AGENDA

ORDINARY MEETING OF COUNCIL

Tuesday, 15 July 2014

To be held
Swan Hill Town Hall
Council Chambers
McCallum Street, Swan Hill
Commencing at 5:00 PM

COUNCIL:
Cr LT McPhee – Mayor
Cr JN Katis
Cr GW Norton
Cr GI Cruickshank
Cr JA Kiley
Cr CM Adamson
Cr JB Crowe
INDEX

15 July 2014

SECTION A – PROCEDURAL MATTERS ........................................................................... 3

SECTION B – REPORTS ................................................................................................. 4

B.14.36  RECEIVE AND HEAR SUBMISSIONS TO THE DRAFT 2014/15 ANNUAL BUDGET ........................................................................................................ 4

B.14.37  SWAN HILL ECONOMIC DEVELOPMENT STRATEGY IMPLEMENTATION ......................................................................................................................... 6

B.14.38  ROOMING HOUSE AND PRESCRIBED ACCOMMODATION UPDATE ......................................................................................................................... 28

B.14.39  PLANNING SCHEME AMENDMENT REQUEST - C58 LAND - SWAN HILL SOUTH WEST DEVELOPMENT PRECINCT ........................................... 31

SECTION C – DECISIONS WHICH NEED ACTION/RATIFICATION .......................... 384

C.14.11  COUNCILLOR ASSEMBLIES - RECORD OF ATTENDANCE AND AGENDA ITEMS .................................................................................................... 384

SECTION D – NOTICES OF MOTION ................................................................................. 386

SECTION E – URGENT ITEMS NOT INCLUDED IN AGENDA ................................ 386

SECTION F – TO CONSIDER & ORDER ON COUNCILLOR REPORTS ....... 386

SECTION G – IN CAMERA ITEMS ..................................................................................... 387

B.14.40  IN CAMERA CONSIDERATION OF CONFIDENTIAL REPORT .......... 387
SECTION A – PROCEDURAL MATTERS

- Open

- Acknowledgement to Country

- Prayer

- Apologies

- Confirmation of Minutes
  1) Ordinary Meeting held on 10 June 2014

- Declarations of Conflict of Interest

- Receptions and Reading of Petitions, Memorials, Joint Letters and Deputations

- Public Question Time
SECTION B – REPORTS

B.14.36 RECEIVE AND HEAR SUBMISSIONS TO THE DRAFT 2014/15 ANNUAL BUDGET

Responsible Officer: Director Corporate Services
File Number: 42-09-71
Attachments: Nil

Declarations of Interest: Officer
David Lenton - as the responsible officer, I declare that I have no disclosable interests in this matter.

Summary

The purpose of this item is to enable Council to formally receive and hear submissions to the Draft 2014/15 Budget.

Discussion

Council advertised for submissions to its Draft 2014/15 Budget in the Swan Hill Guardian on Friday 13 June 2014 and the Robinvale Sentinel on Thursday 19 June 2014.

The Statutory period for making submissions has now passed. As required under the Local Government Act, Council is now in a position to formally receive any submissions and allow submitters to speak to any issues they have raised.

Consideration of any submissions will be dealt with at a Special Council Meeting to be held in 22 July 2014.

Consultation

The submission process is part of the consultation process for the Budget.

Financial Implications

Nil

Social Implications

Nil

Economic Implications

Nil
Environmental Implications
Nil

Risk Management Implications
Nil

Council Plan Strategy Addressed

*Responsible management of resources* - We will continually improve the management of our finances, assets, systems and technology to achieve and maintain Best Value in our operations.

Options
Nil

Recommendations

That Council:

2. Enable any submitters to speak to their submission.
B.14.37 SWAN HILL ECONOMIC DEVELOPMENT STRATEGY IMPLEMENTATION

Responsible Officer: Director Development and Planning
File Number: 26-33-00
Attachments: 1 Economic Development Strategy Implementation Report

Declarations of Interest: Officer
Brett Luxford - as the responsible officer, I declare that I have no disclosable interests in this matter.

Summary

This report seeks to update Council and the community on the actions taken to implement the Swan Hill Rural City Council Economic Development Strategy 2011-2016. The report is accompanied by an attachment that demonstrates the large number of initiatives undertaken to develop a sustainable and diverse local economy.

Discussion

The Swan Hill Rural City Council Economic Development Strategy 2011-2016 was adopted by Council at its Ordinary Meeting in October 2011. The strategy is a key document that links to the Council Plan and helps guide Council’s role in economic development and identifies economic development activities across the five year lifespan of the strategy.

Within the strategy there are also some actions that extend beyond the 5 year horizon. This is in recognition of the long term strategic nature of some of the activities and that many of the projects or initiatives are a long time in the planning.

Throughout the development of the strategy the focus was on understanding what Council was able to achieve or able to influence. This resulted in a series of actions across five strategic themes. The themes are:

1. Attracting New Business Investment
2. Supporting Existing Businesses to Grow
3. Marketing the Region
4. Addressing Infrastructure Needs
5. Educations and Skills Development

It should be noted that the Economic Development Strategy is implemented by many different departments across Council. Many of the actions that Council undertakes on a daily basis either supports or generates local economic development and local businesses.
The attached report breaks down each of the key themes into its actions and outlines some of the activities that Council has been undertaking since the adoption of the strategy. The report highlights that significant progress has been made in achieving many of the actions identified.

The report also highlights that Council alone cannot develop a sustainable economy. Council is supported by, and in turn supports, many private and government entities in the quest for economic growth. Funding support from both the Australian and Victorian Governments has allowed many of the actions to be achieved.

The strategy is a living document and is continually being reviewed. A new strategy will be developed during 2016. Until that time Council will continue to implement the actions identified in the 2011-2016 strategy and harness new opportunities as they arise.

Consultation

Significant consultation was undertaken in the development of the strategy and initiatives or projects undertaken in implementing the strategy are often undertaken in partnership with other organisations or require consultation themselves.

Financial Implications

Not applicable.

Social Implications

There are strong links between economic development outcomes and social outcomes. Measurable community benefits come from creating a sustainable economy including employment and improvements to community infrastructure.

Economic Implications

The development of a sustainable local economy through the five strategic themes identified in the economic development strategy has significant local economic implications. The strategy was developed to seek to leverage the strengths in the local economy and address the gaps that were identified.

Environmental Implications

The economic development strategy identified actions to improve environmental sustainability and at the same time generate local economic growth.
Risk Management Implications

Not applicable.

Council Plan Strategy Addressed

*Attracting new business* - We will encourage new business development and will provide support to attract new business investment and expansion in the community.

Options

Council can accept the recommendations as outlined in the report or not accept the recommendations.

Recommendation

That Council note the report.
**Theme One: ATTRACTING NEW BUSINESS INVESTMENT**

<table>
<thead>
<tr>
<th>Actions</th>
<th>Horizon Years 1-5 &gt;5</th>
<th>Stakeholders</th>
<th>Key Activities</th>
</tr>
</thead>
</table>

SHRCC will encourage new business developments and provide support to attract new business.
<table>
<thead>
<tr>
<th>Actions</th>
<th>Horizon Years</th>
<th>Stakeholders</th>
<th>Key Activities</th>
</tr>
</thead>
</table>
| 2. Attract new investment in identified key industries including tourism, agriculture and manufacturing through the development of targeted investment prospectuses. | ✔️            | Economic Development Unit, DPI, Murray Regional Tourism Board, Community Groups. | 🔄 Swan Hill Region Overview Marketing Materials  
Fact sheets (agriculture, tourism, manufacturing, retail and municipal overview) completed and printed investment prospectus in final draft format  
In progress Investment Attraction Policy Review  
Final draft currently being completed  
In progress Robinvale Investment Prospectus  
Final draft currently being completed  
In progress Riverfront Masterplan – Lodges redevelopment  
Expression of interest document currently under development |
| 3. Secure new business investment through targeted and proactive engagement with potential investors in the renewable energy sector. | ✔️            | Economic Development Unit, Environment Department, Planning Department, Community Groups. | 🔄 SHRCC Solar Prospectus  
Completed and endorsed by Council (2013)  
Distributed to solar developers (2013)  
In progress Wemen Substation investigation  
Ongoing site analysis and discussions with potential solar investors and land owners  
On going Large – Medium Scale Solar Development  
Liaising with potential solar investment companies  
In progress Blackwire Reserve Solar Development  
Rezoning Completed (Nov 2012)  
Preferred developer selected (Dec 2012)  
Due diligence of site completed (2012/2013)  
Land under contract (June 2014) |
| 4. Ensure well-located industrial, business and residential land are available for businesses and individuals to become established within the region. | ✔️            | Economic Development Unit, Planning Department, Victorian State Government | 🔄 Rezoning of North Park Reserve  
Completed  
✔️ Karinie Street Industrial Land (Development Plan)  
Completed  
✔️ Highway Business Strategy  
Completed  
In progress South West Development Precinct  
Under development  
In progress Tower Hill Land Release  
Various stages have been completed  
✔️ Residential Development Strategy (Review)  
Completed and adopted by Council |
<table>
<thead>
<tr>
<th>Actions</th>
<th>Horizon Years</th>
<th>Stakeholders</th>
<th>Key Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>5. Actively pursue a 10-year Aboriginal Tourism Plan through the States Government’s Tourism Victoria and Aboriginal Victoria Project with the aim of establishing an Aboriginal Interpretive Centre within the Swan Hill region.</td>
<td>✓</td>
<td>Economic Development Unit, Tourism Victoria, Wackol Shire, DPCD, Parks Victoria, Aboriginal Elders, Murray Valley Aboriginal Cooperative (MVACOP)</td>
<td>✓ Old Tech School rezoning Completed</td>
</tr>
<tr>
<td>6. Capitalise on opportunities presented by the rollout of a National Broadband Network, particularly in the health and education fields.</td>
<td>✓</td>
<td>Economic Development Unit, LLLEN, SunTAFE, RTOs, SHDH, RDHS, Schools, Community Groups</td>
<td>✓ Old Tech School rezoning Completed (Land sold) ✓ Rezoning of North Park Reserve Completed (Land sold)</td>
</tr>
<tr>
<td>7. Facilitate the sale and development of unoccupied green development zones (Crown Land) in the municipality on behalf of the State Government.</td>
<td>✓</td>
<td>Economic Development Unit, Planning Department, State Government, Private Developers</td>
<td>✓ Update Guide for New Residents Completed and printed (2013/2014) ✓ Regional Certifying Body Providing certification of skilled migrants for businesses ✓ Swan Hill Region Introduction Weekend Held as a result of the Regional Victoria Living Expo (July 2013) Planned to be held again in 2014 ✓ Swan Hill Region App Completed and available for download ✓ Regular Updates of Official Visitor Guides for Robinvale and the Swan Hill region Completed and distributed nationally ✓ Regional Victoria Living Expo Annual event</td>
</tr>
<tr>
<td>8. Improve the social infrastructure, in particular the welcoming of new residents, by developing programs with community groups, industry bodies and service providers.</td>
<td>✓</td>
<td>Economic Development Unit, Media &amp; Events Unit, Community Facilitation Unit, Pacific Islander Guest Workers Schemes, Industry, Community Groups.</td>
<td>✓</td>
</tr>
<tr>
<td>9. Develop an Investment Attraction Program to streamline processes for</td>
<td>✓</td>
<td>Economic Development Unit, Planning Department.</td>
<td>✓</td>
</tr>
<tr>
<td>Actions</td>
<td>Horizon Years</td>
<td>Stakeholders</td>
<td>Key Activities</td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
<td>---------------</td>
<td>------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Large scale business investment.</td>
<td></td>
<td></td>
<td>On-going Industry Forums Breakfast and Luncheons. Business Breakfasts held quarterly if industries meet to discuss issues.</td>
</tr>
<tr>
<td>10. Develop and improve upon relationships with private developers by facilitating timely investment and offering pre-lodgement meetings.</td>
<td>✓</td>
<td>Economic Development Unit, Planning Department, Developers, Real Estate Agents, RDV.</td>
<td>On-going Regular Pre-lodgement Meetings Occurring.</td>
</tr>
<tr>
<td>11. Actively attract private investment for the establishment of tourism-related businesses that enhance access or awareness of the regions’ natural attractions.</td>
<td>✓</td>
<td>Economic Development Unit, Environment Department, Murray Regional Tourism Board, Tourism Victoria, Community Groups.</td>
<td>In progress Blackwire Reserve Solar Development (see above)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>✓ Riverfront Masterplans Swan Hill (2013) and Robinvale Completed and endorsed by Council.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>✓ On-going Regional Victoria Living Expo Annual event.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>In progress Pioneer Settlement Redevelopment including Heartbeat of the Murray.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>✓ Loddon Mallee Region 2014 Investment Prospectus Features SHRCC tourism investment opportunities.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>✓ Murray Regional Tourism Board Investment Prospectus Features SHRCC tourism investment opportunities.</td>
</tr>
</tbody>
</table>
Theme Two: SUPPORTING EXISTING BUSINESSES TO GROW

<table>
<thead>
<tr>
<th>Initiative</th>
<th>Horizon Years</th>
<th>Stakeholders</th>
<th>Key Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Create stronger links with business communities through more planning (info sharing) active engagement and revised communication frameworks.</td>
<td>✓</td>
<td>Economic Development Unit, Industry, Media &amp; Events Unit, Community Groups.</td>
<td>Business Expansion and Retention Business Visits 50 visits completed (May/June 2013) and report endorsed by Council (Oct 2013), To be conducted again in 2014.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Economic Development Unit Newsletter Published and distributed monthly.</td>
</tr>
<tr>
<td></td>
<td>✓ On going</td>
<td></td>
<td>Host Small Business Victoria Workshops and Seminars Events hosted between March and August as part of Victoria’s Small Business Festival, and as available.</td>
</tr>
<tr>
<td></td>
<td>✓ On Going</td>
<td></td>
<td>Swan Hill Incorporated Events and Functions Attendance at events and functions.</td>
</tr>
<tr>
<td></td>
<td>✓ On going</td>
<td></td>
<td>Murray River Tourism Excellence Program Completed 2012.</td>
</tr>
<tr>
<td></td>
<td>✓ On going</td>
<td></td>
<td>Industry Forums Breakfast and Luncheons Business Breakfasts held quarterly Businesses from selected industries meet to discuss issues.</td>
</tr>
<tr>
<td>2. Establish a business database to assist in disseminating information and engaging the business community e.g. advertising of Council tenders, training and funding opportunities.</td>
<td>✓</td>
<td>Economic Development Unit, Media &amp; Events Unit, Community Groups.</td>
<td>Australian Business Register A major audit of businesses in SHRCC is being conducted utilising ABN data, rates information and existing databases.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Swan Hill Incorporated Events and Functions Attendance at events and functions.</td>
</tr>
<tr>
<td>Actions</td>
<td>Horizon Years 1-5</td>
<td>Stakeholders</td>
<td>Key Activities</td>
</tr>
<tr>
<td>---------</td>
<td>------------------</td>
<td>--------------</td>
<td>---------------</td>
</tr>
<tr>
<td>3. Council’s Economic Development Unit will strengthen ties and increase accessibility through a number of tactics including regular site visits throughout the business community.</td>
<td>In progress</td>
<td>Economic Development Unit, Industry, Community Groups.</td>
<td>Complete Municipal Business Database Currently being updated and revamped to include home based businesses (June 2014)</td>
</tr>
<tr>
<td></td>
<td>✓ On going</td>
<td></td>
<td>Solar Industry database Updated as required</td>
</tr>
<tr>
<td></td>
<td>✓ On going</td>
<td></td>
<td>Business Expansion and Retention Business Visits 50 visits completed (May/June 2013) and report endorsed by Council (Oct 2013). To be conducted again in 2014</td>
</tr>
<tr>
<td></td>
<td>✓ On going</td>
<td></td>
<td>Host Small Business Victoria Workshops and Seminars Events hosted between March and August as part of Victoria’s Small Business Festival, and as available.</td>
</tr>
<tr>
<td></td>
<td>✓ On going</td>
<td></td>
<td>Swan Hill Incorporated Events and Functions Attendance at events and functions</td>
</tr>
<tr>
<td></td>
<td>✓ On going</td>
<td></td>
<td>Industry Forums Breakfast and Luncheons Business Breakfasts held quarterly Businesses from selected industries meet to discuss issues</td>
</tr>
<tr>
<td>4. Facilitate programs designed by government and industry bodies to provide business development, professional development training and assistance to meet challenges identified in SHRCC.</td>
<td>✓ On going</td>
<td>Economic Development Unit, SBV, Industry bodies, DPI, RTOs, Employment agencies, LLEN, Community Groups.</td>
<td>Economic Development Unit Newsletter Published and distributed monthly</td>
</tr>
<tr>
<td></td>
<td>✓ On going</td>
<td></td>
<td>Industry Forums Breakfast and Luncheons Business Breakfasts held quarterly Businesses from selected industries meet to discuss issues</td>
</tr>
<tr>
<td></td>
<td>✓</td>
<td></td>
<td>Swan Hill Region Workforce Development Strategy 2013 – 2017 Complete and endorsed by Council (Oct 2013) Implementation now underway</td>
</tr>
<tr>
<td></td>
<td>✓ In progress</td>
<td></td>
<td>Advancing Country Town Project – Robinvale Led by Robinvale District Health Services, the ACT Employment Program is improving outcomes for job seekers and industry by delivering more efficient joined up employment services, training that addresses local and regional skills gaps, and improving employability of local people.</td>
</tr>
<tr>
<td>Actions</td>
<td>Horizon Years</td>
<td>Stakeholders</td>
<td>Key Activities</td>
</tr>
<tr>
<td>---------</td>
<td>---------------</td>
<td>--------------</td>
<td>---------------</td>
</tr>
<tr>
<td>5. Drive a more integrated community response to events including better communication surrounding extended trading hours.</td>
<td>✓</td>
<td>Economic Development Unit, Media &amp; Events Unit, Robinvale Resource Centre, Community Facilitation, Community Groups.</td>
<td>✓ On going Host Small Business Victoria Workshops and Seminars Events hosted between March and August as part of Victoria’s Small Business Festival, and as available. ✓ Murray River Tourism Excellence Program Complete 2012 In progress Strengthening Swan Hill Region’s Retail Industry Strategy development and implementation of actions to increase retail business viability. Funding received and project underway. ✓ On going Economic Development Unit Newsletter Published and distributed monthly ✓ On going Partnering with Swan Hill Incorporated on communication ✓ On going Events and Special Events Calendar Special events calendars produced during Easter and Christmas and long weekends ✓ On going Council Website Update 2013 Major upgrade has been completed. The EDU will continue to update content as required. ✓ On going Swan Hill Region App Completed and available for download ✓ On going Events Pack Compiled by EDU staff promoting attractions and important local information distributed by event organisers</td>
</tr>
<tr>
<td>6. Council will play a more active role in developing business market opportunities on a regional, national and international level. Particular emphasis will be on utilising existing links such as sister city relationships with Yamagata and Villars Bretenoux, France.</td>
<td>✓</td>
<td>Economic Development Unit, Industry, Export Development Bodies, RDV, Yamagata, Villars Bretenoux, France, AusTrade, Export Vic.</td>
<td>✓ On going Regional Victoria Living Expo Annual event ✓ Sunraysia Agribusiness Summit 2014 Agricultural forum held in Robinvale in May 2014 partnered with the Robinvale District Health Service to deliver ✓</td>
</tr>
<tr>
<td>Actions</td>
<td>Horizon Years</td>
<td>Stakeholders</td>
<td>Key Activities</td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
<td>---------------</td>
<td>------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>8. Undertake skills and training projects in partnership with local businesses with seasonal labour demands to establish year round employment outcomes for seasonal workers.</td>
<td>✓ 1-5 &gt;5</td>
<td>Economic Development Unit, LLEN, Industry, RTOs.</td>
<td>Swan Hill Region Workforce Development Strategy 2013 – 2017</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Completed and endorsed by Council (Oct 2013)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Implementation now underway</td>
</tr>
<tr>
<td></td>
<td></td>
<td>In progress</td>
<td>Advancing Country Town Project – Robinvale</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Led by Robinvale District Health Services, the ACT Employment Program is improving outcomes for job seekers and industry by delivering more efficient joined up employment services, training that addresses local and regional skills gaps, and improving employability of local people.</td>
</tr>
<tr>
<td></td>
<td>✓ On going</td>
<td>Regional Certifying Body</td>
<td>Providing certification of skilled migrants for businesses</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Host Small Business Victoria Workshops and Seminars</td>
</tr>
<tr>
<td></td>
<td>✓ On going</td>
<td></td>
<td>Events hosted between March and August as part of Victoria’s Small Business festival, and as available.</td>
</tr>
<tr>
<td>9. SHRCC will employ an Economic Development and Tourism Projects Officer for the Robinvale area to improve business outcomes specifically for Robinvale, subject to available funding.</td>
<td>✓</td>
<td>Economic Development Unit, RDV, Industry.</td>
<td>Economic Development Officer Robinvale</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>This position was funded by Regional Development Victoria until March 2013. Ongoing support has been has been provided from existing resources.</td>
</tr>
<tr>
<td>10. Council will support the improvement of the range and early childhood education and care, flexibility in order to retain the trained workforce.</td>
<td>✓</td>
<td>Family, Youth and Children’s Services, Early Childhood Education Providers, Economic Development Unit.</td>
<td>Swan Hill Region Workforce Development Strategy 2013 – 2017</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Completed and endorsed by Council (Oct 2013)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Implementation now underway</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Family, Youth and Children Services</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Information packs developed &amp; distributed</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Completed and endorsed by Council (2012)</td>
</tr>
</tbody>
</table>
### Theme Three: MARKETING THE REGION

<table>
<thead>
<tr>
<th>Actions</th>
<th>Horizon Years</th>
<th>Stakeholders</th>
<th>Key Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Increase the value of the tourism industry to the region through more targeted marketing programs in partnership with regional tourism bodies.</td>
<td>✔️ 1-5 &gt;5</td>
<td>Economic Development Unit, Murray Regional Tourism Board, Parks Victoria, Events &amp; Media Department, Community Groups, Murray Mallee Racing, Pioneer Settlement, Local tourism operators, Community Groups.</td>
<td>In progress Swan Hill Region Farmers Market Feasibility Study Funding secured from RDV to complete a feasibility study into the establishment of market in the municipality.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>✔️ On going Murray Regional Tourism Board SHRCC continues to be a key member of this regional marketing committee.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>✔️ On going Swan Hill Incorporated Marketing The EDU works in close partnership with Swan Hill Inc to implement projects such billboard advertising in Melbourne, and print and media campaigns.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>✔️ On going Pioneer Settlement Marketing Program Ongoing marketing of the Pioneer Settlement</td>
</tr>
<tr>
<td>2. Continue to support the partnership with Swan Hill Incorporated on the co-operative “Swan Hill - Heart of the Murray” marketing campaigns.</td>
<td>✔️ 1-5 &gt;5</td>
<td>Economic Development Unit, Community Groups.</td>
<td>✔️ On going Swan Hill Incorporated Marketing The EDU works in close partnership with Swan Hill Inc to implement projects such billboard advertising in Melbourne, and print and media campaigns.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>✔️ On going</td>
</tr>
<tr>
<td>3. Review existing marketing efforts to ensure expected economic outcomes are being achieved and encourage a more targeted approach to identified markets including empty nesters and young families.</td>
<td>✔️ 1-5 &gt;5</td>
<td>Economic Development Unit, Swan Hill and Robinvale Information Centres (RDHS), Tourism operators, Murray Regional Tourism Board, Community Groups.</td>
<td>In progress Tourism Investment Prospectuses Promoting tourism opportunities for the LGA, Lake Boga and Robinvale, currently under development.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>In progress SHRCC Tourism Strategy 2010 – 2013 Currently being updated and previous strategy reported on</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>✔️ On going Swan Hill Incorporated Annual Marketing Plan The EDU works closely with Swan Hill Incorporated to ensure KPI’s are achieved.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>✔️ On going Regular Updates of Official Visitor Guides for – Robinvale and the Swan Hill region Completed and distributed nationally</td>
</tr>
</tbody>
</table>

SHRCC will work with the community to ensure the municipality is continually promoted as a family friendly place to invest, live, work, visit and shop.
<table>
<thead>
<tr>
<th>Actions</th>
<th>Horizon Years</th>
<th>Stakeholders</th>
<th>Key Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>4. Continue to update, refine and make available marketing materials and the <a href="http://www.swanhilonline.com">www.swanhilonline.com</a> website, with special emphasis on investor packs, visitor guides, new residents' kits, and informational DVDs.</td>
<td>✓</td>
<td>Economic Development Unit, Community Facilitation Unit, Media &amp; Events Unit, Community Groups.</td>
<td>✩ Swan Hill Region Overview Marketing Materials Fact sheets (agriculture, tourism, manufacturing, retail and municipal overview) completed and printed Investment prospectus in final draft format</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>✩ Investment Attraction Policy review Final draft currently being completed</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>✩ Robinvale Investment Prospectus Final draft currently being completed</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>✓ On-going Murray Regional Tourism Board Research Quarterly ABS visitation reports provided</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>✩ Swan Hill Region App Complete and available for download</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>✩ On-going Update and Redevelopment of Swan Hill Online The upgrade will be conducted in 2014 as part of a joint marketing project with the Murray Regional Tourism Board and Swan Hill Incorporated</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>✩ Regular Updates of Official Visitor Guides for – Robinvale and the Swan Hill region Completed and distributed nationally</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>✩ On-going Council Website Update Major upgrade was completed in 2013. The EDU will continue to update content as required.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>✓ On-going Swan Hill Region App Completed and available for download</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>✩ In progress Update DVD Tourism focussed DVD completed with Swan Hill Incorporated in 2013 Investment DVD in progress, industry specific grabs will be developed for online distribution</td>
</tr>
<tr>
<td>5. Maintain a detailed and up-to-date statistical profile and analysis of the Swan Hill Rural City and its various industries and economic attributes.</td>
<td>✓</td>
<td>Economic Development Unit, RDV, Industry bodies, Community Groups.</td>
<td>✓ Census Data Census data is utilised by the EDU to update marketing materials such as industry fact sheets, new resident's guides and websites.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>✩ Profile ID and REMPLAN Profile ID is online profile of the LGA using graphs and analysis to present statistic information on the region.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>✩ In progress</td>
</tr>
<tr>
<td>Actions</td>
<td>Horizon Years</td>
<td>Stakeholders</td>
<td>Key Activities</td>
</tr>
<tr>
<td>---------</td>
<td>--------------</td>
<td>--------------</td>
<td>---------------</td>
</tr>
<tr>
<td>6. Seek to improve the overall tourism offering by attracting private investment into tourism-related businesses that leverage off our natural assets i.e.: Murray River.</td>
<td>✓</td>
<td>Economic Development Unit, Developers, Planning Department, Parks Victoria.</td>
<td>REMPLAN is an online modelling program that can measure the economic impact of scenarios. Investment Attraction Policy Review Final draft currently being completed Riverfront Masterplans Swan Hill (2013) and Robinvale Completed and endorsed by Council Swan Hill Region Farmers Market Feasibility Study Funding secured from RDV to complete a feasibility study into the establishment of market in the municipality Swan Hill to Lake Boga Trail Feasibility Study Funding secured from RDV to investigate establishing a trail between Lake Boga and Swan Hill Major Events Support Scheme Support of the regions hallmark events along with new and emerging events Murray Regional Tourism Board Investment Prospectus Features SHRCC tourism investment opportunities Loddon Mallee Region 2014 Investment Prospectus Features SHRCC tourism investment opportunities Pioneer Settlement Redevelopment including Heartbeat of the Murray Lake Boga Economic Development and Tourism Marketing Strategy Completed and endorsed by Council (2012) RV Friendly Infrastructure The installation of RV friendly infrastructure throughout the municipality to attract RVs Riverfront Masterplan – Lodges redevelopment Expression of Interest document currently under development</td>
</tr>
<tr>
<td>7. Continue to be involved in and support state and regional marketing programs through Regional Development Victoria and the Murray Regional Tourism Board.</td>
<td>✓</td>
<td>Economic Development Unit, Murray Regional Tourism Board, RDV, Community Groups.</td>
<td>Regional Victoria Living Expo Annual event Murray Regional Tourism Board Membership Membership 2011 – 2014 New agreement endorsed December 2013 for the period 2014 – 2017</td>
</tr>
<tr>
<td>Actions</td>
<td>Horizon Years</td>
<td>Stakeholders</td>
<td>Key Activities</td>
</tr>
<tr>
<td>---------</td>
<td>---------------</td>
<td>--------------</td>
<td>---------------</td>
</tr>
<tr>
<td>8. Continue to run a quality accredited Visitor Information Service and Booking Office in Swan Hill and support the Robinvale Euston Information Centre.</td>
<td>✓</td>
<td>Economic Development Unit, Town Hall, Robinvale District Health Service, Cultural Services, Pioneer Settlement, Community Groups.</td>
<td>Swan Hill Region Information Centre - Accreditation renewal annually. 2014 has been approved. Review of Visitor Services in Robinvale. A review is currently underway in regards to visitor servicing in Robinvale.</td>
</tr>
<tr>
<td>9. Continue to use and enhance the effectiveness of the Major Events Support Scheme. Increase the targeted marketing to identify groups that could hold events during quieter visitor periods.</td>
<td>✓</td>
<td>Economic Development Unit, Community Facilitation Unit, Events &amp; Media Unit, Industry bodies, Community Groups, Tourism operators</td>
<td>Major Events Support Scheme - Support of the region’s hallmark events along with new and emerging events.</td>
</tr>
<tr>
<td>11. Promote services and activities for young people, to reflect the youth and family friendliness of SHRCC.</td>
<td>✓</td>
<td>Family, Youth and Children’s Services, Youth Service Providers, Youth Connections, Youth Inc, SHDH, RDHS, Community groups, Community Facilitation Unit, Community Groups.</td>
<td>Swan Hill Region Overview Marketing Materials - Fact sheets (agriculture, tourism, manufacturing, retail and municipal overview) completed and printed Investment prospectus in final draft format. Regional Victoria Living Expo - Annual event.</td>
</tr>
<tr>
<td>Actions</td>
<td>Horizon Years</td>
<td>Stakeholders</td>
<td>Key Activities</td>
</tr>
<tr>
<td>---------</td>
<td>---------------</td>
<td>--------------</td>
<td>---------------</td>
</tr>
<tr>
<td></td>
<td>1-5</td>
<td>Economic Development Unit.</td>
<td>Murray Regional Tourism Board Investment Prospectus</td>
</tr>
<tr>
<td></td>
<td>&gt;5</td>
<td></td>
<td>Features SHRCC tourism investment opportunities</td>
</tr>
<tr>
<td></td>
<td>In progress</td>
<td></td>
<td>Update and Redevelopment of Swan Hill Online</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>The upgrade will be conducted in 2014 as part of a joint marketing project with Murray Regional Tourism Board and Swan Hill Incorporated</td>
</tr>
<tr>
<td>13. Identify and attend marketing events that promote the region as a place to invest, work, live, visit and shop.</td>
<td>✓</td>
<td></td>
<td>Regional Victoria Living Expo</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Annual event</td>
</tr>
<tr>
<td></td>
<td>✓ On going</td>
<td></td>
<td>National Caravan and Camping Shows</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Annual events</td>
</tr>
<tr>
<td></td>
<td>✓ On going</td>
<td></td>
<td>CMCA Rally – Robinvale 2014</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Robinvale hosted the 2014 CMCA rally which attracted approximately 1500 for over 7 days</td>
</tr>
</tbody>
</table>
Theme Four: ADDRESSING INFRASTRUCTURE NEEDS

<table>
<thead>
<tr>
<th>Initiative</th>
<th>Horizon Years</th>
<th>Stakeholders</th>
<th>Key Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Facilitate the building of the new Murray River Bridge for Swan Hill, in partnership with the Wakool Shire Council (NSW) and the appropriate Victorian and New South Wales State Governments in a timely fashion.</td>
<td>✓ ✓  ✓  ✓</td>
<td>Economic Development Unit, VicRoads, RTA, Wakool Shire Council, Community Facilitation Unit.</td>
<td>In progress Location Under Review Bridge location identified and adopted by the Victorian Government SHRCC seeking a review of the decision and adoption of alternative location.</td>
</tr>
<tr>
<td>2. Ensure that rural settlements remain viable and desirable places to live, work and do business by maintaining a high standard of Council functions and protecting the unique attributes of the towns.</td>
<td>✓ ✓  ✓  ✓</td>
<td>Economic Development Unit, Community Planning, SHRCC, Community Groups.</td>
<td>✓ ✓ Riverfront Masterplan Swan Hill (Oct 2013) and Robinvale Completed and endorsed by Council</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>✓ ✓ Gateway Signage Project Completed (Jan 2014)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>✓ ✓ Community Plans Continue to implement community plans</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>✓ ✓ Discovery Drive CD Discover drive throughout the entire municipality</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>✓ ✓ RV Friendly Infrastructure The installation of RV friendly infrastructure throughout the municipality to attract RVs</td>
</tr>
<tr>
<td></td>
<td>✓ ✓  ✓  ✓</td>
<td></td>
<td>In progress Swan Hill Region Farmers Market Feasibility Study Funding secured from RDV to complete a feasibility study into the establishment of market in the municipality</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>In progress Swan Hill to Lake Boga Trail Feasibility Study Funding secured from RDV to investigate establishing a trail between Lake Boga and Swan Hill</td>
</tr>
<tr>
<td>3. Lobby State and Federal Governments for the delivery of major hard infrastructure into the region including</td>
<td>✓ ✓  ✓  ✓</td>
<td>Economic Development Unit, State Government, MRGC, Community Facilitation Unit, RDV, VicRoads, VLine.</td>
<td>✓ ✓ Natural Gas Feasibility Study Completed by Consultant</td>
</tr>
<tr>
<td>4. Develop a business case for the extension of reticulated natural gas for the Loddon Mallee, specifically the Swan Hill region, in partnership with the Murray River Group of Councils (subject to funding from the State Government).</td>
<td>✅</td>
<td>Economic Development Unit, State Government, MRGC, Environment Industry bodies.</td>
<td>✅</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>5. Lobby for the establishment of an inland transport hub including intermodal connections between road and rail freight.</td>
<td>✅</td>
<td>Economic Development Unit, Infrastructure, State Government, VicRoads, VLine, Planning Department, MRGC.</td>
<td>In progress</td>
</tr>
<tr>
<td>6. Support the redevelopment of the Chisholm Reserve Motorsport Complex so that it is capable of hosting major regional, national and international motorsport events in partnership with local motorsport clubs and national motorsport bodies.</td>
<td>✅</td>
<td>Economic Development Unit, Planning Department, Infrastructure, State Government, Motorsport Industry Bodies, Community Groups, Media &amp; Events Unit.</td>
<td>In progress</td>
</tr>
<tr>
<td>7. Complete required upgrades to the Swan Hill Aerodrome site and develop a business study into future use.</td>
<td>✅</td>
<td>Economic Development Unit, Infrastructure, RDV, Industry bodies, Planning Department, State Government.</td>
<td>✅</td>
</tr>
<tr>
<td>8. Support the Mildura Rail Link Feasibility Study recommendations five and nine to capture additional services from Swan Hill to Bendigo or Melbourne and increased bus links with the Loddon Mallee region.</td>
<td>✅</td>
<td>Economic Development Unit, Mildura RCC, RDV, VLine, State Government.</td>
<td>In progress</td>
</tr>
<tr>
<td>9. Develop the Robinvale and Swan Hill riverfronts in partnership with State and Federal Governments, key stakeholders and private investors with the aim of improving tourism within the municipality.</td>
<td>✅</td>
<td>Economic Development Unit, Planning, Infrastructure Department, RDV, State &amp; Federal Government, Community Groups, Community Facilitation Unit</td>
<td>✅</td>
</tr>
<tr>
<td>10. Advocate for the relocation of Council information services in Robinvale and/or provide a physical upgrade to</td>
<td>✅</td>
<td>Economic Development Unit, Infrastructure, Centrelink, RDHS, Planning Department, RDV,</td>
<td>In progress</td>
</tr>
</tbody>
</table>
| 11. | Upgrade the region's road network through partnerships with VicRoads and major transport users to support projected increases of heavy transport usage, especially in the west of the municipality. | Community Groups, Community Facilitation Unit. | ✓ | Bromley Road Masterplan
Completed and endorsed by Council (Dec 2013) |
|---------------------------------|-------------------------------------------------|-----------------------------------------------|---|------------------------------------------------|
Regional approach to transport, implementation now underway |
|---------------------------------|-------------------------------------------------|-----------------------------------------------|---|------------------------------------------------|
| 13. | Address cross border differences in planning, regulation, service provision and opportunities more efficiently through the establishment of a new collaborative forum involving Local, State and Federal Government regionally-based representatives from Victoria and New South Wales. The forum will identify and develop processes to resolve cross-border differences to be endorsed by the NSW & VGBAC. | Economic Development Unit, Communities, Community Facilitation Unit, Engineering Department, Planning Department. | ✓ | Gateway Signage Project
Completed (Jan 2014) |
|---------------------------------|-------------------------------------------------|-----------------------------------------------|---|------------------------------------------------|
| 14. | Advocate for and support the implementation of the Swan Hill District Hospital Master Development Plan. | SHDH, SHRCC, State Government. | ✓ | Central Murray Transport Forum
Victorian State Logistics Plan |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Theme Five: EDUCATION AND SKILLS DEVELOPMENT**

<table>
<thead>
<tr>
<th>Initiative</th>
<th>Horizon Years</th>
<th>Stakeholders</th>
<th>Key Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>SHRCC will encourage and support local employment opportunities with the aim to improve employment outcomes for local residents.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SHRCC will seek to advocate for increased local post-secondary education options and explore other opportunities to encourage an appropriate level of skills in the community.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Actions</th>
<th>Horizon Years</th>
<th>Stakeholders</th>
<th>Key Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Facilitate the development of a Municipal Learning Strategy, inclusive of all development stages from early childhood to adult learning opportunities.</td>
<td>✓</td>
<td>Economic Development Unit, LLEN, RTOs, SuniTAE, Loddon Mallee Department of Education, Education Providers, Family Youth &amp; Children’s Services.</td>
<td>Yet to commence. Priority has been on the development of the Workforce Development Strategy.</td>
</tr>
<tr>
<td>Actions</td>
<td>Horizon Years 1-5</td>
<td>Stakeholders</td>
<td>Key Activities</td>
</tr>
<tr>
<td>---------</td>
<td>------------------</td>
<td>--------------</td>
<td>---------------</td>
</tr>
<tr>
<td>4. Support improved access to tertiary education via a regional university campus shop front and/or access to appropriate university links, through collaborative partnerships between SuniTAFE and Universities such as the &quot;Deakin at your Doorstep&quot; program.</td>
<td>✔️</td>
<td>Economic Development Unit, LLEN, SuniTAFE, National Universities, Loddon Mallee Department of Education, Education Providers.</td>
<td>Working in partnership with SuniTAFE To promote courses and the region via the Workforce Development Strategy. Deakin at your Doorstep program occurring.</td>
</tr>
<tr>
<td>5. Attract private investment for the development of affordable accommodation options for travelling students and foreign backpackers.</td>
<td>✔️</td>
<td>Economic Development Unit, SuniTAFE, Private Developers, Planning Department, RTOs.</td>
<td>Investment Attraction Policy Review Final draft currently being completed.</td>
</tr>
<tr>
<td>6. Offer and encourage work experience programs throughout the business community including the Victorian Government's Young Professionals Provincial Cadetship Program for tertiary students and structured workplace learning opportunities.</td>
<td>✔️</td>
<td>Economic Development Unit, LLEN, Industry, Community Groups, Community Facilitation Unit, Education Industry, RDV, AES.</td>
<td>In progress Swan Hill Region Workforce Development Strategy 2013 – 2017 Completed and endorsed by Council (Oct 2013) Implementation now underway.</td>
</tr>
<tr>
<td>Actions</td>
<td>Horizon Years</td>
<td>Stakeholders</td>
<td>Key Activities</td>
</tr>
<tr>
<td>---------</td>
<td>---------------</td>
<td>--------------</td>
<td>---------------</td>
</tr>
<tr>
<td>8. Assist and support the Aboriginal Employment Strategy (AES) in the establishment of an AES Service Centre with the Swan Hill Rural City, in the aim of improving regional employment outcomes for local Indigenous communities.</td>
<td>✓</td>
<td>Economic Development Unit, Aboriginal Employment Strategy, Federal Government, LLN, SHRCC, RTOs, MVACOP, Industry.</td>
<td>In progress</td>
</tr>
<tr>
<td>9. Continue to deliver the Pacific Islander Guest Workers Program as part of the Department of Immigration and Citizenship's Diverse Australia Program.</td>
<td>✓</td>
<td>Economic Development Unit, Federal Government, DIOCA, Local Employers, Community facilitation.</td>
<td>Ceased</td>
</tr>
<tr>
<td>10. Support flexible and effective early childhood education options, to allow adult enrolment in formal and informal education.</td>
<td>✓</td>
<td>Family, Youth and Children's Services, Education Providers, SHDH, Welfare providers, MMLLEN, RTOs.</td>
<td>In progress</td>
</tr>
</tbody>
</table>
B.14.38 ROOMING HOUSE AND PRESCRIBED ACCOMMODATION UPDATE

Responsible Officer: Director Development and Planning
File Number: 48-12-01
Attachments: Nil

Declarations of Interest: Officer
Brett Luxford - as the responsible officer, I declare that I have no disclosable interests in this matter.

Summary

This report provides an update on the actions Council takes following reports of alleged rooming houses operating in various locations throughout the municipality. This report also highlights the challenges faced relating to the investigation, compliance and follow-up of alleged rooming houses and requests that Council advocate for a coordinated approach to rooming houses and temporary worker accommodation across the region.

Discussion

The issue relating to alleged unregistered rooming houses and the challenges faced during investigation and enforcement are widespread throughout Victoria. There has also been media attention in recent months regarding rooming houses and follow-up of alleged rooming houses.

Council actively follows up on any reports it receives in relation to rooming houses and has a coordinated internal approach involving four separate departments. Upon receipt of advice regarding an alleged rooming house operating within the municipality, Council employees implement the Cross Functional Rooming House Investigation Procedure which involves Public Health, Building, Planning and Local Laws.

An inspection of the alleged property is conducted by a cross functional team of Authorised Council Officers. Where breaches and non-compliance of respective legislation are identified (eg) Public Health, Building, Planning and Local Laws, the necessary enforcement processes are implemented in accordance with the relevant Acts and Regulatory provisions.

As a result of legislative changes in 2008 and 2009, Council has had a key role to play in enforcement and registration of rooming houses. Since this time Council employees have conducted a number of investigations of alleged rooming houses in Robinvale, Nyah West, Lake Boga and Woorinen.
The following example of an investigation highlights the challenges Council faces in enforcing legislation relating to rooming houses. In 2009 Council received information about 20 alleged rooming houses operating in the Robinvale area. A large investigation resulted in only one of the premises requiring registration with Council as a rooming house. Four other building owners were issued with Building Notices and Orders with respect to illegal building works, lack of smoke detectors, etc.

The above example highlights that while it may be easy for local residents to identify what appears to be an “alleged” rooming house, the ability to gather sufficient evidence to prove a premises is operating in that manner is difficult to obtain. The protracted investigation and subsequent legal processes and costs incurred are also a major frustration.

As an example, matters relating to an alleged rooming house investigated in 2009 were not heard in the Magistrates Court until 2011. Legal costs were in the order of $5,000 and Council employee time involved in this matter was significant. The Magistrate only awarded $1,500 in costs to Council.

As a result when Council receives complaints about an alleged rooming house, Council Officers will seek to work with the owner of the premises to either stop the activity or put into place the necessary requirements and register the premises. To assist, Council’s Public Health and Building departments have developed information kits and links are also available on Council’s website that is specific to rooming house requirements.

Council’s Planning, Building and Public Health departments have also worked together to develop an ‘On-Farm Workers Accommodation Guideline’ to assist farmers who are looking to develop workers’ accommodation on-farm.

The challenges faced by the Council are reflected across the region and across the state and while Council actively enforces the legislation more may be achieved through a coordinated approach by other tiers of Government and industry. A coordinated approach will help ensure that safe accommodation is available for a workforce that is vital to the region.

Consultation

Nil

Financial Implications

There are significant officer resources required to investigate rooming house complaints and the financial impacts to follow up non-compliance is also substantial.
Social Implications

The report will contribute to improving the health and wellbeing of communities.

Economic Implications

Nil

Environmental Implications

Nil

Risk Management Implications

Nil

Council Plan Strategy Addressed

Housing - We will support appropriate accommodation options for our growing economy.

Options

1. Adopt all of the recommendations as outlined below.
2. Adopt some of the recommendations.
3. Choose not to accept the report.

Recommendations

That Council:

1. Note the report.

2. Advocate to other tiers of government and relevant agencies for a coordinated approach to rooming houses and temporary worker accommodation across the region.
B.14.39 PLANNING SCHEME AMENDMENT REQUEST - C58 LAND - SWAN HILL SOUTH WEST DEVELOPMENT PRECINCT

Responsible Officer: Director Development and Planning
File Number: 73-02-125
Attachments:
1. Swan Hill C58 001znMaps36_39_40 Exhibition
2. Swan Hill C58 003dpoMaps36_39 Exhibition
3. Swan Hill C58 002dpoMaps39_40 Exhibition
4. Schedule 6 for DPO Draft
5. Version 4.5 SWDP
6. Infrastructure Cost Sharing Calculations
7. SWDP Planning Report 23 June 2014
8. SWDP Drainage Strategy 23 June 2014
10. TIA Final 20 June 2014
11. TIA Appendices Report

Declarations of Interest: 
Officer
Brett Luxford - as the responsible officer, I declare that I have no disclosable interests in this matter.

Summary

The purpose of this report is to request Council resolve to seek authorisation from the Minister for Planning (Minister) to undertake amendment C58 to the Swan Hill Planning Scheme.

Council adopted the “Review of the Swan Hill Residential Development Strategy 2006-2030” at its meeting in March 2013. When adopting the Strategy, Council directed that officers review the previously prepared Outline Development Plan (ODP) for the Swan Hill South West Development Precinct and undertake necessary amendments to the Planning Scheme.

Accordingly, the previously prepared ODP and the associated documents have been reviewed. A revised draft Swan Hill South West Development Plan (SWDP) has been prepared, which together with the background documents, inform this amendment.

The majority of the land within the SWDP is zoned Farming and Low Density Residential. As such this amendment is required to rezone these parcels of land to General Residential Zone (GRZ) to facilitate the supply of residential zoned land as identified in the draft SWDP. The amendment also proposes to apply necessary planning controls to land within the SWDP to ensure fair, orderly and sustainable development outcomes within the SWDP.
Discussion

Land affected by the amendment

The SWDP includes 33 parcels of land; however the amendment applies to only 27 parcels of land within the Precinct.

The following map shows the land within the SWDP.

![Swan Hill South West Development Precinct and Current Zoning Map](image)

Table below lists the land within the SWDP that is to be rezoned by this amendment.

<table>
<thead>
<tr>
<th>Address</th>
<th>Lot No</th>
<th>TP/PS/LP</th>
<th>Approximate Size/ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dead Horse Lane, Swan Hill</td>
<td>Lot 2</td>
<td>PS 131446</td>
<td>28.3ha</td>
</tr>
<tr>
<td>Sea Lake-Swan Hill Road, Swan Hill (part of)</td>
<td>Lot 2</td>
<td>PS 405842S</td>
<td>19.8ha</td>
</tr>
<tr>
<td>Feldtmann Lane, Swan Hill</td>
<td>Lot 1</td>
<td>LP 131446</td>
<td>3.8ha</td>
</tr>
</tbody>
</table>
### Address

<table>
<thead>
<tr>
<th>Lot No</th>
<th>TP/PS/LP</th>
<th>Approximate Size/ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lot 1</td>
<td>TP 821121W</td>
<td>17.3ha</td>
</tr>
<tr>
<td>Lot 1</td>
<td>TP 821120Y</td>
<td>51.8ha</td>
</tr>
<tr>
<td>Lot 1</td>
<td>TP 519005</td>
<td>5.0ha</td>
</tr>
<tr>
<td>Lot 1</td>
<td>TP 814807A</td>
<td>0.4ha</td>
</tr>
<tr>
<td>Lot 1</td>
<td>TP 519770S</td>
<td>0.5ha</td>
</tr>
<tr>
<td>Lot 1</td>
<td>PS 424914L</td>
<td>0.9ha</td>
</tr>
<tr>
<td>Lot 1</td>
<td>TP 539204Q</td>
<td>7.1ha</td>
</tr>
<tr>
<td>Lot 1</td>
<td>PS 76581</td>
<td>4.4ha</td>
</tr>
<tr>
<td>Lot 1</td>
<td>TP 179253F</td>
<td>13.9ha</td>
</tr>
<tr>
<td>Lot 1</td>
<td>PS 99806</td>
<td>4.8ha</td>
</tr>
<tr>
<td>Lot 1</td>
<td>TP 205402A</td>
<td>4.8ha</td>
</tr>
<tr>
<td>Lot 2</td>
<td>PS 124722</td>
<td>13ha</td>
</tr>
<tr>
<td>Lot 1</td>
<td>PS 124722</td>
<td>0.8ha</td>
</tr>
<tr>
<td>Lot 2</td>
<td>PS 637281M</td>
<td>4.8ha</td>
</tr>
<tr>
<td>Lot 3</td>
<td>PS 99806</td>
<td>0.6ha</td>
</tr>
<tr>
<td>Lot 1</td>
<td>PS 75694</td>
<td>0.9ha</td>
</tr>
<tr>
<td>Lot 2</td>
<td>PS 75694</td>
<td>0.8ha</td>
</tr>
<tr>
<td>Lot 1</td>
<td>PS 637281M</td>
<td>0.5ha</td>
</tr>
<tr>
<td>Lot 1</td>
<td>LP 117284</td>
<td>3.3ha</td>
</tr>
<tr>
<td>Lot 2</td>
<td>LP 117284</td>
<td>6.7ha</td>
</tr>
<tr>
<td>Lot 18</td>
<td>LP14827</td>
<td>6ha</td>
</tr>
<tr>
<td>Lot 19</td>
<td>LP14827</td>
<td>6.1ha</td>
</tr>
<tr>
<td>Lot 2</td>
<td>LP 205853S</td>
<td>11.4ha</td>
</tr>
<tr>
<td>Lot 1</td>
<td>LP205853S</td>
<td>0.8ha</td>
</tr>
</tbody>
</table>

**TOTAL** Approximately **218.5ha**

Although located within the SWDP the following parcels of land listed below will not be rezoned as part of amendment C58 and will be retained in their current zone:

- Properties excluded from being rezoned due to required setback from industrial activities in Gray Street as per requirements of Clause 52.10 of the Swan Hill Planning Scheme, include:
  - Entire land at Nos. 69 and 71 Sea Lake – Swan Hill Road, Swan Hill;
  - No. 219 Gray Street, Swan Hill;
  - No. 183-187 Gray Street (Lot No. 1 TP 614559H);
  - Part of No. 183-187 Gray Street, Swan Hill (Lot No. 1 TP 519005); and
  - A 70 metre wide and 140 metre long strip of land along Gray Street of Lot No. 2 PS 405842 Sea Lake- Swan Hill Road.
- Property at No. 7 Dead Horse Lane will be retained as Farming Zone pending Environmental Audit justifying the suitability of the land for residential uses.
• The Council owned and managed Ken Harrison Reserve will be retained as Public Park and Recreation Zone.

The SWDP also includes land currently used by the Goulburn Murray Water channel; this land will also be rezoned. The authority is in the process of decommissioning the channel infrastructure and aims to reinstate the land used for the channel. However, future developments on land that are reclaimed as a result of decommissioning of the channel requires further investigation to demonstrate the suitability of the land to use and develop for residential and other purposes.

Overlays affecting the SWDP

There are three overlays affecting the land within the SWDP:

• Development Plan Overlay – Schedule 2 (DPO2) affects the land zoned LDRZ. This DPO 2 will be removed and will be replaced with a new Scheduled DPO6 that will be applied to all land to be rezoned for residential purpose within SWDP.
• The southern boundary along Werril Street of the SWDP is affected by Airport Environs Overlay (AEO) and a Design and Development Overlay (DDO). These overlays will be retained.
What the amendment does

Amendment C58 proposes to rezone land within the Swan Hill South West Development Precinct to facilitate the supply of future residential zoned land. It also proposes Schedule 6 to the Development Plan Overlay to implement the final Swan Hill South West Development Plan and removes Schedule 2 to the Development Plan Overlay from land within the SWDP.

In particular the amendment proposes the following:

- Rezones Farming Zone land to General Residential Zone,
- Rezones Low Density Residential Zone land to General Residential Zone,
- Rezones Public Park and Recreation Zone land to General Residential Zone,
- Rezones Farming Zone land to Commercial 1 Zone (to provide a retail activity area),
- Rezones Farming Zone land to Public Park and Recreation Zone (to provide a small public open space),
- Introduces new Schedule to Development Plan Overlay (DPO6) to Clause 43.04 and amends maps 39 DPO and 40 DPO; and
- Removes Development Plan Overlay Schedule 2 (DPO2) in map 39 DPO and 40 DPO from land within the Swan Hill South West Development Precinct.

Compliance with planning and Council policies

Compliance with the State Planning Policy Framework (SPPF)

The proposed amendment directly supports an implementation of the State Planning Policy Framework through the following:

Clause 11 Settlement of SPPF

A rezoning of land within the SWDP is a proactive response by Council to the needs of existing and future communities. The proposal provides appropriately zoned and serviced land for housing; it will generate direct and indirect employment opportunities; and facilitate the provision of recreation and open spaces, commercial and community facilities and necessary infrastructure for future communities.

Clause 15 Built Environment and Heritage of SPPF

The proposed Schedule 6 to Clause 43.04 – Development Plan Overlay ensures orderly outcomes as per the requirements of the proposed General Residential Zone. The SWDP is not affected by heritage overlay.

Clause 16 Housing of SPPF

The proposed rezoning will facilitate the provision of diverse and affordable housing choices to local communities and will ensure the efficient provision and use of supporting infrastructure.
The proposed Schedule 6 to Clause 44.04 (Development Plan Overlay) ensures that new housing within the SWDP will have access to services, and will facilitate long term sustainability by facilitating walking to activity areas, open space and recreational facilities, and public transport service.

**Clause 17 Economic Development of SPPF**

The amendment will have a positive impact on the local economy. There will be direct and indirect job opportunities created during the construction of future developments. In addition, the proposed retail activity area, medical centre, aged care facility and child care centre will bring permanent employment opportunities to Swan Hill.

**Clause 18 Transport of SPPF**

The proposed draft Development Plan identifies the need and allocates land for the provision of six bus stops (on three key locations) along the main collector road that runs through the precinct. The proposed Schedule 6 to the Development Plan Overlay encourages increased densities along the collector roads and closer to the activity areas to maximise the use of public transport service when it becomes available. In addition, the draft Development Plan proposes shared paths that can encourage and support alternative and sustainable transports models like walking and cycling.

**Clause 19 Infrastructure of SPPF**

The draft Development Plan proposes and facilitates the provision of necessary infrastructure and the efficient use of existing infrastructure that is already servicing the surrounding areas of Swan Hill township. It encourages necessary social and physical infrastructure including medical and childcare centres, aged care facilities and retail activity area within the SWDP.

**Local Planning Policy Framework (LPPF)**

The proposed amendment supports and implements the Local Planning Policy Framework, including the Municipal Strategic Statement (MSS) as follows:

**Clause 21.02 Key Influences and Issues of the MSS**

The rezoning supports key issues for the municipality including facilitating residential and economic development and maximising the use of existing infrastructure.

**Clause 21.04 Settlement and Housing of the MSS**

The rezoning supports the municipality’s objectives for settlement by helping to facilitate residential use and developments which are encouraged in the major regional centre of Swan Hill.
Clause 21.04-4 Orderly growth of towns and settlements of the MSS

Clause 21.04-4 highlights the need to prepare an Outline Development Plan for the Swan Hill South West Development Precinct to facilitate future residential development. This amendment fulfils this requirement.

Clause 21.08 Economic Development of the MSS

The rezoning supports Council’s economic development objectives in allowing for appropriate non-residential activities within the SWDP.

Clause 21.10-1 Swan Hill of the MSS

The rezoning will support the enhancement of Swan Hill as a strong regional centre.

Infrastructure provision

The attached draft Swan Hill South West Development Plan identifies the necessary development and community infrastructure within the Precinct. Concept infrastructure requirements for traffic and drainage servicing the SWDP have been prepared by Council to assist developers and Council in the planning for this planning scheme amendment and determining the viability of this rezoning. These concept infrastructure requirements are listed in the following documentation:

- Swan Hill South West Development Precinct Drainage Strategy
- Swan Hill South West Development Precinct Traffic Impact Assessment
- Swan Hill South West Development Precinct Traffic Strategy
- Swan Hill South West Development Precinct Infrastructure Cost Sharing Calculations

Further detailed design and studies as listed within the proposed Schedule 6 to the Development Plan Overlay will be required before development can commence.

The Planning and Environment Act 1987 (Act) specifies that infrastructure provision can be funded by either or a combination of:

- Development Contributions Plans (DCP)
- Under Section 173 Agreements of the Act

In considering the length of time for the completion of the development (in excess of 40 years) within the SWDP and the associated difficulties in determining standards and costs over that timeframe it was determined to enter into a series of s173 Agreements to facilitate development.

One advantage in the use of s173 agreements was that together with subdividing the SWDP into 6 sub-precincts, development could commence in each of these sub-
precincts independently of other sub-precincts. All landowners participated during consultations agreed in principle to enter into s173 Agreements.

However, it is vital that these agreements are signed prior to seeking authorisation to prepare the amendment to the Minister. In particular, the Ministerial Direction No. 15 – The Planning Scheme Amendment Process sets clear timelines for completing each step of the amendment process. Upon receipt of the authorisation, Council has to commence the amendment process and publically exhibit the documents within 40 business days. As such any delay in getting the s173 agreements signed could obstruct the amendment process.

Consultation

Consultation undertaken prior to the commencement of the amendment

During the preparation of the revised draft Development Plan, consultation has been undertaken with the landowners within the SWDP. Where possible and appropriate, landowners’ requirements have been incorporated into the revised Development Plan.

Further, landowners were consulted as individual groups at sub-precinct level to discuss the cost sharing options. They were presented with information on all the infrastructure projects required in future developments, cost of these projects, and the following four options available for sharing the cost for the infrastructure projects.

1. Option 1 – Development Contribution Plan
2. Option 2 – Two or more Development Contribution Plans to match the rate of proposed development in Swan Hill.
3. Section 173 Agreements for sub-precincts.
4. A combination of DCP and section 173 Agreements

Landowners were requested to choose an option from the above four. Landowners who attended the consultation meetings chose the Section 173 option for the provision of infrastructure.

Accordingly required section 173 agreements were prepared by legal professionals and the draft were sent to the landowners for comments prior to them being finalised for signing.

Where needed, State agencies were consulted with and without landowners to promote and facilitate landowners’ interests without compromising agency’s requirements.

In addition to the formal meetings, Council Officers met with landowners and their representatives when needed and or at landowners’ request.

Further, landowners were kept informed via written correspondence of the progress of the project.
In addition to the consultation with the landowners, series of consultations were undertaken with the following State agencies:

- **Lower Murray Water Authority** – No objection and supports the amendment in principle.
- **Goulburn Murray Water Authority** – No objection and supports the amendment in principle.
- **Country Fire Authority** – No objection and supports the amendment in principle.
- **VicRoads** – The authority does not have any objection to the proposed development Plan, except for providing direct access to Sea Lake – Swan Hill Road. However the traffic impact assessment undertaken for the Development Plan specifies the upgrades requirements for the provision of safe and convenient direct access to Sea Lake – Swan Hill Road. Recommended upgrades have been incorporated as part of the infrastructure provision and necessary arrangements have been put in place to ensure that the upgrades are completed at the right time to the quality and standards required. During the exhibition period, VicRoads will be able to provide formal comments on the proposed direct access indicated on the draft Development Plan.

- **Department of Environment and Primary Industries** – No objection and supports the amendment in principle. The authority is also supportive of the environmental impact assessment and soil testing requirements to be included in the Schedule 6 to DPO. Especially, given the 40 years residential supply/development time of the Precinct, there could be changes in land use practices which will impact on the environment and flora and fauna. As such it is agreed that it will be appropriate to undertake such assessments at the time of development.

- **Department of Transport** – The Department recommends increased densities especially along the proposed public transport route. The proposed Schedule 6 encourages increased densities along the collector roads and around the activity areas.

- **Aboriginal Affairs Victoria** – The authority is supportive of the amendment and informed that there is no known cultural heritage significance within the SWDP. The authority provided notes to be included in planning permits in relation to cultural heritage significance. These notes are included in the proposed Schedule 6 to the Development Plan Overlay.
• Department of Transport, Planning and Local Infrastructure – Throughout the development of the revised Development Plan the Department had been consulted and kept informed of its progress. The Department also reviewed the amendment documents prior to send for authorisation. The Department is generally supportive of the amendment.

All of the relevant agencies will be formally notified during the exhibition process.

Relevant internal Council departments were consulted during the development of the draft Development Plan and background documents. In particular, inputs were sought from the Asset Management Department, Engineering Department, Environment Sustainability Unit, Council Valuer, Economic Development, and Community Facilitation Unit.

Proposed consultation during public exhibition

Upon receipt of the authorisation, public exhibition will be held for a period of four weeks. During the public exhibition period, the owners and occupiers of affected land and the adjoining properties will be notified. Further, a public notice will be published at the local news paper the *Guardian* every Wednesday during the public exhibition period. Two drop-in sessions will also be held for the public and agencies to drop in and discuss the amendment and clarify any issues with Council officers. A Notice of Amendment will also be published in the Government Gazette.

Further, amendment documents will be made available at Council’s website, and Council Office.

In addition, notices will be sent to the prescribed Ministers, relevant State agencies and any other agencies required by the Minister for Planning during authorisation.

Financial Implications

Council will be paying the Planning Scheme Amendment fees. In addition, depending on the number of submissions received during the public exhibition there will be costs associated with Panel Hearing.

Social Implications

The amendment will facilitate the supply of residential land to meet the increasing housing needs of Swan Hill communities. Provision of appropriately zoned land is critical in addressing the affordable housing issues. In addition, future developments within the SWDP will offer a variety of residential lots that will meet the diverse housing needs of the future population.

The draft Development Plan encourages the provision of community facilities such as aged care facilities, medical centre, child care centre, retail activity areas and public places. Further, the proposed Schedule 6 to DPO encourages that future
developments within the SWDP incorporate Sustainable Design and Healthy by Design principles. The development infrastructure within SWDP is to be constructed to the standards specified in the Local Government Infrastructure Design Association’s Infrastructure Design Manual (adopted by Council in April 2013).

The above requirements are designed to ensure that future development within the SWDP meets community needs and enhances the liveability of the area and the wellbeing of Swan Hill communities.

Economic Implications

The proposed amendment will not have any negative impact on the economy. In contrast, facilitating the provision of appropriately zoned residential land will have positive impact on the local economy.

The proposed retail activity area, medical centre, aged care facility and child care centre will bring employment opportunities. In addition, during the construction of future developments there will be direct and indirect job opportunities created for locals, particularly in the areas of real-estate and building and construction.

Further, more housing means more people, and more demand for goods and services, which will boost local businesses and the local economy.

Environmental Implications

The SWDP land currently located in the Farming Zone and the Low Density Residential Zone are already cleared and have been used for dry land and irrigated agriculture activities, and for rural residential purposes. As such there are no significant flora and fauna to be affected by the proposed amendment.

As part of the pre-amendment consultations, the draft Development Plan was consulted with the Department of Environment and Primary Industries in April 2014. The Department did not have any objection to the draft Development Plan and agreed that removal of native vegetation to facilitate future developments within the SWDP will have to be assessed as per the requirements of Clause 52.17 of the Swan Hill Planning Scheme.

Further, the proposed Schedule 6 to the Development Plan Overlay requires additional studies/analysis to be undertaken prior to any development approval in order to minimise negative impacts on the environment from future developments. The detailed studies required include:

- Environmental Management Plan to address the following but not limited to:
  - Sub-precinct development plans to identify the location of any significant environmental, cultural, heritage and/or ecological (faunal and/or floral) features including fauna and remnant native vegetation,
  - An environmental assessment of the land, involving a flora and fauna survey, which among other things, identifies the health and habitat value of all native vegetation; and
• A preliminary soil assessment demonstrating the extent of any contaminated soils that may exist on the subject land. If detected, a more detailed assessment outlining the location of the contaminated soil, the type of contaminants detected, and the strategies required to be undertaken to decontaminate the affected areas in accordance with the Ministerial Direction No. 1 - Potentially Contaminated Land.

• Drainage Management Plan for all sub-precincts including computations and stormwater modelling.

• Approval from all relevant service authorities for works on waterways (where necessary).

• A Landscaping Plan including landscaping and street trees proposed to further enhance visual amenity of the area.

These studies will assist in the assessment of future residential subdivisions and will ensure the efficient use of land within the SWDP and minimal negative impact on the environment.

In addition, the SWDP is not located within the Designated Bushfire Prone Area, nor affected by Bushfire Management Overlay / Wildfire Management Overlay. However, any bushfire risk would be addressed at the building permit stage with construction standards enforced through the Building Code of Australia.

Risk Management Implications

There are no known risks in undertaking this amendment.

Council Plan Strategy Addressed

**Housing** - We will support appropriate accommodation options for our growing economy.

The Council Plan 2013 – 2017 emphasises the need to support appropriate accommodation options for the growing economy, and aims to complete respective amendments to the Swan Hill Planning Scheme to support the supply of future housing.

Options

Nil
Recommendations

That Council:

1. Organise the necessary Section 173 Agreements as discussed in this report by end of November 2014.

2. If such agreements are not signed for any sub-precincts by the 30 November 2014, prepare alternative cost-sharing arrangements (such as Development Contributions Plan with no cost to Council) for those sub-precincts that did not sign, or the entire South West Development Precinct if necessary, to enable this planning scheme amendment to proceed.

3. Upon signing the required agreements and/or making alternative cost-sharing arrangements, seek authorisation from the Minister for Planning to prepare amendment C58; and

4. Following the receipt of authorisation, publically exhibit the amendment and the draft Swan Hill South West Development Plan for a minimum period of 30 days.
SWAN HILL PLANNING SCHEME

SCHEDULE 6 TO THE DEVELOPMENT PLAN OVERLAY

Shown on the planning scheme map as DDO6

SWAN HILL SOUTH WEST DEVELOPMENT PRECINCT

1.0 Requirement before a permit is granted

A permit must not be granted to use or subdivide land, construct a building or construct or carry out works within a sub-precinct until the following is prepared to the satisfaction of the Responsible Authority:

1.1 Detailed Sub-precinct Plan

- A detailed sub-precinct level development plan must be prepared as per the requirements outlined in this schedule for the sub-precinct and approved by the Responsible Authority.

Note: The approved sub-precinct level development plan may be amended to the satisfaction of the Responsible Authority, and

1.2 Section 173 Agreement – Provision of infrastructure

- A signed and registered agreement pursuant to section 173 of the Planning and Environment Act 1987 between Swan Hill Rural City Council and the landowners within the sub-precinct for the provision of infrastructure to serve the land within the South West Development Precinct.

This agreement will specify the infrastructure that is to be provided by the landowners within the sub-precinct as their fair and equitable contribution to the provision of infrastructure serving the whole of the South West Development Precinct. As a result they will not be expected to make contributions to the provision of infrastructure in other sub-precincts other than the common infrastructure covered by any s173 Agreement listed in Clause 1.3 of this schedule.

The provision of infrastructure is to be in accordance with the requirements of the report titled “South West Development Precinct Infrastructure Cost Sharing Calculations” dated xxx (or as reviewed thereafter), and

1.3 Section 173 Agreement for infrastructure jointly provided by more than one sub-precinct

- A signed and registered agreement pursuant to section 173 of the Planning and Environment Act 1987 between Swan Hill Rural City Council and the landowners within all the sub-precincts that are to jointly provide infrastructure,
SWAN HILL PLANNING SCHEME

This agreement will specify the infrastructure that is to be jointly provided by the landowners of more than one sub-precinct as their fair and equitable contribution to the provision of infrastructure serving the whole of the South West Development Precinct.

This clause relates to the provision of Project 18: Catchment 4 Retardation Basin, pump station, rising main and outfall drains to service all of sub precinct 3 and parts of sub-precincts 1 and 6.

The provision of infrastructure is to be in accordance with the requirements of the report titled "South West Development Precinct Infrastructure Cost Sharing Calculations" dated xxx (or as reviewed thereafter), and referenced in this schedule, and

1.4 Section 173 Agreement for cost sharing within sub-precincts

A signed and registered agreement pursuant to section 173 of the Planning and Environment Act 1987 between Swan Hill Rural City Council and the landowner/s of the sub-precinct and any landowner on whose land the infrastructure to be provided by the sub-precinct, is located upon.

This agreement is to specify:

- That the landowners party to this agreement will pay 100% of the cost of providing the infrastructure that has been allocated to be provided by the by the landowners within the sub-precinct.
- Details of the cost sharing of the infrastructure allocated to be provided by the landowners within the sub-precinct in the report titled "South West Development Precinct Infrastructure Cost Sharing Calculations" dated xxx (or as reviewed thereafter) to the satisfaction of the Responsible Authority.

The agreement must provide that the signatories to this agreement must meet all of the obligations of the Owner listed in the section 173 agreements listed in Clause 2.2 and 2.3 of this schedule.

All the above agreements must be prepared in consultation with, to the satisfaction of, and at no cost to Swan Hill Rural City Council.

Exemptions

Permits may be granted before the detailed sub-precinct level plan is approved for the following, subject to the Responsible Authority being satisfied that the issuing of a planning permit will not prejudice the preparation and / or the implementation of the Swan Hill South West Development Plan.
SWAN HILL PLANNING SCHEME

- A single dwelling on an existing allotment
- For buildings or works and extensions and modifications associated with an existing use in accordance with the provisions of Clause 63 of this Planning Scheme.
- For the excision of an existing dwelling. The excision should be limited to the dwelling and any outbuildings and works associated with the dwelling to the satisfaction of the Responsible Authority.
- An outdoor advertising sign/structure.
- A minor utility installation and access to.
- Boundary realignment to the satisfaction of the Responsible Authority and will not prejudice the preparation and / or the implementation of the Swan Hill South West West Development Plan.

2.0 Conditions and requirements for permits

Special conditions and notes that are to be included on subdivision permits other than those that are exempted in this schedule.

2.1 Infrastructure works

Conditions as appropriate must be included on any planning permit issued to subdivide or develop land with regard to infrastructure works being completed in accordance with any approved Infrastructure Plan approved under this Schedule.

2.1.1 Where development fronts to an existing collector street and arterial roads (such as Sea Lake - Swan Hill Road, Yara Street, Coronation Avenue, Gray Street and Werril Street) developer will be required to provide the following infrastructure:

- A 2.5 metre wide shared path
- Kerb and channel
- Pavement widening to the satisfaction of the Responsible Authority.

2.2 Cultural Heritage related requirements

Notes to be included in permits:

All Aboriginal Cultural Heritage, that is Aboriginal Places, Aboriginal Objects and Aboriginal Human remains are protected under the State Aboriginal Heritage Act 2006. It is an offence to do an act that will harm Aboriginal cultural heritage or is likely to harm Aboriginal cultural heritage.

- Works must cease immediately upon the discovery of any Aboriginal cultural material, and Aboriginal Affairs Victoria must be notified immediately of any such discovery at GPO Box 2352, Melbourne 3001 or on telephone 1300551380 or (03) 9208 3277 or via email to vahr@dpc.vic.gov.au (Contact details must be checked at the time of contact).
SWAN HILL PLANNING SCHEME

- If any suspected human remains are found, work in the area must cease and the Victorian Police and the State Coroner’s Office must be informed of the discovery immediately.
- If there are reasonable grounds to suspect that the remains are Aboriginal, the discovery should be reported to Aboriginal Affairs Victoria as specified above.

2.3 Construction Management Plan

A site construction management plan that accords with the sediment control principles outlined in Construction techniques for Sediment Pollution Control (Environment Protection Authority, 1991) to manage site run off, dust, erosion, litter and construction waste must be submitted to and approved by the Responsible Authority prior to the commencement works.

3.0 Requirements for Development Plan

The Swan Hill South West Development Plan was prepared and approved by the Swan Hill Rural City Council in July 2014.
This Development Plan requires detailed sub-precinct plans to be prepared for individual sub-precincts prior to any development (other than that are exempted) can be approved. The South West Development Precinct has been divided into six sub-precincts to enable development to proceed in an orderly manner.

Sub-precinct development plans must:

- Ensure future use and development within the South West Development Precinct is generally in accordance with the approved Swan Hill South West Development Plan prepared and approved by Swan Hill Rural City Council July 2014 (or as reviewed thereafter).
- Ensure the orderly development of the Swan Hill South West Development Precinct creates a liveable place for the current and future communities of Swan Hill.
- Ensure the development provides appropriate traffic, drainage, transport, recreational, community and necessary social infrastructure to service the community.

The location of six sub-precincts is shown below on map titled Swan Hill South West Development Sub-Precincts Plan.
3.1 Requirements for Sub-precinct Development Plans

3.1.1 Site analysis and subdivision layout
SWAN HILL PLANNING SCHEME

The sub-precinct development plans must be drawn to scale and must be generally in accordance with the approved Swan Hill South West Development Plan and include the following but not limited to:

- A detailed site analysis plan showing existing conditions on the subject land and adjoining and opposite properties, contours at 0.1 meters and existing infrastructure, vegetation, buildings and any other structures.

- A subdivision layout that:
  
  o Creates a safe, convenient and legible street layout design that ensures development fronts streets and public open space.
  
  o The subdivision layout is sympathetic and appropriately responds to the proposed infrastructure as identified in the approved Swan Hill South West Development Plan, and developments that are already established within the adjoining sub-precincts.
  
  o Provides for a mix of lot sizes that can offer diverse residential development choices and affordable housing options.
  
  o Increased densities are encouraged along the proposed collector streets and near activity areas.
  
  o Is consistent with the requirements of sustainable design principles including solar efficiency where and as appropriate.
  
  o Has a minimum lot size of 2000m² abutting Dead Horse Lane and Werri Street as specified in the approved Swan Hill South West Development Plan. This requirement is valid until end of 2030.
  
  o Has a minimum lot size of 1000m² abutting to existing Low Density Residential Zone as specified in the approved Swan Hill South West Development Plan to minimize the negative impacts on the adjoining land.
  
  o Incorporates where appropriate Healthy by Design principles to encourage walking, cycling and active living by design.
  
  o Identify vegetation that are to be retained and/or to be removed
  
  o Identify existing and proposed infrastructure
  
  o Identify existing buildings, works and structures that are to be removed or to be relocated.

3.1.2 Drainage

A Drainage Management Plan for the sub-precinct addressing the management of the quantity of stormwater which is generally consistent with the drainage strategy titled "South West Development Precinct Drainage Strategy dated XXX (or as reviewed thereafter) and referenced in this schedule must be prepared to the satisfaction of the Responsible Authority. The Plan then has to be approved by the Responsible Authority.

The Drainage Management Plan must address the following but not limited to:
SWAN HILL PLANNING SCHEME

- Provision for stormwater arriving from upstream, passing through, and moving downstream from the site.
- An assessment of the existing surface and subsurface drainage conditions on the site by a suitably qualified professional and the potential impacts on the proposed development, including any measures required to mitigate the impacts of groundwater coming to the surface on the development and the impact of the development on drainage.
- Detailed geotechnical and hydrological analysis and design of any retardation basins and their proximity to any groundwater table and in particular how groundwater infiltration will be addressed and how accessions to the water table will be addressed to the satisfaction of the Responsible Authority.
- Detailed computations and stormwater modelling showing that there are no adverse impacts to the operation of the Swan Hill Main Drain in a 100 year ARI rainfall event by any discharge from the drainage system serving the precinct to the Swan Hill Main Drain.
- Subdivision layout and road alignment must consider and give effect to the natural direction of overland flow paths for stormwater as shown in the "South West Development Precinct Drainage Strategy dated XXX (or as reviewed thereafter). Overland flows should be along roads reserves. Overland flows in drainage reserves should be avoided wherever possible.
- The provision, staging and timing of drainage infrastructure serving particular sub-precinct.
- An agreement from the landowners on whose land the drainage infrastructure is to be located upon (as detailed in Clause 2.4 of this schedule).
- A detailed landscape plans for the retardation basin within the sub-precinct showing the proposed landscape treatments, tree planting, footpaths around the basins and access to and around the basins for maintenance.
- A minimum of 40% of the perimeter of the retardation basin must have a frontage to a road/s to allow overland flows to enter the basin unless otherwise agreed in writing by the Swan Hill Rural City Council.
- Must show the approved drainage connection points to Council’s existing drainage infrastructure identified in the "South West Development Precinct Drainage Strategy" unless otherwise approved by the Swan Hill Rural City Council.
- Designation of fence design provisions in relation to the interface with retardation basin areas to maximise passive surveillance.
- Approval from all relevant service authorities whose assets or land may be affected by surface or pipe flow discharge. In particular it should be noted that a separate permit (Works on Waterway) from the relevant Catchment Management Authority may be required if:
  - There is a direct connection to a waterway.
  - There is a bridge or culvert over a waterway.
  - Construction of a retardation basin.
  - When required by the relevant Catchment Authority.

3.1.3 Traffic
SWAN HILL PLANNING SCHEME

A sub-precinct level Traffic Management Plan that is generally in consistent with the report titled "Swan Hill South West Development Precinct Traffic Impact Assessment" dated XX (or as reviewed thereafter), and the Swan Hill South West Development Precinct Traffic Strategy dated XXX (or as reviewed thereafter) and referenced in this schedule must be prepared to the satisfaction of the Responsible Authority.

The Traffic Management Plan must address the following but not limited to:

- Appropriate access and circulation of vehicles on the existing and future road network.
- Appropriate integration with the existing or proposed subdivision of adjoining properties and sub-precincts including through alignment and configuration of the street network and landscape character.
- The identification of existing and proposed public transport routes, bus stops (as shown on the approved Swan Hill South West Development Plan) and associated infrastructure.
- The identification of existing and proposed pedestrian and cycling networks and shared paths.
- Including provision for safe and convenient access to public transport infrastructure.
- The works necessary to accommodate traffic generated by the development and to mitigate the impact of that traffic on the development.
- Ensure that the road and intersection design must create efficient clearance of traffic, activity areas including around public facilities. The proposed road network should not overloading or detrimentally affect existing or proposed residential streets and intersections.
- Adequate sight distance should be provided, especially where road alignment deflections occur at acute angles.
- Road layouts should provide natural traffic speed control, appropriate to the street category. The introduction of specific speed control devices should be considered only as a secondary option. Roundabouts may be implemented at intersections. However, care must be taken to provide adequate sized roundabouts and therefore road reservation boundaries must be designed to accommodate the radius required and sightlines.
- Road layouts should be designed for all road users appropriate to the street type, including service vehicles, emergency vehicles, waste collection vehicles and street-cleanupers. Bus routes need to be considered when developing road networks and be based on the Department of Transport, Planning and Local Infrastructure publication titled ‘Public Transport Guidelines for Land Use Development’ (or a replacement document by the Department).
- Road reserve widths must be adequate for the intended road type, and should comply with requirements of the Infrastructure Design Manual.
- Should include a typical cross-section of differing road types, detailing the intended function of the road, e.g. bike lanes, drainage, landscaping.
SWAN HILL PLANNING SCHEME

- Addresses all off-site traffic infrastructure requirements associated with the sub-precinct and is to be accompanied by a Road Safety Audit, prepared by an appropriately qualified person. The Plan must address any safety issues raised by the Audit.

3.1.4 Environmental Assessment

A sub-precinct level Environmental Management Plan to be prepared to the satisfaction of the Responsible Authority. The Plan then must be approved by the Responsible Authority.

The Environmental Management Plan must address the following but not limited to:

- The location of any significant environmental, cultural, heritage and/or ecological (faunal and/or floral) features including fauna and remnant native vegetation.
- An environmental assessment of the land, involving a flora and fauna survey, which among other things, identifies the health and habitat value of all native vegetation.
- A preliminary soil assessment demonstrating the extent of any contaminated soils that may exist on the subject land, and if detected, a more detailed assessment outlining the location of the contaminated soil, the type of contaminants detected, and the strategies required to be undertaken to decontaminate the affected areas in accordance with the Ministerial Direction No. 1 - Potentially Contaminated Land.
- Developments on land that are reclaimed as a result of decommissioning of the Goulburn Murray Water Channel infrastructure requires further investigation undertaken by suitably qualified persons to demonstrate the suitability of the land to use and develop for residential and other purposes to the satisfaction of the Responsible Authority.

3.1.5 Infrastructure Plan

A sub-precinct level infrastructure plan approved by the Responsible Authority which identifies the anticipated staging and timing of the provision of infrastructure (on and off the subject land or sub-precinct), in accordance with the “South West Development Precinct Infrastructure Cost Sharing Calculations”. The infrastructure plan should address the following as appropriate:

- The provision, staging and timing of stormwater drainage works both internal and external to the precinct.
- The provision, staging and timing of road works (including bus stops, associated works, and shared paths as identified in the approved Swan Hill South West Development Plan) both internal and external to the precinct in accordance with the approved sub-precinct level traffic management plan.
- The widening of Feldtmann Lane road reserve to 24 metres (Only for sub-precinct 1).
- The provision, staging and timing of project numbers 22 and 23 as listed in Table 3 titled ‘List of Infrastructure Projects to be Provided’ in the Swan Hill South West Infrastructure Provision.
SCHNEZ. 6 FOR DPO DRAFT

SWAN HILL PLANNING SCHEME

- That all infrastructure must be constructed generally in accordance with the provisions of
  the Infrastructure Design Manual as referred in this Schedule.
- The standard of construction for Dead Horse Lane, Werril Street and Yana Street is kerb and
  channel only on one the side of the development, with a 2.5 metre shared path, and 6
  metre seal width and 1.5 metre gravel shoulder.
- Properties wishing to open access to Dead Horse Lane and Werril Street must construct the
  relevant road to which to wish to access at no cost to Council or to any other landowners
  (unless otherwise voluntarily agreed) to the standards specified above up to the nearest
  sealed urban road.
- Any other infrastructure or related matter reasonably requested by the Responsible
  Authority associated with the development of the land.

3.2 Urban Design requirements

Future development fronting Sea Lake-Swan Hill Road and Dead Horse Lane should be designed

to achieve attractive visual presentation to the roads in terms of built form, landscaping and
street scape to the satisfaction of the Responsible Authority.

3.3 Fencing

Fencing on or within 10 meters of the boundary along the Sea Lake-Swan Hill Road and Dead
Horse Lane should be at least 50% transparent to the satisfaction of the Responsible Authority
unless otherwise agreed in writing by the Responsible Authority.

3.4 General Requirements

- The required buffer as per the requirements of Clause 52.10 of the Swan Hill Planning
  Scheme must be maintained between the industrial activities on Gray Street and sensitive
  use and developments within the Swan Hill South West Development Precinct.
- The following documents should be considered in the preparation of the reports, studies
  and documents required in this schedule.
  o Swan Hill South West Development Plan (approved and or revised thereafter)
  o Infrastructure Design Manual (as updated)
  o South West Development Precinct Infrastructure Cost Sharing Calculations dated xxx
    (or as reviewed thereafter),
  o South West Development Precinct Drainage Strategy dated xxx (or as reviewed
    thereafter)
  o Swan Hill South West Development Precinct Traffic Impact Assessment dated xxx (or as reviewed
    thereafter), and the Swan Hill South West Development Precinct Traffic
    Strategy dated xxx (or as reviewed thereafter)
  o Swan Hill Review of the Residential Strategy dated March 2013 (or as reviewed
    thereafter).
- Proposed street names must conform to the Guidelines for Geographic Names Victoria.
SWAN HILL SOUTH WEST DEVELOPMENT PRECINCT INFRASTRUCTURE COST SHARING CALCULATIONS

Version 1.5
Swan Hill Rural City
24 June 2014.
South West Development Precinct
Infrastructure Cost Sharing Calculations

Table of Contents

1. INTRODUCTION .................................................................................................................. 3
   1.1 Purpose .......................................................................................................................... 3

2. PROVISION OF INFRASTRUCTURE ............................................................................... 5

3. STANDARDS OF INFRASTRUCTURE AND ASSUMPTIONS MADE ......................... 6

4. INFRASTRUCTURE PROJECTS TO BE PROVIDED BY THE LANDOWNERS
   WITHIN THE SWDP ........................................................................................................... 7

5. METHOD OF DETERMINING ALLOCATION OF THE DELIVERY OF
   INFRASTRUCTURE PROJECTS ...................................................................................... 15
   5.1 Determination of Analysis Areas ................................................................................. 15
   5.2 Determination of Area of Residential Development.................................................. 16
   5.3 Determination of catchment areas for each infrastructure project and external usage ..... 17
   5.4 Calculation of Infrastructure Cost Sharing ................................................................. 19
   5.5 Determination of the Delivered Infrastructure Projects ............................................. 24
   5.6 Determination of Landowners’ and Cost Sharing Within Analytic Areas .................. 28

6. TIMEFRAME FOR THE PROVISION OF INFRASTRUCTURE PROJECTS .......... 31

7. PROCEDURAL MATTERS ................................................................................................. 32
   7.1 Rise and Fall ................................................................................................................. 32
   7.2 Termination .................................................................................................................. 32
   7.3 Section 173 Agreements ............................................................................................... 32

Appendix A Engineers Estimates for Infrastructure Projects............................................. 34
Appendix B Calculations to Determine Cost Sharing......................................................... 64
1. INTRODUCTION

1.1 Purpose

The Infrastructure Cost Sharing Calculations (ICSC) have been prepared:

- To list the infrastructure projects that will be provided by the landowners/developers within the precinct
- To determine a fair and equitable method of infrastructure delivery which will allow, as far as possible, for development within a sub-precinct (Analysis Area) to proceed independently of other sub-precincts (Analysis Areas)
- To document the basis of calculating the determination of which sub-precinct(s) (Analysis Area/s) is responsible for delivery of a particular infrastructure project
- To provide landowners within a sub-precinct (Analysis Area) the necessary information to determine the fair and equitable cost sharing of the proportional infrastructure allocated to a sub-precinct (Analysis Area) to provide.

The area covered by this report is the land covered by the South West Development Precinct (SWDP) as shown in Map 1.

Map 1 South West Development Precinct Area
The existing and proposed land uses contained within and adjacent to the boundaries of the SWDP are shown in Map 2.

Map 2 Existing and Proposed Land Uses

Table 1 shows the area of each of the proposed uses within the SWDP.

Table 1 Proposed Land Uses within the SWDP

<table>
<thead>
<tr>
<th>Zoning or land description</th>
<th>Area of Land in square metres</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential Land</td>
<td>2,079,865</td>
</tr>
<tr>
<td>Farming Zone</td>
<td>48,686</td>
</tr>
<tr>
<td>Drainage Reserves</td>
<td>93,800</td>
</tr>
<tr>
<td>Ken Harrison Reserve</td>
<td>173,000</td>
</tr>
<tr>
<td>Lower Murray Water Reserve</td>
<td>225</td>
</tr>
<tr>
<td>GMW channel reserves</td>
<td>4,777</td>
</tr>
<tr>
<td>Commercial</td>
<td>3,000</td>
</tr>
<tr>
<td>POS</td>
<td>2,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2,405,153</strong></td>
</tr>
</tbody>
</table>
South West Development Precinct
Infrastructure Cost Sharing Calculations

The amount of land available for residential development within the bounds of the SWDP is 207.99 ha. The average density of development has been nominated to be 10.5 dwellings per ha. This will accommodate those landowners/developers wishing to provide for the demand of larger allotments and those wishing to provide smaller sized residential allotments to maximize the return on investment on infrastructure.

The estimated lot yield based on density of 10.5 dwellings per ha is 2,184 allotments.

2. PROVISION OF INFRASTRUCTURE

The Planning and Environment Act specifies that infrastructure provision can be funded by either or a combination of:

- Development Contributions Plans (DCP)
- s173 Agreements

Council and landowners have agreed to fund the provision of infrastructure works using a series of s173 agreements.

The disadvantages associated with DCP’s as follows:

- The expected period to fully develop the SWDP is in excess of 40 years and the standards of infrastructure today will not be the standard of the infrastructure in the future. Whilst it is reasonable for the today’s standards to apply for the next 10 years it is not reasonable to insist that the standards of today will still be relevant in 40 years time.
- The 40 year period of development and the large number of landowners involved make the nomination of timetables for the supply of infrastructure impossible.
- Council is not in a position to act as banker for the provision of infrastructure and therefore landowners wishing to develop will carry out “works in kind” and may carry costs for considerable periods of time until there are sufficient funds collected from DCP contributions to be able to reimburse them. This also creates an issue for Council in determining the order in which landowners should be reimbursed for infrastructure provided.
- The administration of DCP’s is exacting and time consuming.
- Some landowners will be dependent upon other landowners to provide infrastructure before they can develop.
- Development could be adhoc and not provided in an orderly manner.

The advantages of using a series of s173 agreements, together with dividing the SWDP into 6 sub-precincts are:

- Development could commence in each of these sub-precincts independently of other sub-precincts upon the signing and registering of the necessary s173 agreements
- The timing and delivery of the projects is governed by the landowners within a sub-precinct.
South West Development Precinct
Infrastructure Cost Sharing Calculations

- The cost sharing arrangements within a sub-precinct are determined by those landowners within the sub-precinct wishing to develop
- Gives the opportunity to allocated projects to be delivered by a particular sub-precinct instead of a cash contribution therefore removing the need to index estimated project costs with time.
- S173 agreements can deal with changing standards of infrastructure over time.
- Avoids the need for Council to administer a DCP.

The methodology used to use a series of s173 agreements to deliver the infrastructure within the SWDP is as follows:

1. Determine the cost sharing to all landowners as if a DCP was to be implemented.
2. Allocate the costs to Sub-precincts (Analysis Areas) as per in a DCP.
3. Allocate each sub-precinct to carry out “works in kind” to the approximate value of their contribution determined under step 2.
4. Get the landowners to agree to allocation of “works in kind” to each sub-precinct before the planning scheme amendment is approved. (S173 Agreement for the provision of infrastructure.) This agreement to be signed and registered at the Titles Office before the Council will amend the Swan Hill Planning Scheme to give effect to the SWDP.
5. Identify any infrastructure that is servicing more than one sub-precinct and determine the costs sharing and other arrangements for the provision of this infrastructure and obtain agreement from all the landowners within the benefiting sub-precincts before the planning scheme amendment is approved. (S173 Agreement for Joint provision of Infrastructure.) This agreement to be signed and registered at the Titles Office before the Council will amend the Swan Hill Planning Scheme to give effect to the SWDP.
6. Determine the cost sharing between landowners within a sub-precinct for the works in kind allocated to that sub-precinct. This agreement is required to be signed and registered at the Titles Office before development can commence within a sub-precinct. (S173 Agreement for cost sharing of infrastructure within a sub-precinct.) This agreement will be signed by those landowners within the sub-precinct who are prepared to fund 100% of the infrastructure allocated to the sub-precinct.

3. STANDARDS OF INFRASTRUCTURE AND ASSUMPTIONS MADE
Each landowner/developer will be required to build infrastructure to service the development in accordance with the standards set by the relevant service authorities. In the case of infrastructure to be gifted to the Rural City of Swan Hill the infrastructure standards are specified in the Local Government Infrastructure Design Association’s Infrastructure Design Manual and the specifications of Council to the satisfaction of Council unless otherwise agreed in writing by Council.

The IDM cross sections for Access Streets and Collector Streets are shown below:
The determination of costs in relation to collector streets relates to paying for the difference between the two cross sections i.e. a landowner/developer would have had to pay for the construction of an access street and therefore the additional width of road reserve, road pavement and footpaths for the collector street cross section is used in cost sharing calculations.

The construction standard for Deadhorse Lane (Option 2) is half the collector street – level one shown above plus 1m of seal and 1.5m of shoulder. When development occurs in the future on the west side of Deadhorse Lane they will be required construct the other half of Deadhorse Lane.

The construction of half a collector street for Deadhorse Lane will give a seal width of 6.2m which is considered adequate for the current traffic using Deadhorse Lane.

The calculations used in this ICSC are based on Option 1 of the Swan Hill South West Development Precinct Traffic Impact Assessment as this is the Council’s and the landowners preferred option.

4. INFRASTRUCTURE PROJECTS TO BE PROVIDED BY THE LANDOWNERS WITHIN THE SWDP.

The infrastructure projects provided by the landowners within the SWDP will be owned by Council when they are completed and are listed in Table 3. Their location is shown in Map 3.

The infrastructure to be provided has been identified in this ICAC gives effect to the delivery of those infrastructure projects identified the Swan Hill SWDP Drainage Strategy dated 24 June 2014 and the Swan Hill SWDP Traffic Impact Assessment dated 21 June 2014 and this report as being required to serve the land within the SWDP.

