Traffix Group

Traffic Management Plan

Bulla Spoil Processing Facility 570-650 Sunbury Road, Bulla

Prepared for Hi-Quality Group

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1. Introduction

Traffix Group has been engaged by Hi-Quality Group to prepare a Traffic Management Plan (TMP) for the Bulla Spoil Processing Facility (BSPF) at 570-650 Sunbury Road, Bulla.

In particular, the TMP has been prepared to address the following Conditions of the Incorporated Document as they relate to Traffic Management:

- 5.1.5 Prior to the commencement of the receipt of spoil at the Project Land for the Project, a Traffic Management Plan must be prepared to the satisfaction of the Head, Transport for Victoria. The Traffic Management Plan must address Project traffic impacts from the time of receipt of spoil generated by the West Gate Tunnel Project on the Project Land, and address the following matters:
 - 5.1.5.1 Specification of the routes that will be used by trucks using the Project, when, and how any controls in relation to numbers and hours of use on identified roads will be managed. This will include identification of the responsible road authority for each segment of the route.
 - 5.1.5.2 The preparation of a Road Safety Audit (from the relevant Tullamarine Freeway exit and the site) that includes the identification of whether increased Project related traffic increases road safety risk for local residents and other road users on the identified routes, and if so, how this risk will be mitigated and managed.
 - 5.1.5.3 The identification of potential traffic impacts and required temporary measures resulting from the Project, and how this will be managed, including:
 - Pre-Interim Signalisation of the Hi-Quality access road and Sunbury Road intersection generally in accordance with the Traffix Group Plan (drawing no. G27938-01-01 2020 Appendix V to the Traffix Traffic Engineering Assessment report G27938R-01D dated July 2020).
 - If part of the subject land is required to implement the intersection works required by above conditions, the owner of the subject land must be set aside this land as "ROAD" in a plan of subdivision that is submitted to the Responsible Authority.
 - 5.1.5.4 The roads and accessways on the subject land and local roads must at all times be in a fit and proper state so as not to compromise the operational efficiency of the Sunbury Road (e.g. by spilling gravel or discarding mud).
 - 5.1.5.5 A structural inspection regime for the Deep Creek Bridge for the duration of the use on the Project Land; and
 - 5.1.5.6 A maintenance regime for the Deep Creek Bridge surface to prevent water ingress into the structure for the duration of the use of the Project Land.
 - 5.1.5.7 Identification of an alternative haulage route for the delivery of the West Gate Tunnel spoil to the Project Land, should a structural inspection required by Condition 5.1.5.5 identify significant change in the structural

condition of the Deep Creek bridge, must be approved by the Head, Transport for Victoria.

5.1.6 All mitigation works and management measures as recommended by the approved TMP must be implemented to the satisfaction of and at no cost to the Head, Transport for Victoria.

2. Project Overview

As a part of the West Gate Tunnel project, tunnel boring machines will be used for the construction of twin tunnels under Yarraville, between the West Gate Freeway and the Maribyrnong River. The tunnel portal at the Maribyrnong River end of the tunnel is located in Yarraville, between Whitehall Street and the Maribyrnong River.

As a result of the tunnelling, an anticipated peak of up to 15,000 tonnes of spoil will be removed per day, with typical daily spoil removal to be between 4,000 and 9,000 tonnes per day. A histogram outlining the anticipated spoil removal throughout the project is provided in Figure 1 below.



Figure 1: Daily Spoil Production Throughout Project

This spoil will be conveyed to a site nearby the tunnel portal (known as the 'Pivot Site') before being trucked off site for testing, treatment and disposal at the Hi-Quality site (Project Land) located at 570-650 Sunbury Road, Bulla.

It is anticipated that 'truck and dog' heavy vehicles will be used for the transport of the spoil, however, B-doubles may also be used. Truck loads are anticipated to be 'higher mass limit loads' in the order of 68t per vehicle (gross vehicle load plus load mass) with a spoil load of approximately 35t - 37t.

Based on the peak amount of spoil to be removed from the tunnel per day (15,000 tonnes) and capacity of each transport vehicle, up to 429 truckloads per day will be required to be transported from the pivot site to the Hi-Quality Site during peak periods.

The proposed hours of spoil transport to the Hi-Quality site are 24 hours a day, 7 days a week, consistent with the approved hours of operation for the spoil disposal facility at the Project Land.

To accommodate the treatment and disposal of the spoil material at the Hi-Quality site, containment and treatment facilities as well as associated access driveways will be constructed within the site with direct access to Sunbury Road.

The existing vehicle access to the site via Sunbury Road will be upgraded with a temporary signal arrangement which utilises the existing pavement on Sunbury Road to safely accommodate the additional traffic associated with the spoil treatment and disposal. Depending on the timing of the upgrade of Sunbury Road, the Hi-Quality access may be upgraded to an 'interim' signalised arrangement, prior to the 'ultimate' signalised arrangement which will be constructed as a part of the Major Roads Projects Victoria (MRPV) Sunbury Road upgrade.

Installation of signals at the Hi-Quality access is required before any haulage to the site commences.

A copy of the development plans for the additions to the Hi-Quality site is attached at Appendix A.



3. Site Locality & Existing Conditions¹

3.1. Site Locality

The Hi-Quality site is located approximately 5km south-east of central Sunbury in Bulla and the Pivot Site is located in Yarraville, as shown in the site locations map at Figure 2. The two sites are located approximately 25km apart.



Figure 2: Site Locations

¹ All reference to existing conditions and existing access arranagements refer prior to any Sunbury Road or Hi-Quality site access signalisation works being undertaken.

3.2. Hi-Quality Site

3.2.1. Location & Current Operations

The Hi-Quality site is located on the north-east side of Sunbury Road, as shown in the locality map at Figure 3.



Figure 3: Hi-Quality Site Locality Map

The site has a frontage to Sunbury Road of approximately 1.2km. Part of the site is currently occupied by a quarry and associated activities and the remainder of the site is currently undeveloped farmland. An aerial view of the Hi-Quality Site is presented in Figure 4.



Figure 4: Aerial View of Hi-Quality Site (Source: www.nearmap.com - 6 May 2021)

3.2.2. Access Arrangements

Access to the Hi-Quality site is taken via Sunbury Road in the southern corner of the site. Entry movements from Sunbury Road are accommodated via an approximately 110m long channelised right turn lane and an 85m long left turn deceleration lane.

An aerial view of the existing access arrangements is provided in Figure 5 below.



Figure 5: Hi-Quality Site - Existing Access Arrangements

A contingency access is also provided at the south-western corner of the site as shown in Figure 6 below.



Figure 6: Hi-Quality Site - Existing Contingency Access

The contingency access may be utilised for construction workers (in private vehicles) during construction. Access would be restricted to left-in/left-out and will only be used during the operations if there is an issue at the main access.



3.2.3. Existing Traffic Volumes

Traffic count data collected at the Hi-Quality Site access has been provided to Traffix Group by MRPV. The counts were undertaken for a week between Monday 10th December and Sunday 16th December 2018.

The results of the peak hour volumes recorded for the peak weekday (Monday 10th December 2018) are summarised in Figure 7 below.



Figure 7: Hi-Quality Site Access - AM(PM) Peak Hour Traffic Volumes

3.3. Pivot Site

The pivot site is located at 219 Whitehall Street (on the south-east corner of the Whitehall Street/Somerville Road intersection) in Yarraville as shown in the locality plan at Figure 8 below.



Figure 8: Pivot Site Locality Map

Vehicle access to the site is provided via a temporary signalised access point directly to Whitehall Street in the south-west corner of the site. An aerial view of the Pivot Site is presented in Figure 9.



Figure 9: Aerial View of Pivot Site

3.4. Sunbury Road

3.4.1. Current Road Arrangements

Sunbury Road is a State declared arterial road which extends in a generally north-west to south-east direction for approximately 15km between Sunbury (where it continues as Macedon Street) and Melbourne Airport (where it continues as the Tullamarine Freeway).

To the south-east of the Hi-Quality Site access, Sunbury Road provides a single through traffic lane in each direction with sealed shoulders on both sides of the road. To the north-west of the Hi-Quality Site access, Sunbury Road provides two through traffic lanes and a sealed shoulder in each direction, separated by a painted median.

A posted speed limit of 100km/h applies to Sunbury Road in the vicinity of the subject site.

Photos of Sunbury Road, taken along the Hi-Quality site's frontage are presented in Figure 10 and Figure 11 below.



Figure 10: Sunbury Road – View North-West



Figure 11: Sunbury Road – View South-East

3.4.2. Future Road & Access Arrangements

Sunbury Road, in the vicinity of the Hi-Quality Site, is planned for an upgrade as a part of the Suburban Roads Upgrade (SRU) project. The upgrade involves the duplication and widening of Sunbury Road between Powlett Street, Sunbury and Bulla-Diggers Rest Road, Bulla, resulting in two through traffic lanes in each direction along this entire section of Sunbury Road.

The timing of the upgrade works on this section of Sunbury Road is not yet determined. It is significant however that the project includes signalisation of the Hi-Quality Access, as shown in a diagram from Hume Planning Scheme Amendment C235 explanatory report provided in Figure 12 below.



Figure 12: Sunbury Road Upgrade

It is anticipated that the existing speed limit of 100km/h, which is currently in place from Francis Boulevard to Bulla-Diggers Rest Road, will be reduced to 80km/h as a result of the implementation of multiple signalised intersections.

A possible layout plan provided by MRPV for the Hi-Quality Site access intersection is shown in Figure 13 below.



Figure 13: Future Hi-Quality Site Signalised Access - Concept Plan

Projected future (year 2031) peak hour through traffic volumes along Sunbury Road adjacent to the Hi-Quality site have been provided by MRPV. A summary of the projected future traffic volumes is outlined in Table 1 below.

Table 1: Sunbury Road - Projected Future Peak Hour Volumes

Direction	AM Pea	ak Hour	PM Peak		
	Volume	%HV	Volume	%HV	
North-Westbound	1,080 veh	3.8%	2,537 veh	2.5%	
South-Eastbound	2,299 veh	3.5%	1,148 veh	1.7%	

3.5. B-Double Vehicle Network

A map showing the approved B-double network between the Pivot Site and Hi-Quality site is shown in Figure 14 overleaf.

Notably, Sunbury Road is an approved B-double route. The Calder Freeway provides the only other B-double approved route to the north-west of Melbourne in proximity to the Hi-Quality Site.

In the vicinity of the Pivot Site, a number of streets are B-double approved routes with others conditionally approved. A number of streets immediately to the west of the Pivot Site are restricted.



Figure 14: B-Double Approved Road Network

3.6. Truck Curfews & Restrictions

A map showing truck curfews and restrictions in the area surrounding the Pivot Site is shown in Figure 15 below. No restrictions are in place in the area surrounding the Hi-Quality site.



Figure 15: Truck Curfews and Restrictions

Notably, truck curfews are in place on Whitehall Street, to the south of Somerville Road, Somerville Road, Francis Street and Moore Street at the following times:

- 8:00pm to 6:00am weeknights, and
- 1:00pm Saturday to 6am Monday.

Whitehall Street, to the south of Somerville Road, Somerville Road and Francis Street are also subject to the following additional curfew times.

• 8:00am-9:30am and 2:30pm-4:00pm Monday to Friday on school days.

3.7. Height Clearance on the Road Network

Height clearances on roads between the Pivot Site and the Hi-Quality Site are presented on the map at Figure 16 below. Notably, there is a 4m low clearance bridge on Napier Street beneath the Footscray to Newport Railway and a 4.4m low clearance bridge on Dynon Road beneath the freight rail lines. The design clearance for articulated vehicles outlined in the Australian Standards is 4.3m.



Figure 16: Height Clearances Map



4. Haulage Routes

The preferred and emergency haulage routes for vehicles travelling between the Pivot Site and the Hi-Quality site have been selected based on the following key criteria:

- · minimise travel time and distance,
- utilise the approved B-double network to ensure flexibility in the vehicle types that can be used,
- avoid routes that are subject to truck curfews and restrictions to ensure that the route is available at all times,
- · utilise the freeway and arterial road network where practical,
- avoid routes that include travel through residential areas or that are adjacent to residential frontages and/or sensitive receptors such as schools, where possible, and
- avoidance of known and/or anticipated road work zones.

