ATTACHMENT E – INVESTIGATIONS

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AEG052-01-C1-S00003

JG:jg

18 June 2020

Mr David Barone
Jensen PLUS
Major & Residential Project Delivery
GPO Box 698
ADELAIDE SA 5001

Dear David

ALBERT PARK MIXED USE DEVELOPMENT PLAN AMENDMENT

Kellogg Brown and Root Pty Ltd (KBR) has been engaged by Jensen PLUS to undertake preliminary infrastructure investigations to aid in the preparation of a Development Plan Amendment (DPA) for the proposed development located at Albert Park on behalf of the City of Charles Sturt (Council).

The capacity of the existing stormwater system and flood susceptibility of the subject and surrounding land has been investigated based on criteria set by Council.

KBR have approached service authorities for feedback and advice on the capacity of utility infrastructure and to identify any need for upgrades to accommodate the proposed development. The advice should be considered high level and should be confirmed when specifics of the proposal can confirm actual demands and development layout.

Flooding and Stormwater Management

Preliminary hydrological calculations were undertaken using DRAINS to determine whether or not onsite detention is required for the post-development scenario. Council has prescribed that the pre-development flows for the 0.2 EY (1 in 5 year ARI) rainfall event cannot be exceeded by the post-development flows for the 1% AEP (1 in 100 year ARI) rainfall event.

The development area is within the stormwater system which ultimately flows toward and into the Port Road Drain via pit and pipe infrastructure. There is existing stormwater pit and pipe infrastructure within the development which discharges to the Port Road Drain via May Street, Glyde Street and Botting Street.

Analysis has assumed two catchments which generally follow existing flow paths; one catchment draining toward May Street, and the other draining towards Glyde Street or Botting Street. The development area is very flat, and grades have been assumed based on site inspection and the existing drainage layout. Survey will be required to confirm the grading of the site and depths of the existing infrastructure.

Most of the development land is currently contained within the Urban Employment Zone, with a small portion along Glyde Street contained within the Residential Zone. Therefore, a large portion of the development area is commercial in nature the land use characteristics are not dissimilar to a 'mixed use zone' with potential for higher density residential development in suitable locations and is therefore unlikely to significantly increase stormwater runoff. However, to meet Council's criteria which aims to limit flows to less than that existing catchment, the results of the hydrological calculations indicate that onsite detention of approximately 2,700 m^3 is required as summarised in the below table.

Catchment	Area	Pre-Development 0.2 EY	Post-Development 1% AEP	Storage Required
May Street	6.40 ha	560 L/s	1,400 L/s	1,300 m^3
Glyde & Botting Streets	5.80 ha	430 L/s	1,300 L/s	1,400 m^3

The existing roads and the existing pit and pipe network within the project area will likely need to remain (or at least rerouted along a similar alignment) as they convey runoff through the site from significant catchments upstream and will likely dictate the need for smaller detention areas within each of the sub-catchments prior to discharge to the existing drainage network. Therefore, the detention required for both catchments will need to be split across several outfalls depending on the proposed development layout and connections to the existing stormwater drainage. Please refer to the attached sketch which summarises how KBR envisage the proposed development draining. Hydraulics of these connections needs to be investigated and confirmed during detailed design. the detention volume could be attained by detention basins, underground tanks, oversized pipes, or a combination of these noting that the bioretention system (discussed below) could account for some of the detention volume.

The principal of Water Sensitive Urban Design (WSUD) is to be utilised to ensure that runoff generated by the proposed development is treated within the site before being discharged into the existing Council drainage network. Assuming a filter depth of 0.5 m, approximately 840 m^2 of bioretention is required to meet the following criteria; 80% reduction of total suspended solids, 60% reduction of total phosphorous, 45% reduction of total nitrogen and 90% reduction of total gross pollutants. The bioretention area could be reduced with the use oil and sediment traps or the use other WSUD devices (such as tree pits, vegetated swales, buffer strips etc.) as well. The required bioretention area could be achieved by multiple small ponds at inlet pits or larger ponds incorporated into detention basins.

Flood map information (attached) provided by Council indicate that the development is affected by flooding. Council have advised that the recent upgrade of the Port Road Drain has improved this for a 0.2 EY event but flooding will still occur, particularly in the 1% AEP. The flooding in the 1% AEP is most significant between Murray Street and Botting Street (with depths up to 300 mm) and south of Jervois Street on the Baptis Church site (with depths up to 200 mm). The flooding may be due to low existing levels on these allotments or existing low points within the road network that do not have an appropriate overland flow path across private property and in this instance the development would need to provide appropriate overland flow paths most likely in conjunction with the proposed detention storage at key locations within the catchment. KBR recommend that the finished floor level of the proposed buildings within the development be 300 mm above the anticipated 1% AEP flood level, this is to be confirmed following site survey. Flow paths within the development will need to ensure safe conveyance of major flows and capture into the proposed detention facilities. Stormwater master planning for the project should also consider possible displacement of stormwater volume that would currently be 'detained' in flooding on private property at trapped low points. Should the allotment areas be filled, and appropriate overland flow paths cannot be achieved the displaced water would need to be accounted for. This will need to be confirmed in conjunction with detailed site survey.

Infrastructure Analysis

Service authorities have been consulted regarding infrastructure capacity in the vicinity of the site. Correspondence is attached for reference and summarised below.

Potable water

SA Water have advised that the network has sufficient capacity to support the development however the existing DN 150 branch and main off the existing DN 650 MSCL main in Port Road is to be replaced with a new DN 200 main to feed through the development and linkup to the existing DN 150 CICL mains abutting the development boundaries at West Lakes Boulevard and Glyde Street, refer Figure 1.

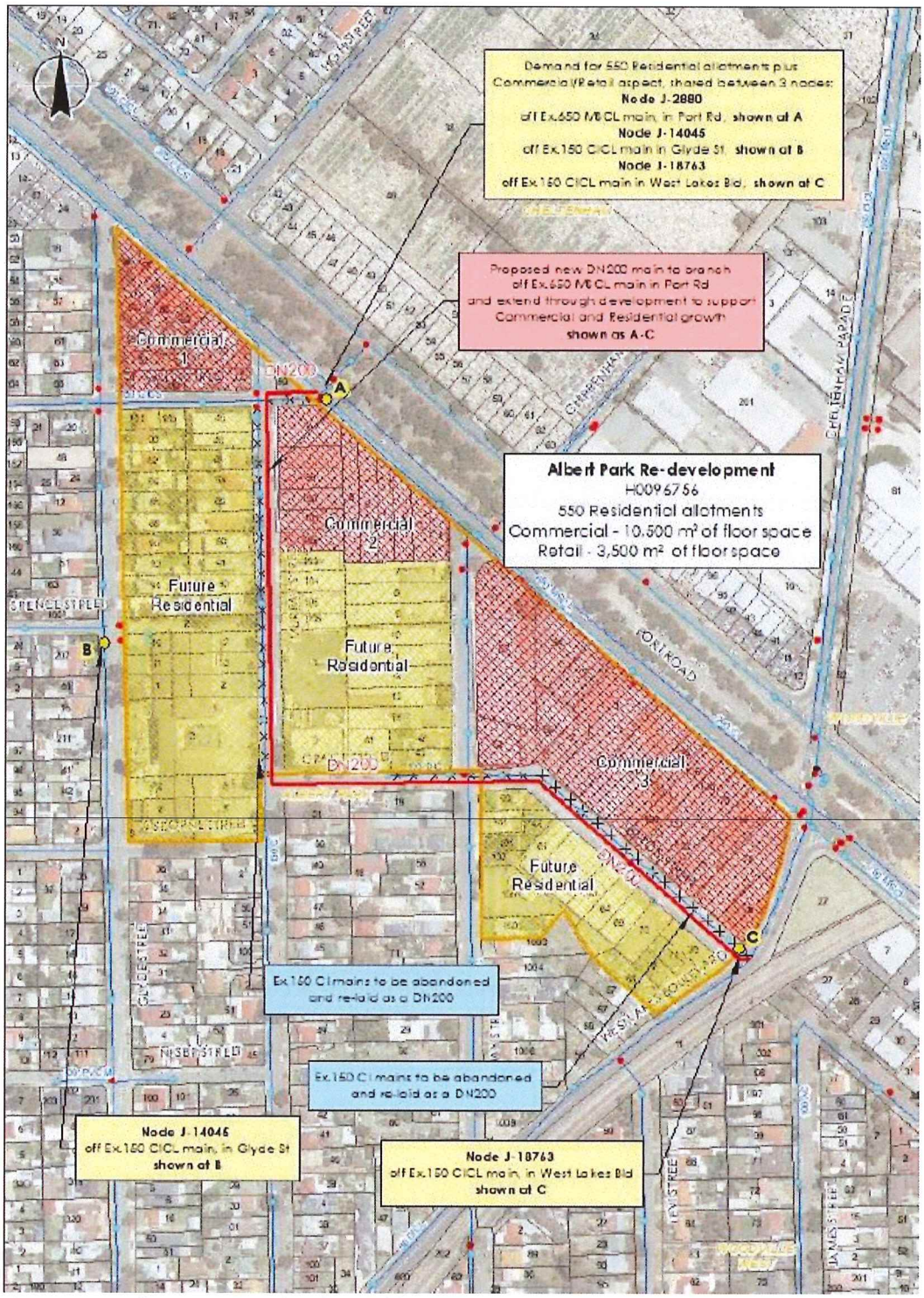


Figure 1 Extract from SA Water Advice for Potable Water

Depending on the final layout, some existing mains may need to be abandoned or resized accordingly and fire service requirements will need to be analysed further.

Sewer

SA Water have advised that the existing network has sufficient capacity to support the development however existing DN 150 mains along streets within and abutting the development will require upgrading to DN 225 mains to comply with the WSA Gravity Sewerage Code. Upgrading existing DN 150 mains to DN 225 mains would also require reestablishment of any existing property connections outside the development site into the respective reticulation sewer.

If the developer identifies the northern-most development is to discharge into the DN 150 VC on Glyde Street/Port Road, further upgrades of DN 150 mains along Port Road, Hawke Street, Lawton Street and up to Avro Avenue to DN 225 mains are required.

Based on preliminary investigation, WWPS 458 Queensbury Pump Station will not require a physical upgrade, but will require an earlier onset of pump operation, extended run times during peak discharge periods and increased frequency during the day to accommodate flows from the proposed development. Should the WWPS require a physical upgrade solely due to the development this would be at the Developer's cost.

Electricity

SA Power Networks have advised that the Woodville substation supplies the development area and that they do not foresee any issue with servicing the development with power, and that standard SAPN augmentation rates would apply for additional power loads. The Woodville substation has adequate capacity to accommodate additional load to the order of 8 MVA at present however if the additional load due to the development exceeds the substation threshold of 2.5 MVA additional zone substation augmentation rate would apply. By AS 3000 and SAPN TS100 taking 6 kVA per residential lot and 0.1 kVA/m^2 for retail and commercial, the estimated total load of the development would be 4.7 MVA which is well less than the available substation capacity even ignoring the existing loads within the development area.

There are two 11 kV HV feeders which pass the development area which would be the connection points for this development. SAPN have advised that the development should split the total load across each of these feeders.

- Feeder AP-351D Woodville South Feeder with a connection point on May Street
- Feeder AP-351E Albert Park Feeder with a connection point to Port Road frontage

Gas

APA have advised that the natural gas networks surrounding this development have adequate capacity to service natural gas requirements for the proposed development. Within the project boundary there may need to be adjustments (extensions or relocations etc.) to the existing gas infrastructure to suit the specifics of a proposed development such as changes in road layout and timing of various stages.

Communications

NBN Co. have advised that there is enough capacity in their network to support this development.

On the basis of enquiries to date and advice offered by the relevant service authorities, the proposed development can be serviced by potable water, sewer, electricity, gas and communications.

If you have any queries regarding the above, please do not hesitate to contact me on 8301 1274.

Yours sincerely

J. Grosser

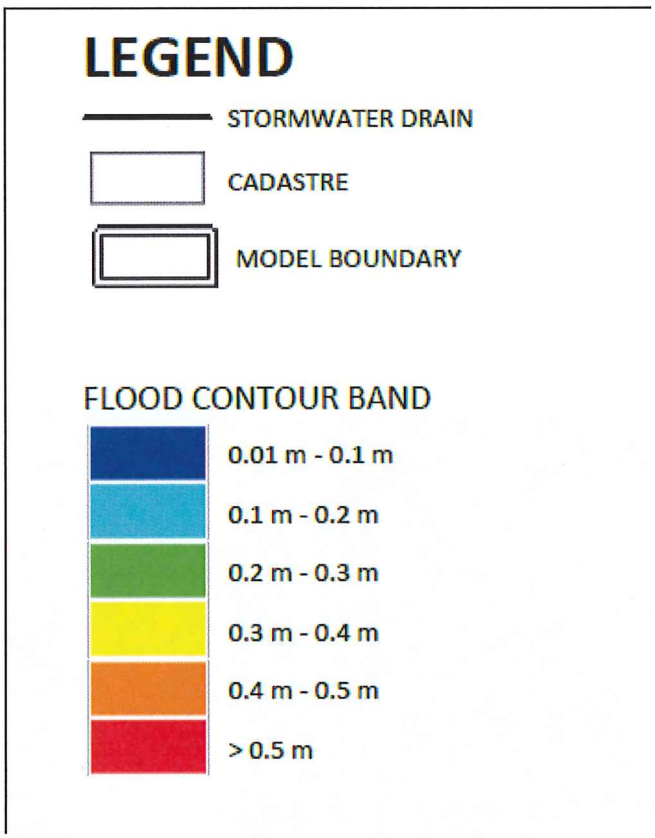
Jenna Grosser
Civil Engineer

PROPOSED SITE DRAINAGE



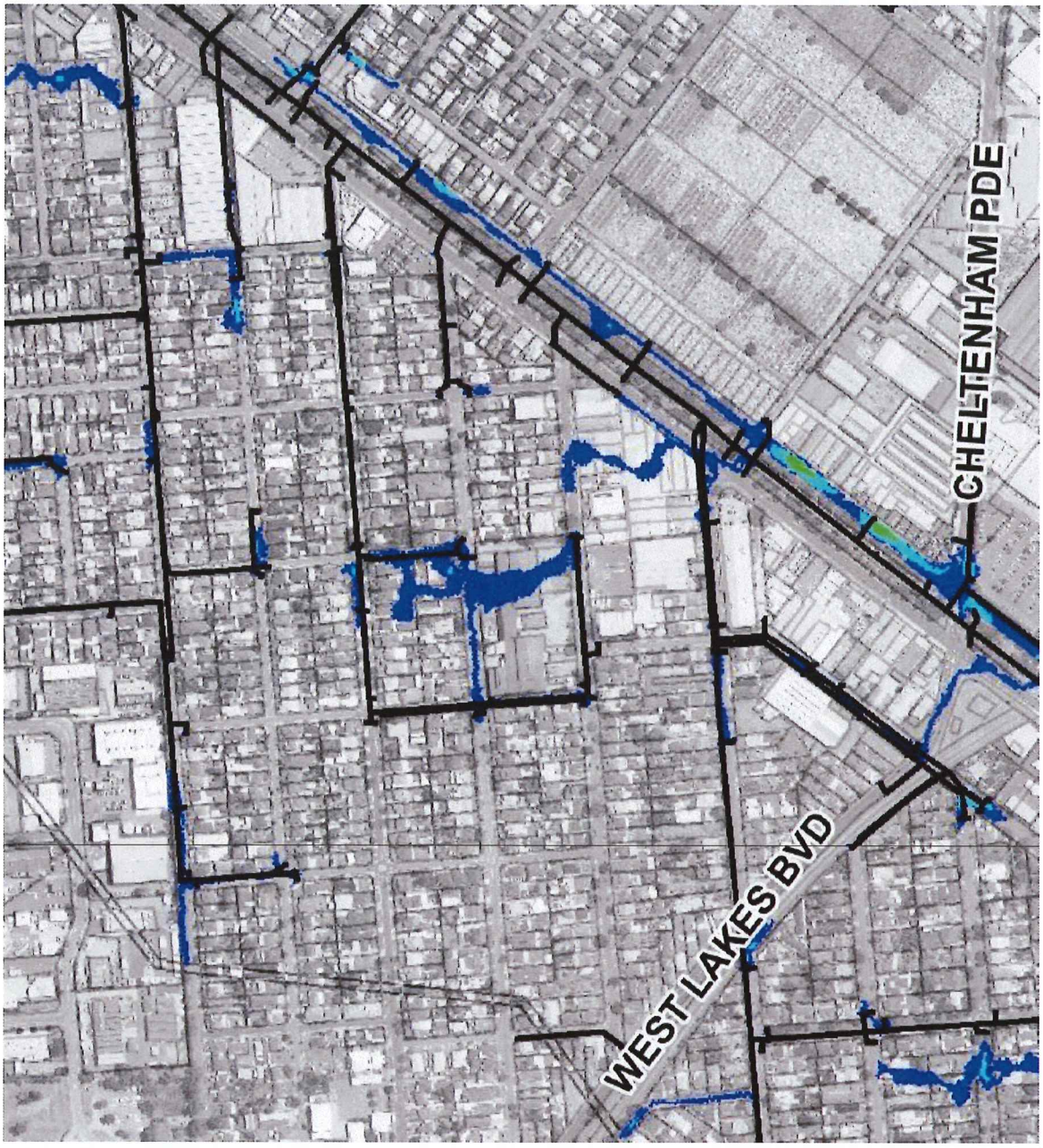
CONNECT TO EXISTING INFRASTRUCTURE INCLUDING ALLOWANCE FOR DETENTION STORAGE (MAY STREET CATCHMENT)

CONNECT TO EXISTING INFRASTRUCTURE INCLUDING ALLOWANCE FOR DETENTION STORAGE (GLYDE & BOTTING STREETS CATCHMENT)


LEGEND
STORMWATER DRAIN
CADASTRE
MODEL BOUNDARY
FLOOD CONTOUR BAND
0.01 m - 0.1 m
0.1 m - 0.2 m
0.2 m - 0.3 m
0.3 m - 0.4 m
0.4 m - 0.5 m
> 0.5 m

