1 | 80 | 17.1 | 897 | 0.089 | 100 | 15.2 | LOS B | 0.5 | 4.8 | Full | 500 | 0.0 | 0.0 |
| Approach | 80 | 17.1 | 80 | 17.1 | | 0.089 | | 15.2 | LOS B | 0.5 | 4.8 | | | | |
| All Vehicles | 1011 | 19.6 | 1011 | 19.6 | | 0.363 | | 8.2 | LOS A | 2.2 | 23.0 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
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 Gap.
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.

d Dominant lane on roundabout approach

# A.6 Calder Alternative Highway – BREP Access

# USER REPORT FOR SITE

## Project: sid_x5902_marong-oct25-v4

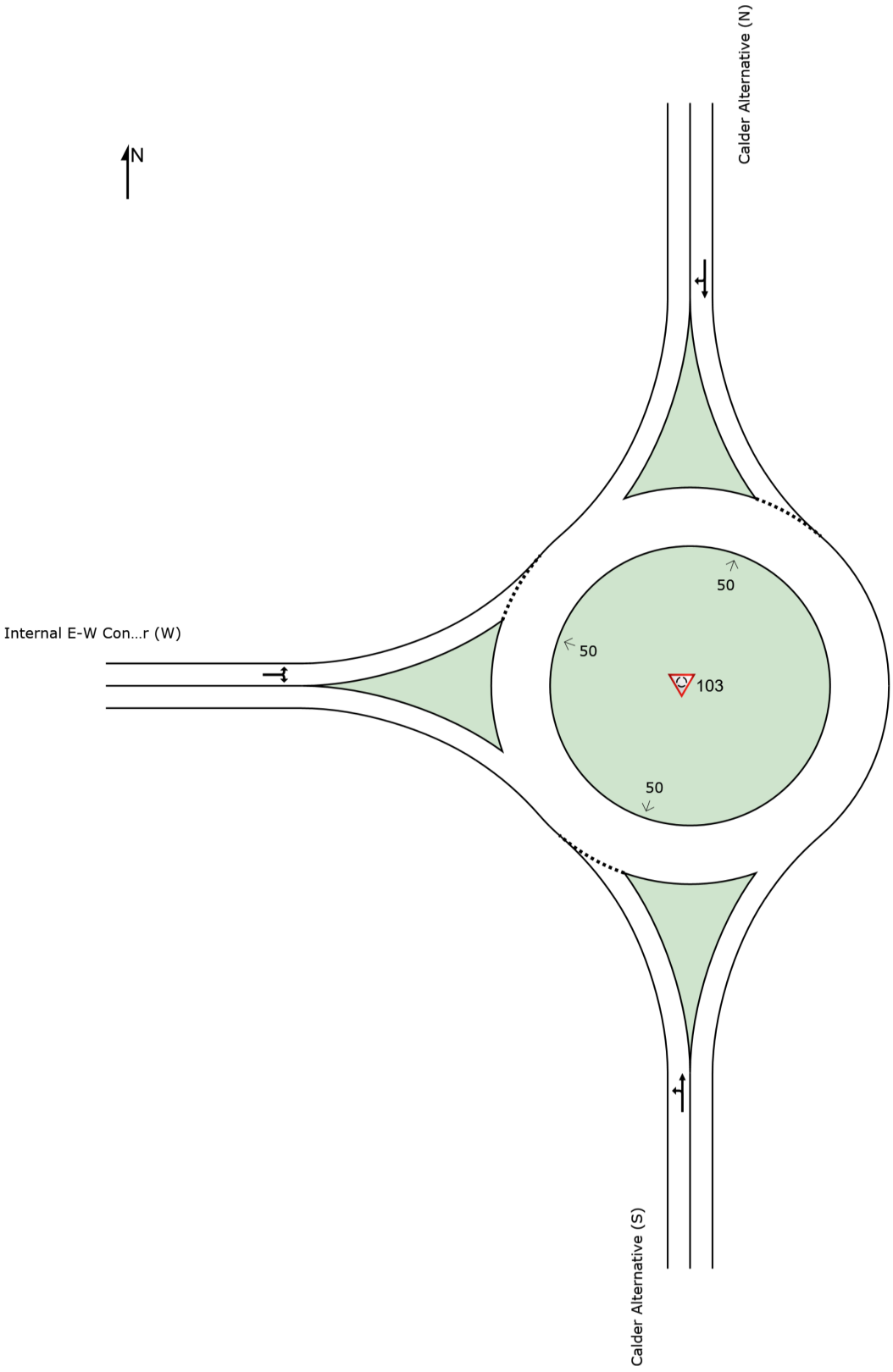
**Output produced by SIDRA INTERSECTION Version: 9.1.6.228** **Template: Site User Report**

