**PREPARED FOR CHIEF MINISTER, TREASURY AND ECONOMIC DEVELOPMENT DIRECTORATE**
**JULY 2018**
**17-001746**
ORIGINAL
TRANSPORT

# John Gorton Drive Stage 3B
## Development Application

# COMMERCIAL IN CONFIDENCE



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DOCUMENT CONTROL

17-001746

| Issue | Date | Issue Details | Author | Checked | Approved |
|---|---|---|---|---|---|
| 0 | 7/03/18 | First Issue | JKM | | |
| 1 | 5/06/18 | Update to address s211 exemption | JRP | JKM | JKM |
| 2 | 27/07/18 | Added TCCS Design Approval | JRP | JKM | JKM |

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## APPENDICES

# 1 INTRODUCTION

The Chief Minister, Treasury and Economic Development Directorate, engaged Calibre in August 2017 to develop the design and documentation for John Gorton Drive Stage 3B (JGD3B) 500m further south of the stage currently under construction (JGD3A). This extension is known as JGD3B and extends from Chainage 16,975 to Chainage 17,500.

This Development Application (DA) report specifically covers planning approval requirements and should be read in conjunction with the accompanying Preliminary Sketch Plan (PSP) report. The PSP covers the following aspects of the project:

- Pre-design studies
    - Bindubi Street Extension – Junction with John Gorton Drive Engineering Assessment Report
    - John Gorton Drive Stage 3B Feasibility Study
- Other relevant projects
    - Molonglo 3 Road Access and Molonglo River Bridge Feasibility Study
    - John Gorton Drive Stage 3A (JGD3A)
    - Whitlam Estate Design
    - Molonglo 3 Planning Design Framework (PDF)
- Stakeholders and consultation
- Support studies and investigations
    - Topographic survey
    - Services potholing
    - Tree assessment
    - Geotechnical investigation
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    - Utility services
    - Landscaping
    - Street lighting
- Safety in design
- Planning Approval
- Constructability
- Opinion of cost

This Development Application is submitted in the Impact track and is exempt from an Environmental Impact Statement (EIS) under s211 of the Planning and Development Act 2007. The exemption was granted on 8 May 2018 by Mick Gentleman MLA, the Minister for Planning and Land Management.

The JGD3B project is the second to last section of Coppins Crossing Road to be upgraded to John Gorton Drive. The last section (JGD3C) will be undertaken as a future project and will complete the arterial north-south transport route.

# 2 PROJECT OVERVIEW

## 2.1 PROJECT LOCATION

The project site is the current Coppins Crossing Road adjacent to the future suburb of Whitlam. Figure 2-1 shows the project location highlighted in green.

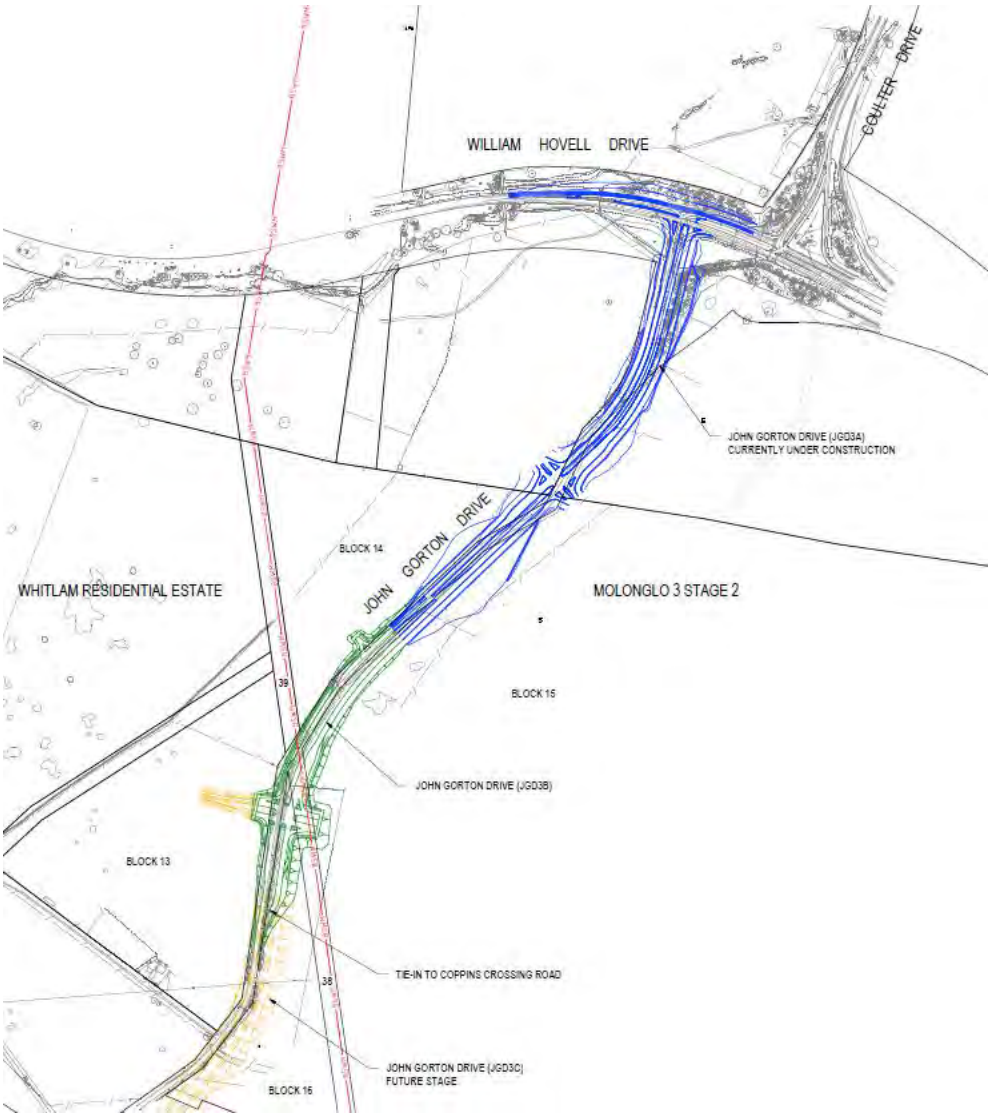


Figure 2-1 Project Location

## 2.2 DESCRIPTION OF WORKS

The key features of the works are as follows:

- Replacement of 500m of the existing two lane Coppins Crossing Road with a 4 lane roadway, directly south of the JGD3A project, which is currently under construction.
- Construction of a four-way signalised intersection on John Gorton Drive (Intersection 3) approximately 1,300m south of William Hovell Drive.
- Construction of a left-in / left-out unsignalised intersection on John Gorton Drive (Intersection 2) approximately 970m south of William Hovell Drive.
- Construction of new pavement, kerbs, paths and stormwater drainage.
- Relocation of existing utilities services (Telstra optic fibre).
- New utilities along John Gorton Drive including electricity, gas and telecommunications.
- New utilities across John Gorton Drive including electricity, gas and telecommunications and sewer.
- Construction of new street lighting.
- Installation of new linemarking and signage.
- Landscaping.

## 2.3 LAND USE

The works are predominantly within the existing Coppins Crossing road reserve, with sections of the new John Gorton Stage 3B alignment and intersection stubs extending into Molonglo Valley Registered Rural Blocks 13, 14, 15, 16, 38 and 39.

The Planning Delivery Division of the Environment, Planning and Sustainable Development Directorate (EPSDD) has advised that the existing leases over the blocks contain a withdrawal clause allowing land to be withdrawn for any purpose providing seven days' prior written notice to the licensee. The relevant advice from EPSDD is included in Appendix K.

The request for land withdrawal will need to be submitted to the Planning Delivery Division at least four weeks prior to the land being required, to allow enough time to have new plans drawn up and withdrawal notices prepared. The licensee will also need to be notified of the pending withdrawal prior to the land withdrawal request being received.

It is understood that the process of requesting land withdrawal and notifying the licensees will be managed by CMTEDD.

## 2.4 CONSTRUCTION TIMING

This project is being staged and timed to facilitate development in Molonglo 3, specifically the new suburb of Whitlam. Construction commencement is scheduled to occur directly following the receipt of the Notice of Decision.

## 2.5 CONSTRUCTION COST

The construction cost is estimated to be $9.7 million. Refer PSP report for breakdown.

## 2.6 TCCS DESIGN APPROVAL

A certificate of design approval was issued by TCCS in July 2018. This is included in Appendix L.

# 3 DEVELOPMENT APPLICATION REQUIREMENTS

## 3.1 DEVELOPMENT APPLICATION DOCUMENTATION CHECKLIST

Development Application requirements have been reviewed against EPD's Documentation Checklist for Industrial, Community, Parks and Recreation Zones, Transport and Services and Non –Urban. The table below outlines where documentation requirements have been provided.

| Requirement | Project Reference | Comment |
|---|---|---|
| Statement Against Relevant Criteria | Section 3.3<br>Appendix B – Transport and Services<br>Appendix C – Residential | Transport and Services Zone Development Code, Non-Urban Zone Development Code and Residential Zone Development Code has been assessed against. |
| Site Plan | Drawings 17-001754-005+ General Arrangement.<br><br>Drawings 17-001754-101+ to 17-001754-103+ Detail Plans. | Provided. |
| Floor Plans | Not Required. | The project does not include any buildings, therefore Floor Plans are not relevant to this proposal. |
| Parking Plans | Not Required. | The project does not include any parking, therefore Parking Plans are not relevant to this proposal. |
| Elevations | Drawings 17-001754-301 to 17-001754-303 Longitudinal Sections | Provided. |
| Area Plans | Not Required. | The project does not include any buildings, therefore Area Plans are not relevant to this proposal. |
| Sections | Drawings 17-001754-010 to 17-001754-011 Typical Cross Sections | Typical Road Cross Sections have been provided for roadways |
| Driveway Plan | Not Required. | The project does not include any driveways, therefore Driveway Plans are not relevant to this proposal. |
| Colour Sample Schedule | Not Required. | The project is for an intersection upgrade and road duplication and does not include any buildings or structures, therefore Colour Sample Schedules are not relevant. |
| Demolition Plan | Drawings 17-001754-101+ to 17-001754-103+. | Provided |
| Erosion & Sediment Control Plan | Drawings 17-001754-750+ to 17-001754-752+ | Concept Pollution Control Plan provided |
| Survey Certificate | Appendix J | Provided |
| Environmental Significance Opinion (ESO) | N/A | Not required. |
| Recovery of Costs – Proof of Payment ESO | N/A | Not required |
| Tree Management Plan | Drawing LMPP-01 and LMPP-02 | Provided |
| Landscape Plans | Refer to drawings L01 to L05. | Provided |

| Requirement | Project Reference | Comment |
|---|---|---|
| Composite Street Scape Elevation | N/A | The project is for roadworks and a Composite Street Scape Elevation is not relevant. |
| Access and Mobility Report | N/A | The project does not include any buildings, therefore an Access and Mobility Report is not relevant to this proposal. |
| Noise Management Plan | Appendix H | Noise Study provided |
| Waste Management Plan | Appendix F | Provided |
| Bill of Quantities | Section 2.5 | Summary provided. Breakdown provide in PSP report. |
| List of Interested Parties | PSP report | Provided |
| Lease Variation Charge Estimate | N/A | Not relevant |
| Valuation Certificate | N/A | Not relevant |
| Valuation Report | N/A | Not relevant |
| Schedule of Unit Entitlements | N/A | Not relevant |
| Social, Cultural and Economic Impact Assessment | N/A | Not relevant |

Table 3.1: Development Application Documentation Checklist

## 3.2 THE MOLONGLO VALLEY PLAN FOR THE PROTECTION OF MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE (NES PLAN)

The NES Plan provides for urban development within the Molonglo Valley and establishes the ACT Government's commitments to protect Matters of National Environmental Significance (MNES).

The NES Plan is structured as follows:

- Section 1 provides an introduction to the NES Plan.
- Section 2 provides a description of the activities that will take place under NES Plan. These include development, conservation and bushfire management.
- Section 3 outlines how the NES Plan will be implemented.
- Section 4 provides the ACT Government commitments to conservation outcomes for the relevant MNES.
- Section 5 provides a description of the monitoring, evaluation and reporting mechanisms to ensure that actions committed to in the NES Plan are being met and publicly reported.
- Section 6 provides reasonable assurance in relation to implementation of the NES Plan.

The NES plan was endorsed on 7 October 2011 by the Minister for Sustainability, Environment, Water, Population and Communities, the Honourable Tony Burke.

A small (maximum 0.08ha) area of 'low quality potential' Pink-tailed Worm-lizard habitat may be impacted, however this is a very small impact in the context of the species' habitat across the Molonglo valley, a large proportion of which is to be conserved as stipulated in the Molonglo NES Plan. The impact to this species has been assessed and approved through the Molonglo Valley Strategic Assessment. Similarly, impacts to the Superb Parrot have already been assessed and approved. No Box Gum Woodland will be impacted by this project. Refer drawing 17-001754-800.

## 3.3 S211 EXEMPTION

In accordance with the Planning and Development Act 2007, an Environmental Impact Statement (EIS) is normally required for projects that involve a process or activity likely to have significant adverse environmental impact on an endangered species or ecological community.

Section 211 of the Act allows an applicant to seek exemption from the requirement to complete an EIS. The Minister responsible for the Act has discretion under Section 211 to grant exemption based on the information presented in previous studies. If an exemption is granted, then the EIS process is regarded as complete and allows an application to lodge a development application (DA) for evaluation under the impact track process.

In May 2018, the EIS exemption was granted by Mick Gentleman MLA, the Minister for Planning and Land Management. A copy of the notifiable instrument granting this exemption is included in Appendix I.

Some of the responses refer to an Ecological Impact Assessment (EIA). This EIA was completed to determine and assess the impacts of the proposed development upon habitat for terrestrial flora and fauna species and ecological communities. A copy of the EIA is included as an appendix to the PSP report.

Within this section, responses have been provided to the Molonglo Stage 3 – Urban Development and Infrastructure – Application for EIS Exemption Consideration Report.

This includes responses to the following components:

- Table 9 Conditions for development approval
- Section 4.2.4 Impacts on species or ecological communities – Recommended mitigation measures
- Section 4.3.4 Native Vegetation Clearing – Recommended mitigation measures
- Section 4.4.4 Natural Waterway – Recommended mitigation measures
- Section 4.5.5 Heritage – Recommended mitigation measures
- Section 5.1.2 Bushfire – Recommended mitigation measures
- Section 5.2.2 Visual Impacts – Recommended mitigation measures

Note that Section 4.1.4 Electricity Transmission Line Construction Works – Recommended mitigation measures has not been responded to as it was considered not applicable.

One of the Conditions for development approval, listed in Table 9 is that all works must be consistent with the mitigation measures in Table 5.2 of the Molonglo Stage3 s211 Application Supporting document – Final (Umwelt, March 2018). This table lists environmental risk mitigation and management measures for the design phase of the project. Response to each of the mitigation measures in Table 5.2 are provided in Table 3.9 of this document.

Table 3.2 Conditions for development approval

| No | Condition | Endorsement/ Approval | Development Stage | Condition of Approval | Response |
|---|---|---|---|---|---|
| 1 | NES Plan | EPSDD | All stages of planning and development | All works must be in accordance with the NES Plan. | • The project is consistent with the Molonglo and North Weston Structure Plan, on which the NES plan was based.<br>• Most of the actions in the NES plan are conservation outcomes to be managed by TCCS and EPSDD.<br>• This project will have minimal impact on the NES clearance budgets (refer Item 2 of this table).<br>• The Adaptive Management Strategy sets out the framework for achieving the NES Plan's commitments. This is addressed in Item 7 of this table. |
| 2 | NES clearance budgets | EPSDD | During construction and operation | Any clearance of BGW or PTWL habitat must be quantified and reported to EPSDD to ensure consistency with the Molonglo NES Plan clearance budgets. | • The EIA found that only a small area (0.08ha) of PTWL habitat may be impacted, however this habitat was considered low quality and unlikely to currently support PTWL.<br>• No BGW was identified in the area of this project. |
| 3 | Flora and fauna | EPSDD | During construction | To minimise impacts on flora and fauna, the proposal must :<br>• avoid clearing hollow-bearing trees;<br>• where hollow-bearing trees cannot be retained, removal must be done outside of the key the breeding season; and<br>• avoid works in all known nesting tree areas for the superb parrot. | • No hollow-bearing trees were identified during in the EIA. |
| 4 | All works | | Prior to planning and commencement of any works. | All works must be consistent with the mitigation measures in Table 5.2 of the Molonglo Stage 3 | Responses to Table 5.2 are provided in Table 3.9 of this report. |

| No | Condition | Endorsement/ Approval | Development Stage | Condition of Approval | Response |
|---|---|---|---|---|---|
| | | | | S211 Application Supporting document –Final (Umwelt, March 2018) | |
| 5 | Kama Nature Reserve Buffer | EPSDD | Preparation of Planning and Design Framework and Estate Development Plans | The treatment and boundary of the Kama Nature Reserve buffer within the FUA must be consistent with the recommendations in the Kama Interface Management Strategy (Capital Ecology, 2016). | This project does not impact the Kama Nature Reserve buffer. |
| 6 | Planning and design | EPSDD | Preparation of Planning and Design Framework and Estate Development Plans | To minimise impacts from urban development on the environmental and heritage values of the Molonglo Valley the following matters must be incorporated in the Planning and Design Framework and addressed in the design of any EDP:<br>• design of urban area to minimise impacts to retained values (e.g. through the placement and management of urban open space; and appropriate buffers) and character of the region;<br>• provide designated pathways and access points to the Molonglo River Corridor;<br>• provide a connection of approximately 60m wide for a fauna corridor from the National Arboretum west to the river and up to Mount Stromlo;<br>• the location of the electricity easement must avoid residential areas, and minimise ecological impacts; and<br>• include the buffer between the Kama Nature Reserve and Urban Development in accordance with the Kama Interface | This project is not a Planning and Design Framework or an Estate Development Plan. |

| No | Condition | Endorsement/ Approval | Development Stage | Condition of Approval | Response |
|---|---|---|---|---|---|
| | | | | Management Strategy Report (Capital Ecology, 2016). | |
| 7 | Molonglo Adaptive Management Strategy | EPSDD | During construction and operation | All works must be undertaken in a manner consistent with the Molonglo Adaptive Management Strategy. | The Molonglo Adaptive Management Strategy primarily relates to:<br>• Kama Nature Reserve<br>• Molonglo River Corridor<br>• The western edge area<br>• Box Gum Woodland patches C, H, E, F, G, GG and N<br>• High quality and moderate PTWL habitat.<br>This project does not impact any of these areas. |
| 8 | Revegetation | | During operation | • All areas of disturbance must be revegetated immediately following construction.<br>• Native grass mix should be used for reseeding where possible, particularly adjacent to areas of BGW. | The project drawings and construction specification will include a requirement to grass all batters and to vegetate any disturbed areas following construction. The grass mix used will be in accordance with ACT Standard Specification for Urban Infrastructure Works. This is considered acceptable given that the land use of the area will be changed to an urban area and the existing natural character will not be retained in the road reserve or immediately adjacent areas. |
| 9 | Heritage | ACT Heritage Council | Prior to construction<br>Preparation of Estate Development Plans | • The Molonglo Stage 3 Additional Areas Cultural Heritage Assessment (Biosis 2014), amended in accordance with ACT Heritage Council dated 10 November 2014, must be | The heritage investigations by Biosis are not being managed by Calibre or CMTEDD.<br><br>Advice from the ACT Heritage Council was obtained and it was confirmed that |

| No | Condition | Endorsement/ Approval | Development Stage | Condition of Approval | Response |
|---|---|---|---|---|---|
| | | | | submitted to the Council for review and endorsement.<br>• The Statement of Heritage Effects – Unexpected Aboriginal Find Molonglo Stage 3 Future Residential Development (Biosis 2016) must be submitted to the Council for review and endorsement.<br>• Subject to ACT Heritage Council approval of the above, all heritage assessment and management requirements for the Molonglo 3 development must be implemented prior to the commencement of works. | JGD3B will not impact any heritage sites. This advice is provided in the correspondence appendix of the PSP report. |
| 10 | Construction environment management plan | EPA/ EPSDD | Before works commence | A CEMP must be developed and implemented addressing the commitments made by the proponent in the EIS exemption application. The CEMP should include, but not be limited to:<br>• weed management strategy to prevent weed infestation;<br>• erosion and sediment control measures to be implemented during and after construction;<br>• unanticipated Discovery Protocols for the management of impacts on unexpected heritage object finds;<br>• provisions for tree removal and log storage; and,<br>• WSUD measures, e.g. removal or construction of stormwater ponds. | The Principal Contractor will be responsible for developing a CEMP and obtaining EPA approval.<br><br>This will be a requirement of the Construction Specification. |
| 11 | Water quality | EPA/ Icon Water/ EPSDD | Requirement for DA lodgement/ prior to | The development application must include details on how stormwater will be managed and/or treated | Stormwater runoff from this project will be captured in temporary sedimentation |

| No | Condition | Endorsement/ Approval | Development Stage | Condition of Approval | Response |
|---|---|---|---|---|---|
| | | | construction/during operation | prior to entering the Molonglo River, in accordance with the relevant guidelines.<br>The water treatment system must be maintained during operation and water entering Molonglo River must be released in accordance with EPA guidelines to ensure water quality is maintained. | basins, and will therefore not enter the Molonglo River. The long term stormwater management strategy for the area will be determined by the design of the adjacent estates. |
| 12 | Electricity | | Prior to construction | Submit electromagnetic radiation (EMR) study as part of any future DA for electrical transmission line works. | This project only involves provision of conduits for future electrical lines, and installation of electrical cables to power the traffic signals and streetlights. It does not involve installation or relocation of major electrical transmission lines. |
| 13 | Land Contamination | EPA | Prior to construction | • The site must be assessed, remediated and the findings of the assessment and remedial works independently audited by an EPA approved Auditor to determine the suitability of the site for its proposed and permitted uses.<br>• The Auditor's findings into site suitability from a contamination perspective must be reviewed and endorsed by the EPA prior to occupancy of the site. | JGD3B does not impact any of the Areas of Environmental Concern identified in the Molonglo Valley Stage 3 (Area B) Stage 2 Detailed Site Investigation (WSP, 2016).<br><br>Refer to the correspondence appendix of the PSP report for liaison with EPSDD and the Auditor. |
| 14 | Bushfire Mitigation | ESA | During operation | All works must be consistent with the Bushfire Risk Strategy – Molonglo Stage 3, Denman Prospect and the Molonglo River Corridor (Australian Bushfire Protection Planners, 2016). | A review of the Bushfire Risk Strategy has confirmed that there are no recommendations applicable to this project. The recommendations chiefly relate to establishment of Asset Protection Zones on the edges of Molonglo Stage 3, Denman Prospect and the Molonglo River Corridor and specific estate planning requirements. |

| No | Condition | Endorsement/ Approval | Development Stage | Condition of Approval | Response |
|---|---|---|---|---|---|
| 15 | Bushfire thinning strategies | Conservation Research (EPSDD) | During operation | Thinning strategies for fuel management, including the intervals for burning, must be determined in consultation with Conservation Research (EPSDD). | Fuel management, if applicable, will be managed by TCCS. |
| 16 | Bushfire SFAZs | ESA | During operation | • APZ will occur within the urban areas;<br>• OAPZ to be established outside conservation areas. Asset protection zones would be implemented in accordance with the 'Planning for Bushfire Risk Mitigation General Code'<br>• The existing Strategic Fire Advantage Zone edges are to be maintained and managed as per Fuel Management Standards of ACT Bushfire Management Standards. | JGD3B does not impact any Asset Protection Zones or Strategic Fire Advantage Zone edges. |
| 17 | DA documentation | EPSDD | Requirement for DA lodgement | • As part of any subsequent development applications relying on this EIS Exemption, a document must be provided detailing how the recommended mitigation measures and conditions in this report have/will be met. | Refer to this table and further information provided in Section 3.3 of this report. |

