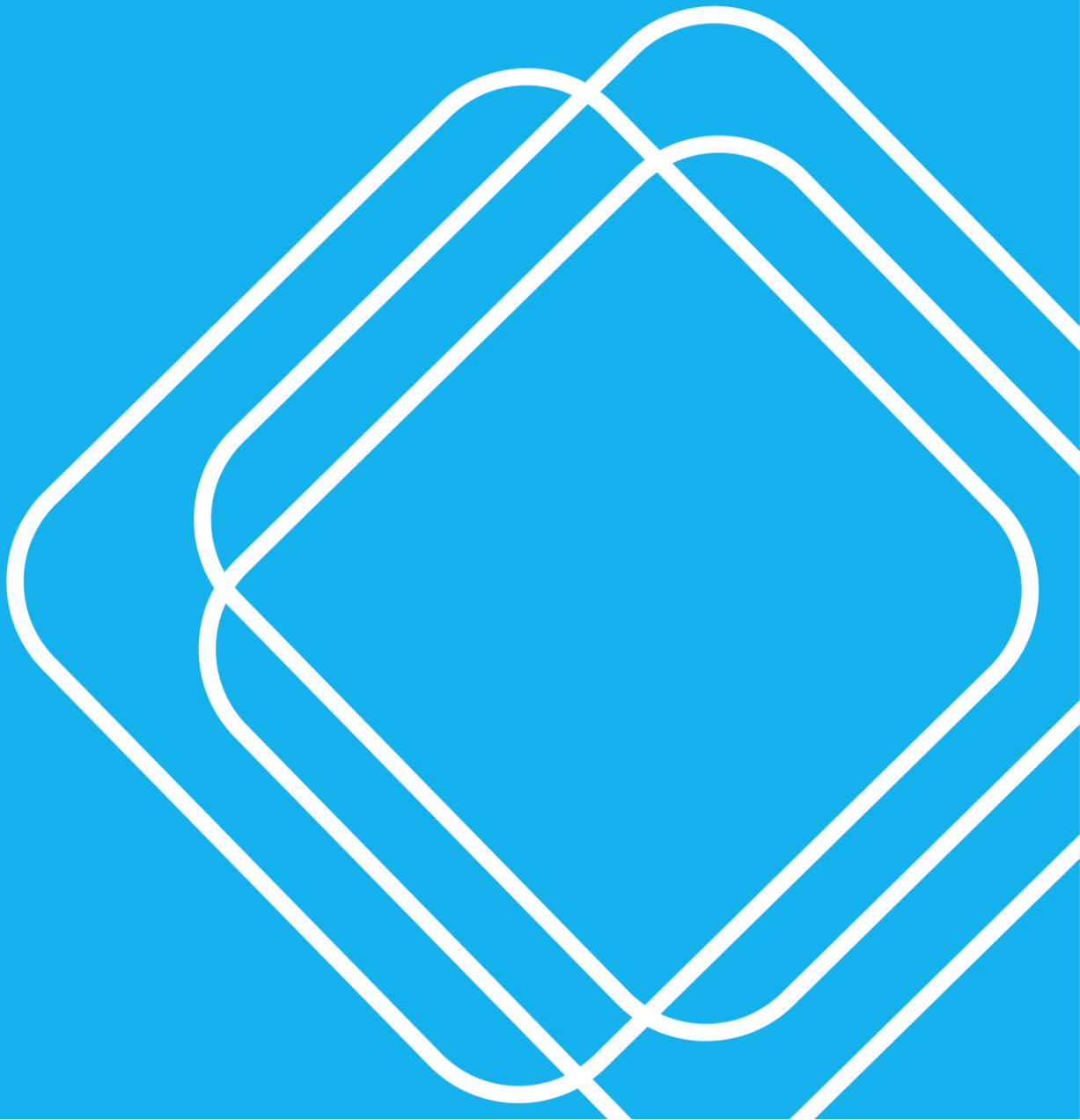
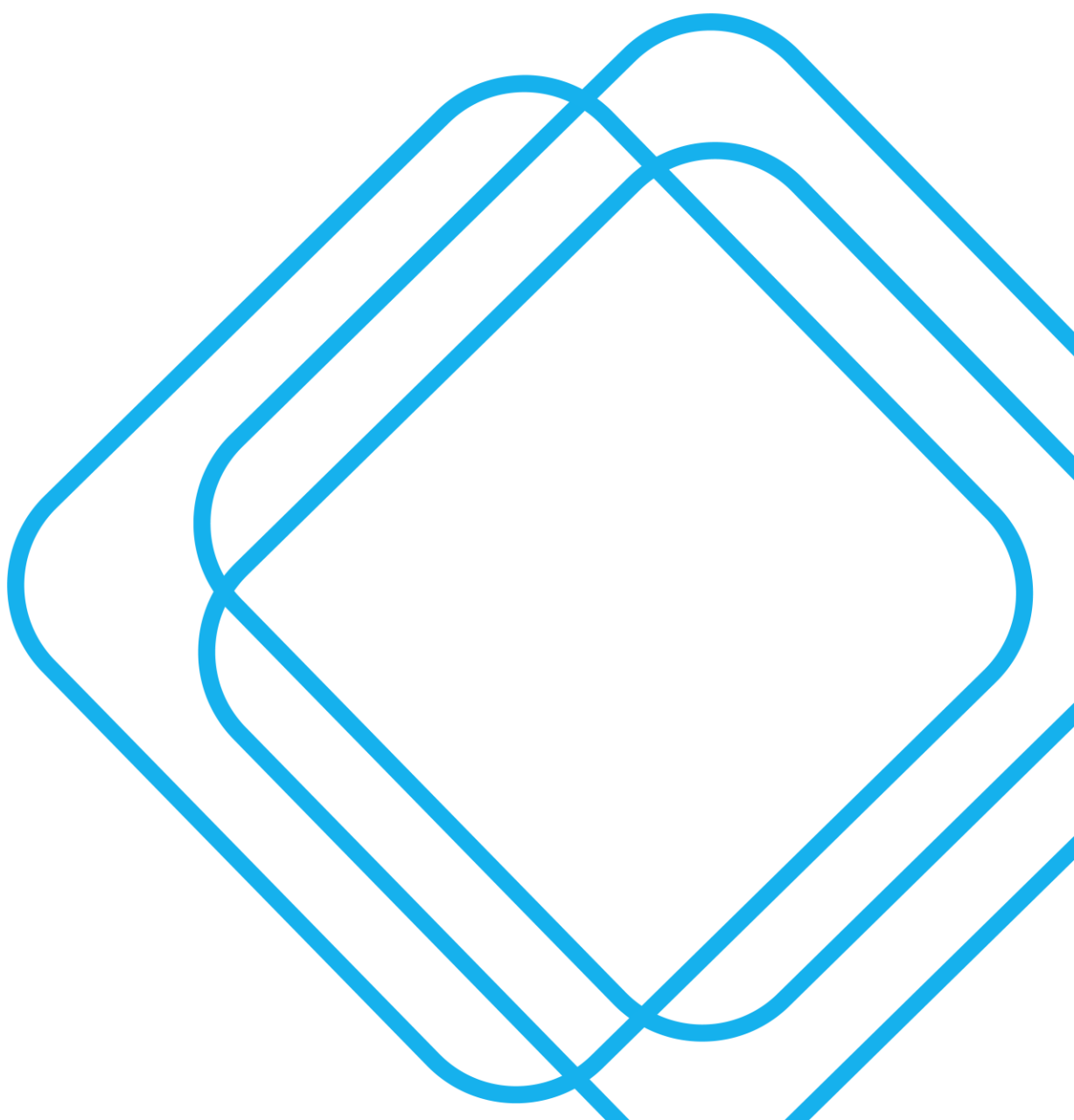


