GTAconsultants

3 Quarry Road, Dural
Retirement Village
Transport Impact Assessment

Client // Thelem Consulting

Office // NSW

Reference // N142020

Date // 14/06/18

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Quality Record

Issue	Date	Description	Prepared By	Checked By	Approved By	Signed
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Table of Contents

Appendices

Figures

Tables

1. Introduction

1.1 Background

A Development Application (DA) is to be lodged with Hornsby Shire Council (Council) for the proposed development on land located at 3 Quarry Road, Dural. The proposed development comprises a retirement village including 147-unit retirement living apartments (RLAs) and 74-room retirement aged care facilities (RACFs), along with site facilities such as a restaurant, library, cinema and gardens.

Thelem Consulting engaged GTA Consultants (GTA) to undertake an assessment to understand the traffic and transport related impacts of the proposed development on the existing transport network.

1.2 Purpose of this Report

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

i Existing traffic and parking conditions surrounding the site
ii Suitability of the proposed parking in terms of supply (quantum) and layout
iii Service vehicle requirements
iv Pedestrian and bicycle requirements
v The traffic generating characteristics of the proposed development
vi Suitability of the proposed access arrangements for the site
vii The transport impact of the development proposal on the surrounding road network.

1.3 References

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

- An inspection of the site and its surrounds on Tuesday 20 February 2018
- Hornsby Shire Council Development Control Plan (DCP) 2013
- Hornsby Shire Council Local Environmental Plan (LEP) 2013
- South Dural Development Transport Management and Access Plan (TMAP) 2016 dated WSP - Parsons Brinckerhoff Australia/ New Zealand (WSP - PB)
- Australian Standard/ New Zealand Standard, Parking Facilities, Part 1: Off-Street Car Parking AS/NZS 2890.1:2004
- Australian Standard, Parking Facilities, Part 2: Off-Street Commercial Vehicle Facilities AS 2890.2:2002
- Australian Standard/ New Zealand Standard, Parking Facilities, Part 6: Off-Street Parking for People with Disabilities AS/NZS 2890.6:2009
- Traffic survey undertaken by Data Audit on Tuesday 20 February 2018 as referenced in the context of this report
- Car parking survey undertaken by GTA on Tuesday 20 February 2018 as referenced in the context of this report
- Plans for the proposed development prepared by Marchese + Partners International Pty Ltd, dated 07 June 2018
- Sydney's Bus Future, Transport for NSW dated December 2013
- Other documents and data as referenced in this report.

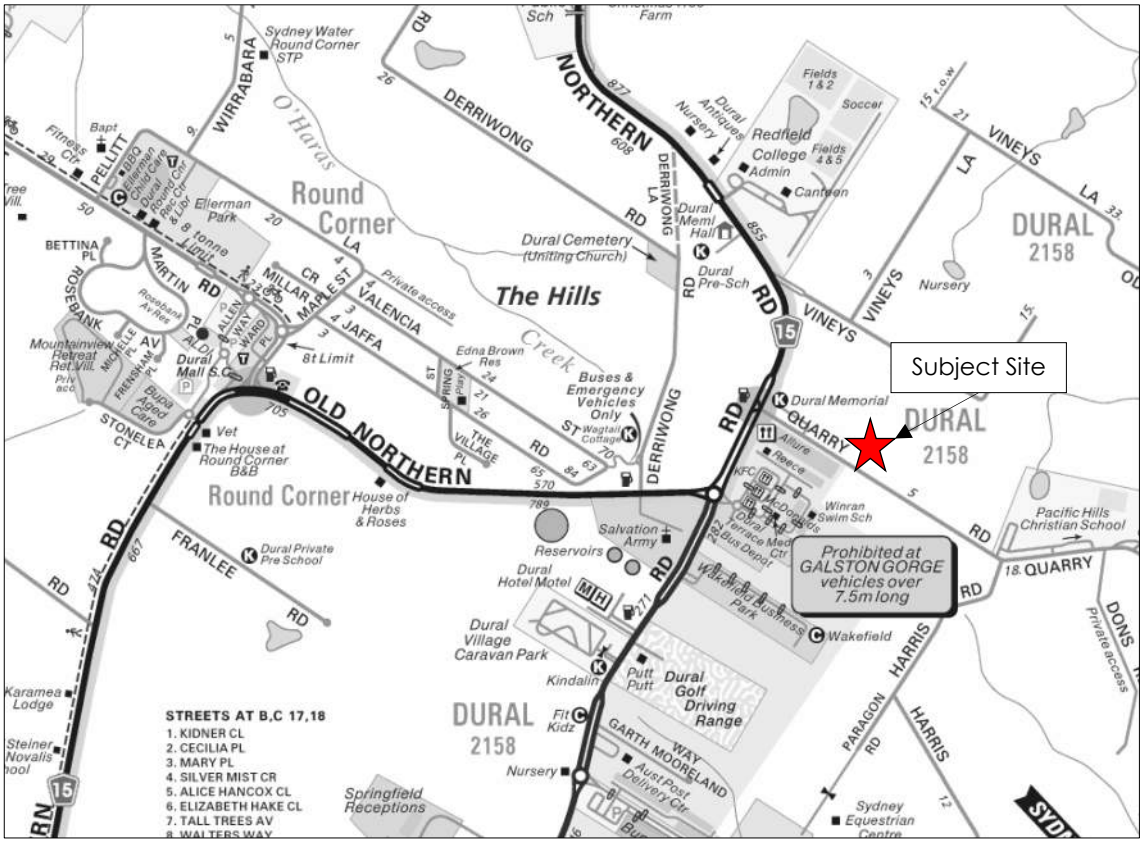
2. Existing Conditions

The subject site is located at 3 Quarry Road, Dural. The site of around 29,700 square metres, has a frontage of about 80 metres to both Quarry Road along the south-western boundary and Vineys Road along its north-eastern boundary. According to the LEP 2013, the site currently has a land use classification as RU2 (Rural Landscape) and is predominantly vacant, with the exception of a single residential house located on the north of the site.

The surrounding properties predominantly consist of undeveloped land north, west and southeast of the site, as well as residential developments east and southwest of the site. Dural Business Park is also located west of the site. In addition, New Hope School and Pacific Hills Christian School are located to the east, while Redfield College is located to the north.

The location of the subject site and its surrounding environs is shown in Figure 2.1.

Figure 2.1: Subject site and its environs



Source: Sydway Publishing Pty Ltd

2.1 Road Network

2.1.1 Adjoining Roads

Old Northern Road

Old Northern Road is classified as a Roads and Maritime Services (Roads and Maritime) State Road and is aligned in a north-south direction near the site. It is a two-way road, generally configured

with two lanes in each direction, set within a 13-metre wide (approximate) carriageway and a 22-metre-wide road reserve.

Old Northern Road, shown in Figure 2.2 and Figure 2.3, has a posted speed limit of 60 kilometres per hour. Kerbside parking is not permitted on either side of the road.

Figure 2.2: Old Northern Road (looking north)

Figure 2.3: Old Northern Road (looking south)

Quarry Road

Quarry Road is classified as a Local Road and is aligned in an east-west direction. It is a two-way road, generally configured with one lane in each direction, set within an eight-metre wide carriageway and 20-metre wide road reserve (approximate).

Unrestricted kerbside parking is permitted on both sides of the road along the site frontage. Closer towards Old Northern Road, kerbside parking is only permitted on the southern side of the road and only outside the hours of 8am to 9:30am and 2:30pm to 4pm Monday to Friday.

Quarry Road is shown in Figure 2.4 and Figure 2.5.

Figure 2.4: Quarry Road (looking northwest)

Figure 2.5: Quarry Road (looking southeast)

Vineys Road

Vineys Road is classified as a Local Road and near the site, is aligned in an east-west direction. It is a two-way road, configured with one lane in each direction, set within a six-metre wide carriageway and 20-metre wide road reserve (approximate).

Parking is unrestricted, with on-site observations indicating that local residents generally park vehicles on the grassed verge. Vineys Road is shown in Figure 2.6 and Figure 2.7.

Figure 2.6: Vineys Road (looking northwest)

Figure 2.7: Vineys Road (looking southeast)

New Line Road

New Line Road is classified as a Roads and Maritime State Road and near the site, is aligned in a north-south direction. It is a two-way road, configured with one lane in each direction set within about a seven-metre wide carriageway and a 22-metre wide road reserve.

New Line Road, shown in Figure 2.8 and Figure 2.9, has a posted speed limit of 60 kilometres per hour. Kerbside parking is permitted in designated zones along the western side of the road, south of the intersection with Old Northern Road, along the western side of the road.

Figure 2.8: New Line Road (looking north)

Figure 2.9: New Line Road (looking south)

2.1.2 Surrounding Intersections

The following key intersections exist near the site:

- Old Northern Road/ New Line Road (roundabout)
- Old Northern Road/ Quarry Road (signalised)
- Old Northern Road/ Vineys Road (unsignalised).

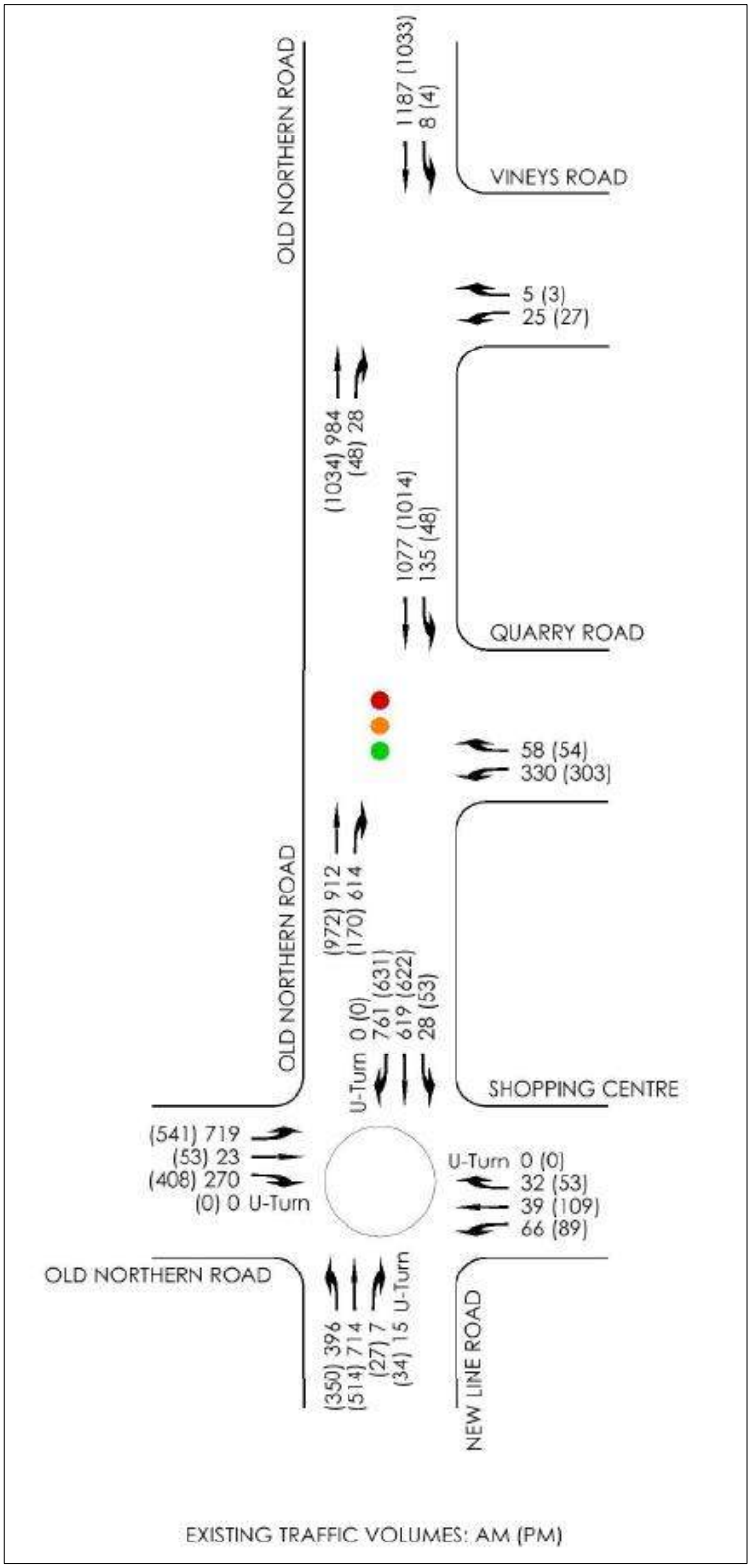
2.2 Traffic Volumes

GTA commissioned turning movement surveys on the key intersections specified in Section 2.1.2 on Tuesday 20 February 2018 during the following peak periods:

- AM peak: 7am and 9am
- PM peak: 4pm and 6pm.

The AM and PM peak hour traffic volumes are summarised in Figure 2.10, with full results contained in Appendix A.

Figure 2.10: Existing AM and PM peak hour traffic volumes



2.3 Intersection Operation

The operation of the key intersections within the study area have been assessed using SIDRA Intersection[1], version 7.0, a computer-based modelling package which calculates intersection performance.

The commonly used measure of intersection performance, as defined by Roads and Maritime, is vehicle delay. SIDRA Intersection determines the average delay that vehicles encounter and provides a measure of the level of service.

Table 2.1 shows the criteria that SIDRA Intersection adopts in assessing the level of service. A level of service of D or better is generally considered to indicate acceptable operating conditions.

Table 2.1: SIDRA Intersection level of service criteria

Level of service	Average delay per vehicle (secs/veh)	Traffic signals and roundabout	Give way and stop sign
A	Less than 14	Good operation	Good operation
B	15 to 28	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Near capacity	Near capacity, accident study required
E	57 to 70	At capacity, at signals incidents will cause excessive delays	At capacity, requires other control mode
F	Greater than 70	Extra capacity required	Extreme delay, major treatment required

Given the close proximity between the assessed intersections, the intersections have been modelled in SIDRA network.

Table 2.2 presents a summary of the existing operation of the key intersections, with full results presented in Appendix B of this report. For signalised intersections the level of service is based on the average delay for the whole intersection, whereas the level of service for unsignalised intersections is based on the worst approach.

[1] Program used under license from Akcelik & Associates Pty Ltd.

Table 2.2: Existing 2018 operating conditions

Intersection	Peak	Leg	Degree of saturation	Average delay (sec)	95th percentile queue (m)	Level of service
Old Northern Road/ New Line Road	AM	**South**	**0.90**	**50**	**145**	**D**
		East	0.16	14	10	A
		North	0.81	16	77	B
		West	0.96	28	155	B
	PM	South	0.70	27	52	B
		East	0.36	15	17	B
		North	**0.91**	**26**	**128**	**B**
		West	0.63	18	36	B
Old Northern Road/ Quarry Road	AM	South	0.91	26	191	B
		East	0.38	31	95	C
		North	0.85	43	285	D
		Overall	**0.91**	**33**	**285**	**C**
	PM	South	0.36	13	75	A
		East	0.53	43	111	D
		North	0.54	20	162	B
		Overall	**0.54**	**20**	**162**	**B**
Old Northern Road/ Vineys Road	AM	South	0.14	24	3	B
		Southeast	**0.12**	**70**	**2**	**E**
		North	0.67	5	0	A
	PM	South	0.27	30	10	C
		East	**0.05**	**46**	**1**	**D**
		North	0.57	5	0	A

Table 2.2 indicates that queuing forms largely on New Line Road and Old Northern Road. On-site observations confirm that queues for the right turn from Old Northern Road into Quarry Road extend into the New Line Road/ Old Northern Road intersection. Notwithstanding this, the Old Northern Road/ Quarry Road intersection operates with a satisfactory overall level of service of C or better during the peak hours.

The Old Northern Road/ Vineys Road intersection is the only surveyed intersection near the site that is operating at an unsatisfactory level of service of E, during the AM peak hour. Modelling results and on-site observations show that vehicles turning right out of Vineys Road experience high delays due to the heavy through movements along Old Northern Road. This results in vehicles turning right out of Vineys Road having insufficient gaps in through traffic to turn into Old Northern Road.

2.4 South Dural Development TMAP (WSP - PB, September 2016)

WSP Parsons Brinckerhoff (WSP) on behalf of Lyon Group Australia prepared a Transport Management Accessibility Plan (TMAP) in September 2016, to assess the traffic and transport impact associated with the proposed South Dural residential development on the surrounding road network.

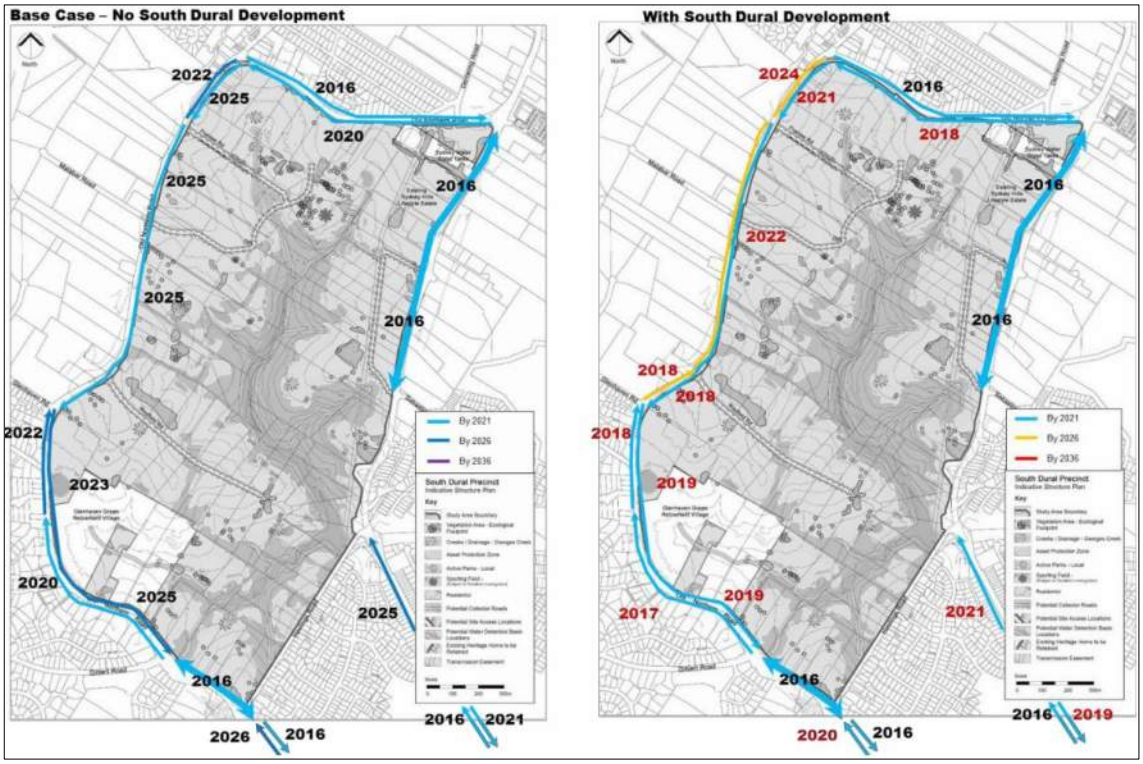
The proposed development includes 240 hectares of infill with up to 2,900 dwellings, new roads and infrastructure, sporting fields, parks, opportunities for shared pedestrian and cycle paths, both within

and external to the site. The proposed development has frontages to Old Northern Road, New Line Road and Hastings Road and will be developed in stages over an approximate 15-year period.

The TMAP identified the infrastructure measures required to manage the additional travel demand resulting from the proposed development, and reviewed opportunities to maximise the use of public transport, walking and cycling to reduce reliance on the private car.

The preliminary analysis for the proposed development was prepared using SIDRA Intersection. The analysis was based on 2016 traffic surveys, future growth estimates from recent assessments and historical growth to forecast year 2031 traffic volumes. The analysis indicated that the some of the surrounding roads would be at or approaching capacity by 2016, with more sections and intersections requiring road upgrades in 2026. The majority of the road network surrounding the South Dural development will require upgrading in one or both directions regardless of whether the development proceeds in 2036. The indicative year that the road links require upgrades is shown in Figure 2.11.

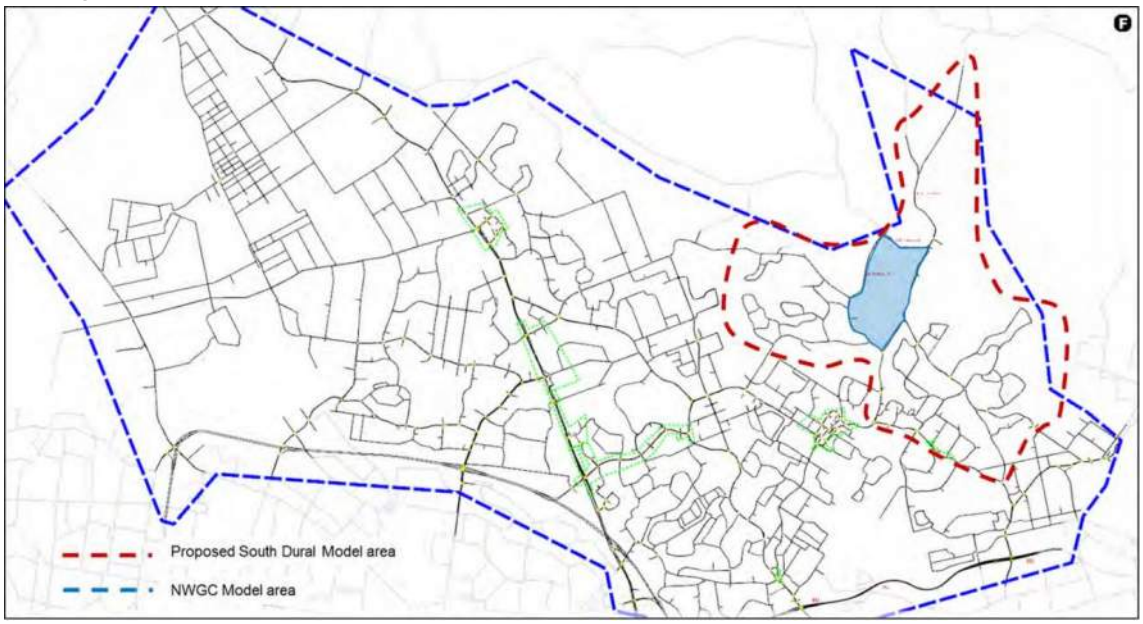
Figure 2.11: Comparison of road upgrades and approximate timings with and without the South Dural development



Source: WSP – South Dural Development TMAP, September 2016

In addition, an Aimsun mesoscopic traffic model was developed for the NorthWest Metro project and adopted for the South Dural Development. As such, the model was calibrated for base year 2014 and future years including 2026 and 2036. The model boundary that covers the area surrounding the South Dural Development is shown in Figure 2.12.

Figure 2.12: Cut of the NorthWest Metro Aimsun model to cover the area surrounding the South Dural Development



Source: WSP – South Dural Development TMAP, September 2016

This model was developed to determine the impact of the proposed development on the surrounding road network. The following annual compound growth rates were adopted for the study:

- Year 2016 to 2021:
  - AM Peak: 1.4 per cent per annum
  - PM Peak: 1.8 per cent per annum.
- Year 2021 to 2036:
  - AM Peak: 1.3 per cent per annum
  - PM Peak: 1.4 per cent per annum.

Road sections relevant for the subjected site that require widening to two lanes in each direction in 2021 are as follows:

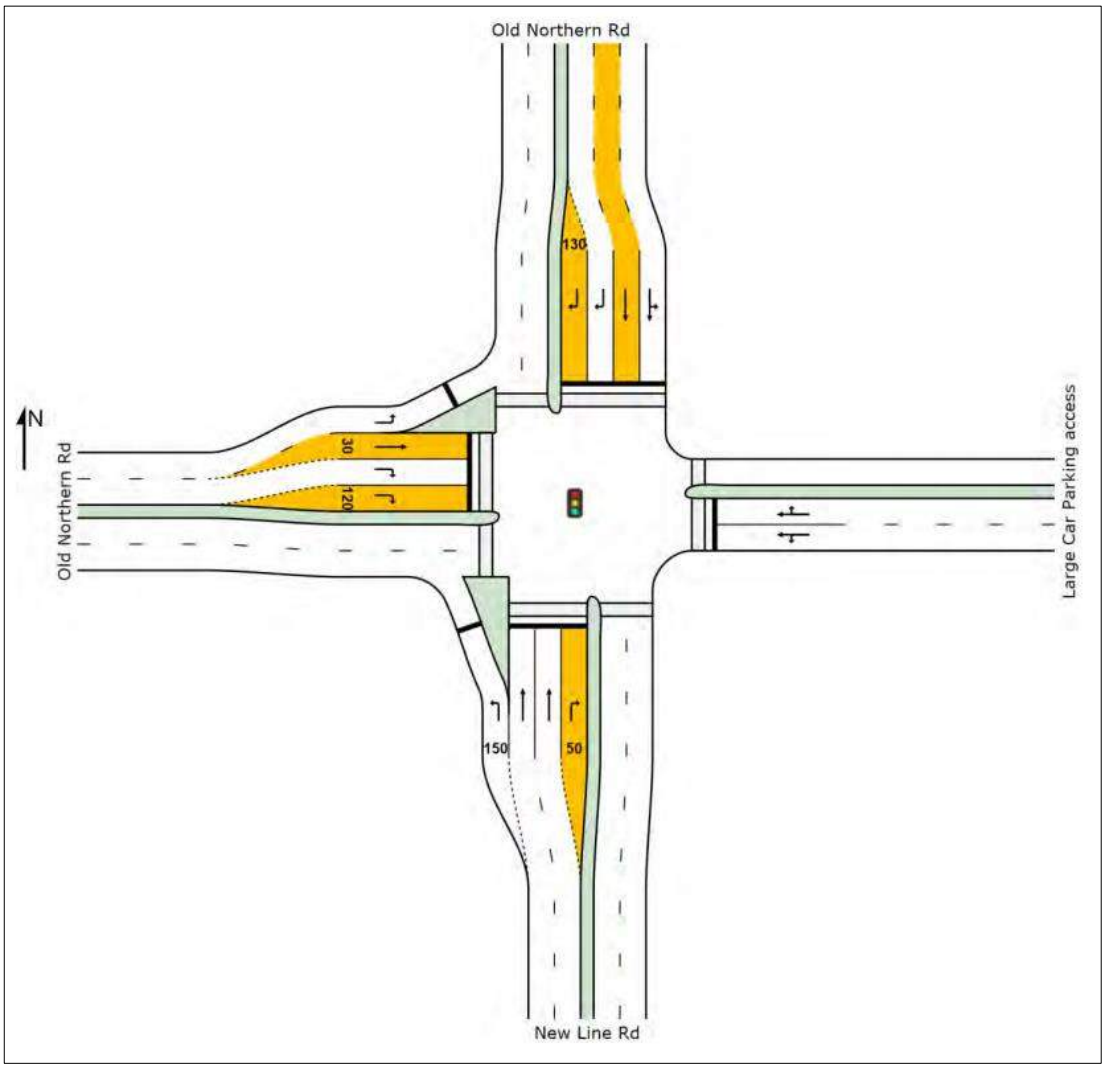
- Old Northern Road between Kenthurst Road and New Line Road
- Road widening to two lanes in each direction: New Line Road between Old Northern Road and Sebastian Drive.

Furthermore, the Old Northern Road/ New Line Road intersection was identified as requiring the following upgrades by 2026:

- Conversion from roundabout to traffic signals
- Additional southbound lane on Old Northern Road from Quarry Road to New Line Road
- Additional 130-metre long right turn bay from Old Northern Road into Old Northern Road
- Additional 120-metre long right turn bay from Old Northern Road into New Long Road
- Additional 30-metre long through lane on Old Northern Road into Dural Business Park access
- Additional 50-metre long right turn lane on New Line Road into Dural Business Park access.

The proposed intersection layout is shown in Figure 2.13.

Figure 2.13: Proposed Old Northern Road/ New Line Road intersection upgrade



Source: WSP – South Dural Development TMAP, September 2016

The TMAP also suggested that cyclist facilities (either as kerbside lanes or a widened shared path) on Old Northern Road and New Line Road, should be incorporated as part of the proposed road widening.

2.5 Car Parking

A review of publicly available car parking near the site is summarised in Table 2.3.

Table 2.3: Summary of publicly available car parking near subject site

Road	Location	Type of parking	Restrictions	Time in effect
Quarry Road (near Old Northern Road)	Both sides	Parallel	Restricted/ Unrestricted	Outside 8am-9:30am and 2:30am-4pm (near Old Northern Road) Unrestricted all other places
Vineys Road	Both sides	Informal parallel	Unrestricted	Unrestricted
Old Northern Road (west of New Line Road)	Both sides	Parallel	Unrestricted	Unrestricted

2.6 Public Transport

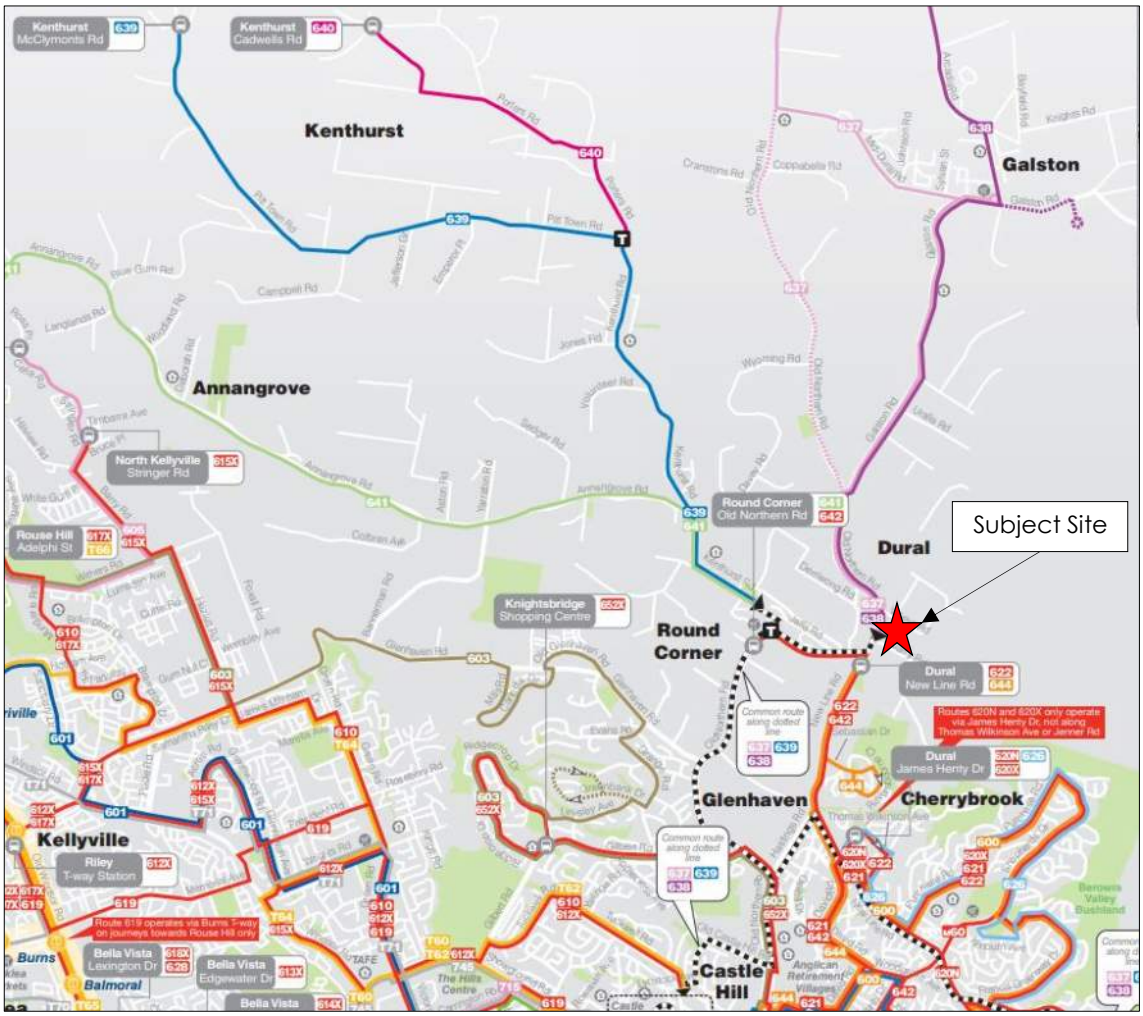
The site has access to public transport services with bus stops located on the Old Northern Road and New Line Road. Key destinations include Sydney CBD, Castle Hill and Pennant Hills. These services connect to major transport nodes such as Pennant Hills Railway Station and public transport corridor's bus stops, services and routes such as Pennant Hills Road, to provide further connections to key Sydney locations such as Parramatta.

A review of the public transport available near the site is summarised in Table 2.4, with the bus network shown in Figure 2.14.

Table 2.4: Public transport provision

Service	Route number	Route description	Location of stop	Distance to nearest stop	Frequency on/ off peak
Bus	637	Glenorie to Castle Hill	Old Northern Road before New Line Road	400 metres	30 mins/ 60 mins
	638	Berrilee to Pennant Hills			30 mins (peak direction only)
	644	Dural to Castle Hill	New Line Road at the Hillsbus Dural Depot	520 metres	60 mins/ 60 mins
	620N	Dural to Wynyard			10-20 mins (peak direction only)
	620X				5 mins morning peak/ 30-60 mins (early morning only)
	622	Dural to Milsons Point			20 mins AM peak, 30 mins PM peak (peak direction only)
	642	Round Corner Dural to Wynyard	Old Northern Road near BP Station	760 metres	Irregular
	642X	Round Corner Dural to Wynyard			10 mins/ 60 mins

Figure 2.14: Bus network map



Source: https://www.cdcbus.com.au, accessed 22 February 2018

Given the existing bus stops along New Line Road at the Hillsbus Dural Depot and Old Northern Road near BP Station are outside the reasonable walking distance from the proposed development to a bus stop, it is proposed that another bus stop be provided near the proposed signalised intersection of Old Northern Road/ New Line Road.

It is also recommended that a shuttle bus service be provided between the proposed development and the above bus stops as well as surrounding major retail/ commercial centres.

These proposals are further discussed in Section 5.4.2.

2.7 Walking and Cycling Infrastructure

Pedestrian paths are provided in the following locations:

- Quarry Road (southwestern side) – 1.5-metre-wide path, from the intersection with Old Northern Road, terminating near the Quarry Road and Harris Road intersection. This pedestrian path provides access to the retail and commercial complex (Dural Business Park) located west of the site as well to the Pacific Hills Christian and New Hope schools located east of the site.

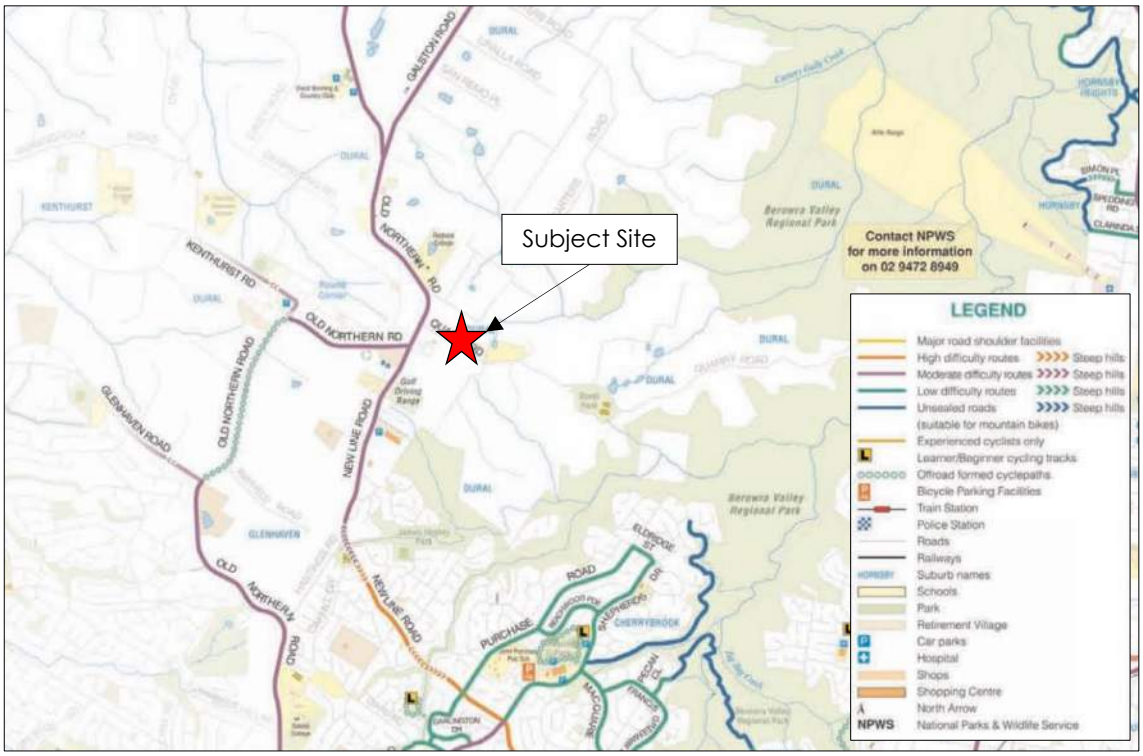
- Old Northern Road (eastern side) – 1.5-metre-wide path from the intersection with Quarry Road in the southwest direction, terminating near the roundabout with New Line Road. This path provides pedestrian access to Dural Business Park located west of the site.
- Old Northern Road (western side) – 1.5-metre-wide path along the street.

Signalised pedestrian crossings are provided on the eastern and southern legs of the Old Northern Road/ Quarry Road intersection. No other pedestrian crossing facilities such as refuges or marked crossings are provided near the site.

There are on-road (mixed traffic) cycle routes along Old Northern Road and New Line Road.