Table 3.3 Impacts on species or ecological communities - Recommended mitigation measures

| Recommended Mitigation Measures | Response |
|---|---|
| Design the urban area to minimise impacts to retained values and character of the region (e.g. through the placement and management of urban open space); | This project does not involve design of an urban area. |
| Prevent indirect additional impacts through comprehensive construction environmental management plans; | The Principal Contractor will prepare a construction environmental management plan (CEMP). This will be a requirement of the project specification. |
| Develop and implement a construction environmental management plan (CEMP) and associated sub plans to minimise impacts during land clearing and construction; | The Principal Contractor will prepare a construction environmental management plan (CEMP). This will be a requirement of the project specification. |

| | |
|---|---|
| Develop and implement an operational management plan to provide ongoing management for the urban interface at the Molonglo River Reserve and Kama Nature Reserve; | Not applicable. |
| Implement avoidance and mitigation measures specified in the NES Plan; | The Principal Contractor will prepare a CEMP so that unnecessary impacts from construction are avoided. |
| Minimise loss of habitat for local fauna in non-cleared areas by using felled trees as habitat; | There is no proposal to use felled trees as habitat as adjacent areas will be developed into urban estates. |
| Minimise vegetation removal to be consistent with the requirements of the NES plan; | Vegetation removal is to be kept to the minimum required for construction of the works. Removal of 27 trees has been supported by TCCS Urban Treescapes (refer to Appendix K Correspondence). |
| Avoid works in all BGW and high and moderate quality PTWL habitat; | The project does not impact any BGW or moderate quality PTWL habitat. It impacts only a small area of low quality potential habitat. Refer to the EIA. |
| Avoid clearing hollow-bearing trees; | No hollow-bearing trees were identified in the EIA. |
| Where hollow-bearing trees cannot be retained, removal must be done outside of the key breeding season; | No hollow-bearing trees were identified in the EIA. |
| Avoid works in all known nesting tree areas for the superb parrot; and | The EIA noted that “the Superb Parrot, may forage in the eucalypts and wattles planted within the study area, however this potential foraging habitat is unlikely to be of significance to the species” (Capital Ecology, 2018). |
| Implement and monitor the ‘impact budget’ as approved under the EPBC Act. | • The EIA found that only a small area (0.08ha) of PTWL habitat may be impacted, however this habitat was considered low quality and unlikely to currently support PTWL.<br>• No BGW was identified in the area of this project. |

Table 3.4 Native vegetation clearing - Recommended mitigation measures

| Recommended Mitigation Measures | Response |
|---|---|
| Revegetate all areas of disturbance immediately following construction; | The project drawings and construction specification will include a requirement to grass all batters and to vegetate any disturbed areas following construction. |
| Clearly mark limits for clearing prior to any construction commencing; | Limits of clearing will be as shown in the fencing plan (refer drawing 17-001746-750). |

| | |
|---|---|
| Reseed disturbed areas with native grass mix where possible, particularly adjacent to areas of BGW; and | The grass mix used will be in accordance with ACT Standard Specification for Urban Infrastructure Works. This is considered acceptable given that the land use of the area will be changed to an urban area and the existing natural character will not be retained in the road reserve or immediately adjacent areas. |
| Develop and implement CEMP and sub plans to avoid or minimise environmental risks (e.g. sedimentation, erosion, weeds, stormwater runoff). | The Principal Contractor will prepare a construction environmental management plan (CEMP). This will be a requirement of the project specification. |

Table 3.5 Natural waterway - Recommended mitigation measures

| Recommended Mitigation Measures | Response |
|---|---|
| Develop and implement a CEMP to ensure best practice erosion control measures are installed during construction; | The Principal Contractor will prepare a construction environmental management plan (CEMP). This will be a requirement of the project specification. |
| Revegetate all areas of disturbance immediately following construction to prevent excessive run-off entering waterways; | The project drawings and construction specification will include a requirement to grass all batters and to vegetate any disturbed areas following construction. |
| Incorporate Water Sensitive Urban Design (WSUD) principles and water quality considerations in drainage design; | The project incorporates WSUD measures in the form of a depressed, grass-lined median. |
| Design stormwater systems to ensure site runoff does not flow across retained areas of PTWL habitat; | The stormwater systems have been designed to capture runoff and divert it to temporary sedimentation basins. |
| Maintain water treatment systems during operation to ensure water quality entering Molonglo River is within EPA guidelines; | No water will be discharged into the Molonglo River. |
| Prior to construction establish no-go zones, site boundaries and fences to prevent unauthorised access into adjacent areas; | Fencing will be established in accordance with the fencing plan (refer drawing 17-001746-750). |
| Minimise adverse impacts on the river corridor during the design and planning phases including consideration of adjacent land uses and adequate open space buffers; and | Not applicable. |
| Provide designated pathways and access points to the Molonglo River Corridor. | Not applicable. |

Table 3.6 Heritage - Recommended mitigation measures

| Recommended Mitigation Measures | Response |
|---|---|
| Develop an Unanticipated Discovery Plan (UDP) prior to the commencement of works as a contingency in the event that any previously unidentified archaeological artefacts or sites are located during the course of the works; | The Principal Contractor will be responsible for developing and implementing an UDP. |
| Implement UDP during construction; | The Principal Contractor will be responsible for developing and implementing an UDP. |
| Prepare a specific management plan to ensure protection of Aboriginal Cultural Heritage areas during construction and operation; | Refer to the correspondence appendix of the PSP report for liaison with ACT Heritage Council. The nearest heritage area is not within the project construction footprint. |
| Ensure boundaries and no-go zones are well defined during construction; | Refer to the correspondence appendix of the PSP report for liaison with ACT Heritage Council. The nearest heritage area is not within the project construction footprint. |
| Avoid areas identified as cultural heritage sites- if impacts to the identified sites cannot be avoided then a program of surface collection (salvage) of the sites should be undertaken; and, | Refer to the correspondence appendix of the PSP report for liaison with ACT Heritage Council. The nearest heritage area is not within the project construction footprint. |
| Avoid impacts to scarred trees-trees should be assessed by a qualified dendrologist to ascertain the origin of the scar/s and guide decisions regarding the future status of these recordings as registered Aboriginal objects. | Refer to the correspondence appendix of the PSP report for liaison with ACT Heritage Council. The nearest heritage area is not within the project construction footprint. |

Table 3.7 Bushfire - Recommended mitigation measures

| Recommended Mitigation Measures | Response |
|---|---|
| IAPZ will be established within the urban area; | A review of the Bushfire Risk Strategy (ABPP, 2016) has confirmed that JGD3B does not impact any Asset Protection Zones. |
| Outer APZ to be established outside conservation areas. Asset protection zones will be implemented in accordance with the 'Planning for Bushfire Risk Mitigation General Code' under the Territory Plan; | A review of the Bushfire Risk Strategy (ABPP, 2016) has confirmed that JGD3B does not impact any Asset Protection Zones. |
| Within the SFAZs the proposed work will be limited to the maintenance of fuel loads through appropriate grazing, slashing or burning; | The project does not impact any SFAZs. |
| The Kama Operation Plan will be implemented for any bushfire or maintenance works required within the reserve; and | Not applicable. The works are outside the Kama Nature Reserve. |
| Establish sensitive mowing regimes. | Mowing will be managed by TCCS. |

Table 3.8 Visual impacts - Recommended mitigation measures

| Recommended Mitigation Measures | Response |
|---|---|
| Appropriate urban form and layout, including considering block sizes and location of denser development multiple-storey buildings to reduce bulk and scale in visually sensitive areas; | Not applicable. |
| Inclusion of open space elements throughout the area for development; and | Not applicable. |
| Establish buffer areas - as well as providing ecological benefits, buffer zones will reduce visual impacts from within retained nature reserves towards the urban development area. | Not applicable. |

Table 3.9 Key Risks - Design Phase

| Activity | Risk | Mitigation (Summary) | Response |
|---|---|---|---|
| Design Development | Development footprint exceeds the approved Strategic Assessment Area, resulting in potential non-compliance with EPBC Approval. | • identify any required works (including services) to be undertaken outside Strategic Assessment Area, or within areas protected in the NES Plan<br>• seek EPBC Approval for any additional significant impacts to MNES (or implement adaptive management strategy) | • The development footprint of John Gorton Drive 3B (JGD3B) is wholly contained within the approved Strategic Assessment Area. |
| | Changes to surface drainage result in changes to the water quality of the Molonglo River | • incorporate Water Sensitive Urban design (WSUD) principles and water quality considerations in drainage design<br>• design stormwater system to ensure site runoff does not flow across retained areas of pink-tailed worm lizard habitat<br>• treat stormwater prior to entering Molonglo River | • The design includes a depressed, grass-lined median, which will provide stormwater treatment.<br>• Stormwater flows for JGD3B are proposed to be directed to temporary sedimentation basins, which will provide treatment and storage for the medium term, until the surrounding estates are developed. The estate design will include WSUD measures to treat stormwater prior to entering Molonglo River.<br>• Stormwater flows are collected via the depressed median and a network of pits and pipes, and therefore will not flow across PTWL habitat. |

| Activity | Risk | Mitigation (Summary) | Response |
|---|---|---|---|
| | Treatment of ecological buffer between Kama Nature Reserve and urban area is not adequate, and results in adverse impacts to the value of the conservation area | • final urban edge treatment and design of Molonglo 3 will be consistent with Emergency Services ACT (ESA) Bushfire Management Standards (as incorporated into the ACT Strategic Bushfire Management Plan), the outcomes of the Capital Ecology (2016) Strategy and consultation with relevant agencies at EDP stage | • JGD3B is not in close proximity to the Kama Nature Reserve and will therefore not impact the ecological buffer between Kama Nature Reserve and the urban area. |
| | Design of urban area results in loss of pink-tailed worm-lizard habitat | • gain approval under EPBC Act for impacts to pink-tailed worm-lizard (complete)<br>• implement and monitor the 'impact budget' as approved under the EPBC Act (underway)<br>• gain approval under PD Act for impacts to pink-tailed worm-lizard (underway)<br>• implement avoidance and mitigation measures specified in NES Plan<br>• compensate for unavoidable impacts through | • The proposed footprint of JGD3B does not impact any identified PTWL habitat. A very small area of potential PWTL habitat is close to the project and may be impacted during construction. However, this is a very small impact in the context of the species' habitat across the Molonglo valley, a large proportion of which is to be conserved as stipulated in the Molonglo NES Plan. The impact to this species has been assessed and approved through the Molonglo Valley Strategic Assessment. Refer to drawing 17-001746-800 Environmental Plan. |
| | Design of urban area results in loss of box gum woodland | • gain approval under EPBC Act for impacts to box gum woodland (complete)<br>• implement and monitor the 'impact budget' as approved under the EPBC Act (underway)<br>• gain approval under PD Act for impacts to box gum woodland (underway) | • The proposed footprint of JGD3B does not impact any identified box gum woodland. Refer to drawing 17-001746-800 Environmental Plan. |

| Activity | Risk | Mitigation (Summary) | Response |
|---|---|---|---|
| | Design of urban area results in the loss of native vegetation | • gain approval under PD Act for impacts to native vegetation (underway)<br>• minimise clearing footprints in areas of native vegetation<br>• manage urban interface with retained natural areas to prevent flow-on impacts<br>• Compensate for unavoidable impacts through offsets identified by the NES Plan | • The development of JGD3B will result in removal of a mixture of native and exotic trees. Endorsement for the tree removal was provided by TCCS Urban Treescapes was provided via email (refer Appendix K).<br>• The clearing area will be kept to the minimum footprint required for the road construction. The Contractor's CEMP will include controls to minimise the impact area.<br>• JGD3B will not interface with any retained natural areas. Urban Development will occur on both sides.<br>• The offsets established within the NES Plan protect the majority of native vegetation within Molonglo Stage 3. The s211 application supporting documentation concludes that the outcomes of the NES Plan appropriately account for losses to native vegetation and species that occur as a result of development within Molonglo Stage 3. |
| | Design of urban area results in loss of habitat for woodland birds | • implement avoidance and mitigation measures specified in NES Plan<br>• Compensate for unavoidable impacts through offsets identified by the NES Plan | • The s211 supporting documentation notes that the majority of habitat for woodland birds is included within offsets established by the NES Plan, and that loss of habitat associated with development of Molonglo Stage 3 would be unlikely to result in a significant impact to these species. |

| Activity | Risk | Mitigation (Summary) | Response |
|---|---|---|---|
| | Integration of heritage values of Cultural Area into urban landscape not appropriate and results in adverse impacts to the value of the site | • consult with Heritage Unit regarding ongoing management of site and surrounding areas<br>• develop a conservation management plan and unanticipated discovery plan for implementation during construction<br>• engage with RAO's if any impact likely to occur | • Heritage items in proximity to the works have been identified via ACTMAPi. Exact coordinates of heritage items have been obtained from ACT Heritage Council to confirm the construction will not impact these items. Refer to the correspondence appendix of the PSP report.<br>• The construction Contractor will be responsible for developing and implementing a conservation management plan and unanticipated discovery plan.<br>• It is considered that the development of JGD3B is not likely to result in any heritage impacts. |
| | Design of facilities and urban development adjacent to the river corridor and western edge results in adverse impacts to otherwise avoided or retained ecological values prescribed in the NES Plan | • Masterplan to be considerate of ecological values in adjacent areas, including sympathetic adjacent land uses and adequate open space buffers | • This project is not adjacent to the river corridor or the western edge. |
| | Alignment of powerline infrastructure results in loss of developable land for easements and setbacks | • undertake detailed design and options analysis of powerline alignment to ensure that loss of developable land is minimised (underway) | • This project does not include any powerline infrastructure. |

| Activity | Risk | Mitigation (Summary) | Response |
|---|---|---|---|
| | Location of urban edge requires bushfire mitigation works outside of the Kama Nature Reserve, with potential impacts on conservation values | • Design should involve consultation with relevant emergency services agencies and land managers responsible for implementing post-construction obligations under the NES Plan at EDP stage with reference to the ESA Bushfire Management Standards as incorporated into the ACT Strategic Bushfire Management Plan and the Bushfire Risk Strategy – Molonglo Stage 3, Denman Prospect & the Molonglo River Corridor (ABPP, April 2016). | • Not applicable. |
| | Management of Strategic Firefighting Advantage Zones (SFAZ) in Kama Nature Reserve | • implement the Kama Operation Plan for any bushfire or maintenance works required within the reserve<br>• establish sensitive mowing regime to be undertaken | • Not applicable. |
| Engineering Inspections, Service Location and Site Selection | Water infrastructure (including ponds and water main) are located within areas avoided by the NES Plan, or outside the strategic assessment area, potentially resulting in additional impacts to MNES and non-compliance with EPBC Approval | • consult with C'wlth (DoEE) for any impacts (permanent or temporary) within areas protected by the NES Plan<br>• gain EPBC Approval for any impacts outside the approved area if MNES are identified | • Not applicable. This project does not involve any water mains within areas avoided by the NES Plan or outside the strategic assessment area. |

| Activity | Risk | Mitigation (Summary) | Response |
|---|---|---|---|
| | Siting of powerlines result in aesthetic impacts to the future residential areas | • undertake detailed design and options analysis of powerline alignment to ensure that visual impacts and encroachment on urban area is minimised (underway) | • Not applicable. |
| | Existing road network does not have capacity to service new development | • undertake traffic planning studies early in design process to ensure capacity of roads to handle additional traffic<br>• implement recommendations of studies prior to occupation of suburbs | • This project is an upgrade to the existing Coppins Crossing Road, to provide additional capacity to service the new development.<br>• The intersection configurations have been tested with 2041 traffic volumes obtained from Molonglo 3 Road Network Scenarios Modelling – Consolidated Report (SMEC, December 2017), which was itself based on refinement of the Canberra Strategic Transport Model (CSTM). |

| Activity | Risk | Mitigation (Summary) | Response |
|---|---|---|---|
| | Subsurface conditions that may impact construction activities (contamination and UXO) not identified and inappropriate design concepts developed as a result | • implement recommendations of site auditor prior to construction commencing<br>• include provision for remediation in project budget | • JGD3B does not impact any of the Areas of Environmental Concern identified in the Molonglo Valley Stage 3 (Area B) Stage 2 Detailed Site Investigation (WSP, 2016).<br>• The potential for UXO discovery has been identified. The project specification will include a requirement for any persons on site to undergo an induction run by a specialty company skilled in assessment and remediation of UXO. The project budget includes a provisional allowance for further liaison with this company and removal of UXO if identified. |
| | Placement of ventilation and odour control structures associated with sewer infrastructure results in aesthetic and public health and safety concerns | • undertake detailed design and options analysis to ensure visual impacts, odour impacts, and encroachment on urban area is minimised<br>• undertake separate approvals process for any works outside S.211 footprint | • Not applicable. This project does not include any ventilation or odour control structures. |
| Approvals | Approval process delays construction of critical road infrastructure and connections required to service Molonglo 1 and 2 | • consult with EPSDD during design development to ensure clear communication of project timeframes and needs<br>• consider assessing critical roads separately if delays are expected | • JGD3B is the focus of this Development Application, and is submitted for approval separately to the estate works, to minimise the risk of delaying critical road infrastructure. |

## 3.4 PLANNING AND DESIGN FRAMEWORK

A Planning and Design Framework (PDF) document is a project requirement arising from the NES Plan. It is not required for statutory approval, but does need to be endorsed by the Commonwealth Government prior to construction. The PDF preparation is currently underway, with delivery expected in 2018.

## 3.5 STATEMENT AGAINST RELEVANT CRITERIA

As detailed in Figure 3-1 and Table 3.10 Impacted Zones and Responses, the new intersection layouts falls within two land use zones.

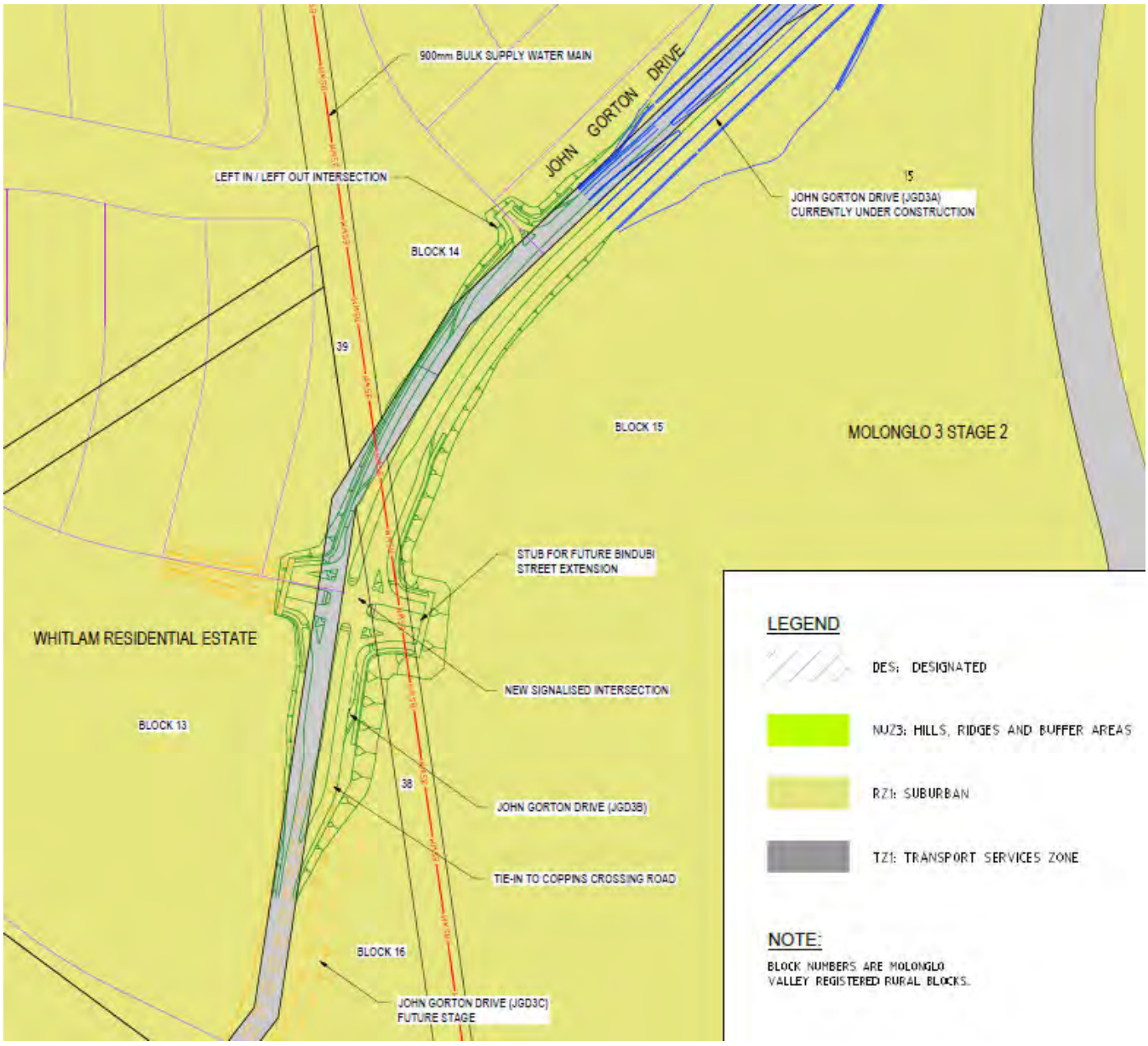


Figure 3-1 Territory Plan Overlay

| Legend | Zone | Area | Response |
|---|---|---|---|
| | Transport and Services – TSZ1 - Transport | Majority of the roadworks, excluding sections of the intersection stubs into the future Whitlam and Molonglo 3 development. | A statement against the Transport and Services Zone Development Code has been provided. Refer to **Appendix B** for details. |
| | Residential – RZ1 – Suburban | Sections of the John Gorton Drive alignment and intersection stubs providing access into future Whitlam and Molonglo 3 development. | The Residential Zones Development Code is generally not applicable to this project. Responses to relevant criteria have been provided, refer to **Appendix C**. |

Table 3.10 Impacted Zones and Responses

### 3.5.1 TRANSPORT AND SERVICES ZONE DEVELOPMENT CODE

The works are predominantly within the existing Coppins Crossing road reserve, which is zoned TSZ1. Responses to the Transport and Services Zone Development Code Criteria have been provided in Appendix B.