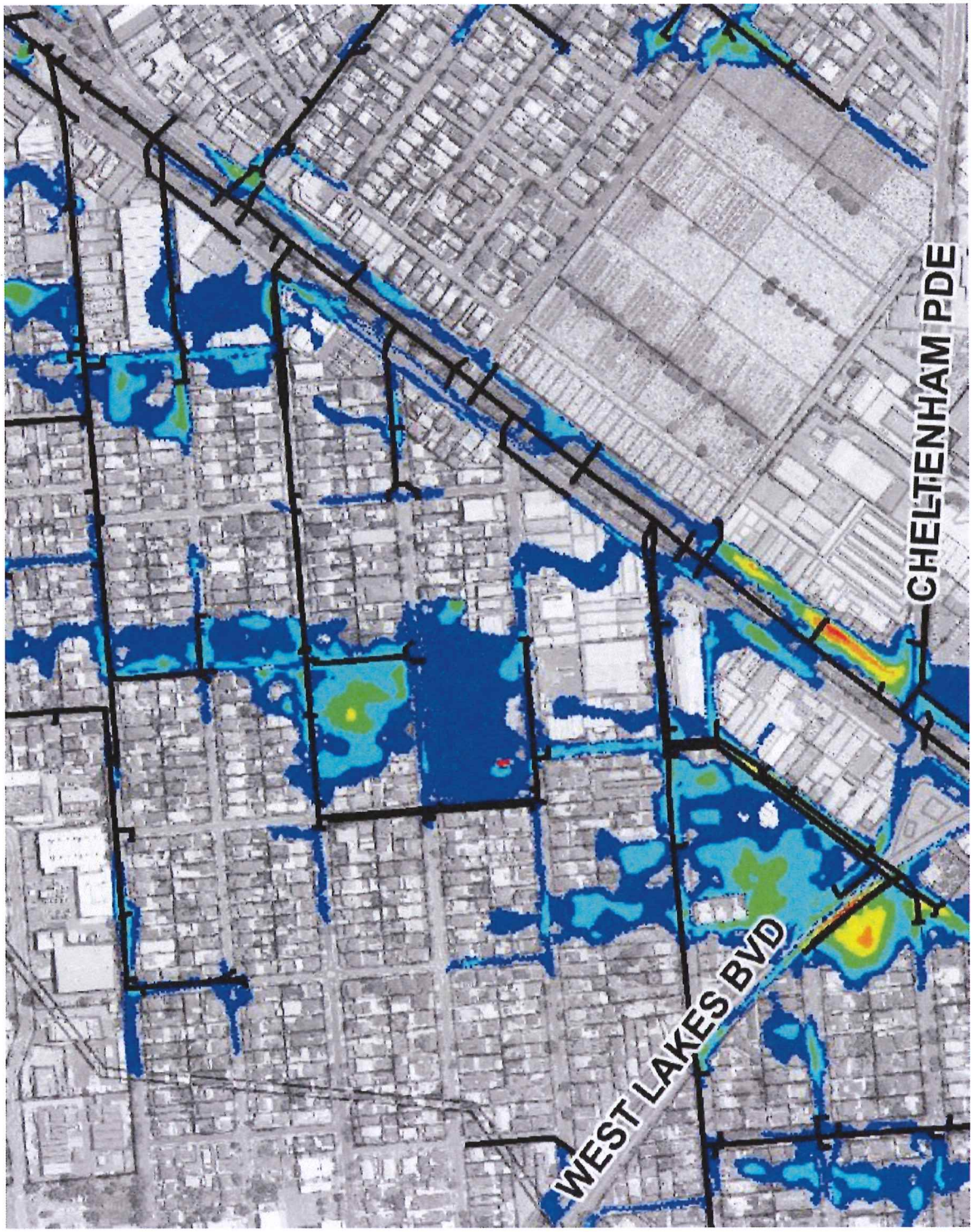
City of Charles Sturt Flood Maps

0.2 EY Flood Map



City of Charles Sturt Flood Maps

1% AEP Flood Map



Jenna Grosser

Subject: SA Water

From: Cleere, Kylie <Kylie.Cleere@sawater.com.au>
Sent: Thursday, May 21, 2020 4:40 PM
To: Jenna Grosser <Jenna.Grosser@kbr.com>
Cc: David Barone <db@jensenplus.com.au>
Subject: [External] RE: Albert Park Redevelopment Preliminary Response

Hi Jenna,

The report is stating the changes to the pump station required would be an earlier onset of pump operation and extended run times during peak discharge periods and increased frequency during the day rather than a physical upgrade (based on the preliminary investigation).

The flows from the development have been modelled to be split 50/50 both north and south. The northern discharge is to WWPS 458.

Further analysis would need to be done when the final development layout and usage is known. When the development is lodged and final figures provided, including any trade waste discharges, this may change the modelling and response. Should the WWPS require a physical upgrade at this time solely due to the development this would be at the developer's cost. We would investigate how this upgrade could be staged during the development.

I trust that helps.

Kylie Cleere
Senior Development Services Officer
7424 1218

From: Jenna Grosser <Jenna.Grosser@kbr.com>
Sent: Thursday, 21 May 2020 9:15 AM
To: Cleere, Kylie <Kylie.Cleere@sawater.com.au>
Cc: David Barone <db@jensenplus.com.au>
Subject: RE: Albert Park Redevelopment Preliminary Response

Hi Kylie,

Thank you for the response. In terms of the sewer you noted that WWPS 458 Queensbury Pump Station details to be analysed further in detail to accommodate flows from the proposed development.

Can you please provide more details? If the pump station is required to be upgraded, how will this be handled? By standard augmentation or does the DPA need to be supported by a deed?

You urgent assistance on this matter would be appreciated. Please call if you have any queries.

Regards,

Jenna Grosser
KBR | Civil Engineer, Infrastructure Services Australia
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From: Cleere, Kylie <Kylie.Cleere@sawater.com.au>
Sent: Friday, May 15, 2020 10:51 AM
To: Jenna Grosser <Jenna.Grosser@kbr.com>
Subject: [External] Albert Park Redevelopment Preliminary Response

HI Jenna,

Thank you for your enquiry re the redevelopment of Albert Park.

Based on the following information provided:

Redevelopment of existing buildings into:

- *10,500 m2 (1.05 ha) commercial floor space*
- *3,500 m2 (0.35 ha) retail floor space*
- *550 residential dwellings (15% i.e. 83 units to be established above the commercial/retail spaces)*
- *Commercial/retail to be located in the red region as shown on Figure 1, while 467 residential lots to located in the yellow region.*

We provide the following response:

Water
The network has sufficient capacity to support the proposed development subject to:

Distribution main
Ex.150 branch and main off the Ex.650 MSCL main in Port Rd, shown at A on Figure 1 to be replaced with a new DN200 main to feed through re-development and link-up to Ex. 150 CICL mains abutting the boundaries, shown at B and C on Figure 1 to support future Commercial and Residential higher density growth.

Depending on final layout, some existing mains may need to be abandoned or resized accordingly.

Upsizing from DN150 to DN200 required to service additional growth

Meters
Torrens Title:
Direct Connection, Individual meters to service customers within development

Community Title:
Direct Connections, to service possible commercial/retail development

Remove existing meters where no longer required

Fire service
Fire flow analysis to be undertaken separately if required

Inline pumps
Inline pumps permit application to be undertaken separately if required

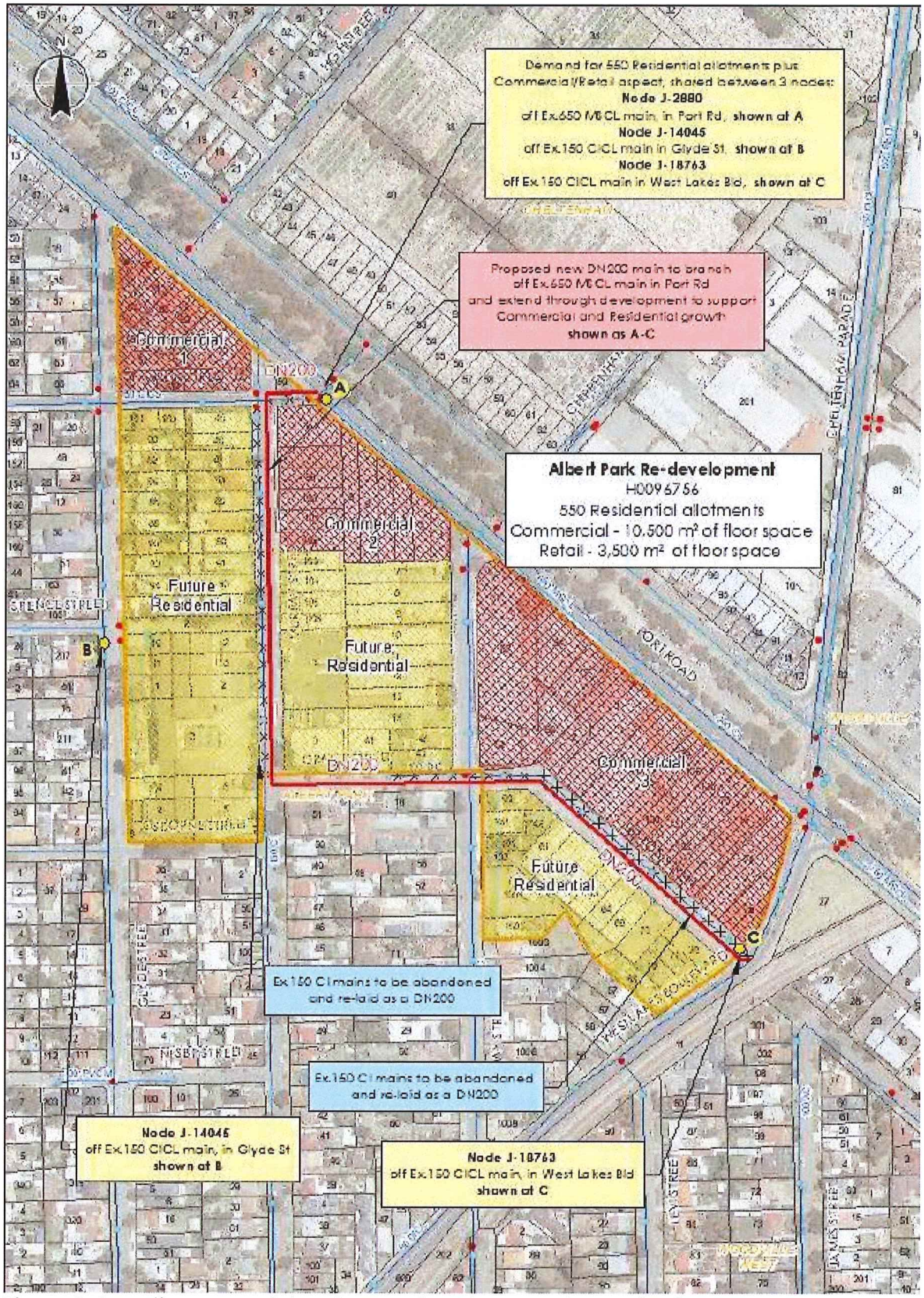


Figure 1. Location map of development and any works required

Sewer

The network has sufficient capacity to support the proposed development subject to:

Distribution Mains

DN 150 reticulation sewers along streets within and abutting the development area require upgrade to DN 225 to comply with the WSA Gravity Sewerage Code requirements:

- Approx. 330m of DN 150 VC on Jervois Street
- Approx. 51m of DN 150 PVCU on Grace Street
- Approx. 324m of DN 150 VC on Murray Street
- Approx. 324 m of DN 150 VC on Glyde Street

Additionally, if the developer identifies the northern-most development is to discharge into the DN 150 VC on Glyde Street/Port Road, further upgrades of approximately 814m of DN 150 reticulation sewers along Port Road, Hawke Street and Lawton Street up to Avro Avenue to DN 225 are required.

Upgrading DN 150 reticulation sewers to DN 225 would also require reestablishment of any existing property connections outside the development site into the respective reticulation sewer.

WWPS 458 Queensbury Pump Station details to be analysed further in detail to accommodate flows from the proposed redevelopment.

Further information including development layout/distribution, location(s) of discharge into the reticulation sewers and site survey information are required to better assess the proposed redevelopment.

The construction of the sewer infrastructure must be in accordance with SA Water Network Infrastructure Standards.

Recycled Water
The proposed development is not within an SA Water Recycled Water area.

Augmentation
The proposed development is not within a current SA Water Augmentation Charge Area.

Please note this is a preliminary response and all requirements will be confirmed upon receipt of a lodged SCAP application and/ or connection application.

Thank you,

Kylie Cleere
SENIOR DEVELOPMENT SERVICES OFFICER

kylie.cleere@sawater.com.au • **7424 1218** •
250 Victoria Square/Tarntanyangga ADELAIDE SA 5000

sawater.com.au

SA Water respects and acknowledges the deep spiritual connection, knowledge and relationship Aboriginal and Torres Strait Islander people have to land and water.

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Jenna Grosser

Subject: SA Power Networks

From: Tim Adams <Tim.adams@sapowernetworks.com.au>
Sent: Friday, May 29, 2020 7:11 AM
To: Jenna Grosser <Jenna.Grosser@kbr.com>
Subject: [External] RE: Albert Park Mixed Use DPA - SA Power Networks

Hi Jenna

I suggest a phone call would be helpful for this enquiry if you would like to give me a call. In direct answer to your questions for now:

1. SA Power Networks have extensive infrastructure in the area and on the limited information provided foresee no issue with servicing the development.
2. Standard augmentation charges apply up to the substation threshold of 2.5MVA. The Sub trans threshold is 13.7MVA which should not be an issue for you I would imagine
3. It is not as simple as saying you will be responsible for the full cost of an additional feeder if required. It will depend on how you plan to connect into the meshed network and where we can draw supply from. As a general rule of thumb, if you require a dedicated feeder for network security (business such as data centres want this) then you would be required to fund a new dedicated feeder. If we can modify and extend our network then you fund the extension components.
4. The email provided by one my team members has given you very high level assumptions utilising ' guess' in the description for the commercial load. This should not constitute a yield estimate for any client. You have nominated 550 residential dwellings so TS100 tells you that you should allow 6kVA per allotment unless your plans support otherwise. We are typically seeing 5kVA on residential projects at present which is why David would have suggested that figure (5 x 550 = 2.75MVA). The commercial yield is not something SA Power Networks is going to provide and I have confirmed with Network Planning that this should not be provided. What I see from most consultants is the estimated yields provided to me, on letterhead and based on Australian Standard estimating methods. Under privacy laws I cannot share this information with you but confirm it is regularly provided in very similar formats from most consultants.

Regards

Tim Adams
Network Manager North

Direct: 08 8404 4628
Mobile: 0400 582 146
tim.adams@sapowernetworks.com.au
---
1 Anzac Highway Keswick SA 5035
sapowernetworks.com.au

SA Power Networks Empowering South Australia

From: Jenna Grosser <Jenna.Grosser@kbr.com>
Sent: Tuesday, 26 May 2020 6:02 PM
To: Tim Adams <Tim.adams@sapowernetworks.com.au>
Cc: James Case <James.Case@sapowernetworks.com.au>; David Barone <db@jensenplus.com.au>
Subject: RE: Albert Park Mixed Use DPA - SA Power Networks

Hi Tim,

Thank you for your email. To confirm; SA Power Networks are able to service the development with power.

Standard augmentation rates for residential and non-residential would apply for increased load to the development. If the load increases above 2.5 MWA then additional zone substation augmentation charges would apply. At what load increase would sub-transmission line augmentation apply?

If an additional feeder is required, the development would be responsible for design and cost?

Also, I've attached advice we received previously for Kilkenny in which SA Power Networks were able to estimate yields – can this be done for this development?

Regards,

Jenna Grosser
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Office: +61 8 8301 1274 | Mobile: +61 402 063 452
jenna.grosser@kbr.com

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From: Tim Adams <Tim.adams@sapowernetworks.com.au>
Sent: Friday, May 22, 2020 3:36 PM
To: Jenna Grosser <Jenna.Grosser@kbr.com>
Cc: James Case <James.Case@sapowernetworks.com.au>; David Barone <db@jensenplus.com.au>
Subject: [External] RE: Albert Park Mixed Use DPA - SA Power Networks

Hi Jenna

As per my phone message, the most recent questions were answered in the earlier email.

1. The threshold for the substation is 2.5MVA and above that load you would trigger the additional 'Zone Substation' Augmentation charge in addition to the standard rate. Please see link below for charge rates.

https://www.sapowernetworks.com.au/public/download/?id=221664

2. Augmentation charges are offset by Incremental Revenue Rebates so I suspect augmentation charges will not be a major concern for this development.

3. The substation has capacity of 8MVA additional load without upgrades which is quite significant.

4. On the information provided I am not able to offer an opinion on the need for an additional feeder to be installed until design work is completed and am not clear on the reference to a deed.

5. SA Power Networks do not estimated yields for developments as you have requested. I am happy to answer question on our network but that sort of engineering is the realm of the consultant.

Happy to speak further with you if further explanation in required.

Regards

Tim Adams
Network Manager North

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---
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sapowernetworks.com.au

SA Power Networks Empowering South Australia

From: Jenna Grosser <Jenna.Grosser@kbr.com>
Sent: Thursday, 21 May 2020 1:37 PM
To: Tim Adams <Tim.adams@sapowernetworks.com.au>
Cc: James Case <James.Case@sapowernetworks.com.au>; David Barone <db@jensenplus.com.au>
Subject: RE: Albert Park Mixed Use DPA - SA Power Networks

Hi Tim,

Thank you for the below response, however we require clarification on the following items to provide more information to the DPA.

You have stated that the Woodville substation has adequate spare capacity but that confirmation of load details would be required. Are you able to estimate the load for this site based on the yield analysis provided by Jensen and therefore confirm if the threshold would be exceeded?

- Commercial floor space: 10,500m^2
- Retail Floor space: 3,500m^2
- Dwellings: 550 (15% of which would be established above retail/commercial floorspace in red areas).

Would you be able to confirm if only standard augmentation rates would apply? Or advise if and when additional zone substation or sub-transmission line augmentation would apply?

If an upgrade to the substation or 11kV feeders is needed and a deed is required, Council need to know this information now.

You urgent assistance on this matter would be appreciated. Please call if you have any queries.

Regards,

Jenna Grosser
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jenna.grosser@kbr.com

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From: Tim Adams <Tim.adams@sapowernetworks.com.au>
Sent: Thursday, April 30, 2020 12:43 PM
To: Jenna Grosser <Jenna.Grosser@kbr.com>
Cc: James Case <James.Case@sapowernetworks.com.au>
Subject: [External] RE: Albert Park Mixed Use DPA - SA Power Networks

Hi Jenna

Apologies for the delay, no shortage of things to do at present, hope you are travelling well.

The request is very difficult to provide a meaningful answer that is actually helpful as it is lacking information. I will try to answer it below:

- Woodville substation supplies the area and has adequate capacity to accommodate additional load to the order of 8MVA at present, confirmation of your load details would be required to confirm if the threshold of 2.5MVA would be exceeded. Standard augmentation rates would apply in any case which is typically offset by the IRR rebate.

- There are 2 11kV HV feeders which pass this property which would be the connection points for this development with reasonable capacity <4MVA
    - Feeder AP-351D Woodville South 11kV Feeder, with a connection point on May Street, and
    - Feeder AP-351E Albert Park 11kV Feeder, with a connection point to Port Road frontage
    - We would request that the total load be split across each 11kV feeder, with an open point between these 2 Feeders. HV Cable would be 300mm² or 630mm² Aluminium XLPE

The cost of the project would be Construction Costs (Extension of the Network) + Augmentation Charge (example below) – Rebates. We need loads to work this out for you and you would need to consider what load is becoming redundant also as this would be netted out.

We would be able to estimate a cost of the extension once we have a design. This development could be constructed contestably, then SA Power Networks would test, connect and energise the extension.

Rebates – Rebates for serviced real estate developments will be the forecast incremental revenue based on the following factors:

- specified ADMD
- known spot-loads
- possibility of alternative energy sources (eg PV or gas); and
- likely take-up rate of the development for the period used to determine the IR.
- The rebate for commercial loads can only be determined once we have load breakdowns of the development types

This information is in our connection policy which you have been sent previously and is available on our website also. https://www.sapowernetworks.com.au/public/download/?id=221664

You will need to consider what assets you need removed and this would be charges in the non-contestable works when we make an offer.

SA Power Networks has made assumptions with best intentions on both the scope and line route that may be available or suitable. This response is based on the information that you have provided to SA Power Networks and,

as such, if this information is incomplete or inaccurate, SA Power Networks reserves the right to vary its assessment of the requirements for the construction works.