Permit condition 5.1.5.1 requires that the TMP addresses the following matter:

• Specification of the routes that will be used by trucks using the Project, when, and how any controls in relation to numbers and hours of use on identified roads will be managed. This will include identification of the responsible road authority for each segment of the route.

The preferred route and emergency routes are detailed in Sections 4.1 and 4.2 respectively, including identification of the responsible road authority for each segment of the route.

When and how any controls in relation to the numbers and hours of use on identified roads will be managed is addressed in Section 4.3.

4.1. Preferred Route

The preferred route for transportation of spoil from the West Gate Tunnel Project Pivot site in Footscray to CityLink is via Whitehall Street, Moreland Street, Footscray Road, over the Shepherd Bridge and onto CityLink.

Beyond Citylink, the preferred haulage route continues along Tullamarine Freeway to Sunbury Road/Bulla Road.

Figure 17 below shows the preferred haulage route.





Figure 17: Preferred Haulage Route

The responsible road authority for each segment of the route is identified in Table 2 below. Table 2: Preferred Route – Responsible Road Authority

Route Segment	Route No.	Description	Zoning	Responsible Authority	
1 – Whitehall St	State Route 35	Pivot Site (219 Whitehall Street) to Moreland Street	Road Zone Category 1	Department of Transport	
2 – Moreland St	NA	Whitehall Street to Footscray Road	Road Zone Category 1	Department of Transport	
3 – Footscray Rd	State Route 32	Moreland Street to CityLink	Road Zone Category 1	Department of Transport	
4 – CityLink	M2	Footscray Road to Tullamarine Freeway	Road Zone Category 1	Department of Transport	
5 – Tullamarine Fwy	M2	CityLink to Sunbury Road	Road Zone Category 1	Department of Transport	
6 – Sunbury Rd/ Bulla Rd	C743	Tullamarine Freeway to Bulla Spoil Processing Facility at 570-650 Sunbury Road, Bulla	Road Zone Category 1	Department of Transport	

The preferred haulage route is contained entirely on an approved B-double network. The preferred haulage route is not subject to any restrictions and utilises the arterial and freeway network for the entire route.

Interactions with residential areas are minimised. The only section of the route which passes residential properties which take direct access to the route is within the Bulla township.



4.2. Emergency Routes

Emergency routes have been identified in the event that the preferred route cannot be used. The preferred route is to be used at all times except when the preferred route has been totally closed to all through traffic during which the following shall apply:

- for trips that are already underway the haulage shall follow direction from emergency services incident control,
- for trips that have not yet commenced, the applicable emergency route should be activated, only until the preferred route is reopened to traffic. The applicable emergency route will be determined from Table 3 below.

Use of emergency routes will be dictated by the Joint Venture manager of the Pivot Site and will not be subject to individual decisions by drivers. An Emergency Route Operational Protocol, which outlines notification protocols for the use of emergency routes, will be in place. As part of this protocol the HTfV must be notified immediate in the event that a diversion is required outside of the nominated emergency routes due to unforeseen network closures.

The emergency haulage routes and conditions for use are described in Table 3 below.

Alt. Route No.	Route Description	Conditions for Use
Emergency Route 1	Whitehall Street, Moreland Street, Footscray Road, Dock Link Road, Dynon Road to CityLink then as per Preferred Route.	For total road closure of Footscray Road east of Dock Link Road.
Emergency Route 2	Whitehall Street, Dynon Road to CityLink then as per Preferred Route.	For total road closure of Footscray Road west of Dock Link Road.
Emergency Route 3	Whitehall Street, Moreland Street, Footscray Road, CityLink, West Gate Freeway, M80 Ring Road to Tullamarine Freeway then as per Preferred Route.	For total road closure of CityLink north of Dynon Road.
Emergency Route 4	Whitehall Street, Moreland Street, Footscray Road, Dudley Street, Wurundjeri Way to Westgate Freeway then as per Emergency Route 3.	For total road closure of CityLink north of Dynon Road and south of Footscray Road
Emergency Route 5	As per Preferred Route to end of CityLink, then Calder Freeway, Vineyard Road, Horne Street, Macedon Street to Sunbury Road.	For road closure to all traffic on Tullarmaine Freeway-Sunbury Road.

Table 3: Emergency Route Description

Where planned disruptions occur and totally close the preferred route, WGTP Works (including roads in proximity to the Pivot Site) haulage must follow the approved construction traffic diversion management plan or detour for each specific planned closure. Such planned disruptions shall not be considered a trigger for emergency route usage.

The emergency haulage routes are shown in Figure 18 below.



Figure 18: Emergency Haulage Routes

The responsible road authority for each segment of the emergency routes, where they differ from the preferred route, is addressed in Table 4 below.

Table 4: Emergency Routes – Responsible Road Authority

Route Segment	Route No.	Description	Zoning	Responsible Authority				
Emergency Route 1								
1 – Whitehall St	State Route 35	Pivot Site (219 Whitehall Street) to Moreland Street	Road Zone Category 1	Department of Transport				
2 – Moreland	NA	Whitehall Street to	Road Zone	Department of				
St		Footscray Road	Category 1	Transport				
3 – Footscray	State Route	Moreland Street to Dock	Road Zone	Department of				
Rd	32	Link Road	Category 1	Transport				
4 – Dock Link	NA	Footscray Road to	Road Zone	Department of				
Rd		Dynon Road	Category 1	Transport				
5 – Dynon	State Route	Docklink Road to	Road Zone	Department of				
Road	50	CityLink	Category 1	Transport				
Emergency Route	e 2							
1 – Whitehall St	State Route	Pivot Site (219 Whitehall	Road Zone	Department of				
	35	Street) to Dynon Road	Category 1	Transport				
2 – Dynon	State Route	Whitehall Street to	Road Zone	Department of				
Road	50	CityLink	Category 1	Transport				
Emergency Route	e 3							
1 – Whitehall St	State Route 35	Pivot Site (219 Whitehall Street) to Moreland Street	Road Zone Category 1	Department of Transport				
2 – Moreland	NA	Whitehall Street to	Road Zone	Department of				
St		Footscray Road	Category 1	Transport				
3 – Footscray	State Route	Moreland Street to	Road Zone	Department of				
Rd	32	Citylink	Category 1	Transport				
4 - Citylink	M2	Footscray Road to West Gate Freeway	Road Zone Category 1	Department of Transport				
5 – Westgate	M1	Citylink to M80 Ring	Road Zone	Department of				
Freeway		Road	Category 1	Transport				
6 – M80 Ring	M80	Westgate Freeway to	Road Zone	Department of				
Road		Tullamarine Freeway	Category 1	Transport				

Route Segment	Route No.	Description	Zoning	Responsible Authority			
Emergency Route 4							
1 – Whitehall St	State Route 35	Pivot Site (219 Whitehall Street) to Moreland Street	Road Zone Category 1	Department of Transport			
2 – Moreland St	NA	Whitehall Street to Footscray Road	Road Zone Category 1	Department of Transport			
3 – Footscray Rd	State Route 32	Moreland Street to Dudley Street	Road Zone Category 1	Department of Transport			
4 – Dudley St	State Route 32	Footscray Road to Wurundjeri Way	Road Zone Category 1	Department of Transport			
5 – Wurundjeri Way	State Route 55	Dudley Street to Westgate Freeway	Road Zone Category 1	Department of Transport			
Emergency Route	e 5						
1 – Calder Fwy	M79	CityLink to Vineyard Road	Road Zone Category 1	Department of Transport			
2 – Vineyard Rd	C706	Calder Freeway to Horne Street	Road Zone Category 1	Department of Transport			
3 – Horne St	C706	Vineyard Road to Macedon Street	Road Zone Category 1	Department of Transport			
4 – Macedon St	C743	Horne Street to Sunbury Road	Road Zone Category 1	Department of Transport			
5 – Sunbury Rd	C743	Macedon Street to Bulla Spoil Processing Facility at 570-650 Sunbury Road, Bulla	Road Zone Category 1	Department of Transport			

4.3. Route Management Controls

Permit condition 5.1.5.1 requires that the TMP specify when, and how any controls in relation to numbers and hours of use on identified roads will be managed.

Trucks will carry spoil between the Pivot Site and the Hi-Quality site and return empty 24 hours per day, seven days per week, at most times via the preferred route, except during the circumstances outlined in section 4.2, at which times emergency routes may be used.

Emergency Route 5 involves travelling through Sunbury and passes along some residential frontages, all identified routes and emergency routes are unrestricted for B-double use with no curfews in place and accordingly no public notification or separate permit process is required

to deviate from the preferred route. The emergency routes are reasonable alternatives to use for short durations in the event that the use of the preferred route is not possible.

It is noted that Bulla-Diggers Rest Road extends between the Calder Freeway and Sunbury Road to the south of the Hi-Quality site and would reduce the travel distance and time for Emergency Route 5, however this is a Council Road which is not gazetted for B-double use and there is a single lane bridge on Bulla-Diggers Rest Road which has relatively steep approaches at both ends. It is therefore unsuitable for use as part of Emergency Route 5 and all drivers will be advised not to take this short-cut in the event that Emergency Route 5 is in place due to closures on the Tullamarine Freeway or Sunbury Road.



5. Internal Circulation

The Development Plans attached at Appendix A show the proposed site layout, including:

- a) proposed processing area,
- b) proposed containment cell,
- c) water treatment (plant, storage, discharge, contingency tanks),
- d) storage pads in eight rows with an additional contingency row to the north,
- e) two-way main access roadway along the south-eastern boundary of the proposed processing area connecting to the signalised access point to Sunbury Road at the southern corner of the site,
- f) one-way (north-westbound) spoil facility access aisles suitable to accommodate fully loaded trucks separating each row of storage pads,
- g) a one-way perimeter road around the outside of the rows of storage pads, operating in an anti-clockwise direction and connecting back to the two-way primary access roadway at the eastern corner of the processing area,
- h) a car parking, heavy duty truck and equipment parking area,
- i) a truck wash for exiting vehicles, and
- j) a contingency truck wash and contingency entry/exit² to Sunbury Road at the western corner of the proposed processing area.

The design of the internal roads/containment bays will accommodate forward movement and circulation through the site to minimise any internal traffic impacts.

The trucks exiting the site will utilise the truck wash.

² The contingency access may be utilised for construction workers (in private vehicles) during construction. Access would be restricted to left-in/left-out.



6. Road Safety Audit

Condition 5.1.5.2 requires:

• The preparation of a Road Safety Audit (from the relevant Tullamarine Freeway exit and the site) that includes the identification of whether increased Project related traffic increases road safety risk for local residents and other road users on the identified routes, and if so, how this risk will be mitigated and managed.

An independent Road Safety Audit (RSA) has been undertaken by Traffix Group, Ref: G27905R-03A dated 1st April 2021.

A copy is attached at Appendix B.

For the purposes of reporting the review was separated into two sections, with the first addressing road surface/condition issues and the second considering broader road safety issues.

The review covers key physical features of the routes which may affect road user safety and identifies potential safety hazards. The RSA project team makes recommendations to reduce the hazard risk and concludes that adoption of the recommendations should improve the level of safety of the routes for all road users (including trucks).

Road Surface Condition Issues

A visual assessment of the existing road pavement condition identified a number of locations where there are existing potholes and poor pavement condition. The RSA recommends patching and/or re-sheeting of road surface at the identified locations.

Road Safety Issues

The road safety assessment identified a total of 24 issues, and made recommendations ranging from repainting line-marking and re-instating/repairing signage to removal of vegetation, provision of road safety barriers, reducing speed limits, undergrounding of electricity and removal of power poles.

Refer to the RSA at Appendix B for detailed descriptions of the issues, locations and recommendations.