Figure 2.15 highlights the network of cycling routes within the local area.

Figure 2.15: Hornsby Council Bicycle Network



Source: http://www.hornsby.nsw.gov.au, accessed 22 February 2018

2.8 Crash History Analysis

Roads and Maritime provided GTA with recorded historical crash data on surrounding roads, including Old Northern Road, New Line Road, Quarry Road and Vineys Road. The data provided was for the most recent five-year period of finalised data (January 2012 to December 2016), as well as provisional data (January 2017 to February 2018). The data is shown graphically in Figure 2.16 and indicates that a total of 50 crashes occurred since January 2012.

24 (48 per cent) of the 50 crashes involved an injury with no fatality reported.

Figure 2.16: Full crash data history

There was a high proportion of crashes on Old Northern Road, west of New Line Road. They were predominantly classified as crashes occurring between vehicles travelling in the same direction, including rear end collisions and side swipe collisions.

One crash that resulted in injury occurred outside the subject site along Quarry Road. This was as a result of a vehicle leaving the carriageway and colliding with an object.

Three crashes occurred at the intersection of Quarry Road/ Old Northern Road including rear end collisions and side impacts. One crash involving a pedestrian also occurred at this intersection, where a pedestrian was struck from the near side travel lane to the footpath.

3. Development Proposal

3.1 Land Uses

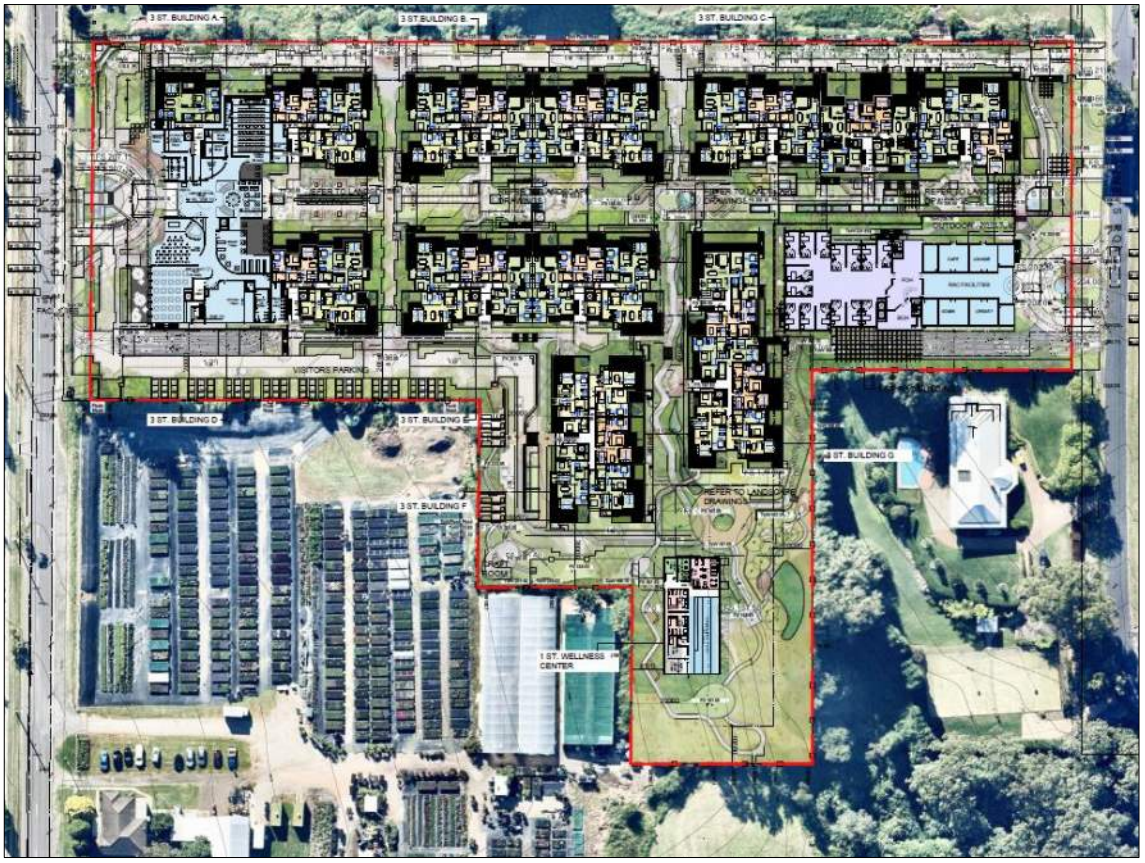
The proposal includes the construction of a retirement village with 146-unit retirement living apartments (RLAs) and 74-room retirement aged care facilities (RACFs), as summarised in Table 3.1. The proposed development also includes ancillary facilities such as a restaurant, library, cinema and garden.

The proposed site plan and surrounding road network is shown in Figure 3.1.

Table 3.1: Development Schedule

Use	Dwelling type	Number of bedrooms
RLA	2-bedroom	73
	3-bedroom	73
Subtotal		**146**
RACF	-	74

Figure 3.1: Site plan



Basemap source: Marchese Partners – 3 Quarry Road, Dural Ground Floor Plan dated 7 June 2018

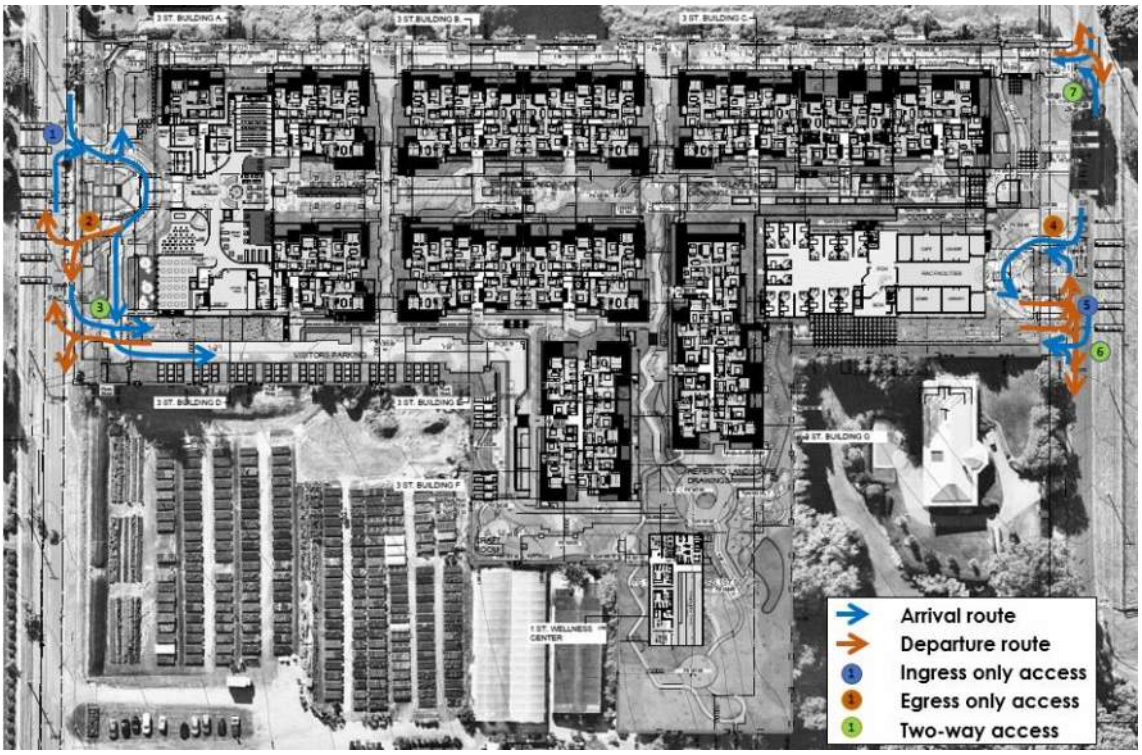
3.2 Vehicle Access

Site access is proposed via seven vehicle crossovers along Quarry Road and Vineys Road. These include:

- One-way separate entry (ingress access 1) and exit (egress access 2) crossovers for the porte-cochere along Quarry Road
- A driveway with two-way access to/ from the basement car park/ visitor car spaces along Quarry Road (two-way access 3)
- One-way separate entry (ingress access 4) and exit (egress access 5) crossovers for the porte-cochere along Vineys Road
- A driveway with two-way access to/ from the basement car park along Vineys Road (access 6).
- A driveway with two-way access to/ from the internal access road along Vineys Road (two-way access 7). Access 7 would only be utilised by the Fire and Rescue NSW fire engines (appliances).

The proposed access locations are indicatively shown in Figure 3.2.

Figure 3.2: Proposed access locations



Base image source: Marchese Partners – 3 Quarry Road, Dural Ground Floor Plan dated 7 June 2018

3.3 Internal Access Road

An internal access road is proposed on the north-western side of the site to provide connection to/ from Vineys Road. An internal access road is also proposed on the south-eastern side of the site, which terminates at a roundabout adjacent to Building G. The internal trafficable area will allow for convenient set-down/ pick-up activity to occur in front of the proposed buildings.

It is proposed that the internal access road be designed as a mixed traffic street and sign-posted at 10 kilometres per hour to facilitate cyclist safety through low vehicle speeds. Measures to maintain a safe environment for all users may include line marking, signage and speed humps.

3.4 Car Parking

The development proposes to provide a total of 383 car parking spaces over three basement levels and ground level, with 337 spaces for RLA use and 46 spaces for RACF use.

The suitability of the car parking provision and layout is discussed in Section 4 of this report.

3.5 Pick-Up/ Set-Down Activity

The proposed development includes a porte-cochere along Quarry Road on ground level, adjacent to the western side of the lobby/ reception area for the RLAs. A second porte-cochere is proposed along Vineys Road on ground level, adjacent to the eastern side of the RACFs building. The porte-cochere for RLAs and RACFs uses are illustrated in Figure 3.3 and Figure 3.4, respectively.

Figure 3.3: Proposed porte-cochere for RLAs use

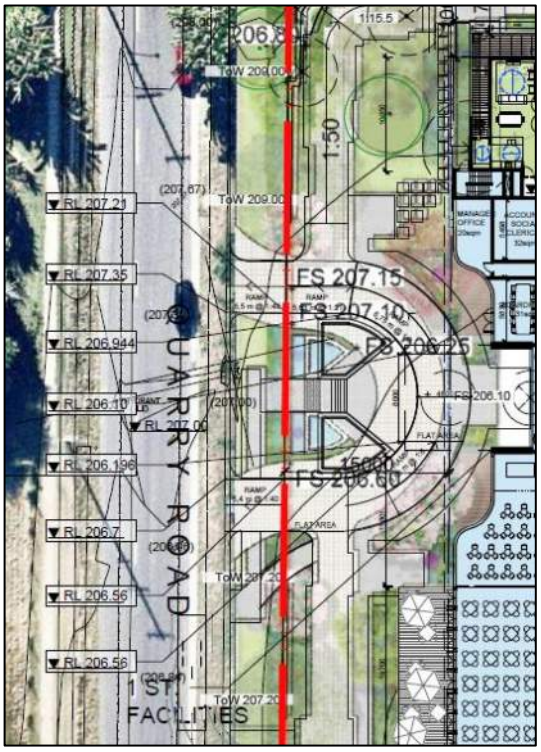
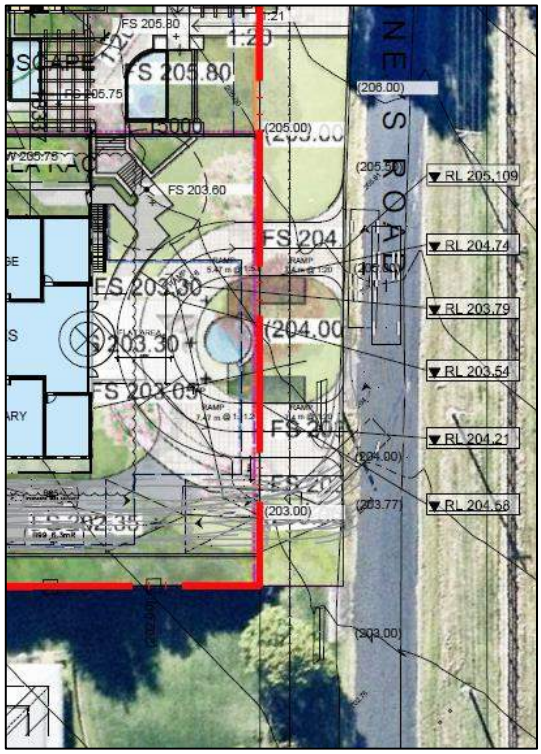


Figure 3.4: Proposed porte-cochere for RACFs use



Source: Marchese Partners – 3 Quarry Road, Dural Ground Floor Plan dated 7 June 2018

The porte-cochere will be designed to formally accommodate four 99th percentile cars. This porte-cochere will be predominantly used for cars, taxis, hire cars and rideshare vehicles.

It is proposed that the set-down/ pick-up zone for the proposed development be accessed via:

- RLAs: one-way entry only from Quarry Road on the north with one-way exit only on the south
- RACFs: one-way entry only from Vineys Road on the north with exit on the south via a two-way driveway.

The operation of the porte-cochere is considered critical for the overall functionality of the proposed RLAs and RACFs uses and will likely require a detailed management plan comprising off-street traffic management as a minimum during peak times. The plan is to be implemented by the RLAs and RACFs staff, to ensure efficient use and avoid any interruptions to Quarry Road and Vineys Road vehicles.

The suitability of the porte-cochere layout is discussed in Section 4 of this report.

3.6 Pedestrian Facilities

Pedestrian access is proposed via Quarry Road and Vineys Road. The development also includes the provision of well-connected internal two-metre wide pedestrian paths linking the RLAs and RACFs buildings to key site amenities including car parks, bus stops and pick-up/ set-down areas, with crossing facilities in key locations to facilitate access.

3.7 Cyclist Facilities

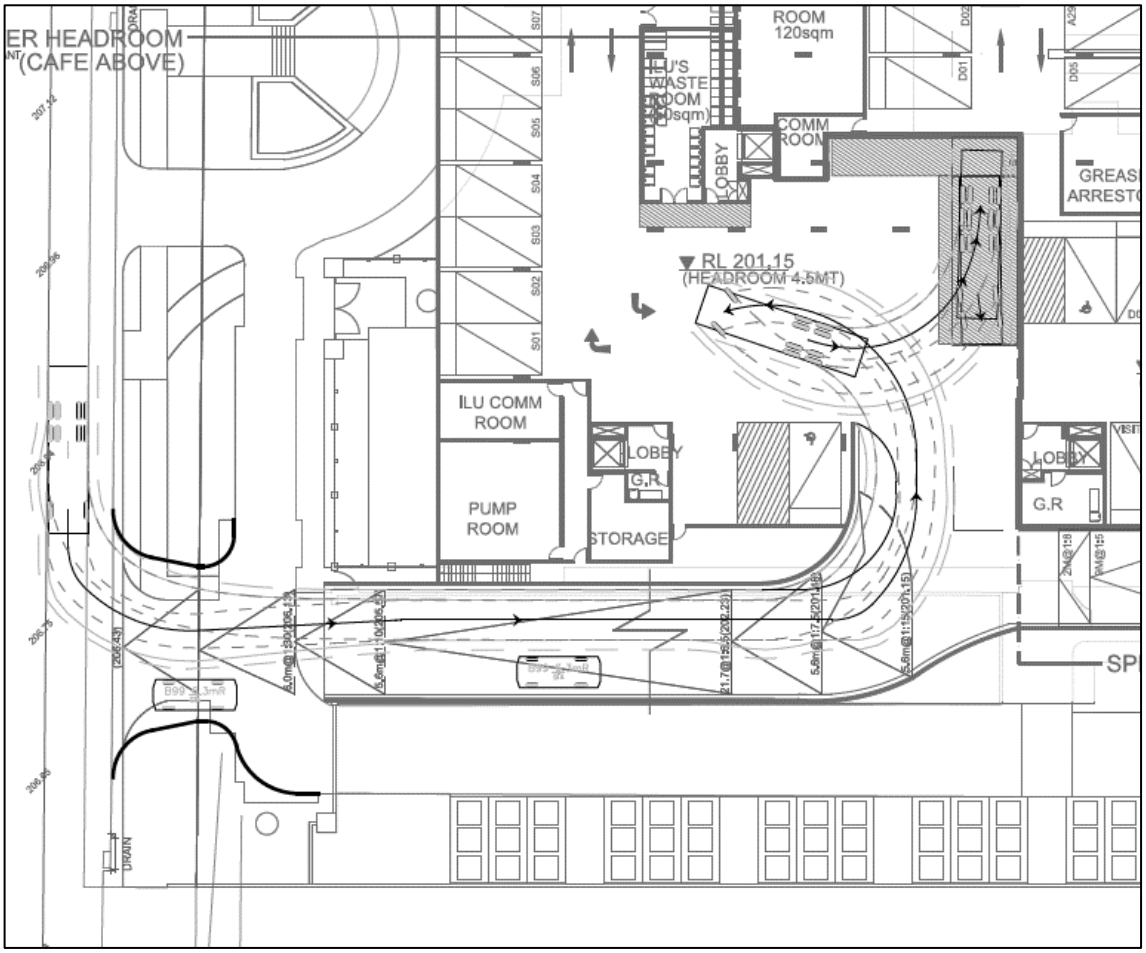
As discussed in Section 3.3, it is proposed that the internal access road be designed as a mixed traffic street.

3.8 Loading Areas

Two on-site loading areas for loading/ unloading and waste collection are proposed within basement one, with one loading area provided to the southwest of the site, servicing the RLA component of the development while the other loading area is proposed underneath the RACF building servicing the RACF use.

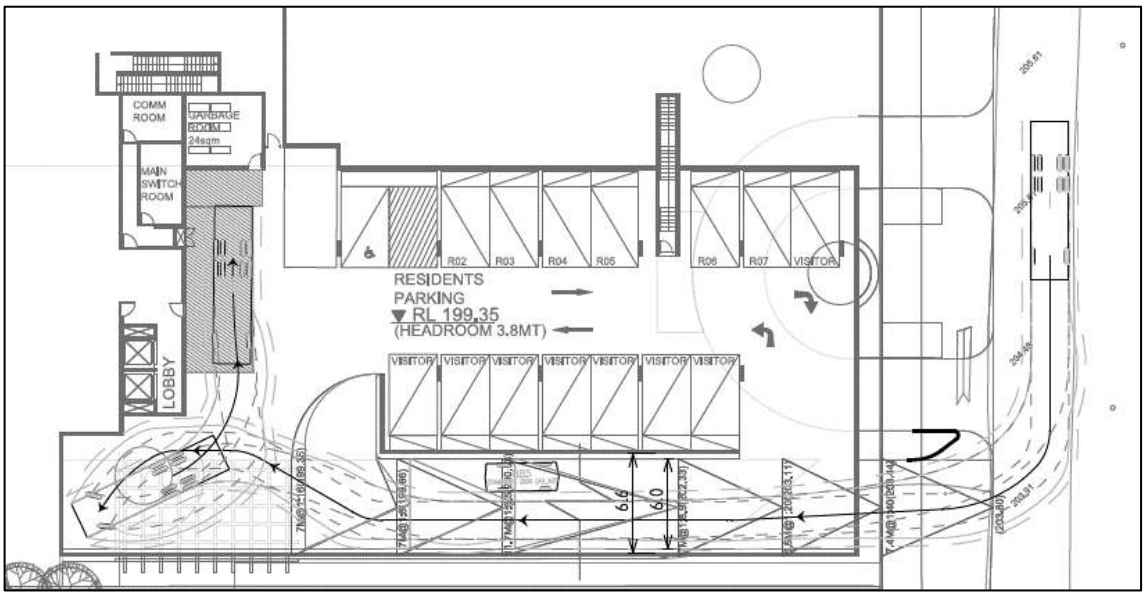
The loading areas for RLA and RACF uses are illustrated in Figure 3.5 and Figure 3.6, respectively.

Figure 3.5: Proposed loading area for RLA use



Source: Marchese Partners – 3 Quarry Road, Dural Basement 1 Plan dated 7 June 2018

Figure 3.6: Proposed loading area for RACF use



Source: Marchese Partners – 3 Quarry Road, Dural Basement 1 Plan dated 7 June 2018

The loading areas are proposed to be located adjacent to the access ramps via Quarry Road and Vineys Road to allow for deliveries.

The loading and waste collection areas for the RLA use have been designed to accommodate Council garbage trucks of up to 10.24 metres.

Given that the RACF is considered to be commercial (non-residential) use and the operator would appoint their own service provider for the RACF facility, the loading and waste collection areas for the RACF use have been designed to accommodate up to 6.4-metre small rigid vehicles (SRVs).

As shown in Figure 3.5 and Figure 3.6 service vehicle access to these areas is proposed to be shared with the general traffic access to/ from the basement car park. The loading area has been designed to accommodate the service vehicle to reverse into the loading area and exit the site in a forward direction. All service vehicles will enter and exit the site in a forward direction via Quarry Road and Vineys Road.

A swept path assessment has been completed to assess the proposed loading areas, as provided in Appendix C.

4. Car Parking

4.1 Car Parking Requirements

4.1.1 SEPP 2004 and Roads and Maritime Guide

A review of Hornsby Shire Council Development Control Plan (DCP) 2013indicates that no specific car parking rate is nominated for RLAs or RACFs. DCP 2013 states that the rate for seniors housing should be referenced from the State Environment Planning Policy – Housing for Seniors or People with a Disability (SEPP) 2004.

A summary of the relevant SEPP 2004 minimum parking requirements is provided in Table 4.1.

Table 4.1: SEPP 2004 car parking requirements

Description	SEPP 2004 minimum parking rate
RLA	0.5 spaces per bedroom
RACF	1 space per 10 beds (or 1 space per 15 beds if the facility provides care only for persons with dementia)
	1 staff space per 2 staff
	1 ambulance space

The Roads and Maritime Guide has also been referenced to better understand the parking requirements for visitors. These parking requirements are provided in Table 4.2.

Table 4.2: Roads and Maritime Guide car parking requirements

Use	Roads and Maritime minimum parking rate
Self-contained units (resident funded development)	1 visitor space per 5 units
Self-contained units (subsidised development)	1 visitor space per 10 units
Nursing homes	1 visitor space per 10 beds

Based on the rates identified in Table 4.1 and Table 4.2, it is recommended that the following minimum car parking rates be applied for the proposed development:

- RLAs:
  - 0.5 resident car spaces per one-bedroom dwelling
  - 1 resident car spaces per two-bedroom dwelling
  - 1.5 resident car spaces per three-bedroom dwelling
  - 0.2 visitor spaces per dwelling.
- RACFs:
  - 1 visitor car space for each 10 beds (or 1 space per 15 beds if the facility provides care only for persons with dementia)
  - 1 car space for each 2 residential care facility staff
  - 1 ambulance space.

Based on the recommended parking rates, the proposed parking rates for the RLA and RACF uses are summarised in Table 4.3. These parking requirements have been developed based on:

- SEPP parking rates for RLA residents and RACF visitors, staff and ambulance spaces
- Roads and Maritime Guide parking rates for RLA visitor and ambulance spaces.

Table 4.3: SEPP 2004 and Roads and Maritime Guide parking requirements

Description	Use	Parking rate	Size	Parking requirement
RLA	Two-bedroom [1]	1/ apartment	73 apartments	73 spaces
	Three-bedroom	1.5/ apartment	73 apartments	110 spaces
	Visitor	0.2/ apartment	146 apartments	30 spaces
			Subtotal	**213 spaces**
RACF	Visitor	0.1/ bed	74 beds	8 spaces
	Staff	0.5/ staff	25 staff	13 spaces
	Ambulance	1 ambulance space	1	1 space
			Subtotal	**22 spaces**
			Total	**235 spaces**

[1] Two-bedroom plus study is categorised under two-bedroom.

Table 4.3 indicates that the proposed development would require a minimum of 213 car parking spaces for RLA and minimum 22 spaces (including one ambulance space) for the RACF to be in accordance with SEPP 2004 and Roads and Maritime Guide parking requirements. This equates to a minimum of 237 car parking spaces.

In addition, a review of the Building Code of Australia (BCA) suggests that the proposed development (assuming Class 3 and Class 9A) generates a People with Disabilities (PWD) car parking requirement of one PWD space for every 100 spaces or part thereof. As such, it is recommended that a minimum three PWD spaces be provided off-street.

4.1.2 DCP 2013 Car Parking Requirement

A comparison of the higher multi dwelling housing rates set out in DCP 2013 has also been completed for the RLA use, as summarised in Table 4.5. The higher rates recognise the nature of the area while also considering the need for residents of such development to still have access to a private vehicle.

Table 4.4: DCP 2013 parking requirements

Description	Use	Parking rate	Size	Parking requirement
RLA	Two-bedroom	2 spaces/ apartment	40 apartments	80 spaces
	Two-bedroom plus study		33 apartments	66 spaces
	Three-bedroom		73 apartments	146 spaces
		Subtotal	*146 apartments*	*292 spaces*
	Visitor	0.2 spaces/ apartment	146 apartments	30 spaces
			Total	**322 spaces**

Table 4.5 indicates that the proposed development would be required to provide 322 car parking spaces for the RLA use to be in accordance with DCP 2013 requirements.

4.2 Adequacy of Parking Supply

A summary of the parking requirements and provisions for the proposed development is shown in Table 4.5.

Table 4.5: Car parking summary

Description	SEPP 2004 and Roads and Maritime Guide	DCP 2013	Proposed parking provision
RLA	213	322	337
SEPP 2004 and Roads and Maritime Guide			
RACF	22	22	46
Total	**235**	**344**	**383**

The overall parking provision of 383 spaces exceeds the SEPP 2004, Roads and Maritime Guide and DCP 2013 parking requirements, with 337 spaces (including 44 visitor spaces) for RLA use and 46 spaces for RACF use.

On this basis, the proposed parking provisions is considered appropriate for the proposed development with the additional car spaces for visitors of site facilities such as restaurant, library, cinema and garden uses in the rare occasion of special events.

One ambulance space will be provided on basement level one with an access via Vineys Road for RACF use. Such a location would allow for quick and efficient departure from the site via Vineys Road.

4.3 Motorcycle Parking

A review of DCP 2013 indicates that all developments are required to provide one motorcycle parking space for every 50 car parking spaces, or part thereof. Based on a total of 383 car parking spaces, the development is required to provide a minimum of eight motorcycle parking spaces.

Motorcycle bays are to measure 2.5 metres long by 1.2 metres wide, in accordance with the DCP 2013 and are to be located away from vehicle manoeuvring areas to avoid motorcycles being damaged.

4.4 Car Parking Layout Review

The car park layout has been reviewed against the requirements of the Australian Standard for Off Street Car Parking (AS/NZS2890.1:2004 and AS/NZS2890.6:2009) and Off Street Commercial Vehicle Facilities (AS/NZS2890.2:2002. This assessment included a review of the following:

- Bay and aisle width
- Adjacent structures
- Turnaround facilities
- Circulation roads and ramps
- Ramp grades
- Height clearances
- Internal queuing
- Pick-up/ set-down area
- Parking for persons with disabilities
- Motorcycle parking
- Ambulance parking.

The review and swept path assessment have been included as Appendix C in this report.

This review indicates that the proposed car parking layout is expected to operate satisfactorily, subject to the adoption of recommendations detailed in Appendix C. Modifications to the proposed car park, porte-cochere and internal access road will be finalised as part of the detailed design process.

5. Sustainable Transport Infrastructure

This section discusses potential measures that could encourage alternative means of travel to the private car and encourage the use of more environmentally sustainable forms of travel.

5.1 Cycle Network

A review of the Council bicycle network indicates that the existing bicycle pathways provide users with connectivity and access to residential areas, popular trip generators and destinations within Dural. These routes directly benefit cyclists of the subject site by improving cycling accessibility around the site.

5.2 Bicycle End of Trip Facilities

DCP 2013 does not provide bicycle parking requirements for RLA and RACF uses. However, in acknowledgement of general changing travel patterns and the increased use of active modes of travel (especially for staff and visitors) and considering the future upgrades of Old Northern Road and New Line Road identified in the TMAP (WSP, 2016), the potential to incorporate these facilities has been reviewed. This is also consistent with Council's Ecologically Sustainable Development objective ESD 9, which aims to encourage the use of public transport, cyclist and pedestrian trips in the development and design process.

Reference to the Planning Guidelines for Walking and Cycling (Department of Planning, 2004) suggests the following bicycle parking provisions:

- Aged or disabled self-contained housing facility:
  - Resident (long-term use) – Rate of three to five per cent of apartments
  - Visitor (short-term use) – Rate of three to five per cent of apartments.
- Nursing/ convalescent homes:
  - Staff (long-term use) – Rate of three to five per cent of staff
  - Visitor (short-term use) – Rate of five to 10 per cent of staff.

A summary of the recommended bicycle spaces for the proposed development are summarised in Table 5.1.

Table 5.1: Planning Guidelines for Walking and Cycling Bicycle Parking Guide

Description	Use	Suggested parking rate	Size	Suggested parking provision
RLA	Resident	3% to 5% of apartments	146 apartments	5 to 8 spaces
	Visitor			5 to 8 spaces
			Subtotal	**10 to 16 spaces**
RACF	Visitor	3% to 5% of staff	74 beds	1 to 2 spaces
	Staff	5% to 10% of staff	25 staff	2 to 3 spaces
			Subtotal	**3 to 5 spaces**
			Total	**13 to 21 spaces**

Based on Table 5.1, the proposed development should provide between 13 and 21 bicycle spaces. Therefore, it is recommended that a minimum of 13 bicycle spaces are provided for resident, staff and visitors. There is adequate space within the site to accommodate these requirements.

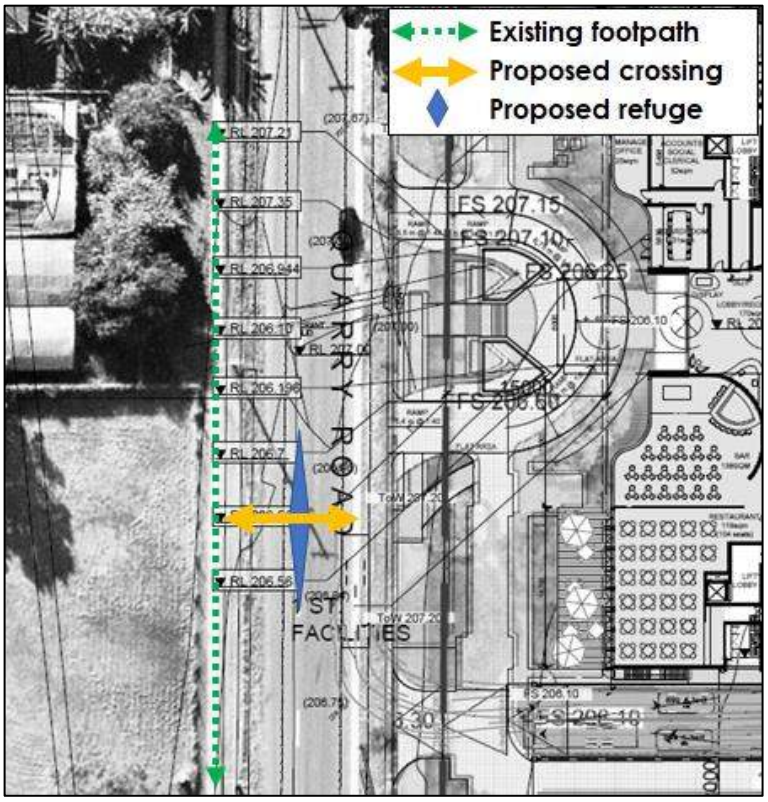
Bicycle parking spaces would be designed in accordance with relevant Australian Standard (AS2890.3 – Bicycle Parking Facilities). To comply with the Australian Standard, the bicycle parking spaces for residential tenants will need to be provided as Class 1 bicycle spaces (i.e. individual bicycle lockers with dimensions of 1,840 millimetres by 715 millimetres), while visitor bicycle spaces will need to be provided as Class 3 bicycle spaces (i.e. bicycle racks in public area at 1,200 millimetres centre to centre). Secure racks for use by staff should be provided in a secure location (i.e. individual locker of secure room/ enclosure).

5.3 Pedestrian Facilities

Pedestrian access to the site is proposed via three entries at ground level along the Quarry Road and Vineys Road frontages. The lobby/ reception area provides linkages from Quarry Road to the internal footpaths within the site and connects to Vineys Road, ensuring good permeability with the on-site facilities including gardens, pond, green village and pergolas.

Given there is only a footpath on the southern side of Quarry Road, it is recommended that a pedestrian refuge island be provided along Quarry Road west of the porte-cochere. The pedestrian refuge island will assist pedestrians to cross Quarry Road safely by providing a space to wait for a gap in the traffic to complete the crossing in two stages. The proposed crossing provides connection to the surrounding retail and commercial areas on the southern side of Quarry Road via the footpaths on Quarry Road and Old Northern Road.

Figure 5.1: Proposed pedestrian refuge and crossing



Base image source: Marchese Partners – 3 Quarry Road, Dural Ground Floor Plan dated 7 June 2018

There are currently limited connection and crossing opportunities along Old Northern Road and New Line Road. As part of the South Dural TMAP (WSP, 2016), it is proposed that pedestrian crossing facilities be provided at the proposed signalised intersection of Old Northern Road/ New Line Road.

The crossings facilitate convenient pedestrian access to/ from the site to other developments to the west of New Line Road and along Old Northern Road (especially Round Corner village centre).

5.4 Public Transport

5.4.1 Rail

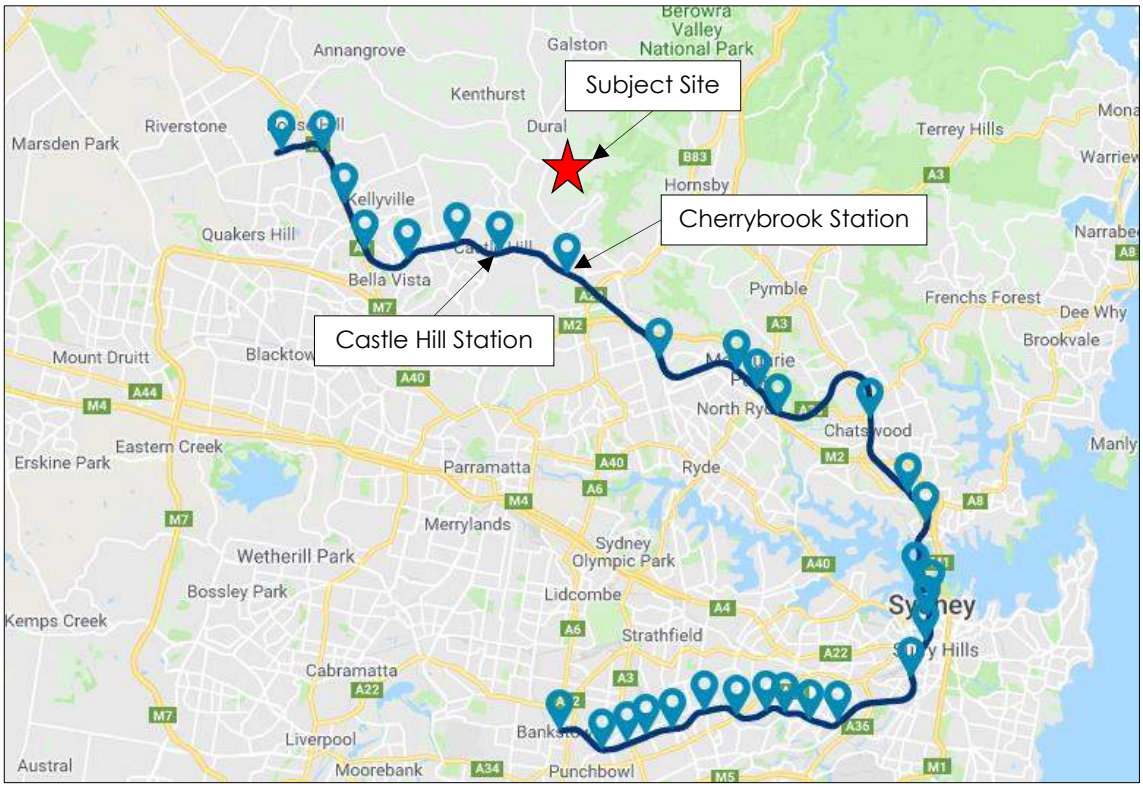
Sydney Metro Northwest, formerly the North West Rail Link, is the first stage of the Sydney Metro and will extend from Cudgegong Road, Schofields to Chatswood. This stage is expected to be opened in 2019. Stage 2 of Sydney Metro will extend south from Chatswood, under Sydney Harbour, via new underground station precincts within the Sydney CBD and through the existing heavy rail line to Bankstown.

Sydney Metro Northwest is delivering eight new railway stations and 4,000 commuter car parking spaces to Sydney's growing Northwest. Trains will run every four minutes in the peak; that is 15 trains an hour operating as a walk up 'no timetable' service.

Of all the new stations along the route, Castle Hill Station and Cherrybrook Station will be the closest and within a 10 minute drive of the site. Castle Hill Station will be an underground station beneath Arthur Whitling Park, opposite the Castle Towers Shopping Centre and will include seven kiss and ride spaces. Cherrybrook Station will be a suburban village station located adjacent Castle Hill Road between Franklin Road and Robert Road, and will include 400 commuter car parking spaces and 14 kiss and ride spaces.

An overview of the future Sydney Metro is shown in Figure 5.2, with the location of Norwest Station in the context of the proposed development.

Figure 5.2: Sydney Metro planned route alignment



Source: https://www.sydneymetro.info/, accessed 3 April 2018.