All design and construction work most comply with applicable SA Power Networks Technical Standards, Specifications, Policies and Procedures. refer to our Connection Policy for additional information.

Please contact me or James Case who is the local manager if you have any further questions.

Kind Regards

Tim Adams
Network Manager North

Direct: 08 8404 4628
Mobile: 0400 582 146
tim.adams@sapowernetworks.com.au
---
1 Anzac Highway Keswick SA 5035
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SA Power Networks Empowering South Australia

Jenna Grosser

Subject: APA

From: David.Holden@agig.com.au <David.Holden@agig.com.au>
Sent: Monday, May 11, 2020 3:06 PM
To: Jenna Grosser <Jenna.Grosser@kbr.com>
Cc: Zofia Kramer (Zofia.Kramer@apa.com.au) <Zofia.Kramer@apa.com.au>
Subject: FW: [EXTERNAL] RE: FW: Albert Park Mixed Use DPA - APA

Hi Jenna

Thank you for the below enquiry. The natural gas networks surrounding this proposed development have adequate capacity to service natural gas requirements for the proposed development. However the natural gas distribution pipes within the development area may need to be extended or up-graded according to specific gas demands.

To determine on what extensions or up-grades would be required to the gas distribution networks within the proposed development area the following information would be required:

- The location of the specific requested gas loads and details of the load requirements.
- Master plan show any changes in road design and overall layout of the development.
- Timing of the various stages of the proposed development.

Generally, revenue derived from projected gas usage is used to offset the cost of gas distribution extensions and new connections which often results in this type of development being done at no-charge to the developer.
Once full details of this proposed development are known and the natural gas requirements specified the scope of works can be determined and the project formally evaluated which will determine whether any costs are applicable.

Regards

David Holden

David Holden
Business Development Manager (South Australia)
M +61 408 456 684
E David.Holden@agig.com.au

Australian Gas Infrastructure Group
Dampier Bunbury Pipeline | Multinet Gas Networks | Australian Gas Networks

Australian Gas Infrastructure Group

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dbp.net.au
australiangasnetworks.com.au
multinetgas.com.au

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Jenna Grosser

Subject: NBN

From: Jodie Lunn <jodielunn@nbnco.com.au>
Sent: Monday, April 6, 2020 11:53 AM
To: Jenna Grosser <Jenna.Grosser@kbr.com>
Subject: [External] RE: Albert Park Mixed Use DPA - NBN

NBN Classification - Commercial

Hi Jenna,

Currently there is enough capacity in our network to support this development. No backhaul charges will be incurred to service the development with Fibre to the Premises, only the per premises contribution of $400 per MDU or $600 per SDU will apply. This will support our full range residential and business grade services.

If the developer would like to secure this capacity and pricing, we can enter into a new development agreement now, noting that our developer agreement has a 7 year term and no charges are incurred from **nbn** until 12 prior to services being delivered to stage one. Alternatively we can undertake a new planning assessment closer to the project commencing.

Let me know if you need any further info.

Cheers

Jodie

Jodie Lunn
Senior Business Development Manager SA/NT
New Developments; Business, Enterprise & Government
+61 412 050773
jodielunn@nbnco.com.au
business nbn™

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From: Jenna Grosser <Jenna.Grosser@kbr.com>
Sent: Thursday, 26 March 2020 1:48 PM
To: Jodie Lunn <jodielunn@nbnco.com.au>
Subject: [External] RE: Albert Park Mixed Use DPA - NBN

This message is from an **external sender - be cautious**, particularly with links and attachments.
Hi Jodie,

Please see below response that I have received from Jensen PLUS.

The first development of the study area is likely to be the proponent's site which is the south-western corner (Murray Street). Beyond that, there is no clarity in additional staging.

We don't know how many businesses will establish as it will depend on many things.

Regards,

Jenna Grosser
KBR | Civil Engineer, Infrastructure Services Australia
186 Greenhill Road | Parkside, SA, 5063 | Australia
Office: +61 8 8301 1274 | Mobile: +61 402 063 452
jenna.grosser@kbr.com

KBR acknowledges the Traditional Custodians throughout Australia and their continuing connection to land, water, culture and community, and pays respect to their Elders past, present and future.

From: Jodie Lunn <jodielunn@nbnco.com.au>
Sent: Tuesday, March 24, 2020 4:53 PM
To: Jenna Grosser <Jenna.Grosser@kbr.com>
Subject: [External] RE: Albert Park Mixed Use DPA - NBN

NBN Classification - Commercial

Hi Jenna,

Can you please advise of the likely stage 1 entrance for the development?

Also in terms of the commercial and retail space, would you be able to estimate how many businesses are likely to operate from here?

Cheers

Jodie

Jodie Lunn
Senior Business Development Manager SA/NT
New Developments; Business, Enterprise & Government
+61 412 050773
jodielunn@nbnco.com.au
business nbn™

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GTA CONSULTANTS

Albert Park Mixed Used Development Plan Amendment

Transport Impact Assessment

November 2021 – FINAL D

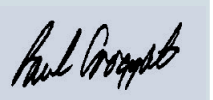


Albert Park Mixed Use

Development Plan Amendment

Transport Impact Assessment

QUALITY RECORD

Issue	Date	Description	Prepared By	Checked By	Approved By	Signed
A	19/05/2020	Final	Joy Yu & Sarah Hartland	Paul Froggatt	Paul Froggatt	
B	27/05/2020	Final – Amended	Final - Amended	Final - Amended	Final - Amended	
C	06/07/2020	Final - Amended	Final - Amended	Final - Amended	Final - Amended	
D	10/11/2021	Final - Amended	Final - Amended	Final - Amended	Final - Amended	

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INTRODUCTION

01

BACKGROUND

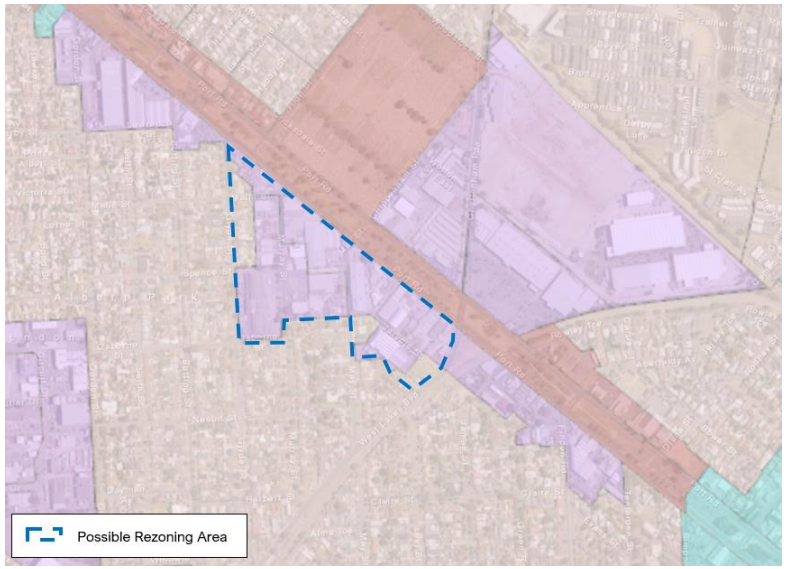
A Development Plan Amendment (DPA) is currently being prepared for a proposed rezoning of land within Albert Park for future mixed-used development including commercial and residential uses.

The primary land owner within the DPA area only owns a proportion of the area included within this DPA. However, the City of Charles Sturt (Council) is considering the wider DPA to provide greater flexibility for future development.

The proponent's land is currently zoned as Urban Employment within the Development Category of Industrial. The wider DPA area is mostly located within the Urban Employment Zone with a small portion currently zoned as residential.

GTA Consultants was commissioned to undertake a transport impact assessment required for the rezoning of the affected area.

Figure 1.1: Possible Rezoning Area



PURPOSE OF THIS REPORT

This report sets out an assessment of the anticipated transport implications of the proposed rezoning, including consideration of the following:

1. Existing traffic and parking conditions surrounding the site
2. Parking demand likely to be generated by the potential development
3. Proposed access arrangements for the site
4. Traffic generation characteristics of the potential development
5. Public Transport, Walking and Cycling transport networks in the vicinity of the site
6. Transport impact of the development proposal on the surrounding road network.

REFERENCES

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

- Charles Sturt Council Development Plan (consolidated – 25 July 2019)
- Concept plans for the potential development
- Traffic and car parking surveys undertaken by GTA Consultants as referenced in the context of this report
- Various technical data as referenced in this report
- An inspection of the site and its surrounds
- Other documents as nominated.

EXISTING CONDITIONS

02

AFFECTED AREA

The land to be rezoned is located within the suburb of Albert Park adjacent to Port Road and West Lakes Boulevard. The proponents land primarily includes a number of commercial properties with a portion of these currently vacant or not operating at full capacity.

Remaining properties within the DPA area consist of residential dwellings and commercial or retail properties. A number of these are currently vacant and not operating at full capacity.

The DPA area also includes the Gateway Baptist Church although the location and use of this is not anticipated to change.

Figure 2.1: Proposed Development Plan Amendment Area



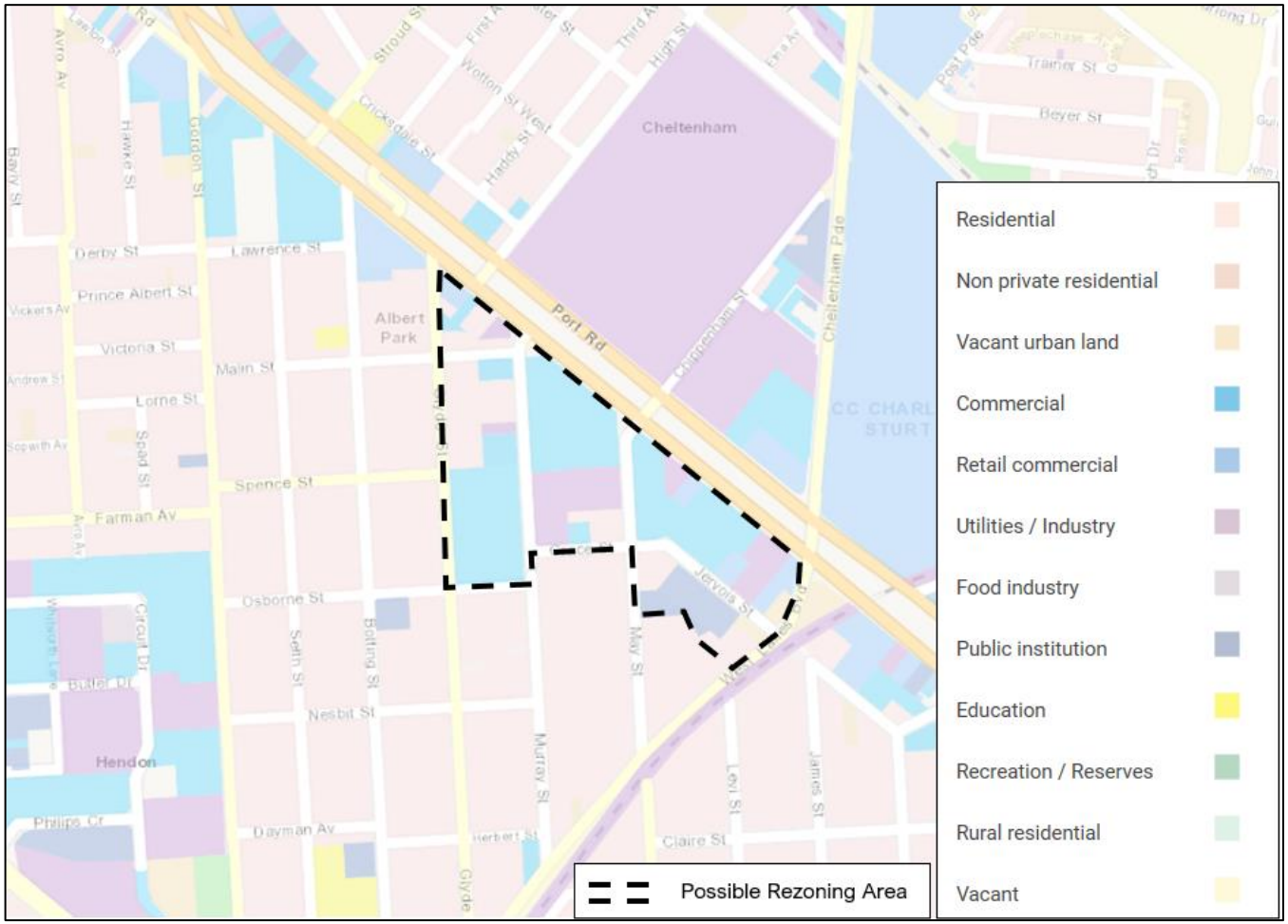
LAND USE MAP

The affected area consists of a mix of land uses including:

- Residential
- Commercial
- Utilities / Industry
- Public Institution (Church)
- Retail Commercial.

The surrounding areas also contain a similar mix of land uses.

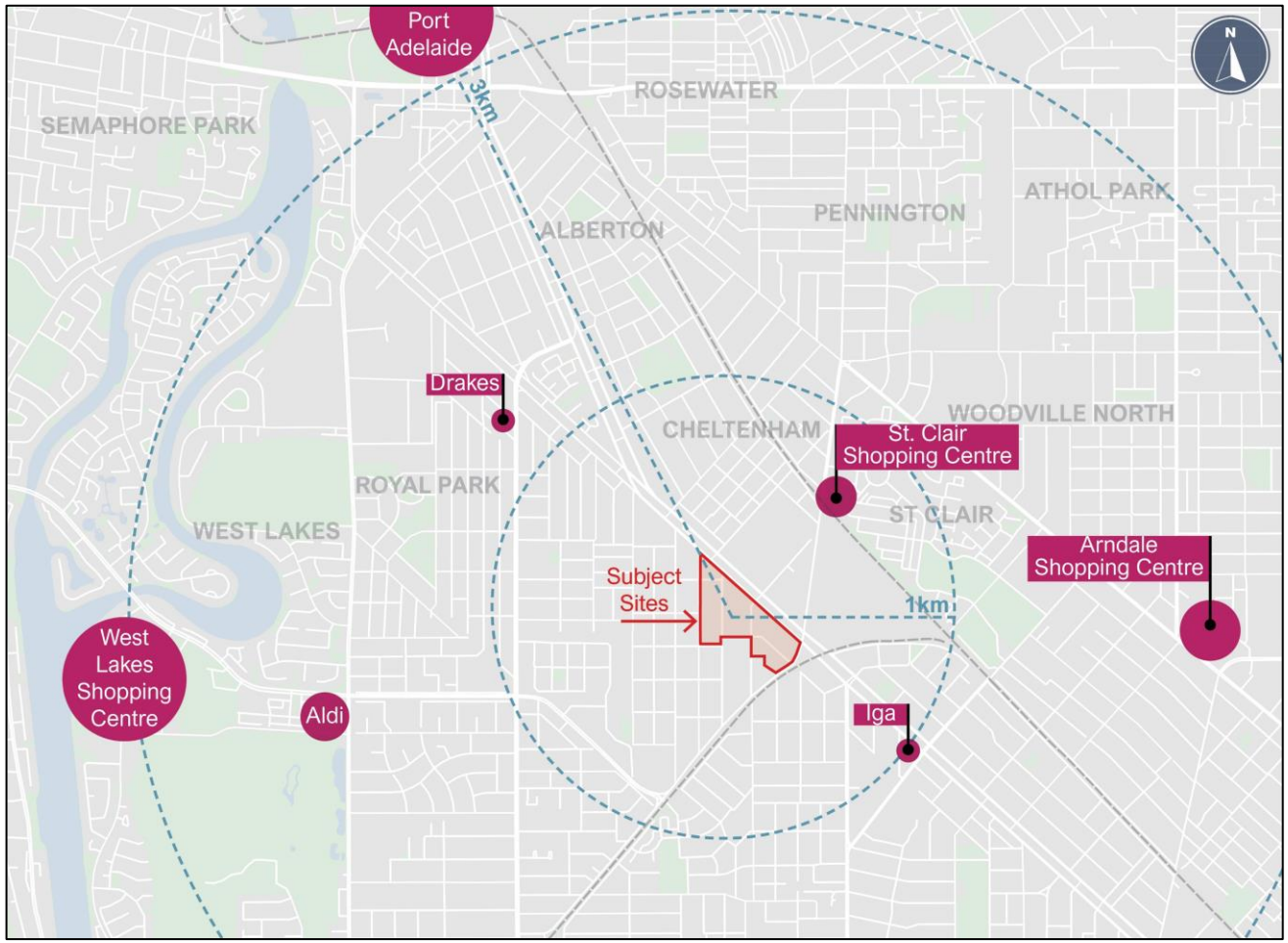
Figure 2.2: Land Use Map



REGIONAL CONTEXT

The subject site area is located within 3 kilometres of West Lakes Shopping Centre, St Clair Shopping Centre and Arndale Shopping Centre. Bus routes are located along Port Road and West Lakes Boulevard. The subject area is also located within 1 kilometre of railway stations on both the Outer Harbor Railway line and the Grange Railway line.

Figure 2.3: Subject Site and Surrounding Environs



ROAD NETWORK

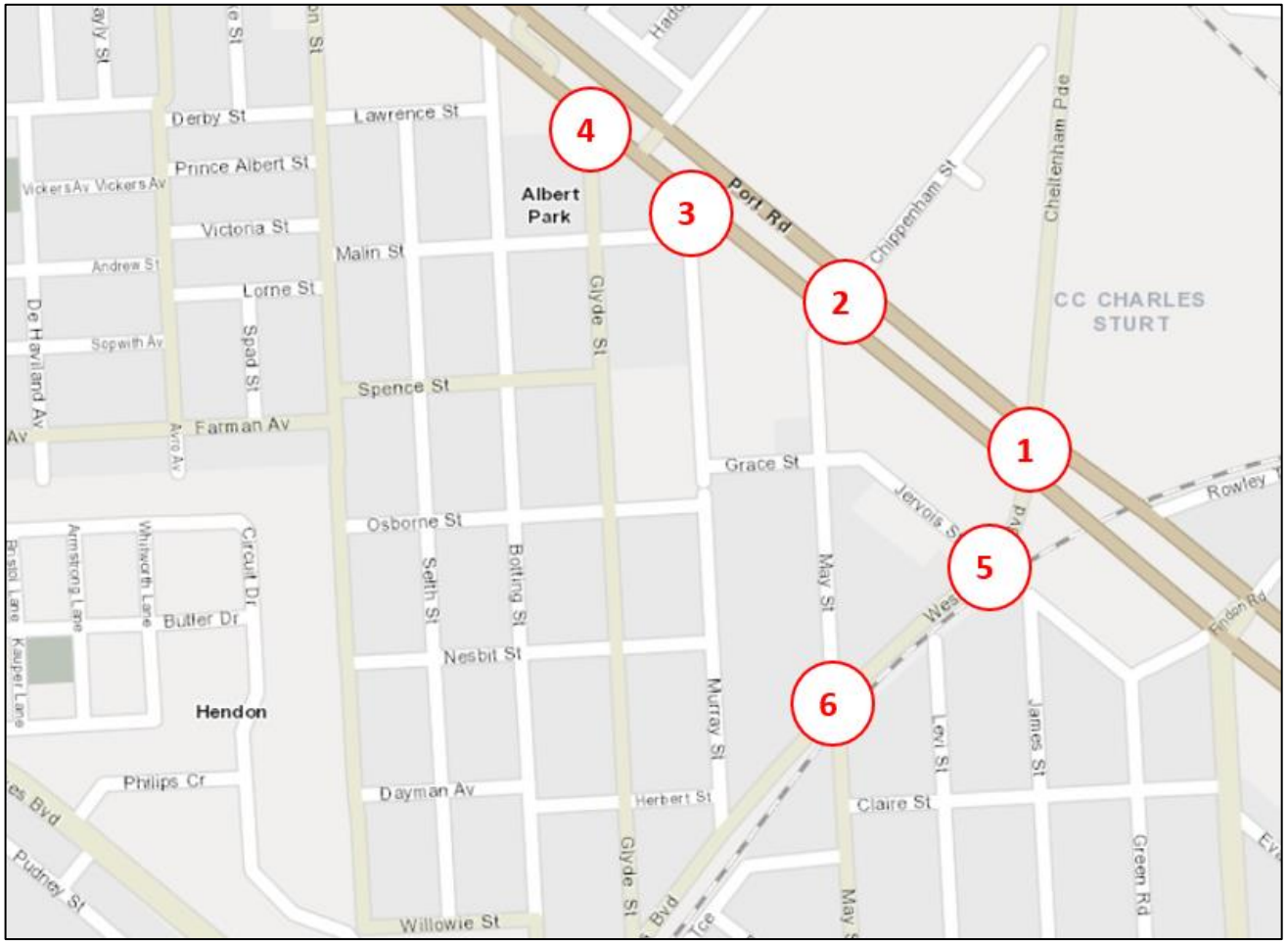
Intersections

The following intersections currently exist in the vicinity of the site:

1. Port Road/West Lakes Boulevard/Cheltenham Parade (signalised)
2. May Street/Port Road (unsignalised)
3. Murray Street/Port Road (unsignalised)
4. Glyde Street/Port Road (unsignalised)
5. Jervois Street/West Lakes Boulevard (unsignalised)
6. May Street/West Lakes Boulevard (unsignalised).