OLD NORTHERN ROAD AND DERRIWONG ROAD DURAL PLANNING PROPOSAL




Traffic Impact Assessment





Quality Assurance

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Executive Summary

Proposed development

This Traffic and Transport Impact Assessment (TIA) was prepared to support a Planning Proposal request by Legacy Property to The Hills Shire Council (Council) to rezone land at Old Northern Road and Derriwong Road, Dural.

The site has an area of 12.879 hectares and comprises five existing lots.

The Planning Proposal request seeks to rezone the site from RU6 Rural Transition to R2 Low Density Residential and SP2 Infrastructure (Local Road), facilitating the delivery of 110 residential lots and a new local park. The proposal also seeks to amend the maximum height of buildings standard from 10 metres to 9 metres. The Planning Proposal request is accompanied by a site-specific development control plan and offer to enter into a Voluntary Planning Agreement to secure public benefits associated with the proposal.

The indicative subdivision layout submitted with the Planning Proposal request provides a mix of larger residential lots ranging from 600sqm to 3,400sqm. This will contribute additional housing supply, diversity, and choice in the local area, and support the viability of the Dural village centre.

Existing conditions

The locality of the site along Old Northern Road is a generally well performing state road that connects Dural to Glenorie and beyond.

The site currently includes four existing residential dwellings and offers no connectivity through the site.