## Site: 103 [#4 - AM - Interim - 2046 Model Volumes (w/MWFC) - 100% Development (Site Folder: [Final Assessment] - Site 4 - Calder Alternative / BREP)]

2034 AM - Calder Alternative / Internal E-W Connector
Site Category: NA
Roundabout

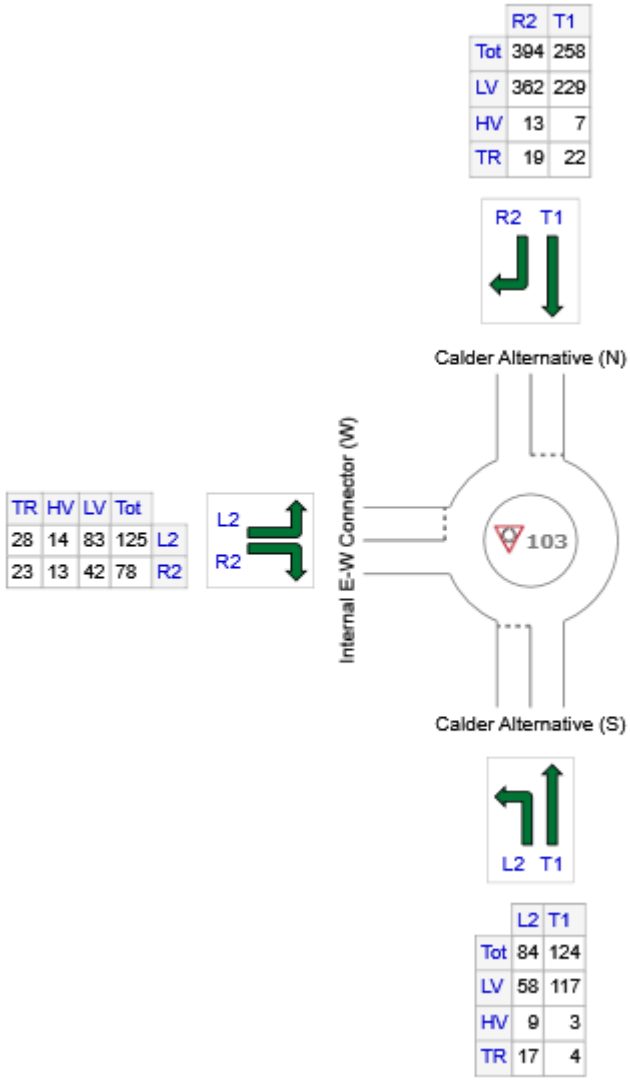
### Site Layout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.


N
Calder Alternative (N)
Internal E-W Con...r (W)
50
50
103
50
Calder Alternative (S)

## Input Volumes

**Volume Display Method: Separate**




| | All MCs | Light Vehicles (LV) | Heavy Vehicles (HV) | Large Trucks (TR) |
|---|---|---|---|---|
| S: Calder Alternative (S) | 208 | 175 | 12 | 21 |
| N: Calder Alternative (N) | 652 | 591 | 20 | 41 |
| W: Internal E-W Connector (W) | 203 | 125 | 27 | 51 |
| Total | 1063 | 891 | 59 | 113 |

## 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. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Calder Alternative (S) | | | | | | | | | | | | | | | |
| Lane 1[d] | 219 | 15.9 | 219 | 15.9 | 935 | 0.234 | 100 | 7.5 | LOS A | 1.4 | 12.8 | Full | 500 | 0.0 | 0.0 |
| Approach | 219 | 15.9 | 219 | 15.9 | | 0.234 | | 7.5 | LOS A | 1.4 | 12.8 | | | | |
| North: Calder Alternative (N) | | | | | | | | | | | | | | | |
| Lane 1[d] | 686 | 9.4 | 686 | 9.4 | 1393 | 0.493 | 100 | 10.5 | LOS B | 4.0 | 33.6 | Full | 500 | 0.0 | 0.0 |
| Approach | 686 | 9.4 | 686 | 9.4 | | 0.493 | | 10.5 | LOS B | 4.0 | 33.6 | | | | |
| West: Internal E-W Connector (W) | | | | | | | | | | | | | | | |
| Lane 1[d] | 214 | 38.4 | 214 | 38.4 | 1009 | 0.212 | 100 | 6.6 | LOS A | 1.3 | 15.9 | Full | 500 | 0.0 | 0.0 |
| Approach | 214 | 38.4 | 214 | 38.4 | | 0.212 | | 6.6 | LOS A | 1.3 | 15.9 | | | | |
| All Vehicles | 1119 | 16.2 | 1119 | 16.2 | | 0.493 | | 9.2 | LOS A | 4.0 | 33.6 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
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 Gap.
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.