Some of the recommendations are low cost and will be undertaken as part of the implementation of this traffic management plan, while others (such as undergrounding of the electricity network) are high-cost projects which are beyond the scope of this traffic management plan and are existing issues on the arterial network which are the responsibility of the Department of Transport (DoT) and will not be exacerbated by the BSPF at the subject site.

7. Traffic Impacts & Mitigation

Condition 5.1.5.3 requires:

- The identification of potential traffic impacts and required temporary measures resulting from the Project, and how this will be managed, including:
 - Pre-Interim Signalisation of the Hi-Quality access road and Sunbury Road intersection generally in accordance with the Traffix Group Plan (drawing no. G27938-01-01 2020 Appendix V to the Traffix Traffic Engineering Assessment report G27938R-01D dated July 2020).
 - If part of the subject land is required to implement the intersection works required by above conditions, the owner of the subject land must be set aside this land as "ROAD" in a plan of subdivision that is submitted to the Responsible Authority

7.1. Traffic Generation

As a result of the tunnelling, an estimated 4,000-9,000 tonnes of spoil will be removed from the tunnel per day, with an anticipated peak of up to 15,000 tonnes.

At a rate of 35 tonnes per load, in the range of 114 - 257 truck loads per day will be transported from the Pivot Site to the Hi-Quality Site, with up to 429 loads during peak spoil removal periods.

Accordingly, during peak spoil removal, up to 858 daily truck movements (429 loads from the Pivot Site to the Hi-Quality Site and 429 empty trucks returning to the Pivot Site) could be generated.

Trucks will be able to operate continuously 24 hours a day/7 days per week and accordingly, these vehicle movements will be distributed relatively evenly throughout each day. Slightly higher hourly volumes can be expected in off-peak periods, when roundtrips take less time, with slightly lower hourly volumes expected during peak periods, when roundtrips take more time.

On average, in the order of 36 vehicle movements per hour (comprising 18 movements from the Pivot Site to the Hi-Quality Site and 18 movements returning to the Pivot Site) could be expected to be generated by the operation, during peak spoil removal periods.

Outside of the peak operating times, hourly truck movements will range from 10 to 21 per hour based on the estimated 4,000-9,000 tonnes of spoil per day.

7.2. Traffic Distribution

Traffic impact assessments were separately undertaken with regard to the capacity of the access point and key intersections in the vicinity of the Pivot Site as part of the establishment of the Pivot site.

The results of these analyses determined that there was sufficient capacity to accommodate the additional heavy vehicle movements during road network peak periods, subject to the establishment of temporary signals at the Pivot Site access point, which are operational.

Accordingly, heavy vehicles can travel to/from the Pivot Site to Citylink via the preferred truck route without causing any significant impacts on this section of the road network. The remainder of the preferred route is on the freeway and arterial road network and the additional truck movements associated with the proposal will not have any noticeable impact from a traffic capacity perspective.

The following distribution and impact assessments focus on the access to the Hi-Quality Site from Sunbury Road.

The preferred route will require vehicles travelling from the Pivot Site to the Hi-Quality Site to turn right into the site from Sunbury Road and vehicles travelling back to the Pivot Site to turn left onto Sunbury Road.

The anticipated post-development traffic volumes at the Hi-Quality Site's access during peak operation periods (15,000 tonnes of spoil per day) are shown in Figure 19 below.



Figure 19: Hi-Quality Site Access - Post-development AM(PM) Peak Hour Traffic Volumes – Peak Conditions

The through volumes on Sunbury Road shown in Figure 19 are current volumes.

The anticipated future traffic volumes at the Hi-Quality Site's access point (taking into account the projected year 2031 volumes outlined in Table 1) are shown in Figure 20 below.



Figure 20: Hi-Quality Site Access - Future AM(PM) Peak Hour Traffic Volumes

7.3. Access Configuration

The existing traffic volumes abutting the Hi-Quality site access as shown in Figure 7 indicate that Sunbury Road is already carrying in excess of 1,500 vehicles per hour in a single lane and is effectively at its practical operating capacity.

Given that uncontrolled right turn movements are permitted into and out of the Hi-Quality Site (as well as at other existing access points along Sunbury Road), it is proposed that the speed limit be reduced to 80km/h to improve safety on this section of Sunbury Road, between Francis Boulevard and Bulla-Diggers Rest Road.

Sunbury Road in the vicinity of the Hi-Quality Site is planned for duplication as a part of the Suburban Roads Upgrade (SRU) project. The SRU project also includes the signalisation of the Hi-Quality Access. It is anticipated that the speed limit on Sunbury Road would be reduced to 80km/h once it is upgraded as part of the SRU project. However, the timing of the upgrade works on this section of Sunbury Road is not yet determined.

Accordingly, it is proposed to upgrade the existing access arrangements to an 'interim' signalised intersection until such time that the SRU project is undertaken. This interim upgrade will allow for improved capacity at the access to the Hi-Quality site and, importantly, provide for a far improved traffic safety outcome when compared to the existing uncontrolled access arrangements.

A copy of the Interim Signalisation Plan (Drawing No. G27938-01-01) is attached at Appendix C.

7.4. Traffic Impact

The adequacy of the signalised intersection arrangements has been tested using SIDRA Intersection analysis software.

The key outputs of SIDRA are degree of saturation (DOS), average delay and 95th%ile queue length. For a signalised intersection, a DOS of up to 0.9 is considered good operating conditions and between 0.9 and 0.95 is considered acceptable.

The layout used in the modelling of the ultimate signalised intersection layout differs slightly from the possible concept layout shown in Figure 13. The layout adopted for the SIDRA model shifts the shared use path that crosses Sunbury Road from the north-west approach to the south-east approach.

It is standard traffic engineering practice to adopt this arrangement for crossings at Tintersections as it results in improved intersection capacity when compared to the arrangement shown in Figure 13.

A summary of the key results of the SIDRA analysis is outlined in Table 5.

Detailed SIDRA outputs (intersection layouts, phasing diagrams and movement summaries) are attached at Appendix D.



Approach	DOS		Average Delay		95 th Percentile Queue	
	АМ	РМ	АМ	РМ	АМ	РМ
Interim Signalised Intersection						
South-East (Sunbury Road)	0.574	0.399	10.7 sec	3.0 sec	37.9m	63.6m
North-East (Hi-Quality)	0.164	0.267	14.7 sec	20.8 sec	8.6m	11.8m
North-West (Sunbury Road)	0.574	0.170	7.3 sec	8.0 sec	169.1m	39.6m
	Ultimat	e Signalised	I Intersectio	on		
South-East (Sunbury Road)	0.799	0.859	5.6 sec	7.4 sec	62.0m	360.5m
North-East (Hi-Quality)	0.151	0.180	34.0 sec	19.6 sec	21.3m	11.9m
North-West (Sunbury Road)	0.869	0.438	13.0 sec	7.3 sec	401.4m	108.1m

Table 5: Hi-Quality Site Access - Summary of SIDRA Analysis Results

Table 5 demonstrates that both the interim and ultimate intersection arrangements will operate well within acceptable limits.

7.5. Temporary Signalised Arrangement

It is understood that the proposed interim signalised access arrangement may not be constructed and operational at the time that vehicles associated with the transport of West Gate Tunnel spoil start accessing the Hi-Quality site.

In order to safely manage the additional vehicle movements accessing Hi-Quality Site prior to the installation of the interim signalised arrangement, a pre-interim temporary signalised access arrangement will be constructed.

The pre-interim arrangement will involve the following:

- continuation of the two through traffic lanes in the south-east bound direction past the Hi-Quality Site access (rather than tapering back to a single through lane),
- · the existing left-turn lane converted to a shared through and left turn lane, and
- installation of temporary potted signals.

Only line-marking is required to accommodate this arrangement as there is sufficient pavement width on Sunbury Road to accommodate the proposed arrangement without the need for any widening or significant road works.

Notably, no part of the subject land is required to implement the pre-interim temporary intersection works. A plan showing the pre-interim arrangement is attached at Appendix E.³

³ The pre-interim signals commenced operation on 20th December 2021. The as-built signal plan is also attached at Appendix E.

The pre-interim arrangement has therefore been tested using SIDRA Intersection software for the post development peak hour traffic volumes outlined in Figure 19, which represents current through traffic volumes on Sunbury Road with the "worst case" peak spoil removal scenario (15,000 tonnes per day).

A summary of the key results of the SIDRA analysis is outlined in Table 6.

Detailed SIDRA outputs (intersection layouts, phasing diagrams and movement summaries) are attached at Appendix D.

Approach	DOS		Averag	Average Delay		95 th Percentile Queue	
	АМ	РМ	АМ	РМ	AM	РМ	
Pre-Interim Temporary Signalised Intersection							
South-East (Sunbury Road)	0.480	0.852	10.3 sec	6.6 sec	34.2m	310.6m	
North-East (Hi-Quality)	0.210	0.426	57.9 sec	62.2 sec	27.8m	53.5m	
North-West (Sunbury Road)	0.752	0.216	10.1 sec	7.8 sec	282.5m	46.6m	

Table 6: Hi-Quality Site Access - Summary of Pre-Interim SIDRA Analysis Results

The results of the SIDRA analysis show that the temporary pre-interim arrangement can appropriately accommodate the anticipated post-development peak hour traffic volumes under the "worst case" peak spoil removal scenario, with a peak DOS of 0.852 occurring during the PM peak hour.

7.6. Contingency Route

In the event that the signalised pre-interim arrangement has not been implemented prior to additional vehicles accessing the site as part of the West Gate Tunnel soil disposal, trucks associated with the West Gate Tunnel soil disposal will be directed to utilise the contingency access route for entry to the site.

The contingency route is as follows:

- as per the "preferred route" (or emergency route subject to the scenarios described), except that northbound trucks are to:
 - continue past the Hi-Quality site entrance along Sunbury Road,
 - undertake a U-turn at the Sunbury Road/Lancefield Road roundabout, and
 - enter the site access point via a left-in manoeuvre.

Signage indicating that right-turn movements into the site are prohibited at the contingency entry is to be erected facing northbound traffic.

This arrangement will ensure that no additional vehicles are undertaking right turn manoeuvres at the unsignalised Hi-Quality Site access.

The contingency route is shown in Figure 21 below.



Figure 21: Pre-Interim Alternative Site Access Route - Contingency Route

To ensure that the Sunbury Road/Lancefield Road roundabout has sufficient capacity to accommodate the additional trucks undertaking a U-turn movement, a capacity analysis has been undertaken.

Existing traffic count data collected at the Sunbury Road/Lancefield Road roundabout has been provided to Traffix Group by MRPV. A summary of the existing AM and PM peak hour traffic volumes is provided in Figure 22.


Traffic Management Plan



Figure 22: Sunbury Road/Lancefield Road - Existing AM(PM) Peak Hour Traffic Volumes

A SIDRA analysis of the intersection under existing conditions, and "worst case" (peak spoil removal) pre-interim conditions, where an additional 18 heavy vehicles undertake a U-turn from the south-east approach has been undertaken.

For a roundabout, a DOS of up to 0.85 is considered good operating conditions. A summary of the key results of the SIDRA analysis is outlined in Table 7.

Detailed SIDRA outputs (intersection layouts and movement summaries) are attached at Appendix D.

Approach	D	os	Average Delay		95 th Percentile Queue	
	АМ	РМ	AM	РМ	AM	РМ
	E	Existing Con	ditions			
South-East (Sunbury Rd)	0.176	0.541	6.0 sec	6.0 sec	8.3m	35.5m
North-East (Lancefield Rd)	0.419	0.119	8.9 sec	6.8 sec	17.0m	4.0m
North-West (Sunbury Rd)	0.431	0.247	5.0 sec	6.6 sec	23.1m	10.9m
	Pre-	Interim Arra	ngements			
South-East (Sunbury Rd)	0.189	0.553	6.4 sec	6.1 sec	9.5m	37.9m
North-East (Lancefield Rd)	0.433	0.122	9.2 sec	6.9 sec	18.1m	4.1m
North-West (Sunbury Rd)	0.446	0.254	5.2 sec	6.8 sec	24.2m	11.3m

Table 7: Sunbury Road/Lancefield Road - Summary of SIDRA Analysis Results

The results of the SIDRA analysis show that the Sunbury Road/Lancefield Road roundabout is currently operating well within acceptable limits and will continue to do so, in the event that heavy vehicles accessing the Hi-Quality site utilise the contingency route.