It is noted that intersection upgrade works are currently being undertaken at the intersection of Port Road / West Lakes Boulevard / Cheltenham Parade. This is inclusive of dual through lanes on West Lakes Boulevard extending to Jervois Street and a number of other minor road widening and lane configuration changes to the remaining areas of the intersection. Refer to DPTI website for further details on the design. (Link)

Figure 2.4: Key Intersections in the vicinity of the Affected Area



ROAD NETWORK

A: Port Road

Port Road functions as an arterial road under the care and control of the Department of Transport, Planning and Infrastructure (DPTI). It is a dual carriageway road aligned in an approximately northwest/southeast direction.

The bicycle lanes are effective at the following times:

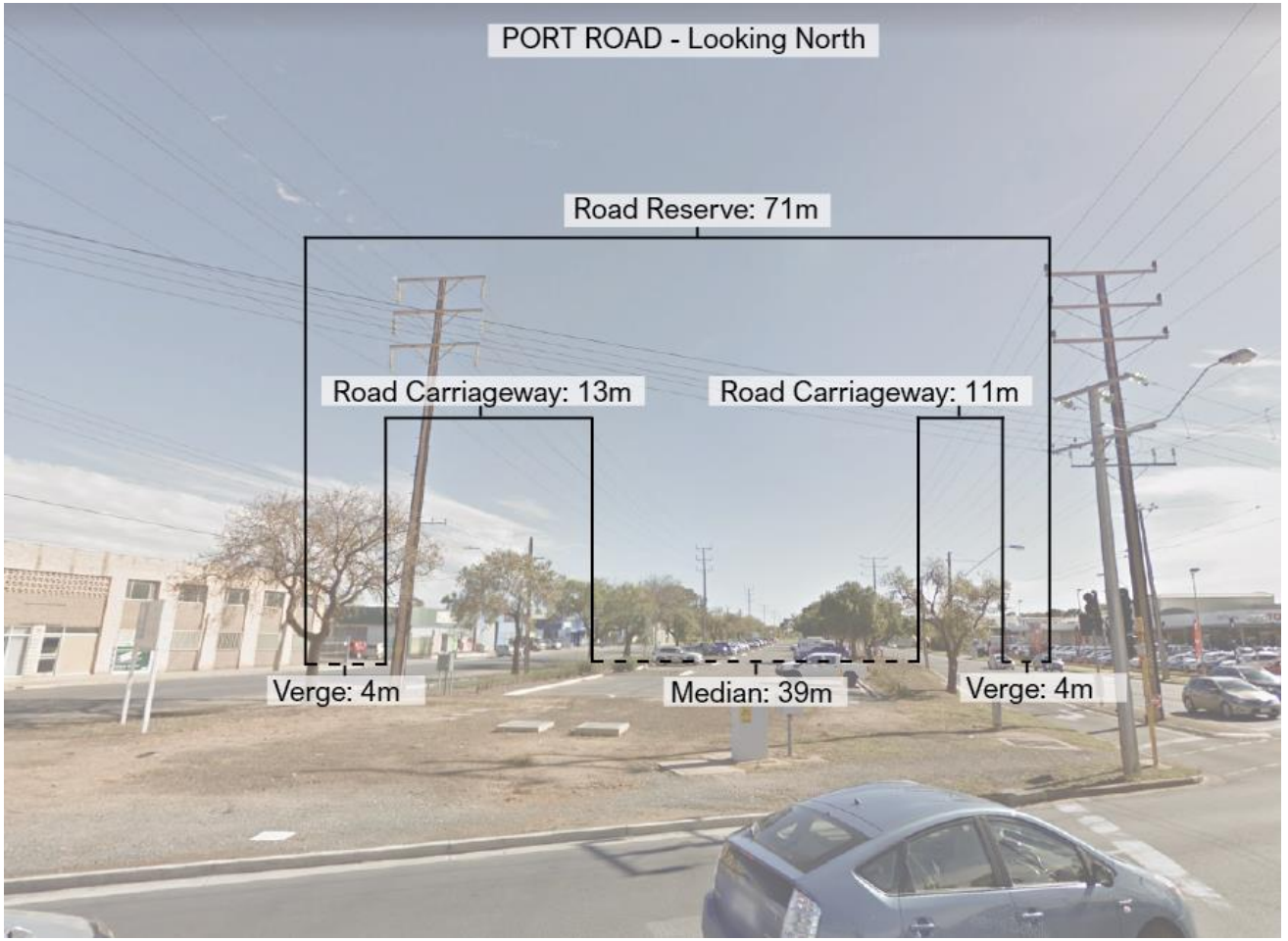
- City bound lanes: 7am-10am and 3pm-7pm Monday to Friday
- Port Adelaide bound lanes: 7am-9am and 4pm-6pm Monday to Friday.

One-hour parking limit (1P) applies to kerbside parking in between the morning and afternoon bicycle lane operating times:

- Southern side (City bound): 1P 10am – 3pm Monday to Friday
- Northern side (Port Adelaide bound): 1P 9am – 4pm Monday to Friday
- No restriction outside bicycle lane operating times and the 1P restriction times.

The average daily traffic volume is 31,600 vpd and Port Road has a speed limit of 60km/h.

Figure 2.5: Port Road Cross Section



ROAD NETWORK

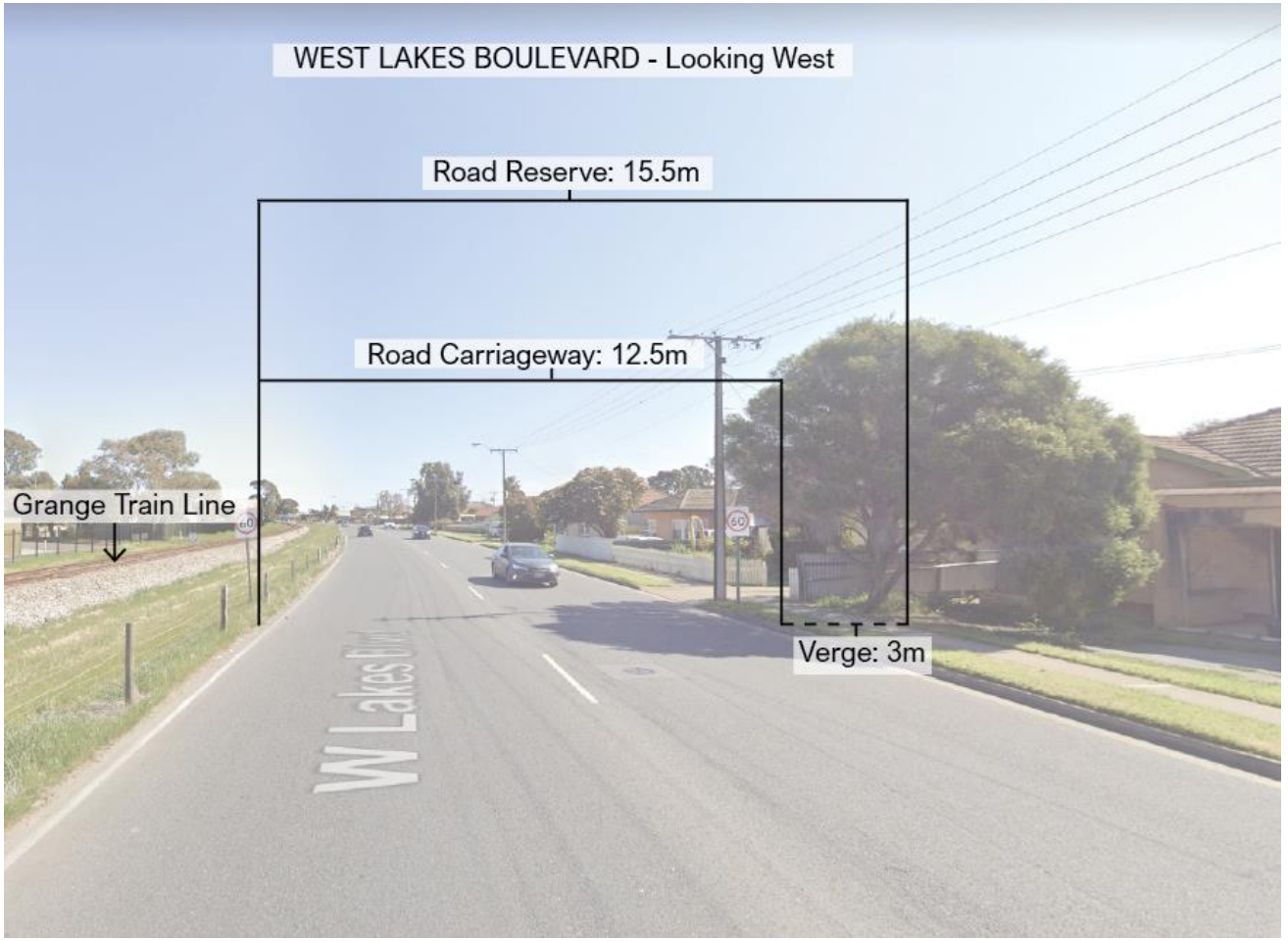
B: West Lakes Boulevard

West Lakes Boulevard is a sub-arterial road under the care and control of DPTI. Between Port Road and Clark Terrace, it is configured with one vehicular lane in each direction and runs in parallel with the Grange Railway line.

Full time bicycle lanes are installed on both side of West Lakes Boulevard between Albert Park Railway Station and a pedestrian level crossing approximately 30 metres south of May Street.

West Lakes Boulevard is subject to a posted speed limit of 60km/h and carries approximately 22,600 vpd.

Figure 2.6: West Lakes Boulevard Cross Section



ROAD NETWORK

C: May Street

May Street is a local road under the care and control of City of Charles Sturt. It is a two-way road aligned in a north/south direction. Kerbside parking is permitted on both sides of May Street.

A 'no trucks on side road' sign is currently placed at the unsignalised intersection of May Street and West Lakes Boulevard. A splitter island and kerb extensions are installed on May Street at this intersection to delineate traffic flow.

May Street is subject to an urban default speed limit of 50km/h and carries approximately 900 vpd.

Figure 2.7: May Street Cross Section



ROAD NETWORK

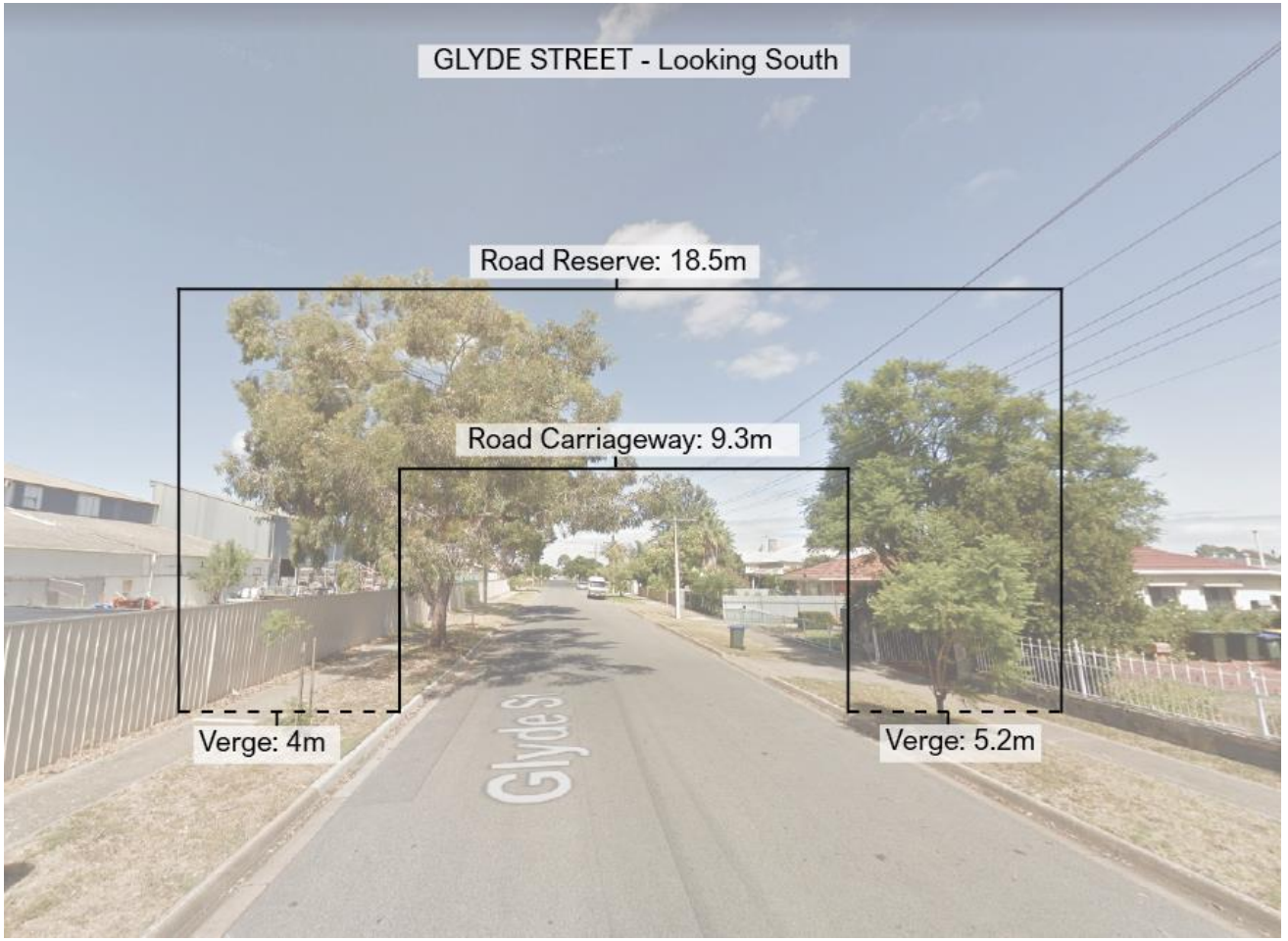
D: Glyde Street

Glyde Street is a collector road under the care and control of City of Charles Sturt. It is a two-way road aligned in a north/south direction. Kerbside parking is permitted with restrictions applied to the first 50 metres off Port Road.

A 'No trucks on side road' sign is currently placed at the unsignalised intersection of Glyde Street and West Lakes Boulevard. A splitter island and kerb extension are installed on Glyde Street at this intersection to delineate traffic flow. A 'Local traffic only' sign is also installed at the entrance of Glyde Street from West Lakes Boulevard to discourage vehicle movements other than local traffic. A roundabout is also installed at the intersection of Glyde Street and Nesbit Street to discourage non-local trips.

Glyde Street is subject to an urban default speed limit of 50km/h.

Figure 2.8: Glyde Street Cross Section



ROAD NETWORK

Murray Street



Murray Street is a local Council road aligned in a north south direction between Port Road and West Lakes Boulevard. A portion of Murray Street is closed between Osborne Street and Grace Street which prevents rat running and separates residential and commercial areas.

Murray Street has speed limit of 50km/h and a daily weekday traffic of 183 vehicles between Port Rd and Grace Street.

Grace Street



Grace Street is a local Council road aligned in an east to west direction between Murray Street and May Street.

Grace Street has a speed limit of 50km/h and a daily weekday traffic of 351 vehicles. It is noted that these traffic counts were completed in 2011 when the adjacent commercial site would have been operating at a high capacity.

Jervois Street



Jervois Street is a local Council road aligned in a north west to south east direction between West Lakes Boulevard and May Street.

Jervois Street has a speed limit of 50km/h and an estimated daily traffic of 270 vehicles (based on available peak period traffic data). Jervois Street is the only access to the Gateway Baptist Church. As such, it is expected that there would be increased traffic on Jervois Street on the weekends.