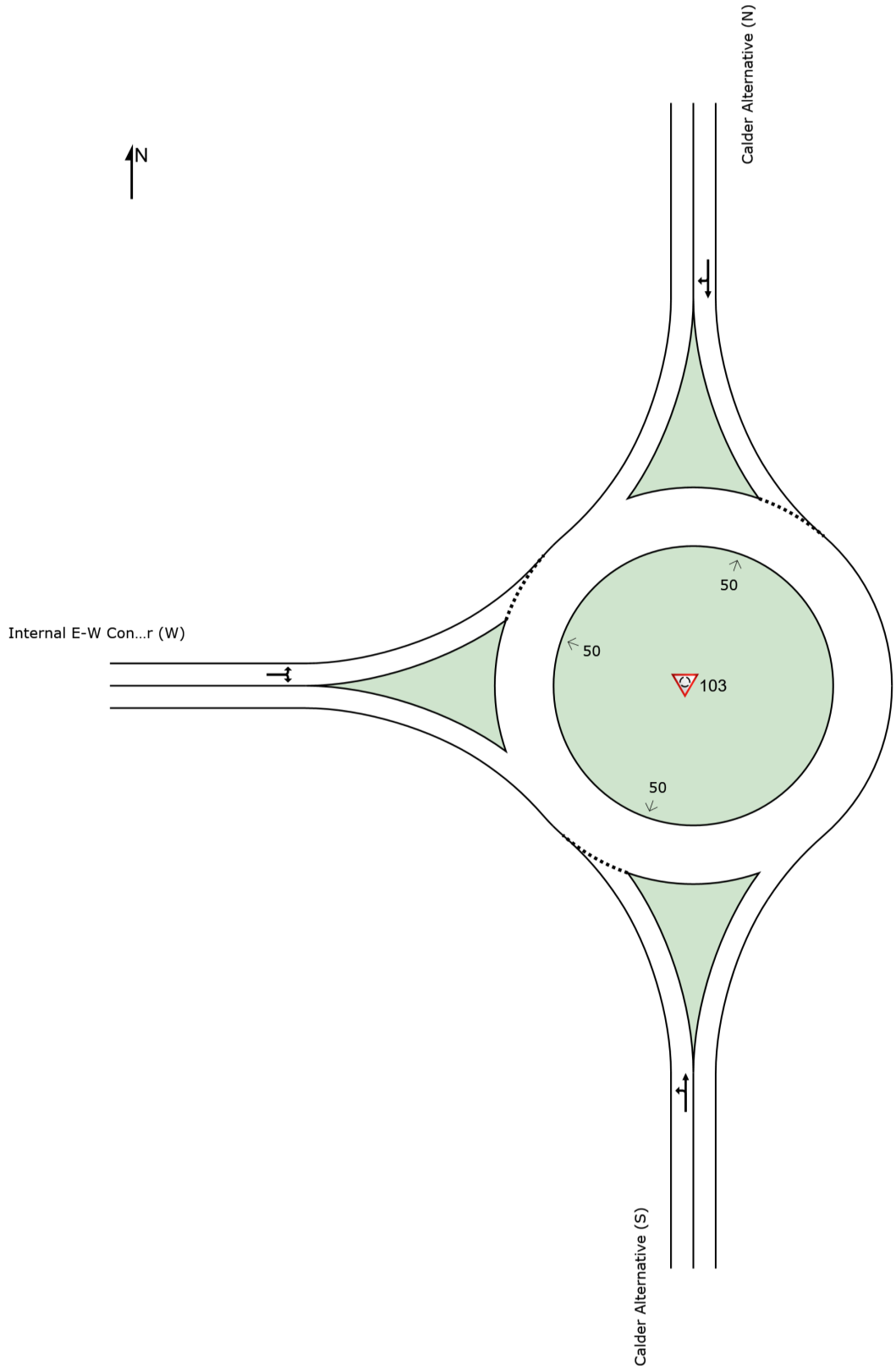
d Dominant lane on roundabout approach

## Site: 103 [#4 - PM - Interim - 2046 Model Volumes (w/MWFC) - 100% Development (Site Folder: [Final Assessment] - Site 4 - Calder Alternative / BREP)]