Accordingly, the contingency route provides a suitable access solution to ensure that any existing issues relating to safety and capacity at the Hi-Quality Site access are not exacerbated prior to the installation of the pre-interim signal arrangement.

7.7. Signalisation (Interim) of Site Entry to Sunbury Road

Prior to the MRPV duplication project which will provide the "ultimate" signalised intersection arrangement at the Sunbury Road access point, the temporary signalised intersection arrangement will be upgraded to the interim signalised arrangement, in accordance with the plan attached at Appendix C.

The existing road reservation for Sunbury Road in the vicinity of the Hi-Quality Site access is 60m wide and is depicted by the blue line on the interim plan attached at Appendix C, with the existing carriageway and the intersection upgrade works located approximately centrally within the reservation.

No part of the subject land is required to implement the intersection works required by condition 5.1.5.3 and accordingly a subdivision plan to set aside additional land as "ROAD" is not required.

7.8. Maintenance of Internal Accessways

Condition 5.1.5.4 requires that:

• The roads and accessways on the Project Land must at all times be in a fit and proper state so as not to compromise the operational efficiency of the Sunbury Road (e.g. by spilling gravel or discarding mud).

The main accessway which intersects Sunbury Road is sealed for approximately the first 1km within the site and accordingly any mud which may be picked up on tyres within the site will not extend as far as the Sunbury Road access intersection and will not compromise the operational efficiency of Sunbury Road.

In order to meet the Condition 5.1.5.4 requirement:

- the roads and accessways on the Project Land will be regularly inspected by the operator, and
- any identified maintenance issues (e.g. potholes) will be attended to in a timely manner.

8. Deep Creek Bridge

The following conditions of the Incorporated Document relate to the Deep Creek Bridge:

- 5.1.5.5. A structural inspection regime for the Deep Creek Bridge for the duration of the use on the Project Land;
- 5.1.5.6. A maintenance regime for the Deep Creek Bridge surface to prevent water ingress into the structure for the duration of the use of the Project Land.
- 5.1.5.7. Identification of an alternative haulage route for the delivery of the West Gate Tunnel spoil to the Project Land, should a structural inspection required by Condition 5.1.5.5 identify significant change in the structural condition of the Deep Creek bridge, must be approved by the Head, Transport for Victoria.

These matters are addressed below.

8.1. Pre-Use Inspection

We understand that DoT has undertaken a level 3 inspection of the Deep Creek Bridge prior to the haulage program commencing.

8.2. Inspection Regime

VicRoads Road Structures Inspection Manual (2018) sets out objectives and requirements to ensure that all structures are systematically inspected for the following reasons:

- to ensure the safety of road users,
- · to ensure the structural integrity of bridges and other road structures, and
- to provide data for:
 - regional and state asset management programs,

- bridge capacity assessment, and
- feedback to the design process.

Level 1 Bridge Inspections – Routine Maintenance Inspection

The primary purpose of a Level 1 inspection is to check for visible defects which might affect the safety of a road user and/or the serviceability of a structure and to identify items that may require routine maintenance and/or urgent attention/further investigation.

For Level 1 inspections, Clause 2.3 of VicRoads Road Structures Inspection Manual states that:

- All structures are to be subject to a minimum of 2 inspections per year with a maximum interval of 6 months between successive inspections.
- Alternatively, subject to a structure-specific risk assessment, the interval between successive inspections may be increased to a maximum of 1 year. If this option is exercised, the Asset Manager must maintain a register of structures which states the frequency of Level 1 inspection for each structure and record the risk assessment.
- Structures ... shall be subject to a Level 1 inspection after events such as a major accident, flood, earthquake or fire.

Notably, the road authority already undertakes Level 1 routine maintenance of all bridge structures on the arterial road network at the required frequency.

No additional Level 1 bridge inspections will be undertaken in addition to the road authority's existing inspection regime.

Level 2 – Structure Condition Inspections

The purpose of a Level 2 inspection is ... "to measure and rate the condition of the structures in order to:

- identify and prioritise maintenance needs,
- · assess the effectiveness of past maintenance treatments,
- model and forecast changes in condition (deterioration modelling) and residual life, and
- estimate future requirements for maintenance budgets".

Clause 3.3 of VicRoads' Road Structures Inspection Manual requires that Level 2 inspections be conducted:

- within 12 months of opening to traffic,
- within 12 months of the completion of major maintenance, strengthening and/or widening, and
- 2 to 5 years thereafter, with the actual frequency of inspections to be determined on a risk basis (Bridge Condition Rating).



Having regard to the bridge condition and the proportional increase in heavy vehicle traffic on the bridge which will be contributed by the receipt of spoil generated by the West Gate Tunnel Project on the Project Land, a Level 2 bridge inspection will be conducted within two months of the commencement of haulage associated with the spoil disposal and treatment, at the midway point of the haulage program and at the end of the haulage program. These inspections will include an underbridge inspection.

8.3. Maintenance Regime

Discussions with regional DoT officers indicate that the Deep Creek Bridge maintenance will continue to be undertaken by the DoT Asset Management Team and accordingly, third party maintenance activities are not supported.

Preventative maintenance measures may be undertaken at the start of the haulage program including a new asphalt layer on the Deep Creek Bridge, implementation of reduced speed signs on the approaches to the bridge and implementation of new signage on the southern approach to Bulla Township advising trucks to avoid using engine brakes.

Alternatively, based on an assessment of the potential additional wear to the bridge surface as a result of the haulage associated with the spoil disposal and treatment, BSPF may be required to enter into an agreement to pay for any additional maintenance or partially offset the cost of an asphalt overlay.

8.4. Alternate Route

Should a structural inspection required by Condition 5.1.5.5 identify significant change in the structural condition of the Deep Creek bridge, the emergency haulage route identified as Emergency 5 in Figure 18 of this Traffic Management Plan will be implemented until such time as repair works can be completed.

Such repairs will be undertaken promptly and at no cost to the Road Authority following identification of a change in structural condition during a Level 2 Bridge Inspection.

9. Truck Management

The management of trucks and drivers associated with the haulage program is the responsibility of the Joint Venture operators of the Pivot Site.

We understand that;-

- The spoil will be transported using NHVR compliant trucks and 3, 4 or 5 axle trailers. The truck height will be a maximum of 4m with trucks loaded using excavators at the Pivot Site. The height of the material loaded into the trucks and trailers shall be regulated by the excavator which can shape the top of the material in the truck and trailer as required to ensure it does not exceed the approved height of the truck.
- All trucks are weighed at the Pivot site prior to leaving the site to ensure overloading by weight has not occurred.



- All truck drivers that commence on the WGTP will have a truck driver's induction to manage truck driver compliance to the Project's regulations and processes. This induction will be undertaken at the Pivot Site Office. The induction will cover all the key elements of the operation including truck specification requirements, routes, emergency routes and how they're used, marshalling arrangements, truck loading processes at the Pivot and truck unloading process at the Hi-Quality site.
- Truck drivers will be issued a daily morning toolbox during the tunnelling operation providing any information updates and other requirements for the day's work.
- All Truck drivers will be GPS tracked to know their location and history at any time. All truck drivers will be issued with a tablet (or other device) to ensure they can receive messages immediately from their logistics Co-Ordinator.

10. Decommissioning Works

No works associated with the spoil disposal and treatment facility are required to be decommissioned following completion of the haulage program.

The operation and decommissioning of the Pivot Site (including the access arrangements in place for the Pivot Site) following the completion of the haulage program are subject to agreements entered into by the Joint Venture operators of the Pivot Site.





Appendix A

BSPF Development Plans

Traffix Group

G27938R-02E



Appendix B

Road Safety Review



G27938R-02E

Traffix Group

Hi-Quality Quarry -Road Safety Review

Proposed Vehicle Routes

Prepared for Hi-Quality Group

April, 2021

G27938R-03A - Road Safety Review

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Our Reference: G27938R-03A - Road Safety Review

Issue No.	Туре	Date	Prepared By	Approved By
А	Report	01/04/2021	D. Trotter	N. Woolcock

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1. Introduction

Traffix Group Pty Ltd has been engaged by Hi-Quality Group to complete a road safety review of proposed vehicle routes between the Hi-Quality site at 570-650 Sunbury Road ("the Site") and the relevant Tullamarine Freeway exit.

It is understood that this review is due to works associated with the West Gate Tunnel project and an associated increase in truck movements to/from the subject site.

Specifically, we have been advised by the project team that our assessment is required in response to Condition 5.1.5.2 of the Bulla Spoil Processing Facility incorporated document, March 2021:

"The preparation of a Road Safety Audit that includes the identification of whether increased Project related traffic increases road safety risk for local residents and other road users on the identified routes, and if so, how this risk will be mitigated and managed."

On this basis, and following discussions with the project team, we were advised that a road safety review be prepared of vehicle access routes between the site and the Tullamarine and Calder Freeways.

Further to this, we were advised that our assessment exclude the Hi-Quality vehicle access point to Sunbury Road as this access is to be signalised as part of future works.

On the above basis, the following outlines our road safety review of vehicle routes between the Site and the Tullamarine and Calder Freeways.



2. Existing Conditions

The Hi-Quality Quarry and Landfill is located at 570-600 Sunbury Road in Bulla with the surrounding road network illustrated within Figure 1.



Source: Melway Publishing Pty Ltd

Figure 1: Locality Map

Vehicle access to the site is via Sunbury Road, located some 12km northwest driving distance from the Tullamarine Freeway (via Sunbury Road) and 10.5km northeast driving distance from the Calder Freeway (via Vineyard Road and Sunbury Road). Both vehicle routes take in the order of 10-15 minutes to travel between the freeway network and subject site, subject to traffic congestion and truck weight.

The vehicle routes to/from the site, referred to herein as the Tullamarine and Calder Routes, are shown within Figure 2.



Figure 2: Vehicle Routes



3. Review Methodology

3.1. Project Team

The road safety review was carried out by:

David Trotter, B.E. Hons., B.Comm

Associate, Traffix Group

• Nathan Woolcock, B.E. (Civil)

Director, Traffix Group

Both members of the project team are accredited Senior Road Safety Auditors with the Department of Transport and have not had any previous involvement in the design or development of this project.

3.2. Site Inspection

In order to review the two vehicle routes a member of the project team travelled the two routes (both directions) in a truck and dog trailer. The truck and dog trailer was not carrying a load during the inspection.

A summary of the inspection details is described in Table 1 with the truck utilised for the site inspection shown within Figure 3.

Table 1: Site Inspection Details

Activity	Day Inspection	Night Inspection
Day	Friday	Friday
Date	19/02/2021	19/02/2021
Time	4:45pm – 7:15pm	8:00pm – 9:00pm
Reviewer/s	D. Trotter	D. Trotter
Weather Conditions (Clear, Raining, Snowing, Fog, Dust, Smoke, Unknown or Not Applicable)	Clear	Clear
Light Conditions (Light, Dark Dusk Dawn, Light and Dark, Unknown or Not Applicable)	Light	Dark
Road Surface Conditions (Dry, Wet, Muddy, Snowy, Icy, Unknown or Not Applicable)	Dry	Dry



Figure 3: Truck & Dog Trailer used for inspection

3.3. Methodology

As described previously, a member of the project team travelled the two routes (both directions) in a truck and dog trailer during the daytime and evening periods. This allowed greater consideration of road safety associated with truck movements by allowing the team member to both observe conditions from a typical vehicle which travels to/from the Site as well as leveraging the insights of a truck driver who is familiar with the routes.

For the purposes of reporting the review has been separated between road surface/condition issues (Section 5) and broader road safety issues (Section 6). Relevant photographs of findings from the review are included within Appendix A for reference.