Table 3 List of Infrastructure Projects to be Provided

<table>
<thead>
<tr>
<th>Project Number</th>
<th>Project Description</th>
<th>Type</th>
<th>Description</th>
<th>Strategic Justification</th>
<th>Responsibility for Provision</th>
</tr>
</thead>
</table>

7 of 71
Version 1.5 24 June 2014
## South West Development Precinct
### Infrastructure Cost Sharing Calculations

<table>
<thead>
<tr>
<th>Project Number</th>
<th>Project Description</th>
<th>Type</th>
<th>Description</th>
<th>Strategic Justification</th>
<th>Responsibility for Provision</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Project 1 Link Road No 1</td>
<td>Road</td>
<td>Construction of the additional width between Collector Street and Access Street including the cost of the additional road reserve width</td>
<td>South West Development Precinct Development Plan</td>
<td>Analysis Area 5</td>
</tr>
<tr>
<td>2</td>
<td>Project 2 Link Road No 2</td>
<td>Road</td>
<td>Construction of the additional width between Collector Street and Access Street including the cost of the additional road reserve width</td>
<td>South West Development Precinct Development Plan</td>
<td>Analysis Area 4</td>
</tr>
<tr>
<td>3</td>
<td>Project 3 Link Road No 3</td>
<td>Road</td>
<td>Construction of the additional width between Collector Street and Access Street including the cost of the additional road reserve width</td>
<td>South West Development Precinct Development Plan</td>
<td>Analysis Area 3</td>
</tr>
<tr>
<td>4</td>
<td>Project 4 Link Road No 4</td>
<td>Road</td>
<td>Construction of the additional width between Collector Street and Access Street including the cost of the additional road reserve width</td>
<td>South West Development Precinct Development Plan</td>
<td>Analysis Area 1</td>
</tr>
<tr>
<td>5</td>
<td>Project 5 Link Road No 5</td>
<td>Road</td>
<td>Construction of the additional width between Collector Street and Access Street including the cost of the additional road reserve width</td>
<td>South West Development Precinct Development Plan</td>
<td>Analysis Area 1</td>
</tr>
<tr>
<td>6</td>
<td>Project 6 Link 6 Feldmann Lane Construction</td>
<td>Road</td>
<td>Construction of the additional width between Collector Street and Access Street including the cost of the additional road reserve width and construction of Feldman Lane including widening of</td>
<td>South West Development Precinct Development Plan</td>
<td>Analysis Area 1</td>
</tr>
<tr>
<td>Project Number</td>
<td>Project Description</td>
<td>Type</td>
<td>Description</td>
<td>Strategic Justification</td>
<td>Responsibility for Provision</td>
</tr>
<tr>
<td>----------------</td>
<td>---------------------</td>
<td>------</td>
<td>-------------</td>
<td>-------------------------</td>
<td>-----------------------------</td>
</tr>
<tr>
<td>7</td>
<td>Project 7 Link Road 7(1)</td>
<td>Road</td>
<td>road reserve</td>
<td>South West Development Precinct Development Plan</td>
<td>Analysis Area 1</td>
</tr>
<tr>
<td>8</td>
<td>Project 8 Roundabout Coronation Street and Link Road Intersection 3</td>
<td>Road</td>
<td>Construction of the full width of Collector Street including the cost of the additional road reserve width from existing width to collector street width.</td>
<td>South West Development Precinct Development Plan</td>
<td>Analysis Area 5</td>
</tr>
<tr>
<td>9</td>
<td>Project 9 Roundabout Yara Street and Link Roads 3 and 4 Intersection 4</td>
<td>Road</td>
<td>Single lane roundabout</td>
<td>South West Development Precinct Development Plan</td>
<td>Analysis Area 3</td>
</tr>
<tr>
<td>10</td>
<td>Project 10 Intersection of Gran Street and Link Road Intersection 8</td>
<td>Road</td>
<td>Construction of left and right turn lanes on both internal road and Gran Street</td>
<td>South West Development Precinct Development Plan</td>
<td>Analysis Area 2</td>
</tr>
<tr>
<td>11</td>
<td>Project 11 Intersection of Gran Street and Feldmann Lane Intersection 7</td>
<td>Road</td>
<td>Construct right turn lane in Gran Street and right and left turn lanes in Feldmann Lane</td>
<td>South West Development Precinct Development Plan</td>
<td>Analysis Area 1</td>
</tr>
<tr>
<td>12</td>
<td>Project 12 New Access Point to Swan Hill Sea Lake Road Intersection 10</td>
<td>Road</td>
<td>Construct new intersection between Link Road 7 and Swan Hill Sea Lake Road including right and left turn lanes in both</td>
<td>South West Development Precinct Development Plan</td>
<td>Analysis Area 1</td>
</tr>
<tr>
<td>Project Number</td>
<td>Project Description</td>
<td>Type</td>
<td>Description</td>
<td>Strategic Justification</td>
<td>Responsibility for Provision</td>
</tr>
<tr>
<td>----------------</td>
<td>---------------------</td>
<td>--------</td>
<td>------------------------------</td>
<td>-------------------------</td>
<td>-----------------------------</td>
</tr>
<tr>
<td>13</td>
<td>Project 13</td>
<td>Road</td>
<td>Single lane roundabout</td>
<td>South West Development</td>
<td>Analysis Area 1</td>
</tr>
<tr>
<td></td>
<td>Roundabout Link Road and Link Road Intersection 12</td>
<td></td>
<td></td>
<td>Precinct Development Plan</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Project 14</td>
<td>Road</td>
<td>T intersection with right and left turn lanes on Link Roads 6, 7 and 5</td>
<td>South West Development</td>
<td>Analysis Area 1</td>
</tr>
<tr>
<td></td>
<td>Roundabout Link Roads 6, 7 and 5 Intersection 13</td>
<td></td>
<td></td>
<td>Precinct Development Plan</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Project 15</td>
<td>Drainage</td>
<td>Construction of 4,200,000 m³ retardation basin, 4m deep pump station, rising main and outfall drains to service development south of Analysis Area 1</td>
<td>South West Development</td>
<td>Analysis Area 1</td>
</tr>
<tr>
<td></td>
<td>Catchment 1</td>
<td></td>
<td></td>
<td>Precinct Development Plan</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Retardation Basin to serve north part of Analysis Area 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Project 16</td>
<td>Drainage</td>
<td>Construction of 21,900 m³ retardation basin, 4m deep pump station with a pumping capacity of 214 lit/sec and 300mm dia rising main. Area of bund 26,900 m² outfall drains consisting of 160m of 600mm RCP, 267m of 750mm RCP, 235m of 900mm RCP and 190m of 1,200mm RCP</td>
<td>South West Development</td>
<td>Analysis Area 1</td>
</tr>
<tr>
<td></td>
<td>Catchment 2</td>
<td></td>
<td></td>
<td>Precinct Development Plan</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Retardation Basin, pump station, rising main and outfall drains to service development south of Analysis Area 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Project 17</td>
<td>Drainage</td>
<td>Outfall drain 220m of 750mm RCP</td>
<td>South West Development</td>
<td>Analysis Area 2</td>
</tr>
<tr>
<td></td>
<td>Catchment 3</td>
<td></td>
<td></td>
<td>Precinct Development Plan</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Gravity Outfall drains to service</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Project Number</td>
<td>Project Description</td>
<td>Type</td>
<td>Description</td>
<td>Strategic Justification</td>
<td>Responsibility for Provision</td>
</tr>
<tr>
<td>----------------</td>
<td>------------------------------------------------------------------------------------</td>
<td>-------</td>
<td>-----------------------------------------------------------------------------</td>
<td>-------------------------</td>
<td>------------------------------</td>
</tr>
<tr>
<td>18</td>
<td>Project 18 Catchment 4 Retardation Basin, pump station, rising main and outfall drains to service development Analysis Areas 3 and part of 1 and 6</td>
<td>Drainage</td>
<td>Construction of 35,600 m³ retardation basin, 4m deep pump station with a pumping capacity of 214 l/sec and 560m of 300mm dia rising main. Area of land 30,300 m² Outfall drains consisting of 7km of 300mm RCP, 1.7km of 375mm RCP, 1.3km of 550mm RCP, 1.64km 600mm RCP, 1.3km of 875mm RCP, and 3.1km of 1000mm RCP.</td>
<td>South West Development Precinct Development Plan</td>
<td>Analysis Areas 1, 3 and 6</td>
</tr>
<tr>
<td>19</td>
<td>Project 19 Catchment 5 Retardation Basin, pump station, rising main and outfall drains to service part development Analysis Areas 1 and 6</td>
<td>Drainage</td>
<td>Construction of 6,300 m³ retardation basin, 3.4m deep pump station with a pumping capacity of 34 l/sec and 1,320m of 150mm dia rising main. Area of land 8,800 m² Outfall drains consisting of 2.1km of 375mm RCP, 1.08km of 450mm RCP, 1.413km of 525mm RCP and 4.113 m of open earth drain.</td>
<td>South West Development Precinct Development Plan</td>
<td>Analysis Areas 1 and 6</td>
</tr>
</tbody>
</table>
### South West Development Precinct
### Infrastructure Cost Sharing Calculations

<table>
<thead>
<tr>
<th>Project Number</th>
<th>Project Description</th>
<th>Type</th>
<th>Description</th>
<th>Strategic Justification</th>
<th>Responsibility for Provision</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>Project 20 Catchment 6 Retardation Basin, pump station, rising main and culvert drains to service development Analysis Area 4</td>
<td>Drainage</td>
<td>Construction of 5,300 m³ retardation basin, 2.5m deep pump station with a pumping capacity of 34 lit/sec and 195m of 150mm dia rising main. Area of land 9,200 m²</td>
<td>South West Development Precinct Development Plan prospects Analysis Area 5</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>Project 21 Catchment 7 Retardation Basin, pump station, rising main and culvert drains to service development Analysis Area 5</td>
<td>Drainage</td>
<td>Construction of 10,700 m³ retardation basin, 3m deep pump station with a pumping capacity of 33 lit/sec and 380m of 200mm dia rising main. Area of land 11,300 m²</td>
<td>South West Development Precinct Development Plan prospects Analysis Area 5</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>Project 22 Development of Ken Harrison Reserve and purchase and development of POS</td>
<td>Contribution</td>
<td>Funds used to upgrade Ken Harrison Reserve as per Reserve Plan and purchase and development of 2000 m² of POS</td>
<td>Planning Scheme prospects Analysis Areas 1, 2 and 6</td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>Project 23 Cost of preparing infrastructure costs: reports, impact assessment and drainage strategy</td>
<td>Contribution</td>
<td>Costs to cover engagement of consultants for Traffic reports and assistance in preparing DCP</td>
<td>Planning Scheme prospects Analysis Area 1</td>
<td></td>
</tr>
</tbody>
</table>

Note: See Section 5.3 to see the basis of determining which Analysis Area delivers which infrastructure project listed above.

**Payment of Contribution to Project Number No 22 Development of Ken Harrison Reserve and purchase and development of POS.**
South West Development Precinct
Infrastructure Cost Sharing Calculations

The total POS payable for the whole of the Swan Hill South West Development Precinct is $1,109,478 based on Council charging 2.5% POS contribution. As part of the agreed delivery of projects between Analysis Areas (See Section 5.5) it has been agreed that this contribution will be used for the development and upgrade of the Ken Harrison Reserve and the purchase and development of POS shown on the SWDP.

This contribution will be levied as a contribution on land within these analysis areas as follows:

<table>
<thead>
<tr>
<th>Analysis Area</th>
<th>Contribution to Project Z2 - Development of Ken Harrison Reserve and purchase and development of POS</th>
<th>Current Value of Residential Land</th>
<th>Contribution as a % of Current Land Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$818,919</td>
<td>$22,858,219</td>
<td>3.58%</td>
</tr>
<tr>
<td>2</td>
<td>$40,559</td>
<td>$3,075,535</td>
<td>1.38%</td>
</tr>
<tr>
<td>6</td>
<td>$250,000</td>
<td>$6,031,308</td>
<td>4.13%</td>
</tr>
</tbody>
</table>

The landowners/developers of land within each of the analysis areas listed in the above table will be required to make their contribution to Project Z2 based on the value of the residential land developed multiplied by the % contribution listed in Column headed “Contribution as a % of Residential Land Value” in the above table.
Map 3 Location of Infrastructure Projects to be Provided
5. **METHOD OF DETERMINING ALLOCATION OF THE DELIVERY OF INFRASTRUCTURE PROJECTS.**

The determination of a fair and equitable allocation of the delivery of infrastructure projects is based on the following methodology:

1. Determination of analysis areas
2. Determination of the area of residential development
3. Determination of catchment areas for each infrastructure project and the external usage.
4. Calculation of infrastructure cost sharing
5. Determination delivery of projects.
6. Determination of the cost sharing within sub-precincts (Analysis Areas)

5.1 **Determination of Analysis Areas**

Six analysis areas were identified based on the ability of each of these areas to be developed independently of each other having regard for land parcel boundaries, access to the existing road network and potential access to a drainage basin or outlet.

Map 4 shows the boundaries of the adopted analysis areas.
5.2 Determination of Area of Residential Development

The adopted average lot density for the SWDP is 10.5 dwellings per hectare. Table 4 shows the estimated lot yield for each analysis area.

<table>
<thead>
<tr>
<th>Analysis Area</th>
<th>Area in hectares</th>
<th>Area for drainage and other purposes</th>
<th>Residential Area</th>
<th>Estimated Lot Yield</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1230.40</td>
<td>8.75</td>
<td>114.29</td>
<td>1200</td>
</tr>
<tr>
<td>2</td>
<td>153.83</td>
<td>0.00</td>
<td>16.24</td>
<td>172</td>
</tr>
<tr>
<td>3</td>
<td>183.26</td>
<td>3.03</td>
<td>15.30</td>
<td>161</td>
</tr>
<tr>
<td>4</td>
<td>99.75</td>
<td>0.92</td>
<td>9.05</td>
<td>95</td>
</tr>
<tr>
<td>5</td>
<td>250.75</td>
<td>1.25</td>
<td>22.56</td>
<td>241</td>
</tr>
<tr>
<td>6</td>
<td>309.60</td>
<td>0.80</td>
<td>30.16</td>
<td>317</td>
</tr>
<tr>
<td>Total</td>
<td>2227.58</td>
<td>14.75</td>
<td>208.01</td>
<td>2184</td>
</tr>
</tbody>
</table>
5.3 Determination of catchment areas for each infrastructure project and external usage.

The catchment boundaries for each infrastructure project have been determined by the traffic impact assessment and the drainage strategy.

This information is summarised in Table 5 Catchment Boundaries and External Benefitting Landowners.

<table>
<thead>
<tr>
<th>Project Number</th>
<th>Description of Project</th>
<th>External landowners that benefit</th>
<th>Reasons relating to external benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-5</td>
<td>Collector Streets—Link Roads No 1, 2, 3, 4 and 5</td>
<td>Nil</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Feldtmann Lane Construction and the remainder of Link Road 6</td>
<td>Nil</td>
<td>The landowner to the east of Feldtmann Lane has direct access to Gray Street and the volume of traffic attributable to this single property is negligible compared to the traffic being generated from within the SWDP.</td>
</tr>
<tr>
<td>7</td>
<td>Collector Street – Link 7</td>
<td>Nil</td>
<td>No external benefit is applicable as this link is wholly contained within the bounds of the SWDP.</td>
</tr>
<tr>
<td>8</td>
<td>Roundabout Coronation Avenue and Collector Street Intersection 3</td>
<td>Nil</td>
<td>The roundabout is triggered by the development and would not be needed without the development and therefore no external benefit is applicable</td>
</tr>
<tr>
<td>9</td>
<td>Roundabout Yuna Street and Collector Street, Intersection 4</td>
<td>Nil</td>
<td>The roundabout is triggered by the development and would not be needed without the development and therefore no external benefit is applicable</td>
</tr>
<tr>
<td>10</td>
<td>Internal Road Analysis Area 2 to Gray Street Intersection 6</td>
<td>Nil</td>
<td>Works created by the development within Analysis Area 2</td>
</tr>
<tr>
<td>11</td>
<td>Intersection of Gray Street and Feldtmann Lane Intersection 7</td>
<td>Nil</td>
<td>Works created by the development within the bounds of the SWDP.</td>
</tr>
<tr>
<td>12</td>
<td>New Access Point to Swan Hill Sea Lake</td>
<td>Nil</td>
<td>Works created by the development within the bounds of</td>
</tr>
<tr>
<td>Project Number</td>
<td>Description of Project</td>
<td>External landowners that benefit</td>
<td>Reasons relating to external benefit</td>
</tr>
<tr>
<td>----------------</td>
<td>------------------------</td>
<td>----------------------------------</td>
<td>-------------------------------------</td>
</tr>
<tr>
<td>13-14</td>
<td>Road Intersection 10</td>
<td>Nil</td>
<td>Works created by the development within the bounds of the SWDP</td>
</tr>
<tr>
<td>15-21</td>
<td>Internal roundabouts</td>
<td>Nil</td>
<td>Works created by the development within the bounds of the SWDP</td>
</tr>
<tr>
<td>22</td>
<td>Drainage related projects</td>
<td>Nil</td>
<td>There are no catchments external to the SWDP which contribute runoff to the drainage infrastructure to be provided as per the detail in the drainage strategy</td>
</tr>
<tr>
<td>23</td>
<td>Development of Ken Harrison Reserve and purchase and development of POS</td>
<td>Nil</td>
<td>There is no external contribution required for this project to be funded from landowners within the SWDP</td>
</tr>
<tr>
<td>23</td>
<td>Cost of preparing the scheme</td>
<td>Nil</td>
<td>To be funded from landowners within the SWDP</td>
</tr>
</tbody>
</table>
5.4 Calculation of Infrastructure Cost Sharing

The number and type of infrastructure projects to be provided are quite varied and therefore the method of determining which analysis area delivers that infrastructure will need to vary depending on the type of infrastructure to be provided.

Table 6 lists the different type of infrastructure to be provided and the method used to determine the cost apportionment to benefitting landowners which then is used to determine which Analysis Area will be required to provide the various items of infrastructure.

<table>
<thead>
<tr>
<th>Type of Infrastructure</th>
<th>Basis of Cost Apportionment</th>
</tr>
</thead>
</table>
| Construction of the difference between Access Streets and Collector Streets and the additional land required for the Collector Streets to be built on | The traffic engineer who was engaged by Council to carry out the Traffic Impact Assessment for the development, then determined the amount of traffic generated by each land parcel within the development and assigned the amount of traffic using each portion of the Collector Street based on the following assumptions:  
  - Residential density: Approximately 105 households per ha (2184 lots in total)  
  - Residential traffic generation:  
    - Daily: 10 vtr/household/day  
    - Peak hour: 1 hrs/household/hr  
    - Peak hour: "Peak hour": 20% "Out": 80%  
    - PM Peak hour: "In": 60% "Out": 40%  
  - Trip purposes:  
    - Internal: 6%  
    - External: 94%  
    - Work: 25.6%  
    - School: 11.4%  
    - Shopping: 34.2%  
    - Other: 23.8%  
  - From these assumptions a general trip distribution was able to be established and modelled which was then used to predict the daily traffic volumes using the Collector Streets and thereby give a basis for apportioning the cost for these projects against each analysis area. |
| Drainage Infrastructure | The cost apportionment for all retention basins, pump stations, rising mains, and outfall works and structures is based on the equivalent area (Co-efficient of run-off multiplied by area contributing) for each catchment area. The cost is then apportioned to each analysis area within the drainage catchment in proportion to the equivalent area they contribute. |
| POS contribution | Is a straight levy of 2.5% of the value of the residential land parcel. |
| Cost of preparing ISC | is based on the proportion of area of land parcel compared to the total area of land within the ISC. |
South West Development Precinct
Infrastructure Cost Sharing Calculations

Using the methods for cost apportionment listed in Table 4 the total contribution payable for each analysis area is able to be determined. This will be used to determine which Analysis Area will be allocated the delivery of each item of infrastructure.
<table>
<thead>
<tr>
<th>Project Number</th>
<th>Description of Project</th>
<th>Area 1</th>
<th>Area 2</th>
<th>Area 3</th>
<th>Area 4</th>
<th>Area 5</th>
<th>Area 6</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Project 1, Link Road 1</td>
<td>50</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>50</td>
</tr>
<tr>
<td>2</td>
<td>Project 2, Link Road 2</td>
<td>0</td>
<td>50</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>50</td>
</tr>
<tr>
<td>3</td>
<td>Project 3, Link Road 3</td>
<td>0</td>
<td>0</td>
<td>50</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>50</td>
</tr>
<tr>
<td>4</td>
<td>Project 4, Link Road 4</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>50</td>
<td>0</td>
<td>0</td>
<td>50</td>
</tr>
<tr>
<td>5</td>
<td>Project 5, Link Road 5</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>50</td>
<td>0</td>
<td>50</td>
</tr>
<tr>
<td>6</td>
<td>Project 6, Link Road 6</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>7</td>
<td>Project 7, Link Road 7</td>
<td>50</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>50</td>
</tr>
<tr>
<td>8</td>
<td>Project 8, Roundabout</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>9</td>
<td>Project 9, Roundabout</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>10</td>
<td>Project 10, Roundabout</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>11</td>
<td>Project 11, Intersection</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>12</td>
<td>Project 12, Intersection</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>50</td>
<td>50</td>
</tr>
</tbody>
</table>

Table 7: Allocation of Cost

The Spall Hill sage project is allocated the following costs: 6 projects are included in Table 7.
<table>
<thead>
<tr>
<th>Project #</th>
<th>Description</th>
<th>Analysis Type</th>
<th>Amount</th>
<th>Analysis 1</th>
<th>Analysis 2</th>
<th>Analysis 3</th>
<th>Analysis 4</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Project 1: Calculations</td>
<td>Analysis 1</td>
<td>$2,826,000</td>
<td>$2,826,000</td>
<td>$2,826,000</td>
<td>$2,826,000</td>
<td>$2,826,000</td>
<td>$11,304,000</td>
</tr>
<tr>
<td>2</td>
<td>Project 2: Calculations</td>
<td>Analysis 2</td>
<td>$2,826,000</td>
<td>$2,826,000</td>
<td>$2,826,000</td>
<td>$2,826,000</td>
<td>$2,826,000</td>
<td>$11,304,000</td>
</tr>
<tr>
<td>3</td>
<td>Project 3: Calculations</td>
<td>Analysis 3</td>
<td>$2,826,000</td>
<td>$2,826,000</td>
<td>$2,826,000</td>
<td>$2,826,000</td>
<td>$2,826,000</td>
<td>$11,304,000</td>
</tr>
<tr>
<td>4</td>
<td>Project 4: Calculations</td>
<td>Analysis 4</td>
<td>$2,826,000</td>
<td>$2,826,000</td>
<td>$2,826,000</td>
<td>$2,826,000</td>
<td>$2,826,000</td>
<td>$11,304,000</td>
</tr>
</tbody>
</table>

South-West Development Project

Infrastructure Cost Sharing Calculations
<table>
<thead>
<tr>
<th>Project Number</th>
<th>Description of Project</th>
<th>Analysis 1</th>
<th>Analysis 2</th>
<th>Analysis 3</th>
<th>Analysis 4</th>
<th>Analysis 5</th>
<th>Analysis 6</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>8,669,313</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>$8,669,313</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>5,292,000</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>$5,292,000</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>2,109,418</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>$2,109,418</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>3,034,772</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>$3,034,772</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>1,277,409</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>$1,277,409</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>643,435</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>$643,435</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td>31,437</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>$31,437</td>
</tr>
<tr>
<td>8</td>
<td></td>
<td>4,968,559</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>$4,968,559</td>
</tr>
<tr>
<td>9</td>
<td></td>
<td>3,034,772</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>$3,034,772</td>
</tr>
<tr>
<td>10</td>
<td></td>
<td>1,277,409</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>$1,277,409</td>
</tr>
<tr>
<td>11</td>
<td></td>
<td>643,435</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>$643,435</td>
</tr>
<tr>
<td>12</td>
<td></td>
<td>4,968,559</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>$4,968,559</td>
</tr>
<tr>
<td>13</td>
<td></td>
<td>3,034,772</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>$3,034,772</td>
</tr>
<tr>
<td>14</td>
<td></td>
<td>1,277,409</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>$1,277,409</td>
</tr>
<tr>
<td>15</td>
<td></td>
<td>643,435</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>$643,435</td>
</tr>
<tr>
<td>16</td>
<td></td>
<td>4,968,559</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>$4,968,559</td>
</tr>
<tr>
<td>17</td>
<td></td>
<td>3,034,772</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>$3,034,772</td>
</tr>
<tr>
<td>18</td>
<td></td>
<td>1,277,409</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>$1,277,409</td>
</tr>
<tr>
<td>19</td>
<td></td>
<td>643,435</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>$643,435</td>
</tr>
<tr>
<td>20</td>
<td></td>
<td>4,968,559</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>$4,968,559</td>
</tr>
<tr>
<td>21</td>
<td></td>
<td>3,034,772</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>$3,034,772</td>
</tr>
<tr>
<td>22</td>
<td></td>
<td>1,277,409</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>$1,277,409</td>
</tr>
<tr>
<td>23</td>
<td></td>
<td>643,435</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>$643,435</td>
</tr>
<tr>
<td>24</td>
<td></td>
<td>4,968,559</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>$4,968,559</td>
</tr>
</tbody>
</table>

Infastructure Cost Sharing Calculations
South West Development Project

[Attachment 6] Infrastructure Cost Sharing Calculations
5.5 **Determination of the Delivery of Infrastructure Projects**

The purpose of these calculations is to determine a fair and equitable method of allocating the responsibilities of delivering the infrastructure projects listed in these ICSC. This is done by comparing the cost sharing that would have been attributable under a Development Contributions Plan and the costs of delivering the projects listed in this ICSC. Table 8 shows how the allocation of infrastructure projects has been carried out to achieve this aim.
<table>
<thead>
<tr>
<th>Project Number</th>
<th>Project Description</th>
<th>Total Cost (in $)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Project 1U Link Rd 1</td>
<td>50,430,000</td>
</tr>
<tr>
<td>2</td>
<td>Project 1L Link Rd 2</td>
<td>50,420,000</td>
</tr>
<tr>
<td>3</td>
<td>Project 1L Link Rd 3</td>
<td>49,200,000</td>
</tr>
<tr>
<td>4</td>
<td>Project 1L Link Rd 4</td>
<td>51,230,000</td>
</tr>
<tr>
<td>5</td>
<td>Project 1L Link Rd 5</td>
<td>49,200,000</td>
</tr>
<tr>
<td>6</td>
<td>Project 1L Link Rd 6</td>
<td>49,200,000</td>
</tr>
<tr>
<td>7</td>
<td>Project 2U Link Rd 7</td>
<td>52,330,000</td>
</tr>
<tr>
<td>8</td>
<td>Project 3L Link Rd 8</td>
<td>52,330,000</td>
</tr>
<tr>
<td>9</td>
<td>Project 3L Link Rd 9</td>
<td>52,330,000</td>
</tr>
<tr>
<td>10</td>
<td>Project 4U Link Rd 10</td>
<td>52,330,000</td>
</tr>
<tr>
<td>11</td>
<td>Project 4L Link Rd 11</td>
<td>52,330,000</td>
</tr>
<tr>
<td>12</td>
<td>Project 4L Link Rd 12</td>
<td>52,330,000</td>
</tr>
<tr>
<td>13</td>
<td>Project 4L Link Rd 13</td>
<td>52,330,000</td>
</tr>
<tr>
<td>14</td>
<td>Project 4L Link Rd 14</td>
<td>52,330,000</td>
</tr>
<tr>
<td>15</td>
<td>Project 4L Link Rd 15</td>
<td>52,330,000</td>
</tr>
</tbody>
</table>

Table 8: Determination of Delivery of Projects

Infrastructure Cost Sharing Calculations
South West Development District
<table>
<thead>
<tr>
<th>Project</th>
<th>Cost Share</th>
<th>Other Costs</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>$20,000</td>
<td>$8,000</td>
<td>$28,000</td>
</tr>
<tr>
<td>B</td>
<td>$30,000</td>
<td>$5,000</td>
<td>$35,000</td>
</tr>
</tbody>
</table>

Note: Other costs include non-cost shares.
<table>
<thead>
<tr>
<th>Project Number</th>
<th>Project Description</th>
<th>Area 1</th>
<th>Area 2</th>
<th>Area 3</th>
<th>Area 4</th>
<th>Area 5</th>
<th>Area 6</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>5269.84.32</td>
<td></td>
<td>5189.3</td>
<td>5240.88</td>
<td>5240.88</td>
<td>5189.3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5269.84.32</td>
<td></td>
<td>5189.3</td>
<td>5240.88</td>
<td>5240.88</td>
<td>5189.3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5269.84.32</td>
<td></td>
<td>5189.3</td>
<td>5240.88</td>
<td>5240.88</td>
<td>5189.3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5269.84.32</td>
<td></td>
<td>5189.3</td>
<td>5240.88</td>
<td>5240.88</td>
<td>5189.3</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
South West Development Precinct
Infrastructure Cost Sharing Calculations

Table 8 shows that it has not been possible to exactly match the costs using the $173 Agreements as compared to the cost apportioned under a DCP without there being a cash contribution to compensate for differences.

Analysis Area 1 will be required to make a cash contribution to Council as their development proceeds and Council will pay this money over to the landowners in Analysis Areas 4 and 5 as it receives the contributions. This obligation will be included in the $173 agreements that are prepared under clause 7.3 of this report.

5.6 Determination of Land Given Up and Cost Sharing Within Analysis Areas

Table 9 shows the credits for land given up in excess of the proportion of cost attributable to the project which is located on the land. Map 5 shows the location and number of each parcel of land within the boundaries of the SWDP. This allows the landowners who are giving up land to receive compensation located on it to be reimbursed by having the amount they are liable for in the provision of infrastructure within their analysis area reduced by the value of land they have given up.

<table>
<thead>
<tr>
<th>Analysis Area (Sub-precinct Number)</th>
<th>Land Parcel Number</th>
<th>Area of Residential Land</th>
<th>Contribution</th>
<th>Land Contribution</th>
<th>Net Contribution</th>
<th>% of Net Contribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>1,152,867.60</td>
<td>$1,152,867.60</td>
<td>$176,240</td>
<td>$1,329,107.60</td>
<td>12.99%</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>282,891.10</td>
<td>$282,891.10</td>
<td>$88,000</td>
<td>$370,891.10</td>
<td>18.85%</td>
</tr>
<tr>
<td>1</td>
<td>3</td>
<td>38,222.11</td>
<td>$38,222.11</td>
<td>$58,080</td>
<td>$96,304.21</td>
<td>1.97%</td>
</tr>
<tr>
<td>1</td>
<td>4</td>
<td>150,888.45</td>
<td>$150,888.45</td>
<td>$582,800</td>
<td>$733,688.45</td>
<td>6.68%</td>
</tr>
<tr>
<td>1</td>
<td>5</td>
<td>518,795.50</td>
<td>$518,795.50</td>
<td>$1,913,865</td>
<td>$2,432,660.50</td>
<td>59.51%</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>1,428,910.77</td>
<td>$1,428,910.77</td>
<td>$1,082,240</td>
<td>$2,511,150.77</td>
<td>100.00%</td>
</tr>
</tbody>
</table>

Table 9 Determination of Credit for Land Given Up

<table>
<thead>
<tr>
<th>Ken Harrison Reserve</th>
<th>Analysis Area (Sub-precinct Number)</th>
<th>Land Parcel Number</th>
<th>Area of Residential Land</th>
<th>Contribution</th>
<th>Land Contribution</th>
<th>Net Contribution</th>
<th>% of Net Contribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>2</td>
<td>7,349.09</td>
<td>$7,349.09</td>
<td>$25,637</td>
<td>$0</td>
<td>$25,637</td>
<td>5.47%</td>
</tr>
<tr>
<td>12</td>
<td>7</td>
<td>180,840.00</td>
<td>$180,840.00</td>
<td>$0</td>
<td>$180,840.00</td>
<td>$180,840.00</td>
<td>38.55%</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
<td>1,138,084.50</td>
<td>$1,138,084.50</td>
<td>$0</td>
<td>$1,138,084.50</td>
<td>$1,138,084.50</td>
<td>2.79%</td>
</tr>
<tr>
<td>9</td>
<td>8</td>
<td>4,849.73</td>
<td>$4,849.73</td>
<td>$0</td>
<td>$4,849.73</td>
<td>$4,849.73</td>
<td>3.77%</td>
</tr>
<tr>
<td>50</td>
<td>7</td>
<td>70,725.17</td>
<td>$70,725.17</td>
<td>$0</td>
<td>$70,725.17</td>
<td>$70,725.17</td>
<td>46.57%</td>
</tr>
<tr>
<td>29</td>
<td>8</td>
<td>8,600.00</td>
<td>$8,600.00</td>
<td>$0</td>
<td>$8,600.00</td>
<td>$8,600.00</td>
<td>1.84%</td>
</tr>
<tr>
<td>3</td>
<td>30</td>
<td>7,051.00</td>
<td>$7,051.00</td>
<td>$0</td>
<td>$7,051.00</td>
<td>$7,051.00</td>
<td>1.50%</td>
</tr>
<tr>
<td>11</td>
<td>3</td>
<td>109,123.34</td>
<td>$988,972.00</td>
<td>$705,040</td>
<td>$283,932</td>
<td>53.02%</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>3</td>
<td>43,840.91</td>
<td>$251,574.00</td>
<td>$0</td>
<td>$251,574</td>
<td>46.98%</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>12</td>
<td>1,240,547.00</td>
<td>$1,240,547.00</td>
<td>$705,040</td>
<td>$535,507</td>
<td>100.00%</td>
<td></td>
</tr>
</tbody>
</table>

15,826.74 | $468,559 | 0 | $468,559 | 100.00%

28 of 71 Version 1.5 24 June 2004
## South West Development Precinct
### Infrastructure Cost Sharing Calculations

<table>
<thead>
<tr>
<th>Analysis Area (Sub-precinct Number)</th>
<th>Land Parcel Number</th>
<th>Area of Residential Land</th>
<th>Contribution</th>
<th>Credit for Land</th>
<th>Net Contribution</th>
<th>% of Net Contribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 14 121,705.63 1</td>
<td>$1,212,347</td>
<td>$160,000</td>
<td>$1,052,347</td>
<td>42.50%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 15 48,323.10 2</td>
<td>$243,238</td>
<td>$0</td>
<td>$243,238</td>
<td>9.82%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 16 48,100.72 3</td>
<td>$298,584</td>
<td>$0</td>
<td>$298,584</td>
<td>12.06%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 17 8,098.32 4</td>
<td>$108,568</td>
<td>$0</td>
<td>$108,568</td>
<td>4.38%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 18 47,598.42 5</td>
<td>$447,596</td>
<td>$0</td>
<td>$447,596</td>
<td>18.08%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 19 6,157.93 6</td>
<td>$94,886</td>
<td>$0</td>
<td>$94,886</td>
<td>3.93%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 20 8,748.36 7</td>
<td>$69,642</td>
<td>$0</td>
<td>$69,642</td>
<td>2.81%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 21 8,220.32 8</td>
<td>$104,199</td>
<td>$0</td>
<td>$104,199</td>
<td>4.21%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 22 4,642.59 9</td>
<td>$56,891</td>
<td>$0</td>
<td>$56,891</td>
<td>2.30%</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>301,595.39</strong></td>
<td><strong>$2,635,950</strong></td>
<td><strong>$160,000</strong></td>
<td><strong>$2,475,950</strong></td>
<td><strong>100.00%</strong></td>
<td></td>
</tr>
</tbody>
</table>

| 4 23 | $244,944 | $0 | $244,944 | 60.20% |
| 4 24 | $415,348 | $254,400 | $160,948 | 39.80% |
| **Total** | **90,346.17** | **$561,292** | **$254,400** | **$306,892** | **100.00%** |

| 5 25 | $345,239 | $239,390 | $215,849 | 22.48% |
| 5 26 | $303,245 | $187,700 | $115,545 | 12.44% |
| 5 27 | $113,822.73 | $586,383 | $586,383 | 61.00% |
| 5 28 | $8,014.04 | $0 | $8,014.04 | 4.08% |
| **Total** | **279,527.47** | **$313,200** | **$961,204** | **100.00%** |

**Total** | **2,071,470.99** | **$2,514,880** | **$12,807,598** | **100.00%** |
Map 5 Location of Parcels of land within the boundaries of the SWDP.
6. **TIMEFRAME FOR THE PROVISION OF INFRASTRUCTURE PROJECTS**

The timeframe for the provision of infrastructure projects contained in this ICSC is based upon the priorities for development within each Analysis Area. These priorities are as follows:

1. Install pump station, pumps, electrical and rising mains and stage 1 of retardation basin together with the necessary outfall drain to service the first stage the development within an Analysis Area unless temporary drainage infrastructure is permitted to be installed by the Council as per the requirements stated in the Drainage Strategy for the SWDP.
2. Install stage 1 of the Collector Street and relevant intersections to service the development.

All intersections listed in the infrastructure to be provided shall be constructed at the same time the collector street feeding the intersection is constructed.

In the case of Link Road 1 and Intersection 3 these shall be provided upon:

- The completion of Link Road 2, or
- The completion of 50% of the residential land in Analysis Area 2

whichever occurs first.

In the case of Projects 22 and 23 and the cash contribution required to be paid by Analysis Area 1 landowners these will be provided progressively in accordance with the proportion of land developed within the respective Analysis Areas which have been allocated these projects to deliver.

In the case of the cash contributions made by the landowners of Analysis Area 1 (only those signing the s173 agreement under clause 7.3.2 of this report), these will be paid to Council who will pay that contribution to landowners of Analysis Area 4 and Analysis Area 5 who sign the s173 agreement under Clause 7.3.3 of this report for the cost sharing of infrastructure in accordance with the following percentages:

- **Analysis Area 4 amount to be reimbursed:** $157,708 (40.2%)
- **Analysis Area 5 amount to be reimbursed:** $234,296 (59.80%)

**Total Amount to be contributed by Analysis Area 1 landowners:** $392,303
7. **PROCEDURAL MATTERS**

7.1 **Rise and Fall**

Project 23 the cost of the preparing this ICSC is as at 30 June 2014. This cost will be adjusted annually on 1 July each year to adjust for the rise and fall in prices using the Melbourne All Groups Consumer Price Index ("CPI").

The rise and fall clause will also apply to the cash contribution that Analysis Area 1 is required to make under clause 5.5 of this report.

7.2 **Terminology**

The term Analysis Area whilst useful for determining the cost sharing of infrastructure provision is not suitable for use in the Schedule to the DPO6 Development Plan Overlay to the Swan Hill Planning Scheme and therefore the S173 Agreements which are called up in that schedule use the term sub-precinct which has been used in these documents to replace Analysis Area.

7.3 **Section 173 Agreements**

The delivery of infrastructure projects allocated to particular sub-precincts (Analysis Areas) will be governed by a number of s173 Agreements entered between Council and Landowners to cover the delivery, standard, cost sharing and pre-requisites for development within any sub-precinct (Analysis Area).

All agreements must be prepared in consultation with and the satisfaction of, and at no cost to Swan Hill Rural City Council.

The details of the various s173 agreements is shown below

7.3.1 **Section 173 Agreements for the Delivery of Infrastructure Projects**

A signed and registered agreement pursuant to section 173 of the Planning and Environment Act 1987 between Swan Hill Rural City Council and the landowners within the sub-precinct for the provision of infrastructure to serve the land within the South West Development Precinct.

This agreement will specify the infrastructure that is to be provided by the landowners within the sub-precinct in their fair and equitable contribution to the provision of infrastructure serving the whole of the South West Development Precinct. As a result of this agreement landowners within the sub-precinct will not be required to make contributions to the provision of infrastructure in other sub-precincts other than the common infrastructure covered by any s173 Agreement listed in Clause 7.3.2

There will be 6 separate section 173 agreements (i.e. one for each sub-precinct).

Each agreement will be required to be signed by all the landowners within that sub-precinct.
South West Development Precinct
Infrastructure Cost Sharing Calculations

This agreement must be signed and registered at the Titles Office before the Council will amend the Swan Hill Planning Scheme to give effect to the SWDP.

7.3.2 Section 173 Agreement for Infrastructure jointly provided by more than one sub-precinct
A signed and registered agreement pursuant to section 173 of the Planning and Environment Act 1987 between Swan Hill Rural City Council and the landowners within all the sub-precincts that are to jointly provide infrastructure.

This agreement will specify the infrastructure that is to be jointly provided by the landowners of more than one sub-precinct as their fair and equitable contribution to the provision of infrastructure serving the whole of the South West Development Precinct.

This clause relates to the provision of Project 18: Catchment 4 Retardation Basin, pump station, rising main and outfall drains to service all of sub-precinct 3 and parts of sub-precincts 1 and 4.

This agreement must be signed and registered at the Titles Office before the Council will amend the Swan Hill Planning Scheme to give effect to the SWDP.

7.3.3 Section 173 Agreement for the cost sharing of infrastructure within a sub-precinct
A signed and registered agreement pursuant to section 173 of the Planning and Environment Act 1987 between Swan Hill Rural City Council and the landowners of the sub-precinct and any landowner on whose land the infrastructure to be provided by the sub-precinct, is located upon.

This agreement is to specify that the landowners party to this agreement will pay 100% of the cost of providing the infrastructure that has been allocated to be provided by the by the landowners within the sub-precinct.

The agreement must provide that the signatories to this agreement must meet all of the obligations of the Owner listed in the Section 173 agreements listed in Clause 7.3.1 and 7.3.3.

This agreement must be signed and registered at the Titles Office before develop can commence in a sub-precinct.
South West Development Precinct
Infrastructure Cost Sharing Calculations

Appendix A Engineers Estimates for Infrastructure Projects.

Project No 16 Link Road
Construction.
Determine cost for typical length and use this to determine unit rate for all the link road projects.

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Quantity</th>
<th>Unit</th>
<th>Rate</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Setout and project administration</td>
<td>1000</td>
<td>m</td>
<td>2</td>
<td>$2,000</td>
</tr>
<tr>
<td>2</td>
<td>Topsoil removal and stockpiling</td>
<td>3700</td>
<td>m³</td>
<td>0.75</td>
<td>$2,775</td>
</tr>
<tr>
<td>3</td>
<td>Earthworks</td>
<td>2072</td>
<td>m³</td>
<td></td>
<td>$12,432</td>
</tr>
<tr>
<td>4</td>
<td>Pavement</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4a</td>
<td>Supply and delivery of base wetmix of Class 2 crushed rock</td>
<td>1221</td>
<td>Tonnes</td>
<td>30.25</td>
<td>$36,935</td>
</tr>
<tr>
<td>4b</td>
<td>Supply and delivery of subbase wetmix of Class 3 crushed rock</td>
<td>1221</td>
<td>Tonnes</td>
<td>25.54</td>
<td>$32,405</td>
</tr>
<tr>
<td>4c</td>
<td>Placement and compaction of crushed rock</td>
<td>3700</td>
<td>m³</td>
<td>1.6</td>
<td>$5,920</td>
</tr>
<tr>
<td>4d</td>
<td>Preparation for sealing</td>
<td>3700</td>
<td>m³</td>
<td>3.5</td>
<td>$12,950</td>
</tr>
<tr>
<td>5</td>
<td>Supply and placement of Asphalt</td>
<td>3700</td>
<td>m³</td>
<td>36.62</td>
<td>$136,234</td>
</tr>
<tr>
<td>6</td>
<td>Construction of additional footpath width to make shared path</td>
<td>24800</td>
<td>m³</td>
<td>85</td>
<td>$170,000</td>
</tr>
<tr>
<td>6</td>
<td>Linemarking</td>
<td>1500</td>
<td>m</td>
<td>1</td>
<td>$1,000</td>
</tr>
<tr>
<td>7</td>
<td>Land acquisition</td>
<td>8000</td>
<td>m³</td>
<td>20</td>
<td>$160,000</td>
</tr>
</tbody>
</table>

Subtotal                             $572,652
15% Contingency                       $85,898
Total                                 $658,549
SAY                                   $659,000

Assumptions:
No site establishment as this would be done as part of Access St
1. Component uses estimate based on a unit length
2. For example, Shared path required on both sides of collector streets.

Calculation of quantities

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Length of road</td>
<td>1000</td>
<td>m</td>
</tr>
<tr>
<td>Additional width of pavement</td>
<td>3.7</td>
<td>m</td>
</tr>
<tr>
<td>Depth of pavement</td>
<td>0.3</td>
<td>m</td>
</tr>
<tr>
<td>Volume of pavement material (solid)</td>
<td>1110</td>
<td></td>
</tr>
<tr>
<td>Quantity of crushed rock</td>
<td>2442</td>
<td>tonnes</td>
</tr>
</tbody>
</table>

Consultation Draft 34 of 71
Version 1.5 24 June 2004
### South West Development Precinct
**Infrastructure Cost Sharing Calculations**

<table>
<thead>
<tr>
<th>Description</th>
<th>Quantity/Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quantity of Class 2 base</td>
<td>1221 tonnes</td>
</tr>
<tr>
<td>Quantity of Class 3 Sub base</td>
<td>1221 tonnes</td>
</tr>
<tr>
<td>Area of asphalt</td>
<td>3700 m³</td>
</tr>
<tr>
<td>Supply of Class 2 wetmix ex bin</td>
<td>23.8 $/tonne</td>
</tr>
<tr>
<td>Supply of Class 3 wetmix ex bin</td>
<td>20.09 $/tonne</td>
</tr>
<tr>
<td>Cartage from Lake Boga Quarries to Swan Hill</td>
<td>6.45 $/tonne</td>
</tr>
<tr>
<td>Depth of excavation for pavement</td>
<td>0.4 m</td>
</tr>
<tr>
<td>Volume of excavation (solid)</td>
<td>1480 m³</td>
</tr>
<tr>
<td>Volume of excavation (loose)</td>
<td>2072 m³</td>
</tr>
<tr>
<td>Width of additional road reserve</td>
<td>8 m</td>
</tr>
<tr>
<td>Area of additional land</td>
<td>8000 m²</td>
</tr>
<tr>
<td>Length of shared path</td>
<td>2000 m</td>
</tr>
<tr>
<td>Additional width of path</td>
<td>1 m</td>
</tr>
</tbody>
</table>

### Link Roads

<table>
<thead>
<tr>
<th>Link Roads</th>
<th>Length as at 15 April</th>
<th>Estimated Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project 1 Link Road 1 Communication Avenue to GMW Channel</td>
<td>395</td>
<td>$261,000</td>
</tr>
<tr>
<td>Project 2 Link Road 2 GMW Channel to Tana Street</td>
<td>441</td>
<td>$291,000</td>
</tr>
<tr>
<td>Project 3 Link Road 3 Tana Street to Internal Roundabout</td>
<td>672</td>
<td>$443,000</td>
</tr>
<tr>
<td>Project 4 Link Road 4 Internal Roundabout to Deadhorse Lane</td>
<td>636</td>
<td>$420,000</td>
</tr>
<tr>
<td>Project 5 Link Road 6 Feldtmann Lane Construction (Internal)</td>
<td>711</td>
<td>$469,000</td>
</tr>
<tr>
<td>Project 6 Link Road 6 Feldtmann Lane (See Project 7)</td>
<td>249.6</td>
<td>$165,000</td>
</tr>
<tr>
<td>Project 6 Link Road 6 Feldtmann Lane (See Project 7)</td>
<td>267.4</td>
<td>$520,000</td>
</tr>
<tr>
<td>Project 7 From Internal T intersection to Swan Hill Sea Lake Road</td>
<td>808</td>
<td>$533,000</td>
</tr>
<tr>
<td>Check</td>
<td>1000</td>
<td>$659,000</td>
</tr>
<tr>
<td>-------</td>
<td>------</td>
<td>----------</td>
</tr>
<tr>
<td>Project 7 (2)</td>
<td>697</td>
<td>$460,000</td>
</tr>
</tbody>
</table>

South West Development Precinct Infrastructure Cost Sharing Calculations
<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Quantity</th>
<th>Unit</th>
<th>Rate</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Set out and project administration</td>
<td></td>
<td>Item</td>
<td></td>
<td>$4,000</td>
</tr>
<tr>
<td>2</td>
<td>Topsoil removal and stockpiling</td>
<td>2980.96</td>
<td>m²</td>
<td>0.875</td>
<td>$2,608</td>
</tr>
<tr>
<td>3</td>
<td>Traffic control</td>
<td>267.4</td>
<td>m</td>
<td>10</td>
<td>$2,674</td>
</tr>
<tr>
<td>4</td>
<td>Earthworks</td>
<td>1669.3376</td>
<td>m³</td>
<td>74</td>
<td>$11,685</td>
</tr>
<tr>
<td>5</td>
<td>Pavement</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5a</td>
<td>Supply and delivery of base wetmix of Class 2 crushed rock</td>
<td>1076.5524</td>
<td>Tones</td>
<td>58.75</td>
<td>$62,556</td>
</tr>
<tr>
<td>5b</td>
<td>Supply and delivery of subbase wetmix of Class 3 crushed rock</td>
<td>1076.5524</td>
<td>Tones</td>
<td>58.75</td>
<td>$62,572</td>
</tr>
<tr>
<td>5c</td>
<td>Placement and compaction of crushed rock</td>
<td>2980.96</td>
<td>m²</td>
<td>1.6</td>
<td>$4,770</td>
</tr>
<tr>
<td>5d</td>
<td>Preparation for sealing</td>
<td>2980.96</td>
<td>m²</td>
<td>4</td>
<td>$11,924</td>
</tr>
<tr>
<td>6</td>
<td>Kerb and channel supply and lay</td>
<td>534.8</td>
<td>m</td>
<td>90</td>
<td>$48,132</td>
</tr>
<tr>
<td>7</td>
<td>Supply and lay 375mm dia underground drainage</td>
<td>30.0</td>
<td>m</td>
<td>115</td>
<td>$25,300</td>
</tr>
<tr>
<td>8</td>
<td>SEP</td>
<td>9/26</td>
<td>%</td>
<td></td>
<td>$12,000</td>
</tr>
<tr>
<td>9</td>
<td>Supply and placement of Asphalt</td>
<td>2980.96</td>
<td>m²</td>
<td>36.82</td>
<td>$109,759</td>
</tr>
<tr>
<td>10</td>
<td>Construction of shared path</td>
<td>267.4</td>
<td>m</td>
<td>5</td>
<td>$11,645</td>
</tr>
<tr>
<td>11</td>
<td>Linemarking and road furniture</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Land acquisition</td>
<td>2/136.2</td>
<td>m³</td>
<td>20</td>
<td>$42,784</td>
</tr>
</tbody>
</table>

**Subtotal** $451,755

**15% Contingency** $67,763

**Total** $519,519

**SAY** $520,000

**Assumptions**

No site preparation as this would be done as part of Access

1. Streets

Shared path required on both sides of streets

**Calculation of quantities**

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length of road</td>
<td>367.4 m</td>
</tr>
<tr>
<td>Area of seal</td>
<td>2980.96 m²</td>
</tr>
<tr>
<td>Width of pavement</td>
<td>12.2 m</td>
</tr>
<tr>
<td>Depth of pavement</td>
<td>0.3 m</td>
</tr>
<tr>
<td>Volume of pavement material (solid)</td>
<td>378.684 m³</td>
</tr>
<tr>
<td>Quantity of crushed rock</td>
<td>2153.1048 tonnes</td>
</tr>
<tr>
<td>Quantity of Class 2 base</td>
<td>1076.5524 tonnes</td>
</tr>
<tr>
<td>Quantity of Class 3 Sub base</td>
<td>1076.5524 tonnes</td>
</tr>
<tr>
<td>Description</td>
<td>Value</td>
</tr>
<tr>
<td>--------------------------------------------------------------</td>
<td>-------------</td>
</tr>
<tr>
<td>Area of asphalt</td>
<td>2980.96 m²</td>
</tr>
<tr>
<td>Supply of Class 2 wet mix ex bin</td>
<td>$22.8/tonne</td>
</tr>
<tr>
<td>Supply of Class 3 wet mix ex bin</td>
<td>$30.09/tonne</td>
</tr>
<tr>
<td>Cartage from Lake Boga Quarries to Swan Hill</td>
<td>$6.45/tonne</td>
</tr>
<tr>
<td>Depth of excavation for pavement</td>
<td>0.4 m</td>
</tr>
<tr>
<td>Volume of excavation (solid)</td>
<td>1192.384 m³</td>
</tr>
<tr>
<td>Volume of excavation (loose)</td>
<td>1659.3376 m³</td>
</tr>
<tr>
<td>Length of kerb and channel</td>
<td>534.8 m</td>
</tr>
<tr>
<td>Width of additional road reserve</td>
<td>8 m</td>
</tr>
<tr>
<td>Area of additional land</td>
<td>2139.2 m²</td>
</tr>
<tr>
<td>Length of shared path</td>
<td>534.8 m</td>
</tr>
<tr>
<td>Width of path</td>
<td>2.5 m</td>
</tr>
</tbody>
</table>
### South West Development Precinct
**Infrastructure Cost Sharing Calculations**

**Project No 8, 9, 13 and 14 Typical Roundabout Construction.**

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Quantity</th>
<th>Unit</th>
<th>Rate</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Set out and project administration</td>
<td></td>
<td></td>
<td></td>
<td>$4,000</td>
</tr>
<tr>
<td>2</td>
<td>Topsoil removal and stockpiling</td>
<td>1700</td>
<td>m³</td>
<td>1,875</td>
<td>$3,188</td>
</tr>
<tr>
<td>3</td>
<td>Traffic control</td>
<td></td>
<td></td>
<td></td>
<td>$5,000</td>
</tr>
<tr>
<td>4</td>
<td>Earthworks</td>
<td>1028.16</td>
<td>m³</td>
<td>15</td>
<td>$15,422</td>
</tr>
<tr>
<td>5</td>
<td>Pavement</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5a</td>
<td>Supply and delivery of base wetmix of Class 2 crushed rock</td>
<td>561</td>
<td>Tonne</td>
<td>30</td>
<td>$16,970</td>
</tr>
<tr>
<td>5b</td>
<td>Supply and delivery of subbase wetmix of Class 3 crushed rock</td>
<td>561</td>
<td>Tonne</td>
<td>26.54</td>
<td>$14,889</td>
</tr>
<tr>
<td>5c</td>
<td>Placement and compaction of crushed rock</td>
<td>1700</td>
<td>m³</td>
<td></td>
<td>$17,000</td>
</tr>
<tr>
<td>5d</td>
<td>Preparation for sealing</td>
<td>1700</td>
<td>m³</td>
<td>8</td>
<td>$13,600</td>
</tr>
<tr>
<td>6</td>
<td>Kerb and channel and traffic islands supply and lay</td>
<td>262</td>
<td>m</td>
<td>150</td>
<td>$39,300</td>
</tr>
<tr>
<td>7</td>
<td>Supply and lay 275mm dia underground drainage</td>
<td>54</td>
<td>m</td>
<td>115</td>
<td>$5,750</td>
</tr>
<tr>
<td>8</td>
<td>SEP</td>
<td>50</td>
<td>No</td>
<td>2000</td>
<td>$12,000</td>
</tr>
<tr>
<td>9</td>
<td>Supply and placement of Asphalt</td>
<td>1700</td>
<td>m</td>
<td>36.82</td>
<td>$62,594</td>
</tr>
<tr>
<td>10</td>
<td>Construction of kerb ramps</td>
<td>50</td>
<td>m</td>
<td>150</td>
<td>$9,000</td>
</tr>
<tr>
<td>11</td>
<td>Construction of central concrete rail</td>
<td>50</td>
<td>m²</td>
<td>85</td>
<td>$2,553</td>
</tr>
<tr>
<td>12</td>
<td>Street lighting</td>
<td></td>
<td></td>
<td></td>
<td>$15,000</td>
</tr>
<tr>
<td>13</td>
<td>Linemarking and road furniture</td>
<td></td>
<td></td>
<td></td>
<td>$4,000</td>
</tr>
<tr>
<td>14</td>
<td>Landscaping and reinforcement</td>
<td></td>
<td></td>
<td></td>
<td>$3,000</td>
</tr>
<tr>
<td></td>
<td>Allowance for Service Anewton</td>
<td></td>
<td></td>
<td></td>
<td>$15,000</td>
</tr>
</tbody>
</table>

**Subtotal**  
$250,003

15% Contingency  
$38,739

**Total**  
$288,742

**SA**  
$298,000

**Submissions**  
No site establishment as this would be done as part of Access St component
1. Shared path would be part of Collector
2. Street costs
   Based on McCrae Street/High Street
3. Roundabout costs

---

*Consultation Draft*
### Calculation of Quantities

<table>
<thead>
<tr>
<th>Description</th>
<th>Unit</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length of road</td>
<td>m</td>
<td>1700</td>
</tr>
<tr>
<td>Area of seal</td>
<td>m²</td>
<td>510</td>
</tr>
<tr>
<td>Width of pavement</td>
<td>m</td>
<td></td>
</tr>
<tr>
<td>Depth of pavement</td>
<td>m</td>
<td>0.3</td>
</tr>
<tr>
<td>Volume of pavement material (solid)</td>
<td></td>
<td>510</td>
</tr>
<tr>
<td>Quantity of crushrock rock</td>
<td>tonnes</td>
<td>1122</td>
</tr>
<tr>
<td>Quantity of Class 2 base</td>
<td>tonnes</td>
<td>561</td>
</tr>
<tr>
<td>Quantity of Class 3 Sub base</td>
<td>tonnes</td>
<td>561</td>
</tr>
<tr>
<td>Area of asphalt</td>
<td>m²</td>
<td>1700</td>
</tr>
<tr>
<td>Supply of Class 2 wetmix ex bin</td>
<td>$/tonne</td>
<td>23.8</td>
</tr>
<tr>
<td>Supply of Class 3 wetmix ex bin</td>
<td>$/tonne</td>
<td>20.09</td>
</tr>
<tr>
<td>Carriage from Lake Boga Quarries to Swan Hill</td>
<td>$/tonne</td>
<td>6.45</td>
</tr>
<tr>
<td>Depth of excavation for pavement</td>
<td>m</td>
<td>0.4</td>
</tr>
<tr>
<td>Volume of excavation (solid)</td>
<td>m³</td>
<td>734.4</td>
</tr>
<tr>
<td>Volume of excavation (loose)</td>
<td>m³</td>
<td>428.19</td>
</tr>
<tr>
<td>Length of kerb and channel</td>
<td>m</td>
<td>1361</td>
</tr>
<tr>
<td>Width of additional road reserve</td>
<td></td>
<td>8</td>
</tr>
<tr>
<td>Area of additional land</td>
<td>m²</td>
<td></td>
</tr>
<tr>
<td>Length of shared path</td>
<td>m</td>
<td>0</td>
</tr>
<tr>
<td>Width of path</td>
<td>m</td>
<td>2.5</td>
</tr>
<tr>
<td>Diameter of central median</td>
<td>m</td>
<td>15.6</td>
</tr>
</tbody>
</table>

### Cost Estimate of Standard Roundabout in SW Development

**Costing date: 09/04/2014**

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Description of Work</th>
<th>Unit</th>
<th>Quantity</th>
<th>Rate</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>LUMP SUM ITEMS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>EARTH WORKS/SITE CLEARANCE</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.1</td>
<td>Excavation and subgrade profile</td>
<td>m²</td>
<td>1,572.00</td>
<td>$5.00</td>
<td>$7,860.00</td>
</tr>
<tr>
<td>2</td>
<td>REMOVAL DISPOSAL ACESS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.1</td>
<td>Removal of kerb and channel</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Section</td>
<td>Description</td>
<td>Unit</td>
<td>Quantity</td>
<td>Cost 1</td>
<td>Cost 2</td>
</tr>
<tr>
<td>---------</td>
<td>-------------</td>
<td>------</td>
<td>----------</td>
<td>--------</td>
<td>--------</td>
</tr>
<tr>
<td>2.2</td>
<td>Removal of footpath and kerb crossings</td>
<td>item</td>
<td>1.00</td>
<td>$3,000.00</td>
<td>$3,000.00</td>
</tr>
<tr>
<td>3</td>
<td>ROAD PAVEMENT</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.3</td>
<td>Compaction of subgrade</td>
<td>m$^2$</td>
<td>1572.00</td>
<td>$10.00</td>
<td>$15,720.00</td>
</tr>
<tr>
<td>3.4</td>
<td>Supply lay compact class 3 crushed rock</td>
<td>m$^2$</td>
<td>1437.00</td>
<td>$17.00</td>
<td>$24,499.00</td>
</tr>
<tr>
<td>3.5</td>
<td>Supply lay compact class 2 crushed rock</td>
<td>m$^2$</td>
<td>1437.00</td>
<td>$23.00</td>
<td>$33,051.00</td>
</tr>
<tr>
<td>4</td>
<td>ASPHALT WORKS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.1</td>
<td>Supply lay and compact 10mm Type V asphalt (inc primer)</td>
<td>m$^2$</td>
<td>1376.00</td>
<td>$40.00</td>
<td>$55,040.00</td>
</tr>
<tr>
<td>5</td>
<td>CONCRETE WORKS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.1</td>
<td>Kerb and Channel SM1</td>
<td>L$m$</td>
<td>198.00</td>
<td>$100.00</td>
<td>$19,800.00</td>
</tr>
<tr>
<td>5.2</td>
<td>Kerb and Channel SM2</td>
<td>L$m$</td>
<td>120.00</td>
<td>$120.00</td>
<td>$14,400.00</td>
</tr>
<tr>
<td>6</td>
<td>FOOTPATH</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.1</td>
<td>Footpath</td>
<td>m$^2$</td>
<td>156.00</td>
<td>$50.00</td>
<td>$7,800.00</td>
</tr>
<tr>
<td>6.2</td>
<td>Kerb Ramps</td>
<td>item</td>
<td>200</td>
<td>$1,500.00</td>
<td>$30,000.00</td>
</tr>
<tr>
<td>6.3</td>
<td>Supply install &amp; repair kerbs</td>
<td>item</td>
<td>1,000</td>
<td>$1,500.00</td>
<td>$12,000.00</td>
</tr>
<tr>
<td>7</td>
<td>MEDIAN ISLANDS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.1</td>
<td>Construct pedestrian refuge</td>
<td>item</td>
<td>200</td>
<td>$1,500.00</td>
<td>$30,000.00</td>
</tr>
<tr>
<td>8</td>
<td>CENTRAL RING</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.1</td>
<td>Construct concrete infill panels</td>
<td>m$^2$</td>
<td>45.00</td>
<td>$120.00</td>
<td>$5,400.00</td>
</tr>
<tr>
<td>9</td>
<td>DRAINAGE</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.2</td>
<td>Supply and lay 300 mm diameter RCP</td>
<td>L$m$</td>
<td>160.00</td>
<td>$300.00</td>
<td>$48,000.00</td>
</tr>
<tr>
<td>9.3</td>
<td>SEP</td>
<td>item</td>
<td>4.00</td>
<td>$2,500.00</td>
<td>$10,000.00</td>
</tr>
<tr>
<td>9.4</td>
<td>Junction Pit</td>
<td>item</td>
<td>4.00</td>
<td>$3,500.00</td>
<td>$14,000.00</td>
</tr>
<tr>
<td>10</td>
<td>PROVISION OF LIGHTING</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.1</td>
<td>Excavation, supply and laying of concrete protection slabs</td>
<td>item</td>
<td>1.00</td>
<td>$3,500.00</td>
<td>$3,500.00</td>
</tr>
<tr>
<td>10.2</td>
<td>Install underground power cable, pits and install and connect light role</td>
<td>item</td>
<td>1.00</td>
<td>$12,000.00</td>
<td>$12,000.00</td>
</tr>
<tr>
<td>11</td>
<td>TREATMENT OF CENTRAL RING</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.1</td>
<td>Supply and fill central ring 250mm</td>
<td>m$^2$</td>
<td>136.00</td>
<td>$20.00</td>
<td>$2,720.00</td>
</tr>
<tr>
<td>11.2</td>
<td>Supply and fill quarry dust 50mm</td>
<td>m$^2$</td>
<td>136.00</td>
<td>$10.00</td>
<td>$1,360.00</td>
</tr>
<tr>
<td>12</td>
<td>SIGNAGE</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12.1</td>
<td>Supply and install signs</td>
<td>item</td>
<td>1.00</td>
<td>$5,000.00</td>
<td>$5,000.00</td>
</tr>
<tr>
<td>13</td>
<td>TRAFFIC MANAGEMENT</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### South West Development Precinct

**Infrastructure Cost Sharing Calculations**

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Quantity</th>
<th>Unit Cost (Excl GST)</th>
<th>Total Cost (Excl GST)</th>
</tr>
</thead>
<tbody>
<tr>
<td>13.1</td>
<td>Safety measure and Provide traffic management</td>
<td>1.00</td>
<td>$1,000.00</td>
<td>$2,000.00</td>
</tr>
<tr>
<td>14</td>
<td><strong>GENERAL ITEMS</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14.1</td>
<td>Saw-cut existing footpath concrete and road pavement</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14.2</td>
<td>As constructed drawings</td>
<td>1.00</td>
<td>$500.00</td>
<td>$500.00</td>
</tr>
<tr>
<td>14.3</td>
<td>General site reinstatement</td>
<td>1.00</td>
<td>$2,000.00</td>
<td>$2,000.00</td>
</tr>
<tr>
<td>14.4</td>
<td>Costingencies</td>
<td>1.00</td>
<td>$15,000.00</td>
<td>$15,000.00</td>
</tr>
<tr>
<td></td>
<td><strong>Total (Excl GST)</strong></td>
<td></td>
<td></td>
<td>$20,500.00</td>
</tr>
</tbody>
</table>

**Total (GST Excl) = $20,500.00**

---

**Costing References from Projects:**
- High-McCrae Roundabout
- Pritchard St Drainage
- Beveridge St Drainage
- Beveridge St Reconstruction
- CBD Projects
- TGS1s works
## South West Development Precinct
### Infrastructure Cost Sharing Calculations

**Project No 10 Intersection of Analysis Area 2 with Gray Street.**
**Intersection 6**
Construction of left and right turn lanes in internal road plus left turn lane in Gray Street

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Quantity</th>
<th>Unit</th>
<th>Rate</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Set out and project administration</td>
<td></td>
<td>Item</td>
<td>$4,000</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Cutting and removing of herb and channel and relocation of services and drainage pipes</td>
<td>20</td>
<td>m</td>
<td>200</td>
<td>$4,000</td>
</tr>
<tr>
<td>3</td>
<td>Traffic control</td>
<td></td>
<td>Item</td>
<td></td>
<td>$5,000</td>
</tr>
<tr>
<td>4</td>
<td>Earthworks</td>
<td>680</td>
<td>m²</td>
<td>15</td>
<td>$11,280</td>
</tr>
<tr>
<td>5</td>
<td>Pavement</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5a</td>
<td>Supply and delivery of base wetmix of Class 2 crushed rock</td>
<td>374</td>
<td>Tonne</td>
<td>30.25</td>
<td>$11,320</td>
</tr>
<tr>
<td>5b</td>
<td>Supply and delivery of subbase wetmix of Class 3 crushed rock</td>
<td>374</td>
<td>Tonne</td>
<td>26.9</td>
<td>$9,932</td>
</tr>
<tr>
<td>5c</td>
<td>Placement and compaction of crushed rock</td>
<td>1134</td>
<td>m³</td>
<td>10</td>
<td>$11,340</td>
</tr>
<tr>
<td>5d</td>
<td>Preparation for sealing</td>
<td>1134</td>
<td>m³</td>
<td>20</td>
<td>$22,680</td>
</tr>
<tr>
<td>6</td>
<td>Kerb and channel supply and lay</td>
<td>30</td>
<td>m</td>
<td>150</td>
<td>$4,500</td>
</tr>
<tr>
<td>7</td>
<td>Supply and lay 375mm dia underground drainage</td>
<td>50</td>
<td>m</td>
<td>11.5</td>
<td>$5,750</td>
</tr>
<tr>
<td>8</td>
<td>SEP</td>
<td>1</td>
<td>m</td>
<td>2000</td>
<td>$2,000</td>
</tr>
<tr>
<td>9</td>
<td>Supply and placement of Asphalt</td>
<td>124</td>
<td>m³</td>
<td>30.82</td>
<td>$41,754</td>
</tr>
<tr>
<td>10</td>
<td>Street lighting</td>
<td></td>
<td>Item</td>
<td>$15,000</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Purchase of additional kerb for widening at intersection</td>
<td>966</td>
<td>m²</td>
<td>20</td>
<td>$19,320</td>
</tr>
<tr>
<td>12</td>
<td>Linemarking and road furniture</td>
<td></td>
<td>Item</td>
<td>$4,000</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Landscaping and reinstatement</td>
<td></td>
<td>Item</td>
<td>$3,000</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Allowance for Surveyor's attention</td>
<td></td>
<td>Item</td>
<td>$15,000</td>
<td></td>
</tr>
</tbody>
</table>

**Subtotal** | **$188,883**

20% Contingency | **$37,777**

**Total** | **$226,660**

**SA** | **$227,000**

**Assumptions**
- All establishment as this would be done as part of
- Access St component
- Width of pavement at intersection is:
  - 2 parking lanes: 4.2
  - 3 through lanes: 11.1
  - Total: 15.3
  - Road Reserve Width: 1.6
  - Nature strip width at intersections: 0.35
  - Width of widening: 6.4
Since it is a T intersection allow for the construction of a left turn lane in Gray St

2

| Assume length of widening in Access Street | 115 |
| Assume length of left lane is              | 20  |
| Width of lane                              | 8.4 |

<table>
<thead>
<tr>
<th>Calculation of quantities</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Length of road</td>
<td>m</td>
</tr>
<tr>
<td>Area of seal</td>
<td>m²</td>
</tr>
<tr>
<td>Width of pavement</td>
<td>m</td>
</tr>
<tr>
<td>Depth of pavement</td>
<td>m</td>
</tr>
<tr>
<td>Volume of pavement material (solid)</td>
<td>m³</td>
</tr>
<tr>
<td>Quantity of crushed rock</td>
<td>t</td>
</tr>
<tr>
<td>Quantity of Class 2 base</td>
<td>t</td>
</tr>
<tr>
<td>Quantity of Class 3 Sub base</td>
<td>t</td>
</tr>
<tr>
<td>Area of asphalt</td>
<td>m²</td>
</tr>
<tr>
<td>Supply of Class 2 wetmix ex bin</td>
<td>t</td>
</tr>
<tr>
<td>Supply of Class 3 wetmix ex bin</td>
<td>t</td>
</tr>
<tr>
<td>Cartage from Lake Boga Quarries to Swan St</td>
<td>t</td>
</tr>
<tr>
<td>Depth of excavation for pavement</td>
<td>m</td>
</tr>
<tr>
<td>Volume of excavation (solid)</td>
<td>m³</td>
</tr>
<tr>
<td>Volume of excavation (loose)</td>
<td>m³</td>
</tr>
<tr>
<td>Length of kerb and channel</td>
<td>m</td>
</tr>
<tr>
<td>Width of additional pavement</td>
<td>m</td>
</tr>
<tr>
<td>Area of additional land</td>
<td>m²</td>
</tr>
<tr>
<td>Length of pedestrian path</td>
<td>m</td>
</tr>
<tr>
<td>Width of path</td>
<td>m</td>
</tr>
<tr>
<td>Diameter of central median</td>
<td>m</td>
</tr>
</tbody>
</table>
South West Development Precinct  
Infrastructure Cost Sharing Calculations

Project 11 Intersection of Gray Street and Feldtmann Lane  
Intersection 7  
Left and right turn lanes in Feldtmann Street and Right Turn Lane in Gray Street

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Quantity</th>
<th>Unit</th>
<th>Rate</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Set out and project administration</td>
<td></td>
<td>Item</td>
<td>$4,000</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Cutting and removing of kerb and channel and relocation of services and drainage pipes and reinstatement</td>
<td>130</td>
<td>m</td>
<td>150</td>
<td>$10,500</td>
</tr>
<tr>
<td>3</td>
<td>Traffic control</td>
<td></td>
<td>Item</td>
<td></td>
<td>$5,000</td>
</tr>
<tr>
<td>4</td>
<td>Earthworks</td>
<td>617</td>
<td>m³</td>
<td>12</td>
<td>$7,404</td>
</tr>
<tr>
<td>5</td>
<td>Pavement</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5a</td>
<td>Supply and delivery of base wet mix of Class 2 crushed rock</td>
<td>306</td>
<td>Tonnes</td>
<td>9.25</td>
<td>$2,828</td>
</tr>
<tr>
<td>5b</td>
<td>Supply and delivery of subbase wet mix of Class 3 crushed rock</td>
<td>673.2</td>
<td>Tonnes</td>
<td></td>
<td>$6,260</td>
</tr>
<tr>
<td>5c</td>
<td>Placement and compaction of crushed rock</td>
<td>336.6</td>
<td>m³</td>
<td>10</td>
<td>$3,366</td>
</tr>
<tr>
<td>5d</td>
<td>Preparation for sealing</td>
<td>336.6</td>
<td></td>
<td>20</td>
<td>$6,732</td>
</tr>
<tr>
<td>6</td>
<td>Kerb and channel supply and lay</td>
<td>194</td>
<td>m</td>
<td>150</td>
<td>$19,500</td>
</tr>
<tr>
<td>7</td>
<td>Supply and lay 375mm dia underground drainage</td>
<td>194</td>
<td>m</td>
<td>115</td>
<td>$14,950</td>
</tr>
<tr>
<td>8</td>
<td>SEP</td>
<td></td>
<td>2000</td>
<td></td>
<td>$4,000</td>
</tr>
<tr>
<td>9</td>
<td>Supply and placement of Asphalt</td>
<td>1000</td>
<td>m²</td>
<td>36.82</td>
<td>$37,556</td>
</tr>
<tr>
<td>10</td>
<td>Street lighting</td>
<td></td>
<td>Item</td>
<td>$15,000</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Linemarking and road furniture</td>
<td></td>
<td>Item</td>
<td>$4,000</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Landscaping and reinstatement</td>
<td></td>
<td>Item</td>
<td>$3,000</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Allowance for Service Access</td>
<td></td>
<td>Item</td>
<td>$15,000</td>
<td></td>
</tr>
</tbody>
</table>

Subtotal $187,981  
20% Contingency $37,596  
Total $225,577  
SAY $226,000
## Project 12 New Access Point to Swan Hill Sea Lake Road
### Intersection 10

Left and right turn lanes on both roads

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Quantity</th>
<th>Unit</th>
<th>Rate</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Set out and project administration</td>
<td>Item</td>
<td></td>
<td></td>
<td>$4,000</td>
</tr>
<tr>
<td>2</td>
<td>Cutting and removing of curb and channel and relocation of services and drainage pipes and reinstatement</td>
<td>0</td>
<td>m</td>
<td>150</td>
<td>$0</td>
</tr>
<tr>
<td>3</td>
<td>Traffic control</td>
<td>Item</td>
<td></td>
<td></td>
<td>$5,000</td>
</tr>
<tr>
<td>4</td>
<td>Earthworks</td>
<td>1003</td>
<td>m³</td>
<td>15</td>
<td>$15,050</td>
</tr>
<tr>
<td>5</td>
<td>Pavement</td>
<td>Item</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5a</td>
<td>Supply and delivery of base wetmix of Class 2 crushed rock</td>
<td>497.7</td>
<td>Tonnes</td>
<td>0.25</td>
<td>$15,055</td>
</tr>
<tr>
<td>5b</td>
<td>Supply and delivery of subbase wetmix of Class 2 crushed rock</td>
<td>1094.94</td>
<td>Tonnes</td>
<td>0.25</td>
<td>$29,060</td>
</tr>
<tr>
<td>5c</td>
<td>Placement and compaction of crushed rock</td>
<td>547.47</td>
<td>m³</td>
<td>10</td>
<td>$5,475</td>
</tr>
<tr>
<td>5d</td>
<td>Preparation for seeding</td>
<td>547.47</td>
<td>m³</td>
<td>20</td>
<td>$10,949</td>
</tr>
<tr>
<td>6</td>
<td>Kerb and channel supply and lay</td>
<td>590</td>
<td>m</td>
<td>115</td>
<td>$14,950</td>
</tr>
<tr>
<td>7</td>
<td>Supply and lay 375mm dia underground drainage pipe</td>
<td>36.8</td>
<td>m</td>
<td>2000</td>
<td>$4,000</td>
</tr>
<tr>
<td>8</td>
<td>SEP</td>
<td>150</td>
<td>m³</td>
<td>20</td>
<td>$3,000</td>
</tr>
<tr>
<td>9</td>
<td>Supply and placement of Asphalt</td>
<td>150</td>
<td>m³</td>
<td>36.32</td>
<td>$51,084</td>
</tr>
<tr>
<td>10</td>
<td>Street lighting</td>
<td>Item</td>
<td></td>
<td></td>
<td>$15,000</td>
</tr>
<tr>
<td>11</td>
<td>Linemarking and road furniture</td>
<td>Item</td>
<td></td>
<td></td>
<td>$4,000</td>
</tr>
<tr>
<td>12</td>
<td>Landscaping and reinstatement</td>
<td>Item</td>
<td></td>
<td></td>
<td>$3,000</td>
</tr>
<tr>
<td>13</td>
<td>Allowance for Service Alteration</td>
<td>Item</td>
<td></td>
<td></td>
<td>$15,000</td>
</tr>
</tbody>
</table>

**Subtotal** | $223,124
20% Contingency | $44,625
Total | $277,749
SAY | $260,000

**Assumptions**
- No site establishment as this would be done as part of Access
- All component works were done as part of the construction of the road, except the intersection
- Assume length of left lane in Swan Hill Sea Lake Road 50m
- Width of lane 3.7m
- Assume length of right lane in Swan Hill Sea Lake Road 150m
- Assume length of widening in link road for left hand lane 50m
- Assume length of right turn lane in link road 130m
South West Development Precinct  
Infrastructure Cost Sharing Calculations

<table>
<thead>
<tr>
<th>Calculation of quantities</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Length of road</td>
<td>m</td>
</tr>
<tr>
<td>Area of seal</td>
<td>m²</td>
</tr>
<tr>
<td>Width of pavement</td>
<td>m</td>
</tr>
<tr>
<td>Depth of pavement</td>
<td>m</td>
</tr>
<tr>
<td>Volume of pavement material (sold)</td>
<td>m³</td>
</tr>
<tr>
<td>Quantity of crushed rock</td>
<td>tonnes</td>
</tr>
<tr>
<td>Quantity of Class 2 base</td>
<td>tonnes</td>
</tr>
<tr>
<td>Quantity of Class 3 Sub base</td>
<td>tonnes</td>
</tr>
<tr>
<td>Area of asphalt</td>
<td>m²</td>
</tr>
<tr>
<td>Supply of Class 2 wetmix ex bin</td>
<td>$/tonne</td>
</tr>
<tr>
<td>Supply of Class 3 wetmix ex bin</td>
<td>$/tonne</td>
</tr>
<tr>
<td>Carriage from Lake Boga Quarry to Swan HH</td>
<td>$/tonne</td>
</tr>
<tr>
<td>Depth of excavation for pavement</td>
<td>m</td>
</tr>
<tr>
<td>Volume of excavation (sold)</td>
<td>m³</td>
</tr>
<tr>
<td>Volume of excavation (block)</td>
<td>m³</td>
</tr>
<tr>
<td>Length of kerb and channel</td>
<td>m</td>
</tr>
<tr>
<td>Length of additional road reserve</td>
<td>m</td>
</tr>
<tr>
<td>Area of additional land</td>
<td>m²</td>
</tr>
<tr>
<td>Length of shared path</td>
<td>m</td>
</tr>
<tr>
<td>Width of path</td>
<td>m</td>
</tr>
<tr>
<td>Diameter of central median</td>
<td>m</td>
</tr>
</tbody>
</table>

Total length of widening is: 390

Width of widening in new Link Road:
- 2 parking lanes: 4.2
- 3 through lanes: 11.1
- Total: 15.3

Road Reserve Width: 24
Nature strip width at intersections: 4.35
Width of widening of link road: 4.9
Width of widening Swan Hill Sea Lake Road: 3.7
South West Development Precinct
Infrastructure Cost Sharing Calculations

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Quantity</th>
<th>Unit</th>
<th>Rate</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Set up and project administration</td>
<td>Item</td>
<td>Item</td>
<td></td>
<td>$3,000</td>
</tr>
<tr>
<td>2</td>
<td>Stripping and stockpiling of topsoil</td>
<td>5,329</td>
<td>m³</td>
<td>0.75</td>
<td>$3,997</td>
</tr>
<tr>
<td>3</td>
<td>Excavation of material and carting and placing</td>
<td>7,840</td>
<td>m³</td>
<td>0.75</td>
<td>$44,688</td>
</tr>
<tr>
<td></td>
<td>on allotments and grading, compacting to line</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>and level</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Excavate clay liner 500mm deep</td>
<td>0</td>
<td>m³</td>
<td>0.75</td>
<td>$0</td>
</tr>
<tr>
<td>5</td>
<td>Place and compact clay liner 500mm deep</td>
<td>0</td>
<td>m³</td>
<td>0.75</td>
<td>$0</td>
</tr>
<tr>
<td>6</td>
<td>Place topsoil and sow down</td>
<td>0</td>
<td>m³</td>
<td>3</td>
<td>$0</td>
</tr>
<tr>
<td>7</td>
<td>Landscaping</td>
<td>6,889</td>
<td>m³</td>
<td>5</td>
<td>$34,445</td>
</tr>
<tr>
<td>8</td>
<td>Access track</td>
<td>100</td>
<td></td>
<td>20</td>
<td>$2,000</td>
</tr>
<tr>
<td>9</td>
<td>Pumpwell, pump station and electrics as per</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>quote from Aquatich</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>300mm dia rising main</td>
<td>250</td>
<td>m</td>
<td>300</td>
<td>$78,000</td>
</tr>
<tr>
<td>11</td>
<td>Gravity mains</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11a</td>
<td>600mm RCP</td>
<td>m</td>
<td>550</td>
<td>$0</td>
<td></td>
</tr>
<tr>
<td>11b</td>
<td>750mm RCP</td>
<td>m</td>
<td>700</td>
<td>$0</td>
<td></td>
</tr>
<tr>
<td>11c</td>
<td>500mm RCP</td>
<td>m</td>
<td>850</td>
<td>$0</td>
<td></td>
</tr>
<tr>
<td>11d</td>
<td>1200mm RCP</td>
<td>m</td>
<td>1000</td>
<td>$0</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Fits</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12a</td>
<td>600mm pipeline</td>
<td>No</td>
<td>4000</td>
<td>$0</td>
<td></td>
</tr>
<tr>
<td>12b</td>
<td>750mm pipeline</td>
<td>No</td>
<td>4500</td>
<td>$0</td>
<td></td>
</tr>
<tr>
<td>12c</td>
<td>500mm pipeline</td>
<td>No</td>
<td>5000</td>
<td>$0</td>
<td></td>
</tr>
<tr>
<td>12d</td>
<td>1200mm pipeline</td>
<td>No</td>
<td>7000</td>
<td>$0</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Electricity</td>
<td>No</td>
<td>1500</td>
<td>$0</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Area of land required for basin</td>
<td>6,889</td>
<td>m²</td>
<td>20</td>
<td>$137,780</td>
</tr>
</tbody>
</table>

Subtotal: $303,910

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Quantity</th>
<th>Unit</th>
<th>Rate</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>Contingency</td>
<td></td>
<td></td>
<td></td>
<td>$45,586</td>
</tr>
</tbody>
</table>

Total: $349,496

SAY: $350,000

Assumptions:
- Basin is square

Quantities
<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basin storage volume required</td>
<td>3,918 m³</td>
</tr>
<tr>
<td>Excavation volume (solid) excluding clay layer</td>
<td>5,600 m³</td>
</tr>
<tr>
<td>Excavation volume (loose)</td>
<td>7,840 m³</td>
</tr>
<tr>
<td>Area of liner</td>
<td>0 m²</td>
</tr>
<tr>
<td>Excavation of clay liner 500mm deep (solid)</td>
<td>0 m³</td>
</tr>
<tr>
<td>Excavation of clay liner loose</td>
<td>0 m³</td>
</tr>
<tr>
<td>Top width of basin</td>
<td>73 m</td>
</tr>
<tr>
<td>Area of topsoil to be stripped</td>
<td>5,329 m²</td>
</tr>
<tr>
<td>Area of land</td>
<td>6,889 m²</td>
</tr>
</tbody>
</table>
## South West Development Precinct
### Infrastructure Cost Sharing Calculations

#### Construction of 42,500 m³ retardation basin, 4m deep pump station with a pumping capacity of 214 lit/sec and 1210m of 300mm dia rising main. Area of land 26,986 m² Outfall drains consisting of 160m of 600mm RCP, 267m of 750mm RCP, 235m of 900mm RCP and 190m of 1200mm RCP

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Quantity</th>
<th>Unit</th>
<th>Rate</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Set up and project administration</td>
<td>Item</td>
<td></td>
<td></td>
<td>$5,000</td>
</tr>
<tr>
<td>2</td>
<td>Striping and stockpiling of topsoil</td>
<td>23,716</td>
<td>m²</td>
<td>0.8</td>
<td>$17,787</td>
</tr>
<tr>
<td>3</td>
<td>Excavation of material and carting and placing on allotments and grading, compacting to line and level</td>
<td>70,980</td>
<td>m³</td>
<td>0.5</td>
<td>$35,490</td>
</tr>
<tr>
<td>4</td>
<td>Excavate clay liner 500mm deep</td>
<td>12,000</td>
<td>m³</td>
<td>0.5</td>
<td>$6,000</td>
</tr>
<tr>
<td>5</td>
<td>Place and compact clay liner 500mm deep including Geo-membrane</td>
<td>24,000</td>
<td>m³</td>
<td>0.9</td>
<td>$21,600</td>
</tr>
<tr>
<td>6</td>
<td>Place topsoil and sow down</td>
<td>24,000</td>
<td>m³</td>
<td>3</td>
<td>$72,000</td>
</tr>
<tr>
<td>7</td>
<td>Landscaping</td>
<td>200</td>
<td>m</td>
<td>20</td>
<td>$4,000</td>
</tr>
<tr>
<td>8</td>
<td>Access track</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Pumpwell, pump station and electricals &amp; per quote from Aquatach</td>
<td>1210</td>
<td>m</td>
<td>300</td>
<td>$363,000</td>
</tr>
<tr>
<td>10</td>
<td>300mm dia rising main</td>
<td>1210</td>
<td>m</td>
<td>550</td>
<td>$88,000</td>
</tr>
<tr>
<td>11</td>
<td>Gravity mains</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11a</td>
<td>600mm RCP</td>
<td>160</td>
<td>m</td>
<td>700</td>
<td>$112,000</td>
</tr>
<tr>
<td>11b</td>
<td>750mm RCP</td>
<td>267</td>
<td>m</td>
<td>700</td>
<td>$186,900</td>
</tr>
<tr>
<td>11c</td>
<td>900mm RCP</td>
<td>235</td>
<td>m</td>
<td>850</td>
<td>$199,750</td>
</tr>
<tr>
<td>11d</td>
<td>1200mm RCP</td>
<td>190</td>
<td>m</td>
<td>1000</td>
<td>$190,000</td>
</tr>
<tr>
<td>12</td>
<td>Pits</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12a</td>
<td>600mm pipeline</td>
<td>3</td>
<td>No</td>
<td>4000</td>
<td>$12,000</td>
</tr>
<tr>
<td>12b</td>
<td>750mm pipeline</td>
<td>7</td>
<td>No</td>
<td>4500</td>
<td>$31,500</td>
</tr>
<tr>
<td>12c</td>
<td>900mm pipeline</td>
<td>4</td>
<td>No</td>
<td>5000</td>
<td>$20,000</td>
</tr>
<tr>
<td>12d</td>
<td>1200mm pipeline</td>
<td>4</td>
<td>No</td>
<td>7000</td>
<td>$28,000</td>
</tr>
<tr>
<td>13</td>
<td>Peri-fall</td>
<td>2</td>
<td>No</td>
<td>1500</td>
<td>$3,000</td>
</tr>
<tr>
<td>14</td>
<td>Area of Land required for basin</td>
<td>26,986</td>
<td>m²</td>
<td>20</td>
<td>$539,720</td>
</tr>
</tbody>
</table>

**Subtotal** $2,456,737

15% Contingency $368,511

**Total** $2,825,248

**SAY** $2,826,000

**Assumptions**

- Basin is square

---

50 of 71 Version 1.5 24 June 2004
<table>
<thead>
<tr>
<th>Quantities</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Basin storage volume required</td>
<td>42,481 m$^3$</td>
</tr>
<tr>
<td>Excavation volume (solid) excluding clay layer</td>
<td>50,700 m$^3$</td>
</tr>
<tr>
<td>Excavation volume (loose)</td>
<td>70,980 m$^3$</td>
</tr>
<tr>
<td>Area of liner</td>
<td>24,000 m$^2$</td>
</tr>
<tr>
<td>Excavation of clay liner 500mm deep (solid)</td>
<td>12,000 m$^3$</td>
</tr>
<tr>
<td>Excavation of clay liner loose</td>
<td>16,800 m$^3$</td>
</tr>
<tr>
<td>Top width of basin</td>
<td>154 m</td>
</tr>
<tr>
<td>Area of topsoil to be stripped</td>
<td>23,740 m$^2$</td>
</tr>
<tr>
<td>Area of land</td>
<td>20,585 m$^2$</td>
</tr>
</tbody>
</table>
### Outfall drain 220m of 750mm RCP

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Quantity</th>
<th>Unit</th>
<th>Rate</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Set up and project administration</td>
<td>Item</td>
<td></td>
<td></td>
<td>$1,000</td>
</tr>
<tr>
<td>2</td>
<td>Stripping and stockpiling of topsoil</td>
<td>0</td>
<td>m³</td>
<td>0.75</td>
<td>$0</td>
</tr>
<tr>
<td>3</td>
<td>Excavation of material and carting and placing on allotments and grading, compaction to line and level</td>
<td>0</td>
<td>m³</td>
<td></td>
<td>$0</td>
</tr>
<tr>
<td>4</td>
<td>Excavate clay liner 500mm deep</td>
<td>0</td>
<td>m³</td>
<td>7</td>
<td>$0</td>
</tr>
<tr>
<td>5</td>
<td>Place and compact clay liner 500mm deep</td>
<td>0</td>
<td>m³</td>
<td>5</td>
<td>$0</td>
</tr>
<tr>
<td>6</td>
<td>Place topsoil and sod down</td>
<td>0</td>
<td>m³</td>
<td>3</td>
<td>$0</td>
</tr>
<tr>
<td>7</td>
<td>Landscaping</td>
<td>0</td>
<td>m³</td>
<td>2</td>
<td>$0</td>
</tr>
<tr>
<td>8</td>
<td>Access track</td>
<td>0</td>
<td></td>
<td>20</td>
<td>$0</td>
</tr>
<tr>
<td>9</td>
<td>Pumpwell, pump station and electrics as per siphon from Aquatich</td>
<td></td>
<td></td>
<td></td>
<td>$0</td>
</tr>
<tr>
<td>10</td>
<td>300mm dia rising main</td>
<td>0</td>
<td>m</td>
<td>300</td>
<td>$0</td>
</tr>
<tr>
<td>11</td>
<td>Gravity mains</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11a</td>
<td>600mm RCP</td>
<td>0</td>
<td>m</td>
<td>550</td>
<td>$0</td>
</tr>
<tr>
<td>11b</td>
<td>750mm RCP</td>
<td>220</td>
<td>m</td>
<td>700</td>
<td>$154,000</td>
</tr>
<tr>
<td>11c</td>
<td>500mm RCP</td>
<td>0</td>
<td>m</td>
<td>850</td>
<td>$0</td>
</tr>
<tr>
<td>11d</td>
<td>1200mm RCP</td>
<td>0</td>
<td>m</td>
<td>1000</td>
<td>$0</td>
</tr>
<tr>
<td>12</td>
<td>Fittings</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12a</td>
<td>600mm pipe line</td>
<td>0</td>
<td>No</td>
<td>4000</td>
<td>$0</td>
</tr>
<tr>
<td>12b</td>
<td>750mm pipe line</td>
<td>4</td>
<td>No</td>
<td>4500</td>
<td>$18,000</td>
</tr>
<tr>
<td>12c</td>
<td>500mm pipe line</td>
<td>0</td>
<td>No</td>
<td>5000</td>
<td>$0</td>
</tr>
<tr>
<td>12d</td>
<td>1200mm pipe line</td>
<td>0</td>
<td>No</td>
<td>7000</td>
<td>$0</td>
</tr>
<tr>
<td>13</td>
<td>Geotechnical</td>
<td>1</td>
<td>No</td>
<td>1500</td>
<td>$1,500</td>
</tr>
<tr>
<td>14</td>
<td>Area of land required for basin</td>
<td>0</td>
<td>m²</td>
<td>20</td>
<td>$0</td>
</tr>
<tr>
<td></td>
<td><strong>Subtotal</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>$174,500</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Total Contingency</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>$26,175</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>$200,675</strong></td>
</tr>
<tr>
<td></td>
<td><strong>SAY</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>$201,000</strong></td>
</tr>
</tbody>
</table>

### Assumptions
- Basin is square
- Basin is constructed below water table
- Basin requires lining
## South West Development Precinct
### Infrastructure Cost Sharing Calculations

<table>
<thead>
<tr>
<th>Quantities</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Basin storage volume required</td>
<td>0 m³</td>
</tr>
<tr>
<td>Excavation volume (solid) excluding clay layer</td>
<td>0 m³</td>
</tr>
<tr>
<td>Excavation volume (loose)</td>
<td>0 m³</td>
</tr>
<tr>
<td>Area of liner</td>
<td>0 m²</td>
</tr>
<tr>
<td>Excavation of clay liner 500mm deep (solid)</td>
<td>0 m³</td>
</tr>
<tr>
<td>Excavation of clay liner loose</td>
<td>0 m³</td>
</tr>
<tr>
<td>Top width of basin</td>
<td>0 m</td>
</tr>
<tr>
<td>Area of topsoil to be stripped</td>
<td>0 m²</td>
</tr>
<tr>
<td>Area of land</td>
<td>0 m²</td>
</tr>
</tbody>
</table>
### Infrastructure Cost Sharing Calculations

#### South West Development Precinct

**Construction of 35,600 m$^3$ retardation basin, 4m deep pump station with a pumping capacity of 214 l/sec and 560m of 300mm dia rising main. Area of land 30,300 m$^2$ Outfall drains consisting of 70m of 300mm RCP, 347m of 375mm RCP, 130m of 525mm RCP, 67m of 500mm RCP, 130m of 900mm RCP, and 310m of 1050mm RCP**

<table>
<thead>
<tr>
<th>Project 18 Catchment 4</th>
<th>Description</th>
<th>Quantity</th>
<th>Unit</th>
<th>Rate</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Set up and project administration</td>
<td>Item</td>
<td></td>
<td></td>
<td>$5,000</td>
</tr>
<tr>
<td></td>
<td>Stripping and stockpiling of topsoil</td>
<td>26,896</td>
<td>m$^2$</td>
<td>0.75</td>
<td>$20,172</td>
</tr>
<tr>
<td></td>
<td>Excavation of material and carting and placing on allotments and grading, compacting to line and level</td>
<td>61,600</td>
<td>m$^3$</td>
<td>5.5</td>
<td>$341,130</td>
</tr>
<tr>
<td></td>
<td>Excavate clay liner 500mm deep</td>
<td>13,500</td>
<td>m$^2$</td>
<td>5</td>
<td>$0</td>
</tr>
<tr>
<td></td>
<td>Place and compact clay liner 500mm deep including placement of Geo-membrane</td>
<td>27,000</td>
<td>m$^2$</td>
<td>29</td>
<td>$0</td>
</tr>
<tr>
<td></td>
<td>Place topsoil and sow down</td>
<td>12,000</td>
<td>m</td>
<td>3</td>
<td>$81,000</td>
</tr>
<tr>
<td></td>
<td>Landscaping</td>
<td>30,245</td>
<td>m$^2$</td>
<td>4</td>
<td>$121,104</td>
</tr>
<tr>
<td></td>
<td>Access track</td>
<td>200</td>
<td>m</td>
<td>20</td>
<td>$4,000</td>
</tr>
<tr>
<td></td>
<td>Pumpwell, pump station and electrics not quote from Aquatech</td>
<td>Item</td>
<td></td>
<td></td>
<td>$174,900</td>
</tr>
<tr>
<td></td>
<td>375mm dia rising main</td>
<td>827</td>
<td>m</td>
<td>375</td>
<td>$310,125</td>
</tr>
<tr>
<td></td>
<td>Gravity mains</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>300mm dia RCP</td>
<td>70</td>
<td>m</td>
<td>300</td>
<td>$21,000</td>
</tr>
<tr>
<td></td>
<td>375mm dia RCP</td>
<td>347</td>
<td>m</td>
<td>350</td>
<td>$121,150</td>
</tr>
<tr>
<td></td>
<td>525mm dia RCP</td>
<td>130</td>
<td>m</td>
<td>450</td>
<td>$56,500</td>
</tr>
<tr>
<td></td>
<td>600mm RCP</td>
<td>67</td>
<td>m</td>
<td>550</td>
<td>$36,850</td>
</tr>
<tr>
<td></td>
<td>750mm RCP</td>
<td>0</td>
<td>m</td>
<td>700</td>
<td>$0</td>
</tr>
<tr>
<td></td>
<td>900mm RCP</td>
<td>130</td>
<td>m</td>
<td>850</td>
<td>$110,500</td>
</tr>
<tr>
<td></td>
<td>1050mm RCP</td>
<td>310</td>
<td>m</td>
<td>900</td>
<td>$279,000</td>
</tr>
<tr>
<td></td>
<td>200mm dia RCP</td>
<td>190</td>
<td>m</td>
<td>1000</td>
<td>$190,000</td>
</tr>
<tr>
<td></td>
<td>300mm pipeline</td>
<td>2</td>
<td>No</td>
<td>2500</td>
<td>$5,000</td>
</tr>
<tr>
<td></td>
<td>500mm pipeline</td>
<td>7</td>
<td>No</td>
<td>3000</td>
<td>$21,000</td>
</tr>
<tr>
<td></td>
<td>525 pipeline</td>
<td>3</td>
<td>No</td>
<td>3800</td>
<td>$11,400</td>
</tr>
<tr>
<td></td>
<td>600mm pipeline</td>
<td>2</td>
<td>No</td>
<td>4000</td>
<td>$8,000</td>
</tr>
<tr>
<td></td>
<td>750mm pipeline</td>
<td>0</td>
<td>No</td>
<td>4500</td>
<td>$0</td>
</tr>
<tr>
<td></td>
<td>900mm pipeline</td>
<td>3</td>
<td>No</td>
<td>5000</td>
<td>$15,000</td>
</tr>
<tr>
<td></td>
<td>1050mm pipeline</td>
<td>7</td>
<td>No</td>
<td>6000</td>
<td>$42,000</td>
</tr>
<tr>
<td></td>
<td>1200mm pipeline</td>
<td>0</td>
<td>No</td>
<td>7000</td>
<td>$0</td>
</tr>
<tr>
<td></td>
<td>Headwall</td>
<td>3</td>
<td>No</td>
<td>1100</td>
<td>$3,300</td>
</tr>
</tbody>
</table>

---

34 of 71

Version 1.5 24 June 2004
## South West Development Precinct Infrastructure Cost Sharing Calculations

<table>
<thead>
<tr>
<th></th>
<th>Area of Land required for basin</th>
<th>$</th>
<th>20</th>
<th>$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>30,276</td>
<td>20</td>
<td>$605,520</td>
</tr>
<tr>
<td>Subtotal</td>
<td></td>
<td>$2,595,941</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15% Contingency</td>
<td></td>
<td>$389,391</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>$2,985,332</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>SAY</strong></td>
<td></td>
<td><strong>$2,986,000</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Assumptions

- Basin is square

### Quantities

- Basin storage volume required: 35,591 m³
- Excavation volume (solid) excluding clay layer: 44,000 m³
- Excavation volume (loose): 61,600 m³
- Area of liner: 27,900 m²
- Excavation of clay liner 500mm deep (solid): 13,900 m³
- Excavation of clay liner loose: 8,900 m³
- Top width of basin: 164 m
- Area of topsoil to be stripped: 26,896 m²
- Area of land: 30,276 m²
South West Development Precinct
Infrastructure Cost Sharing Calculations

Construction of 6,300 m³ retardation basin, 3.4m deep pump station with a pumping capacity of 34 ltr/sec and 1.320m of 150mm dia rising main. Area of land 8,000 m² Outfall drains consisting of 21m of 375mm RCP, 108m of 450mm RCP, 413m of 525mm RCP and 413m of open earth drain.