2034 AM - Calder Alternative / Internal E-W Connector
Site Category: NA
Roundabout

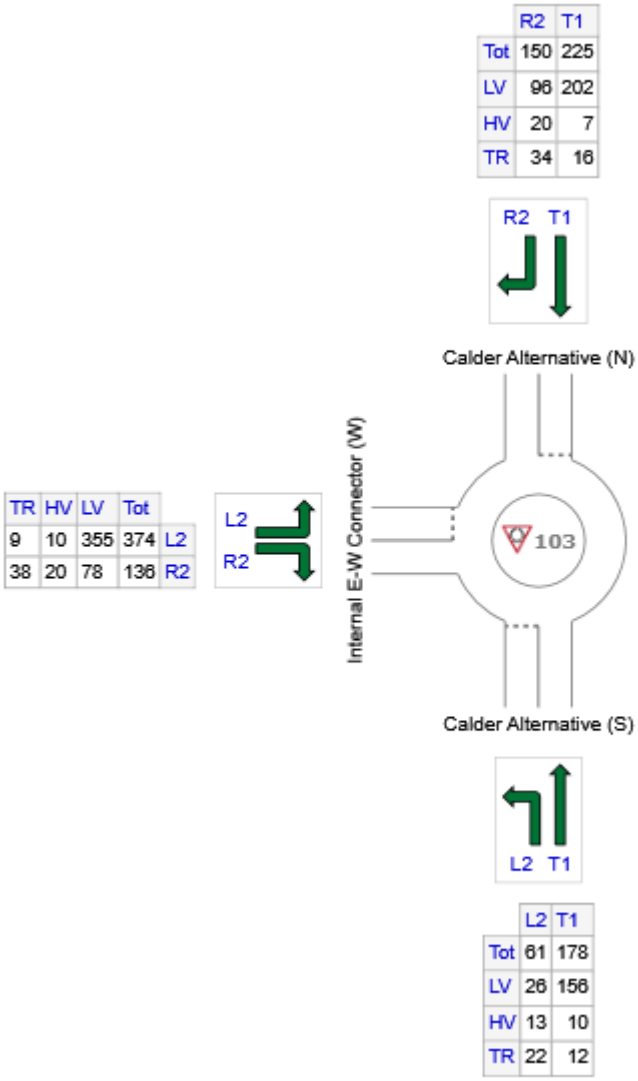
### Site Layout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



## Input Volumes

**Volume Display Method: Separate**




| | All MCs | Light Vehicles (LV) | Heavy Vehicles (HV) | Large Trucks (TR) |
|---|---|---|---|---|
| S: Calder Alternative (S) | 239 | 182 | 23 | 34 |
| N: Calder Alternative (N) | 375 | 298 | 27 | 50 |
| W: Internal E-W Connector (W) | 510 | 433 | 30 | 47 |
| Total | 1124 | 913 | 80 | 131 |

## 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. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Calder Alternative (S) | | | | | | | | | | | | | | | |
| Lane 1[d] | 252 | 23.8 | 252 | 23.8 | 1068 | 0.235 | 100 | 6.3 | LOS A | 1.4 | 14.5 | Full | 500 | 0.0 | 0.0 |
| Approach | 252 | 23.8 | 252 | 23.8 | | 0.235 | | 6.3 | LOS A | 1.4 | 14.5 | | | | |
| North: Calder Alternative (N) | | | | | | | | | | | | | | | |
| Lane 1[d] | 395 | 20.5 | 395 | 20.5 | 1112 | 0.355 | 100 | 9.5 | LOS A | 2.4 | 23.9 | Full | 500 | 0.0 | 0.0 |
| Approach | 395 | 20.5 | 395 | 20.5 | | 0.355 | | 9.5 | LOS A | 2.4 | 23.9 | | | | |
| West: Internal E-W Connector (W) | | | | | | | | | | | | | | | |
| Lane 1[d] | 537 | 15.1 | 537 | 15.1 | 1199 | 0.448 | 100 | 6.1 | LOS A | 3.4 | 30.3 | Full | 500 | 0.0 | 0.0 |
| Approach | 537 | 15.1 | 537 | 15.1 | | 0.448 | | 6.1 | LOS A | 3.4 | 30.3 | | | | |
| All Vehicles | 1183 | 18.8 | 1183 | 18.8 | | 0.448 | | 7.3 | LOS A | 3.4 | 30.3 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
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 Gap.
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.