### 3.5.2 RESIDENTIAL ZONES DEVELOPMENT CODE

Sections of the John Gorton Drive alignment and the intersection stubs providing access into the future Whitlam and Molonglo 3 development will impact upon areas of RZ1 zoned land.

The design is only for the construction of roadworks and associated infrastructure and does not involve any residential development. As such, the Residential Zones Development Code is generally not applicable to this development. Responses to the relevant criteria have been provided in Appendix C.

### 3.5.3 MOLONGLO AND NORTH WESTON STRUCTURE PLAN

John Gorton Drive Stage 3A is within the Molonglo and North Weston Structure Plan area. Responses to the relevant provisions have been provided in Appendix D.

### 3.5.4 MOLONGLO VALLEY DISTRICT PRECINCT MAP AND CODE

A review of the Molonglo Valley District Precinct Map and Code has been conducted. As demonstrated in Figure 3-2 below, no additional criteria provisions apply to the project area. The Molonglo Valley District Precinct Code is therefore not applicable to this development.

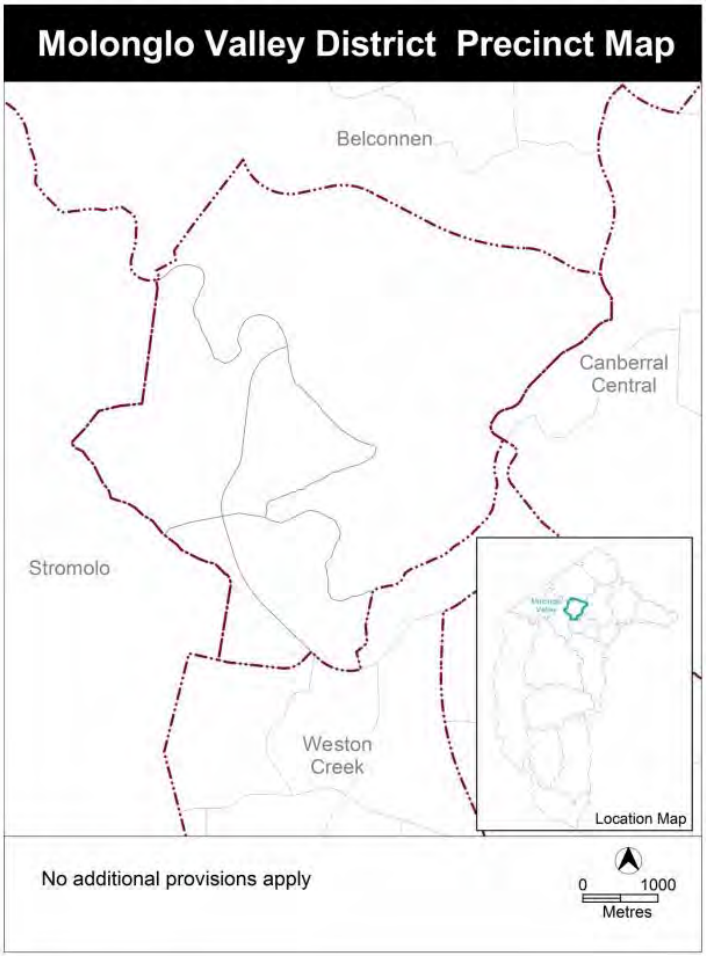


Figure 3-2 Molonglo Valley District Precinct Map

### 3.5.5 GENERAL CODES

| General Code | Comment | Applicable |
|---|---|---|
| Parking and Vehicular Access General Code | Not Applicable. This development does not include any on or off-street parking facilities or access from off- street car parking areas. | No |
| Bicycle Parking General Code | Not Applicable. This development does not include any bicycle parking. | No |
| Access and Mobility General Code. | The development includes a road upgrade and public transport facility. Therefore the Access and Mobility General Code is Relevant to this proposal. Responses to criteria are provided in Error! Reference source not found.. | Yes |
| Crime Prevention Through Environmental Design General Code. | The development includes a road upgrade and public transport facility. Therefore the Crime Prevention Through Environmental Design General Code is relevant to this proposal. Responses to criteria are provided in Error! Reference source not found.. | Yes |
| Community and Recreation Facilities Location General Code. | The Community and Recreation Facilities Location General Code is not applicable. | No |
| Communication Facilities and Associated Infrastructure General Code | Not Applicable. This development does is for a road upgrade only and therefore does not include any community facilities as per this general code. | No |
| Signs General Code | Not Applicable. No signs, as per the Signs General Code, are included in this proposed development.<br><br>*Note: All proposed traffic control signs have been designed in accordance with AS1742 and are located within the road reserve.* | No |
| Water Use and Catchment General Code | Not Applicable. The project does not fall within the areas prescribed within the Water Use and Catchment General Code. | No |
| Home Business General Code | Not Applicable. The project is for a road upgrade. | No |
| WaterWays: Water Sensitive Urban Design General Code | Applicable. Refer to PSP report. | Yes |
| Planning for Bushfire Risk Mitigation General Code | Not Applicable. The project is for a road upgrade.<br><br>*Note: A bushfire management plan will be developed during the estate development processes for the adjacent estates.* | No |
| Residential Boundary Fences General Code | Not Applicable. No impact upon residential boundary fences is proposed | No |
| Lease Variation General Code | Not Applicable. No Lease Variations are proposed | No |

# APPENDICES

# APPENDIX A LETTER OF APPOINTMENT

# APPENDIX B TRANSPORT AND SERVICES DEVELOPMENT CODE – STATEMENT AGAINST CRITERIA

# APPENDIX C RESIDENTIAL ZONE DEVELOPMENT CODE – STATEMENT AGAINST CRITERIA

# APPENDIX D MOLONGLO AND NORTH WESTON STRUCTURE PLAN

# APPENDIX E GENERAL CODE RESPONSES

# APPENDIX F WASTE MANAGEMENT PLAN

# APPENDIX G TREE ASSESSMENT

# APPENDIX H NOISE ASSESSMENT

# APPENDIX I S211 EXEMPTION NOTIFIABLE INSTRUMENT

# APPENDIX J SURVEY CERTIFICATE

# APPENDIX K CORRESPONDENCE

# APPENDIX L TCCS DESIGN APPROVAL

# John Gorton Drive Stage 3C

## John Gorton Drive Stage 3C - Road Safety Audit

IA216800.-RP-TM-090_Road Safety Audit - Final PSP | Rev B

12 June 2020

**Infrastructure Delivery Partners Group**

# John Gorton Drive Stage 3C

| | |
|---|---|
| Project No: | IA216800 |
| Document Title: | John Gorton Drive Stage 3C - Road Safety Audit |
| Document No.: | IA216800.-RP-TM-090_Road Safety Audit - Final PSP |
| Revision: | Rev B |
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| Client Name: | Infrastructure Delivery Partners Group |
| Client No: | 2018.29852.100 |
| Project Manager: | Steven Rusby-Perera |
| Author: | Phillip Truong |
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## Document history and status

| Revision | Date | Description | Author | Reviewed | Approved |
|---|---|---|---|---|---|
| A | 19/12/19 | Road Safety Audit | D. Lowe | P. Truong | A. Hillhouse |
| B | 12/06/20 | Road Safety Audit – Designer Response | D. Garroway | A. Jiao | S. Rusby-Perera |
| | | | | | |
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## Contents

# Executive Summary

This report details a PSP road safety audit of the Final Draft PSP design of the Molonglo Bridge and John Gorton Drive Extension Stage 3C.

A number of potential safety issues were identified by the audit team. The principal concerns relate to the following issues:

- Drainage pits are located in the road shoulder in which cyclists are permitted to ride. There is the potential for a cyclist to snag a wheel and lose control and fall from their bicycle.
- There are no advance warning signs on the approach to the marked pedestrian crossings of slip lanes. There is the potential for a left turning vehicle to be unaware of the presence of the crossing and to collide with a pedestrian.
- Guide signs placed on median islands at each corner of the intersection have the potential to block sight lines to traffic signal displays. There is the potential for a driver to proceed through a red signal and collide with other vehicles.
- There are no advance warning signs on the side street slip lane approaches to John Gorton Drive of the need to give way to cyclists. Their focus on finding a suitable gap in general traffic may result in them failing to observe an approaching cyclist in the cycle lane. There is the potential for crashes between left turning vehicles and cyclists.

It should be noted that while every effort has been made to identify potential safety hazards, no guarantee can be made that every issue has been identified. Further, if all the risks in this report were to be addressed, this would not guarantee that the design is "safe"; rather, the level of safety of the facility should be improved.

While the road safety audit may provide recommendations about possible remedial measures in response to identified deficiencies, it is ultimately the responsibility of the asset manager / road owner to determine how best to respond to each identified safety deficiency.

# 1. Introduction

Jacobs Group (Australia) Pty Ltd was commissioned to undertake a PSP road safety audit of the John Gorton Drive Extension Stage 3C.

A road safety audit is "*a formal examination of a traffic project or an existing road in which an independent, qualified examiner reports on the project's accident potential and safety performance*," (Austroads, 2009).

This road safety audit focused on providing an independent identification of potential safety hazards, regardless of current practices, standards and operations, to allow the asset manager / road owner to identify remedial measures. It is ultimately the responsibility of the asset manager / road owner to determine how to respond to each identified safety deficiency.

## 1.1 Site description

The John Gorton Drive Extension will provide a link connecting the existing extensions of John Gorton Drive to create a link between William Hovell Drive and Cotter Road. The road replaces the existing Coppins Crossing Road which is a two-way two-lane rural road. The new road will be two lanes in each direction with a posted speed limit of 70 kilometres per hour from the JGD3B project boundary to CH16050 and a posted speed limit of 60 kilometres per hour from CH16050 to the JGD2A project boundary.

The features of the new road will be:

- Two lanes in each direction.
- A new high level bridge over the Molonglo River
- Separated shared path on either side of the road.
- Two new signalised intersections either side of the bridge.
- The bridge will not have street lighting however the shared paths either side of the bridge will be lit.

A location map is presented in Figure 1.1.

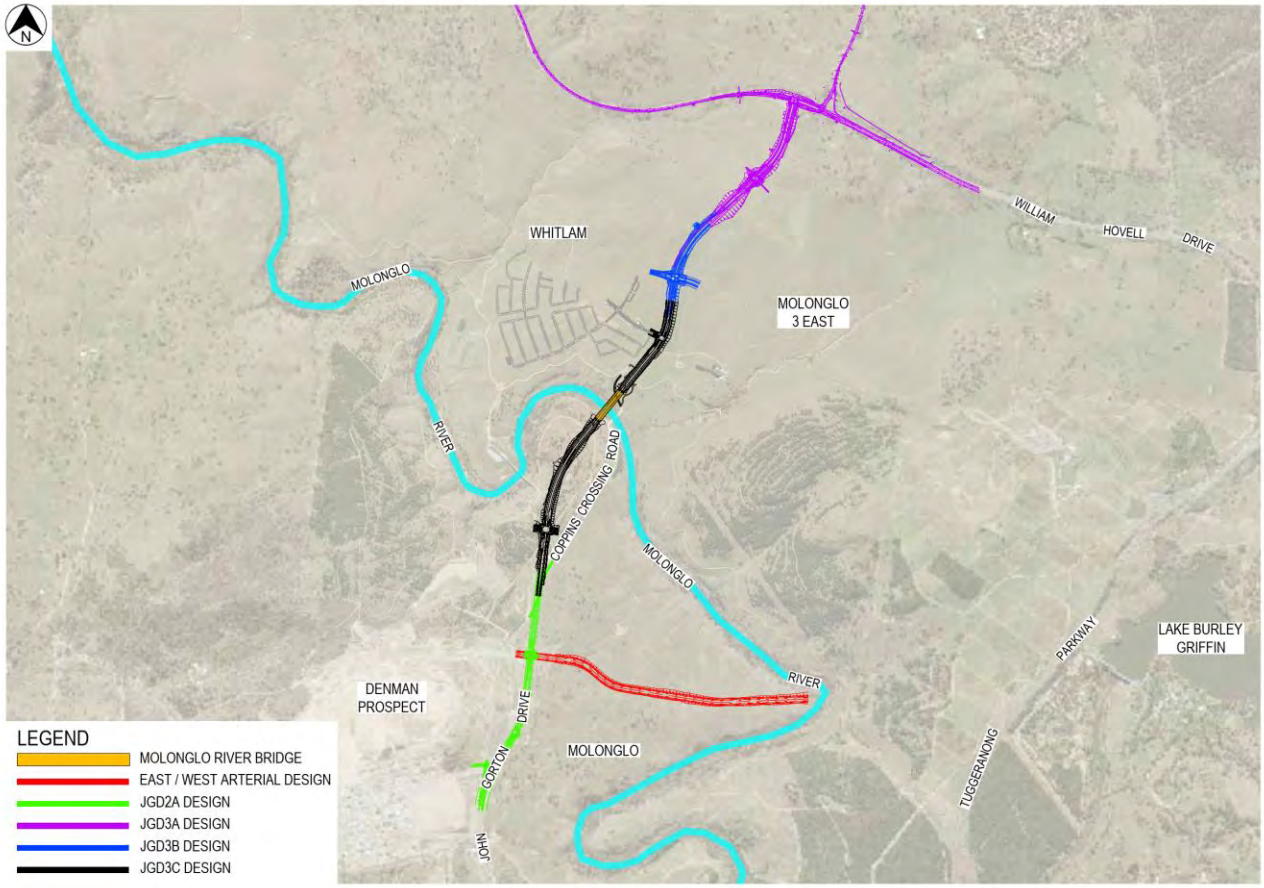



Figure 1.1 : Location map

# 2. Audit details

## 2.1 Audit scope

The scope of the PSP road safety audit was for the entire length of the design including the intersections. The following design drawings were provided for the audit:

- Molonglo River Bridge and John Gorton Drive Extension Stage 3C (Final Draft PSP)
  - Road Geometry
  - Drainage
  - Pavement

## 2.2 Audit methodology

The PSP road safety audit was based on the standard practice of identifying safety related issues along the subject sections of road by review the design drawings. The audit was undertaken on 18 December 2019.

The audit team consisted of:

- David Lowe (Level 3 Road Safety Auditor)
- Phillip Truong (Level 3 Road Safety Auditor).

While every care has been taken to identify safety issues, no guarantee can be made that every safety issue has been identified. Furthermore, even if all the findings of this review were to be addressed, this would not guarantee that the roads would be made "safe". Rather, the safety performance of the roads could be improved.

## 2.3 Previous road safety audits

A PSP road safety audit was undertaken on an earlier version of the design by a different audit team to the one that carried out this audit (with the exception of Phillip Truong who also participated in the previous audit) on 29th August 2019. Where a corrective action or response to the findings of that audit have not been clearly provided, the finding may be repeated within this audit.

## 2.4 References

The following documents were referred to during the audit:

- Austroads *Guide to Road Safety: Part 6 Road Safety Audit* (Third Edition), 2009
- RMS *Road Design Guide*, 1996
- RMS *Guidelines for Road Safety Audit Practices*, 2011
- RMS *Traffic control at work sites*, 2010
- RMS *NSW Bicycle Guidelines,* 2005
- *Australian Standards* 1742.1 – *Manual of uniform traffic control devices, Part 1 General introduction and index of sig*ns, 2003
- *Australian Standards* 1742.2 – *Manual of uniform traffic control devices, Part 2 Traffic control devices for general use*, 2009.

# 3. Risk assessment criteria

The road safety audit process requires that the safety issues identified during an audit be acknowledged by the audit team and accordingly responded to by the asset manager / road owner. The risk assessment system is the easiest means of identifying the level of risk associated with any given hazard. The risk assessment system is outlined below.

## 3.1 Risk assessment system

Each hazard has been recorded and assessed in accordance with the Austroads *Guide to Road Safety: Part 6 Road Safety Audit* (Third Edition, 2009). The guide recommends a risk matrix be used to determine the level of risk associated with each hazard. This risk matrix is described below.

### 3.1.1 Estimated crash frequency (F)

The probable frequency of an incident occurring as a direct result of the hazard was determined using the scale displayed in **Table 3.1**.

Table 3.1 : Crash frequency

| Crash frequency | Description |
|---|---|
| **Frequent (F)** | Once or more per week |
| **Probable (P)** | Once or more per year but less than once per week |
| **Occasional (O)** | Once every five to ten years |
| **Improbable (I)** | Less than once every ten years |

### 3.1.2 Estimated crash severity (S)

The likely severity of the incident which occurred as a direct result of the hazard was determined using the scale in **Table 3.2**.

Table 3.2 : Crash severity

| Severity | Description | Examples |
|---|---|---|
| **Catastrophic (C)** | Likely multiple deaths | • High-speed, multi-vehicle crash on a freeway<br>• Car runs into crowded bus stop<br>• Bus and petrol tanker collide<br>• Collapse of a bridge or tunnel |
| **Serious (S)** | Likely death or serious injury | • High or medium-speed vehicle / vehicle collision<br>• High or medium-speed collision with a fixed roadside object<br>• Pedestrian struck at high speed<br>• Cyclist is hit by a car |
| **Minor (M)** | Likely minor injury | • Some low-speed vehicle collisions |

| | | |
|---|---|---|
| | | • Cyclist falls from bicycle at low speed<br>• Left-turn rear-end crash in a slip lane |
| **Limited (L)** | Likely trivial injury or property damage only | • Some low speed collisions<br>• Pedestrian walks into object (no head injury)<br>• Car reverses into post |

### 3.1.3 Deemed level of risk (R)

The risk matrix in **Table 3.3** was used to assess the level of risk for each hazard. The risk matrix uses the frequency and severity determined above to determine the likely level of risk for each hazard.

Table 3.3 : Risk matrix

| | Frequent (F) | Probable (P) | Occasional (O) | Improbable (I) |
|---|---|---|---|---|
| Catastrophic (C) | Intolerable (I) | Intolerable (I) | Intolerable (I) | High (H) |
| Serious (S) | Intolerable (I) | Intolerable (I) | High (H) | Medium (M) |
| Minor (M) | Intolerable (I) | High (H) | Medium (M) | Low (L) |
| Limited (L) | High (H) | Medium (M) | Low (L) | Low (L) |

## 3.2 Treatment

Each hazard can be aligned with a suggested treatment, as outlined in **Table 3.4**.

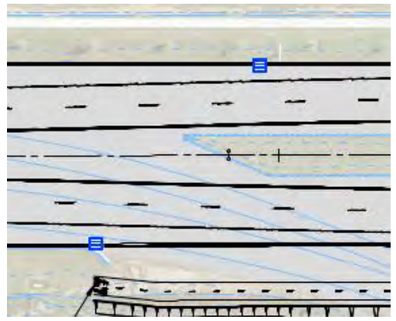
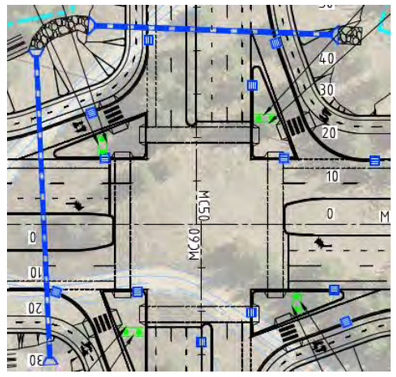
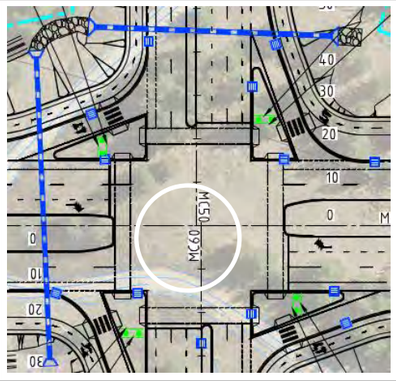
Table 3.4 : Treatment

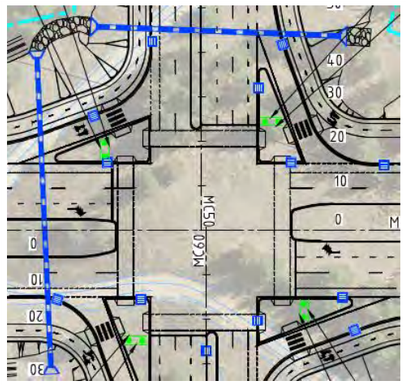
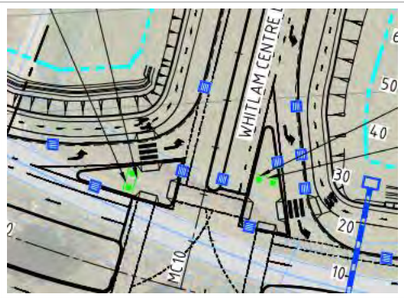
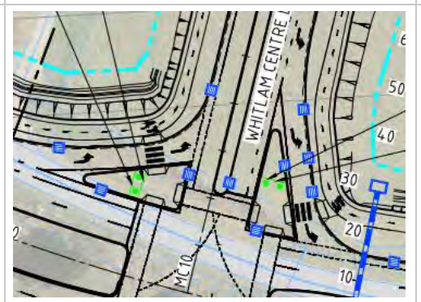
| Risk | Suggested treatment approach |
|---|---|
| **Intolerable (I)** | Must be corrected |
| **High (H)** | Should be corrected or the risk significantly reduced, even if the treatment cost is high |
| **Medium (M)** | Should be corrected or the risk significantly reduced, if the treatment cost is moderate, but not high |
| **Low (L)** | Should be corrected or the risk reduced, if the treatment cost is low |

# 4. Audit findings

The audit findings are documented below in Table 4.1.