5.4.2 Bus

The site is relatively well serviced by public transport due to the close proximity to a Hillsbus depot, particularly in the peak periods, with regular bus services provided along Old Northern Road and New Line Road. However, bus stops are limited and rarely have safe crossing opportunities nearby. The proposed signalised intersection of Old Northern Road/ New Line Road provides the opportunity to rationalise the provision of another bus stop in the northbound direction of New Line Road south of the intersection. The proposed bus stop would allow for shorter walking distance for surrounding developments to access these stops along Old Northern Road opposite Derriwong Road.

Further, the opening of the Northwest Metro Line in 2019 will introduce a rapid and frequent service to Dural given its proximity to the Castle Hill and Cherrybrook stations.

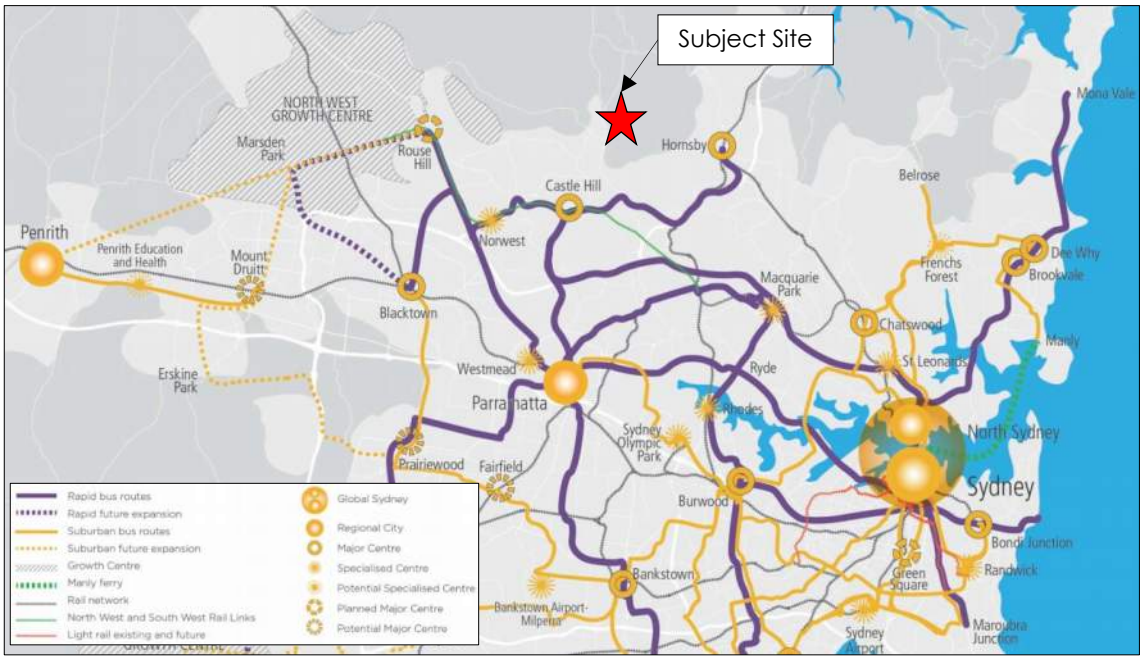
As part of the South Dural TMAP (WSP, 2016), it is recommended to increase the existing bus level of service through the following measures:

- The Old Northern Road bus routes (637, 638 and 639) increase from a 30-minute frequency to a 15-minute frequency in the peak direction during the peak period, which is an increase of six services
- An additional two services per hour in the peak direction during the peak period on one or more of bus routes 620N, 620X, 622, 642 or 642X
- Increase route 644 to a 15-minute frequency in the peak direction during peak periods
- Increase service levels during non-peak times (during the middle of the weekday, in the evening and on weekends).

There are currently varying levels of bus stop infrastructure within South Dural ranging from a bus stop identification plate bolted to a power pole to a stop with shelter, seating and a printed timetable. As part of the South Dural TMAP (WSP, 2016), it is recommended the bus stops be upgraded to bus shelters with seating and a bicycle rack/ U-Stems.

While the Sydney's Bus Future (Transport for NSW, 2013) does not propose rapid or suburban routes that would directly service the Dural area, the proposed routes will improve connections to Castle Hill by allowing interchange to rapid routes to Norwest, Parramatta and Hornsby.

Figure 5.3: Sydney's Bus future surrounding the study area



Source: http://www.rms.nsw.gov.au/, accessed 3 March 2018.

Sydney's Bus Future also includes plans to improve servicing and infrastructure around Dural. These improvements to the bus network will enhance the existing bus service surrounding the Dural area by providing linkages to the Northwest Metro. They include:

- Additional bus services along existing routes with extended operating hours
- Bus Head Start Program, including travel options for new developments
- New bus interchange facilities at each of the Northwest Metro stations.

5.4.3 Shuttle Bus Service

While it is recognised that the site's proximity to the bus stops and the type of development and likely residents / tenants somewhat limits the practicality of using sustainable transport modes, there are opportunities for improved utilisation of public transport and associated provision of sustainable transport infrastructure.

Several opportunities exist to provide staff, residents and tenants with incentives to consider alternative modes of travel to and from work. The following recommendations are high level strategies that would need to be developed in greater detail and through consultation with relevant stakeholders closer to the opening of the proposed development:

- Provide an on-demand shuttle bus service between bus stops along Old Northern Road and New Line Road and the proposed development for residents/ tenants to further reduce reliance on private vehicles.
- Provide a shuttle bus service between bus stops along Old Northern Road and New Line Road and the proposed development, aligned with staff shifts. A regular, flexible service is likely to increase staff perception of convenience and reliability.
- Develop shuttle bus routes targeting major retail/ commercial areas near the proposed development.

The above improvements encourage the use of non-vehicle mode transport through active transport choices.

6. Traffic Impact Assessment

6.1 Traffic Generation

6.1.1 Design Rates

RLA

Technical Direction TDT 2013/ 04 Guide to Traffic Generating Developments Updated traffic surveys (TDT 2013/ 04) recommends a rate of 0.4 vehicle trips per occupied dwelling during the weekday PM peak period. It is noted that the AM site peak hour does not generally coincide with the general network AM peak hour. As such, a rate of 0.2 vehicle trips per dwelling has been adopted for the AM peak hour.

The directional split of traffic (i.e. the ratio between the inbound and outbound traffic movements) is assumed to be 20:80 in the AM peak. The reverse directional split is assumed in the PM peak.

RACF

It is considered appropriate to adopt a first principles assessment to determine the future number of vehicle trips generated by the proposed RACF.

The proposed staff spaces are anticipated to generate in the order of 0.4 peak hour vehicle trips per space. This rate is reflective of the nature of shift work employment and the varying start and finish times for staff.

The proposed visitor spaces are not expected to generate vehicle trips during the peak periods. However, for a conservative assessment, it is recommended that a rate of 0.3 peak hour vehicle trips per visitor space be adopted.

The directional split of traffic is assumed to be 75:25 between inbound and outbound traffic in the AM peak. The reverse directional split is assumed in the PM peak. This is associated with the arrival of staff/ visitors in the morning and departure in the afternoon.

Traffic generation estimates of the peak hour traffic volumes resulting from the proposed development are set out in Table 6.1.

Table 6.1: Traffic generation estimates

Use	Size	Traffic generation rate		Traffic generation estimates (trips/ hour)			
		AM peak	PM peak	AM peak		PM peak	
				In	Out	In	Out
RLA	146 dwellings	0.2 trips/ dwelling	0.4 trips/ dwelling	6	24	47	12
RACF	29 staff spaces	0.4 trips/ staff space		9	3	3	9
	17 visitor spaces	0.3 trips/ visitor space		4	2	2	4
			Totals:	**19**	**29**	**52**	**25**
				48		**77**	

Table 6.1 indicates that the site could potentially generate up to 77 vehicle movements in a peak hour.

The restaurant, library, cinema and garden uses would be ancillary to the proposed retirement living. As such, no additional trips are expected to be generated from these uses.

6.2 Distribution and Assignment

The directional distribution and assignment of traffic generated by the proposed development will be influenced by a number of factors, including the:

i Configuration of the arterial road network in the immediate vicinity of the site
ii Existing operation of intersections providing access between the local and arterial road network
iii Distribution of households near the site
iv Surrounding employment centres, retail centres and schools in relation to the site
v Likely distribution of staff's residences in relation to the site
vi Configuration of access points to the site.

Considering these factors and for the purpose of estimating vehicle movements, the directional distributions shown in Figure 6.1 and Figure 6.2 have been assumed.

Figure 6.1: RLA and RACF visitor distribution

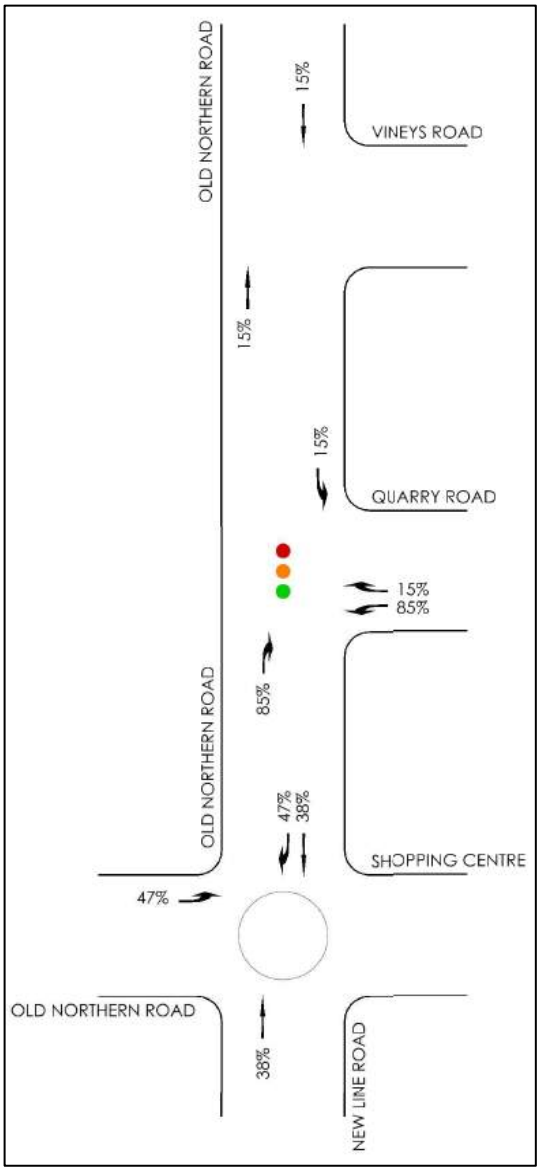
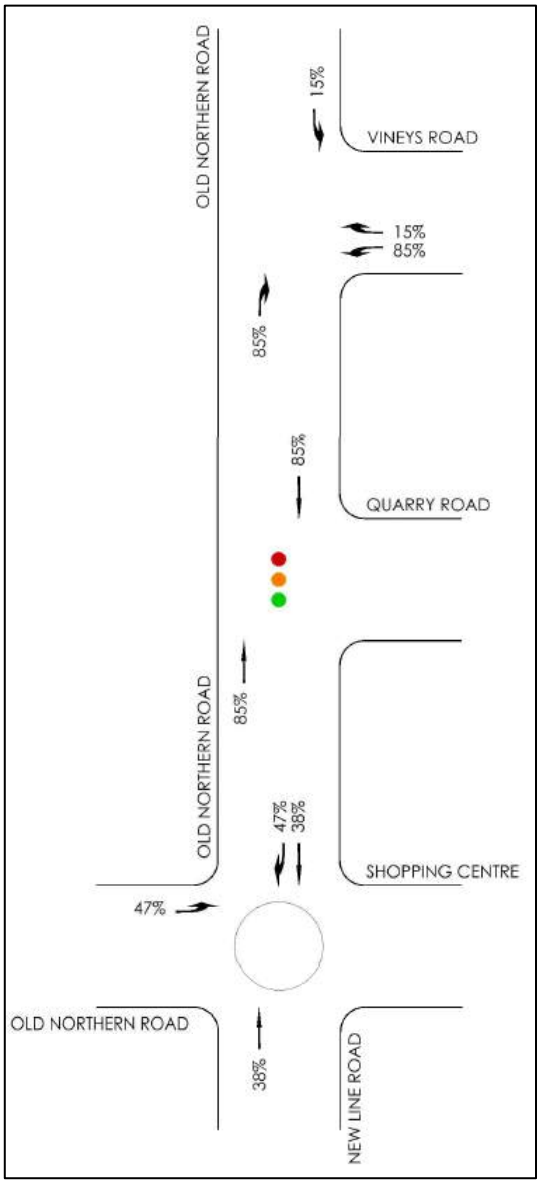


Figure 6.2: RACF staff distribution



An assessment of the intersection operation 10 years post development has been completed to safeguard the intersection layout and operation. The annual compound growth rates from the South Dural TMAP (WSP, 2016) report have been adopted for the study:

- Year 2016 to 2021:
  - AM peak: 1.4 per cent per annum
  - PM peak: 1.8 per cent per annum.
- Year 2021 to 2028:
  - AM peak: 1.3 per cent per annum
  - PM peak: 1.4 per cent per annum.

This considers the forecast increase in traffic movements due to future development in South Dural.

Based on these annual growth rates, Figure 6.3 and Figure 6.4 have been prepared to show the estimated marginal increase in turning movements near the proposed development following full site development and considering the background traffic growth.

Figure 6.3: AM 2028 peak hour and site generated traffic volumes

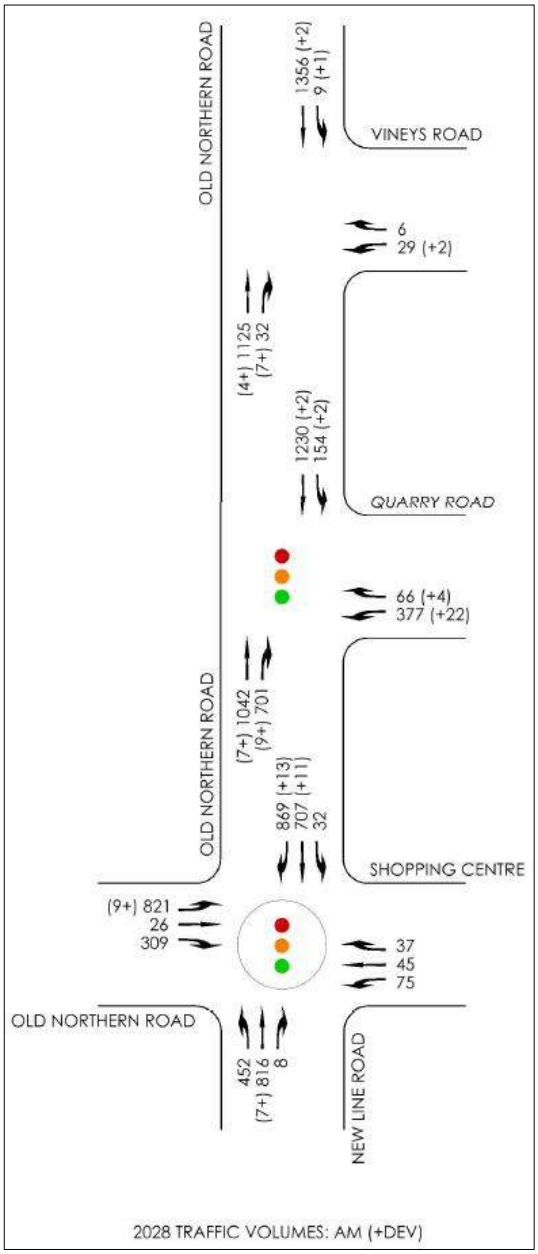
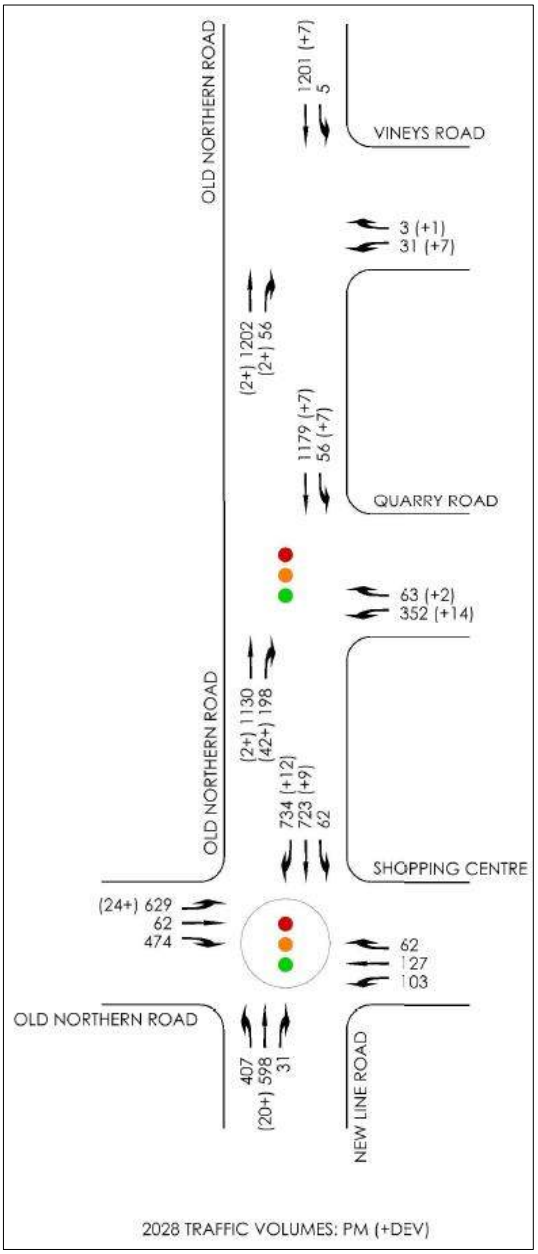


Figure 6.4: PM 2028 peak hour and site generated traffic volumes



6.3 Traffic Impact

6.3.1 2028 No Development

The key intersections identified in Section 2 of this report were modelled to assess the 2028 operation without the proposed development. The corresponding intersection operation results are summarised in Table 6.2.

Table 6.2: Future 2028 operating conditions (no development)

Intersection	Peak	Leg	Degree of saturation	Average delay (sec)	95th percentile queue (m)	Level of service
Old Northern Road/ New Line Road	AM	**South**	**1.31**	**318**	**>500**	**F**
		East	0.27	18	14	B
		North	0.95	25	167	B
		West	0.94	20	126	B
	PM	South	0.88	38	95	C
		East	0.54	30	28	C
		North	**1.11**	**120**	**472**	**F**
		West	0.77	21	59	B
Old Northern Road/ Quarry Road	AM	South	1.00	37	274	C
		East	0.45	33	116	C
		North	1.03	109	>500	F
		Overall	**1.03**	**66**	**>500**	**E**
	PM	South	0.58	14	93	A
		East	0.75	51	150	D
		North	0.75	20	274	B
		Overall	**0.75**	**22**	**274**	**B**
Old Northern Road/ Vineys Road	AM	South	0.31	49	7	D
		Southeast	**0.31**	**173**	**5**	**F**
		North	0.92	6	0	A
	PM	South	0.64	77	23	F
		Southeast	**0.12**	**107**	**2**	**F**
		North	0.67	5	0	A

As shown in Table 6.2, with the additional background growth, the intersections of Old Northern Road/ New Line Road and Old Northern Road/ Vineys Road are expected to worsen to unsatisfactory operating conditions in both peak hours. The intersection of Old Northern Road/ Quarry Road is also expected to worsen, however only operates at unsatisfactory conditions in the AM peak, which aligns with the school peak hour.

The Old Northern Road/ New Line Road intersection is expected to be over capacity, with high delays and queues on the southern and northern legs in the AM and PM peak hours, respectively. The right turn movements in and out of Vineys Road at the Old Northern Road/ Vineys Road intersection are expected to experience increased delays due to increase in through movements along Old Northern Road. As a result, the operation of the intersection is expected to worsen to unsatisfactory conditions.

As identified in Section 2.4, the South Dural TMAP (WSP, 2016) states that the intersection of Old Northern Road/ New Line Road is proposed to be upgraded by 2036. The three intersections have been reassessed with the proposed upgrades shown in Figure 6.5, with the SIDRA Intersection results summarised in Table 6.3.

Figure 6.5: Proposed Old Northern Road/ New Line Road upgrades from TMAP (WSP, 2016)

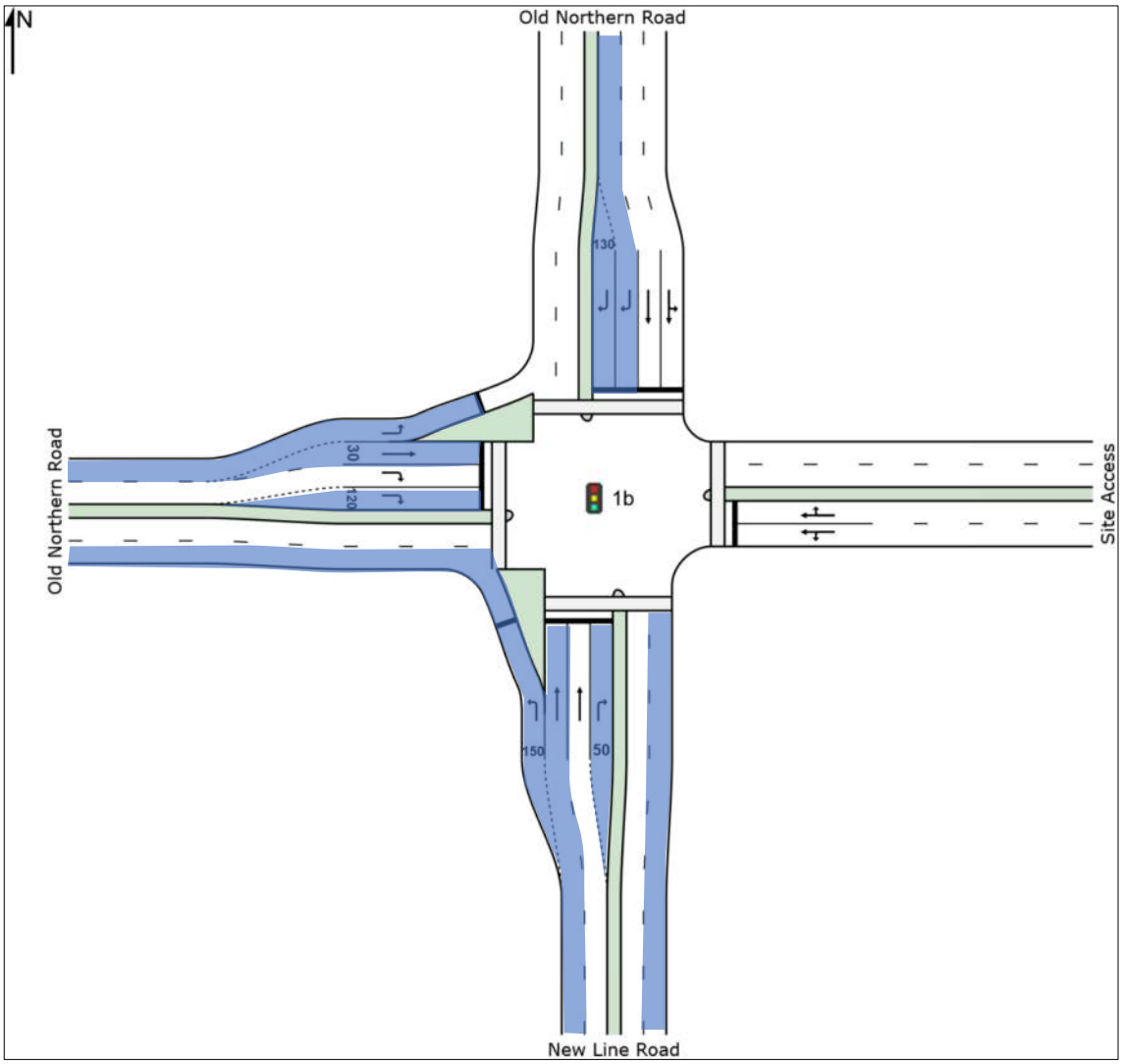


Table 6.3: Future 2028 operating conditions (no development with TMAP mitigation measures)

Intersection	Peak	Leg	Degree of saturation	Average delay (sec)	95th percentile queue (m)	Level of service
Old Northern Road/ New Line Road	AM	South	0.90	46	213	D
		East	0.28	47	36	D
		North	0.83	51	173	D
		West	1.04	101	>500	F
		Overall	**1.04**	**64**	**>500**	**E**
	PM	South	0.75	38	138	C
		East	0.53	51	66	D
		North	0.82	46	169	D
		West	0.81	46	220	D
		Overall	**0.82**	**45**	**220**	**D**
Old Northern Road/ Quarry Road	AM	South	0.91	26	201	B
		East	0.38	25	88	B
		North	1.18	224	>500	F
		Overall	**1.18**	**101**	**>500**	**F**
	PM	South	0.57	15	124	B
		East	0.62	44	131	D
		North	0.59	18	175	B
		Overall	**0.62**	**20**	**175**	**B**
Old Northern Road/ Vineys Road	AM	South	0.34	51	7	D
		Southeast	**0.38**	**225**	**6**	**F**
		North	1.15	69	0	E
	PM	South	0.64	77	23	F
		Southeast	**0.11**	**103**	**2**	**F**
		North	0.67	5	0	A

As shown in Table 6.3, the Old Northern Road/ New Line Road intersection will operate with reduced delay. However, it is noted that the intersection is still expected to operate at unsatisfactory conditions in the AM peak hour with high delays and queues on the west approach.

The intersection of Old Northern Road/ Quarry Road is expected to approach capacity in the AM peak hour on the northern leg as a result of the upstream signalisation. This is expected to cause delays for the intersection to increase and queues to remain high. The intersection operation in the PM peak hour is expected to improve and will continue to operate satisfactorily.

The Old Northern Road/ Vineys Road intersection is anticipated to worsen as a result of the queues from the Old Northern Road/ Quarry Road intersection extending back past Vineys Road in the AM peak hour. Delays on the right turn in and out of Vineys Road are expected to remain high due to the significant through traffic volumes on Old Northern Road, however the queues are expected to be adequately accommodated within the lane storage. Given the low traffic volumes turning in and out of Vineys Road, it is unlikely that signalisation of this intersection will meet the required Roads and Maritime warrants. Instead, it is recommended that a short departure lane be provided on the northern leg of the intersection, converting the intersection to a seagull configuration.

Based on the SIDRA Intersection results, further mitigation measures are required to accommodate forecast 2028 traffic volumes. The further mitigation measures required are shown in Figure 6.6 to Figure 6.8 and include the following:

- Old Northern Road/ New Line Road – Additional 30-metre slip lane on west approach
- Old Northern Road/ Quarry Road – Additional 120-metre short through lane on north approach
- Old Northern Road/ Vineys Road – Additional 10-metre short departure lane on the northern leg.

Figure 6.6: Old Northern Road/ New Line Road further upgrades

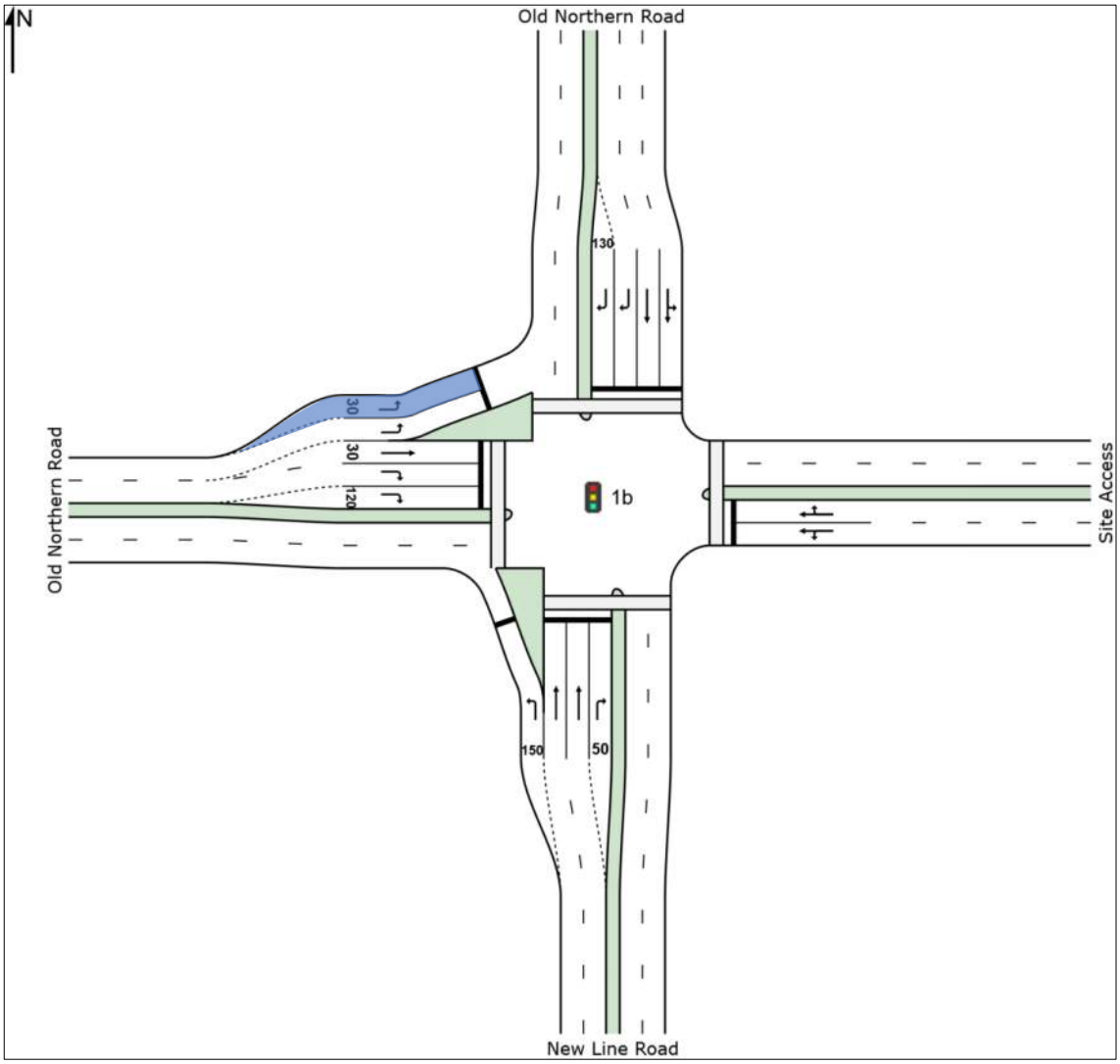


Figure 6.7: Old Northern Road/ Quarry Road further upgrades

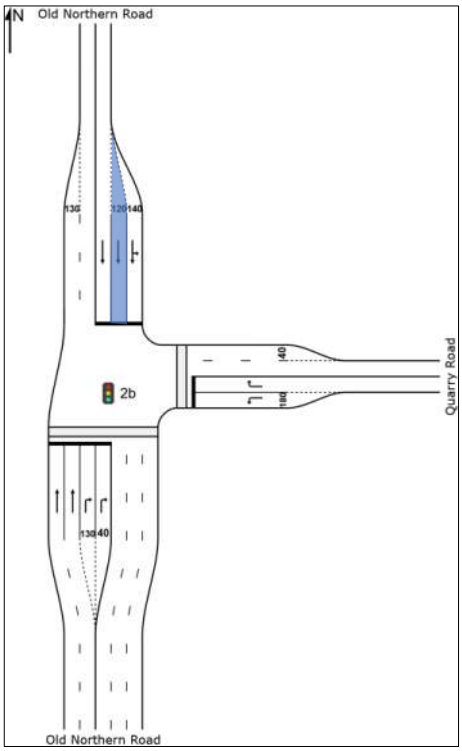
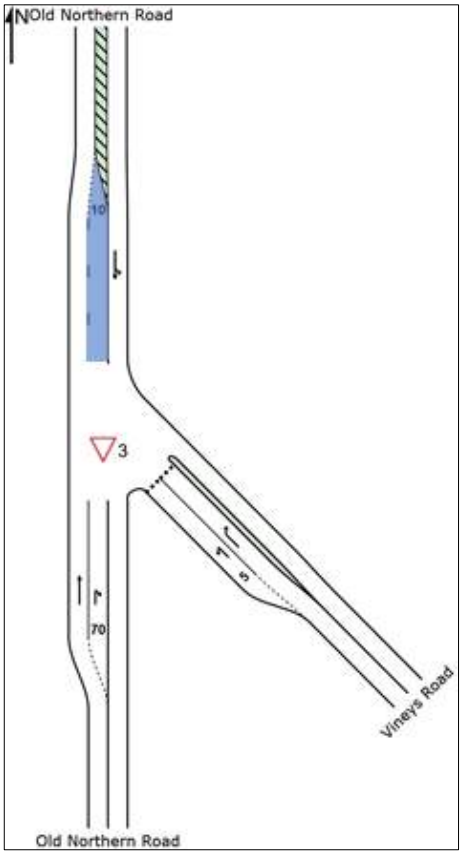


Figure 6.8: Old Northern Road/ Vineys Road further upgrades



The key surveyed intersections were modelled under a 2028 no development scenario with the recommended further upgrades as detailed in Figure 6.6 to Figure 6.8, with the SIDRA Intersection results summarised in Table 6.4.

Table 6.4: Future 2028 operating conditions (no development with further mitigation measures)

Intersection	Peak	Leg	Degree of saturation	Average delay (sec)	95th percentile queue (m)	Level of service
Old Northern Road/ New Line Road	AM	South	0.93	51	227	D
		East	0.28	47	36	D
		North	0.86	52	205	D
		West	0.79	40	130	C
		Overall	**0.93**	**48**	**227**	**D**
	PM	South	0.75	38	138	C
		East	0.53	51	66	D
		North	0.82	46	169	D
		West	0.81	43	114	D
		Overall	**0.82**	**43**	**169**	**D**
Old Northern Road/ Quarry Road	AM	South	0.88	22	189	B
		East	0.37	24	84	B
		North	0.90	57	33	E
		Overall	**0.90**	**36**	**33**	**C**
	PM	South	0.43	12	74	A
		East	0.55	40	122	C
		North	0.43	18	109	B
		Overall	**0.55**	**18**	**122**	**B**
Old Northern Road/ Vineys Road	AM	**South**	**0.34**	**51**	**7**	**D**
		Southeast	0.30	47	6	D
		North	0.76	5	0	A
	PM	**South**	**0.64**	**78**	**23**	**F**
		Southeast	0.17	23	4	B
		North	0.67	5	0	A

As shown in Table 6.4, the intersections of Old Northern Road/ New Line Road and Old Northern Road/ Quarry Road are expected to improve to satisfactory operating conditions in both the AM and PM peak periods. The Old Northern Road/ Vineys Road intersection is also expected to improve, with most legs operating satisfactorily. The exception is the right turn into Vineys Road from Old Northern Road in the PM peak hour, which is anticipated to experience an average delay of about 80 seconds. Considering the low volume of traffic performing this turn and that the 95th percentile queue is expected to be accommodated within the short turn bay, an 80 second delay for this turn is considered acceptable.

6.3.2 2028 With Development and Required Intersection Upgrades

The key surveyed intersections with required 2028 upgrades were modelled with the additional traffic from the proposed development. The SIDRA Intersection results are summarised in Table 6.5.

Table 6.5: Future 2028 operating conditions (with development)

Intersection	Peak	Leg	Degree of saturation	Average delay (sec)	95th percentile queue (m)	Level of service
Old Northern Road/ New Line Road	AM	South	0.93	53	233	D
		East	0.28	47	36	D
		North	0.83	50	203	D
		West	0.80	41	133	C
		Overall	**0.93**	**48**	**233**	D
	PM	South	0.78	39	145	C
		East	0.53	51	66	D
		North	0.83	47	173	D
		West	0.81	42	114	C
		Overall	**0.83**	**44**	**173**	D
Old Northern Road/ Quarry Road	AM	South	0.89	23	198	B
		East	0.39	24	91	B
		North	0.90	57	243	E
		Overall	**0.90**	**36**	**243**	C
	PM	South	0.46	14	81	A
		East	0.55	39	125	C
		North	0.45	20	115	B
		Overall	**0.55**	**20**	**125**	B
Old Northern Road/ Vineys Road	AM	**South**	0.42	54	9	D
		Southeast	**0.34**	**48**	**7**	D
		North	0.76	5	0	A
	PM	**South**	0.67	81	24	F
		Southeast	**0.21**	**24**	**5**	B
		North	0.67	5	0	A

As shown in Table 6.5, all intersections are expected to operate at similar levels of service as without development (results detailed in Table 6.2), with slightly higher delays and queues in general over all three intersections. All intersections are expected to operate satisfactorily, with the exception of the right turn into Vineys Road from Old Northern Road. This said, the delay experienced for this movement is expected to be similar as without the proposed development and the queue Is expected to be well accommodated in the provided short turn bay.

It should be noted that the western approach of the Old Northern Road/ New Line Road intersection improves from a level of service D to C in the PM peak hour with the additional traffic from the development. This is due to a change in the signal phase times in the attempt to optimise the delay over the whole intersection. While this approach experiences a reduction in delay, the delay over the intersection increases which is expected.

7. Conclusion

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

i The proposal involves the development of a retirement village with 146 RLAs and 74-room RACF.

ii The proposed development generates a SEPP 2004 and Roads and Maritime Guide parking requirements of 235 spaces, with 213 car parking spaces for RLAs and 22 spaces (including one ambulance space) for the RACF.

iii The proposed development generates a DCP 2013 car parking requirements of 322 spaces for the RLA use.

iv The proposed supply of 383 spaces exceeds the SEPP 2004, Roads and Maritime Guide and DCP 2013 parking requirements, with 337 spaces (including 44 visitor spaces) for RLA use and 46 spaces for RACF use.

v It is recommended that the proposed development provide a minimum of 13 bicycle spaces for staff and visitors.

vi Two loading areas (one for RLA and one for RACF) are proposed within basement one.

vii The loading area for RLA use can accommodate vehicles up to 10.24 metre (Council's garbage trucks).

viii Given that the RACF is considered to be commercial (non-residential) use and the operator would appoint their own service provider for the RACF facility, the loading and waste collection areas for the RACF use have been designed to accommodate up to 6.4-metre SRVs.

ix The site is expected to generate up to 77 vehicle movements in any peak hour.

x Even without the additional traffic from the development, upgrades are required at Old Northern Roads intersection with New Line Road, Quarry Road and Vineys Road to accommodate the anticipated 2028 traffic volumes.

xi Once the intersections are upgraded with the required upgrades, the additional traffic from the proposed development is expected to have a negligible impact on these intersections.