The review covers key physical features of the routes which may affect road user safety and seeks to identify potential safety hazards. However, the project team point out that no guarantee is made that every deficiency has been identified. Further, if all the recommendations in this report were to be followed, this would not guarantee that the routes are 'safe'. Rather, adoption of the recommendations should improve the level of safety of the routes for all road users (including trucks).

3.4. Notation

The proposed vehicle routes change alignment between the freeways and subject site. For the purposes of reporting the following directional terminologies have been adopted:

- Calder Freeway to Site Northbound
- Calder Freeway from Site Southbound
- Tullamarine Freeway to Site Westbound
- Tullamarine Freeway from Site Eastbound



4. References

In reviewing road safety considerations reference has been sought from the following documents:

- Australian Standard AS 1742.2-2009, Manual of Uniform Traffic Control Devices Part 2, Traffic Control Devices for General Use, March 2009.
- Australian Standard Manual of uniform traffic control devices Part 14: Traffic signals, AS 1742.14:2014.
- Austroads, Guide to Road Design, Part 4: Intersections and Crossings General, June 2017.
- Austroads, Guide to Road Design, Part 4A: Unsignalised and Signalised Intersections, June 2017.
- Austroads, Guide to Road Design, Part 6: Roadside Design, Safety and Barriers, August 2010
- Austroads, Guide to Road Design, Part 6: Roadside Design, Safety and Barriers, August 2020
- Austroads Guide to Road Design Part 6B Roadside Environment, 2015.
- Austroads Guide to Road Design Part 9 Roadside Hazard Management, 2008
- VicRoads Supplements to Australian Standards (Traffic Engineering Manual Volume 2), October 2015.
- VicRoads Supplements to Austroads Guide to Road Design, January 2017.
- VicRoads Tree Policy Revision 2.0 May 2016
- Department of Transport Road Design note 03-10 Audio Tactile Line Marking (ATLM) dated June 2020



5. Road Condition

As part of the road safety review a visual assessment of the existing road pavement condition was completed. In this regard, Table 2 and Table 3 have been prepared to summarise existing potholes and generally poor pavement condition respectively.

A reference map summarising the location of findings is included as Figure 4.

Table 2: Localised Road Condition Review (Potholes) – Findings





Site	Location & Traffix Group Ref.	Photo
2	Location: Vineyard Road (Northbound) at Miller Street Route: Calder	
3	Location: Vineyard Road (Northbound) approx. 150m north of Gap Road Route: Calder	<image/>



Site	Location & Traffix Group Ref.	Photo
4	Location: Sunbury Road (Eastbound) approx. 350m southeast of Melbourne- Lancefield Road Route: Calder	<image/>
5	Location: Sunbury Road (Eastbound) approx. 1.8km southeast of Melbourne- Lancefield Road Route: Calder	



Site	Location & Traffix Group Ref.	Photo
6	Location: Sunbury Road (Westbound) approx. 100m west of Sheppards Lane Route: Calder	<image/>
7	Location: Sunbury Road (Westbound) approx. 500m east of Sheppards Lane Route: Calder	<image/>



Site	Location & Traffix Group Ref.	Photo
8	Location: Sunbury Road (Eastbound) approx. 650m northwest of Bulla-Diggers Rest Road Route: Tullamarine	
9	Location: Sunbury Road (Eastbound) immediately west of Wildwood Drive Route: Tullamarine	



Site	Location & Traffix Group Ref.	Photo
12	Location: Sunbury Road (Westbound) approx. 300m west of Old Bulla Road Route: Tullamarine	<image/>



Table 3: General Road Condition Review (Road Sections) – Findings

ltem	Location	Finding	Recommendation
1	Location: Vineyard Road (Northbound) – Calder Freeway Interchange Bridge Route: Calder	Evidence of traffic lane pavement deterioration and cracking. Inherent road safety risk for motorists, both through the destabilisation of the road surface (i.e. pot holes and debris creation) and potential stopping distance issues in wet weather conditions.	Consider patching and/or re- sheeting of road surface at locations
	Location: Sunbury Road (Eastbound) immediately west of Oaklands Road	Refer Photo 1 for example.	
	Route: Tullamarine		
	Location: Sunbury Road (Both Directions) between Green Street and Oaklands Road Route: Tullamarine		
	Location: Sunbury Road (Westbound) between Vineyard Road and Jackson Street Route: Calder		
2	Location: Vineyard Road (Northbound) – Between Calder Freeway and Old Vineyard Road Route: Calder	On-road bicycle lane has a road seal join in the middle of lane. May create a falling hazard for cyclists or result in cyclists using the traffic lane in preference. Refer Photo 2 .	Consider re-sheeting of road surface at location





Source: Melway Publishing Pty Ltd

Figure 4: Road Potholes & Condition – Reference Map

6. Road Safety

Table 4 has been prepared to summarise relevant road safety findings as well as recommendations.

A reference map summarising the location of findings is included as Figure 5.

Table 4: Existing Conditions (2020) - Road Safety Review – Findings and Recommendations

ltem	Location(s)	Finding	Recommendation
1	Location: Vineyard Road (Northbound) – North of Calder Freeway Southern Interchange roundabout Route: Calder Location: Sunbury Road (Both Directions) at Melbourne- Lancefield Road roundabout Route: Calder Location: Sunbury Road (Both Directions) at Wildwood Road roundabout Route: Tullamarine	Zip merge occurs shortly after the roundabout (departure side) and/or line marking, and signage of the merge is poor. Lane merges which are either unclear and/or provide motorists with limited advanced warning increases the likelihood of side swipe type crashes. Refer Photo 3 for example.	Improve line marking and signage on the departure side of the roundabout for nominated locations. Consideration to be given to increasing the offset of the merge from the roundabout. A safer example of a merge on the departure side of the roundabout was noted on Sunbury Road (eastbound) at the Bulla-Diggers Rest Road roundabout.



ltem	Location(s)	Finding	Recommendation
2	Location: Vineyard Road (Northbound) – Vicinity of Rosenthal Boulevard Route: Calder	Dividing lane line marking is duplicated. May create some confusion for motorists as to traffic lane extents. Refer Photo 4 for example.	Remove or blackout redundant dividing lane line marking.



3	Location: Sunbury Road (Both Directions) at Evans Street Route: Calder Location: Sunbury Road (Both Directions) at Francis Boulevard Route: Calder	Circulating lane line marking delineation through the roundabout is either faded or absent. Circulating lane line marking through a roundabout assists both in directing and delineating motorists as well as allowing truck drivers to judge the alignment of, and make necessary corrections to, their rear trailer alignment (if applicable). Refer Photo 5 for example.	Re-paint circulating lane line marking within roundabouts at nominated locations.
	Location: Sunbury Road (Both Directions) at Melbourne- Lancefield Road Route: Calder		
	Location: Sunbury Road (Eastbound) at Bulla-Diggers Rest Road Route: Tullamarine		
	Location: Sunbury Road (Both Directions) at Green Street Route: Tullamarine		
	Location: Sunbury Road (Both Directions) at Wildwood Road Route: Tullamarine		
	Location: Sunbury Road (Both Directions) at Oaklands Road Route: Tullamarine		



4 **Location:** Sunbury Road (Westbound) approx. 650m southeast of Francis Boulevard **Route:** Calder

> Location: Sunbury Road (Eastbound) approx. 550m northwest of Melbourne-Lancefield Road Route: Calder

The nominated locations were observed to have trees which were proximate to through traffic lanes.

In general, there are a number of established trees on both sides of Sunbury Road between Francis Boulevard and Melbourne-Lancefield Road. Sunbury Road has a posted speed limit of 100km/h in each direction within this area.

Traffic volume information sourced from the Department of Transport indicates that this section of Sunbury Road has an average daily traffic volume in excess of 6,000 vehicles per day in each direction.

As such, the trees within the nominated locations and potentially other trees within the area are located within the former clear zone requirements of the Austroads Guide to Road Design: Part 6 which is 8.5-10m.

Whilst the clear zone requirements have since been discontinued in favour of an 'area of interest', some trees are located both within the former clear zone and lateral extent of the 'area of interest'.

These established trees are a fixed hazard and have the potential to result in serious and fatal crashes in the event that they are struck by a motorist.

Electricity poles were also noted on both sides of the road in these locations, however, electricity poles were typically further offset from the carriageway than trees.

Refer Photo 6 for example.

Consideration to be given to the following works along Sunbury Road (both directions) between Francis Boulevard and Melbourne-Lancefield Road:

- Provision of an appropriate road safety barrier
- · Reduction in the speed limit
- Removal of vegetation located within the clear zone (former requirement) of the road
- Undergrounding of electricity wires and associated removal of poles.



Item	Location(s)	Finding	Recommendation
5	Location: Sunbury Road (Eastbound) approx. 2.3km southeast of Melbourne- Lancefield Road Route: Calder	Lane merge provided on road bend, noting posted speed limit of 100km/h. A 'Form one lane sign' is provided on approach to the merge with no further advance warning signage of the upcoming merge provided. The high speed limit, in combination with the road bend, increase the risk to merging motorists, relative to a lower speed merge on a straight section of road. Given this, it is considered that there should be additional advance warning signage to advise motorists of the upcoming merge. This is considered of particular importance for truck drivers who typically travel within the kerbside lane and have limited ability (relative to car drivers) to make sudden changes to their speed to allow for a safe merge. Refer Photo 7 .	Provide a 'left land ends 500m' (G9-V119) sign on approach to lane merge.
6	Location: Sunbury Road (Eastbound) approx. 650m northwest of Bulla-Diggers Rest Road Route: Tullamarine	The dividing lane line marking between the acceleration lane (for trucks exiting the Bulla Tip & Quarry) and the through traffic lane is very faded. Refer Photo 8 .	Re-paint line marking.


ltem	Location(s)	Finding	Recommendation
7	Location: Sunbury Road (Eastbound) approx. 400m northwest of Quartz Street Route: Tullamarine	A number of support posts are missing from the wire rope barrier. As a result, the integrity and crash performance of the barrier is compromised. Refer Photo 9 .	Replace missing barrier support post sections and confirm structural and crash performance integrity of wire rope barrier meets requirements.
8	Location: Sunbury Road (Both Directions) adjacent to Melbourne Airport between Tullamarine Freeway and Oaklands Road Route: Tullamarine	A road safety barrier is provided in the centre of Sunbury Road to physically separate east and westbound motorists. 'Reflectors' are located on top of the barrier; however, these reflectors are yellow and are not reflective. As such, motorist headlights are not reflected by the 'reflectors' during the evening. This greatly decreases the visibility, and hence effectiveness of, the treatment, noting that there is limited existing street lighting in the area. Refer Photo 10 & 11 .	Replace yellow 'reflectors' on top of the central road safety barrier with reflective reflectors.