Table 4.1 : Audit findings

| No. | Description of road safety deficiency | Image | Crash frequency | Crash severity | Level of risk | Response to identified road safety deficiency |
|---|---|---|---|---|---|---|
| 1 | Entire project length.<br>Drainage pits are located in the road shoulder in which cyclists are permitted to ride. There is the potential for a cyclist to snag a wheel and lose control and fall from their bicycle. |  | Occasional | Minor | Medium | Most of the drainage pits along the JGD3C carriageway, MTC link roads and Sculthorpe Avenue are kerb inlet pits without grates. Pit symbols on the Final Draft PSP drawings (shown as grate) are not correct. This will be updated in the Final PSP drawings. For those kerb inlet pits with grates on the cycle lane, the grates will be specified as bicycle safe grates.. |
| 2 | **Ch 15350 – 15450**<br>There are no advance warning signs on the approach to the marked pedestrian crossings of the four slip lanes. There is the potential for a left turning vehicle to be unaware of the presence of the crossing and to collide with a pedestrian. |  | Occasional | Serious | High | Advanced warning signs to the marked pedestrian crossings will be included in the detailed design as per ACTSD-3540 requirements |
| 3 | **Ch 15350 – 15450**<br>Guide signs placed on median islands at each corner of the intersection have the potential to block sight lines to traffic signal displays.<br>There is the potential for a driver to proceed through a red signal and collide with other vehicles. |  | Occasional | Serious | High | This comment has been addressed in the Final PSP with the guide signs now located in advance of each intersection. Sight distance will be checked again to make sure sufficient sight distance will be achievable by adjusting the guide sign locations in the detailed design. |

| No. | Description of road safety deficiency | Image | Crash frequency | Crash severity | Level of risk | Response to identified road safety deficiency |
|---|---|---|---|---|---|---|
| 4 | **Ch 15350 – 15450**<br>There are no advance warning signs on the side street slip lane approaches to John Gorton Drive slip lanes of the need to give way to cyclists. Their focus on finding a suitable gap in general traffic may result in them failing to observe an approaching cyclist in the cycle lane.<br>There is the potential for crashes between left turning vehicles and cyclists. |  | | | | Additional signage will be provided in the detailed design stage of the project such as "Watch for cyclists" on the approach to the slip lanes as per ACTSD-3540 requirements. |
| 5 | **Ch 16700 – 16800**<br>There are no advance warning signs on the approach to the marked pedestrian crossings of the two slip lanes at this T intersection.<br>There is the potential for a left turning vehicle to be unaware of the presence of the crossing and to collide with a pedestrian. |  | Occasional | Serious | High | Advanced warning signs to the marked pedestrian crossings will be included in the detailed design as per ACTSD-3540 requirements. |
| 6 | **Ch 16700 – 16800**<br>Guide signs placed on median islands of the intersection have the potential to block sight lines to traffic signal displays.<br>There is the potential for a driver to proceed through a red signal and collide with other vehicles. |  | Occasional | Serious | High | This comment has been addressed in the Final PSP with the guide signs now located in advance of each intersection. Sight distance will be checked again to make sure sufficient sight distance will be achievable by adjusting the guide sign locations in the detailed design. |
| 7 | **Ch 16700 – 16800**<br>There are no advance warning signs on the side street slip lane approaches to John Gorton Drive of the need to give way to cyclists. Their focus on finding a suitable gap in general traffic may result in them failing to observe an approaching cyclist in the cycle lane.<br>There is the potential for crashes between left turning vehicles and cyclists. |  | | | | Additional signage will be provided in the detailed design stage of the project such as "Watch for cyclists" on the approach to the slip lanes. as per ACTSD-3540 requirements. |

# 5. Conclusion

This report details a PSP road safety audit of the Final Draft PSP design of the Molonglo Bridge and John Gorton Drive Extension Stage 3C.

A number of potential safety issues were identified by the audit team. The principal concerns relate to the following issues:

- Drainage pits are located in the road shoulder in which cyclists are permitted to ride. There is the potential for a cyclist to snag a wheel and lose control and fall from their bicycle.
- There are no advance warning signs on the approach to the marked pedestrian crossings of slip lanes. There is the potential for a left turning vehicle to be unaware of the presence of the crossing and to collide with a pedestrian.
- Guide signs placed on median islands at each corner of the intersection have the potential to block sight lines to traffic signal displays. There is the potential for a driver to proceed through a red signal and collide with other vehicles.
- There are no advance warning signs on the side street slip lane approaches to John Gorton Drive of the need to give way to cyclists. Their focus on finding a suitable gap in general traffic may result in them failing to observe an approaching cyclist in the cycle lane. There is the potential for crashes between left turning vehicles and cyclists.

It should be noted that while every effort has been made to identify potential safety hazards, no guarantee can be made that every issue has been identified. Further, if all the risks in this report were to be addressed, this would not guarantee that the design is "safe"; rather, the level of safety of the facility should be improved.

While the road safety audit may provide recommendations about possible remedial measures in response to identified deficiencies, it is ultimately the responsibility of the asset manager / road owner to determine how best to respond to each identified safety deficiency.

# 6. Formal audit statement

This road safety audit has been undertaken by suitably qualified, independent road safety auditors from Jacobs, using the references and documentation detailed previously.

While the road safety audit may provide recommendations about possible remedial measures in response to identified deficiencies, it is ultimately the responsibility of the asset manager / road owner to determine how best to respond to each identified safety deficiency.

The audit has been undertaken for the sole purpose of identifying any safety-deficient features and road safety risks for the audited sections of road. Every effort was made to ensure that all relevant safety issues were considered. The findings are the opinion and judgement of the following team:

David J Lowe — 19 December 2019
Audit team leader

Phillip Truong — 19 December 2019
Audit team member

# Appendix J - Traffic Assessment

# Denman Prospect 1B - Traffic Impact Assessment

Prepared by Calibre Consulting
Prepared for Capital Estate Developments

15-003035
Transportation

# COMMERCIAL IN CONFIDENCE



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DOCUMENT CONTROL
15-003035

| Issue | Date | Issue Details | Author | Checked | Approved |
|---|---|---|---|---|---|
| 0 | 4/03/16 | Draft | BH | JS | |
| 1 | 22/03/16 | Final | BH | JS | PB |
| 2 | 10/06/16 | Additional Analysis | BH | JS | PB |
| 3 | 7/07/16 | Additional Analysis | BH | JS | PB |

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## FIGURES



## APPENDICES

# 1 INTRODUCTION

Calibre Consulting has been engaged by Capital Estate Developments to undertake the Estate Development Plan, Detailed Design and documentation of Denman Prospect Stage 1B. As part of this design, investigations into the traffic and intersection performance of intersections within Denman Prospect Stage 1B has been undertaken. This report details the predicted traffic volumes and movements for the Denman Prospect 1B development and analyses the significant intersections within the subdivision.

# 2 PROPOSED DEVELOPMENT

## 2.1 STAGE 1B

Denman Prospect Stage 1B is located between Uriarra Road, John Gorton Drive and Holborow Avenue, located south-west of Canberra City. The suburb is part of the Molonglo region, and is located north of Denman Prospect Stage 1A. Denman Prospect Stage 1B will be accessed by one intersection on Uriarra Road, three intersections on Holborow Avenue and through multiple intersections in Denman Prospect 1A. Additional access points will become available in later stages of development. The development involves numerous internal roads providing connectivity throughout the suburb to the nearby arterial roads, namely John Gorton Drive, Holborow Avenue and Uriarra Road.

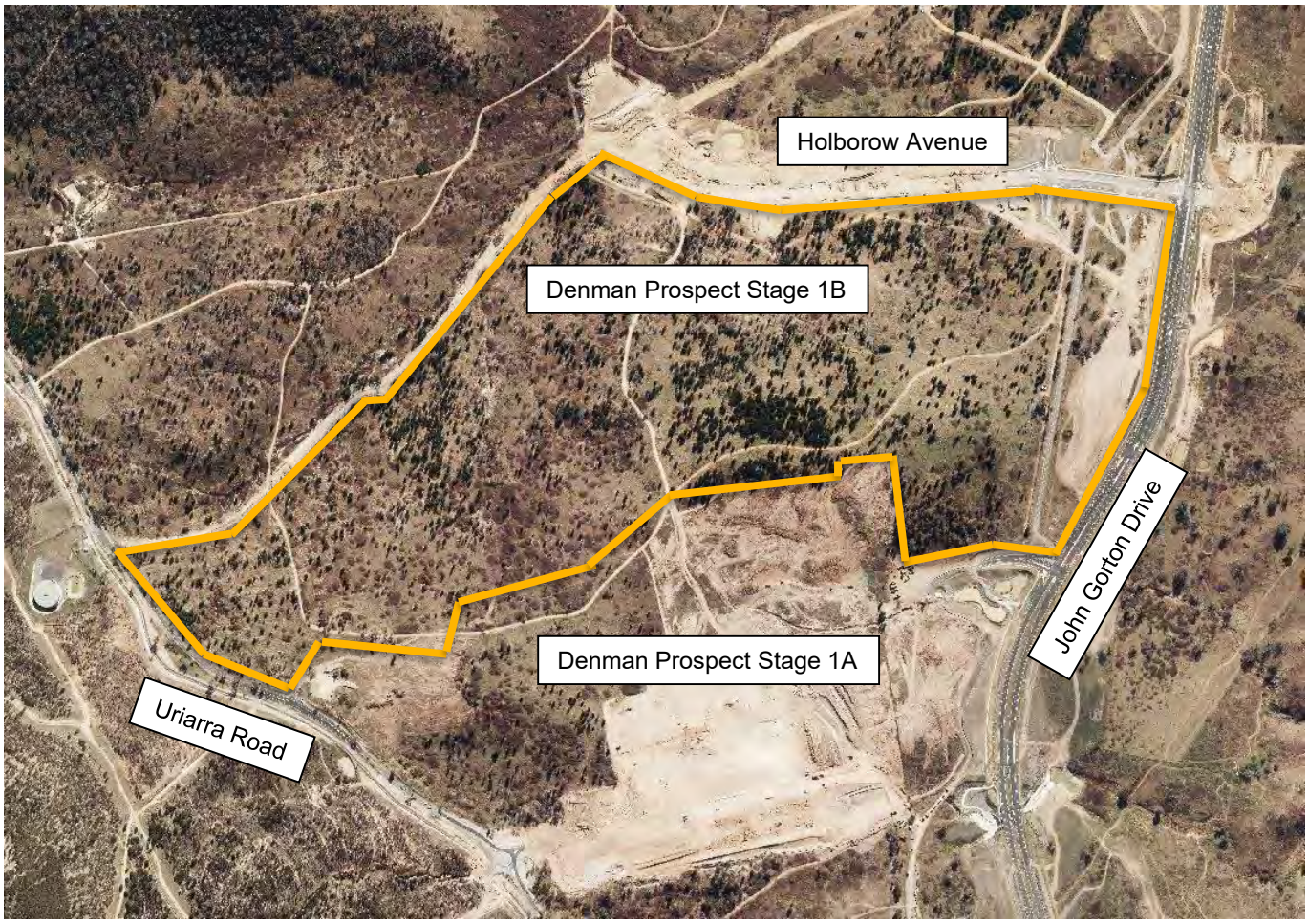



Figure 2-1: Denman Prospect Stage 1B

# 3 BACKGROUND ANALYSIS

Calibre Consulting has prepared a Road Hierarchy Plan as part of the traffic analysis for Denman Prospect Stage 1B. The hierarchy was developed using the road layout developed in conjunction with Imogen Miller Urban Design.

Generation rates utilised for the hierarchy analysis can be summarised as follows:

- Local Community Centre: 922 trips per day, based on expected developments within the Centre
- Low density residential: 8 trips per day
- Medium density residential: 7 trips per day
- High density residential: 6 trips per day

A Road Hierarchy Plan was created to determine the vehicular movements within the estate and the volumes for each of the roads within Denman Prospect Stage 1B. Refer **Appendix B** for the Road Hierarchy Plan. Traffic analysis estimated the traffic movements and volumes for Denman Prospect Stage 1B which in turn informed the hierarchical requirements of the suburb. Figure 3-1 indicates the road hierarchy of Denman Prospect Stage 1B. It shows that the internal road system typically requires minor collector roads on all access points to Denman Prospect 1B, as daily traffic volumes are between 1,000 and 3,000 vehicles per day (vpd) for each of these roads. The exception of this is Road 01and the southern section of Road 2. Road 01 between Roads 06 and 40 and the southern section of Road 2 are major collectors and is expected to have between 3,000-6,000 vehicles per day. This is due to the large number of multi-unit development sites in close proximity to these roads.

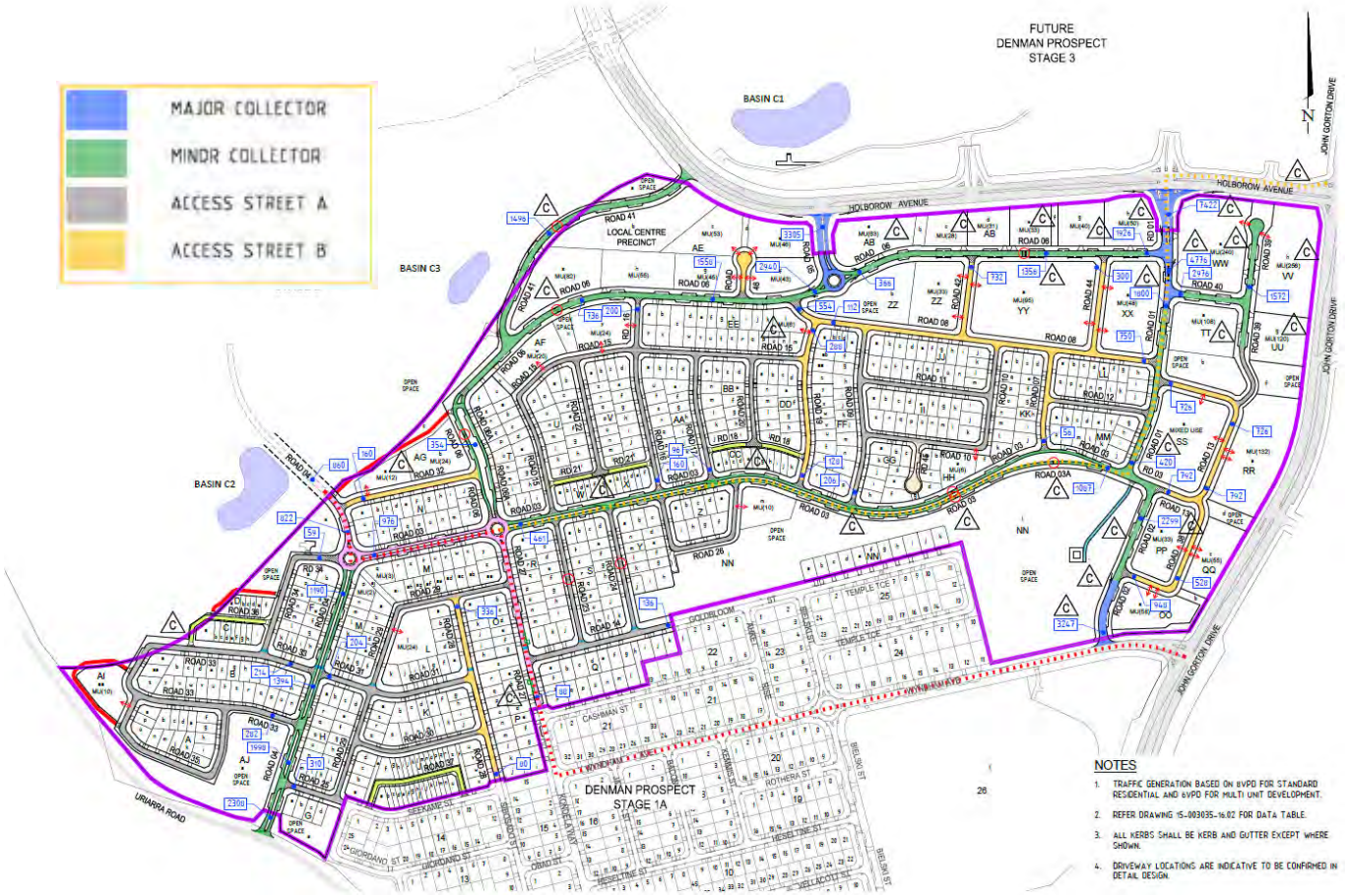



Figure 3-1: Road Hierarchy Plan

# 4 INTERSECTION ANALYSIS

As part of the Denman Prospect Traffic Impact Assessment, intersection analysis of the four main internal intersections was undertaken.

## 4.1 ROAD 01 / ROAD 06

The Road 01 / Road 06 intersection is the main intersection before the intersection of Holborow Avenue / Road 01 for the Denman Prospect Stage 1B estate. It is anticipated that this intersection will have the highest volumes of any intersection within the suburb due to its proximity to the proposed multi-unit development sites. The results of the intersection analysis for Road 01 / Road 06 are summarised in Table 4-1.

| Intersection | AM Peak Hour | | | PM Peak Hour | | |
|---|---|---|---|---|---|---|
| | Average Delay (s) | Worst LOS | 95% Queue Distance (m) | Average Delay (s) | Worst LOS | 95% Queue Distance (m) |
| Road 01 / Road 06 | 2.3 | A | 4.4 | 2.1 | A | 9.0 |

Table 4-1: Road 01 / Road 06 SIDRA Summary

## 4.2 ROAD 05 / ROAD 06

Road 05 connects to Holborow Avenue to the west of the Road 01 connection. The intersection of Road 05 / Road 06 is a roundabout and is located to the south of the intersection of Holborow Avenue and Road 05. The roundabout serves as a means of collecting low density and multi-unit developments and provides access to Holborow Avenue. The results of the intersection analysis for Road 05 / Road 06 are summarised in Table 4-2.

| Intersection | AM Peak Hour | | | PM Peak Hour | | |
|---|---|---|---|---|---|---|
| | Average Delay (s) | LOS | 95% Queue Distance (m) | Average Delay (s) | LOS | 95% Queue Distance (m) |
| Road 05 / Road 06 | 5.2 | A | 7.6 | 4.9 | A | 6.3 |

Table 4-2: Road 05 / Road 06 SIDRA Summary

## 4.3 ROAD 06 / ROAD 03 / ROAD 27

The Road 06 / Road 03 / Road 27 intersection is one of the main roundabouts for Denman Prospect Stage 1B. This intersection will serve as part of the proposed bus route in Denman Prospect Stage 1B. The results of the intersection analysis for Road 06 / Road 03 / Road 27 are summarised in Table 4-3.

| Intersection | AM Peak Hour | | | PM Peak Hour | | |
|---|---|---|---|---|---|---|
| | Average Delay (s) | LOS | 95% Queue Distance (m) | Average Delay (s) | Worst LOS | 95% Queue Distance (m) |
| Road 06 / Road 03 / Road 27 | 3.5 | A | 0.7 | 3.5 | A | 0.8 |

Table 4-3: Road 06 / Road 03 / Road 27 SIDRA Summary

## 4.4 ROAD 03 / ROAD 04 / ROAD 34

The Road 03 / Road 04 / Road 34 intersection is a roundabout which will provide access to Uriarra Road and the future stage of Denman Prospect 2. This intersection is located in the north western corner of Denman Prospect Stage 1B and will serve as part of the proposed bus route within Denman Prospect Stage 1B. The results of the intersection analysis for the Road 03 / Road 04 / Road 34 are summarised in Table 4-4.

| Intersection | AM Peak Hour | | | PM Peak Hour | | |
|---|---|---|---|---|---|---|
| | Average Delay (s) | LOS | 95% Queue Distance (m) | Average Delay (s) | LOS | 95% Queue Distance (m) |
| Road 03 / Road 04 / Road 34 | 3.8 | A | 2.1 | 3.9 | A | 2.3 |

Table 4-4: Road 03 / Road 04 / Road 34 SIDRA Summary

## 4.5 WYNDHAM AVENUE / ROAD 02

The Wyndham Avenue / Road 02 intersection is a T intersection which will provide access to John Gorton Drive and Denman Prospect 1B. This intersection is located in the south eastern corner of Denman Prospect Stage 1B. The results of the intersection analysis for the Wyndham Avenue / Road 02 are summarised in Table 4-4.

| Intersection | AM Peak Hour | | | PM Peak Hour | | |
|---|---|---|---|---|---|---|
| | Average Delay (s) | Worst LOS | 95% Queue Distance (m) | Average Delay (s) | Worst LOS | 95% Queue Distance (m) |
| Wyndham Avenue / Road 02 | 3.6 | A | 7.3 | 3.1 | A | 13.4 |

Table 4-5: Wyndham Avenue / Road 02 SIDRA Summary

## 4.6 JOHN GORTON DRIVE / WYNDHAM AVENUE

The John Gorton Drive / Wyndham Avenue intersection is an existing signalised T intersection which will provide access to Wyndham Road and Denman Prospect 1B. This intersection is located to the south east of Denman Prospect Stage 1B, and will serve as one of the primary intersections for accessing Denman Prospect Stage 1B. The intersection analysis for the year of 2031 for the intersection of John Gorton Drive / Wyndham Avenue are summarised in Table 4-4. It is noted that the queues to the west of the intersection extend approximately 48m from the signalised intersection during the AM peak hour. The intersection of Wyndham Avenue / Road 02 is located approximately 90m to the west of the intersection of John Gorton Drive / Wyndham Avenue for 2031 traffic volumes.

| Intersection | AM Peak Hour | | | PM Peak Hour | | |
|---|---|---|---|---|---|---|
| | Average Delay (s) | LOS | 95% Queue Distance (m) | Average Delay (s) | LOS | 95% Queue Distance (m) |
| John Gorton Drive / Wyndham Avenue | 34.1 | C | 204.8 | 36.1 | D | 243.8 |

Table 4-6: John Gorton Drive / Wyndham Avenue SIDRA Summary

## 4.7 HOLBOROW AVENUE / ROAD 01

The Holborow Avenue / Road 01 intersection is an existing signalised four way intersection which will provide access to Denman Prospect 1B. This intersection is located to the north east of Denman Prospect Stage 1B, and will serve as one of the primary intersections for accessing Denman Prospect Stage 1B.