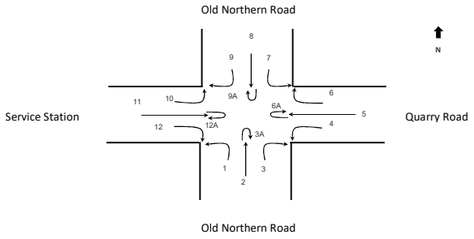
Appendix A

Survey Results

Data Audit Systems
TRAFFIC SURVEYS

Location: Old Northern Road/ Quarry Road
Weather: Fine
Date: Tuesday, 20 February 2018
Survey Period : 7 am to 9 am
4 pm to 6 pm

AM Peak: 7:45am-8:45am
PM Peak: 4:00pm-5:00pm



TIME	1				2				3				3A				4				5				6				6A				7				8				9				9A				10				11				12				12A			
	Light	Heavy	Cyc	Total	Light	Heavy	Cyc	Total	Light	Heavy	Cyc	Total	Light	Heavy	Cyc	Total	Light	Heavy	Cyc	Total	Light	Heavy	Cyc	Total	Light	Heavy	Cyc	Total	Light	Heavy	Cyc	Total	Light	Heavy	Cyc	Total	Light	Heavy	Cyc	Total	Light	Heavy	Cyc	Total	Light	Heavy	Cyc	Total	Light	Heavy	Cyc	Total	Light	Heavy	Cyc	Total	Light	Heavy	Cyc	Total
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07:30	0	0	0	**0**	190	8	0	**198**	31	0	1	**32**	0	0	0	**0**	21	0	0	**21**	0	0	1	**1**	3	0	0	**3**	0	0	0	**0**	6	2	0	**8**	250	10	0	**260**	0	0	0	**0**	0	0	0	**0**	12	0	1	**13**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**
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AM Peak	**0**	**0**	**0**	**0**	**840**	**72**	**0**	**912**	**598**	**16**	**0**	**614**	**0**	**0**	**0**	**0**	**318**	**11**	**1**	**330**	**0**	**0**	**0**	**0**	**52**	**6**	**0**	**58**	**0**	**0**	**0**	**0**	**126**	**9**	**0**	**135**	**1031**	**46**	**0**	**1077**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**34**	**6**	**0**	**40**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

TIME	1				2				3				3A				4				5				6				6A				7				8				9				9A				10				11				12				12A			
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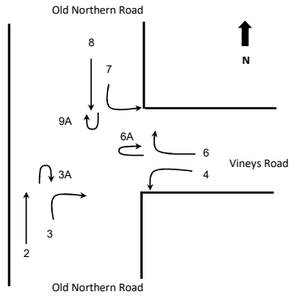
Data Audit Systems
TRAFFIC SURVEYS

Location: Old Northern Road/ Quarry Road
Weather: Fine
Date: Tuesday, 20 February 2018
Survey Period : 7 am to 9 am
4 pm to 6 pm

AM Peak: 7:45am-8:45am
PM Peak: 4:00pm-5:00pm



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TIME	Light	Heavy	Cyc	Total	Light	Heavy	Cyc	Total	Light	Heavy	Cyc	Total	Light	Heavy	Cyc	Total	Light	Heavy	Cyc	Total	Light	Heavy	Cyc	Total	Light	Heavy	Cyc	Total	Light	Heavy	Cyc	Total	Light	Heavy	Cyc	Total	Hour	Total
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AM Peak	905	79	0	984	27	1	0	28	0	0	0	0	24	1	0	25	5	0	0	5	0	0	0	0	8	0	0	8	1127	60	0	1187	0	0	0	0		

	Pedestrian			
	South	East	North	Total
	0	0	0	0
	0	0	0	0
	0	0	0	0
	0	0	0	0
	0	1	0	1
	0	0	0	0
	0	0	0	0
	0	0	0	0
	0	1	0	1

	2				3				3A				4				6				6A				7				8				9A				PM PEAK	
TIME	Light	Heavy	Cyc	Total	Light	Heavy	Cyc	Total	Light	Heavy	Cyc	Total	Light	Heavy	Cyc	Total	Light	Heavy	Cyc	Total	Light	Heavy	Cyc	Total	Light	Heavy	Cyc	Total	Light	Heavy	Cyc	Total	Light	Heavy	Cyc	Total	Hour	Total
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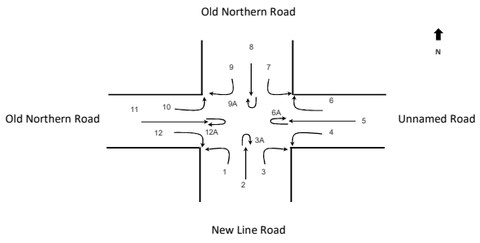
17:00	237	7	0	244	10	10	0	20	0	0	0	0	8	0	0	8	2	0	0	2	0	0	0	0	0	0	0	0	236	7	0	243	0	0	0	0	16:45 - 17:45	2003
17:15	254	3	0	257	8	8	0	16	0	0	0	0	6	0	0	6	1	0	0	1	0	0	0	0	0	10	0	10	240	5	0	245	0	0	0	0	17:00 - 18:00	1918
17:30	232	3	0	235	4	4	0	8	0	0	0	0	4	0	0	4	1	0	0	1	0	0	0	0	1	0	0	1	202	4	0	206	0	0	0	0		
17:45	265	4	0	269	2	2	0	4	0	0	0	0	4	0	0	4	1	0	0	1	0	0	0	0	1	0	0	1	212	5	0	217	0	0	0	0		
18:00	230	2	0	232	7	7	0	14	0	0	0	0	1	0	0	1	2	0	0	2	0	0	0	0	2	0	0	2	178	3	0	181	0	0	0	0		
Total	1964	62	1	2027	45	45	0	90	1	0	0	1	41	1	0	42	8	0	0	8	0	0	0	0	8	10	0	18	1828	52	2	1882	0	0	0	0		
PM Peak	983	50	1	1034	24	24	0	48	1	0	0	1	26	1	0	27	3	0	0	3	0	0	0	0	4	0	0	4	996	35	2	1033	0	0	0	0		

	Pedestrian			
	South	East	North	Total
	0	0	0	0
	0	0	0	0
	0	0	0	0
	0	0	0	0
	0	0	0	0
	0	0	0	0
	0	0	0	0
	0	1	0	1
	0	1	0	1

Data Audit Systems
TRAFFIC SURVEYS

Location: Old Northern Road/ New Line Road
Weather: Fine
Date: Tuesday, 20 February 2018
Survey Period : 7 am to 9 am
4 pm to 6 pm

AM Peak: 7:45am-8:45am
PM Peak: 4:00pm-5:00pm



	1				2				3				3A				4				5				6				6A				7				8				9				9A				10				11				12				12A			
TIME	Light	Heavy	Cyc	Total	Light	Heavy	Cyc	Total	Light	Heavy	Cyc	Total	Light	Heavy	Cyc	Total	Light	Heavy	Cyc	Total	Light	Heavy	Cyc	Total	Light	Heavy	Cyc	Total	Light	Heavy	Cyc	Total	Light	Heavy	Cyc	Total	Light	Heavy	Cyc	Total	Light	Heavy	Cyc	Total	Light	Heavy	Cyc	Total	Light	Heavy	Cyc	Total	Light	Heavy	Cyc	Total	Light	Heavy	Cyc	Total
07:15	67	4	0	**71**	69	3	0	**72**	1	1	0	**2**	1	1	0	**2**	5	12	0	**17**	7	12	0	**19**	7	1	0	**8**	0	0	0	**0**	5	0	0	**5**	144	9	0	**153**	112	8	0	**120**	0	0	0	**0**	129	8	0	**137**	8	0	0	**8**	101	5	0	**106**	0	0	0	**0**
07:30	63	2	0	**65**	90	5	0	**95**	4	1	0	**5**	7	1	0	**8**	12	7	0	**19**	6	7	0	**13**	4	2	0	**6**	0	0	0	**0**	10	0	0	**10**	168	7	1	**176**	109	8	0	**117**	0	0	0	**0**	119	7	0	**126**	12	0	0	**12**	90	10	0	**100**	0	0	0	**0**
07:45	85	4	0	**89**	80	6	0	**86**	0	1	0	**1**	7	0	0	**7**	10	7	0	**17**	14	3	0	**17**	15	3	0	**18**	0	0	0	**0**	8	0	0	**8**	153	4	0	**157**	110	5	1	**116**	0	0	0	**0**	166	8	1	**175**	9	1	0	**10**	68	6	0	**74**	0	0	0	**0**
08:00	92	3	0	**95**	120	15	0	**135**	2	0	0	**2**	2	1	0	**3**	12	2	0	**14**	19	1	0	**20**	11	0	0	**11**	0	0	0	**0**	5	0	0	**5**	139	8	1	**148**	160	8	0	**168**	0	0	0	**0**	216	13	0	**229**	10	0	0	**10**	93	4	0	**97**	0	0	0	**0**
08:15	95	3	0	**98**	150	11	0	**161**	5	0	0	**5**	5	0	0	**5**	14	1	0	**15**	6	1	0	**7**	6	0	0	**6**	0	0	0	**0**	6	0	0	**6**	147	5	0	**152**	189	7	0	**196**	0	0	0	**0**	201	13	0	**214**	1	0	0	**1**	72	6	0	**78**	0	0	0	**0**
08:30	101	4	0	**105**	190	7	0	**197**	0	0	0	**0**	1	0	0	**1**	15	2	0	**17**	5	0	0	**5**	9	0	0	**9**	0	0	0	**0**	6	0	0	**6**	151	12	0	**163**	206	3	0	**209**	0	0	0	**0**	161	7	0	**168**	6	0	0	**6**	46	5	0	**51**	0	0	0	**0**
08:45	93	5	0	**98**	204	17	0	**221**	0	0	0	**0**	2	4	0	**6**	20	0	0	**20**	6	1	0	**7**	6	0	0	**6**	0	0	0	**0**	11	0	0	**11**	148	8	0	**156**	182	6	0	**188**	0	0	0	**0**	141	4	0	**145**	4	2	0	**6**	41	3	0	**44**	0	0	0	**0**
09:00	72	3	0	**75**	109	9	0	**118**	4	1	0	**5**	7	8	0	**15**	20	1	0	**21**	8	0	0	**8**	8	0	0	**8**	0	0	0	**0**	9	0	0	**9**	139	12	0	**151**	148	5	0	**153**	0	0	0	**0**	158	9	0	**167**	15	0	0	**15**	78	10	0	**88**	0	0	0	**0**
Total	**668**	**28**	**0**	**696**	**1012**	**73**	**0**	**1085**	**16**	**4**	**0**	**20**	**32**	**15**	**0**	**47**	**108**	**32**	**0**	**140**	**71**	**25**	**0**	**96**	**66**	**6**	**0**	**72**	**0**	**0**	**0**	**0**	**60**	**0**	**0**	**60**	**1189**	**65**	**2**	**1256**	**1216**	**50**	**1**	**1267**	**0**	**0**	**0**	**0**	**1291**	**69**	**1**	**1361**	**65**	**3**	**0**	**68**	**589**	**49**	**0**	**638**	**0**	**0**	**0**	**0**
AM Peak	**381**	**15**	**0**	**396**	**664**	**50**	**0**	**714**	**7**	**0**	**0**	**7**	**10**	**5**	**0**	**15**	**61**	**5**	**0**	**66**	**36**	**3**	**0**	**39**	**32**	**0**	**0**	**32**	**0**	**0**	**0**	**0**	**28**	**0**	**0**	**28**	**585**	**33**	**1**	**619**	**737**	**24**	**0**	**761**	**0**	**0**	**0**	**0**	**719**	**37**	**0**	**756**	**21**	**2**	**0**	**23**	**252**	**18**	**0**	**270**	**0**	**0**	**0**	**0**

	1				2				3				3A				4				5				6				6A				7				8				9				9A				10				11				12				12A			
TIME	Light	Heavy	Cyc	Total	Light	Heavy	Cyc	Total	Light	Heavy	Cyc	Total	Light	Heavy	Cyc	Total	Light	Heavy	Cyc	Total	Light	Heavy	Cyc	Total	Light	Heavy	Cyc	Total	Light	Heavy	Cyc	Total	Light	Heavy	Cyc	Total	Light	Heavy	Cyc	Total	Light	Heavy	Cyc	Total	Light	Heavy	Cyc	Total	Light	Heavy	Cyc	Total	Light	Heavy	Cyc	Total	Light	Heavy	Cyc	Total
16:15	84	2	0	**86**	120	12	0	**132**	6	0	0	**6**	3	6	0	**9**	24	3	0	**27**	36	2	0	**38**	12	0	0	**12**	0	0	0	**0**	16	0	0	**16**	147	8	0	**155**	188	1	0	**189**	0	0	0	**0**	143	9	1	**153**	9	0	0	**9**	90	12	0	**102**	0	0	0	**0**
16:30	78	8	0	**86**	101	17	0	**118**	4	0	0	**4**	5	5	0	**10**	14	2	0	**16**	22	1	0	**23**	12	0	0	**12**	0	0	0	**0**	9	0	0	**9**	167	7	0	**174**	144	7	0	**151**	0	0	0	**0**	133	6	0	**139**	11	0	0	**11**	93	4	0	**97**	0	0	0	**0**
16:45	99	5	0	**104**	116	8	0	**124**	10	0	0	**10**	4	2	0	**6**	19	2	0	**21**	26	0	0	**26**	19	1	0	**20**	0	0	0	**0**	9	0	0	**9**	127	8	0	**135**	160	4	0	**164**	0	0	0	**0**	133	6	0	**139**	11	0	0	**11**	111	8	0	**119**	0	0	0	**0**
17:00	64	10	0	**74**	130	10	0	**140**	7	0	0	**7**	6	3	0	**9**	24	1	0	**25**	22	0	0	**22**	9	0	0	**9**	0	0	0	**0**	19	0	0	**19**	152	6	0	**158**	120	7	0	**127**	0	0	0	**0**	132	6	0	**138**	20	0	2	**22**	85	5	0	**90**	0	0	0	**0**
17:15	77	3	0	**80**	140	9	0	**149**	9	0	0	**9**	5	3	0	**8**	20	1	0	**21**	23	2	0	**25**	10	0	0	**10**	0	0	0	**0**	14	0	0	**14**	129	5	0	**134**	154	2	0	**156**	0	0	0	**0**	109	2	0	**111**	22	0	0	**22**	132	2	0	**134**	0	0	0	**0**
17:30	75	5	0	**80**	120	5	0	**125**	7	0	0	**7**	4	2	0	**6**	15	5	0	**20**	25	1	0	**26**	12	0	0	**12**	0	0	0	**0**	20	1	0	**21**	110	6	0	**116**	132	1	0	**133**	0	0	0	**0**	106	2	0	**108**	13	0	0	**13**	92	3	0	**95**	1	0	0	**1**
17:45	69	4	0	**73**	124	3	0	**127**	9	1	0	**10**	4	2	0	**6**	18	2	0	**20**	36	2	0	**38**	15	1	0	**16**	0	0	0	**0**	10	0	0	**10**	123	3	0	**126**	104	2	0	**106**	0	0	0	**0**	129	5	0	**134**	16	0	0	**16**	104	5	0	**109**	1	0	0	**1**
18:00	87	5	0	**92**	120	5	0	**125**	15	1	0	**16**	8	3	0	**11**	11	1	0	**12**	32	1	0	**33**	9	0	0	**9**	0	0	0	**0**	11	0	0	**11**	97	1	0	**98**	89	3	0	**92**	0	0	0	**0**	120	2	0	**122**	17	0	0	**17**	92	5	0	**97**	2	0	0	**2**
Total	**633**	**42**	**0**	**675**	**971**	**69**	**0**	**1040**	**67**	**2**	**0**	**69**	**39**	**26**	**0**	**65**	**145**	**17**	**0**	**162**	**222**	**9**	**0**	**231**	**98**	**2**	**0**	**100**	**0**	**0**	**0**	**0**	**108**	**1**	**0**	**109**	**1052**	**44**	**0**	**1096**	**1091**	**27**	**0**	**1118**	**0**	**0**	**0**	**0**	**1005**	**38**	**1**	**1044**	**119**	**0**	**2**	**121**	**799**	**44**	**0**	**843**	**4**	**0**	**0**	**4**

Appendix B

SIDRA INTERSECTION Results

029(0(17 6800$5<

6LWH˛ 2OG 1RUWK 5RDG 1HZ /LQH 5RD   1HWZRUN˛ >$0 3H

2OG 1RUWK 5RDG 1HZ /LQH 5RDG
5RXQGDERXW

0RYHPHQW 3HUIRUPDQFH 9HKLFOHV

0RY ,'	2' 0RY	'HPDQG) 7R' YHK	+9	$UULYD 7R' YHK	+9	'HJ 6D Y	$YHU 'HOD VH	/HYH 6HU	˝˘ %DFN RI 9HKL YH	'LVWD P	3UR 4XHX	(IIHF 6WRS SHU	$YHU 6SHH NP
6RXWK˛ 1HZ /LQH 5RDG													
	/	ˆ		ˆ		·˝		/26	·	˘		˘	· ˘
	7	ˆ˘	ˆ	ˆ˘	ˆ	·˝	˘	/26	·	˘		˘	· ˘
	5	ˆ		ˆ		·˝	˘	/26	˝			˘	ˆ
X	8	˝	·	˝	·	·˝		/26	˝			˘	˝
$SSURD		˘	˘	˘	˘	·˝	˘	/26	·	˘		˘	
(DVW˛ 6LWH $FFHVV													
	/	˘ˆ	ˆ	˘ˆ	ˆ	˘		/26	·	·		·	˘ ˘
˘	7		ˆ		ˆ	˘		/26	·	·		·	ˆ
˘	5					˘	·	/26		˝		·	· ˝
˘X	8					˘	·	/26		˝		·	
$SSURD		˘	˘	˘	˘	˘	·	/26	·	·		·	·
1RUWK˛ 2OG 1RUWKHUQ 5RDG													
ˆ	/	˝		˝		˘ˆ	·	/26		˝	˘	˘	˘
·	7	˘˘	˘	˘˘	˘	·	ˆ	/26	·	ˆˆ	˘	˘	˘
˝	5	·		·		·		/26	·	ˆˆ	˘	·	·
˝X	8					·	˘	/26	·	ˆˆ	˘	·	˘
$SSURD		·		·		·		/26	·	ˆˆ	˘	ˆ	˝ ˝
:HVW˛ 2OG 1RUWKHUQ 5RDG													
	/	ˆ˝`	·	ˆ˝`		˝˘	ˆ	/26		˘		˘	ˆ
	7		·		·	˘	·	/26		˘	·		˝
	5	·	˘	·	˘	˘	˘	/26		˘	·		˝ ˝
X	8					˘	ˆ	/26		˘	·		˘
$SSURD		˘	˘	˘	˘	˝˘		/26		˘	˝		ˆ ˘
$OO 9HK		˝ ˆ	˘	˝ ˆ	˘	˝˘		/26	·	˘	·		˝ ˘

6LWH /HYHO RI 6HUYLFH /26 0HWKRG˛ 'HOD\ 57$ 16:   6LWH /26 0HWKRG LV 1HWZ
9HKLFOH PRYHPHQW /26 YDOXHV DUH EDVHG RQ DYHUDJH GHOD\ SHU PRYHPHQ
,QWHUVHFWLRQ DQG $SSURDFK /26 YDOXHV DUH EDVHG RQ DYHUDJH GHOD\ IRU
5RXQGDERXW &DSDFLW\ 0RGHO˛ 6,'5$ 6WDQGDUG
6,'5$ 6WDQGDUG 'HOD\ 0RGHO LV XVHG &RQWURO 'HOD\ LQFOXGHV *HRPHWULF
*DS$FFHSWDQFH &DSDFLW\˛ 6,'5$ 6WDQGDUG $NoHOLN 0 '
+9   YDOXHV DUH FDOFXODWHG IRU $OO 0RYHPHQW &ODVVHV RI $OO +HDY\ 9H
/DUJHVW FKDQJH LQ $YHUDJH %DFN RI 4XHXH RU 'HJUHH RI 6DWXUDWLRQ IRU D
1XPEHU RI ,WHUDWLRQV˛ ˘ PD[LPXP VSHFLILHG˛

029(0(17 6800$5<

6LWH> 2OG 1RUWKHUQ 5RDG 4XDUU\ 5 | 1HWZRUN> >$0 3H

2OG 1RUWKHUQ 5RDG 4XDUU\ 5RDG
6LJQDOV)L[HG 7LPH ,VRODWHG &\FOH 7LPH 8VHU &\FOH 7LPH

0RYHPHQW 3HUIRUPDQFH 9HKLFOHV													
0RY ,'	2' 0RY	'HPDQG) 7R' YHK	+9	$UULYD 7R' YHK	+9	'HJ 6D Y	$YHU 'HOD VH	/HYH 6HU	˝ˇ 9HKL YH	%DFN RI 'LVWD P	3URS 4XHX	(IIHF 6WRS SHU	$YHU 6SHH NP
6RXWK 2OG 1RUWKHUQ 5RDG													
	7	˝˘	ˆ	˝˘	ˆ			/26	˝	˘˝			
	5	˘ ˘		˘ ˘		˝	˘ˆ	/26	˘	˝	·	˝	˝
$SSURD		˘ ˘	˘	˘ ˘	˘	˝	˘	/26	˘	˝	˘	˘	· ˘
(DVW 4XDUU\ 5RDG													
	/	˘		˘		ˆ	˘	/26		˝	˘	ˆ	˘
˘	5	˘		˘		˘	˘	/26		˘	˝	ˆ	
$SSURD		ˆ		ˆ		ˆ		/26		˝	˘	ˆ	˝ ·
1RUWK 2OG 1RUWKHUQ 5RDG													
ˆ	/		˘		˘	·	ˆ	/26	·	ˆˆ	˝	˝	˘
·	7					·		/26	˝	·˘	˝	˝	˘
$SSURD		ˆ˘		ˆ˘		·		/26	˝	·˘	˝	˝	˘ ˘
$OO 9HK		·ˆ	˘	·ˆ	˘	˝		/26	˝	·˘	ˆ	ˆ	ˆ ·

6LWH /HYHO RI 6HUYLFH /26 0HWKRG 'HOD\ 57$ 16: 6LWH /26 0HWKRG 1HWZRUN
9HKLFOH PRYHPHQW /26 YDOXHV DUH EDVHG RQ DYHUDJH GHOD\ SHU PRYHPHQ
,QWHUVHFWLRQ DQG $SSURDFK /26 YDOXHV DUH EDVHG RQ DYHUDJH GHOD\ IRU
6,'5$ 6WDQGDUG 'HOD\ 0RGHO LV XVHG &RQWURO 'HOD\ LQFOXGHV *HRPHWULF
*DS $FFHSWDQFH &DSDFLW\ 6,'5$ 6WDQGDUG $NoHOLN 0 '
+9 YDOXHV DUH FDOFXODWHG IRU $OO 0RYHPHQW &ODVVHV RI $OO +HDY\ 9H
/DUJHVW FKDQJH LQ $YHUDJH %DFN RI 4XHXH RU 'HJUHH RI 6DWXUDWLRQ IRU D
1XPEHU RI ,WHUDWLRQV ˘ PD[LPXP VSHFLILHG

0RYHPHQW 3HUIRUPDQFH 3HGHVWULDQV								
0RY ,'	'HVFULSWLRQ	'HPD)OR SHG	$YHU 'HOD VH	/HYH 6HU	$YHUDJH 3HGHV SH	%DFN 'LVWD P	3URS 4XHX	(IIHF 6WRS SHU
3	6RXWK)XOO &URVV	˘	˘˝	/26			˝	˝˘
3	(DVW)XOO &URVVL	˘	˝	/26			˘	˘·
$OO 3HGHVWULDQV		˘		/26			·	·

/HYHO RI 6HUYLFH /26 0HWKRG 6,'5$ 3HGHVWULDQ /26 0HWKRG %DVHG RQ $YHU
3HGHVWULDQ PRYHPHQW /26 YDOXHV DUH EDVHG RQ DYHUDJH GHOD\ SHU SHGHVW
,QWHUVHFWLRQ /26 YDOXH IRU 3HGHVWULDQV LV EDVHG RQ DYHUDJH GHOD\ IRU

029(0(17 6800$5<

6LWH: 2OG 1RUWKHUQ 5RDG 9LQH\V 5RDG — 1HWZRUN: >$0 3H

2OG 1RUWKHUQ 5RDG 9LQH\V 5RDG
*LYHZD\ <LHOG 7ZR

0RYHPHQW 3HUIRUPDQFH 9HKLFOHV													
0RY ,'	2' 0RY	'HPDQG) 7R' YHK	+9	$UULYD 7R' YHK	+9	'HJ 6D Y	$YHU 'HOD VH	/HYH 6HU	˝˘ %DFN RI 9HKL YH	'LVWD P	3UR 4XHX	(IIHF\ 6WRS SHU	$YHU 6SHH NP
6RXWK¸ 2OG 1RUWKHUQ 5RDG													
	7	˘	˙	˘	˙	˘˘		/26					˘˝ ˙
E	5	˝		˝				/26			˝	˝	˝ ˆ
$SSURD		˘˘	ˆ	˘˘	ˆ	˘˘		1$					˘˝
6RXWK(DVW¸ 9LQH\V 5RDG													
E	/	˘		˘				/26			˙	˝	
D	5	˘		˘			ˆ	/26			˝	˝	˘
$SSURD								/26			˝	˝	˝ ˘
1RUWK¸ 2OG 1RUWKHUQ 5RDG													
ˆD	/	˙		˙		˘˘	˘	/26					˘ˆ ˆ
˙	7	˝	˘	˝	˘	˘˘		/26					˘˝ ˘
$SSURD		˘˙	˘	˘˙	˘	˘˘		1$					˘˝ ˘
$OO 9HK		˘˘	˘	˘˘	˘	˘˘		1$					˘˙ ˘

6LWH /HYHO RI 6HUYLFH /26 0HWKRG¸ 'HOD\ 57$ 16: 6LWH /26 0HWKRG LV 6SHFLILHG LQ WKH 1HWZRUN 'DWD GLDORJ
9HKLFOH PRYHPHQW /26 YDOXHV DUH EDVHG RQ DYHUDJH GHOD\ SHU PRYHPHQW
0LQRU 5RDG $SSURDFK /26 YDOXHV DUH EDVHG RQ DYHUDJH GHOD\ IRU DOO YH
1$¸ ,QWHUVHFWLRQ /26 DQG 0DMRU 5RDG $SSURDFK /26 YDOXHV DUH 1RW $SSOLFDEOH IRU WZR ZD\ VLJQ FRQWURO VLQFH WKH DYHUDJH GHOD\ LV QRW
D JRRG /26 PHDVXUH GXH WR]HUR GHOD\V DVVRFLDWHG ZLWK PDMRU URDG PR
6,'5$ 6WDQGDUG 'HOD\ 0RGHO LV XVHG 5 &RQWURO 'HOD\ LQFOXGHV *HRPHWULF
*DS $FFHSWDQFH &DSDFLW\¸ 6,'5$ 6WDQGDUG $NoHOLN 0 '
+9 YDOXHV DUH FDOFXODWHG IRU $OO 0RYHPHQW &ODVVHV RI $OO +HDY\ 9H
/DUJHVW FKDQJH LQ $YHUDJH %DFN RI 4XHXH RU 'HJUHH RI 6DWXUDWLRQ IRU D
1XPEHU RI ,WHUDWLRQV¸ ˘ PD[LPXP VSHFLILHG¸

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6LWH˛ 2OG 1RUWKHUQ 5RGG 4XDUU\ 5 1HWZRUN˛>30 3H

2OG 1RUWKHUQ 5RDG 4XDUU\ 5RDG
6LJQDOL]HG)ULHG 7LPH ,VRODWHG &\FOH 7LPH &\FOH 7LPH 8VHU

0RYHPHQW 3HUIRUPDQFH												
0RY ,'	2' 0RY	'HPDQG)ORZV 7RW YHK	+9	$UULYDO)ORZV 7RW YHK	+9	'HJ 6DW Y	$YHU 'HOD VH	/HYH 6HUY	˝˘ 9HKL YH	%DFN RI 'LVWD P	3URS 4XHX	(IIHF 6WRS SHU	$YHU 6SHH NP
6RXWK˛ 2OG 1RUWKHUQ 5RDG												
	7	ˆ		ˆ		˘	˘	/26		ˆ			ˆ
	5	ˆˆ		ˆˆ			˘˘	/26	˘		˝	ˆ	˘
$SSURD		˘		˘		˘		/26		ˆ			
(DVW˛ 4XDUU\ 5RDG												
	/	˝		˝		˘	˝	/26	˘		˙	˙	˘
˘	5	˘ˆ		˘ˆ			˘	/26			˝	ˆ	
$SSURD		ˆ˘		ˆ˘		˘		/26	˘		˙	˙	˘
1RUWK˛ 2OG 1RUWKHUQ 5RDG												
ˆ	/	˝		˝		˘	˘	/26		˘˝	˘	˘	
˙	7	˘ˆ		˘ˆ		˘	˝	/26		˘	˘	˘	˘
$SSURD		ˆ		ˆ		˘		/26		˘	˘	˘	˘ ˝
$OO 9HK		˘˝˘		˘˝˘		˘		/26		˘	˘	˘	

6LWH /HYHO RI 6HUYLFH /26 0HWKRG˛ 'HOD\ 57$ 16: 6LWH /26 0HWKRG 1HWZ
9HKLFOH PRYHPHQW /26 YDOXHV DUH EDVHG RQ DYHUDJH GHOD\ SHU PRYHPHQ
,QWHUVHFWLRQ DQG $SSURDFK /26 YDOXHV DUH EDVHG RQ DYHUDJH GHOD\ IRU
6,'5$ 6WDQGDUG 'HOD\ 0RGHO LV XVHG &RQWURO 'HOD\ LQFOXGHV *HRPHWULF
*DS $FFHSWDQFH &DSDFLW\˛ 6,'5$ 6WDQGDUG $NoHOLN 0 '
+9 YDOXHV DUH FDOFXODWHG IRU $OO 0RYHPHQW &ODVVHV RI $OO +HDY\ 9H
/DUJHVW FKDQJH LQ $YHUDJH %DFN RI 4XHXH RU 'HJUHH RI 6DWXUDWLRQ IRU D
1XPEHU RI ,WHUDWLRQV˛ ˘ PD[LPXP VSHFLILHG˛

0RYHPHQW 3HUIRUPDQFH 3HGHVWULDQV									
0RY ,'	'HVFULSWLRQ	'HPD)ORZ SHG	$YHU 'HOD VH	/HYH 6HUY	$YHUDJH 3HGHV SH	%DFN 'LVWD P	3URS 4XHX	(IIHFW 6WRS SHU	
3	6RXWK)XOO &URVV	˘	˘˝	/26			˝	˝˘	
3	(DVW)XOO &URVVL	˘	˙	/26			˘	˘	
$OO 3HGHVWULDQV		˘	˙	/26			ˆ	ˆ	

/HYHO RI 6HUYLFH /26 0HWKRG˛ 6,'5$ 3HGHVWULDQ /26 0HWKRG %DVHG RQ $YHU
3HGHVWULDQ PRYHPHQW /26 YDOXHV DUH EDVHG RQ DYHUDJH GHOD\ SHU SHGHV
,QWHUVHFWLRQ /26 YDOXH IRU 3HGHVWULDQV LV EDVHG RQ DYHUDJH GHOD\ IRU

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6LWH˛ 2OG 1RUWK 5RDG 1HZ /LQH 5RD   1HWZRUN˛>30 3H

2OG 1RUWK 5RDG 1HZ /LQH 5RDG
5RXQGDERXW

0RYHPHQW 3HUIRUPDQFH													
0RY ,'	2' 0RY	'HPDQG) 7R' YHK	+9	$UULYD 7R' YHK	+9	'HJ 6D Y	$YHU 'HOD VH	/HYH 6HUY	˝ˇ 9HKL YH	%DFN RI 'LVWI P	3UR 4XHX	(IIHF 6WRS SHU	$YHU 6SHH NP
6RXWK˛ 1HZ /LQH 5RDG													
	/	ˇ˙	ˆ	ˇ˙	ˆ	ˆ		/26	ˆ	ˇˇ	˝		ˇ
	7	ˇ	˝	ˇ	˝	ˆ		/26	ˆ	ˇˇ	˝		
	5	˙		˙		ˆ	ˆ	/26	ˇ	ˇ	˝		˝
X	8	ˇ	ˆ	ˇ	ˆ	ˆ		/26	ˇ	ˇ	˝		˝ ˝
$SSURD		˝ˆ	˝	˝ˆ	˝	ˆ		/26	ˆ	ˇˇ	˝		ˇ
(DVW˛ 6LWH $FFHVV													
	/	˝	˝	˝	˝	ˇ		/26					ˇ
ˇ	7	ˇ		ˇ		ˇ		/26			˝		
ˇ	5	ˇˇ		ˇˇ		ˇ		/26		ˇ	˝		˙ ˇ
ˇX	8					ˇ		/26		ˇ	˝		˝ ˆ
$SSURD		ˇˇ		ˇˇ		ˇ		/26			˝		
1RUWK˛ 2OG 1RUWKHUQ 5RDG													
ˆ	/	ˇˇ		ˇˇ		ˇˇ		/26	ˇ	˙	ˆ	˙	ˇ
˙	7	ˇˇˇ		ˇˇˇ		˝		/26	ˆ	˙	ˆ	˝	ˆ
˝	5	ˇˇ		ˇˇ		˝		/26	ˆ	˙	˙		˙
˝X	8					˝	ˇ	/26	ˆ	˙	˙		ˆ
$SSURD		ˆˇ		ˆˇ		˝	ˆ	/26	ˆ	˙	˙		
:HVW˛ 2OG 1RUWKHUQ 5RDG													
	/	ˇ˝˙		ˇ˝˙		ˇ	ˆ	/26	ˇ	˝	˙	˝	ˆ ˝
	7	ˇ		ˇ		ˇ	ˆ	/26		ˇ	˙		˝ ˇ
	5	˝	ˆ	˝	ˆ	ˇ		/26		ˇ	˙		ˇ
X	8					ˇ	ˇ	/26		ˇ	˙		ˇ ˇ
$SSURD		˙	ˇ	˙	ˇ	ˇ		/26	ˇ	˝	˙	˝	˙ ˆ
$OO 9HK		ˇ˝´	ˇ	ˇ˝´	ˇ	˝		/26	ˆ	˙	˙		ˇ

6LWH /HYHO RI 6HUYLFH /26 0HWKRG˛ 'HOD\ 57$ 16: 6LWH /26 0HWKRG 1HWZRU
9HKLFOH PRYHPHQW /26 YDOXHV DUH EDVHG RQ DYHUDJH GHOD\ SHU PRYHPHQ
,QWHUVHFWLRQ DQG $SSURDFK /26 YDOXHV DUH EDVHG RQ DYHUDJH GHOD\ IRU
5RXQGDERXW &DSDFLW\ 0RGHO˛ 6,'5$ 6WDQGDUG
6,'5$ 6WDQGDUG 'HOD\ 0RGHO LV XVHG &RQWURO 'HOD\ LQFOXGHV *HRPHWULF
*DS $FFHSWDQFH &DSDFLW\˛ 6,'5$ 6WDQGDUG $NoHOLN 0 '
+9 YDOXHV DUH FDOFXODWHG IRU $OO 0RYHPHQW &ODVVHV RI $OO +HDY\ 9H
/DUJHVW FKDQJH LQ $YHUDJH %DFN RI 4XHXH RU 'HJUHH RI 6DWXUDWLRQ IRU D
1XPEHU RI ,WHUDWLRQV˛ ˇ PD[LPXP VSHFLILHG˛

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6LWH>¸ 2OG 1RUWKHUQ 5RDG 9LQH\V 5I — 1HWZRUN¸>30 3H

2OG 1RUWKHUQ 5RDG 9LQH\V 5RDG
*LYHZD\ <LHOG 7ZR

0RYHPHQW 3HUIRUPDQFH													
0RY ,'	2' 0RY	'HPDQG) 7R' YHI	+9	$UULYD 7R' YHI	+9	'HJ 6D Y	$YHU 'HOD VH	/HYH 6HU'	˝ˇ 9HKL YH	%DFN RI 'LVWD P	3URS 4XHX	(IIHF\ 6WRS SHU	$YHUD 6SHH NP
6RXWK¸ 2OG 1RUWKHUQ 5RDG													
	7	˙˘		˙˘		ˇ˘		/26					ˇ˝ ˙
E	5	ˇ	ˇ	ˇ	ˇ	˘	˝	/26		˝	˝	˝	˘
$SSURD		˙	ˇ	˙	ˇ	ˇ˘		1$		˝			ˇ˙
6RXWK(DVW¸ 9LQH\V 5RDG													
E	/	˙		˙		˙	ˇ	/26			˙	˝	ˇ ˇ
D	5						ˇ	/26			˝	˝	ˇ
$SSURD						˙	˙	/26			˙	˝	˙
1RUWK¸ 2OG 1RUWKHUQ 5RDG													
ˆD	/					ˇ˘	ˇ	/26					ˇ˘ ˙
˙	7	˙ˇ		˙ˇ		ˇ˘		/26					ˇ˝ ˘
$SSURD		˙˘		˙˘		ˇ˘		1$					ˇ˝ ˘
$OO 9HK		ˇ˘	ˇ	ˇ˘	ˇ	ˇ˘		1$		˝			ˇ˙