Item	Location(s)	Finding	Recommendation
9	Location: Sunbury Road (Westbound) immediately east of Oaklands Road Route: Tullamarine	A bus stop is located within the grass verge. It is understood that this stop services the route 479 bus. There is no footpath or accessible access to this stop. There are inherent tripping and general accessibility issues with such an arrangement. Furthermore, it is also noted that there are no footpaths in the vicinity of the stop. A propped bus at the stop would either need to block part of the kerbside traffic lane or travel onto grass to be clear of the traffic lane. Either option has the potential to create road safety issues for the bus or other motorists. Refer Photo 12 .	Either linemark a bus stop within the kerbside traffic lane road surface or increase the road seal width to provide an indented bus bay treatment.
10	Location: Sunbury Road (Westbound) approx. 100m west of Old Bulla Road Route: Tullamarine	The '60km/h ahead' sign on the southern side of the road is rotated 90 degrees from the view of oncoming motorists. The traffic sign is not visible to oncoming motorists and is ineffective as such. Refer Photo 13 .	Re-instate or rotate traffic sign to face oncoming traffic.



ltem	Location(s)	Finding	Recommendation
11	Location: Sunbury Road (Westbound) between Coghill Street and Rawdon Street Route: Tullamarine	Motorist sightlines to a 'pedestrian crossing' and '60km/h speed limit' sign, both located within the southern verge, are obstructed by vegetation. Signs which cannot be clearly seen by motorists do not serve their function in providing advisory messages to motorists. Refer Photo 14 & 15 .	Trim or remove vegetation to allow for signs to be clearly visible to oncoming motorists.
12	Location: Sunbury Road (Both Directions) between Green Street and School lane Route: Tullamarine	Guide posts are located within a central median. No retroreflective markings are included on the guide posts. As a result the guide posts are not easily visible during night-time periods. Refer Photo 16 & 17 .	Install reflective tape/markings to guide posts.



ltem	Location(s)	Finding	Recommendation
13	Location: Sunbury Road (Westbound) opposite Quartz Street Route: Tullamarine	There is 40km/h advisory signage, both a separate static and electronic sign, on approach to the Deep Creek Bridge (westbound). With respect to the electronic sign a '40km/h' message is displayed at all times along with a 'TOO FAST' message for motorists who are overspeed. The size of text on the electronic speed sign is too small and is considered to be relatively ineffective in providing motorists of significant advance warning of excess speeds. Moreover, the 'TOO FAST' message appears as motorists are passing the sign itself and provides limited awareness for these motorists. Refer Photo 18 .	Consider increasing the size of the electronic sign and/or text displayed on the sign to increase legibility to oncoming motorists. Consider modifications to the sensors which record vehicle speeds and/or the timing of 'TOO FAST' messaging to ensure that it is visible to motorists on approach.
14	Location: Sunbury Road (Westbound) between Quartz Street and Bulla-Diggers Rest Road Route: Tullamarine	A number of support posts and guard fence sections are misaligned and damaged. As a result, the integrity and crash performance of the barrier is compromised. Refer Photo 19 .	Replace barrier support posts and guard fence and confirm structural and crash performance integrity of crash barrier meets requirements.

Item	Location(s)	Finding	Recommendation
15	Location: Sunbury Road (Westbound) approx. 400m east of Bulla-Diggers Rest Road Route: Tullamarine	Oncoming motorist sightlines to chevron hazard markers at bend obstructed by vegetation. Signs which cannot be clearly seen by motorists do not serve their function in providing advisory messages to motorists. Refer Photo 20.	Trim or remove vegetation to allow for signs to be clearly visible to oncoming motorists.
16	Location: Sunbury Road (Westbound) approx. 150- 200m east of Bulla-Diggers Rest Road Route: Tullamarine	There is a signage pole without a sign. Also noted was a green directional sign which was laying on the ground within the verge. Missing signs may create directional, statutory compliance or awareness issues for motorists. Refer Photo 21 & 22.	Re-instate signs. If no sign is needed at signage pole location then remove signage pole.
17	Location: Sunbury Road (Westbound) between Bulla- Diggers Rest Road and Bulla Tip Site Access Route: Tullamarine	The edge and dividing lane line marking is generally faded or missing. The absence of the edge line marking in particular may make it difficult for some motorists to determine where the edge of the road and hence the sealed surface is. Refer Photo 23 .	Re-paint line marking.



Item	Location(s)	Finding	Recommendation
18	Location: Sunbury Road (Westbound) between Evans Street and Vineyard Road Route: Calder	Line marking of on-road cycle lane is very faded. This makes it difficult for motorists and cyclists to determine the lane extents and increases the probability of conflict between these users as such. Refer Photo 24 .	Re-paint line marking.
19	Location: Vineyard Road (Southbound) at Service Road Entry immediately south of Mitchells Lane Route: Calder	The bi-directional hazard sign at the service road entry is rotated 90 degrees from oncoming traffic. The traffic sign is not visible to oncoming motorists and is ineffective as such. Refer Photo 25 .	Re-instate or rotate traffic sign to face oncoming traffic.
20	Location: Vineyard Road (Southbound) on approach to McDougall Road Route: Calder	The geometry of the road, along with vegetation within the verge, results in relatively limited approach sight distance for motorists of both the upcoming traffic signals and any vehicle queuing. Refer Photo 26 .	Install a (W3-3) 'traffic signals ahead' sign within the eastern verge, opposite the existing W3-3 sign that is within the central median. Trim and/or remove vegetation (as required) to improve sight distance to the traffic signals for approaching motorists.
21	Location: General - Vineyard Road (Both Directions) through the Sunbury township Route: Calder	Power poles are located adjacent to the carriageway throughout the Sunbury township. Refer Photo 27 .	These are clearly an existing condition; however, consideration could be given to undergrounding electricity in the area and thus allowing for the removal of these power poles.



ltem	Location(s)	Finding	Recommendation			
22	Location: General Route: Calder & Tullamarine	A number of road sections with a posted speed limit of 80-100km/h comprise a gravel road shoulder. If motorists veer into gravel shoulders they may have difficulty adjusting their course back onto the sealed surface. Refer Photo 28 .	Provide audio edge tactile line marking for 80- 100km/h roads with a gravel shoulder. Priority to be given to roads which comprise trees or similar hazards within the lateral extents of the area of interest. Consideration to be given to widening the width of the sealed shoulder section as per the requirements of Section 3.4 of the Department of Transport Road Design note 03-10.			
23	Location: General – Sunbury Road (Both Directions) Route: Calder & Tullamarine	Several guide posts on Sunbury Road were knocked over or bent and aren't facing oncoming motorists.	Replace or reinstate guide posts so they are upright and facing motorists.			
24	Location: General – Sunbury Road (Both Directions) Route: Calder & Tullamarine General	Several directional pavement arrows on approach to roundabouts were observed to be faded. Refer Photo 28 .	Re-paint line marking.			





Source: Melway Publishing Pty Ltd

Figure 5: Road Safety Considerations - Reference Map



Appendix A

Photographs



Photograph 1:

Sunbury Road (Westbound) on approach to Vineyard Road

Road cracking visible



Photograph 2:

Vineyard Road (Northbound) to the north of Old Vineyard Road

Road seal join in middle of bicycle lane



Photograph 3:

Vineyard Road (Northbound) on departure from Calder Freeway Southern Interchange

Zip merge without signage or line marking



Photograph 4:

Vineyard Road (Northbound) in vicinity of Rosenthal Boulevard

Duplication of dividing lane line marking



Photograph 5:

Sunbury Road (Eastbound) at Melbourne-Lancefield Road

Faded circulating lane line marking through roundabout



Photograph 7:

Sunbury Road (Eastbound) approx. 2.3km southeast of Melbourne-Lancefield Road

Lane merge located on road corner



Photograph 6:

Sunbury Road (Westbound) between Melbourne-Lancefield Road and Francis Boulevard

Tree located within former clear zone extents

Photograph 8:

Sunbury Road (Eastbound) approx. 650m northwest of Bulla-Diggers Rest Road

Faded line marking



Photograph 9:

Sunbury Road (Eastbound) approx. 400m northwest of Quartz Street

Missing barrier sections



Photograph 10:

Sunbury Road (Both Directions) adjacent to Melbourne Airport between Tullamarine Freeway and Oaklands Road

Coloured markers (night-time)



Photograph 11:

Sunbury Road (Both Directions) adjacent to Melbourne Airport between Tullamarine Freeway and Oaklands Road

Coloured markers (night-time)



Photograph 12:

Sunbury Road (Westbound) immediately south of Oaklands Road

Bus Stop within grass verge (Source: Google Maps)



Photograph 13:

Sunbury Road (Westbound) approx. 100m west of Old Bulla Road

Rotated speed limit ahead sign



Photograph 15:

Sunbury Road (Westbound) between Coghill Street and Rawdon Street

Vegetation blocking road sign



Photograph 14:

Sunbury Road (Westbound) between Coghill Street and Rawdon Street

Vegetation blocking road sign

Photograph 16:

Sunbury Road (Both Directions) between Green Street and School lane

Guide posts without reflectivity (daytime)



Photograph 17:

Sunbury Road (Both Directions) between Green Street and School lane

Guide posts without reflectivity (nighttime)





Photograph 19:

Sunbury Road (Westbound) between Quartz Street and Bulla-Diggers Rest Road

Damage to road safety barrier



Photograph 18:

Sunbury Road (Westbound) opposite Quartz Street

Electronic speed sign

Photograph 20:

Sunbury Road (Westbound) approx. 400m south of Bulla-Diggers Rest Road

Vegetation blocking road signs



Photograph 21:

Sunbury Road (Westbound) approx. 150-200m east of Bulla-Diggers Rest Road

Signage pole missing sign



Photograph 22:

Sunbury Road (Westbound) approx. 150-200m east of Bulla-Diggers Rest Road

Sign laying on ground

Photograph 24:

Sunbury Road (Westbound) between Evans Street and Vineyard Road

Faded on-road cycle lane line marking



Photograph 23:

Sunbury Road (Westbound) between Bulla-Diggers Rest Road and Bulla Tip Site Access

Faded/missing line marking





Photograph 25:

Vineyard Road (Southbound) at Service Road Entry immediately west of Mitchells Lane

Rotated road sign



Photograph 26:

Vineyard Road (Southbound) on approach to McDougall Road

Sight distance on approach to traffic signals



Photograph 27:

Vineyard Road (Southbound) immediately south of Sunbury Road

Power poles adjacent to carriageway



Photograph 28: General Example Gravel Shoulder



Photograph 29:

General Example

Faded directional arrows





Appendix C

Interim Signalisation Plan

Traffix Group

G27938R-02E



ISSUE	ISSUE DESCRIPTION	ISSUE DATE	GENERAL NOTES	DESIGNED	
			1 BASE INFORMATION FROM SUPPLIED DRAWINGSI / AERIAL PHOTOGRAPH (SOURCE-NEARMAP 23 NOV 2019) 2 ALL TRAFFIC LANES ON SUNBURY ROAD ARE 35m WIDE	G RAKITA 29 JAN 2020	Iraffix Group
			3 MAIN ROAD - SUNBURY ROAD (SPEED ZONE 80km/h) 4 ALL PROPOSED FOOTPATHS AND PRAM CROSSINGS ARE TO BE CONSTRUCTED WITH TACTILE GROUND SURFACE INDICATORS	CHECKED/APPROVED	in all the one of the
			TO DDA COMPLIANCE GUIDELINES REFER TO AS 1428.4-2009.	H TURNBULL 29 JAN 2020	Level 28, 459 Collins Street
				FILE NAME	+61 3 9822 2888
				G27938-00-00 dgn	www.traffixgroup.com.au



Appendix D

SIDRA Output

Traffix Group

G27938R-02E

MOVEMENT SUMMARY

Site: 101 [Hi-Quality Site Access - Future AM]

New Site Site Category: (None)

Signals - Fixed Time Isolated Cycle Time = 130 seconds (Site Optimum Cycle Time - Minimum Delay)

Move	Movement Performance - Vehicles													
Mov ID	Turn	Demano Total veh/h	l Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back Vehicles veh	of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h		
South	East: Su	nbury Roa	d											
22	T1	1137	5.0	0.362	2.8	LOS A	8.5	62.0	0.26	0.24	0.26	57.4		
23	R2	40	100.0	0.799	84.5	LOS F	2.9	38.1	1.00	0.91	1.43	24.5		
Approa	ach	1177	8.2	0.799	5.6	LOS A	8.5	62.0	0.29	0.26	0.30	54.9		
NorthE	East: Hi-0	Quality Sit	e Access											
24	L2	36	100.0	0.151	31.9	LOS C	1.6	21.3	0.71	0.74	0.71	38.3		
26	R2	2	100.0	0.025	68.5	LOS E	0.1	1.7	0.95	0.63	0.95	27.5		
Approa	ach	38	100.0	0.151	34.0	LOS C	1.6	21.3	0.72	0.73	0.72	37.5		
NorthV	Vest: Su	nbury Roa	ıd											
27	L2	5	100.0	0.007	10.8	LOS B	0.1	1.1	0.27	0.60	0.27	48.4		
28	T1	2420	5.0	0.869	13.0	LOS B	55.0	401.4	0.80	0.76	0.80	49.4		
Approa	ach	2425	5.2	0.869	13.0	LOS B	55.0	401.4	0.80	0.75	0.80	49.4		
All Veh	nicles	3640	7.2	0.869	10.8	LOS B	55.0	401.4	0.63	0.59	0.64	50.9		

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab). Vehicle movement LOS values are based on average delay per movement.