d Dominant lane on roundabout approach

# A.7 Wimmera Highway – BREP Access

# USER REPORT FOR SITE

**Project: sid_x5902_marong-oct25-v4**

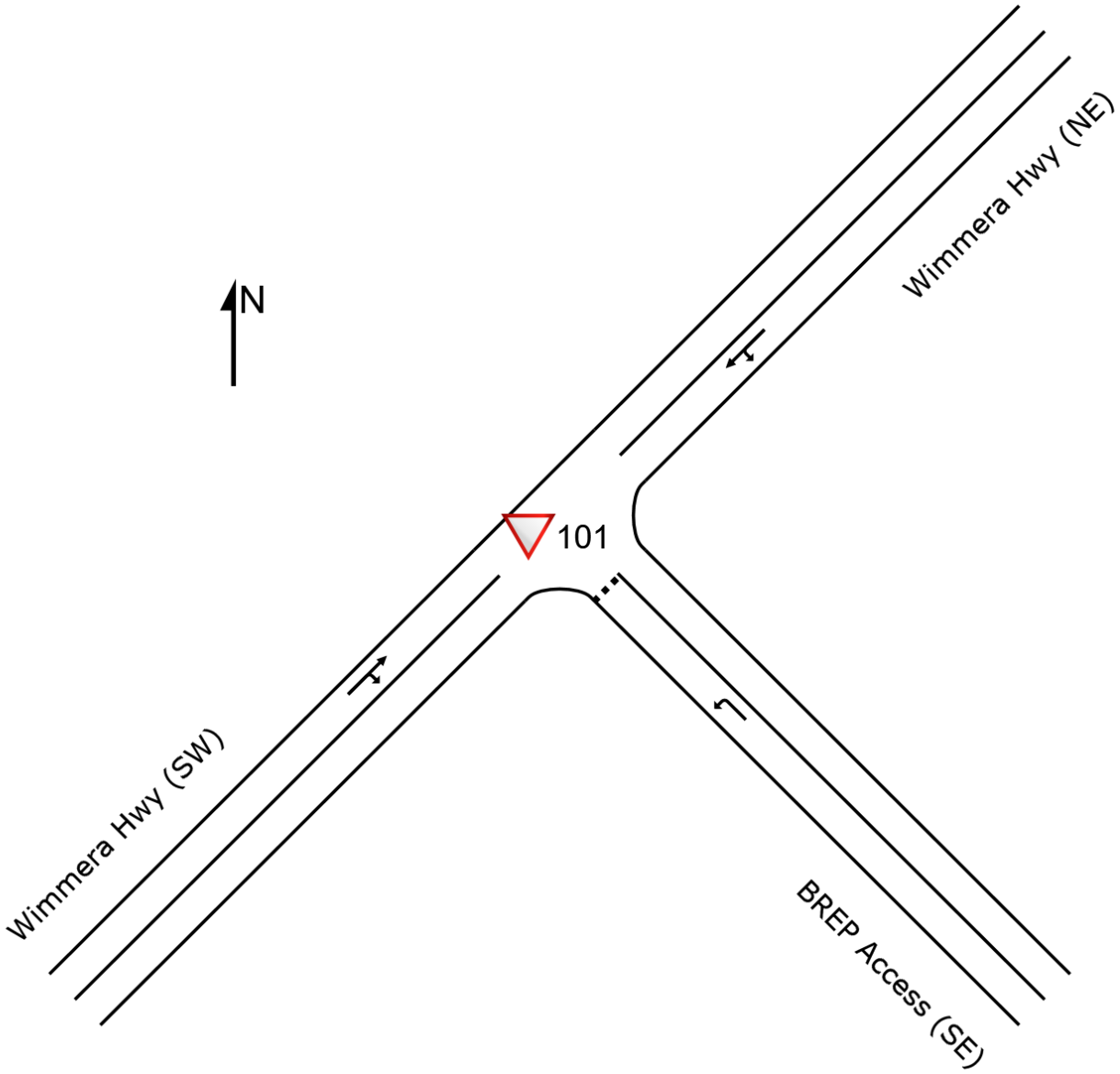
**Output produced by SIDRA INTERSECTION Version: 9.1.6.228** **Template: Site User Report**

## Site: 101 [#7 - AM - Ultimate - 2046 Model Volumes (w/MWFC) - 100% Development (Site Folder: [Final Assessment] - Site 7 - Calder Alternative / BREP)]