Calibre Consulting previously carried out the detailed design for the intersection of Holborow Avenue / Road 01. The intersection design was based upon the 2031 traffic volumes shown in the mark-up in Appendix C. As indicated in Appendix C, the daily traffic volume for Road 01 was expected to be approximately 7800 vehicles. The traffic volumes shown for Road 01 in the Road Hierarchy plan allows for approximately 7422 vehicles per day. As the southern leg of Holborow Avenue / Road 01 was designed for a higher volume of traffic than what Denman Prospect 1B will generate, the intersection will perform better than previously expected and agreed to by TaMSD.

# 5 CONCLUSION

The traffic study undertaken for Denman Prospect Stage 1B revealed no traffic congestion, delays or level or service issues when considering the proposed design. The design of the estate was developed in conjunction with the traffic analysis and as such, is suitable for the needs of the proposed Denman Prospect 1B development.

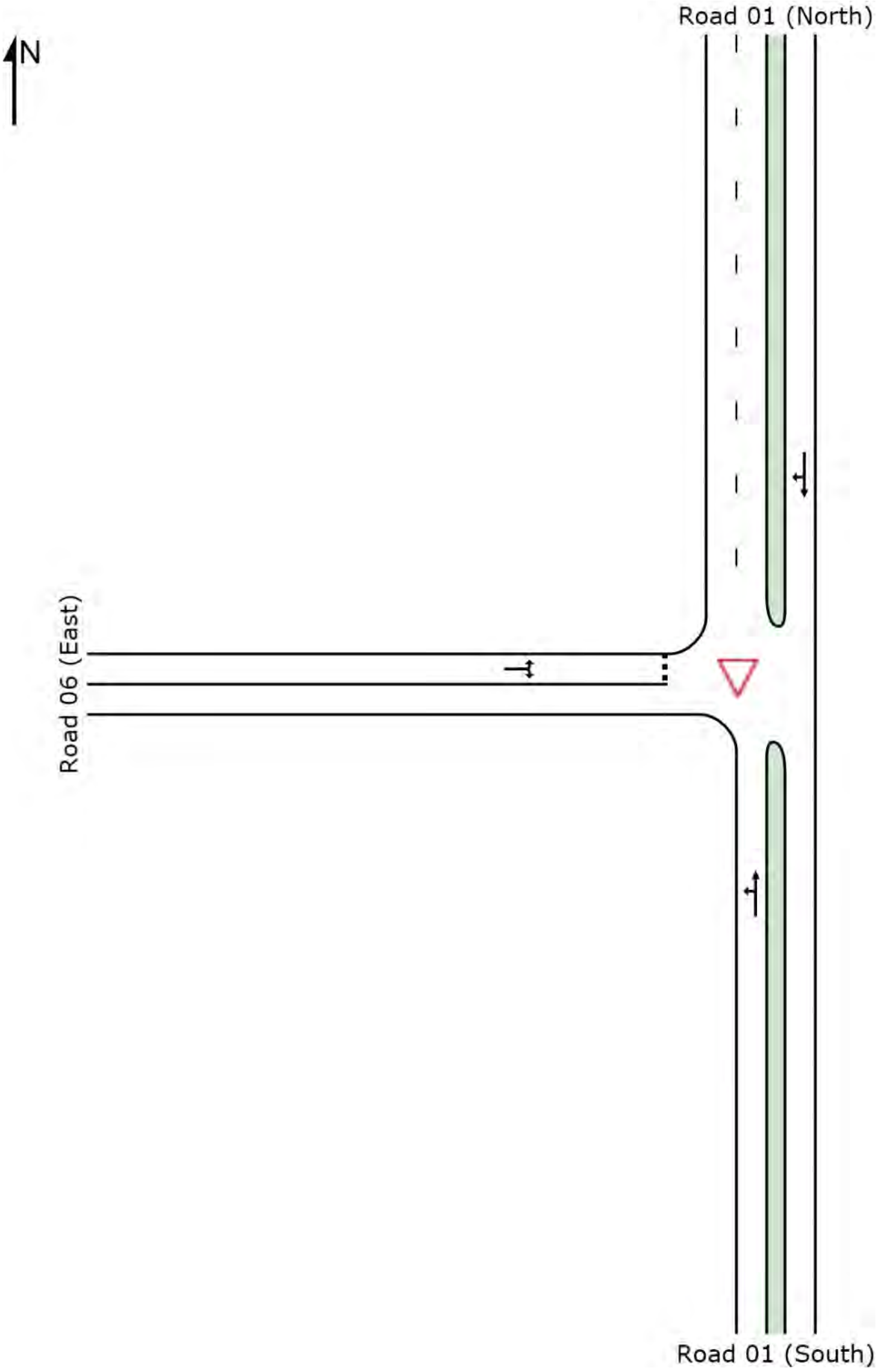
# APPENDICES

# APPENDIX A SIDRA OUTPUTS

# SITE LAYOUT

## Site: Road 01 / Road 06 - AM Peak

New Site
Giveway / Yield (Two-Way)


N
Road 01 (North)
Road 06 (East)
Road 01 (South)

# MOVEMENT SUMMARY

## Site: Road 01 / Road 06 - AM Peak

New Site
Giveway / Yield (Two-Way)

**Movement Performance - Vehicles**

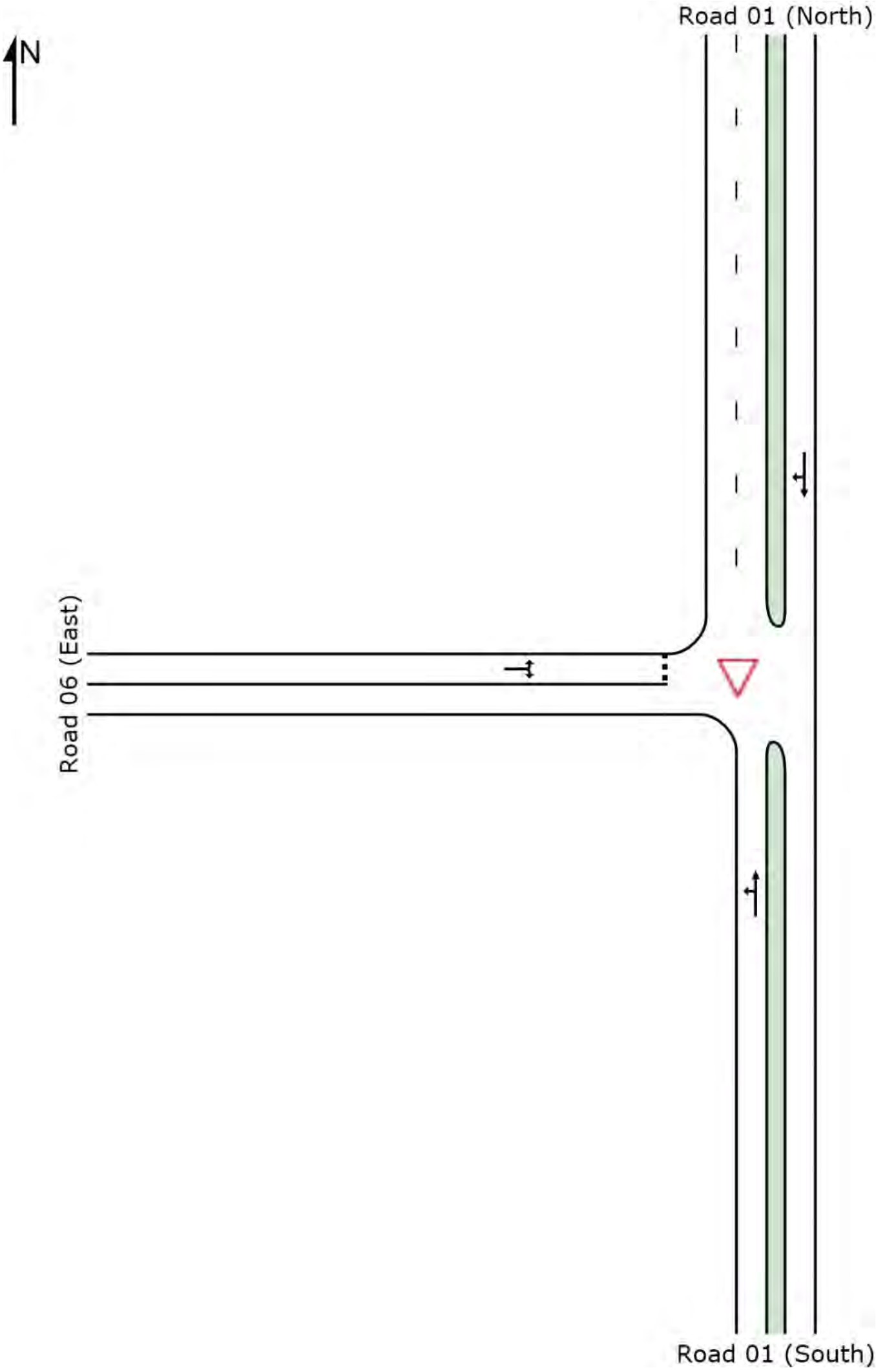
| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Road 01 (South) | | | | | | | | | | | |
| 1 | L2 | 20 | 2.5 | 0.187 | 4.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.03 | 49.3 |
| 2 | T1 | 319 | 2.5 | 0.187 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.03 | 49.7 |
| Approach | | 339 | 2.5 | 0.187 | 0.3 | NA | 0.0 | 0.0 | 0.00 | 0.03 | 49.6 |
| North: Road 01 (North) | | | | | | | | | | | |
| 8 | T1 | 40 | 2.5 | 0.055 | 1.2 | LOS A | 0.2 | 1.7 | 0.33 | 0.30 | 46.2 |
| 9 | R2 | 41 | 2.5 | 0.055 | 5.8 | LOS A | 0.2 | 1.7 | 0.33 | 0.30 | 45.1 |
| Approach | | 81 | 2.5 | 0.055 | 3.6 | NA | 0.2 | 1.7 | 0.33 | 0.30 | 45.6 |
| West: Road 06 (East) | | | | | | | | | | | |
| 10 | L2 | 165 | 2.5 | 0.149 | 5.5 | LOS A | 0.6 | 4.4 | 0.34 | 0.57 | 43.4 |
| 12 | R2 | 21 | 2.5 | 0.149 | 5.5 | LOS A | 0.6 | 4.4 | 0.34 | 0.57 | 45.4 |
| Approach | | 186 | 2.5 | 0.149 | 5.5 | LOS A | 0.6 | 4.4 | 0.34 | 0.57 | 43.7 |
| All Vehicles | | 606 | 2.5 | 0.187 | 2.3 | NA | 0.6 | 4.4 | 0.15 | 0.23 | 47.1 |

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Minor Road Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

# SITE LAYOUT

## Site: Road 01 / Road 06 - PM Peak

New Site
Giveway / Yield (Two-Way)


N
Road 01 (North)
Road 06 (East)
Road 01 (South)

# MOVEMENT SUMMARY

## Site: Road 01 / Road 06 - PM Peak

New Site
Giveway / Yield (Two-Way)

**Movement Performance - Vehicles**

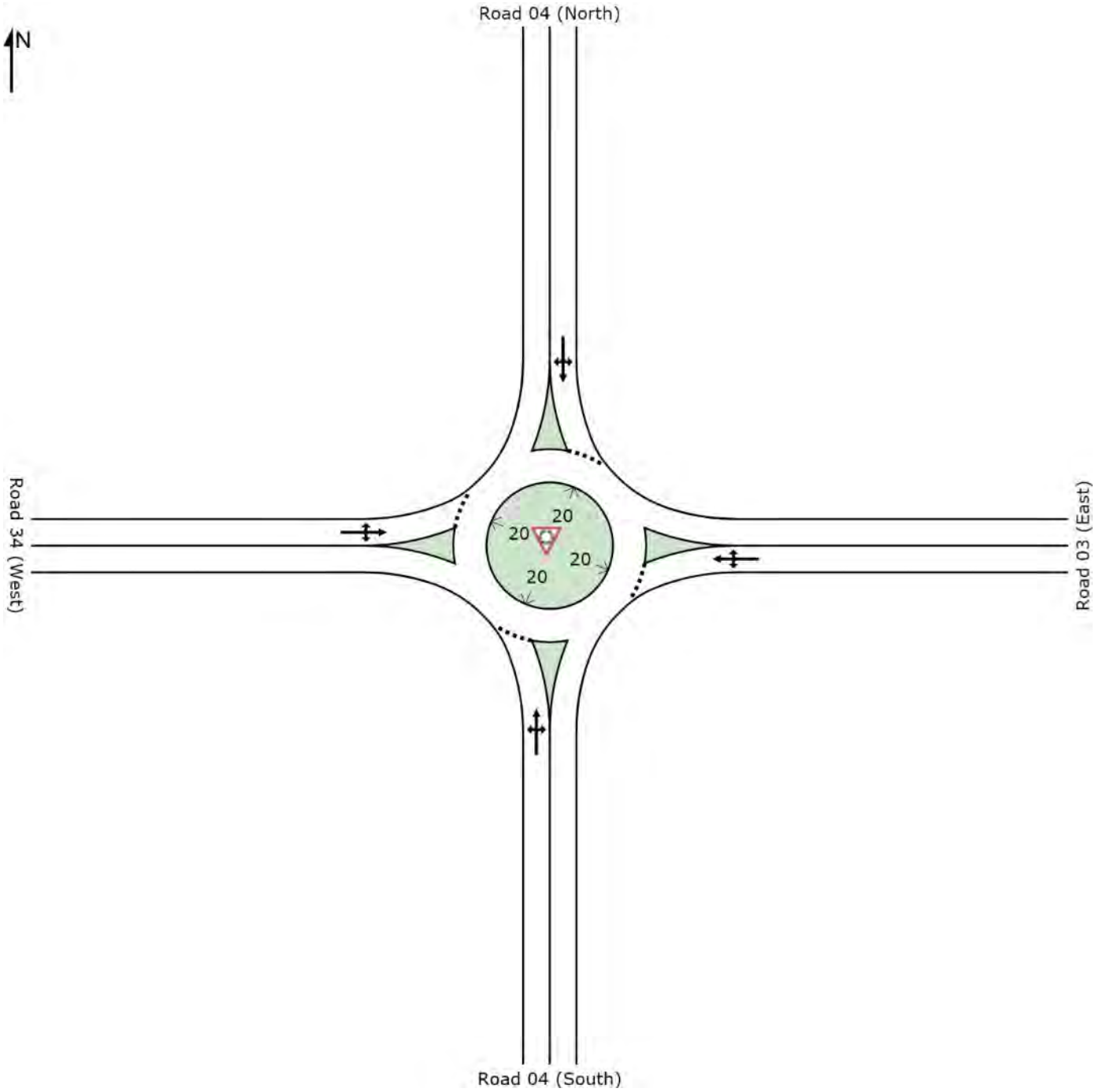
| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Road 01 (South) | | | | | | | | | | | |
| 1 | L2 | 19 | 2.5 | 0.031 | 4.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.18 | 48.4 |
| 2 | T1 | 37 | 2.5 | 0.031 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.18 | 48.3 |
| Approach | | 56 | 2.5 | 0.031 | 1.6 | NA | 0.0 | 0.0 | 0.00 | 0.18 | 48.4 |
| North: Road 01 (North) | | | | | | | | | | | |
| 8 | T1 | 287 | 2.5 | 0.249 | 0.2 | LOS A | 1.3 | 9.0 | 0.14 | 0.18 | 47.7 |
| 9 | R2 | 149 | 2.5 | 0.249 | 4.8 | LOS A | 1.3 | 9.0 | 0.14 | 0.18 | 46.6 |
| Approach | | 437 | 2.5 | 0.249 | 1.8 | NA | 1.3 | 9.0 | 0.14 | 0.18 | 47.3 |
| West: Road 06 (East) | | | | | | | | | | | |
| 10 | L2 | 38 | 2.5 | 0.047 | 5.3 | LOS A | 0.2 | 1.3 | 0.07 | 0.53 | 43.9 |
| 12 | R2 | 19 | 2.5 | 0.047 | 5.3 | LOS A | 0.2 | 1.3 | 0.07 | 0.53 | 45.7 |
| Approach | | 57 | 2.5 | 0.047 | 5.3 | LOS A | 0.2 | 1.3 | 0.07 | 0.53 | 44.7 |
| All Vehicles | | 549 | 2.5 | 0.249 | 2.1 | NA | 1.3 | 9.0 | 0.12 | 0.22 | 47.1 |

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Minor Road Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

# SITE LAYOUT

## Site: Road 03 / Road 04 / Road 34 - AM Peak

New Site
Roundabout



# MOVEMENT SUMMARY

## Site: Road 03 / Road 04 / Road 34 - AM Peak

New Site
Roundabout

**Movement Performance - Vehicles**

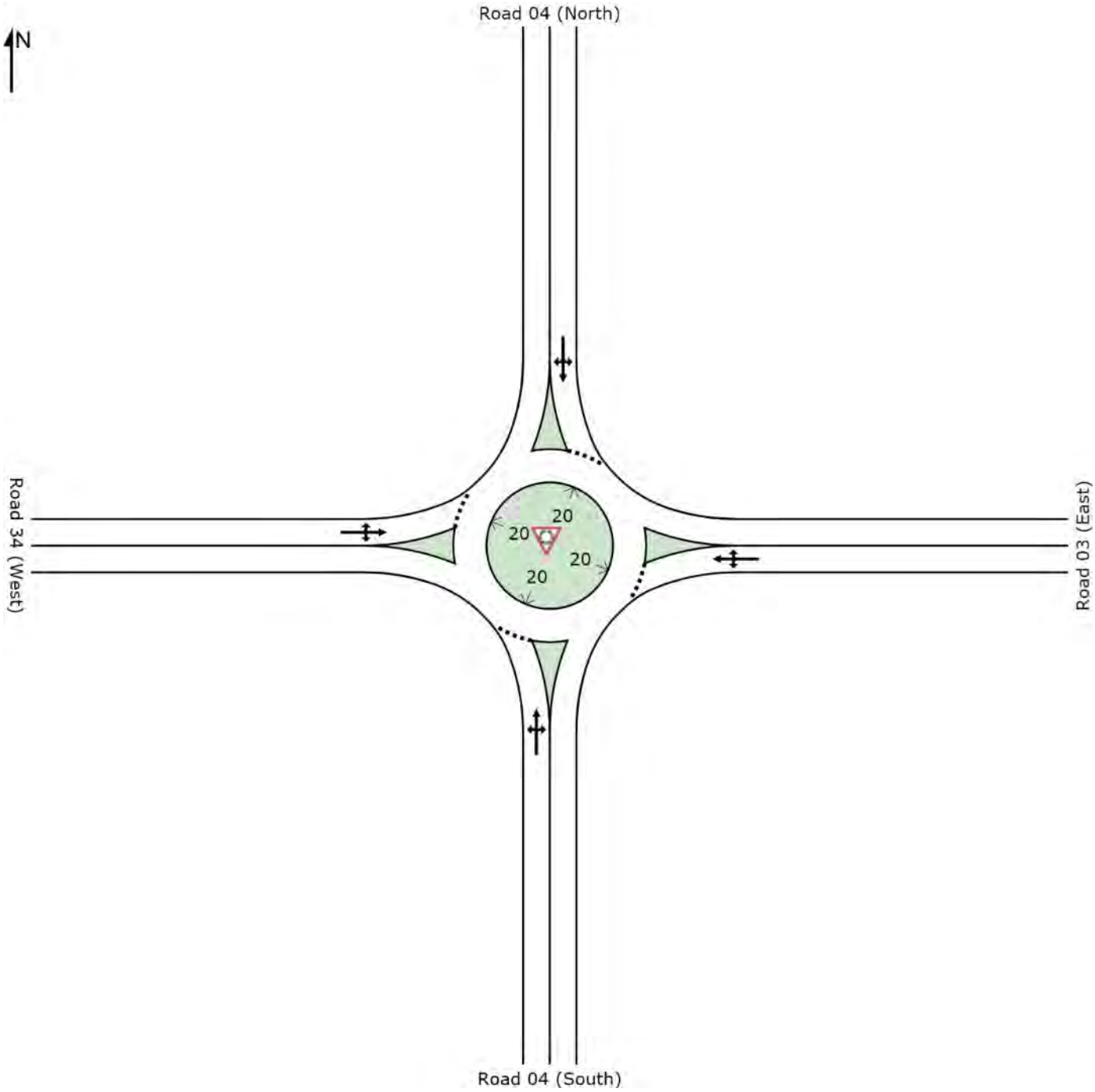
| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Road 04 (South) | | | | | | | | | | | |
| 1 | L2 | 1 | 2.5 | 0.009 | 3.3 | LOS A | 0.0 | 0.2 | 0.06 | 0.01 | 45.8 |
| 2 | T1 | 7 | 2.5 | 0.009 | 3.3 | LOS A | 0.0 | 0.2 | 0.06 | 0.01 | 46.8 |
| 3 | R2 | 1 | 2.5 | 0.009 | 3.3 | LOS A | 0.0 | 0.2 | 0.06 | 0.01 | 47.0 |
| Approach | | 9 | 2.5 | 0.009 | 3.3 | LOS A | 0.0 | 0.2 | 0.06 | 0.01 | 46.7 |
| East: Road 03 (East) | | | | | | | | | | | |
| 4 | L2 | 33 | 2.5 | 0.040 | 3.8 | LOS A | 0.1 | 1.0 | 0.18 | 0.08 | 45.5 |
| 5 | T1 | 4 | 2.5 | 0.040 | 3.8 | LOS A | 0.1 | 1.0 | 0.18 | 0.08 | 46.5 |
| 6 | R2 | 4 | 2.5 | 0.040 | 3.8 | LOS A | 0.1 | 1.0 | 0.18 | 0.08 | 46.6 |
| Approach | | 41 | 2.5 | 0.040 | 3.8 | LOS A | 0.1 | 1.0 | 0.18 | 0.08 | 45.7 |
| North: Road 04 (North) | | | | | | | | | | | |
| 7 | L2 | 14 | 2.5 | 0.080 | 3.9 | LOS A | 0.3 | 2.1 | 0.05 | 0.01 | 45.6 |
| 8 | T1 | 69 | 2.5 | 0.080 | 3.9 | LOS A | 0.3 | 2.1 | 0.05 | 0.01 | 46.6 |
| 9 | R2 | 5 | 2.5 | 0.080 | 3.9 | LOS A | 0.3 | 2.1 | 0.05 | 0.01 | 46.8 |
| Approach | | 88 | 2.5 | 0.080 | 3.9 | LOS A | 0.3 | 2.1 | 0.05 | 0.01 | 46.5 |
| West: Road 34 (West) | | | | | | | | | | | |
| 10 | L2 | 1 | 2.5 | 0.007 | 3.3 | LOS A | 0.0 | 0.2 | 0.06 | 0.01 | 45.1 |
| 11 | T1 | 3 | 2.5 | 0.007 | 3.3 | LOS A | 0.0 | 0.2 | 0.06 | 0.01 | 46.0 |
| 12 | R2 | 3 | 2.5 | 0.007 | 3.3 | LOS A | 0.0 | 0.2 | 0.06 | 0.01 | 46.2 |
| Approach | | 7 | 2.5 | 0.007 | 3.3 | LOS A | 0.0 | 0.2 | 0.06 | 0.01 | 45.9 |
| All Vehicles | | 146 | 2.5 | 0.080 | 3.8 | LOS A | 0.3 | 2.1 | 0.09 | 0.03 | 46.2 |