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Quantity</th>
<th>Unit</th>
<th>Rate</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Set up and project administration</td>
<td>Item</td>
<td></td>
<td></td>
<td>$3,000</td>
</tr>
<tr>
<td>2c</td>
<td>Stripping and stockpiling of topsoil</td>
<td>6,241 m³</td>
<td>m³</td>
<td>0.75</td>
<td>$4,681</td>
</tr>
<tr>
<td>3</td>
<td>Excavation of material and carting and placing on allotments and grading, compacting to line and level</td>
<td>12,180 m³</td>
<td>m³</td>
<td>0.75</td>
<td>$6,072</td>
</tr>
<tr>
<td>4</td>
<td>Excavate clay liner 500mm deep</td>
<td>3,200 m³</td>
<td>m³</td>
<td></td>
<td>$0</td>
</tr>
<tr>
<td>5</td>
<td>Place and compact clay liner 500mm deep including placement of Geo-membrane</td>
<td>9,700 m³</td>
<td>m³</td>
<td>0.29</td>
<td>$2,765</td>
</tr>
<tr>
<td>6</td>
<td>Place topsoil and sow down</td>
<td>6,400 m³</td>
<td>m³</td>
<td>3</td>
<td>$19,200</td>
</tr>
<tr>
<td>7</td>
<td>Landscaping</td>
<td>1692 m²</td>
<td>m²</td>
<td>5</td>
<td>$39,960</td>
</tr>
<tr>
<td>8</td>
<td>Access track</td>
<td>110 m</td>
<td>m</td>
<td>20</td>
<td>$2,000</td>
</tr>
<tr>
<td>9</td>
<td>Pumpwell, pump station and electricity per quote from Aquatech</td>
<td>Item</td>
<td></td>
<td></td>
<td>$126,700</td>
</tr>
<tr>
<td>10</td>
<td>150mm dia rising main</td>
<td>1320 m</td>
<td>m</td>
<td>300</td>
<td>$396,000</td>
</tr>
<tr>
<td>11</td>
<td>Gravity mains</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11a</td>
<td>450mm RCP</td>
<td>108 m</td>
<td>m</td>
<td>450</td>
<td>$48,600</td>
</tr>
<tr>
<td>11b</td>
<td>525mm RCP</td>
<td>413 m</td>
<td>m</td>
<td>450</td>
<td>$185,850</td>
</tr>
<tr>
<td>11c</td>
<td>375mm RCP</td>
<td>21 m</td>
<td>m</td>
<td>350</td>
<td>$7,350</td>
</tr>
<tr>
<td>11d</td>
<td>750mm RCP</td>
<td>0 m</td>
<td>m</td>
<td>700</td>
<td>$0</td>
</tr>
<tr>
<td>11e</td>
<td>900mm RCP</td>
<td>0 m</td>
<td>m</td>
<td>850</td>
<td>$0</td>
</tr>
<tr>
<td>11f</td>
<td>1200mm RCP</td>
<td>0 m</td>
<td>m</td>
<td>1000</td>
<td>$0</td>
</tr>
<tr>
<td>12</td>
<td>Pits</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12a</td>
<td>450mm pipeline</td>
<td>4 No</td>
<td>No</td>
<td>3500</td>
<td>$14,000</td>
</tr>
<tr>
<td>12b</td>
<td>525mm pipeline</td>
<td>5 No</td>
<td>No</td>
<td>3800</td>
<td>$19,000</td>
</tr>
<tr>
<td>12c</td>
<td>375mm pipeline</td>
<td>2 No</td>
<td>No</td>
<td>3000</td>
<td>$6,000</td>
</tr>
<tr>
<td>12d</td>
<td>750mm pipeline</td>
<td>0 No</td>
<td>No</td>
<td>4500</td>
<td>$0</td>
</tr>
<tr>
<td>12e</td>
<td>900mm pipeline</td>
<td>0 No</td>
<td>No</td>
<td>5000</td>
<td>$0</td>
</tr>
<tr>
<td>12f</td>
<td>1200mm pipeline</td>
<td>0 No</td>
<td>No</td>
<td>7000</td>
<td>$0</td>
</tr>
<tr>
<td>13</td>
<td>Headwall</td>
<td>1 No</td>
<td>No</td>
<td>900</td>
<td>$900</td>
</tr>
<tr>
<td>14</td>
<td>Construction of open earth drain overland flow path</td>
<td>413 m</td>
<td>m</td>
<td>10</td>
<td>$4,130</td>
</tr>
<tr>
<td>15</td>
<td>Area of Land required for basin</td>
<td>7,592 m²</td>
<td>m²</td>
<td>20</td>
<td>$159,840</td>
</tr>
</tbody>
</table>

Subtotal | $1,106,637 |
15% Contingency | $165,999 |
South West Development Precinct
Infrastructure Cost Sharing Calculations

<table>
<thead>
<tr>
<th>Total</th>
<th>$1,272,632</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAY</td>
<td>$1,273,000</td>
</tr>
</tbody>
</table>

Assumptions
Basin is square

Quantities

- Basin storage volume required: 6,232 m³
- Excavation volume (solid) excluding clay layer: 8,700 m³
- Excavation volume (loose): 12,100 m³
- Area of liner: 4,600 m²
- Excavation of clay liner 500mm deep (solid): 3,200 m³
- Excavation of clay liner loose: 4,480 m³
- Top width of basin: 7.9 m
- Area of topsoil to be stripped: 2,241 m²
- Area of land: 7,992 m²
South West Development Precinct
Infrastructure Cost Sharing Calculations

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Quantity</th>
<th>Unit</th>
<th>Rate</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Set up and project administration</td>
<td>Item</td>
<td></td>
<td></td>
<td>$5,000</td>
</tr>
<tr>
<td>2</td>
<td>Stripping and stockpiling of topsoil</td>
<td>7,396 m³</td>
<td>0.75</td>
<td></td>
<td>$5,547</td>
</tr>
<tr>
<td>3</td>
<td>Excavation of material and carting and placing on allotments and grading, compacting to line and level</td>
<td>10,640 m³</td>
<td>0.75</td>
<td>5%</td>
<td>$80,836</td>
</tr>
<tr>
<td>4</td>
<td>Excavate clay liner 500mm deep</td>
<td>3,700 m³</td>
<td></td>
<td>2%</td>
<td>$0</td>
</tr>
<tr>
<td>5</td>
<td>Place and compact clay liner 500mm deep including placement of Geo-membrane</td>
<td>2,100 m³</td>
<td>29</td>
<td></td>
<td>$0</td>
</tr>
<tr>
<td>6</td>
<td>Place topsoil and sow down</td>
<td>7,600 m³</td>
<td>3</td>
<td></td>
<td>$22,200</td>
</tr>
<tr>
<td>7</td>
<td>Landscaping</td>
<td>8,139 m²</td>
<td>5</td>
<td></td>
<td>$45,695</td>
</tr>
<tr>
<td>8</td>
<td>Access track</td>
<td>200 m</td>
<td>20</td>
<td></td>
<td>$4,000</td>
</tr>
<tr>
<td>9</td>
<td>Pumpwell, pump station and electrics as per quote from Aquatech</td>
<td>Item</td>
<td></td>
<td></td>
<td>$103,500</td>
</tr>
<tr>
<td>10</td>
<td>150mm dia rising main</td>
<td>195 m</td>
<td>150</td>
<td></td>
<td>$29,250</td>
</tr>
<tr>
<td>11</td>
<td>Gravity mains</td>
<td>0 m</td>
<td>550</td>
<td></td>
<td>$0</td>
</tr>
<tr>
<td>11a</td>
<td>600mm RCP</td>
<td>0 m</td>
<td>700</td>
<td></td>
<td>$0</td>
</tr>
<tr>
<td>11b</td>
<td>750mm RCP</td>
<td>0 m</td>
<td>850</td>
<td></td>
<td>$0</td>
</tr>
<tr>
<td>11c</td>
<td>900mm RCP</td>
<td>0 m</td>
<td>1000</td>
<td></td>
<td>$0</td>
</tr>
<tr>
<td>11d</td>
<td>1200mm RCP</td>
<td>0 m</td>
<td></td>
<td></td>
<td>$0</td>
</tr>
<tr>
<td>12</td>
<td>Fittings</td>
<td>0 No</td>
<td>4000</td>
<td></td>
<td>$0</td>
</tr>
<tr>
<td>12a</td>
<td>600mm pipe in</td>
<td>0 m</td>
<td>4500</td>
<td></td>
<td>$0</td>
</tr>
<tr>
<td>12b</td>
<td>750mm pipe in</td>
<td>0 m</td>
<td>5000</td>
<td></td>
<td>$0</td>
</tr>
<tr>
<td>12c</td>
<td>900mm pipe in</td>
<td>0 m</td>
<td>7000</td>
<td></td>
<td>$0</td>
</tr>
<tr>
<td>12d</td>
<td>1200mm pipe in</td>
<td>0 m</td>
<td>1500</td>
<td></td>
<td>$0</td>
</tr>
<tr>
<td>13</td>
<td>Fittings</td>
<td>0 No</td>
<td>2000</td>
<td></td>
<td>$0</td>
</tr>
<tr>
<td>14</td>
<td>Area of Land required for basin</td>
<td>9,139 m²</td>
<td>20</td>
<td></td>
<td>$182,780</td>
</tr>
<tr>
<td></td>
<td>Subtotal</td>
<td></td>
<td></td>
<td></td>
<td>$458,620</td>
</tr>
<tr>
<td></td>
<td>25% Contingency</td>
<td></td>
<td></td>
<td></td>
<td>$68,793</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td>$527,413</td>
</tr>
<tr>
<td></td>
<td>SAY</td>
<td></td>
<td></td>
<td></td>
<td>$528,000</td>
</tr>
</tbody>
</table>

Assumptions:
Basin is square
### Quantities

<table>
<thead>
<tr>
<th>Description</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basin storage volume required</td>
<td>5,430 m³</td>
</tr>
<tr>
<td>Excavation volume (solid) excluding clay layer</td>
<td>7,600 m³</td>
</tr>
<tr>
<td>Excavation volume (loose)</td>
<td>10,640 m³</td>
</tr>
<tr>
<td>Area of liner</td>
<td>7,400 m²</td>
</tr>
<tr>
<td>Excavation of clay liner 500mm deep (solid)</td>
<td>3,700 m³</td>
</tr>
<tr>
<td>Excavation of clay liner loose</td>
<td>5,180 m²</td>
</tr>
<tr>
<td>Top width of basin</td>
<td>86 m</td>
</tr>
<tr>
<td>Area of topsoil to be stripped</td>
<td>7,000 m²</td>
</tr>
<tr>
<td>Area of land</td>
<td>1439 m²</td>
</tr>
</tbody>
</table>
## South West Development Precinct
### Infrastructure Cost Sharing Calculations

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Quantity</th>
<th>Unit</th>
<th>Rate</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Set up and project administration</td>
<td>item</td>
<td></td>
<td></td>
<td>$5,000</td>
</tr>
<tr>
<td>2</td>
<td>Stripping and stockpiling of topsoil</td>
<td>10,404</td>
<td>m²</td>
<td>0.75</td>
<td>$7,803</td>
</tr>
<tr>
<td>3</td>
<td>Excavation of material and carting and placing on allotments and grading, compacting to line and level</td>
<td>19,500</td>
<td>m³</td>
<td>0.77</td>
<td>$14,720</td>
</tr>
<tr>
<td>4</td>
<td>Excavate clay liner 500mm deep</td>
<td>5,200</td>
<td>m³</td>
<td>5.7</td>
<td>$0</td>
</tr>
<tr>
<td>5</td>
<td>Place and compact clay liner 500mm deep including placement of Geo membrane</td>
<td>10,404</td>
<td>m²</td>
<td>29</td>
<td>$0</td>
</tr>
<tr>
<td>6</td>
<td>Place topsoil and sow down</td>
<td>10,404</td>
<td>m²</td>
<td>3</td>
<td>$31,200</td>
</tr>
<tr>
<td>7</td>
<td>Landscaping</td>
<td>21,955</td>
<td>m²</td>
<td>5</td>
<td>$102,275</td>
</tr>
<tr>
<td>8</td>
<td>Access track</td>
<td>900</td>
<td>m</td>
<td>20</td>
<td>$4,000</td>
</tr>
<tr>
<td>9</td>
<td>Pumpwell, pump station and electronics as per quote from Aquatech</td>
<td>item</td>
<td></td>
<td></td>
<td>$163,250</td>
</tr>
<tr>
<td>10</td>
<td>250mm dia rising main</td>
<td>580</td>
<td>m</td>
<td>250</td>
<td>$145,000</td>
</tr>
<tr>
<td></td>
<td>Construction of Rising Main in sealed pavement</td>
<td>580</td>
<td>m</td>
<td></td>
<td>$46,039</td>
</tr>
<tr>
<td>11</td>
<td>Gravity mains</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11a</td>
<td>500mm RCP</td>
<td>0</td>
<td>m</td>
<td>550</td>
<td>$0</td>
</tr>
<tr>
<td>11b</td>
<td>750mm RCP</td>
<td>0</td>
<td>m</td>
<td>700</td>
<td>$0</td>
</tr>
<tr>
<td>11c</td>
<td>900mm RCP</td>
<td>0</td>
<td>m</td>
<td>850</td>
<td>$0</td>
</tr>
<tr>
<td>11d</td>
<td>1200mm RCP</td>
<td>0</td>
<td>m</td>
<td>1000</td>
<td>$0</td>
</tr>
<tr>
<td>12</td>
<td>Pits</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12a</td>
<td>500mm pipeline</td>
<td>0</td>
<td>No</td>
<td>4000</td>
<td>$0</td>
</tr>
<tr>
<td>12b</td>
<td>750mm pipeline</td>
<td>0</td>
<td>No</td>
<td>4500</td>
<td>$0</td>
</tr>
<tr>
<td>12c</td>
<td>900mm pipeline</td>
<td>0</td>
<td>No</td>
<td>5000</td>
<td>$0</td>
</tr>
<tr>
<td>12d</td>
<td>1200mm pipeline</td>
<td>0</td>
<td>No</td>
<td>7000</td>
<td>$0</td>
</tr>
<tr>
<td>13</td>
<td>Blockwall</td>
<td>0</td>
<td>No</td>
<td>1500</td>
<td>$0</td>
</tr>
<tr>
<td>14</td>
<td>Area of Land required for basin</td>
<td>12,455</td>
<td>m²</td>
<td>20</td>
<td>$249,100</td>
</tr>
<tr>
<td></td>
<td><strong>Subtotal</strong></td>
<td></td>
<td></td>
<td></td>
<td>$825,367</td>
</tr>
<tr>
<td></td>
<td>15% Contingency</td>
<td></td>
<td></td>
<td></td>
<td>$123,808</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td>$949,155</td>
</tr>
<tr>
<td></td>
<td><strong>SAY</strong></td>
<td></td>
<td></td>
<td></td>
<td>$950,000</td>
</tr>
</tbody>
</table>

- 117 -
Assumptions
Basin is square
Rising main located in road pavement

Quantities

<table>
<thead>
<tr>
<th>Description</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basin storage volume required</td>
<td>10,669 m³</td>
</tr>
<tr>
<td>Excavation volume (solid) excluding clay layer</td>
<td>14,000 m³</td>
</tr>
<tr>
<td>Excavation volume (loose)</td>
<td>19,600 m³</td>
</tr>
<tr>
<td>Area of liner</td>
<td>10,400 m²</td>
</tr>
<tr>
<td>Excavation of clay liner 500mm deep (solid)</td>
<td>5,200 m³</td>
</tr>
<tr>
<td>Excavation of clay liner loose</td>
<td>7,700 m³</td>
</tr>
<tr>
<td>Top width of basin</td>
<td>102 m</td>
</tr>
<tr>
<td>Area of topsoil to be stripped</td>
<td>10,400 m²</td>
</tr>
<tr>
<td>Area of land</td>
<td>12,455 m²</td>
</tr>
</tbody>
</table>

Calculation of quantities

<table>
<thead>
<tr>
<th>Description</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length of trench</td>
<td>580 m</td>
</tr>
<tr>
<td>Additional width of pavement</td>
<td>0.6 m</td>
</tr>
<tr>
<td>Depth of pavement</td>
<td>1 m</td>
</tr>
<tr>
<td>Volume of pavement material (solid)</td>
<td>348</td>
</tr>
<tr>
<td>Quantity of crushed rock</td>
<td>769.5 tonnes</td>
</tr>
<tr>
<td>Quantity of Class 2 base</td>
<td>382.8 tonnes</td>
</tr>
<tr>
<td>Quantity of Class 3 sub-base</td>
<td>382.8 tonnes</td>
</tr>
<tr>
<td>Area of asphalt</td>
<td>348 m²</td>
</tr>
<tr>
<td>Supply of Class 2 wet mix ex bin</td>
<td>23.8 $/tonne</td>
</tr>
<tr>
<td>Supply of Class 3 wet mix ex bin</td>
<td>20.09 $/tonne</td>
</tr>
<tr>
<td>Transport from Lake Boga Quarries to Swan valley</td>
<td>6.45 $/tonne</td>
</tr>
<tr>
<td>Depth of excavation for pavement</td>
<td>0.4 m</td>
</tr>
<tr>
<td>Volume of excavation (solid)</td>
<td>139.2 m³</td>
</tr>
<tr>
<td>Volume of excavation (loose)</td>
<td>194.88 m³</td>
</tr>
<tr>
<td>Width of additional road reserve</td>
<td>8 m</td>
</tr>
<tr>
<td>Area of additional land</td>
<td>4540 m²</td>
</tr>
<tr>
<td>Length of shared path</td>
<td>1160 m</td>
</tr>
<tr>
<td>Additional width of path</td>
<td>1 m</td>
</tr>
</tbody>
</table>

Cost of supply of crushed rock                    | $20,319     |
Cost of asphalt                                    | $13,920     |
<table>
<thead>
<tr>
<th>South West Development Precinct</th>
<th>Infrastructure Cost Sharing Calculations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost of cutting pavement</td>
<td>$5,800</td>
</tr>
<tr>
<td>Reinstatement</td>
<td>$2,000</td>
</tr>
<tr>
<td>Traffic Control</td>
<td>$4,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$46,039</strong></td>
</tr>
</tbody>
</table>
## South West Development Precinct
### Infrastructure Cost Sharing Calculations

**Project Z3 Cost of preparing infrastructure cost sharing report, traffic impact assessment and drainage strategy**

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Traffic Impact Assessment</td>
<td>$30,000</td>
</tr>
<tr>
<td>2</td>
<td>Drainage Strategy</td>
<td>$2,000</td>
</tr>
<tr>
<td>3</td>
<td>Consultants assistance in preparing and reviewing cost sharing, finalising drainage strategy and preparing and traffic strategy</td>
<td>$40,000</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>$72,000</strong></td>
</tr>
</tbody>
</table>
## Appendix B Calculations to Determine Cost Sharing

### Project 1 Link Road No 1

<table>
<thead>
<tr>
<th>Analysis Area (Sub-precinct) Number</th>
<th>% of Traffic</th>
<th>Proportion of Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>32.48%</td>
<td>$84,773</td>
</tr>
<tr>
<td>2</td>
<td>0.00%</td>
<td>$0</td>
</tr>
<tr>
<td>3</td>
<td>18.28%</td>
<td>$47,711</td>
</tr>
<tr>
<td>4</td>
<td>15.82%</td>
<td>$41,290</td>
</tr>
<tr>
<td>5</td>
<td>16.93%</td>
<td>$44,187</td>
</tr>
<tr>
<td>6</td>
<td>16.49%</td>
<td>$43,039</td>
</tr>
<tr>
<td>Total</td>
<td>100.00%</td>
<td>$261,000</td>
</tr>
</tbody>
</table>

### Project 2 Link Road No 2

<table>
<thead>
<tr>
<th>Analysis Area (Sub-precinct) Number</th>
<th>% of Traffic</th>
<th>Proportion of Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>46.21%</td>
<td>$134,471</td>
</tr>
<tr>
<td>2</td>
<td>0.00%</td>
<td>$0</td>
</tr>
<tr>
<td>3</td>
<td>26.25%</td>
<td>$76,323</td>
</tr>
<tr>
<td>4</td>
<td>0.42%</td>
<td>$222</td>
</tr>
<tr>
<td>5</td>
<td>0.99%</td>
<td>$2,881</td>
</tr>
<tr>
<td>6</td>
<td>26.13%</td>
<td>$76,038</td>
</tr>
<tr>
<td>Total</td>
<td>100.00%</td>
<td>$291,000</td>
</tr>
</tbody>
</table>

### Project 3 Link Road No 3

<table>
<thead>
<tr>
<th>Analysis Area (Sub-precinct) Number</th>
<th>% of Traffic</th>
<th>Proportion of Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>82.73%</td>
<td>$277,894</td>
</tr>
<tr>
<td>2</td>
<td>0.00%</td>
<td>$0</td>
</tr>
<tr>
<td>3</td>
<td>21.82%</td>
<td>$96,663</td>
</tr>
<tr>
<td>4</td>
<td>0.29%</td>
<td>$1,285</td>
</tr>
<tr>
<td>5</td>
<td>0.55%</td>
<td>$2,437</td>
</tr>
<tr>
<td>6</td>
<td>14.81%</td>
<td>$64,722</td>
</tr>
<tr>
<td>Total</td>
<td>100.00%</td>
<td>$443,000</td>
</tr>
</tbody>
</table>
## South West Development Precinct
### Infrastructure Cost Sharing Calculations

<table>
<thead>
<tr>
<th>Analysis Area (Sub-precinct) Number</th>
<th>Project 4 Link Road No 4</th>
<th>% of traffic</th>
<th>Proportion of Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>91.51%</td>
<td>$384,752</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>0.00%</td>
<td>$0</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>0.00%</td>
<td>$0</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>0.00%</td>
<td>$0</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>0.00%</td>
<td>$0</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>8.49%</td>
<td>$35,238</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>100.00%</strong></td>
<td><strong>$420,000</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Analysis Area (Sub-precinct) Number</th>
<th>Project 5 Link Road No 5</th>
<th>% of traffic</th>
<th>Proportion of Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>87.35%</td>
<td>$416,610</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>0.00%</td>
<td>$0</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>0.42%</td>
<td>$1,970</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>0.70%</td>
<td>$393</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>0.45%</td>
<td>$2,251</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>11.38%</td>
<td>$53,372</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>100.00%</strong></td>
<td><strong>$469,000</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Analysis Area (Sub-precinct) Number</th>
<th>Project 6 Link 5 Electronic Lane Construction</th>
<th>% of traffic</th>
<th>Proportion of Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>50.20%</td>
<td>$622,117</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>0.00%</td>
<td>$0</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>0.12%</td>
<td>$274</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>0.20%</td>
<td>$137</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>0.05%</td>
<td>$343</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>9.07%</td>
<td>$62,130</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>100.00%</strong></td>
<td><strong>$685,000</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Analysis Area (Sub-precinct) Number</th>
<th>Project 7 Link Road 7(1)</th>
<th>% of traffic</th>
<th>Proportion of Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>95.89%</td>
<td>$511,094</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>0.00%</td>
<td>$0</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>1.00%</td>
<td>$5,330</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>0.46%</td>
<td>$2,452</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>1.08%</td>
<td>$5,756</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>1.57%</td>
<td>$8,368</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>100.00%</strong></td>
<td><strong>$533,000</strong></td>
</tr>
<tr>
<td>Analysis Area (Sub-precinct) Number</td>
<td>Project 8 Roundabout Coronation Street and Link Road Intersection 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-----------------------------------</td>
<td>---------------------------------------------------------------</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td></td>
<td>% of traffic</td>
<td>Proportion of Cost</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>22.01%</td>
<td>$65,590</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>0.00%</td>
<td>$0</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>12.32%</td>
<td>$36,714</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>10.67%</td>
<td>$31,797</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>43.30%</td>
<td>$130,822</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>11.10%</td>
<td>$33,078</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100.00%</strong></td>
<td><strong>$298,000</strong></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Analysis Area (Sub-precinct) Number</th>
<th>Project 9 Roundabout Yana Street and Link Roads 3 and 4 Intersection 4</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>% of traffic</td>
<td>Proportion of Cost</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>32.33%</td>
<td>$266,343</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>0.00%</td>
<td>$0</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>23.85%</td>
<td>$200,477</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>0.21%</td>
<td>$626</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>0.38%</td>
<td>$1,132</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>43.43%</td>
<td>$129,421</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100.00%</strong></td>
<td><strong>$298,000</strong></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Analysis Area (Sub-precinct) Number</th>
<th>Project 10 Intern Road Analysis Area 2 to Gray Street Intersection 6</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>% of traffic</td>
<td>Proportion of Cost</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>21.83%</td>
<td>$49,554</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>78.05%</td>
<td>$177,174</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>0.12%</td>
<td>$272</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>0.00%</td>
<td>$0</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>0.00%</td>
<td>$0</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>0.00%</td>
<td>$0</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100.00%</strong></td>
<td><strong>$227,000</strong></td>
<td></td>
</tr>
</tbody>
</table>
### South West Development Precinct
**Infrastructure Cost Sharing Calculations**

<table>
<thead>
<tr>
<th>Analysis Area (Sub-precinct) Number</th>
<th>Project 11 Intersection of Gray Street and Feldmann Lane Intersection 7</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>% of traffic</td>
</tr>
<tr>
<td>1</td>
<td>92.08%</td>
</tr>
<tr>
<td>2</td>
<td>0.13%</td>
</tr>
<tr>
<td>3</td>
<td>0.05%</td>
</tr>
<tr>
<td>4</td>
<td>0.00%</td>
</tr>
<tr>
<td>5</td>
<td>0.00%</td>
</tr>
<tr>
<td>6</td>
<td>7.54%</td>
</tr>
<tr>
<td>Total</td>
<td>100.00%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Analysis Area (Sub-precinct) Number</th>
<th>Project 12 New Access Point to Swan Hill Sea Lake Road Intersection 10</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>% of traffic</td>
</tr>
<tr>
<td>1</td>
<td>56.36%</td>
</tr>
<tr>
<td>2</td>
<td>0.68%</td>
</tr>
<tr>
<td>3</td>
<td>0.76%</td>
</tr>
<tr>
<td>4</td>
<td>0.36%</td>
</tr>
<tr>
<td>5</td>
<td>0.50%</td>
</tr>
<tr>
<td>6</td>
<td>41.18%</td>
</tr>
<tr>
<td>Total</td>
<td>100.00%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Analysis Area (Sub-precinct) Number</th>
<th>Project 13 Roundabout Link Road and Link Road Intersection 12</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>% of traffic</td>
</tr>
<tr>
<td>1</td>
<td>91.18%</td>
</tr>
<tr>
<td>2</td>
<td>0.00%</td>
</tr>
<tr>
<td>3</td>
<td>0.77%</td>
</tr>
<tr>
<td>4</td>
<td>0.17%</td>
</tr>
<tr>
<td>5</td>
<td>0.23%</td>
</tr>
<tr>
<td>6</td>
<td>8.05%</td>
</tr>
<tr>
<td>Total</td>
<td>100.00%</td>
</tr>
</tbody>
</table>
### South West Development Precinct
#### Infrastructure Cost Sharing Calculations

<table>
<thead>
<tr>
<th>Analysis Area (Sub-precinct) Number</th>
<th>Project 14 Roundabout Link Roads 5, 7 and 5 Intersection 13</th>
<th>% of traffic</th>
<th>Proportion of Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>89.76%</td>
<td>$267,485</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>0.00%</td>
<td>$0</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>0.36%</td>
<td>$1,073</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>0.13%</td>
<td>$387</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>0.47%</td>
<td>$1,401</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>9.28%</td>
<td>$27,654</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>100.00%</strong></td>
<td><strong>$298,000</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Analysis Area (Sub-precinct) Number</th>
<th>Project 15 Catchment 1 Retardation Basin to serve north part of Analysis Area 1</th>
<th>%AE</th>
<th>Proportion of Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>100.00%</td>
<td>$250,000</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>0.00%</td>
<td>$0</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>0.00%</td>
<td>$0</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>0.00%</td>
<td>$0</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>0.00%</td>
<td>$0</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>0.00%</td>
<td>$0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>100.00%</strong></td>
<td><strong>$350,000</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Analysis Area (Sub-precinct) Number</th>
<th>Project 15 Catchment 2 Retardation Basin, pump station, using main and outfall drains to service development south part of Analysis Area 1</th>
<th>%AE</th>
<th>Proportion of Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>100.00%</td>
<td>$2,826,000</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>0.00%</td>
<td>$0</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>0.00%</td>
<td>$0</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>0.00%</td>
<td>$0</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>0.00%</td>
<td>$0</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>0.00%</td>
<td>$0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>100.00%</strong></td>
<td><strong>$2,826,000</strong></td>
</tr>
<tr>
<td>Analysis Area (Sub-precinct) Number</td>
<td>Project 17 Catchment 3 Gravity Outfall drains to service development Analysis Area 2</td>
<td>%AE</td>
<td>Proportion of Cost</td>
</tr>
<tr>
<td>------------------------------------</td>
<td>----------------------------------------------------------------------------------</td>
<td>-----</td>
<td>-------------------</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>0.00%</td>
<td>$0</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>100.00%</td>
<td>$201,000</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>0.00%</td>
<td>$0</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>0.00%</td>
<td>$0</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>0.00%</td>
<td>$0</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>0.00%</td>
<td>$0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>100.00%</td>
<td>$201,000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Analysis Area (Sub-precinct) Number</th>
<th>Project 18 Catchment 4 Retardation Basin, pump station, rising main and outfall drains to service development Analysis Areas 3 and part of 11 and 6</th>
<th>%AE</th>
<th>Proportion of Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>38.50%</td>
<td>$1,152,396</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>0.00%</td>
<td>$0</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>27.24%</td>
<td>$813,386</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>0.00%</td>
<td>$0</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>0.00%</td>
<td>$0</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>34.26%</td>
<td>$1,020,018</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>100.00%</td>
<td>$2,986,000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Analysis Area (Sub-precinct) Number</th>
<th>Project 19 Catchment 5 Retardation Basin, pump station, rising main and outfall drains to service part development Analysis Areas 1 and 6</th>
<th>%AE</th>
<th>Proportion of Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>31.90%</td>
<td>$406,087</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>0.00%</td>
<td>$0</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>0.00%</td>
<td>$0</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>0.00%</td>
<td>$0</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>0.00%</td>
<td>$0</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>68.10%</td>
<td>$866,913</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>100.00%</td>
<td>$1,273,000</td>
</tr>
</tbody>
</table>
### South West Development Precinct

#### Infrastructure Cost Sharing Calculations

<table>
<thead>
<tr>
<th>Analysis Area (Sub-precinct) Number</th>
<th>Project 20 Catchment 6 Retardation Basin, pump station, rising main and outfall drains to service development Analysis Area 4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>%AE</td>
</tr>
<tr>
<td>1</td>
<td>0.00%</td>
</tr>
<tr>
<td>2</td>
<td>0.00%</td>
</tr>
<tr>
<td>3</td>
<td>0.00%</td>
</tr>
<tr>
<td>4</td>
<td>100.00%</td>
</tr>
<tr>
<td>5</td>
<td>0.00%</td>
</tr>
<tr>
<td>6</td>
<td>0.00%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100.00%</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Analysis Area (Sub-precinct) Number</th>
<th>Project 21 Catchment 7 Retardation Basin, pump station, rising main and outfall drains to service development Analysis Area 5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>%AE</td>
</tr>
<tr>
<td>1</td>
<td>0%</td>
</tr>
<tr>
<td>2</td>
<td>0%</td>
</tr>
<tr>
<td>3</td>
<td>0%</td>
</tr>
<tr>
<td>4</td>
<td>9%</td>
</tr>
<tr>
<td>5</td>
<td>100.00%</td>
</tr>
<tr>
<td>6</td>
<td>0%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100.00%</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Analysis Area (Sub-precinct) Number</th>
<th>Project 22 Development of Ken Harrison Reserve and purchase and development of POS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>% of residential area</td>
</tr>
<tr>
<td>1</td>
<td>55.17%</td>
</tr>
<tr>
<td>2</td>
<td>7.43%</td>
</tr>
<tr>
<td>3</td>
<td>7.38%</td>
</tr>
<tr>
<td>4</td>
<td>4.37%</td>
</tr>
<tr>
<td>5</td>
<td>11.09%</td>
</tr>
<tr>
<td>6</td>
<td>14.56%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100.00%</strong></td>
</tr>
</tbody>
</table>
South West Development Precinct
Infrastructure Cost Sharing Calculations

<table>
<thead>
<tr>
<th>Analysis Area (Sub-precinct) Number</th>
<th>Area</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1142910.97</td>
<td>$39,725</td>
</tr>
<tr>
<td>2</td>
<td>158326.74</td>
<td>$5,347</td>
</tr>
<tr>
<td>3</td>
<td>152964.25</td>
<td>$5,317</td>
</tr>
<tr>
<td>4</td>
<td>90546.17</td>
<td>$3,147</td>
</tr>
<tr>
<td>5</td>
<td>219627.47</td>
<td>$7,981</td>
</tr>
<tr>
<td>6</td>
<td>301595.39</td>
<td>$10,483</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2071470.99</strong></td>
<td><strong>$72,000</strong></td>
</tr>
</tbody>
</table>
Swan Hill South West Development Precinct
Planning Scheme Amendment C58
Planning Report

Swan Hill Rural City Council

June 2014
<table>
<thead>
<tr>
<th>Table of contents</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contents</td>
<td>2</td>
</tr>
<tr>
<td>INTRODUCTION</td>
<td>3</td>
</tr>
<tr>
<td>Background</td>
<td>3</td>
</tr>
<tr>
<td>Land affected by the project</td>
<td>3</td>
</tr>
<tr>
<td>Current zoning and land uses within SWDP</td>
<td>5</td>
</tr>
<tr>
<td>Overlay affecting the SWDP</td>
<td>7</td>
</tr>
<tr>
<td>Surrounding land uses</td>
<td>8</td>
</tr>
<tr>
<td>STRATEGIC POLICY BACKGROUND</td>
<td>8</td>
</tr>
<tr>
<td>State Planning Policy Framework</td>
<td>8</td>
</tr>
<tr>
<td>Loddon Mallee North Regional Growth Plan</td>
<td>9</td>
</tr>
<tr>
<td>Council Plan 2013-2017</td>
<td>10</td>
</tr>
<tr>
<td>Local Planning Policy Framework</td>
<td>10</td>
</tr>
<tr>
<td>Relevant adopted strategies</td>
<td>11</td>
</tr>
<tr>
<td>CONSULTATION</td>
<td>11</td>
</tr>
<tr>
<td>Consultation prior to the commencement of the amendment</td>
<td>11</td>
</tr>
<tr>
<td>Proposed consultation during public exhibition</td>
<td>13</td>
</tr>
<tr>
<td>PLANNING SCHEME AMENDMENT</td>
<td>13</td>
</tr>
<tr>
<td>INFRASTRUCTURE PROVISION</td>
<td>14</td>
</tr>
<tr>
<td>Existing infrastructure and buildings</td>
<td>14</td>
</tr>
<tr>
<td>Proposed Infrastructure</td>
<td>14</td>
</tr>
<tr>
<td>Triggers for the Provision of Proposed Infrastructure</td>
<td>15</td>
</tr>
<tr>
<td>Infrastructure Standards</td>
<td>15</td>
</tr>
<tr>
<td>Infrastructure Requirements</td>
<td>16</td>
</tr>
<tr>
<td>Community infrastructure</td>
<td>17</td>
</tr>
<tr>
<td>Service Provision</td>
<td>17</td>
</tr>
<tr>
<td>IMPLEMENTATION</td>
<td>18</td>
</tr>
<tr>
<td>REFERENCE DOCUMENTS</td>
<td>18</td>
</tr>
<tr>
<td>APPENDIXES</td>
<td></td>
</tr>
<tr>
<td>Swan Hill South West Development Plan</td>
<td></td>
</tr>
<tr>
<td>South West Development Precinct Infrastructure Cost Sharing Calculations</td>
<td></td>
</tr>
<tr>
<td>South West Development Precinct Drainage Strategy</td>
<td></td>
</tr>
<tr>
<td>Swan Hill South West Development Precinct Traffic Impact Assessment</td>
<td></td>
</tr>
<tr>
<td>Swan Hill South West Development Precinct Traffic Strategy</td>
<td></td>
</tr>
</tbody>
</table>
Swan Hill South West Development Precinct
Planning Scheme Amendment C58

Introduction

The purpose of this report is to provide background information for Amendment C58 (C58) to Swan Hill Planning Scheme. Amendment C58 proposes rezoning of land within the Swan Hill South West Development Precinct (SWDP) to facilitate the supply of residential zoned land to meet the housing needs of future communities. C58 also proposes Schedule 6 to Development Plan Overlay that will implement the orderly development outcome of future residential developments within the SWDP.

Background

The Swan Hill Residential Development Strategy 2006 identified the SWDP as the suitable area for future residential development for the Township of Swan Hill. Accordingly Swan Hill Rural City Council (SHRCC) in consultation with landowners developed a draft Development Plan. Drainage Plan and associated background documents towards an amendment process. However due to various reasons including estimated cost associated with stormwater management within the precinct the project has not been proceeded with.

In 2009, Council has commenced the Review of the Swan Hill Residential Development Strategy. This Strategy while reviewed the previous residential strategy, it also investigated further opportunities for residential land supply. The revised Strategy was adopted by Council at its meeting in March 2013. The Strategy provides directions for future residential development in the municipality and recommends that the previously prepared draft Outline Development Plan for the SWDP to be reviewed.

The current SWDP project includes the review of the previously prepared draft Outline Development Plan, review of the previously prepared drainage plan, stormwater management plan, and develops suitable cost sharing mechanism for the provision of future development infrastructure within the precinct via a series of section 173 agreements under the Planning and Environment Act 1987.

Land affected by the project

The table below shows the land within the SWDP. Total area of land within the Precinct is approximately 244.33ha, of which the Council owned and managed Ken Harrison Reserve and the Feldmann Reserve both zoned Public Park and Recreation Zone (PPRZ) are approximately 17.3ha and 3.8ha respectively. Ken Harrison Reserved will be retained as PPRZ.

---

1 Draft Development Plan was prepared by David Locks and Associates.
Drainage Plan was prepared by Oricon
Development Contributors Plan was prepared by SGS Economics
<table>
<thead>
<tr>
<th>Address</th>
<th>Lot No</th>
<th>TP/PS/LP</th>
<th>Size ha</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>56 Sea Lake-Swan Hill Road, Swan Hill</td>
<td>Lot 1</td>
<td>PS 81008</td>
<td>0.1ha</td>
<td></td>
</tr>
<tr>
<td>71 Sea Lake-Swan Hill Rd, Swan Hill</td>
<td>Lot 1</td>
<td>TP 99093Y</td>
<td>0.1ha</td>
<td></td>
</tr>
<tr>
<td>219 Gray Street, Swan Hill</td>
<td>Lot 1</td>
<td>PS 405842S</td>
<td>1.3ha</td>
<td></td>
</tr>
<tr>
<td>7 Dead Horse Lane, Swan Hill</td>
<td>Lot 1</td>
<td>TP 243546J</td>
<td>2ha</td>
<td></td>
</tr>
<tr>
<td>183-187 Gray Street, Swan Hill</td>
<td>Lot 1</td>
<td>TP 614559H</td>
<td>0.8ha</td>
<td>Will be retained as LDRZ due to proximity to IN1Z</td>
</tr>
<tr>
<td>56 Yana Street, Swan Hill</td>
<td>Lot 1</td>
<td>TP 187649H</td>
<td>17.2ha</td>
<td>Ferri Harrison Reserve will be retained as PPRZ</td>
</tr>
<tr>
<td>Feldmann Lane, Swan Hill</td>
<td>Lot 1</td>
<td>LP 151446</td>
<td>3.8ha</td>
<td></td>
</tr>
<tr>
<td>Dead Horse Lane, Swan Hill</td>
<td>Lot 2</td>
<td>PS 131446</td>
<td>28.2ha</td>
<td></td>
</tr>
<tr>
<td>Sea Lake-Swan Hill Rd Swan Hill</td>
<td>Lot 2</td>
<td>PS 405842S</td>
<td>20.6ha</td>
<td></td>
</tr>
<tr>
<td>Dead Horse Lane, Swan Hill</td>
<td>Lot 1</td>
<td>TP 821121W</td>
<td>18.2ha</td>
<td>Part of the land (about 9000sqm) will be retained FZ</td>
</tr>
<tr>
<td>Dead Horse Lane, Swan Hill</td>
<td>Lot 1</td>
<td>TP 821120Y</td>
<td>51.8ha</td>
<td>Part of the land (about 1ha) is outside the SWDP in LDRZ.</td>
</tr>
<tr>
<td>183-187 Gray Street, Swan Hill</td>
<td>Lot 1</td>
<td>TP 519005</td>
<td>5.7ha</td>
<td></td>
</tr>
<tr>
<td>177 Gray Street, Swan Hill</td>
<td>Lot 1</td>
<td>TP 814607A</td>
<td>0.4ha</td>
<td></td>
</tr>
<tr>
<td>175 Gray Street, Swan Hill</td>
<td>Lot 1</td>
<td>TP 519770S</td>
<td>0.5ha</td>
<td></td>
</tr>
<tr>
<td>173 Gray Street, Swan Hill</td>
<td>Lot 1</td>
<td>PS 424914L</td>
<td>0.9ha</td>
<td></td>
</tr>
<tr>
<td>70 Yana Street, Swan Hill</td>
<td>Lot 1</td>
<td>PS 76581</td>
<td>4.4ha</td>
<td></td>
</tr>
<tr>
<td>96 Yana Street, Swan Hill</td>
<td>Lot 1</td>
<td>TP 179253F</td>
<td>13.9ha</td>
<td></td>
</tr>
<tr>
<td>110 Yana Street, Swan Hill</td>
<td>Lot 1</td>
<td>PS 99806</td>
<td>4.8ha</td>
<td></td>
</tr>
<tr>
<td>116 Yana Street, Swan Hill</td>
<td>Lot 1</td>
<td>TP 265402A</td>
<td>4.8ha</td>
<td></td>
</tr>
<tr>
<td>235 Dead Horse Lane, Swan Hill</td>
<td>Lot 2</td>
<td>PS 124722</td>
<td>13ha</td>
<td></td>
</tr>
<tr>
<td>233 Dead Horse Lane, Swan Hill</td>
<td>Lot 1</td>
<td>PS 124722</td>
<td>0.8ha</td>
<td></td>
</tr>
<tr>
<td>249 Dead Horse Lane, Swan Hill</td>
<td>Lot 2</td>
<td>PS 637281M</td>
<td>4.8ha</td>
<td></td>
</tr>
<tr>
<td>134 Yana Street, Swan Hill</td>
<td>Lot 3</td>
<td>PS 99806</td>
<td>0.6ha</td>
<td></td>
</tr>
<tr>
<td>142 Yana Street, Swan Hill</td>
<td>Lot 1</td>
<td>PS 75634</td>
<td>0.9ha</td>
<td></td>
</tr>
<tr>
<td>148 Yana Street, Swan Hill</td>
<td>Lot 2</td>
<td>PS 75634</td>
<td>0.6ha</td>
<td></td>
</tr>
<tr>
<td>154 Yana Street, Swan Hill</td>
<td>Lot 1</td>
<td>PS 637281M</td>
<td>0.5ha</td>
<td></td>
</tr>
<tr>
<td>75 Yana Street, Swan Hill</td>
<td>Lot 1</td>
<td>LP 117284</td>
<td>3.3ha</td>
<td></td>
</tr>
<tr>
<td>75 Yana Street, Swan Hill</td>
<td>Lot 2</td>
<td>LP 117284</td>
<td>6.7ha</td>
<td></td>
</tr>
<tr>
<td>Coronation Avenue, Swan Hill</td>
<td>Lot 18</td>
<td>LP14827</td>
<td>6ha</td>
<td></td>
</tr>
<tr>
<td>112 Coronation Avenue, Swan Hill</td>
<td>Lot 19</td>
<td>LP 14827</td>
<td>6.1ha</td>
<td></td>
</tr>
<tr>
<td>112 Coronation Avenue, Swan Hill</td>
<td>Lot 2</td>
<td>LP 265653S</td>
<td>11.4ha</td>
<td></td>
</tr>
<tr>
<td>152 Coronation Avenue, Swan Hill</td>
<td>Lot 1</td>
<td>LP 265653S</td>
<td>0.8ha</td>
<td></td>
</tr>
</tbody>
</table>

The SWDP also includes land currently used by the Goulburn Murray Water channel. The authority is in the process of decommissioning the channel infrastructure and reinstates the land. However, future developments on land that are reclaimed as a result of decommissioning of the Goulburn Murray Water Channel infrastructure requires further investigation to demonstrate the suitability of the land for build on for habitable and other purposes.
Current zoning and land uses within SWDP

As shown in map below, majority of the land within SWDP is Farming Zone (FZ) with an exception to land along the south side of Gray Street, east of Yana Street and west of Coronation Avenue which are zoned Low Density Residential Zone (LDRZ).

Most of the land within the precinct are predominantly used for combination of dry land and irrigated farming. Small FZ parcels along west side of Yana Street are used for residential purpose. Smaller parcels of land zoned LDRZ along the southern side of Gray Street are too used for residential purposes while the larger parcels of along this section are used for farming activities.

Small parcels of FZ land that located on south west corner of Gray Street and Swan Hill – Sea Lake Road are too being used for residential purposes (69 Sea Lake-Swan Hill Road, 71 Sea Lake-Swan Hill Road and 219 Gray Street, Swan Hill). However, it is believed that these properties are located within the minimum setback requirements specified in Clause 52.10 of the Swan Hill Planning Scheme to the existing industrial activities on the east side of Gray Street. This 100 metre setback was measured from the polystyrene products operation at No. 2-4 McAllister Road, Swan Hill. As such these land cannot be rezoned for residential purposes and will be retained FZ. The landowners were advised of this matter and were invited to justify if they believe their land should be included in the residential zoning.
When applied the same setback requirements to Lot No. 2 PS 405842 Sea Lake- Swan Hill Road, it is found a 70metre setback was required inside the property to make up the 100metre setback from the above polystyrene products activity, this setback is 20 meters more than what the landowners proposed. This setback within Lot No. 2 PS 405842 Sea Lake- Swan Hill Road will also be retained Farming Zone as indicated in the draft Swan Hill South West Development Plan.

The land located at the south east corner of Dead Horse Lane and Swan Hill – Sea Lake Road (No. 7 Dead Horse Lane, Swan Hill) will also be retained FZ. Due to the history of its previous uses, an environmental audit of the site is required prior to the land can be considered for residential rezoning. Representatives of the owners of the land have been advised of this issue and were invited to submit an environmental audit to justify the suitability of the land for residential zoning. This land will also be retained as FZ until the above matter is addressed.

Further, a 15 metre buffer is proposed on the adjoining land to protect the future residential amenity from activities of this FZ land.

The LDRZ properties along the southern side of Gray Street that are within the SWDP were invited to justify their suitability and required minimum setbacks as per the requirements Clause 52.10 of the Swan Hill Planning Scheme. Information provided by landowners claims these properties are located outside the minimum setback. However, it is noted that as per the requirements of Clause 52.10 the concrete batching use at No. 9 Quin Drive, Swan Hill requires 300 metre setback from residential uses. As such the entire Lot No. 1 TP614599 and the northern section of Lot No.1 TP519005 both properties known as No. 183-187 Gray Street could not be rezoned from LDRZ to GRZ as they are located within the 300 metre setback. The remaining southern section of Lot No.1 TP519005 (outside the existing dwelling and associated outbuildings) will be rezoned to GRZ.

The Council owned Ken Harrison Reserve is zoned PPRZ and used for recreational activities and will be kept as PPRZ. The Development Plan for SWDP identifies this reserve as a public open space for future residential uses. The Reserve currently fronts to Yana Street. A small 50 X 40 metre public open space ‘pose area’ is proposed at the south west corner of the Reserve to provide pedestrian access to the Reserve from SWDP. In addition, the proposed collector roads and the shared paths are too designed to provide linear, efficient and safe access to Ken Harrison Reserve from the development.

Project No 22 - Development of Ken Harrison Reserve and purchase and development of public open space identified in the ‘South West Development Precinct Infrastructure Cost Sharing Calculations’ will be used to purchase land for and develop the small public open space ‘pose area’ and to upgrade the facilities at Ken Harrison Reserve as identified in the approved Master Plan for the Reserve.

The Council owned and managed Feldtmann Reserve located within the SWDP is currently used by a Pony Club. This reserve will be rezoned for residential uses and the Pony Club will be relocated to the exiting Equestrian Facility at E.F. Butler Reserve in Tynyns South or another suitable location.
Overlays affecting the SWDP

There are three overlays affecting the land within the SWDP. Development Plan Overlay – Schedule 2 (DPO2) affects the land zoned LDRZ. This DPO 2 will be removed and will be replaced with a new Scheduled DPO6 that will be applied to all land to be rezoned for residential purpose within SWDP.

The southern boundary along Werri Street of the SWDP is affected by Airport Environ Overlay (AEO) and a Design and Development Overlay (DDO). These overlays will be retained.

Surrounding land uses

Most of the surrounding uses along the north and western sides of the Precinct are residential, with an exception of the industrial uses on the north east corner of Gray Street, the Council owned reserve and the Swan Hill Primary School both located south of Gray Street. These lands are zoned Public Use Zone -PUZ 6 and PUZ2 respectively. Uses along the west of Dead Horse Lane and the south of Werri Street are predominately farming with exception to residential activities towards the east end of Werri Street.
Sea Lake- Swan Hill Road borders a section of the northern boundary of the Precinct zoned Road Zone Category 1 (RD1Z). Majority of the eastern half of the northern boundary is bounded by Gray Street zoned both Industrial 1 Zone and LDRZ. Dead Horse Lane and Warren Street border the western and southern boundaries of the Precinct respectively, whereas Coronation Avenue, a section of Yana Street and various private properties border the eastern boundaries of the Precinct. A section of Yana Street also runs north-south through the Precinct and zoned Road Zone Category 2 (RD2Z).

**Strategic policy background**

**State Planning Policy Framework (SPPF)**

The proposed rezoning and future residential and associated developments within the SWDP are consistent with the SPPF. Clause 11 (Settlement) of the SPPF states that:

*Planning is to anticipate and respond to the needs of existing and future communities through provision of zoned and serviced land for housing, employment, recreation and open space, commercial and community facilities and infrastructure. Planning is to recognise the need for, and as far as practicable contribute towards:*

- Health and safety.
- Diversity of choice.
- Adaptation in response to changing technology.
- Economic viability.
- A high standard of urban design and amenity.
- Energy efficiency.
- Prevention of pollution to land, water and air.
- Protection of environmentally sensitive areas and natural resources.
- Accessibility, and
- Land use and transport integration.

Above directions from the SPPF are acknowledged, recognised and incorporated in the preparation of the DP and associated provisions for the SWDP.

Clause 11.02 (Urban Growth) within the SPPF requires “to ensure a sufficient supply of land is available for residential, commercial, retail, industrial, recreational, institutional and other community uses”. As identified by the Review of the Swan Hill Residential Strategy 2013, the main aim of the rezoning of land for residential uses within the SWDP is to ensure the supply of appropriately zoned residential land to meet the current and future communities of Swan Hill.

The clause also emphasises the importance of infrastructure to support sustainable urban development. The proposed DP for the SWDP ensures the provision of relevant development and community infrastructure are planned and provided in the Precinct. Infrastructure that is identified and planned for includes collector streets, internal streets, shared paths, bus stops, public open space, upgrades to existing intersections, retardation
basins, overland flow paths for managing stormwater, and a retail area for convenience stores.

Standards and quality of development infrastructure provided within the Precinct will be in accordance with the standards specified within the Local Government Infrastructure Design Manual (version as updated).

In addition, to the above, the DP recognises the need for and supports the provision of aged care facilities, child care centres and medical centres within the SWDP. Use and development of these facilities and any other relevant social, community and commercial uses can be supported within the Precinct as needed and as per the requirements of Swan Hill Planning Scheme.

Clause 16 (Housing) of the SPPF specifies that:
- Planning should provide for housing diversity, and ensure the efficient provision of supporting infrastructure.
- New housing should have access to services and be planned for long term sustainability, including walkability to activity centres, public transport, schools and open space.
- Planning for housing should include providing land for affordable housing.

The proposed DP for SWDP carefully considers the above directions including the provision of necessary development and social infrastructure, long-term sustainability, encourage walkability by the provision of shared path, provision of bus stops for future public transport, the and provision of and efficient access to open spaces within the Precinct. It also aims to, and supports the supply of affordable housing by encouraging small residential lots in suitable locations with appropriate orientations. These will not only ensure affordability during purchase, but will also be affordable live in these as houses as the right orientation will reduce the cost of heating and cooling in different seasons and allow natural light and ventilation into the houses.

**Loddon Mallee North Regional Growth Plan (LMNRGP)**

The LMNRGP was adopted by Council in November 2013 as it was by other four municipalities within the Loddon Mallee North Region. The Plan amongst other things recognises the need for appropriately zoned land to meet the increasing need of variates of residential uses in the region. It acknowledges the SWDP being identified for the provision of future residential land supply.

It also recognises continues increase in housing prices. affordable and sustainable housing needs, quality and standards of development infrastructure, the need to create places that encourage active and healthy living and integrated development that encourage use of public transport.

The proposed draft Development Plan for the SWDP and the Schedule 6 to DPO ensure the achievement of the above goals outlined in the LMNRGP and quality development outcome.
Council Plan 2013-2017 - Council's vision for housing

Council Plan 2013 – 2017 sets out Council’s targets for service delivery and provides strategic directions to achieve them. It emphasises the need to support appropriate accommodation options for the growing economy, and aims to complete respective amendments to the Swan Hill Planning Scheme to support the supply of future housing.

The Council Plan also states that Council is seeking to grow the regional population to 40,000 by 2040 (also referred in Clause 21 of the Swan Hill Planning Scheme). The proposed residential rezoning will contribute to achieve this goal by facilitating the supply of residential land.

Local Planning Policy Framework (LPPF)

The LPPF of the Swan Hill Planning Scheme consists of two major clauses. Clause 21 being the Municipal Strategic Statement (MSS) and Clause 22 contains local (planning) policies.

Clause 21.02 (Settlement) recognises that:

- Moderate population growth is expected in Swan Hill and Robinvale.
- The size of households has declined over time and is consistent with general national trends.
- The population is ageing and will require a diversified housing stock.

The proposed rezoning of land within the SWDP will increase the supply of residential zoned land to meet the housing needs of the growing population. Decline in household size with increase in population means more demand for variety of housing types including one to two bedroom units and townhouses as generally small households prefer this type of accommodations. Equally the aging population also means increasing needs for low-maintenance small houses for downsizing, and increasing demand for variety of retirement villages and age care facilities, including lifestyle living, independent living units, semi-care facilities, high-care facilities and palliative care units. Residential rezoning within SWDP and the associated DP recognise the need for and facilitate future aged care facilities within the Precinct.

Clause 21.02.2 (Settlement and housing) recognises “the provision of an alternative to Tower Hill in Swan Hill as a new residential development front”. The proposed development within the SWDP provides alternative residential fronts for the Township of Swan Hill.

Relevant adopted strategies
The Review of Swan Hill Residential Development Strategy 2006-2013 identifies SWDP for future residential development. Although the Strategy suggests mixture of GRZ and LDRZ for the SWDP, Council chooses to use only GRZ for the following reasons:

- Lower Murray Water the authority responsible for sewer and water is supportive of the amendment and confirmed that SWDP could be serviced with recycled sewer and water.
- To provide fair and equal opportunity to all landowners (big and small) within the precinct opportunity to develop. There are total of 23 private landowners within the precinct who have experienced many delays in attempts to rezone this land. The previous attempts were based on a mixture of LDRZ and Residential 1 Zone (former zone) which in Council’s opinion will make it a difficult task to stage the development. As such, Council has decided to allow for all land that can be serviced to be rezone GRZ and introduced a sub-precinct approach with Section 173 agreements where landowners within each sub-precinct can share the infrastructure cost and develop their land as they prefer.
- However, as in any development the market will guide and determine the supply and release of the land.

Public Health and Wellbeing Plan – recognises the need to incorporate Healthy by Design principles in future residential developments.

Swan Hill Economic Development Strategy 2011-2015 (2011) highlights the importance of attracting new residents, and encouraging economic activities that can generate employment opportunities.

Swan Hill Reserves Master Plan – lists the upgrades required for Ken Harrison Reserve.

Consultation

Consultation prior to the commencement of the amendment.

During the preparation of the revised Development Plan series of consultation have been undertaken with the landowners within the SWDP. Where possible and appropriate landowners’ requirements have been incorporated into the revised Development Plan.

Further, landowners were consulted as individual groups at sub-precinct level to discuss the cost sharing options. They were presented with information on all the infrastructure projects required in future developments, cost of these projects, and the following four options available for sharing the cost for the infrastructure projects.

1. Option 1 – Development Contribution Plan
2. Option 2 – or more Development Contribution Plans to match the rate of proposed development in Swan Hill.
3. Section 173 Agreements for sub-precincts.
4. A combination of DCP and section 173 Agreements
Landowners were requested to choose an option from the above four. Landowners attended the consultation meetings choose Section 173 option for the provision of infrastructure.

Accordingly the required section 173 agreements were prepared by legal professionals and the drafts were sent to the landowners for comments prior to them being finalised for signing.

Where needed State agencies were too consulted with and without landowners to promote and facilitate landowners’ interest without compromising agencies requirements.

In addition to the formal meetings, Council Officers met with landowners and their representatives when needed and or at landowners’ request.

Further, landowners were kept informed via written correspondence of the progress of the project.

In addition to the consultation with the landowners, series of consultation were undertaken with the following State agencies.

- **Lower Murray Water Authority** – No objection and supports the amendment in principle
- **Goulburn Murray Water Authority** – No objections and supports the amendment in principle
- **Country Fire Authority** – No objections and supports the amendment in principle
- **VicRoads** – The authority does not have any objections to the proposed development Plan, except for providing direct access to Sea Lake – Swan Hill Road.

The traffic impact assessment undertaken for the Development Plan specifies the upgrades requirements for the provision of safe and convenient direct access to Sea Lake – Swan Hill Road.

Recommended upgrades have been incorporated as part of the infrastructure provision and necessary arrangements have been put in place to ensure the upgrades are completed at the right time to the quality and standards required.

During the exhibition period, VicRoads will be able to provide formal comments on the proposed direct access indicated on the draft Development Plan.

- **Department of Environment and Primary Industries** – No objections and supports the amendment in principle. The authority also supportive for environmental impact assessment and soil testing requirements to be included in the Schedule 6 to the DPO. Especially, given the 40 years residential supply/development time of the Precinct, there could be changes in land use practises which will impact on the environment and flora and fauna. As such it is agreed that it will be appropriate to undertake such assessments at the time of development.

- **Department of Transport** – The Department recommends increased densities especially along the proposed public transport route. The proposed Schedule 6 to the DPO encourages increased densities along the collector roads and around the activity areas.
• **Aboriginal Affairs Victoria** – The authority is supportive of the amendment and informed there is no known cultural heritage significance within the SWDP. The authority provided notes to be included in planning permits in relation to cultural heritage significance. These notes are included in the proposed Schedule 6 to the Development Plan Overlay.

• **Department of Transport, Planning and Local Infrastructure** – Throughout the development of the revised Development Plan the Department had been consulted and kept informed of the progress of the Plan. The Department also reviewed the amendment documents prior to submitting for authorisation. The Department is generally supportive of the amendment.

All the relevant agencies will be formally notified during exhibition process.

Relevant internal departments were consulted during the development of the draft Development Plan and background documents. In particular, inputs were sought from Asset Management Department, Engineering Department, Environment Sustainability Unit, Council Veluer, Economic Development, and Community Facilitation Unit.

**Proposed consultation during public exhibition**

Upon receipt of the authorisation, public exhibition will be held for a period of four weeks. During the public exhibition period, the owners and occupiers of affected land and the adjoining properties will be notified. And a public notice will be published at the local newspaper the *Guardian* each Friday. Two drop-in sessions will also be held for public and agencies to drop in and discuss the amendment and clarify any issues with Council Officers. A Notice of Amendment will also be published at the Government Gazette.

Further, amendment documents will be made available at Council website, and Council Office.

In addition, notices will be sent to the Prescribed Ministers, relevant State agencies and any other agencies as required by the Minister for Planning during authorisation.

**Planning Scheme Amendment**

The amendment proposes the following:

**Rezoning:**

• Rezones Farming Zone to General Residential Zone in map No. 39
• Rezones Low Density Residential Zone into General Residential Zone in maps Nos. 39 and 40
• Rezones Public Park and Recreation Zone into General Residential Zone (Feldtmann Reserve) in map No. 39
• Rezones Farming Zone to Commercial 1 Zone (proposed retail activity area within the SWDP) in map No. 39
• Rezones Farming Zone to Public Park and Recreation Zone (proposed small Public Open Space within the SWDP) in map No. 39.

Overlays:
• Amends maps Nos. 39 DPO and 40 DPO to introduce the new DPO6 and to delete DPO2 from land within the SWDP, and
• Introduces new Schedule (DPO6) to Clause 43.04.

INFRASTRUCTURE PROVISION

Existing infrastructure and buildings

The following street and other infrastructure are currently available within the SWDP.

• Goulburn Murray Water Channel No 9 and other small channels
• Kan Harrison Reserve - Swan Hill Rural City Council
• Equestrian Reserve – Swan Hill Rural City Council
• Dead Horse Lane – Rural road
• Werril Street – Road Zone Category 2
• Yara Street – Road Zone Category 2
• Coronation Avenue – Urban road
• Gray Street – Urban road
• Sea Lake – Swan Hill Road – VicRoads Road Zone Category 1
• Feldmann Lane – unmade local street and
• Existing dwellings and associated outbuildings – private

Proposed Infrastructure

The following infrastructure is proposed to service the SWDP as identified in the Swan Hill South West Development Precinct Traffic Impact Assessment Report and as indicated in the Swan Hill South West Development Plan (only for infrastructure within the SWDP).

• Collector streets
• Intersections and upgrades (Yara Street and new collector street intersection, Coronation Avenue and new collector street intersection, Gray St, Feldmann Lane widening and intersection with Gray Street, Dead Horse Lane Sea Lake Road intersection.
• Collector road exit to Sea Lake - Swan Hill Road (Option 1) and via Dead Horse Lane (Option 2) are shown on the draft Development Plan. However, only one option is required to serve the development. Council’s preferred option 1 has been discussed with VicRoads; however the authority is not supportive of the option as it will impact on the functionality of the arterial road. The traffic impact assessment undertaken for
the development discuss the minimal impact on the arterial road of Option 1, and the necessary upgrades required at this intersection to support direct exit to Sea Lake – Swan Hill Road. As such Council prefers to proceed with this option.

- Shared paths on both sides of collector streets
- Internal streets
- Drainage infrastructure including pipes, pits, retardation basins (including landscaping), rising mains and associated infrastructure
- Street trees and footpaths in local streets
- Street furniture – by Council in the future
- Upgrades to the existing Ken Harrison Reserve. Public Open Space contribution collected from SWDP will be used to upgrade the Ken Harrison Recreation Reserve in accordance with an approved Master Plan for the reserve and to purchase and develop a small parcel of land for PCS.
- A small 50m x 40m Public Open Space (PPRZ)
- 75m x 40m Commercial 1 Zone land to provide retail activities
- Intersection upgrades
- Entry features
- Street lights

Triggers for the Provision of Proposed Infrastructure

The triggers for provision of common infrastructure are listed in Clause 6 of the Swan Hill South West Development Precinct Infrastructure Cost Sharing Calculations.

In summary this document states all intersections to be provided and upgraded must be carried out at the time of the construction of streets leading into that intersection.

There is a specific trigger for the provision of the collector street between east of Yana Street and Coronation Avenue and construction of a roundabout at the intersection of Coronation Avenue and the collector street.

This requires the construction of this collector street upon

- The completion of the collector street identified as Link Road 2, or
- The completion of 50% of the residential land in sub-precinct 5 whichever occurs first.

Infrastructure Standards

Each developer will be required to build infrastructure to service the development in accordance with the standards set by the relevant service authorities. In the case of infrastructure to be gifted to the Rural City of Swan Hill the infrastructure standards are specified in the Local Government Infrastructure Design Association’s Infrastructure Design Manual (IDM, version as updated) and the specifications of Council.
The developer will be responsible for the maintenance of infrastructure and landscaping, after the handover of assets to Council, for the periods specified in the IDM, unless otherwise agreed in writing by Council.

**Infrastructure Requirements**

Concept infrastructure requirements for traffic and drainage servicing the SWDP have been prepared by Council to assist developers and Council in the planning for this planning scheme amendment and determining the viability of this rezoning. These concept infrastructure requirements are listed in the following documentation:

- Swan Hill South West Development Precinct Drainage Strategy
- Swan Hill South West Development Precinct Traffic Impact Assessment
- Swan Hill South West Development Precinct Traffic Strategy
- Swan Hill South West Development Precinct Infrastructure Cost Sharing Calculations

Further detailed design and studies as listed within the proposed Schedule 6 to the Development Plan Overlay will be required before development can commence.

**Provision of Infrastructure - Funding**

The Planning and Environment Act 1987 specifies that infrastructure provision can be funded by either or a combination of:

- Development Contributions Plans (DCP)
- S173 Agreements

In considering the length of time to complete the development (in excess of 40 years) within the SWDP and the associated difficulties in determining standards and costs over that timeframe it was determined to enter into a series of s173 Agreements to facilitate development.

One advantage in the use of s173 agreements was that together with subdividing the SWDP into 6 sub-precincts development could commence in each of these sub-precincts independently of other sub-precincts.

The methodology used to achieve this aim is as follows:

1. Determine the cost sharing to all landowners as if a DCP was to be implemented.
2. Allocate the costs to Analysis Areas (sub-precincts) as per in a DCP.
3. Allocate each sub-precinct to carry out “works in kind” to the approximate value of their contribution determined under step 2.
4. Get the landowners to agree to allocation of “works in kind” to each sub-precinct before the planning scheme amendment is approved. (Level 1 s173 Agreement.)
5. Identify any infrastructure that is servicing more than one sub-precinct and determine the costs sharing and other arrangements for the provision of this infrastructure and obtain agreement from all the landowners with the benefiting sub-precincts before the planning scheme amendment is approved (Level 2 s173 Agreement)
6. Determine the cost sharing between landowners within a sub-precinct for the works in kind allocated to that sub-precinct. This agreement is required before development can commence within a sub-precinct. (Level 3 s173 Agreement). This agreement will not require all landowners within the sub-precinct to sign it but those that do sign it must be prepared to fund 100% of the works in kind allocated to that sub-precinct.

The analysis of applying the above principles to the provision of infrastructure is detailed in Swan Hill South West Development Precinct Infrastructure Cost Sharing Calculations.

Community Infrastructure

South West Development encourages the provision of community services such as medical centre, childcare centre and aged care facilities within the precinct. It identifies the need for and designates a small 40 X 75 metre area for the retail activities that can provide neighbourhood activity type of activities for future residents. A small 50x40metre ‘pose area’ has been identified adjacent to the exiting Ken Harrison Reserve. This area will be rezoned to Public Park and Recreation Zone and will be developed as a focal point and a pose area for public to sit and relax. These public areas are located in the centre of the prescient and will be linked by internal roads and shared paths.

In addition to the above, appropriate non-residential and community uses can be considered in the future as per the requirements of the proposed General Residential Zone.

Department of Education will be consulted during public exhibition. The Department will be able to incorporate future development of this area in their strategic planning for the Township of Swan Hill.

Service Provision

The local water and sewer authority Lower Murray Water indicated its support for the rezoning. Upon satisfying the authority’s requirements, future developments can be connected to reticulated water and sewer services through the subdivision process.

There several properties connected to rural water supply through irrigation channels from Goulburn Murray Water Authority. Provision of rural water is not within the control of SHRCC. As such, future residential properties wish to receive rural water will have approach GMW for such arrangements.

Electricity, telecommunication, internet broadband including the provision for NBN will be addressed through the subdivision process of individual properties. Swan Hill does not have reticulated natural gas, however, if natural gas becomes available in the future, properties within the South West Development area will be able to tap into the service like any other developed urban areas of Swan Hill Township.

The SWDP designate areas for future bus stops. These bus stops will be provided by Council or other statutory authority and will not be the responsibility of the developer.
Implementation

The approved Swan Hill South West Development Plan will be implemented through the amendment C58 to the Swan Hill Planning Scheme Amendment. The amendment amongst other things introduces Schedule 6 to the Development Plan Overlay (DPO6). DPO 6 outlines the prerequisites, standards and cost sharing arrangements required to ensure the orderly development of Swan Hill South West Development Precinct.

There are number of agreements under section 173 of the Planning and Environment Act 1987 that have been proposed to ensure current and future landowners provide the agreed infrastructure.

Where necessary, the approved plan, and agreements may be modified by Council to accommodate future circumstances of landowners, Council and agencies.

REFERENCE DOCUMENTS

The following supporting documents are prepared by the Council to inform the South West Development Plan and the associated planning scheme amendment.

- Swan Hill South West Development Plan (approved and or revised thereafter)
- Infrastructure Design Manual (version as updated)
- South West Development Precinct Infrastructure Cost Sharing Calculations dated \( \text{xxx} \) (or as reviewed thereafter),
- South West Development Precinct Drainage Strategy dated \( \text{xxx} \) (or as reviewed thereafter)
- Swan Hill South West Development Precinct Traffic Impact Assessment dated \( \text{xxx} \) (or as reviewed thereafter), Swan Hill South West Development Precinct Traffic Strategy dated (or as reviewed thereafter)
- Background report and environmental impact assessment (Flora fauna assessment from previous reports, if not use the discussions in this report)
Swan Hill South West Development Precinct Drainage Strategy

Version 4.1
Swan Hill Rural City
21 June 2014.
South West Development Precinct
Drainage Strategy

1. Introduction ..................................................................................................................... 3
2. Objectives ......................................................................................................................... 3
3. Methodology and Assumptions ....................................................................................... 4
4. Site Context ...................................................................................................................... 6
   4.1 General .......................................................................................................................... 6
   4.2 Existing Council Infrastructure ................................................................................. 8
5. Catchments ...................................................................................................................... 8
   5.1 Location and sizing ...................................................................................................... 8
   5.2 Catchment Characteristics ......................................................................................... 10
6. Retarding Basin and Outfall Pipe Sizes ....................................................................... 11
   6.1 Retardation Basin and Outfall Pipe Sizes ................................................................ 11
   6.2 Earthwork Volumes .................................................................................................... 11
   6.3 Gravity Drains ............................................................................................................ 12
7. Overland Flow Paths .................................................................................................... 13
8. Temporary Drainage Infrastructure .............................................................................. 13
9. Standards of Construction ........................................................................................... 14
10. Landscaping of the Drainage Reserves Containing Retardation Basins ...................... 14
11. Estimated Costs ............................................................................................................. 14
Appendix – Drainage Computations .................................................................................. 15
1. **Introduction**
This strategy has been prepared to assist Council to implement the rezoning of land within the bounds of the South West Development Precinct.

This has been a long term desire of Council to provide for the future residential growth for Swan Hill. Over time the requirements for the type and density of development to be permitted within this precinct and as a result there is a need to update a previous drainage study which was prepared for this precinct.

This strategy is based upon the study completed by M Dang of Aurecon entitled Swan Hill South West Development Precinct – Stormwater Drainage Schematic Design Study (Version 3, 5/12/2011, Doc Id 225232 001/350).

Since that report was completed following changes that have occurred:

- The rezoning proposed for the precinct has changed from partly Res 1 and partly LDR2 to the majority of precinct being rezoned to General Residential Zone. There are some other minor zoning changes but these do not affect the outcomes of this strategy and therefore they have been ignored.
- Council wishes to reduce future operational and maintenance costs of the drainage system by reducing the number of retarding basins, pump stations and rising mains proposed in the Aurecon Report.
- Council adoption of the Infrastructure Design Manual (IDM) as the design standard for new developments has an impact on the design of the drainage infrastructure.

This updated drainage strategy will provide Council and developers with the necessary drainage information to enable the provision of drainage infrastructure to serve the land within the precinct so that development can proceed in a logical and orderly manner so that the objectives of this drainage strategy are met.

2. **Objectives**
The objectives of this drainage strategy are as follows:

1. To ensure that the drainage infrastructure provided to serve the South West Development Precinct is planned, effective and avoids the unnecessary provision of infrastructure that will increase Council’s future maintenance and renewal costs.

2. To provide drainage infrastructure which will allow for a number of development fronts to open up within the precinct without compromising the other objectives of this strategy.

3. To ensure that the drainage being discharged from this precinct does not adversely impact the existing Council drainage infrastructure or the environment.
4. To identify the additional detailed drainage design requirements that are required for any area within the precinct to commence development.

5. To allow the review, assessment and approval of future detailed drainage designs required by Council before development can proceed against the requirements of this strategy.

6. To ensure that overland flow paths are identified and provided to the satisfaction of Council.

3. Methodology and Assumptions
Calculations have been done using the major and minor storm approach and the Rational Method as described in Australian Rainfall and Runoff. Some of the work previously done by Aurecon has been adopted for this report.

Rainfall Intensity Frequency Duration data for Swan Hill has been adopted from Table 3.1 of the Aurecon study as shown below.

<table>
<thead>
<tr>
<th>Duration (minutes)</th>
<th>Rainfall Intensity mm/hr</th>
<th>Average Storm Recurrence Interval 5 years</th>
<th>Average Storm Recurrence Interval 100 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>66.01</td>
<td>126.35</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>47.21</td>
<td>89.43</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>37.7</td>
<td>71.03</td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>31.72</td>
<td>59.57</td>
<td></td>
</tr>
<tr>
<td>50</td>
<td>27.56</td>
<td>51.63</td>
<td></td>
</tr>
<tr>
<td>60</td>
<td>24.46</td>
<td>45.75</td>
<td></td>
</tr>
<tr>
<td>90</td>
<td>18.56</td>
<td>34.64</td>
<td></td>
</tr>
<tr>
<td>120</td>
<td>15.15</td>
<td>28.24</td>
<td></td>
</tr>
<tr>
<td>150</td>
<td>12.91</td>
<td>24.03</td>
<td></td>
</tr>
<tr>
<td>180</td>
<td>11.3</td>
<td>21.04</td>
<td></td>
</tr>
<tr>
<td>210</td>
<td>10.1</td>
<td>18.79</td>
<td></td>
</tr>
<tr>
<td>240</td>
<td>9.16</td>
<td>17.03</td>
<td></td>
</tr>
<tr>
<td>270</td>
<td>8.4</td>
<td>15.62</td>
<td></td>
</tr>
<tr>
<td>300</td>
<td>7.77</td>
<td>14.45</td>
<td></td>
</tr>
</tbody>
</table>

Runoff coefficients have been adopted from Table 6.2 of the Aurecon study as shown below.

<table>
<thead>
<tr>
<th>Land Use Zone</th>
<th>Fraction Impervious</th>
<th>Runoff Coefficient C5</th>
<th>Runoff Coefficient C100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farming Zone</td>
<td>0.1</td>
<td>0.21</td>
<td>0.266</td>
</tr>
<tr>
<td>Residential 1 Zone</td>
<td>0.45</td>
<td>0.461</td>
<td>0.582</td>
</tr>
<tr>
<td>Low Density Residential</td>
<td>0.2</td>
<td>0.282</td>
<td>0.356</td>
</tr>
<tr>
<td>Public Park &amp; Recreation</td>
<td>0.1</td>
<td>0.21</td>
<td>0.266</td>
</tr>
</tbody>
</table>
The following design assumptions have been adopted for this strategy:

- The existing main drain and Yana Street drains have limited capacity to accept additional stormwater runoff without major upgrades, therefore only Catchment 3 has been allowed to discharge directly into the drain. Other catchments may be discharged to the main drain via retarding basins provided that discharge is delayed by 12 hours. This will allow the main drain to empty before receiving discharges from the catchments covered by this strategy.

- Discharge to the existing southern drain may only occur after a 6 hour delay.

- A stormwater treatment wetland exists at the main drain outfall and no further treatment is required within the South West Development Precinct.

- It has been assumed that no overland flow will cross Deadhorse Lane from the farming zones to the west and south. Discussion with Council and council staff have revealed that stormwater runoff to the west of Deadhorse Lane does soak into the sand layers until it reaches the clay layer whereupon it flows along the clay layer and discharges out of the soil some days later on land east of Feldtmann Lane and south of Gray Street. Due to the time lag for this discharge to reach the proposed drainage system it will have no impact upon the sizing of the retardation basin or underground pipes. The issue of the impacts of these discharges will need to be determined (by developers to the satisfaction of Council) prior to development commencing.

- Discharge to the existing open drain in Sea Lake Swan Hill Road to be restricted to gravity discharge from a single 300mm pipe.

- Depth of retarding basins no longer restricted to 1.5m to allow for fewer basins placed further apart from each other.

**Ground Water Table Assumptions and Preliminary Testing**

Information on the local ground water table levels has been obtained from the DEPI website [http://data.water.vic.gov.au/monitoring.htm](http://data.water.vic.gov.au/monitoring.htm). Ground water table levels have been recorded at bore number 26808 located near the intersection of Butterworth Street and Woorinen Rd, Swan Hill for the period 1986 to 2012. These records show that 95% of recorded levels are at or below AHD 66.04m.

Natural surface levels at the retarding basin sites vary from 56.75m to 68.0m.

Due to the possibility that groundwater levels would impact the design of the basins and the need to provide geotextiles and clay liners test excavations were dug at each site of a proposed retardation basin to determine the presence of groundwater. Monitoring bores were not installed at this time and will be a requirement placed a developers before development proceeds.

The results of the test excavations as shown in the...
Based on the testing carried out it has been assumed that the level of groundwater at each site that there is no impact on the design or construction of the retardation basins.

At least 6 months prior to development commencing in any of the above catchment areas developers will need to install a monitoring bore and monitor the level of any ground water table so that Council can be satisfied that the detailed design of retardation basins has adequately addressed the impacts of any groundwater table that may be present in the area of the proposed retardation basin.

4. **Site Context**

4.1 **General**

The Swan Hill South West Development Precinct is bounded by Sea Lake – Swan Hill Road, Dead Horse Lane, Coronation Avenue and Gray Street as shown in Map 1.
Map 1 Swan Hill South West Development Precinct

The majority of the development precinct is currently Farming Zone (FZ) used for agricultural purposes. The precinct is bounded by residential development to the north and east as Residential 1 Zone (R1Z) and Low Density Residential Zone (LDRZ). Towards the south and west of the precinct the land use is currently FZ.

Minor open irrigation channels are located within the precinct serviced from the main irrigation channel (Channel No. 9) located between Yana Street and Coronation Avenue as shown in Map 2 on the next page.

Discussions with Goulburn Murray Water have indicated that the main irrigation channel is proposed to be piped underground and that the minor open irrigation channels within the precinct will be removed.

This drainage study assumes that existing open irrigation channels within the precinct are abandoned and removed.
4.2 Existing Council Infrastructure

There are a number of existing drainage issues and constraints surrounding the development precinct. These are summarised below:

- An existing concrete lined open channel is located north of the precinct near Gray Street. Council’s main drain is currently servicing Swan Hill and outfalls towards the Murray River at the north end of Swan Hill.
- The existing piped drainage system is unable to accommodate the whole of the development within the precinct. The existing concrete lined main drain is capable of accepting development flows subject to some discharge and timing constraints.
- The main drain is relatively flat with a grade of approximately 1 in 5000, however the cross sectional area does have the capacity for the development once the flows from existing drainage system have passed. The outfall for the main drain is approximately 4.5km north east of the development and is treated and ultimately pumped into the Murray River.
- The main drain acts as a retarding basin as the flows to the river are highly restricted due to the existing pump rates.

5. Catchments

5.1 Location and sizing

Catchment boundaries have been determined firstly by following ridge lines and secondly by following property boundaries. This resulted in 7 catchments as shown Map 3 Catchment Boundaries.
The areas and outfalls of the catchments are shown in the following table:

<table>
<thead>
<tr>
<th>Catchment</th>
<th>Area (m²)</th>
<th>Area (ha)</th>
<th>Location</th>
<th>Outfall</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>119,700</td>
<td>11.97</td>
<td>Sea Lake Rd</td>
<td>Gravity to Tower Hill</td>
</tr>
<tr>
<td>2</td>
<td>799,200</td>
<td>79.92</td>
<td>West</td>
<td>Pump to main drain</td>
</tr>
<tr>
<td>3</td>
<td>127,500</td>
<td>12.75</td>
<td>North</td>
<td>Gravity to main drain</td>
</tr>
<tr>
<td>4</td>
<td>672,300</td>
<td>67.23</td>
<td>Central</td>
<td>Pump to Yana St</td>
</tr>
<tr>
<td>5</td>
<td>117,600</td>
<td>11.76</td>
<td>South</td>
<td>Pump to Yana St</td>
</tr>
<tr>
<td>6</td>
<td>100,200</td>
<td>10.02</td>
<td>Yana Street</td>
<td>Pump to Yana St</td>
</tr>
<tr>
<td>7</td>
<td>241,900</td>
<td>24.19</td>
<td>Rosaia property</td>
<td>Pump to Cecland Drive</td>
</tr>
</tbody>
</table>
5.2 Catchment Characteristics

The catchment boundaries have been determined using a 0.5m contour plan prepared by Price Merrett Consulting for the Council in 2007.

**Catchment 1** – bound to the north by Sea Lake Swan Hill Rd, to the west by Dead Horse Lane, to the east by Gray Street and to the south by a ridge line. This catchment can discharge by gravity to the open channel constructed for the Tower Hill Estate along the north side of Sea Lake Swan Hill Rd. The capacity of this open channel will have to be determined by discussions with the Tower Hill Estate engineers Parcissian Grant Associates. For the purposes of this report it has been assumed that the channel can only accept the discharge from a single 300mm pipe operating under gravity. For this reason a retarding basin will be required in this catchment. This is an additional retarding basin not included in the Aurecon study.

**Catchment 2** – bound to the west by Deadhorse Lane, to the north and south by ridge lines and to the east by property boundaries. This catchment combines catchments B2 and B3 from the Aurecon study and requires a retarding basin, pump station and rising main discharging to the main drain in Gray St.

**Catchment 3** – bound to the north by Gray St, to the south by Ken Harrison Reserve and to the east and west by property boundaries. This catchment has the same extents as Aurecon’s Gray Street catchment and is assumed to discharge by gravity to the main drain in Gray Street. Since the main drain itself acts as a retardation basin and all other catchments discharging to the main drain at Gray Street have retarding basins it has been assumed that no further retardation will be required for catchment 3. This assumption should be verified by computation at detailed design stage.

**Catchment 4** – bound by ridge lines to the north and south, Deadhorse Lane to the west, Yana St to the east and Ken Harrison Reserve to the north. This catchment includes Aurecon’s catchment B4 and part of B1 and requires a retarding basin, pump station and rising main discharging to the gravity drain in Yana Street. The exact location of the discharge point in Yana Street is to be determined at detailed design stage.

**Catchment 5** – bound to the south by Deadhorse Lane, to the north by a ridge line and to the east by Yana St. In the Aurecon study this catchment (Ext2) was entirely low density development and drainage was assumed to be retained on site, however with the new proposed zoning of General Residential, this will no longer be acceptable and a retarding basin, pump station and rising main discharging to the gravity drain in Yana Street will be required.

**Catchment 6** – bound to the west by Yana Street, the east by the No. 9 channel and to the north and south by existing developments. This low lying catchment will require a retarding basin, pump station and rising main discharging to the gravity drain in Yana St.
Catchment 7 – bound by Coronation Avenue to the east, the No. 9 channel to the west, Wernil Street to the south and existing development to the north. This catchment will require a retarding basin, pump station and rising main discharging to the gravity drain in Cleeland Drive.

6. Retarding Basin and Outfall Pipe Sizes

6.1 Retardation Basin and Outfall Pipe Sizes

Calculation of retarding basin, pump station and outfall pipe sizes is detailed in a spreadsheet titled SWDP Drainage Review April 2014 located at M:\Projects\SWDP. The locations of the basins shown in the map are indicative only and subject to detailed design and subdivision layout.

A summary of the basin capacity and outfall details are shown in the following table:

<table>
<thead>
<tr>
<th>Catchment Number</th>
<th>Outfall Type</th>
<th>Basin Storage Capacity (m³)</th>
<th>Outfall Flow Rate and Pump Capacity (lit/sec)</th>
<th>Outfall Diameter (mm)</th>
<th>Length of Outfall Pipe (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Gravity</td>
<td>3,918</td>
<td>63</td>
<td>300</td>
<td>260</td>
</tr>
<tr>
<td>2</td>
<td>Pump</td>
<td>42,481</td>
<td>214</td>
<td>300</td>
<td>730</td>
</tr>
<tr>
<td>3</td>
<td>Gravity</td>
<td>Nil</td>
<td>Nil</td>
<td>Nil</td>
<td>Nil</td>
</tr>
<tr>
<td>4</td>
<td>Pump</td>
<td>35,591</td>
<td>214</td>
<td>375</td>
<td>560</td>
</tr>
<tr>
<td>5</td>
<td>Pump</td>
<td>6,232</td>
<td>34</td>
<td>150</td>
<td>1220</td>
</tr>
<tr>
<td>6</td>
<td>Pump</td>
<td>5,304</td>
<td>34</td>
<td>150</td>
<td>504</td>
</tr>
<tr>
<td>7</td>
<td>Pump</td>
<td>10,669</td>
<td>131</td>
<td>250</td>
<td>580</td>
</tr>
</tbody>
</table>

With co-operation between the developers the above three rising mains in Yana Street i.e. rising mains serving Catchments 4, 5 and 6 could be combined into a single larger diameter rising main for a reduced cost. This combined rising main would be required to discharge into the Yana Street underground drainage system at the pit with the asset ID 11356 opposite Curi Drive Swan Hill.

The rising main to serve catchment 4 has been increased in size from 300mm diameter to 375mm diameter and this will reduce the velocity slightly but will allow for the flows from catchments 5 and 6 to enter into it.

In the event that the rising main from Catchment 4 is not constructed at the time either development within catchment 5 or 6 is ready to develop they could choose to construct their own 150mm dia rising main to discharge into the existing Yana Street drainage system at Asset ID xxx which is locate approximately 454m from where the rising main from where Catchment 6 enters Yana Street.

6.2 Earthwork Volumes

Earthwork volume and minimum land area required have been calculated assuming that the retarding basin and land are square in shape, batters are sloped at 1 in 8, there is 300mm freeboard above top water level during a 1 in 100 year event, basin floor level matches the invert of incoming
pipes and a 5m wide access/landscaping area on all sides of the basin. The resulting earthworks volumes and land areas are shown in the following table:

<table>
<thead>
<tr>
<th>Catchment Number</th>
<th>Basin storage capacity (m³)</th>
<th>Excavation Depth (m)</th>
<th>Floor width (m)</th>
<th>Excavation Volume (m³)</th>
<th>Land width (m)</th>
<th>Land area (m²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3,918</td>
<td>1.5</td>
<td>49</td>
<td>5,365</td>
<td>83</td>
<td>6,889</td>
</tr>
<tr>
<td>2</td>
<td>42,481</td>
<td>3</td>
<td>106</td>
<td>48,972</td>
<td>164</td>
<td>26,896</td>
</tr>
<tr>
<td>3</td>
<td>Nil</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>35,591</td>
<td>2</td>
<td>132</td>
<td>43,296</td>
<td>174</td>
<td>30,276</td>
</tr>
<tr>
<td>5</td>
<td>6,232</td>
<td>2.4</td>
<td>41</td>
<td>7,813</td>
<td>89</td>
<td>7,992</td>
</tr>
<tr>
<td>6</td>
<td>5,304</td>
<td>1.4</td>
<td>64</td>
<td>7,396</td>
<td>95</td>
<td>9,139</td>
</tr>
<tr>
<td>7</td>
<td>10,569</td>
<td>1.9</td>
<td>72</td>
<td>13,533</td>
<td>111</td>
<td>12,454</td>
</tr>
</tbody>
</table>

Due to the amount of earthworks being excavated from the retardation basins the developers will be required to provide an earthworks master plan to the satisfaction of Council prior to development commencing.

### 6.3 Gravity Drains

Where stormwater flows from one property across a different property to reach its retarding basin the size and depth of pipe required has been calculated to allow for apportionment of costs between property owners. The calculations are detailed in a spreadsheet titled SWDP Drainage Review April 2014 located at M:\Projects\SWDP.

The Rational Method was used to calculate flows resulting from a 1 in 5 year storm and pipes were sized and graded to ensure that a minimum velocity of 1m/sec was achieved. A maximum length between pits of 80m was assumed and a minimum cover of 600mm over the pipes. The resultant pipe diameters, depths and lengths are summarised in the table below and shown in Map1 above.