6LWH /HYHO RI 6HUYLFH /26 0HWKRG¸ 'HOD\ 57$ 16: 6LWH /26 0HWKRG LV 1HWZ
9HKLFOH PRYHPHQW /26 YDOXHV DUH EDVHG RQ DYHUDJH GHOD\ SHU PRYHPHQ
0LQRU 5RDG $SSURDFK /26 YDOXHV DUH EDVHG RQ DYHUDJH GHOD\ IRU DOO YH
1$¸ ,QWHUVHFWLRQ /26 DQG 0DMRU 5RDG $SSURDFK /26 YDOXHV DUH 1RW $SSOLF
D JRRG /26 PHDVXUH GXH WR]HUR GHOD\V DVVRFLDWHG ZLWK PDMRU URDG PR
6,'5$ 6WDQGDUG 'HOD\ 0RGHO LV XVHG &RQWURO 'HOD\ LQFOXGHV *HRPHWULF
*DS$FFHSWDQFH &DSDFLW\¸ 6,'5$ 6WDQGDUG $NoHOLN 0 '
+9 YDOXHV DUH FDOFXODWHG IRU $OO 0RYHPHQW &ODVVHV RI $OO +HDY\ 9H
/DUJHVW FKDQJH LQ $YHUDJH %DFN RI 4XHXH RU 'HJUHH RI 6DWXUDWLRQ IRU D
1XPEHU RI ,WHUDWLRQV¸ ˇ PD[LPXP VSHFLILHG¸

2OG 1RUWK 5RDG 1HZ /LQH 5RDG
5RXQGDERXW

0RYHPHQW 3HUIRUPDQFH - 9HKLFOHV													
0RY ,'	2' 0RY	'HPDQG) 7R' YHK	+9	$UULYD 7R' YHK	+9	'HJ 6D Y	$YHU 'HOD VH	/HYH 6HU	˝ˇ 9HKL YH	%DFN RI 'LVWI P	3UR 4XHX	(IIHF 6WRS SHU	$YHU 6SHH NP
6RXWK: 1HZ /LQH 5RDG													
	/	ˆˇ		ˆˇ				/26		˝ˆ		ˇ	
	7	˙ˇ˝	ˆ	˙ˇ˝	ˆ			/26		˝ˆ		˙	ˇ ˙
	5	˙		˙			˙	/26	ˇ	ˆ˝		ˇ	ˇ
X	8	˝	˙	˝	˙			/26	ˇ	ˆ˝		ˇ	
$SSURD		˙	ˇ	˙	ˇ			/26		˝ˆ		˝	ˆ ˇ
(DVW: 6LWH $FFHVV													
	/	˙	ˆ	˙	ˆ	ˆ		/26		ˇ		˝	ˆ
ˇ	7	ˇ	ˇ	ˇ	ˇ	ˆ	ˇ	/26		ˇ		˝	˝
ˇ	5	˝		˝		ˆ	ˆ	/26		˙			˙
ˇX	8					ˆ	ˆ	/26		˙			˝
$SSURD		ˇˇ	ˇ	ˇˇ	ˇ	ˆ	ˇ	/26		ˇ		˝	˙ ˝
1RUWK: 2OG 1RUWKHUQ 5RDG													
ˆ	/					ˇˆ		/26	ˇ		ˇ	ˆ	˝
˙	7	ˆ	ˇ	ˆ ˆ	ˇ	˝ˇ		/26		ˇˆ	ˇ	˙	˝ ˇ
˝	5	˝ ˇ		˝ ˙		˝ˇ		/26		ˇˆ	˝		
˝X	8					˝ˇ		/26		ˇˆ	˝		ˇ
$SSURD		ˇ˝		ˇ˙ [1]		˝ˇ	ˇ	/26		ˇˆ	˙		ˇ
:HVW: 2OG 1RUWKHUQ 5RDG													
	/	˙ˇ		˙ˇ		˝	˝	/26	˙	ˇ			ˇ ˙
	7	ˆ	ˆ	ˆ	ˆ	ˇˇ	˙	/26		ˆ	˙	˝	˝ ˇ
	5	ˇ	ˇ	ˇ	ˇ	ˇˇ		/26		ˆ	˙	˝	ˇ
X	8					ˇˇ	ˇ	/26		ˆ	˙	˝	ˇ ˇ
$SSURD		˙		˙		˝	˙	/26	˙	ˇ	˝		ˇ
$OO 9HK		ˇ		˙ [1]			ˇ	/26		˝ˆ	˝		ˆ

6LWH /HYHO RI 6HUYLFH /26 0HWKRG: 'HOD\ 57$ 16:   6LWH /26 0HWKRG LV 'HOD\ 1HWZ
9HKLFOH PRYHPHQW /26 YDOXHV DUH EDVHG RQ DYHUDJH GHOD\ SHU PRYHPHQ
,QWHUVHFWLRQ DQG $SSURDFK /26 YDOXHV DUH EDVHG RQ DYHUDJH GHOD\ IRU
5RXQGDERXW &DSDFLW\ 0RGHO: 6,'5$ 6WDQGDUG
6,'5$ 6WDQGDUG 'HOD\ 0RGHO LV XVHG &RQWURO 'HOD\ LQFOXGHV *HRPHWULF
*DS$FFHSWDQFH &DSDFLW\: 6,'5$ 6WDQGDUG $NoHOLN 0 '
+9 YDOXHV DUH FDOFXODWHG IRU $OO 0RYHPHQW &ODVVHV RI $OO +HDY\ 9H
/DUJHVW FKDQJH LQ $YHUDJH %DFN RI 4XHXH RU 'HJUHH RI 6DWXUDWLRQ IRU D
1XPEHU RI ,WHUDWLRQV: PD[LPXP VSHFLILHG:

1 $UULYDO)ORZ YDOXH LV UHGXFHG GXH WR FDSDFLW\ FRQVWUDLQW DW RYHU

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6LWH D> D 2OG 1RUWKHUQ 5RDG 4XDUU\ 1HWZRUN>$0 3H

2OG 1RUWKHUQ 5RDG 4XDUU\ 5RDG
6LJQDOL]HG 7LPH ,VRODWHG &\FOH 7LPH &\FOH 7LPH 8VHU

0RYHPHQW 3HUIRUPDQFH

0RY ,'	2' 0RY	'HPDQG 7R YH	) +9	$UULYDO 7R YH	) +9	'HJ 6D Y	$YHU 'HO[V+	/HYH 6HU`	~~ %DFN RI 9HKL YI	'LVWI P	3UR 4XHX	(IIHF\ 6WRS SHU	$YHU 6SHH NP
6RXWK 2OG 1RUWKHUQ 5RDG													
	7	~		~				/26	~				~
	5							/26			~		~
$SSURD				[1]				/26					
(DVW 4XDUU\ 5RDG													
	/	~		~				/26					
	5					~		/26			~		
$SSURD								/26					~
1RUWK 2OG 1RUWKHUQ 5RDG													
	/							/26					
	7	~		~				/26					
$SSURD								/26					
$OO 9HK				[1]				/26					

6LWH /HYHO RI 6HUYLFH /26 0HWKRG 'HOD\ 57$ 16: 6LWH 26 GHOD\ 1HWZS
9HKLFOH PRYHPHQW /26 YDOXHV DUH EDVHG RQ DYHUDJH GHOD\ SHU PRYHPHQ
,QWHUVHFWLRQ DQG $SSURDFK /26 YDOXHV DUH EDVHG RQ DYHUDJH GHOD\ IRU
6,'5$ 6WDQGDUG 'HOD\ 0RGHO LV XVHG &RQWURO 'HOD\ LQFOXGHV *HRPHWULF
*DS$FFHSWDQFH &DSDFLW\ 6,'5$ 6WDQGDUG $NHOLN 0 '
+9 YDOXHV DUH FDOFXODWHG IRU $OO 0RYHPHQW &ODVVHV RI $OO +HDY\ 9H
/DUJHVW FKDQJH LQ $YHUDJH %DFN RI 4XHXH RU 'HJUHH RI 6DWXUDWLRQ IRU D
1XPEHU RI ,WHUDWLRQV PD[LPXP VSHFLILHG

1 $UULYDO)ORZ YDOXH LV UHGXFHG GXH WR FDSDFLW\ FRQVWUDLQW DW RYHU

0RYHPHQW 3HUIRUPDQFH

0RY ,'	'HVFULSWLRQ	'HPD)OR SH	$YHU 'HO[V+	/HYH 6HU`	$YHUDJH 3HGHV SH	%DFN 'LVWI P	3UR 4XHX	(IIHF 6WRS SHU
3	6RXWK)XOO &URVV	~	~~	/26			~	~~
3	(DVW)XOO &URVVL	~		/26			~	~~
$OO 3HGHVWULDQV		~		/26				

/HYHO RI 6HUYLFH /26 0HWKRG 6,'5$ 3HGHVWULDQ /26 0HWKRG %DVHG RQ $YHU
3HGHVWULDQ PRYHPHQW /26 YDOXHV DUH EDVHG RQ DYHUDJH GHOD\ SHU SHGHVW
,QWHUVHFWLRQ /26 YDOXH IRU 3HGHVWULDQV LV EDVHG RQ DYHUDJH GHOD\ IRU

6,'5$,17(56(&7,21_&RS\ULJKW ‰ $NFHOLN DQG $VVRFLDWHV 3RO\WHFKQLF
2UJDQLVDWLRQ *7$ &ROOHJH 6WDWLRQ 7H[DV 7XHVGD\ 0DUFK 30
3URMHFW DX?SURMHFWILOHV?3URMHFW)LOHV?5RDGHXOOLQH VLG4XDU\ 5R
'XUDO 1R 'HYHORSPHQW VLS

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6LWH>¸ 2OG 1RUWKHUQ 5RDG 9LQH\V 5F   1HWZRUN¸ >$0 3H

2OG 1RUWKHUQ 5RDG 9LQH\V 5RDG
*LYHZD\ <LHOG 7ZR

0RYHPHQW 3HUIRUPDQFH 9HKLFOHV														
0RY ,'	2' 0RY	'HPDQG) 7R' YHK	+9	$UULYD 7R' YHK	+9	'HJ 6D Y	$YHU 'HOD VH	/HYH 6HU\	˝ˇ 9HKL YH	%DFN RI 'LVWD P	3UR 4XHX	(IIHF\ 6WRS SHU	$YHU 6SHH NP	
6RXWK¸ 2OG 1RUWKHUQ 5RDG														
	7	·	·	˘˘	·	˘ˆ		/26					˘˝ ·	
E	5						˝	/26		˘	˝			
$SSURD		·	·	˝˘ 1	ˆ	˘ˆ	·	1$		˘			˘·	
6RXWK(DVW¸ 9LQH\V 5RDG														
E	/	˝		˝		˘	˝	/26		˘	˝		˘	
D	5	˘		˘			ˆ	/26			˝		˘	
$SSURD		˘		˘		˘	ˆ	/26		˘	˝		˝	
1RUWK¸ 2OG 1RUWKHUQ 5RDG														
ˆD	/	˝		˝		˝	˘	/26					˘˘	
·	7	ˆ	˘	ˆ	˘	˝		/26					˘ˆ ˝	
$SSURD		ˆ	˘	ˆ	˘	˝		1$					˘ˆ ˝	
$OO 9HK		˘˝	˘	˘˘ 1	˘	˝		1$		˘			˘˘ ·	

6LWH /HYHO RI 6HUYLFH /26 0HWKRG¸ 'HOD\ 57$ 16: 6LWH /26 0HWKRG 1HWZ
9HKLFOH PRYHPHQW /26 YDOXHV DUH EDVHG RQ DYHUDJH GHOD\ SHU PRYHPHQ
0LQRU 5RDG $SSURDFK /26 YDOXHV DUH EDVHG RQ DYHUDJH GHOD\ IRU DOO YH
1$¸ ,QWHUVHFWLRQ /26 DQG 0DMRU 5RDG $SSURDFK /26 YDOXHV DUH 1RW $SSOLF
D JRRG /26 PHDVXUH GXH WR]HUR GHOD\V DVVRFLDWHG ZLWK PDMRU URDG PR
6,'5$ 6WDQGDUG 'HOD\ 0RGHO LV XVHG &RQWURO 'HOD\ LQFOXGHV *HRPHWULF
*DS $FFHSWDQFH &DSDFLW\¸ 6,'5$ 6WDQGDUG $NoHOLN 0 '
+9 YDOXHV DUH FDOFXODWHG IRU $OO 0RYHPHQW &ODVVHV RI $OO +HDY\ 9H
/DUJHVW FKDQJH LQ $YHUDJH %DFN RI 4XHXH RU 'HJUHH RI 6DWXUDWLRQ ˆIRU D
1XPEHU RI ,WHUDWLRQV¸ PD[LPXP VSHFLILHG¸

1 $UULYDO)ORZ YDOXH LV UHGXFHG GXH WR FDSDFLW\ FRQVWUDLQW DW RYHU

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6LWH> D 2OG 1RUWKHUQ 5RDG 4XDUU\ 1HWZRUN >30 3H

2OG 1RUWKHUQ 5RDG 4XDUU\ 5RDG
6LJQDO)L[HG 7LPH ,VRODWHG &\FOH 7LPH &\FOH 7LPH 8VHU

0RYHPHQW 3HUIRUPDQFH													
0RY ,'	2' 0RY	'HPDQG) 7RW YHK	+9	$UULYD 7RW YHK	+9	'HJ 6D Y	$YHU 'HOD VH	/HYH 6HU	9HKL YH	%DFN RI 'LVWD P	3URS 4XHX	(IIHF 6WRS SHU	$YHU 6SHH NP
6RXWK 2OG 1RUWKHUQ 5RDG													
	7							/26					
	5							/26					
$SSURD								/26					
(DVW 4XDUU\ 5RDG													
	/							/26					
	5							/26					
$SSURD								/26					
1RUWK 2OG 1RUWKHUQ 5RDG													
	/							/26					
	7							/26					
$SSURD								/26					
$OO 9HK								/26					

6LWH /HYHO RI 6HUYLFH /26 0HWKRG 'HOD\ 57$ 16: 6LWH /26 0HWKRG LV 'HOD\ 1HWZRUN
9HKLFOH PRYHPHQW /26 YDOXHV DUH EDVHG RQ DYHUDJH GHOD\ SHU PRYHPHQ
,QWHUVHFWLRQ DQG $SSURDFK /26 YDOXHV DUH EDVHG RQ DYHUDJH GHOD\ IRU
6,'5$ 6WDQGDUG 'HOD\ 0RGHO LV XVHG &RQWURO 'HOD\ LQFOXGHV *HRPHWULF
*DS $FFHSWDQFH &DSDFLW\ 6,'5$ 6WDQGDUG $NoHOLN 0 '
+9 YDOXHV DUH FDOFXODWHG IRU $OO 0RYHPHQW &ODVVHV RI $OO +HDY\ 9H
/DUJHVW FKDQJH LQ $YHUDJH %DFN RI 4XHXH RU 'HJUHH RI 6DWXUDWLRQ IRU D
1XPEHU RI ,WHUDWLRQV PD[LPXP VSHFLILHG

0RYHPHQW 3HUIRUPDQFH 3HGHVWULDQV									
0RY ,'	'HVFULSWLRQ	'HPD)OR SHG	$YHU 'HOD VH	/HYH 6HU	$YHUDJH 3HGHV SH	%DFN 'LVWD P	3URS 4XHX	(IIHFW 6WRS SHU	
3	6RXWK)XOO &URVV			/26					
3	(DVW)XOO &URVVL			/26					
$OO 3HGHVWULDQV				/26					

/HYHO RI 6HUYLFH /26 0HWKRG 6,'5$ 3HGHVWULDQ /26 0HWKRG %DVHG RQ $YHU
3HGHVWULDQ PRYHPHQW /26 YDOXHV DUH EDVHG RQ DYHUDJH GHOD\ SHU SHGHV
,QWHUVHFWLRQ /26 YDOXH IRU 3HGHVWULDQV LV EDVHG RQ DYHUDJH GHOD\ IRU

029(0(17 6800$5<

6LWH˛ D 2OG 1RUWK 5RDG 1HZ /LQH 5R   1HWZRUN˛ >30 3H

2OG 1RUWK 5RDG 1HZ /LQH 5RDG
5RXQGDERXW

0RYHPHQW 3HUIRUPDQFH														
0RY ,'	2' 0RY	'HPDQG) 7RWDO YHK	+9	$UULYD 7RWDO YHK	+9	'HJ 6DWQ Y	$YHUDJH 'HOD\ VHF	/HYHO RI 6HUYLFH	%DFN RI 9HKLFOHV YHK	4XHXH 'LVWDQFH P	3URS 4XHXHG	(IIHFWLYH 6WRS 5DWH SHU	$YHU 1R &\FOHV	$YHUDJH 6SHHG NP
6RXWK˛ 1HZ /LQH 5RDG														
	/							/26						
	7							/26						
	5							/26						
	X 8							/26						
$SSURD								/26						
(DVW˛ 6LWH $FFHVV														
	/							/26						
	7							/26						
	5							/26						
	X 8							/26						
$SSURD								/26						
1RUWK˛ 2OG 1RUWKHUQ 5RDG														
	/							/26						
	7							/26						
	5							/26						
	X 8							/26						
$SSURD								/26						
:HVW˛ 2OG 1RUWKHUQ 5RDG														
	/							/26						
	7							/26						
	5							/26						
	X 8							/26						
$SSURD								/26						
$OO 9HK								/26						

6LWH /HYHO RI 6HUYLFH /26 0HWKRG˛ 'HOD\ 57$ 16: 6LWH /26 0HWKRG LV 1HWZRUN
9HKLFOH PRYHPHQW /26 YDOXHV DUH EDVHG RQ DYHUDJH GHOD\ SHU PRYHPHQW
,QWHUVHFWLRQ DQG $SSURDFK /26 YDOXHV DUH EDVHG RQ DYHUDJH GHOD\ IRU
5RXQGDERXW &DSDFLW\ 0RGHO˛ 6,'5$ 6WDQGDUG
6,'5$ 6WDQGDUG 'HOD\ 0RGHO LV XVHG &RQWURO 'HOD\ LQFOXGHV *HRPHWULF
*DS $FFHSWDQFH &DSDFLW\˛ 6,'5$ 6WDQGDUG $NoHOLN 0 '
+9 YDOXHV DUH FDOFXODWHG IRU $OO 0RYHPHQW &ODVVHV RI $OO +HDY\ 9H
/DUJHVW FKDQJH LQ $YHUDJH %DFN RI 4XHXH RU 'HJUHH RI 6DWXUDWLRQ IRU D
1XPEHU RI ,WHUDWLRQV˛ PD[LPXP VSHFLILHG˛

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6LWH> 2OG 1RUWKHUQ 5RDG 9LQH\V 5R 1HWZRUN> 30 3H 1HWZRUN¸>30 3H

2OG 1RUWKHUQ 5RDG 9LQH\V 5RDG
*LYHZD\ <LHOG 7ZR <LHOG 7ZR

0RYHPHQW 3HUIRUPDQFH 9HKLFOHV													
0RY ,'	2' 0RY	'HPDQG) 7R' YHI	+9	$UULYD 7R' YHI	+9	'HJ 6D Y	$YHU 'HOD VH	/HYH 6HU	˝˘	%DFN RI 9HKL YH	'LVWD P	3URS 4XHX	(IIHF\ 6WRS SHU	$YHU 6SHH NP
6RXWK¸ 2OG 1RUWKHUQ 5RDG													
	7	˘˘		˘˘		˘˘		/26					˘˝ ˆ
E	5	˘ˆ	˘	˘ˆ	˘	˘	ˆˆ	/26				˝	˘
$SSURD		˘		˘		˘˘		1$					˘˘
6RXWK(DVW¸ 9LQH\V 5RDG													
E	/					˘		/26				˝ ˝	
D	5						ˆ	/26				˝ ˝	˘
$SSURD		˘		˘		˘		/26				˝ ˝	ˆ
1RUWK¸ 2OG 1RUWKHUQ 5RDG													
ˆD	/	˘		˘		˘˘	˘	/26					˘ˆ ˆ
	7	˘		˘		˘˘		/26					˘˝ ˘
$SSURD		˘ˆ		˘ˆ		˘˘		1$					˘˝ ˘
$OO 9HK		˘ ˆ	˘	˘ ˆ	˘	˘˘		1$					˘˘ ˆ

6LWH /HYHO RI 6HUYLFH /26 0HWKRG¸ 'HOD\ 57$ 16: 6LWH /26 0HWKRG LV VSHFLILHG LQ WKH 1HWZRUN 'DWD GLDORJ (Site tab).
9HKLFOH PRYHPHQW /26 YDOXHV DUH EDVHG RQ DYHUDJH GHOD\ SHU PRYHPHQW
0LQRU 5RDG $SSURDFK /26 YDOXHV DUH EDVHG RQ DYHUDJH GHOD\ IRU DOO YH
1$¸ ,QWHUVHFWLRQ /26 DQG 0DMRU 5RDG $SSURDFK /26 YDOXHV DUH 1RW $SSOLFDEOH IRU WZR ZD\ VLJQ FRQWURO VLQFH WKH DYHUDJH GHOD\ LV QRW
D JRRG /26 PHDVXUH GXH WR]HUR GHOD\V DVVRFLDWHG ZLWK PDMRU URDG PR
6,'5$ 6WDQGDUG 'HOD\ 0RGHO LV XVHG &RQWURO 'HOD\ LQFOXGHV *HRPHWULF
*DS$FFHSWDQFH &DSDFLW\¸ 6,'5$ 6WDQGDUG $NoHOLN 0 '
+9 YDOXHV DUH FDOFXODWHG IRU $OO 0RYHPHQW &ODVVHV RI $OO +HDY\ 9H
/DUJHVW FKDQJH LQ $YHUDJH %DFN RI 4XHXH RU 'HJUHH RI 6DWXUDWLRQ IRU D
1XPEHU RI ,WHUDWLRQV¸ PD[LPXP VSHFLILHG¸

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6LWH˛> E 2OG 1RUWKHUQ 5RDG 1HZ /LQ 1HWZRUN˛>$0 3H 8SJUD

6LJQDO 7LPH &RRUGLQDWHG &\FOH 7LPH 8VHU 1HWZRUN &

0RYHPHQW 3HUIRUPDQFH													
0RY ,'	2' 0RY	'HPDQG) 7R' YHK	+9	$UULYD 7R' YHK	+9	'HJ 6D Y	$YHU 'HOD VH	/HYH 6HUY	˝˘ 9HKL YH	%DFN RI 'LVW P	3UR 4XHX	(IIHF\ 6WRS SHU	$YHU 6SHH NP
6RXWK˛ 1HZ /LQH 5RDG													
	/	ˆ˘		ˆ˘		˘		/26		˝˝	·	·	ˆ
	7	·˘˒	ˆ	·˘˒	ˆ	·˝	˘˝	/26	·				ˆ
	5	·		·		˘	˘˘	/26			˝	˘	˝
$SSURD		˘		˘		·˝	˘	/26	·		˝	˝	·
(DVW˛ 6LWH $FFHVV													
	/	·	ˆ	·	ˆ	ˆ		/26		˘	·	ˆ	˘
˘	7	˘	˘	˘	˘	ˆ	˝	/26		˘	˝	ˆ	
˘	5	˝		˝		ˆ	˘	/26		˘	˝	ˆ	˘
$SSURD		˘˘	˘	˘˘	˘	ˆ	ˆ	/26		˘	˝	ˆ	· ˘
1RUWK˛ 2OG 1RUWKHUQ 5RDG													
ˆ	/			˝		˝	·	/26	˘	˘	˝	·	˘ ·
·	7	ˆ	˘	˘ ˘	˘	˝	˝	/26	˘	˘	·	ˆ	˘
˝	5	˝ ˘		ˆ·		·	˘˝	/26		ˆ		˝	ˆ
$SSURD		˘˝		·[1]		·	˘	/26		ˆ	˝	·	˘ ˝
:HVW˛ 2OG 1RUWKHUQ 5RDG													
	/	·˘		·˘			·	/26	·˘	˘			˘
	7	ˆ	ˆ	ˆ	ˆ	˝	˘˘	/26			˝	ˆ	
	5	˘	˘	˘	˘	˘	˘·	/26	˝	˘ˆ	˝	·	
$SSURD		ˆ		ˆ				/26	·˘	˘	˝		˘ ˆ
$OO 9HK		·		ˆ[1]			˘	/26	·˘	˘	˝	˝	

6LWH /HYHO RI 6HUYLFH /26 0HWKRG˛ 'HOD\ 57$ 16: 6LWH /26 0HWKRG 1HWZ
9HKLFOH PRYHPHQW /26 YDOXHV DUH EDVHG RQ DYHUDJH GHOD\ SHU PRYHPHQ
,QWHUVHFWLRQ DQG $SSURDFK /26 YDOXHV DUH EDVHG RQ DYHUDJH GHOD\ IRU
6,'5$ 6WDQGDUG 'HOD\ 0RGHO LV XVHG &RQWURO 'HOD\ LQFOXGHV *HRPHWULF
*DS $FFHSWDQFH &DSDFLW\˛ 6,'5$ 6WDQGDUG $NoHOLN 0 '
+9 YDOXHV DUH FDOFXODWHG IRU $OO 0RYHPHQW &ODVVHV RI $OO +HDY\ 9H
/DUJHVW FKDQJH LQ $YHUDJH %DFN RI 4XHXH RU 'HJUHH RI 6DWXUDWLRQ IRU D
1XPEHU RI ,WHUDWLRQV˛ PD[LPXP VSHFLILHG˛

1 $UULYDO)ORZ YDOXH LV UHGXFHG GXH WR FDSDFLW\ FRQVWUDLQW DW RYHU

0RYHPHQW 3HUIRUPDQFH 3HGHVWULDQV									
0RY ,'	'HVFULSWLRQ	'HPD)OR SH	$YHU 'HO VH	/HYH 6HU	$YHUDJH 3HGHV SH	%DFN 'LVW P	3UR 4XHX	(IIHFW 6WRS SHU	
3	6RXWK)XOO &URVV	˘	˘	/26			˝	˝˘	
3	(DVW)XOO &URVVL	˘	˘	/26			˝	˝˘	
3	1RUWK)XOO &URVV	˘	˘	/26			˝	˝˘	
3	:HVW)XOO &URVVL	˘	˘	/26			˝	˝˘	

$OO 3HGHVWULDQV ˘ /26 ˝ ˝˘

/HYHO RI 6HUYLFH /26 0HWKRG¸ 6,'5$ 3HGHVWULDQ /26 0HWKRG %DVHG RQ $YHU
3HGHVWULDQ PRYHPHQW /26 YDOXHV DUH EDVHG RQ DYHUDJH GHOD\ SHU SHGHVW
,QWHUVHFWLRQ /26 YDOXH IRU 3HGHVWULDQV LV EDVHG RQ DYHUDJH GHOD\ IRU

6,'5$,17(56(&7,21_&RS\ULJKW ‰ ˆ $NFHOLN DQG $VVRFLDWHV 3URIHVVLRQDO
2UJDQLVDWLRQ¸ *7$ &2168/7,1* 7XHVGD\ ˆ 0DUFK ˙ ˛ ˝ 30
3URMHFW¸ FRP DX?SURMHFWILOHV?3URMHFW)LOHV?GRGHOOLQJ VLG4XDUU\ 5R
'XUDO ˙ 1R 'HYHORSPHQW VLS˙

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6LWH E> E 2OG 1RUWKHUQ 5RDG 4XDUU\ 1HWZRUN> $0 3H 8SJUDG

2OG 1RUWKHUQ 5RDG 4XDUU\ 5RDG
6LJQDO 7LPH &RRUGLQDWHG &\FOH 7LPH 8VHU &RQGV 1HWZRUN &

0RYHPHQW 3HUIRUPDQFH

0RY ,'	2' 0RY	'HPDQG) 7R 'HVW	+9	$UULYDO 7R 'HVW	+9	'HJ 6DW	$YHU 'HOD	/HYH 6HUY	%DFN RI 'LVWL	3UR 4XHX	(IIHF\ 6WRS SHU	$YHU 6SHH NP
6RXWK 2OG 1RUWKHUQ 5RDG												
7								/26				
5								/26				
$SSURD				[1]				/26				
(DVW 4XDUU\ 5RDG												
/								/26				
5								/26				
$SSURD								/26				
1RUWK 2OG 1RUWKHUQ 5RDG												
/								/26				
7								/26				
$SSURD				[1]				/26				
$OO 9HK				[1]				/26				

6LWH /HYHO RI 6HUYLFH /26 0HWKRG 'HOD\ 57$ 16: 6LWH 9HKLFOH PRYHPHQW /26 YDOXHV DUH EDVHG RQ DYHUDJH GHOD\ SHU PRYHPHQ ,QWHUVHFWLRQ DQG $SSURDFK /26 YDOXHV DUH EDVHG RQ DYHUDJH GHOD\ IRU 6,'5$ 6WDQGDUG 'HOD\ 0RGHO LV XVHG &RQWURO 'HOD\ LQFOXGHV *HRPHWULF *DS $FFHSWDQFH &DSDFLW\ 6,'5$ 6WDQGDUG $NHOLN 0 ' +9 YDOXHV DUH FDOFXODWHG IRU $OO 0RYHPHQW &ODVVHV RI $OO +HDY\ 9H /DUJHVW FKDQJH LQ $YHUDJH %DFN RI 4XHXH RU 'HJUHH RI 1XPEHU RI ,WHUDWLRQV PD[LPXP VSHFLILHG

1 $UULYDO)ORZ YDOXH LV UHGXFHG GXH WR FDSDFLW\ FRQVWUDLQW DW RYHU

0RYHPHQW 3HUIRUPDQFH

0RY ,'	'HVFULSWLRQ	'HPD)OR SH	$YHU 'HOD	/HYH 6HU	$YHUDJH 3HGHV SH	%DFN 'LVWL P	3UR 4XHX	(IIHF 6WRS SHU
3	6RXWK)XOO &URVV			/26				
3	(DVW)XOO &URVVL			/26				
$OO 3HGHVWULDQV				/26				

/HYHO RI 6HUYLFH /26 0HWKRG 6,'5$ 3HGHVWULDQ /26 0HWKRG %DVHG RQ $YHU 3HGHVWULDQ PRYHPHQW /26 YDOXHV DUH EDVHG RQ DYHUDJH GHOD\ SHU SHGHV ,QWHUVHFWLRQ /26 YDOXH IRU 3HGHVWULDQV LV EDVHG RQ DYHUDJH GHOD\ IRU

6,'5$,17(56(&7,21 &RS\ULJKW $FFHOLN DQG $VVRFLDWHV 2UJDQL]DWLRQ *7$ &HQWHU 7XHVGD\ 0DUFK 3URMHFW FRP DX?SURMHFWILOHV? 'XDO 1R 'HYHORSPHQW VLS 4XDUU\ 5RDG

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6LWH 2OG 1RUWKHUQ 5RDG 9LQH\V 5R 1HWZR1UN >$0 3K 8SJUDG

2OG 1RUWKHUQ 5RDG 9LQH\V 5RDG
*LYHZD\ <LHOG 7ZR

0RYHPHQW 3HUIRUPDQFH

0RY ,'	2' 0RY	'HPDQG 7R YH	) +9	$UULYD 7R YH	+9	'HJ 6D Y	$YHU 'HO[V+	/HYH 6HU\	˜˜ %DFN RI 9HKL YH	'LVWI P	3UR 4XHX	(IIHF\ 6WRS SHU	$YHU 6SHH NP
6RXWK 2OG 1RUWKHUQ 5RDG													
	7							/26					˜˝
	E 5							/26					
$SSURD				˝^[1]				1$					˜
6RXWK(DVW 9LQH\V 5RDG													
	E /							/26					
	D 5							/26					
$SSURD								/26					
1RUWK 2OG 1RUWKHUQ 5RDG													
	^D /							/26					
	7							/26					
$SSURD								1$					
$OO 9H				˜^[1]				1$					

6LWH /HYHO RI 6HUYLFH /26 0HWKRG 'HOD\ 57$ 16: 6LWH 9HKLFOH PRYHPHQW /26 YDOXHV DUH EDVHG RQ DYHUDJH GHOD\ SHU PRYHPHQ 0LQRU 5RDG $SSURDFK /26 YDOXHV DUH EDVHG RQ DYHUDJH GHOD\ IRU DOO YH 1$,QWHUVHFWLRQ /26 DQG 0DMRU 5RDG $SSURDFK D JRRG /26 PHDVXUH GXH WR]HUR GHOD\V DVVRFLDWHG ZLWK PDMRU URDG PR 6,'5$ 6WDQGDUG 'HOD\ 0RGHO LV XVHG &RQWURO 'HOD\ LQFOXGHV *HRPHWULF *DS$FFHSWDQFH &DSDFLW\ 6,'5$ 6WDQGDUG $NHOLN 0 ' +9 YDOXHV DUH FDOFXODWHG IRU $OO 0RYHPHQW &ODVVHV RI $OO +HDY\ 9H /DUJHVW FKDQJH LQ $YHUDJH %DFN RI 4XHXH RU 'HJUHH RI 1XPEHU RI ,WHUDWLRQV PD[LPXP VSHFLILHG

1 $UULYDO)ORZ YDOXH LV UHGXFHG GXH WR FDSDFLW\ FRQVWUDLQW DW RYHU

6,'5$,17(56(&7,21 &RS\ULJKW ‰ $NFHOLN DQG $VVRFLDWHV 2UJDQL]DWLRQ FRP 3URMHFW DX?SURMHFWILOHV? 'XUDO 1R 'HYHORSPHQW VLS 4XDUU\ 5R

029(0(17 6800$5<

6LWH˛> E 2OG 1RUWKHUQ 5RDG 1HZ /LQ 1HWZRUN˛>30 3H 8SJUDG

6LJQDOV) L[HG 7LPH &RRUGLQDWHG &\FOH 7LPH 3KDVH 7LPLQJ 8VHU

0RY ,'	2' 0RY	'HPDQG)7R' YHK	+9	$UULYD 7R' YHK	+9	'HJ 6DW Y	$YHU 'HOD VH	/HYH 6HU	˝˘ %DFN RI 9HKL YH	'LVWD P	3URS 4XHX	(IIHF 6WRS SHU	$YHUD 6SHH NP
6RXWK˛ 1HZ /LQH 5RDG													
	/	·	ˆ	·	ˆ	˘˝		/26		·˝	·	·	·
	7	˘ˆ	˝	˘ˆ	˝	ˆ˘	·	/26	·	·	˝	·	ˆ
	5					˘	ˆ	/26				ˆ	·
$SSURD		˝	·	˝	·	ˆ˘	·	/26	·	·	˝	·	˘
(DVW˛ 6LWH $FFHVV													
	/	·	·	·	·	˘	˝	/26	·	˘˘	˝	ˆ	
˘	7					˘	˘	/26	·	˘˘	˝	ˆ	˝
˘	5	˘		˘		˘	˘	/26	ˆ	˘˘	˝	ˆ	
$SSURD		˘		˘		˘	˘	/26	·	˘˘	˝	ˆ	·
1RUWK˛ 2OG 1RUWKHUQ 5RDG													
ˆ	/	˘˘		˘˘		˝		/26	˘		ˆ	ˆ	··
·	7	ˆ˘		ˆ˘		˝		/26	˘		ˆ	˘	ˆ˘
˝	5	ˆˆ		ˆˆ		·	˘·	/26		˘˝		·	·
$SSURD		˘		˘		·	˘	/26		˘˝	·	ˆ	·
:HVW˛ 2OG 1RUWKHUQ 5RDG													
	/	˘˘		˘˘		ˆ˝		/26			·	·	˝
	7	˘˘		˘˘		˝	˘	/26			·	ˆ	ˆ
	5	˘	ˆ	˘	ˆ	·	˘	/26	˘			˝	˝
$SSURD		ˆ		ˆ		·	˘	/26			˝	·	·˝
$OO 9HK						·		/26			˝	·	·˘

6LWH /HYHO RI 6HUYLFH /26 0HWKRG˛ 'HOD\ 57$ 16: 6LWH /26 0HWKRG LV 1HWZ
9HKLFOH PRYHPHQW /26 YDOXHV DUH EDVHG RQ DYHUDJH GHOD\ SHU PRYHPHQ
,QWHUVHFWLRQ DQG $SSURDFK /26 YDOXHV DUH EDVHG RQ DYHUDJH GHOD\ IRU
6,'5$ 6WDQGDUG 'HOD\ 0RGHO LV XVHG &RQWURO 'HOD\ LQFOXGHV *HRPHWULF
*DS$FFHSWDQFH &DSDFLW\˛ 6,'5$ 6WDQGDUG $NoHOLN 0 '
+9 YDOXHV DUH FDOFXODWHG IRU $OO 0RYHPHQW &ODVVHV RI $OO +HDY\ 9H
/DUJHVW FKDQJH LQ $YHUDJH %DFN RI 4XHXH RU 'HJUHH RI 6DWXUDWLRQ IRU D
1XPEHU RI ,WHUDWLRQV˛ ˘ PD[LPXP VSHFLILHG˛

0RY ,'	'HVFULSWLRQ	'HPD)OR SH	$YHU 'HOD VH	/HYH 6HU	$YHUDJH 3HGHV SH	%DFN 'LVWD P	3URS 4XHX	(IIHFW 6WRS SHU
3	6RXWK)XOO &URVV	˘	˘	/26			˝	˝˘
3	(DVW)XOO &URVVL	˘	˘	/26			˝	˝˘
3	1RUWK)XOO &URVV	˘	˘	/26			˝	˝˘
3	:HVW)XOO &URVVL	˘	˘	/26			˝	˝˘
$OO 3HGHVWULDQV			˘	/26			˝	˝˘