PUBLIC TRANSPORT CONTEXT

Bus Services

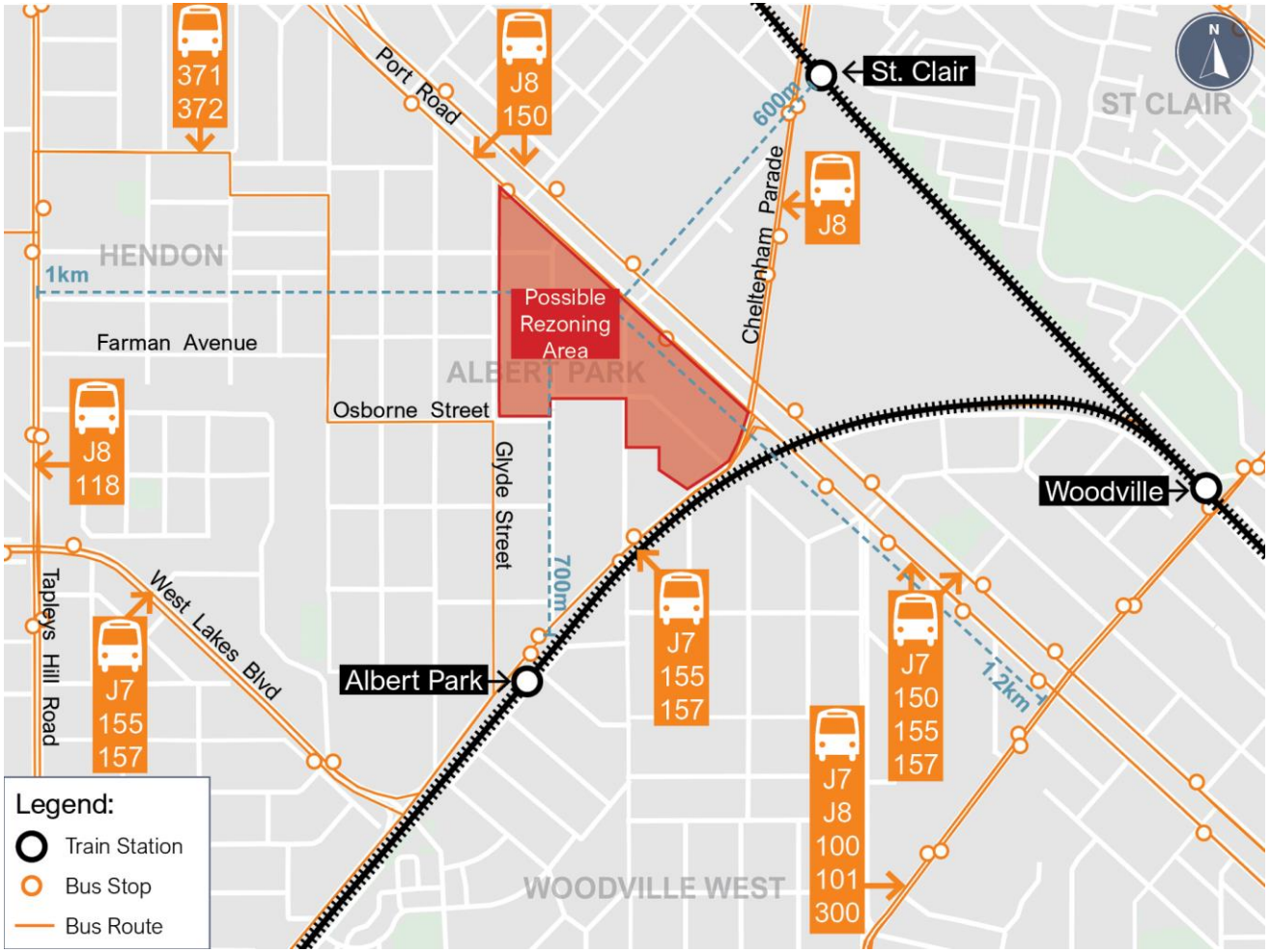
Bus stops on Port Road provide services to West Lakes, Port Adelaide, Adelaide CBD, Largs Bay and Osborne via routes J8, 150 and 150B. Bus stops on West Lakes Boulevard provide services to West Lakes, Port Adelaide, Largs Bay, Adelaide CBD and Marion via routes 155, 157, 371, 372 and J7.

Stops located on Port Road, south east of West Lakes Boulevard, are classified as high frequency transport routes or 'Go Zones.'

Rail Services

The site is also located within 800m of Albert Park and St Clair Railway Stations, which provide services to and from Adelaide CBD and Grange and Outer Harbor respectively.

Figure 2.9: Available Public Transport in the Affected Area



WALKING AND CYCLING CONTEXT

Walking

Sealed pedestrian footpaths are located as follows:

- Southern side of Jervois Street
- Both sides of Grace Street
- Both sides of May Street
- Western side of Murray Street (Port Road to Grace Street)
- Both sides of Glyde Street
- Both side of Port Road.

Pedestrian crossings are shown on the adjacent map.

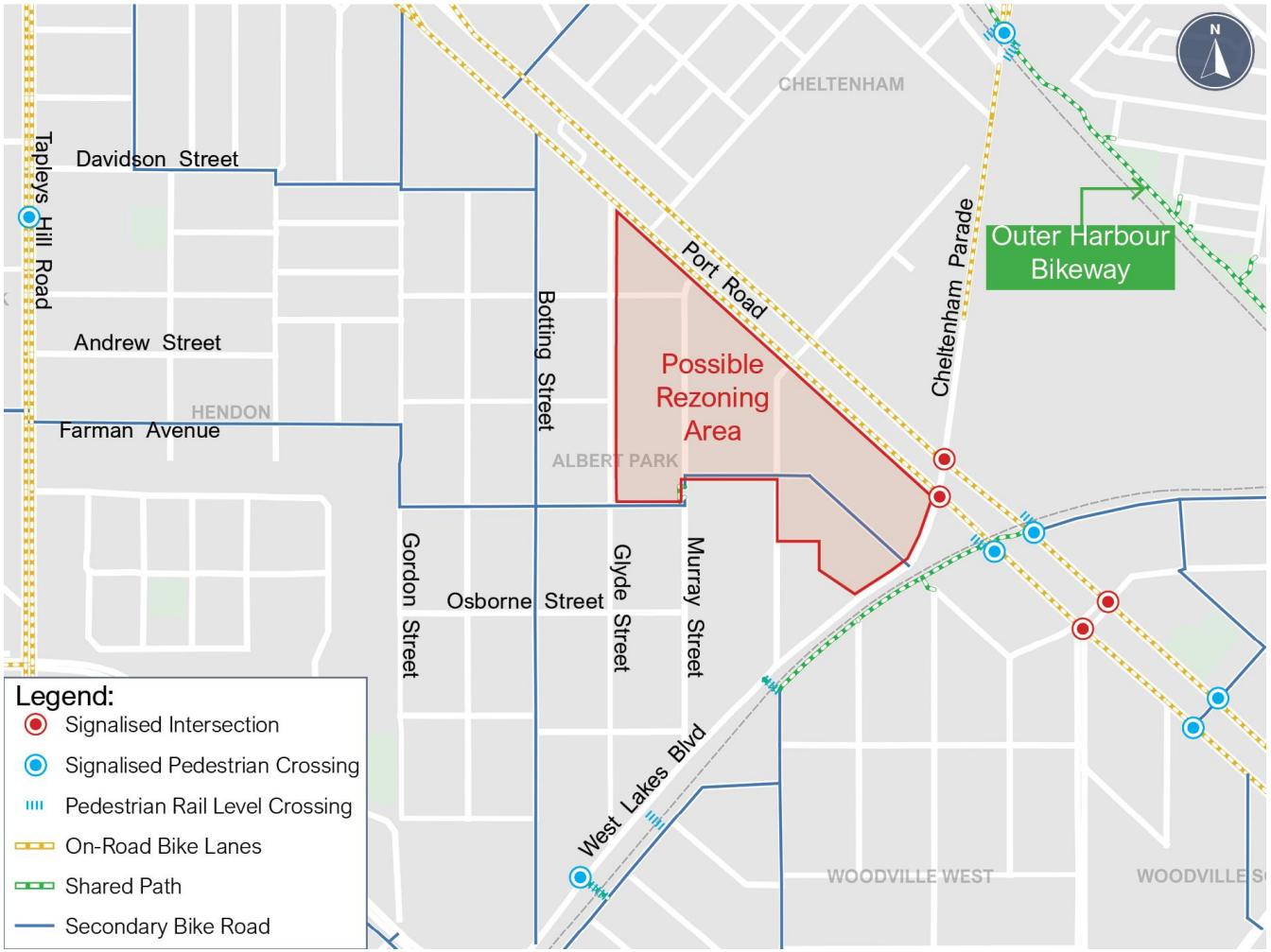
Cycling

Port Road is identified as a main road with bicycle lanes in the Bike Direct network. The bicycle lanes are operating at the following times:

- Southern side (City bound): 7am-10am and 3pm-7pm Monday to Friday
- Northern side (Port Adelaide bound): 7am-9am and 4pm-6pm Monday to Friday.

Full time bicycle lanes are installed on both sides of West Lakes Boulevard from approximately 30 metres south of May Street

Figure 2.10: Walking and Cycling connectivity in the Affected Area



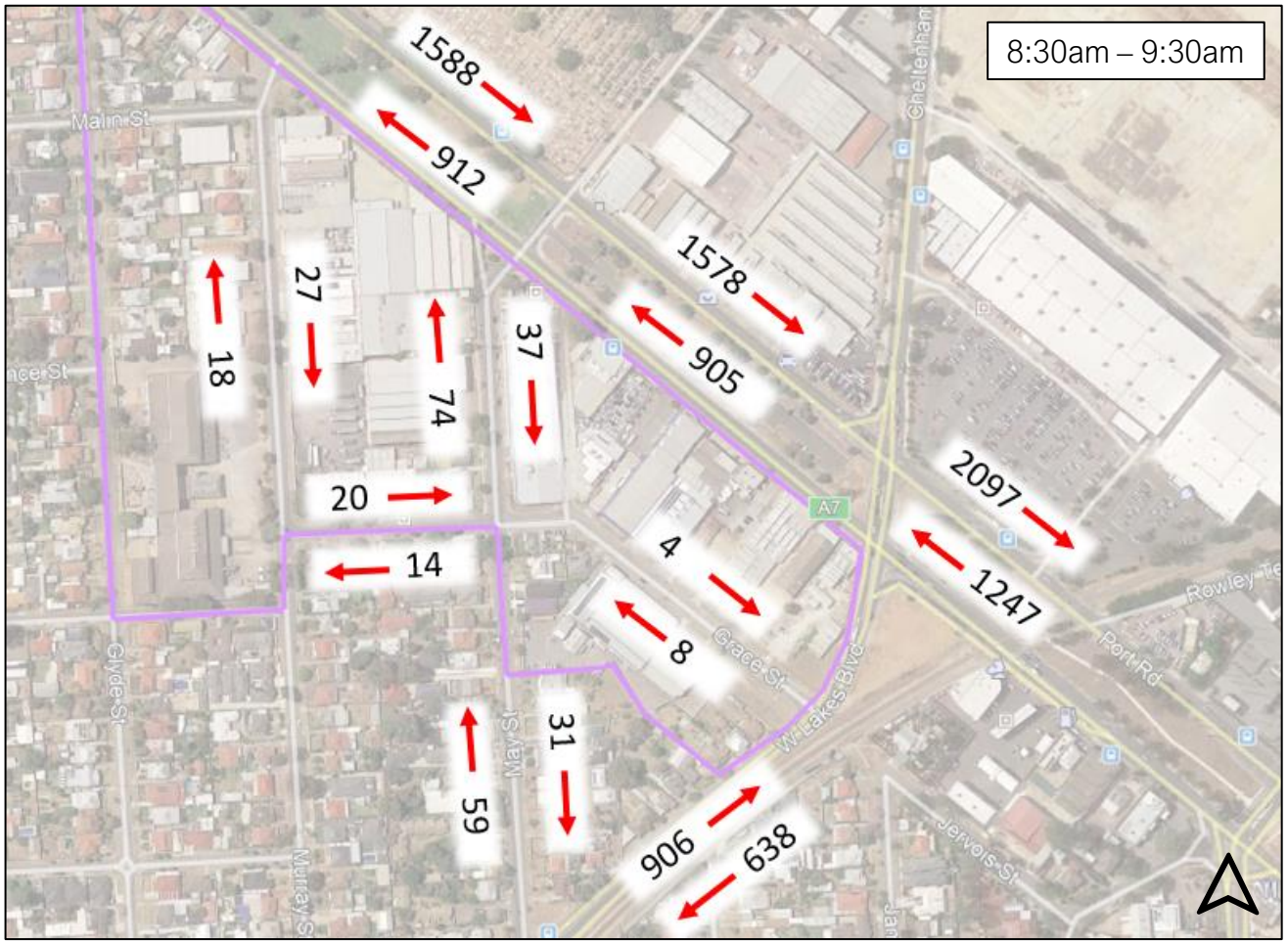
DAILY TRAFFIC VOLUMES – AM PEAK PERIOD

Traffic surveys for the subject area were sourced from Council and DPTI for the peak hour periods. Further traffic surveys were undertaken by HDS for the intersections of May Street/West Lakes Boulevard and May Street/ Port Road.

No traffic data was available for Glyde Street and was deemed unnecessary as there is limited connectivity from Glyde Street to the remaining affected areas. This is because of the full road closure on Murray Street at Osborne Street and Malin Street is exit only onto Murray Street.

The adjacent map illustrates existing traffic volumes of the previously available and new data during the AM peak period.

Figure 2.11: Existing Traffic Volumes (AM Peak)

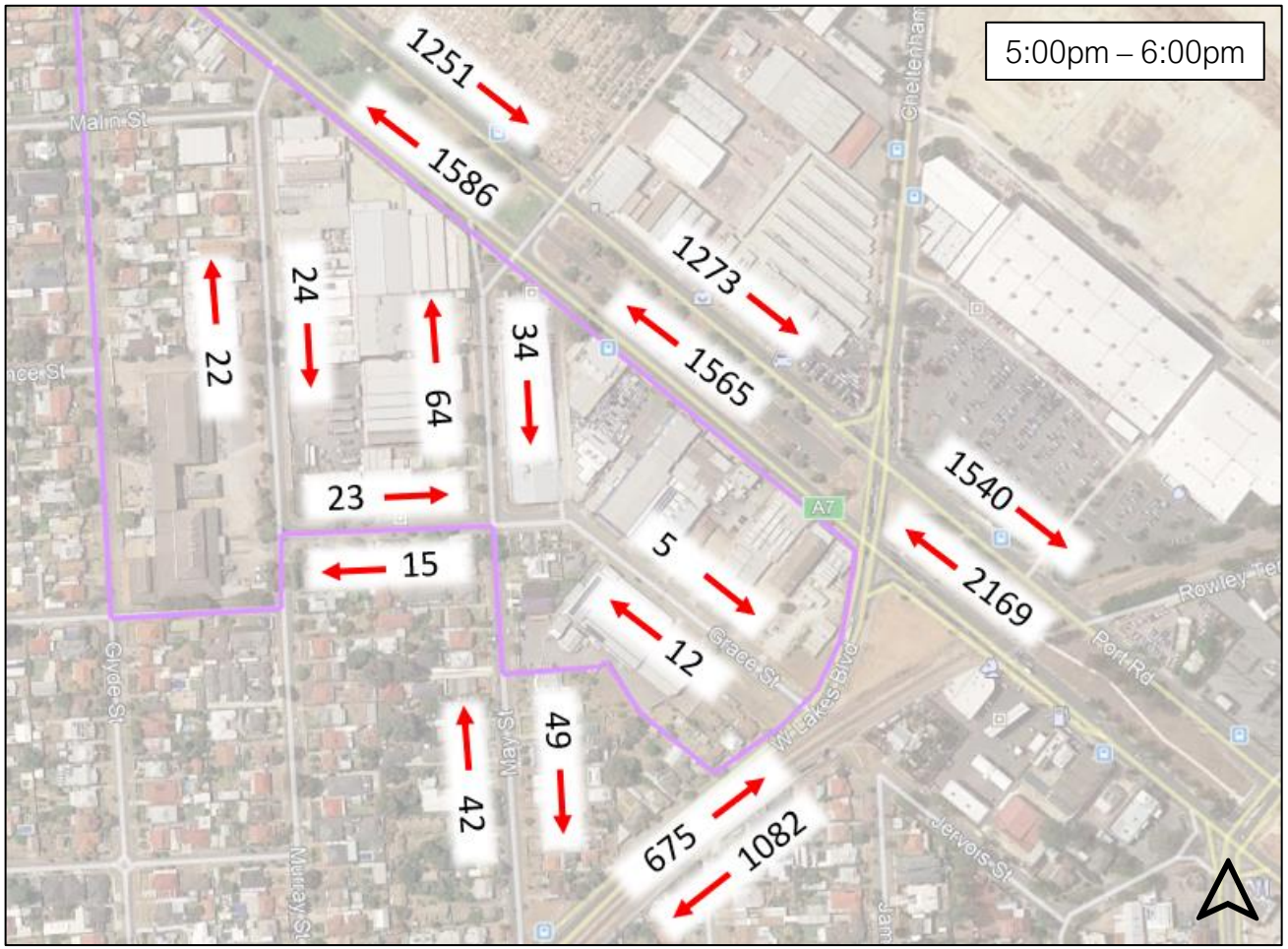


DAILY TRAFFIC VOLUMES – PM PEAK PERIOD

Traffic surveys for the subject area were sourced from Council and DPTI for the peak hour periods. Further traffic surveys were undertaken by HDS for the intersections of May Street/West Lakes Boulevard and May Street/ Port Road.

The adjacent map illustrates existing traffic volumes of the previously available and new data during the PM peak period.

Figure 2.12: Existing Traffic Volumes (PM Peak)



CRASH HISTORY 2014 – 2018

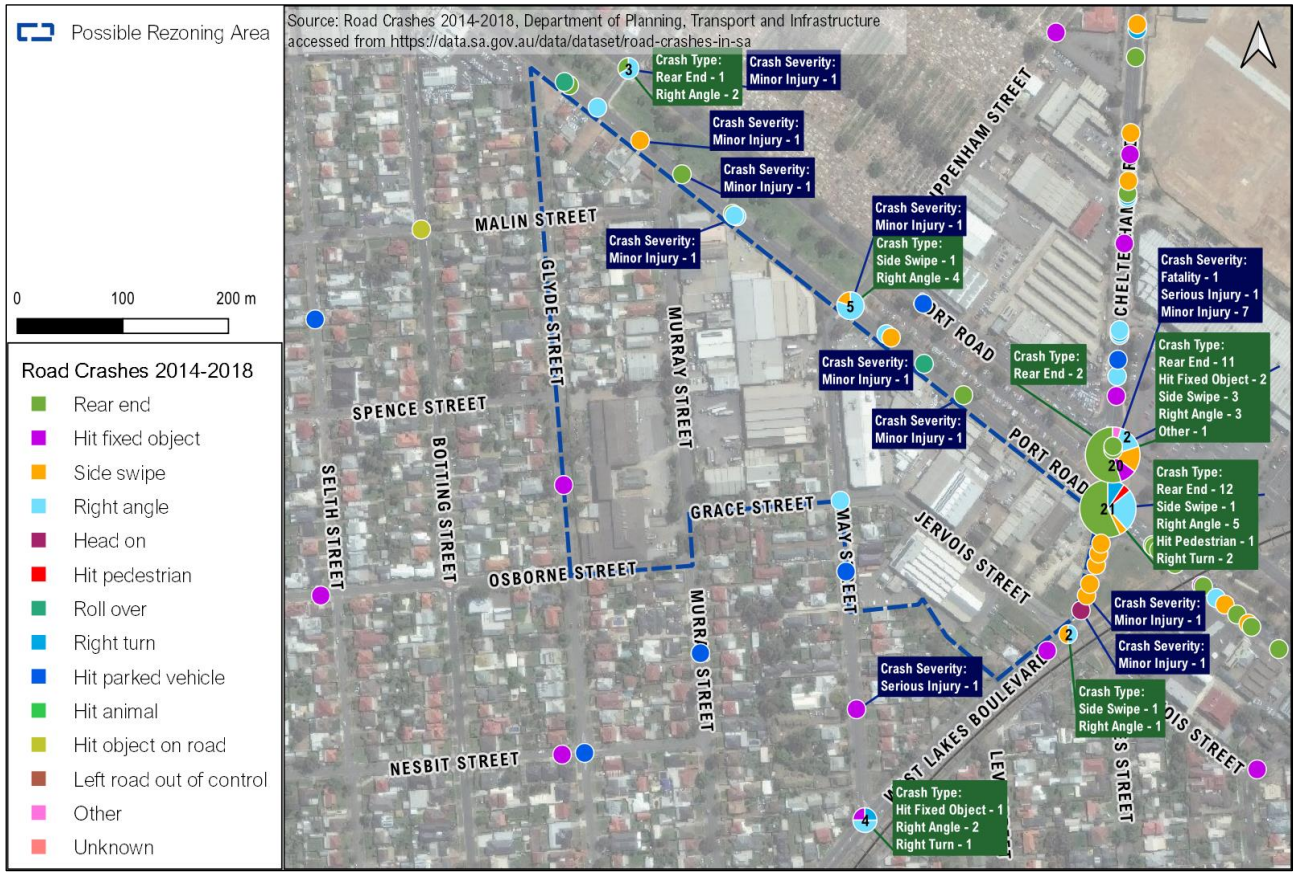
A review of the reported crash history during the most recent 5-year period (2014-2018) for the roads and intersections adjoining the subject sites has been sourced from the Department of Planning, Transport & Infrastructure (DPTI).