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 (Akçelik M3D).

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

Movement Performance - Pedestrians													
Mov	D	Demand	Average	Level of	Average Bacl	k of Queue	Prop.	Effective					
ID	Description	Flow	Delay	Service	Pedestrian	Distance	Queued	Stop Rate					
		ped/h	sec		ped	m							
P51	SouthEast Stage 1	53	59.3	LOS E	0.2	0.2	0.96	0.96					
P52	SouthEast Stage 2	53	59.3	LOS E	0.2	0.2	0.96	0.96					
P6	NorthEast Full Crossing	53	59.3	LOS E	0.2	0.2	0.96	0.96					
All Pedestrians		158	59.3	LOS E			0.96	0.96					

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

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PHASING SUMMARY

Site: 101 [Hi-Quality Site Access - Future AM]

New Site Site Category: (None) Signals - Fixed Time Isolated Cycle Time = 130 seconds (Site Optimum Cycle Time - Minimum Delay)

Timings based on settings in the Site Phasing & Timing dialog Phase Times determined by the program Phase Sequence: Variable Phasing Reference Phase: Phase A Input Phase Sequence: A, B, C Output Phase Sequence: A, B, C

PHASE TIMING SUMMARY

Phase	Α	В	С
Phase Change Time (sec)	0	102	118
Green Time (sec)	96	10	6
Phase Time (sec)	102	16	12
Phase Split	78%	12%	9%

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



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SITE LAYOUT

Site: 101 [Hi-Quality Site Access - Future AM]

New Site Site Category: (None) Signals - Fixed Time Isolated



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MOVEMENT SUMMARY

Site: 101 [Hi-Quality Site Access - Future PM]

New Site Site Category: (None)

Signals - Fixed Time Isolated Cycle Time = 130 seconds (Site Optimum Cycle Time - Minimum Delay)

Move	Movement Performance - Vehicles													
Mov ID	Turn	Demand Total veh/h	l Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back Vehicles veh	of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h		
South	East: Sun	bury Roa	d											
22	T1	2671	5.0	0.859	6.7	LOS A	49.4	360.5	0.63	0.61	0.63	54.1		
23	R2	26	100.0	0.451	77.1	LOS E	1.8	23.3	1.00	0.73	1.00	25.8		
Approa	ach	2697	5.9	0.859	7.4	LOS A	49.4	360.5	0.64	0.61	0.64	53.5		
NorthE	East: Hi-C	uality Site	e Access											
24	L2	57	100.0	0.180	9.3	LOS A	0.9	11.9	0.30	0.63	0.30	50.1		
26	R2	12	100.0	0.139	70.3	LOS E	0.7	9.5	0.96	0.70	0.96	27.1		
Approa	ach	68	100.0	0.180	19.6	LOS B	0.9	11.9	0.41	0.64	0.41	43.8		
NorthV	Vest: Sur	bury Roa	ıd											
27	L2	2	100.0	0.003	11.0	LOS B	0.0	0.5	0.28	0.59	0.28	48.2		
28	T1	1208	5.0	0.438	7.3	LOS A	14.8	108.1	0.43	0.39	0.43	53.6		
Approa	ach	1211	5.2	0.438	7.3	LOS A	14.8	108.1	0.43	0.39	0.43	53.6		
All Veh	nicles	3976	7.3	0.859	7.6	LOS A	49.4	360.5	0.57	0.54	0.57	53.3		

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab). Vehicle movement LOS values are based on average delay per movement.

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 (Akçelik M3D).

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

Movement Performance - Pedestrians											
Mov	D	Demand	Average	Level of	Average Bacl	k of Queue	Prop.	Effective			
ID	Description	Flow	Delay	Service	Pedestrian	Distance	Queued	Stop Rate			
		ped/h	sec		ped	m					
P51	SouthEast Stage 1	53	59.3	LOS E	0.2	0.2	0.96	0.96			
P52	SouthEast Stage 2	53	59.3	LOS E	0.2	0.2	0.96	0.96			
P6	NorthEast Full Crossing	53	59.3	LOS E	0.2	0.2	0.96	0.96			
All Pedestrians		158	59.3	LOS E			0.96	0.96			

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

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PHASING SUMMARY

Site: 101 [Hi-Quality Site Access - Future PM]

New Site Site Category: (None) Signals - Fixed Time Isolated Cycle Time = 130 seconds (Site Optimum Cycle Time - Minimum Delay)

Timings based on settings in the Site Phasing & Timing dialog Phase Times determined by the program Phase Sequence: Variable Phasing Reference Phase: Phase A Input Phase Sequence: A, B, C Output Phase Sequence: A, B, C

PHASE TIMING SUMMARY

Phase	Α	В	С
Phase Change Time (sec)	0	101	117
Green Time (sec)	95	10	7
Phase Time (sec)	101	16	13
Phase Split	78%	12%	10%

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



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SITE LAYOUT

Site: 101 [Hi-Quality Site Access - Future PM]

New Site Site Category: (None) Signals - Fixed Time Isolated



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MOVEMENT SUMMARY

Site: 101 [Hi-Quality Site Access - Interim AM]

New Site Site Category: (None)

Signals - Fixed Time Isolated Cycle Time = 140 seconds (Site Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles												
Mov ID	Turn	Demano Total veh/h	l Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back Vehicles veh	of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South	East: Su	nbury Roa	ıd									
22	T1	299	5.0	0.091	1.3	LOS A	1.4	10.0	0.15	0.12	0.15	58.7
23	R2	40	100.0	0.574	81.3	LOS F	2.9	37.9	1.00	0.78	1.07	25.0
Approa	ach	339	16.2	0.574	10.7	LOS B	2.9	37.9	0.25	0.20	0.26	50.7
NorthE	East: Hi-	Quality Sit	e Access									
24	L2	36	100.0	0.164	10.8	LOS B	0.7	8.6	0.32	0.62	0.32	49.1
26	R2	2	100.0	0.045	80.6	LOS F	0.1	1.9	0.98	0.62	0.98	25.2
Approa	ach	38	100.0	0.164	14.7	LOS B	0.7	8.6	0.36	0.62	0.36	46.6
NorthV	Vest: Su	inbury Roa	ad									
27	L2	5	100.0	0.006	7.8	LOS A	0.1	0.7	0.16	0.59	0.16	50.4
28	T1	1657	5.0	0.574	7.3	LOS A	23.2	169.1	0.46	0.42	0.46	53.6
Approa	ach	1662	5.3	0.574	7.3	LOS A	23.2	169.1	0.46	0.42	0.46	53.6
All Veh	nicles	2039	8.9	0.574	8.0	LOS A	23.2	169.1	0.42	0.39	0.42	52.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab). Vehicle movement LOS values are based on average delay per movement.

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 (Akçelik M3D).

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

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PHASING SUMMARY

Site: 101 [Hi-Quality Site Access - Interim AM]

New Site Site Category: (None) Signals - Fixed Time Isolated Cycle Time = 140 seconds (Site Optimum Cycle Time - Minimum Delay)

Timings based on settings in the Site Phasing & Timing dialog Phase Times determined by the program Phase Sequence: Variable Phasing Reference Phase: Phase A Input Phase Sequence: A, B, C Output Phase Sequence: A, B, C

PHASE TIMING SUMMARY

Phase	Α	В	С
Phase Change Time (sec)	0	113	128
Green Time (sec)	107	9	6
Phase Time (sec)	113	15	12
Phase Split	81%	11%	9%

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



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SITE LAYOUT

Site: 101 [Hi-Quality Site Access - Interim AM]

New Site Site Category: (None) Signals - Fixed Time Isolated



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MOVEMENT SUMMARY

Site: 101 [Hi-Quality Site Access - Interim PM]

New Site Site Category: (None)

Signals - Fixed Time Isolated Cycle Time = 150 seconds (Site Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles												
Mov ID	Turn	Demano Total veh/h	l Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back Vehicles veh	of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South	East: Su	inbury Roa	ıd									
22	T1	1327	5.0	0.399	1.7	LOS A	8.7	63.6	0.20	0.18	0.20	58.3
23	R2	26	100.0	0.173	69.2	LOS E	1.8	22.8	0.92	0.73	0.92	27.3
Approa	ach	1354	6.8	0.399	3.0	LOS A	8.7	63.6	0.21	0.20	0.21	57.1
NorthE	East: Hi-	Quality Site	e Access									
24	L2	57	100.0	0.093	6.9	LOS A	0.4	4.7	0.14	0.57	0.14	51.8
26	R2	12	100.0	0.267	89.2	LOS F	0.9	11.8	1.00	0.69	1.00	23.8
Approa	ach	68	100.0	0.267	20.8	LOS C	0.9	11.8	0.28	0.59	0.28	43.2
NorthV	Vest: Su	unbury Roa	ad									
27	L2	2	100.0	0.002	9.9	LOS A	0.0	0.4	0.23	0.59	0.23	49.0
28	T1	449	5.0	0.170	8.0	LOS A	5.4	39.6	0.36	0.31	0.36	53.0
Approa	ach	452	5.4	0.170	8.0	LOS A	5.4	39.6	0.36	0.31	0.36	53.0
All Veh	nicles	1874	9.9	0.399	4.9	LOS A	8.7	63.6	0.25	0.24	0.25	55.4

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab). Vehicle movement LOS values are based on average delay per movement.

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 (Akçelik M3D).

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

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PHASING SUMMARY

Site: 101 [Hi-Quality Site Access - Interim PM]

New Site Site Category: (None) Signals - Fixed Time Isolated Cycle Time = 150 seconds (Site Optimum Cycle Time - Minimum Delay)

Timings based on settings in the Site Phasing & Timing dialog Phase Times determined by the program Phase Sequence: Variable Phasing Reference Phase: Phase A Input Phase Sequence: A, B, C Output Phase Sequence: A, B, C

PHASE TIMING SUMMARY

Phase	Α	В	С
Phase Change Time (sec)	0	111	138
Green Time (sec)	105	21	6
Phase Time (sec)	111	27	12
Phase Split	74%	18%	8%

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



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SITE LAYOUT

Site: 101 [Hi-Quality Site Access - Interim PM]

New Site Site Category: (None) Signals - Fixed Time Isolated



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MOVEMENT SUMMARY

Site: 101 [Hi-Quality Site Access - Pre-Interim AM]

New Site Site Category: (None)

Signals - Fixed Time Isolated Cycle Time = 130 seconds (Site Optimum Cycle Time - Minimum Delay)

Move	Movement Performance - Vehicles											
Mov ID	Turn	Demand Total veh/h	l Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back Vehicles veh	of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South	East: Su	inbury Roa	d									
22	T1	299	5.0	0.187	1.9	LOS A	3.4	24.5	0.20	0.17	0.20	58.2
23	R2	40	100.0	0.480	73.1	LOS E	2.6	34.2	1.00	0.75	1.00	26.4
Approa	ach	339	16.2	0.480	10.3	LOS B	3.4	34.2	0.29	0.24	0.29	50.9
NorthE	East: Hi-	Quality Site	e Access									
24	L2	36	100.0	0.210	57.9	LOS E	2.1	27.8	0.90	0.75	0.90	29.8
26	R2	2	100.0	0.210	57.8	LOS E	2.1	27.8	0.90	0.75	0.90	29.7
Approa	ach	38	100.0	0.210	57.9	LOS E	2.1	27.8	0.90	0.75	0.90	29.8
NorthV	Vest: Su	unbury Roa	ıd									
27	L2	5	100.0	0.468	13.9	LOS B	16.2	118.8	0.44	0.41	0.44	49.9
28	T1	1657	5.0	0.752	10.1	LOS B	38.7	282.2	0.58	0.54	0.58	51.4
Approa	ach	1662	5.3	0.752	10.1	LOS B	38.7	282.2	0.58	0.54	0.58	51.4
All Veh	nicles	2039	8.9	0.752	11.0	LOS B	38.7	282.2	0.54	0.49	0.54	50.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab). Vehicle movement LOS values are based on average delay per movement.