/HYHO RI 6HUYLFH /26 0HWKRG¸ 6,'5$ 3HGHVWULDQ /26 0HWKRG %DVHG RQ $YHU
3HGHVWULDQ PRYHPHQW /26 YDOXHV DUH EDVHG RQ DYHUDJH GHOD\ SHU SHGHV\
,QWHUVHFWLRQ /26 YDOXH IRU 3HGHVWULDQV LV EDVHG RQ DYHUDJH GHOD\ IRU

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6LWH> E 2OG 1RUWKHUQ 5RDG 4XDUU\ 1HWZRUN> 30 3H 8SJUD

2OG 1RUWKHUQ 5RDG 4XDUU\ 5RDG
6LJQDOV 0L[HG 7LPH &RRUGLQDWHG &\FOH 7LPH 8VHU*LYHQ 1HWZRUN &

0RY ,'	2' 0RY	'HPDQG)ORZV 7RWDO YHK	+9	$UULYDO)ORZV 7RWDO YHK	+9	'HJ 6DWQ Y	$YHUDJH 'HOD\ VHF	/HYHO RI 6HUYLFH	9HKLFOHV YHK	'LVWDQFH P	3URS 4XHXHG	(IIHFWLYH 6WRS 5DWH SHU	$YHU 1R &\FOHV	$YHUDJH 6SHHG NP
6RXWK 2OG 1RUWKHUQ 5RDG														
	7	˝	ˆ	˝	ˆ		˘	/26	˘					˝
	5	ˆ		ˆ		˘˘	˘	/26	ˆ	˘	˝	ˆ		
$SSURDFK		˝˙	˘	˝˙	˘	˘˘		/26	˘		˘			
(DVW 4XDUU\ 5RDG														
	/	ˆ		ˆ		˘		/26	˙		˝	˙	˘	
˘	5	˘˘		˘˘			˘	/26			˝	ˆ	˝	
$SSURDFK		ˆ		ˆ		˘		/26	˙		˝	˙	ˆ	
1RUWK 2OG 1RUWKHUQ 5RDG														
ˆ	/	˘˙		˘˙		˘˝		/26		ˆ	˘	˘	˘	
˙	7					˘˝	ˆ	/26		ˆ	˘	˘	˙	
$SSURDFK		˝ˆ		˝ˆ		˘˝	ˆ	/26		ˆ	˘	˘	˙ ˙	
$OO 9HK						˘		/26		ˆ	˘	˘		

6LWH /HYHO RI 6HUYLFH /26 0HWKRG> 'HOD\ 57$ 16: 6LWH /26 0HWKRG 1HWZRUN
9HKLFOH PRYHPHQW /26 YDOXHV DUH EDVHG RQ DYHUDJH GHOD\ SHU PRYHPHQW
,QWHUVHFWLRQ DQG $SSURDFK /26 YDOXHV DUH EDVHG RQ DYHUDJH GHOD\ IRU
6,'5$ 6WDQGDUG 'HOD\ 0RGHO LV XVHG &RQWURO 'HOD\ LQFOXGHV *HRPHWULF
*DS$FFHSWDQFH &DSDFLW\> 6,'5$ 6WDQGDUG $NoHOLN 0 '
+9 YDOXHV DUH FDOFXODWHG IRU $OO 0RYHPHQW &ODVVHV RI $OO +HDY\ 9H
/DUJHVW FKDQJH LQ $YHUDJH %DFN RI 4XHXH RU 'HJUHH RI 6DWXUDWLRQ IRU D
1XPEHU RI ,WHUDWLRQV> ˘ PD[LPXP VSHFLILHG>

0RY ,'	'HVFULSWLRQ	'HPDQG)ORZ SHG	$YHUDJH 'HOD\ VHF	/HYHO RI 6HUYLFH	$YHUDJH %DFN RI 4XHXH 3HGHVWULDQ SHG	'LVWDQFH P	3URS 4XHXHG	(IIHFWLYH 6WRS 5DWH SHU
3	6RXWK)XOO &URVVLQJ	˘	˘	/26			˝	˝˘
3	(DVW)XOO &URVVLQJ	˘	˘	/26			˘	˘
$OO 3HGHVWULDQV		˘		/26			ˆ	ˆ

/HYHO RI 6HUYLFH /26 0HWKRG> 6,'5$ 3HGHVWULDQ /26 0HWKRG %DVHG RQ $YHUDJH
3HGHVWULDQ PRYHPHQW /26 YDOXHV DUH EDVHG RQ DYHUDJH GHOD\ SHU SHGHVWULDQ
,QWHUVHFWLRQ /26 YDOXH IRU 3HGHVWULDQV LV EDVHG RQ DYHUDJH GHOD\ IRU

029(0(17 6800$5<

6LWH˛ 2OG 1RUWKHUQ 5RDG 9LQH\V 5R 1HWZRUN˛ >30 3H 8SJUDG

2OG 1RUWKHUQ 5RDG 9LQH\V 5RDG
*LYHZD\ <LHOG 7ZR

0RYHPHQW 3HUIRUPDQFH													
0RY ,'	2' 0RY	'HPDQG) 7R' YHK	+9	$UULYD 7R' YHK	+9	'HJ 6D Y	$YHU 'HOD VH	/HYH 6HU	˝ˇ 9HKL YH	%DFN RI 'LVWD P	3UR 4XHX	(IIHF 6WRS SHU	$YHU 6SHH NP
6RXWK˛ 2OG 1RUWKHUQ 5RDG													
	7	ˇˇ		ˇˇ		ˇˇ		/26					ˇ˝ ˆ
E	5	ˇ˄	ˇ	ˇ˄	ˇ	ˇ	ˆˇ	/26			˝		ˇ
$SSURD			ˇ		ˇ	ˇˇ		1$					ˇˇ
6RXWK(DVW˛ 9LQH\V 5RDG													
E	/					ˇ		/26			˝	˝	
D	5							/26			˝	˝	
$SSURD		ˇ		ˇ		ˇ		/26			˝	˝	˝
1RUWK˛ 2OG 1RUWKHUQ 5RDG													
ˆD	/	ˇ		ˇ		ˇˇ	ˇ	/26					ˇˆ ˆ
	7	ˇ		ˇ		ˇˇ		/26					ˇ˝ ˇ
$SSURD		ˇ˄		ˇ˄		ˇˇ		1$					ˇ˝ ˇ
$OO 9HK		ˇ ˄	ˇ	ˇ ˄	ˇ	ˇˇ		1$					ˇˇ ˆ

6LWH /HYHO RI 6HUYLFH /26 0HWKRG˛ 'HOD\ 57$ 16: 6LWH /26 0HWKRG 1HWZRUN
9HKLFOH PRYHPHQW /26 YDOXHV DUH EDVHG RQ DYHUDJH GHOD\ SHU PRYHPHQ
0LQRU 5RDG $SSURDFK /26 YDOXHV DUH EDVHG RQ DYHUDJH GHOD\ IRU DOO YH
1$˛ ,QWHUVHFWLRQ /26 DQG 0DMRU 5RDG $SSURDFK /26 YDOXHV DUH 1RW $SSOLF
D JRRG /26 PHDVXUH GXH WR]HUR GHOD\V DVVRFLDWHG ZLWK PDMRU URDG PR
6,'5$ 6WDQGDUG 'HOD\ 0RGHO LV XVHG &RQWURO 'HOD\ LQFOXGHV *HRPHWULF
*DS $FFHSWDQFH &DSDFLW\˛ 6,'5$ 6WDQGDUG $NoHOLN 0 '
+9 YDOXHV DUH FDOFXODWHG IRU $OO 0RYHPHQW &ODVVHV RI $OO +HDY\ 9H
/DUJHVW FKDQJH LQ $YHUDJH %DFN RI 4XHXH RU 'HJUHH RI 6DWXUDWLRQ IRU D
1XPEHU RI ,WHUDWLRQV˛ ˇ PD[LPXP VSHFLILHG˛

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6LWH E> E 2OG 1RUWKHUQ 5RDG 1HZ /LQH 5RDG 1HWZRUN> $0 3K)XUWKHU 8SJUDGHV@

6LJQDOL]HG 7LPH &RRUGLQDWHG &\FOH*7LPH 3KDVH7RO3V 8VHU

0RYHPHQW 3HUIRUPDQFHV

0RY ,'	2' 0RY	'HPDQG) 7R YH+	$UULYD +9 7R YH+	+9	'HJ 6DY	$YHU 'HO[V+	/HYH 6HU\	~~ 9HKL	%DFN RI 'LVWL P	3UR 4XHX	(IIHF\ 6WRS SHU	$YHU 6SHH NP
6RXWK¸ 1HZ /LQH 5RDG												
	/	^~	^~		~~		/26		~	·	·	
	7	·~´ ^	·~´ ^		″	~~	/26		~			″
	5	·	·		~	~~	/26			″	~	″
$SSURD		~	~		″	~	/26		~	″		^
(DVW¸ 6LWH $FFHVV												
	/	· ^	· ^		^		/26		~	·	^	~
~	7	~ ~	~ ~		^	″	/26		~	″	^	
~	5	″	″		^	~	/26		~	″	^	~
$SSURD		~~ ~	~~ ~		^	^	/26		~	″	^	· ~
1RUWK¸ 2OG 1RUWKHUQ 5RDG												
^	/					~	/26	·		·	·	^ ~
·	7	^ ~	^ ~			″	/26	·	^	·	^	~
″	5	″ ~	″ ~		·~	^	/26	·			″	~
$SSURD		~″	~″		·~	~	/26	·		″	·	~ ·
:HVW¸ 2OG 1RUWKHUQ 5RDG												
	/	·~	·~		^″		/26	·	″	^	·	″ ~
	7	^ ^	^ ^		″	~~	/26			″	^	
	5	~ ~	~ ~		~	~·	/26	″	~^	″	·	
$SSURD		^	^		^″	″	/26	·	″	·	·	″ ^
$OO 9HK		·	·		″	·	/26		~	″	·	^

6LWH /HYHO RI 6HUYLFH /26 0HWKRG¸ 'HOD\ 57$ 16: 6LWHW/26 GLHDOKRRG 1HWZS
9HKLFOH PRYHPHQW /26 YDOXHV DUH EDVHG RQ DYHUDJH GHOD\ SHU PRYHPHQ
,QWHUVHFWLRQ DQG $SSURDFK /26 YDOXHV DUH EDVHG RQ DYHUDJH GHOD\ IRU
6,'5$ 6WDQGDUG 'HOD\ 0RGHO LV XVHG &RQWURO 'HOD\ LQFOXGHV *HRPHWULF
*DS$FFHSWDQFH &DSDFLW¸ 6,'5$ 6WDQGDUG $NoHOLN 0 '
+9 YDOXHV DUH FDOFXODWHG IRU $OO 0RYHPHQW &ODVVHV RI $OO +HDY\ 9H
/DUJHVW FKDQJH LQ $YHUDJH %DFN RI 4XHXH RU 'HJUHH RI LWDWXWLRQ IRU D
1XPEHU RI ,WHUDWLRQV¸ ^ PD[LPXP VSHFLILHG¸

0RYHPHQW 3HUIRUPDQFHV

0RY ,'	'HVFULSWLRQ	'HPD)OR SH(	$YHU 'HO[V+	/HYH 6HU\	$YHUDJH 3HGHV S+	%DFN 'LVWL P	3UR 4XHX	(IIHF 6WRS SHU
3	6RXWK)XOO &URVV	~	~	/26			″	″~
3	(DVW)XOO &URVVL(	~	~	/26			″	″~
3	1RUWK)XOO &URVV	~	~	/26			″	″~
3	:HVW)XOO &URVVL(	~	~	/26			″	″~
$OO 3HGHVWULDQV			~	/26			″	″~

/HYHO RI 6HUYLFH /26 0HWKRG¸ 6,'5$ 3HGHVWULDQ /26 0HWKRG %DVHG RQ $YHU
3HGHVWULDQ PRYHPHQW /26 YDOXHV DUH EDVHG RQ DYHUDJH GHOD\ SHU SHGHVW\
,QWHUVHFWLRQ /26 YDOXH IRU 3HGHVWULDQV LV EDVHG RQ DYHUDJH GHOD\ IRU

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6LWH [illegible] E 2OG 1RUWKHUQ 5RDG)XWXUH 8SJUDGHV@ 1HWZRUN [illegible] $0 3HDN)XWXUH 8S[illegible]

2OG 1RUWKHUQ 5RDG 4XDUU\ 5RDG
6LJQDOV)L[HG 7LPH &RRUGLQDWHG &\FOH 7LPH 8VHU*LYHQ 1HWZRUN [illegible]

0RYHPHQW 3HUIRUPDQFH 9HKLFOHV													
0RY ,'	2' 0RY	'HPDQG) 7RW YHK	+9	$UULYD 7RW YHK	+9	'HJ 6DW Y	$YHU 'HOD VH	/HYH 6HUY	%DFN RI 9HKL YH	'LVWD P	3URS 4XHX	(IIHFW 6WRS SHU	$YHU 6SHH NP
6RXWK 2OG 1RUWKHUQ 5RDG													
	7							/26					
	5							/26					
$SSURD								/26					
(DVW 4XDUU\ 5RDG													
	/							/26					
	5							/26					
$SSURD								/26					
1RUWK 2OG 1RUWKHUQ 5RDG													
	/							/26					
	7							/26					
$SSURD								/26					
$OO 9HK								/26					

6LWH /HYHO RI 6HUYLFH /26 0HWKRG 'HOD\ 57$ 16: 6LWH /26 0HWKRG 1HWZRUN
9HKLFOH PRYHPHQW /26 YDOXHV DUH EDVHG RQ DYHUDJH GHOD\ SHU PRYHPHQ
,QWHUVHFWLRQ DQG $SSURDFK /26 YDOXHV DUH EDVHG RQ DYHUDJH GHOD\ IRU
6,'5$ 6WDQGDUG 'HOD\ 0RGHO LV XVHG &RQWURO 'HOD\ LQFOXGHV *HRPHWULF
*DS$FFHSWDQFH &DSDFLW\ 6,'5$ 6WDQGDUG $NoHOLN 0 '
+9 YDOXHV DUH FDOFXODWHG IRU $OO 0RYHPHQW &ODVVHV RI $OO +HDY\ 9H
/DUJHVW FKDQJH LQ $YHUDJH %DFN RI 4XHXH RU 'HJUHH RI 6DWXUDWLRQ IRU D
1XPEHU RI ,WHUDWLRQV PD[LPXP VSHFLILHG

0RYHPHQW 3HUIRUPDQFH 3HGHVWULDQV								
0RY ,'	'HVFULSWLRQ	'HPD)OR SH	$YHU 'HOD VH	/HYH 6HUY	$YHUDJH 3HGHV SH	%DFN 'LVWD P	3URS 4XHX	(IIHFW 6WRS SHU
3	6RXWK)XOO &URVV			/26				
3	(DVW)XOO &URVVL			/26				
$OO 3HGHVWULDQV				/26				

/HYHO RI 6HUYLFH /26 0HWKRG 6,'5$ 3HGHVWULDQ /26 0HWKRG %DVHG RQ $YHU
3HGHVWULDQ PRYHPHQW /26 YDOXHV DUH EDVHG RQ DYHUDJH GHOD\ SHU SHGHV
,QWHUVHFWLRQ /26 YDOXH IRU 3HGHVWULDQV LV EDVHG RQ DYHUDJH GHOD\ IRU

029(0(17 6800$5<

6LWH>¸ 2OG 1RUWKHUQ 5RDG 9LQH\V 5RDG 8SJUDGHV@)XUWKHU 5H 1HWZRUN¸>$0 3H)XUWKHU 8S

2OG 1RUWKHUQ 5RDG 9LQH\V 5RDG
*LYHZD\ <LHOG 7ZR

0RYHPHQW 3HUIRUPDQFH 9HKLFOHV													
0RY ,'	2' 0RY	'HPDQG 7R' YHK	) +9	$UULYD 7R' YHK	+9	'HJ 6D Y	$YHU 'HOD VH	/HYH 6HUY		%DFN RI 9HKL YH	'LVWL P	3UR 4XHX	(IIHF\ 6WRS SHU	$YHUD 6SHH NP
6RXWK¸ 2OG 1RUWKHUQ 5RDG														
	7						˘	/26						˘˝ ˆ
E	5						˘	/26			ˆ	˝		
$SSURD						˘		1$			ˆ			˘
6RXWK(DVW¸ 9LQH\V 5RDG														
E	/	˝		˝			˘	/26			˘	˝		
D	5	˘		˘			˘	/26				˝	˝	˘
$SSURD		˘		˘				/26			˘	˝		˘ ˘
1RUWK¸ 2OG 1RUWKHUQ 5RDG														
ˆD	/	ˆ		˝		ˆ˘	˘	/26						˘ˆ ˘
	7	ˆ	˘	ˆ	˘	ˆ˘		/26						˘˝
$SSURD		ˆ	˘	ˆ	˘	ˆ˘		1$						˘˝
$OO 9HK		˘˝	˘	˘˝	˘	ˆ˘		1$			ˆ			˘ˆ

6LWH /HYHO RI 6HUYLFH /26 0HWKRG¸ 'HOD\ 57$ 16: 6LWH /26 0HWKRG 1HWZRUN
9HKLFOH PRYHPHQW /26 YDOXHV DUH EDVHG RQ DYHUDJH GHOD\ SHU PRYHPHQ
0LQRU 5RDG $SSURDFK /26 YDOXHV DUH EDVHG RQ DYHUDJH GHOD\ IRU DOO YH
1$¸ ,QWHUVHFWLRQ /26 DQG 0DMRU 5RDG $SSURDFK /26 YDOXHV DUH QRW DSSOLF
D JRRG /26 PHDVXUH GXH WR]HUR GHOD\V DVVRFLDWHG ZLWK PDMRU URDG PR
6,'5$ 6WDQGDUG 'HOD\ 0RGHO LV XVHG &RQWURO 'HOD\ LQFOXGHV *HRPHWULF
*DS $FFHSWDQFH &DSDFLW\¸ 6,'5$ 6WDQGDUG $NoHOLN 0 '
+9 YDOXHV DUH FDOFXODWHG IRU $OO 0RYHPHQW &ODVVHV RI $OO +HDY\ 9H
/DUJHVW FKDQJH LQ $YHUDJH %DFN RI 4XHXH RU 'HJUHH RI 6DWXUDWLRQ IRU D
1XPEHU RI ,WHUDWLRQV¸ ˆ PD[LPXP VSHFLILHG¸

029(0(17 6800$5<

6LWH E> E 2OG 1RUWKHUQ 5RDG 1HXUWRQ 8SJUDGHV@ 1HWZRUN>30 3K)XUWKHU 8S

6LJQD0LVHG 7LPH &RRUGLQDWHG &\FOH7LPH 3KDVH7RS8V 8VHU

0RYHPHQW 3HUIRUPDQFH

0RY ,'	2' 0RY	'HPDQG 7R YH	) +9	$UULYD 7R YH	+9	'HJ 6DY	$YHU 'HO[Vł	/HYH 6HU`	~~ %DFN RI 9HKL YŁ	'LVWI P	3UR 4XHX	(IIHF\ 6WRS SHU	$YHU 6SHH NP
6RXWK¸ 1HZ /LQH 5RDG													
	/	·	^	·	^	˘˝		/26		· ˝	·	·	·
	7	˘ ^	˝	˘ ^	˝	^˘	·	/26	·	·	˝	·	·
	5					˘	^	/26				^	·
$SSURD		˝	·	˝	·	^˘	·	/26	·	·	˝	·	˘
(DVW¸ 6LWH $FFHVV													
	/	·	·	·	·	˘	˝	/26	·	˘˘	˝	^	
˘	7					˘	˘	/26	·	˘˘	˝	^	˝
˘	5	˘	·	˘	·	˘	˘	/26	^	˘˘	˝	^	
$SSURD		˘	·	˘	·	˘	˘	/26	·	˘˘	˝	^	·
1RUWK¸ 2OG 1RUWKHUQ 5RDG													
^	/	˘˘		˘˘		˝		/26	·	˘	˘	˘	˝ ˘
·	7	^˘	·	^˘	·	˝	·	/26	˘		^	˘	^ ˝
˝	5	^^		^^		·	˘·	/26	·	˘˝		˝	
$SSURD		˘	·	˘	·	·	˘	/26	·	˘˝	·	^	·
:HVW¸ 2OG 1RUWKHUQ 5RDG													
	/	˘˘		˘˘		˘	˘	/26		·	˘	^	^
	7	˘˘		˘˘		˝	˘	/26		·	^	^	
	5	˘	^	˘	^	·	˘	/26	˘		˝	˝	
$SSURD		^	·	^	·	·		/26	˘		·	·	
$OO 9HK			·		·			/26	·	˘˝	·	·	· ˝

6LWH /HYHO RI 6HUYLFH /26 0HWKRG¸ 'HOD\ 57$ 16: 6LWH W/26 GLHDWKRRG 1HWZS
9HKLFOH PRYHPHQW /26 YDOXHV DUH EDVHG RQ DYHUDJH GHOD\ SHU PRYHPHQ
,QWHUVHFWLRQ DQG $SSURDFK /26 YDOXHV DUH EDVHG RQ DYHUDJH GHOD\ IRU
6,'5$ 6WDQGDUG 'HOD\ 0RGHO LV XVHG &RQWURO 'HOD\ LQFOXGHV *HRPHWULF
*DS$FFHSWDQFH &DSDFLW¸ 6,'5$ 6WDQGDUG $NoHOLN 0 '
+9 YDOXHV DUH FDOFXODWHG IRU $OO 0RYHPHQW &ODVVHV RI $OO +HDY\ 9H
/DUJHVW FKDQJH LQ $YHUDJH %DFN RI 4XHXH RU 'HJUHH RI WDWXDWLRQ IRU D
1XPEHU RI ,WHUDWLRQV¸ ˘ PD[LPXP VSHFLILHG¸

0RYHPHQW 3HUIRUPDQFH 6XPPDULHV

0RY ,'	'HVFULSWLRQ	'HPD)OR SH(	$YHU 'HO[Vł	/HYH 6HU`	$YHUDJH 3HGHV Sł	%DFN 'LVWI P	3UR 4XHX	(IIHFW 6WRS SHU
3	6RXWK)XOO &URVV	˘	˘	/26			˝	˝˘
3	(DVW)XOO &URVVL(	˘	˘	/26			˝	˝˘
3	1RUWK)XOO &URVV	˘	˘	/26			˝	˝˘
3	:HVW)XOO &URVVL(	˘	˘	/26			˝	˝˘
$OO 3HGHVWULDQV			˘	/26			˝	˝˘

/HYHO RI 6HUYLFH /26 0HWKRG¸ 6,'5$ 3HGHVWULDQ /26 0HWKRG %DVHG RQ $YHU
3HGHVWULDQ PRYHPHQW /26 YDOXHV DUH EDVHG RQ DYHUDJH GHOD\ SHU SHGHV\
,QWHUVHFWLRQ /26 YDOXH IRU 3HGHVWULDQV LV EDVHG RQ DYHUDJH GHOD\ IRU

029(0(17 6800$5<

6LWH˛> E 2OG 1RUWKHUQ 5RDG)XWXUH 8SJUDGHV@ — 1HWZRUN˛>30 3HDN)XWXUH 8SJUDGHV@

2OG 1RUWKHUQ 5RDG 4XDUU\ 5RDG
6LJQDOLVHG)L[HG 7LPH &RRUGLQDWHG &\FOH 7LPH 8VHU*LYHQ 1HWZRUN &

0RYHPHQW 3HUIRUPDQFH 9HKLFOHV

0RY ,'	2' 0RY	'HPDQG) 7RW YHK	+9	$UULYD 7RW YHK	+9	'HJ 6DW Y	$YHU 'HOD VH	/HYH 6HUY	˝˘ 9HKL YH	%DFN RI 'LVWD P	3URS 4XHX	(IIHF\ 6WRS SHU	$YHUD 6SHH NP
6RXWK˛ 2OG 1RUWKHUQ 5RDG													
	7	˝	ˆ	˝	ˆ		˘	/26		ˆ			˘
	5	ˆ		ˆ			˝	/26	˘		˙	ˆ	ˆ
$SSURD		˝˙	˘	˝˙	˘			/26		ˆ			˘
(DVW˛ 4XDUU\ 5RDG													
	/	ˆ		ˆ		˘˘	ˆ	/26	ˆ		˙	˙	ˆ
˘	5	˘˘		˘˘			˘	/26			˝	ˆ	
$SSURD		ˆ		ˆ		˘˘		/26	ˆ		˙	˙	˘
1RUWK˛ 2OG 1RUWKHUQ 5RDG													
ˆ	/	˘˙		˘˙				/26		ˆ	˘	˘	˘
˙	7						ˆ	/26	˘	˝	˘	˘	ˆ ˝
$SSURD		˝ˆ		˝ˆ			˙	/26	˘	˝	˘	˘	˙
$OO 9HK						˘˘	˙	/26	ˆ		˘	˘	ˆ

6LWH /HYHO RI 6HUYLFH /26 0HWKRG˛ 'HOD\ 57$ 16: 6LWH /26 0HWKRG 1HWZRUN
9HKLFOH PRYHPHQW /26 YDOXHV DUH EDVHG RQ DYHUDJH GHOD\ SHU PRYHPHQ
,QWHUVHFWLRQ DQG $SSURDFK /26 YDOXHV DUH EDVHG RQ DYHUDJH GHOD\ IRU
6,'5$ 6WDQGDUG 'HOD\ 0RGHO LV XVHG &RQWURO 'HOD\ LQFOXGHV *HRPHWULF
*DS$FFHSWDQFH &DSDFLW\˛ 6,'5$ 6WDQGDUG $NoHOLN 0 '
+9 YDOXHV DUH FDOFXODWHG IRU $OO 0RYHPHQW &ODVVHV RI $OO +HDY\ 9H
/DUJHVW FKDQJH LQ $YHUDJH %DFN RI 4XHXH RU 'HJUHH RI 6DWXUDWLRQ IRU D
1XPEHU RI ,WHUDWLRQV˛ ˘ PD[LPXP VSHFLILHG˛

0RYHPHQW 3HUIRUPDQFH 3HGHVWULDQV

0RY ,'	'HVFULSWLRQ	'HPD)OR SH(	$YHU 'HOD VH	/HYH 6HUY	$YHUDJH 3HGHV SH	%DFN 'LVWD P	3URS 4XHX	(IIHFW 6WRS SHU
3	6RXWK)XOO &URVV	˘	˘	/26			˝	˝˘
3	(DVW)XOO &URVVL(	˘	˙	/26			˘	˘˘
$OO 3HGHVWULDQV		˘	˘	/26			ˆ	ˆ˘

/HYHO RI 6HUYLFH /26 0HWKRG˛ 6,'5$ 3HGHVWULDQ /26 0HWKRG %DVHG RQ $YHU
3HGHVWULDQ PRYHPHQW /26 YDOXHV DUH EDVHG RQ DYHUDJH GHOD\ SHU SHGHV\
,QWHUVHFWLRQ /26 YDOXH IRU 3HGHVWULDQV LV EDVHG RQ DYHUDJH GHOD\ IRU

029(0(17 6800$5<

6LWH>¸ 2OG 1RUWKHUQ 5RDG 9LQH\V 5RDG 8SJUDGHV@ | 1HWZRUN¸ >30 3HDN)XUWKHU 8SJUDGHV@

2OG 1RUWKHUQ 5RDG 9LQH\V 5RDG
*LYHZD\ <LHOG 7ZR

0RYHPHQW 3HUIRUPDQFH 9HKLFOHV												
0RY ,'	2' 0RY	'HPDQG) 7RW YHK	+9	$UULYD 7RW YHK	+9	'HJ 6DW Y	$YHU 'HOD VH	/HYH 6HUY	˝˘ 9HKL YH	%DFN RI 'LVWD P	3URS 4XHX	(IIHF 6WRS SHU	$YHUD 6SHH NP
6RXWK¸ 2OG 1RUWKHUQ 5RDG													
	7	˘˘		˘˘		˘˘		/26					˘˝ ˆ
E	5	˘˄	˘	˘˄	˘	˘	ˆˆ	/26			˝		˘
$SSURD			˘		˘	˘˘		1$					˘˘
6RXWK(DVW¸ 9LQH\V 5RDG													
E	/					˘		/26			˝	˝	
D	5						˘	/26				˝	
$SSURD		˘		˘		˘		/26				˝	
1RUWK¸ 2OG 1RUWKHUQ 5RDG													
ˆD	/	˘		˘		˘˘	˘	/26					˘ˆ ˆ
	7	˘		˘		˘˘		/26					˘˝ ˘
$SSURD		˘˄		˘˄		˘˘		1$					˘˝ ˘
$OO 9HK		˘ ˄	˘	˘ ˄	˘	˘˘		1$					˘˘

6LWH /HYHO RI 6HUYLFH /26 0HWKRG¸ 'HOD\ 57$ 16: 6LWH /26 0HWKRG 1HWZRUN
9HKLFOH PRYHPHQW /26 YDOXHV DUH EDVHG RQ DYHUDJH GHOD\ SHU PRYHPHQW
0LQRU 5RDG $SSURDFK /26 YDOXHV DUH EDVHG RQ DYHUDJH GHOD\ IRU DOO YH
1$¸ ,QWHUVHFWLRQ /26 DQG 0DMRU 5RDG $SSURDFK /26 YDOXHV DUH QRW DSSOLFDEOH
D JRRG /26 PHDVXUH GXH WR]HUR GHOD\V DVVRFLDWHG ZLWK PDMRU URDG PR
6,'5$ 6WDQGDUG 'HOD\ 0RGHO LV XVHG &RQWURO 'HOD\ LQFOXGHV *HRPHWULF
*DS $FFHSWDQFH &DSDFLW\¸ 6,'5$ 6WDQGDUG $NoHOLN 0 '
+9 YDOXHV DUH FDOFXODWHG IRU $OO 0RYHPHQW &ODVVHV RI $OO +HDY\ 9H
/DUJHVW FKDQJH LQ $YHUDJH %DFN RI 4XHXH RU 'HJUHH RI 6DWXUDWLRQ IRU D
1XPEHU RI ,WHUDWLRQV¸ ˘ PD[LPXP VSHFLILHG¸

MOVEMENT SUMMARY

Site: 1b [1b Old Northern Road/ New Line Road AM - Further Upgrades]

Network: N101 [AM Peak Further Upgrades]

Signals - Fixed Time Coordinated Cycle Time = 120 seconds (User-Given Phase Times)

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: New Line Road													
1	L2	476	3.8	476	3.8	0.672	23.5	LOS B	15.0	108.4	0.88	0.84	42.9
2	T1	866	7.0	866	7.0	0.934	69.0	LOS E	31.3	232.6	1.00	1.14	18.8
3	R2	8	0.0	8	0.0	0.068	65.3	LOS E	0.5	3.4	0.96	0.67	19.1
Approach		1351	5.8	1351	5.8	0.934	52.9	LOS D	31.3	232.6	0.96	1.03	26.5
East: Site Access													
4	L2	80	7.9	80	7.9	0.279	44.3	LOS D	4.8	35.9	0.89	0.71	22.5
5	T1	46	6.8	46	6.8	0.279	49.0	LOS D	4.8	35.9	0.92	0.72	21.4
6	R2	39	0.0	39	0.0	0.279	51.5	LOS D	3.7	26.8	0.94	0.72	2.5
Approach		165	5.7	165	5.7	0.279	47.3	LOS D	4.8	35.9	0.91	0.71	18.6
North: Old Northern Road													
7	L2	34	0.0	34	0.0	0.426	35.5	LOS C	18.3	133.7	0.87	0.79	18.0
8	T1	756	5.3	756	5.3	0.426	28.2	LOS B	18.8	137.4	0.88	0.78	36.1
9	R2	929	3.2	929	3.2	0.830	67.3	LOS E	28.3	203.1	1.00	0.90	23.2
Approach		1719	4.0	1719	4.0	0.830	49.5	LOS D	28.3	203.1	0.94	0.85	27.5
West: Old Northern Road													
10	L2	873	0.0	873	0.0	0.802	33.3	LOS C	19.1	133.4	0.73	0.82	29.1
11	T1	27	7.7	27	7.7	0.104	57.1	LOS E	1.4	10.5	0.90	0.73	21.0
12	R2	325	6.8	325	6.8	0.648	60.0	LOS E	9.3	69.1	1.00	0.82	30.0
Approach		1225	2.0	1225	2.0	0.802	40.9	LOS C	19.1	133.4	0.80	0.82	29.3
All Vehicles		4460	4.1	4460	4.1	0.934	48.1	LOS D	31.3	232.6	0.91	0.89	27.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network 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.
Largest change in Average Back of Queue or Degree of Saturation for any lane during the last three iterations: 1.0 %
Number of Iterations: 7 (maximum specified: 10)

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	54.3	LOS E	0.2	0.2	0.95	0.95
P2	East Full Crossing	53	54.3	LOS E	0.2	0.2	0.95	0.95
P3	North Full Crossing	53	54.3	LOS E	0.2	0.2	0.95	0.95
P4	West Full Crossing	53	54.3	LOS E	0.2	0.2	0.95	0.95
All Pedestrians		211	54.3	LOS E			0.95	0.95

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.

MOVEMENT SUMMARY

Site: 2b [2b Old Northern Road/ Quarry Road AM - Further Upgrades]

Network: N101 [AM Peak Further Upgrades]

Old Northern Road/ Quarry Road
Signals - Fixed Time Coordinated Cycle Time = 120 seconds (Network Cycle Time - User-Given)

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: Old Northern Road													
2	T1	1105	8.0	1105	8.0	0.402	6.0	LOS A	11.6	87.1	0.40	0.36	40.4
3	R2	747	2.7	747	2.7	0.892	46.9	LOS D	27.7	198.4	0.91	0.89	28.0
Approach		1853	5.9	1853	5.9	0.892	22.5	LOS B	27.7	198.4	0.61	0.57	30.9
East: Quarry Road													
4	L2	420	3.3	420	3.3	0.386	18.8	LOS B	12.6	90.5	0.56	0.75	37.4
6	R2	74	10.0	74	10.0	0.268	54.4	LOS D	3.9	29.4	0.92	0.76	21.9
Approach		494	4.3	494	4.3	0.386	24.1	LOS B	12.6	90.5	0.61	0.75	33.8
North: Old Northern Road													
7	L2	164	6.4	164	6.4	0.896	61.1	LOS E	32.3	235.8	1.00	1.03	30.4
8	T1	1298	4.3	1298	4.3	0.896	56.5	LOS D	33.5	243.0	1.00	1.05	21.1
Approach		1462	4.5	1462	4.5	0.896	57.0	LOS E	33.5	243.0	1.00	1.05	22.5
All Vehicles		3808	5.1	3808	5.1	0.896	36.0	LOS C	33.5	243.0	0.76	0.78	26.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network 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.
Largest change in Average Back of Queue or Degree of Saturation for any lane during the last three iterations: 1.0 %
Number of Iterations: 7 (maximum specified: 10)

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	54.3	LOS E	0.2	0.2	0.95	0.95
P2	East Full Crossing	53	36.9	LOS D	0.1	0.1	0.79	0.79
All Pedestrians		105	45.6	LOS E			0.87	0.87

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.

MOVEMENT SUMMARY

Site: 3 [3 Old Northern Road/ Vineys Road AM - Further Upgrades]

Network: N101 [AM Peak Further Upgrades]

Old Northern Road/ Vineys Road
Giveway / Yield (Two-Way)

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: Old Northern Road													
2	T1	1188	8.1	1188	8.1	0.642	0.2	LOS A	0.0	0.0	0.00	0.00	59.7
3b	R3	41	2.6	41	2.6	0.416	54.0	LOS D	1.3	9.0	0.97	1.02	29.9
Approach		1229	8.0	1229	8.0	0.642	2.0	NA	1.3	9.0	0.03	0.03	57.8
SouthEast: Vineys Road													
21b	L3	33	3.2	33	3.2	0.335	47.7	LOS D	1.0	6.9	0.96	1.01	22.1
23a	R1	6	0.0	6	0.0	0.049	25.7	LOS B	0.1	0.8	0.90	0.95	38.6
Approach		39	2.7	39	2.7	0.335	44.2	LOS D	1.0	6.9	0.95	1.00	25.0
North: Old Northern Road													
7a	L1	11	0.0	11	0.0	0.763	5.2	LOS A	0.0	0.0	0.00	0.00	57.5
8	T1	1428	5.2	1428	5.2	0.763	0.3	LOS A	0.0	0.0	0.00	0.00	59.4
Approach		1439	5.1	1439	5.1	0.763	0.3	NA	0.0	0.0	0.00	0.00	59.4
All Vehicles		2707	6.4	2707	6.4	0.763	1.7	NA	1.3	9.0	0.03	0.03	57.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Largest change in Average Back of Queue or Degree of Saturation for any lane during the last three iterations: 1.0 %
Number of Iterations: 7 (maximum specified: 10)

MOVEMENT SUMMARY

Site: 1b [1b Old Northern Road/ New Line Road PM - Further Upgrades]

Network: N101 [PM Peak Further Upgrades]

Signals - Fixed Time Coordinated Cycle Time = 120 seconds (User-Given Phase Times)

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: New Line Road													
1	L2	428	7.1	428	7.1	0.594	21.6	LOS B	12.1	89.5	0.83	0.82	43.8
2	T1	651	8.9	651	8.9	0.776	49.3	LOS D	19.2	144.9	0.99	0.91	23.4
3	R2	33	0.0	33	0.0	0.351	70.3	LOS E	2.0	13.8	1.00	0.72	18.2
Approach		1112	8.0	1112	8.0	0.776	39.2	LOS C	19.2	144.9	0.93	0.87	31.2
East: Site Access													
4	L2	108	8.7	108	8.7	0.531	49.4	LOS D	8.9	65.8	0.96	0.78	21.2
5	T1	133	2.4	133	2.4	0.531	51.4	LOS D	8.9	65.8	0.97	0.79	20.9
6	R2	64	1.6	64	1.6	0.531	52.7	LOS D	7.9	56.1	0.98	0.79	2.4
Approach		305	4.5	305	4.5	0.531	51.0	LOS D	8.9	65.8	0.97	0.79	18.2
North: Old Northern Road													
7	L2	65	0.0	65	0.0	0.500	32.7	LOS C	15.6	112.6	0.70	0.67	18.9
8	T1	772	4.6	772	4.6	0.500	25.7	LOS B	17.3	126.2	0.74	0.67	37.3
9	R2	784	3.0	784	3.0	0.834	69.0	LOS E	24.1	172.6	1.00	0.90	22.8
Approach		1621	3.6	1621	3.6	0.834	46.9	LOS D	24.1	172.6	0.86	0.78	28.1
West: Old Northern Road													
10	L2	687	0.0	687	0.0	0.564	26.5	LOS B	12.6	88.1	0.68	0.76	32.6
11	T1	65	0.0	65	0.0	0.191	54.0	LOS D	3.3	23.0	0.89	0.76	21.7
12	R2	500	7.2	500	7.2	0.808	62.6	LOS E	15.3	113.7	1.00	0.91	29.3
Approach		1253	2.9	1253	2.9	0.808	42.3	LOS C	15.3	113.7	0.82	0.82	30.1
All Vehicles		4291	4.6	4291	4.6	0.834	43.9	LOS D	24.1	172.6	0.87	0.82	28.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network 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.
Largest change in Average Back of Queue or Degree of Saturation for any lane during the last three iterations: 0.5 %
Number of Iterations: 5 (maximum specified: 10)

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	54.3	LOS E	0.2	0.2	0.95	0.95
P2	East Full Crossing	53	54.3	LOS E	0.2	0.2	0.95	0.95
P3	North Full Crossing	53	54.3	LOS E	0.2	0.2	0.95	0.95
P4	West Full Crossing	53	54.3	LOS E	0.2	0.2	0.95	0.95
All Pedestrians		211	54.3	LOS E			0.95	0.95

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.