Wimmera Hwy / BREP Access
Site Category: (None)
Give-Way (Two-Way)

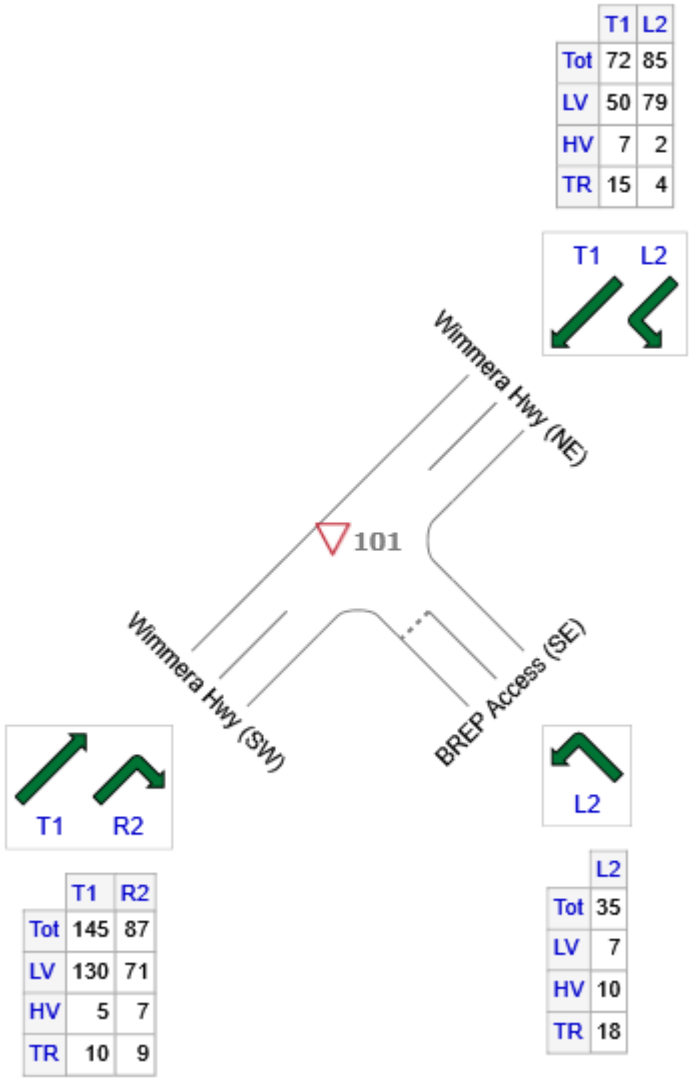
### Site Layout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



## Input Volumes

**Volume Display Method: Separate**




| | All MCs | Light Vehicles (LV) | Heavy Vehicles (HV) | Large Trucks (TR) |
|---|---|---|---|---|
| SE: BREP Access (SE) | 35 | 7 | 10 | 18 |
| NE: Wimmera Hwy (NE) | 157 | 129 | 9 | 19 |
| SW: Wimmera Hwy (SW) | 232 | 201 | 12 | 19 |
| Total | 424 | 337 | 31 | 56 |

## 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. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SouthEast: BREP Access (SE) | | | | | | | | | | | | | | | |
| Lane 1 | 37 | 80.0 | 37 | 80.0 | 709 | 0.052 | 100 | 6.7 | LOS A | 0.2 | 3.7 | Full | 500 | 0.0 | 0.0 |
| Approach | 37 | 80.0 | 37 | 80.0 | | 0.052 | | 6.7 | LOS A | 0.2 | 3.7 | | | | |
| NorthEast: Wimmera Hwy (NE) | | | | | | | | | | | | | | | |
| Lane 1 | 165 | 17.8 | 165 | 17.8 | 1558 | 0.106 | 100 | 3.9 | LOS A | 0.0 | 0.0 | Full | 500 | 0.0 | 0.0 |
| Approach | 165 | 17.8 | 165 | 17.8 | | 0.106 | | 3.9 | NA | 0.0 | 0.0 | | | | |
| SouthWest: Wimmera Hwy (SW) | | | | | | | | | | | | | | | |
| Lane 1 | 244 | 13.4 | 244 | 13.4 | 1425 | 0.171 | 100 | 3.6 | LOS A | 0.7 | 6.5 | Full | 500 | 0.0 | 0.0 |
| Approach | 244 | 13.4 | 244 | 13.4 | | 0.171 | | 3.6 | NA | 0.7 | 6.5 | | | | |
| All Vehicles | 446 | 20.5 | 446 | 20.5 | | 0.171 | | 3.9 | NA | 0.7 | 6.5 | | | | |