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 (Akçelik M3D).

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

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PHASING SUMMARY

Site: 101 [Hi-Quality Site Access - Pre-Interim AM]

New Site Site Category: (None) Signals - Fixed Time Isolated Cycle Time = 130 seconds (Site Optimum Cycle Time - Minimum Delay)

Timings based on settings in the Site Phasing & Timing dialog Phase Times determined by the program Phase Sequence: Variable Phasing Reference Phase: Phase A Input Phase Sequence: A, B, C Output Phase Sequence: A, B, C

Dhaaa	Timina	Cummon.	
Fliase	rinnig	Summary	

Phase	Α	В	С
Phase Change Time (sec)	0	100	116
Green Time (sec)	94	10	8
Phase Time (sec)	100	16	14
Phase Split	77%	12%	11%

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





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SITE LAYOUT

Site: 101 [Hi-Quality Site Access - Pre-Interim AM]

New Site Site Category: (None) Signals - Fixed Time Isolated



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Site: 101 [Hi-Quality Site Access - Pre-Interim PM]

New Site Site Category: (None)

Signals - Fixed Time Isolated Cycle Time = 130 seconds (Site Optimum Cycle Time - Minimum Delay)

Move	Movement Performance - Vehicles											
Mov ID	Turn	Demano Total veh/h	l Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back Vehicles veh	of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South	East: Si	unbury Roa	ıd									
22	T1	1327	5.0	0.852	5.4	LOS A	42.6	310.6	0.57	0.54	0.57	55.1
23	R2	26	100.0	0.210	65.0	LOS E	1.6	20.6	0.94	0.73	0.94	28.1
Appro	ach	1354	6.8	0.852	6.6	LOS A	42.6	310.6	0.58	0.55	0.58	54.0
NorthE	East: Hi	-Quality Sit	e Access									
24	L2	57	100.0	0.426	62.2	LOS E	4.1	53.5	0.95	0.78	0.95	28.8
26	R2	12	100.0	0.426	62.2	LOS E	4.1	53.5	0.95	0.78	0.95	28.7
Appro	ach	68	100.0	0.426	62.2	LOS E	4.1	53.5	0.95	0.78	0.95	28.8
North\	Vest: S	unbury Roa	ad									
27	L2	2	100.0	0.135	13.5	LOS B	3.7	27.1	0.37	0.32	0.37	50.1
28	T1	449	5.0	0.216	7.7	LOS A	6.4	46.6	0.39	0.33	0.39	53.2
Approa	ach	452	5.4	0.216	7.8	LOS A	6.4	46.6	0.39	0.33	0.39	53.2
All Vel	nicles	1874	9.9	0.852	8.9	LOS A	42.6	310.6	0.54	0.50	0.54	52.2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab). Vehicle movement LOS values are based on average delay per movement.

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 (Akçelik M3D).

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

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PHASING SUMMARY

Site: 101 [Hi-Quality Site Access - Pre-Interim PM]

New Site Site Category: (None) Signals - Fixed Time Isolated Cycle Time = 130 seconds (Site Optimum Cycle Time - Minimum Delay)

Timings based on settings in the Site Phasing & Timing dialog Phase Times determined by the program Phase Sequence: Variable Phasing Reference Phase: Phase A Input Phase Sequence: A, B, C Output Phase Sequence: A, B, C

Phase	Timina	Summarv

Phase	Α	В	С
Phase Change Time (sec)	0	95	116
Green Time (sec)	89	15	8
Phase Time (sec)	95	21	14
Phase Split	73%	16%	11%

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





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Site: 101 [Hi-Quality Site Access - Pre-Interim PM]

New Site Site Category: (None) Signals - Fixed Time Isolated



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Site: 101 [Existing Roundabout - AM Peak]

New Site Site Category: (None) Roundabout

Move	Movement Performance - Vehicles											
Mov ID	Turn	Demand F Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back Vehicles veh	of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South	East: Su	nbury Road										
2	T1	262	6.8	0.176	4.9	LOS A	1.1	8.3	0.31	0.50	0.31	54.1
3	R2	99	7.4	0.176	9.0	LOS A	1.1	8.3	0.31	0.53	0.31	53.4
3u	U	1	0.0	0.176	10.9	LOS B	1.1	8.3	0.31	0.53	0.31	54.6
Approa	ach	362	7.0	0.176	6.0	LOS A	1.1	8.3	0.31	0.50	0.31	53.9
NorthE	East: Lar	ncefield Roa	d									
4	L2	420	2.3	0.419	8.1	LOS A	2.4	17.0	0.68	0.87	0.72	51.5
6	R2	107	3.9	0.419	12.1	LOS B	2.4	17.0	0.70	0.89	0.76	52.3
6u	U	1	0.0	0.419	13.9	LOS B	2.4	17.0	0.70	0.89	0.76	53.2
Approa	ach	528	2.6	0.419	8.9	LOS A	2.4	17.0	0.68	0.87	0.73	51.6
North\	Vest: Su	nbury Road										
7	L2	47	8.9	0.271	5.2	LOS A	1.7	12.0	0.32	0.47	0.32	53.1
8	T1	915	2.5	0.431	5.0	LOS A	3.2	23.1	0.34	0.46	0.34	54.7
9u	U	1	0.0	0.431	11.1	LOS B	3.2	23.1	0.35	0.46	0.35	55.4
Approa	ach	963	2.8	0.431	5.0	LOS A	3.2	23.1	0.34	0.46	0.34	54.7
All Vel	nicles	1854	3.6	0.431	6.3	LOS A	3.2	23.1	0.43	0.59	0.45	53.6

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

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 (Akcelik M3D).

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

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V Site: 101 [Existing Roundabout - AM Peak]

New Site Site Category: (None) Roundabout



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Site: 101 [Existing Roundabout - PM Peak]

New Site Site Category: (None) Roundabout

Move	Movement Performance - Vehicles											
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back Vehicles veh	of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South	East: Si	unbury Road	ł									
2	T1	866	1.6	0.541	4.7	LOS A	5.0	35.5	0.29	0.48	0.29	54.2
3	R2	404	2.6	0.541	8.9	LOS A	5.0	35.5	0.31	0.52	0.31	53.4
3u	U	1	0.0	0.541	10.9	LOS B	5.0	35.5	0.31	0.52	0.31	54.4
Appro	ach	1272	1.9	0.541	6.0	LOS A	5.0	35.5	0.30	0.50	0.30	54.0
North	East: La	ncefield Roa	ad									
4	L2	136	3.9	0.119	5.6	LOS A	0.6	4.0	0.41	0.61	0.41	52.7
6	R2	60	3.5	0.119	9.6	LOS A	0.6	4.0	0.41	0.62	0.41	53.2
6u	U	1	0.0	0.119	11.4	LOS B	0.6	4.0	0.41	0.62	0.41	54.2
Appro	ach	197	3.7	0.119	6.8	LOS A	0.6	4.0	0.41	0.61	0.41	52.9
North\	Nest: S	unbury Road	b									
7	L2	105	5.0	0.155	7.0	LOS A	0.9	6.2	0.56	0.66	0.56	52.5
8	T1	306	2.1	0.247	6.4	LOS A	1.5	10.9	0.57	0.62	0.57	53.7
9u	U	2	50.0	0.247	13.9	LOS B	1.5	10.9	0.57	0.62	0.57	52.3
Appro	ach	414	3.1	0.247	6.6	LOS A	1.5	10.9	0.57	0.63	0.57	53.4
All Vel	hicles	1882	2.3	0.541	6.2	LOS A	5.0	35.5	0.37	0.54	0.37	53.7

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

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 (Akcelik M3D).

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

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Site: 101 [Existing Roundabout - PM Peak]

New Site Site Category: (None) Roundabout



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Site: 101 [Post Development Roundabout - AM Peak]

New Site Site Category: (None) Roundabout

Move	ment l	Performan	ce - Vel	nicles								
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back Vehicles veh	of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South	East: S	unbury Road	ł									
2	T1	262	6.8	0.189	4.9	LOS A	1.2	9.5	0.32	0.50	0.32	54.0
3	R2	99	7.4	0.189	9.0	LOS A	1.2	9.5	0.32	0.54	0.32	53.3
3u	U	20	94.7	0.189	12.5	LOS B	1.2	9.5	0.32	0.54	0.32	50.8
Appro	ach	381	11.6	0.189	6.4	LOS A	1.2	9.5	0.32	0.51	0.32	53.7
North	East: La	ancefield Roa	ad									
4	L2	420	2.3	0.433	8.3	LOS A	2.5	18.1	0.70	0.88	0.75	51.3
6	R2	107	3.9	0.433	12.4	LOS B	2.5	18.1	0.72	0.91	0.80	52.1
6u	U	1	0.0	0.433	14.2	LOS B	2.5	18.1	0.72	0.91	0.80	53.0
Appro	ach	528	2.6	0.433	9.2	LOS A	2.5	18.1	0.71	0.89	0.76	51.5
North\	Nest: S	unbury Road	d									
7	L2	47	8.9	0.280	5.4	LOS A	1.7	12.4	0.37	0.49	0.37	52.9
8	T1	915	2.5	0.446	5.2	LOS A	3.4	24.2	0.39	0.48	0.39	54.5
9u	U	1	0.0	0.446	11.2	LOS B	3.4	24.2	0.40	0.48	0.40	55.2
Appro	ach	963	2.8	0.446	5.2	LOS A	3.4	24.2	0.39	0.48	0.39	54.4
All Vel	hicles	1873	4.6	0.446	6.5	LOS A	3.4	24.2	0.47	0.60	0.48	53.4

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

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 (Akcelik M3D).

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

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Site: 101 [Post Development Roundabout - AM Peak]

New Site Site Category: (None) Roundabout



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Site: 101 [Post Development Roundabout - PM Peak]

New Site Site Category: (None) Roundabout

Move	Movement Performance - Vehicles											
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back Vehicles veh	of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South	East: Su	inbury Road	ł									
2	T1	866	1.6	0.553	4.7	LOS A	5.2	37.9	0.30	0.48	0.30	54.2
3	R2	404	2.6	0.553	8.9	LOS A	5.2	37.9	0.32	0.52	0.32	53.3
3u	U	20	94.7	0.553	12.4	LOS B	5.2	37.9	0.32	0.52	0.32	50.7
Approa	ach	1291	3.3	0.553	6.1	LOS A	5.2	37.9	0.31	0.50	0.31	53.9
NorthE	East: Lai	ncefield Roa	ad									
4	L2	136	3.9	0.122	5.7	LOS A	0.6	4.1	0.43	0.62	0.43	52.6
6	R2	60	3.5	0.122	9.7	LOS A	0.6	4.1	0.42	0.63	0.42	53.2
6u	U	1	0.0	0.122	11.5	LOS B	0.6	4.1	0.42	0.63	0.42	54.1
Approa	ach	197	3.7	0.122	6.9	LOS A	0.6	4.1	0.43	0.62	0.43	52.8
North\	Vest: Su	Inbury Road	d									
7	L2	105	5.0	0.159	7.2	LOS A	0.9	6.4	0.58	0.67	0.58	52.3
8	T1	306	2.1	0.254	6.6	LOS A	1.6	11.3	0.59	0.64	0.59	53.6
9u	U	2	50.0	0.254	14.1	LOS B	1.6	11.3	0.59	0.63	0.59	52.3
Approa	ach	414	3.1	0.254	6.8	LOS A	1.6	11.3	0.59	0.64	0.59	53.3
All Vel	nicles	1901	3.3	0.553	6.4	LOS A	5.2	37.9	0.38	0.54	0.38	53.6

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

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 (Akcelik M3D).

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

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Site: 101 [Post Development Roundabout - PM Peak]

New Site Site Category: (None) Roundabout



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Appendix E

Pre-Interim Intersection Functional Layout Plan & As-built Signal Plan



G27938R-02E





ISSUE

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SSUE	APP'D	DATE	AMENDMENT							
W		21/12/21	AS-BUILT ISSUE FROM APPROVED TRAFFIX ISSUE F							