MOVEMENT SUMMARY

Site: 2b [2b Old Northern Road/ Quarry Road PM - Further Upgrades]

Network: N101 [PM Peak Further Upgrades]

Old Northern Road/ Quarry Road
Signals - Fixed Time Coordinated Cycle Time = 120 seconds (Network Cycle Time - User-Given)

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: Old Northern Road													
2	T1	1193	7.3	1193	7.3	0.432	5.6	LOS A	10.9	81.1	0.34	0.31	41.2
3	R2	252	1.3	252	1.3	0.459	53.6	LOS D	7.5	52.8	0.88	0.77	26.1
Approach		1444	6.3	1444	6.3	0.459	14.0	LOS A	10.9	81.1	0.43	0.39	33.2
East: Quarry Road													
4	L2	385	1.9	385	1.9	0.549	36.5	LOS C	17.5	124.7	0.84	0.82	27.5
6	R2	68	1.5	68	1.5	0.235	53.8	LOS D	3.6	25.2	0.91	0.76	22.0
Approach		454	1.9	454	1.9	0.549	39.1	LOS C	17.5	124.7	0.85	0.81	26.5
North: Old Northern Road													
7	L2	66	3.2	66	3.2	0.446	24.7	LOS B	15.6	112.9	0.67	0.62	44.2
8	T1	1248	3.6	1248	3.6	0.446	19.3	LOS B	15.9	114.9	0.67	0.60	36.8
Approach		1315	3.6	1315	3.6	0.446	19.5	LOS B	15.9	114.9	0.67	0.60	37.4
All Vehicles		3213	4.6	3213	4.6	0.549	19.8	LOS B	17.5	124.7	0.59	0.54	33.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network 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.
Largest change in Average Back of Queue or Degree of Saturation for any lane during the last three iterations: 0.5 %
Number of Iterations: 5 (maximum specified: 10)

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	54.3	LOS E	0.2	0.2	0.95	0.95
P2	East Full Crossing	53	19.3	LOS B	0.1	0.1	0.57	0.57
All Pedestrians		105	36.8	LOS D			0.76	0.76

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.

MOVEMENT SUMMARY

Site: 3 [3 Old Northern Road/ Vineys Road PM - Further Upgrades]

Network: N101 [PM Peak Further Upgrades]

Old Northern Road/ Vineys Road
Giveway / Yield (Two-Way)

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: Old Northern Road													
2	T1	1268	4.8	1268	4.8	0.671	0.2	LOS A	0.0	0.0	0.00	0.00	59.7
3b	R3	61	48.3	61	48.3	0.672	81.1	LOS F	2.5	24.4	0.98	1.11	24.4
Approach		1329	6.8	1329	6.8	0.672	3.9	NA	2.5	24.4	0.04	0.05	55.9
SouthEast: Vineys Road													
21b	L3	41	2.6	41	2.6	0.211	24.4	LOS B	0.6	4.6	0.90	0.97	30.4
23a	R1	5	0.0	5	0.0	0.025	16.9	LOS B	0.1	0.4	0.83	0.92	42.5
Approach		46	2.3	46	2.3	0.211	23.6	LOS B	0.6	4.6	0.89	0.97	32.2
North: Old Northern Road													
7a	L1	5	0.0	5	0.0	0.670	5.1	LOS A	0.0	0.0	0.00	0.00	57.7
8	T1	1273	3.4	1273	3.4	0.670	0.2	LOS A	0.0	0.0	0.00	0.00	59.6
Approach		1278	3.4	1278	3.4	0.670	0.2	NA	0.0	0.0	0.00	0.00	59.6
All Vehicles		2654	5.1	2654	5.1	0.672	2.5	NA	2.5	24.4	0.04	0.04	56.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Largest change in Average Back of Queue or Degree of Saturation for any lane during the last three iterations: 0.5 %
Number of Iterations: 5 (maximum specified: 10)

Appendix C

Swept Path Assessment

FIRE TRUCK ACCESS AND MANOEUVRE ZONES SHOULD BE CLEAR OF HARD LANDSCAPING. ZONES CAN POTENTIALLY BE UTILISED FOR PASSING OF VEHICLES IF PAVED (SHOULD BE SIGNED AS NO-PARKING ZONES)

INTERNAL ROAD WIDTH SHOULD BE A MINIMUM 4m TO ACCOMMODATE FIRE AND RESCUE NSW (FRNSW) VEHICLES AS PER FRNSW 'GUIDELINE FOR EMERGENCY VEHICLE ACCESS POLICY NO. 4'

PROPOSED FIRE AND RESCUE NSW (FRNSW) VEHICLE ACCESS. CONFIRM WITH FIRE SAFETY CONSULTANT, FRNSW, OR LOCAL FIRE STATIONS THEIR LARGEST SIZE VEHICLE THEY WILL REQUIRE TO ACCESS THE SITE

NO BOOM GATE HAS BEEN SHOWN/IDENTIFIED, WILL THERE BE ONE? (RECOMMEND TO BE INCORPORATED INTO DESIGN AT AN EARLY STAGE AND INSTALLED OUTSIDE OF ROADWAY TO ALLOW FRNSW VEHICLES ACCESS). HOW WILL IT BE OPERATED? (DURING AND AFTER HOURS).

4.0 MINIMUM REQUIRED

2.8

ACCESS CAN ACCOMMODATE ONE-WAY CIRCULATION ONLY FOR B99 VEHICLES

ACCESS NOT SUITABLE FOR FRNSW VEHICLES ACCESS

RECOMMEND REMOVE MEDIAN ISLAND TO ACCOMMODATE EMERGENCY/FRNSW VEHICLES ACCESS. SEE SWEPT PATH ASSESSMENT ON SHEET 11

NO SECURITY DOOR HAS BEEN SHOWN, WILL THERE BE ONE? (RECOMMEND TO BE INCORPORATED INTO DESIGN AT AN EARLY STAGE). HOW WILL IT BE OPERATED? (DURING AND AFTER HOURS). HOW WILL VISITORS GAIN ACCESS?

KERB MODIFICATION REQUIRED TO ACCOMMODATE 10.5m VEHICLE SWEPT PATHS

PROVIDE 6.5m WIDE RAMP KERB TO KERB (7.1m WALL TO WALL) AS PER PREVIOUS ADVICES.

GRADE SHOULD BE 1:16 TO COMPLY WITH AS2890.2:2002. (PROPOSED COMPLIANT MODIFICATIONS SHOWN IN RED)

ACCESS CAN ACCOMMODATE ONE-WAY CIRCULATION ONLY FOR B99 VEHICLES

6.8 6.3

IDENTIFY RAMP WALLS AND KERB ON PLAN

5.7 5.8 2.40 2.40 5.40

MINIMUM AISLE WIDTH REQUIREMENT OF 6.1m BETWEEN PARKING SPACE AND STRUCTURE/WALL OPPOSITE. SEE NOTES

KERB MODIFICATION REQUIRED TO ACCOMODATE SWEPT PATH. SEE SHEET 09

NO SECURITY DOOR/GATE HAS BEEN SHOWN, WILL THERE BE ONE? (RECOMMEND TO BE INCORPORATED INTO DESIGN AT AN EARLY STAGE). HOW WILL IT BE OPERATED? (DURING AND AFTER HOURS). HOW WILL VISITORS GAIN ACCESS?

NO BOOM GATE HAS BEEN SHOWN/IDENTIFIED, WILL THERE BE ONE? (RECOMMEND TO BE INCORPORATED INTO DESIGN AT AN EARLY STAGE). HOW WILL IT BE OPERATED? (DURING AND AFTER HOURS). HOW WILL VISITORS GAIN ACCESS?

THERE ARE POOR SIGHTLINES AT INTERSECTION. RAMP STRUCTURE IMPEDES SIGHTLINES. RECOMMEND A TRAFFIC MANAGEMENT SYSTEM SUCH AS CONVEX MIRRORS AND/OR WARNING LIGHTS TO WARN DRIVERS ABOUT OTHER VEHICLES

SHOW INTERNAL ROADS ALIGNMENT ON PLAN TO CONFIRM SWEPT PATH ASSESSMENTS

KERB MODIFICATIONS REQUIRED TO B99 VEHICLE SWEPT PATH.

R 6.0 R 7.5 R 8.0 R 8.0 5.0

NOTES:
- MAXIMUM CHANGE IN GRADE FOR CARS SHOULD BE 1:8 OVER 2m
- A MINIMUM HEIGHT CLEARANCE OF 2.2m (TO SERVICES AND STRUCTURE) SHOULD BE PROVIDED ABOVE CIRCULATION AISLES AND PARKING SPACES.
- A MINIMUM HEIGHT CLEARANCE OF 2.5m (TO SERVICES AND STRUCTURE) SHOULD BE PROVIDED ABOVE DISABLED PARKING SPACES
- A MINIMUM HEIGHT CLEARANCE OF 4.5m (TO SERVICES AND STRUCTURE) SHOULD BE PROVIDED FOR ACCESS OF SERVICE VEHICLES UP TO HRV ABOVE ROADWAYS AND LOADING DOCKS
- HEIGHT CLEARANCE ABOVE A SAG CHANGE IN GRADES SHOULD BE MEASURED IN ACCORDANCE WITH FIGURE 5.3 AS2890.1-2004.
- PROVIDE 1m AISLE EXTENSION AT THE END OF ALL BLIND AISLES
-MINIMUM AISLE WIDTH OF 6.1m IS REQUIRED BETWEEN PARKING SPACES AND STRUCTURE (WALLS) OPPOSITE
- ADDITIONAL WIDENING OF SPACE OF 0.30m IS REQUIRED IF THERE IS A WALL OR A FENCE AT THE SIDE OF THE LAST PARKING SPACE AS PER FIGURE 2.3 AS 2890.1:2004

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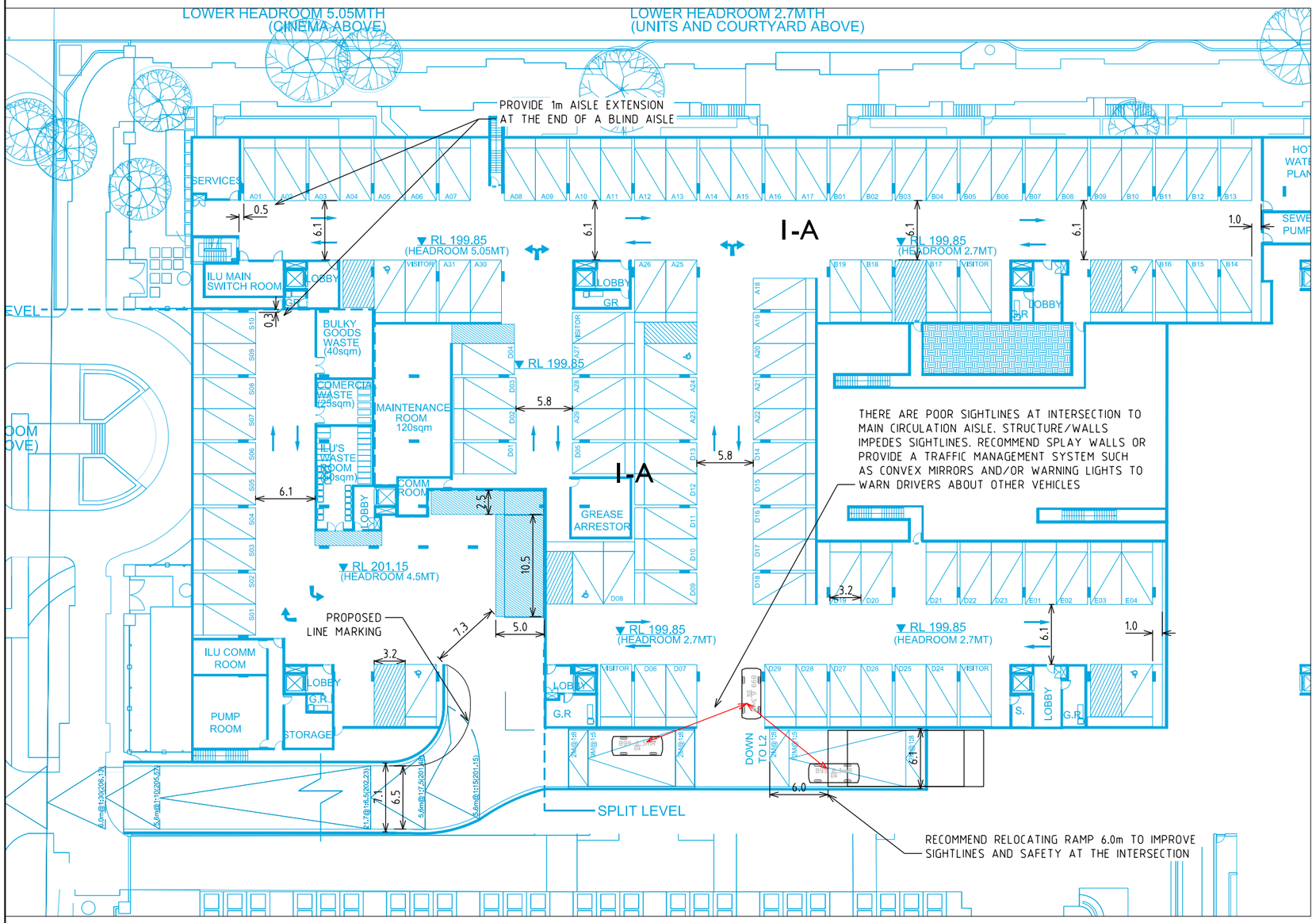
PRELIMINARY PLAN
FOR DISCUSSION PURPOSES ONLY SUBJECT TO CHANGE WITHOUT NOTIFICATION

DESIGNED C.AGUIRRE	DESIGN CHECK H.OBERMAIER
APPROVED BY -	DATE ISSUED 13 JUNE 2018
SCALE A3	0 10 20 1:1000
CAD FILE NO. N142020-01-P5.dgn	

3 QUARRY ROAD, DURAL

GROUND LEVEL
CARPARK COMPLIANCE REVIEW

DRAWING NO. N142020-01-01 SHEET 01 OF 12 ISSUE P5



NOTES FOR LOADING SERVICE VEHICLE ACCESS:

- HEIGHT CLEARANCES FOR SERVICE VEHICLES OVER 6.4M IN LENGTH SHOULD BE MINIMUM 4.5M. HEIGHT CLEARANCE FOR VEHICLES UP TO 6.4M SRV SHOULD BE A MINIMUM 3.5M.
- HEIGHT CLEARANCES MAYBE REDUCED SUBJECT TO COUNCIL APPROVAL AND DESIGNED FOR THE LARGEST DESIGN VEHICLE.
- HEIGHT CLEARANCE TO BE MEASURED TO STRUCTURE AND SERVICES.
- THE MAXIMUM GRADE FOR A VEHICLE EXIT SHOULD BE 1:20 (5%) FOR 6.0M PRIOR TO THE PROPERTY LINE, BUILDING LINE AND/OR PEDESTRIAN WALKWAYS. THE LENGTH OF THIS GRADE SHOULD BE INCREASED TO 7.0M FOR LRV, AND 10.0M FOR ARTICULATED VEHICLES TO ACCOMMODATE CHANGE IN GRADE REQUIREMENTS.

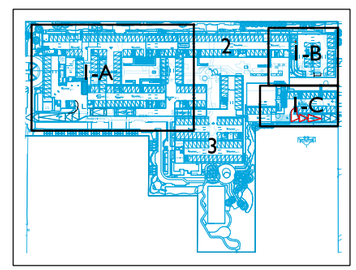
MAXIMUM CHANGE IN GRADE (DIFFERENCE BETWEEN TWO ADJACENT RAMP GRADES) SHOULD BE:

SRV 1:12 (8.3%) OVER 4.0M (EG 1:20 TO A MAXIMUM GRADE OF 1:7.5)
MRV & HRV 1:16 (6.25%) OVER 7.0M (EG. 1:16 TO A MAXIMUM GRADE OF 1:8)

- MAXIMUM GRADE FOR SERVICE VEHICLE RAMPS SHOULD BE 1:6.5 (15.4%)
- MAXIMUM CROSS FALL ON A RAMP SHOULD BE 1:20 (5%)
- MAXIMUM GRADE OF A SERVICE BAY SHOULD BE 1:25 AND SUBJECT TO CLIENTS MAXIMUM SPECIFICATIONS.

NOTES FOR OFF-STREET CAR PARKING:

- MAXIMUM CHANGE IN GRADE FOR CARS SHOULD BE 1:8 OVER 2m
- A MINIMUM HEIGHT CLEARANCE OF 2.2m (TO SERVICES AND STRUCTURE) SHOULD BE PROVIDED ABOVE CIRCULATION AISLES AND PARKING SPACES.
- A MINIMUM HEIGHT CLEARANCE OF 2.5m (TO SERVICES AND STRUCTURE) SHOULD BE PROVIDED ABOVE DISABLED PARKING SPACES
- A MINIMUM HEIGHT CLEARANCE OF 3.8m (TO SERVICES AND STRUCTURE) SHOULD BE PROVIDED ABOVE AMBULANCE VEHICLE ACCESS ROADWAYS AND BAYS
- HEIGHT CLEARANCE ABOVE A SAG CHANGE IN GRADES SHOULD BE MEASURED IN ACCORDANCE WITH FIGURE 5.3 AS2890.1-2004.
- PROVIDE 1m AISLE EXTENSION AT THE END OF ALL BLIND AISLES
-MINIMUM AISLE WIDTH OF 6.1m IS REQUIRED BETWEEN PARKING SPACES AND STRUCTURE (WALLS) OPPOSITE
- MINIMUM WIDTH ON A TWO-WAY STRAIGHT SECTION OF A RAMP OR CIRCULATION ROADWAY SHOULD BE 5.5m PLUS CLEARANCES OF 0.3m EITHER SIDE TO STRUCTURE (6.1m BETWEEN STRUCTURE), AND ACCOMMODATE VEHICLE SWEPT PATHS
-ENSURE REAR OF SPACE STORAGE DO NOT ENCROACH INTO THE PARKING SPACE VEHICLE DESIGN ENVELOPE SHOWN IN FIGURE 5.3 AS2890.1:2004



BASEMENT 1 LOCATIONS KEY

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PRELIMINARY PLAN
FOR DISCUSSION PURPOSES ONLY SUBJECT TO CHANGE WITHOUT NOTIFICATION

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APPROVED BY -	DATE ISSUED 6 JUNE 2018	CAD FILE NO. N142020-01-P5.dgn	

3 QUARRY ROAD, DURAL

BASEMENT 1
CARPARK COMPLIANCE REVIEW

DRAWING NO. N142020-01-02 SHEET 02 OF 12 ISSUE P5

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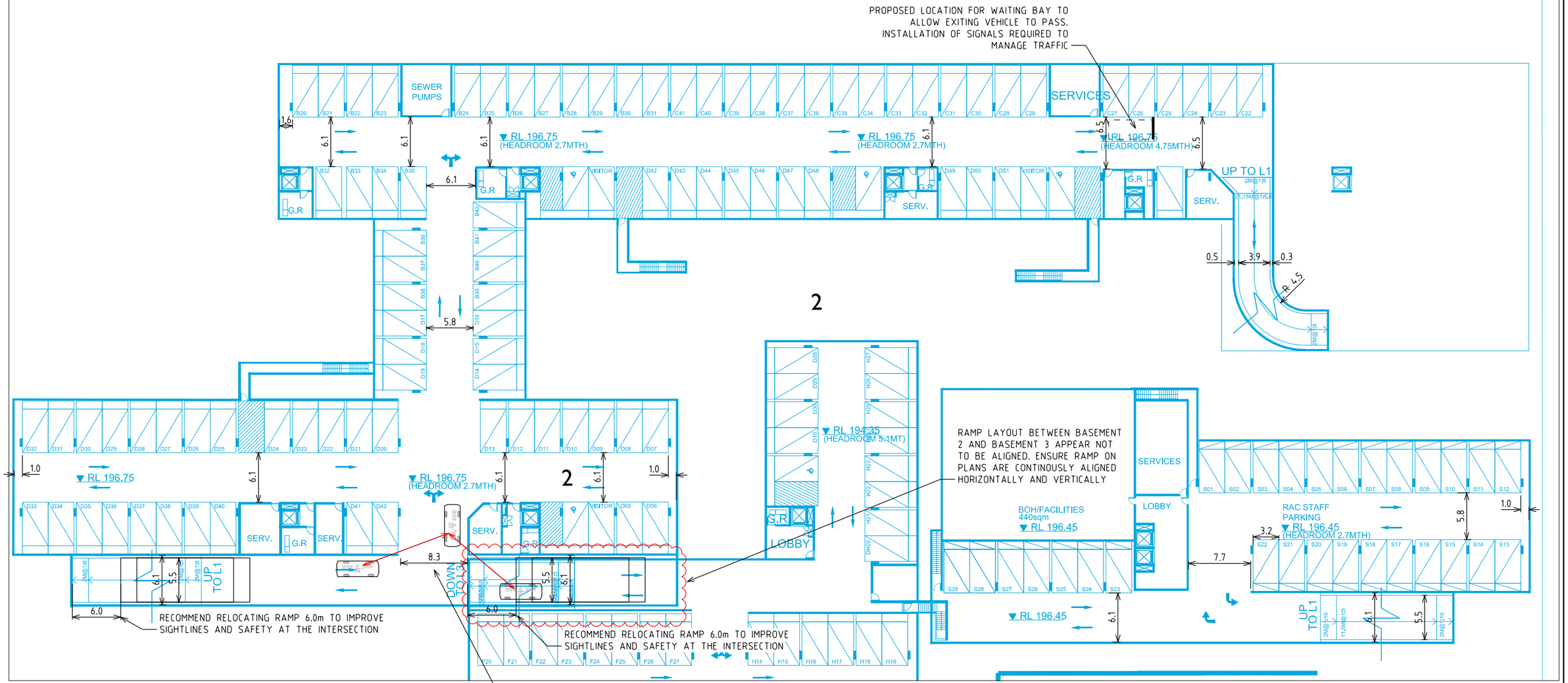

NOTES:
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- A MINIMUM HEIGHT CLEARANCE OF 2.2m (TO SERVICES AND STRUCTURE) SHOULD BE PROVIDED ABOVE CIRCULATION AISLES AND PARKING SPACES.
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- A MINIMUM HEIGHT CLEARANCE OF 4.5m (TO SERVICES AND STRUCTURE) SHOULD BE PROVIDED FOR ACCESS OF SERVICE VEHICLES UP TO HRV ABOVE ROADWAYS AND LOADING DOCKS
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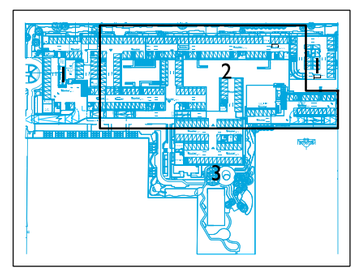

BASEMENT 2 LOCATION KEY

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PRELIMINARY PLAN
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3 QUARRY ROAD, DURAL

BASEMENT 2
CARPARK COMPLIANCE REVIEW

DRAWING NO. N142020-01-03 SHEET 03 OF 12 ISSUE P5

NOTES:
- MAXIMUM CHANGE IN GRADE FOR CARS SHOULD BE 1:8 OVER 2m
- A MINIMUM HEIGHT CLEARANCE OF 2.2m (TO SERVICES AND STRUCTURE) SHOULD BE PROVIDED ABOVE CIRCULATION AISLES AND PARKING SPACES.
- A MINIMUM HEIGHT CLEARANCE OF 2.5m (TO SERVICES AND STRUCTURE) SHOULD BE PROVIDED ABOVE DISABLED PARKING SPACES
- A MINIMUM HEIGHT CLEARANCE OF 4.5m (TO SERVICES AND STRUCTURE) SHOULD BE PROVIDED ABOVE SERVICE VEHICLE ACCESS ROADWAYS AND LOADING DOCKS
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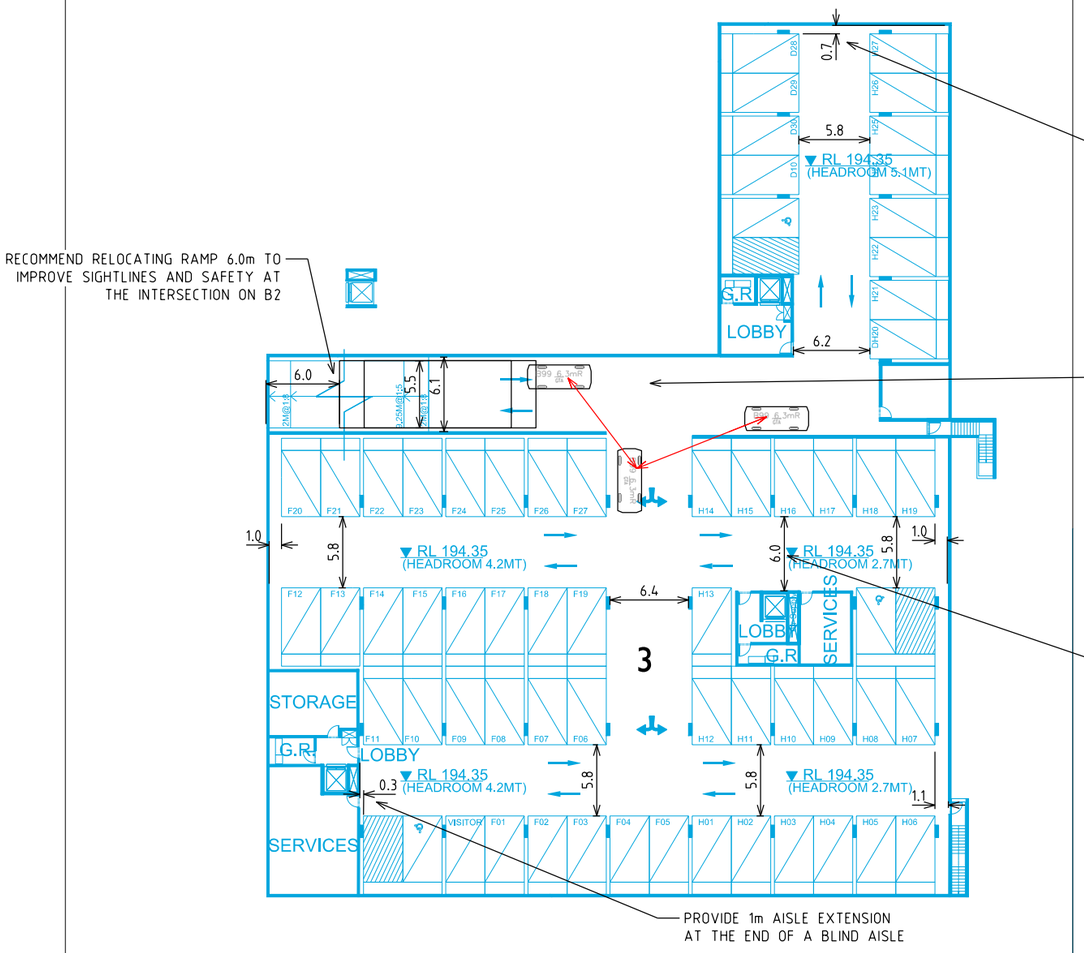
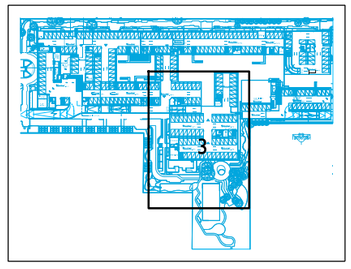
-ENSURE REAR OF SPACE STORAGE DO NOT ENCROACH INTO THE PARKING SPACE VEHICLE DESIGN ENVELOPE SHOWN IN FIGURE 5.3 AS2890.1:2004





BASEMENT 3 LOCATION KEY

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PRELIMINARY PLAN
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APPROVED BY -
DATE ISSUED 6 JUNE 2018
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CAD FILE NO. N142020-01-P5.dgn

3 QUARRY ROAD, DURAL

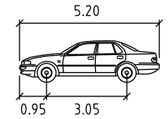
BASEMENT 3
CARPARK COMPLIANCE REVIEW

DRAWING NO. N142020-01-04 SHEET 04 OF 12 ISSUE P5

SWEPT PATH KEY

- VEHICLE CENTRE LINE
- VEHICLE TYRE PATH
- VEHICLE BODY PATH
- 300mm CLEARANCE FROM VEHICLE BODY

ASSUMED SPEED 5km/h



B99 6.3mR

		metres
Width	:	1.94
Track	:	1.77
Lock to Lock Time	:	6.0
Steering Angle	:	34.0

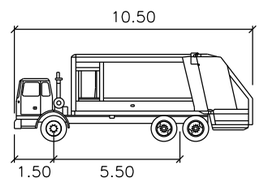
NOTE:

SHOW INTERNAL ROADS ALIGNMENT ON PLAN TO CONFIRM SWEPT PATH ASSESSMENTS

SWEPT PATH KEY

- VEHICLE CENTRE LINE
- VEHICLE TYRE PATH
- VEHICLE BODY PATH
- 600mm CLEARANCE FROM VEHICLE BODY

ASSUMED SPEED 5km/h



GARBAGE TRUCK

		meters
Width	:	2.50
Track	:	2.50
Lock to Lock Time	:	4.0
Steering Angle	:	36.0

PLOTTED BY : Clifford.Aguirre ON 13/06/2018 AT 5:22:31 PM

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PRELIMINARY PLAN
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APPROVED BY -
DATE ISSUED 8 MAY 2018

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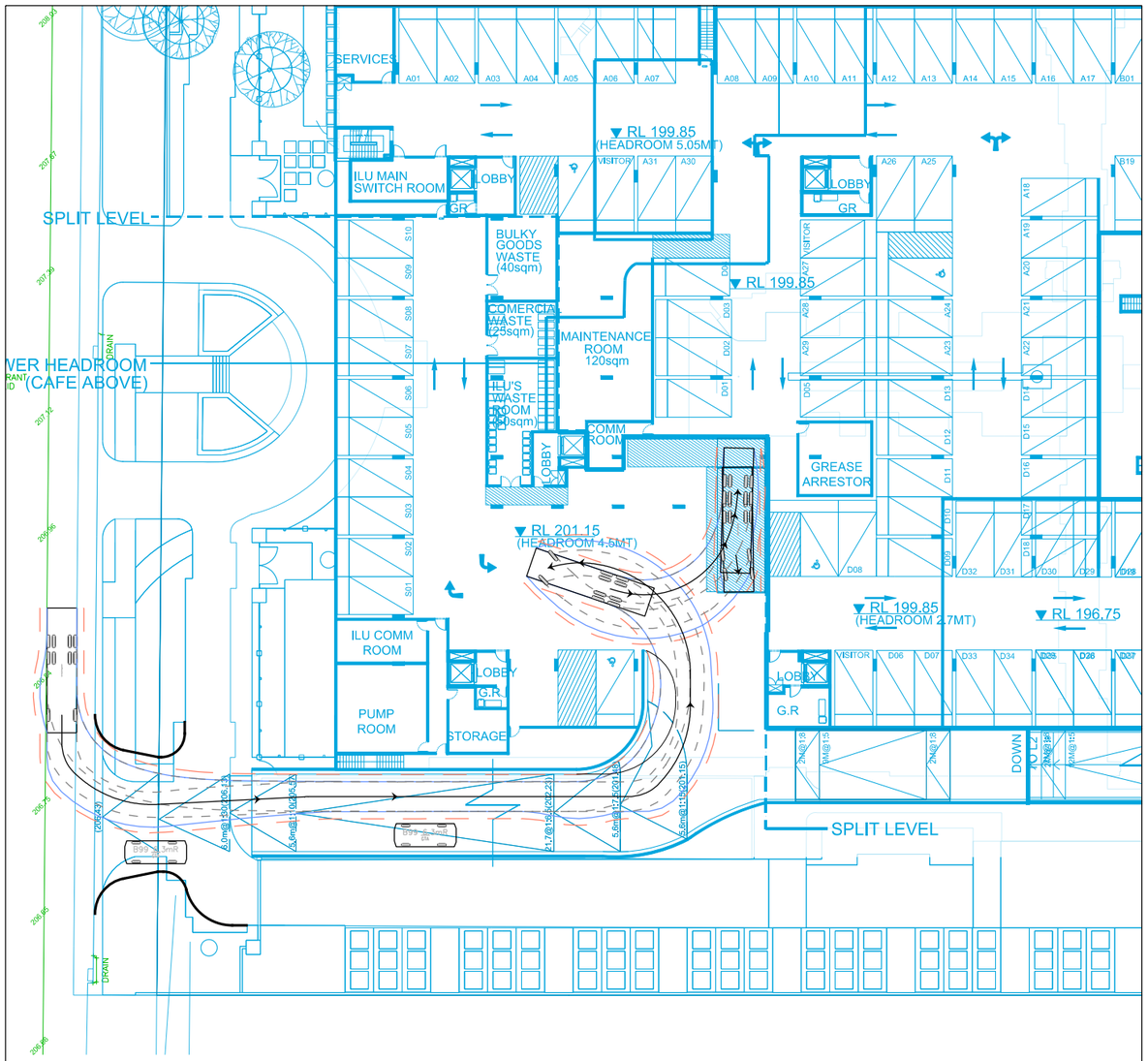
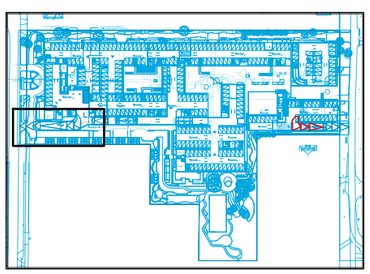
CAD FILE NO. N142020-01-P5.dgn

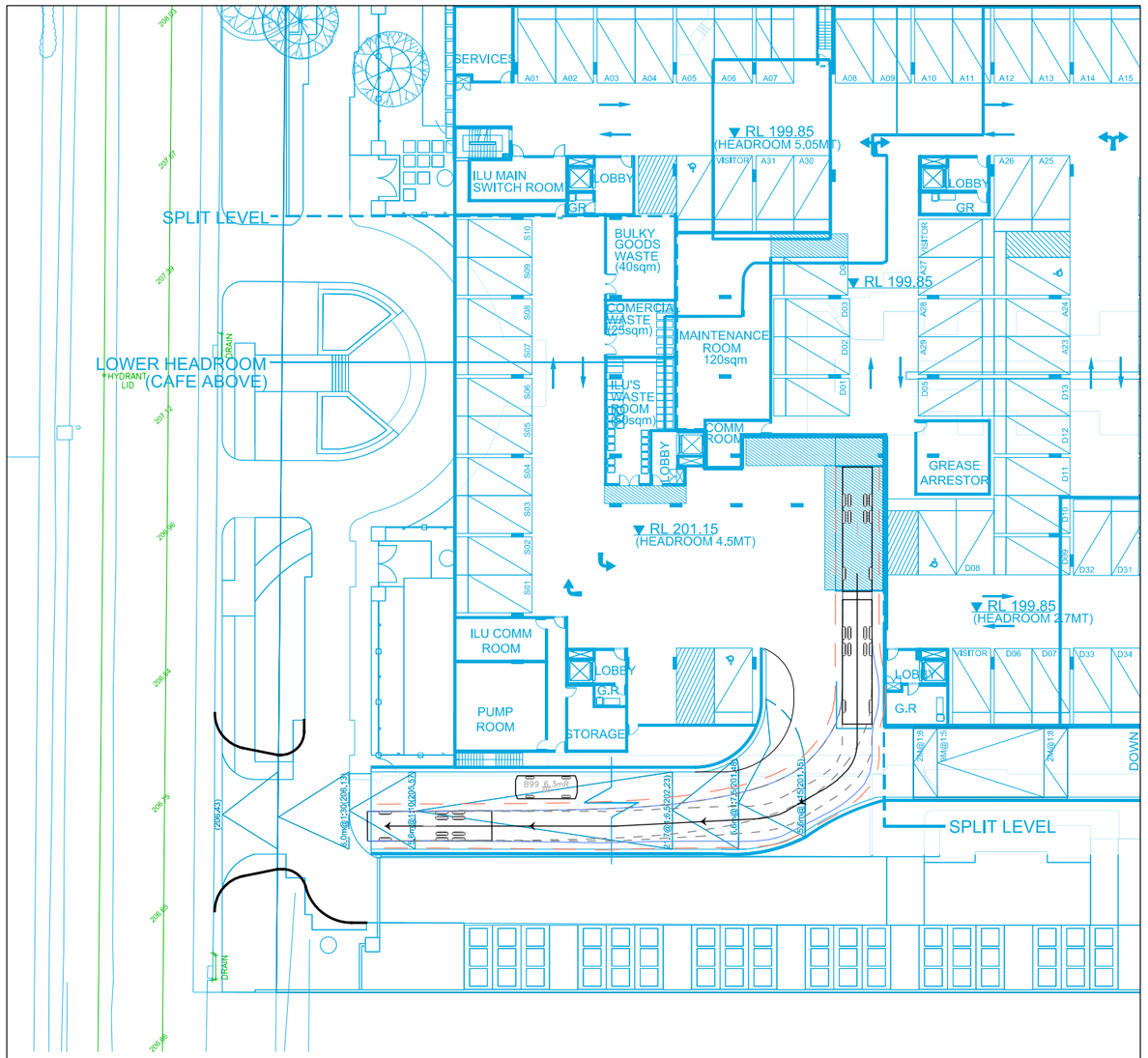
3 QUARRY ROAD, DURAL

GROUND LEVEL SWEPT PATH ASSESSMENT

DRAWING NO. N142020-01-05 SHEET 05 OF 12 ISSUE P4



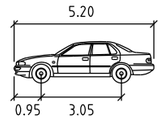




SWEPT PATH KEY

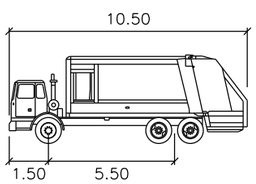
- VEHICLE CENTRE LINE
- VEHICLE TYRE PATH
- VEHICLE BODY PATH
- 300mm CLEARANCE FROM VEHICLE BODY