<table>
<thead>
<tr>
<th>Line</th>
<th>Catchment</th>
<th>Length (m)</th>
<th>Diameter (mm)</th>
<th>Average Depth to invert (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>2</td>
<td>100</td>
<td>750</td>
<td>1.4</td>
</tr>
<tr>
<td>A</td>
<td>2</td>
<td>167</td>
<td>750</td>
<td>1.5</td>
</tr>
<tr>
<td>A</td>
<td>2</td>
<td>160</td>
<td>600</td>
<td>1.3</td>
</tr>
<tr>
<td>A</td>
<td>2</td>
<td>190</td>
<td>1200</td>
<td>2.1</td>
</tr>
<tr>
<td>B</td>
<td>2</td>
<td>235</td>
<td>900</td>
<td>1.5</td>
</tr>
<tr>
<td>C</td>
<td>4</td>
<td>212</td>
<td>375</td>
<td>1.2</td>
</tr>
<tr>
<td>D</td>
<td>4</td>
<td>130</td>
<td>900</td>
<td>1.5</td>
</tr>
<tr>
<td>D</td>
<td>4</td>
<td>180</td>
<td>1050</td>
<td>1.7</td>
</tr>
<tr>
<td>E</td>
<td>4</td>
<td>130</td>
<td>1050</td>
<td>1.7</td>
</tr>
<tr>
<td>E</td>
<td>4</td>
<td>70</td>
<td>300</td>
<td>1.0</td>
</tr>
<tr>
<td>E</td>
<td>4</td>
<td>143</td>
<td>375</td>
<td>1.2</td>
</tr>
<tr>
<td>E</td>
<td>4</td>
<td>130</td>
<td>525</td>
<td>2.0</td>
</tr>
<tr>
<td>E</td>
<td>4</td>
<td>67</td>
<td>600</td>
<td>2.1</td>
</tr>
</tbody>
</table>
The routes of the various pipes are approximate only and cannot be accurately determined until the layout of the subdivisions is known. Developers will be required to provide detailed drainage designs to the satisfaction of Council generally complying with this strategy prior to development proceeding.

As the pipes are designed for minor 1 in 5 year storms only, overland flow paths along approximately the same routes will also be required for major 1 in 100 year storms. These must be allowed for in the detailed drainage design.

7. **Overland Flow Paths**
Gravity drainage pipes are designed for minor 1 in 5 year storms only and therefore overland flow paths will also be required to convey the stormwater for storms exceeding the pipe capacity for major 1 in 100 year storms.

These overland flow paths are required to be designed for all catchments throughout the development area in accordance with the requirements of the Infrastructure Design Manual (IDM).

Overland flow paths must be located on public land either in road reserves or landscaped drainage reserves to the satisfaction of Council.

Where overland flow paths cross property boundaries there is potential for cost sharing between developers. These instances coincide with the gravity drains described in the previous section and follow the same alignments as the gravity drains shown in green Map 1 and labelled A to G.

It is essential that overland flow paths crossing property boundaries are provided for by each developer and taken through to the appropriate retardation basin to the satisfaction of Council.

The siting of retardation basins along the frontage of collector streets is important to ensure that overlands flows are able to enter into the retardation basins. To achieve this, the retardation basins must have a frontage of at least 40% of the perimeter of the basin to a street’s frontage to the satisfaction of Council unless otherwise agreed in writing.

8. **Temporary Drainage Infrastructure**
To assist in the orderly and timely development of the precinct Council **MAY** allow the installation of temporary drainage infrastructure to service the land to be developed where the Council is satisfied that:
South West Development Precinct
Drainage Strategy

- The proposed works will not result in any adverse effects on adjoining landowners
- The temporary works are designed to the satisfaction of Council
- The temporary works are constructed, maintained and owned by the developer. Council will have no responsibility or liability in relation to the operation, maintenance or renewal of such a temporary drainage system. This will remain the case until the drainage system is connected to Council’s drainage infrastructure as per the details of this strategy or otherwise as approved by Council.
- Until a S173 Agreement is entered into with Council specifying that the landowner is responsible for all aspects of the temporary drainage works.
- The discharge from temporary drainage system must be contained on land belonging to the developer/landowner unless otherwise agreed in writing by the Council.

9. Standards of Construction
The infrastructure to be constructed for the SWDP must be constructed to the standards specified in the Local Government Infrastructure Design Association Infrastructure Design Manual (IDM) to the satisfaction of Council unless otherwise agreed in writing by Council.

10. Landscaping of the Drainage Reserves Containing Retardation Basins
All drainage reserves to be constructed within the bounds of the SWDP must be landscaped to the satisfaction of Council.

11. Estimated Costs
Costs of all of the above works have been estimated and are detailed in the Swan Hill South West Development Precinct Infrastructure Cost Sharing Calculations.
**Appendix – Drainage Computations**

**Sizing of Basins for 100 Yr ARI**

### Gravity outfall

<table>
<thead>
<tr>
<th>Catchment No</th>
<th>Diameter</th>
<th>300 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size m²</td>
<td>Grade</td>
<td>%</td>
</tr>
<tr>
<td>C*A m²</td>
<td>Flow Rate</td>
<td>m³/sec</td>
</tr>
<tr>
<td>119,700</td>
<td>0.3</td>
<td>0.063</td>
</tr>
<tr>
<td>69,665</td>
<td>0.85</td>
<td>0.89</td>
</tr>
</tbody>
</table>

### Duration hrs | Intensity mm/hr | Volume in m³ | Volume out m³ | Storage m³ | Maximum Storage m³ |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0.2</td>
<td>129.25</td>
<td>1,759</td>
<td>45</td>
<td>1,714</td>
<td></td>
</tr>
<tr>
<td>0.3</td>
<td>89.43</td>
<td>1,669</td>
<td>68</td>
<td>1,801</td>
<td></td>
</tr>
<tr>
<td>0.5</td>
<td>71.03</td>
<td>2,474</td>
<td>113</td>
<td>2,361</td>
<td></td>
</tr>
<tr>
<td>0.7</td>
<td>59.57</td>
<td>2,905</td>
<td>159</td>
<td>2,746</td>
<td></td>
</tr>
<tr>
<td>0.8</td>
<td>51.63</td>
<td>2,877</td>
<td>181</td>
<td>2,696</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>45.76</td>
<td>3,168</td>
<td>227</td>
<td>2,961</td>
<td></td>
</tr>
<tr>
<td>1.2</td>
<td>41.23</td>
<td>3,447</td>
<td>272</td>
<td>3,175</td>
<td></td>
</tr>
<tr>
<td>1.3</td>
<td>37.86</td>
<td>3,405</td>
<td>295</td>
<td>3,110</td>
<td></td>
</tr>
<tr>
<td>1.5</td>
<td>34.64</td>
<td>3,620</td>
<td>340</td>
<td>3,280</td>
<td></td>
</tr>
<tr>
<td>1.7</td>
<td>32.16</td>
<td>3,809</td>
<td>386</td>
<td>3,423</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>29.24</td>
<td>3,935</td>
<td>454</td>
<td>3,461</td>
<td></td>
</tr>
<tr>
<td>2.5</td>
<td>24.03</td>
<td>4,185</td>
<td>567</td>
<td>3,618</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>21.04</td>
<td>4,397</td>
<td>680</td>
<td>3,717</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>17.03</td>
<td>4,746</td>
<td>907</td>
<td>3,839</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>14.45</td>
<td>5,033</td>
<td>1134</td>
<td>3,899</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>12.63</td>
<td>5,279</td>
<td>1361</td>
<td>3,918</td>
<td>3,918</td>
</tr>
<tr>
<td>7</td>
<td>11.28</td>
<td>5,501</td>
<td>1588</td>
<td>3,913</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>10.22</td>
<td>5,696</td>
<td>1814</td>
<td>3,882</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>9.37</td>
<td>5,875</td>
<td>2041</td>
<td>3,834</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>8.67</td>
<td>6,040</td>
<td>2268</td>
<td>3,772</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>8.08</td>
<td>6,192</td>
<td>2495</td>
<td>3,697</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>7.58</td>
<td>6,337</td>
<td>2722</td>
<td>3,615</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>7.14</td>
<td>6,466</td>
<td>2948</td>
<td>3,518</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>6.76</td>
<td>6,593</td>
<td>3175</td>
<td>3,418</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>6.42</td>
<td>6,709</td>
<td>3402</td>
<td>3,307</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>6.12</td>
<td>6,822</td>
<td>3629</td>
<td>3,193</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>5.85</td>
<td>6,928</td>
<td>3856</td>
<td>3,072</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>5.61</td>
<td>7,035</td>
<td>4082</td>
<td>2,953</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>5.39</td>
<td>7,134</td>
<td>4309</td>
<td>2,825</td>
<td></td>
</tr>
</tbody>
</table>
South West Development Precinct
Drainage Strategy

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>5.18</td>
<td>7,217</td>
<td>4536</td>
<td>2,581</td>
</tr>
<tr>
<td>21</td>
<td>5</td>
<td>7,315</td>
<td>4763</td>
<td>2,552</td>
</tr>
<tr>
<td>22</td>
<td>4.82</td>
<td>7,387</td>
<td>4990</td>
<td>2,397</td>
</tr>
<tr>
<td>23</td>
<td>4.66</td>
<td>7,467</td>
<td>5216</td>
<td>2,251</td>
</tr>
<tr>
<td>24</td>
<td>4.52</td>
<td>7,557</td>
<td>5443</td>
<td>2,114</td>
</tr>
<tr>
<td>25</td>
<td>4.38</td>
<td>7,628</td>
<td>5670</td>
<td>1,958</td>
</tr>
<tr>
<td>26</td>
<td>4.25</td>
<td>7,698</td>
<td>5897</td>
<td>1,801</td>
</tr>
<tr>
<td>27</td>
<td>4.13</td>
<td>7,768</td>
<td>6124</td>
<td>1,644</td>
</tr>
<tr>
<td>28</td>
<td>4.01</td>
<td>7,822</td>
<td>6350</td>
<td>1,472</td>
</tr>
<tr>
<td>29</td>
<td>3.9</td>
<td>7,879</td>
<td>6577</td>
<td>1,302</td>
</tr>
<tr>
<td>30</td>
<td>3.8</td>
<td>7,942</td>
<td>6804</td>
<td>1,138</td>
</tr>
<tr>
<td>31</td>
<td>3.71</td>
<td>8,012</td>
<td>7031</td>
<td>961</td>
</tr>
<tr>
<td>32</td>
<td>3.62</td>
<td>8,070</td>
<td>7258</td>
<td>812</td>
</tr>
<tr>
<td>33</td>
<td>3.53</td>
<td>8,115</td>
<td>7484</td>
<td>651</td>
</tr>
<tr>
<td>34</td>
<td>3.45</td>
<td>8,172</td>
<td>7711</td>
<td>461</td>
</tr>
<tr>
<td>35</td>
<td>3.37</td>
<td>8,217</td>
<td>7938</td>
<td>279</td>
</tr>
<tr>
<td>36</td>
<td>3.29</td>
<td>8,251</td>
<td>8165</td>
<td>86</td>
</tr>
</tbody>
</table>
## Pumped outfall

<table>
<thead>
<tr>
<th>Catchment No</th>
<th>Diameter</th>
<th>Grade</th>
<th>Flow Rate</th>
<th>Velocity</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>300 mm</td>
<td>3.5 %</td>
<td>0.214 m³/sec</td>
<td>3.03 m/sec</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Duration hrs</th>
<th>Intensity mm/hr</th>
<th>Volume In m³</th>
<th>Volume Out m³</th>
<th>Storage m³</th>
<th>Maximum Storage m³</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.2</td>
<td>126.25</td>
<td>11,745</td>
<td>11,745</td>
<td>11,745</td>
<td></td>
</tr>
<tr>
<td>0.3</td>
<td>69.43</td>
<td>12,479</td>
<td>12,479</td>
<td>12,479</td>
<td></td>
</tr>
<tr>
<td>0.5</td>
<td>71.03</td>
<td>16,519</td>
<td>16,519</td>
<td>16,519</td>
<td></td>
</tr>
<tr>
<td>0.7</td>
<td>59.57</td>
<td>19,396</td>
<td>19,396</td>
<td>19,396</td>
<td></td>
</tr>
<tr>
<td>0.8</td>
<td>51.63</td>
<td>19,212</td>
<td>19,212</td>
<td>19,212</td>
<td></td>
</tr>
<tr>
<td>0.1</td>
<td>45.76</td>
<td>21,285</td>
<td>21,285</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.2</td>
<td>41.23</td>
<td>23,013</td>
<td>23,013</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.3</td>
<td>37.6</td>
<td>22,736</td>
<td>22,736</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.5</td>
<td>34.64</td>
<td>24,168</td>
<td>24,168</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.7</td>
<td>32.16</td>
<td>25,430</td>
<td>25,430</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>28.24</td>
<td>26,271</td>
<td>26,271</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.5</td>
<td>24.03</td>
<td>27,943</td>
<td>27,943</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>21.04</td>
<td>29,359</td>
<td>29,359</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>17.03</td>
<td>31,685</td>
<td>31,685</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>14.45</td>
<td>33,606</td>
<td>33,606</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>12.63</td>
<td>35,248</td>
<td>35,248</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>11.28</td>
<td>36,727</td>
<td>36,727</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>10.22</td>
<td>38,029</td>
<td>38,029</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>9.37</td>
<td>39,225</td>
<td>39,225</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>8.67</td>
<td>40,327</td>
<td>40,327</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>8.08</td>
<td>41,341</td>
<td>41,341</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>7.58</td>
<td>42,309</td>
<td>42,309</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>7.14</td>
<td>43,174</td>
<td>43,174</td>
<td>770</td>
<td>42,404</td>
</tr>
<tr>
<td>14</td>
<td>6.76</td>
<td>44,020</td>
<td>44,020</td>
<td>1541</td>
<td>42,479</td>
</tr>
<tr>
<td>15</td>
<td>6.42</td>
<td>44,792</td>
<td>44,792</td>
<td>2311</td>
<td>42,481</td>
</tr>
<tr>
<td>16</td>
<td>6.12</td>
<td>45,546</td>
<td>45,546</td>
<td>3082</td>
<td>42,484</td>
</tr>
<tr>
<td>17</td>
<td>5.85</td>
<td>46,258</td>
<td>46,258</td>
<td>3852</td>
<td>42,406</td>
</tr>
<tr>
<td>18</td>
<td>5.61</td>
<td>46,989</td>
<td>46,989</td>
<td>4622</td>
<td>42,347</td>
</tr>
<tr>
<td>19</td>
<td>5.39</td>
<td>47,634</td>
<td>47,634</td>
<td>5393</td>
<td>42,241</td>
</tr>
<tr>
<td>20</td>
<td>5.18</td>
<td>48,188</td>
<td>48,188</td>
<td>6163</td>
<td>42,025</td>
</tr>
<tr>
<td>21</td>
<td>5</td>
<td>48,839</td>
<td>48,839</td>
<td>6934</td>
<td>41,905</td>
</tr>
<tr>
<td>22</td>
<td>4.82</td>
<td>49,323</td>
<td>49,323</td>
<td>7704</td>
<td>41,619</td>
</tr>
<tr>
<td>23</td>
<td>4.66</td>
<td>49,853</td>
<td>49,853</td>
<td>8474</td>
<td>41,379</td>
</tr>
<tr>
<td>No.</td>
<td>Flow Rate</td>
<td>Area</td>
<td>Peak Flow</td>
<td>Peak Velocity</td>
<td></td>
</tr>
<tr>
<td>-----</td>
<td>-----------</td>
<td>------</td>
<td>-----------</td>
<td>---------------</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>4.52</td>
<td>50,456</td>
<td>9245</td>
<td>41,213</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>4.38</td>
<td>50,932</td>
<td>10015</td>
<td>40,917</td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>4.25</td>
<td>51,397</td>
<td>10786</td>
<td>40,611</td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>4.13</td>
<td>51,867</td>
<td>11556</td>
<td>40,311</td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>4.01</td>
<td>52,225</td>
<td>12326</td>
<td>39,899</td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>3.9</td>
<td>52,607</td>
<td>13097</td>
<td>39,510</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>3.8</td>
<td>53,025</td>
<td>13867</td>
<td>39,158</td>
<td></td>
</tr>
<tr>
<td>31</td>
<td>3.71</td>
<td>53,495</td>
<td>14638</td>
<td>38,857</td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>3.62</td>
<td>53,881</td>
<td>15408</td>
<td>38,473</td>
<td></td>
</tr>
<tr>
<td>33</td>
<td>3.53</td>
<td>54,194</td>
<td>16176</td>
<td>38,006</td>
<td></td>
</tr>
<tr>
<td>34</td>
<td>3.45</td>
<td>54,560</td>
<td>16949</td>
<td>37,611</td>
<td></td>
</tr>
<tr>
<td>35</td>
<td>3.37</td>
<td>54,863</td>
<td>17719</td>
<td>37,144</td>
<td></td>
</tr>
<tr>
<td>36</td>
<td>3.29</td>
<td>55,091</td>
<td>18490</td>
<td>36,601</td>
<td></td>
</tr>
<tr>
<td>37</td>
<td>3.22</td>
<td>55,416</td>
<td>19260</td>
<td>36,156</td>
<td></td>
</tr>
<tr>
<td>38</td>
<td>3.15</td>
<td>55,677</td>
<td>20030</td>
<td>35,647</td>
<td></td>
</tr>
<tr>
<td>39</td>
<td>3.09</td>
<td>56,053</td>
<td>20801</td>
<td>35,252</td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>3.03</td>
<td>56,374</td>
<td>21571</td>
<td>34,803</td>
<td></td>
</tr>
<tr>
<td>41</td>
<td>2.96</td>
<td>56,449</td>
<td>22342</td>
<td>34,107</td>
<td></td>
</tr>
<tr>
<td>42</td>
<td>2.91</td>
<td>56,849</td>
<td>23112</td>
<td>33,737</td>
<td></td>
</tr>
<tr>
<td>43</td>
<td>2.85</td>
<td>57,002</td>
<td>23882</td>
<td>33,120</td>
<td></td>
</tr>
<tr>
<td>44</td>
<td>2.8</td>
<td>57,305</td>
<td>24653</td>
<td>32,652</td>
<td></td>
</tr>
<tr>
<td>45</td>
<td>2.75</td>
<td>57,560</td>
<td>25423</td>
<td>32,137</td>
<td></td>
</tr>
<tr>
<td>46</td>
<td>2.7</td>
<td>57,770</td>
<td>26194</td>
<td>31,576</td>
<td></td>
</tr>
<tr>
<td>47</td>
<td>2.65</td>
<td>57,932</td>
<td>26964</td>
<td>30,968</td>
<td></td>
</tr>
<tr>
<td>48</td>
<td>2.6</td>
<td>58,048</td>
<td>27734</td>
<td>30,315</td>
<td></td>
</tr>
</tbody>
</table>
Pumped outfall

<table>
<thead>
<tr>
<th>Catchment No</th>
<th>Diameter mm</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>300</td>
<td>3.5%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Size m²</th>
<th>C*A m²</th>
<th>Flow Rate m³/sec</th>
<th>Velocity m/sec</th>
</tr>
</thead>
<tbody>
<tr>
<td>672,300</td>
<td>391,279</td>
<td>0.214</td>
<td>3.03</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Duration hrs</th>
<th>Intensity mm/hr</th>
<th>Volume in m³</th>
<th>Volume out m³</th>
<th>Storage m³</th>
<th>Maximum Storage m³</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.2</td>
<td>126.25</td>
<td>9,880</td>
<td>9,880</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.3</td>
<td>69.43</td>
<td>10,498</td>
<td>10,498</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.5</td>
<td>71.03</td>
<td>13,896</td>
<td>13,896</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.7</td>
<td>59.57</td>
<td>16,316</td>
<td>16,316</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.8</td>
<td>51.53</td>
<td>16,161</td>
<td>16,161</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>45.76</td>
<td>17,905</td>
<td>17,905</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.2</td>
<td>41.23</td>
<td>19,359</td>
<td>19,359</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.3</td>
<td>37.64</td>
<td>19,126</td>
<td>19,126</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.5</td>
<td>34.64</td>
<td>20,331</td>
<td>20,331</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.7</td>
<td>32.16</td>
<td>21,392</td>
<td>21,392</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>28.24</td>
<td>22,099</td>
<td>22,099</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.5</td>
<td>24.03</td>
<td>23,506</td>
<td>23,506</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>21.04</td>
<td>24,698</td>
<td>24,698</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>17.03</td>
<td>26,654</td>
<td>26,654</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>14.45</td>
<td>28,270</td>
<td>28,270</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>12.63</td>
<td>29,651</td>
<td>29,651</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>11.28</td>
<td>30,895</td>
<td>30,895</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>10.22</td>
<td>31,991</td>
<td>31,991</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>9.37</td>
<td>32,997</td>
<td>32,997</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>8.87</td>
<td>33,924</td>
<td>33,924</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>8.08</td>
<td>34,777</td>
<td>34,777</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>7.56</td>
<td>35,591</td>
<td>35,591</td>
<td>35,591</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>7.14</td>
<td>36,318</td>
<td>770</td>
<td>35,548</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>6.76</td>
<td>37,031</td>
<td>1541</td>
<td>35,490</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>6.42</td>
<td>37,680</td>
<td>2311</td>
<td>35,369</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>6.12</td>
<td>38,314</td>
<td>3082</td>
<td>35,232</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>5.85</td>
<td>38,913</td>
<td>3852</td>
<td>35,061</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>5.61</td>
<td>39,511</td>
<td>4622</td>
<td>34,889</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>5.39</td>
<td>40,071</td>
<td>5393</td>
<td>34,679</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>5.18</td>
<td>40,536</td>
<td>6163</td>
<td>34,373</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>5</td>
<td>41,084</td>
<td>6934</td>
<td>34,150</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>4.82</td>
<td>41,491</td>
<td>7704</td>
<td>33,767</td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>4.66</td>
<td>41,937</td>
<td>8474</td>
<td>33,463</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>4.52</td>
<td>42,446</td>
<td>6245</td>
<td>33,201</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>4.38</td>
<td>42,845</td>
<td>10015</td>
<td>32,830</td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>4.25</td>
<td>43,236</td>
<td>10786</td>
<td>32,450</td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>4.13</td>
<td>43,631</td>
<td>11556</td>
<td>32,075</td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>4.01</td>
<td>43,933</td>
<td>12320</td>
<td>31,607</td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>3.9</td>
<td>44,254</td>
<td>13097</td>
<td>31,157</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>3.8</td>
<td>44,606</td>
<td>13867</td>
<td>30,739</td>
<td></td>
</tr>
<tr>
<td>31</td>
<td>3.71</td>
<td>45,001</td>
<td>14638</td>
<td>30,363</td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>3.62</td>
<td>45,326</td>
<td>15408</td>
<td>29,918</td>
<td></td>
</tr>
<tr>
<td>33</td>
<td>3.53</td>
<td>45,590</td>
<td>16176</td>
<td>29,402</td>
<td></td>
</tr>
<tr>
<td>34</td>
<td>3.45</td>
<td>45,897</td>
<td>16949</td>
<td>28,948</td>
<td></td>
</tr>
<tr>
<td>35</td>
<td>3.37</td>
<td>46,151</td>
<td>17719</td>
<td>28,432</td>
<td></td>
</tr>
<tr>
<td>36</td>
<td>3.29</td>
<td>46,343</td>
<td>18490</td>
<td>27,853</td>
<td></td>
</tr>
<tr>
<td>37</td>
<td>3.22</td>
<td>46,617</td>
<td>19260</td>
<td>27,357</td>
<td></td>
</tr>
<tr>
<td>38</td>
<td>3.15</td>
<td>46,836</td>
<td>20030</td>
<td>26,806</td>
<td></td>
</tr>
<tr>
<td>39</td>
<td>3.09</td>
<td>47,153</td>
<td>20801</td>
<td>26,352</td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>3.03</td>
<td>47,423</td>
<td>21571</td>
<td>25,852</td>
<td></td>
</tr>
<tr>
<td>41</td>
<td>2.96</td>
<td>47,486</td>
<td>22342</td>
<td>25,144</td>
<td></td>
</tr>
<tr>
<td>42</td>
<td>2.91</td>
<td>47,822</td>
<td>23112</td>
<td>24,710</td>
<td></td>
</tr>
<tr>
<td>43</td>
<td>2.85</td>
<td>47,951</td>
<td>23882</td>
<td>24,069</td>
<td></td>
</tr>
<tr>
<td>44</td>
<td>2.8</td>
<td>48,206</td>
<td>24653</td>
<td>23,553</td>
<td></td>
</tr>
<tr>
<td>45</td>
<td>2.75</td>
<td>48,421</td>
<td>25423</td>
<td>22,998</td>
<td></td>
</tr>
<tr>
<td>46</td>
<td>2.7</td>
<td>48,597</td>
<td>26194</td>
<td>22,403</td>
<td></td>
</tr>
<tr>
<td>47</td>
<td>2.65</td>
<td>48,734</td>
<td>26964</td>
<td>21,770</td>
<td></td>
</tr>
<tr>
<td>48</td>
<td>2.6</td>
<td>48,832</td>
<td>27734</td>
<td>21,098</td>
<td></td>
</tr>
</tbody>
</table>
## Pumped outfall

<table>
<thead>
<tr>
<th>Catchment No</th>
<th>Diameter</th>
<th>Size m²</th>
<th>Grade</th>
<th>C*A m²</th>
<th>Flow Rate</th>
<th>Velocity</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>150 mm</td>
<td>117,600</td>
<td>0.5 %</td>
<td>68,443</td>
<td>0.034 m³/sec</td>
<td>1.92 m/sec</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Duration hrs</th>
<th>Intensity mm/hr</th>
<th>Volume in m³</th>
<th>Volume out m³</th>
<th>Storage m³</th>
<th>Maximum Storage m³</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.2</td>
<td>126.25</td>
<td>1,728</td>
<td>1,728</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.3</td>
<td>69.43</td>
<td>1,836</td>
<td>1,836</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.5</td>
<td>71.03</td>
<td>2,431</td>
<td>2,431</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.7</td>
<td>59.57</td>
<td>2,854</td>
<td>2,854</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.8</td>
<td>51.63</td>
<td>2,827</td>
<td>2,827</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>45.76</td>
<td>3,132</td>
<td>3,132</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.2</td>
<td>41.23</td>
<td>3,386</td>
<td>3,386</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.3</td>
<td>37.6</td>
<td>3,346</td>
<td>3,346</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.5</td>
<td>34.64</td>
<td>3,556</td>
<td>3,556</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.7</td>
<td>32.16</td>
<td>3,742</td>
<td>3,742</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>28.24</td>
<td>3,866</td>
<td>3,866</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.5</td>
<td>24.03</td>
<td>4,112</td>
<td>4,112</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>21.04</td>
<td>4,320</td>
<td>4,320</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>17.03</td>
<td>4,662</td>
<td>4,662</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>14.45</td>
<td>4,945</td>
<td>4,945</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>12.63</td>
<td>5,187</td>
<td>5,187</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>11.28</td>
<td>5,404</td>
<td>5,404</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>10.22</td>
<td>5,596</td>
<td>5,596</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>9.37</td>
<td>5,772</td>
<td>5,772</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>8.67</td>
<td>5,934</td>
<td>5,934</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>8.08</td>
<td>6,083</td>
<td>6,083</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>7.58</td>
<td>6,226</td>
<td>0</td>
<td>6,226</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>7.14</td>
<td>6,353</td>
<td>122</td>
<td>6,231</td>
<td>6,231</td>
</tr>
<tr>
<td>14</td>
<td>6.76</td>
<td>6,477</td>
<td>245</td>
<td>6,232</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>6.42</td>
<td>6,591</td>
<td>367</td>
<td>6,224</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>6.12</td>
<td>6,702</td>
<td>490</td>
<td>6,212</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>5.85</td>
<td>6,807</td>
<td>612</td>
<td>6,195</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>5.61</td>
<td>6,911</td>
<td>734</td>
<td>6,177</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>5.39</td>
<td>7,000</td>
<td>857</td>
<td>6,152</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>5.18</td>
<td>7,091</td>
<td>979</td>
<td>6,112</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>5</td>
<td>7,187</td>
<td>1102</td>
<td>6,085</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>4.82</td>
<td>7,258</td>
<td>1224</td>
<td>6,034</td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>4.66</td>
<td>7,336</td>
<td>1346</td>
<td>5,990</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>4.52</td>
<td>7,425</td>
<td>1469</td>
<td>5,956</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>4.38</td>
<td>7,496</td>
<td>1591</td>
<td>5,904</td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>4.25</td>
<td>7,563</td>
<td>1714</td>
<td>5,849</td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>4.13</td>
<td>7,632</td>
<td>1836</td>
<td>5,796</td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>4.01</td>
<td>7,685</td>
<td>1958</td>
<td>5,727</td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>3.9</td>
<td>7,741</td>
<td>2081</td>
<td>5,660</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>3.8</td>
<td>7,803</td>
<td>2203</td>
<td>5,600</td>
<td></td>
</tr>
<tr>
<td>31</td>
<td>3.71</td>
<td>7,872</td>
<td>2326</td>
<td>5,546</td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>3.62</td>
<td>7,928</td>
<td>2448</td>
<td>5,480</td>
<td></td>
</tr>
<tr>
<td>33</td>
<td>3.53</td>
<td>7,973</td>
<td>2570</td>
<td>5,403</td>
<td></td>
</tr>
<tr>
<td>34</td>
<td>3.45</td>
<td>8,026</td>
<td>2693</td>
<td>5,335</td>
<td></td>
</tr>
<tr>
<td>35</td>
<td>3.37</td>
<td>8,073</td>
<td>2815</td>
<td>5,256</td>
<td></td>
</tr>
<tr>
<td>36</td>
<td>3.29</td>
<td>8,106</td>
<td>2938</td>
<td>5,186</td>
<td></td>
</tr>
<tr>
<td>37</td>
<td>3.22</td>
<td>8,154</td>
<td>3060</td>
<td>5,094</td>
<td></td>
</tr>
<tr>
<td>38</td>
<td>3.15</td>
<td>8,193</td>
<td>3182</td>
<td>5,011</td>
<td></td>
</tr>
<tr>
<td>39</td>
<td>3.09</td>
<td>8,248</td>
<td>3305</td>
<td>4,943</td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>3.03</td>
<td>8,295</td>
<td>3427</td>
<td>4,888</td>
<td></td>
</tr>
<tr>
<td>41</td>
<td>2.96</td>
<td>8,306</td>
<td>3550</td>
<td>4,756</td>
<td></td>
</tr>
<tr>
<td>42</td>
<td>2.91</td>
<td>8,385</td>
<td>3672</td>
<td>4,693</td>
<td></td>
</tr>
<tr>
<td>43</td>
<td>2.85</td>
<td>8,386</td>
<td>3794</td>
<td>4,594</td>
<td></td>
</tr>
<tr>
<td>44</td>
<td>2.8</td>
<td>8,432</td>
<td>3917</td>
<td>4,515</td>
<td></td>
</tr>
<tr>
<td>45</td>
<td>2.75</td>
<td>8,470</td>
<td>4039</td>
<td>4,431</td>
<td></td>
</tr>
<tr>
<td>46</td>
<td>2.7</td>
<td>8,501</td>
<td>4162</td>
<td>4,339</td>
<td></td>
</tr>
<tr>
<td>47</td>
<td>2.65</td>
<td>8,525</td>
<td>4284</td>
<td>4,241</td>
<td></td>
</tr>
<tr>
<td>48</td>
<td>2.6</td>
<td>8,542</td>
<td>4406</td>
<td>4,136</td>
<td></td>
</tr>
</tbody>
</table>
### Pumped outfall

<table>
<thead>
<tr>
<th>Catchment No</th>
<th>Size m²</th>
<th>C*A m²</th>
<th>Diameter</th>
<th>Grade</th>
<th>Flow Rate</th>
<th>Velocity</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>100,200</td>
<td>58,316</td>
<td>150 mm</td>
<td>3.5%</td>
<td>0.034 m³/sec</td>
<td>1.92 m/sec</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Duration hrs</th>
<th>Intensity mm/hr</th>
<th>Volume in m³</th>
<th>Volume out m³</th>
<th>Storage m³</th>
<th>Maximum Storage m³</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.2</td>
<td>126.25</td>
<td>1,472</td>
<td>1,472</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.3</td>
<td>89.43</td>
<td>1,565</td>
<td>1,565</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.5</td>
<td>71.03</td>
<td>2,071</td>
<td>2,071</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.7</td>
<td>59.57</td>
<td>2,432</td>
<td>2,432</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.8</td>
<td>51.63</td>
<td>2,409</td>
<td>2,409</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>45.76</td>
<td>2,669</td>
<td>2,669</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.2</td>
<td>41.23</td>
<td>2,885</td>
<td>2,885</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.3</td>
<td>37.9</td>
<td>2,851</td>
<td>2,851</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.5</td>
<td>34.64</td>
<td>3,030</td>
<td>3,030</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.7</td>
<td>32.16</td>
<td>3,188</td>
<td>3,188</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>28.24</td>
<td>3,294</td>
<td>3,294</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.5</td>
<td>24.03</td>
<td>3,503</td>
<td>3,503</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>21.04</td>
<td>3,681</td>
<td>3,681</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>17.03</td>
<td>3,973</td>
<td>3,973</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>14.45</td>
<td>4,213</td>
<td>4,213</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>12.63</td>
<td>4,419</td>
<td>4,419</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>11.28</td>
<td>4,605</td>
<td>4,605</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>10.22</td>
<td>4,768</td>
<td>4,768</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>9.37</td>
<td>4,918</td>
<td>4,918</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>8.67</td>
<td>5,056</td>
<td>5,056</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>8.08</td>
<td>5,183</td>
<td>5,183</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>7.93</td>
<td>5,304</td>
<td>5,304</td>
<td>5,304</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>7.14</td>
<td>5,413</td>
<td>122</td>
<td>5,291</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>6.75</td>
<td>5,519</td>
<td>245</td>
<td>5,274</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>6.42</td>
<td>5,616</td>
<td>367</td>
<td>5,249</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>6.12</td>
<td>5,710</td>
<td>490</td>
<td>5,220</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>5.85</td>
<td>5,800</td>
<td>612</td>
<td>5,188</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>5.61</td>
<td>5,889</td>
<td>734</td>
<td>5,155</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>5.39</td>
<td>5,972</td>
<td>857</td>
<td>5,115</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>5.18</td>
<td>5,042</td>
<td>979</td>
<td>5,063</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>5</td>
<td>5,123</td>
<td>1,102</td>
<td>5,021</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>4.82</td>
<td>5,184</td>
<td>1,224</td>
<td>4,960</td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>4.66</td>
<td>6,250</td>
<td>1,346</td>
<td>4,904</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>4.52</td>
<td>5,326</td>
<td>1469</td>
<td>4,857</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>4.38</td>
<td>6,386</td>
<td>1591</td>
<td>4,795</td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>4.25</td>
<td>6,444</td>
<td>1714</td>
<td>4,730</td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>4.13</td>
<td>6,503</td>
<td>1836</td>
<td>4,667</td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>4.01</td>
<td>6,548</td>
<td>1958</td>
<td>4,590</td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>3.9</td>
<td>6,596</td>
<td>2081</td>
<td>4,515</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>3.8</td>
<td>6,648</td>
<td>2203</td>
<td>4,445</td>
<td></td>
</tr>
<tr>
<td>31</td>
<td>3.71</td>
<td>6,707</td>
<td>2326</td>
<td>4,381</td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>3.62</td>
<td>6,755</td>
<td>2448</td>
<td>4,307</td>
<td></td>
</tr>
<tr>
<td>33</td>
<td>3.53</td>
<td>6,793</td>
<td>2570</td>
<td>4,223</td>
<td></td>
</tr>
<tr>
<td>34</td>
<td>3.45</td>
<td>6,841</td>
<td>2693</td>
<td>4,148</td>
<td></td>
</tr>
<tr>
<td>35</td>
<td>3.37</td>
<td>6,878</td>
<td>2815</td>
<td>4,063</td>
<td></td>
</tr>
<tr>
<td>36</td>
<td>3.29</td>
<td>6,907</td>
<td>2938</td>
<td>3,969</td>
<td></td>
</tr>
<tr>
<td>37</td>
<td>3.22</td>
<td>6,948</td>
<td>3060</td>
<td>3,888</td>
<td></td>
</tr>
<tr>
<td>38</td>
<td>3.15</td>
<td>6,980</td>
<td>3182</td>
<td>3,798</td>
<td></td>
</tr>
<tr>
<td>39</td>
<td>3.09</td>
<td>7,028</td>
<td>3305</td>
<td>3,723</td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>3.03</td>
<td>7,068</td>
<td>3427</td>
<td>3,641</td>
<td></td>
</tr>
<tr>
<td>41</td>
<td>2.95</td>
<td>7,077</td>
<td>3550</td>
<td>3,527</td>
<td></td>
</tr>
<tr>
<td>42</td>
<td>2.91</td>
<td>7,127</td>
<td>3672</td>
<td>3,455</td>
<td></td>
</tr>
<tr>
<td>43</td>
<td>2.85</td>
<td>7,147</td>
<td>3794</td>
<td>3,353</td>
<td></td>
</tr>
<tr>
<td>44</td>
<td>2.8</td>
<td>7,185</td>
<td>3917</td>
<td>3,268</td>
<td></td>
</tr>
<tr>
<td>45</td>
<td>2.75</td>
<td>7,217</td>
<td>4039</td>
<td>3,178</td>
<td></td>
</tr>
<tr>
<td>46</td>
<td>2.7</td>
<td>7,243</td>
<td>4162</td>
<td>3,081</td>
<td></td>
</tr>
<tr>
<td>47</td>
<td>2.65</td>
<td>7,263</td>
<td>4284</td>
<td>2,979</td>
<td></td>
</tr>
<tr>
<td>48</td>
<td>2.6</td>
<td>7,278</td>
<td>4406</td>
<td>2,872</td>
<td></td>
</tr>
</tbody>
</table>
### Pumped outfall

<table>
<thead>
<tr>
<th>Catchment No</th>
<th>Diameter</th>
<th>Size m²</th>
<th>C*A m²</th>
<th>Flow Rate</th>
<th>Velocity</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>241,900</td>
<td>3.5</td>
<td>140,736</td>
<td>0.131 m³/sec</td>
<td>2.67 m/s</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Duration hrs</th>
<th>Intensity mm/hr</th>
<th>Volume in m³</th>
<th>Volume out m³</th>
<th>Storage m³</th>
<th>Maximum Storage m³</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.2</td>
<td>126.25</td>
<td>3.555</td>
<td>3.555</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.3</td>
<td>89.43</td>
<td>3.777</td>
<td>3.777</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.5</td>
<td>71.03</td>
<td>5.000</td>
<td>5.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.7</td>
<td>59.57</td>
<td>5.871</td>
<td>5.871</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.8</td>
<td>51.63</td>
<td>5.815</td>
<td>5.815</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>45.76</td>
<td>6.442</td>
<td>6.442</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.2</td>
<td>41.23</td>
<td>6.966</td>
<td>6.966</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.3</td>
<td>37.6</td>
<td>6.882</td>
<td>6.882</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.5</td>
<td>34.64</td>
<td>7.315</td>
<td>7.315</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.7</td>
<td>32.16</td>
<td>7.697</td>
<td>7.697</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>28.24</td>
<td>7.952</td>
<td>7.952</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.5</td>
<td>24.03</td>
<td>8.456</td>
<td>8.456</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>21.04</td>
<td>8.886</td>
<td>8.886</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>17.03</td>
<td>9.590</td>
<td>9.590</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>14.45</td>
<td>10.172</td>
<td>10.172</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>12.63</td>
<td>10.669</td>
<td>10.669</td>
<td>10.669</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>11.28</td>
<td>11.116</td>
<td>472</td>
<td>10.644</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>10.22</td>
<td>11.511</td>
<td>943</td>
<td>10.568</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>9.37</td>
<td>11.872</td>
<td>1415</td>
<td>10.457</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>8.67</td>
<td>12.206</td>
<td>1886</td>
<td>10.320</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>8.08</td>
<td>12.513</td>
<td>2358</td>
<td>10.155</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>7.56</td>
<td>12.806</td>
<td>2830</td>
<td>9.976</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>7.14</td>
<td>13.068</td>
<td>3301</td>
<td>9.757</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>6.76</td>
<td>13.324</td>
<td>3773</td>
<td>9.551</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>6.42</td>
<td>13.558</td>
<td>4244</td>
<td>9.314</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>6.12</td>
<td>13.786</td>
<td>4716</td>
<td>9.070</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>5.85</td>
<td>14.001</td>
<td>5188</td>
<td>8.813</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>5.61</td>
<td>14.217</td>
<td>5659</td>
<td>8.556</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>5.39</td>
<td>14.418</td>
<td>6131</td>
<td>8.297</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>5.18</td>
<td>14.585</td>
<td>6602</td>
<td>7.983</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>5</td>
<td>14.783</td>
<td>7074</td>
<td>7.709</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>4.82</td>
<td>14.929</td>
<td>7546</td>
<td>7.383</td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>4.66</td>
<td>15.089</td>
<td>8017</td>
<td>7.072</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>24</td>
<td>4.52</td>
<td>15.272</td>
<td>8489</td>
<td>6,783</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>4.38</td>
<td>15.416</td>
<td>8960</td>
<td>6,456</td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>4.25</td>
<td>15.557</td>
<td>9432</td>
<td>6,125</td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>4.13</td>
<td>15.699</td>
<td>9904</td>
<td>5,795</td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>4.01</td>
<td>15.807</td>
<td>10375</td>
<td>5,432</td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>3.9</td>
<td>15.923</td>
<td>10847</td>
<td>5,076</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>3.8</td>
<td>16.050</td>
<td>11318</td>
<td>4,732</td>
<td></td>
</tr>
<tr>
<td>31</td>
<td>3.71</td>
<td>16.192</td>
<td>11790</td>
<td>4,402</td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>3.62</td>
<td>16.309</td>
<td>12262</td>
<td>4,047</td>
<td></td>
</tr>
<tr>
<td>33</td>
<td>3.53</td>
<td>16.400</td>
<td>12733</td>
<td>3,667</td>
<td></td>
</tr>
<tr>
<td>34</td>
<td>3.45</td>
<td>16.514</td>
<td>13205</td>
<td>3,309</td>
<td></td>
</tr>
<tr>
<td>35</td>
<td>3.37</td>
<td>16.606</td>
<td>13676</td>
<td>2,930</td>
<td></td>
</tr>
<tr>
<td>36</td>
<td>3.29</td>
<td>16.675</td>
<td>14148</td>
<td>2,527</td>
<td></td>
</tr>
<tr>
<td>37</td>
<td>3.22</td>
<td>16.773</td>
<td>14620</td>
<td>2,153</td>
<td></td>
</tr>
<tr>
<td>38</td>
<td>3.15</td>
<td>16.852</td>
<td>15091</td>
<td>1,761</td>
<td></td>
</tr>
<tr>
<td>39</td>
<td>3.09</td>
<td>16.966</td>
<td>15563</td>
<td>1,403</td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>3.03</td>
<td>17.063</td>
<td>16034</td>
<td>1,029</td>
<td></td>
</tr>
<tr>
<td>41</td>
<td>2.96</td>
<td>17.086</td>
<td>16506</td>
<td>580</td>
<td></td>
</tr>
<tr>
<td>42</td>
<td>2.91</td>
<td>17.207</td>
<td>16978</td>
<td>229</td>
<td></td>
</tr>
<tr>
<td>43</td>
<td>2.85</td>
<td>17.253</td>
<td>17449</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>44</td>
<td>2.8</td>
<td>17.345</td>
<td>17921</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>45</td>
<td>2.75</td>
<td>17.422</td>
<td>18392</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>46</td>
<td>2.7</td>
<td>17.486</td>
<td>18864</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>47</td>
<td>2.65</td>
<td>17.535</td>
<td>19336</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>48</td>
<td>2.6</td>
<td>17.570</td>
<td>19807</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>
Swan Hill South West Development Precinct
Traffic Strategy

Version 2.1
Swan Hill Rural City
3 July 2014.
South West Development Precinct
Traffic Strategy

1. Introduction .............................................................................................................................................. 3
2. Objectives.................................................................................................................................................. 3
3. South West Development Precinct Site Context ................................................................................. 3
   3.1 General................................................................................................................................................ 3
   3.2 Existing Transport Network .................................................................................................................. 5
      3.2.1 Existing Transport Services ........................................................................................................... 5
      3.2.2 Road Network Connections ........................................................................................................... 6
      3.2.3 Pedestrian and Bicycle Network Connections ................................................................................ 12
      3.2.4 Public Transport Connections ....................................................................................................... 12
4. Information to be Provided Before Development Commences ......................................................... 13
1. **Introduction**
This strategy has been prepared to assist Council to implement the rezoning of land within the bounds of the South West Development Precinct (SWDP).

This has been a long term desire of Council to provide for the future residential growth for Swan Hill.

This strategy has been prepared to consider the traffic management requirements of the proposed development of the South West Development Precinct.

Council engaged the Traffix Group to undertake a traffic impact assessment (TIA) of the proposed development. A copy of the assessment titled Swan Hill South West Development Precinct Traffic Impact Assessment prepared by in June 2014 is attached as Appendix 1 to this strategy.

2. **Objectives**
The objectives of this traffic strategy are as follows:

1. To integrate the transport requirements of the SWDP with the existing transport infrastructure serving Swan Hill.
2. To consider the two options for the collector street connection to the Swan Hill Sea Lake Road as identified in the SWDP.
3. To identify additional traffic studies/assessments to be undertaken prior to the development within the sub-precincts of the SWDP.
4. To identify and incorporate any existing Council strategy, policy or program into this Traffic Strategy.

3. **South West Development Precinct Site Context**

3.1 **General**
The Swan Hill South West Development Precinct is bounded by Sea Lake – Swan Hill Road, Dead Horse Lane, Coronation Avenue and Gray Street as shown in Map 1.
Map 1 Locality Plan of the Swan Hill South West Development Precinct

The majority of the development precinct is currently Farming Zone (FZ) used for agricultural purposes. The precinct is bounded by residential development to the north and east as Residential 1 Zone (R1Z) and Low Density Residential Zone (LDRZ). Towards the south and west of the precinct the land use is currently FZ.

Minor open irrigation channels are located within the precinct serviced from the main irrigation channel (Channel No. 9) located between Yana Street and Coronation Avenue as shown in Map 2 on the next page.
The existing and proposed land uses contained within and adjacent to the boundaries of the SWDP are shown in Map 2.

**Map 2 Existing and Proposed Land Uses**

---

### 3.2 Existing Transport Network

**3.2.1 Existing Transport Services**

Map 3 Existing Transport Services details the location of existing transport services within the locality of the SWDP.
3.2.2 Road Network Connections

The SWDP primary connection points to the existing road network are listed in Table 1 Details of Existing Road Network Interfaces with the SWDP.

<table>
<thead>
<tr>
<th>Road Name</th>
<th>Status</th>
<th>Existing Construction Standard</th>
<th>Proposed Construction Standard</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sea Lake Swan Hill Road</td>
<td>VicRoads Arterial Road</td>
<td>7.9m seal width</td>
<td>No change</td>
<td>Intersection upgrades will be required as detailed in the Traffic Impact Assessment</td>
</tr>
<tr>
<td>Gray Street</td>
<td>Council Collector</td>
<td>9.4m seal at Feldmann Lane and 6.9m where new</td>
<td>Where new development fronts Gray Street a 2.5m</td>
<td>Intersection upgrades will be required as detailed in the</td>
</tr>
<tr>
<td>Road Name</td>
<td>Status</td>
<td>Existing Construction Standard</td>
<td>Proposed Construction Standard</td>
<td>Comments</td>
</tr>
<tr>
<td>------------</td>
<td>--------------------</td>
<td>--------------------------------</td>
<td>--------------------------------</td>
<td>---------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Yana Street</td>
<td>Council Collector Street</td>
<td>6.9m seal</td>
<td>Where new development fronts Yana Street a 2.5m shared path and kerb and channel will be required. Overall seal width must be at least 10.4m</td>
<td>Intersection upgrades will be required as detailed in the Traffic Impact Assessment</td>
</tr>
<tr>
<td>Coronation Avenue</td>
<td>Council Collector Street</td>
<td>7.4m seal</td>
<td>Where new development fronts Coronation Avenue a 2.5m shared path and kerb and channel will be required. Overall seal width must be at least 10.4m</td>
<td>Intersection upgrades will be required as detailed in the Traffic Impact Assessment</td>
</tr>
<tr>
<td>Werril Street</td>
<td>Council Collector Street</td>
<td>6.9m seal</td>
<td>Where new development fronts Werril Street a 2.5m shared path and kerb and channel will be required. Overall seal width must be at least 10.4m</td>
<td>Traffic Impact Assessment</td>
</tr>
</tbody>
</table>

access road from east of Feldmann Lane intersects with Gray Street
<table>
<thead>
<tr>
<th>Road Name</th>
<th>Status</th>
<th>Existing Construction Standard</th>
<th>Proposed Construction Standard</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dead Horse Lane</td>
<td>Council Access</td>
<td>7.5m Gravel Road</td>
<td>6.2m seal, 1.5m shoulder, K&amp;C and 2.5m shared path</td>
<td>channel will be required. Overall seal width must be at least 10.4m.</td>
</tr>
<tr>
<td>Feldtmann Lane</td>
<td>Council Access</td>
<td>6.0m Gravel Road</td>
<td>10.4m seal, K&amp;C and 2.5m shared path on both sides</td>
<td>Intersection upgrade will be required as detailed in the Traffic Impact Assessment.</td>
</tr>
</tbody>
</table>

The impact of the SWDP on the existing road network has been considered as part of the Traffic Impact Assessment (TIA) undertaken by the Traffic Group for Council.

A summary of their recommendations is shown in Table 2 Summary of TIA Intersection Treatment Recommendations for Option 1.

### Table 2 Summary of TIA Intersection Treatment Recommendations

<table>
<thead>
<tr>
<th>Intersection Number</th>
<th>Description of Intersection</th>
<th>Recommended Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Dead Horse Lane/Link 4</td>
<td>Simple T-intersection</td>
</tr>
<tr>
<td>2</td>
<td>Yana Street/Werri Street/Dead Horse Lane</td>
<td>The existing simple T-intersection continues to be provided.</td>
</tr>
<tr>
<td>3</td>
<td>Coronation Avenue/Wattie Street/Link 1</td>
<td>A single lane roundabout be provided</td>
</tr>
<tr>
<td>4</td>
<td>Yana Street/Link 2/Link 3</td>
<td>A single lane roundabout be provided</td>
</tr>
<tr>
<td>Intersection Number</td>
<td>Description of Intersection</td>
<td>Recommended Treatment</td>
</tr>
<tr>
<td>---------------------</td>
<td>------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>5</td>
<td>Gray Street/Yana Street</td>
<td>The existing configuration of the Gray Street/Yana Street intersection continues to be provided.</td>
</tr>
<tr>
<td>6</td>
<td>Gray Street/Internal Road</td>
<td>A simple T-intersection be provided at the Gray Street/Internal Road intersection provided with priority to Gray Street and separate left and right turn lanes in the internal road. A left turn lane should be provided in Gray Street, due to the relatively large volume of left turning traffic.</td>
</tr>
<tr>
<td>7</td>
<td>Gray Street/Feldtmann Lane</td>
<td>A simple T-intersection continues to be provided at the Gray Street/Feldtmann Lane intersection. A separate right turn facility should be provided in Gray Street and separate left and right turn lanes in Feldtmann Lane. A left turn lane in Gray Street is not warranted on the basis of the predicted left turn volumes.</td>
</tr>
<tr>
<td>8</td>
<td>Sea Lake-Swan Hill Road/Gray Street/Boobiatta Drive</td>
<td>The intersection remains under roundabout control. No upgrades are required from a capacity perspective.</td>
</tr>
<tr>
<td>9</td>
<td>Sea Lake-Swan Hill Road/Dead Horse Lane/Memorial Drive</td>
<td>That the intersection remains in its current form.</td>
</tr>
<tr>
<td>10</td>
<td>Sea Lake-Swan Hill Road/Link 7(1)</td>
<td>That a BAR (basic right turn) and AUL (auxiliary left turn) treatments be provided on the west and east approaches respectively. Given the relatively high volume of right turning traffic compared to left turning traffic in Link 7, separate left and right turn lanes should be provided in Link 7 at this intersection.</td>
</tr>
<tr>
<td>12</td>
<td>Link 5/Link 3/Link 4</td>
<td>A single lane roundabout be provided</td>
</tr>
<tr>
<td>13</td>
<td>Link 7/Link 6/Link 5</td>
<td>A single lane roundabout be provided</td>
</tr>
</tbody>
</table>
Connection to the Sea Lake Swan Hill Road.

The SWDP considered two options for the connection of the collector roads servicing the SWDP to the Sea Lake Swan Hill Road. These options are shown in Map 4 Connection Options to Sea Lake Swan Hill Road.

Map 4 Connection Options to Sea Lake Swan Hill Road.

The Sea Lake Swan Hill is an arterial road under the control and management of VicRoads and it is noted that under Clause 56.08.4 and Standard C17 that Council is required to comply with the Roads Corporation’s arterial road access management policies.

A search of the VicRoads website has not revealed any arterial road access management policies. (However, it is believed that the draft arterial road access management policy was prepared in 2006 but was never formally adopted. It has been assumed that the draft was used to prepare VicRoads internal arterial road access management guidelines.)

Option 1 is the preferred option for Council for the following reasons:

1. The urban design outcomes are superior for Option 1 because the interface of the development with the Sea Lake Swan Hill Road provides a more attractive visual presentation to the roads in terms of built form, landscaping and streetscape.

2. Will provide passive surveillance and promote a sense of safety for people as emphasised by the State Government’s Safer Design Guidelines 2006. It is also noted that Clause 15.01-4 of
the Planning Scheme requires planning to consider the recommendations of the Safer Design Guidelines 2006.

3. Provides a better distribution of traffic from the SWDP into Feldtmann Lane and Gray Street. The Traffic Impact Assessment undertaken for the SWDP states “provides a superior road network compared to Option 2 and will not detrimentally affect the operation or capacity of the Sea Lake Swan Hill Road.”

4. This will also provide an opportunity to create a gateway entrance at the western entrance to Swan Hill.

5. Is consistent with the option indicated in the previous Outline Development Plan for the SWDP which was supported by VicRoads.

However, VicRoads’ letter dated 8 October 2013 stating “In August 2007 VicRoads agreed to create a new access point on Sea Lake—Swan Hill Road (arterial road) between Gray Street and Dead Horse Lane. VicRoads has now reconsidered this in order to uphold the functionality of the arterial road and to follow the Guidelines in Access Management which has been developed in recent years.”

VicRoads could not provide a copy of the document as it was only an internal draft policy and had not been through any public consultation.

While Council acknowledging the need to protect the existing and future functionality of arterial roads; Council believes that Option 1 does not detrimentally affect the functionality or operation or capacity of the Sea Lake - Swan Hill Road for the following reasons:

- The intersection spacing proposed Option 1 is not inconsistent with the spacing of existing intersections along the Sea Lake Swan Hill Road.

- There are no known traffic management issues with the existing spacing of intersections and therefore the addition of one more intersection will not detrimentally affect the functionality, operation and capacity of the Sea Lake Swan Hill Road.

Council is concerned that VicRoad’s decision to reject Option 1 is based upon the following:

- An internal VicRoads Guideline which has not been subject public consultation and input and

- That the Guideline does not distinguish between urban arterials having different traffic volumes such that the access requirements for the Sea Lake Swan Hill Road with a current traffic count of 1095 vpd is the same as for an urban arterial having a traffic count of 6,000 to 10,000 vpd. There is a significant difference between the impacts of an additional intersection in both these situations and therefore Council believes that VicRoads should take this into account when assessing the preferred option of Council.
3.2.3 Pedestrian and Bicycle Network Connections
Map 3 showing the existing transport services shows that on the Sea Lake Swan Hill Road that the nearest shared path is some 430m east of the intersection of Gray Street and the Sea Lake Swan Hill Road. Developers will not be required to link the existing shared path network.

There is no master plan for pedestrian connections and it is recommended that Council should address this shortfall so that linkages to the Tower Hill residential development and the SWDP development can be identified as priorities and their provision planned future capital works programs.

Map 3 also there is a need to connect to the existing footpath networks in Yana Street, Coronation Avenue and Gray Street. This will be a requirement for individual developers as development takes place.

The new collector streets to be constructed are required to be constructed with a shared 2.5m path on both sides of the street.

This will meet the needs of parents and children riding to school but will not be used by cyclists cycling to and from work and other activities.

Some Council’s recognising the differing requirements of parents and children riding to school and other serious cyclists have opted to replace one shared path with on road cycle lanes. The other 2.5m shared path is reclassified as a 2.5m wide footpath so that the shared path signage is not required.

It is recommended that Council gives serious consideration to this option.

3.2.4 Public Transport Connections
Map 3 shows the existing public bus routes going along some of the boundary streets to the SWDP.

The collector streets have been sized that are able to be used by buses and therefore as the SWDP develops both school bus routes and the public bus routes could be changed to service this development, subject to there being sufficient patronage to warrant such changes.
4. **Information to be Provided Before Development Commences**

To facilitate development within the SWDP the precinct has been subdivide into 6 sub-precincts. Map 5 Swan Hill South West Development Sub-precinct Plan shows the boundaries of the sub-precincts.

**Map 5 Swan Hill South West Development Sub-precinct Plan**

The following requirements must be met before development can take place within a sub-precinct.
A sub-precinct level Traffic Management Plan that is generally in consistent with the report titled “Swan Hill South West Development Precinct Traffic Impact Assessment” dated 20 June 2014) and this strategy

The Traffic Management Plan must address the following but not limited to:

- Appropriate access and circulation of vehicles on the existing and future road network.
- Appropriate integration with the existing or proposed subdivision of adjoining properties and sub-precincts including through alignment and configuration of the street network and landscape character.
- The identification of existing and proposed public transport routes, bus stops (as shown on the approved Swan Hill South West Development Plan) and associated infrastructure.
- The identification of existing and proposed pedestrian and cycling networks and shared paths.
- Including provision for safe and convenient access to public transport infrastructure.
- The works necessary to accommodate traffic generated by the development and to mitigate the impact of that traffic on the development.
- Ensure that the road and intersection design must create efficient clearance of traffic, activity areas including around public facilties. The proposed road network should not overload or detrimentally affect existing or proposed residential streets and intersections.
- Adequate sight distance should be provided, especially where road alignment deflections occur at acute angles.
- Road layouts should provide natural traffic speed control, appropriate to the street category. The introduction of specific speed control devices should be considered only as a secondary option. Roundabouts may be implemented at intersections. However, care must be taken to provide adequate sized roundabouts and therefore road reservation boundaries must be designed to accommodate the radius required and sightlines.
- Road layouts should be designed for all road users appropriate to the street type, including service vehicles, emergency vehicles, waste collection vehicles and street sweepers. Bus routes need to be considered when developing road networks and be based on the Department of Transport, Planning and Local Infrastructure publication titled ‘Public Transport Guidelines for Land Use Development’ (or a replacement document by the Department).
- Road reserve widths must be adequate for the intended road type, and should comply with requirements of the Local Government Infrastructure Design Association’s Infrastructure Design Manual.
- Should include a typical cross-section of differing road types, detailing the intended function of the road, e.g. bike lanes, drainage, landscaping.
South West Development Precinct
Traffic Strategy

- Addresses all off-site traffic infrastructure requirements associated with the sub-precinct and is to be accompanied by a Road Safety Audit, prepared by an appropriately qualified person. The Plan must address any safety issues raised by the Audit.
Appendix 1 VicRoads Response to Option 1 Sea Lake Swan Hill Road Intersection.

Dear Mr. Vinge,

SWAN HILL DRAFT DEVELOPMENT PLAN – SOUTH WEST SWAN HILL

I refer to your meeting with VicRoads’ officers and Department of Transport officers in Bendigo on 24 September 2013 in relation to the draft development plan for South West Swan Hill.

In August 2007 VicRoads agreed to create a new access point on Sea Lake-Swan Hill Road (pedestrian footpath between Gray Street and Dead Horse Lane). VicRoads has now determined this to be the most appropriate location for an intersection, to ensure the functionality of the internal road and to facilitate the efficient use of access management which was developed in recent years.

VicRoads’ position supports the principle of creating a new access point on Swan Hill-Swan Hill Road between Gray Street and Dead Horse Lane to minimize congestion and compromised future traffic flow configurations.

VicRoads also supports council’s intention of channeling traffic to the west via a single access point on Dead Horse Lane. This access should be relocated well away from the Swan Hill-Swan Hill Road/Dead Horse Lane intersection, preferably to the order of more than 500 metres to improve future operational efficiency of both Dead Horse Lane and its intersections with the Swan Hill-Swan Hill Road.

VicRoads has no objection to the plan submitted by the council provided the above is considered and included in the Transport Impact Assessment Report (TIA) prepared by VicRoads.

VicRoads thanks you for your assistance and looks forward to ongoing discussions.

Yours sincerely,

[Signature]

Mr. Vinge
Planning Team Leader
Swan Hill Road City Council
PD Box 988
SWAN HILL VIC 3568
improvements assist the operation of the arterial road traffic flow and pedestrian movements along and across this section.

- Provision of pedestrian, bicycle and public bus facilities must be considered.
- Staging of the development must identify trigger points for all identified improvement measures on and along the arterial road network, and identify a mechanism for the delivery of the mitigating works.

Yours sincerely

[Signature]

[Position]
SWAN HILL SOUTH WEST DEVELOPMENT PRECINCT

TRAFFIC IMPACT ASSESSMENT

PREPARED FOR

SWAN HILL RURAL CITY COUNCIL

20 JUNE, 2014

GRP16371R9263B
TRAFFIC IMPACT ASSESSMENT

SWAN HILL SOUTH WEST DEVELOPMENT PRECINCT

Our Reference:  GRP16371R9263B

COPYRIGHT: The ideas and material contained in this document are the property of Traffic Group (Traffic Group Pty Ltd – ABN 32 103 481 570, Traffic Survey Pty Ltd – ABN 57 120 461 510, Traffic Design Pty Ltd – ABN 41 066 859 443). Use or copying of this document in whole or in part without the written permission of Traffic Group constitutes an infringement of copyright.

LIMITATION: This report has been prepared on behalf of and for the exclusive use of Traffic Group’s client, and is subject to and issued in connection with the provisions of the agreement between Traffic Group and its client. Traffic Group accepts no liability or responsibility whatsoever for or in respect of any use of or reliance upon this report by any third party.

GRP16371R9263B
# TABLE OF CONTENTS

**EXECUTIVE SUMMARY**

1. INTRODUCTION............................................................................................................ 1

2. SWAN HILL SOUTH WEST DEVELOPMENT PRECINCT .................................................. 1
   2.1. LOCATION ............................................................................................................ 1
   2.2. ZONING ............................................................................................................ 2
   2.3. DEVELOPMENT PLAN ....................................................................................... 3
   2.4. EXISTING TRAFFIC VOLUMES ................................................................. 4

3. SWAN HILL SOUTH WEST DEVELOPMENT PRECINCT TRAFFIC GENERATION MODEL ... 8

4. OPTION 1 - SEA LAKE-SWAN HILL ROAD LINK .................................................. 9
   4.1. DESIGN TRAFFIC VOLUMES (OPTION 1 - SEA LAKE-SWAN HILL ROAD LINK) .......... 9
   4.2. INTERSECTION REQUIREMENTS (OPTION 1 - SEA LAKE-SWAN HILL ROAD LINK) ....... 22
       4.2.1. Dead Horse Lane/Link 4 (Intersection #1) ............................................. 23
       4.2.2. Yana Street/Werri Street/Dead Horse Lane (Intersection #2) ..................... 23
       4.2.3. Coronation Avenue/Wattie Street/Link 1 (Intersection #3) ....................... 23
       4.2.4. Yana Street/Link 2/Link 3 (Intersection #4) ........................................... 24
       4.2.5. Gray Street/Yana Street (Intersection #5) ............................................... 25
       4.2.6. Gray Street/Internal Road (Intersection #6) ............................................ 28
       4.2.7. Gray Street/Foldmann Lane (Intersection #7) ......................................... 29
       4.2.8. Sea Lake-Swan Hill Road/Gray Street/Boobiilla Drive (Intersection #8) ........ 29
       4.2.9. Sea Lake-Swan Hill Road/Dead Horse Lane/Memorial Drive (Intersection #9) ... 30
       4.2.10. Sea Lake-Swan Hill Road/Link 7(1) (Intersection #10) ......................... 31
       4.2.11. Link 5/Link 3/Link 4 (Intersection #12) .............................................. 33
       4.2.12. Link 5/Link 6/Link 7 (Intersection #13) ............................................... 34
   4.3. RELATIVE TRAFFIC VOLUMES CONTRIBUTIONS BY INDIVIDUAL LAND HOLDINGS (OPTION 1 - SEA LAKE SWAN HILL ROAD LINK) ...................................... 35
       4.3.1. Nominated Intersections (Option 1 - Sea Lake-Swan Hill Road Link) ............. 36
       4.3.2. Nominated Internal Roads (Option 1 - Sea Lake-Swan Hill Road Link) .......... 38

5. OPTION 2 - DEAD HORSE LANE LINK .................................................................... 41
   5.1. DESIGN TRAFFIC VOLUMES (OPTION 2 - DEAD HORSE LANE LINK) ............... 41
   5.2. INTERSECTION REQUIREMENTS (OPTION 2 - DEAD HORSE LANE LINK) ........ 54
       5.2.1. Gray Street/Foldmann Lane (Intersection #7) ....................................... 54
       5.2.2. Sea Lake-Swan Hill Road/Gray Street/Boobiilla Drive (Intersection #6) ........ 55
       5.2.3. Sea Lake-Swan Hill Road/Dead Horse Lane/Memorial Drive (Intersection #9) ... 56
       5.2.4. Dead Horse Lane/Link 7(2) (Intersection #11) ...................................... 59
   5.3. RELATIVE TRAFFIC VOLUMES CONTRIBUTIONS BY INDIVIDUAL LAND HOLDINGS (OPTION 2 - DEAD HORSE LANE LINK) ............................................. 59
       5.3.1. Nominated Intersections (Option 2 - Dead Horse Lane Link) ..................... 59

GFP13371R92638
5.3.2. Nominated Internal Roads (Option 2 - Dead Horse Lane Link) ........................................60
5.4. OPTION 1 VS OPTION 2 .................................................................................................61
6. INCREASED DENSITY .............................................................. 62
6.1. DESIGN TRAFFIC VOLUMES .........................................................................................62
6.2. INTERSECTION REQUIREMENTS ..................................................................................68
6.2.1. Gray Street/Yana Street (Intersection #5) .................................................................68
6.2.2. Gray Street/Foldtman Lane (Intersection #7) .............................................................71
6.2.3. Sea Lake-Swan Hill Road/Gray Street/Boobialla Drive (Intersection #8) ....................71
7. COMMENTS ON SPECIFIC ITEMS ...............................................................................73
EXECUTIVE SUMMARY

Traffix Group was engaged by Swan Hill Rural City Council to undertake a traffic impact assessment of the proposed Swan Hill South West Development Precinct. Initially, the scope of the study comprised an assessment of the external traffic impacts, the forms of intersection treatments required and, on Sea Lake-Swan Hill Road, the trigger point for their provision. The scope of the study was extended to include an assessment of the relative traffic volumes from each land holding that travels through nominated intersections and along nominated roads. Initially, a yield of approximately 10.5 lots per hectare was investigated. The study was extended to “test” the impacts of a yield of approximately 14 lots per hectare.

Two layout options were considered: Option 1 - Sea Lake-Swan Hill Road Link, and Option 2 - Dead Horse Lane Link.

The outcomes of the study are summarised as follows:

1. Traffic Model

A traffic generation and distribution model was prepared for the Swan Hill South West Development Precinct, with the following key assumptions adopted:

- A residential density of approximately 10.5 lots per ha was adopted, resulting in 2,241 lots within the precinct.
- Daily traffic generation: 10 vte/household/day
- Peak hour traffic generation: 1 vte/household/hr
- Direction of travel: AM peak hour: "In": 20% "Out": 80%
  FM peak hour: "In": 60% "Out": 40%

- 5% of trips generated remain internal to the precinct.
- A design year of 2033 and a traffic growth of 1% per annum along Sea Lake-Swan Hill Road, as required by VicRoads.

2. Option 1 - Sea Lake-Swan Hill Road Link

2.1 Intersection Requirements

Dead Horse Lane/Link 4 (Intersection #1)

- It is recommended that a simple T-intersection be provided at the Yana Street/Werri Street/Dead Horse Lane intersection.

Yana Street/Werri Street/Dead Horse Lane (Intersection #2)

- It is recommended that the existing simple T-intersection continue to be provided at the Yana Street/Werri Street/Dead Horse Lane intersection.

Coronation Avenue/Watte Street/Link 1 (Intersection #3)

- It is recommended that a single lane roundabout be provided at the Coronation/Watte Street/Link 1 Intersection.

Yana Street/Link 2/Link 3 (Intersection #4)

- It is recommended that a single lane roundabout be provided at the Yana Street/Link 2/Link 3 intersection.
- This should be provided when an intersection is first created (either as a T-intersection or as a cross road).

Gray Street/Yana Street (Intersection #5)

- It is recommended that the existing configuration of the Gray Street/Yana Street intersection continue to be provided.

Gray Street/Internal Road (intersection #6)

- It is recommended that a simple T-intersection be provided at the Gray Street/Internal Road intersection provided with priority to Gray Street and separate left and right turn lanes in the internal road. A left turn lane should be provided in Gray Street, due to the relatively large volume of left turning traffic.
Gray Street/Feldmann Lane (intersection #7)
- It is recommended that a simple T-intersection continue to be provided at the Gray Street/Feldmann Lane intersection. A separate right turn facility should be provided in Gray Street and separate left and right turn lanes in Feldmann Lane. A left turn lane in Gray Street is not warranted on the basis of the predicted left turn volumes.

Sea Lake-Swan Hill Road/Gray Street/Bookala Drive (intersection #8)
- It is recommended that the intersection remain under roundabout control. No upgrades are required from a capacity perspective.
- As no upgrades are required from a capacity perspective, there is no “trigger point”.

Sea Lake-Swan Hill Road/Dead Horse Lane/Memorial Drive (intersection #9)
- It is recommended that the intersection remain in its current form.
- As no upgrades are required from a capacity perspective, there is no “trigger point”.

Sea Lake-Swan Hill Road/Link 7/1 (intersection #10)
- It is recommended that BAR (basic right turn) and AUL (auxiliary left turn) treatments be provided on the west and east approaches respectively. Given the relatively high volume of right turning traffic compared to left turning traffic in Link 7, separate left and right turn lanes should be provided in Link 7 at this intersection.
- The need for the AUL treatment in Sea Lake-Swan Hill Road is linked to the volume of left turning traffic. Initially, a BAS (basic left turn) treatment may only be necessary, with an upgrade to an AUL treatment when traffic volumes warrant it. In terms of a “trigger point” for its provision, guidance is provided by Austroads Figure 4.8(b). A PM peak hour volume of 60 vph turning left would be appropriate, equivalent to approximately 130 residential lots each using this intersection in that period.
- It may be that it is more convenient to initially construct this intersection with the AUL treatment.

Link 5/Link 3/Link 4 (intersection #12)
- It is recommended that a single lane roundabout be provided at the Link 5/Link 3/Link 4 intersection.

Link 7/Link 5/Link 5 (intersection #13)
- It is recommended that a single lane roundabout be provided at the Link 5/Link 6/Link 5 intersection.

2.2 Apportionment of Traffic Generation to Land Holders

<table>
<thead>
<tr>
<th>Landowner Number</th>
<th>Int #3</th>
<th>Int #4</th>
<th>Int #6</th>
<th>Int #7</th>
<th>Int #10</th>
<th>Int #12</th>
<th>Int #13</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.41%</td>
<td>0.33%</td>
<td>2.11%</td>
<td>4.47%</td>
<td>65.60%</td>
<td>0.00%</td>
<td>0.44%</td>
</tr>
<tr>
<td>2</td>
<td>0.00%</td>
<td>0.00%</td>
<td>9.65%</td>
<td>10.22%</td>
<td>27.32%</td>
<td>0.00%</td>
<td>14.73%</td>
</tr>
<tr>
<td>3</td>
<td>0.66%</td>
<td>0.05%</td>
<td>2.73%</td>
<td>5.41%</td>
<td>1.19%</td>
<td>0.00%</td>
<td>0.69%</td>
</tr>
<tr>
<td>4</td>
<td>4.40%</td>
<td>4.35%</td>
<td>7.34%</td>
<td>21.53%</td>
<td>0.58%</td>
<td>5.10%</td>
<td>12.94%</td>
</tr>
<tr>
<td>5</td>
<td>17.13%</td>
<td>27.61%</td>
<td>0.00%</td>
<td>50.36%</td>
<td>1.89%</td>
<td>86.19%</td>
<td>51.04%</td>
</tr>
<tr>
<td>6</td>
<td>0.00%</td>
<td>0.00%</td>
<td>4.24%</td>
<td>0.02%</td>
<td>0.04%</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>7</td>
<td>0.00%</td>
<td>0.00%</td>
<td>26.68%</td>
<td>0.12%</td>
<td>0.20%</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>8</td>
<td>0.00%</td>
<td>0.00%</td>
<td>2.12%</td>
<td>0.81%</td>
<td>0.02%</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>Landowner Number</td>
<td>Proportion of Traffic Along Link Attributable to Landowner</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>------------------</td>
<td>------------------------------------------------------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Link 1</td>
<td>Link 2</td>
<td>Link 3</td>
<td>Link 4</td>
<td>Link 5</td>
<td>Link 6</td>
<td>Link 7(1)</td>
</tr>
<tr>
<td>1</td>
<td>0.61%</td>
<td>0.88%</td>
<td>0.33%</td>
<td>0.00%</td>
<td>0.27%</td>
<td>0.14%</td>
<td>45.96%</td>
</tr>
<tr>
<td>2</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>6.50%</td>
<td>46.72%</td>
</tr>
<tr>
<td>3</td>
<td>0.09%</td>
<td>0.12%</td>
<td>0.05%</td>
<td>0.00%</td>
<td>0.04%</td>
<td>3.34%</td>
<td>1.76%</td>
</tr>
<tr>
<td>4</td>
<td>6.53%</td>
<td>9.38%</td>
<td>8.49%</td>
<td>0.00%</td>
<td>11.51%</td>
<td>16.51%</td>
<td>0.59%</td>
</tr>
<tr>
<td></td>
<td>25.26%</td>
<td>35.83%</td>
<td>55.87%</td>
<td>91.66%</td>
<td>75.74%</td>
<td>61.33%</td>
<td>2.84%</td>
</tr>
<tr>
<td>---</td>
<td>---------</td>
<td>---------</td>
<td>---------</td>
<td>--------</td>
<td>--------</td>
<td>--------</td>
<td>-------</td>
</tr>
<tr>
<td>6</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>7</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>8</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>9</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>10</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>11</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>12</td>
<td>15.51%</td>
<td>22.26%</td>
<td>21.74%</td>
<td>0.00%</td>
<td>0.35%</td>
<td>0.03%</td>
<td>0.85%</td>
</tr>
<tr>
<td>13</td>
<td>2.78%</td>
<td>3.99%</td>
<td>0.08%</td>
<td>0.00%</td>
<td>0.07%</td>
<td>0.01%</td>
<td>1.15%</td>
</tr>
<tr>
<td>14</td>
<td>7.14%</td>
<td>10.25%</td>
<td>13.71%</td>
<td>8.05%</td>
<td>10.66%</td>
<td>8.68%</td>
<td>0.78%</td>
</tr>
<tr>
<td>15</td>
<td>0.05%</td>
<td>0.08%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.01%</td>
</tr>
<tr>
<td>16</td>
<td>3.09%</td>
<td>4.44%</td>
<td>0.18%</td>
<td>0.00%</td>
<td>0.15%</td>
<td>0.01%</td>
<td>0.33%</td>
</tr>
<tr>
<td>17</td>
<td>0.31%</td>
<td>0.44%</td>
<td>0.59%</td>
<td>0.34%</td>
<td>0.46%</td>
<td>0.37%</td>
<td>0.03%</td>
</tr>
<tr>
<td>18</td>
<td>1.92%</td>
<td>2.75%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>19</td>
<td>2.88%</td>
<td>6.61%</td>
<td>0.09%</td>
<td>0.00%</td>
<td>0.07%</td>
<td>0.01%</td>
<td>0.32%</td>
</tr>
<tr>
<td>20</td>
<td>0.35%</td>
<td>0.50%</td>
<td>0.01%</td>
<td>0.00%</td>
<td>0.01%</td>
<td>0.00%</td>
<td>0.04%</td>
</tr>
<tr>
<td>21</td>
<td>0.55%</td>
<td>0.78%</td>
<td>0.03%</td>
<td>0.00%</td>
<td>0.03%</td>
<td>0.00%</td>
<td>0.06%</td>
</tr>
<tr>
<td>22</td>
<td>0.20%</td>
<td>0.28%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>23</td>
<td>10.92%</td>
<td>0.17%</td>
<td>0.12%</td>
<td>0.00%</td>
<td>0.10%</td>
<td>0.01%</td>
<td>0.23%</td>
</tr>
<tr>
<td>24</td>
<td>4.96%</td>
<td>0.25%</td>
<td>0.17%</td>
<td>0.00%</td>
<td>0.10%</td>
<td>0.01%</td>
<td>0.23%</td>
</tr>
<tr>
<td>25</td>
<td>16.25%</td>
<td>0.25%</td>
<td>0.09%</td>
<td>0.00%</td>
<td>0.06%</td>
<td>0.01%</td>
<td>0.32%</td>
</tr>
<tr>
<td>26</td>
<td>0.16%</td>
<td>0.23%</td>
<td>0.08%</td>
<td>0.00%</td>
<td>0.07%</td>
<td>0.01%</td>
<td>0.31%</td>
</tr>
<tr>
<td>27</td>
<td>0.34%</td>
<td>0.49%</td>
<td>0.37%</td>
<td>0.00%</td>
<td>0.31%</td>
<td>0.03%</td>
<td>0.43%</td>
</tr>
<tr>
<td>28</td>
<td>0.18%</td>
<td>0.02%</td>
<td>0.01%</td>
<td>0.00%</td>
<td>0.01%</td>
<td>0.00%</td>
<td>0.02%</td>
</tr>
<tr>
<td>29</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>30</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
</tbody>
</table>
3. Option 2 - Dead Horse Lane Link

There is very little difference in the predicted traffic volumes for the majority of intersections and link roads as a result of replacing a connection to Sea Lake-Swan Hill Road (Option 1) by a connection to Dead Horse Land (Option 2). Intersections 7, 8, 9 and 11 and links 6 and 7 are most affected by this change and therefore these intersections have been assessed. The remainder of the intersections have the treatments recommended for Option 1.

3.1 Intersection Requirements

Gray Street/Feldmann Lane (Intersection #7)

- It is recommended that a simple T-intersection continue to be provided at the Gray Street/Feldmann Lane intersection be provided with priority to Gray Street, a right turn facility in Gray Street (due to the large volume of right turning traffic) and separate left and right turn lanes in Feldmann Lane.

Sea Lake-Swan Hill Road/Gray Street/Boobiala Drive (Intersection #8)

- It is recommended that the intersection remain under roundabout control. No upgrades are required from a capacity perspective.
- As no upgrades are required from a capacity perspective, there is no "trigger point".

Sea Lake-Swan Hill Road/Dead Horse Lane/Memorial Drive (Intersection #9)

- It is recommended that BAR (basic right turn) and BAL (basic left turn) treatments be provided on the west and east approaches respectively. No particular treatment is required for the left and right turn lanes in Dead Horse Lane at this intersection.
- The existing volumes warrant the provision of BAR and BAL turn treatments, as do the post development volumes. There is therefore no "trigger point" for an upgrade of the right turn treatment as a result of the Swan Hill South West Development Precinct.

Dead Horse Lane/Link 7/2 (Intersection #11)

- It is recommended that a simple T-intersection be provided at the Dead Horse Lane/Link 7/2 intersection, with priority to Dead Horse Lane.

3.2 Apportionment of Traffic Generation to Land Holders

Intersections

Table C: Apportionment of Traffic - Intersections (Option 2 - Dead Horse Lane Link)

<table>
<thead>
<tr>
<th>Landowner Number</th>
<th>Proportion of Traffic Through Intersection Attributable to Landowner</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Int #3</td>
</tr>
<tr>
<td>1</td>
<td>0.37%</td>
</tr>
<tr>
<td>2</td>
<td>0.52%</td>
</tr>
<tr>
<td>3</td>
<td>0.08%</td>
</tr>
<tr>
<td>4</td>
<td>4.38%</td>
</tr>
<tr>
<td>5</td>
<td>17.05%</td>
</tr>
<tr>
<td>6</td>
<td>0.00%</td>
</tr>
<tr>
<td>7</td>
<td>0.00%</td>
</tr>
<tr>
<td>8</td>
<td>0.00%</td>
</tr>
<tr>
<td>9</td>
<td>0.00%</td>
</tr>
</tbody>
</table>
### Table D: Apportionment of Traffic - Road Links (Option 2 - Dead Horse Lane Link)

<table>
<thead>
<tr>
<th>Landowner Number</th>
<th>Proportion of Traffic Along Link Attributable to Landowner</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Link 1</td>
</tr>
<tr>
<td>1</td>
<td>0.00%</td>
</tr>
<tr>
<td>2</td>
<td>0.00%</td>
</tr>
<tr>
<td>3</td>
<td>0.00%</td>
</tr>
<tr>
<td>4</td>
<td>0.00%</td>
</tr>
<tr>
<td>5</td>
<td>0.00%</td>
</tr>
</tbody>
</table>
4. **Option 1 v Option 2**

Option 1 (a connection to Sea Lake-Swan Hill Road) provides a superior road network compared to Option 2 (a connection to Dead Horse Lane) and will not detrimentally affect the operation or capacity of Sea Lake-Swan Hill Road. Option 1 is the preferred solution.
5. Increased Residential Density

The single lane roundabouts recommended at intersections 3 (Coronation Avenue/Wattle Street/Link 1), 4 Yane Street/Link 2/Link 3, 12 (Link 3/Link 4/Link 5) and 13 ((Link 5/Link 6/Link 7) will have the capacity to accommodate the extra traffic generated by a higher residential density.

The higher density will increase traffic at intersections 5 (Grey Street/Yana Street), 7 (Gray Street/Feldtmann Lane (Link 6)) and 8 Sea Lake-Swan Hill Road/Gray Street/Boobialla Drive. Additional capacity analysis was undertaken to determine the impact the higher density will have on the operation and form of these intersections.

These analyses showed that the recommended treatments remain appropriate, albeit that the intersections will operate at lower levels of service. It is noted that the east approach in Gray Street is sufficiently wide to enable through vehicles to pass left turning vehicles, and on the west approach there is scope to ban kerbside parking to allow through traffic to pass stationary right turning traffic. This action should be considered by Council separate to this study.

6. Comments on Specific Items

Distance from Sea Lake-Swan Hill Road of First Intersection on Dead Horse Lane

VicRoads’ requirement to offset a local road intersection on Dead Horse Lane more than 800m from Sea Lake Swan Hill Road is excessive. There will be low volumes of traffic through this intersection in the design year (2033) and queues on the Dead Horse Lane approach will be one vehicle long. The first intersection to the south will carry low volumes of traffic, and a simple T-intersection is all that is required.

The property on the southeast corner of this intersection has a frontage to Dead Horse Lane of some 135m and is to be retained. The first intersection to the south of Sea Lake Swan Hill Road will therefore be greater than this distance from the main road, which is more than sufficient to ensure that both intersections can operate efficiently in the future.

Access to Sea Lake-Swan Hill Road

The intersections of Gray Street and Dead Horse Lane with Sea Lake-Swan Hill Road are separated by approximately 750m. There is therefore more than sufficient road length in which to create an intersection if so desired. A connection to Sea Lake-Swan Hill Road provides a superior road network whilst not detrimentally affecting the operation or capacity of Sea Lake-Swan Hill Road.

Recommended Speed Zones

The setting of speed zones on the declared road network is the responsibility of VicRoads and takes into account many factors. The assessment of the intersection requirements at Dead Horse Lane has been undertaken on the basis that, as the urban edge of Swan Hill would have moved to this location, a speed limit of 80 kmh is appropriate.
1. **INTRODUCTION**

Traffix Group was engaged by Swan Hill Rural City Council to undertake a traffic impact assessment of the proposed Swan Hill South West Development Precinct. Initially, the scope of the study comprised an assessment of the external traffic impacts, the forms of intersection treatments required and, on Sea Lake-Swan Hill Road, the trigger point for their provision. The scope of the study was extended to include an assessment of the relative traffic volumes from each land holding that travels though nominated intersections and along nominated roads. Initially, a yield of approximately 10.5 lots per hectare was investigated. The study was extended to “test” the impacts of a yield of approximately 14 lots per hectare.

2. **SWAN HILL SOUTH WEST DEVELOPMENT PRECINCT**

2.1. **LOCATION**

The development area is bounded by Sea Lake-Swan Hill Road, Gray Street, Yana Street and Dead Horse Lane. It is located at the southwest edge of the urban development of the Swan Hill township. The development area covers approximately 241 hectares. A locality plan is shown in Figure 1.

![Figure 1: Swan Hill South West Development Precinct Locality Plan](Source: www.swanhill.vic.gov.au)
2.2 ZONING

The development area comprises a number of zones, principally Farming Zone, but including Low Density Residential Zone and Public Park & Recreation Zone, as shown in the zoning map at Figure 2.
2.3 DEVELOPMENT PLAN

The Swan Hill South West Development Precinct plan is shown in Figure 3.
The Swan Hill South West Development Precinct Plan shows two access options in the northwest corner of the precinct:

- Option 1: Connection to Sea Lake-Swan Hill Road; and
- Option 2: Connection to Dead Horse Lane.

The remainder of the Development Precinct Plan is the same for both options.

2.4. **EXISTING TRAFFIC VOLUMES**

Swan Hill Rural City Council undertook a number of traffic surveys within the precinct area in November, 2013. These comprised turning movement counts and automatic tube counts. The results are shown in Figures 4 to 7 and Table 1.

**Figure 4: Existing Traffic Volumes - Sea Lake-Swan Hill Road/Gray Street/Boobialla Drive**

**Figure 5: Existing Traffic Volumes - Gray Street/Yara Street**
Figure 6: Existing Traffic Volumes - Yana Street/Werril Street/Dead Horse Lane

Figure 7: Existing Traffic Volumes - Coronation Avenue/Wattle Street
<table>
<thead>
<tr>
<th>Table 1: Existing Traffic Volumes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Period</strong></td>
</tr>
<tr>
<td>-----------------</td>
</tr>
<tr>
<td><strong>Dead Horse Lane, South of Sea Lake Road</strong></td>
</tr>
<tr>
<td>8:00am-9:00am</td>
</tr>
<tr>
<td>5:00pm-6:00pm</td>
</tr>
<tr>
<td>Daily</td>
</tr>
<tr>
<td><strong>Dead Horse Lane, West of Yara Street</strong></td>
</tr>
<tr>
<td>8:00am-9:00am</td>
</tr>
<tr>
<td>5:00pm-6:00pm</td>
</tr>
<tr>
<td>Daily</td>
</tr>
<tr>
<td><strong>Gray Street, Between Murling Street and Sea Lake Road</strong></td>
</tr>
<tr>
<td>8:00am-9:00am</td>
</tr>
<tr>
<td>5:00pm-6:00pm</td>
</tr>
<tr>
<td>Daily</td>
</tr>
<tr>
<td><strong>Sea Lake Road, Between Gray Street and Dead Horse Lane</strong></td>
</tr>
<tr>
<td>8:00am-9:00am</td>
</tr>
<tr>
<td>5:00pm-6:00pm</td>
</tr>
<tr>
<td>Daily</td>
</tr>
<tr>
<td><strong>Wernli Street, Between Yara Street and Back Boga Road</strong></td>
</tr>
<tr>
<td>8:00am-9:00am</td>
</tr>
<tr>
<td>5:00pm-6:00pm</td>
</tr>
<tr>
<td>Daily</td>
</tr>
<tr>
<td><strong>Period</strong></td>
</tr>
<tr>
<td><strong>Coronation Avenue, North of Wattie Street</strong></td>
</tr>
<tr>
<td>8:00am-9:00am</td>
</tr>
<tr>
<td>5:00pm-6:00pm</td>
</tr>
<tr>
<td>Daily</td>
</tr>
<tr>
<td>---------------------------------------------</td>
</tr>
<tr>
<td><strong>Coronation Avenue, South of Wattie Street</strong></td>
</tr>
<tr>
<td>8:00am-9:00am</td>
</tr>
<tr>
<td>5:00pm-6:00pm</td>
</tr>
<tr>
<td>Daily</td>
</tr>
<tr>
<td><strong>Coronation Avenue, North of Wattie Street</strong></td>
</tr>
<tr>
<td>8:00am-9:00am</td>
</tr>
<tr>
<td>5:00pm-6:00pm</td>
</tr>
<tr>
<td>Daily</td>
</tr>
<tr>
<td><strong>Yana Street, South of Ken Harrison Reserve Entrance</strong></td>
</tr>
<tr>
<td>8:00am-9:00am</td>
</tr>
<tr>
<td>5:00pm-6:00pm</td>
</tr>
<tr>
<td>Daily</td>
</tr>
<tr>
<td><strong>Yana Street, North of Werri Street/Dead Horse Lane</strong></td>
</tr>
<tr>
<td>8:00am-9:00am</td>
</tr>
<tr>
<td>5:00pm-6:00pm</td>
</tr>
<tr>
<td>Daily</td>
</tr>
<tr>
<td><strong>Werri Street, East of Back Boga Road</strong></td>
</tr>
<tr>
<td>8:00am-9:00am</td>
</tr>
<tr>
<td>5:00pm-6:00pm</td>
</tr>
<tr>
<td>Daily</td>
</tr>
<tr>
<td><strong>Period</strong></td>
</tr>
<tr>
<td><strong>Sea Lake Road, West of Dead Horse Lane</strong></td>
</tr>
<tr>
<td>8:00am-9:00am</td>
</tr>
<tr>
<td>5:00pm-6:00pm</td>
</tr>
<tr>
<td>Daily</td>
</tr>
</tbody>
</table>
3. SWAN HILL SOUTH WEST DEVELOPMENT PRECINCT TRAFFIC GENERATION MODEL

A spreadsheet traffic generation and distribution model was prepared for the Swan Hill South West Development Precinct, whereby the precinct was divided into a number of discrete areas and the traffic generated by each area was assigned to the road network.

The following assumptions were adopted:

- **Residential density:**
  - “Standard” lot sizes: Approximately 10.5 households per ha
  - Low density lot sizes: 1,000m² and 2,000m²

- **Residential traffic generation**
  - Daily: 10 vte/household/day
  - Peak hour: 1 vte/household/hr
    - AM peak hour: “in”: 20% “Out”: 80%
    - PM peak hour: “in”: 80% “Out”: 20%

- **Trip purpose:**
  - Internal: 5%
  - External:
    - Work: 25.6%
    - School: 11.4%
    - Shopping: 34.2%
    - Other: 23.8%


<table>
<thead>
<tr>
<th>Purpose</th>
<th>To/From North</th>
<th>To/From South</th>
<th>To/From East</th>
<th>To/From West</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Work</td>
<td>50%</td>
<td>0%</td>
<td>50%</td>
<td>0%</td>
</tr>
<tr>
<td>School</td>
<td>100%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Shopping</td>
<td>50%</td>
<td>0%</td>
<td>50%</td>
<td>0%</td>
</tr>
<tr>
<td>Other</td>
<td>45%</td>
<td>5%</td>
<td>45%</td>
<td>5%</td>
</tr>
</tbody>
</table>

The model assumed that the traffic generated by the childcare centre, retail area and “village green” located within the middle of the precinct was all internal traffic.

Applying this general trip distribution to the individual trip purpose produced the following adopted average external trip distributions:

- To/from north: 58%
- To/from south: 1%
- To/from east: 15%
- To/from west: 1%

VicRoads required traffic along Sea Lake-Swan Hill Road to be grown at a rate of 1% per annum to a design year of 2033 (being 10 years until full development of the precinct plus a further 10 years). Whilst full development of the precinct may take longer than 10 years, this design year is considered to be appropriate in light of the adopted growth rate for Sea Lake-Swan Hill Road traffic, which is likely to be high given the lack of future traffic generators to the west of the precinct.
4. OPTION 1 - SEA LAKE-SWAN HILL ROAD LINK

4.1. DESIGN TRAFFIC VOLUMES

(Option 1 - Sea Lake-Swan Hill Road Link)

Figure 8 identifies the intersection and road numbers used in this report for Option 1.

Legend:
- Existing Road
- New Road
- Intersection

Figure 8: Intersection and Road Identification
(Option 1 - Sea Lake-Swan Hill Road Link)
The predicted precinct daily traffic volumes arising from the traffic model for Option 1 - Sea Lake-Swan Hill Road Link are shown in Figure 9.