The adjacent image summaries the location and type of crashes within or immediately surrounding the DPA area.

Five crashes has occurred over the five-year period at the intersection of May Street and Port Road, including 1 minor injury. Four crashes occurred at the intersection of May Street and West Lakes Boulevard with no recorded injuries. There was a Hit Fixed Object crash resulting in serious injury on May Street midblock.

A cluster of crashes was recorded at the intersection of Port Road and West Lakes Boulevard which is considered common for signalised intersections of major arterial roads.

Figure 2.13: Crash History for 2014 - 2018



DEVELOPMENT PROPOSAL

03

PROPOSED LAND USES

Land Uses

The rezoning will facilitate a mixed used development outcome to accommodate medium density housing, retail, commercial and mixed uses.

The overall DPA area is anticipated to be comprised of the following:

- Commercial Floor Space: up to 10,500 sq.m
- Retail Floor Space: up to 3,500 sq.m
- Residential Dwellings: up to 550.

(15% of residential dwellings to be established above the retail / commercial floorspace)

Figure 3.1: Proposed Land Uses



TRAFFIC IMPACT ASSESSMENT

04

TRAFFIC GENERATION – EXISTING POTENTIAL

Due to the limitation in daily traffic volume data within the subject site, the theoretical existing traffic generation has been calculated for the subject site based on the existing land uses and rates sourced from Transport for NSW (formerly RTA) in the "Guide to Traffic Generating Developments" published in 2002 (henceforth referred to as the NSW Guide).

It is noted that the subject area currently contains a number of properties that are either vacant or not currently operating at their full capacity. Under the current scenario these properties have the potential to generate higher traffic volumes if their operations were to increase or a new tenant moved in. As such, the theoretical traffic generation for the subject area has been calculated to determine what the area could potentially generate within existing buildings without further Council approvals.

Table 4.1: Potential Theoretical Traffic Generation by Land Use

Potential Theoretical Traffic Generation by Land Use				
Land Use	Land Use (Approx.)	Estimated Traffic Generation (AM Peak)	Estimated Traffic Generation (PM Peak)	Estimated Traffic Generation (Daily)
Residential	35 Dwellings	29	29	306
Office and Commercial	13352 sq.m GLFA	244	244	1,228
Factory	12274 sq.m GLFA	123	123	614
Warehouses	7995 sq.m GLFA	5	54	434
Motor Showroom	1845 sq.m GLFA	1	13	129
Bulky Goods retail store	4611 sq.m GLFA	12	124	784
Retail (0-10,000 GLFA)	218 sq.m GLFA	3	27	264
Vacant Building	0	0	0	0
Vacant Land	1548 sq.m Site Area	0	0	0
Church	3720 sq.m GLFA	Unknown	Unknown	Unknown
	Total:	417 vph	614 vph	3759 vpd

As such, the subject area currently has the potential to generate 417 trips in the AM peak, 614 trips in the PM peak and 3759 daily trips.

TRAFFIC GENERATION – POST DEVELOPMENT

To calculate the post development traffic generation, the same process has been undertaken as per the existing potential traffic generation assessment. The future land uses were provided to GTA by Jensen Plus.

The following assumptions have been made to determine Post Development Traffic Generation:

Table 4.2: Post Development Traffic Generation Assumptions

Assumptions:
- Estimated peak hour is based on PM peak only. - Assume total number of dwellings is 550. - 35 existing standard dwellings will remain. - Remaining dwellings will all be classed as medium density with 80% containing 3 bedrooms and 20% containing 2 bedrooms. - 50% of retail will be classed as bulky goods outlet

Based on theses assumptions the theoretical traffic generation post development of the subject area is detailed below.

Table 4.3: Post Development Traffic Generation by Land Use

Post Development Traffic Generation by Land Use				
Land Use	Land Use (Approx.)	Estimated Traffic Generation (AM Peak)	Estimated Traffic Generation (PM Peak)	Estimated Traffic Generation (Daily)
Residential	35 Dwellings	30	30	315
Residential -Medium Density (3 BR)	412 Dwellings	268	268	2,678
Residential -Medium Density (2 BR)	103 Dwellings	52	52	515
Office and Commercial	10500 GLFA	210	210	1,050
Bulky Goods retail store	1750 GLFA	5	47	298
Retail (0-10,000 GLFA)	1750 GLFA	22	215	2,118
	Total:	585 vph	822 vph	6973 vpd

As such, the subject area has the potential to generate 585 AM peak hour trips, 822 PM peak hour trips and 6973 daily trips post development.

TRAFFIC DISTRIBUTION - NETWORK

Based on the calculations presented, the increase in peak hour traffic generation by the subject area is expected to be 168 trips in the AM peak and 208 vehicle trips in the PM Peak. However, it is noted that a portion of these trips would likely be classified as 'linked trips' between the retail and residential properties during the residents typical commute and local accessibility. No 'linked trip' discount has been applied as part of this DPA to provide a more conservative assessment.

It has been assumed that all property road frontages are currently generating commercial or residential vehicle trips. As such, an uplift rate has been applied to each of the road frontages for the additional trips expected post development in the worst case PM peak period as follows:

- 1 additional trip per 18 metres of residential road frontage
- 1 additional trip per 12 metres of retail / commercial road frontage.

The images on the following page illustrate the location of additional vehicle trips based on the uplift rate during the AM and PM peak period based on the proposed rezoning.

TRAFFIC DISTRIBUTION - NETWORK

Figure 4.1: Post Development Traffic Uplift – AM Peak

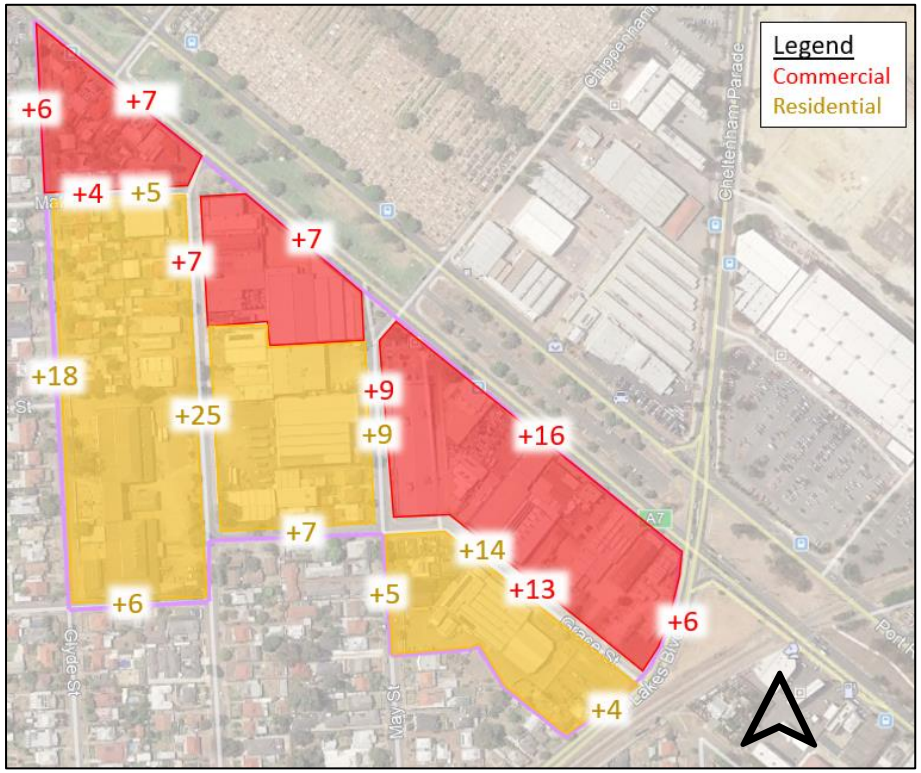
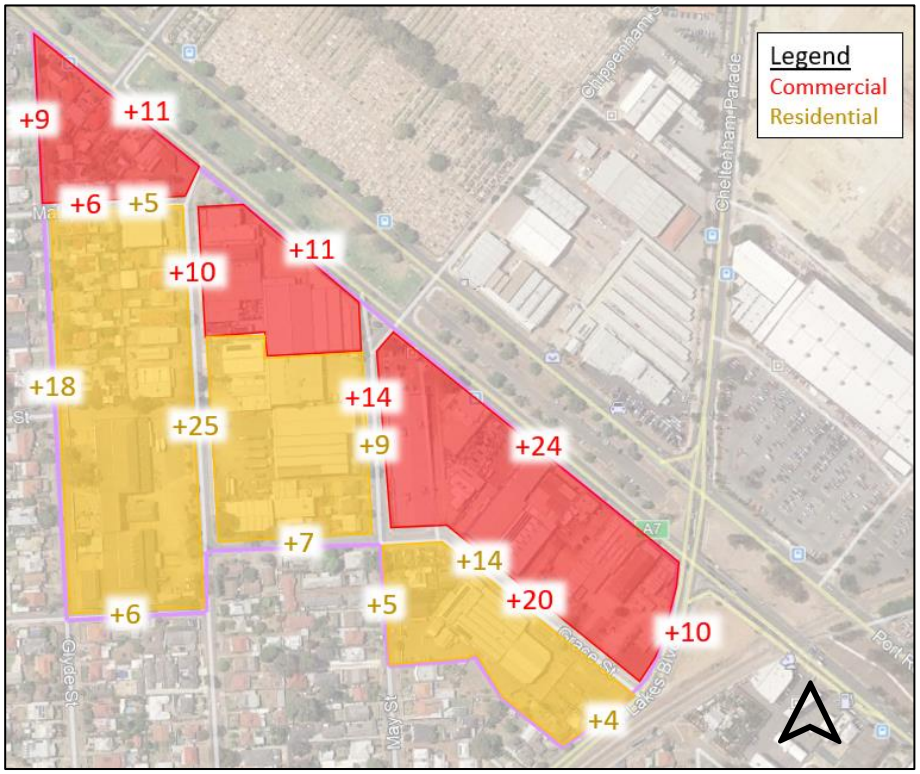


Figure 4.2: Post Development Traffic Uplift – PM Peak



*Assume residential properties on Port Road are accessed via Murray Street, May Street or Glyde Street

**Map shows additional trips only and not the trips already existing within the road network

TRAFFIC DISTRIBUTION - NETWORK

Direction distribution of the additional uplift traffic has been based on the distribution identified in the existing traffic volume surveys. The following assumptions have been made:

- Residential apartments on Port Road will be accessed from the local streets; Murray Street, May Street and Glyde Street
- Directional distribution of traffic Murray Street and May Street will remain as per existing
- Assume Glyde Street has a similar directional distribution as May Street (no existing data for Glyde Street)
- No Residential access located on Port Road
- Partial road closure remains in place on Murray Street.

Based on these assumptions the combined directional distribution of the additional uplift traffic (residential and commercial) generated by the rezoning is shown in the adjacent map. These trips are in addition to the existing trips occurring on the network.

TRAFFIC DISTRIBUTION - NETWORK

Figure 4.3: Post Development Distribution of Traffic Uplift – AM Peak

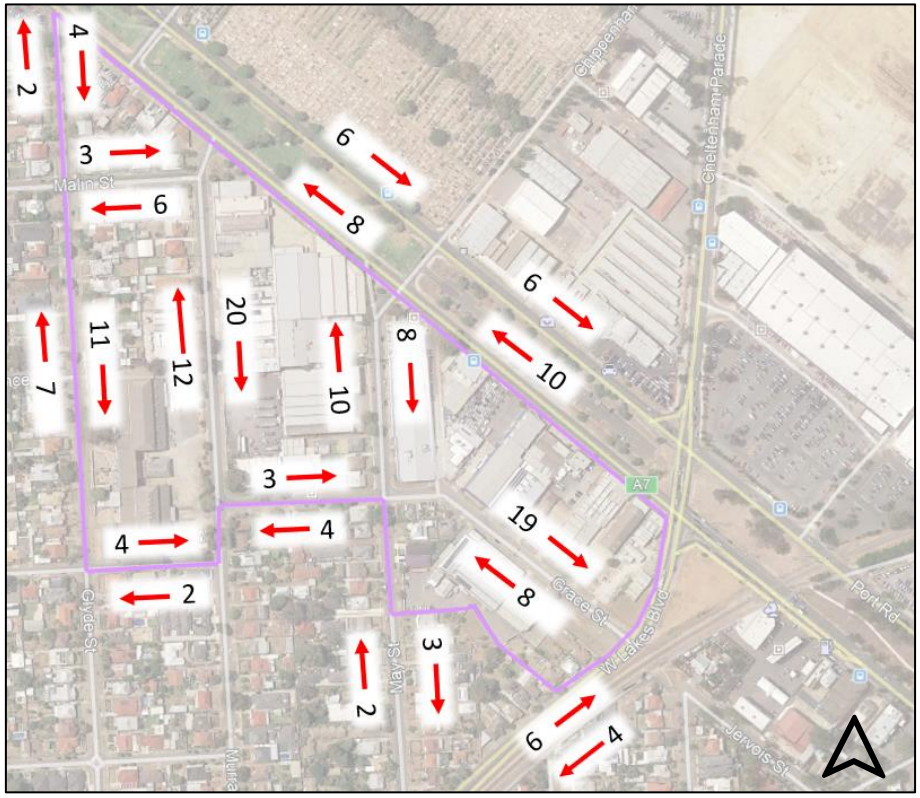
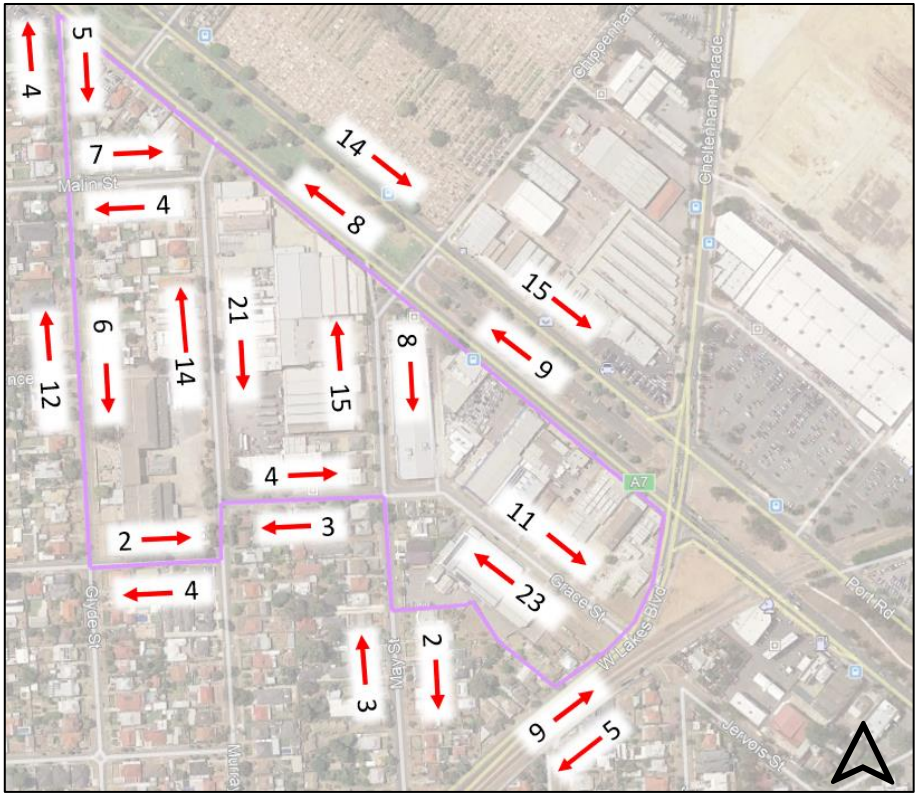


Figure 4.4: Post Development Distribution of Traffic Uplift – PM Peak



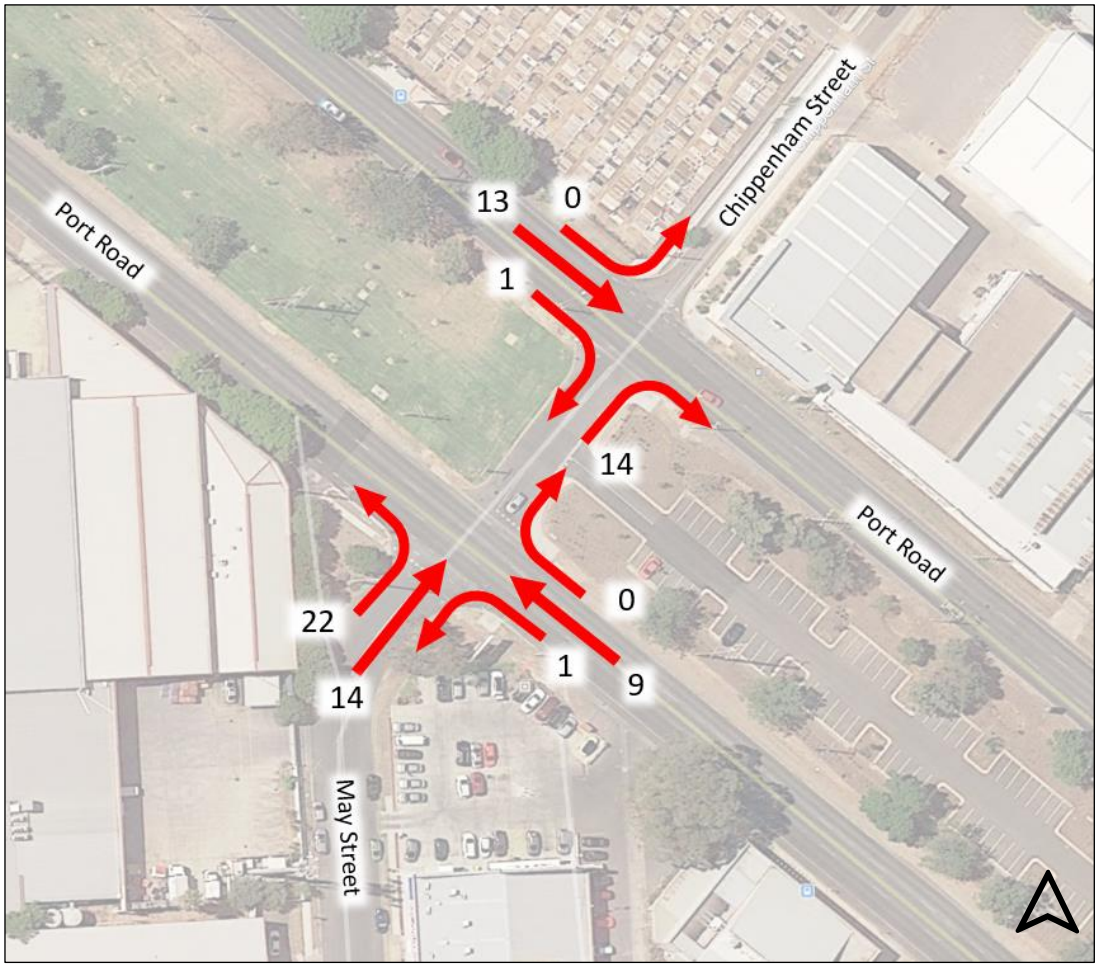
TRAFFIC DISTRIBUTION – PORT ROAD / MAY STREET

To assess the impacts on the surrounding key intersections in the network, the adjacent map has been prepared to illustrate the total additional trips that could be expected during the PM peak hour period at the intersection of May Street / Port Road / Chippenham Street. From this the following has been identified:

- A total of 60 additional vehicle trips could be expected during the PM peak period at the intersection.
- The majority of these trips are likely to be turning left from May St onto Port Road or right from May St median onto Port Road.
- All other increases are considered low given the existing traffic volumes on Port Road.
- This assumes no additional trips to/from the central median carpark.