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

# SITE LAYOUT

## Site: Road 03 / Road 04 / Road 34 - PM Peak

New Site
Roundabout



# MOVEMENT SUMMARY

## Site: Road 03 / Road 04 / Road 34 - PM Peak

New Site
Roundabout

**Movement Performance - Vehicles**

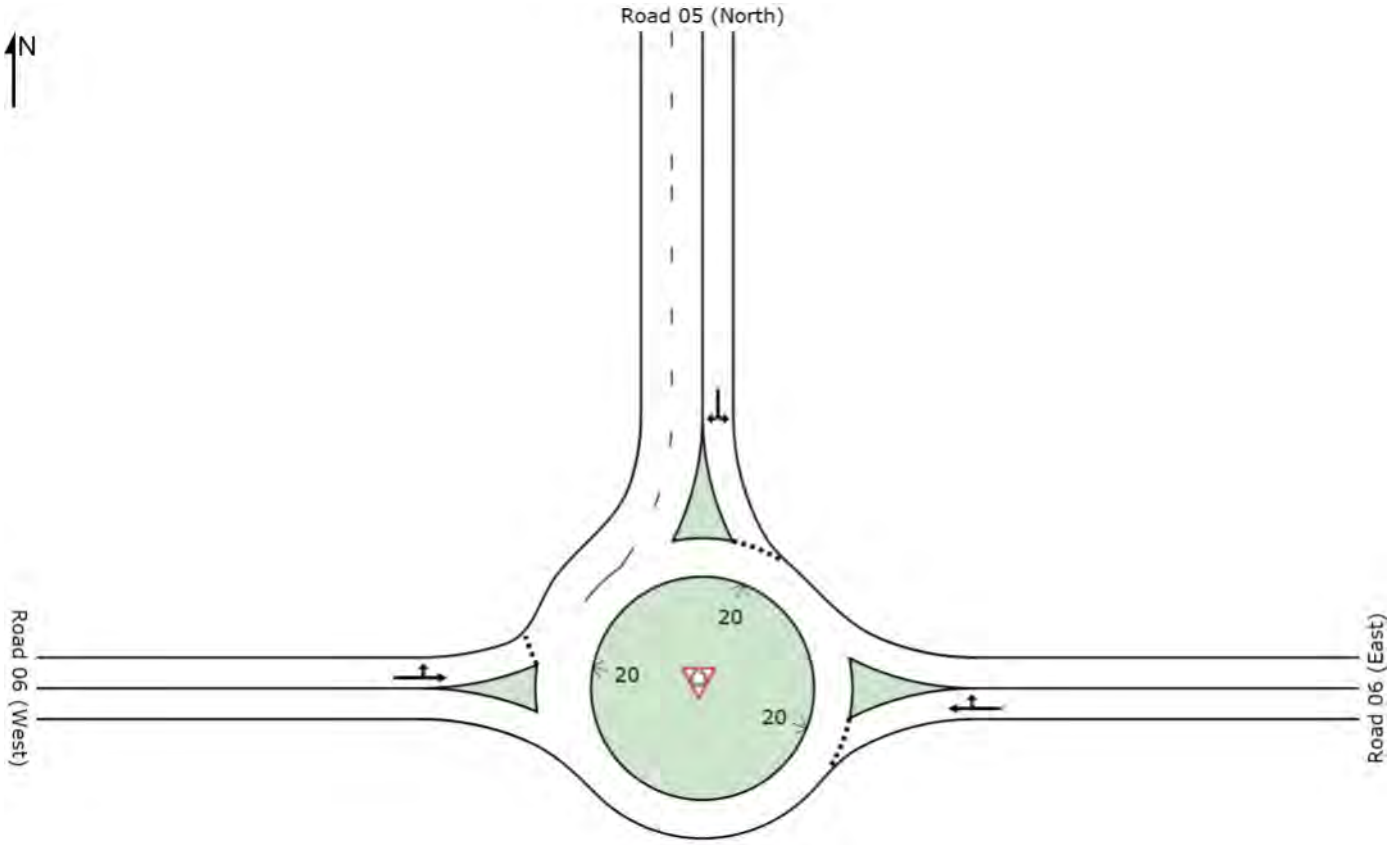
| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Road 04 (South) | | | | | | | | | | | |
| 1 | L2 | 3 | 2.5 | 0.089 | 4.1 | LOS A | 0.3 | 2.3 | 0.11 | 0.04 | 44.9 |
| 2 | T1 | 63 | 2.5 | 0.089 | 4.1 | LOS A | 0.3 | 2.3 | 0.11 | 0.04 | 45.9 |
| 3 | R2 | 29 | 2.5 | 0.089 | 4.1 | LOS A | 0.3 | 2.3 | 0.11 | 0.04 | 46.0 |
| Approach | | 96 | 2.5 | 0.089 | 4.1 | LOS A | 0.3 | 2.3 | 0.11 | 0.04 | 45.9 |
| East: Road 03 (East) | | | | | | | | | | | |
| 4 | L2 | 1 | 2.5 | 0.028 | 3.5 | LOS A | 0.1 | 0.7 | 0.05 | 0.01 | 45.0 |
| 5 | T1 | 17 | 2.5 | 0.028 | 3.5 | LOS A | 0.1 | 0.7 | 0.05 | 0.01 | 46.0 |
| 6 | R2 | 13 | 2.5 | 0.028 | 3.5 | LOS A | 0.1 | 0.7 | 0.05 | 0.01 | 46.1 |
| Approach | | 31 | 2.5 | 0.028 | 3.5 | LOS A | 0.1 | 0.7 | 0.05 | 0.01 | 46.0 |
| North: Road 04 (North) | | | | | | | | | | | |
| 7 | L2 | 4 | 2.5 | 0.012 | 3.4 | LOS A | 0.0 | 0.3 | 0.11 | 0.03 | 45.8 |
| 8 | T1 | 7 | 2.5 | 0.012 | 3.4 | LOS A | 0.0 | 0.3 | 0.11 | 0.03 | 46.8 |
| 9 | R2 | 1 | 2.5 | 0.012 | 3.4 | LOS A | 0.0 | 0.3 | 0.11 | 0.03 | 47.0 |
| Approach | | 13 | 2.5 | 0.012 | 3.4 | LOS A | 0.0 | 0.3 | 0.11 | 0.03 | 46.5 |
| West: Road 34 (West) | | | | | | | | | | | |
| 10 | L2 | 5 | 2.5 | 0.010 | 3.7 | LOS A | 0.0 | 0.3 | 0.21 | 0.09 | 45.6 |
| 11 | T1 | 4 | 2.5 | 0.010 | 3.7 | LOS A | 0.0 | 0.3 | 0.21 | 0.09 | 46.6 |
| 12 | R2 | 1 | 2.5 | 0.010 | 3.7 | LOS A | 0.0 | 0.3 | 0.21 | 0.09 | 46.8 |
| Approach | | 11 | 2.5 | 0.010 | 3.7 | LOS A | 0.0 | 0.3 | 0.21 | 0.09 | 46.1 |
| All Vehicles | | 149 | 2.5 | 0.089 | 3.9 | LOS A | 0.3 | 2.3 | 0.11 | 0.03 | 46.0 |

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

# SITE LAYOUT

## Site: Road 05 / Road 06 - AM Peak

New Site
Roundabout



# MOVEMENT SUMMARY

## Site: Road 05 / Road 06 - AM Peak

New Site
Roundabout

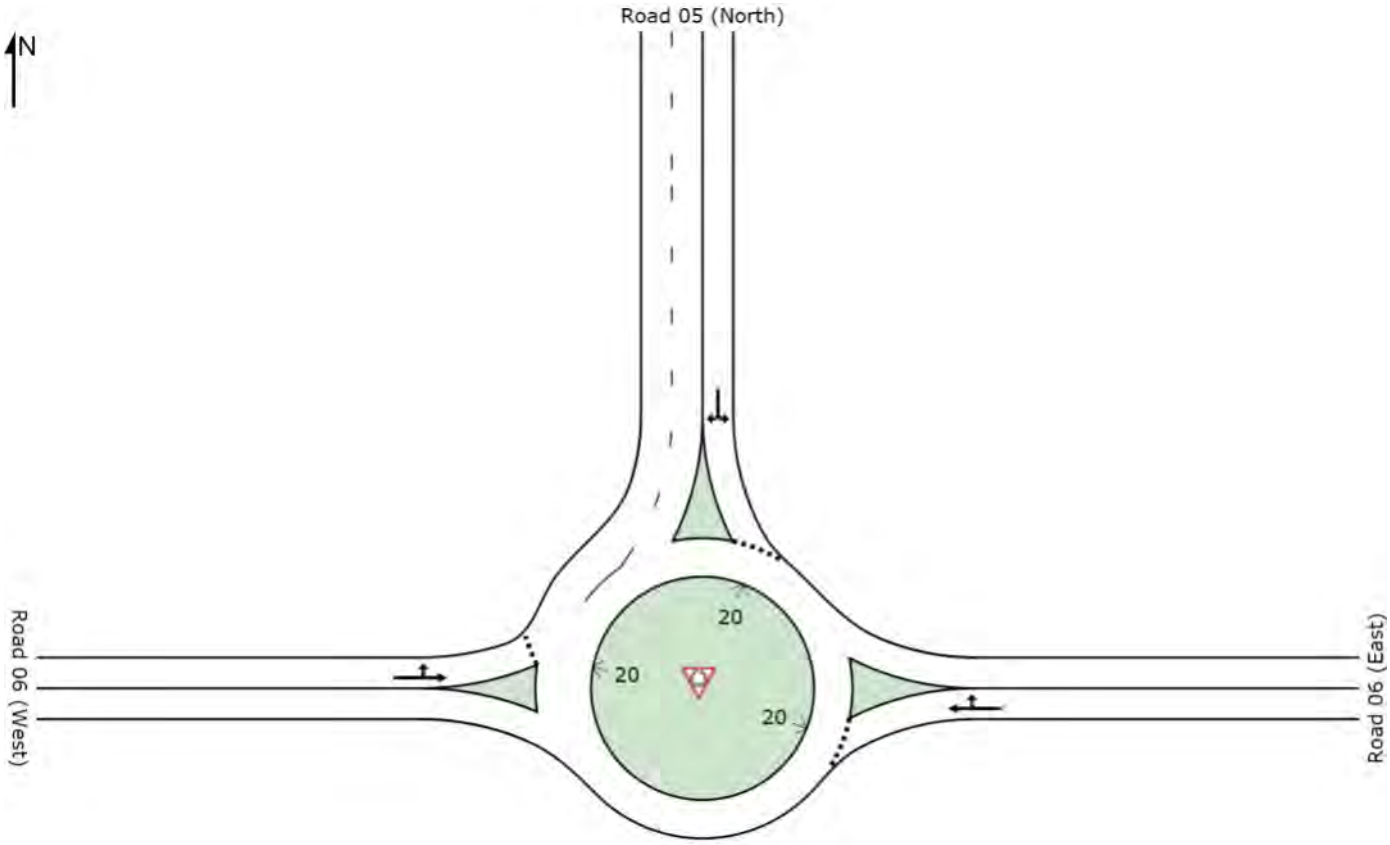
| Movement Performance - Vehicles | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
| East: Road 06 (East) | | | | | | | | | | | |
| 5 | T1 | 3 | 2.5 | 0.022 | 3.5 | LOS A | 0.1 | 0.4 | 0.08 | 0.02 | 44.9 |
| 6 | R2 | 21 | 2.5 | 0.022 | 3.5 | LOS A | 0.1 | 0.4 | 0.08 | 0.02 | 40.1 |
| Approach | | 24 | 2.5 | 0.022 | 3.5 | LOS A | 0.1 | 0.4 | 0.08 | 0.02 | 40.9 |
| North: Road 05 (North) | | | | | | | | | | | |
| 7 | L2 | 3 | 2.5 | 0.031 | 3.6 | LOS A | 0.1 | 0.8 | 0.10 | 0.03 | 40.7 |
| 9 | R2 | 31 | 2.5 | 0.031 | 3.6 | LOS A | 0.1 | 0.8 | 0.10 | 0.03 | 42.2 |
| Approach | | 34 | 2.5 | 0.031 | 3.6 | LOS A | 0.1 | 0.8 | 0.10 | 0.03 | 42.0 |
| West: Road 06 (West) | | | | | | | | | | | |
| 10 | L2 | 237 | 2.5 | 0.245 | 5.6 | LOS A | 1.1 | 7.6 | 0.11 | 0.03 | 41.8 |
| 11 | T1 | 31 | 2.5 | 0.245 | 5.6 | LOS A | 1.1 | 7.6 | 0.11 | 0.03 | 45.7 |
| Approach | | 267 | 2.5 | 0.245 | 5.6 | LOS A | 1.1 | 7.6 | 0.11 | 0.03 | 42.4 |
| All Vehicles | | 325 | 2.5 | 0.245 | 5.2 | LOS A | 1.1 | 7.6 | 0.10 | 0.03 | 42.3 |

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

# SITE LAYOUT

## Site: Road 05 / Road 06 - PM Peak

New Site
Roundabout



# MOVEMENT SUMMARY

## Site: Road 05 / Road 06 - PM Peak

New Site
Roundabout

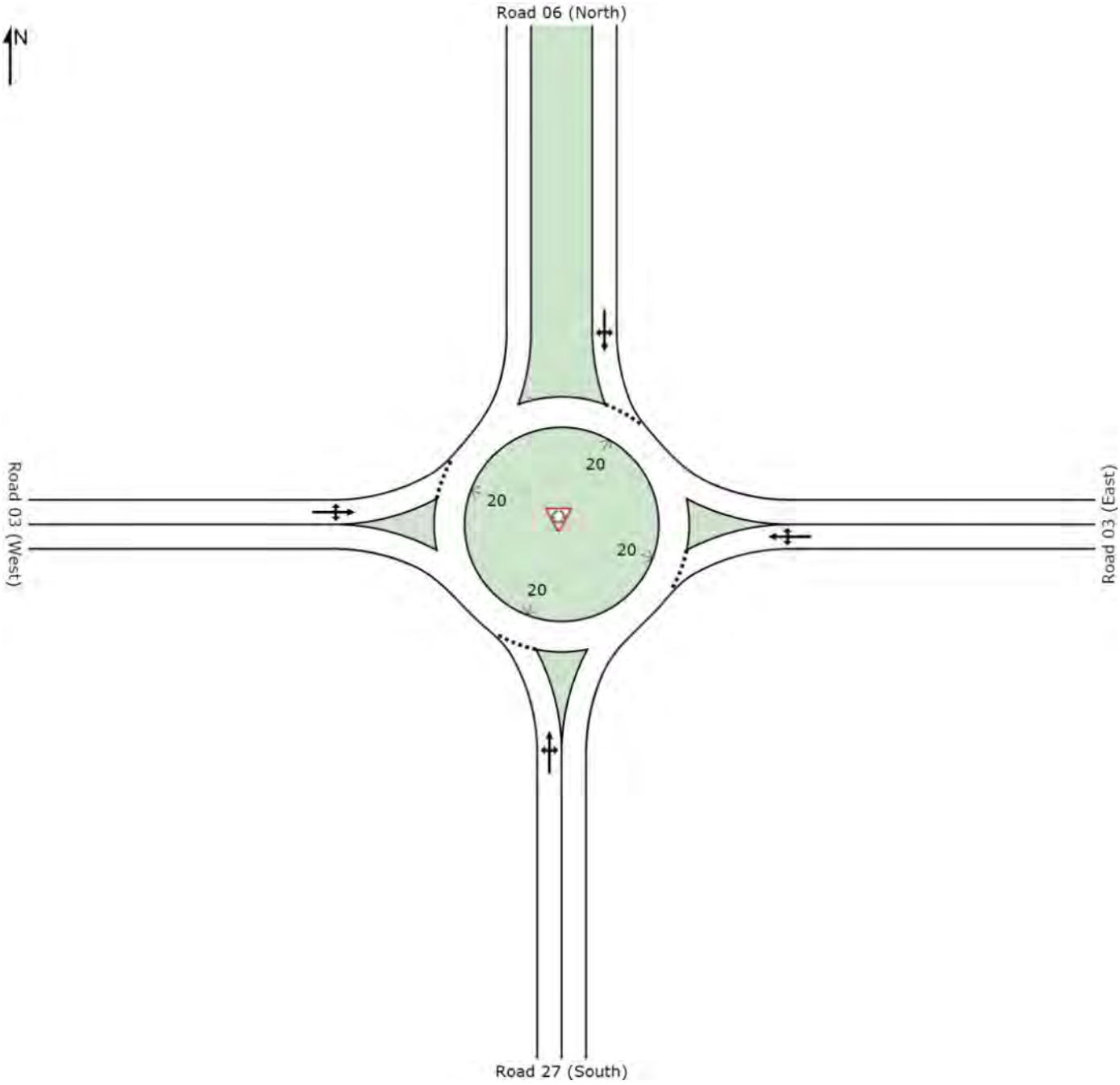
| Movement Performance - Vehicles | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
| East: Road 06 (East) | | | | | | | | | | | |
| 5 | T1 | 28 | 2.5 | 0.034 | 4.1 | LOS A | 0.1 | 0.7 | 0.26 | 0.16 | 46.4 |
| 6 | R2 | 3 | 2.5 | 0.034 | 4.1 | LOS A | 0.1 | 0.7 | 0.26 | 0.16 | 42.0 |
| Approach | | 32 | 2.5 | 0.034 | 4.1 | LOS A | 0.1 | 0.7 | 0.26 | 0.16 | 46.1 |
| North: Road 05 (North) | | | | | | | | | | | |
| 7 | L2 | 19 | 2.5 | 0.209 | 5.1 | LOS A | 0.9 | 6.3 | 0.03 | 0.00 | 39.6 |
| 9 | R2 | 214 | 2.5 | 0.209 | 5.1 | LOS A | 0.9 | 6.3 | 0.03 | 0.00 | 41.0 |
| Approach | | 233 | 2.5 | 0.209 | 5.1 | LOS A | 0.9 | 6.3 | 0.03 | 0.00 | 40.9 |
| West: Road 06 (West) | | | | | | | | | | | |
| 10 | L2 | 28 | 2.5 | 0.028 | 3.5 | LOS A | 0.1 | 0.7 | 0.03 | 0.00 | 43.5 |
| 11 | T1 | 3 | 2.5 | 0.028 | 3.5 | LOS A | 0.1 | 0.7 | 0.03 | 0.00 | 46.9 |
| Approach | | 32 | 2.5 | 0.028 | 3.5 | LOS A | 0.1 | 0.7 | 0.03 | 0.00 | 44.0 |
| All Vehicles | | 296 | 2.5 | 0.209 | 4.9 | LOS A | 0.9 | 6.3 | 0.06 | 0.02 | 41.9 |