Figure 9: Predicted Precinct Daily Traffic Volumes (Option 1 - Sea Lake-Swan Hill Road Link)

The traffic model also allowed the peak hour turning volumes to be determined at critical locations. These are shown in Figures 10 to 21, which also show existing volumes and the total post-development volumes (including growth of traffic along Sea Lake-Swan Hill Road, as required by VicRoads).
Figure 10: Traffic Volumes - Dead Horse Lane/Link 4 (Intersection #1)
(Optional 1 - Sea Lake-Swan Hill Road Link)

(1) Assumed equally split northbound/southbound (based on directional split at Yara Street).
AM Peak Hour:

Existing

Yara Street

Werri Street

Dead Horse Lane

Development

Yara Street

Werri Street

Dead Horse Lane

Post Development

Yara Street

Werri Street

Dead Horse Lane

PM Peak Hour:

Existing

Yara Street

Werri Street

Dead Horse Lane

Development

Yara Street

Werri Street

Dead Horse Lane

Post Development

Yara Street

Werri Street

Dead Horse Lane

Figure 11: Traffic Volumes - Yara Street/Werri Street/Dead Horse Lane (Intersection #2) (Option 1 - Sea Lake-Swan Hill Road Link)
Figure 12: Traffic Volumes - Coronation Avenue/Wattie Street/Link 1 (Intersection #3) (Option 1 - Sea Lake-Swan Hill Road Link)
Figure 13: Traffic Volumes - Yana Street/Link 2/Link 3 (Intersection #4)
(Option 1 - Sea Lake-Swan Hill Road Link)

(1) Assumed equally split northbound/southbound (based on directional split at Gray Street).
Figure 14: Traffic Volumes - Grey Street/Yana Street (Intersection #5) (Option 1 - Sea Lake-Swan Hill Road Link)
AM Peak Hour

**Existing**
Gray Street

- 61 (1) → 54 (1)

**Development**
Gray Street

- 39
- 1

- 10
- 34

**Post Development**
Gray Street

- 100
- 1

- 16
- 34

Internal Road

PM Peak Hour

**Existing**
Gray Street

- 39 (1) → 53 (1)

**Development**
Gray Street

- 29
- 1

- 29
- 104

**Post Development**
Gray Street

- 58
- 1

- 82
- 104

Internal Road

(1) Derived from adjacent intersection

---

**Figure 15:** Traffic Volumes - Gray Street/Internal Road (Intersection #6)
(Option 1 - Sea Lake-Swan Hill Road Link)
Figure 16: Traffic Volumes - Gray Street/Feldtmann Lane (Link 6) (Intersection #7) (Option 1 - Sea Lake-Swan Hill Road Link)

(1) Assumed.
(2) Derived from adjacent intersection.
Figure 17: Traffic Volumes - Swan Hill Road/Gray Street/Boobiala Drive (Intersection #8) (Option 1 - Swan Hill Road Link)

(1) From TTM Consulting (Vic) traffic report for Tower Hill Development.
(2) Derived from TTM Consulting (Vic) traffic report for Tower Hill Development.
Figure 18: Traffic Volumes - Sea Lake-Swan Hill Road/Dead Horse Lane/Memorial Drive

(Intersection #3)

(Optional sea Lake-Swan Hill Road Link)
Figure 19: Traffic Volumes - Sea Lake-Swan Hill Road/Link 7(1) (Intersection #10)
(Optional 1 - Sea Lake-Swan Hill Road Link)

(1) Derived from adjacent intersections.
Figure 20: Traffic Volumes - Link 5/Link 3/Link 4 (Intersection #12) (Option 1 - Sea Lake-Swan Hill Road Link)
4.2. INTERSECTION REQUIREMENTS  
(OPTION 1 - SEA LAKE-SWAN HILL ROAD LINK)

To determine the appropriate requirements for the critical intersections, two assessments were completed - SIDRA capacity analysis and, on Sea Lake-Swan Hill Road, an assessment against the relevant requirements of “Guide to Road Design Part 4A: Unsignalised and Signalised Intersections” (Austroads, 2009). The outputs from the capacity analyses are contained in the separate Appendices report.

In undertaking these analyses, the following parameters were adopted:

- **T-intersection:**
  - Right turn from major road: \( t_r = 4 \) sec  \( t_s = 2 \) sec
  - Right turn from minor road: \( t_r = 5 \) sec  \( t_s = 3 \) sec
  - Left turn from minor road: \( t_r = 5 \) sec  \( t_s = 3 \) sec

- **Roundabout:**
  - As calculated by SIDRA
4.2.1. Dead Horse Lane/Link 4 (Intersection #1)

Capacity Analysis

The existing simple T-intersection is an appropriate treatment for this intersection. Due to the low volumes of traffic through the intersection, no capacity analysis has been undertaken.

Recommended Intersection Treatment

It is recommended that a simple T-intersection be provided at the Yana Street/Werri Street/Dead Horse Lane intersection.

4.2.2. Yana Street/Werri Street/Dead Horse Lane (Intersection #2)

Capacity Analysis

The existing simple T-intersection is an appropriate treatment for this intersection. Due to the low volumes of traffic through the intersection, no capacity analysis has been undertaken.

Recommended Intersection Treatment

It is recommended that the existing simple T-intersection continue to be provided at the Yana Street/Werri Street/Dead Horse Lane intersection.

4.2.3. Coronation Avenue/Wattie Street/Link 1 (Intersection #3)

Capacity Analysis

This intersection will become a cross road, so a roundabout has been nominated as the most appropriate treatment. The results of the analysis for this configuration are summarised in Table 2.

| Table 2: Capacity Analysis - Coronation Avenue/Wattie Street/Link 1 (Intersection #3) (Option 1 - Sea Lake-Swan Hill Road Link) |
|---|---|---|---|---|---|---|
| Period | Approach | Existing Approach | | Post Development |
|       |        | DoS | Ave Delay (sec) | 95th %ile Queue (m) | DoS | Ave Delay (sec) | 95th %ile Queue (m) |
| AM     | South  | N/A | N/A | N/A | 0.14 | 6.4 | 5.3 |
|        | East   | N/A | N/A | N/A | 0.08 | 8.4 | 3.1 |
|        | North  | N/A | N/A | N/A | 0.19 | 6.7 | 7.7 |
|        | West   | N/A | N/A | N/A | 0.24 | 6.0 | 9.8 |
|        | All Veh| N/A | N/A | N/A | 0.24 | 6.6 | 9.8 |
|        | LoS    | N/A | N/A | N/A |   |   |   |
| PM     | South  | N/A | N/A | N/A | 0.08 | 6.8 | 2.8 |
|        | East   | N/A | N/A | N/A | 0.15 | 6.9 | 5.6 |
|        | North  | N/A | N/A | N/A | 0.24 | 7.2 | 10.0 |
|        | West   | N/A | N/A | N/A | 0.11 | 5.4 | 4.1 |
|        | All Veh| N/A | N/A | N/A | 0.24 | 6.7 | 10.0 |
|        | LoS    | N/A | N/A | N/A |   |   |   |
The analysis shows that under post-development traffic volumes, the intersection operates at a Level of Service A, with a low degree of saturation in both the AM and PM peak periods, with minimal delays and minimal queues on all approaches.

**Recommended Intersection Treatment**

It is recommended that a single lane roundabout be provided at the Coronation/Wattle Street/Link 1 intersection.

4.2.4. Yana Street/Link 2/Link 3 (Intersection #4)

**Capacity Analysis**

This intersection will become a cross road, so a roundabout has been nominated as the most appropriate treatment.

The results of the analysis for this configuration are summarised in Table 3.

| Table 3: Capacity Analysis - Yana Street/Link 2/Link 3 (Intersection #4) (Option 1 - Sea Lake-Swan Hill Road Link) |
|--------------------------------------------------|--------------------------------------------------|--------------------------------------------------|
| Period  | Approach  | Existing | Post Development |
|         |           | Approach DoS | Approach Ave Delay (sec) | Approach 95th %ile Queue (m) | Approach DoS | Approach Ave Delay (sec) | Approach 95th %ile Queue (m) |
|         |           | N/A | N/A | N/A | 0.15 | 5.6 | 5.7 | 0.04 | 5.4 | 1.6 |
| AM      | South     | N/A | N/A | N/A | 0.12 | 7.6 | 4.7 |
|         | East      | N/A | N/A | N/A | 0.29 | 6.0 | 12.7 |
|         | North     | N/A | N/A | N/A | 0.29 | 6.1 | 12.7 |
|         | West      | N/A | N/A | N/A | 0.29 | N/A | N/A |
|         | All Veh   | N/A | N/A | N/A | 0.29 | 6.1 | 12.7 |
|         | LoS       | N/A | N/A | N/A | 0.29 | 6.1 | 12.7 |
| PM      | South     | N/A | N/A | N/A | 0.13 | 6.1 | 4.9 |
|         | East      | N/A | N/A | N/A | 0.22 | 8.2 | 9.2 |
|         | North     | N/A | N/A | N/A | 0.22 | 8.2 | 9.2 |
|         | West      | N/A | N/A | N/A | 0.22 | 8.2 | 9.2 |
|         | All Veh   | N/A | N/A | N/A | 0.22 | 8.2 | 9.2 |
|         | LoS       | N/A | N/A | N/A | 0.22 | 8.2 | 9.2 |

The analysis shows that under post-development traffic volumes, the intersection operates at a Level of Service A, with a low degree of saturation in both the AM and PM peak periods, with minimal delays and minimal queues on all approaches.

**Recommended Intersection Treatment**

It is recommended that a single lane roundabout be provided at the Yana Street/Link 2/Link 3 intersection. This should be provided when an intersection is first created (either as a T-intersection or as a cross road).
4.2.5. Gray Street/Yana Street (Intersection #5)

Capacity Analysis

The existing configuration of this intersection comprises a simple T-intersection with priority to Gray Street and separate left and right turn lanes in Yana Street.

The results of the analysis for this configuration are summarised in Table 4.

Table 4: Capacity Analysis - Gray Street/Yana Street - Existing Configuration (Intersection #5) (Option 1 - Sea Lake-Swan Hill Road Link)

<table>
<thead>
<tr>
<th>Period</th>
<th>Approach</th>
<th>DoS</th>
<th>Approach Ave Delay (sec)</th>
<th>Approach 95th %ile Queue (m)</th>
<th>DoS</th>
<th>Approach Ave Delay (sec)</th>
<th>Approach 95th %ile Queue (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AM</td>
<td>South</td>
<td>0.18</td>
<td>10.1</td>
<td>4.0</td>
<td>0.57</td>
<td>13.2</td>
<td>25.1</td>
</tr>
<tr>
<td></td>
<td>East</td>
<td>0.13</td>
<td>4.0</td>
<td>0.0</td>
<td>0.19</td>
<td>5.0</td>
<td>0.0</td>
</tr>
<tr>
<td></td>
<td>West</td>
<td>0.15</td>
<td>4.9</td>
<td>6.5</td>
<td>0.24</td>
<td>5.5</td>
<td>10.7</td>
</tr>
<tr>
<td></td>
<td>All Veh</td>
<td>0.16</td>
<td>6.2</td>
<td>6.5</td>
<td>0.57</td>
<td>8.9</td>
<td>25.1</td>
</tr>
<tr>
<td>PM</td>
<td>South</td>
<td>0.07</td>
<td>9.3</td>
<td>1.8</td>
<td>0.27</td>
<td>11.0</td>
<td>7.7</td>
</tr>
<tr>
<td></td>
<td>East</td>
<td>0.08</td>
<td>4.6</td>
<td>0.0</td>
<td>0.17</td>
<td>5.6</td>
<td>0.0</td>
</tr>
<tr>
<td></td>
<td>West</td>
<td>0.09</td>
<td>3.2</td>
<td>3.2</td>
<td>0.21</td>
<td>6.3</td>
<td>8.6</td>
</tr>
<tr>
<td></td>
<td>All Veh</td>
<td>0.09</td>
<td>5.3</td>
<td>3.2</td>
<td>0.27</td>
<td>7.5</td>
<td>8.6</td>
</tr>
</tbody>
</table>

The analysis shows that under post-development traffic volumes, Gray Street operates with a very low degree of saturation in both the AM and PM peak periods, with minimal delays and minimal queues on both approaches. Yana Street will experience a reduction in Level of Service in both peak periods.

It is noted that the model produced for this study does not allow for any redistribution of traffic that might occur due to congestion and/or delays at a particular intersection. Both these factors mean that the predicted traffic volumes turning from Yana Street (and into Yana Street) may be overestimated, which, in turn, means that the traffic impact may be overstated.

To assess upgrade options, three upgrades have been assessed - left and right turn lanes in Gray Street, a roundabout and traffic signals. The results of the analyses for these configurations are shown in Tables 5, 6 and 7.
### Table 5: Capacity Analysis - Gray Street/Yana Street (Intersection #5)  
Turn Lanes in Gray Street  
(OPTION 1 - Sea Lake-Swan Hill Road Link)

<table>
<thead>
<tr>
<th>Period</th>
<th>Approach</th>
<th>Existing</th>
<th></th>
<th>Post Development</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Approach DoS</td>
<td>Approach Ave Delay (sec)</td>
<td>Approach 95th %ile Queue (m)</td>
<td>Approach DoS</td>
</tr>
<tr>
<td>AM</td>
<td>South</td>
<td>0.16</td>
<td>10.1</td>
<td>4.0</td>
<td>0.54</td>
</tr>
<tr>
<td></td>
<td>East</td>
<td>0.13</td>
<td>4.0</td>
<td>0.0</td>
<td>0.12</td>
</tr>
<tr>
<td></td>
<td>West</td>
<td>0.16</td>
<td>4.9</td>
<td>6.5</td>
<td>0.14</td>
</tr>
<tr>
<td></td>
<td>All Veh</td>
<td>0.16</td>
<td>6.2</td>
<td>6.5</td>
<td>0.54</td>
</tr>
<tr>
<td>PM</td>
<td>South</td>
<td>0.07</td>
<td>9.3</td>
<td>1.8</td>
<td>0.26</td>
</tr>
<tr>
<td></td>
<td>East</td>
<td>0.08</td>
<td>4.6</td>
<td>0.0</td>
<td>0.12</td>
</tr>
<tr>
<td></td>
<td>West</td>
<td>0.09</td>
<td>3.2</td>
<td>3.2</td>
<td>0.14</td>
</tr>
<tr>
<td></td>
<td>All Veh</td>
<td>0.09</td>
<td>5.3</td>
<td>3.2</td>
<td>0.25</td>
</tr>
</tbody>
</table>

### Table 6: Capacity Analysis - Gray Street/Yana Street (Intersection #5)  
Roundabout  
(OPTION 1 - Sea Lake-Swan Hill Road Link)

<table>
<thead>
<tr>
<th>Period</th>
<th>Approach</th>
<th>Existing</th>
<th></th>
<th>Post Development</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Approach DoS</td>
<td>Approach Ave Delay (sec)</td>
<td>Approach 95th %ile Queue (m)</td>
<td>Approach DoS</td>
</tr>
<tr>
<td>AM</td>
<td>South</td>
<td>0.16</td>
<td>10.1</td>
<td>4.0</td>
<td>0.20</td>
</tr>
<tr>
<td></td>
<td>East</td>
<td>0.13</td>
<td>4.0</td>
<td>0.0</td>
<td>0.20</td>
</tr>
<tr>
<td></td>
<td>West</td>
<td>0.16</td>
<td>4.9</td>
<td>6.5</td>
<td>0.33</td>
</tr>
<tr>
<td></td>
<td>All Veh</td>
<td>0.16</td>
<td>6.2</td>
<td>6.5</td>
<td>0.33</td>
</tr>
<tr>
<td>PM</td>
<td>South</td>
<td>0.07</td>
<td>9.3</td>
<td>1.8</td>
<td>0.11</td>
</tr>
<tr>
<td></td>
<td>East</td>
<td>0.08</td>
<td>4.6</td>
<td>0.0</td>
<td>0.25</td>
</tr>
<tr>
<td></td>
<td>West</td>
<td>0.09</td>
<td>3.2</td>
<td>3.2</td>
<td>0.25</td>
</tr>
<tr>
<td></td>
<td>All Veh</td>
<td>0.09</td>
<td>5.3</td>
<td>3.2</td>
<td>0.26</td>
</tr>
</tbody>
</table>
Table 7: Capacity Analysis - Gray Street/Yana Street (Intersection #5)  
Traffic Signals  
(OPTION 1 - Sea Lake-Swan Hill Road Link)

<table>
<thead>
<tr>
<th>Period</th>
<th>Approach</th>
<th>Existing</th>
<th>Post Development</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Approach DoS</td>
<td>Approach Ave Delay (sec)</td>
</tr>
<tr>
<td>AM</td>
<td>South</td>
<td>0.15</td>
<td>10.1</td>
</tr>
<tr>
<td></td>
<td>East</td>
<td>0.13</td>
<td>4.0</td>
</tr>
<tr>
<td></td>
<td>West</td>
<td>0.15</td>
<td>4.9</td>
</tr>
<tr>
<td></td>
<td>All Veh</td>
<td>0.15</td>
<td>6.2</td>
</tr>
<tr>
<td>PM</td>
<td>South</td>
<td>0.07</td>
<td>9.3</td>
</tr>
<tr>
<td></td>
<td>East</td>
<td>0.08</td>
<td>4.6</td>
</tr>
<tr>
<td></td>
<td>West</td>
<td>0.09</td>
<td>3.2</td>
</tr>
<tr>
<td></td>
<td>All Veh</td>
<td>0.09</td>
<td>5.3</td>
</tr>
</tbody>
</table>

It is noted that the SIDRA analysis did not take into account the “peak effect” of the adjacent school during the AM period. In practice, more of the existing traffic will occur closer to 9:00am than be evenly spread over the hour. Similarly, more of the development traffic may occur away from the school peak to avoid the delays that it creates. Thus, the proposed development will have less of an impact at this intersection during the AM peak.

These analyses show that, compared to the existing configuration of the intersection, for post-development traffic volumes:

- Turn lanes in Gray Street have limited impact on delays and queues to traffic leaving Yana Street, and on the operation of Gray Street;
- A roundabout reduces delays and queues in Yana Street at the expense of increased queues in both directions along Gray Street; and
- Traffic signals, whilst operating at Level of Service B in both the AM and PM peaks, increase delays and queues for all movements.

Traffic Engineering Manual Volume 1 Traffic Management (VicRoads) provides guidelines for new traffic signals installations. A key consideration is traffic volumes. The manual states “Traffic signals may be considered subject to detailed analysis; when the major road carries at least 600 vehicles per hour (two way) and the minor road concurrently carries at least 200 vehicles per hour (one way) on one approach over any 4 hours of an average day.” The predicted traffic volumes do not reach these values.

Pedestrian movements across the intersection would be enhanced by its signalisation. The manual states the following for pedestrian operated signals “Where the crossing is primarily intended for the use of school children, the device may be appropriate where for at least one hour of an average school day:

- The number of children (P) crossing the road within 20m of the proposed site exceeds 50 per hour; and
- The number of vehicles which children have to cross during that hour exceeds 50; and
- The product P x V exceeds:
  - 25,000 for primary school children, or
  - 34,000 for secondary school children.”
It is unlikely that the existing pedestrian activity in the area would justify pedestrian operated signals (or signalisation of the intersection). The Swan Hill South West Development Precinct is unlikely to increase the number of pedestrian movements at this location.

Intersection signals are a costly measure (depending on services and the ike, the cost could be in the order of $1m to $1.5m). Should they be considered for implementation as part of the Swan Hill South West Development Precinct, funding could include a contribution from Council to account for the traffic that currently uses the intersection.

It is noted that the east approach in Gray Street is sufficiently wide to enable through vehicles to pass left turning vehicles, and on the west approach there is scope to ban kerb-side parking to allow through traffic to pass stationary right turning traffic.

**Recommended Intersection Treatment**

It is recommended that the existing configuration of the Gray Street/Yara Street intersection continue to be provided.

4.2.5. Gray Street/Internal Road (Intersection #6)

**Capacity Analysis**

The intersection was analysed as a simple T-intersection with priority to Gray Street and separate left and right turn lanes in the internal road.

The results of the analysis are summarised in Table 8.

<table>
<thead>
<tr>
<th>Period</th>
<th>Approach</th>
<th>Existing</th>
<th>Post Development</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Approach DoS</td>
<td>Approach Ave Delay (sec)</td>
</tr>
<tr>
<td>AM</td>
<td>South</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>East</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>West</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>All Veh</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>PM</td>
<td>South</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>East</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>West</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>All Veh</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

The analysis shows that under post-development traffic volumes, Gray Street operates with a very low degree of saturation in both the AM and PM peak periods, with minimal delays and minimal queues on both approaches. The south approach (internal road) will operate at a Level of Service A, in both the AM and PM peaks.

**Recommended Intersection Treatment**

It is recommended that a simple T-intersection be provided at the Gray Street/Internal Road intersection with priority to Gray Street and separate left and right turn lanes in the internal road. A left turn lane should be provided in Gray Street, due to the relatively large volume of left turning traffic.
4.2.7. Gray Street/Feldtmann Lane (Intersection #7)

Capacity Analysis

The predicted volume of right turning traffic from Gray Street is high. This intersection has therefore been modelled with a separate right turn lane in Gray Street and separate left and right turn lanes in Feldtmann Lane. The results of the analysis are summarised in Table 9.

Table 9: Capacity Analysis - Gray Street/Feldtmann Lane (Intersection #7)
(Option 1 - Sea Lake-Swan Hill Road Link)

<table>
<thead>
<tr>
<th>Period</th>
<th>Approach</th>
<th>Existing</th>
<th>Post Development</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Approach</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>DoS</td>
<td>Ave Delay (sec)</td>
</tr>
<tr>
<td>AM</td>
<td>South</td>
<td>0.00</td>
<td>8.7</td>
</tr>
<tr>
<td></td>
<td>East</td>
<td>0.03</td>
<td>0.3</td>
</tr>
<tr>
<td></td>
<td>West</td>
<td>0.03</td>
<td>0.3</td>
</tr>
<tr>
<td></td>
<td>All Veh</td>
<td>0.03</td>
<td>0.6</td>
</tr>
<tr>
<td>FM</td>
<td>South</td>
<td>0.03</td>
<td>8.6</td>
</tr>
<tr>
<td></td>
<td>East</td>
<td>0.03</td>
<td>0.3</td>
</tr>
<tr>
<td></td>
<td>West</td>
<td>0.02</td>
<td>0.4</td>
</tr>
<tr>
<td></td>
<td>All Veh</td>
<td>0.03</td>
<td>0.7</td>
</tr>
</tbody>
</table>

The analysis shows that under post-development traffic volumes, the intersection operates with a very low degree of saturation in both the AM and PM peak periods, with minimal delays and minimal queues on all approaches.

Recommended Intersection Treatment

It is recommended that a simple T-intersection continue to be provided at the Gray Street/Feldtmann Lane intersection. A separate right turn facility should be provided in Gray Street and separate left and right turn lanes in Feldtmann Lane. A left turn lane in Gray Street is not warranted on the basis of the predicted left turn volumes.

4.2.8. Sea Lake-Swan Hill Road/Gray Street/Boobialla Drive (Intersection #8)

Capacity Analysis

This existing cross road intersection is currently controlled by a single lane roundabout. The results of the analysis for this configuration are summarised in Table 10.
Table 10: Capacity Analysis - Sea Lake-Swan Hill Road/Grey Street/Boobialla Drive (Intersection #8) (Option 1 - Sea Lake-Swan Hill Road Link)

<table>
<thead>
<tr>
<th>Period</th>
<th>Approach</th>
<th>Existing</th>
<th></th>
<th>Post Development</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Approach DoS</td>
<td>Approach Ave Delay (sec)</td>
<td>Approach 95th %ile Queue (m)</td>
</tr>
<tr>
<td>AM</td>
<td>South</td>
<td>0.04</td>
<td>7.8</td>
<td>1.3</td>
</tr>
<tr>
<td></td>
<td>East</td>
<td>0.05</td>
<td>8.1</td>
<td>1.6</td>
</tr>
<tr>
<td></td>
<td>North</td>
<td>0.10</td>
<td>5.6</td>
<td>3.3</td>
</tr>
<tr>
<td></td>
<td>West</td>
<td>0.07</td>
<td>5.9</td>
<td>2.3</td>
</tr>
<tr>
<td></td>
<td>All Veh</td>
<td>0.10</td>
<td>8.5</td>
<td>3.3</td>
</tr>
<tr>
<td></td>
<td>LoS</td>
<td>A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PM</td>
<td>South</td>
<td>0.04</td>
<td>7.4</td>
<td>1.3</td>
</tr>
<tr>
<td></td>
<td>East</td>
<td>0.08</td>
<td>8.5</td>
<td>2.6</td>
</tr>
<tr>
<td></td>
<td>North</td>
<td>0.04</td>
<td>5.3</td>
<td>1.4</td>
</tr>
<tr>
<td></td>
<td>West</td>
<td>0.03</td>
<td>6.1</td>
<td>0.9</td>
</tr>
<tr>
<td></td>
<td>All Veh</td>
<td>0.08</td>
<td>7.2</td>
<td>2.6</td>
</tr>
<tr>
<td></td>
<td>LoS</td>
<td>A</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The analysis shows that under existing and post-development traffic volumes, the intersection operates at a Level of Service A with low degrees of saturation in both the AM and PM peak periods and minimal delays and minimal queues on all approaches.

Recommended Intersection Treatment

It is recommended that the intersection remain under roundabout control. No upgrades are required from a capacity perspective.

"Trigger Point" for Upgrade

As no upgrades are required from a capacity perspective, there is no “trigger point”.

4.2.9. Sea Lake-Swan Hill Road/Dead Horse Lane/Memorial Drive (Intersection #9)

Capacity Analysis

This cross road intersection carries relatively low volumes on the side roads, including very low volumes of crossing traffic. The intersection has therefore been analysed under yield conditions for the side road traffic, with no left or right turn lanes in Sea Lake-Swan Hill Road.

The results of the analysis are summarised in Table 11.
### Table 11: Capacity Analysis - Sea Lake-Swan Hill Road/Dead Horse Lane/Memorial Drive (Intersection #9) (Option 1 - Sea Lake-Swan Hill Road Link)

<table>
<thead>
<tr>
<th>Period</th>
<th>Approach</th>
<th>Existing</th>
<th></th>
<th>Post Development</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Approach DoS</td>
<td>Approach Ave Delay (sec)</td>
<td>Approach 95th %ile Queue (m)</td>
<td>Approach DoS</td>
</tr>
<tr>
<td>AM</td>
<td>South</td>
<td>0.01</td>
<td>8.4</td>
<td>0.1</td>
<td>0.07</td>
</tr>
<tr>
<td></td>
<td>East</td>
<td>0.03</td>
<td>1.7</td>
<td>1.0</td>
<td>0.04</td>
</tr>
<tr>
<td></td>
<td>North</td>
<td>0.02</td>
<td>8.5</td>
<td>0.4</td>
<td>0.02</td>
</tr>
<tr>
<td></td>
<td>West</td>
<td>0.05</td>
<td>0.5</td>
<td>1.9</td>
<td>0.06</td>
</tr>
<tr>
<td></td>
<td>All Veh</td>
<td>0.05</td>
<td>1.8</td>
<td>1.9</td>
<td>0.06</td>
</tr>
<tr>
<td>PM</td>
<td>South</td>
<td>0.01</td>
<td>0.2</td>
<td>0.1</td>
<td>0.01</td>
</tr>
<tr>
<td></td>
<td>East</td>
<td>0.04</td>
<td>1.8</td>
<td>1.3</td>
<td>0.04</td>
</tr>
<tr>
<td></td>
<td>North</td>
<td>0.01</td>
<td>8.3</td>
<td>0.2</td>
<td>0.01</td>
</tr>
<tr>
<td></td>
<td>West</td>
<td>0.02</td>
<td>1.0</td>
<td>0.8</td>
<td>0.03</td>
</tr>
<tr>
<td></td>
<td>All Veh</td>
<td>0.04</td>
<td>2.4</td>
<td>1.3</td>
<td>0.04</td>
</tr>
</tbody>
</table>

The analysis shows that under existing and post-development traffic volumes, the intersection operates with a very low degree of saturation in both the AM and PM peak periods, with minimal delays and minimal queues on all approaches. The impact of the additional traffic on the operation of the intersection is negligible.

**Austroads**

"Guide to Road Design Part 4A: Unsignalised and Signalised Intersections" (Austroads, 2009) provides guidance on the form of intersection treatment for various situations. Of relevance here is Figure 4.9(b), which provides numerical warrants for turn treatments on the major road with a design speed of less than 100km/h (for the purposes of this assessment, it is assumed that the speed limit on Sea Lake-Swan Hill Road is 80 km/h).

The predicted volumes of left and right turning traffic into Dead Horse Lane from Sea Lake-Swan Hill Road are 2 or 3 vph. These volumes are within the range whereby basic right turn (BAR) and basic left turn (BAL) treatments are required, i.e. the warrants for a higher standard of treatment (CHR(S) or AUL(S)) are not met.

**Recommended Intersection Treatment**

It is recommended that the intersection remain in its current form.

"Trigger Point" for Upgrade

As no upgrades are required from a capacity perspective, there is no “trigger point”.

### 4.2.10. Sea Lake-Swan Hill Road/Link 7(1) (Intersection #10)

**Capacity Analysis**

On the basis of predicted traffic volumes, this new intersection was analysed as a T-intersection with a left turn lane in Sea Lake-Swan Hill Road and separate left and right turn lanes in Link 7 (the new intersecting road).

The results of the analysis are summarised in Table 12.
Table 12:  Capacity Analysis - Sea Lake-Swan Hill Road/Link 7(1) (Intersection #10)  
(Option 1 - Sea Lake-Swan Hill Road Link)

<table>
<thead>
<tr>
<th>Period</th>
<th>Approach</th>
<th>Existing</th>
<th>Post Development</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Approach DoS</td>
<td>Approach Ave Delay (sec)</td>
</tr>
<tr>
<td>AM</td>
<td>South</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>East</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>West</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>All Veh</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>PM</td>
<td>South</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>East</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>West</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>All Veh</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

The analysis shows that under post-development traffic volumes, the intersection operates with a very low degree of saturation in both the AM and PM peak periods, with minimal delays and minimal queues on all approaches.

Austroads

“Guide to Road Design Part 4A: Unsignalised and Signalised Intersections” (Austroads, 2009) provides guidance on the form of intersection treatment for various situations. Of relevance here is Figure 4.9(b), which provides numerical warrants for turn treatments on the major road with a design speed of less than 100km/h (for the purposes of this assessment, it is assumed that the speed limit on Sea Lake-Swan Hill Road is 80 km/h).

Figure 22 shows the post-development assessments for the AM peak and the PM peak.

![AM Peak](image)

![PM Peak](image)

Figure 22: Turn Lane Warrant Assessment - Sea Lake-Swan Hill Road/Link 7(1) (Intersection #10)  
(Option 1 - Sea Lake-Swan Hill Road Link)
It is noted that the modelled left turn volume in the PM peak for the post development scenario is greater than 80 vph, the maximum value on the chart. The model developed for this study assumes that parcels of land ("zones") within the Development Precinct have one access point to the road network, ie there is no movement through zones to travel to and from the precinct. A consequence of this is that the volume of traffic moving between the east and south legs of this intersection may be overestimated.

The high volume of left turning traffic from Sea Lake-Swan Hill Road supports the provision of an AUL (auxiliary left turn) treatment on the east approach.

Recommended Intersection Treatment

On this basis, it is recommended that BAR (basic right turn) and AUL (auxiliary left turn) treatments be provided on the west and east approaches respectively. Given the relatively high volume of right turning traffic compared to left turning traffic in Link 7, separate left and right turn lanes should be provided in Link 7 at this intersection.

"Trigger Point" for Upgrade

The need for the AUL treatment in Sea Lake-Swan Hill Road is linked to the volume of left turning traffic. Initially, a BAL (basic left turn) treatment may only be necessary, with an upgrade to an AUL treatment when traffic volumes warrant it. In terms of a "trigger point" for its provision, guidance is provided by Austroads Figure 4.9(b). A PM peak hour volume of 60 vph turning left would be appropriate, equivalent to approximately 130 residential lots each using this intersection in that period.

It may be that it is more convenient to initially construct this intersection with the AUL treatment.

4.2.11. Link 5/Link 3/Link 4 (Intersection #12)

Capacity Analysis

This internal intersection has been analysed for two layouts - a simple T-intersection and a roundabout.

The results of the analysis for a T-intersection are summarised in Table 13.

<table>
<thead>
<tr>
<th>Period</th>
<th>Approach</th>
<th>Existing</th>
<th>Post Development</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Approach DoS</td>
<td>Approach Ave Delay (sec)</td>
</tr>
<tr>
<td>AM</td>
<td>South</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>East</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>North</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>All Vehs</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>PM</td>
<td>South</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>East</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>North</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>All Vehs</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

The results of the analysis for a roundabout are summarised in Table 14.
Table 14:  Capacity Analysis - Link 5/Link 3/Link 4 - Roundabout (Intersection #12)  
(Oppon 1 - Sea Lake-Swan Hill Road Link)

<table>
<thead>
<tr>
<th>Period</th>
<th>Approach</th>
<th>Existing Approach</th>
<th>Post Development</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>DoS (sec)</td>
<td>Ave Delay (sec)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>AM</td>
<td>South</td>
<td>N/A</td>
<td>0.25</td>
</tr>
<tr>
<td></td>
<td>East</td>
<td>N/A</td>
<td>0.03</td>
</tr>
<tr>
<td></td>
<td>North</td>
<td>N/A</td>
<td>0.07</td>
</tr>
<tr>
<td></td>
<td>All Veh</td>
<td>N/A</td>
<td>0.25</td>
</tr>
<tr>
<td>PM</td>
<td>South</td>
<td>N/A</td>
<td>0.13</td>
</tr>
<tr>
<td></td>
<td>East</td>
<td>N/A</td>
<td>0.11</td>
</tr>
<tr>
<td></td>
<td>North</td>
<td>N/A</td>
<td>0.16</td>
</tr>
<tr>
<td></td>
<td>All Veh</td>
<td>N/A</td>
<td>0.16</td>
</tr>
</tbody>
</table>

The analysis shows that for both layout options, the intersection operates with low degrees of saturation and minimal delays and queues. Link4-Link5 is a relatively long length of road. A roundabout is therefore preferred at this location from a speed management perspective.

**Recommended Intersection Treatment**

It is recommended that a single lane roundabout be provided at the Link 5/Link3/Link 4 intersection.

4.2.12. Link 5/Link 6/Link 7 (Intersection #13)

**Capacity Analysis**

This internal intersection has been analysed as a simple T-intersection with separate left and right turn lanes on the north (Link 6) approach. The results are summarised in Table 15.
Table 15: Capacity Analysis - Link 5/Link 6/Link 7 (intersection #13) (Option 1 - Sea Lake-Swan Hill Road Link)

<table>
<thead>
<tr>
<th>Period</th>
<th>Approach</th>
<th>Existing</th>
<th>Post Development</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Approach DoS</td>
<td>Approach Ave Delay (sec)</td>
</tr>
<tr>
<td>AM</td>
<td>East</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>North</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>West</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>All Veh</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>PM</td>
<td>East</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>North</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>West</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>All Veh</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

The analysis shows that the intersection will operate at a low degree of saturation, with minimal queues and delays.

While not analysed, a roundabout would also operate at a low degree of saturation, with minimal queues and delays. A roundabout provides better speed control than a T-intersection and is therefore recommended for this location.

Recommended Intersection Treatment

It is recommended that a single lane roundabout be provided at the Link 5/Link 6/Link 7 intersection.

4.3. Relative Traffic Volumes Contributions by Individual Land Holdings (Option 1 - Sea Lake-Swan Hill Road Link)

Traffix Group was requested by Council to identify the relative traffic volumes from each land holding that travels through nominated intersections and along nominated roads.

The various land holdings (as provided by Council) are shown in Figure 23.
4.3.1. Nominated Intersections (Option 1 - Sea Lake-Swan Hill Road Link)

The apportionment of traffic, calculated by determining the proportion of traffic generated by each zone in the traffic model that was attributable to each land holding, is shown in Table 16 for the nominated intersections.
### Table 16: Apportionment of Traffic - Intersections (Option 1 - Sea Lake-Swan Hill Road Link)

<table>
<thead>
<tr>
<th>Landowner Number</th>
<th>Int #3</th>
<th>Int #4</th>
<th>Int #6</th>
<th>Int #7</th>
<th>Int #10</th>
<th>Int #12</th>
<th>Int #13</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.41%</td>
<td>0.33%</td>
<td>2.11%</td>
<td>4.47%</td>
<td>65.60%</td>
<td>0.00%</td>
<td>0.44%</td>
</tr>
<tr>
<td>2</td>
<td>0.00%</td>
<td>0.00%</td>
<td>9.65%</td>
<td>10.22%</td>
<td>27.32%</td>
<td>0.00%</td>
<td>14.73%</td>
</tr>
<tr>
<td>3</td>
<td>0.06%</td>
<td>0.05%</td>
<td>2.73%</td>
<td>5.41%</td>
<td>1.15%</td>
<td>0.00%</td>
<td>0.59%</td>
</tr>
<tr>
<td>4</td>
<td>4.40%</td>
<td>4.35%</td>
<td>7.34%</td>
<td>21.63%</td>
<td>0.56%</td>
<td>5.10%</td>
<td>12.84%</td>
</tr>
<tr>
<td>5</td>
<td>17.13%</td>
<td>27.61%</td>
<td>0.00%</td>
<td>50.36%</td>
<td>1.80%</td>
<td>66.19%</td>
<td>61.04%</td>
</tr>
<tr>
<td>6</td>
<td>0.00%</td>
<td>0.00%</td>
<td>4.24%</td>
<td>0.02%</td>
<td>0.04%</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>7</td>
<td>0.00%</td>
<td>0.00%</td>
<td>29.69%</td>
<td>0.12%</td>
<td>0.26%</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>8</td>
<td>0.00%</td>
<td>0.00%</td>
<td>2.12%</td>
<td>0.01%</td>
<td>0.02%</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>9</td>
<td>0.00%</td>
<td>0.00%</td>
<td>2.54%</td>
<td>0.01%</td>
<td>0.02%</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>10</td>
<td>0.00%</td>
<td>0.00%</td>
<td>34.78%</td>
<td>0.15%</td>
<td>0.30%</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>11</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>12</td>
<td>10.46%</td>
<td>22.10%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.56%</td>
<td>0.22%</td>
<td>0.31%</td>
</tr>
<tr>
<td>13</td>
<td>1.87%</td>
<td>1.5%</td>
<td>0.12%</td>
<td>0.05%</td>
<td>0.20%</td>
<td>0.05%</td>
<td>0.25%</td>
</tr>
<tr>
<td>14</td>
<td>4.81%</td>
<td>13.97%</td>
<td>0.00%</td>
<td>7.23%</td>
<td>0.52%</td>
<td>7.59%</td>
<td>8.54%</td>
</tr>
<tr>
<td>15</td>
<td>0.04%</td>
<td>0.15%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>16</td>
<td>2.08%</td>
<td>8.67%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.22%</td>
<td>0.11%</td>
<td>0.12%</td>
</tr>
<tr>
<td>17</td>
<td>0.21%</td>
<td>0.60%</td>
<td>0.00%</td>
<td>0.31%</td>
<td>0.02%</td>
<td>0.33%</td>
<td>0.37%</td>
</tr>
<tr>
<td>18</td>
<td>1.29%</td>
<td>7.30%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>19</td>
<td>1.94%</td>
<td>9.37%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.21%</td>
<td>0.00%</td>
<td>0.12%</td>
</tr>
<tr>
<td>20</td>
<td>0.23%</td>
<td>1.02%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.03%</td>
<td>0.00%</td>
<td>0.01%</td>
</tr>
<tr>
<td>21</td>
<td>0.37%</td>
<td>1.60%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.04%</td>
<td>0.02%</td>
<td>0.32%</td>
</tr>
<tr>
<td>22</td>
<td>0.13%</td>
<td>0.75%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>23</td>
<td>7.36%</td>
<td>0.06%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.16%</td>
<td>0.07%</td>
<td>0.98%</td>
</tr>
<tr>
<td>24</td>
<td>3.31%</td>
<td>0.15%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.21%</td>
<td>0.10%</td>
<td>0.35%</td>
</tr>
<tr>
<td>25</td>
<td>10.95%</td>
<td>0.05%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.26%</td>
<td>0.00%</td>
<td>0.39%</td>
</tr>
<tr>
<td>26</td>
<td>10.16%</td>
<td>0.09%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.21%</td>
<td>0.00%</td>
<td>0.12%</td>
</tr>
<tr>
<td>27</td>
<td>21.95%</td>
<td>0.16%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.15%</td>
<td>0.22%</td>
<td>0.25%</td>
</tr>
</tbody>
</table>
### 4.3.2. Nominated Internal Roads (Option 1 - Sea Lake-Swan Hill Road Link)

The roads nominated by Council for assessment are shown in Figure 24.

<p>| | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>28</td>
<td>0.83%</td>
<td>0.01%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.01%</td>
<td>0.01%</td>
</tr>
<tr>
<td>29</td>
<td>0.00%</td>
<td>0.00%</td>
<td>2.54%</td>
<td>0.01%</td>
<td>0.02%</td>
<td>0.00%</td>
</tr>
<tr>
<td>30</td>
<td>0.00%</td>
<td>0.00%</td>
<td>2.12%</td>
<td>0.01%</td>
<td>0.02%</td>
<td>0.00%</td>
</tr>
</tbody>
</table>

![Figure 24: Nominated Internal Roads](image-url)
The apportionment of traffic, calculated by determining the proportion of traffic generated by each zone in the traffic model that was attributable to each land holding, is shown in Table 17 for the nominated road links.

**Table 17: Apportionment of Traffic - Road Links (Option 1 - Sea Lake-Swan Hill Road Link)**

<table>
<thead>
<tr>
<th>Landowner Number</th>
<th>Proportion of Traffic Along Link</th>
<th>Attributable to Landowner</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Link 1</td>
<td>Link 2</td>
</tr>
<tr>
<td>1</td>
<td>0.61%</td>
<td>0.88%</td>
</tr>
<tr>
<td>2</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>3</td>
<td>0.09%</td>
<td>0.12%</td>
</tr>
<tr>
<td>4</td>
<td>6.53%</td>
<td>9.38%</td>
</tr>
<tr>
<td>5</td>
<td>25.26%</td>
<td>35.53%</td>
</tr>
<tr>
<td>6</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>7</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>8</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>9</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>10</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>11</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>12</td>
<td>15.51%</td>
<td>22.26%</td>
</tr>
<tr>
<td>13</td>
<td>2.78%</td>
<td>3.99%</td>
</tr>
<tr>
<td>14</td>
<td>7.14%</td>
<td>10.25%</td>
</tr>
<tr>
<td>15</td>
<td>0.05%</td>
<td>0.08%</td>
</tr>
<tr>
<td>16</td>
<td>3.09%</td>
<td>4.44%</td>
</tr>
<tr>
<td>17</td>
<td>0.31%</td>
<td>0.44%</td>
</tr>
<tr>
<td>18</td>
<td>1.92%</td>
<td>2.75%</td>
</tr>
<tr>
<td>19</td>
<td>2.88%</td>
<td>6.61%</td>
</tr>
<tr>
<td>20</td>
<td>0.35%</td>
<td>0.50%</td>
</tr>
<tr>
<td>21</td>
<td>0.55%</td>
<td>0.78%</td>
</tr>
<tr>
<td>22</td>
<td>0.20%</td>
<td>0.28%</td>
</tr>
<tr>
<td>23</td>
<td>10.96%</td>
<td>0.17%</td>
</tr>
<tr>
<td>24</td>
<td>4.90%</td>
<td>0.25%</td>
</tr>
<tr>
<td>25</td>
<td>16.25%</td>
<td>0.25%</td>
</tr>
<tr>
<td></td>
<td>0.16%</td>
<td>0.23%</td>
</tr>
<tr>
<td>---</td>
<td>-------</td>
<td>-------</td>
</tr>
<tr>
<td>26</td>
<td>0.34%</td>
<td>0.49%</td>
</tr>
<tr>
<td>27</td>
<td>0.18%</td>
<td>0.02%</td>
</tr>
<tr>
<td>28</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>29</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>30</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
</tbody>
</table>
5. **OPTION 2 - DEAD HORSE LANE LINK**

5.1. **DESIGN TRAFFIC VOLUMES**

*(OPTION 2 - DEAD HORSE LANE LINK)*

Figure 25 identifies the intersection and road numbers used in this report for Option 2.

![Diagram of traffic volumes and intersections for Option 2, Dead Horse Lane Link](image-url)

**Figure 25:** Intersection and Road Identification (Option 2 - Dead Horse Lane Link)
The predicted precinct daily traffic volumes arising from the traffic model for Option 2 - Dead Horse Lane Link are shown in Figure 26.

Figure 26: Predicted Precinct Daily Traffic Volumes (Option 2 - Dead Horse Lane Link)

Figures 27 to 38 show existing volumes and the total post-development volumes (including growth of traffic along Sea Lake-Swan Hill Road, as required by VicRoads) for Option 2 - Dead Horse Lane Link.
Figure 27: Traffic Volumes - Dead Horse Lane/Link 4 (Intersection #1)
(Option 2 - Dead Horse Lane Link)

(2) Assumed equally split northbound/southbound (based on directional split at Yana Street).
Figure 28: Traffic Volumes - Yara Street / Werri Street / Dead Horse Lane (Intersection #2) (Option 2 - Dead Horse Lane Link)
Figure 29: Traffic Volumes - Coronation Avenue/Wattie Street/Link 1 (Intersection #3) (Option 2 - Dead Horse Lane Link)
Figure 30: Traffic Volumes - Yana Street/Link 2/Link 3 (Intersection #4)
(Option 2 - Dead Horse Lane Link)

(1) Assumed equally split northbound/southbound (based on directional split at Gray Street).
Figure 31: Traffic Volumes - Gray Street/Yana Street (Intersection #5) (Option 2 - Dead Horse Lane Link)
Figure 32: Traffic Volumes - Gray Street/Internal Road (Intersection #6) (Option 2 - Dead Horse Lane Link)
Figure 33: Traffic Volumes - Gray Street/Feldmann Lane (Link 6) (Intersection #7) (Option 2 - Dead Horse Lane Link)
AM Peak Hour:

Existing

Boobialla Drive

Sea Lake-Swan Hill Road

Gray Street

Development

Boobialla Drive

Sea Lake-Swan Hill Road

Gray Street

Post Development

Boobialla Drive

Sea Lake-Swan Hill Road

Gray Street

PM Peak Hour:

Existing

Boobialla Drive

Sea Lake-Swan Hill Road

Gray Street

Development

Boobialla Drive

Sea Lake-Swan Hill Road

Gray Street

Post Development

Boobialla Drive

Sea Lake-Swan Hill Road

Gray Street

Figure 34: Traffic Volumes - Sea Lake-Swan Hill Road/Gray Street/Boobialla Drive (Intersection #8) (Option 2: Dead Horse Lane Link)

(1) From TTM Consulting (Vic) traffic report for Tower Hill Development.
(2) Derived from TTM Consulting (Vic) traffic report for Tower Hill Development.
Figure 35: Traffic Volumes - Sea Lake-Swan Hill Road/Dead Horse Lane/Memorial Drive

(Intersection #9)

(Option 2 - Dead Horse Lane Link)
AM Peak Hour

Existing
Dead Horse Lane

Development
Dead Horse Lane
Link 7(2)

Post Development
Dead Horse Lane
Link 7(2)

PM Peak Hour

Existing
Dead Horse Lane

Development
Dead Horse Lane
Link 7(2)

Post Development
Dead Horse Lane
Link 7(2)

Figure 36:  Traffic Volumes - Dead Horse Lane/Link 7(2) (Intersection #11) (Option 2: Dead Horse Lane Link)
Figure 37: Traffic Volumes - Link 5/Link 3/Link 4 (Intersection #12) (Option 2 - Dead Horse Lane Link)
5.2. INTERSECTION REQUIREMENTS  
(OPTION 2 - DEAD HORSE LANE LINK)

A comparison of Figures 10 to 21 and Figures 25 to 37 shows that there is very little difference in the predicted traffic volumes for the majority of intersections and link roads. Intersections 7, 8, 9 and 11 and links 6 and 7 are affected by the replacement of a connection to Sea Lake-Swan Hill Road (Option 1) by a connection to Dead Horse Lane (Option 2). These intersections and links are therefore assessed as follows. The outputs of the capacity analyses are contained in the separate Appendices report.

5.2.1. Gray Street/Feldtmann Lane (Intersection #7)

Capacity Analysis

The volumes of traffic through this intersection are relatively low. The intersection was analysed as a simple T-intersection with priority to Gray Street and separate left and right turn lanes in Feldtmann Lane.

The results of the analysis are summarised in Table 18.
Table 18: **Capacity Analysis - Grey Street/Feldtmann Lane (Intersection #7)**  
(Option 2 - Dead Horse Lane Link)

<table>
<thead>
<tr>
<th>Period</th>
<th>Approach</th>
<th>Existing</th>
<th>Post Development</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Approach DoS</td>
<td>Approach Ave Delay (ssec)</td>
</tr>
<tr>
<td>AM</td>
<td>South</td>
<td>0.00</td>
<td>8.7</td>
</tr>
<tr>
<td></td>
<td>East</td>
<td>0.03</td>
<td>0.3</td>
</tr>
<tr>
<td></td>
<td>West</td>
<td>0.03</td>
<td>0.4</td>
</tr>
<tr>
<td></td>
<td>All Veh</td>
<td>0.03</td>
<td>0.6</td>
</tr>
<tr>
<td>FM</td>
<td>South</td>
<td>0.00</td>
<td>8.6</td>
</tr>
<tr>
<td></td>
<td>East</td>
<td>0.03</td>
<td>0.3</td>
</tr>
<tr>
<td></td>
<td>West</td>
<td>0.02</td>
<td>0.6</td>
</tr>
<tr>
<td></td>
<td>All Veh</td>
<td>0.03</td>
<td>0.7</td>
</tr>
</tbody>
</table>

The analysis shows that under existing and post-development traffic volumes, the intersection generally operates with low degrees of saturation in both the AM and PM peak periods, with minimal delays and minimal queues on all approaches. The exception to this is Feldtmann Lane, where the degree of saturation is 0.60 and the 95th percentile queue is 31.3m in the AM peak. These compare to Option 1 values of 0.38 and 13.7m.

Removing the new access to Sea Lake-Swan Hill Road significantly increases the number of movements between the south and west legs. Whilst the intersection operates at an acceptable level, it nonetheless performs at a lower level than in Option 1.

**Recommended Intersection Treatment**

It is recommended that a simple T-intersection continue to be provided at the Gray Street/Feldtmann Lane intersection be provided with priority to Gray Street, a right turn facility in Gray Street (due to the large volume of right turning traffic) and separate left and right turn lanes in Feldtmann Lane.

5.2.2. **Sea Lake-Swan Hill Road/Gray Street/Boobialla Drive (Intersection #8)**

**Capacity Analysis**

This existing cross road intersection is currently controlled by a single lane roundabout.

The results of the analysis for this configuration are summarised in Table 19.
Table 19: Capacity Analysis - Sea Lake-Swan Hill Road/Gray Street/Boobialla Drive (Intersection #8) (Option 2 - Dead Horse Lane Link)

<table>
<thead>
<tr>
<th>Period</th>
<th>Approach</th>
<th>Existing</th>
<th>Post Development</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Approach DoS</td>
<td>Approach Ave Delay (sec)</td>
</tr>
<tr>
<td>AM</td>
<td>South</td>
<td>0.04</td>
<td>7.8</td>
</tr>
<tr>
<td></td>
<td>East</td>
<td>0.05</td>
<td>8.1</td>
</tr>
<tr>
<td></td>
<td>North</td>
<td>0.10</td>
<td>5.6</td>
</tr>
<tr>
<td></td>
<td>West</td>
<td>0.07</td>
<td>5.9</td>
</tr>
<tr>
<td></td>
<td>All Veh</td>
<td>0.10</td>
<td>6.5</td>
</tr>
<tr>
<td></td>
<td>LoS</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>PM</td>
<td>South</td>
<td>0.04</td>
<td>7.4</td>
</tr>
<tr>
<td></td>
<td>East</td>
<td>0.08</td>
<td>8.5</td>
</tr>
<tr>
<td></td>
<td>North</td>
<td>0.04</td>
<td>5.3</td>
</tr>
<tr>
<td></td>
<td>West</td>
<td>0.03</td>
<td>6.1</td>
</tr>
<tr>
<td></td>
<td>All Veh</td>
<td>0.08</td>
<td>7.2</td>
</tr>
<tr>
<td></td>
<td>LoS</td>
<td>A</td>
<td>A</td>
</tr>
</tbody>
</table>

As with Option 1, the analysis shows that under existing and post-development traffic volumes, the intersection operates at a Level of Service A, with a lower degree of saturation in both the AM and PM peak periods, with minimal delays and minimal queues at all approaches.

Removing the new access to Sea Lake-Swan Hill Road significantly increases the number of movements between the south and east legs. Whilst the intersection operates at an acceptable level, it nonetheless performs at a lower level than in Option 1.

Recommended Intersection Treatment

It is recommended that the intersection remain under roundabout control. No upgrades are required from a capacity perspective.

“Trigger Point” for Upgrade

As no upgrades are required from a capacity perspective, there is no “trigger point”.

5.2.3. Sea Lake-Swan Hill Road/Dead Horse Lane/Memorial Drive (Intersection #9)

Capacity Analysis

This cross road intersection carries relatively low volumes on the side roads, including very low volumes of crossing traffic. The intersection has therefore been analysed under yield conditions for the side road traffic, with no left or right turn lanes in Sea Lake-Swan Hill Road.

The results of the analysis are summarised in Table 20.
Table 20:  Capacity Analysis - Sea Lake-Swan Hill Road/Dead Horse Lane/Memorial Drive
(Intersection #9)
(Option 2 - Dead Horse Lane Link)

<table>
<thead>
<tr>
<th>Period</th>
<th>Approach</th>
<th>Existing</th>
<th></th>
<th></th>
<th>Post Development</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Approach DoS</td>
<td>Approach Ave Delay (sec)</td>
<td>95th %ile Queue (m)</td>
<td>Approach DoS</td>
<td>Approach Ave Delay (sec)</td>
<td>95th %ile Queue (m)</td>
</tr>
<tr>
<td>AM</td>
<td>South</td>
<td>0.01</td>
<td>8.4</td>
<td>0.1</td>
<td>0.02</td>
<td>8.6</td>
<td>0.6</td>
</tr>
<tr>
<td></td>
<td>East</td>
<td>0.03</td>
<td>1.7</td>
<td>1.0</td>
<td>0.03</td>
<td>1.6</td>
<td>1.2</td>
</tr>
<tr>
<td></td>
<td>North</td>
<td>0.02</td>
<td>8.5</td>
<td>0.4</td>
<td>0.02</td>
<td>8.6</td>
<td>0.4</td>
</tr>
<tr>
<td></td>
<td>West</td>
<td>0.05</td>
<td>0.5</td>
<td>1.9</td>
<td>0.05</td>
<td>0.8</td>
<td>2.2</td>
</tr>
<tr>
<td></td>
<td>All Veh</td>
<td>0.05</td>
<td>1.8</td>
<td>1.9</td>
<td>0.06</td>
<td>2.5</td>
<td>2.2</td>
</tr>
<tr>
<td>PM</td>
<td>South</td>
<td>0.01</td>
<td>0.2</td>
<td>0.1</td>
<td>0.01</td>
<td>0.5</td>
<td>0.4</td>
</tr>
<tr>
<td></td>
<td>East</td>
<td>0.04</td>
<td>1.8</td>
<td>1.3</td>
<td>0.04</td>
<td>1.9</td>
<td>1.5</td>
</tr>
<tr>
<td></td>
<td>North</td>
<td>0.01</td>
<td>8.3</td>
<td>0.2</td>
<td>0.01</td>
<td>8.3</td>
<td>0.2</td>
</tr>
<tr>
<td></td>
<td>West</td>
<td>0.02</td>
<td>1.0</td>
<td>0.8</td>
<td>0.03</td>
<td>2.4</td>
<td>1.1</td>
</tr>
<tr>
<td></td>
<td>All Veh</td>
<td>0.04</td>
<td>2.4</td>
<td>1.3</td>
<td>0.04</td>
<td>3.1</td>
<td>1.5</td>
</tr>
</tbody>
</table>

As with Option 1, the analysis shows that under existing and post-development traffic volumes, the intersection operates with a very low degree of saturation in both the AM and PM peak periods, with minimal delays and minimal queues on all approaches. The impact of the additional traffic on the operation of the intersection is negligible.

Austroads

"Guide to Road Design Part 4A: Unsignalised and Signalled Intersections" (Austroads, 2009) provides guidance on the form of intersection treatment for various situations. Of relevance here is Figure 4.9(b), which provides numerical warrants for turn treatments on the major road with a design speed of less than 100km/h (for the purposes of this assessment, it is assumed that the speed limit on Sea Lake-Swan Hill Road has been reduced to 80 km/h).

Figure 30 compares the existing and post development assessment for the AM peak, and Figure 40 for the PM peak.
Figure 39: Turn Lane Warrant Assessment - Sea Lake-Swan Hill Road/
Dead Horse Lane/Memorial Drive (Intersection #9) - AM Peak
(Option 2 - Dead Horse Lane Link)

Figure 40: Turn Lane Warrant Assessment - Sea Lake-Swan Hill Road/
Dead Horse Lane/Memorial Drive (Intersection #9) - PM Peak
(Option 2 - Dead Horse Lane Link)

Recommended Intersection Treatment
On this basis, it is recommended that BAR (basic right turn) and BAL (basic left turn) treatments be provided on the west and east approaches respectively. No particular treatment is required for the left and right turn lanes in Dead Horse Lane at this intersection.

“Trigger Point” for Upgrade
The existing volumes warrant the provision of BAR and BAL turn treatments, as do the post-development volumes. There is therefore no “trigger point” for an upgrade of the right turn treatment as a result of the Swan Hill South West Development Precinct.
5.2.4. Dead Horse Lane/Link 7(2) (intersection #11)

Capacity Analysis

Due to the low volumes of traffic through the intersection, a simple T-intersection is an appropriate treatment. No capacity analysis has been undertaken.

Recommended Intersection Treatment

It is recommended that a simple T-intersection be provided at the Dead Horse Lane/Link 7(2) intersection, with priority to Dead Horse Lane.

5.3. Relative Traffic Volumes Contributions by Individual Land Holdings (Option 2 - Dead Horse Lane Link)

5.3.1. Nominated Intersections (Option 2 - Dead Horse Lane Link)

The apportionment of traffic, calculated by determining the proportion of traffic generated by each zone in the traffic model that was attributable to each land holding, is shown in Table 21 for the nominated intersections.

<table>
<thead>
<tr>
<th>Landowner Number</th>
<th>Int #3</th>
<th>Int #4</th>
<th>Int #6</th>
<th>Int #7</th>
<th>Int #11</th>
<th>Int #12</th>
<th>Int #13</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.37%</td>
<td>0.30%</td>
<td>12.06%</td>
<td>19.77%</td>
<td>4.03%</td>
<td>0.35%</td>
<td>0.28%</td>
</tr>
<tr>
<td>2</td>
<td>0.52%</td>
<td>0.42%</td>
<td>16.85%</td>
<td>27.26%</td>
<td>31.67%</td>
<td>0.49%</td>
<td>39.15%</td>
</tr>
<tr>
<td>3</td>
<td>0.08%</td>
<td>0.05%</td>
<td>25.11%</td>
<td>4.07%</td>
<td>1.07%</td>
<td>0.02%</td>
<td>1.42%</td>
</tr>
<tr>
<td>4</td>
<td>4.38%</td>
<td>4.33%</td>
<td>5.89%</td>
<td>13.24%</td>
<td>4.50%</td>
<td>5.08%</td>
<td>9.62%</td>
</tr>
<tr>
<td>5</td>
<td>17.05%</td>
<td>27.49%</td>
<td>0.00%</td>
<td>30.82%</td>
<td>21.94%</td>
<td>65.45%</td>
<td>42.99%</td>
</tr>
<tr>
<td>6</td>
<td>0.00%</td>
<td>0.00%</td>
<td>3.40%</td>
<td>0.01%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>7</td>
<td>0.00%</td>
<td>0.00%</td>
<td>23.86%</td>
<td>0.88%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>8</td>
<td>0.00%</td>
<td>0.00%</td>
<td>1.76%</td>
<td>0.01%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>9</td>
<td>0.00%</td>
<td>0.00%</td>
<td>2.04%</td>
<td>0.01%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>10</td>
<td>0.00%</td>
<td>0.00%</td>
<td>27.88%</td>
<td>0.09%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>11</td>
<td>0.00%</td>
<td>0.00%</td>
<td>2.88%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>12</td>
<td>10.40%</td>
<td>22.01%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>13</td>
<td>1.86%</td>
<td>1.55%</td>
<td>23.86%</td>
<td>0.00%</td>
<td>1.14%</td>
<td>0.05%</td>
<td>0.04%</td>
</tr>
<tr>
<td>14</td>
<td>4.79%</td>
<td>13.51%</td>
<td>0.00%</td>
<td>4.42%</td>
<td>6.00%</td>
<td>7.53%</td>
<td>6.07%</td>
</tr>
<tr>
<td>15</td>
<td>0.04%</td>
<td>0.15%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.04%</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>16</td>
<td>2.07%</td>
<td>8.63%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>2.53%</td>
<td>0.11%</td>
<td>0.09%</td>
</tr>
</tbody>
</table>
### 5.3.2. Nominated Internal Roads (Option 2 - Dead Horse Lane Link)

The apportionment of traffic, calculated by determining the proportion of traffic generated by each zone in the traffic model that was attributable to each land holding, is shown in Table 22 for the nominated road links.

**Table 22: Apportionment of Traffic - Road Links (Option 2 - Dead Horse Lane Link)**

<table>
<thead>
<tr>
<th>Landowner Number</th>
<th>Proportion of Traffic Along Link Attributable to Landowner</th>
<th>Link 1</th>
<th>Link 2</th>
<th>Link 3</th>
<th>Link 4</th>
<th>Link 5</th>
<th>Link 6</th>
<th>Link 7(2)</th>
<th>Link 8</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>0.11%</td>
<td>0.07%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>2.62%</td>
<td>3.25%</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>6.48%</td>
<td>9.28%</td>
<td>8.39%</td>
<td>0.00%</td>
<td>11.39%</td>
<td>12.98%</td>
<td>0.38%</td>
<td>4.57%</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>25.07%</td>
<td>35.45%</td>
<td>53.27%</td>
<td>91.63%</td>
<td>75.01%</td>
<td>40.81%</td>
<td>1.71%</td>
<td>22.28%</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>8</td>
<td></td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>9</td>
<td></td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>10</td>
<td></td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
</tbody>
</table>
### 5.4. Option 1 vs Option 2

A key comparison task of the study was to compare the provision of a connection to Sea Lake-Swan Hill Road (Option 1) to the provision of a connection to Dead Horse Lane. A driver of this was VicRoads' preference to not provide a new intersection on Sea Lake-Swan Hill Road between the Gray Street/Bobbialla Drive and Dead Horse Lane/Memorial Drive intersections to minimise congestion and to not compromise future traffic lane configurations.

To assist put this into perspective, the following are noted:

- The Gray Street/Bobbialla Drive and Dead Horse Lane/Memorial Drive intersections are approximately 750m apart; and

- From Figure 4, the current daily two way traffic volume on Sea Lake-Swan Hill Road west of Gray Street/Bobbialla Drive is 1,095 vpd. Based on the adopted growth rate of 1% pa for ten years, this will increase to around 1,215 vpd in 2025 (without Swan Hill South West Development Precinct traffic).
The intersections affected by the variation in connection to the external road network are intersections 7 (Gray Street/Feldmann Lane), 8 Sea lake-Swan Hill Road/Gray Street/Boshialla Drive) and 9 (Sea Lake-Swan Hill Road/Dead Horse Lane/Memorial Drive). Removing the Sea Lake-Swan Hill Road connection (Option 1) significantly increases the number of movements between the south and west legs of the Gray Street/Feldmann Lane intersection. It also significantly increases the number of movements between the south and east legs at the Sea Lake-Swan Hill Road/Gray Street/Boshialla Drive roundabout. Whilst both these intersections will operate at an acceptable level under the increased traffic volumes resulting from the removal of the connection to Sea Lake-Swan Hill Road (ie Option 2), they will nonetheless perform at lower levels than in Option 1 (ie retaining the connection to Sea Lake-Swan Hill Road). This situation would be exacerbated should residential densities of 14 households per ha be adopted instead of 10.5 households per ha.

In simple terms, Option 2 results in more traffic using Gray Street and Feldmann Lane than in Option 1. It also increases the volume of traffic through the internal intersection 13.

Physically, there are no reasons that prevent a new intersection to Sea Lake-Swan Hill Road in the location proposed. It is to be located approximately 400m west of the Gray Street/Boshialla Drive roundabout and approximately 350m east of the Dead Horse Lane/Memorial Drive intersection. The recommended treatment is a BAL (basic left turn) on the west approach and an AUL (auxiliary left turn) on the east approach. For an 80 km/h design speed, there is more than sufficient road length in which to generate the required lane lengths without affecting the adjacent intersections.

Option 1 will direct approximately 2,500 vpd onto Sea Lake-Swan Hill Road to/from the east. This will increase the total daily traffic volume on Sea Lake-Swan Hill Road west of Gray Street/Boshialla Drive to around 3,700 vpd in 2023 (the assumed completion date for development within the Swan Hill South West Development Precinct). This can be readily accommodated in a two lane-two way cross-section. Also, it is well within the environmental capacity of an arterial road (rural or urban) (10,000 vpc or more, depending on the road cross section).

Option 1 (a connection to Sea Lake-Swan Hill Road) provides a superior road network compared to Option 2 (a connection to Dead Horse Lane) and will not detrimentally affect the operation or capacity of Sea Lake-Swan Hill Road.

6. INCREASED DENSITY

Traffix Group was requested by Council to assess the impact of increasing the residential density from 10.5 lots per ha to 14 lots per ha.

6.1. DESIGN TRAFFIC VOLUMES

The predicted precinct daily traffic volumes arising from the traffic model for Option 1 - Sea Lake Swan Hill Road Link are shown in Figure 41 and for Option 2 - Dead Horse Lane Link are shown in Figure 42.
Figure 41: Predicted Precinct Daily Traffic Volumes - 14 Lots per ha
(Option 1 - Sea Lake-Swan Hill Road Link)
Clearly, the higher density results in greater traffic volumes being generated by the Swan Hill South West Development Precinct.

The single lane roundabouts recommended at intersections 3 (Coronation Avenue/Wattle Street/Link 1), 4 Yana Street/Link 2/Link 3), 12 (Link 3/Link 4/Link 5) and 13 (Link 5/Link 6/Link 7) will have the capacity to accommodate the extra traffic generated by a higher residential density.

The higher density will increase traffic at intersections 5 (Gray Street/Yana Street), 7 (Gray Street/Feldtmann Lane (Link 6)) and 8 Sea Lake-Swan Hill Road/Gray Street/Boobialla Drive) to the point where additional capacity analysis is warranted to determine the impact the higher density will have on the operation and form of these intersections.
Figures 43, 44 and 45 show the predicted traffic volumes with higher densities for Option 1 (Sea Lake-Swan Hill Road connection).

**AM Peak Hour**

**Existing**

Gray Street

<table>
<thead>
<tr>
<th>Yana Street</th>
</tr>
</thead>
<tbody>
<tr>
<td>121</td>
</tr>
<tr>
<td>135</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Yana Street</th>
</tr>
</thead>
<tbody>
<tr>
<td>117</td>
</tr>
<tr>
<td>121</td>
</tr>
</tbody>
</table>

**Development**

Gray Street

<table>
<thead>
<tr>
<th>Yana Street</th>
</tr>
</thead>
<tbody>
<tr>
<td>58</td>
</tr>
<tr>
<td>71</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Yana Street</th>
</tr>
</thead>
<tbody>
<tr>
<td>125</td>
</tr>
<tr>
<td>18</td>
</tr>
</tbody>
</table>

**Post Development**

Gray Street

<table>
<thead>
<tr>
<th>Yana Street</th>
</tr>
</thead>
<tbody>
<tr>
<td>138</td>
</tr>
<tr>
<td>200</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Yana Street</th>
</tr>
</thead>
<tbody>
<tr>
<td>242</td>
</tr>
<tr>
<td>179</td>
</tr>
</tbody>
</table>

**PM Peak Hour**

**Existing**

Gray Street

<table>
<thead>
<tr>
<th>Yana Street</th>
</tr>
</thead>
<tbody>
<tr>
<td>49</td>
</tr>
<tr>
<td>98</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Yana Street</th>
</tr>
</thead>
<tbody>
<tr>
<td>60</td>
</tr>
<tr>
<td>75</td>
</tr>
</tbody>
</table>

**Development**

Gray Street

<table>
<thead>
<tr>
<th>Yana Street</th>
</tr>
</thead>
<tbody>
<tr>
<td>170</td>
</tr>
<tr>
<td>54</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Yana Street</th>
</tr>
</thead>
<tbody>
<tr>
<td>181</td>
</tr>
<tr>
<td>224</td>
</tr>
</tbody>
</table>

**Post Development**

Gray Street

<table>
<thead>
<tr>
<th>Yana Street</th>
</tr>
</thead>
<tbody>
<tr>
<td>114</td>
</tr>
<tr>
<td>161</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Yana Street</th>
</tr>
</thead>
<tbody>
<tr>
<td>257</td>
</tr>
<tr>
<td>224</td>
</tr>
</tbody>
</table>

*Figure 43: Traffic Volumes - Grey Street/Yana Street (Intersection #5) - 14 Lots per ha (Option 1 - Sea Lake-Swan Hill Road Link)*
### AM Peak Hour

**Existing**
Gray Street

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>61 (a)</td>
<td>2 (m)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Development**
Gray Street

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>136</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Post Development**
Gray Street

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>62</td>
<td>138</td>
<td>56</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**PM Peak Hour**

**Existing**
Gray Street

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>38 (a)</td>
<td>2 (m)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Development**
Gray Street

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>409</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Post Development**
Gray Street

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>40</td>
<td>411</td>
<td>54</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(3) Assumed
(4) Derived from adjacent intersection.

**Figure 44:** Traffic Volumes - Gray Street/Feldmann Lane (Link 6) (intersection #7) - 14 Lots per ha
(Option 1 - Sea Lake-Swan Hill Road Link)
Figure 45: Traffic Volumes - Sea Lake-Swan Hill Road/Gray Street/Boobialla Drive (Intersection #8) - 14 Lcto per ha
(Option 1 - Sea Lake-Swan Hill Road Link)
6.2. INTERSECTION REQUIREMENTS

The outputs of the capacity analyses for these intersections are contained in the separate Appendices report.

6.2.1. Gray Street/Yana Street (Intersection #5)

Capacity Analysis

The existing configuration of this intersection comprises a simple T-intersection with priority to Gray Street and separate left and right turn lanes in Yana Street.

The results of the analysis for this configuration are summarised in Table 23.

Table 23: Capacity Analysis - Gray Street/Yana Street - Existing Configuration (Intersection #5) - 14 Lots per ha

<table>
<thead>
<tr>
<th>Period</th>
<th>Approach</th>
<th>Existing</th>
<th></th>
<th></th>
<th>Post Development</th>
</tr>
</thead>
<tbody>
<tr>
<td>AM</td>
<td></td>
<td>Approach DoS</td>
<td>Approach Ave Delay (sec)</td>
<td>Approach 95th %ile Queue (m)</td>
<td>Approach DoS</td>
</tr>
<tr>
<td>South</td>
<td>0.16</td>
<td>10.1</td>
<td>4.0</td>
<td>0.74</td>
<td>12.9</td>
</tr>
<tr>
<td>East</td>
<td>0.13</td>
<td>4.0</td>
<td>0.0</td>
<td>0.21</td>
<td>3.5</td>
</tr>
<tr>
<td>West</td>
<td>0.16</td>
<td>4.9</td>
<td>6.5</td>
<td>0.27</td>
<td>4.5</td>
</tr>
<tr>
<td>All Veh</td>
<td>0.15</td>
<td>6.2</td>
<td>6.5</td>
<td>0.74</td>
<td>8.2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PM</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>South</td>
<td>0.07</td>
<td>9.3</td>
<td>1.8</td>
<td>0.39</td>
<td>9.6</td>
</tr>
<tr>
<td>East</td>
<td>0.08</td>
<td>4.6</td>
<td>0.0</td>
<td>0.21</td>
<td>3.9</td>
</tr>
<tr>
<td>West</td>
<td>0.09</td>
<td>3.2</td>
<td>3.2</td>
<td>0.28</td>
<td>5.1</td>
</tr>
<tr>
<td>All Veh</td>
<td>0.09</td>
<td>5.3</td>
<td>3.2</td>
<td>0.38</td>
<td>6.1</td>
</tr>
</tbody>
</table>

The analysis shows that under post-development traffic volumes, Gray Street operates with a low degree of saturation in both the AM and PM peak periods, with minimal delays and minimal queues on both approaches. Yana Street will experience a reduction in Level of Service in both peak periods, in particular the AM peak where the degree of saturation increases to 0.74.

It is noted that the model produced for this study does not allow for any redistribution of traffic that might occur due to congestion and/or delays at a particular intersection. Both these factors mean that the predicted traffic volumes turning from Yana Street (and into Yana Street) may be overestimated which, in turn, means that the traffic impact may be overstated.

To assess upgrade options, three upgrades have been assessed - left and right turn lanes in Gray Street, a roundabout and traffic signals. The results of the analyses for these configurations are shown in Tables 24, 25 and 26.
Table 24: Capacity Analysis - Gray Street/Yana Street (Intersection #5) - Lots per ha
Turn Lanes in Gray Street
(Option 1 - Sea Lake-Swan Hill Road Link)

<table>
<thead>
<tr>
<th>Period</th>
<th>Approach</th>
<th>Existing</th>
<th>Post Development</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Approach DoS</td>
<td>Approach Ave Delay (sec)</td>
</tr>
<tr>
<td>AM</td>
<td>South</td>
<td>0.15</td>
<td>10.1</td>
</tr>
<tr>
<td></td>
<td>East</td>
<td>0.13</td>
<td>4.0</td>
</tr>
<tr>
<td></td>
<td>West</td>
<td>0.16</td>
<td>4.9</td>
</tr>
<tr>
<td></td>
<td>All Veh</td>
<td>0.15</td>
<td>6.2</td>
</tr>
<tr>
<td>PM</td>
<td>South</td>
<td>0.07</td>
<td>9.3</td>
</tr>
<tr>
<td></td>
<td>East</td>
<td>0.09</td>
<td>4.6</td>
</tr>
<tr>
<td></td>
<td>West</td>
<td>0.09</td>
<td>3.2</td>
</tr>
<tr>
<td></td>
<td>All Veh</td>
<td>0.09</td>
<td>5.3</td>
</tr>
</tbody>
</table>

Table 25: Capacity Analysis - Gray Street/Yana Street (Intersection #5) - 14 Lots per ha
Roundabout
(Option 1 - Sea Lake-Swan Hill Road Link)

<table>
<thead>
<tr>
<th>Period</th>
<th>Approach</th>
<th>Existing</th>
<th>Post Development</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Approach DoS</td>
<td>Approach Ave Delay (sec)</td>
</tr>
<tr>
<td>AM</td>
<td>South</td>
<td>0.16</td>
<td>10.1</td>
</tr>
<tr>
<td></td>
<td>East</td>
<td>0.13</td>
<td>4.0</td>
</tr>
<tr>
<td></td>
<td>West</td>
<td>0.16</td>
<td>4.9</td>
</tr>
<tr>
<td></td>
<td>All Veh</td>
<td>0.16</td>
<td>6.2</td>
</tr>
<tr>
<td>PM</td>
<td>South</td>
<td>0.07</td>
<td>9.3</td>
</tr>
<tr>
<td></td>
<td>East</td>
<td>0.08</td>
<td>4.6</td>
</tr>
<tr>
<td></td>
<td>West</td>
<td>0.09</td>
<td>3.2</td>
</tr>
<tr>
<td></td>
<td>All Veh</td>
<td>0.09</td>
<td>5.3</td>
</tr>
</tbody>
</table>
Table 26: Capacity Analysis - Gray Street/Yana Street (Intersection #5) - 14 Lots per ha  
Traffic Signals  
(Option 1 - Sea Lake-Swan Hill Road Link)

<table>
<thead>
<tr>
<th>Period</th>
<th>Approach</th>
<th>Existing</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Approach DoS</td>
<td>Approach Ave Delay (sec)</td>
<td>Approach 95th %ile Queue (m)</td>
<td>Approach DoS</td>
<td>Approach Ave Delay (sec)</td>
<td>Approach 95th %ile Queue (m)</td>
<td></td>
</tr>
<tr>
<td>AM</td>
<td>South</td>
<td>0.15</td>
<td>10.1</td>
<td>4.0</td>
<td>0.50</td>
<td>17.1</td>
<td>50.6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>East</td>
<td>0.13</td>
<td>4.0</td>
<td>0.0</td>
<td>0.22</td>
<td>8.8</td>
<td>18.3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>West</td>
<td>0.18</td>
<td>4.9</td>
<td>6.5</td>
<td>0.51</td>
<td>17.5</td>
<td>28.3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>All Veh</td>
<td>0.15</td>
<td>6.2</td>
<td>6.5</td>
<td>0.51</td>
<td>15.1</td>
<td>50.6</td>
<td></td>
</tr>
<tr>
<td>PM</td>
<td>South</td>
<td>0.07</td>
<td>9.3</td>
<td>1.8</td>
<td>0.37</td>
<td>26.7</td>
<td>28.9</td>
<td></td>
</tr>
<tr>
<td></td>
<td>East</td>
<td>0.00</td>
<td>4.6</td>
<td>0.0</td>
<td>0.19</td>
<td>7.1</td>
<td>11.3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>West</td>
<td>0.09</td>
<td>3.2</td>
<td>3.2</td>
<td>0.46</td>
<td>13.3</td>
<td>29.6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>All Veh</td>
<td>0.09</td>
<td>5.3</td>
<td>3.2</td>
<td>0.46</td>
<td>13.5</td>
<td>29.6</td>
<td></td>
</tr>
</tbody>
</table>

It is noted that the SIDRA analysis did not take into account the “peaking effect” of the adjacent school during the AM period. In practice, more of the existing traffic will occur closer to 9:00am than be evenly spread over the hour. Similarly, more of the development traffic may occur away from the school peak to avoid the delays that it creates. Thus, the proposed development will have less of an impact at this intersection during the AM peak.

These analyses show that, compared to the existing configuration of the intersection, for post-development traffic volumes:

- Turn lanes in Gray Street have limited impact on delays and queues to traffic leaving Yana Street, and on the operation of Gray Street;
- A roundabout reduces delays and queues in Yana Street at the expense of increased queues in both directions along Gray Street; and
- Traffic signals, whilst operating at Level of Service B in both the AM and PM peaks, increase delays and queues for all movements.

It is noted that the east approach in Gray Street is sufficiently wide to enable through vehicles to pass left turning vehicles, and on the west approach there is scope to ban kerbside parking to allow through traffic to pass stationary right turning traffic.

**Recommended Intersection Treatment**

It is recommended that the existing configuration of the Gray Street/Yana Street intersection continue to be provided.
6.2.2. Gray Street/Feldtmann Lane (Intersection #7)

**Capacity Analysis**

The predicted volume of right turning traffic from Gray Street is high. This intersection has therefore been modelled with a separate right turn lane in Gray Street and separate left and right turn lanes in Feldtmann Lane. The results of the analysis are summarised in Table 27.

**Table 27:** Capacity Analysis - Gray Street/Feldtmann Lane (Intersection #7) - 14 Lots per ha (Option 1 - Sea Lake-Swan Hill Road Link)

| Period | Approach | Existing | | | Post Development | | |
|--------|---------|----------|----------|----------|-----------------|----------|-----------------|----------|-----------------|----------|
|        |         | Approach DoS | Approach Ave Delay (sec) | Approach 95th %ile Queue (m) | Approach DoS | Approach Ave Delay (sec) | Approach 95th %ile Queue (m) |
| AM     | South   | 0.00      | 8.7       | 0.0       | 0.49        | 6.1      | 20.9            |
|        | East    | 0.03      | 0.3       | 0.0       | 0.04        | 1.2      | 0.0             |
|        | West    | 0.03      | 0.3       | 0.0       | 0.09        | 4.0      | 2.9             |
|        | All Veh | 0.03      | 0.6       | 0.0       | 0.49        | 5.2      | 20.9            |
| PM     | South   | 0.03      | 8.6       | 0.1       | 0.25        | 6.2      | 7.6             |
|        | East    | 0.03      | 0.3       | 0.0       | 0.05        | 2.4      | 0.0             |
|        | West    | 0.02      | 0.4       | 0.0       | 0.25        | 5.4      | 10.1            |
|        | All Veh | 0.03      | 0.7       | 0.0       | 0.25        | 5.3      | 10.1            |

The analysis shows that under post-development traffic volumes, the intersection operates with a very low degree of saturation in both the AM and PM peak periods, with minimal delays and minimal queues on all approaches.

**Recommended Intersection Treatment**

It is recommended that a simple T-intersection continue to be provided at the Gray Street/Feldtmann Lane intersection. A separate right turn facility should be provided in Gray Street and separate left and right turn lanes in Feldtmann Lane. A left turn lane in Gray Street is not warranted on the basis of the predicted left turn volumes.

6.2.3. Sea Lake-Swan Hill Road/Gray Street/Boobialla Drive (Intersection #8)

**Capacity Analysis**

This existing cross road intersection is currently controlled by a single lane roundabout. The results of the analysis for this configuration are summarised in Table 28.
Table 26: Capacity Analysis - Sea Lake-Swan Hill Road/Gray Street/Boobialla Drive (Intersection #8) - 14 Lots per ha
(Option 1 - Sea Lake-Swan Hill Road Link)

<table>
<thead>
<tr>
<th>Period</th>
<th>Approach</th>
<th>Existing</th>
<th></th>
<th></th>
<th>Post Development</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Approach DoS</td>
<td>Approach Ave Delay (sec)</td>
<td>50th %ile Queue (m)</td>
<td>Approach DoS</td>
</tr>
<tr>
<td>AM</td>
<td>South</td>
<td>0.04</td>
<td>7.8</td>
<td>1.3</td>
<td>0.50</td>
</tr>
<tr>
<td></td>
<td>East</td>
<td>0.05</td>
<td>8.1</td>
<td>1.6</td>
<td>0.27</td>
</tr>
<tr>
<td></td>
<td>North</td>
<td>0.10</td>
<td>5.6</td>
<td>3.3</td>
<td>0.58</td>
</tr>
<tr>
<td></td>
<td>West</td>
<td>0.07</td>
<td>5.9</td>
<td>2.3</td>
<td>0.49</td>
</tr>
<tr>
<td></td>
<td>All Veh</td>
<td>0.10</td>
<td>6.5</td>
<td>3.3</td>
<td>0.58</td>
</tr>
<tr>
<td></td>
<td>LoS</td>
<td>A</td>
<td></td>
<td></td>
<td>B</td>
</tr>
<tr>
<td>PM</td>
<td>South</td>
<td>0.04</td>
<td>7.4</td>
<td>1.3</td>
<td>0.44</td>
</tr>
<tr>
<td></td>
<td>East</td>
<td>0.08</td>
<td>8.5</td>
<td>2.6</td>
<td>0.68</td>
</tr>
<tr>
<td></td>
<td>North</td>
<td>0.04</td>
<td>5.3</td>
<td>1.4</td>
<td>0.10</td>
</tr>
<tr>
<td></td>
<td>West</td>
<td>0.03</td>
<td>6.1</td>
<td>0.9</td>
<td>0.27</td>
</tr>
<tr>
<td></td>
<td>All Veh</td>
<td>0.08</td>
<td>7.2</td>
<td>2.6</td>
<td>0.68</td>
</tr>
<tr>
<td></td>
<td>LoS</td>
<td>A</td>
<td></td>
<td></td>
<td>A</td>
</tr>
</tbody>
</table>

The analysis shows that under existing and post-development traffic volumes, the intersection operates at a Level of Service B in the AM peak and a Level of Service A in the PM peak.

**Recommended Intersection Treatment**

It is recommended that the intersection remain under roundabout control. No upgrades are required from a capacity perspective.

**“Trigger Point” for Upgrade**

As no upgrades are required from a capacity perspective, there is no “trigger point”.
7. COMMENTS ON SPECIFIC ITEMS

Trafix Group was requested by Council to comment on a number of specific items as follows.

**Distance from Sea Lake-Swan Hill Road of First Intersection on Dead Horse Lane**

Council has sought a response to the requirement by VicRoads for the first intersection on Dead Horse Lane south of Sea Lake-Swan Hill Road to be "relocated well away from Sea Lake Swan Hill Road/Dead Horse Lane intersection, preferably in the order of more than 800m to support future operational efficiency of both Dead Horse Lane and its intersection with the Swan Hill-Sea Lake Road".

The requirement to offset a local road intersection more than 800m from Sea Lake Swan Hill Road is excessive. The traffic projections and the capacity analysis indicate that there will be low volumes of traffic through this intersection in the design year (2033) and that queues on the Dead Horse Lane approach will be one vehicle long. Also, the first intersection to the south will carry low volumes of traffic, and a simple T-intersection is all that is required.

The property on the southeast corner of this intersection has a frontage to Dead Horse Lane of some 135m and is to be retained. The first intersection to the south of Sea Lake-Swan Hill Road will therefore be greater than this distance from the main road, which is more than sufficient to ensure that both intersections can operate efficiently in the future.

**Access to Sea Lake-Swan Hill Road**

It is understood that the Swan Hill South West Development Precinct plan has undergone a number of iterations. An earlier version of the Swan Hill South West Development Precinct plan did not show an access to Sea Lake-Swan Hill Road between Gray Street and Dead Horse Lane, which VicRoads supported "in principle ... to minimise congestion and compromised future traffic lane configurations". The current plan shows such an access, and Council has sought a response to this.

Section 5.4 of this report compares the provision of a connection to Sea Lake-Swan Hill Road or a connection to Dead Horse Lane and concludes that a connection to Sea Lake-Swan Hill Road provides a superior road network whilst not detrimentally affecting the operation or capacity of Sea Lake-Swan Hill Road.

**Recommended Speed Zones**

The setting of speed zones on the declared road network is the responsibility of VicRoads and takes into account many factors. The assessment of the intersection requirements at Dead Horse Lane has been undertaken on the basis that, as the urban edge of Swan Hill would have moved to this location, a speed limit of 80 km/h is appropriate.
SWAN HILL SOUTH WEST DEVELOPMENT PRECINCT

TRAFFIC IMPACT ASSESSMENT

APPENDICES REPORT

PREPARED FOR

SWAN HILL RURAL CITY COUNCIL

20 JUNE, 2014

GRP16371R0063B
Traffic Impact Assessment

Appendices Report

Swan Hill South West Development Precinct

Our Reference: GRP16371R0283B Appendices Report

COPYRIGHT: The ideas and material contained in this document are the property of Traffix Group (Traffix Group Pty Ltd – ABN 32 103 461 570, Traffix Survey Pty Ltd – ABN 57 120 461 510, Traffix Design Pty Ltd – ABN 41 066 899 443). Use or copying of this document in whole or in part without the written permission of Traffix Group constitutes an infringement of copyright.

LIMITATION: This report has been prepared on behalf of and for the exclusive use of Traffix Group’s client and is subject to and issued in connection with the provisions of the agreement between Traffix Group and its client. Traffix Group accepts no liability or responsibility whatsoever for or in respect of any use of or reliance upon this report by any third party.

GRP16371R0283B
APPENDIX A

CAPACITY ANALYSIS RESULTS
OPTION 1 - SEA LAKE-SWAN HILL ROAD LINK
SITE LAYOUT

Site: INT 3 - Coronation Avenue/Link 1 - AM Post Development

Coronation Avenue/Link 1
Roundabout
### MOVEMENT SUMMARY

**Site:** INT 3 - Coronation Avenue/Link 1 - AM Post Development

**Coronation Avenue/Link 1**

**Roundabout**

<table>
<thead>
<tr>
<th>Movement Performance - Vehicles</th>
<th>Mov ID</th>
<th>OD Mov</th>
<th>Demand Flows</th>
<th>HV %</th>
<th>Deg. Sum veh</th>
<th>Average Delay sec</th>
<th>Level of Service</th>
<th>95% Back of Vehicles</th>
<th>Queue Distance m</th>
<th>Prop. Queued</th>
<th>Effective Speed veh</th>
<th>Average Speed km/h</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>South: Coronation Avenue</strong></td>
<td>1</td>
<td>L2</td>
<td>1</td>
<td>0.0</td>
<td>0.151</td>
<td>5.9</td>
<td>LOS A</td>
<td>0.3</td>
<td>5.7</td>
<td>0.36</td>
<td>1.33</td>
<td>49.6</td>
</tr>
<tr>
<td>2</td>
<td>T1</td>
<td>151</td>
<td>0.0</td>
<td>0.151</td>
<td>4.9</td>
<td>LOS A</td>
<td>0.3</td>
<td>5.7</td>
<td>0.36</td>
<td>1.33</td>
<td>49.6</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>R2</td>
<td>56</td>
<td>0.0</td>
<td>0.151</td>
<td>11.8</td>
<td>LOS B</td>
<td>0.3</td>
<td>5.7</td>
<td>0.36</td>
<td>1.33</td>
<td>49.6</td>
<td></td>
</tr>
<tr>
<td>Approach</td>
<td>207</td>
<td>0.0</td>
<td>0.151</td>
<td>6.0</td>
<td>LOS A</td>
<td>0.3</td>
<td>5.7</td>
<td>0.36</td>
<td>0.51</td>
<td>49.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>East: Wattie Street</strong></td>
<td>4</td>
<td>L2</td>
<td>17</td>
<td>0.0</td>
<td>0.084</td>
<td>5.8</td>
<td>LOS A</td>
<td>0.4</td>
<td>3.1</td>
<td>0.26</td>
<td>1.12</td>
<td>48.2</td>
</tr>
<tr>
<td>5</td>
<td>T1</td>
<td>40</td>
<td>0.0</td>
<td>0.084</td>
<td>4.8</td>
<td>LOS A</td>
<td>0.4</td>
<td>3.1</td>
<td>0.26</td>
<td>1.12</td>
<td>48.2</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>R2</td>
<td>37</td>
<td>0.0</td>
<td>0.084</td>
<td>11.7</td>
<td>LOS B</td>
<td>0.4</td>
<td>3.1</td>
<td>0.26</td>
<td>1.12</td>
<td>48.2</td>
<td></td>
</tr>
<tr>
<td>Approach</td>
<td>114</td>
<td>0.0</td>
<td>0.084</td>
<td>8.4</td>
<td>LOS A</td>
<td>0.4</td>
<td>3.1</td>
<td>0.26</td>
<td>0.56</td>
<td>48.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>North: Coronation Avenue</strong></td>
<td>7</td>
<td>L2</td>
<td>129</td>
<td>0.0</td>
<td>0.194</td>
<td>6.3</td>
<td>LOS A</td>
<td>1.1</td>
<td>7.8</td>
<td>0.41</td>
<td>1.39</td>
<td>49.1</td>
</tr>
<tr>
<td>8</td>
<td>T1</td>
<td>80</td>
<td>0.0</td>
<td>0.194</td>
<td>5.3</td>
<td>LOS A</td>
<td>1.1</td>
<td>7.8</td>
<td>0.41</td>
<td>1.39</td>
<td>49.1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>R2</td>
<td>35</td>
<td>0.0</td>
<td>0.194</td>
<td>12.2</td>
<td>LOS B</td>
<td>1.1</td>
<td>7.8</td>
<td>0.41</td>
<td>1.39</td>
<td>49.1</td>
<td></td>
</tr>
<tr>
<td>Approach</td>
<td>244</td>
<td>0.0</td>
<td>0.194</td>
<td>8.8</td>
<td>LOS A</td>
<td>1.1</td>
<td>7.8</td>
<td>0.41</td>
<td>0.54</td>
<td>49.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>West: Link 1</strong></td>
<td>10</td>
<td>L2</td>
<td>138</td>
<td>0.0</td>
<td>0.243</td>
<td>6.6</td>
<td>LOS A</td>
<td>1.4</td>
<td>10.0</td>
<td>0.46</td>
<td>1.38</td>
<td>49.6</td>
</tr>
<tr>
<td>11</td>
<td>T1</td>
<td>165</td>
<td>0.0</td>
<td>0.243</td>
<td>5.6</td>
<td>LOS A</td>
<td>1.4</td>
<td>10.0</td>
<td>0.46</td>
<td>1.38</td>
<td>49.6</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>R2</td>
<td>1</td>
<td>0.0</td>
<td>0.243</td>
<td>12.5</td>
<td>LOS B</td>
<td>1.4</td>
<td>10.0</td>
<td>0.46</td>
<td>1.38</td>
<td>49.6</td>
<td></td>
</tr>
<tr>
<td>Approach</td>
<td>299</td>
<td>0.0</td>
<td>0.243</td>
<td>6.1</td>
<td>LOS A</td>
<td>1.4</td>
<td>10.0</td>
<td>0.46</td>
<td>0.54</td>
<td>49.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>All Vehicles</strong></td>
<td>864</td>
<td>0.0</td>
<td>0.243</td>
<td>6.8</td>
<td>LOS A</td>
<td>1.4</td>
<td>10.0</td>
<td>0.38</td>
<td>0.54</td>
<td>49.3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Level of Service (LOS): Method: Delay (HCM 2000).**

Roundabout LOS Method: Same as Signalised Intersections.

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

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.