All parking associated with development fronting Port Road should be included within the development site. Any additional parking shortfall from future developments has the potential to result in increased traffic utilising the median carpark. This should be considered as part of the subsequent development applications to ensure minimal impact on the operation of the intersections.

Figure 4.5: Post Development Additional PM Peak trips – Port Road / May Street



TRAFFIC DISTRIBUTION – MAY STREET / WEST LAKES BOULEVARD

To assess the impacts on the surrounding key intersections in the network, the adjacent map has been prepared to illustrate the total additional trips that could be expected during the PM peak hour period at the intersection of May Street / West Lakes Boulevard. From this the following has been identified:

- A total of 6 additional vehicle trips could be expected during the PM peak period at the intersection.
- A traffic distribution split of 50/50 for turning movements has been adopted.
- Increases to all movements at the intersection are expected to be low and have minimal impact on the surrounding network.

Figure 4.6: Post Development Additional PM Peak trips – May Street / West Lakes Boulevard

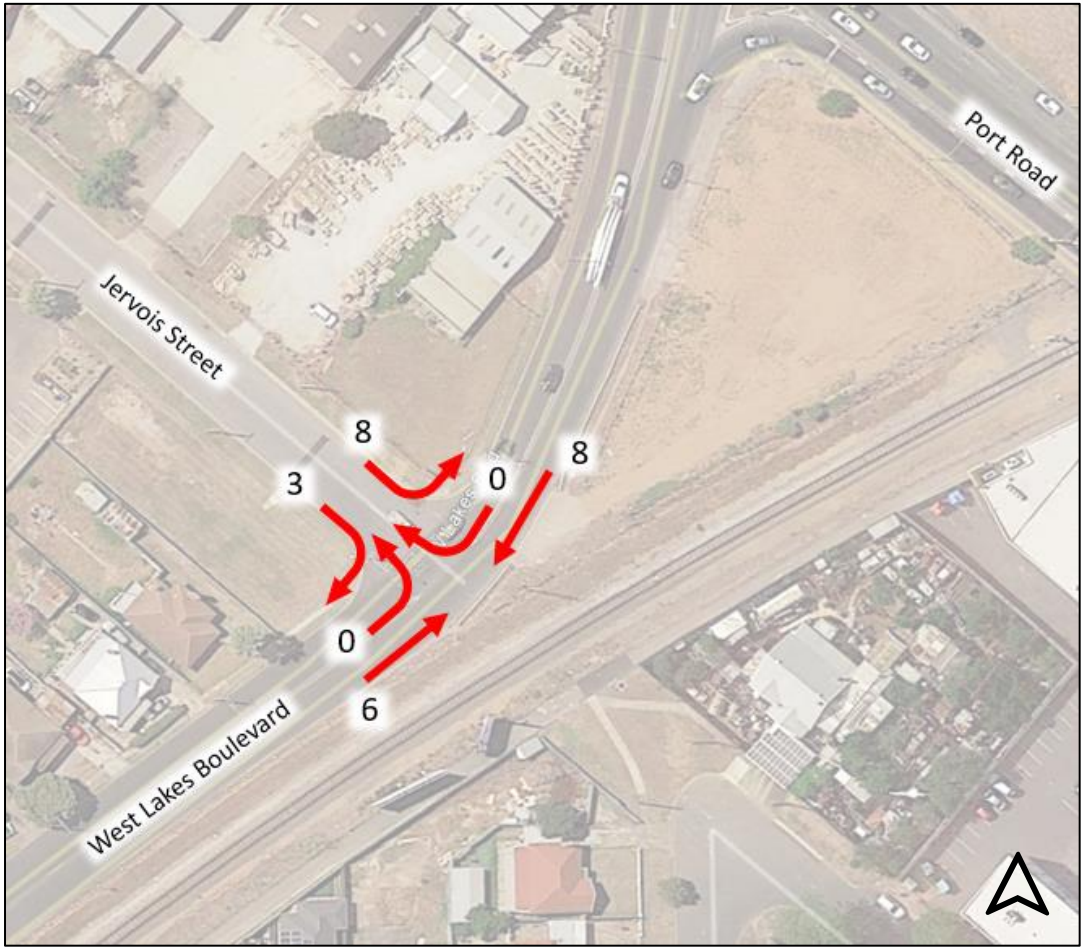


TRAFFIC DISTRIBUTION – WEST LAKES BOULEVARD / JERVOIS STREET

To assess the impacts on the surrounding key intersections in the network, the adjacent map has been prepared to illustrate the total additional trips that could be expected during the PM peak hour period at the intersection of Jervois Street / West Lakes Boulevard From this the following has been identified:

- A total of 25 additional vehicle trips could be expected during the PM peak period at the intersection.
- The majority of these trips are likely to be turning left from Jervois Street onto West Lakes Boulevard towards Port Road or continuing westbound on West Lakes Boulevard past Jervois Street having originated from elsewhere in the DPA area.
- The additional traffic volumes in this location are unlikely to cause any additional traffic issues at the adjacent intersection of Port Road / West Lakes Boulevard / Cheltenham Parade.
- SIDRA analysis was not undertaken due to the low volumes observed and the inaccuracy of modelling an unsignalized intersection adjacent a major intersection. The upgrade of the Port Road / West Lakes Boulevard intersection will also increase the storage capacity on approach to the intersection and potentially reduce the queue lengths observed.

Figure 4.7: Post Development Additional PM Peak trips – West Lakes Boulevard / Jervois Street



TRAFFIC MODELLING – MAY STREET / CHIPPENHAM STREET / PORT ROAD INTERSECTION

Traffic modelling has been undertaken on the intersection of May Street / Chippenham Street / Port Road to determine the impact on the intersection post development.

High level traffic modelling has been completed utilising SIDRA Intersection 7 for both the Base Case (existing) and Post Development Scenario.

Turning movements

Base case

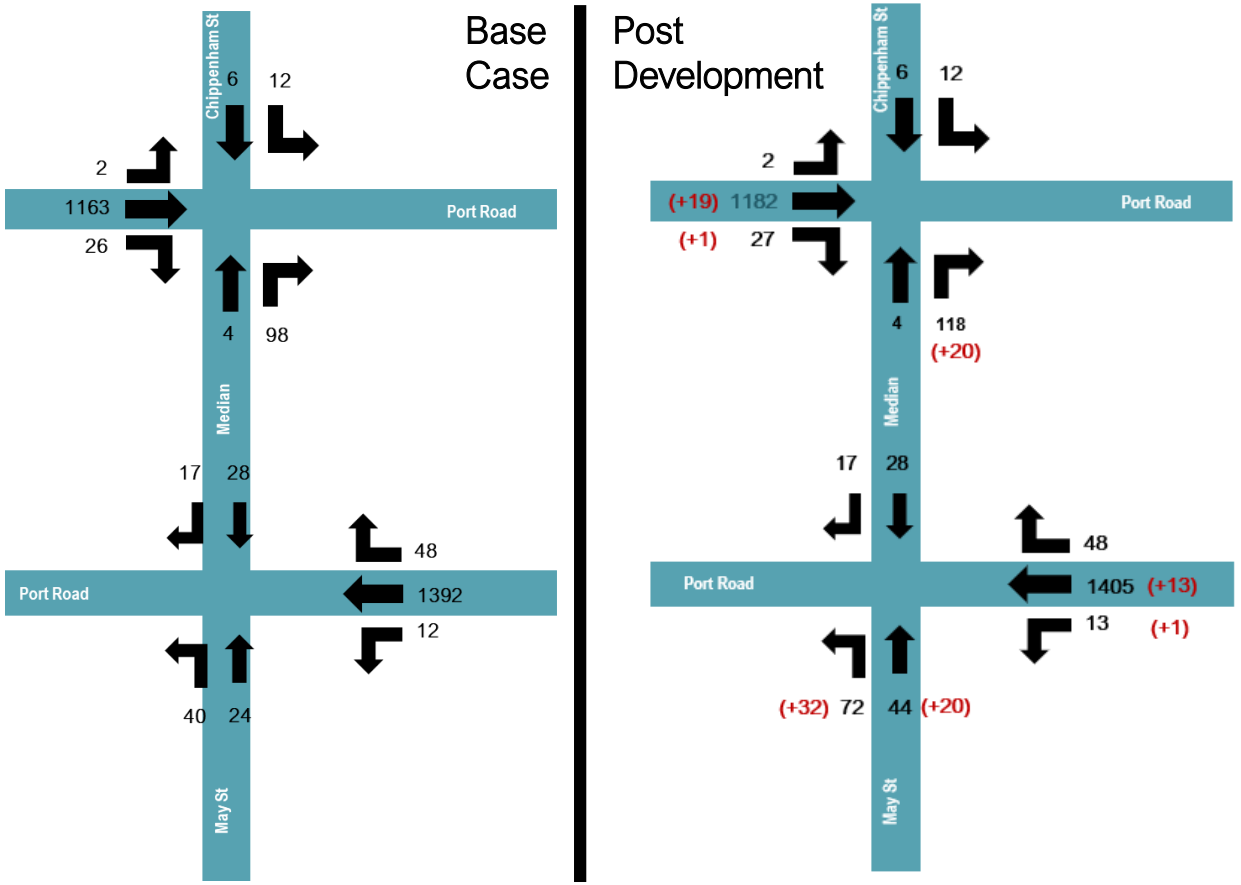
The turning movement volumes on May Street and Chippenham Street are based on the survey undertaken at the intersection on Tuesday 11th February 2020.

Through movements on Port Road are based on vehicle turning movement survey at the intersection of Port Road, West Lakes Boulevard and Cheltenham Parade undertaken by the Department of Planning, Transport and Infrastructure dated 24 September 2019.

Post Development

The post development turning movement volumes are calculated by adding the post development additional trips to the base volumes and the potential theoretical generation.

Figure 4.8: SIDRA Modelling – Traffic Volume Input for Base Case and Post Development



TRAFFIC MODELLING – MAY STREET / CHIPPENHAM STREET / PORT ROAD INTERSECTION

Base Case Scenario

The following summarises the key findings of the Base Case model:

- The intersection is currently operating satisfactorily during the peak hour period, with a DOS of 0.55 at the Chippenham Street/Port Road section and a DOS of 0.26 at the May Street and Port Road section.
- The right turn movement from the median storage area onto Port Road (SE bound) currently operates at a LOS of D with an average delay of 29.3 seconds and a 95%ile back of queue of 13.2 metres (2-3 vehicles).
- The right turn movement from the median storage area onto Port Road (NW bound) currently operates at a LOS of D with an average delay of 26.8 seconds however, the 95%ile back of queue is only 5.9 metres (1 vehicle).
- All other movements in the intersection are operating at a LOS of C or better.

Base Case Movement Summary at Chippenham Street/ Port Road / Median Storage Area

Movement Performance - Vehicles													
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Median Storage Area													
2	T1	4	0.0	4	0.0	0.554	23.0	LOS C	2.4	13.2	0.92	1.16	23.8
3	R2	103	0.0	103	0.0	0.554	29.3	LOS D	2.4	13.2	0.92	1.16	19.8
Approach		107	0.0	107	0.0	0.554	29.0	LOS D	2.4	13.2	0.92	1.16	20.0
North: Chippenham St													
7	L2	13	0.0	13	0.0	0.035	6.0	LOS A	0.1	0.9	0.58	0.67	42.1
8	T1	6	0.0	6	0.0	0.035	16.5	LOS C	0.1	0.9	0.58	0.67	36.4
Approach		19	0.0	19	0.0	0.035	9.5	LOS A	0.1	0.9	0.58	0.67	40.6
West: Port Road													
10	L2	2	0.0	2	0.0	0.218	5.6	LOS A	0.0	0.0	0.00	0.00	58.0
11	T1	1228	1.9	1228	1.9	0.218	0.0	LOS A	0.0	0.0	0.00	0.01	59.8
12	R2	27	4.0	27	4.0	0.218	5.5	LOS A	0.0	0.0	0.00	0.04	59.3
Approach		1258	1.9	1258	1.9	0.218	0.2	NA	0.0	0.0	0.00	0.01	59.8
All Vehicles		1384	1.8	1384	1.8	0.554	2.5	NA	2.4	13.2	0.08	0.11	55.9

Base Case Movement Summary at May Street / Port Road / Median Storage Area

Movement Performance - Vehicles													
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: May Street													
1	L2	42	0.0	42	0.0	0.146	6.4	LOS A	0.5	3.8	0.64	0.73	44.4
2	T1	25	0.0	25	0.0	0.146	19.7	LOS C	0.5	3.8	0.64	0.73	27.2
Approach		67	0.0	67	0.0	0.146	11.4	LOS B	0.5	3.8	0.64	0.73	40.8
East: Port Road													
4	L2	13	0.0	13	0.0	0.264	5.6	LOS A	0.0	0.0	0.00	0.01	56.3
5	T1	1465	1.1	1465	1.1	0.264	0.0	LOS A	0.0	0.0	0.00	0.02	59.7
6	R2	51	0.0	51	0.0	0.264	5.5	LOS A	0.0	0.0	0.00	0.06	58.2
Approach		1528	1.1	1528	1.1	0.264	0.2	NA	0.0	0.0	0.00	0.03	59.6
North: Median Storage Area													
8	T1	28	3.3	28	3.3	0.232	20.6	LOS C	0.8	5.9	0.87	0.96	20.0
9	R2	18	0.0	18	0.0	0.232	26.8	LOS D	0.8	5.9	0.87	0.96	33.5
Approach		46	2.0	46	2.0	0.232	23.0	LOS C	0.8	5.9	0.87	0.96	26.6
All Vehicles		1642	1.0	1642	1.0	0.264	1.3	NA	0.8	5.9	0.05	0.08	58.0

TRAFFIC MODELLING – MAY STREET / CHIPPENHAM STREET / PORT ROAD INTERSECTION

Post Development Scenario

The following summarises the key findings of the Post Development model:

- The intersection continues to operate satisfactorily during the peak hour period, with a DOS of 0.68 at the Chippenham Street/Port Road section and a DOS of 0.27 at the May Street and Port Road section.
- The right turn movement from the median storage area onto Port Road (SE bound) will operate at a LOS of E with an average delay of 36.1 seconds and a 95%ile back of queue of 18.3 metres (3 vehicles).
- The through movement from the median storage area onto Chippenham Street will operate at a LOS of D with an average delay of 29.5 seconds and a 95%ile back of queue of 18.3 metres (2-3 vehicles).
- The right turn movement from the median storage area onto Port Road (NW bound) operates at a LOS of D with an average delay of 28.7 seconds however, the 95%ile back of queue is only 6.3 metres (1 vehicle).
- All other movements in the intersection continue to operate at a LOS of C or better.

Post Development Movement Summary at Chippenham Street/ Port Road / Median Storage Area

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Median Storage Area													
2	T1	4	0.0	4	0.0	0.683	29.5	LOS D	3.3	18.3	0.94	1.32	21.3
3	R2	124	0.0	124	0.0	0.683	36.1	LOS E	3.3	18.3	0.94	1.32	17.5
Approach		128	0.0	128	0.0	0.683	35.9	LOS E	3.3	18.3	0.94	1.32	17.7
North: Chippenham St													
7	L2	13	0.0	13	0.0	0.035	6.0	LOS A	0.1	0.9	0.58	0.68	41.9
8	T1	6	0.0	6	0.0	0.035	16.9	LOS C	0.1	0.9	0.58	0.68	36.3
Approach		19	0.0	19	0.0	0.035	9.7	LOS A	0.1	0.9	0.58	0.68	40.5
West: Port Road													
10	L2	2	0.0	2	0.0	0.221	5.6	LOS A	0.0	0.0	0.00	0.00	58.0
11	T1	1244	1.9	1244	1.9	0.221	0.0	LOS A	0.0	0.0	0.00	0.01	59.8
12	R2	28	3.8	28	3.8	0.221	5.5	LOS A	0.0	0.0	0.00	0.04	59.3
Approach		1275	1.9	1275	1.9	0.221	0.2	NA	0.0	0.0	0.00	0.01	59.8
All Vehicles		1422	1.7	1422	1.7	0.683	3.5	NA	3.3	18.3	0.09	0.14	54.6

Post Development Movement Summary at May Street / Port Road / Median Storage Area

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: May Street													
1	L2	76	0.0	76	0.0	0.270	7.2	LOS A	1.1	7.9	0.67	0.80	43.4
2	T1	46	0.0	46	0.0	0.270	21.7	LOS C	1.1	7.9	0.67	0.80	25.9
Approach		122	0.0	122	0.0	0.270	12.7	LOS B	1.1	7.9	0.67	0.80	39.6
East: Port Road													
4	L2	14	0.0	14	0.0	0.266	5.6	LOS A	0.0	0.0	0.00	0.02	56.3
5	T1	1479	1.1	1479	1.1	0.266	0.0	LOS A	0.0	0.0	0.00	0.02	59.7
6	R2	51	0.0	51	0.0	0.266	5.5	LOS A	0.0	0.0	0.00	0.06	58.2
Approach		1543	1.1	1543	1.1	0.266	0.2	NA	0.0	0.0	0.00	0.03	59.6
North: Median Storage Area													
8	T1	29	3.6	29	3.6	0.246	21.4	LOS C	0.9	6.3	0.88	0.96	19.4
9	R2	18	0.0	18	0.0	0.246	28.7	LOS D	0.9	6.3	0.88	0.96	32.9
Approach		47	2.2	47	2.2	0.246	24.2	LOS C	0.9	6.3	0.88	0.96	25.8
All Vehicles		1713	1.0	1713	1.0	0.270	1.8	NA	1.1	7.9	0.07	0.11	57.3

TRAFFIC MODELLING – MAY STREET / CHIPPENHAM STREET / PORT ROAD INTERSECTION

Comparison

Level of Service

The LOS at each approach is shown. LOS at each approach has not changed between the base case and the post development scenarios.

95%ile Back of Queue

The post development scenario shows minor increase in queue lengths, i.e. an increase from 13.2m to 18.3m at the Chippenham Street and Port Road intersection and an increase from 5.9m to 7.9m at the May Street/Port Road intersection.