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

# SITE LAYOUT

## Site: Road 06 / Road 03 / Road 27 - AM Peak

New Site
Roundabout



# MOVEMENT SUMMARY

## Site: Road 06 / Road 03 / Road 27 - AM Peak

New Site
Roundabout

**Movement Performance - Vehicles**

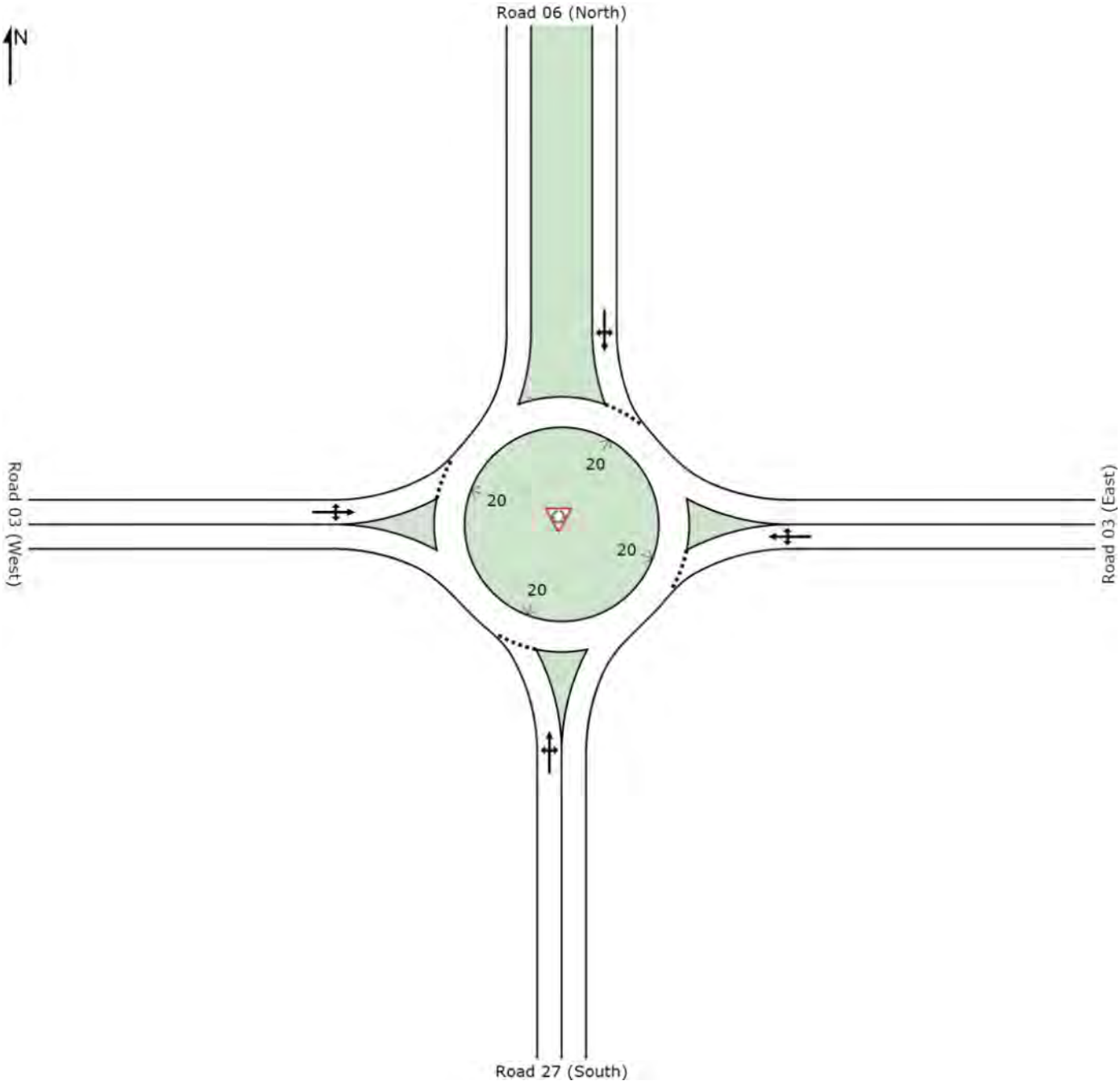
| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Road 27 (South) | | | | | | | | | | | |
| 1 | L2 | 16 | 2.5 | 0.022 | 3.5 | LOS A | 0.1 | 0.5 | 0.10 | 0.03 | 45.4 |
| 2 | T1 | 3 | 2.5 | 0.022 | 3.5 | LOS A | 0.1 | 0.5 | 0.10 | 0.03 | 46.4 |
| 3 | R2 | 5 | 2.5 | 0.022 | 3.5 | LOS A | 0.1 | 0.5 | 0.10 | 0.03 | 46.5 |
| Approach | | 24 | 2.5 | 0.022 | 3.5 | LOS A | 0.1 | 0.5 | 0.10 | 0.03 | 45.8 |
| East: Road 03 (East) | | | | | | | | | | | |
| 4 | L2 | 3 | 2.5 | 0.028 | 3.5 | LOS A | 0.1 | 0.7 | 0.05 | 0.01 | 45.8 |
| 5 | T1 | 24 | 2.5 | 0.028 | 3.5 | LOS A | 0.1 | 0.7 | 0.05 | 0.01 | 46.8 |
| 6 | R2 | 3 | 2.5 | 0.028 | 3.5 | LOS A | 0.1 | 0.7 | 0.05 | 0.01 | 46.9 |
| Approach | | 31 | 2.5 | 0.028 | 3.5 | LOS A | 0.1 | 0.7 | 0.05 | 0.01 | 46.7 |
| North: Road 06 (North) | | | | | | | | | | | |
| 7 | L2 | 1 | 2.5 | 0.008 | 3.4 | LOS A | 0.0 | 0.2 | 0.09 | 0.02 | 45.8 |
| 8 | T1 | 6 | 2.5 | 0.008 | 3.4 | LOS A | 0.0 | 0.2 | 0.09 | 0.02 | 46.8 |
| 9 | R2 | 1 | 2.5 | 0.008 | 3.4 | LOS A | 0.0 | 0.2 | 0.09 | 0.02 | 46.9 |
| Approach | | 8 | 2.5 | 0.008 | 3.4 | LOS A | 0.0 | 0.2 | 0.09 | 0.02 | 46.7 |
| West: Road 03 (West) | | | | | | | | | | | |
| 10 | L2 | 3 | 2.5 | 0.022 | 3.4 | LOS A | 0.1 | 0.5 | 0.06 | 0.01 | 45.7 |
| 11 | T1 | 18 | 2.5 | 0.022 | 3.4 | LOS A | 0.1 | 0.5 | 0.06 | 0.01 | 46.7 |
| 12 | R2 | 3 | 2.5 | 0.022 | 3.4 | LOS A | 0.1 | 0.5 | 0.06 | 0.01 | 46.9 |
| Approach | | 24 | 2.5 | 0.022 | 3.4 | LOS A | 0.1 | 0.5 | 0.06 | 0.01 | 46.6 |
| All Vehicles | | 87 | 2.5 | 0.028 | 3.5 | LOS A | 0.1 | 0.7 | 0.07 | 0.02 | 46.4 |

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

# SITE LAYOUT

## Site: Road 06 / Road 03 / Road 27 - PM Peak

New Site
Roundabout



# MOVEMENT SUMMARY

## Site: Road 06 / Road 03 / Road 27 - PM Peak

New Site
Roundabout

**Movement Performance - Vehicles**

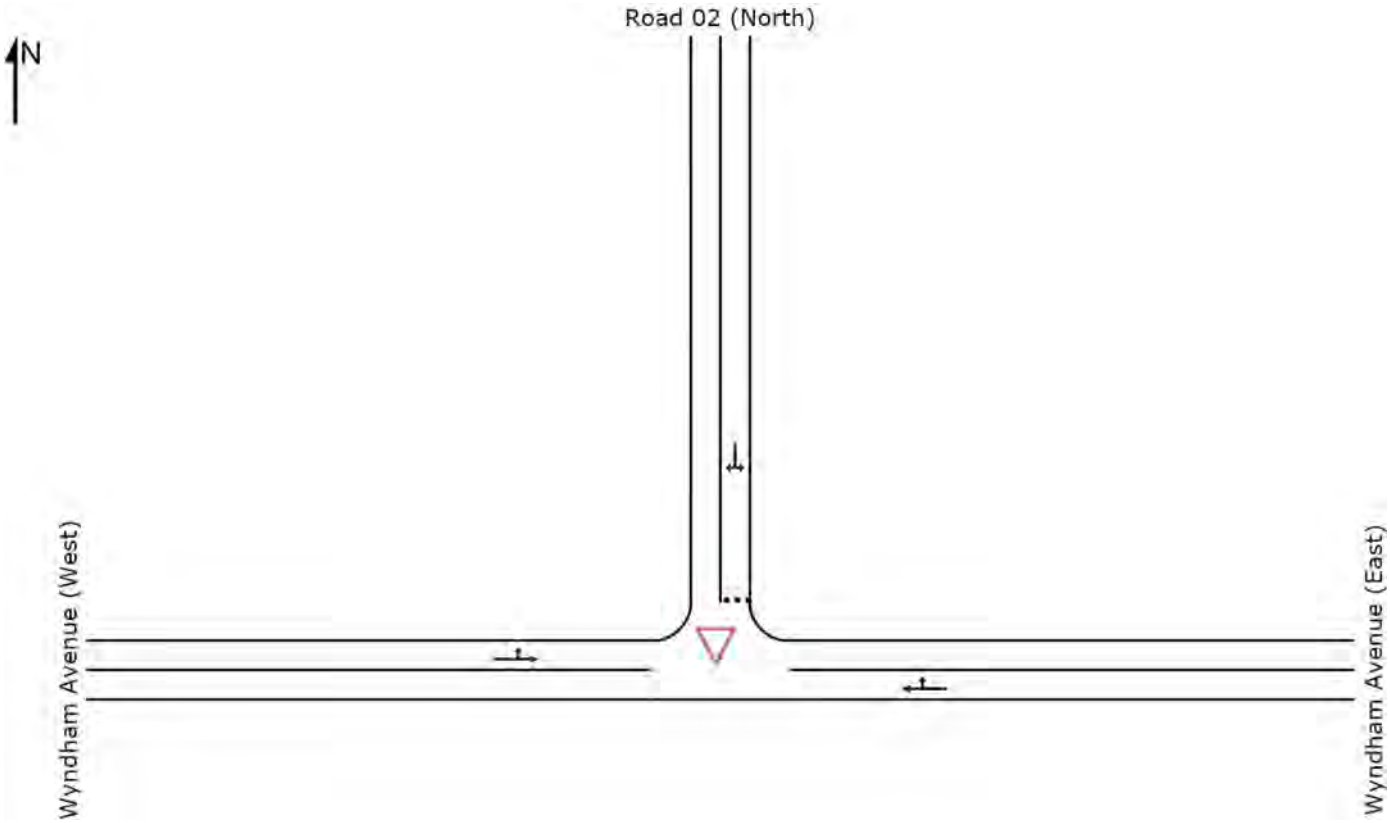
| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Road 27 (South) | | | | | | | | | | | |
| 1 | L2 | 3 | 2.5 | 0.012 | 3.4 | LOS A | 0.0 | 0.3 | 0.08 | 0.02 | 45.4 |
| 2 | T1 | 6 | 2.5 | 0.012 | 3.4 | LOS A | 0.0 | 0.3 | 0.08 | 0.02 | 46.4 |
| 3 | R2 | 3 | 2.5 | 0.012 | 3.4 | LOS A | 0.0 | 0.3 | 0.08 | 0.02 | 46.6 |
| Approach | | 13 | 2.5 | 0.012 | 3.4 | LOS A | 0.0 | 0.3 | 0.08 | 0.02 | 46.2 |
| East: Road 03 (East) | | | | | | | | | | | |
| 4 | L2 | 5 | 2.5 | 0.021 | 3.5 | LOS A | 0.1 | 0.5 | 0.08 | 0.02 | 45.9 |
| 5 | T1 | 17 | 2.5 | 0.021 | 3.5 | LOS A | 0.1 | 0.5 | 0.08 | 0.02 | 46.9 |
| 6 | R2 | 1 | 2.5 | 0.021 | 3.5 | LOS A | 0.1 | 0.5 | 0.08 | 0.02 | 47.1 |
| Approach | | 23 | 2.5 | 0.021 | 3.5 | LOS A | 0.1 | 0.5 | 0.08 | 0.02 | 46.7 |
| North: Road 06 (North) | | | | | | | | | | | |
| 7 | L2 | 3 | 2.5 | 0.009 | 3.4 | LOS A | 0.0 | 0.2 | 0.12 | 0.03 | 45.2 |
| 8 | T1 | 3 | 2.5 | 0.009 | 3.4 | LOS A | 0.0 | 0.2 | 0.12 | 0.03 | 46.2 |
| 9 | R2 | 3 | 2.5 | 0.009 | 3.4 | LOS A | 0.0 | 0.2 | 0.12 | 0.03 | 46.3 |
| Approach | | 9 | 2.5 | 0.009 | 3.4 | LOS A | 0.0 | 0.2 | 0.12 | 0.03 | 45.9 |
| West: Road 03 (West) | | | | | | | | | | | |
| 10 | L2 | 1 | 2.5 | 0.034 | 3.5 | LOS A | 0.1 | 0.8 | 0.06 | 0.01 | 45.0 |
| 11 | T1 | 22 | 2.5 | 0.034 | 3.5 | LOS A | 0.1 | 0.8 | 0.06 | 0.01 | 46.0 |
| 12 | R2 | 15 | 2.5 | 0.034 | 3.5 | LOS A | 0.1 | 0.8 | 0.06 | 0.01 | 46.1 |
| Approach | | 38 | 2.5 | 0.034 | 3.5 | LOS A | 0.1 | 0.8 | 0.06 | 0.01 | 46.0 |
| All Vehicles | | 83 | 2.5 | 0.034 | 3.5 | LOS A | 0.1 | 0.8 | 0.07 | 0.02 | 46.2 |

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

# SITE LAYOUT

## Site: Wyndham Avenue / Road 02 - AM Peak

New Site
Giveway / Yield (Two-Way)





Project: \\cbrnas01\active\P15\15-003035\technical\Traffic\SIDRA Analysis\15-003035 - Denman Prospect - Additional Analysis.sip6
8000937, 6019182, CALIBRE CONSULTING (QLD) PTY LTD, PLUS / Floating

# MOVEMENT SUMMARY

## Site: Wyndham Avenue / Road 02 - AM Peak

New Site
Giveway / Yield (Two-Way)

**Movement Performance - Vehicles**

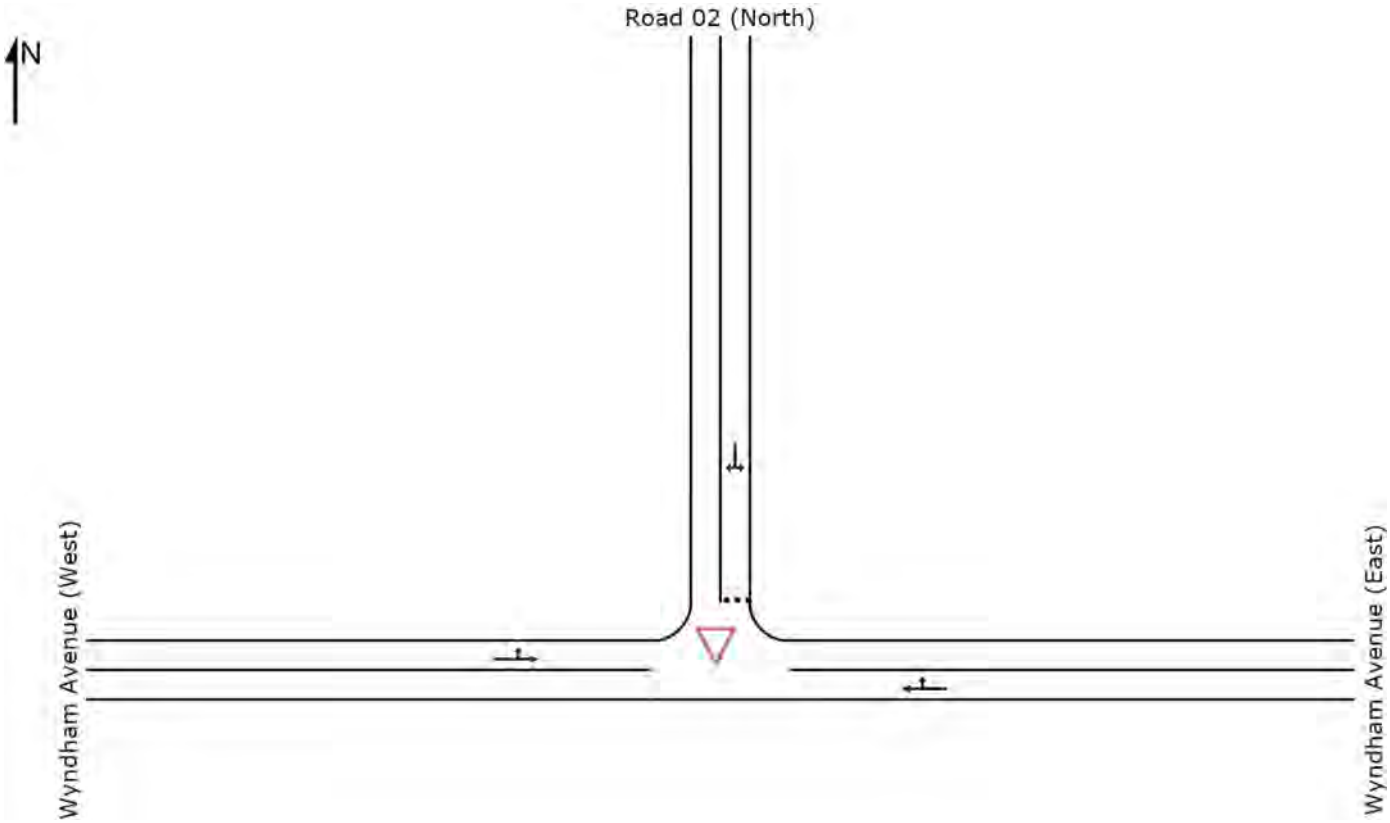
| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Wyndham Avenue (East) | | | | | | | | | | | |
| 5 | T1 | 15 | 5.0 | 0.019 | 0.9 | LOS A | 0.1 | 0.7 | 0.37 | 0.29 | 56.1 |
| 6 | R2 | 15 | 5.0 | 0.019 | 6.4 | LOS A | 0.1 | 0.7 | 0.37 | 0.29 | 53.9 |
| Approach | | 30 | 5.0 | 0.019 | 3.7 | NA | 0.1 | 0.7 | 0.37 | 0.29 | 55.0 |
| North: Road 02 (North) | | | | | | | | | | | |
| 7 | L2 | 264 | 5.0 | 0.227 | 6.7 | LOS A | 1.0 | 7.3 | 0.39 | 0.63 | 52.2 |
| 9 | R2 | 15 | 5.0 | 0.227 | 6.6 | LOS A | 1.0 | 7.3 | 0.39 | 0.63 | 51.7 |
| Approach | | 279 | 5.0 | 0.227 | 6.7 | LOS A | 1.0 | 7.3 | 0.39 | 0.63 | 52.2 |
| West: Wyndham Avenue (West) | | | | | | | | | | | |
| 10 | L2 | 15 | 5.0 | 0.146 | 5.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.03 | 57.8 |
| 11 | T1 | 259 | 5.0 | 0.146 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.03 | 59.7 |
| Approach | | 274 | 5.0 | 0.146 | 0.3 | NA | 0.0 | 0.0 | 0.00 | 0.03 | 59.6 |
| All Vehicles | | 583 | 5.0 | 0.227 | 3.6 | NA | 1.0 | 7.3 | 0.20 | 0.33 | 55.6 |

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

# SITE LAYOUT

## Site: Wyndham Avenue / Road 02 - PM Peak

New Site
Giveway / Yield (Two-Way)





Project: \\cbrnas01\active\P15\15-003035\technical\Traffic\SIDRA Analysis\15-003035 - Denman Prospect - Additional Analysis.sip6
8000937, 6019182, CALIBRE CONSULTING (QLD) PTY LTD, PLUS / Floating

# MOVEMENT SUMMARY

## Site: Wyndham Avenue / Road 02 - PM Peak

New Site
Giveway / Yield (Two-Way)

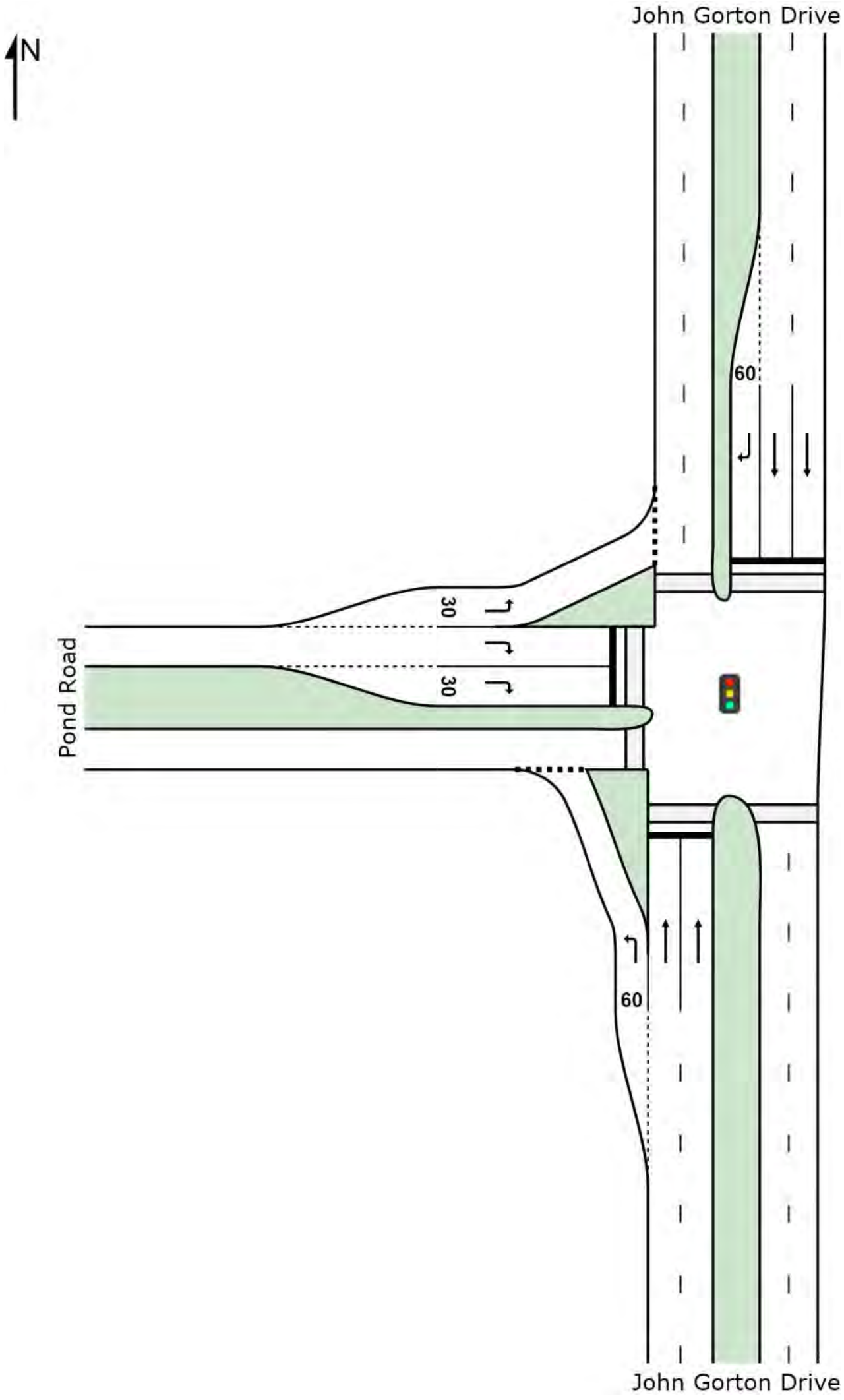
| Movement Performance - Vehicles | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
| East: Wyndham Avenue (East) | | | | | | | | | | | |
| 5 | T1 | 259 | 5.0 | 0.295 | 0.1 | LOS A | 1.8 | 13.4 | 0.13 | 0.29 | 56.9 |
| 6 | R2 | 264 | 5.0 | 0.295 | 5.6 | LOS A | 1.8 | 13.4 | 0.13 | 0.29 | 54.6 |
| Approach | | 523 | 5.0 | 0.295 | 2.9 | NA | 1.8 | 13.4 | 0.13 | 0.29 | 55.8 |
| North: Road 02 (North) | | | | | | | | | | | |
| 7 | L2 | 15 | 5.0 | 0.031 | 7.0 | LOS A | 0.1 | 0.8 | 0.05 | 0.58 | 52.4 |
| 9 | R2 | 15 | 5.0 | 0.031 | 6.9 | LOS A | 0.1 | 0.8 | 0.05 | 0.58 | 51.8 |
| Approach | | 30 | 5.0 | 0.031 | 7.0 | LOS A | 0.1 | 0.8 | 0.05 | 0.58 | 52.1 |
| West: Wyndham Avenue (West) | | | | | | | | | | | |
| 10 | L2 | 15 | 5.0 | 0.016 | 5.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.29 | 55.7 |
| 11 | T1 | 15 | 5.0 | 0.016 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.29 | 57.4 |
| Approach | | 30 | 5.0 | 0.016 | 2.8 | NA | 0.0 | 0.0 | 0.00 | 0.29 | 56.5 |
| All Vehicles | | 583 | 5.0 | 0.295 | 3.1 | NA | 1.8 | 13.4 | 0.12 | 0.30 | 55.6 |