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

**Site:** INT 3 - Coronation Avenue/Link 1 - PM Post Development

Coronation Avenue/Link 1
Roundabout

### Movement Performance - Vehicles

<table>
<thead>
<tr>
<th>Mov ID</th>
<th>OD Mov</th>
<th>Demand Flows</th>
<th>% H V</th>
<th>Total veh</th>
<th>HV %</th>
<th>Average Delay (sec)</th>
<th>Level of Service</th>
<th>95% Back of Vehicles</th>
<th>Queue Delay (m)</th>
<th>Prop Queue</th>
<th>Effective Stop Rate per veh</th>
<th>Average Speed (km/h)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>South:</strong> Coronation Avenue</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>L2</td>
<td>1</td>
<td>0.0</td>
<td>0.077</td>
<td>6.4</td>
<td>LOS A</td>
<td>0.4</td>
<td>2.8</td>
<td>0.46</td>
<td>1.36</td>
<td>49.3</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>T1</td>
<td>75</td>
<td>0.0</td>
<td>0.077</td>
<td>5.4</td>
<td>LOS A</td>
<td>0.4</td>
<td>2.8</td>
<td>0.46</td>
<td>1.36</td>
<td>49.3</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>R2</td>
<td>19</td>
<td>0.0</td>
<td>0.077</td>
<td>12.3</td>
<td>LOS B</td>
<td>0.4</td>
<td>2.8</td>
<td>0.46</td>
<td>1.36</td>
<td>49.3</td>
<td></td>
</tr>
<tr>
<td>Approach</td>
<td></td>
<td>95</td>
<td>0.0</td>
<td>0.077</td>
<td>6.6</td>
<td>LOS A</td>
<td>0.4</td>
<td>2.6</td>
<td>0.46</td>
<td>0.53</td>
<td>49.3</td>
<td></td>
</tr>
<tr>
<td><strong>East:</strong> Wattie Street</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>L2</td>
<td>28</td>
<td>0.0</td>
<td>0.147</td>
<td>6.3</td>
<td>LOS A</td>
<td>0.8</td>
<td>5.5</td>
<td>0.38</td>
<td>1.38</td>
<td>49.3</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>T1</td>
<td>129</td>
<td>0.0</td>
<td>0.147</td>
<td>5.3</td>
<td>LOS A</td>
<td>0.8</td>
<td>5.5</td>
<td>0.38</td>
<td>1.38</td>
<td>49.3</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>R2</td>
<td>38</td>
<td>0.0</td>
<td>0.147</td>
<td>12.2</td>
<td>LOS B</td>
<td>0.5</td>
<td>5.5</td>
<td>0.38</td>
<td>1.38</td>
<td>49.3</td>
<td></td>
</tr>
<tr>
<td>Approach</td>
<td></td>
<td>186</td>
<td>0.0</td>
<td>0.147</td>
<td>6.8</td>
<td>LOS A</td>
<td>0.8</td>
<td>5.5</td>
<td>0.38</td>
<td>0.54</td>
<td>49.3</td>
<td></td>
</tr>
<tr>
<td><strong>North:</strong> Coronation Avenue</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>L2</td>
<td>129</td>
<td>0.0</td>
<td>0.223</td>
<td>5.5</td>
<td>LOS A</td>
<td>1.3</td>
<td>9.0</td>
<td>0.17</td>
<td>1.33</td>
<td>49.8</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>T1</td>
<td>114</td>
<td>0.0</td>
<td>0.223</td>
<td>4.5</td>
<td>LOS A</td>
<td>1.3</td>
<td>9.0</td>
<td>0.17</td>
<td>1.33</td>
<td>49.8</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>R2</td>
<td>105</td>
<td>0.0</td>
<td>0.223</td>
<td>11.4</td>
<td>LOS B</td>
<td>1.3</td>
<td>9.0</td>
<td>0.17</td>
<td>1.33</td>
<td>49.8</td>
<td></td>
</tr>
<tr>
<td>Approach</td>
<td></td>
<td>348</td>
<td>0.0</td>
<td>0.223</td>
<td>7.0</td>
<td>LOS A</td>
<td>1.3</td>
<td>9.0</td>
<td>0.17</td>
<td>0.51</td>
<td>49.8</td>
<td></td>
</tr>
<tr>
<td><strong>West:</strong> Link 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>L2</td>
<td>69</td>
<td>0.0</td>
<td>0.073</td>
<td>5.8</td>
<td>LOS A</td>
<td>0.4</td>
<td>2.6</td>
<td>0.26</td>
<td>0.32</td>
<td>50.5</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>T1</td>
<td>27</td>
<td>0.0</td>
<td>0.073</td>
<td>4.9</td>
<td>LOS A</td>
<td>0.4</td>
<td>2.6</td>
<td>0.26</td>
<td>0.32</td>
<td>50.5</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>R2</td>
<td>1</td>
<td>0.0</td>
<td>0.073</td>
<td>11.7</td>
<td>LOS B</td>
<td>0.4</td>
<td>2.6</td>
<td>0.26</td>
<td>0.32</td>
<td>50.5</td>
<td></td>
</tr>
<tr>
<td>Approach</td>
<td></td>
<td>98</td>
<td>0.0</td>
<td>0.073</td>
<td>5.6</td>
<td>LOS A</td>
<td>0.4</td>
<td>2.6</td>
<td>0.26</td>
<td>0.46</td>
<td>50.5</td>
<td></td>
</tr>
<tr>
<td><strong>All Vehicles</strong></td>
<td></td>
<td>727</td>
<td>0.0</td>
<td>0.223</td>
<td>6.7</td>
<td>LOS A</td>
<td>1.3</td>
<td>9.0</td>
<td>0.27</td>
<td>0.32</td>
<td>49.7</td>
<td></td>
</tr>
</tbody>
</table>

Level of Service (LOS): Method: Delay (HCM 2000).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
SITE LAYOUT

Site: INT 4 - Yana Street/Link 2/Link 3 - AM Post Development

Yana Street/Link 2/Link 3
Roundabout
## MOVEMENT SUMMARY

### Site: INT 4 - Yana Street/Link 2/Link 3 - AM Post Development

Yana Street/Link 2/Link 3 Roundsabout

### Movement Performance - Vehicles

<table>
<thead>
<tr>
<th>Mov ID</th>
<th>OD Mov</th>
<th>Demand Flows (veh)</th>
<th>HV %</th>
<th>Deg. Sum (sec)</th>
<th>Average Delay (sec)</th>
<th>Level of Service</th>
<th>95% Back of Vehicles (veh)</th>
<th>Queue Distance (m)</th>
<th>Prop. Queued (veh)</th>
<th>Effective Stop Rate per veh</th>
<th>Average Speed (km/h)</th>
</tr>
</thead>
<tbody>
<tr>
<td>South: Yana Street</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>L2</td>
<td>1</td>
<td>0.0</td>
<td>0.151</td>
<td>5.7</td>
<td>LOS A</td>
<td>0.3</td>
<td>5.7</td>
<td>0.25</td>
<td>0.31</td>
<td>508</td>
</tr>
<tr>
<td>2</td>
<td>T1</td>
<td>187</td>
<td>0.0</td>
<td>0.151</td>
<td>48</td>
<td>LOS A</td>
<td>0.3</td>
<td>5.7</td>
<td>0.25</td>
<td>0.91</td>
<td>508</td>
</tr>
<tr>
<td>3</td>
<td>R2</td>
<td>26</td>
<td>0.0</td>
<td>0.151</td>
<td>11.6</td>
<td>LOS B</td>
<td>0.3</td>
<td>5.7</td>
<td>0.25</td>
<td>0.91</td>
<td>508</td>
</tr>
<tr>
<td>Approach</td>
<td></td>
<td>215</td>
<td>0.0</td>
<td>0.151</td>
<td>5.6</td>
<td>LOS A</td>
<td>0.3</td>
<td>5.7</td>
<td>0.25</td>
<td>0.46</td>
<td>508</td>
</tr>
<tr>
<td>East: Link 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>L3</td>
<td>13</td>
<td>0.0</td>
<td>0.044</td>
<td>5.9</td>
<td>LOS A</td>
<td>0.2</td>
<td>1.6</td>
<td>0.36</td>
<td>0.88</td>
<td>507</td>
</tr>
<tr>
<td>5</td>
<td>T1</td>
<td>44</td>
<td>0.0</td>
<td>0.044</td>
<td>4.9</td>
<td>LOS A</td>
<td>0.2</td>
<td>1.6</td>
<td>0.36</td>
<td>0.98</td>
<td>507</td>
</tr>
<tr>
<td>6</td>
<td>R2</td>
<td>2</td>
<td>0.0</td>
<td>0.044</td>
<td>11.8</td>
<td>LOS B</td>
<td>0.2</td>
<td>1.6</td>
<td>0.36</td>
<td>0.98</td>
<td>507</td>
</tr>
<tr>
<td>Approach</td>
<td></td>
<td>59</td>
<td>0.0</td>
<td>0.044</td>
<td>5.4</td>
<td>LOS A</td>
<td>0.2</td>
<td>1.6</td>
<td>0.36</td>
<td>0.44</td>
<td>507</td>
</tr>
<tr>
<td>North: Yana Street</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>L2</td>
<td>3</td>
<td>0.0</td>
<td>0.122</td>
<td>6.1</td>
<td>LOS A</td>
<td>0.7</td>
<td>4.7</td>
<td>0.37</td>
<td>1.11</td>
<td>487</td>
</tr>
<tr>
<td>8</td>
<td>T1</td>
<td>94</td>
<td>0.0</td>
<td>0.122</td>
<td>5.2</td>
<td>LOS A</td>
<td>0.7</td>
<td>4.7</td>
<td>0.37</td>
<td>1.11</td>
<td>487</td>
</tr>
<tr>
<td>9</td>
<td>R2</td>
<td>54</td>
<td>0.0</td>
<td>0.122</td>
<td>12.0</td>
<td>LOS B</td>
<td>0.7</td>
<td>4.7</td>
<td>0.37</td>
<td>1.11</td>
<td>487</td>
</tr>
<tr>
<td>Approach</td>
<td></td>
<td>156</td>
<td>0.0</td>
<td>0.122</td>
<td>7.6</td>
<td>LOS A</td>
<td>0.7</td>
<td>4.7</td>
<td>0.37</td>
<td>0.56</td>
<td>487</td>
</tr>
<tr>
<td>West: Link 3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>L2</td>
<td>211</td>
<td>0.0</td>
<td>0.095</td>
<td>6.4</td>
<td>LOS A</td>
<td>1.8</td>
<td>12.8</td>
<td>0.43</td>
<td>1.35</td>
<td>497</td>
</tr>
<tr>
<td>11</td>
<td>T1</td>
<td>168</td>
<td>0.0</td>
<td>0.095</td>
<td>5.4</td>
<td>LOS A</td>
<td>1.8</td>
<td>12.8</td>
<td>0.43</td>
<td>1.35</td>
<td>497</td>
</tr>
<tr>
<td>12</td>
<td>R2</td>
<td>1</td>
<td>0.0</td>
<td>0.095</td>
<td>12.3</td>
<td>LOS B</td>
<td>1.8</td>
<td>12.8</td>
<td>0.43</td>
<td>1.35</td>
<td>497</td>
</tr>
<tr>
<td>Approach</td>
<td></td>
<td>380</td>
<td>0.0</td>
<td>0.095</td>
<td>6.0</td>
<td>LOS A</td>
<td>1.8</td>
<td>12.8</td>
<td>0.43</td>
<td>0.32</td>
<td>497</td>
</tr>
<tr>
<td>All Vehicles</td>
<td></td>
<td>809</td>
<td>0.0</td>
<td>0.095</td>
<td>6.1</td>
<td>LOS A</td>
<td>1.8</td>
<td>12.8</td>
<td>0.36</td>
<td>0.51</td>
<td>498</td>
</tr>
</tbody>
</table>

Level of Service (LOS): Method: Delay (HCM 2000).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
# MOVEMENT SUMMARY

**Site:** INT 4 - Yana Street/Link 2/Link 3 - PM Post Development

**Yana Street/Link 2/Link 3**

## Roundsabout

### Movement Performance - Vehicles

<table>
<thead>
<tr>
<th>Mov ID</th>
<th>OD Mov</th>
<th>Demand Flow</th>
<th>Total Vehs</th>
<th>HV %</th>
<th>Avg. Delay</th>
<th>LOS</th>
<th>95% Back of Vehicles</th>
<th>Queues</th>
<th>Prop. Queue</th>
<th>Effective Stop Rate</th>
<th>Average Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>HV %</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.0</td>
<td>1.019</td>
<td>6.5</td>
<td>LOS A</td>
<td>0.6</td>
<td>4.4</td>
<td>0.42</td>
<td>1.36</td>
<td>496</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.0</td>
<td>1.119</td>
<td>0.6</td>
<td>LOS A</td>
<td>0.6</td>
<td>4.4</td>
<td>0.42</td>
<td>1.36</td>
<td>496</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.0</td>
<td>1.219</td>
<td>12.4</td>
<td>LOS B</td>
<td>0.6</td>
<td>4.4</td>
<td>0.42</td>
<td>1.36</td>
<td>496</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.0</td>
<td>1.119</td>
<td>6.2</td>
<td>LOS A</td>
<td>0.6</td>
<td>4.4</td>
<td>0.42</td>
<td>1.36</td>
<td>496</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.0</td>
<td>1.128</td>
<td>8.7</td>
<td>LOS A</td>
<td>0.7</td>
<td>4.9</td>
<td>0.46</td>
<td>1.37</td>
<td>496</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.0</td>
<td>1.228</td>
<td>5.7</td>
<td>LOS A</td>
<td>0.7</td>
<td>4.9</td>
<td>0.46</td>
<td>1.37</td>
<td>496</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.0</td>
<td>1.228</td>
<td>12.6</td>
<td>LOS B</td>
<td>0.7</td>
<td>4.9</td>
<td>0.46</td>
<td>1.37</td>
<td>496</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.0</td>
<td>1.128</td>
<td>6.1</td>
<td>LOS A</td>
<td>0.7</td>
<td>4.9</td>
<td>0.46</td>
<td>1.53</td>
<td>496</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.0</td>
<td>1.222</td>
<td>5.7</td>
<td>LOS A</td>
<td>1.3</td>
<td>9.2</td>
<td>0.26</td>
<td>1.12</td>
<td>48.4</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.0</td>
<td>1.222</td>
<td>4.8</td>
<td>LOS A</td>
<td>1.3</td>
<td>9.2</td>
<td>0.26</td>
<td>1.12</td>
<td>48.4</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.0</td>
<td>1.222</td>
<td>11.6</td>
<td>LOS B</td>
<td>1.3</td>
<td>9.2</td>
<td>0.26</td>
<td>1.12</td>
<td>48.4</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.0</td>
<td>1.223</td>
<td>8.2</td>
<td>LOS A</td>
<td>1.3</td>
<td>9.2</td>
<td>0.28</td>
<td>0.96</td>
<td>48.4</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.0</td>
<td>1.144</td>
<td>5.9</td>
<td>LOS A</td>
<td>0.8</td>
<td>5.7</td>
<td>0.33</td>
<td>0.34</td>
<td>50.4</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.0</td>
<td>1.144</td>
<td>5.0</td>
<td>LOS A</td>
<td>0.8</td>
<td>5.7</td>
<td>0.33</td>
<td>0.34</td>
<td>50.4</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.0</td>
<td>1.144</td>
<td>11.8</td>
<td>LOS B</td>
<td>0.8</td>
<td>5.7</td>
<td>0.33</td>
<td>0.34</td>
<td>50.4</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.0</td>
<td>1.144</td>
<td>5.5</td>
<td>LOS A</td>
<td>0.8</td>
<td>5.7</td>
<td>0.33</td>
<td>0.47</td>
<td>50.4</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.0</td>
<td>1.144</td>
<td>6.8</td>
<td>LOS A</td>
<td>1.3</td>
<td>9.2</td>
<td>0.35</td>
<td>0.53</td>
<td>49.3</td>
<td></td>
</tr>
</tbody>
</table>

**All Vehicles**: 805

**Level of Service (LOS):** Method: Delay (HCM 2000).

Roundabout LOS Method: Same as Signalised Intersections.

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

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.


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

---

*Processed: Tuesday, 13 May 2014 11:10:10 AM*

*SIDRA INTERSECTION 6.0.17.4486*

*Project: P:\Synergy\Projects\GRP\GRF16071\SIDRA\May 2014\Option 1\Sidra 3.xsp 6 800956 TRAFFIC GROUP PTY LTD, PLAT / Floating*
**MOVEMENT SUMMARY**

Site: INT 5 (1) - Gray Street/Yana Street - AM Existing

Gray Street/Yana Street
Giveway / Yield (Two-Way)

<table>
<thead>
<tr>
<th>Movement Performance - Vehicles</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mov</td>
<td>OD</td>
<td>Mov</td>
<td>Demand Flows</td>
<td>HV %</td>
<td>Delg.</td>
<td>Average Delay sec</td>
<td>Level of Service</td>
<td>95% Back of Queues Distancem</td>
<td>Prop. Queued</td>
<td>Effective Stop Rate per veh</td>
</tr>
<tr>
<td>South: Yana Street</td>
<td>1</td>
<td>L2</td>
<td></td>
<td>111</td>
<td>0.0</td>
<td>0.105</td>
<td>8.8</td>
<td>LOS A</td>
<td>0.4</td>
<td>2.8</td>
<td>0.25</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>R2</td>
<td></td>
<td>112</td>
<td>0.0</td>
<td>0.155</td>
<td>11.4</td>
<td>LOS B</td>
<td>0.5</td>
<td>4.0</td>
<td>0.56</td>
</tr>
<tr>
<td></td>
<td>Approach</td>
<td></td>
<td>222</td>
<td>0.0</td>
<td>0.165</td>
<td>10.1</td>
<td>LOS B</td>
<td>0.6</td>
<td>4.0</td>
<td>0.37</td>
<td>0.72</td>
</tr>
<tr>
<td>East: Gray Street</td>
<td>4</td>
<td>L2</td>
<td></td>
<td>123</td>
<td>0.0</td>
<td>0.132</td>
<td>8.2</td>
<td>LOS A</td>
<td>0.3</td>
<td>0.0</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>T1</td>
<td></td>
<td>127</td>
<td>0.0</td>
<td>0.192</td>
<td>0.0</td>
<td>LOS A</td>
<td>0.3</td>
<td>0.0</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>Approach</td>
<td></td>
<td>251</td>
<td>0.0</td>
<td>0.192</td>
<td>4.0</td>
<td>NA</td>
<td>0.3</td>
<td>0.0</td>
<td>0.00</td>
<td>0.41</td>
</tr>
<tr>
<td>West: Gray Street</td>
<td>11</td>
<td>T1</td>
<td></td>
<td>142</td>
<td>0.0</td>
<td>0.164</td>
<td>0.9</td>
<td>LOS A</td>
<td>0.9</td>
<td>6.5</td>
<td>0.38</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>R2</td>
<td></td>
<td>127</td>
<td>0.0</td>
<td>0.104</td>
<td>9.2</td>
<td>LOS A</td>
<td>0.9</td>
<td>6.5</td>
<td>0.36</td>
</tr>
<tr>
<td></td>
<td>Approach</td>
<td></td>
<td>269</td>
<td>0.0</td>
<td>0.164</td>
<td>4.9</td>
<td>NA</td>
<td>0.9</td>
<td>6.5</td>
<td>0.38</td>
<td>0.36</td>
</tr>
<tr>
<td>All Vehicles</td>
<td>742</td>
<td>0.0</td>
<td>0.164</td>
<td>6.2</td>
<td>NA</td>
<td>0.9</td>
<td>6.5</td>
<td>0.25</td>
<td>0.48</td>
<td>50.3</td>
<td></td>
</tr>
</tbody>
</table>

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.


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

**Site:** INT 5 (1) - Gray Street/Yana Street - AM Post Development

**Gray Street/Yana Street**

**Giveway / Yield (Two-Way)**

<table>
<thead>
<tr>
<th>Movement Performance - Vehicles</th>
<th>Mov ID</th>
<th>OD Mov</th>
<th>Demand Flows</th>
<th>H/V %</th>
<th>Deg. Serv</th>
<th>Average Delay sec</th>
<th>Level of Service</th>
<th>95% Back of Queue</th>
<th>Vehicles veh</th>
<th>Queue Distance m</th>
<th>Prop. Queued</th>
<th>Effective Stop Rate per veh</th>
<th>Average Speed km/h</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>South: Yana Street</strong></td>
<td>1</td>
<td>L2</td>
<td>282</td>
<td>0.0</td>
<td>0.274</td>
<td>9.1</td>
<td>LOS A</td>
<td>1.2</td>
<td>8.4</td>
<td>0.31</td>
<td>0.35</td>
<td>47.6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>R2</td>
<td>325</td>
<td>0.0</td>
<td>0.591</td>
<td>17.6</td>
<td>LOS C</td>
<td>3.8</td>
<td>26.6</td>
<td>0.74</td>
<td>1.99</td>
<td>40.3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Approach</td>
<td></td>
<td>607</td>
<td>0.0</td>
<td>0.591</td>
<td>13.7</td>
<td>LOS B</td>
<td>3.8</td>
<td>26.6</td>
<td>0.84</td>
<td>0.79</td>
<td>43.4</td>
<td></td>
</tr>
<tr>
<td><strong>East: Gray Street</strong></td>
<td>4</td>
<td>L2</td>
<td>223</td>
<td>0.0</td>
<td>0.196</td>
<td>8.2</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.0</td>
<td>0.00</td>
<td>0.47</td>
<td>52.8</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>T1</td>
<td>147</td>
<td>0.0</td>
<td>0.196</td>
<td>0.0</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.0</td>
<td>0.00</td>
<td>0.47</td>
<td>52.8</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Approach</td>
<td></td>
<td>371</td>
<td>0.0</td>
<td>0.196</td>
<td>4.9</td>
<td>NA</td>
<td>0.0</td>
<td>0.0</td>
<td>0.00</td>
<td>0.47</td>
<td>52.8</td>
<td></td>
</tr>
<tr>
<td><strong>West: Gray Street</strong></td>
<td>11</td>
<td>T1</td>
<td>222</td>
<td>0.0</td>
<td>0.264</td>
<td>1.7</td>
<td>LOS A</td>
<td>1.5</td>
<td>11.5</td>
<td>0.52</td>
<td>0.36</td>
<td>49.1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>R2</td>
<td>174</td>
<td>0.0</td>
<td>0.254</td>
<td>10.0</td>
<td>LOS B</td>
<td>1.5</td>
<td>11.5</td>
<td>0.52</td>
<td>0.36</td>
<td>49.1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Approach</td>
<td></td>
<td>396</td>
<td>0.0</td>
<td>0.264</td>
<td>5.4</td>
<td>NA</td>
<td>1.5</td>
<td>11.5</td>
<td>0.52</td>
<td>0.36</td>
<td>49.1</td>
<td></td>
</tr>
<tr>
<td><strong>All Vehicles</strong></td>
<td>1374</td>
<td></td>
<td>0.0</td>
<td>0.591</td>
<td>8.9</td>
<td>NA</td>
<td>3.8</td>
<td>26.6</td>
<td>0.38</td>
<td>0.82</td>
<td>47.2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**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.


H/V (%) values are calculated for All Movement Classes of All Heavy Vehicle Designation.
# MOVEMENT SUMMARY

**Site:** INT 5 (1) - Gray Street/Yana Street - PM Existing

**Gray Street/Yana Street**  
**Giveway / Yold (Two-Way)**

## Movement Performance - Vehicles

<table>
<thead>
<tr>
<th>Mov ID</th>
<th>OD Mov</th>
<th>Demand Flows</th>
<th>HV %</th>
<th>Deg. Sum</th>
<th>Average Delay</th>
<th>Level of Service</th>
<th>95% Back of Queued Vehicles</th>
<th>Prop. Queued</th>
<th>Effective Stop Rate per veh</th>
<th>Average Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Total veh/h</td>
<td></td>
<td></td>
<td>sec</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>South: Yana Street</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>L2</td>
<td>36</td>
<td>0.0</td>
<td>0.032</td>
<td>8.5</td>
<td>LOS A</td>
<td>0.1</td>
<td>0.8</td>
<td>0.15</td>
<td>0.92</td>
</tr>
<tr>
<td>3</td>
<td>R2</td>
<td>66</td>
<td>0.0</td>
<td>0.072</td>
<td>9.8</td>
<td>LOS A</td>
<td>0.3</td>
<td>1.8</td>
<td>0.35</td>
<td>0.99</td>
</tr>
<tr>
<td>Approach</td>
<td></td>
<td>102</td>
<td>0.0</td>
<td>0.072</td>
<td>9.3</td>
<td>LOS A</td>
<td>0.3</td>
<td>1.6</td>
<td>0.28</td>
<td>0.87</td>
</tr>
<tr>
<td>East: Gray Street</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>L2</td>
<td>80</td>
<td>0.0</td>
<td>0.075</td>
<td>8.2</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.0</td>
<td>0.00</td>
<td>0.45</td>
</tr>
<tr>
<td>5</td>
<td>T1</td>
<td>63</td>
<td>0.0</td>
<td>0.076</td>
<td>0.0</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.0</td>
<td>0.00</td>
<td>0.45</td>
</tr>
<tr>
<td>Approach</td>
<td></td>
<td>143</td>
<td>0.0</td>
<td>0.075</td>
<td>4.6</td>
<td>NA</td>
<td></td>
<td></td>
<td></td>
<td>0.45</td>
</tr>
<tr>
<td>West: Gray Street</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>T1</td>
<td>103</td>
<td>0.0</td>
<td>0.086</td>
<td>0.5</td>
<td>LOS A</td>
<td>0.5</td>
<td>3.2</td>
<td>0.26</td>
<td>0.27</td>
</tr>
<tr>
<td>12</td>
<td>R2</td>
<td>52</td>
<td>0.0</td>
<td>0.060</td>
<td>8.8</td>
<td>LOS A</td>
<td>0.5</td>
<td>3.2</td>
<td>0.26</td>
<td>0.27</td>
</tr>
<tr>
<td>Approach</td>
<td></td>
<td>155</td>
<td>0.0</td>
<td>0.086</td>
<td>3.2</td>
<td>NA</td>
<td></td>
<td></td>
<td></td>
<td>0.26</td>
</tr>
<tr>
<td>All Vehicles</td>
<td></td>
<td>400</td>
<td>0.0</td>
<td>0.086</td>
<td>5.3</td>
<td>NA</td>
<td></td>
<td></td>
<td></td>
<td>0.17</td>
</tr>
</tbody>
</table>

*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 signal 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.  


HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Modal Designation.
# MOVEMENT SUMMARY

Site: INT 5 (1) - Gray Street/Yana Street - PM Post Development

Gray Street/Yana Street
Giveaway / Yold (Two-Way)

| Movement Performance - Vehicles | Mov ID | OD Mov | Demand Flows | HV % | Deg. Sam vph | Average Delay | Average Delay sec | Level of Service | 95% Back of Queue | Vehicles per veh | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|--------------------------------|--------|--------|--------------|------|--------------|---------------|-------------------|------------------|----------------|----------------|-------------|----------------|----------------|----------------|----------------|
| South: Yana Street             | 1      | L2     | 122          | 0.0  | 0.115        | 88            | LOS A 1.3        | LOS B 1.2        | 0.4             | 3.1           | 0.24        | 0.33         | 47.9           | 44.0           |
|                                | 3      | R2     | 174          | 0.0  | 0.279        | 130           | LOS B 1.2        | 0.8             | 0.58           | 0.90          | 0.30         | 44.0           |                 |                |
|                                |        |Approach| 298          | 0.0  | 0.279        | 113           | LOS B 1.2        | 0.8             | 0.44           | 0.79          | 0.30         | 45.6           |                 |                |
| East: Gray Street              | 4      | L2     | 225          | 0.0  | 0.184        | 8.2           | LOS A 0.0         | LOS A 0.0        | 0.0             | 0.0           | 0.00         | 0.50         | 52.3           | 52.3           |
|                                | 5      | T1     | 123          | 0.0  | 0.184        | 0.0           | LOS A 0.0         | 0.0             | 0.00           | 0.00          | 0.50         | 52.3           | 52.3           |
|                                |        |Approach| 348          | 0.0  | 0.184        | 5.3           | NA                | 0.0             | 0.00           | 0.00          | 0.50         | 52.3           |                 |                |
| West: Gray Street              | 11     | T1     | 143          | 0.0  | 0.223        | 1.5           | LOS A 1.3         | LOS A 1.3        | 0.48           | 0.48          | 0.45         | 48.8          | 48.8           | 48.8           |
|                                | 12     | R2     | 191          | 0.0  | 0.223        | 9.8           | LOS A 1.3         | 0.48           | 0.45           | 0.45          | 48.8          | 48.8           |                 |                |
|                                |        |Approach| 334          | 0.0  | 0.223        | 6.3           | NA                | 0.48           | 0.45           | 0.45          | 48.8          | 48.8           |                 |                |
| All Vehicles                   | 978    |        |              | 0.0  | 0.279        | 7.4           | NA                | 1.3             | 0.36           | 0.57          | 48.9          |                 |                 |                |

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

**Site:** INT 5 (2) Gray Street/Yana Street - AM Existing

Gray Street/Yana Street
Giveway / Yold (Two-Way)

<table>
<thead>
<tr>
<th>Movement Performance - Vehicles</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mov ID</strong></td>
</tr>
<tr>
<td>-----------</td>
</tr>
<tr>
<td>South: Yana Street</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>Approach</td>
</tr>
<tr>
<td>East: Gray Street</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>5</td>
</tr>
<tr>
<td>Approach</td>
</tr>
<tr>
<td>West: Gray Street</td>
</tr>
<tr>
<td>11</td>
</tr>
<tr>
<td>12</td>
</tr>
<tr>
<td>Approach</td>
</tr>
<tr>
<td>All Vehicles</td>
</tr>
</tbody>
</table>

**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.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Modal Designation.
# MOVEMENT SUMMARY

**Site:** INT 5 (2) Gray Street/Yana Street - AM Post Development

**Gray Street/Yana Street**  
**Giveway / Yold (Two-Way)**

## Movement Performance - Vehicles

<table>
<thead>
<tr>
<th>Mov ID</th>
<th>OD Mov</th>
<th>Demand Flows</th>
<th>HV %</th>
<th>Deg. Stm (s)</th>
<th>Average Delay (sec)</th>
<th>Level of Service</th>
<th>95% Back of Queue Delay distance (m)</th>
<th>Prop. Queue</th>
<th>Effective Stop Rate per veh</th>
<th>Average Speed (km/h)</th>
</tr>
</thead>
<tbody>
<tr>
<td>South: Yana Street</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>L2</td>
<td>282</td>
<td>0.0</td>
<td>0.274</td>
<td>9.1</td>
<td>LOS A</td>
<td>1.2</td>
<td>8.4</td>
<td>0.31</td>
<td>0.36</td>
</tr>
<tr>
<td>2</td>
<td>R2</td>
<td>325</td>
<td>0.0</td>
<td>0.564</td>
<td>16.6</td>
<td>LOS C</td>
<td>3.6</td>
<td>25.2</td>
<td>0.71</td>
<td>1.36</td>
</tr>
<tr>
<td>Approach</td>
<td></td>
<td>607</td>
<td>0.0</td>
<td>0.564</td>
<td>13.1</td>
<td>LOS B</td>
<td>3.6</td>
<td>25.2</td>
<td>0.53</td>
<td>0.37</td>
</tr>
<tr>
<td>East: Gray Street</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>L2</td>
<td>223</td>
<td>0.0</td>
<td>0.120</td>
<td>8.2</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.0</td>
<td>0.00</td>
<td>0.57</td>
</tr>
<tr>
<td>5</td>
<td>T1</td>
<td>147</td>
<td>0.0</td>
<td>0.076</td>
<td>0.0</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.0</td>
<td>0.00</td>
<td>0.30</td>
</tr>
<tr>
<td>Approach</td>
<td></td>
<td>371</td>
<td>0.0</td>
<td>0.120</td>
<td>4.9</td>
<td>NA</td>
<td>0.0</td>
<td>0.0</td>
<td>0.00</td>
<td>0.40</td>
</tr>
<tr>
<td>West: Gray Street</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>T1</td>
<td>222</td>
<td>0.0</td>
<td>0.114</td>
<td>0.0</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.0</td>
<td>0.00</td>
<td>0.30</td>
</tr>
<tr>
<td>12</td>
<td>R2</td>
<td>174</td>
<td>0.0</td>
<td>0.136</td>
<td>9.7</td>
<td>LOS A</td>
<td>0.5</td>
<td>4.4</td>
<td>0.44</td>
<td>0.70</td>
</tr>
<tr>
<td>Approach</td>
<td></td>
<td>396</td>
<td>0.0</td>
<td>0.136</td>
<td>4.2</td>
<td>NA</td>
<td>0.5</td>
<td>4.4</td>
<td>0.20</td>
<td>0.31</td>
</tr>
<tr>
<td>All Vehicles</td>
<td></td>
<td>1374</td>
<td>0.0</td>
<td>0.564</td>
<td>8.4</td>
<td>NA</td>
<td>3.6</td>
<td>25.2</td>
<td>0.26</td>
<td>0.58</td>
</tr>
</tbody>
</table>

**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 (Akcelik M90).  
**HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Designation.**
### MOVEMENT SUMMARY

**Site:** INT 5 (2) Gray Street/Yana Street - PM Existing

Gray Street/Yana Street
Gjeoway / Yold (Two-Way)

<table>
<thead>
<tr>
<th>Movement Performance - Vehicles</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mov ID</strong></td>
</tr>
<tr>
<td>-----------</td>
</tr>
<tr>
<td>South: Yana Street</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>Approach</td>
</tr>
<tr>
<td>East: Gray Street</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>Approach</td>
</tr>
<tr>
<td>West: Gray Street</td>
</tr>
<tr>
<td>5</td>
</tr>
<tr>
<td>6</td>
</tr>
<tr>
<td>Approach</td>
</tr>
<tr>
<td>All Vehicles</td>
</tr>
</tbody>
</table>

**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.


HV (%): Values are calculated for All Movement Classes of All Heavy Vehicle Modal Designation.
## MOVEMENT SUMMARY

**Site:** INT 5 (2) Gray Street/Yana Street - PM Post Development

**Gray Street/Yana Street**

**Giveow / Yold (Two-Way)**

<table>
<thead>
<tr>
<th>Movement Performance - Vehicles</th>
<th>Demand Flows</th>
<th>% H/V</th>
<th>Average Delay</th>
<th>Level of Service</th>
<th>% Back of Queue</th>
<th>Effective Stop Rate per veh</th>
<th>Average Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>South: Yana Street</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 L2</td>
<td>122</td>
<td>0.0</td>
<td>0.115</td>
<td>8.8</td>
<td>LOS A</td>
<td>0.4</td>
<td>0.24</td>
</tr>
<tr>
<td>3 R2</td>
<td>174</td>
<td>0.0</td>
<td>0.271</td>
<td>21.6</td>
<td>LOS B</td>
<td>1.1</td>
<td>0.57</td>
</tr>
<tr>
<td>Approach</td>
<td>296</td>
<td>0.0</td>
<td>0.271</td>
<td>11.0</td>
<td>LOS B</td>
<td>1.1</td>
<td>0.44</td>
</tr>
<tr>
<td><strong>East: Gray Street</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 L2</td>
<td>225</td>
<td>0.0</td>
<td>0.121</td>
<td>8.2</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.00</td>
</tr>
<tr>
<td>5 T1</td>
<td>123</td>
<td>0.0</td>
<td>0.063</td>
<td>0.0</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.00</td>
</tr>
<tr>
<td>Approach</td>
<td>348</td>
<td>0.0</td>
<td>0.121</td>
<td>5.3</td>
<td>NA</td>
<td>0.0</td>
<td>0.00</td>
</tr>
<tr>
<td><strong>West: Gray Street</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11 T1</td>
<td>143</td>
<td>0.0</td>
<td>0.073</td>
<td>0.0</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.00</td>
</tr>
<tr>
<td>12 R2</td>
<td>191</td>
<td>0.0</td>
<td>0.140</td>
<td>9.6</td>
<td>LOS B</td>
<td>0.7</td>
<td>4.8</td>
</tr>
<tr>
<td>Approach</td>
<td>334</td>
<td>0.0</td>
<td>0.146</td>
<td>5.5</td>
<td>NA</td>
<td>0.7</td>
<td>4.8</td>
</tr>
<tr>
<td>All Vehicles</td>
<td>973</td>
<td>0.0</td>
<td>0.271</td>
<td>7.1</td>
<td>NA</td>
<td>1.1</td>
<td>0.22</td>
</tr>
</tbody>
</table>

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.
H/V (%) values are calculated for All Movement Classes of All Heavy Vehicle Modal Designation.
## MOVEMENT SUMMARY

**Site:** INT 5 (3) Gray Street/Yana Street - AM Existing

**Gray Street/Yana Street**

### Roundabout

#### Movement Performance - Vehicles

<table>
<thead>
<tr>
<th>Mov ID</th>
<th>O/D Mov</th>
<th>Demand Flow</th>
<th>HV %</th>
<th>Deg. Sam vph</th>
<th>Average Delay sec</th>
<th>Level of Service</th>
<th>95% Back of Vehicles veh</th>
<th>Queu</th>
<th>Prop. Queu</th>
<th>Effective Stop Rate per veh</th>
<th>Average Speed km/h</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Total veh/h</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>South: Yana Street</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>L2</td>
<td>111</td>
<td>0.0</td>
<td>0.069</td>
<td>5.6</td>
<td>LOS A</td>
<td>0.4</td>
<td>2.9</td>
<td>0.36</td>
<td>0.30</td>
<td>50.4</td>
</tr>
<tr>
<td>3</td>
<td>R2</td>
<td>112</td>
<td>0.0</td>
<td>0.069</td>
<td>11.7</td>
<td>LOS B</td>
<td>0.4</td>
<td>2.9</td>
<td>0.36</td>
<td>1.23</td>
<td>45.4</td>
</tr>
<tr>
<td>Approach</td>
<td></td>
<td>222</td>
<td>0.0</td>
<td>0.069</td>
<td>8.6</td>
<td>LOS A</td>
<td>0.4</td>
<td>2.9</td>
<td>0.36</td>
<td>0.93</td>
<td>47.7</td>
</tr>
<tr>
<td><strong>East: Gray Street</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>L2</td>
<td>123</td>
<td>0.0</td>
<td>0.185</td>
<td>5.9</td>
<td>LOS A</td>
<td>1.2</td>
<td>8.4</td>
<td>0.35</td>
<td>0.32</td>
<td>50.4</td>
</tr>
<tr>
<td>5</td>
<td>T1</td>
<td>127</td>
<td>0.0</td>
<td>0.185</td>
<td>5.0</td>
<td>LOS A</td>
<td>1.2</td>
<td>8.4</td>
<td>0.35</td>
<td>0.32</td>
<td>50.4</td>
</tr>
<tr>
<td>Approach</td>
<td></td>
<td>251</td>
<td>0.0</td>
<td>0.185</td>
<td>5.5</td>
<td>LOS A</td>
<td>1.2</td>
<td>8.4</td>
<td>0.35</td>
<td>0.46</td>
<td>50.4</td>
</tr>
<tr>
<td><strong>West: Gray Street</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>T1</td>
<td>142</td>
<td>0.0</td>
<td>0.194</td>
<td>4.9</td>
<td>LOS A</td>
<td>1.3</td>
<td>8.8</td>
<td>0.32</td>
<td>1.11</td>
<td>48.3</td>
</tr>
<tr>
<td>12</td>
<td>R2</td>
<td>127</td>
<td>0.0</td>
<td>0.194</td>
<td>11.8</td>
<td>LOS B</td>
<td>1.3</td>
<td>8.8</td>
<td>0.32</td>
<td>1.11</td>
<td>48.3</td>
</tr>
<tr>
<td>Approach</td>
<td></td>
<td>269</td>
<td>0.0</td>
<td>0.194</td>
<td>8.2</td>
<td>LOS A</td>
<td>1.3</td>
<td>8.8</td>
<td>0.32</td>
<td>0.55</td>
<td>48.3</td>
</tr>
<tr>
<td><strong>All Vehicles</strong></td>
<td></td>
<td>742</td>
<td>0.0</td>
<td>0.194</td>
<td>7.4</td>
<td>LOS A</td>
<td>1.3</td>
<td>8.8</td>
<td>0.32</td>
<td>0.52</td>
<td>48.8</td>
</tr>
</tbody>
</table>

**Level of Service (LOS):** Method: Delay (HCM 2000).

Roundabout LOS Method: Same as Signalled Intersections.

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

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.


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

*Site: INT 5 (3) Gray Street/Yana Street - AM Post Development*

Gray Street/Yana Street
Roundabout

### Movement Performance - Vehicles

<table>
<thead>
<tr>
<th>Mov ID</th>
<th>OD Mov</th>
<th>Demand Flow</th>
<th>% HV</th>
<th>Total veh/hr</th>
<th>Deg.</th>
<th>Average Delay</th>
<th>Level of Service</th>
<th>% Back of Vehicles</th>
<th>Queued</th>
<th>Prop.</th>
<th>Effective Stop Rate</th>
<th>Average Speed km/h</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>South: Yana Street</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 L2</td>
<td>282</td>
<td>0.0</td>
<td>0.178</td>
<td>5.7</td>
<td>LOS A</td>
<td>1.2</td>
<td>8.5</td>
<td>0.36</td>
<td>0.35</td>
<td>49.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 R2</td>
<td>325</td>
<td>0.0</td>
<td>0.205</td>
<td>11.8</td>
<td>LOS B</td>
<td>1.4</td>
<td>10.0</td>
<td>0.37</td>
<td>1.25</td>
<td>45.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Approach</td>
<td>607</td>
<td>0.0</td>
<td>0.206</td>
<td>9.0</td>
<td>LOS A</td>
<td>1.4</td>
<td>10.0</td>
<td>0.36</td>
<td>0.56</td>
<td>47.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>East: Gray Street</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 L2</td>
<td>223</td>
<td>0.0</td>
<td>0.288</td>
<td>6.3</td>
<td>LOS A</td>
<td>2.1</td>
<td>15.0</td>
<td>0.47</td>
<td>1.32</td>
<td>49.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 T1</td>
<td>147</td>
<td>0.0</td>
<td>0.288</td>
<td>6.4</td>
<td>LOS A</td>
<td>2.1</td>
<td>15.0</td>
<td>0.47</td>
<td>1.32</td>
<td>49.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Approach</td>
<td>371</td>
<td>0.0</td>
<td>0.286</td>
<td>5.9</td>
<td>LOS A</td>
<td>2.1</td>
<td>15.0</td>
<td>0.47</td>
<td>0.51</td>
<td>49.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>West: Gray Street</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11 T1</td>
<td>222</td>
<td>0.0</td>
<td>0.254</td>
<td>6.5</td>
<td>LOS A</td>
<td>2.6</td>
<td>18.1</td>
<td>0.62</td>
<td>1.35</td>
<td>46.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12 R2</td>
<td>174</td>
<td>0.0</td>
<td>0.254</td>
<td>13.4</td>
<td>LOS B</td>
<td>2.5</td>
<td>18.1</td>
<td>0.62</td>
<td>1.35</td>
<td>46.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Approach</td>
<td>396</td>
<td>0.0</td>
<td>0.254</td>
<td>9.5</td>
<td>LOS A</td>
<td>2.6</td>
<td>18.1</td>
<td>0.62</td>
<td>0.58</td>
<td>46.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>All Vehicles</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1374</td>
<td>0.0</td>
<td>0.254</td>
<td>8.3</td>
<td>LOS A</td>
<td>2.6</td>
<td>18.1</td>
<td>0.47</td>
<td>0.58</td>
<td>47.6</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Level of Service (LOS): Method: Delay (HCM 2000).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
HV (%) values are calculated for all Movement Classes of all Heavy Vehicle Model Designation.
### MOVEMENT SUMMARY

**Site: INT 5 (3) Gray Street/Yana Street - PM Existing**

**Roundabout**

<table>
<thead>
<tr>
<th>Movement Performance - Vehicles</th>
<th>Mov ID</th>
<th>OD Mov</th>
<th>Demand Flows Total veh/h</th>
<th>HV %</th>
<th>Deg. Sum veh</th>
<th>Average Delay sec</th>
<th>Level of Service</th>
<th>95% Back of Queues Vehicles veh</th>
<th>Queues Distance m</th>
<th>Prop. Queue</th>
<th>Effective Stop Rate per veh</th>
<th>Average Speed km/h</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>South: Yana Street</strong></td>
<td>1</td>
<td>L2</td>
<td>36</td>
<td>0.0</td>
<td>0.021</td>
<td>5.4</td>
<td>LOS A</td>
<td>0.1</td>
<td>0.8</td>
<td>0.19</td>
<td>0.36</td>
<td>51.2</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>R2</td>
<td>66</td>
<td>0.0</td>
<td>0.039</td>
<td>11.4</td>
<td>LOS B</td>
<td>0.2</td>
<td>1.5</td>
<td>0.18</td>
<td>1.25</td>
<td>45.9</td>
</tr>
<tr>
<td></td>
<td>Approach</td>
<td></td>
<td>102</td>
<td>0.0</td>
<td>0.039</td>
<td>9.3</td>
<td>LOS A</td>
<td>0.2</td>
<td>1.5</td>
<td>0.19</td>
<td>0.56</td>
<td>47.5</td>
</tr>
<tr>
<td><strong>East: Gray Street</strong></td>
<td>4</td>
<td>L2</td>
<td>80</td>
<td>0.0</td>
<td>0.096</td>
<td>5.5</td>
<td>LOS A</td>
<td>0.5</td>
<td>4.0</td>
<td>0.19</td>
<td>0.34</td>
<td>51.5</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>T1</td>
<td>63</td>
<td>0.0</td>
<td>0.096</td>
<td>4.6</td>
<td>LOS A</td>
<td>0.5</td>
<td>4.0</td>
<td>0.19</td>
<td>0.34</td>
<td>51.5</td>
</tr>
<tr>
<td></td>
<td>Approach</td>
<td></td>
<td>143</td>
<td>0.0</td>
<td>0.096</td>
<td>5.1</td>
<td>LOS A</td>
<td>0.5</td>
<td>4.0</td>
<td>0.19</td>
<td>0.42</td>
<td>51.5</td>
</tr>
<tr>
<td><strong>West: Gray Street</strong></td>
<td>11</td>
<td>T1</td>
<td>103</td>
<td>0.0</td>
<td>0.106</td>
<td>4.7</td>
<td>LOS A</td>
<td>0.5</td>
<td>4.4</td>
<td>0.22</td>
<td>1.31</td>
<td>49.7</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>R2</td>
<td>52</td>
<td>0.0</td>
<td>0.106</td>
<td>11.5</td>
<td>LOS B</td>
<td>0.5</td>
<td>4.4</td>
<td>0.22</td>
<td>1.31</td>
<td>49.7</td>
</tr>
<tr>
<td></td>
<td>Approach</td>
<td></td>
<td>155</td>
<td>0.0</td>
<td>0.106</td>
<td>7.0</td>
<td>LOS A</td>
<td>0.5</td>
<td>4.4</td>
<td>0.22</td>
<td>0.51</td>
<td>49.7</td>
</tr>
<tr>
<td></td>
<td>All Vehicles</td>
<td></td>
<td>400</td>
<td>0.0</td>
<td>0.106</td>
<td>6.9</td>
<td>LOS A</td>
<td>0.5</td>
<td>4.4</td>
<td>0.26</td>
<td>0.49</td>
<td>49.7</td>
</tr>
</tbody>
</table>

**Level of Service (LOS):**

- **LOS Method:** Delay (HCM 2000).
- **Roundabout LOS Method:** Same as Signalised Intersections.

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

**Intersection and Approach LOS values are based on average delay for all vehicle movements.**

**Roundabout Capacity Model:** SIDRA Standard.

**SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.**

**Gap Acceptance Capacity:** SIDRA Standard (Akgelik M3D).

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

--

**Processed:** Monday, 12 May 2014 4:33:00 PM  
**Copyright © 2000-2013 Akerly and Associates Pty Ltd**

*Project: P:Synergy/Projects/GRP1/GRP16/71/SIDRA/May2014/Sidra 4.sip6  
8000958. TRAFFIX GROUP PTY LTD, PLUS / Floating*
### MOVEMENT SUMMARY

**Site:** INT 5 (3) Gray Street/Yana Street - PM Post Development

**Gray Street/Yana Street**

#### Roundabout

<table>
<thead>
<tr>
<th>Movement Performance - Vehicles</th>
<th>Mov ID</th>
<th>QD Mov</th>
<th>Demand Flows</th>
<th>HV %</th>
<th>Total veh(^h)</th>
<th>Deg. Sat veh</th>
<th>Average Delay sec</th>
<th>Level of Service</th>
<th>95% Back of Vehicles veh</th>
<th>Quiescent Distance m</th>
<th>Prop. Queue</th>
<th>Effective Stop Rate per veh</th>
<th>Average Speed km/h</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>South: Yana Street</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>L2</td>
<td>122</td>
<td>0.0</td>
<td>0.076</td>
<td>5.6</td>
<td>LOS A</td>
<td>0.5</td>
<td>3.3</td>
<td>0.36</td>
<td>0.30</td>
<td>50.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>R2</td>
<td>174</td>
<td>0.0</td>
<td>0.108</td>
<td>11.7</td>
<td>LOS B</td>
<td>0.7</td>
<td>4.9</td>
<td>0.31</td>
<td>1.24</td>
<td>45.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Approach</td>
<td></td>
<td>296</td>
<td>0.0</td>
<td>0.108</td>
<td>9.2</td>
<td>LOS A</td>
<td>0.7</td>
<td>4.9</td>
<td>0.31</td>
<td>0.55</td>
<td>47.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>East: Gray Street</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>L2</td>
<td>225</td>
<td>0.0</td>
<td>0.274</td>
<td>6.4</td>
<td>LOS A</td>
<td>1.9</td>
<td>13.6</td>
<td>0.47</td>
<td>1.34</td>
<td>49.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>T1</td>
<td>123</td>
<td>0.0</td>
<td>0.274</td>
<td>5.5</td>
<td>LOS A</td>
<td>1.9</td>
<td>13.6</td>
<td>0.47</td>
<td>1.34</td>
<td>49.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Approach</td>
<td></td>
<td>348</td>
<td>0.0</td>
<td>0.274</td>
<td>6.1</td>
<td>LOS A</td>
<td>1.9</td>
<td>13.6</td>
<td>0.47</td>
<td>0.52</td>
<td>49.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>West: Gray Street</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>T1</td>
<td>143</td>
<td>0.0</td>
<td>0.256</td>
<td>5.4</td>
<td>LOS A</td>
<td>1.7</td>
<td>12.2</td>
<td>0.43</td>
<td>1.20</td>
<td>47.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>R2</td>
<td>191</td>
<td>0.0</td>
<td>0.256</td>
<td>12.2</td>
<td>LOS B</td>
<td>1.7</td>
<td>12.2</td>
<td>0.43</td>
<td>1.20</td>
<td>47.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Approach</td>
<td></td>
<td>334</td>
<td>0.0</td>
<td>0.256</td>
<td>9.3</td>
<td>LOS A</td>
<td>1.7</td>
<td>12.2</td>
<td>0.43</td>
<td>0.50</td>
<td>47.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>All Vehicles</strong></td>
<td></td>
<td>978</td>
<td>0.0</td>
<td>0.274</td>
<td>8.1</td>
<td>LOS A</td>
<td>1.9</td>
<td>13.6</td>
<td>0.41</td>
<td>0.56</td>
<td>48.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Level of Service (LOS): Method: Delay (HCM 2000).
- Roundabout LOS Method: Same as Signalised Intersections.
- Vehicle movement LOS values are based on average delay per movement.
- Intersection and Approach LOS values are based on average delay for all vehicle movements.
- Roundabout Capacity Model: SIDRA Standard.
- SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
- HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
SITE LAYOUT

Site: Intersection 5 Option 1 - AM Existing

Gray Street/Yana Street
Signals - Fixed Time
# MOVEMENT SUMMARY

**Site:** Intersection 5 Option 1 - AM Post

Gray Street/Yena Street  
Signals - Fixed Time  
Cycle Time = 50 seconds (Practical Cycle Time)

## Movement Performance - Vehicles

<table>
<thead>
<tr>
<th>Mov ID</th>
<th>QD Mov</th>
<th>Demand Flows Total veh/h</th>
<th>HV %</th>
<th>Deg. Sat. w/c</th>
<th>Average Delay sec</th>
<th>Level of Service</th>
<th>95% Back of Queue Distance m</th>
<th>Prop. Queued</th>
<th>Effective Stop Rate per veh</th>
<th>Average Speed km/h</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>South: Yena Street</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>L2</td>
<td>282</td>
<td>0.0</td>
<td>0.380</td>
<td>17.2</td>
<td>LOS B</td>
<td>5.0</td>
<td>0.75</td>
<td>0.78</td>
<td>45.8</td>
</tr>
<tr>
<td>3</td>
<td>R2</td>
<td>325</td>
<td>0.0</td>
<td>0.438</td>
<td>17.6</td>
<td>LOS B</td>
<td>5.9</td>
<td>0.77</td>
<td>0.79</td>
<td>45.4</td>
</tr>
<tr>
<td>Approach</td>
<td>607</td>
<td>0.0</td>
<td>0.438</td>
<td>17.4</td>
<td>LOS B</td>
<td>6.5</td>
<td>41.5</td>
<td>0.76</td>
<td>0.78</td>
<td>45.6</td>
</tr>
<tr>
<td><strong>East: Gray Street</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>L2</td>
<td>222</td>
<td>0.0</td>
<td>0.157</td>
<td>6.4</td>
<td>LOS A</td>
<td>0.3</td>
<td>0.29</td>
<td>0.35</td>
<td>52.7</td>
</tr>
<tr>
<td>5</td>
<td>T1</td>
<td>142</td>
<td>0.0</td>
<td>0.202</td>
<td>12.1</td>
<td>LOS B</td>
<td>2.4</td>
<td>0.73</td>
<td>0.58</td>
<td>50.0</td>
</tr>
<tr>
<td>Approach</td>
<td>364</td>
<td>0.0</td>
<td>0.202</td>
<td>8.7</td>
<td>LOS A</td>
<td>2.4</td>
<td>17.1</td>
<td>0.46</td>
<td>0.82</td>
<td>51.6</td>
</tr>
<tr>
<td><strong>West: Gray Street</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>T1</td>
<td>200</td>
<td>0.0</td>
<td>0.286</td>
<td>12.6</td>
<td>LOS B</td>
<td>3.6</td>
<td>0.75</td>
<td>0.82</td>
<td>49.7</td>
</tr>
<tr>
<td>12</td>
<td>R2</td>
<td>174</td>
<td>0.0</td>
<td>0.434</td>
<td>20.8</td>
<td>LOS C</td>
<td>3.5</td>
<td>0.65</td>
<td>0.79</td>
<td>43.6</td>
</tr>
<tr>
<td>Approach</td>
<td>374</td>
<td>0.0</td>
<td>0.434</td>
<td>16.4</td>
<td>LOS B</td>
<td>3.6</td>
<td>24.9</td>
<td>0.78</td>
<td>0.90</td>
<td>46.7</td>
</tr>
<tr>
<td><strong>All Vehicles</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1345</td>
<td>0.0</td>
<td>0.438</td>
<td>14.8</td>
<td>LOS B</td>
<td>5.9</td>
<td>41.5</td>
<td>0.68</td>
<td>0.72</td>
<td>0.74</td>
<td>47.4</td>
</tr>
</tbody>
</table>

Level of Service (LOS): Method: Delay (HCM 2000).

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

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.


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

## Movement Performance - Pedestrians

<table>
<thead>
<tr>
<th>Mov ID</th>
<th>Description</th>
<th>Demand Flow paths</th>
<th>Average Delay sec</th>
<th>Level of Service</th>
<th>Average Back of Queue Distance m</th>
<th>Prop. Queued</th>
<th>Effective Step Rate per ped</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1</td>
<td>South Full Crossing</td>
<td>53</td>
<td>16.1</td>
<td>LOS B</td>
<td>0.1</td>
<td>0.02</td>
<td>0.62</td>
</tr>
<tr>
<td>P4</td>
<td>West Full Crossing</td>
<td>53</td>
<td>15.2</td>
<td>LOS B</td>
<td>0.1</td>
<td>0.76</td>
<td>0.78</td>
</tr>
<tr>
<td>All Pedestrians</td>
<td></td>
<td>105</td>
<td>16.0</td>
<td>LOS B</td>
<td>0.89</td>
<td>0.80</td>
<td></td>
</tr>
</tbody>
</table>

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.

---

Processed: Thursday, 19 June 2014 12:02:10 PM  
Copyright © 2006-2014 Amptek and Associates Pty Ltd  
www.sidrasolutions.com  
Project: P/Synergy/Projects/GRPH/GRP16175/SIDRA/June 2014/15/6  
SIDRA CORPORATION Pty Ltd, Suite 101A, 8000858 TRAFFIX GROUP PTY LTD, PLUS / Floating
**PHASING SUMMARY**

**Site:** Intersection 5 Option 1 - AM Post

Gray Street/Hana Street  
Signals - Fixed Time  
Cycle Time = 50 seconds (Practical Cycle Time)

Phase times determined by the program  
Sequence: Two-Phase  
Movement Class: All Movement Classes  
Input Sequence: A, B  
Output Sequence: A, B

### Phase Timing Results

<table>
<thead>
<tr>
<th>Phase</th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reference Phase</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Phase Change Time (sec)</td>
<td>0</td>
<td>24</td>
</tr>
<tr>
<td>Green Time (sec)</td>
<td>16</td>
<td>20</td>
</tr>
<tr>
<td>Yellow Time (sec)</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>All-Red Time (sec)</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Phase Time (sec)</td>
<td>24</td>
<td>26</td>
</tr>
<tr>
<td>Phase Split</td>
<td>48%</td>
<td>52%</td>
</tr>
</tbody>
</table>

---

**SIDRA INTERSECTION 6**

Processed: Thursday, 19 June 2014 12:32:10 PM  
Copyright © 2009-2014 Accelik and Associates Pty Ltd  
www.sidra.com.au

Project: P:Synergy/Projects/CRP1097/107/DQ/DA/June 2014/19.6.14/0sidra.spd  
6800058, TRAFFIX GROUP PTY LTD, PLUJS / Floating
## MOVEMENT SUMMARY

**Site: Intersection 5 Option 1 - PM Post**

**Gray Street/Yena Street**

*Signals - Fixed Time*  
*Cyclo Time = 60 seconds (Practical Cyclo Time)*

### Movement Performance - Vehicles

<table>
<thead>
<tr>
<th>Mov ID</th>
<th>OD Mov</th>
<th>Demand Flows Total veh/h</th>
<th>HV %</th>
<th>Delay Sat. sec</th>
<th>Average Delay sec</th>
<th>Level of Service</th>
<th>95% Back of Queue Dist/m</th>
<th>Prop. Queued</th>
<th>Effective Stop Rate per veh</th>
<th>Average Speed km/h</th>
</tr>
</thead>
<tbody>
<tr>
<td>South: Yena Street</td>
<td>1</td>
<td>L2</td>
<td>121</td>
<td>0.0</td>
<td>0.217</td>
<td>20.1</td>
<td>LOS C</td>
<td>2.3</td>
<td>16.0</td>
<td>0.75</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>R2</td>
<td>174</td>
<td>0.0</td>
<td>0.312</td>
<td>20.6</td>
<td>LOS C</td>
<td>3.4</td>
<td>23.7</td>
<td>0.81</td>
</tr>
<tr>
<td></td>
<td>Approach</td>
<td>295</td>
<td>0.0</td>
<td>0.312</td>
<td>20.4</td>
<td>LOS C</td>
<td>3.4</td>
<td>23.7</td>
<td>0.86</td>
<td>0.76</td>
</tr>
<tr>
<td>East: Gray Street</td>
<td>4</td>
<td>L2</td>
<td>225</td>
<td>0.0</td>
<td>0.160</td>
<td>4.6</td>
<td>LOS A</td>
<td>0.3</td>
<td>5.4</td>
<td>0.29</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>T1</td>
<td>108</td>
<td>0.0</td>
<td>0.119</td>
<td>8.4</td>
<td>LOS A</td>
<td>1.5</td>
<td>10.5</td>
<td>0.66</td>
</tr>
<tr>
<td></td>
<td>Approach</td>
<td>332</td>
<td>0.0</td>
<td>0.160</td>
<td>7.1</td>
<td>LOS A</td>
<td>1.5</td>
<td>10.5</td>
<td>0.38</td>
<td>0.39</td>
</tr>
<tr>
<td>West: Gray Street</td>
<td>11</td>
<td>T1</td>
<td>132</td>
<td>0.0</td>
<td>0.147</td>
<td>8.5</td>
<td>LOS A</td>
<td>1.9</td>
<td>13.1</td>
<td>0.61</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>R2</td>
<td>169</td>
<td>0.0</td>
<td>0.359</td>
<td>16.0</td>
<td>LOS B</td>
<td>3.2</td>
<td>22.5</td>
<td>0.70</td>
</tr>
<tr>
<td></td>
<td>Approach</td>
<td>321</td>
<td>0.0</td>
<td>0.359</td>
<td>12.9</td>
<td>LOS B</td>
<td>3.2</td>
<td>22.5</td>
<td>0.67</td>
<td>0.55</td>
</tr>
<tr>
<td>All Vehicles</td>
<td>947</td>
<td>0.0</td>
<td>0.359</td>
<td>13.2</td>
<td>LOS B</td>
<td>3.4</td>
<td>23.7</td>
<td>0.61</td>
<td>0.57</td>
<td>48.4</td>
</tr>
</tbody>
</table>

Level of Service (LOS) Method: Delay (HCM 2000)

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

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap Acceptance Capacity: SIDRA Standard (M3D).

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

### Movement Performance - Pedestrians

<table>
<thead>
<tr>
<th>Mov ID</th>
<th>Description</th>
<th>Demand Flow Ped.</th>
<th>Average Delay sec</th>
<th>Level of Service</th>
<th>Average Back of Queue Dist/m</th>
<th>Prop. Queued</th>
<th>Effective Step Rate per ped</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1</td>
<td>South Full Crossing</td>
<td>53</td>
<td>13.0</td>
<td>LOS B</td>
<td>0.1</td>
<td>0.1</td>
<td>0.72</td>
</tr>
<tr>
<td>P4</td>
<td>West Full Crossing</td>
<td>53</td>
<td>19.4</td>
<td>LOS B</td>
<td>0.1</td>
<td>0.1</td>
<td>0.86</td>
</tr>
<tr>
<td>All Pedestrians</td>
<td>105</td>
<td>16.2</td>
<td>LOS B</td>
<td>0.1</td>
<td>0.1</td>
<td>0.80</td>
<td>0.80</td>
</tr>
</tbody>
</table>

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.

Processed: Thursday, 19 June 2014 12:04:25 PM

Copyright © 2006-2014 Arckel and Associates Pty Ltd

www.sidrasolutions.com

Project: P:S Synergy/Projects/GRP1GRP161715SIDRA/June 2014/15/6 14/sidra.cr6
8000858 TRAFFIC GROUP PTY LTD. PLUS / Floating
PHASING SUMMARY

Site: Intersection 5 Option 1 - PM Post

Gray Street/Fana Street

Signals - Fixed Time  Cycle Time = 50 seconds (Practical Cycle Time)

Phase times determined by the program

Sequence: Two-Phase

Movement Class: All Movement Classes

Input Sequence: A, B

Output Sequence: A, B

Phase Timing Results

<table>
<thead>
<tr>
<th>Phase</th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase Change Time (sec)</td>
<td>0</td>
<td>20</td>
</tr>
<tr>
<td>Green Time (sec)</td>
<td>23</td>
<td>15</td>
</tr>
<tr>
<td>Yellow Time (sec)</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>All-Red Time (sec)</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Phase Time (sec)</td>
<td>29</td>
<td>21</td>
</tr>
<tr>
<td>Phase Split</td>
<td>58 %</td>
<td>42 %</td>
</tr>
</tbody>
</table>

Phase A

Phase B

Normal Movement
Slip/Bypass-Lane Movement
Stopped Movement
Other Movement Class Running
Mixed Running & Stopped Movement Classes
Undetected Movement

Permitted/Opposed
Opposed Slip/Bypass-Lane
Turn On Red
Other Movement Class Stopped

Phase Transition Applied

Processed: Thursday, 19 June 2014 12:34:25 PM

Copyright © 2009-2014 Accelik and Associates Pty Ltd

Project: P:\Synergy\Projects\GFPI\GFPI0371\SIDRA\June 2014\18\6\14\Sidra.spd
880005, TRAFFIK GROUP PTY LTD, PLUS / Floating
## MOVEMENT SUMMARY

### Site: INT 6 - Gray Street/Link 9 - AM Post Development

Gray Street/Yana Street
Giveway / Yold (Two-Way)

### Movement Performance - Vehicles

<table>
<thead>
<tr>
<th>Mov ID</th>
<th>QD Mov</th>
<th>Demand Flows</th>
<th>HV %</th>
<th>Deg. Salt.</th>
<th>Average Delay</th>
<th>Level of Service</th>
<th>95% Back of</th>
<th>Prop. Queue</th>
<th>Effective Stop Rate</th>
<th>Average Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Total veh/h</td>
<td></td>
<td></td>
<td>sec</td>
<td></td>
<td>Queue Length</td>
<td>per veh</td>
<td></td>
<td>km/h</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**South: Link 9**

1. L2 1 0.0 0.01 8.5 LOS A 0.0 0.0 0.17 0.30 48.2
2. R2 145 0.0 0.157 9.9 LOS A 0.5 4.3 0.37 0.71 47.1
3. Approach 146 0.0 0.157 9.8 LOS A 0.5 4.3 0.37 0.71 47.1

**East: Gray Street**

4. L2 37 0.0 0.060 8.2 LOS A 0.0 0.0 0.06 0.29 56.0
5. T1 79 0.0 0.060 0.0 LOS A 0.0 0.0 0.06 0.29 56.0
6. Approach 115 0.0 0.060 2.6 NA 0.0 0.0 0.06 0.29 56.0

**West: Gray Street**

7. T1 152 0.0 0.079 0.4 LOS A 0.4 3.1 0.23 0.31 55.7
8. R2 1 0.0 0.079 0.7 LOS A 0.4 3.1 0.23 0.31 55.7
9. Approach 153 0.0 0.079 0.4 NA 0.4 3.1 0.23 0.31 55.7

All Vehicles: 415 0.0 0.157 4.4 NA 0.5 4.3 0.21 0.33 52.4

**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 signal 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.


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

**Site: INT 6 - Gray Street/Link 9 - PM Post Development**

Gray Street/Yana Street
Giveway / Yold (Two-Way)

<table>
<thead>
<tr>
<th>Movement Performance - Vehicles</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mov ID</strong></td>
<td><strong>O/D Mov</strong></td>
<td><strong>Demand Flows HV %</strong></td>
<td><strong>Deg. Serv</strong></td>
<td><strong>Average Delay sec</strong></td>
<td><strong>Level of Service</strong></td>
<td><strong>95% Back of Queues Vehicles veh</strong></td>
<td><strong>Prop. Queued</strong></td>
<td><strong>Effective Stop Rate per veh</strong></td>
<td><strong>Average Speed km/h</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>South: Link 9</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>L2</td>
<td>1</td>
<td>0.0</td>
<td>0.001</td>
<td>8.7</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.0</td>
<td>0.22</td>
<td>0.59</td>
<td>48.0</td>
</tr>
<tr>
<td>3</td>
<td>R2</td>
<td>73</td>
<td>0.0</td>
<td>0.080</td>
<td>9.8</td>
<td>LOS A</td>
<td>0.3</td>
<td>2.0</td>
<td>0.36</td>
<td>0.70</td>
<td>47.2</td>
</tr>
<tr>
<td>Approach</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>L2</td>
<td>109</td>
<td>0.0</td>
<td>0.122</td>
<td>8.2</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.0</td>
<td>0.00</td>
<td>0.39</td>
<td>54.2</td>
</tr>
<tr>
<td>5</td>
<td>T1</td>
<td>122</td>
<td>0.0</td>
<td>0.122</td>
<td>0.0</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.0</td>
<td>0.00</td>
<td>0.39</td>
<td>54.2</td>
</tr>
<tr>
<td>Approach</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>West: Gray Street</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>T1</td>
<td>84</td>
<td>0.0</td>
<td>0.044</td>
<td>0.7</td>
<td>LOS A</td>
<td>0.3</td>
<td>1.8</td>
<td>0.33</td>
<td>0.31</td>
<td>53.9</td>
</tr>
<tr>
<td>12</td>
<td>R2</td>
<td>1</td>
<td>0.0</td>
<td>0.044</td>
<td>9.0</td>
<td>LOS A</td>
<td>0.3</td>
<td>1.8</td>
<td>0.33</td>
<td>0.31</td>
<td>53.9</td>
</tr>
<tr>
<td>Approach</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All Vehicles</td>
<td>391</td>
<td>0.0</td>
<td>0.122</td>
<td>4.3</td>
<td>NA</td>
<td>0.3</td>
<td>2.0</td>
<td>0.14</td>
<td>0.37</td>
<td>52.7</td>
<td></td>
</tr>
</tbody>
</table>

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.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Modal Designation.
## MOVEMENT SUMMARY

**Site: INT 7 - Gray Street/Link 7 - AM Existing**

Gray Street/Link 7

Give Way / Yield (Two-Way)

### Movement Performance - Vehicles

<table>
<thead>
<tr>
<th>Mov ID</th>
<th>OD Mov</th>
<th>Demand Flows</th>
<th>HV %</th>
<th>Deg. Stu vt</th>
<th>Average Delay sec</th>
<th>Level of Service</th>
<th>%55% Back of Queue</th>
<th>Vehicles</th>
<th>Prop. Queued</th>
<th>Effective Stop Rate per veh</th>
<th>Average Speed km/h</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>South: Link 7</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>L2</td>
<td>2</td>
<td>0.0</td>
<td>0.002</td>
<td>8.4</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.0</td>
<td>0.14</td>
<td>0.51</td>
<td>48.3</td>
</tr>
<tr>
<td>3</td>
<td>R2</td>
<td>2</td>
<td>0.0</td>
<td>0.002</td>
<td>9.0</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.0</td>
<td>0.22</td>
<td>0.92</td>
<td>47.8</td>
</tr>
<tr>
<td>Approach</td>
<td>4</td>
<td>0.0</td>
<td>0.002</td>
<td>8.7</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.0</td>
<td>0.18</td>
<td>0.92</td>
<td>48.0</td>
<td></td>
</tr>
<tr>
<td><strong>East: Gray Street</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>L2</td>
<td>2</td>
<td>0.0</td>
<td>0.030</td>
<td>8.2</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.0</td>
<td>0.06</td>
<td>0.34</td>
<td>59.5</td>
</tr>
<tr>
<td>5</td>
<td>T1</td>
<td>57</td>
<td>0.0</td>
<td>0.030</td>
<td>0.0</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.0</td>
<td>0.06</td>
<td>0.34</td>
<td>59.5</td>
</tr>
<tr>
<td>Approach</td>
<td>59</td>
<td>0.0</td>
<td>0.030</td>
<td>0.3</td>
<td>NA</td>
<td>0.0</td>
<td>0.0</td>
<td>0.06</td>
<td>0.34</td>
<td>59.5</td>
<td></td>
</tr>
<tr>
<td><strong>West: Gray Street</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>T1</td>
<td>64</td>
<td>0.0</td>
<td>0.033</td>
<td>0.0</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.0</td>
<td>0.06</td>
<td>0.30</td>
<td>60.0</td>
</tr>
<tr>
<td>12</td>
<td>R2</td>
<td>2</td>
<td>0.0</td>
<td>0.031</td>
<td>0.4</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.0</td>
<td>0.14</td>
<td>0.31</td>
<td>46.2</td>
</tr>
<tr>
<td>Approach</td>
<td>66</td>
<td>0.0</td>
<td>0.033</td>
<td>0.3</td>
<td>NA</td>
<td>0.0</td>
<td>0.0</td>
<td>0.03</td>
<td>0.32</td>
<td>59.5</td>
<td></td>
</tr>
<tr>
<td>All Vehicles</td>
<td>129</td>
<td>0.0</td>
<td>0.033</td>
<td>0.6</td>
<td>NA</td>
<td>0.0</td>
<td>0.0</td>
<td>0.01</td>
<td>0.35</td>
<td>59.1</td>
<td></td>
</tr>
</tbody>
</table>

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.


HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Modal Designation.
# MOVEMENT SUMMARY

**Site:** INT 7 - Gray Street/Link 7 - AM Post Development

**Give Way / Yield (Two-Way)**

## Movement Performance - Vehicles

<table>
<thead>
<tr>
<th>Mov ID</th>
<th>Mov</th>
<th>OD Mov</th>
<th>Demand Flows %</th>
<th>HV %</th>
<th>Deg.</th>
<th>Sam</th>
<th>Average Delay sec</th>
<th>Level of Service</th>
<th>95% Back of Queue Vehicles veh</th>
<th>Prop. Queue</th>
<th>Effective Stop Rate per veh</th>
<th>Average Speed km/h</th>
</tr>
</thead>
<tbody>
<tr>
<td>South: Link 7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>L2</td>
<td>682</td>
<td>0.0</td>
<td>0.603</td>
<td>8.8</td>
<td>LOS A</td>
<td>4.5</td>
<td>31.3</td>
<td>0.36</td>
<td>0.51</td>
<td>47.6</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>R2</td>
<td>89</td>
<td>0.0</td>
<td>0.104</td>
<td>10.1</td>
<td>LOS B</td>
<td>0.4</td>
<td>2.7</td>
<td>0.48</td>
<td>0.72</td>
<td>46.8</td>
<td></td>
</tr>
<tr>
<td>Approach</td>
<td></td>
<td>772</td>
<td>0.0</td>
<td>0.603</td>
<td>9.0</td>
<td>LOS A</td>
<td>4.5</td>
<td>31.3</td>
<td>0.31</td>
<td>0.82</td>
<td>47.5</td>
<td></td>
</tr>
<tr>
<td>East: Gray Street</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>L2</td>
<td>24</td>
<td>0.0</td>
<td>0.043</td>
<td>8.2</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.0</td>
<td>0.00</td>
<td>0.27</td>
<td>56.3</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>T1</td>
<td>50</td>
<td>0.0</td>
<td>0.043</td>
<td>0.0</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.0</td>
<td>0.00</td>
<td>0.27</td>
<td>56.3</td>
<td></td>
</tr>
<tr>
<td>Approach</td>
<td></td>
<td>83</td>
<td>0.0</td>
<td>0.043</td>
<td>2.4</td>
<td>NA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>West: Gray Street</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>T1</td>
<td>65</td>
<td>0.0</td>
<td>0.033</td>
<td>0.0</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.0</td>
<td>0.00</td>
<td>0.30</td>
<td>60.0</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>R2</td>
<td>175</td>
<td>0.0</td>
<td>0.105</td>
<td>8.6</td>
<td>LOS A</td>
<td>0.5</td>
<td>3.5</td>
<td>0.19</td>
<td>0.33</td>
<td>48.0</td>
<td></td>
</tr>
<tr>
<td>Approach</td>
<td></td>
<td>241</td>
<td>0.0</td>
<td>0.105</td>
<td>6.2</td>
<td>NA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All Vehicles</td>
<td></td>
<td>1096</td>
<td>0.0</td>
<td>0.603</td>
<td>7.9</td>
<td>NA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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.


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

**Site: INT 7 - Gray Street/Link 7 - PM Existing**

Gray Street/Link 7
Give Way / Yield (Two-Way)

<table>
<thead>
<tr>
<th>Movement Performance - Vehicles</th>
<th>Mov ID</th>
<th>OD Mov</th>
<th>Demand Flows</th>
<th>HV %</th>
<th>Deg. Sum %</th>
<th>Average Delay</th>
<th>Level of Service</th>
<th>95% Back of Queue</th>
<th>Vehicles with Distance &gt; 100m</th>
<th>Prop. Queued</th>
<th>Effective Stop Rate per veh</th>
<th>Average Speed km/h</th>
</tr>
</thead>
<tbody>
<tr>
<td>South: Link 7</td>
<td>1</td>
<td>L2</td>
<td>2</td>
<td>0.0</td>
<td>0.022</td>
<td>8.4</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.0</td>
<td>0.14</td>
<td>0.51</td>
<td>48.3</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>R2</td>
<td>2</td>
<td>0.0</td>
<td>0.022</td>
<td>8.8</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.0</td>
<td>0.16</td>
<td>0.53</td>
<td>47.9</td>
</tr>
<tr>
<td></td>
<td>Approach</td>
<td></td>
<td>4</td>
<td>0.0</td>
<td>0.022</td>
<td>8.6</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.0</td>
<td>0.17</td>
<td>0.52</td>
<td>48.1</td>
</tr>
<tr>
<td>East: Gray Street</td>
<td>4</td>
<td>L2</td>
<td>2</td>
<td>0.0</td>
<td>0.030</td>
<td>8.2</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.0</td>
<td>0.06</td>
<td>0.34</td>
<td>59.5</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>T1</td>
<td>58</td>
<td>0.0</td>
<td>0.030</td>
<td>0.0</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.0</td>
<td>0.06</td>
<td>0.34</td>
<td>59.5</td>
</tr>
<tr>
<td></td>
<td>Approach</td>
<td></td>
<td>58</td>
<td>0.0</td>
<td>0.030</td>
<td>0.3</td>
<td>NA</td>
<td>0.0</td>
<td>0.0</td>
<td>0.06</td>
<td>0.34</td>
<td>59.5</td>
</tr>
<tr>
<td>West: Gray Street</td>
<td>11</td>
<td>T1</td>
<td>40</td>
<td>0.0</td>
<td>0.021</td>
<td>0.0</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.0</td>
<td>0.00</td>
<td>0.30</td>
<td>60.0</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>R2</td>
<td>2</td>
<td>0.0</td>
<td>0.001</td>
<td>0.4</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.0</td>
<td>0.14</td>
<td>0.32</td>
<td>48.2</td>
</tr>
<tr>
<td></td>
<td>Approach</td>
<td></td>
<td>42</td>
<td>0.0</td>
<td>0.021</td>
<td>0.4</td>
<td>NA</td>
<td>0.0</td>
<td>0.0</td>
<td>0.01</td>
<td>0.33</td>
<td>59.3</td>
</tr>
<tr>
<td>All Vehicles</td>
<td>104</td>
<td></td>
<td>1</td>
<td>0.0</td>
<td>0.030</td>
<td>0.7</td>
<td>NA</td>
<td>0.0</td>
<td>0.0</td>
<td>0.01</td>
<td>0.36</td>
<td>58.9</td>
</tr>
</tbody>
</table>

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 signal 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.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Modal Designation.
# Movement Summary

**Site:** INT 7 - Gray Street/Link 7 - PM Post Development

**Give Way / Yield (Two-Way)**

<table>
<thead>
<tr>
<th>Movement Performance - Vehicles</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mov ID</strong></td>
</tr>
<tr>
<td>----------</td>
</tr>
<tr>
<td><strong>South:</strong></td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td><strong>Approach</strong></td>
</tr>
<tr>
<td><strong>East:</strong></td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>5</td>
</tr>
<tr>
<td><strong>Approach</strong></td>
</tr>
<tr>
<td><strong>West:</strong></td>
</tr>
<tr>
<td>11</td>
</tr>
<tr>
<td>12</td>
</tr>
<tr>
<td><strong>Approach</strong></td>
</tr>
<tr>
<td><strong>All Vehicles</strong></td>
</tr>
</tbody>
</table>

**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.


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

---

Processed: Tuesday, 13 May 2014 11:16:17 AM
Copyright © 2006-2013 Akcelik and Associates Pty Ltd
SIDRA INTERSECTION 6.0.17.4446
www.sidasolutions.com
Project: P:Synergy/Projects/GRP1/GRP16271/SIDRA/May2014/Option2/Sidas.5.sp5
8000658. TRAFFIC GROUP PTY LTD, PLUSB/ Floating
SITE LAYOUT

Site: INT 8 - Sea Lake Swan Hill Road/Gray Street/Boobialla Drive - AM Existing

Sea Lake Swan Hill Road/Gray Street/Boobialla Drive Roundsabout
## MOVEMENT SUMMARY

**Site:** INT B - Sea Lake Swan Hill Road/Gray Street/Boobialla Drive - AM Existing

**Sea Lake Swan Hill Road/Gray Street/Boobialla Drive**

### Roundsabout

#### Movement Performance - Vehicles

<table>
<thead>
<tr>
<th>Mov ID</th>
<th>OD Mov</th>
<th>Demand Flows</th>
<th>Total vehs</th>
<th>HV %</th>
<th>Deg. %</th>
<th>Average Delay sec</th>
<th>Level of Service</th>
<th>95th Back of Q. vehs</th>
<th>Queue m</th>
<th>Prop. Queued %</th>
<th>Effective Stop Rate per veh</th>
<th>Average Speed km/h</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>South: Gray Street</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>L2</td>
<td>17</td>
<td>0.0</td>
<td>0.040</td>
<td>5.5</td>
<td>LOS A</td>
<td>0.2</td>
<td>1.3</td>
<td>0.17</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2</td>
<td>T1</td>
<td>15</td>
<td>0.0</td>
<td>0.040</td>
<td>4.6</td>
<td>LOS A</td>
<td>0.2</td>
<td>1.3</td>
<td>0.17</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3</td>
<td>R2</td>
<td>24</td>
<td>0.0</td>
<td>0.040</td>
<td>11.4</td>
<td>LOS B</td>
<td>0.2</td>
<td>1.3</td>
<td>0.17</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Approach</td>
<td></td>
<td>57</td>
<td>0.0</td>
<td>0.040</td>
<td>7.8</td>
<td>LOS A</td>
<td>0.2</td>
<td>1.3</td>
<td>0.17</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>East: Sea Lake Swan Hill</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4</td>
<td>L2</td>
<td>11</td>
<td>0.0</td>
<td>0.046</td>
<td>5.5</td>
<td>LOS A</td>
<td>0.2</td>
<td>1.6</td>
<td>0.17</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>5</td>
<td>T1</td>
<td>23</td>
<td>0.0</td>
<td>0.046</td>
<td>4.6</td>
<td>LOS A</td>
<td>0.2</td>
<td>1.6</td>
<td>0.17</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>6</td>
<td>R2</td>
<td>33</td>
<td>0.0</td>
<td>0.046</td>
<td>11.4</td>
<td>LOS B</td>
<td>0.2</td>
<td>1.6</td>
<td>0.17</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Approach</td>
<td></td>
<td>66</td>
<td>0.0</td>
<td>0.046</td>
<td>8.1</td>
<td>LOS A</td>
<td>0.2</td>
<td>1.6</td>
<td>0.17</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>North: Boobialla Drive</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>7</td>
<td>L2</td>
<td>92</td>
<td>0.0</td>
<td>0.095</td>
<td>5.8</td>
<td>LOS A</td>
<td>0.5</td>
<td>3.3</td>
<td>0.26</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>8</td>
<td>T1</td>
<td>36</td>
<td>0.0</td>
<td>0.095</td>
<td>4.8</td>
<td>LOS A</td>
<td>0.5</td>
<td>3.3</td>
<td>0.26</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>9</td>
<td>R2</td>
<td>2</td>
<td>0.0</td>
<td>0.095</td>
<td>11.7</td>
<td>LOS B</td>
<td>0.5</td>
<td>3.3</td>
<td>0.26</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Approach</td>
<td></td>
<td>129</td>
<td>0.0</td>
<td>0.095</td>
<td>5.6</td>
<td>LOS A</td>
<td>0.5</td>
<td>3.3</td>
<td>0.26</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>West: Sea Lake Swan Hill</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>10</td>
<td>L2</td>
<td>1</td>
<td>0.0</td>
<td>0.087</td>
<td>5.6</td>
<td>LOS A</td>
<td>0.3</td>
<td>2.3</td>
<td>0.20</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>11</td>
<td>T1</td>
<td>77</td>
<td>0.0</td>
<td>0.087</td>
<td>4.6</td>
<td>LOS A</td>
<td>0.3</td>
<td>2.3</td>
<td>0.20</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>12</td>
<td>R2</td>
<td>15</td>
<td>0.0</td>
<td>0.087</td>
<td>11.5</td>
<td>LOS B</td>
<td>0.3</td>
<td>2.3</td>
<td>0.20</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Approach</td>
<td></td>
<td>95</td>
<td>0.0</td>
<td>0.087</td>
<td>5.9</td>
<td>LOS A</td>
<td>0.3</td>
<td>2.3</td>
<td>0.20</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>All Vehicles</td>
<td></td>
<td>348</td>
<td>0.0</td>
<td>0.095</td>
<td>6.5</td>
<td>LOS A</td>
<td>0.5</td>
<td>3.3</td>
<td>0.21</td>
</tr>
</tbody>
</table>

Level of Service (LOS): Method: Delay (HCM 2000).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Processed: Monday, 12 May 2014 5:03:07 PM  
SIDRA INTERSECTION 6.0.17.4468  
Project: P:\Synergy\Projects\GR316\10371-SIDRA\May 2014\Sidra 4.sof6  
800056 TRAFFIX GROUP PTY LTD, PLUS / Floating
# MOVEMENT SUMMARY

**Site:** INT 8 - Sea Lake Swan Hill Road/Gray Street/Boobialla Drive - AM Post Development

**Roundabout**

### Movement Performance - Vehicles

<table>
<thead>
<tr>
<th>Movement ID</th>
<th>OD Mov</th>
<th>Demand Flows</th>
<th>Total veh/h</th>
<th>HV %</th>
<th>Average Delay</th>
<th>Level of Service</th>
<th>95% Back of Queue</th>
<th>Queued</th>
<th>Effective Stop Rate per veh</th>
<th>Average Speed km/h</th>
</tr>
</thead>
<tbody>
<tr>
<td>South: Gray Street</td>
<td>1</td>
<td>L2</td>
<td>4</td>
<td>0.0</td>
<td>0.524</td>
<td>6.5</td>
<td>LOS A</td>
<td>4.2</td>
<td>29.5</td>
<td>0.51</td>
</tr>
<tr>
<td>2</td>
<td>T1</td>
<td>15</td>
<td>0.0</td>
<td>0.524</td>
<td>5.5</td>
<td>LOS A</td>
<td>4.2</td>
<td>29.5</td>
<td>0.51</td>
<td>1.32</td>
</tr>
<tr>
<td>3</td>
<td>R2</td>
<td>694</td>
<td>0.0</td>
<td>0.524</td>
<td>12.4</td>
<td>LOS B</td>
<td>4.2</td>
<td>29.5</td>
<td>0.51</td>
<td>1.32</td>
</tr>
<tr>
<td>Approach</td>
<td>714</td>
<td>0.0</td>
<td>0.524</td>
<td>12.2</td>
<td>LOS B</td>
<td>4.2</td>
<td>29.5</td>
<td>0.51</td>
<td>1.32</td>
<td>44.7</td>
</tr>
<tr>
<td>East: Sea Lake Swan Hill</td>
<td>4</td>
<td>L2</td>
<td>188</td>
<td>0.0</td>
<td>0.543</td>
<td>5.7</td>
<td>LOS A</td>
<td>1.7</td>
<td>11.6</td>
<td>0.28</td>
</tr>
<tr>
<td>5</td>
<td>T1</td>
<td>25</td>
<td>0.0</td>
<td>0.543</td>
<td>4.7</td>
<td>LOS A</td>
<td>1.7</td>
<td>11.6</td>
<td>0.28</td>
<td>1.99</td>
</tr>
<tr>
<td>6</td>
<td>R2</td>
<td>147</td>
<td>0.0</td>
<td>0.543</td>
<td>11.6</td>
<td>LOS B</td>
<td>1.7</td>
<td>11.6</td>
<td>0.28</td>
<td>1.99</td>
</tr>
<tr>
<td>Approach</td>
<td>357</td>
<td>0.0</td>
<td>0.543</td>
<td>8.0</td>
<td>LOS A</td>
<td>1.7</td>
<td>11.6</td>
<td>0.28</td>
<td>1.99</td>
<td>48.3</td>
</tr>
<tr>
<td>North: Boobialla Drive</td>
<td>7</td>
<td>L2</td>
<td>315</td>
<td>0.0</td>
<td>0.494</td>
<td>12.4</td>
<td>LOS B</td>
<td>4.3</td>
<td>30.2</td>
<td>0.96</td>
</tr>
<tr>
<td>8</td>
<td>T1</td>
<td>53</td>
<td>0.0</td>
<td>0.494</td>
<td>11.4</td>
<td>LOS B</td>
<td>4.3</td>
<td>30.2</td>
<td>0.96</td>
<td>1.90</td>
</tr>
<tr>
<td>9</td>
<td>R2</td>
<td>11</td>
<td>0.0</td>
<td>0.494</td>
<td>18.3</td>
<td>LOS B</td>
<td>4.3</td>
<td>30.2</td>
<td>0.96</td>
<td>1.90</td>
</tr>
<tr>
<td>Approach</td>
<td>379</td>
<td>0.0</td>
<td>0.494</td>
<td>12.4</td>
<td>LOS B</td>
<td>4.3</td>
<td>30.2</td>
<td>0.96</td>
<td>1.90</td>
<td>44.8</td>
</tr>
<tr>
<td>West: Sea Lake Swan Hill</td>
<td>10</td>
<td>L2</td>
<td>11</td>
<td>0.0</td>
<td>0.162</td>
<td>10.5</td>
<td>LOS B</td>
<td>1.1</td>
<td>7.7</td>
<td>0.81</td>
</tr>
<tr>
<td>11</td>
<td>T1</td>
<td>88</td>
<td>0.0</td>
<td>0.162</td>
<td>9.6</td>
<td>LOS A</td>
<td>1.1</td>
<td>7.7</td>
<td>0.81</td>
<td>1.56</td>
</tr>
<tr>
<td>12</td>
<td>R2</td>
<td>19</td>
<td>0.0</td>
<td>0.162</td>
<td>16.4</td>
<td>LOS B</td>
<td>1.1</td>
<td>7.7</td>
<td>0.81</td>
<td>1.56</td>
</tr>
<tr>
<td>Approach</td>
<td>118</td>
<td>0.0</td>
<td>0.162</td>
<td>10.8</td>
<td>LOS B</td>
<td>1.1</td>
<td>7.7</td>
<td>0.81</td>
<td>1.56</td>
<td>46.4</td>
</tr>
<tr>
<td>All Vehicles</td>
<td>1567</td>
<td>0.0</td>
<td>0.524</td>
<td>11.2</td>
<td>LOS B</td>
<td>4.3</td>
<td>30.2</td>
<td>0.97</td>
<td>0.71</td>
<td>45.6</td>
</tr>
</tbody>
</table>

- **Level of Service (LOS):** Method: Delay (HCM 2000).
- Roundabout LOS Method: Same as Signalised Intersections.
- Vehicle movement LOS values are based on average delay per movement.
- Intersection and Approach LOS values are based on average delay for all vehicle movements.
- Roundabout Capacity Model: SIDRA Standard.
- SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
- HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Processed: Tuesday, 13 May 2014 11:02:03 AM
SIDRA INTERSECTION 6.0.17.4486
Project: P:\Synergy\Projects\GRP1\GRP16371\SIDRA\May 2014\Option 2\Sidra 5.sp6
8000068 TRAFFIC GROUP PTY LTD, PLUS / Floating
### MOVEMENT SUMMARY

**Site:** INT 8 - Sea Lake Swan Hill Road/Gray Street/Boobialla Drive - PM Existing

**Sea Lake Swan Hill Road/Gray Street/Boobialla Drive**

**Roundabout**

<table>
<thead>
<tr>
<th>Movement Performance - Vehicles</th>
<th>Mov ID</th>
<th>OD Mov</th>
<th>Demand Flows</th>
<th>HV %</th>
<th>Total veh</th>
<th>Average Delay</th>
<th>LOS</th>
<th>95% Back of Queue</th>
<th>Distance</th>
<th>Prop. Queued</th>
<th>Effective Stopped Rate</th>
<th>Average Speed km/h</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>South: Gray Street</strong></td>
<td>1</td>
<td>L2</td>
<td>17</td>
<td>0.0</td>
<td>0.040</td>
<td>5.7</td>
<td>LOS A</td>
<td>0.2</td>
<td>1.3</td>
<td>0.24</td>
<td>1.35</td>
<td>492</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>T1</td>
<td>20</td>
<td>0.0</td>
<td>0.040</td>
<td>4.7</td>
<td>LOS A</td>
<td>0.2</td>
<td>1.3</td>
<td>0.24</td>
<td>1.35</td>
<td>492</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>R2</td>
<td>19</td>
<td>0.0</td>
<td>0.040</td>
<td>11.6</td>
<td>LOS B</td>
<td>0.2</td>
<td>1.3</td>
<td>0.24</td>
<td>1.35</td>
<td>492</td>
</tr>
<tr>
<td><strong>Approach</strong></td>
<td>55</td>
<td></td>
<td>50</td>
<td>0.0</td>
<td>0.040</td>
<td>7.4</td>
<td>LOS A</td>
<td>0.2</td>
<td>1.3</td>
<td>0.24</td>
<td>0.52</td>
<td>492</td>
</tr>
<tr>
<td><strong>East: Sea Lake Swan Hill</strong></td>
<td>4</td>
<td>L2</td>
<td>9</td>
<td>0.0</td>
<td>0.075</td>
<td>5.4</td>
<td>LOS A</td>
<td>0.4</td>
<td>2.6</td>
<td>0.12</td>
<td>1.16</td>
<td>486</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>T1</td>
<td>39</td>
<td>0.0</td>
<td>0.075</td>
<td>4.5</td>
<td>LOS A</td>
<td>0.4</td>
<td>2.6</td>
<td>0.12</td>
<td>1.16</td>
<td>486</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>R2</td>
<td>67</td>
<td>0.0</td>
<td>0.075</td>
<td>11.3</td>
<td>LOS B</td>
<td>0.4</td>
<td>2.6</td>
<td>0.12</td>
<td>1.16</td>
<td>486</td>
</tr>
<tr>
<td><strong>Approach</strong></td>
<td>115</td>
<td></td>
<td>115</td>
<td>0.0</td>
<td>0.075</td>
<td>8.5</td>
<td>LOS A</td>
<td>0.4</td>
<td>2.6</td>
<td>0.12</td>
<td>0.58</td>
<td>486</td>
</tr>
<tr>
<td><strong>North: Boobialla Drive</strong></td>
<td>7</td>
<td>L2</td>
<td>38</td>
<td>0.0</td>
<td>0.043</td>
<td>5.5</td>
<td>LOS A</td>
<td>0.2</td>
<td>1.4</td>
<td>0.17</td>
<td>0.96</td>
<td>51.5</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>T1</td>
<td>23</td>
<td>0.0</td>
<td>0.043</td>
<td>4.6</td>
<td>LOS A</td>
<td>0.2</td>
<td>1.4</td>
<td>0.17</td>
<td>0.96</td>
<td>51.5</td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>R2</td>
<td>1</td>
<td>0.0</td>
<td>0.043</td>
<td>11.4</td>
<td>LOS B</td>
<td>0.2</td>
<td>1.4</td>
<td>0.17</td>
<td>0.96</td>
<td>51.5</td>
</tr>
<tr>
<td><strong>Approach</strong></td>
<td>69</td>
<td></td>
<td>69</td>
<td>0.0</td>
<td>0.043</td>
<td>5.3</td>
<td>LOS A</td>
<td>0.2</td>
<td>1.4</td>
<td>0.17</td>
<td>0.43</td>
<td>51.5</td>
</tr>
<tr>
<td><strong>West: Sea Lake Swan Hill</strong></td>
<td>10</td>
<td>L2</td>
<td>1</td>
<td>0.0</td>
<td>0.027</td>
<td>5.7</td>
<td>LOS A</td>
<td>0.1</td>
<td>0.9</td>
<td>0.23</td>
<td>0.34</td>
<td>50.4</td>
</tr>
<tr>
<td></td>
<td>11</td>
<td>T1</td>
<td>28</td>
<td>0.0</td>
<td>0.027</td>
<td>4.7</td>
<td>LOS A</td>
<td>0.1</td>
<td>0.9</td>
<td>0.23</td>
<td>0.34</td>
<td>50.4</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>R2</td>
<td>7</td>
<td>0.0</td>
<td>0.027</td>
<td>11.6</td>
<td>LOS B</td>
<td>0.1</td>
<td>0.9</td>
<td>0.23</td>
<td>0.34</td>
<td>50.4</td>
</tr>
<tr>
<td><strong>Approach</strong></td>
<td>37</td>
<td></td>
<td>37</td>
<td>0.0</td>
<td>0.027</td>
<td>6.1</td>
<td>LOS A</td>
<td>0.1</td>
<td>0.9</td>
<td>0.23</td>
<td>0.47</td>
<td>50.4</td>
</tr>
<tr>
<td><strong>All Vehicles</strong></td>
<td>271</td>
<td></td>
<td>271</td>
<td>0.0</td>
<td>0.075</td>
<td>7.2</td>
<td>LOS A</td>
<td>0.4</td>
<td>2.6</td>
<td>0.17</td>
<td>0.52</td>
<td>496</td>
</tr>
</tbody>
</table>

Level of Service (LOS): Method: Delay (HCM 2000).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Processed: Monday, 12 May 2014 5:00:57 PM
SIDRA INTERSECTION 6.0.17.44a8
Project: P:\Synergy\Projects\GRP1\GRP1_16071\SIDRA\Way 2014\SIDRA 4.sof6
0000356 TRAFFIX GROUP PTY LTD, PLUS / Floating

- 315 -
## MOVEMENT SUMMARY

**Site:** INT 8 - Sea Lake Swan Hill Road/Gray Street/Boobialla Drive - PM Post Development

**Sea Lake Swan Hill Road/Gray Street/Boobialla Drive Roundabout**

### Movement Performance - Vehicles

<table>
<thead>
<tr>
<th>Mov ID</th>
<th>O/D Mov</th>
<th>Demand Flows (vph)</th>
<th>HV %</th>
<th>Avg. Delay (sec)</th>
<th>Level of Service</th>
<th>95% Back of Queue (vph)</th>
<th>Prop. Queued</th>
<th>Effective Stop Rate (vph)</th>
<th>Average Speed (km/h)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Total veh</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>South: Gray Street</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>L2</td>
<td>19</td>
<td>0.0</td>
<td>0.419</td>
<td>8.3</td>
<td>LOS A</td>
<td>2.9</td>
<td>20.3</td>
<td>0.69</td>
</tr>
<tr>
<td>2</td>
<td>T1</td>
<td>63</td>
<td>0.0</td>
<td>0.419</td>
<td>7.3</td>
<td>LOS A</td>
<td>2.9</td>
<td>20.3</td>
<td>0.69</td>
</tr>
<tr>
<td>3</td>
<td>R2</td>
<td>365</td>
<td>0.0</td>
<td>0.419</td>
<td>14.2</td>
<td>LOS B</td>
<td>2.9</td>
<td>20.3</td>
<td>0.69</td>
</tr>
<tr>
<td><strong>Approach</strong></td>
<td>437</td>
<td>0.0</td>
<td>0.419</td>
<td>12.9</td>
<td>LOS B</td>
<td>2.9</td>
<td>20.3</td>
<td>0.69</td>
<td>1.56</td>
</tr>
<tr>
<td><strong>East: Sea Lake Swan Hill</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>L2</td>
<td>526</td>
<td>0.0</td>
<td>0.611</td>
<td>5.6</td>
<td>LOS A</td>
<td>6.5</td>
<td>45.7</td>
<td>0.26</td>
</tr>
<tr>
<td>5</td>
<td>T1</td>
<td>45</td>
<td>0.0</td>
<td>0.611</td>
<td>4.6</td>
<td>LOS A</td>
<td>6.5</td>
<td>45.7</td>
<td>0.26</td>
</tr>
<tr>
<td>6</td>
<td>R2</td>
<td>442</td>
<td>0.0</td>
<td>0.611</td>
<td>11.5</td>
<td>LOS B</td>
<td>6.5</td>
<td>45.7</td>
<td>0.26</td>
</tr>
<tr>
<td><strong>Approach</strong></td>
<td>1015</td>
<td>0.0</td>
<td>0.611</td>
<td>8.1</td>
<td>LOS A</td>
<td>6.5</td>
<td>45.7</td>
<td>0.26</td>
<td>1.96</td>
</tr>
<tr>
<td><strong>North: Boobialla Drive</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>L2</td>
<td>79</td>
<td>0.0</td>
<td>0.098</td>
<td>7.0</td>
<td>LOS A</td>
<td>0.5</td>
<td>4.0</td>
<td>0.55</td>
</tr>
<tr>
<td>8</td>
<td>T1</td>
<td>23</td>
<td>0.0</td>
<td>0.098</td>
<td>6.1</td>
<td>LOS A</td>
<td>0.5</td>
<td>4.0</td>
<td>0.55</td>
</tr>
<tr>
<td>9</td>
<td>R2</td>
<td>3</td>
<td>0.0</td>
<td>0.098</td>
<td>12.9</td>
<td>LOS B</td>
<td>0.5</td>
<td>4.0</td>
<td>0.55</td>
</tr>
<tr>
<td><strong>Approach</strong></td>
<td>105</td>
<td>0.0</td>
<td>0.098</td>
<td>7.0</td>
<td>LOS A</td>
<td>0.5</td>
<td>4.0</td>
<td>0.55</td>
<td>1.17</td>
</tr>
<tr>
<td><strong>West: Sea Lake Swan Hill</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>L2</td>
<td>32</td>
<td>0.0</td>
<td>0.101</td>
<td>10.4</td>
<td>LOS B</td>
<td>0.7</td>
<td>4.6</td>
<td>0.76</td>
</tr>
<tr>
<td>11</td>
<td>T1</td>
<td>34</td>
<td>0.0</td>
<td>0.101</td>
<td>9.4</td>
<td>LOS A</td>
<td>0.7</td>
<td>4.6</td>
<td>0.76</td>
</tr>
<tr>
<td>12</td>
<td>R2</td>
<td>11</td>
<td>0.0</td>
<td>0.101</td>
<td>16.3</td>
<td>LOS B</td>
<td>0.7</td>
<td>4.6</td>
<td>0.76</td>
</tr>
<tr>
<td><strong>Approach</strong></td>
<td>76</td>
<td>0.0</td>
<td>0.101</td>
<td>10.8</td>
<td>LOS B</td>
<td>0.7</td>
<td>4.6</td>
<td>0.76</td>
<td>1.48</td>
</tr>
<tr>
<td><strong>All Vehicles</strong></td>
<td>1633</td>
<td>0.0</td>
<td>0.611</td>
<td>9.4</td>
<td>LOS A</td>
<td>6.5</td>
<td>45.7</td>
<td>0.42</td>
<td>0.51</td>
</tr>
</tbody>
</table>

**Level of Service (LOS): Method: Delay (HCM 2000).**

Roundabout LOS Method: Same as Signalised Intersections.