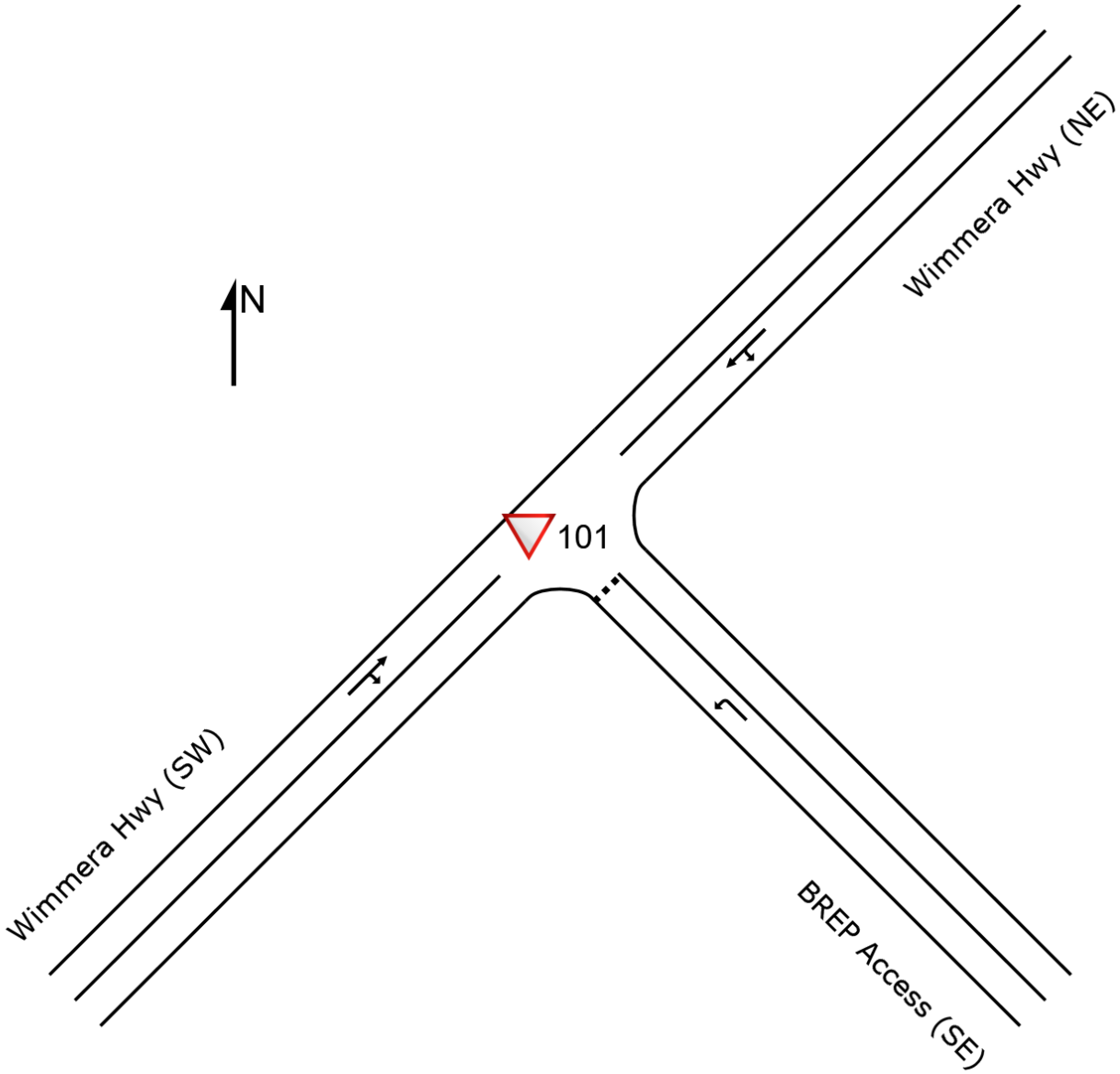
Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
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 Gap.
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.