ASSUMED SPEED 5km/h



B99 6.3mR

	metres
Width	: 1.94
Track	: 1.77
Lock to Lock Time	: 6.0
Steering Angle	: 34.0



GARBAGE TRUCK

	meters
Width	: 2.50
Track	: 2.50
Lock to Lock Time	: 4.0
Steering Angle	: 36.0

SWEPT PATH KEY

- VEHICLE CENTRE LINE
- VEHICLE TYRE PATH
- VEHICLE BODY PATH
- 600mm CLEARANCE FROM VEHICLE BODY

ASSUMED SPEED 5km/h

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PRELIMINARY PLAN

FOR DISCUSSION PURPOSES
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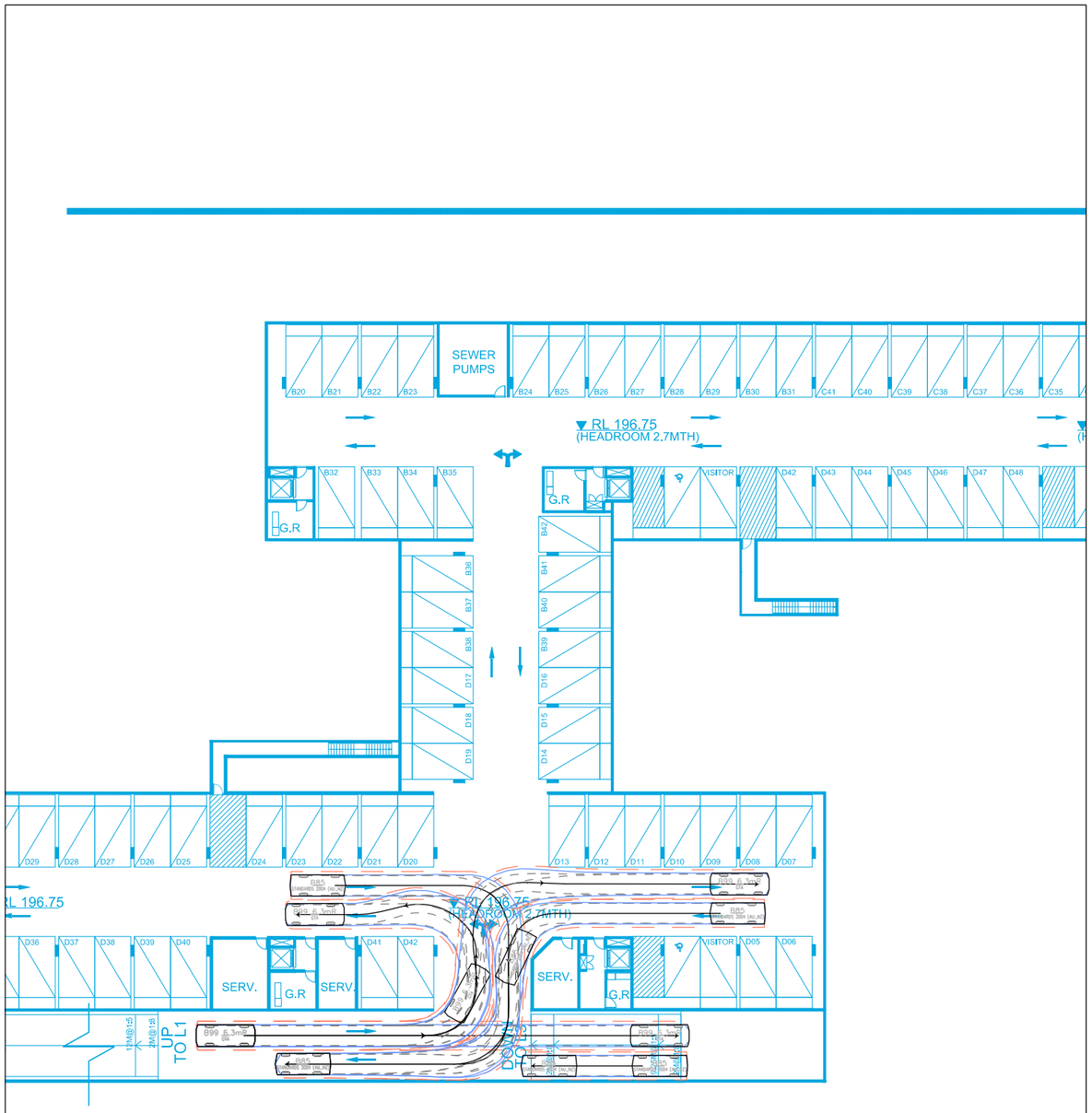
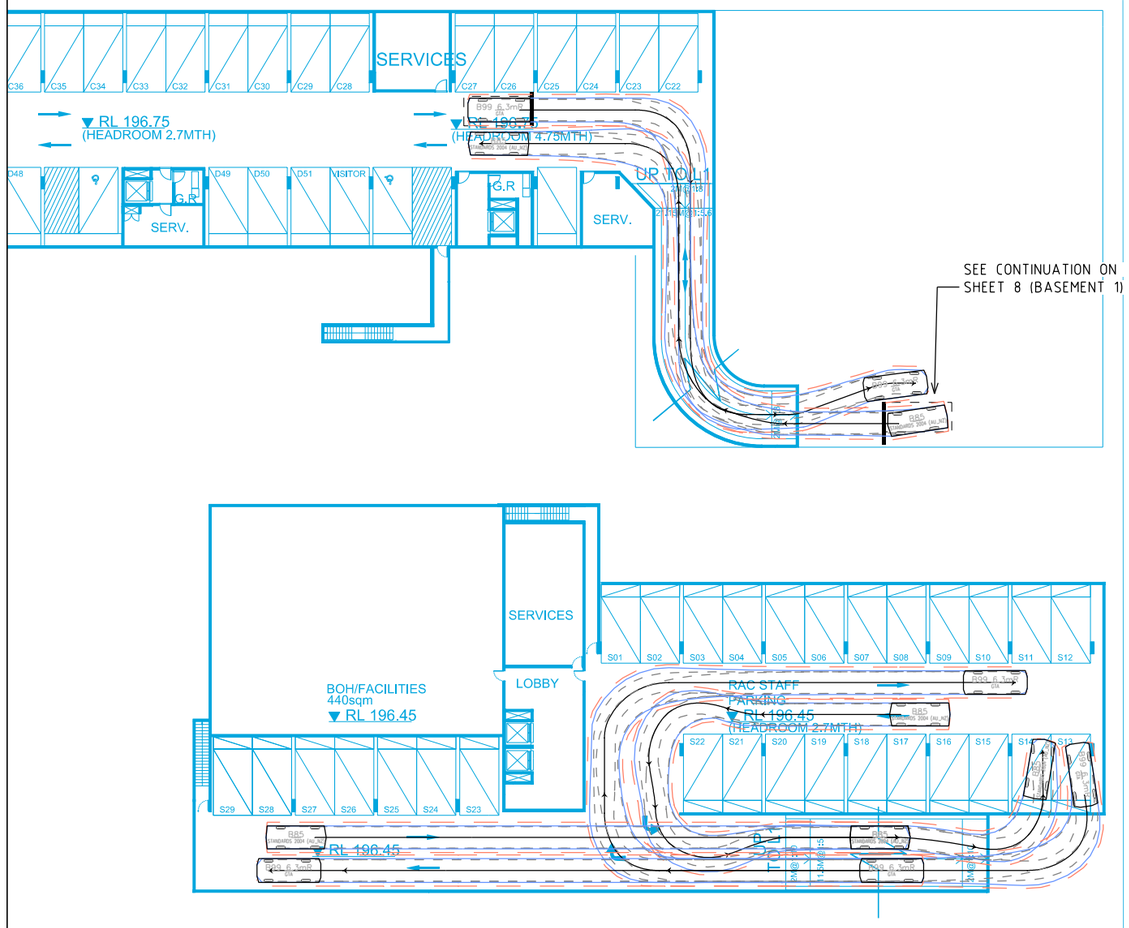
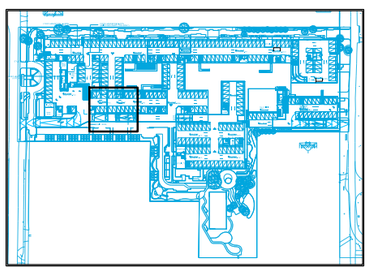
3 QUARRY ROAD, DURAL

BASEMENT 1
SWEPT PATH ASSESSMENT

DRAWING NO. N142020-01-06 SHEET 06 OF 12 ISSUE P5



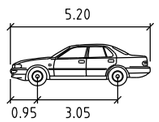




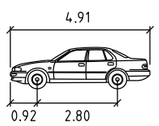
SWEPT PATH KEY

- VEHICLE CENTRE LINE
- VEHICLE TYRE PATH
- VEHICLE BODY PATH
- 300mm CLEARANCE FROM VEHICLE BODY

ASSUMED SPEED 5km/h



B99 6.3mR	metres
Width	: 1.94
Track	: 1.77
Lock to Lock Time	: 6.0
Steering Angle	: 34.0



B85	metres
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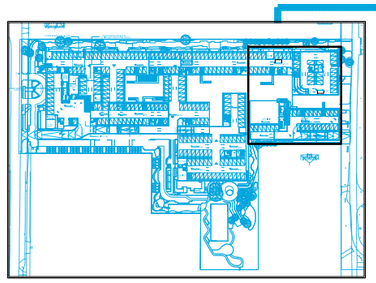
Steering Angle	: 34.0



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PRELIMINARY PLAN
FOR DISCUSSION PURPOSES ONLY SUBJECT TO CHANGE WITHOUT NOTIFICATION

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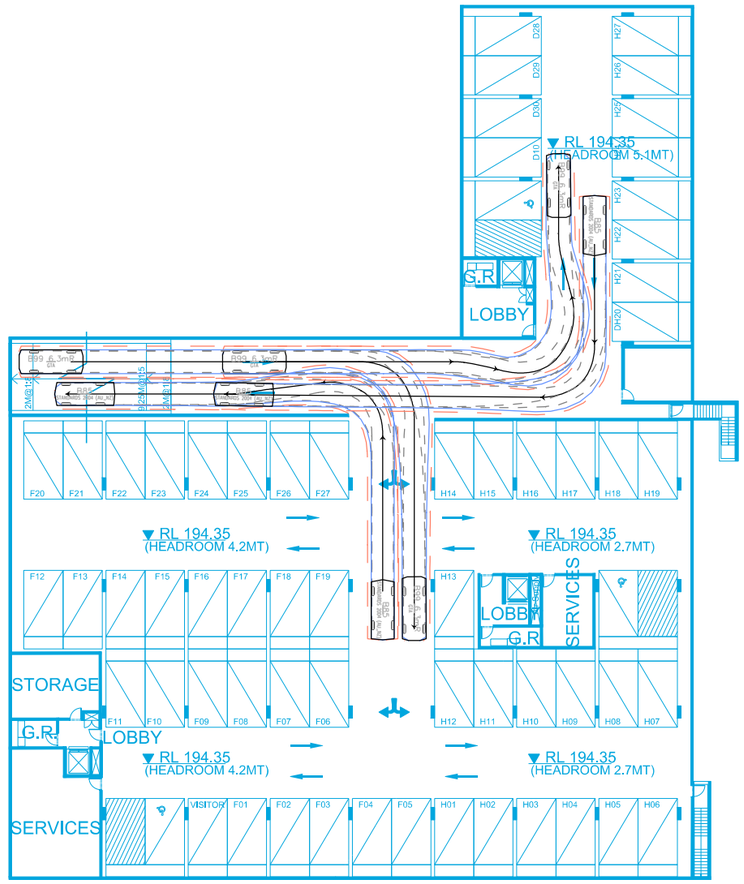
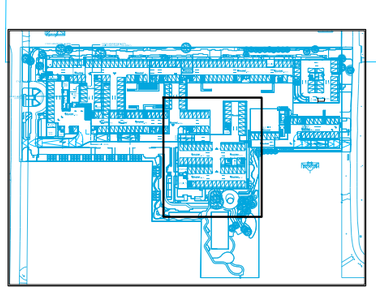
3 QUARRY ROAD, DURAL

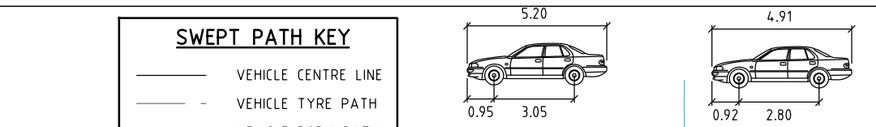
BASEMENT 2
SWEPT PATH ASSESSMENT

DRAWING NO. N142020-01-07 SHEET 07 OF 12 ISSUE P5



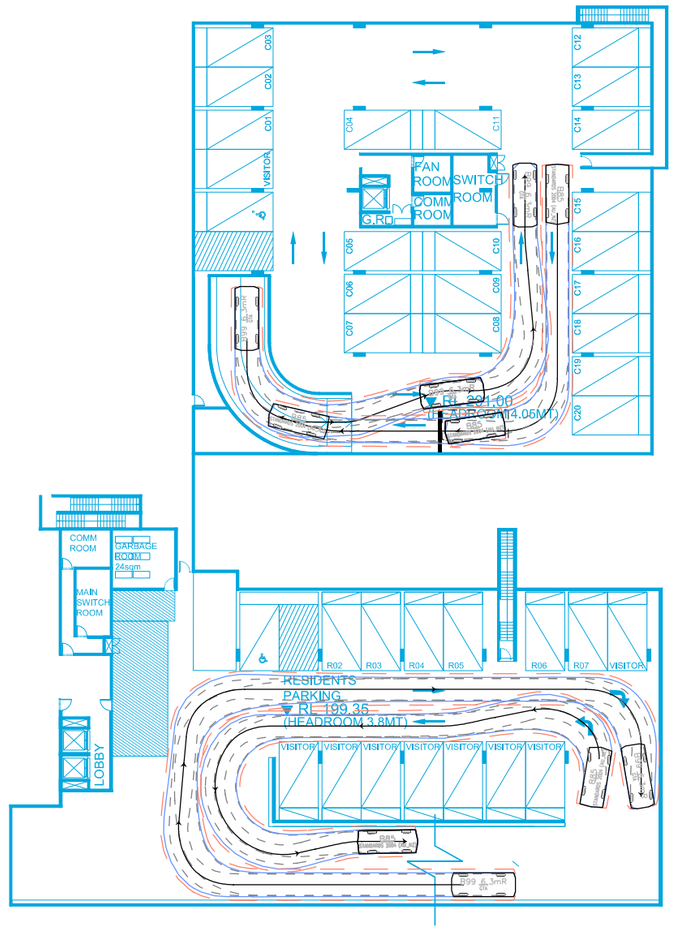
BASEMENT 3



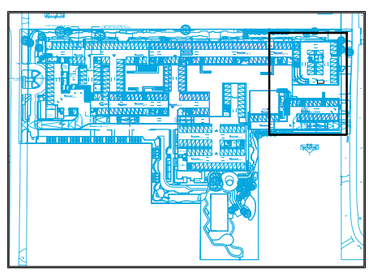


B99 6.3mR	metres
Width	: 1.94
Track	: 1.77
Lock to Lock Time	: 6.0
Steering Angle	: 34.0

B85	metres
Width	: 1.87
Track	: 1.77
Lock to Lock Time	: 6.0
Steering Angle	: 34.0



BASEMENT 1



ON 13/06/2018 AT 5:22:52 PM

PLOTTED BY : Clifford.Aguirre

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PRELIMINARY PLAN
FOR DISCUSSION PURPOSES
ONLY SUBJECT TO CHANGE
WITHOUT NOTIFICATION

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DESIGN CHECK H.OBERMAIER
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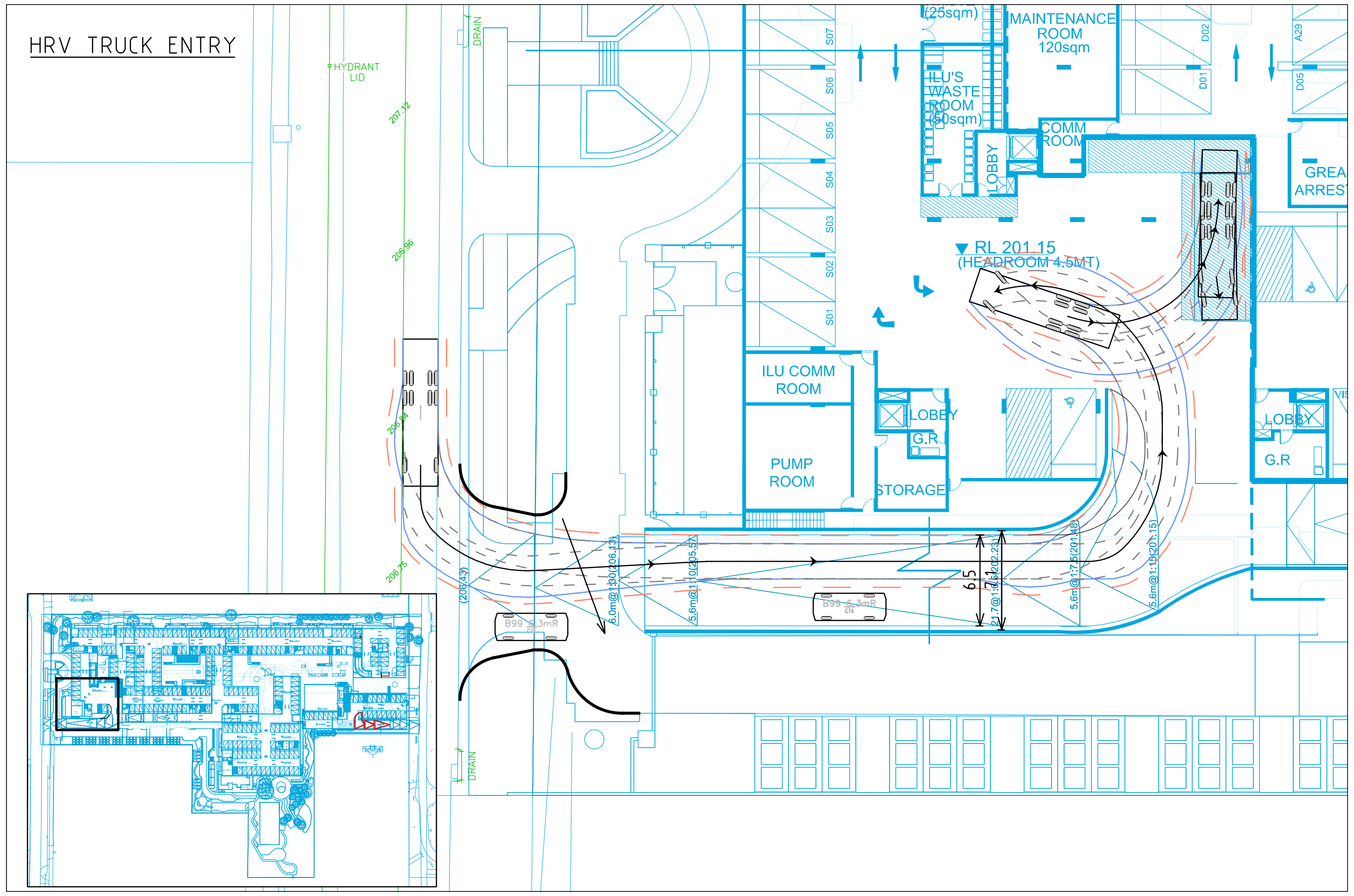
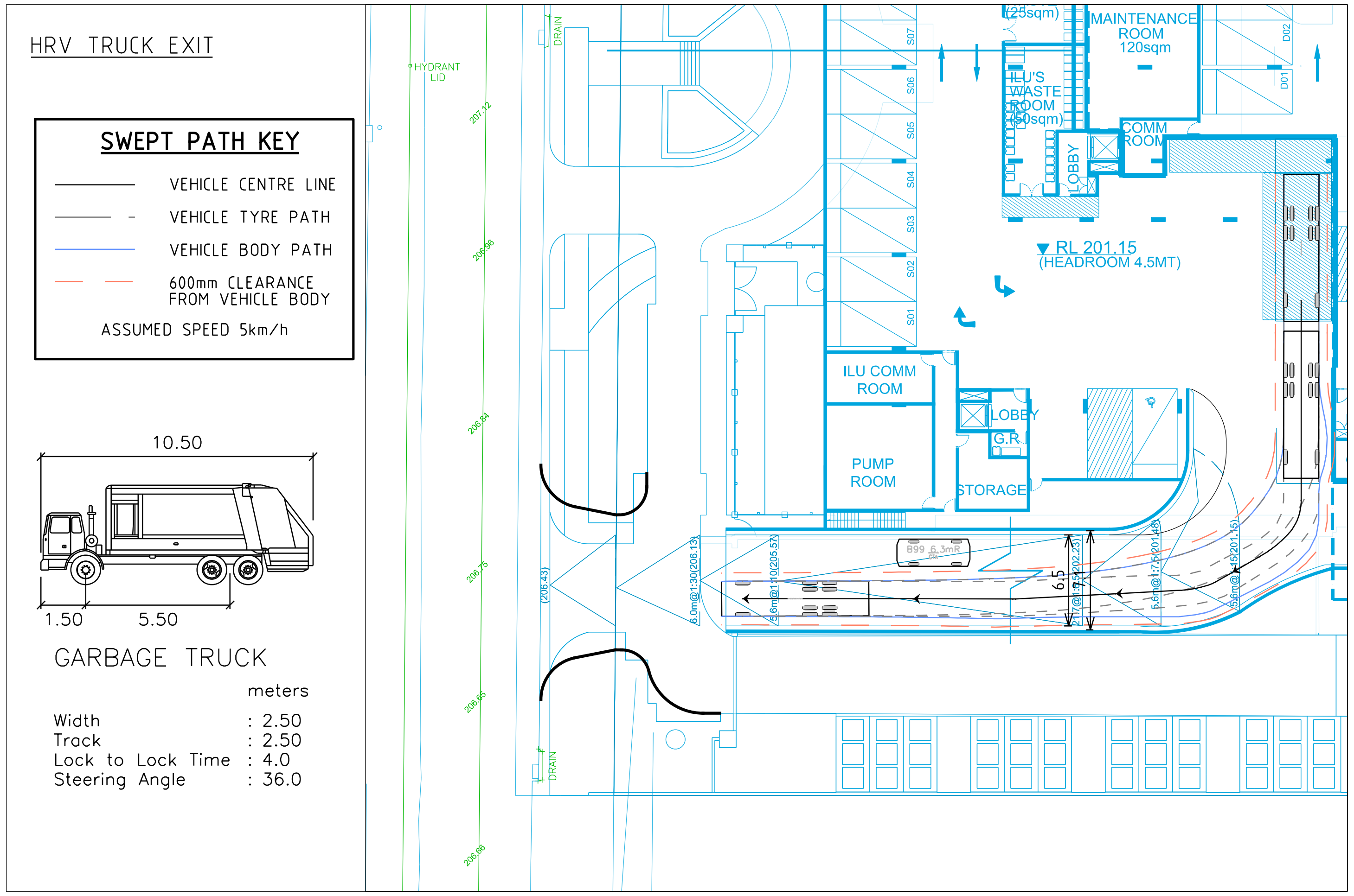
CAD FILE NO. N142020-01-P5.dgn

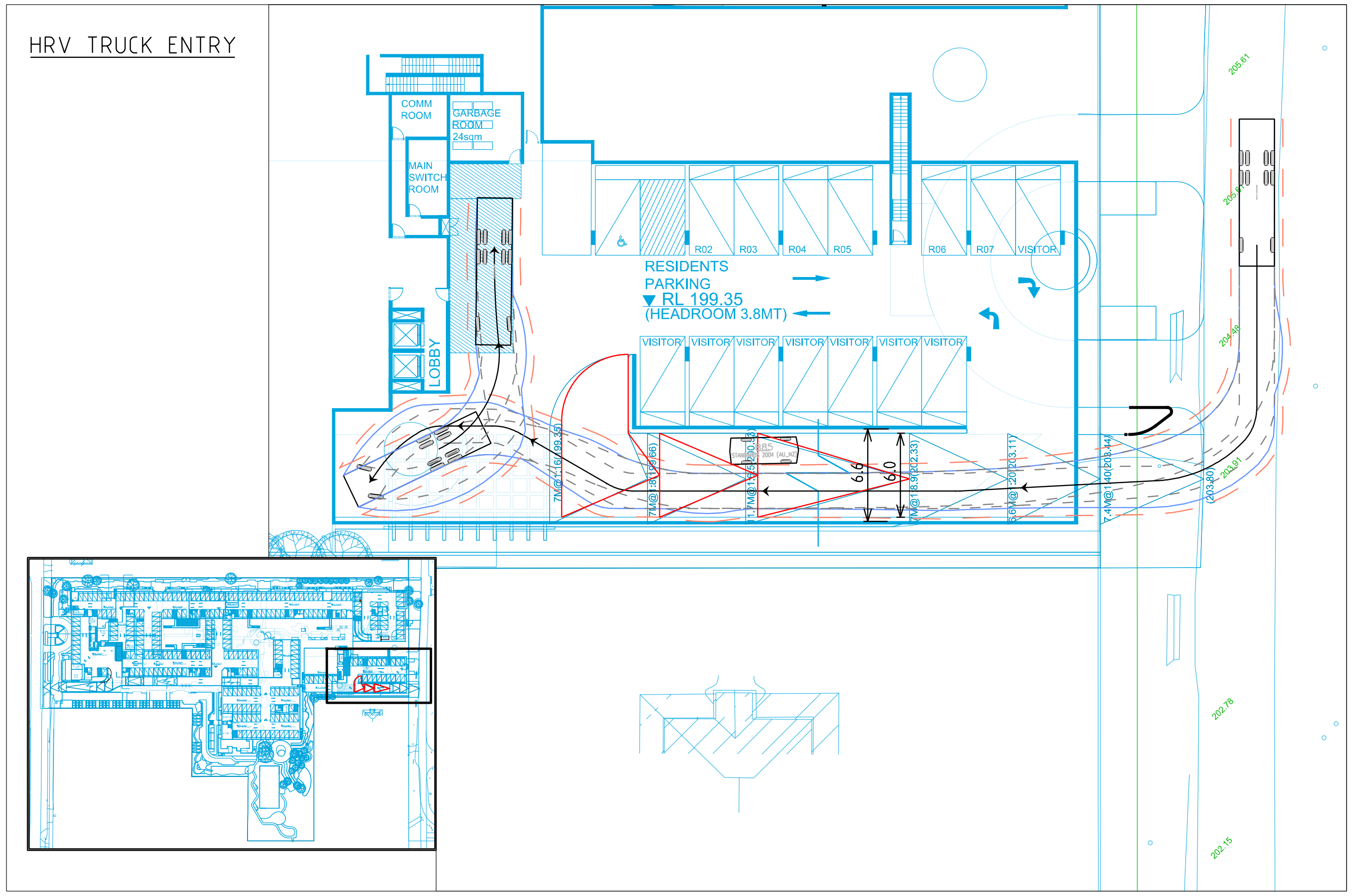
3 QUARRY ROAD, DURAL

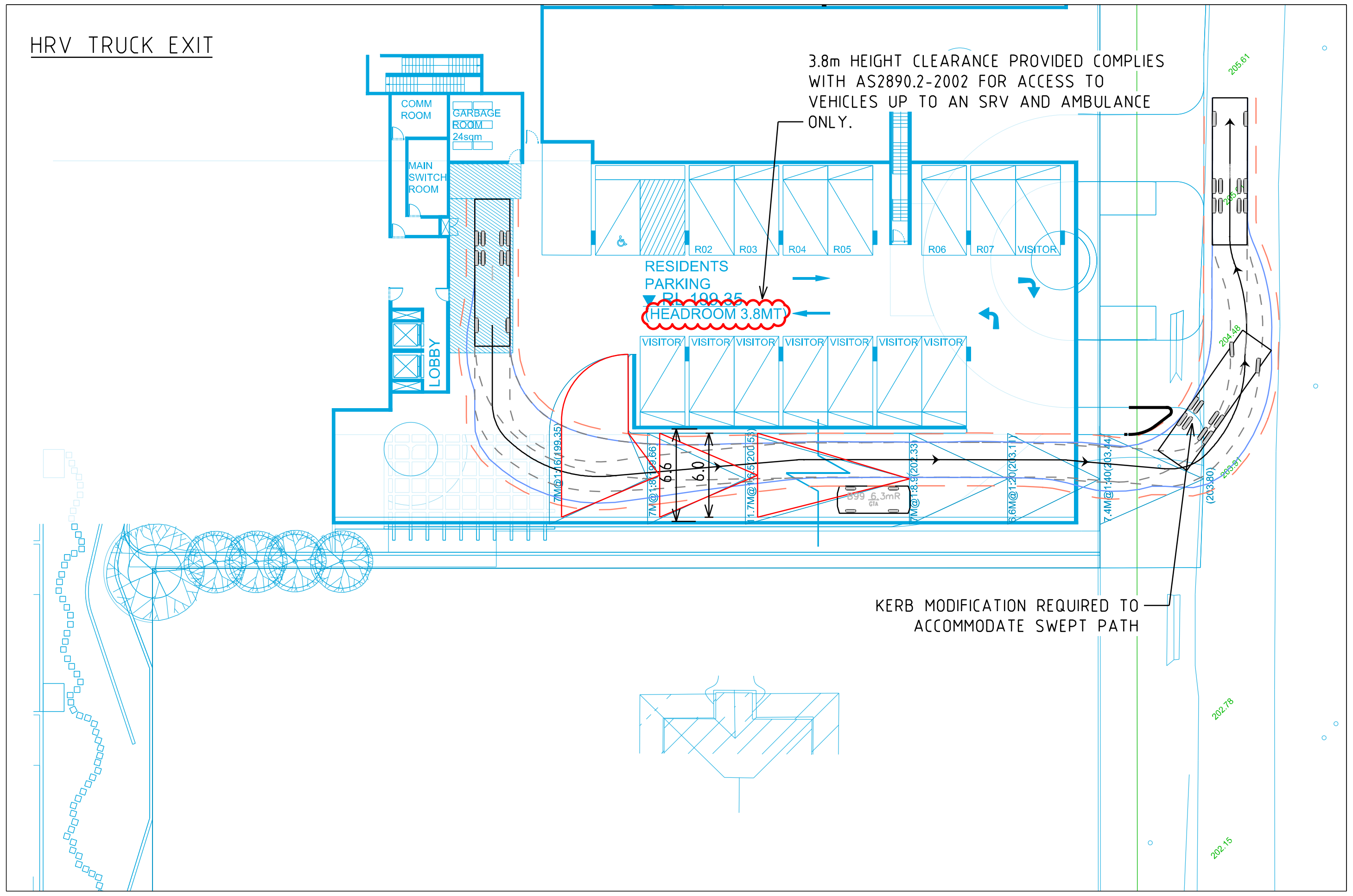
BASEMENT 3 AND BASEMENT 1
SWEPT PATH ASSESSMENT

DRAWING NO. N142020-01-08 SHEET 08 OF 12 ISSUE P5









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PRELIMINARY PLAN

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3 QUARRY ROAD, DURAL

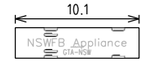
GARBAGE TRUCK ACCESS SWEPT PATH ASSESSMENT

DRAWING NO. N142020-01-09 SHEET 09 OF 12 ISSUE P5

PLOTTED BY : Clifford.Aguirre ON 13/06/2018 AT 5:22:57 PM

NOTE:

FIRE AND RESCUE NSW (FRNSW) VEHICLES REQUIRED TO ACCESS THE PROPERTY TO BE CONFIRMED BY FIRE SAFETY CONSULTANT



FRNSW APPLIANCE

SWEPT PATH KEY

- VEHICLE CENTRE LINE
- VEHICLE TYRE PATH
- VEHICLE BODY PATH
- 500mm CLEARANCE FROM VEHICLE BODY

ASSUMED SPEED 5km/h

TWO STOREY BRICK RESIDENCE No. 2 *QUARRY RD* (TILE ROOF)

QUARRY ROAD

QUARRY

ACCESS NOT SUITABLE FOR FIRE TRUCKS

PRELIMINARY PLAN
FOR DISCUSSION PURPOSES ONLY SUBJECT TO CHANGE WITHOUT NOTIFICATION

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3 QUARRY ROAD, DURAL

GROUND LEVEL - FIRE TRUCK ACCESS SWEPT PATH ASSESSMENT

DRAWING NO. N142020-01-10 SHEET 10 OF 12 ISSUE P5

PLOTTED BY : Clifford.Aguirre ON 13/06/2018 AT 5:23:01 PM

SWEPT PATH KEY

- VEHICLE CENTRE LINE
- VEHICLE TYRE PATH
- VEHICLE BODY PATH
- 500mm CLEARANCE FROM VEHICLE BODY

ASSUMED SPEED 5km/h

NOTE:

FIRE AND RESCUE NSW (FRNSW) VEHICLES REQUIRED TO ACCESS THE PROPERTY TO BE CONFIRMED BY FIRE SAFETY CONSULTANT

10.1
NSWFB Appliance
GTA-1638

FRNSW APPLIANCE

PLOTTED BY : Clifford Aguirre ON 13/06/2018 AT 5:23:06 PM

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3 QUARRY ROAD, DURAL

GROUND LEVEL - FIRE TRUCK ACCESS SWEPT PATH ASSESSMENT

DRAWING NO. N142020-01-11 SHEET 11 OF 12 ISSUE P5

NOTE:

PROPOSED RAMP RLs SHOWN HERE ARE SUBJECT TO EXISTING SURVEYED ROAD LEVELS (BY OTHERS) AT INTERSECTION WITH THE RAMPS, AND FINAL ARCHITECTURAL DESIGN

QUARRY ROAD

206.75

206.65

DRAIN

ILU COMM ROOM

PUMP ROOM

LOBBY

G.R

STORAGE

(206.43)

6.0m@1:30(206.13)

5.6m@1:10(205.57)

21.7@1:6.5(202.23)

5.6m@1:7.5(201.48)

5.6m@1:15(201.15)

BASEMENT LEVEL 1
RL 201.150

4.75 1:40 | 6.0 1:30 | 5.6 1:10 | 21.70 1:6.5 | 5.6 1:7.5 | 5.6 1:15

▼ RL 199.85
(HEADROOM 2.7MT)

LOBBY

G.R

VISITOR D06 D07

D29 D28 D

2M@1:8 9M@1:5 2M@1:8

DOWN TO L2

2M@1:8 12M@1:5

SPLIT LEVEL

R02 R03 R04 R05 R06 R07 VISITOR

RESIDENTS PARKING

▼ RL 199.35
(HEADROOM 3.8MT)

VISITOR VISITOR VISITOR VISITOR VISITOR VISITOR VISITOR

LOBBY

RL 199.35
BASEMENT LEVEL 1)

7M@1:8(199.78)

11.7M@1:6.5(200.66

7M@1:8.9(202.33)

6.6M@1:20(203.11)

7.4M@1:40(203.44)

(203.80)

204.49

203.91

VINEYS ROAD

7.00 1:16 | 7.00 1:8 | 10.84 1:6.5 | 7.00 1:8.9 | 6.60 1:20 | 7.42 1:20

GRADE SHOULD BE 1:16 TO COMPLY WITH AS2890.2:2002.
(PROPOSED COMPLIANT MODIFICATIONS SHOWN IN RED)

PLOTTED BY : Clifford.Aguirre ON 13/06/2018 AT 5:23:08 PM

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PRELIMINARY PLAN
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3 QUARRY ROAD, DURAL

LOADING DOCK ACCESSES
PROPOSED RAMP GRADES

DRAWING NO. N142020-01-12 SHEET 12 OF 12 ISSUE P5

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