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

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.


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

Processed: Tuesday, 13 May 2014 11:21:44 AM

Copyright © 2000-2013 Akcelik and Associates Pty Ltd

www.sidrasolutions.com

Project: P:\Synergy\Projects\GRP1\GRP16371:SIDRA\May 2014:Option 2\Sidra 5.sp6

SIDs 0056: TRAFFIX GROUP PTY LTD, PLUS / Float/fig
SITE LAYOUT

Site: INT 9 - Swan Hill Road/Dead Horse Lane/Memorial Drive - AM Existing

Swan Hill Road/Dead Horse Lane/Memorial Drive
Giveaway / Yeld (Two-Way)
# MOVEMENT SUMMARY

**Site:** INT 9 - Swan Hill Road/Dead Horse Lane/Memorial Drive - AM Existing

**Swan Hill Road/Dead Horse Lane/Memorial Drive**

**Give Way / Yield (Two-Way)**

<table>
<thead>
<tr>
<th>Movement Performance - Vehicles</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mov ID</strong></td>
</tr>
<tr>
<td>----------</td>
</tr>
<tr>
<td><strong>South: Dead Horse Lane</strong></td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td><strong>Approach</strong></td>
</tr>
<tr>
<td><strong>East: Sea Lake Swan Hill</strong></td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>5</td>
</tr>
<tr>
<td>6</td>
</tr>
<tr>
<td><strong>Approach</strong></td>
</tr>
<tr>
<td><strong>North: Memorial Drive</strong></td>
</tr>
<tr>
<td>7</td>
</tr>
<tr>
<td>8</td>
</tr>
<tr>
<td>9</td>
</tr>
<tr>
<td><strong>Approach</strong></td>
</tr>
<tr>
<td><strong>West: Sea Lake Swan Hill</strong></td>
</tr>
<tr>
<td>10</td>
</tr>
<tr>
<td>11</td>
</tr>
<tr>
<td>12</td>
</tr>
<tr>
<td><strong>Approach</strong></td>
</tr>
<tr>
<td><strong>All Vehicles</strong></td>
</tr>
</tbody>
</table>

- 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 signal 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.
- HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
# MOVEMENT SUMMARY

## Site: INT 9 - Swan Hill Road/Dead Horse Lane/Memorial Drive - AM Post Development

**Swan Hill Road/Dead Horse Lane/Memorial Drive**

**Give Way / Yield (Two-Way)**

<table>
<thead>
<tr>
<th>Movement Performance - Vehicles</th>
<th>Mov ID</th>
<th>OD Mov</th>
<th>Demand Flows HV %</th>
<th>Deg. FRI %</th>
<th>Average Delay sec</th>
<th>Level of Service</th>
<th>95% Back of Vehicles veh</th>
<th>Quiescent Distance m</th>
<th>Prop. Queued</th>
<th>Effective Stop Rate veh</th>
<th>Average Speed km/h</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>South: Dead Horse Lane</strong></td>
<td>1</td>
<td>L2</td>
<td>17</td>
<td>0.0</td>
<td>0.23</td>
<td>8.6</td>
<td>LOS A</td>
<td>0.1</td>
<td>0.6</td>
<td>0.14</td>
<td>0.33</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>T1</td>
<td>2</td>
<td>0.0</td>
<td>0.23</td>
<td>7.3</td>
<td>LOS A</td>
<td>0.1</td>
<td>0.6</td>
<td>0.14</td>
<td>0.33</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>R2</td>
<td>6</td>
<td>0.0</td>
<td>0.23</td>
<td>8.9</td>
<td>LOS A</td>
<td>0.1</td>
<td>0.6</td>
<td>0.14</td>
<td>0.33</td>
</tr>
<tr>
<td></td>
<td>Approach</td>
<td></td>
<td>25</td>
<td>0.0</td>
<td>0.23</td>
<td>8.6</td>
<td>LOS A</td>
<td>0.1</td>
<td>0.6</td>
<td>0.14</td>
<td>0.33</td>
</tr>
<tr>
<td><strong>East: Sea Lake Swan Hill</strong></td>
<td>4</td>
<td>L2</td>
<td>3</td>
<td>0.0</td>
<td>0.032</td>
<td>8.5</td>
<td>LOS A</td>
<td>0.1</td>
<td>1.2</td>
<td>0.21</td>
<td>0.14</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>T1</td>
<td>51</td>
<td>0.0</td>
<td>0.032</td>
<td>0.3</td>
<td>LOS A</td>
<td>0.1</td>
<td>1.2</td>
<td>0.21</td>
<td>0.14</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>R2</td>
<td>5</td>
<td>0.0</td>
<td>0.032</td>
<td>8.8</td>
<td>LOS A</td>
<td>0.1</td>
<td>1.2</td>
<td>0.21</td>
<td>0.14</td>
</tr>
<tr>
<td></td>
<td>Approach</td>
<td></td>
<td>60</td>
<td>0.0</td>
<td>0.032</td>
<td>1.6</td>
<td>NA</td>
<td></td>
<td></td>
<td></td>
<td>0.14</td>
</tr>
<tr>
<td><strong>North: Memorial Drive</strong></td>
<td>7</td>
<td>L2</td>
<td>12</td>
<td>0.0</td>
<td>0.015</td>
<td>8.7</td>
<td>LOS A</td>
<td>0.1</td>
<td>0.4</td>
<td>0.22</td>
<td>0.51</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>T1</td>
<td>2</td>
<td>0.0</td>
<td>0.015</td>
<td>7.5</td>
<td>LOS A</td>
<td>0.1</td>
<td>0.4</td>
<td>0.22</td>
<td>0.51</td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>R2</td>
<td>2</td>
<td>0.0</td>
<td>0.015</td>
<td>9.0</td>
<td>LOS A</td>
<td>0.1</td>
<td>0.4</td>
<td>0.22</td>
<td>0.51</td>
</tr>
<tr>
<td></td>
<td>Approach</td>
<td></td>
<td>15</td>
<td>0.0</td>
<td>0.015</td>
<td>8.6</td>
<td>LOS A</td>
<td>0.1</td>
<td>0.4</td>
<td>0.22</td>
<td>0.51</td>
</tr>
<tr>
<td><strong>West: Sea Lake Swan Hill</strong></td>
<td>10</td>
<td>L2</td>
<td>2</td>
<td>0.0</td>
<td>0.059</td>
<td>8.3</td>
<td>LOS A</td>
<td>0.3</td>
<td>2.2</td>
<td>0.14</td>
<td>0.37</td>
</tr>
<tr>
<td></td>
<td>11</td>
<td>T1</td>
<td>108</td>
<td>0.0</td>
<td>0.059</td>
<td>0.2</td>
<td>LOS A</td>
<td>0.3</td>
<td>2.2</td>
<td>0.14</td>
<td>0.37</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>R2</td>
<td>5</td>
<td>0.0</td>
<td>0.059</td>
<td>8.6</td>
<td>LOS A</td>
<td>0.3</td>
<td>2.2</td>
<td>0.14</td>
<td>0.37</td>
</tr>
<tr>
<td></td>
<td>Approach</td>
<td></td>
<td>115</td>
<td>0.0</td>
<td>0.059</td>
<td>0.8</td>
<td>NA</td>
<td></td>
<td></td>
<td></td>
<td>0.37</td>
</tr>
<tr>
<td><strong>All Vehicles</strong></td>
<td>215</td>
<td></td>
<td>0.0</td>
<td>0.059</td>
<td>2.5</td>
<td>NA</td>
<td>0.3</td>
<td>2.2</td>
<td>0.17</td>
<td>0.20</td>
<td>54.2</td>
</tr>
</tbody>
</table>

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.


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

**Site:** INT 9 - Swan Hill Road/Dead Horse Lane/Memorial Drive - PM Existing

**Swan Hill Road/Dead Horse Lane/Memorial Drive**

**Give Way / Yield (Two-Way)**

## Movement Performance - Vehicles

<table>
<thead>
<tr>
<th>Mov ID</th>
<th>OD Mov</th>
<th>Demand Flows</th>
<th>Total Veh</th>
<th>HV %</th>
<th>Deg. Stm</th>
<th>Veh</th>
<th>Average Delay</th>
<th>LOS</th>
<th>95% Back of Vehicle Delay</th>
<th>Queue</th>
<th>Prop. Queued</th>
<th>Effective Stop Rate</th>
<th>Average Speed km/h</th>
</tr>
</thead>
<tbody>
<tr>
<td>South: Dead Horse Lane</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>L2</td>
<td>2</td>
<td>0.0</td>
<td>0.006</td>
<td>86</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.1</td>
<td>0.17</td>
<td>0.30</td>
<td>48.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>T1</td>
<td>2</td>
<td>0.0</td>
<td>0.006</td>
<td>73</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.1</td>
<td>0.17</td>
<td>0.30</td>
<td>48.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>R2</td>
<td>2</td>
<td>0.0</td>
<td>0.006</td>
<td>88</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.1</td>
<td>0.17</td>
<td>0.30</td>
<td>48.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Approach</td>
<td>5</td>
<td>0.0</td>
<td>0.006</td>
<td>62</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.1</td>
<td>0.17</td>
<td>0.30</td>
<td>48.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>East: Sea Lake Swan Hill</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>L2</td>
<td>2</td>
<td>0.0</td>
<td>0.037</td>
<td>83</td>
<td>LOS A</td>
<td>0.2</td>
<td>1.3</td>
<td>0.12</td>
<td>0.18</td>
<td>55.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>T1</td>
<td>50</td>
<td>0.0</td>
<td>0.037</td>
<td>0.1</td>
<td>LOS A</td>
<td>0.2</td>
<td>1.3</td>
<td>0.12</td>
<td>0.18</td>
<td>55.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>R2</td>
<td>12</td>
<td>0.0</td>
<td>0.037</td>
<td>86</td>
<td>LOS A</td>
<td>0.2</td>
<td>1.3</td>
<td>0.12</td>
<td>0.18</td>
<td>55.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Approach</td>
<td>69</td>
<td>0.0</td>
<td>0.037</td>
<td>1.8</td>
<td>NA</td>
<td>0.2</td>
<td>1.3</td>
<td>0.12</td>
<td>0.18</td>
<td>55.6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>North: Memorial Drive</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>L2</td>
<td>5</td>
<td>0.0</td>
<td>0.009</td>
<td>55</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.2</td>
<td>0.12</td>
<td>0.62</td>
<td>48.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>T1</td>
<td>2</td>
<td>0.0</td>
<td>0.009</td>
<td>72</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.2</td>
<td>0.12</td>
<td>0.62</td>
<td>48.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>R2</td>
<td>2</td>
<td>0.0</td>
<td>0.009</td>
<td>87</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.2</td>
<td>0.12</td>
<td>0.62</td>
<td>48.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Approach</td>
<td>11</td>
<td>0.0</td>
<td>0.009</td>
<td>8.3</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.2</td>
<td>0.12</td>
<td>0.62</td>
<td>48.6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>West: Sea Lake Swan Hill</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>L2</td>
<td>2</td>
<td>0.0</td>
<td>0.021</td>
<td>83</td>
<td>LOS A</td>
<td>0.1</td>
<td>0.8</td>
<td>0.14</td>
<td>0.10</td>
<td>56.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>T1</td>
<td>37</td>
<td>0.0</td>
<td>0.021</td>
<td>0.2</td>
<td>LOS A</td>
<td>0.1</td>
<td>0.8</td>
<td>0.14</td>
<td>0.10</td>
<td>56.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>R2</td>
<td>2</td>
<td>0.0</td>
<td>0.021</td>
<td>86</td>
<td>LOS A</td>
<td>0.1</td>
<td>0.8</td>
<td>0.14</td>
<td>0.10</td>
<td>56.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Approach</td>
<td>41</td>
<td>0.0</td>
<td>0.021</td>
<td>1.0</td>
<td>NA</td>
<td>0.1</td>
<td>0.8</td>
<td>0.14</td>
<td>0.10</td>
<td>56.2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All Vehicles</td>
<td>127</td>
<td>0.0</td>
<td>0.037</td>
<td>2.4</td>
<td>NA</td>
<td>0.2</td>
<td>1.3</td>
<td>0.13</td>
<td>0.21</td>
<td>54.7</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Level of Service (LOS):** [Method: Delay (HCM 2020)].

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.


HV (%): Values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
### MOVEMENT SUMMARY

**Site:** INT 9 - Swan Hill Road/Dead Horse Lane/Memorial Drive - PM Post Development

**Giveaway / Yield (Two-Way)**

<table>
<thead>
<tr>
<th>Movement Performance - Vehicles</th>
<th>Mov ID</th>
<th>OD Mov</th>
<th>Demand Flows</th>
<th>HV %</th>
<th>Deg. Sum</th>
<th>Delay</th>
<th>Average Delay</th>
<th>LOS</th>
<th>Level of Service</th>
<th>95% Back of Vehicle</th>
<th>Queued</th>
<th>Prop. Queued</th>
<th>Effective Back</th>
<th>Average Speed km/h</th>
</tr>
</thead>
<tbody>
<tr>
<td>South: Dead Horse Lane</td>
<td>1</td>
<td>L2</td>
<td>9</td>
<td>0.0</td>
<td>0.014</td>
<td>8.6</td>
<td>LOS A 0.1</td>
<td>0.4</td>
<td>0.17</td>
<td>0.32</td>
<td>48.3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>T1</td>
<td>2</td>
<td>0.0</td>
<td>0.014</td>
<td>7.3</td>
<td>LOS A 0.1</td>
<td>0.4</td>
<td>0.17</td>
<td>0.32</td>
<td>48.3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>R2</td>
<td>4</td>
<td>0.0</td>
<td>0.014</td>
<td>8.9</td>
<td>LOS A 0.1</td>
<td>0.4</td>
<td>0.17</td>
<td>0.32</td>
<td>48.3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Approach</strong></td>
<td></td>
<td></td>
<td>15</td>
<td>0.0</td>
<td>0.014</td>
<td>8.5</td>
<td>LOS A 0.1</td>
<td>0.4</td>
<td>0.17</td>
<td>0.32</td>
<td>48.3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>East: Sea Lake Swan Hill</td>
<td>4</td>
<td>L2</td>
<td>5</td>
<td>0.0</td>
<td>0.042</td>
<td>8.3</td>
<td>LOS A 0.2</td>
<td>1.5</td>
<td>0.13</td>
<td>0.19</td>
<td>55.3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>T1</td>
<td>6</td>
<td>0.0</td>
<td>0.042</td>
<td>0.1</td>
<td>LOS A 0.2</td>
<td>1.5</td>
<td>0.13</td>
<td>0.19</td>
<td>55.3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>R2</td>
<td>12</td>
<td>0.0</td>
<td>0.042</td>
<td>8.6</td>
<td>LOS A 0.2</td>
<td>1.5</td>
<td>0.13</td>
<td>0.19</td>
<td>55.3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Approach</strong></td>
<td></td>
<td></td>
<td>80</td>
<td>0.0</td>
<td>0.042</td>
<td>1.9</td>
<td>NA 0.2</td>
<td>1.5</td>
<td>0.13</td>
<td>0.19</td>
<td>55.3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>North: Memorial Drive</td>
<td>7</td>
<td>L2</td>
<td>5</td>
<td>0.0</td>
<td>0.010</td>
<td>8.5</td>
<td>LOS A 0.0</td>
<td>0.2</td>
<td>0.13</td>
<td>0.62</td>
<td>48.6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>T1</td>
<td>2</td>
<td>0.0</td>
<td>0.010</td>
<td>7.3</td>
<td>LOS A 0.0</td>
<td>0.2</td>
<td>0.13</td>
<td>0.62</td>
<td>48.6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>R2</td>
<td>2</td>
<td>0.0</td>
<td>0.010</td>
<td>8.8</td>
<td>LOS A 0.0</td>
<td>0.2</td>
<td>0.13</td>
<td>0.62</td>
<td>48.6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Approach</strong></td>
<td></td>
<td></td>
<td>11</td>
<td>0.0</td>
<td>0.010</td>
<td>8.3</td>
<td>LOS A 0.0</td>
<td>0.2</td>
<td>0.13</td>
<td>0.62</td>
<td>48.6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>West: Sea Lake Swan Hill</td>
<td>10</td>
<td>L2</td>
<td>2</td>
<td>0.0</td>
<td>0.032</td>
<td>8.4</td>
<td>LOS A 0.2</td>
<td>1.1</td>
<td>0.16</td>
<td>0.23</td>
<td>54.3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>11</td>
<td>T1</td>
<td>44</td>
<td>0.0</td>
<td>0.032</td>
<td>0.2</td>
<td>LOS A 0.2</td>
<td>1.1</td>
<td>0.16</td>
<td>0.23</td>
<td>54.3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>R2</td>
<td>14</td>
<td>0.0</td>
<td>0.032</td>
<td>8.6</td>
<td>LOS A 0.2</td>
<td>1.1</td>
<td>0.16</td>
<td>0.23</td>
<td>54.3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Approach</strong></td>
<td></td>
<td></td>
<td>60</td>
<td>0.0</td>
<td>0.032</td>
<td>2.4</td>
<td>NA 0.2</td>
<td>1.1</td>
<td>0.16</td>
<td>0.23</td>
<td>54.3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All Vehicles</td>
<td>165</td>
<td></td>
<td>0.042</td>
<td>3.1</td>
<td>0.2</td>
<td>1.5</td>
<td>0.14</td>
<td>0.27</td>
<td>53.7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Level of Service (LOS):** Method: Delay (HCM 2020).

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 this way on the control since the average delay per movement category is not a major road LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Design Delay.


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

Site: INT 11 - Dead Horse Lane/Link 7 - AM Post Development

Dead Horse Lane/Link 7
Give Way / Yield (Two-Way)
# MOVEMENT SUMMARY

**Site:** INT 11 - Dead Horse Lane/Link 7 - AM Post Development

**Giveoway / Yield (Two-Way)**

## Movement Performance - Vehicles

<table>
<thead>
<tr>
<th>Mov ID</th>
<th>OD Mov</th>
<th>Demand Flows</th>
<th>HV %</th>
<th>Deg. Sat</th>
<th>Average Delay</th>
<th>Level of Service</th>
<th>95% Back of Queu</th>
<th>Prop. Queued</th>
<th>Effective Stop Rate per veh</th>
<th>Average Speed</th>
<th>km/h</th>
</tr>
</thead>
<tbody>
<tr>
<td>South: Dead Horse Lane</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>T1</td>
<td>1</td>
<td>0.0</td>
<td>0.001</td>
<td>0.0</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.0</td>
<td>0.02</td>
<td>0.42</td>
<td>53.4</td>
</tr>
<tr>
<td>3</td>
<td>R2</td>
<td>1</td>
<td>0.0</td>
<td>0.001</td>
<td>8.5</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.0</td>
<td>0.03</td>
<td>0.42</td>
<td>53.4</td>
</tr>
<tr>
<td>Approach</td>
<td>2</td>
<td>0.0</td>
<td>0.001</td>
<td>4.2</td>
<td>NA</td>
<td>NA</td>
<td>0.0</td>
<td>0.0</td>
<td>0.03</td>
<td>0.42</td>
<td>53.4</td>
</tr>
<tr>
<td>East: Link 7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>L2</td>
<td>1</td>
<td>0.0</td>
<td>0.015</td>
<td>8.2</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.3</td>
<td>0.02</td>
<td>0.39</td>
<td>48.5</td>
</tr>
<tr>
<td>6</td>
<td>R2</td>
<td>19</td>
<td>0.0</td>
<td>0.015</td>
<td>8.5</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.3</td>
<td>0.02</td>
<td>0.39</td>
<td>48.5</td>
</tr>
<tr>
<td>Approach</td>
<td>20</td>
<td>0.0</td>
<td>0.015</td>
<td>8.4</td>
<td>LOA</td>
<td>NA</td>
<td>0.0</td>
<td>0.3</td>
<td>0.02</td>
<td>0.39</td>
<td>48.5</td>
</tr>
<tr>
<td>North: Dead Horse Lane</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>L2</td>
<td>4</td>
<td>0.0</td>
<td>0.003</td>
<td>8.2</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.0</td>
<td>0.00</td>
<td>0.58</td>
<td>50.8</td>
</tr>
<tr>
<td>8</td>
<td>T1</td>
<td>1</td>
<td>0.0</td>
<td>0.003</td>
<td>8.2</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.0</td>
<td>0.00</td>
<td>0.58</td>
<td>50.8</td>
</tr>
<tr>
<td>Approach</td>
<td>5</td>
<td>0.0</td>
<td>0.003</td>
<td>6.5</td>
<td>NA</td>
<td>NA</td>
<td>0.0</td>
<td>0.0</td>
<td>0.00</td>
<td>0.58</td>
<td>50.8</td>
</tr>
<tr>
<td>All Vehicles</td>
<td>27</td>
<td>0.0</td>
<td>0.015</td>
<td>7.8</td>
<td>NA</td>
<td>NA</td>
<td>0.0</td>
<td>0.3</td>
<td>0.02</td>
<td>0.54</td>
<td>49.3</td>
</tr>
</tbody>
</table>

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.


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

Site: INT 11 - Dead Horse Lane/Link 7 - PM Post Development

**Dead Horse Lane/Link 7**
**Giveaway / Yield (Two-Way)**

### Movement Performance - Vehicles

<table>
<thead>
<tr>
<th>Mov ID</th>
<th>OD Mov</th>
<th>Demand Flows HV %</th>
<th>Deg. Stn veh</th>
<th>Average Delay sec</th>
<th>Level of Service (LOS)</th>
<th>% of Back of Queue</th>
<th>Distance cm</th>
<th>Prop. Queued</th>
<th>Prop. Stop Rate per veh</th>
<th>Effective Speed km/h</th>
</tr>
</thead>
<tbody>
<tr>
<td>South: Dead Horse Lane</td>
<td>2</td>
<td>T1</td>
<td>1</td>
<td>0.0</td>
<td>0.001</td>
<td>0.0</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.0</td>
<td>0.06</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>R2</td>
<td>1</td>
<td>0.0</td>
<td>0.001</td>
<td>8.5</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.0</td>
<td>0.06</td>
</tr>
<tr>
<td></td>
<td>Approach</td>
<td>2</td>
<td>0.0</td>
<td>0.001</td>
<td>4.3</td>
<td>NA</td>
<td>0.0</td>
<td>0.0</td>
<td>0.06</td>
<td>0.41</td>
</tr>
<tr>
<td>East: Link 7</td>
<td>4</td>
<td>L2</td>
<td>1</td>
<td>0.0</td>
<td>0.008</td>
<td>8.2</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.0</td>
<td>0.02</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>R2</td>
<td>0.0</td>
<td>0.008</td>
<td>8.5</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.0</td>
<td>0.02</td>
<td>0.38</td>
</tr>
<tr>
<td></td>
<td>Approach</td>
<td>11</td>
<td>0.0</td>
<td>0.008</td>
<td>8.4</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.0</td>
<td>0.02</td>
<td>0.38</td>
</tr>
<tr>
<td>North: Dead Horse Lane</td>
<td>7</td>
<td>L2</td>
<td>14</td>
<td>0.0</td>
<td>0.008</td>
<td>8.2</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.0</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>T1</td>
<td>1</td>
<td>0.0</td>
<td>0.008</td>
<td>0.0</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.0</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>Approach</td>
<td>15</td>
<td>0.0</td>
<td>0.008</td>
<td>7.6</td>
<td>NA</td>
<td>0.0</td>
<td>0.0</td>
<td>0.00</td>
<td>0.54</td>
</tr>
<tr>
<td>All Vehicles</td>
<td>27</td>
<td>0.0</td>
<td>0.008</td>
<td>7.7</td>
<td>NA</td>
<td>0.0</td>
<td>0.0</td>
<td>0.01</td>
<td>0.54</td>
<td>49.4</td>
</tr>
</tbody>
</table>

**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.


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

Site: INT 12 (1) - Link3/Link 4/Link 5 - AM Post Development

Link3/Link 4/Link 5
Giveaway / Yield (Two-Way)
# MOVEMENT SUMMARY

**Site:** INT 12 (1) - Link3/Link 4/Link 5 - AM Post Development

**Link3/Link 4/Link 5**

**Giveaway / Yield (Two-Way)**

## Movement Performance - Vehicles

<table>
<thead>
<tr>
<th>Mov ID</th>
<th>OD Mov</th>
<th>Demand Flows (%)</th>
<th>Veh per Hour</th>
<th>Deg. Start Delay (sec)</th>
<th>Average Delay (sec)</th>
<th>Level of Service</th>
<th>% of Veh Delay</th>
<th>Queue Time (min)</th>
<th>Prop. Queue</th>
<th>Effective Stop Rate per Veh</th>
<th>Average Speed (km/h)</th>
</tr>
</thead>
<tbody>
<tr>
<td>South: Link 4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>T1</td>
<td>0.0</td>
<td>286</td>
<td>0.263</td>
<td>0.5</td>
<td>LOS A</td>
<td>1.7</td>
<td>11.8</td>
<td>0.26</td>
<td>0.28</td>
<td>52.4</td>
</tr>
<tr>
<td>3</td>
<td>R2</td>
<td>0.0</td>
<td>148</td>
<td>0.263</td>
<td>8.8</td>
<td>LOS A</td>
<td>1.7</td>
<td>11.8</td>
<td>0.26</td>
<td>0.28</td>
<td>52.4</td>
</tr>
<tr>
<td>Approach</td>
<td></td>
<td></td>
<td>435</td>
<td>0.0</td>
<td>3.4</td>
<td>NA</td>
<td>1.7</td>
<td>11.8</td>
<td>0.26</td>
<td>0.28</td>
<td>52.4</td>
</tr>
<tr>
<td>East: Link 3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>L2</td>
<td>0.0</td>
<td>37</td>
<td>0.024</td>
<td>8.4</td>
<td>LOS A</td>
<td>0.1</td>
<td>0.7</td>
<td>0.15</td>
<td>0.31</td>
<td>48.3</td>
</tr>
<tr>
<td>6</td>
<td>R2</td>
<td>0.0</td>
<td>12</td>
<td>0.015</td>
<td>10.7</td>
<td>LOS B</td>
<td>0.0</td>
<td>0.3</td>
<td>0.44</td>
<td>0.72</td>
<td>46.3</td>
</tr>
<tr>
<td>Approach</td>
<td></td>
<td></td>
<td>48</td>
<td>0.0</td>
<td>8.9</td>
<td>LOS A</td>
<td>0.1</td>
<td>0.7</td>
<td>0.22</td>
<td>0.94</td>
<td>47.6</td>
</tr>
<tr>
<td>North: Link 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>L2</td>
<td>0.0</td>
<td>31</td>
<td>0.053</td>
<td>8.2</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.0</td>
<td>0.00</td>
<td>0.27</td>
<td>56.2</td>
</tr>
<tr>
<td>8</td>
<td>T1</td>
<td>0.0</td>
<td>72</td>
<td>0.053</td>
<td>0.0</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.0</td>
<td>0.00</td>
<td>0.27</td>
<td>56.2</td>
</tr>
<tr>
<td>Approach</td>
<td></td>
<td></td>
<td>102</td>
<td>0.0</td>
<td>2.5</td>
<td>NA</td>
<td>0.0</td>
<td>0.0</td>
<td>0.00</td>
<td>0.27</td>
<td>56.2</td>
</tr>
<tr>
<td>All Vehicles</td>
<td></td>
<td>585</td>
<td>0.0</td>
<td>0.263</td>
<td>3.7</td>
<td>NA</td>
<td>1.7</td>
<td>11.8</td>
<td>0.21</td>
<td>0.31</td>
<td>52.6</td>
</tr>
</tbody>
</table>

**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.


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

---

Processed: Tuesday, 13 May 2014 11:30:55 AM
Copyright © 2006-2013 Akcelik and Associates Pty Ltd
SIDRA INTERSECTION 6.0.17.4496
www.sidrasolutions.com
Project: P:Synergy/Projects/GRP1/GRP16/71/SIDRA/May 2014/Option 2/Sidra 5.sp6
8009658, TRAFFIX GROUP PTY LTD, FLUS / Flatting
## MOVEMENT SUMMARY

**Site:** INT 12 (1) - Link3/Link 4//Link 5 - PM Post Development

**Link3/Link 4//Link 5**

**Give Way / Yield (Two-Way)**

### Movement Performance - Vehicles

<table>
<thead>
<tr>
<th>Mov ID</th>
<th>OD Mov</th>
<th>Demand Flows</th>
<th>% H/V</th>
<th>Deg. Stan</th>
<th>Average Delay</th>
<th>Level of Service</th>
<th>95% Back of Queues</th>
<th>Distance (m)</th>
<th>Prop. Queued</th>
<th>Effective Stop Rate</th>
<th>Average Speed (km/h)</th>
</tr>
</thead>
<tbody>
<tr>
<td>South: Link 4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>T1</td>
<td>143</td>
<td>0.0</td>
<td>0.139</td>
<td>1.1</td>
<td>LOS A</td>
<td>0.3</td>
<td>5.7</td>
<td>0.36</td>
<td>0.28</td>
<td>51.2</td>
</tr>
<tr>
<td>3</td>
<td>R2</td>
<td>74</td>
<td>0.0</td>
<td>0.139</td>
<td>9.4</td>
<td>LOS A</td>
<td>0.3</td>
<td>5.7</td>
<td>0.36</td>
<td>0.28</td>
<td>51.2</td>
</tr>
<tr>
<td>Approach</td>
<td></td>
<td>217</td>
<td>0.0</td>
<td>0.139</td>
<td>3.9</td>
<td>NA</td>
<td>0.3</td>
<td>5.7</td>
<td>0.36</td>
<td>0.28</td>
<td>51.2</td>
</tr>
<tr>
<td>East: Link 3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>L2</td>
<td>112</td>
<td>0.0</td>
<td>0.082</td>
<td>8.9</td>
<td>LOS A</td>
<td>0.3</td>
<td>2.3</td>
<td>0.36</td>
<td>0.34</td>
<td>47.6</td>
</tr>
<tr>
<td>6</td>
<td>R2</td>
<td>28</td>
<td>0.0</td>
<td>0.028</td>
<td>10.2</td>
<td>LOS B</td>
<td>0.1</td>
<td>0.6</td>
<td>0.46</td>
<td>0.71</td>
<td>48.8</td>
</tr>
<tr>
<td>Approach</td>
<td></td>
<td>136</td>
<td>0.0</td>
<td>0.082</td>
<td>9.1</td>
<td>LOS A</td>
<td>0.3</td>
<td>2.3</td>
<td>0.32</td>
<td>0.35</td>
<td>47.5</td>
</tr>
<tr>
<td>North: Link 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>L2</td>
<td>18</td>
<td>0.0</td>
<td>0.120</td>
<td>8.2</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.0</td>
<td>0.00</td>
<td>0.38</td>
<td>59.0</td>
</tr>
<tr>
<td>8</td>
<td>T1</td>
<td>215</td>
<td>0.0</td>
<td>0.120</td>
<td>0.0</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.0</td>
<td>0.00</td>
<td>0.38</td>
<td>59.0</td>
</tr>
<tr>
<td>Approach</td>
<td></td>
<td>233</td>
<td>0.0</td>
<td>0.120</td>
<td>0.6</td>
<td>NA</td>
<td>0.0</td>
<td>0.0</td>
<td>0.00</td>
<td>0.38</td>
<td>59.0</td>
</tr>
<tr>
<td>All Vehicles</td>
<td></td>
<td>585</td>
<td>0.0</td>
<td>0.139</td>
<td>3.8</td>
<td>NA</td>
<td>0.3</td>
<td>5.7</td>
<td>0.21</td>
<td>0.29</td>
<td>53.0</td>
</tr>
</tbody>
</table>

**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 (Akcelik M30).**

**H/V (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.**

---

Processed: Tuesday, 13 May 2014 11:34:40 AM
Copyright © 2006-2013 Akcelik and Associates Pty Ltd
SIDRA INTERSECTION 6.0.17.466
www.sidrasolutions.com
Project: P:Synergy/Projects/GRPI/GRPI16071/SIDRA/May 2014/Option 2/Sidra 5.sp6
8000958, TRAFFIC GROUP PTY LTD, PLUS / Floating
SITE LAYOUT

Site: INT 12 (2) - Link3/Link 4/Link 5 - AM Post Development

Link3/Link 4/Link 5 Roundsabout
# MOVEMENT SUMMARY

**Site:** INT 12 (2) - Link3/Link 4/Link 5 - AM Post Development

**Link3/Link 4/Link 5**

## Roundsbout

### Movement Performance - Vehicles

<table>
<thead>
<tr>
<th>Mov ID</th>
<th>OD Mov</th>
<th>Demand Flows</th>
<th>Total veh/h</th>
<th>HV %</th>
<th>Deg. Sum veh</th>
<th>Average Delay</th>
<th>Level of Service</th>
<th>95% Back of Vehicles</th>
<th>Queued</th>
<th>Prop. Queued</th>
<th>Effective Stop Rate</th>
<th>Average Speed km/h</th>
</tr>
</thead>
<tbody>
<tr>
<td>South: Link 4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>T1</td>
<td>285</td>
<td>0.0</td>
<td>0.253</td>
<td>4.4</td>
<td>LOS A</td>
<td>1.8</td>
<td>12.5</td>
<td>0.08</td>
<td>1.33</td>
<td>50.4</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>R2</td>
<td>148</td>
<td>0.0</td>
<td>0.253</td>
<td>11.3</td>
<td>LOS B</td>
<td>1.8</td>
<td>12.5</td>
<td>0.08</td>
<td>1.33</td>
<td>50.4</td>
<td></td>
</tr>
<tr>
<td>Approach</td>
<td>435</td>
<td>0.0</td>
<td>0.253</td>
<td>6.7</td>
<td>LOS A</td>
<td>1.8</td>
<td>12.5</td>
<td>0.08</td>
<td>0.51</td>
<td>50.4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| East: Link 3 |
| 4 | L2 | 37 | 0.0 | 0.035 | 5.6 | LOS A | 0.2 | 1.4 | 0.22 | 1.30 | 49.5 |
| 6 | R2 | 12 | 0.0 | 0.035 | 11.5 | LOS B | 0.2 | 1.4 | 0.22 | 1.30 | 49.5 |
| Approach | 40 | 0.0 | 0.035 | 7.0 | LOS A | 0.2 | 1.4 | 0.22 | 0.30 | 49.5 |

| North: Link 5 |
| 7 | L1 | 31 | 0.0 | 0.078 | 6.0 | LOS A | 0.4 | 3.0 | 0.32 | 0.99 | 50.7 |
| 8 | T1 | 72 | 0.0 | 0.078 | 5.1 | LOS A | 0.4 | 3.0 | 0.32 | 0.99 | 50.7 |
| Approach | 102 | 0.0 | 0.078 | 5.3 | LOS A | 0.4 | 3.0 | 0.32 | 0.44 | 50.7 |
| All Vehicles | 585 | 0.0 | 0.253 | 6.5 | LOS A | 1.8 | 12.5 | 0.14 | 0.50 | 50.4 |

Level of Service (LOS) Method: Delay (HCM 2000).
Roundsbout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundsbout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
### MOVEMENT SUMMARY

**Site:** INT 12 (2) - Link3/Link 4/Link 5 - PM Post Development

#### Roundabout

<table>
<thead>
<tr>
<th>Movement Performance - Vehicles</th>
<th>Mov ID</th>
<th>OD Mov</th>
<th>Demand Flows</th>
<th>% HV</th>
<th>Deg. Sam v/h</th>
<th>Average Delay sec</th>
<th>Level of Service</th>
<th>% Back of Vehicles</th>
<th>Queue</th>
<th>Effective Stop Rate per v/h</th>
<th>Average Speed km/h</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>South: Link 4</strong></td>
<td>2</td>
<td>T1</td>
<td>143</td>
<td>0.0</td>
<td>0.136</td>
<td>4.5</td>
<td>LOS A</td>
<td>0.9</td>
<td>6.2</td>
<td>0.13</td>
<td>1.31</td>
</tr>
<tr>
<td>3</td>
<td>R2</td>
<td>74</td>
<td>0.0</td>
<td>0.136</td>
<td>11.3</td>
<td></td>
<td>LOS B</td>
<td>0.9</td>
<td>6.2</td>
<td>0.13</td>
<td>1.31</td>
</tr>
<tr>
<td><strong>Approach</strong></td>
<td></td>
<td></td>
<td>217</td>
<td>0.0</td>
<td>0.136</td>
<td>6.8</td>
<td>LOS A</td>
<td>0.9</td>
<td>6.2</td>
<td>0.13</td>
<td>0.51</td>
</tr>
<tr>
<td><strong>East: Link 3</strong></td>
<td>4</td>
<td>L2</td>
<td>112</td>
<td>0.0</td>
<td>0.110</td>
<td>6.4</td>
<td>LOS A</td>
<td>0.7</td>
<td>4.6</td>
<td>0.42</td>
<td>1.39</td>
</tr>
<tr>
<td>6</td>
<td>R2</td>
<td>24</td>
<td>0.0</td>
<td>0.110</td>
<td>12.3</td>
<td></td>
<td>LOS B</td>
<td>0.7</td>
<td>4.6</td>
<td>0.42</td>
<td>1.39</td>
</tr>
<tr>
<td><strong>Approach</strong></td>
<td>130</td>
<td>0.0</td>
<td>0.110</td>
<td>7.4</td>
<td>110</td>
<td></td>
<td>LOS A</td>
<td>0.7</td>
<td>4.6</td>
<td>0.42</td>
<td>0.55</td>
</tr>
<tr>
<td><strong>North: Link 5</strong></td>
<td>7</td>
<td>L2</td>
<td>18</td>
<td>0.0</td>
<td>0.159</td>
<td>5.6</td>
<td>LOS A</td>
<td>1.0</td>
<td>6.8</td>
<td>0.24</td>
<td>0.81</td>
</tr>
<tr>
<td>8</td>
<td>T1</td>
<td>215</td>
<td>0.0</td>
<td>0.159</td>
<td>4.7</td>
<td></td>
<td>LOS A</td>
<td>1.0</td>
<td>6.8</td>
<td>0.24</td>
<td>0.31</td>
</tr>
<tr>
<td><strong>Approach</strong></td>
<td>233</td>
<td>0.0</td>
<td>0.159</td>
<td>4.8</td>
<td>159</td>
<td></td>
<td>LOS A</td>
<td>1.0</td>
<td>6.8</td>
<td>0.24</td>
<td>0.40</td>
</tr>
<tr>
<td><strong>All Vehicles</strong></td>
<td>585</td>
<td>0.0</td>
<td>0.159</td>
<td>6.1</td>
<td>159</td>
<td></td>
<td>LOS A</td>
<td>1.0</td>
<td>6.8</td>
<td>0.24</td>
<td>0.47</td>
</tr>
</tbody>
</table>

- **Level of Service (LOS): Method: Delay (HCM 2000).**
- **Roundabout LOS Method:** Same as Signalised Intersections.
- **Vehicle movement LOS values are based on average delay per movement.**
- **Intersection and Approach LOS values are based on average delay for all vehicle movements.**
- **Roundabout Capacity Model:** SIDRA Standard.
- **SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.**
- **Gap Acceptance Capacity:** SIDRA Standard (Arbel & M3D).
- **HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.**

Processed: Tuesday, 13 May 2014 11:36:27 AM

[Copyright © 2000-2013 Akcelik and Associates Pty Ltd]

SIDRA INTERSECTION 6.0.17.4466

Project: P:\Synergy\Projects\GRP1\GRP16371\SIDRA\May 2014\Option 2\Sidra 5.3.pip6

8000958. TRAFFIX GROUP PTY LTD. PLUS / Floating
## MOVENT SUMMARY

**Site:** INT 13 - Link 5/Link 6/Link 7 - AM Post Development

### Movement Performance - Vehicles

<table>
<thead>
<tr>
<th>Mov ID</th>
<th>OD Mov</th>
<th>Demand Flows</th>
<th>HV %</th>
<th>Deg. Sum. (sec)</th>
<th>Average Delay (sec)</th>
<th>Level of Service</th>
<th>% Back of Vehicles</th>
<th>Queued Time (sec)</th>
<th>Prop. Queued</th>
<th>Effective Stop Rate per veh</th>
<th>Average Speed (kmph)</th>
</tr>
</thead>
<tbody>
<tr>
<td>East: Link 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>T1</td>
<td>13</td>
<td>0.0</td>
<td>0.229</td>
<td>0.8</td>
<td>LOS A</td>
<td>1.2</td>
<td>8.3</td>
<td>0.35</td>
<td>0.33</td>
<td>47.6</td>
</tr>
<tr>
<td>6</td>
<td>R2</td>
<td>334</td>
<td>0.0</td>
<td>0.229</td>
<td>9.1</td>
<td>LOS A</td>
<td>1.2</td>
<td>8.3</td>
<td>0.35</td>
<td>0.33</td>
<td>47.6</td>
</tr>
<tr>
<td>Approach</td>
<td></td>
<td>346</td>
<td>0.0</td>
<td>0.229</td>
<td>8.8</td>
<td>NA</td>
<td>1.2</td>
<td>8.3</td>
<td>0.35</td>
<td>0.33</td>
<td>47.6</td>
</tr>
<tr>
<td>North: Link 6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>L2</td>
<td>85</td>
<td>0.0</td>
<td>0.252</td>
<td>8.2</td>
<td>LOS A</td>
<td>0.2</td>
<td>1.5</td>
<td>0.03</td>
<td>0.35</td>
<td>48.8</td>
</tr>
<tr>
<td>6</td>
<td>R2</td>
<td>97</td>
<td>0.0</td>
<td>0.115</td>
<td>10.6</td>
<td>LOS B</td>
<td>0.4</td>
<td>2.7</td>
<td>0.43</td>
<td>0.77</td>
<td>46.5</td>
</tr>
<tr>
<td>Approach</td>
<td></td>
<td>182</td>
<td>0.0</td>
<td>0.115</td>
<td>9.4</td>
<td>LOS A</td>
<td>0.4</td>
<td>2.7</td>
<td>0.24</td>
<td>0.71</td>
<td>47.6</td>
</tr>
<tr>
<td>West: Link 7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>L2</td>
<td>195</td>
<td>0.0</td>
<td>0.108</td>
<td>8.2</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.0</td>
<td>0.00</td>
<td>0.66</td>
<td>49.2</td>
</tr>
<tr>
<td>11</td>
<td>T1</td>
<td>15</td>
<td>0.0</td>
<td>0.108</td>
<td>0.0</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.0</td>
<td>0.00</td>
<td>0.66</td>
<td>49.2</td>
</tr>
<tr>
<td>Approach</td>
<td></td>
<td>200</td>
<td>0.0</td>
<td>0.108</td>
<td>8.0</td>
<td>NA</td>
<td>0.0</td>
<td>0.0</td>
<td>0.00</td>
<td>0.66</td>
<td>49.2</td>
</tr>
<tr>
<td>All Vehicles</td>
<td></td>
<td>728</td>
<td>0.0</td>
<td>0.229</td>
<td>8.7</td>
<td>NA</td>
<td>1.2</td>
<td>8.3</td>
<td>0.23</td>
<td>0.66</td>
<td>48.0</td>
</tr>
</tbody>
</table>

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

**Site:** INT 13 - Link 5/Link 6/ Link 7 - PM Post Development

**Moveway / Yield (Two-Way)**

<table>
<thead>
<tr>
<th>Movement Performance - Vehicles</th>
<th>Mov ID</th>
<th>OD Mov</th>
<th>Demand Flows</th>
<th>H/V %</th>
<th>Deg. Sum</th>
<th>Average Delay sec</th>
<th>Level of Service</th>
<th>95% Back of Queue, Vehicles</th>
<th>Prop. Queued</th>
<th>Effective Stop Rate per veh</th>
<th>Average Speed km/h</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>East: Link 5</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 T1</td>
<td>7</td>
<td>0.0</td>
<td>0.107</td>
<td>0.3</td>
<td>LOS A</td>
<td>0.5</td>
<td>3.6</td>
<td>0.22</td>
<td>0.51</td>
<td>48.2</td>
<td></td>
</tr>
<tr>
<td>6 R2</td>
<td>188</td>
<td>0.0</td>
<td>0.107</td>
<td>0.6</td>
<td>LOS A</td>
<td>0.5</td>
<td>3.6</td>
<td>0.22</td>
<td>0.51</td>
<td>48.2</td>
<td></td>
</tr>
<tr>
<td>Approach</td>
<td>175</td>
<td>0.0</td>
<td>0.107</td>
<td>8.3</td>
<td>NA</td>
<td>0.5</td>
<td>3.6</td>
<td>0.22</td>
<td>0.51</td>
<td>48.2</td>
<td></td>
</tr>
<tr>
<td><strong>North: Link 6</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7 L2</td>
<td>251</td>
<td>0.0</td>
<td>0.154</td>
<td>8.2</td>
<td>LOS A</td>
<td>0.7</td>
<td>4.9</td>
<td>0.05</td>
<td>0.54</td>
<td>48.7</td>
<td></td>
</tr>
<tr>
<td>6 R2</td>
<td>131</td>
<td>0.0</td>
<td>0.124</td>
<td>9.4</td>
<td>LOS A</td>
<td>0.4</td>
<td>3.0</td>
<td>0.36</td>
<td>0.59</td>
<td>47.4</td>
<td></td>
</tr>
<tr>
<td>Approach</td>
<td>381</td>
<td>0.0</td>
<td>0.154</td>
<td>8.6</td>
<td>LOS A</td>
<td>0.7</td>
<td>4.9</td>
<td>0.14</td>
<td>0.96</td>
<td>48.3</td>
<td></td>
</tr>
<tr>
<td><strong>West: Link 7</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 L2</td>
<td>98</td>
<td>0.0</td>
<td>0.058</td>
<td>8.2</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.0</td>
<td>0.00</td>
<td>0.53</td>
<td>49.8</td>
<td></td>
</tr>
<tr>
<td>11 T1</td>
<td>9</td>
<td>0.0</td>
<td>0.058</td>
<td>0.0</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.0</td>
<td>0.00</td>
<td>0.33</td>
<td>49.8</td>
<td></td>
</tr>
<tr>
<td>Approach</td>
<td>107</td>
<td>0.0</td>
<td>0.058</td>
<td>7.5</td>
<td>NA</td>
<td>0.0</td>
<td>0.0</td>
<td>0.00</td>
<td>0.53</td>
<td>49.8</td>
<td></td>
</tr>
<tr>
<td><strong>All Vehicles</strong></td>
<td>664</td>
<td>0.0</td>
<td>0.154</td>
<td>8.3</td>
<td>NA</td>
<td>0.7</td>
<td>4.9</td>
<td>0.14</td>
<td>0.54</td>
<td>48.5</td>
<td></td>
</tr>
</tbody>
</table>

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.
H/V (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
APPENDIX B

CAPACITY ANALYSIS RESULTS
OPTION 2 - DEAD HORSE LANE LINK
### MOBILITY SUMMARY

**Site:** INT 6 - Gray Street/Link 9 - AM Post Development

**Gray Street/Yano Street**

**Giveaway / Yold (Two-Way)**

#### Movement Performance - Vehicles

<table>
<thead>
<tr>
<th>Movement</th>
<th>OD Mov</th>
<th>Demand Flows</th>
<th>% HV</th>
<th>Shrunk Delay</th>
<th>Average Delay</th>
<th>Level of Service</th>
<th>% Veh Per Hour</th>
<th>Prop. Queue</th>
<th>Effective Stop Rate</th>
<th>Average Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>South: Link 9</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>L2</td>
<td>1</td>
<td>0.0</td>
<td>0.001</td>
<td>8.4</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.0</td>
<td>0.15</td>
<td>0.30</td>
</tr>
<tr>
<td>3</td>
<td>R2</td>
<td>145</td>
<td>0.0</td>
<td>0.147</td>
<td>9.5</td>
<td>LOS A</td>
<td>0.6</td>
<td>4.0</td>
<td>0.32</td>
<td>0.98</td>
</tr>
<tr>
<td>Approach</td>
<td></td>
<td>146</td>
<td>0.0</td>
<td>0.147</td>
<td>9.5</td>
<td>LOS A</td>
<td>0.6</td>
<td>4.0</td>
<td>0.32</td>
<td>0.98</td>
</tr>
<tr>
<td><strong>East: Gray Street</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>L2</td>
<td>36</td>
<td>0.0</td>
<td>0.054</td>
<td>8.5</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.0</td>
<td>0.06</td>
<td>0.31</td>
</tr>
<tr>
<td>5</td>
<td>T1</td>
<td>67</td>
<td>0.0</td>
<td>0.054</td>
<td>0.0</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.0</td>
<td>0.06</td>
<td>0.31</td>
</tr>
<tr>
<td>Approach</td>
<td></td>
<td>103</td>
<td>0.0</td>
<td>0.054</td>
<td>2.8</td>
<td>NA</td>
<td>0.0</td>
<td>0.0</td>
<td>0.06</td>
<td>0.31</td>
</tr>
<tr>
<td><strong>West: Gray Street</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>T1</td>
<td>105</td>
<td>0.0</td>
<td>0.055</td>
<td>0.3</td>
<td>LOS A</td>
<td>0.3</td>
<td>2.1</td>
<td>0.21</td>
<td>0.31</td>
</tr>
<tr>
<td>12</td>
<td>R2</td>
<td>1</td>
<td>0.0</td>
<td>0.055</td>
<td>0.6</td>
<td>LOS A</td>
<td>0.3</td>
<td>2.1</td>
<td>0.21</td>
<td>0.31</td>
</tr>
<tr>
<td>Approach</td>
<td></td>
<td>105</td>
<td>0.0</td>
<td>0.055</td>
<td>0.4</td>
<td>NA</td>
<td>0.3</td>
<td>2.1</td>
<td>0.21</td>
<td>0.31</td>
</tr>
<tr>
<td>All Vehicles</td>
<td></td>
<td>356</td>
<td>0.0</td>
<td>0.147</td>
<td>4.8</td>
<td>NA</td>
<td>0.5</td>
<td>4.0</td>
<td>0.19</td>
<td>0.37</td>
</tr>
</tbody>
</table>

**Level of Service (LOS):** 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 (Akojek M30).

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

---

*Processed: Monday, 19 May 2014 4:40:21 PM  Copyright © 2006-2013 Akojek and Associates Pty Ltd
SIDRA INTERSECTION 6.0 17/4/96  www.sidrasolutions.com
Project: P/Synergy/Projects/GRPI/GRF1671 SIDRA/MAY 2014 SIDRA 4 sp6
8000958. TRAFFIC GROUP PTY LTD, PLUS / Floating*
MOVEMENT SUMMARY

Site: INT 6 - Gray Street/Link 9- PM Post Development
Gray Street/Yanta Street
Giveaway/Yould (Two-Way)

<table>
<thead>
<tr>
<th>Movement Performance - Vehicles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mov ID</td>
</tr>
<tr>
<td>--------</td>
</tr>
<tr>
<td>South: Link 9</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>East: Gray Street</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>5</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>West: Gray Street</td>
</tr>
<tr>
<td>11</td>
</tr>
<tr>
<td>12</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>All Vehicles</td>
</tr>
</tbody>
</table>

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.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Modal Designation.
### MOVEMENT SUMMARY

**Site: INT 7 - Gray Street/Link 7 - AM Existing**

**Give Way / Yield (Two-Way)**

<table>
<thead>
<tr>
<th>Movement Performance - Vehicles</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mov ID</strong></td>
</tr>
<tr>
<td>-----------------</td>
</tr>
<tr>
<td>South: Link 7</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>Approach</td>
</tr>
<tr>
<td>East: Gray Street</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>5</td>
</tr>
<tr>
<td>Approach</td>
</tr>
<tr>
<td>West: Gray Street</td>
</tr>
<tr>
<td>11</td>
</tr>
<tr>
<td>12</td>
</tr>
<tr>
<td>Approach</td>
</tr>
<tr>
<td>All Vehicles</td>
</tr>
</tbody>
</table>

- **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 (Akoecil M30).
- HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
# Movement Summary

**Site:** INT 7 - Gray Street/Link 7 - AM Post Development

**Give Way / Yield (Two-Way)**

### Movement Performance - Vehicles

<table>
<thead>
<tr>
<th>Mov ID</th>
<th>Mov</th>
<th>Demand Flows</th>
<th>HV %</th>
<th>Deg. Sum (s)</th>
<th>Average Delay (s)</th>
<th>Level of Service</th>
<th>95% Back of Queue Vehicles (m)</th>
<th>Prop. Queued</th>
<th>Effective Stop Rate per Veh</th>
<th>Average Speed (km/h)</th>
</tr>
</thead>
<tbody>
<tr>
<td>South: Link 7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>L2</td>
<td>429</td>
<td>0.0</td>
<td>0.380</td>
<td>8.6</td>
<td>LOS A</td>
<td>2.0</td>
<td>13.7</td>
<td>0.21</td>
<td>0.92</td>
</tr>
<tr>
<td>3</td>
<td>R2</td>
<td>43</td>
<td>0.0</td>
<td>0.046</td>
<td>9.6</td>
<td>LOS A</td>
<td>0.2</td>
<td>1.2</td>
<td>0.35</td>
<td>0.98</td>
</tr>
<tr>
<td>Approach</td>
<td>473</td>
<td>0.0</td>
<td>0.380</td>
<td>8.7</td>
<td>LOS A</td>
<td>2.0</td>
<td>13.7</td>
<td>0.22</td>
<td>0.93</td>
<td>48.0</td>
</tr>
<tr>
<td>East: Gray Street</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>L2</td>
<td>13</td>
<td>0.0</td>
<td>0.037</td>
<td>8.2</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.0</td>
<td>0.06</td>
<td>0.17</td>
</tr>
<tr>
<td>5</td>
<td>T1</td>
<td>59</td>
<td>0.0</td>
<td>0.037</td>
<td>0.0</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.0</td>
<td>0.06</td>
<td>0.17</td>
</tr>
<tr>
<td>Approach</td>
<td>72</td>
<td>0.0</td>
<td>0.037</td>
<td>1.4</td>
<td>NA</td>
<td>0.0</td>
<td>0.0</td>
<td>0.06</td>
<td>0.17</td>
<td>57.7</td>
</tr>
<tr>
<td>West: Gray Street</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>T1</td>
<td>65</td>
<td>0.0</td>
<td>0.033</td>
<td>0.0</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.0</td>
<td>0.06</td>
<td>0.30</td>
</tr>
<tr>
<td>12</td>
<td>R2</td>
<td>113</td>
<td>0.0</td>
<td>0.067</td>
<td>8.5</td>
<td>LOS A</td>
<td>0.3</td>
<td>2.2</td>
<td>0.17</td>
<td>0.92</td>
</tr>
<tr>
<td>Approach</td>
<td>178</td>
<td>0.0</td>
<td>0.067</td>
<td>5.4</td>
<td>NA</td>
<td>0.3</td>
<td>2.2</td>
<td>0.11</td>
<td>0.40</td>
<td>51.9</td>
</tr>
<tr>
<td>All Vehicles</td>
<td>722</td>
<td>0.0</td>
<td>0.380</td>
<td>7.2</td>
<td>NA</td>
<td>2.0</td>
<td>13.7</td>
<td>0.17</td>
<td>0.52</td>
<td>49.7</td>
</tr>
</tbody>
</table>

---

**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.


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

Site: INT 7 - Gray Street/Link 7 - PM Existing
Gray Street/Link 7
Giveaway / Yield (Two-Way)

<table>
<thead>
<tr>
<th>Movement Performance - Vehicles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mov ID</td>
</tr>
<tr>
<td>--------</td>
</tr>
<tr>
<td>South: Link 7</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>Approach</td>
</tr>
<tr>
<td>East: Gray Street</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>5</td>
</tr>
<tr>
<td>Approach</td>
</tr>
<tr>
<td>West: Gray Street</td>
</tr>
<tr>
<td>11</td>
</tr>
<tr>
<td>12</td>
</tr>
<tr>
<td>Approach</td>
</tr>
<tr>
<td>All Vehicles</td>
</tr>
</tbody>
</table>

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

Processed: Monday, 13 May 2014 4:32:00 PM
Copyright © 2006-2013 Akopec and Associates Pty Ltd
SIDRA INTERSECTION 6.0.17.466
www.sidrasolutions.com
Project: P/Synergy/Projects/GRP/GRP16971/SIDRA/May2014/Sidra 3.sp6 8000658. TRAFFIC GROUP PTY LTD, FLUS / Floating
# MOVEMENT SUMMARY

Site: INT 7 - Gray Street/Link 7 - PM Post Development

Gray Street/Link 7
Give Way / Yield (Two-Way)

<table>
<thead>
<tr>
<th>Movement Performance - Vehicles</th>
<th>Mov ID</th>
<th>O/D Mov</th>
<th>Demand Flows HV %</th>
<th>Total veh/h</th>
<th>HV Sec</th>
<th>Average Delay sec</th>
<th>Level of Service</th>
<th>95% Back of Queued Vehicles veh</th>
<th>Prop. Queued</th>
<th>Effective Stop Rate per veh</th>
<th>Average Speed km/h</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>South: Link 7</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 L2</td>
<td>215</td>
<td>0.0</td>
<td>0.190</td>
<td>8.5</td>
<td>LOS A</td>
<td>0.3</td>
<td>5.5</td>
<td>0.17</td>
<td>0.92</td>
<td>48.2</td>
<td></td>
</tr>
<tr>
<td>3 R2</td>
<td>23</td>
<td>0.0</td>
<td>0.032</td>
<td>11.0</td>
<td>LOS B</td>
<td>0.1</td>
<td>0.8</td>
<td>0.46</td>
<td>0.73</td>
<td>46.0</td>
<td></td>
</tr>
<tr>
<td>Approach</td>
<td>239</td>
<td>0.0</td>
<td>0.190</td>
<td>8.7</td>
<td>LOS A</td>
<td>0.3</td>
<td>5.5</td>
<td>0.19</td>
<td>0.93</td>
<td>48.0</td>
<td></td>
</tr>
<tr>
<td><strong>East: Gray Street</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 L2</td>
<td>33</td>
<td>0.0</td>
<td>0.047</td>
<td>8.2</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.0</td>
<td>0.00</td>
<td>0.32</td>
<td>55.4</td>
<td></td>
</tr>
<tr>
<td>5 T1</td>
<td>57</td>
<td>0.0</td>
<td>0.047</td>
<td>0.0</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.0</td>
<td>0.00</td>
<td>0.32</td>
<td>55.4</td>
<td></td>
</tr>
<tr>
<td>Approach</td>
<td>69</td>
<td>0.0</td>
<td>0.047</td>
<td>3.0</td>
<td>NA</td>
<td>0.0</td>
<td>0.0</td>
<td>0.00</td>
<td>0.32</td>
<td>55.4</td>
<td></td>
</tr>
<tr>
<td><strong>West: Gray Street</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11 T1</td>
<td>41</td>
<td>0.0</td>
<td>0.021</td>
<td>0.0</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.0</td>
<td>0.00</td>
<td>0.30</td>
<td>60.0</td>
<td></td>
</tr>
<tr>
<td>12 R2</td>
<td>334</td>
<td>0.0</td>
<td>0.200</td>
<td>8.6</td>
<td>LOS A</td>
<td>1.0</td>
<td>7.3</td>
<td>0.22</td>
<td>0.33</td>
<td>47.9</td>
<td></td>
</tr>
<tr>
<td>Approach</td>
<td>375</td>
<td>0.0</td>
<td>0.200</td>
<td>7.7</td>
<td>NA</td>
<td>1.0</td>
<td>7.3</td>
<td>0.18</td>
<td>0.56</td>
<td>49.0</td>
<td></td>
</tr>
<tr>
<td>All Vehicles</td>
<td>703</td>
<td>0.0</td>
<td>0.200</td>
<td>7.4</td>
<td>NA</td>
<td>1.0</td>
<td>7.3</td>
<td>0.17</td>
<td>0.55</td>
<td>49.4</td>
<td></td>
</tr>
</tbody>
</table>

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

Site: INT 8 - Sea Lake Swan Hill Road/Gray Street/Boobialla Drive - AM Existing

Sea Lake Swan Hill Road/Gray Street/Boobialla Drive
Roundabout

[Diagram of a roundabout with directions and distances marked]
## MOVEMENT SUMMARY

**Site:** INT 8 - Sea Lake Swan Hill Road/Gray Street/Boobialla Drive - AM Existing

**Sea Lake Swan Hill Road/Gray Street/Boobialla Drive**
**Roundabout**

### Movement Performance - Vehicles

<table>
<thead>
<tr>
<th>Mov ID</th>
<th>OD Mov</th>
<th>Demand Flows</th>
<th>Total vph</th>
<th>HV %</th>
<th>Avg Delay</th>
<th>LOS</th>
<th>95% Back of</th>
<th>Queued</th>
<th>Prop. Queued</th>
<th>Effective Stop Rate per vph</th>
<th>Average Speed km/h</th>
</tr>
</thead>
<tbody>
<tr>
<td>South: Gray Street:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>L2</td>
<td>17</td>
<td>0.0</td>
<td>0.040</td>
<td>5.5</td>
<td>LOS A</td>
<td>0.2</td>
<td>1.3</td>
<td>0.17</td>
<td>1.38</td>
<td>49.1</td>
</tr>
<tr>
<td>2</td>
<td>T1</td>
<td>16</td>
<td>0.0</td>
<td>0.040</td>
<td>4.6</td>
<td>LOS A</td>
<td>0.2</td>
<td>1.3</td>
<td>0.17</td>
<td>1.38</td>
<td>49.1</td>
</tr>
<tr>
<td>3</td>
<td>R2</td>
<td>24</td>
<td>0.0</td>
<td>0.040</td>
<td>11.4</td>
<td>LOS B</td>
<td>0.2</td>
<td>1.3</td>
<td>0.17</td>
<td>1.38</td>
<td>49.1</td>
</tr>
<tr>
<td>Approach</td>
<td>57</td>
<td>0.0</td>
<td>0.040</td>
<td>7.8</td>
<td>LOS A</td>
<td>0.2</td>
<td>1.3</td>
<td>0.17</td>
<td>0.54</td>
<td>49.1</td>
<td></td>
</tr>
<tr>
<td>East: Sea Lake Swan Hill:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>L2</td>
<td>11</td>
<td>0.0</td>
<td>0.046</td>
<td>5.5</td>
<td>LOS A</td>
<td>0.2</td>
<td>1.6</td>
<td>0.17</td>
<td>1.11</td>
<td>48.8</td>
</tr>
<tr>
<td>5</td>
<td>T1</td>
<td>20</td>
<td>0.0</td>
<td>0.046</td>
<td>4.6</td>
<td>LOS A</td>
<td>0.2</td>
<td>1.6</td>
<td>0.17</td>
<td>1.11</td>
<td>48.8</td>
</tr>
<tr>
<td>6</td>
<td>R2</td>
<td>30</td>
<td>0.0</td>
<td>0.046</td>
<td>11.4</td>
<td>LOS B</td>
<td>0.2</td>
<td>1.6</td>
<td>0.17</td>
<td>1.11</td>
<td>48.8</td>
</tr>
<tr>
<td>Approach</td>
<td>60</td>
<td>0.0</td>
<td>0.046</td>
<td>8.1</td>
<td>LOS A</td>
<td>0.2</td>
<td>1.6</td>
<td>0.17</td>
<td>0.55</td>
<td>48.8</td>
<td></td>
</tr>
<tr>
<td>North: Boobialla Drive:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>L2</td>
<td>1</td>
<td>0.0</td>
<td>0.095</td>
<td>5.8</td>
<td>LOS A</td>
<td>0.5</td>
<td>3.3</td>
<td>0.26</td>
<td>0.92</td>
<td>50.6</td>
</tr>
<tr>
<td>8</td>
<td>T1</td>
<td>2</td>
<td>0.0</td>
<td>0.095</td>
<td>4.8</td>
<td>LOS A</td>
<td>0.5</td>
<td>3.3</td>
<td>0.26</td>
<td>0.92</td>
<td>50.6</td>
</tr>
<tr>
<td>9</td>
<td>R2</td>
<td>2</td>
<td>0.0</td>
<td>0.095</td>
<td>11.7</td>
<td>LOS B</td>
<td>0.5</td>
<td>3.3</td>
<td>0.26</td>
<td>0.92</td>
<td>50.6</td>
</tr>
<tr>
<td>Approach</td>
<td>12</td>
<td>0.0</td>
<td>0.095</td>
<td>6.8</td>
<td>LOS A</td>
<td>0.5</td>
<td>3.3</td>
<td>0.26</td>
<td>0.46</td>
<td>50.6</td>
<td></td>
</tr>
<tr>
<td>West: Sea Lake Swan Hill:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>L2</td>
<td>1</td>
<td>0.0</td>
<td>0.067</td>
<td>5.6</td>
<td>LOS A</td>
<td>0.3</td>
<td>2.3</td>
<td>0.16</td>
<td>0.33</td>
<td>50.8</td>
</tr>
<tr>
<td>11</td>
<td>T1</td>
<td>1</td>
<td>0.0</td>
<td>0.067</td>
<td>4.6</td>
<td>LOS A</td>
<td>0.3</td>
<td>2.3</td>
<td>0.16</td>
<td>0.33</td>
<td>50.8</td>
</tr>
<tr>
<td>12</td>
<td>R2</td>
<td>1</td>
<td>0.0</td>
<td>0.067</td>
<td>11.5</td>
<td>LOS B</td>
<td>0.3</td>
<td>2.3</td>
<td>0.16</td>
<td>0.33</td>
<td>50.8</td>
</tr>
<tr>
<td>Approach</td>
<td>13</td>
<td>0.0</td>
<td>0.067</td>
<td>5.9</td>
<td>LOS A</td>
<td>0.3</td>
<td>2.3</td>
<td>0.19</td>
<td>0.46</td>
<td>50.8</td>
<td></td>
</tr>
<tr>
<td>All Vehicles</td>
<td>348</td>
<td>0.0</td>
<td>0.095</td>
<td>6.5</td>
<td>LOS A</td>
<td>0.5</td>
<td>3.3</td>
<td>0.21</td>
<td>0.49</td>
<td>50.0</td>
<td></td>
</tr>
</tbody>
</table>

Level of Service (LOS): Method: Delay (HCM 2020).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
## MOVEMENT SUMMARY

**Site:** INT 8 - Sea Lake Swan Hill Road/Gray Street/Boobialla Drive - AM Post Development

### Sea Lake Swan Hill Road/Gray Street/Boobialla Drive
#### Roundabout

<table>
<thead>
<tr>
<th>Movement Performance - Vehicles</th>
<th>Mov ID</th>
<th>OD Mov</th>
<th>Demand Flows</th>
<th>% HV</th>
<th>Total v/h</th>
<th>Average Delay</th>
<th>Level of Service</th>
<th>95% Back of Queue</th>
<th>Distance</th>
<th>Prop. Queue</th>
<th>Effective Stop Rate</th>
<th>Average Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>South: Gray Street</strong></td>
<td>1</td>
<td>L2</td>
<td>19</td>
<td>0.0</td>
<td>0.391</td>
<td>6.6</td>
<td>LOS A</td>
<td>2.7</td>
<td>18.6</td>
<td>0.49</td>
<td>1.36</td>
<td>45.0</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>T1</td>
<td>15</td>
<td>0.0</td>
<td>0.391</td>
<td>5.7</td>
<td>LOS A</td>
<td>2.7</td>
<td>18.6</td>
<td>0.49</td>
<td>1.36</td>
<td>45.0</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>R2</td>
<td>466</td>
<td>0.0</td>
<td>0.391</td>
<td>12.5</td>
<td>LOS B</td>
<td>2.7</td>
<td>18.6</td>
<td>0.49</td>
<td>1.36</td>
<td>45.0</td>
</tr>
<tr>
<td><strong>Approach</strong></td>
<td>501</td>
<td></td>
<td></td>
<td>0.0</td>
<td>0.391</td>
<td>12.1</td>
<td>LOS B</td>
<td>2.7</td>
<td>18.6</td>
<td>0.49</td>
<td>1.36</td>
<td>45.0</td>
</tr>
<tr>
<td><strong>East: Sea Lake Swan Hill</strong></td>
<td>4</td>
<td>L2</td>
<td>120</td>
<td>0.0</td>
<td>0.235</td>
<td>5.7</td>
<td>LOS A</td>
<td>1.5</td>
<td>16.7</td>
<td>0.27</td>
<td>1.09</td>
<td>48.5</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>T1</td>
<td>73</td>
<td>0.0</td>
<td>0.205</td>
<td>4.7</td>
<td>LOS A</td>
<td>1.5</td>
<td>16.7</td>
<td>0.27</td>
<td>1.09</td>
<td>48.5</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>R2</td>
<td>147</td>
<td>0.0</td>
<td>0.235</td>
<td>11.6</td>
<td>LOS B</td>
<td>1.5</td>
<td>16.7</td>
<td>0.27</td>
<td>1.09</td>
<td>48.5</td>
</tr>
<tr>
<td><strong>Approach</strong></td>
<td>345</td>
<td></td>
<td></td>
<td>0.0</td>
<td>0.235</td>
<td>8.0</td>
<td>LOS A</td>
<td>1.5</td>
<td>16.7</td>
<td>0.27</td>
<td>0.55</td>
<td>48.5</td>
</tr>
<tr>
<td><strong>North: Boobialla Drive</strong></td>
<td>7</td>
<td>L2</td>
<td>79</td>
<td>0.0</td>
<td>0.174</td>
<td>9.8</td>
<td>LOS A</td>
<td>1.1</td>
<td>7.9</td>
<td>0.75</td>
<td>1.50</td>
<td>47.1</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>T1</td>
<td>53</td>
<td>0.0</td>
<td>0.174</td>
<td>8.8</td>
<td>LOS A</td>
<td>1.1</td>
<td>7.9</td>
<td>0.75</td>
<td>1.50</td>
<td>47.1</td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>R2</td>
<td>11</td>
<td>0.0</td>
<td>0.174</td>
<td>15.7</td>
<td>LOS B</td>
<td>1.1</td>
<td>7.9</td>
<td>0.75</td>
<td>1.50</td>
<td>47.1</td>
</tr>
<tr>
<td><strong>Approach</strong></td>
<td>142</td>
<td></td>
<td></td>
<td>0.0</td>
<td>0.174</td>
<td>9.9</td>
<td>LOS A</td>
<td>1.1</td>
<td>7.9</td>
<td>0.75</td>
<td>0.75</td>
<td>47.1</td>
</tr>
<tr>
<td><strong>West: Sea Lake Swan Hill</strong></td>
<td>10</td>
<td>L2</td>
<td>11</td>
<td>0.0</td>
<td>0.354</td>
<td>9.0</td>
<td>LOS A</td>
<td>2.5</td>
<td>17.2</td>
<td>0.75</td>
<td>1.50</td>
<td>47.5</td>
</tr>
<tr>
<td></td>
<td>11</td>
<td>T1</td>
<td>205</td>
<td>0.0</td>
<td>0.354</td>
<td>8.1</td>
<td>LOS A</td>
<td>2.5</td>
<td>17.2</td>
<td>0.75</td>
<td>1.50</td>
<td>47.5</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>R2</td>
<td>19</td>
<td>0.0</td>
<td>0.354</td>
<td>14.9</td>
<td>LOS B</td>
<td>2.5</td>
<td>17.2</td>
<td>0.75</td>
<td>1.50</td>
<td>47.5</td>
</tr>
<tr>
<td><strong>Approach</strong></td>
<td>324</td>
<td></td>
<td></td>
<td>0.0</td>
<td>0.354</td>
<td>8.5</td>
<td>LOS A</td>
<td>2.5</td>
<td>17.2</td>
<td>0.75</td>
<td>0.75</td>
<td>47.5</td>
</tr>
</tbody>
</table>

**All Vehicles:** 1313

- Demand Flows: Total v/h
- % HV: % High Volume
- Average Delay: Average delay in seconds
- Level of Service: LOS
- 95% Back of Queue: Distance (m)
- Prop. Queue: Proportion of Queue
- Effective Stop Rate: per vehicle
- Average Speed: Average speed in km/h

**Level of Service (LOS):** Method: Delay (HCM 2000).
- Roundabout LOS Method: Same as Signalised Intersections.
- Vehicle movement LOS values are based on average delay per movement.
- Intersection and Approach LOS values are based on average delay for all vehicle movements.
- Roundabout Capacity Model: SIDRA Standard.
- SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
- HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
## MOVEMENT SUMMARY

**Site:** INT 8 - Sea Lake Swan Hill Road/Gray Street/Boobialla Drive - PM Existing

**Sea Lake Swan Hill Road/Gray Street/Boobialla Drive**
Roundabout

### Movement Performance - Vehicles

<table>
<thead>
<tr>
<th>Mov ID</th>
<th>OD Mov</th>
<th>Demand Flows</th>
<th>HV %</th>
<th>Total veh</th>
<th>Average Delay</th>
<th>Level of Service</th>
<th>95% Back of Vehicles</th>
<th>Prop. Queued</th>
<th>Effective Stop Rate</th>
<th>Average Speed</th>
<th>Speed %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>South: Gray Street</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>L2</td>
<td>17</td>
<td>0.0</td>
<td>0.040</td>
<td>5.7</td>
<td>LOS A</td>
<td>0.2</td>
<td>1.3</td>
<td>0.24</td>
<td>1.35</td>
<td>49.2</td>
</tr>
<tr>
<td>2</td>
<td>T1</td>
<td>20</td>
<td>0.0</td>
<td>0.040</td>
<td>4.7</td>
<td>LOS A</td>
<td>0.2</td>
<td>1.3</td>
<td>0.24</td>
<td>1.35</td>
<td>49.2</td>
</tr>
<tr>
<td>3</td>
<td>R2</td>
<td>19</td>
<td>0.0</td>
<td>0.040</td>
<td>11.6</td>
<td>LOS B</td>
<td>0.2</td>
<td>1.3</td>
<td>0.24</td>
<td>1.35</td>
<td>49.2</td>
</tr>
<tr>
<td>Approach</td>
<td></td>
<td>50</td>
<td>0.0</td>
<td>0.040</td>
<td>7.4</td>
<td>LOS A</td>
<td>0.2</td>
<td>1.3</td>
<td>0.24</td>
<td>1.35</td>
<td>49.2</td>
</tr>
<tr>
<td>East: Sea Lake Swan Hill</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>L2</td>
<td>9</td>
<td>0.0</td>
<td>0.075</td>
<td>6.4</td>
<td>LOS A</td>
<td>0.4</td>
<td>2.6</td>
<td>0.12</td>
<td>1.16</td>
<td>48.6</td>
</tr>
<tr>
<td>5</td>
<td>T1</td>
<td>39</td>
<td>0.0</td>
<td>0.075</td>
<td>4.5</td>
<td>LOS A</td>
<td>0.4</td>
<td>2.6</td>
<td>0.12</td>
<td>1.16</td>
<td>48.6</td>
</tr>
<tr>
<td>6</td>
<td>R2</td>
<td>67</td>
<td>0.0</td>
<td>0.075</td>
<td>11.3</td>
<td>LOS B</td>
<td>0.4</td>
<td>2.6</td>
<td>0.12</td>
<td>1.16</td>
<td>48.6</td>
</tr>
<tr>
<td>Approach</td>
<td></td>
<td>115</td>
<td>0.0</td>
<td>0.075</td>
<td>8.5</td>
<td>LOS A</td>
<td>0.4</td>
<td>2.6</td>
<td>0.12</td>
<td>1.16</td>
<td>48.6</td>
</tr>
<tr>
<td>North: Boobialla Drive</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>L2</td>
<td>38</td>
<td>0.0</td>
<td>0.043</td>
<td>5.5</td>
<td>LOS A</td>
<td>0.2</td>
<td>1.4</td>
<td>0.17</td>
<td>0.96</td>
<td>51.5</td>
</tr>
<tr>
<td>8</td>
<td>T1</td>
<td>23</td>
<td>0.0</td>
<td>0.043</td>
<td>4.6</td>
<td>LOS A</td>
<td>0.2</td>
<td>1.4</td>
<td>0.17</td>
<td>0.96</td>
<td>51.5</td>
</tr>
<tr>
<td>9</td>
<td>R2</td>
<td>1</td>
<td>0.0</td>
<td>0.043</td>
<td>11.4</td>
<td>LOS B</td>
<td>0.2</td>
<td>1.4</td>
<td>0.17</td>
<td>0.96</td>
<td>51.5</td>
</tr>
<tr>
<td>Approach</td>
<td></td>
<td>52</td>
<td>0.0</td>
<td>0.043</td>
<td>5.3</td>
<td>LOS A</td>
<td>0.2</td>
<td>1.4</td>
<td>0.17</td>
<td>0.96</td>
<td>51.5</td>
</tr>
<tr>
<td>West: Sea Lake Swan Hill</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>L2</td>
<td>1</td>
<td>0.0</td>
<td>0.027</td>
<td>5.7</td>
<td>LOS A</td>
<td>0.1</td>
<td>0.9</td>
<td>0.23</td>
<td>0.94</td>
<td>50.4</td>
</tr>
<tr>
<td>11</td>
<td>T1</td>
<td>28</td>
<td>0.0</td>
<td>0.027</td>
<td>4.7</td>
<td>LOS A</td>
<td>0.1</td>
<td>0.9</td>
<td>0.23</td>
<td>0.94</td>
<td>50.4</td>
</tr>
<tr>
<td>12</td>
<td>R2</td>
<td>7</td>
<td>0.0</td>
<td>0.027</td>
<td>11.6</td>
<td>LOS B</td>
<td>0.1</td>
<td>0.9</td>
<td>0.23</td>
<td>0.94</td>
<td>50.4</td>
</tr>
<tr>
<td>Approach</td>
<td></td>
<td>37</td>
<td>0.0</td>
<td>0.027</td>
<td>6.1</td>
<td>LOS A</td>
<td>0.1</td>
<td>0.9</td>
<td>0.23</td>
<td>0.94</td>
<td>50.4</td>
</tr>
<tr>
<td>All Vehicles</td>
<td></td>
<td>271</td>
<td>0.0</td>
<td>0.075</td>
<td>7.2</td>
<td>LOS A</td>
<td>0.4</td>
<td>2.6</td>
<td>0.17</td>
<td>0.92</td>
<td>49.6</td>
</tr>
</tbody>
</table>

Level of Service (LOS): Method: Delay (HCM 2000).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
# MOVEMENT SUMMARY

**Site:** INT B - Sea Lake Swan Hill Road/Gray Street/Boobialla Drive - PM Post Development

**Sea Lake Swan Hill Road/Gray Street/Boobialla Drive**

**Roundabout**

<table>
<thead>
<tr>
<th>Movement Performance - Vehicles</th>
<th>Mov ID</th>
<th>OD Mov</th>
<th>Demand Flows Total veh</th>
<th>HV %</th>
<th>Deg. Sum veh</th>
<th>Average Delay sec</th>
<th>Level of Service</th>
<th>95% Back Queued</th>
<th>Prop. Queued</th>
<th>Effective Stop Rate per veh</th>
<th>Average Speed km/h</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>South: Gray Street</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 L2</td>
<td>15</td>
<td>0.0</td>
<td>0.00</td>
<td>0.0</td>
<td>0.00</td>
<td>9.0</td>
<td>LOS A</td>
<td>2.0</td>
<td>18.0</td>
<td>0.72</td>
<td>1.51</td>
</tr>
<tr>
<td>2 T1</td>
<td>20</td>
<td>0.0</td>
<td>0.00</td>
<td>0.0</td>
<td>0.00</td>
<td>8.1</td>
<td>LOS A</td>
<td>2.0</td>
<td>18.0</td>
<td>0.72</td>
<td>1.51</td>
</tr>
<tr>
<td>3 R2</td>
<td>240</td>
<td>0.0</td>
<td>0.00</td>
<td>0.0</td>
<td>0.00</td>
<td>14.9</td>
<td>LOS B</td>
<td>2.0</td>
<td>18.0</td>
<td>0.72</td>
<td>1.51</td>
</tr>
<tr>
<td>Approach</td>
<td>270</td>
<td>0.0</td>
<td>0.00</td>
<td>0.0</td>
<td>0.00</td>
<td>14.1</td>
<td>LOS B</td>
<td>2.0</td>
<td>18.0</td>
<td>0.72</td>
<td>1.51</td>
</tr>
<tr>
<td><strong>East: Sea Lake Swan Hill</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 L2</td>
<td>338</td>
<td>0.0</td>
<td>0.591</td>
<td>0.6</td>
<td>0.00</td>
<td>3.2</td>
<td>LOS A</td>
<td>6.2</td>
<td>43.3</td>
<td>0.26</td>
<td>1.36</td>
</tr>
<tr>
<td>5 T1</td>
<td>201</td>
<td>0.0</td>
<td>0.591</td>
<td>0.6</td>
<td>0.00</td>
<td>4.2</td>
<td>LOS A</td>
<td>6.2</td>
<td>43.3</td>
<td>0.26</td>
<td>1.36</td>
</tr>
<tr>
<td>6 R2</td>
<td>442</td>
<td>0.0</td>
<td>0.591</td>
<td>0.6</td>
<td>0.00</td>
<td>11.5</td>
<td>LOS B</td>
<td>6.2</td>
<td>43.3</td>
<td>0.25</td>
<td>1.36</td>
</tr>
<tr>
<td>Approach</td>
<td>981</td>
<td>0.0</td>
<td>0.591</td>
<td>0.6</td>
<td>0.00</td>
<td>8.0</td>
<td>LOS A</td>
<td>6.2</td>
<td>43.3</td>
<td>0.25</td>
<td>1.36</td>
</tr>
<tr>
<td><strong>North: Boobialla Drive</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7 L2</td>
<td>315</td>
<td>0.0</td>
<td>0.310</td>
<td>0.0</td>
<td>0.00</td>
<td>1.3</td>
<td>LOS A</td>
<td>2.0</td>
<td>14.3</td>
<td>0.66</td>
<td>1.28</td>
</tr>
<tr>
<td>8 T1</td>
<td>23</td>
<td>0.0</td>
<td>0.310</td>
<td>0.0</td>
<td>0.00</td>
<td>6.4</td>
<td>LOS A</td>
<td>6.2</td>
<td>43.3</td>
<td>0.26</td>
<td>1.36</td>
</tr>
<tr>
<td>9 R2</td>
<td>3</td>
<td>0.0</td>
<td>0.310</td>
<td>0.0</td>
<td>0.00</td>
<td>13.2</td>
<td>LOS B</td>
<td>6.2</td>
<td>43.3</td>
<td>0.25</td>
<td>1.36</td>
</tr>
<tr>
<td>Approach</td>
<td>342</td>
<td>0.0</td>
<td>0.310</td>
<td>0.0</td>
<td>0.00</td>
<td>7.3</td>
<td>LOS A</td>
<td>6.2</td>
<td>43.3</td>
<td>0.25</td>
<td>1.36</td>
</tr>
<tr>
<td><strong>West: Sea Lake Swan Hill</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 L2</td>
<td>32</td>
<td>0.0</td>
<td>0.002</td>
<td>0.0</td>
<td>0.00</td>
<td>9.2</td>
<td>LOS A</td>
<td>1.3</td>
<td>9.0</td>
<td>0.72</td>
<td>1.45</td>
</tr>
<tr>
<td>11 T1</td>
<td>197</td>
<td>0.0</td>
<td>0.002</td>
<td>0.0</td>
<td>0.00</td>
<td>8.2</td>
<td>LOS A</td>
<td>1.3</td>
<td>9.0</td>
<td>0.72</td>
<td>1.45</td>
</tr>
<tr>
<td>12 R2</td>
<td>9</td>
<td>0.0</td>
<td>0.002</td>
<td>0.0</td>
<td>0.00</td>
<td>15.1</td>
<td>LOS B</td>
<td>1.3</td>
<td>9.0</td>
<td>0.72</td>
<td>1.45</td>
</tr>
<tr>
<td>Approach</td>
<td>175</td>
<td>0.0</td>
<td>0.002</td>
<td>0.0</td>
<td>0.00</td>
<td>8.8</td>
<td>LOS A</td>
<td>1.3</td>
<td>9.0</td>
<td>0.72</td>
<td>1.45</td>
</tr>
<tr>
<td><strong>All Vehicles</strong></td>
<td>1779</td>
<td>0.0</td>
<td>0.591</td>
<td>0.0</td>
<td>0.00</td>
<td>8.9</td>
<td>LOS A</td>
<td>6.2</td>
<td>43.3</td>
<td>0.44</td>
<td>0.51</td>
</tr>
</tbody>
</table>

**Level of Service (LOS):** Method: Delay (HCM 2000).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
HV (%) values are calculated for all Movement Classes of All Heavy Vehicle Model Designation.