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

# SITE LAYOUT

## Site: John Gorton Drive / Pond Road - AM Peak

John Gorton Drive / Pond Road
2031
AM Peak
Signals - Fixed Time


N
John Gorton Drive
60
30
30
Pond Road
60
John Gorton Drive

# MOVEMENT SUMMARY

## Site: John Gorton Drive / Pond Road - AM Peak

John Gorton Drive / Pond Road
2031
AM Peak
Signals - Fixed Time  Cycle Time = 105 seconds (Optimum Cycle Time - Minimum Delay)

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: John Gorton Drive | | | | | | | | | | | |
| 1 | L2 | 62 | 3.0 | 0.045 | 6.2 | LOS A | 0.2 | 1.8 | 0.15 | 0.58 | 53.7 |
| 2 | T1 | 727 | 3.0 | 0.793 | 44.2 | LOS D | 19.0 | 136.3 | 1.00 | 0.93 | 34.9 |
| Approach | | 789 | 3.0 | 0.793 | 41.2 | LOS D | 19.0 | 136.3 | 0.93 | 0.90 | 35.9 |
| North: John Gorton Drive | | | | | | | | | | | |
| 8 | T1 | 1183 | 3.0 | 0.795 | 32.3 | LOS C | 28.5 | 204.8 | 0.94 | 0.87 | 39.3 |
| 9 | R2 | 61 | 3.0 | 0.086 | 27.1 | LOS C | 1.9 | 14.0 | 0.66 | 0.70 | 41.2 |
| Approach | | 1244 | 3.0 | 0.795 | 32.0 | LOS C | 28.5 | 204.8 | 0.93 | 0.87 | 39.4 |
| West: Pond Road | | | | | | | | | | | |
| 10 | L2 | 257 | 3.0 | 0.225 | 9.4 | LOS A | 3.6 | 26.1 | 0.37 | 0.66 | 51.3 |
| 12 | R2 | 295 | 3.0 | 0.381 | 45.3 | LOS D | 6.6 | 47.6 | 0.91 | 0.79 | 34.0 |
| Approach | | 552 | 3.0 | 0.381 | 28.6 | LOS C | 6.6 | 47.6 | 0.66 | 0.73 | 40.3 |
| All Vehicles | | 2585 | 3.0 | 0.795 | 34.1 | LOS C | 28.5 | 204.8 | 0.87 | 0.85 | 38.4 |

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

**Movement Performance - Pedestrians**

| Mov ID | Description | Demand Flow ped/h | Average Delay sec | Level of Service | Average Back of Queue Pedestrian ped | Average Back of Queue Distance m | Prop. Queued | Effective Stop Rate per ped |
|---|---|---|---|---|---|---|---|---|
| P1 | South Full Crossing | 53 | 46.8 | LOS E | 0.1 | 0.1 | 0.94 | 0.94 |
| P3 | North Full Crossing | 53 | 46.8 | LOS E | 0.1 | 0.1 | 0.94 | 0.94 |
| P4 | West Full Crossing | 53 | 41.3 | LOS E | 0.1 | 0.1 | 0.89 | 0.89 |
| All Pedestrians | | 158 | 44.9 | LOS E | | | 0.93 | 0.93 |

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

# PHASING SUMMARY

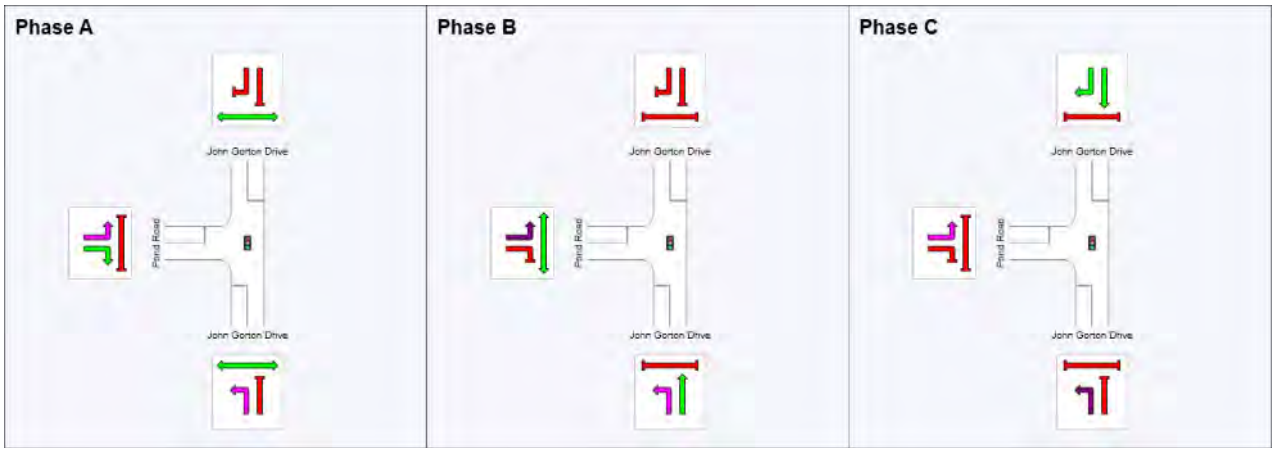
## Site: John Gorton Drive / Pond Road - AM Peak

John Gorton Drive / Pond Road
2031
AM Peak
Signals - Fixed Time  Cycle Time = 105 seconds (Optimum Cycle Time - Minimum Delay)

**Phase times determined by the program**
**Sequence: Adapted**
**Movement Class: All Movement Classes**
**Input Sequence: A, B, C**
**Output Sequence: A, B, C**

**Phase Timing Results**

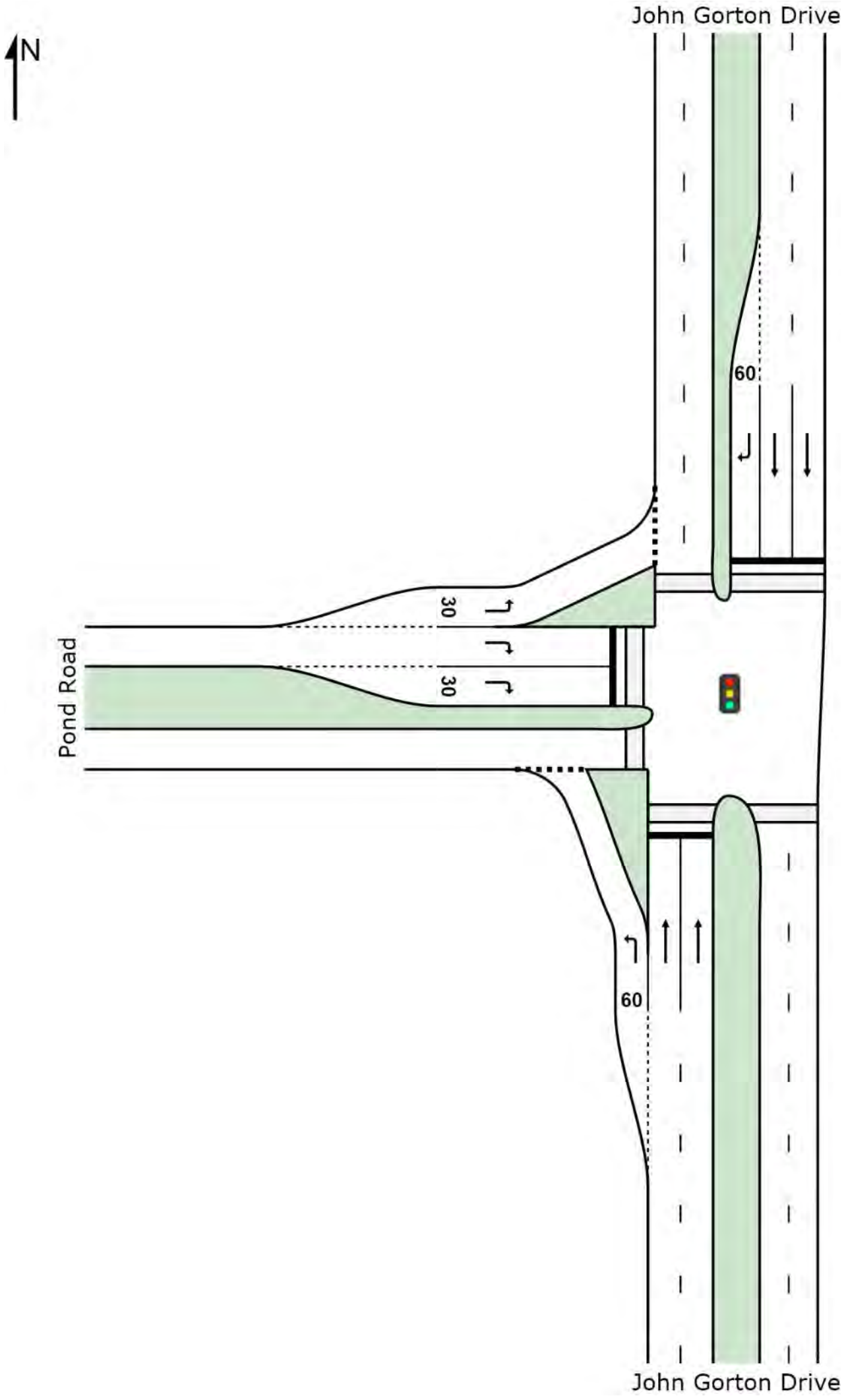
| Phase | A | B | C |
|---|---|---|---|
| Reference Phase | Yes | No | No |
| Phase Change Time (sec) | 0 | 27 | 58 |
| Green Time (sec) | 21 | 25 | 41 |
| Yellow Time (sec) | 4 | 4 | 4 |
| All-Red Time (sec) | 2 | 2 | 2 |
| Phase Time (sec) | 27 | 31 | 47 |
| Phase Split | 26 % | 30 % | 45 % |




# SITE LAYOUT

## Site: John Gorton Drive / Pond Road - PM Peak

John Gorton Drive / Pond Road
2031
AM Peak
Signals - Fixed Time


N
John Gorton Drive
60
30
30
Pond Road
60
John Gorton Drive

# MOVEMENT SUMMARY

## Site: John Gorton Drive / Pond Road - PM Peak

John Gorton Drive / Pond Road
2031
AM Peak
Signals - Fixed Time  Cycle Time = 120 seconds (Optimum Cycle Time - Minimum Delay)

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: John Gorton Drive | | | | | | | | | | | |
| 1 | L2 | 295 | 3.0 | 0.225 | 8.1 | LOS A | 3.6 | 26.0 | 0.29 | 0.64 | 52.2 |
| 2 | T1 | 1183 | 3.0 | 0.796 | 32.4 | LOS C | 34.0 | 243.8 | 0.90 | 0.82 | 39.3 |
| Approach | | 1478 | 3.0 | 0.796 | 27.5 | LOS C | 34.0 | 243.8 | 0.77 | 0.79 | 41.3 |
| North: John Gorton Drive | | | | | | | | | | | |
| 8 | T1 | 727 | 3.0 | 0.802 | 48.8 | LOS D | 22.8 | 163.7 | 0.98 | 0.92 | 33.4 |
| 9 | R2 | 257 | 3.0 | 0.565 | 48.3 | LOS D | 13.2 | 95.0 | 0.93 | 0.82 | 33.3 |
| Approach | | 984 | 3.0 | 0.802 | 48.7 | LOS D | 22.8 | 163.7 | 0.97 | 0.89 | 33.4 |
| West: Pond Road | | | | | | | | | | | |
| 10 | L2 | 29 | 3.0 | 0.034 | 13.4 | LOS B | 0.6 | 4.3 | 0.42 | 0.64 | 48.6 |
| 12 | R2 | 62 | 3.0 | 0.092 | 50.4 | LOS D | 1.5 | 11.0 | 0.87 | 0.71 | 32.5 |
| Approach | | 92 | 3.0 | 0.092 | 38.5 | LOS D | 1.5 | 11.0 | 0.73 | 0.69 | 36.4 |
| All Vehicles | | 2554 | 3.0 | 0.802 | 36.1 | LOS D | 34.0 | 243.8 | 0.85 | 0.82 | 37.7 |

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

**Movement Performance - Pedestrians**

| Mov ID | Description | Demand Flow ped/h | Average Delay sec | Level of Service | Average Back of Queue Pedestrian ped | Average Back of Queue Distance m | Prop. Queued | Effective Stop Rate per ped |
|---|---|---|---|---|---|---|---|---|
| P1 | South Full Crossing | 53 | 54.3 | LOS E | 0.2 | 0.2 | 0.95 | 0.95 |
| P3 | North Full Crossing | 53 | 54.3 | LOS E | 0.2 | 0.2 | 0.95 | 0.95 |
| P4 | West Full Crossing | 53 | 28.1 | LOS C | 0.1 | 0.1 | 0.68 | 0.68 |
| All Pedestrians | | 158 | 45.5 | LOS E | | | 0.86 | 0.86 |

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

# PHASING SUMMARY

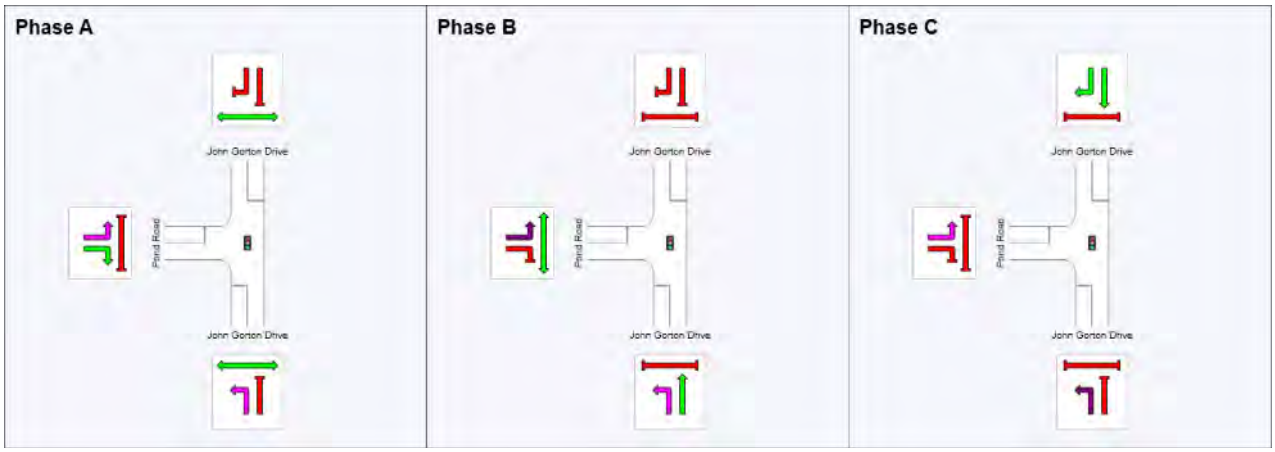
## Site: John Gorton Drive / Pond Road - PM Peak

John Gorton Drive / Pond Road
2031
AM Peak
Signals - Fixed Time  Cycle Time = 120 seconds (Optimum Cycle Time - Minimum Delay)

**Phase times determined by the program**
**Sequence: Adapted**
**Movement Class: All Movement Classes**
**Input Sequence: A, B, C**
**Output Sequence: A, B, C**

**Phase Timing Results**

| Phase | A | B | C |
|---|---|---|---|
| Reference Phase | Yes | No | No |
| Phase Change Time (sec) | 0 | 27 | 84 |
| Green Time (sec) | 21 | 51 | 30 |
| Yellow Time (sec) | 4 | 4 | 4 |
| All-Red Time (sec) | 2 | 2 | 2 |
| Phase Time (sec) | 27 | 57 | 36 |
| Phase Split | 23 % | 48 % | 30 % |




# APPENDIX B ROAD HIERARCHY PLAN

## LEGEND

- KG — KERB AND GUTTER
- MK — MOUNTABLE KERB
- PK — PERMEABLE KERB
- K4A — MODIFIED KERB AND GUTTER
- BKG — BARRIER KERB AND GUTTER
- 328 — VEHICLES PER DAY (NUMBER) (SEE NOTE 1)
- EXISTING/UNDER CONSTRUCTION ARTERIAL ROAD
- MAJOR COLLECTOR
- MINOR COLLECTOR (WITH PARKING BAYS)
- MINOR COLLECTOR (BUS ROUTE, WITH PARKING BAYS)
- ACCESS B
- ACCESS A
- REAR LANE
- WOONERF STREET
- MAINTENANCE VEHICLE ACCESS TRACK
- STENCILED PAVEMENT THRESHOLD
- RAISED PAVEMENT/PEDESTRIAN CROSSING
- ESTATE BOUNDARY
- DRIVEWAY
- ROAD NARROWING AND SLOW POINT FOR SPEED CONTROL
- PROPOSED BUS STOP (INDICATIVE)
- INDICATIVE MULTI UNIT DRIVEWAY LOCATION
- FIRE TRAIL
- PROPOSED LOCAL BUS ROUTE
- TEMPORARY LOCAL BUS ROUTE

FUTURE DENMAN PROSPECT STAGE 3

FUTURE DENMAN PROSPECT STAGE 2

DENMAN PROSPECT STAGE 1A

BASIN C1

BASIN C2

BASIN C3

HOLBOROW AVENUE

JOHN GORTON DRIVE

URIARRA ROAD

LOCAL CENTRE PRECINCT

OPEN SPACE

## NOTES

1. TRAFFIC GENERATION BASED ON 8VPD FOR STANDARD RESIDENTIAL AND 6VPD FOR MULTI UNIT DEVELOPMENT.
2. REFER DRAWING 15-003035-16.02 FOR DATA TABLE.
3. ALL KERBS SHALL BE KERB AND GUTTER EXCEPT WHERE SHOWN.
4. DRIVEWAY LOCATIONS ARE INDICATIVE TO BE CONFIRMED IN DETAIL DESIGN.

DRAFT

| | DESIGN | DRAWN | CHECK | APPROVED | DATE | AMENDMENT DETAILS |
|---|---|---|---|---|---|---|
| FIRST ISSUE | HA | SKT | | | 8/04/2016 | |
| A | | | | | | |
| B | | | | | 24/03/2016 | LOCAL CENTRE PRECINCT SITE |
| C | | | | | 8/04/2016 | PROPOSED LOCAL BUS ROUTE SHOWN, MU(No.) e/AB,c/AC,k/EE & i/LaSS MIXED USE |
| | HA | LA | | | | EDP COMMENTS ADDRESSED |

IMOGEN MILLER URBAN DESIGN

Knight Frank Town Planning

Cia landscapes + colour

WAE No.

PROJECT No.

A3 PLOT 1:5000 — SCALE (METRES) 50 0 50 100 — A1 PLOT 1:2500

CONSULT AUSTRALIA

CLIENT: CAPITAL ESTATE DEVELOPMENTS — Denman Prospect

PROJECT: DENMAN PROSPECT STAGE 1B ESTATE DEVELOPMENT PLAN



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DRAWING TITLE: ROAD HIERARCHY AND TRAFFIC ANALYSIS PLAN

DRAWING NUMBER: 15-003035-16.01+

FILE: H:\P5\15-003035\drawing\EDP_P5-003035\15-003035-16 RHP.dwg 16th-Nov-2015 4:32PM USER: Sini Tuomi
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# APPENDIX C EAST WEST ARTERIAL – TRAFFIC VOLUMES

# EAST WEST ARTERIAL - TRAFFIC VOLUMES
## 2031

N

MOLONGLO VALLEY BLOCK NO 17

CRAVENS CREEK

12,460 VPD

270 VPD

11,580 VPD

MOLONGLO VALLEY BLOCK NO 18

AREA OF WORKS

BLOCK 1125 WESTON CREEK

12,970 VPD.

ROAD 5

ROAD 3

ROAD 2

LANE 1

FUTURE EAST WEST ARTERIAL

MATCH TO JGD STAGE 2A

2640 VPD

ROAD 4

HOLDING LEASE BOUNDARY

ROAD 1

14,800 VPD

MOLONGLO 2 GROUP CENTRE

CRAVENS CREEK

11,760 VPD

7820 VPD.

13,940 VPD.

5270 VPD

11,310 VPD.

JOHN GORTON DRIVE

COPPINS CROSSING ROAD

DENMAN PROSPECT

BLOCK 1187 WESTON CREEK

| FIRST ISSUE | DESIGN | DRAWN | CHECK | APPROVED | DATE | AMENDMENT DETAILS |
|---|---|---|---|---|---|---|
| | TDP | LAG | | | 28/06/13 | |
| amendments > A | | | | | | |
| B | | | | | | |
| C | | | | | | |
| D | | | | | | |
| E | | | | | | |
| F | | | | | | |

A0 PLOT 1.4000 | SCALE (METRES) 20 10 0 20 40 60 80 100 | A1 PLOT 1.2000

TAE No.

PROJECT No.

CONSULT AUSTRALIA

CLIENT ACT Government Economic Development

PROJECT EAST WEST ARTERIAL STAGE 1

BROWN



www.brownconsulting.com.au

DRAWING TITLE GENERAL ARRANGEMENT

DRAWING NUMBER C13025-P005+

AMEND

FILE: N:\C13000\C13025\drawings\C13025-P005-GA Aug 28th-Jun-2013 3:28PM USER: Victor van bovene
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