## Site: 101 [#7 - PM - Ultimate - 2046 Model Volumes (w/MWFC) - 100% Development (Site Folder: [Final Assessment] - Site 7 - Calder Alternative / BREP)]

Wimmera Hwy / BREP Access
Site Category: (None)
Give-Way (Two-Way)

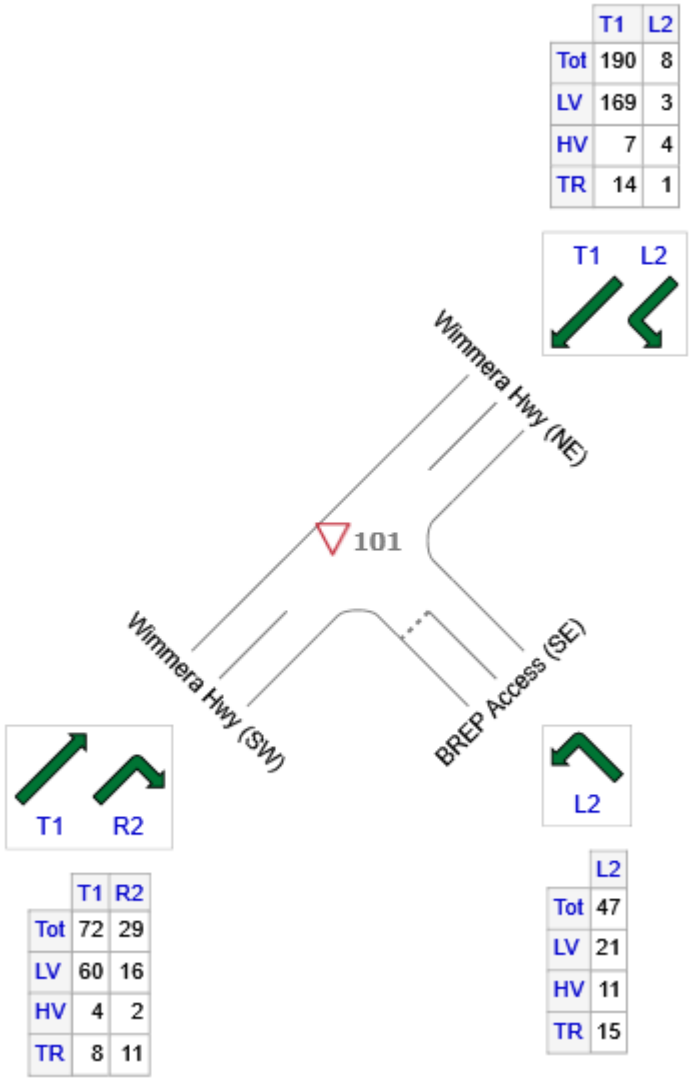
### Site Layout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



## Input Volumes

**Volume Display Method: Separate**




| | All MCs | Light Vehicles (LV) | Heavy Vehicles (HV) | Large Trucks (TR) |
|---|---|---|---|---|
| SE: BREP Access (SE) | 47 | 21 | 11 | 15 |
| NE: Wimmera Hwy (NE) | 198 | 172 | 11 | 15 |
| SW: Wimmera Hwy (SW) | 101 | 76 | 6 | 19 |
| Total | 346 | 269 | 28 | 49 |

## 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. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SouthEast: BREP Access (SE) | | | | | | | | | | | | | | | |
| Lane 1 | 49 | 55.3 | 49 | 55.3 | 696 | 0.071 | 100 | 7.6 | LOS A | 0.3 | 3.8 | Full | 500 | 0.0 | 0.0 |
| Approach | 49 | 55.3 | 49 | 55.3 | | 0.071 | | 7.6 | LOS A | 0.3 | 3.8 | | | | |
| NorthEast: Wimmera Hwy (NE) | | | | | | | | | | | | | | | |
| Lane 1 | 208 | 13.1 | 208 | 13.1 | 1689 | 0.123 | 100 | 0.4 | LOS A | 0.0 | 0.0 | Full | 500 | 0.0 | 0.0 |
| Approach | 208 | 13.1 | 208 | 13.1 | | 0.123 | | 0.4 | NA | 0.0 | 0.0 | | | | |
| SouthWest: Wimmera Hwy (SW) | | | | | | | | | | | | | | | |
| Lane 1 | 106 | 24.8 | 106 | 24.8 | 1121 | 0.095 | 100 | 4.1 | LOS A | 0.4 | 4.4 | Full | 500 | 0.0 | 0.0 |
| Approach | 106 | 24.8 | 106 | 24.8 | | 0.095 | | 4.1 | NA | 0.4 | 4.4 | | | | |
| All Vehicles | 364 | 22.3 | 364 | 22.3 | | 0.123 | | 2.4 | NA | 0.4 | 4.4 | | | | |

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.
Minor Road Approach LOS values are based on average delay for all lanes.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
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 Gap.
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.

Stantec

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