---

Processed: Monday, 12 May 2014 05:10:29 PM

Copyright © 2006-2013 Akcelik and Associates Pty Ltd

www.sidrasolutions.com
SITE LAYOUT

Site: INT 9 - Swan Hill Road/Dead Horse Lane/Memorial Drive - AM Existing

Swan Hill Road/Dead Horse Lane/Memorial Drive
Give Way / Yield (Two-Way)
## MOVEMENT SUMMARY

**Site:** INT 9 - Swan Hill Road/Dead Horse Lane/Memorial Drive - AM Existing

### Swan Hill Road/Dead Horse Lane/Memorial Drive

#### Movement Performance - Vehicles

<table>
<thead>
<tr>
<th>Mov ID</th>
<th>OD Mov</th>
<th>Demand Flows</th>
<th>HV %</th>
<th>Total veh</th>
<th>HV %</th>
<th>Average Delay sec</th>
<th>LOS A</th>
<th>95% Back of Vehicles veh</th>
<th>Queued veh per veh</th>
<th>Effective Stop Rate</th>
<th>Average Speed km/h</th>
</tr>
</thead>
<tbody>
<tr>
<td>South: Dead Horse Lane</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>L2</td>
<td>2</td>
<td>0.0</td>
<td>000</td>
<td>0.06</td>
<td>8.7</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.1</td>
<td>0.16</td>
<td>0.51</td>
</tr>
<tr>
<td>2</td>
<td>T1</td>
<td>2</td>
<td>0.0</td>
<td>000</td>
<td>0.06</td>
<td>7.4</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.1</td>
<td>0.16</td>
<td>0.51</td>
</tr>
<tr>
<td>3</td>
<td>R2</td>
<td>2</td>
<td>0.0</td>
<td>000</td>
<td>0.06</td>
<td>8.9</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.1</td>
<td>0.16</td>
<td>0.51</td>
</tr>
<tr>
<td>Approach</td>
<td>5</td>
<td>0.0</td>
<td>000</td>
<td>8.4</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.1</td>
<td>0.16</td>
<td>0.51</td>
<td>48.6</td>
<td></td>
</tr>
<tr>
<td>East: Sea Lake Swan Hill</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>L2</td>
<td>2</td>
<td>0.0</td>
<td>000</td>
<td>0.027</td>
<td>8.5</td>
<td>LOS A</td>
<td>0.1</td>
<td>1.0</td>
<td>0.20</td>
<td>0.15</td>
</tr>
<tr>
<td>5</td>
<td>T1</td>
<td>42</td>
<td>0.0</td>
<td>000</td>
<td>0.027</td>
<td>0.3</td>
<td>LOS A</td>
<td>0.1</td>
<td>1.0</td>
<td>0.20</td>
<td>0.15</td>
</tr>
<tr>
<td>6</td>
<td>R2</td>
<td>2</td>
<td>0.0</td>
<td>000</td>
<td>0.027</td>
<td>8.7</td>
<td>LOS A</td>
<td>0.1</td>
<td>1.0</td>
<td>0.20</td>
<td>0.15</td>
</tr>
<tr>
<td>Approach</td>
<td>51</td>
<td>0.0</td>
<td>000</td>
<td>1.7</td>
<td>NA</td>
<td>0.1</td>
<td>1.0</td>
<td>0.20</td>
<td>0.15</td>
<td>54.7</td>
<td></td>
</tr>
<tr>
<td>North: Memorial Drive</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>L2</td>
<td>12</td>
<td>0.0</td>
<td>000</td>
<td>0.015</td>
<td>8.7</td>
<td>LOS A</td>
<td>0.1</td>
<td>0.4</td>
<td>0.20</td>
<td>0.51</td>
</tr>
<tr>
<td>8</td>
<td>T1</td>
<td>2</td>
<td>0.0</td>
<td>000</td>
<td>0.015</td>
<td>7.4</td>
<td>LOS A</td>
<td>0.1</td>
<td>0.4</td>
<td>0.20</td>
<td>0.51</td>
</tr>
<tr>
<td>9</td>
<td>R2</td>
<td>2</td>
<td>0.0</td>
<td>000</td>
<td>0.015</td>
<td>8.9</td>
<td>LOS A</td>
<td>0.1</td>
<td>0.4</td>
<td>0.20</td>
<td>0.51</td>
</tr>
<tr>
<td>Approach</td>
<td>16</td>
<td>0.0</td>
<td>000</td>
<td>8.5</td>
<td>LOS A</td>
<td>0.1</td>
<td>0.4</td>
<td>0.20</td>
<td>0.51</td>
<td>48.2</td>
<td></td>
</tr>
<tr>
<td>West: Sea Lake Swan Hill</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>L2</td>
<td>2</td>
<td>0.0</td>
<td>000</td>
<td>0.052</td>
<td>8.3</td>
<td>LOS A</td>
<td>0.3</td>
<td>1.9</td>
<td>0.13</td>
<td>0.34</td>
</tr>
<tr>
<td>11</td>
<td>T1</td>
<td>96</td>
<td>0.0</td>
<td>000</td>
<td>0.052</td>
<td>0.1</td>
<td>LOS A</td>
<td>0.3</td>
<td>1.9</td>
<td>0.13</td>
<td>0.34</td>
</tr>
<tr>
<td>12</td>
<td>R2</td>
<td>2</td>
<td>0.0</td>
<td>000</td>
<td>0.052</td>
<td>8.6</td>
<td>LOS A</td>
<td>0.3</td>
<td>1.9</td>
<td>0.13</td>
<td>0.34</td>
</tr>
<tr>
<td>Approach</td>
<td>100</td>
<td>0.0</td>
<td>000</td>
<td>0.5</td>
<td>NA</td>
<td>0.3</td>
<td>1.9</td>
<td>0.13</td>
<td>0.34</td>
<td>57.1</td>
<td></td>
</tr>
<tr>
<td>All Vehicles</td>
<td>173</td>
<td>0.0</td>
<td>000</td>
<td>1.8</td>
<td>NA</td>
<td>0.3</td>
<td>1.9</td>
<td>0.16</td>
<td>0.15</td>
<td>55.1</td>
<td></td>
</tr>
</tbody>
</table>

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

Processed: Tuesday, 19 May 2014 9:47:56 AM
SIDRA INTERSECTION 6.0.17.4456
Project: P:Synergy/Projects/GP1/GP116371/SIDRA/May 2014/Sidra 4.sp6
800068, TRAFFIC GROUP PTY LTD, PLUS / Floating
## MOVEMENT SUMMARY

### Site: INT 9 - Swan Hill Road/Dead Horse Lane/Memorial Drive - AM Post Development

#### Swan Hill Road/Dead Horse Lane/Memorial Drive
Give Way / Yield (Two-Way)

### Movement Performance - Vehicles

<table>
<thead>
<tr>
<th>Mov ID</th>
<th>OD Mov</th>
<th>Demand Flow</th>
<th>Total veh</th>
<th>HV %</th>
<th>Deg. Sat wtd</th>
<th>Average Delay sec</th>
<th>Level of Service</th>
<th>95% Back of Vehicles veh</th>
<th>Queuing Distance m</th>
<th>Prop. Queued</th>
<th>Effective Stop Rate per veh</th>
<th>Average Speed km/h</th>
</tr>
</thead>
<tbody>
<tr>
<td>South: Dead Horse Lane</td>
<td>1</td>
<td>L2</td>
<td>3</td>
<td>0.0</td>
<td>0.007</td>
<td>88</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.2</td>
<td>0.19</td>
<td>0.51</td>
<td>48.4</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>T1</td>
<td>0.0</td>
<td>0.007</td>
<td>75</td>
<td>LOS A</td>
<td>0.3</td>
<td>0.2</td>
<td>0.19</td>
<td>0.51</td>
<td>48.4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>R2</td>
<td>0.0</td>
<td>0.007</td>
<td>90</td>
<td>LOS A</td>
<td>0.3</td>
<td>0.2</td>
<td>0.19</td>
<td>0.51</td>
<td>48.4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Approach</td>
<td>7</td>
<td>0.0</td>
<td>0.007</td>
<td>85</td>
<td>LOS A</td>
<td>0.3</td>
<td>0.2</td>
<td>0.19</td>
<td>0.51</td>
<td>48.4</td>
<td></td>
</tr>
<tr>
<td>East: Sea Lake Swan Hill</td>
<td>4</td>
<td>L3</td>
<td>2</td>
<td>0.0</td>
<td>0.038</td>
<td>85</td>
<td>LOS A</td>
<td>0.2</td>
<td>1.4</td>
<td>0.22</td>
<td>0.11</td>
<td>45.9</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>T1</td>
<td>0.0</td>
<td>0.038</td>
<td>85</td>
<td>LOS A</td>
<td>0.2</td>
<td>1.4</td>
<td>0.22</td>
<td>0.11</td>
<td>45.9</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>R2</td>
<td>0.0</td>
<td>0.038</td>
<td>85</td>
<td>LOS A</td>
<td>0.2</td>
<td>1.4</td>
<td>0.22</td>
<td>0.11</td>
<td>45.9</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Approach</td>
<td>73</td>
<td>0.0</td>
<td>0.038</td>
<td>13</td>
<td>NA</td>
<td>0.2</td>
<td>1.4</td>
<td>0.22</td>
<td>0.11</td>
<td>45.9</td>
<td></td>
</tr>
<tr>
<td>North: Memorial Drive</td>
<td>7</td>
<td>L2</td>
<td>12</td>
<td>0.0</td>
<td>0.015</td>
<td>88</td>
<td>LOS A</td>
<td>0.1</td>
<td>0.4</td>
<td>0.22</td>
<td>0.51</td>
<td>48.1</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>T1</td>
<td>0.0</td>
<td>0.015</td>
<td>75</td>
<td>LOS A</td>
<td>0.1</td>
<td>0.4</td>
<td>0.22</td>
<td>0.51</td>
<td>48.1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>R2</td>
<td>0.0</td>
<td>0.015</td>
<td>90</td>
<td>LOS A</td>
<td>0.1</td>
<td>0.4</td>
<td>0.22</td>
<td>0.51</td>
<td>48.1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Approach</td>
<td>15</td>
<td>0.0</td>
<td>0.015</td>
<td>88</td>
<td>LOS A</td>
<td>0.1</td>
<td>0.4</td>
<td>0.22</td>
<td>0.51</td>
<td>48.1</td>
<td></td>
</tr>
<tr>
<td>West: Sea Lake Swan Hill</td>
<td>10</td>
<td>L2</td>
<td>2</td>
<td>0.0</td>
<td>0.059</td>
<td>84</td>
<td>LOS A</td>
<td>0.3</td>
<td>2.2</td>
<td>0.16</td>
<td>0.34</td>
<td>56.5</td>
</tr>
<tr>
<td></td>
<td>11</td>
<td>T1</td>
<td>109</td>
<td>0.0</td>
<td>0.059</td>
<td>0.2</td>
<td>LOS A</td>
<td>0.3</td>
<td>2.2</td>
<td>0.16</td>
<td>0.34</td>
<td>56.5</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>R2</td>
<td>3</td>
<td>0.0</td>
<td>0.059</td>
<td>86</td>
<td>LOS A</td>
<td>0.3</td>
<td>2.2</td>
<td>0.16</td>
<td>0.34</td>
<td>56.5</td>
</tr>
<tr>
<td></td>
<td>Approach</td>
<td>115</td>
<td>0.0</td>
<td>0.059</td>
<td>0.6</td>
<td>NA</td>
<td>0.3</td>
<td>2.2</td>
<td>0.16</td>
<td>0.34</td>
<td>56.5</td>
<td></td>
</tr>
<tr>
<td>All Vehicles</td>
<td>211</td>
<td>0.0</td>
<td>0.059</td>
<td>1.7</td>
<td>NA</td>
<td>0.3</td>
<td>2.2</td>
<td>0.19</td>
<td>0.13</td>
<td>54.9</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Level of Service (LOS): Method: Delay (HCM 2020).**
- **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 (A22elk M30).**
- **HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.**

Processed: Tuesday, 13 May 2014 09:40:11 AM

SIDRA INTERSECTION 6.0.17.4466
Project: P-Synergy/Projects/sidrapy16371/SIDRA/SIDRAMay2014/Sidra 4.sp6
8000666; TRAFFIC GROUP PTY LTD; PLUS / Floating
## MOVEMENT SUMMARY

**Site:** INT 9 - Swan Hill Road/Dead Horse Lane/Memorial Drive - PM Existing

**Swan Hill Road/Dead Horse Lane/Memorial Drive**

**Give Way / Yield (Two-Way)**

<table>
<thead>
<tr>
<th>Movement Performance - Vehicles</th>
<th>Mov ID</th>
<th>OD Mov</th>
<th>Demand Flows Total veh/h</th>
<th>HV %</th>
<th>Deg. Samp veh</th>
<th>Average Delay sec</th>
<th>Level of Service</th>
<th>95% Back of Vehicles veh</th>
<th>Queue Distance m</th>
<th>Prop. Queued</th>
<th>Effective Stop Rate per veh</th>
<th>Average Speed km/h</th>
</tr>
</thead>
<tbody>
<tr>
<td>South: Dead Horse Lane</td>
<td>1</td>
<td>L2</td>
<td>2</td>
<td>0.0</td>
<td>0.006</td>
<td>8.6</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.1</td>
<td>0.17</td>
<td>0.30</td>
<td>48.5</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>T1</td>
<td>2</td>
<td>0.0</td>
<td>0.006</td>
<td>7.3</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.1</td>
<td>0.17</td>
<td>0.30</td>
<td>48.5</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>R2</td>
<td>2</td>
<td>0.0</td>
<td>0.006</td>
<td>8.8</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.1</td>
<td>0.17</td>
<td>0.30</td>
<td>48.5</td>
</tr>
<tr>
<td>Approach</td>
<td>5</td>
<td></td>
<td>0</td>
<td>0.0</td>
<td>0.009</td>
<td>8.2</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.1</td>
<td>0.17</td>
<td>0.30</td>
<td>48.5</td>
</tr>
<tr>
<td>East: Sea Lake Swan Hill</td>
<td>4</td>
<td>L2</td>
<td>2</td>
<td>0.0</td>
<td>0.037</td>
<td>8.3</td>
<td>LOS A</td>
<td>0.2</td>
<td>1.3</td>
<td>0.12</td>
<td>0.18</td>
<td>55.6</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>T1</td>
<td>2</td>
<td>0.0</td>
<td>0.037</td>
<td>0.1</td>
<td>LOS A</td>
<td>0.2</td>
<td>1.3</td>
<td>0.12</td>
<td>0.18</td>
<td>55.6</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>R2</td>
<td>2</td>
<td>0.0</td>
<td>0.037</td>
<td>8.6</td>
<td>LOS A</td>
<td>0.2</td>
<td>1.3</td>
<td>0.12</td>
<td>0.18</td>
<td>55.6</td>
</tr>
<tr>
<td>Approach</td>
<td>69</td>
<td></td>
<td>0</td>
<td>0.0</td>
<td>0.037</td>
<td>1.8</td>
<td>NA</td>
<td>0.2</td>
<td>1.3</td>
<td>0.12</td>
<td>0.18</td>
<td>55.6</td>
</tr>
<tr>
<td>North: Memorial Drive</td>
<td>7</td>
<td>L2</td>
<td>2</td>
<td>0.0</td>
<td>0.009</td>
<td>8.5</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.2</td>
<td>0.12</td>
<td>0.62</td>
<td>48.6</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>T1</td>
<td>2</td>
<td>0.0</td>
<td>0.009</td>
<td>7.2</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.2</td>
<td>0.12</td>
<td>0.62</td>
<td>48.6</td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>R2</td>
<td>2</td>
<td>0.0</td>
<td>0.009</td>
<td>3.7</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.2</td>
<td>0.12</td>
<td>0.62</td>
<td>48.6</td>
</tr>
<tr>
<td>Approach</td>
<td>11</td>
<td></td>
<td>0</td>
<td>0.0</td>
<td>0.009</td>
<td>8.3</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.2</td>
<td>0.15</td>
<td>0.52</td>
<td>48.6</td>
</tr>
<tr>
<td>West: Sea Lake Swan Hill</td>
<td>10</td>
<td>L2</td>
<td>2</td>
<td>0.0</td>
<td>0.031</td>
<td>8.3</td>
<td>LOS A</td>
<td>0.1</td>
<td>0.8</td>
<td>0.14</td>
<td>0.10</td>
<td>56.2</td>
</tr>
<tr>
<td></td>
<td>11</td>
<td>T1</td>
<td>2</td>
<td>0.0</td>
<td>0.031</td>
<td>0.2</td>
<td>LOS A</td>
<td>0.1</td>
<td>0.8</td>
<td>0.14</td>
<td>0.10</td>
<td>56.2</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>R2</td>
<td>2</td>
<td>0.0</td>
<td>0.031</td>
<td>0.6</td>
<td>LOS A</td>
<td>0.1</td>
<td>0.8</td>
<td>0.14</td>
<td>0.10</td>
<td>56.2</td>
</tr>
<tr>
<td>Approach</td>
<td>41</td>
<td></td>
<td>0</td>
<td>0.0</td>
<td>0.037</td>
<td>1.0</td>
<td>NA</td>
<td>0.1</td>
<td>0.8</td>
<td>0.14</td>
<td>0.10</td>
<td>56.2</td>
</tr>
<tr>
<td>All Vehicles</td>
<td>127</td>
<td></td>
<td>0</td>
<td>0.0</td>
<td>0.037</td>
<td>2.4</td>
<td>NA</td>
<td>0.2</td>
<td>1.3</td>
<td>0.13</td>
<td>0.21</td>
<td>54.7</td>
</tr>
</tbody>
</table>

**Level of Service (LOS): Method: Delay (HCM 2020).**

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

Site: INT 9 - Swan Hill Road/Dead Horse Lane/Memorial Drive - PM Post Development
Swan Hill Road/Dead Horse Lane/Memorial Drive
Give Way / Yield (Two-Way)

<table>
<thead>
<tr>
<th>Movement Performance - Vehicles</th>
<th>MOv ID</th>
<th>MOV</th>
<th>Demand Flow</th>
<th>%</th>
<th>Deg. Stop</th>
<th>Total veh.</th>
<th>Average Delay</th>
<th>LOS A</th>
<th>95% Back of Vehicle</th>
<th>95% Downstream</th>
<th>Prop. Queued</th>
<th>Effective Stop Rate</th>
<th>Average Speed</th>
<th>Vehicle Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>South: Dead Horse Lane</td>
<td>1</td>
<td>L2</td>
<td>3</td>
<td>0.0</td>
<td>0.007</td>
<td>8.7</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.2</td>
<td>0.16</td>
<td>0.51</td>
<td>48.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>T1</td>
<td>2</td>
<td>0.0</td>
<td>0.007</td>
<td>7.4</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.2</td>
<td>0.16</td>
<td>0.51</td>
<td>48.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>R2</td>
<td>2</td>
<td>0.0</td>
<td>0.007</td>
<td>8.9</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.2</td>
<td>0.16</td>
<td>0.51</td>
<td>48.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Approach</td>
<td>7</td>
<td></td>
<td>7</td>
<td>0.0</td>
<td>0.007</td>
<td>6.4</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.2</td>
<td>0.16</td>
<td>0.51</td>
<td>48.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>East: Sea Lake Swan Hill</td>
<td>4</td>
<td>L2</td>
<td>2</td>
<td>0.0</td>
<td>0.044</td>
<td>8.3</td>
<td>LOS A</td>
<td>0.2</td>
<td>1.6</td>
<td>0.15</td>
<td>0.16</td>
<td>55.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>T1</td>
<td>7</td>
<td>0.0</td>
<td>0.044</td>
<td>0.2</td>
<td>LOS A</td>
<td>0.2</td>
<td>1.6</td>
<td>0.15</td>
<td>0.16</td>
<td>55.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>R2</td>
<td>12</td>
<td>0.0</td>
<td>0.044</td>
<td>8.6</td>
<td>LOS A</td>
<td>0.2</td>
<td>1.6</td>
<td>0.15</td>
<td>0.15</td>
<td>55.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Approach</td>
<td>84</td>
<td></td>
<td>84</td>
<td>0.0</td>
<td>0.044</td>
<td>1.5</td>
<td>NA</td>
<td>0.2</td>
<td>1.6</td>
<td>0.15</td>
<td>0.15</td>
<td>55.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>North: Memorial Drive</td>
<td>7</td>
<td>L2</td>
<td>5</td>
<td>0.0</td>
<td>0.010</td>
<td>8.6</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.2</td>
<td>0.15</td>
<td>0.51</td>
<td>48.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>T1</td>
<td>2</td>
<td>0.0</td>
<td>0.010</td>
<td>7.3</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.2</td>
<td>0.15</td>
<td>0.51</td>
<td>48.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>R2</td>
<td>2</td>
<td>0.0</td>
<td>0.010</td>
<td>8.8</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.2</td>
<td>0.15</td>
<td>0.51</td>
<td>48.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Approach</td>
<td>11</td>
<td></td>
<td>11</td>
<td>0.0</td>
<td>0.010</td>
<td>8.4</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.2</td>
<td>0.15</td>
<td>0.51</td>
<td>48.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>West: Sea Lake Swan Hill</td>
<td>10</td>
<td>L2</td>
<td>2</td>
<td>0.0</td>
<td>0.031</td>
<td>8.4</td>
<td>LOS A</td>
<td>0.2</td>
<td>1.1</td>
<td>0.17</td>
<td>0.38</td>
<td>55.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>11</td>
<td>T1</td>
<td>5</td>
<td>0.0</td>
<td>0.031</td>
<td>0.2</td>
<td>LOS A</td>
<td>0.2</td>
<td>1.1</td>
<td>0.17</td>
<td>0.38</td>
<td>55.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>R2</td>
<td>3</td>
<td>0.0</td>
<td>0.031</td>
<td>8.6</td>
<td>LOS A</td>
<td>0.2</td>
<td>1.1</td>
<td>0.17</td>
<td>0.38</td>
<td>55.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Approach</td>
<td>69</td>
<td></td>
<td>69</td>
<td>0.0</td>
<td>0.031</td>
<td>0.9</td>
<td>NA</td>
<td>0.2</td>
<td>1.1</td>
<td>0.17</td>
<td>0.38</td>
<td>55.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All Vehicles</td>
<td>162</td>
<td></td>
<td>162</td>
<td>0.0</td>
<td>0.044</td>
<td>2.1</td>
<td>NA</td>
<td>0.2</td>
<td>1.6</td>
<td>0.16</td>
<td>0.18</td>
<td>54.8</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

CAPACITY ANALYSIS RESULTS
OPTION 1 - SEA LAKE-SWAN HILL ROAD LINK
14 LOTS PER HA
### MOVEMENT SUMMARY

**Site:** INT 5 (1) - Gray Street/Yana Street - AM Existing

**Gray Street/Yana Street**
**Giveoway / Yold (Two-Way)**

| Movement Performance - Vehicles |  |
|-------------------------------|--
| **Mov ID** | **Mov** | **OD Mov** | **Demand Flows** | **HV %** | **Deg.Slots** | **y/c** | **Average Delay** | **sec** | **Level of Service** | **95% Back of Queue** | **Vehicles veh** | **Eff. Step Rate** | **vph** | **Effective Speed** | **kph** |
| South: Yana Street | 1 | L2 | 111 | 0.0 | 0.105 | 8.8 | LOS A | 0.4 | 2.8 | 0.25 | 0.34 | 47.9 |
| 2 | R2 | 112 | 0.0 | 0.155 | 11.4 | LOS B | 0.6 | 4.0 | 0.56 | 0.30 | 45.6 |
| Approach | 222 | 0.0 | 0.155 | 10.1 | LOS B | 0.6 | 4.0 | 0.37 | 0.72 | 46.7 |
| East: Gray Street | 4 | L2 | 123 | 0.0 | 0.132 | 8.2 | LOS A | 0.6 | 0.0 | 0.00 | 0.41 | 54.0 |
| 5 | T1 | 127 | 0.0 | 0.193 | 0.0 | LOS A | 0.3 | 0.0 | 0.00 | 0.41 | 54.0 |
| Approach | 251 | 0.0 | 0.193 | 4.0 | NA | 0.3 | 0.0 | 0.00 | 0.41 | 54.0 |
| West: Gray Street | 11 | T1 | 142 | 0.0 | 0.164 | 0.9 | LOS A | 0.9 | 6.5 | 0.38 | 0.36 | 50.2 |
| 12 | R2 | 127 | 0.0 | 0.104 | 9.2 | LOS A | 0.9 | 6.5 | 0.36 | 0.36 | 50.2 |
| Approach | 269 | 0.0 | 0.104 | 4.9 | NA | 0.9 | 6.5 | 0.38 | 0.36 | 50.2 |
| All Vehicles | 742 | 0.0 | 0.164 | 6.2 | NA | 0.9 | 6.5 | 0.25 | 0.48 | 50.3 |

**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.


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

**Site:** INT 5 {1} - Gray Street/Yana Street - AM Post Development

**Gray Street/Yana Street, Giveway/Yield (Two-Way)**

### Movement Performance - Vehicles

<table>
<thead>
<tr>
<th>Mov ID</th>
<th>OD Mov</th>
<th>Demand F1ow %</th>
<th>Total Vehl</th>
<th>HV (%)</th>
<th>Demand Sat.</th>
<th>Delay Delay sec</th>
<th>Level of Service</th>
<th>95% Back of Queue, Distance m</th>
<th>Prop. Queue</th>
<th>Effective Stop Rate veh</th>
<th>Average Speed km/h</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>South: Yana Street</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>L2</td>
<td>338</td>
<td>0.0</td>
<td>0.228</td>
<td>6.5</td>
<td>LOS A</td>
<td>1.5</td>
<td>10.6</td>
<td>0.33</td>
<td>0.90</td>
<td>52.6</td>
</tr>
<tr>
<td>3</td>
<td>R2</td>
<td>393</td>
<td>0.0</td>
<td>0.738</td>
<td>18.3</td>
<td>LOS C</td>
<td>6.1</td>
<td>42.8</td>
<td>0.83</td>
<td>1.25</td>
<td>44.7</td>
</tr>
<tr>
<td>Approach</td>
<td></td>
<td>731</td>
<td>0.0</td>
<td>0.738</td>
<td>12.9</td>
<td>LOS B</td>
<td>6.1</td>
<td>42.8</td>
<td>0.86</td>
<td>0.94</td>
<td>48.1</td>
</tr>
<tr>
<td><strong>East: Gray Street</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>L2</td>
<td>255</td>
<td>0.0</td>
<td>0.212</td>
<td>5.6</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.0</td>
<td>0.00</td>
<td>0.37</td>
<td>55.2</td>
</tr>
<tr>
<td>5</td>
<td>T1</td>
<td>146</td>
<td>0.0</td>
<td>0.212</td>
<td>0.0</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.0</td>
<td>0.00</td>
<td>0.37</td>
<td>56.7</td>
</tr>
<tr>
<td>Approach</td>
<td></td>
<td>461</td>
<td>0.0</td>
<td>0.212</td>
<td>3.5</td>
<td>NA</td>
<td>0.0</td>
<td>0.0</td>
<td>0.00</td>
<td>0.37</td>
<td>55.6</td>
</tr>
<tr>
<td><strong>West: Gray Street</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>T1</td>
<td>217</td>
<td>0.0</td>
<td>0.209</td>
<td>1.9</td>
<td>LOS A</td>
<td>1.8</td>
<td>12.3</td>
<td>0.55</td>
<td>0.33</td>
<td>55.6</td>
</tr>
<tr>
<td>12</td>
<td>R2</td>
<td>186</td>
<td>0.0</td>
<td>0.209</td>
<td>7.5</td>
<td>LOS A</td>
<td>1.8</td>
<td>12.3</td>
<td>0.55</td>
<td>0.33</td>
<td>53.9</td>
</tr>
<tr>
<td>Approach</td>
<td></td>
<td>405</td>
<td>0.0</td>
<td>0.209</td>
<td>4.5</td>
<td>NA</td>
<td>1.8</td>
<td>12.3</td>
<td>0.55</td>
<td>0.33</td>
<td>54.8</td>
</tr>
<tr>
<td><strong>All Vehicles</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1537</td>
<td>0.0</td>
<td>0.738</td>
<td>8.2</td>
<td>NA</td>
<td>6.1</td>
<td>42.8</td>
<td>0.43</td>
<td>0.83</td>
<td>51.6</td>
</tr>
</tbody>
</table>

**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.


HV (%) values are calculated for All Movement Classes of All Heavy Vehicles Model Designation.
### MOVEMENT SUMMARY

**Site:** INT 5 (1) - Gray Street/Yana Street - PM Existing

**Gray Street/Yana Street**
**Giveaway / Yold (Two-Way)**

#### Movement Performance - Vehicles

<table>
<thead>
<tr>
<th>Movement</th>
<th>OD Mov</th>
<th>Demand Flows</th>
<th>HV %</th>
<th>Deg. Stam</th>
<th>Average Delay</th>
<th>Level of Service</th>
<th>95% Back of Queue</th>
<th>Distance</th>
<th>Prop. Queue</th>
<th>Effective Stop Rate</th>
<th>Average Speed</th>
<th>km/h</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>South: Yana Street</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>L2</td>
<td>36</td>
<td>0.0</td>
<td>0.032</td>
<td>8.5</td>
<td>LOS A</td>
<td>0.1</td>
<td>0.8</td>
<td>0.15</td>
<td>0.92</td>
<td>48.3</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>R2</td>
<td>66</td>
<td>0.0</td>
<td>0.072</td>
<td>9.8</td>
<td>LOS A</td>
<td>0.3</td>
<td>1.8</td>
<td>0.35</td>
<td>0.99</td>
<td>47.2</td>
<td></td>
</tr>
<tr>
<td>Approach</td>
<td></td>
<td>102</td>
<td>0.0</td>
<td>0.072</td>
<td>9.3</td>
<td>LOS A</td>
<td>0.3</td>
<td>1.8</td>
<td>0.26</td>
<td>0.57</td>
<td>47.6</td>
<td></td>
</tr>
<tr>
<td><strong>East: Gray Street</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>L2</td>
<td>80</td>
<td>0.0</td>
<td>0.075</td>
<td>8.2</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.0</td>
<td>0.00</td>
<td>0.45</td>
<td>53.3</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>T1</td>
<td>63</td>
<td>0.0</td>
<td>0.076</td>
<td>9.0</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.0</td>
<td>0.00</td>
<td>0.45</td>
<td>53.3</td>
<td></td>
</tr>
<tr>
<td>Approach</td>
<td></td>
<td>143</td>
<td>0.0</td>
<td>0.075</td>
<td>4.6</td>
<td>NA</td>
<td>0.0</td>
<td>0.0</td>
<td>0.00</td>
<td>0.45</td>
<td>53.3</td>
<td></td>
</tr>
<tr>
<td><strong>West: Gray Street</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>T1</td>
<td>103</td>
<td>0.0</td>
<td>0.086</td>
<td>0.5</td>
<td>LOS A</td>
<td>0.5</td>
<td>3.2</td>
<td>0.26</td>
<td>0.27</td>
<td>52.5</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>R2</td>
<td>52</td>
<td>0.0</td>
<td>0.090</td>
<td>0.8</td>
<td>LOS A</td>
<td>0.5</td>
<td>3.2</td>
<td>0.26</td>
<td>0.27</td>
<td>52.5</td>
<td></td>
</tr>
<tr>
<td>Approach</td>
<td></td>
<td>155</td>
<td>0.0</td>
<td>0.086</td>
<td>3.2</td>
<td>NA</td>
<td>0.5</td>
<td>3.2</td>
<td>0.26</td>
<td>0.27</td>
<td>52.5</td>
<td></td>
</tr>
<tr>
<td><strong>All Vehicles</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>400</td>
<td></td>
<td>0.0</td>
<td>0.086</td>
<td>5.3</td>
<td>NA</td>
<td>0.5</td>
<td>3.2</td>
<td>0.17</td>
<td>0.43</td>
<td>51.4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**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.


HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Modal Designation.
# MOVEMENT SUMMARY

**Site:** INT 5 (1) - Gray Street/Yana Street - PM Post Development

Gray Street/Yana Street
Goway / Yold (Two-Way)

<table>
<thead>
<tr>
<th>Movement Performance - Vehicles</th>
<th>MOV ID</th>
<th>Mov</th>
<th>Demand Flows</th>
<th>Total Veh</th>
<th>HV %</th>
<th>Deg. Stats</th>
<th>Average Delay sec</th>
<th>Level of Service</th>
<th>95% Back of Queue Dist</th>
<th>Prop. Queue</th>
<th>Effective Stop Rate per veh</th>
<th>Average Speed km/h</th>
</tr>
</thead>
<tbody>
<tr>
<td>South: Yana Street</td>
<td>1</td>
<td>L2</td>
<td>149</td>
<td>0.141</td>
<td>6.2</td>
<td>LOS A</td>
<td>0.5</td>
<td>3.8</td>
<td>0.24</td>
<td>0.57</td>
<td>52.9</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>R2</td>
<td>207</td>
<td>0.381</td>
<td>12.2</td>
<td>LOS B</td>
<td>1.8</td>
<td>12.6</td>
<td>0.66</td>
<td>0.93</td>
<td>48.4</td>
<td></td>
</tr>
<tr>
<td>Approach</td>
<td>357</td>
<td></td>
<td>0.381</td>
<td>9.6</td>
<td></td>
<td>LOS A</td>
<td>1.8</td>
<td>12.6</td>
<td>0.46</td>
<td>0.78</td>
<td>50.2</td>
<td></td>
</tr>
<tr>
<td>East: Gray Street</td>
<td>4</td>
<td>L2</td>
<td>271</td>
<td>0.207</td>
<td>5.6</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.41</td>
<td>55.0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>T1</td>
<td>120</td>
<td>0.207</td>
<td>0.0</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.41</td>
<td>56.4</td>
<td></td>
</tr>
<tr>
<td>Approach</td>
<td>391</td>
<td></td>
<td>0.207</td>
<td>3.9</td>
<td></td>
<td>NA</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.41</td>
<td>55.4</td>
<td></td>
</tr>
<tr>
<td>West: Gray Street</td>
<td>11</td>
<td>T1</td>
<td>169</td>
<td>0.281</td>
<td>1.9</td>
<td>LOS A</td>
<td>1.7</td>
<td>12.2</td>
<td>0.54</td>
<td>0.41</td>
<td>55.1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>R2</td>
<td>236</td>
<td>0.281</td>
<td>7.4</td>
<td>LOS A</td>
<td>1.7</td>
<td>12.2</td>
<td>0.54</td>
<td>0.41</td>
<td>53.5</td>
<td></td>
</tr>
<tr>
<td>Approach</td>
<td>405</td>
<td></td>
<td>0.281</td>
<td>5.1</td>
<td></td>
<td>NA</td>
<td>1.7</td>
<td>12.2</td>
<td>0.54</td>
<td>0.41</td>
<td>54.1</td>
<td></td>
</tr>
<tr>
<td>All Vehicles</td>
<td>1153</td>
<td></td>
<td>0.381</td>
<td>6.1</td>
<td></td>
<td>NA</td>
<td>1.3</td>
<td>12.6</td>
<td>0.34</td>
<td>0.52</td>
<td>53.3</td>
<td></td>
</tr>
</tbody>
</table>

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 (Akcelik MFD). HV (%) values are calculated for All Movement Classes of All Heavy Vehicles Model Designation.
## MOVEMENT SUMMARY

**Site:** INT 5 (2) Gray Street/Yana Street - AM Existing

**Gray Street/Yana Street**

**Giveow / Yold (Two-Way)**

<table>
<thead>
<tr>
<th>Movement Performance - Vehicles</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mov ID</td>
<td>OD Mov</td>
<td>Demand Flows</td>
<td>HV %</td>
<td>Deg. Sam.</td>
<td>Delay sec</td>
<td>Average Delay</td>
<td>LOS</td>
<td>95% Back of Queue</td>
<td>Prop. Queued</td>
<td>Effective Stop Rate per veh</td>
</tr>
<tr>
<td>South: Yana Street</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>L2</td>
<td>0.0</td>
<td>111</td>
<td>0.105</td>
<td>8.8</td>
<td>LOS A</td>
<td>0.4</td>
<td>2.8</td>
<td>0.25</td>
<td>0.84</td>
<td>47.9</td>
</tr>
<tr>
<td>3</td>
<td>R2</td>
<td>0.0</td>
<td>112</td>
<td>0.152</td>
<td>11.1</td>
<td>LOS B</td>
<td>0.6</td>
<td>4.0</td>
<td>0.45</td>
<td>0.78</td>
<td>45.9</td>
</tr>
<tr>
<td>Approach</td>
<td></td>
<td></td>
<td>222</td>
<td>0.0</td>
<td>0.152</td>
<td>LOS A</td>
<td>0.6</td>
<td>4.0</td>
<td>0.37</td>
<td>0.71</td>
<td>46.9</td>
</tr>
<tr>
<td>East: Gray Street</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>L2</td>
<td>0.0</td>
<td>123</td>
<td>0.066</td>
<td>8.2</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.0</td>
<td>0.00</td>
<td>0.57</td>
<td>48.9</td>
</tr>
<tr>
<td>5</td>
<td>T1</td>
<td>0.0</td>
<td>127</td>
<td>0.065</td>
<td>0.0</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.0</td>
<td>0.00</td>
<td>0.39</td>
<td>60.0</td>
</tr>
<tr>
<td>Approach</td>
<td></td>
<td></td>
<td>251</td>
<td>0.0</td>
<td>0.066</td>
<td>NA</td>
<td>0.0</td>
<td>0.0</td>
<td>0.00</td>
<td>0.33</td>
<td>54.0</td>
</tr>
<tr>
<td>West: Gray Street</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>T1</td>
<td>0.0</td>
<td>142</td>
<td>0.073</td>
<td>0.0</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.0</td>
<td>0.00</td>
<td>0.30</td>
<td>60.0</td>
</tr>
<tr>
<td>12</td>
<td>R2</td>
<td>0.0</td>
<td>127</td>
<td>0.080</td>
<td>9.1</td>
<td>LOS A</td>
<td>0.4</td>
<td>2.9</td>
<td>0.35</td>
<td>0.55</td>
<td>47.4</td>
</tr>
<tr>
<td>Approach</td>
<td></td>
<td></td>
<td>269</td>
<td>0.0</td>
<td>0.088</td>
<td>NA</td>
<td>0.4</td>
<td>2.9</td>
<td>0.17</td>
<td>0.31</td>
<td>53.3</td>
</tr>
<tr>
<td>All Vehicles</td>
<td></td>
<td></td>
<td>742</td>
<td>0.0</td>
<td>0.152</td>
<td>NA</td>
<td>0.5</td>
<td>4.0</td>
<td>0.17</td>
<td>0.43</td>
<td>51.4</td>
</tr>
</tbody>
</table>

**Notes:**
- 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 signal 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.
- HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Modal Designation.
# MOVEMENT SUMMARY

**Site:** INT 5 (2) Gray Street/Yana Street - AM Post Development

**Gray Street/Yana Street**

**Giveaway / Yield (Two-Way)**

<table>
<thead>
<tr>
<th>Movement Performance - Vehicles</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mov ID</strong></td>
</tr>
<tr>
<td>----------</td>
</tr>
<tr>
<td><strong>South: Yana Street</strong></td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td><strong>Approach</strong></td>
</tr>
<tr>
<td><strong>East: Gray Street</strong></td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>5</td>
</tr>
<tr>
<td><strong>Approach</strong></td>
</tr>
<tr>
<td><strong>West: Gray Street</strong></td>
</tr>
<tr>
<td>11</td>
</tr>
<tr>
<td>12</td>
</tr>
<tr>
<td><strong>Approach</strong></td>
</tr>
<tr>
<td><strong>All Vehicles</strong></td>
</tr>
</tbody>
</table>

---

**Level of Service (LOS)**

- 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
- Standard Delay Model (SIDRA) is used. Control Delay includes geometric delay
- Gap Acceptance Capacity: SIDRA Standard (Akgulik MSD)
- HV (%) values are calculated for all movement classes of all heavy vehicles model designation

---

**Processed:** Wednesday, 18 June 2014 9:51:26 AM

Copyright © 2006-2014 Akgulik and Associates Pty Ltd

Project: P:\Synergy\Projects\GRP\GRP161T\SIDRA\June 2014\Sidra.sip\8000658, TRAFFIX GROUP PTY LTD, PLUS / Floating

---

- 361 -
## MOVEMENT SUMMARY

**Site:** INT 5 (2) Gray Street/Yana Street - PM Existing

**Giveoway / Yold (Two-Way)**

<table>
<thead>
<tr>
<th>Movement Performance - Vehicles</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mov. ID</strong></td>
</tr>
<tr>
<td>----------------</td>
</tr>
<tr>
<td><strong>South: Yana Street</strong></td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td><strong>Approach</strong></td>
</tr>
<tr>
<td><strong>East: Gray Street</strong></td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>5</td>
</tr>
<tr>
<td><strong>Approach</strong></td>
</tr>
<tr>
<td><strong>West: Gray Street</strong></td>
</tr>
<tr>
<td>11</td>
</tr>
<tr>
<td>12</td>
</tr>
<tr>
<td><strong>Approach</strong></td>
</tr>
<tr>
<td><strong>All Vehicles</strong></td>
</tr>
</tbody>
</table>

- **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.
- HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
# MOVEMENT SUMMARY

**Site:** INT 5 (2) Gray Street/Yana Street - PM Post Development

**Gray Street/Yana Street**
**Giveay / Yield (Two-Way)**

## Movement Performance - Vehicles

<table>
<thead>
<tr>
<th>Mov ID</th>
<th>OD Mov</th>
<th>Demand Flows</th>
<th>Total veh</th>
<th>HV %</th>
<th>Deg. Sat %</th>
<th>Average Delay sec</th>
<th>Level of Service</th>
<th>95% Back of Queue</th>
<th>Vehicles veh</th>
<th>Distance m</th>
<th>Prop. Queuet</th>
<th>Effective Stop Rate per veh</th>
<th>Average Speed km/h</th>
</tr>
</thead>
<tbody>
<tr>
<td>South: Yana Street:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>L2</td>
<td>149</td>
<td>0.0</td>
<td>0.141</td>
<td>6.2</td>
<td>LOS A</td>
<td>0.5</td>
<td>3.8</td>
<td>0.24</td>
<td>0.57</td>
<td>52.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>R2</td>
<td>207</td>
<td>0.0</td>
<td>0.363</td>
<td>11.6</td>
<td>LOS B</td>
<td>1.7</td>
<td>12.0</td>
<td>0.63</td>
<td>0.91</td>
<td>49.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Approach</td>
<td>357</td>
<td>0.0</td>
<td>0.363</td>
<td>9.3</td>
<td>LOS A</td>
<td>1.7</td>
<td>12.0</td>
<td>0.47</td>
<td>0.76</td>
<td>50.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>East: Gray Street:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>L2</td>
<td>271</td>
<td>0.0</td>
<td>0.146</td>
<td>5.6</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.0</td>
<td>0.06</td>
<td>0.38</td>
<td>53.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>T1</td>
<td>120</td>
<td>0.0</td>
<td>0.062</td>
<td>0.0</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.0</td>
<td>0.06</td>
<td>0.30</td>
<td>60.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Approach</td>
<td>391</td>
<td>0.0</td>
<td>0.146</td>
<td>3.6</td>
<td>NA</td>
<td>0.0</td>
<td>0.0</td>
<td>0.00</td>
<td>0.40</td>
<td>55.4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>West: Gray Street:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>T1</td>
<td>169</td>
<td>0.0</td>
<td>0.087</td>
<td>0.0</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.0</td>
<td>0.00</td>
<td>0.30</td>
<td>60.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>R2</td>
<td>236</td>
<td>0.0</td>
<td>0.188</td>
<td>7.0</td>
<td>LOS A</td>
<td>0.9</td>
<td>6.3</td>
<td>0.47</td>
<td>0.57</td>
<td>52.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Approach</td>
<td>405</td>
<td>0.0</td>
<td>0.188</td>
<td>4.1</td>
<td>NA</td>
<td>0.9</td>
<td>6.3</td>
<td>0.28</td>
<td>0.39</td>
<td>55.1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All Vehicles</td>
<td>1153</td>
<td>0.0</td>
<td>0.363</td>
<td>5.6</td>
<td>NA</td>
<td>1.7</td>
<td>12.0</td>
<td>0.24</td>
<td>0.51</td>
<td>53.7</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 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.


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

**Processed:** Wednesday, 18 June 2014 9:52:20 AM
**Copyright © 2006-2014 Akçayik and Associates Pty Ltd**
**www.sidrasolutions.com**
**Project:** P:Synergy/Projects/GRP1/GRP16571/SIDRA/June 2014/Sidra sip6 8000658, TRAFFIX GROUP PTY LTD, PLUS / Floating
## MOVEMENT SUMMARY

**Site:** INT 5 (3) Gray Street/Yana Street - AM Existing

Gray Street/Yana Street
Roundabout

### Movement Performance - Vehicles

<table>
<thead>
<tr>
<th>Mov ID</th>
<th>QD Mov</th>
<th>Demand Flow</th>
<th>%HV</th>
<th>Total veh/h</th>
<th>Deg.</th>
<th>Sam.</th>
<th>Deg.</th>
<th>Average Delay</th>
<th>LOS</th>
<th>%95 Back of</th>
<th>Queued</th>
<th>Eff Stop Rate</th>
<th>Average Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Total veh/h</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>sec</td>
<td></td>
<td>veh</td>
<td></td>
<td>per veh</td>
<td>km/h</td>
</tr>
<tr>
<td>South: Yana Street</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>L2</td>
<td>111</td>
<td>0.0</td>
<td>0.069</td>
<td>5.6</td>
<td></td>
<td></td>
<td>2.9</td>
<td>LOS A</td>
<td>0.4</td>
<td>0.36</td>
<td>0.30</td>
<td>50.4</td>
</tr>
<tr>
<td>3</td>
<td>R2</td>
<td>112</td>
<td>0.0</td>
<td>0.069</td>
<td>11.7</td>
<td></td>
<td></td>
<td>2.9</td>
<td>LOS B</td>
<td>0.4</td>
<td>0.36</td>
<td>1.23</td>
<td>45.4</td>
</tr>
<tr>
<td>Approach</td>
<td></td>
<td>222</td>
<td>0.0</td>
<td>0.069</td>
<td>8.6</td>
<td></td>
<td></td>
<td>2.9</td>
<td>LOS A</td>
<td>0.4</td>
<td>0.36</td>
<td>0.53</td>
<td>47.7</td>
</tr>
<tr>
<td>East: Gray Street</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>L2</td>
<td>123</td>
<td>0.0</td>
<td>0.185</td>
<td>5.9</td>
<td></td>
<td></td>
<td>8.4</td>
<td>LOS A</td>
<td>1.2</td>
<td>0.35</td>
<td>0.32</td>
<td>50.4</td>
</tr>
<tr>
<td>5</td>
<td>T1</td>
<td>127</td>
<td>0.0</td>
<td>0.185</td>
<td>5.0</td>
<td></td>
<td></td>
<td>8.4</td>
<td>LOS A</td>
<td>1.2</td>
<td>0.35</td>
<td>0.32</td>
<td>50.4</td>
</tr>
<tr>
<td>Approach</td>
<td></td>
<td>251</td>
<td>0.0</td>
<td>0.185</td>
<td>5.5</td>
<td></td>
<td></td>
<td>8.4</td>
<td>LOS A</td>
<td>1.2</td>
<td>0.35</td>
<td>0.46</td>
<td>50.4</td>
</tr>
<tr>
<td>West: Gray Street</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>T1</td>
<td>142</td>
<td>0.0</td>
<td>0.194</td>
<td>4.9</td>
<td></td>
<td></td>
<td>8.8</td>
<td>LOS A</td>
<td>1.3</td>
<td>0.32</td>
<td>1.11</td>
<td>48.3</td>
</tr>
<tr>
<td>12</td>
<td>R2</td>
<td>127</td>
<td>0.0</td>
<td>0.194</td>
<td>11.8</td>
<td></td>
<td></td>
<td>8.8</td>
<td>LOS B</td>
<td>1.3</td>
<td>0.32</td>
<td>1.11</td>
<td>48.3</td>
</tr>
<tr>
<td>Approach</td>
<td></td>
<td>269</td>
<td>0.0</td>
<td>0.194</td>
<td>8.2</td>
<td></td>
<td></td>
<td>8.8</td>
<td>LOS A</td>
<td>1.3</td>
<td>0.32</td>
<td>0.55</td>
<td>48.3</td>
</tr>
<tr>
<td>All Vehicles</td>
<td></td>
<td>742</td>
<td>0.0</td>
<td>0.194</td>
<td>7.4</td>
<td></td>
<td></td>
<td>8.8</td>
<td>LOS A</td>
<td>1.3</td>
<td>0.32</td>
<td>0.52</td>
<td>48.8</td>
</tr>
</tbody>
</table>

Level of Service (LOS): Method: Delay (HCM 2000).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Processed: Monday, 12 May 2014 3:31:28 PM
Copyright © 2000-2013 Akcelik and Associates Pty Ltd
SIDRA INTERSECTION 6.0.17.4466
Project: P:\Synergy\Projects\GRP1\GRP16071\SIDRA\May2014\Sidra 4.sp6
8000958. TRAFFIX GROUP PTY LTD, PLUS / Floating
## MOVEMENT SUMMARY

**Site:** INT 5 (3) Gray Street/Yana Street - AM Post Development

**Gray Street/Yana Street**

### Roundabout

<table>
<thead>
<tr>
<th>Movement Performance - Vehicles</th>
</tr>
</thead>
<tbody>
<tr>
<td>MV ID</td>
</tr>
<tr>
<td>-------</td>
</tr>
<tr>
<td><strong>South: Yana Street</strong></td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>East: Gray Street</strong></td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>5</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>West: Gray Street</strong></td>
</tr>
<tr>
<td>11</td>
</tr>
<tr>
<td>12</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>All Vehicles</strong></td>
</tr>
<tr>
<td>1537</td>
</tr>
</tbody>
</table>

**Level of Service (LOS) Method: Delay (HCM 2000).**

Roundabout LOS Method: Same as Signalised Intersections.

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

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.


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

---

Processed: Wednesday, 16 June 2014 9:54 AM

Copyright © 2006-2014 Akcelik and Associates Pty Ltd

SIDRA INTERSECTION 6.2.20.4680

Project: P:\Synergy\Projects\CRP1\CRP16171\SIDRA\June 2014\SIDRA unzip 8000658 TRAFFIC GROUP PTY LTD, PLUS / Routing
# MOVEMENT SUMMARY

**Site:** INT 5 (3) Gray Street/Yana Street - PM Existing

Gray Street/Yana Street

## Roundsbout

### Movement Performance - Vehicles

<table>
<thead>
<tr>
<th>Mov ID</th>
<th>OD</th>
<th>Mov</th>
<th>Demand Flows</th>
<th>HV %</th>
<th>Deg. Sum</th>
<th>Average Delay</th>
<th>Level of Service</th>
<th>95% Back of Queue</th>
<th>Vehicles</th>
<th>Prop. Queue</th>
<th>Effective Stop Rate per veh</th>
<th>Average Speed km/h</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Total veh/h</td>
<td></td>
<td></td>
<td>sec</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>South: Yana Street</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>L2</td>
<td>35</td>
<td>0.0</td>
<td>0.021</td>
<td>5.4</td>
<td>LOS A</td>
<td>0.1</td>
<td>0.8</td>
<td>0.16</td>
<td>0.36</td>
<td>51.2</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>R2</td>
<td>65</td>
<td>0.0</td>
<td>0.039</td>
<td>11.4</td>
<td>LOS B</td>
<td>0.2</td>
<td>1.5</td>
<td>0.16</td>
<td>1.25</td>
<td>45.9</td>
</tr>
<tr>
<td>Approach</td>
<td></td>
<td></td>
<td>102</td>
<td>0.0</td>
<td>0.039</td>
<td>9.3</td>
<td>LOS A</td>
<td>0.2</td>
<td>1.5</td>
<td>0.16</td>
<td>0.56</td>
<td>47.5</td>
</tr>
<tr>
<td>East: Gray Street</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>L2</td>
<td>80</td>
<td>0.0</td>
<td>0.096</td>
<td>5.5</td>
<td>LOS A</td>
<td>0.5</td>
<td>4.0</td>
<td>0.19</td>
<td>0.84</td>
<td>51.5</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>T1</td>
<td>63</td>
<td>0.0</td>
<td>0.096</td>
<td>4.6</td>
<td>LOS A</td>
<td>0.5</td>
<td>4.0</td>
<td>0.16</td>
<td>0.84</td>
<td>51.5</td>
</tr>
<tr>
<td>Approach</td>
<td></td>
<td></td>
<td>143</td>
<td>0.0</td>
<td>0.096</td>
<td>5.1</td>
<td>LOS A</td>
<td>0.5</td>
<td>4.0</td>
<td>0.16</td>
<td>0.42</td>
<td>51.5</td>
</tr>
<tr>
<td>West: Gray Street</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td></td>
<td>T1</td>
<td>103</td>
<td>0.0</td>
<td>0.106</td>
<td>4.7</td>
<td>LOS A</td>
<td>0.5</td>
<td>4.2</td>
<td>0.22</td>
<td>1.31</td>
<td>49.7</td>
</tr>
<tr>
<td>12</td>
<td></td>
<td>R2</td>
<td>52</td>
<td>0.0</td>
<td>0.106</td>
<td>11.5</td>
<td>LOS B</td>
<td>0.5</td>
<td>4.2</td>
<td>0.22</td>
<td>1.31</td>
<td>49.7</td>
</tr>
<tr>
<td>Approach</td>
<td></td>
<td></td>
<td>155</td>
<td>0.0</td>
<td>0.106</td>
<td>7.0</td>
<td>LOS A</td>
<td>0.5</td>
<td>4.4</td>
<td>0.22</td>
<td>0.51</td>
<td>49.7</td>
</tr>
<tr>
<td>All Vehicles</td>
<td></td>
<td></td>
<td>400</td>
<td>0.0</td>
<td>0.106</td>
<td>6.9</td>
<td>LOS A</td>
<td>0.5</td>
<td>4.4</td>
<td>0.26</td>
<td>0.49</td>
<td>49.7</td>
</tr>
</tbody>
</table>

Level of Service (LOS): Method: Delay (HCM 2000).
Roundsbout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundsbout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
## MOVEMENT SUMMARY

**Site:** INT 5 (3) Gray Street/Yana Street - PM Post Development

**Gray Street/Yana Street**

### Roundabout

#### Movement Performance - Vehicles

<table>
<thead>
<tr>
<th>Mov ID</th>
<th>OD Mov</th>
<th>Demand Flows (veh)</th>
<th>% HV</th>
<th>Delay (sec)</th>
<th>Average Speed (km/h)</th>
<th>Level of Service</th>
<th>95% Back of Queue Distance (m)</th>
<th>Prop. Queuet</th>
<th>Effective Stop Rate per veh</th>
<th>Average Speed (km/h)</th>
</tr>
</thead>
<tbody>
<tr>
<td>South: Yana Street</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>L2</td>
<td>149</td>
<td>0.0</td>
<td>0.093</td>
<td>3.7</td>
<td>LOS A</td>
<td>0.5</td>
<td>4.2</td>
<td>0.31</td>
<td>0.42</td>
</tr>
<tr>
<td>3</td>
<td>R2</td>
<td>207</td>
<td>0.0</td>
<td>0.129</td>
<td>9.6</td>
<td>LOS A</td>
<td>0.9</td>
<td>6.0</td>
<td>0.32</td>
<td>0.39</td>
</tr>
<tr>
<td>Approach</td>
<td>357</td>
<td>0.0</td>
<td>0.129</td>
<td>7.2</td>
<td>LOS A</td>
<td>0.9</td>
<td>6.0</td>
<td>0.31</td>
<td>0.52</td>
<td>54.2</td>
</tr>
</tbody>
</table>

| East: Gray Street |
| 4   | L2   | 271 | 0.0 | 0.222 | 4.9 | LOS A | 2.4 | 16.7 | 0.54 | 0.53 | 54.4 |
| 5   | T1   | 120 | 0.0 | 0.222 | 5.0 | LOS A | 2.4 | 16.7 | 0.54 | 0.53 | 56.1 |
| Approach | 391 | 0.0 | 0.222 | 4.9 | LOS A | 2.4 | 16.7 | 0.54 | 0.53 | 54.9 |

| West: Gray Street |
| 11  | T1   | 169 | 0.0 | 0.221 | 4.8 | LOS A | 2.3 | 16.1 | 0.46 | 0.50 | 53.9 |
| 12  | R2   | 255 | 0.0 | 0.221 | 10.5 | LOS B | 2.3 | 16.1 | 0.46 | 0.39 | 54.3 |
| Approach | 405 | 0.0 | 0.221 | 6.1 | LOS A | 2.3 | 16.1 | 0.49 | 0.39 | 54.1 |

| All Vehicles | 1153 | 0.0 | 0.222 | 6.7 | LOS A | 2.4 | 16.7 | 0.45 | 0.55 | 54.4 |

*Level of Service (LOS): Method: Delay (HCM 2000).
Roundabout LOS Method: Same as Signalled Intersections;
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.*
MOVEMENT SUMMARY

Site: Intersection 5 Option 1 - AM Post - 14 lots per Ha
Gray Street/Fana Street
Signals - Fixed Time  Cycle Time = 50 seconds (Practical Cycle Time)

|| Mov ID | OD Mov | Demand Flows | Deg. | Average Delay | Level of Service | 95% Back of Queue | Prop Queued | Effective Stop Rate | Average Speed |
|-------|-------|-------------|------|--------------|-----------------|-------------------|-------------|-------------------|--------------|
|       |       | Total veh | HV % | Sat. Vol |                |                   |             |                   |              |
| South: Yena Street | 1 | L2 | 330 | 0.0 | 0.433 | 16.9 | LOS B | 0.0 | 41.9 | 0.75 | 0.76 | 40.3 |
| | 3 | R2 | 363 | 0.0 | 0.503 | 17.3 | LOS B | 7.2 | 50.6 | 0.76 | 0.80 | 45.9 |
| | Approach | 731 | 0.0 | 0.503 | 17.1 | LOS B | 7.2 | 50.6 | 0.77 | 0.79 | 45.8 |
| East: Grey Street | 4 | L2 | 255 | 0.0 | 0.180 | 6.5 | LOS A | 0.9 | 6.2 | 0.29 | 0.66 | 52.7 |
| | 5 | T1 | 146 | 0.0 | 0.221 | 13.0 | LOS B | 2.5 | 18.3 | 0.75 | 0.60 | 49.4 |
| | Approach | 401 | 0.0 | 0.221 | 8.8 | LOS A | 2.5 | 18.3 | 0.46 | 0.64 | 51.5 |
| West: Gray Street | 11 | T1 | 217 | 0.0 | 0.327 | 12.5 | LOS B | 4.0 | 28.3 | 0.78 | 0.65 | 49.1 |
| | 12 | R2 | 188 | 0.0 | 0.512 | 22.1 | LOS C | 4.0 | 28.3 | 0.87 | 0.80 | 43.3 |
| | Approach | 406 | 0.0 | 0.512 | 17.6 | LOS B | 4.0 | 28.3 | 0.83 | 0.72 | 46.3 |
| All Vehicles | 1657 | 0.0 | 0.512 | 15.1 | LOS B | 7.2 | 50.6 | 0.70 | 0.73 | 47.2 |

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

<table>
<thead>
<tr>
<th>Mov ID</th>
<th>Description</th>
<th>Demand Flow (fltr)</th>
<th>Average Delay (sec)</th>
<th>Level of Service</th>
<th>Average Back of Queue (ped)</th>
<th>Prop Queued</th>
<th>Effective Stop Rate (ped/l)</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1</td>
<td>South Full Crossing</td>
<td>53</td>
<td>17.7</td>
<td>LOS B</td>
<td>0.1</td>
<td>0.1</td>
<td>0.84</td>
</tr>
<tr>
<td>P4</td>
<td>West Full Crossing</td>
<td>63</td>
<td>14.5</td>
<td>LOS B</td>
<td>0.1</td>
<td>0.1</td>
<td>0.76</td>
</tr>
<tr>
<td>All Pedestrians</td>
<td>106</td>
<td>16.1</td>
<td>LOS B</td>
<td>0.80</td>
<td>0.80</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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.

Processed: Thursday, 16 June 2016 12:11:36 PM
Copyright © 2008-2014 Acelik and Associates Pty Ltd
SIDRA INTERSECTION 6.0.20.4660
www.sidrasolutions.com
Project: P/SynergyProjects/GFP1/GFP1837/ISIDRA.June 2016.19.6.14/Sidra.sp6
8000058, TRAFFIC GROUP PTY LTD, FLUS / Floating
PHASING SUMMARY

Site: Intersection 5 Option 1 - AM Post - 14 lots per Ha
Gray Street/Anza Street
Signals - Fixed Time  Cycle Time = 50 seconds (Practical Cycle Time)

Phase times determined by the program
Sequence: Two-Phase
Movement Class: All Movement Classes
Input Sequence: A, B
Output Sequence: A, B

Phase Timing Results

<table>
<thead>
<tr>
<th>Phase</th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reference Phase</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Phase Change Time (sec)</td>
<td>0</td>
<td>21</td>
</tr>
<tr>
<td>Green Time (sec)</td>
<td>17</td>
<td>21</td>
</tr>
<tr>
<td>Yellow Time (sec)</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>All-Red Time (sec)</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Phase Time (sec)</td>
<td>23</td>
<td>27</td>
</tr>
<tr>
<td>Phase Split</td>
<td>46%</td>
<td>54%</td>
</tr>
</tbody>
</table>

- Normal Movement
- Slip/Bypass-Lane Movement
- Stopped Movement
- Other Movement Class Running
- Mixed Running & Stopped Movement Classes
- Undetected Movement
- Permitted/Opposed
- Opposed Slip/Bypass-Lane
- Turn On Red
- Other Movement Class Stopped

Processed: Thursday, 19 June 2014 12:11:36 PM
Copyright © 2009-2014 Acelik and Associates Pty Ltd
www.sidrasolutions.com
## Movement Summary

**Site:** Intersection 5 Option 1 - PM Post - 14 lots per Ha

Gray Street/Yana Street  
Signals - Fixed Time  
Cycle Time = 50 seconds (Practical Cycle Time)

### Movement Performance - Vehicles

<table>
<thead>
<tr>
<th>Movement ID</th>
<th>QD Mov</th>
<th>Demand Flows (Total veh/h)</th>
<th>HV %</th>
<th>Deg. Sat. (v/c)</th>
<th>Average Delay (sec)</th>
<th>Level of Service</th>
<th>Percentage Back of Queues (veh)</th>
<th>Prop. Queue (veh)</th>
<th>Effective Stop Rate per veh</th>
<th>Average Speed (km/h)</th>
</tr>
</thead>
<tbody>
<tr>
<td>South: Yana Street</td>
<td>1 L2</td>
<td>149</td>
<td>0.0</td>
<td>0.268</td>
<td>20.4</td>
<td>LOS C</td>
<td>2.9</td>
<td>20.1</td>
<td>0.80</td>
<td>0.76</td>
</tr>
<tr>
<td></td>
<td>3 R2</td>
<td>207</td>
<td>0.0</td>
<td>0.372</td>
<td>20.9</td>
<td>LOS C</td>
<td>4.1</td>
<td>28.9</td>
<td>0.83</td>
<td>0.78</td>
</tr>
<tr>
<td></td>
<td>Approach</td>
<td>357</td>
<td>0.0</td>
<td>0.372</td>
<td>20.7</td>
<td>LOS C</td>
<td>4.1</td>
<td>28.9</td>
<td>0.82</td>
<td>0.77</td>
</tr>
<tr>
<td>East: Gray Street</td>
<td>4 L2</td>
<td>271</td>
<td>0.0</td>
<td>0.192</td>
<td>6.5</td>
<td>LOS A</td>
<td>1.0</td>
<td>6.7</td>
<td>0.36</td>
<td>0.35</td>
</tr>
<tr>
<td></td>
<td>5 T1</td>
<td>120</td>
<td>0.0</td>
<td>0.134</td>
<td>8.4</td>
<td>LOS A</td>
<td>1.7</td>
<td>11.9</td>
<td>0.61</td>
<td>0.48</td>
</tr>
<tr>
<td></td>
<td>Approach</td>
<td>391</td>
<td>0.0</td>
<td>0.192</td>
<td>7.1</td>
<td>LOS A</td>
<td>1.7</td>
<td>11.9</td>
<td>0.38</td>
<td>0.30</td>
</tr>
<tr>
<td>West: Gray Street</td>
<td>11 T1</td>
<td>169</td>
<td>0.0</td>
<td>0.180</td>
<td>8.7</td>
<td>LOS A</td>
<td>2.5</td>
<td>17.3</td>
<td>0.62</td>
<td>0.51</td>
</tr>
<tr>
<td></td>
<td>12 R2</td>
<td>236</td>
<td>0.0</td>
<td>0.459</td>
<td>16.6</td>
<td>LOS B</td>
<td>4.2</td>
<td>29.6</td>
<td>0.75</td>
<td>0.76</td>
</tr>
<tr>
<td></td>
<td>Approach</td>
<td>405</td>
<td>0.0</td>
<td>0.459</td>
<td>13.3</td>
<td>LOS B</td>
<td>4.2</td>
<td>29.6</td>
<td>0.69</td>
<td>0.57</td>
</tr>
<tr>
<td>All Vehicles</td>
<td>1,153</td>
<td>0.0</td>
<td>0.459</td>
<td>13.5</td>
<td>LOS B</td>
<td>4.2</td>
<td>29.6</td>
<td>0.63</td>
<td>0.58</td>
<td>48.2</td>
</tr>
</tbody>
</table>

Level of Service (LOS) Method: Delay (HCM 2000).  
Vehicle movement LOS values are based on average delay per movement.  
Intersection and Approach LOS values are based on average delay for all vehicle movements.  
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.  
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

### Movement Performance - Pedestrians

<table>
<thead>
<tr>
<th>Movement ID</th>
<th>Description</th>
<th>Demand Flow (ped/h)</th>
<th>Average Delay (sec)</th>
<th>Level of Service</th>
<th>Average Back of Queues (m)</th>
<th>Prop. Queue (ped)</th>
<th>Effective Pedestrian Step Rate per ped</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1</td>
<td>South Full Crossing</td>
<td>53</td>
<td>13.0</td>
<td>LOS B</td>
<td>0.1</td>
<td>0.1</td>
<td>0.72</td>
</tr>
<tr>
<td>P4</td>
<td>West Full Crossing</td>
<td>53</td>
<td>19.4</td>
<td>LOS B</td>
<td>0.1</td>
<td>0.1</td>
<td>0.86</td>
</tr>
<tr>
<td>All Pedestrians</td>
<td>105</td>
<td>16.2</td>
<td>LOS B</td>
<td>0.80</td>
<td>0.80</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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.

Processed: Thursday, 19 June 2014 12:13:28 PM  
Copyright © 2006-2014 Akcelik and Associates Pty Ltd  
www.sidrasolutions.com  
SIDRA INTERSECTION 6.0.20.4660  
Project: PLUS/Plus / Floating  
8000985. TRAFFIX GROUP PTY LTD, PLUS / Floating
**PHASING SUMMARY**

- Site: Intersection 5 Option 1 - PM Post - 14 lots per Ha

Gray Street/Fana Street
Signals - Fixed Time  Cycle Time = 50 seconds (Practical Cycle Time)

Phase times determined by the program
Sequence: Two-Phase
Movement Class: All Movement Classes
Input Sequence: A, B
Output Sequence: A, B

<table>
<thead>
<tr>
<th>Phase Timing Results</th>
<th>Phase</th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reference Phase</td>
<td>Yes</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Phase Change Time (sec)</td>
<td>0</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Green Time (sec)</td>
<td>23</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Yellow Time (sec)</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Al-Red Time (sec)</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Phase Time (sec)</td>
<td>29</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td>Phase Split</td>
<td>58 %</td>
<td>42 %</td>
<td></td>
</tr>
</tbody>
</table>

**Diagram:**
- Phase A
- Phase B

**Legend:**
- Normal Movement
- Slip/Bypass-Lane Movement
- Stopped Movement
- Other Movement Class Running
- Mixed Running & Stopped Movement Classes
- Undetected Movement
- Permitted/Opposed
- Opposed Slip/Bypass-Lane
- Turn On Red
- Other Movement Class Stopped

**Project:**
- Synergy/Projects/rgfpt1/rgfpt1037/ID/PRA/June 29/2014/15:14/Sidra.spd
- 800006, TRAFFIK GROUP PTY LTD, PLUS / Floating

**Processed:**
- Thursday, 19 June 2014 12:13:28 PM

**Copyright © 2009-2014 Accelik and Associates Pty Ltd**

**Sidra**
**INTERSECTION 6**
SITE LAYOUT

Site: INT 7 - Gray Street/Link 6 - AM Existing
Gray Street/Link 6
Give way / Yield (Two-Way)
**MOVEMENT SUMMARY**

**Site: INT 7 - Gray Street/Link 6 - AM Existing**

**Gray Street/Link 6**

**Giveaway / Yield (Two-Way)**

<table>
<thead>
<tr>
<th>Movement Performance - Vehicles</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>South: Link 6</strong></td>
</tr>
<tr>
<td>MV</td>
</tr>
<tr>
<td>----</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>East: Gray Street</strong></td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>5</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>West: Gray Street</strong></td>
</tr>
<tr>
<td>11</td>
</tr>
<tr>
<td>12</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>All Vehicles</strong></td>
</tr>
<tr>
<td>129</td>
</tr>
</tbody>
</table>

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

Processed: Wednesday, 18 June 2014 11:06:39 AM
Copyright © 2006-2014 Akcakil and Associates Pty Ltd
www.sidracolutions.com
Project: P/Synergy/Projects/GRP1/GRP16171SIDRA/June 2014/Sidra.zip
8000058, TRAFFIX GROUP PTY LTD, PLUS / Floating
# MOVEMENT SUMMARY

**Site: INT 7 - Gray Street/Link 6 - AM Post Development**

Gray Street/Link 6  
Give-Way / Yield (Two-Way)

## Movement Performance - Vehicles

<table>
<thead>
<tr>
<th>Mov ID</th>
<th>OD Mov</th>
<th>Demand Flows Total veh/h</th>
<th>HV %</th>
<th>Delay Sat v/c</th>
<th>Average Delay sec</th>
<th>Level of Service</th>
<th>95% Back of Queue Dist. m</th>
<th>Prop. Queued</th>
<th>Effective Stop Rate per veh</th>
<th>Average Speed k/nph</th>
</tr>
</thead>
<tbody>
<tr>
<td>South: Link 6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>L2</td>
<td>550</td>
<td>0.0</td>
<td>0.491</td>
<td>6.0</td>
<td>LOS A</td>
<td>3.0</td>
<td>20.9</td>
<td>0.25</td>
<td>0.55</td>
</tr>
<tr>
<td>3</td>
<td>R2</td>
<td>55</td>
<td>0.0</td>
<td>0.081</td>
<td>6.9</td>
<td>LOS A</td>
<td>0.2</td>
<td>1.5</td>
<td>0.36</td>
<td>0.93</td>
</tr>
<tr>
<td>Approach</td>
<td>611</td>
<td>0.0</td>
<td>0.491</td>
<td>6.1</td>
<td>LOS A</td>
<td>3.0</td>
<td>20.9</td>
<td>0.26</td>
<td>0.55</td>
<td>52.8</td>
</tr>
<tr>
<td>East: Gray Street</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>L2</td>
<td>18</td>
<td>0.0</td>
<td>0.039</td>
<td>5.5</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.0</td>
<td>0.00</td>
<td>0.13</td>
</tr>
<tr>
<td>5</td>
<td>T1</td>
<td>50</td>
<td>0.0</td>
<td>0.039</td>
<td>0.0</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.0</td>
<td>0.00</td>
<td>0.13</td>
</tr>
<tr>
<td>Approach</td>
<td>75</td>
<td>0.0</td>
<td>0.039</td>
<td>1.2</td>
<td>NA</td>
<td>0.0</td>
<td>0.0</td>
<td>0.00</td>
<td>0.13</td>
<td>58.5</td>
</tr>
<tr>
<td>West: Gray Street</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>T1</td>
<td>65</td>
<td>0.0</td>
<td>0.033</td>
<td>0.0</td>
<td>LOS A</td>
<td>0.0</td>
<td>0.0</td>
<td>0.00</td>
<td>0.30</td>
</tr>
<tr>
<td>12</td>
<td>R2</td>
<td>145</td>
<td>0.0</td>
<td>0.080</td>
<td>5.7</td>
<td>LOS A</td>
<td>0.4</td>
<td>2.9</td>
<td>0.16</td>
<td>0.55</td>
</tr>
<tr>
<td>Approach</td>
<td>211</td>
<td>0.0</td>
<td>0.086</td>
<td>4.0</td>
<td>NA</td>
<td>0.4</td>
<td>2.9</td>
<td>0.12</td>
<td>0.38</td>
<td>54.9</td>
</tr>
<tr>
<td>All Vehicles</td>
<td>896</td>
<td>0.0</td>
<td>0.491</td>
<td>5.2</td>
<td>NA</td>
<td>3.0</td>
<td>20.9</td>
<td>0.26</td>
<td>0.48</td>
<td>53.7</td>
</tr>
</tbody>
</table>

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

---

Processed: Wednesday, 18 June 2014 11:04:58 AM  
Copyright © 2006-2014 Akcelik and Associates Pty Ltd  
www.sidracollections.com  
Project: P:\Synergy\Projects\GRP\1GRP16271\SIDRA\June 2014\Sidra.sip\  
8000058, TRAFFIX GROUP PTY LTD, PLUS / Floating
# MOVEMENT SUMMARY

Site: INT 7 - Gray Street/Link 6 - PM Existing

Gray Street/Link 6
Giveaway / Yield (Two-Way)

<table>
<thead>
<tr>
<th>Movement Performance - Vehicles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mov ID</td>
</tr>
<tr>
<td>--------</td>
</tr>
<tr>
<td>South: Link 6</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>Approach</td>
</tr>
<tr>
<td>East: Gray Street</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>5</td>
</tr>
<tr>
<td>Approach</td>
</tr>
<tr>
<td>West: Gray Street</td>
</tr>
<tr>
<td>11</td>
</tr>
<tr>
<td>12</td>
</tr>
<tr>
<td>Approach</td>
</tr>
<tr>
<td>All Vehicles</td>
</tr>
</tbody>
</table>

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.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicles Model Designation.
### MOVEMENT SUMMARY

**Site:** INT 7 - Gray Street/Link 6 - PM Post Development

**Gray Street/Link 6**
**Giveaway / Yield (Two-Way)**

<table>
<thead>
<tr>
<th>Movement Performance - Vehicles</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mov ID</strong></td>
</tr>
<tr>
<td>----------</td>
</tr>
<tr>
<td><strong>South:</strong> Link 6</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td><strong>Approach</strong></td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td><strong>East:</strong> Gray Street</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>5</td>
</tr>
<tr>
<td><strong>Approach</strong></td>
</tr>
<tr>
<td>9</td>
</tr>
<tr>
<td><strong>West:</strong> Gray Street</td>
</tr>
<tr>
<td>11</td>
</tr>
<tr>
<td>12</td>
</tr>
<tr>
<td><strong>Approach</strong></td>
</tr>
<tr>
<td>475</td>
</tr>
<tr>
<td><strong>All Vehicles</strong></td>
</tr>
<tr>
<td>881</td>
</tr>
</tbody>
</table>

**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 signal 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.
- HV (%) values are calculated for All Movement Classes of All Heavy Vehicles Model Designation.

---

Processed: Wednesday, 18 June 2014 11:01:37 AM

Copyright © 2006-2014 Akcelik and Associates Pty Ltd

Project: P/Synergy/Projects/GRP1/GRP16171/SIDRA/June 2014/Sidra/sip6

8000858, TRAFFIX GROUP PTY LTD, PLUS / Floating
SITE LAYOUT

Site: INT 8 - Sea Lake Swan Hill Road/Gray Street/Boobialla Drive - AM Existing

Sea Lake Swan Hill Road/Gray Street/Boobialla Drive
Roundabout
## MOVEMENT SUMMARY

**Site:** INT B - Sea Lake Swan Hill Road/Gray Street/Boobialla Drive - AM Existing

**Sea Lake Swan Hill Road/Gray Street/Boobialla Drive Roundabout**

### Movement Performance - Vehicles

<table>
<thead>
<tr>
<th>Mov ID</th>
<th>OD Mov</th>
<th>Demand Flows</th>
<th>Total veh/h</th>
<th>HV %</th>
<th>Average Delay sec</th>
<th>Level of Service</th>
<th>95% Back of Queue, veh</th>
<th>Queuer Distance, m</th>
<th>Prop. Queue, %</th>
<th>Effective Stop Rate, per vehicle</th>
<th>Average Speed, km/h</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>South: Gray Street</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 L2</td>
<td>17</td>
<td>0.0</td>
<td>0.040</td>
<td>5.5</td>
<td>LOS A</td>
<td>0.2</td>
<td>1.3</td>
<td>0.17</td>
<td>1.38</td>
<td>49.1</td>
<td></td>
</tr>
<tr>
<td>2 T1</td>
<td>15</td>
<td>0.0</td>
<td>0.040</td>
<td>4.6</td>
<td>LOS A</td>
<td>0.2</td>
<td>1.3</td>
<td>0.17</td>
<td>1.38</td>
<td>49.1</td>
<td></td>
</tr>
<tr>
<td>3 R2</td>
<td>24</td>
<td>0.0</td>
<td>0.040</td>
<td>11.4</td>
<td>LOS B</td>
<td>0.2</td>
<td>1.3</td>
<td>0.17</td>
<td>1.38</td>
<td>49.1</td>
<td></td>
</tr>
<tr>
<td><strong>Approach</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 L2</td>
<td>11</td>
<td>0.0</td>
<td>0.046</td>
<td>5.5</td>
<td>LOS A</td>
<td>0.2</td>
<td>1.6</td>
<td>0.17</td>
<td>1.11</td>
<td>48.8</td>
<td></td>
</tr>
<tr>
<td>5 T1</td>
<td>23</td>
<td>0.0</td>
<td>0.046</td>
<td>4.6</td>
<td>LOS A</td>
<td>0.2</td>
<td>1.6</td>
<td>0.17</td>
<td>1.11</td>
<td>48.8</td>
<td></td>
</tr>
<tr>
<td>6 R2</td>
<td>33</td>
<td>0.0</td>
<td>0.046</td>
<td>11.4</td>
<td>LOS B</td>
<td>0.2</td>
<td>1.6</td>
<td>0.17</td>
<td>1.11</td>
<td>48.8</td>
<td></td>
</tr>
<tr>
<td><strong>North: Boobialla Drive</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7 L2</td>
<td>92</td>
<td>0.0</td>
<td>0.085</td>
<td>5.8</td>
<td>LOS A</td>
<td>0.5</td>
<td>3.3</td>
<td>0.26</td>
<td>0.92</td>
<td>50.6</td>
<td></td>
</tr>
<tr>
<td>8 T1</td>
<td>39</td>
<td>0.0</td>
<td>0.085</td>
<td>4.8</td>
<td>LOS A</td>
<td>0.5</td>
<td>3.3</td>
<td>0.26</td>
<td>0.92</td>
<td>50.6</td>
<td></td>
</tr>
<tr>
<td>9 R2</td>
<td>2</td>
<td>0.0</td>
<td>0.085</td>
<td>11.7</td>
<td>LOS B</td>
<td>0.5</td>
<td>3.3</td>
<td>0.26</td>
<td>0.92</td>
<td>50.6</td>
<td></td>
</tr>
<tr>
<td><strong>Approach</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 L2</td>
<td>8</td>
<td>0.0</td>
<td>0.087</td>
<td>5.6</td>
<td>LOS A</td>
<td>0.3</td>
<td>2.3</td>
<td>0.19</td>
<td>0.33</td>
<td>50.8</td>
<td></td>
</tr>
<tr>
<td>11 T1</td>
<td>37</td>
<td>0.0</td>
<td>0.087</td>
<td>4.6</td>
<td>LOS A</td>
<td>0.3</td>
<td>2.3</td>
<td>0.19</td>
<td>0.33</td>
<td>50.8</td>
<td></td>
</tr>
<tr>
<td>12 R2</td>
<td>10</td>
<td>0.0</td>
<td>0.087</td>
<td>11.5</td>
<td>LOS B</td>
<td>0.3</td>
<td>2.3</td>
<td>0.19</td>
<td>0.33</td>
<td>50.8</td>
<td></td>
</tr>
<tr>
<td><strong>Approach</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13 L2</td>
<td>348</td>
<td>0.0</td>
<td>0.095</td>
<td>6.5</td>
<td>LOS A</td>
<td>0.5</td>
<td>3.3</td>
<td>0.21</td>
<td>0.49</td>
<td>50.0</td>
<td></td>
</tr>
</tbody>
</table>

Level of Service (LOS): Method: Delay (HCM 2000).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
HV (%) values are calculated for each Movement Class of All Heavy Vehicle Model Designation.

Processed: Monday, 12 May 2014 5:00:27 PM
SIDRA INTERSECTION 6.0.17.4488
Project: P:\Synergy\Projects\GRPI\GPP16371-SIDRA\May 2014\Sidra 4.sof6
8000958 TRAFFIX GROUP PTY LTD, PLUS: Floating

- 380 -
## MOVENT SUMMARY

### Site: INT 8 - Sea Lake Swan Hill Road/Gray Street/Boobialla Drive - AM Post Development

Sea Lake Swan Hill Road/Gray Street/Boobialla Drive
Roundabout

### Movement Performance - Vehicles

<table>
<thead>
<tr>
<th>Mov ID</th>
<th>OD Mov</th>
<th>Demand Flow Total veh/h</th>
<th>HV %</th>
<th>Delay Status/sec</th>
<th>Average Delay sec</th>
<th>Level of Service</th>
<th>95% Back of Queue Distance m</th>
<th>Prop. Queued</th>
<th>Effective Stop Rate per veh</th>
<th>Average Speed km/h</th>
</tr>
</thead>
<tbody>
<tr>
<td>South: Gray Street</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 L2</td>
<td>20 0.0 0.488 5.0</td>
<td>LOS A</td>
<td>3.3</td>
<td>26.7</td>
<td>0.57</td>
<td>0.57</td>
<td>508</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 T1</td>
<td>18 0.0 0.488 5.1</td>
<td>LOS A</td>
<td>3.3</td>
<td>26.7</td>
<td>0.57</td>
<td>0.57</td>
<td>522</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 R2</td>
<td>658 0.0 0.488 10.8</td>
<td>LOS B</td>
<td>3.3</td>
<td>26.7</td>
<td>0.57</td>
<td>0.57</td>
<td>526</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Approach</td>
<td>694 0.0 0.488 10.5</td>
<td>LOS B</td>
<td>3.3</td>
<td>26.7</td>
<td>0.57</td>
<td>0.57</td>
<td>525</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| East: Sea Lake Swan Hill |
| 4 L3 | 153 0.0 0.288 3.8 | LOS A | 1.9 | 13.3 | 0.26 | 0.50 | 539 |
| 5 T1 | 95 0.0 0.288 3.9 | LOS A | 1.9 | 13.3 | 0.29 | 0.50 | 556 |
| 6 R2 | 147 0.0 0.288 9.6 | LOS A | 1.9 | 13.3 | 0.29 | 0.50 | 560 |
| Approach | 395 0.0 0.288 6.0 | LOS A | 1.9 | 13.3 | 0.26 | 0.50 | 551 |

| North: Boobialla Drive |
| 7 L2 | 315 0.0 0.578 16.4 | LOS B | 6.0 | 42.3 | 0.95 | 1.12 | 47.2 |
| 8 T1 | 53 0.0 0.578 16.5 | LOS B | 6.0 | 42.3 | 0.98 | 1.12 | 48.5 |
| 9 R2 | 11 0.0 0.578 22.2 | LOS C | 6.0 | 42.3 | 0.96 | 1.12 | 48.8 |
| Approach | 379 0.0 0.578 16.6 | LOS B | 6.0 | 42.3 | 0.96 | 1.12 | 47.4 |

| West: Sea Lake Swan Hill |
| 10 L2 | 11 0.0 0.492 9.8 | LOS A | 4.3 | 29.8 | 0.85 | 0.32 | 515 |
| 11 T1 | 362 0.0 0.492 10.0 | LOS A | 4.3 | 29.8 | 0.85 | 0.32 | 531 |
| 12 R2 | 19 0.0 0.492 15.6 | LOS B | 4.3 | 29.8 | 0.89 | 0.32 | 534 |
| Approach | 392 0.0 0.492 10.2 | LOS B | 4.3 | 29.8 | 0.89 | 0.32 | 530 |

| All Vehicles | 1759 0.0 0.578 10.7 | LOS B | 6.0 | 42.3 | 0.67 | 0.78 | 520 |

Level of Service (LOS): Method: Delay (HCM 2000).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
### MOVEMENT SUMMARY

**Site:** INT B - Sea Lake Swan Hill Road/Gray Street/Boobialla Drive - PM Existing

Sea Lake Swan Hill Road/Gray Street/Boobialla Drive Roundsabout

#### Movement Performance - Vehicles

<table>
<thead>
<tr>
<th>Mov ID</th>
<th>OD Mov</th>
<th>Demand Flow</th>
<th>HV %</th>
<th>Deg. Jam Vic</th>
<th>Average Delay sec</th>
<th>Level of Service</th>
<th>95% Back of Vehicles</th>
<th>Queue m</th>
<th>Prop. Queued</th>
<th>Effective Stop Rate per veh</th>
<th>Average Speed kmh</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Total vehn</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>South: Gray Street</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>L2</td>
<td>17</td>
<td>0</td>
<td>0.040</td>
<td>5.7</td>
<td>LOS A</td>
<td>0.2</td>
<td>1.3</td>
<td>0.24</td>
<td>1.35</td>
<td>49.2</td>
</tr>
<tr>
<td>2</td>
<td>T1</td>
<td>20</td>
<td>0</td>
<td>0.040</td>
<td>4.7</td>
<td>LOS A</td>
<td>0.2</td>
<td>1.3</td>
<td>0.24</td>
<td>1.35</td>
<td>49.2</td>
</tr>
<tr>
<td>3</td>
<td>R2</td>
<td>19</td>
<td>0</td>
<td>0.040</td>
<td>11.6</td>
<td>LOS B</td>
<td>0.2</td>
<td>1.3</td>
<td>0.24</td>
<td>1.95</td>
<td>49.2</td>
</tr>
<tr>
<td>Approach</td>
<td>L2</td>
<td>55</td>
<td>0</td>
<td>0.040</td>
<td>7.4</td>
<td>LOS A</td>
<td>0.2</td>
<td>1.3</td>
<td>0.24</td>
<td>0.52</td>
<td>49.2</td>
</tr>
<tr>
<td>East: Sea Lake Swan Hill</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>L2</td>
<td>9</td>
<td>0</td>
<td>0.075</td>
<td>5.4</td>
<td>LOS A</td>
<td>0.4</td>
<td>2.6</td>
<td>0.12</td>
<td>1.16</td>
<td>48.6</td>
</tr>
<tr>
<td>5</td>
<td>T1</td>
<td>39</td>
<td>0</td>
<td>0.075</td>
<td>4.5</td>
<td>LOS A</td>
<td>0.4</td>
<td>2.6</td>
<td>0.12</td>
<td>1.16</td>
<td>48.6</td>
</tr>
<tr>
<td>6</td>
<td>R2</td>
<td>67</td>
<td>0</td>
<td>0.075</td>
<td>11.3</td>
<td>LOS B</td>
<td>0.4</td>
<td>2.6</td>
<td>0.12</td>
<td>1.16</td>
<td>48.6</td>
</tr>
<tr>
<td>Approach</td>
<td>L2</td>
<td>115</td>
<td>0</td>
<td>0.075</td>
<td>8.5</td>
<td>LOS A</td>
<td>0.4</td>
<td>2.6</td>
<td>0.12</td>
<td>0.58</td>
<td>48.6</td>
</tr>
<tr>
<td>North: Boobialla Drive</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>L2</td>
<td>38</td>
<td>0</td>
<td>0.043</td>
<td>5.5</td>
<td>LOS A</td>
<td>0.2</td>
<td>1.4</td>
<td>0.17</td>
<td>0.96</td>
<td>51.5</td>
</tr>
<tr>
<td>8</td>
<td>T1</td>
<td>23</td>
<td>0</td>
<td>0.043</td>
<td>4.6</td>
<td>LOS A</td>
<td>0.2</td>
<td>1.4</td>
<td>0.17</td>
<td>0.96</td>
<td>51.5</td>
</tr>
<tr>
<td>9</td>
<td>R2</td>
<td>1</td>
<td>0</td>
<td>0.043</td>
<td>11.4</td>
<td>LOS B</td>
<td>0.2</td>
<td>1.4</td>
<td>0.17</td>
<td>0.96</td>
<td>51.5</td>
</tr>
<tr>
<td>Approach</td>
<td>L2</td>
<td>62</td>
<td>0</td>
<td>0.043</td>
<td>5.3</td>
<td>LOS A</td>
<td>0.2</td>
<td>1.4</td>
<td>0.17</td>
<td>0.43</td>
<td>51.5</td>
</tr>
<tr>
<td>West: Sea Lake Swan Hill</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>L2</td>
<td>1</td>
<td>0</td>
<td>0.027</td>
<td>5.7</td>
<td>LOS A</td>
<td>0.1</td>
<td>0.9</td>
<td>0.23</td>
<td>0.34</td>
<td>50.4</td>
</tr>
<tr>
<td>11</td>
<td>T1</td>
<td>28</td>
<td>0</td>
<td>0.027</td>
<td>4.7</td>
<td>LOS A</td>
<td>0.1</td>
<td>0.9</td>
<td>0.23</td>
<td>0.34</td>
<td>50.4</td>
</tr>
<tr>
<td>12</td>
<td>R2</td>
<td>7</td>
<td>0</td>
<td>0.027</td>
<td>11.6</td>
<td>LOS B</td>
<td>0.1</td>
<td>0.9</td>
<td>0.23</td>
<td>0.34</td>
<td>50.4</td>
</tr>
<tr>
<td>Approach</td>
<td>L2</td>
<td>37</td>
<td>0</td>
<td>0.027</td>
<td>6.1</td>
<td>LOS A</td>
<td>0.1</td>
<td>0.9</td>
<td>0.23</td>
<td>0.47</td>
<td>50.4</td>
</tr>
<tr>
<td>All Vehicles</td>
<td></td>
<td>271</td>
<td>0</td>
<td>0.075</td>
<td>7.2</td>
<td>LOS A</td>
<td>0.4</td>
<td>2.6</td>
<td>0.17</td>
<td>0.32</td>
<td>49.6</td>
</tr>
</tbody>
</table>

**Level of Service (LOS): Method: Delay (HCM 2000).**
- Roundabout LOS Method: Same as Signalised Intersections.
- Vehicle movement LOS values are based on average delay per movement.
- Intersection and Approach LOS values are based on average delay for all vehicle movements.
- Roundabout Capacity Model: SIDRA Standard.
- SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
- HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Processed: Monday, 12 May 2014 5:00:27 PM
SIDRA INTERSECTION 6.0 17.4 4a68
Project: P/Synergy/Projects/GRP1/GRP16371-SIDRA/May 2014/Sidra 4.8f
9000958 TRAFFIX GROUP PTY LTD, PLUS / Fiatling
## MOVEMENT SUMMARY

### Site: INT 8 - Sea Lake Swan Hill Road/Gray Street/Boobialla Drive - PM Post Development

**Sea Lake Swan Hill Road/Gray Street/Boobialla Drive**

**Roundabout**

### Movement Performance - Vehicles

<table>
<thead>
<tr>
<th>Mov ID</th>
<th>OD Mov</th>
<th>Demand Flows Total veh/h</th>
<th>% of Total</th>
<th>Delay/veh/s</th>
<th>Average Delay sec</th>
<th>Level of Service</th>
<th>95% Back of Queues</th>
<th>Prop. Queued</th>
<th>Effective Stop Rate per veh</th>
<th>Average Speed mph</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>South: Gray Street</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>L2</td>
<td>13</td>
<td>0.0</td>
<td>0.438</td>
<td>8.2</td>
<td>LOS A</td>
<td>3.3</td>
<td>22.9</td>
<td>0.81</td>
<td>0.86</td>
</tr>
<tr>
<td>2</td>
<td>T1</td>
<td>63</td>
<td>0.0</td>
<td>0.438</td>
<td>8.3</td>
<td>LOS A</td>
<td>3.3</td>
<td>22.9</td>
<td>0.81</td>
<td>0.86</td>
</tr>
<tr>
<td>3</td>
<td>R2</td>
<td>305</td>
<td>0.0</td>
<td>0.458</td>
<td>14.0</td>
<td>LOS B</td>
<td>3.3</td>
<td>22.9</td>
<td>0.81</td>
<td>0.86</td>
</tr>
<tr>
<td><strong>Approach</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>East: Sea Lake Swan Hill</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>L2</td>
<td>435</td>
<td>0.0</td>
<td>0.676</td>
<td>3.7</td>
<td>LOS A</td>
<td>8.4</td>
<td>58.8</td>
<td>0.36</td>
<td>0.47</td>
</tr>
<tr>
<td>5</td>
<td>T1</td>
<td>232</td>
<td>0.0</td>
<td>0.670</td>
<td>3.8</td>
<td>LOS A</td>
<td>8.4</td>
<td>58.8</td>
<td>0.36</td>
<td>0.47</td>
</tr>
<tr>
<td>6</td>
<td>R2</td>
<td>442</td>
<td>0.0</td>
<td>0.670</td>
<td>9.5</td>
<td>LOS A</td>
<td>8.4</td>
<td>58.8</td>
<td>0.36</td>
<td>0.47</td>
</tr>
<tr>
<td><strong>Approach</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>North: Boobialla Drive</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>L2</td>
<td>79</td>
<td>0.0</td>
<td>0.104</td>
<td>5.6</td>
<td>LOS A</td>
<td>0.6</td>
<td>4.3</td>
<td>0.38</td>
<td>0.50</td>
</tr>
<tr>
<td>8</td>
<td>T1</td>
<td>23</td>
<td>0.0</td>
<td>0.104</td>
<td>5.7</td>
<td>LOS A</td>
<td>0.6</td>
<td>4.3</td>
<td>0.38</td>
<td>0.50</td>
</tr>
<tr>
<td>9</td>
<td>R2</td>
<td>3</td>
<td>0.0</td>
<td>0.104</td>
<td>11.4</td>
<td>LOS B</td>
<td>0.6</td>
<td>4.3</td>
<td>0.38</td>
<td>0.50</td>
</tr>
<tr>
<td><strong>Approach</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>West: Sea Lake Swan Hill</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>L2</td>
<td>32</td>
<td>0.0</td>
<td>0.272</td>
<td>5.5</td>
<td>LOS A</td>
<td>1.9</td>
<td>13.2</td>
<td>0.81</td>
<td>0.79</td>
</tr>
<tr>
<td>11</td>
<td>T1</td>
<td>171</td>
<td>0.0</td>
<td>0.272</td>
<td>8.6</td>
<td>LOS A</td>
<td>1.9</td>
<td>13.2</td>
<td>0.81</td>
<td>0.79</td>
</tr>
<tr>
<td>12</td>
<td>R2</td>
<td>9</td>
<td>0.0</td>
<td>0.272</td>
<td>14.3</td>
<td>LOS B</td>
<td>1.9</td>
<td>13.2</td>
<td>0.81</td>
<td>0.79</td>
</tr>
<tr>
<td><strong>Approach</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>All Vehicles</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Level of Service (LOS): Method: Delay (HCM 2000).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Myelk M05).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
SECTION C – DECISIONS WHICH NEED ACTION/RATIFICATION

C.14.11 COUNCILLOR ASSEMBLIES - RECORD OF ATTENDANCE AND AGENDA ITEMS

Responsible Officer: Chief Executive Officer
File Number: 22-13-12
Attachments: Nil

Declarations of Interest: Officer
Dean Miller - as the responsible officer, I declare that I have no disclosable interests in this matter.

Summary
The Local Government Act 1989 requires that the details of Councillor Assemblies be reported to Council meetings on a monthly basis.

Discussion
The State Government has amended the Local Government Act 1989 which requires Council to report on Councillor Assemblies.

Whilst Minutes do not have to be recorded, Agenda items and those in attendance must be, and a report presented to Council.

An assembly of Councillors is defined as a meeting that is planned or scheduled at which at least half of the Council and one Officer are in attendance, and where the matters being considered that are intended or likely to be the subject of a Council decision.

No formal decisions can be made at an assembly but rather direction can be given that is likely to lead to a formal decision of Council.

Details of the most recent assemblies of Council are attached.

Consultation
Nil

Financial Implications
Nil

Social Implications
Nil
Economic Implications
Nil

Environmental Implications
Nil

Risk Management Implications
Nil

Council Plan Strategy Addressed

Councillor and Staff accountability - We will represent the interests of our community and will conduct our affairs openly and with integrity, reflecting high levels of good governance.

Options

Council must comply with the requirements of the Local Government Act 1989.

Recommendations

That Council note the contents of the report.
SECTION D – NOTICES OF MOTION

SECTION E – URGENT ITEMS NOT INCLUDED IN AGENDA

SECTION F – TO CONSIDER & ORDER ON COUNCILLOR REPORTS
SECTION G – IN CAMERA ITEMS

Recommendation

That Council close the meeting to the public on the grounds that the following report(s) include concerns contractual matters

B.14.40 IN CAMERA CONSIDERATION OF CONFIDENTIAL REPORT