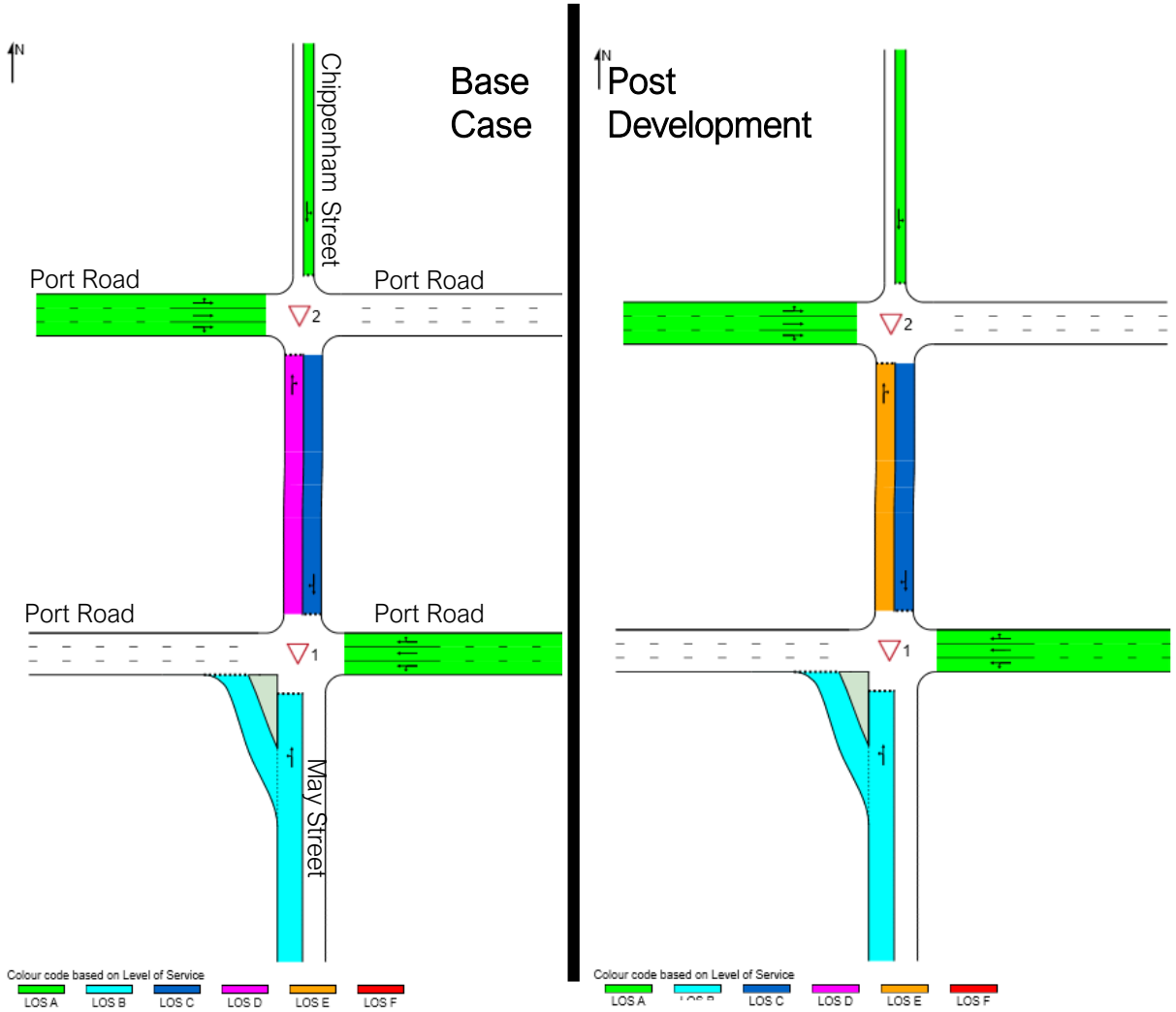
Degree of Saturation

The DOS at the median storage area for the post development scenario is at 0.683 and all other approaches have a degree of saturation of less than 0.6.

Summary

The intersection will continue to operate satisfactorily with the anticipated additional post development traffic volumes, with minor increase in queue length and DOS.

Figure 4.9: SIDRA Modelling – Level of Service for Base Case and Post Development



TRAFFIC MODELLING – MAY STREET / WEST LAKES BOULEVARD INTERSECTION

Traffic modelling has been undertaken on the intersection of May Street / West Lakes Boulevard to determine the impact on the intersection post development.

The traffic modelling has been completed utilising SIDRA Intersection 7 for both the Base Case (existing) and Post Development Scenario.

Turning movements

Base case

Through movements on May Street are based on the traffic counts undertaken by Council in May 2018 between Jervois Street and West Lakes Boulevard.

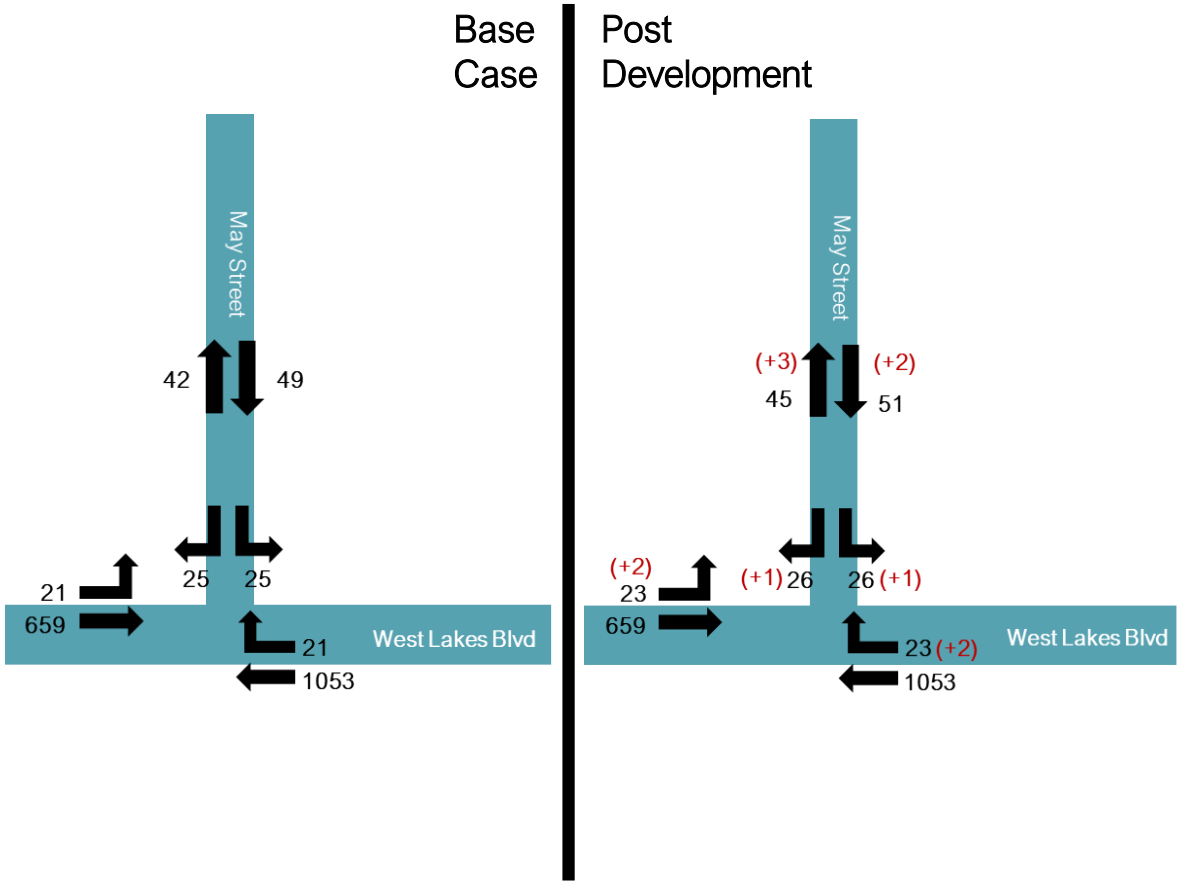
Through movements on West Lakes Boulevard are derived from the turning movement survey at the nearby intersection of Jervois Street and West Lakes Boulevard undertaken on Tuesday 11th February 2020.

No recent turning movement survey was undertaken at the intersection of May Street and West Lakes Boulevard. As such, a high level traffic model has been completed with distribution of left and right turn movements assumed to be 50:50.

Post Development

The post development turning movement volumes are calculated by adding the site generated additional traffic volumes on May Street to the base case volumes. The same distribution assumptions have been applied.

Figure 4.10: SIDRA Modelling – Traffic Volume Input for Base Case and Post Development



TRAFFIC MODELLING – MAY STREET / WEST LAKES BOULEVARD INTERSECTION

Base Case Scenario

The following summarises the key findings of the Base Case model:

- The intersection is currently operating satisfactorily during the peak hour period, with a DOS of 0.51.
- The right turn movement from May Street onto West Lakes Boulevard has a LOS of F, a 95%ile back of queue of 7.9m (1-2 vehicles) and an average delay of 66.6 seconds. The high average of delay is due to the high through volumes on West Lakes Boulevard. There is not sufficient space on West Lakes Boulevard for a median storage area to enable vehicles to do a staged right turn. However the high average delay and LOS F for right turn on minor approach at peak times is common for an unsignalised intersection from a minor road onto an arterial road.
- All other movements in the intersection are operating at a LOS of B or better.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: West Lakes Blvd											
5	T1	1108	2.6	0.513	0.4	LOS A	0.7	5.0	0.06	0.01	59.4
6	R2	22	0.0	0.513	13.2	LOS B	0.7	5.0	0.08	0.02	53.0
Approach		1131	2.5	0.513	0.6	NA	0.7	5.0	0.07	0.01	59.3
North: May Street											
7	L2	26	0.0	0.035	7.8	LOS A	0.1	0.9	0.56	0.71	46.1
9	R2	26	0.0	0.362	66.6	LOS F	1.1	7.9	0.96	1.02	28.7
Approach		53	0.0	0.362	37.2	LOS E	1.1	7.9	0.76	0.86	34.2
West: West Lakes Blvd											
10	L2	22	0.0	0.350	5.6	LOS A	0.0	0.0	0.00	0.02	58.3
11	T1	694	5.6	0.350	0.1	LOS A	0.0	0.0	0.00	0.02	59.7
Approach		716	5.4	0.350	0.2	NA	0.0	0.0	0.00	0.02	59.7
All Vehicles		1899	3.6	0.513	1.5	NA	1.1	7.9	0.06	0.04	58.3

TRAFFIC MODELLING – MAY STREET / WEST LAKES BOULEVARD INTERSECTION

Post Development Scenario

The following summarises the key findings of the Post Development model:

- The intersection continues to operate satisfactorily during the peak hour period, with a DOS of 0.52.
- The right turn movement from May Street onto West Lakes Boulevard has a LOS of F, a 95%ile back of queue of 8.3m (1-2 vehicles) and an average delay of 68.1 seconds. This is a negligible change from the base case scenario.
- All other movements in the intersection would continue to operate at a LOS of B or better.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: West Lakes Blvd											
5	T1	1108	2.6	0.516	0.4	LOS A	0.8	5.5	0.07	0.01	59.4
6	R2	24	0.0	0.516	13.3	LOS B	0.8	5.5	0.09	0.02	53.0
Approach		1133	2.5	0.516	0.7	NA	0.8	5.5	0.07	0.01	59.2
North: May Street											
7	L2	27	0.0	0.036	7.9	LOS A	0.1	0.9	0.56	0.71	46.1
9	R2	27	0.0	0.379	68.1	LOS F	1.2	8.3	0.96	1.02	28.4
Approach		55	0.0	0.379	38.0	LOS E	1.2	8.3	0.76	0.87	34.0
West: West Lakes Blvd											
10	L2	24	0.0	0.351	5.6	LOS A	0.0	0.0	0.00	0.02	58.3
11	T1	694	5.6	0.351	0.1	LOS A	0.0	0.0	0.00	0.02	59.7
Approach		718	5.4	0.351	0.2	NA	0.0	0.0	0.00	0.02	59.7
All Vehicles		1905	3.6	0.516	1.6	NA	1.2	8.3	0.06	0.04	58.2

TRAFFIC MODELLING – MAY STREET / WEST LAKES BOULEVARD INTERSECTION

Comparison

Level of Service

LOS at each approach has not changed between the base case and the post development scenarios.

95%ile Back of Queue

The post development scenario shows minor increase in queue lengths, i.e. an increase from 7.9m to 8.3m at the May Street approach and minor increase from 5.0m to 5.5m at the West Lakes Boulevard east approach.

Degree of Saturation

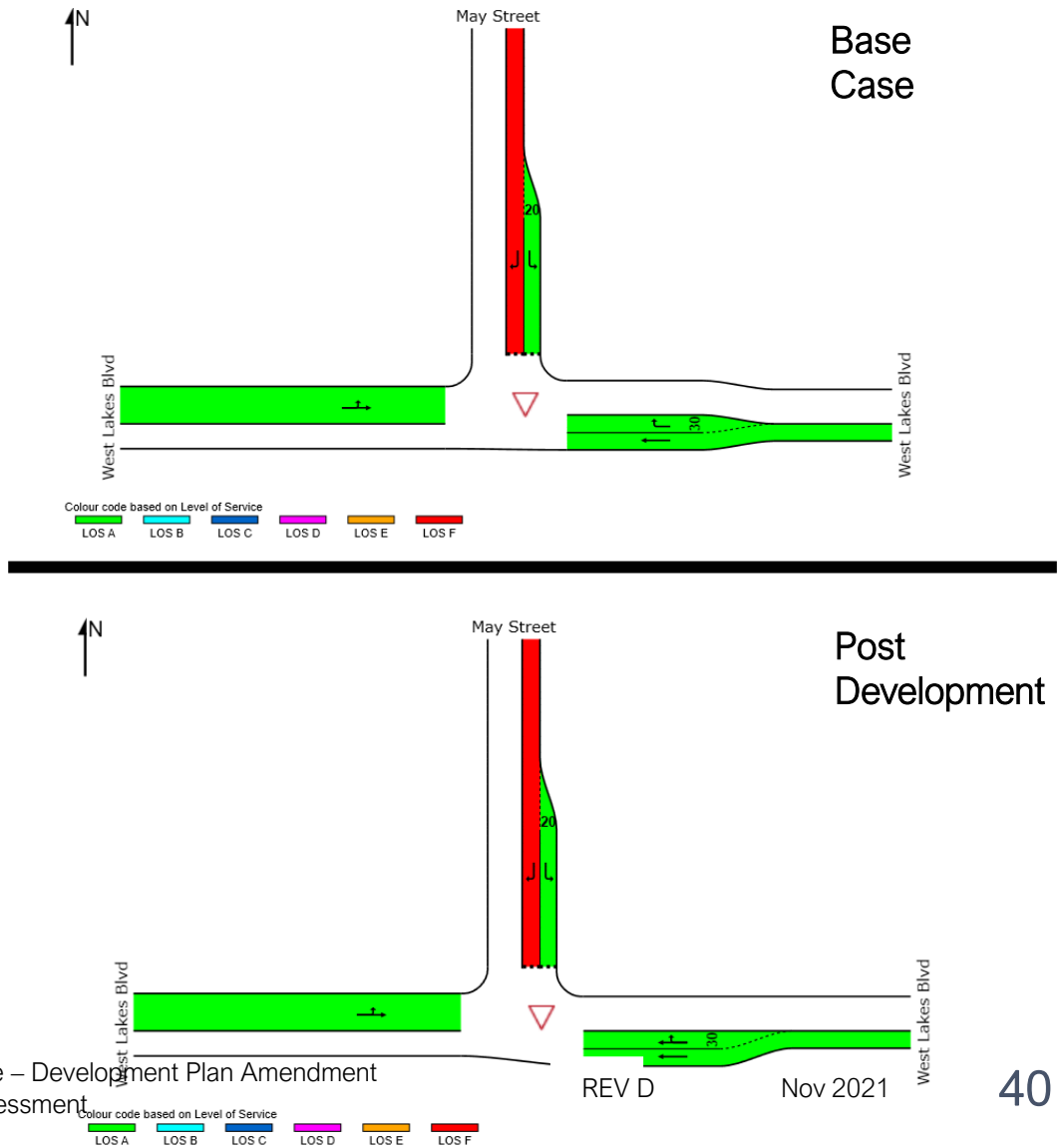
DOS for the intersection has slightly increased from 0.513 to 0.516.

Summary

The intersection will continue to operate satisfactorily with the anticipated additional post development traffic volumes, with minor increase in queue length and DOS.

Delays of approximately 67 and 68 seconds are expected for the base case and the post development scenarios respectively during the PM peak for the right turn movement at May Street Approach. This is considered appropriate due to the high through movements on West Lakes Boulevard.

Figure 4.11: SIDRA Modelling – Level of Service for Base Case and Post Development



PARKING

Development Plan Parking Requirements

Parking for each development site is to be assessed during the development application stage with consideration given to the existing parking demand within the area. The following parking rates provided within the Council Development Plan are expected be adopted with any departures for individual sites considered on their own merit.

Table 4.4: Council Development Plan Parking Rates

Development Plan Parking Requirements		
Land Use	**Number of Required Car Parking Spaces**	
Bulky Goods Outlet	3 car parking spaces for every 100 square metres of retail area	
Car Parking for People with Disabilities	1 car park for each 100 spaces	
Dwelling (detached and semi-detached)	2 on site parking spaces, one of which is covered (the second space can be tandem)	
Dwelling (residential flat building)	**Ave. spaces per dwelling where the dwelling is located within 1 km of a District Centre, the Integrated Policy Area 20, or 200 metres of a railway station, light rail or bus stop**	**Ave. spaces per dwelling in any other circumstances**
- 3 or more Bedrooms or a floor area 130 sq.m or more	1.25 plus an additional 0.5 visitor parking spaces	2 plus an additional 0.25 visitor parking spaces
- 2 bedrooms or a floor area of more than 75 sq.m and less than 130 sq.m	1 plus an additional 0.25 visitor parking spaces	1.5 plus an additional 0.25 visitor parking spaces
Shop (s)	7 car park spaces for every 100 sq.m of total floor area	
Industry / warehouse / store or similar activity	a) 1 car park space for each 50 sq.m or part thereof for the first 200 sq.m of total floor area b) 1 car park space for each 75 sq.m or part thereof used where the total floor area exceeds 200 sq.m but is less than 2,000 sq.m c) 1 car park space for every 140 sq.m or part thereof where the total floor area exceeds 2000 sq.m or 75 percent of the number of employees where the development is labour intensive	
On site secure bicycle parking racks for non residential development	3 bicycle spaces per 50 employees	

It is noted that additional parking spaces are available within the central verge on Port Road adjacent to the subject area within the Council owned carpark. These spaces should be considered when preparing the development application for developments with frontages on this section of Port Road however, these should not be relied on.

CONCLUSIONS

05

CONCLUSIONS

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

- The proposed rezoning has the potential to deliver up to 10,500 sq.m of commercial floor space, 3,500 sq.m of retail floor space and 550 residential dwellings. Approximately 15% of these residential dwellings will be located above the retail / commercial floors spaces.
- Based on typical traffic generation rates sourced from the NWS Guide, a total increase of 207 vehicle trips during the PM peak hour could be generated by the affected area, which would be expected to include some linked and internal trips.
- The impact of the additional traffic generation on the adjacent road network is likely to be minimal during the peak periods with a net increase of only 60 vehicles at the intersection of May Street / Port Road and only 25 vehicles at the intersection of Jervois Street / West Lakes Boulevard in comparison to the potential traffic generation from the existing site.
- No existing parking issues were identified within the affected area. All proposed developments are expected to provide parking on-site in accordance with the Development Plan requirements.
- The subject area is well serviced by public transport with numerous bus services and 2 railway lines and stations located within 800 metres of the area.

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