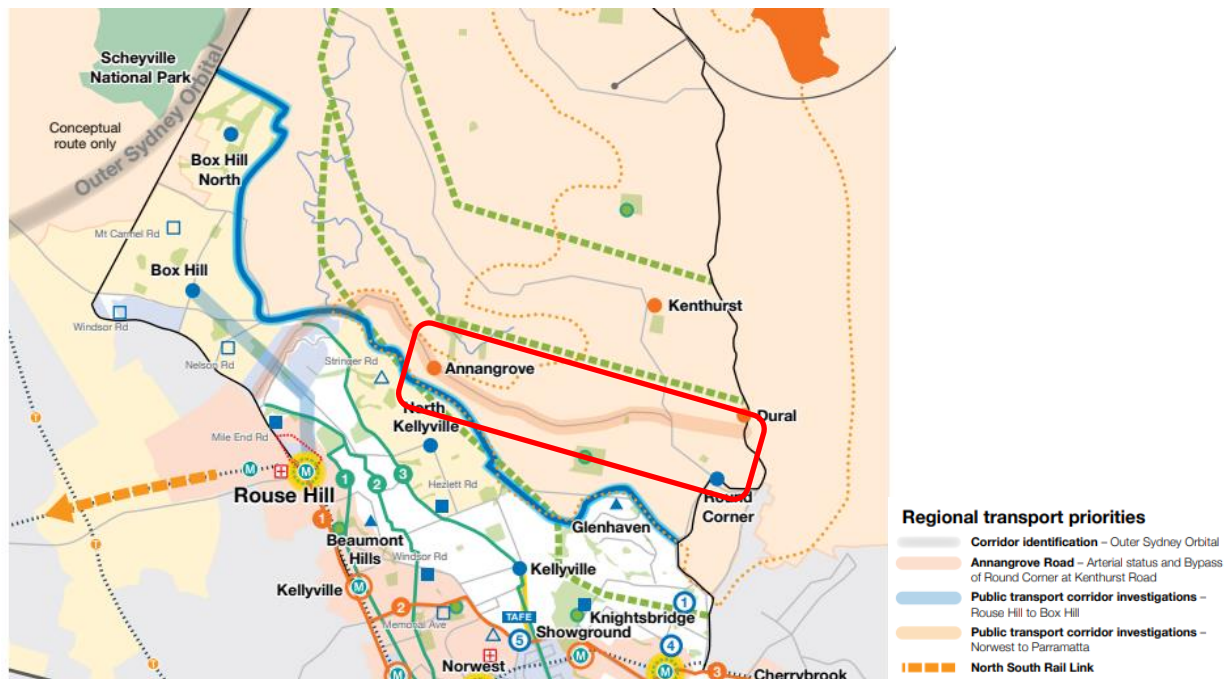
The site is directly adjacent to Dural Public School, which has a student population of 397 students. Access to the school by car (kiss 'n drop) currently occurs on Old Northern Road, which results in queuing outside the school and safety issues.

Public benefits of proposal

The proposal delivers a number of key public benefits from a traffic perspective for the community of Dural and beyond:

- Delivering a corridor reservation and interim collector road that facilitates part of Hills Shire Council's desired Round Corner Bypass by connecting Old Northern Road to Derriwong Road.
- Relocating the school kiss 'n drop off Old Northern Road to improve traffic flow and safety in school hours
- Facilitating rear access to existing dwellings on Old Northern Road that will allow removal of driveway access with resulting safety benefits

Council identifies the Round Corner Bypass in the Local Strategic Planning Statement as a regional transport priority.

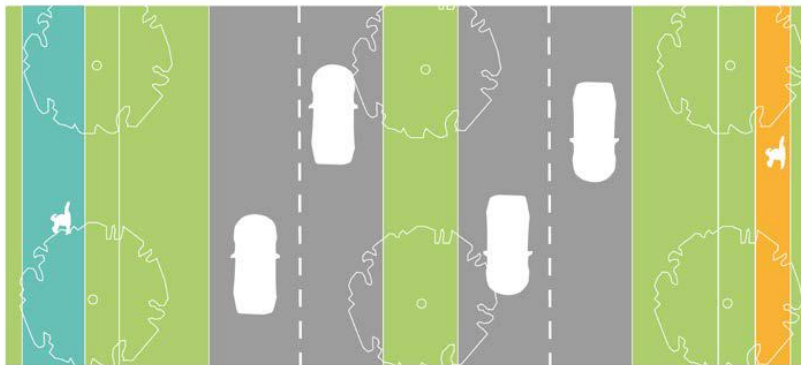
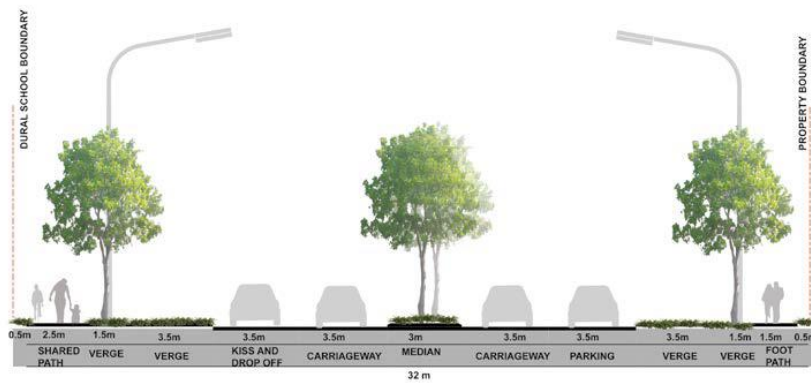


Source: Hills Shire Council

The proposal includes reservation of a 32m wide local road corridor through the site that supports the proposed Round Corner Bypass by providing a connection between Derriwong Road and Old Northern Road.

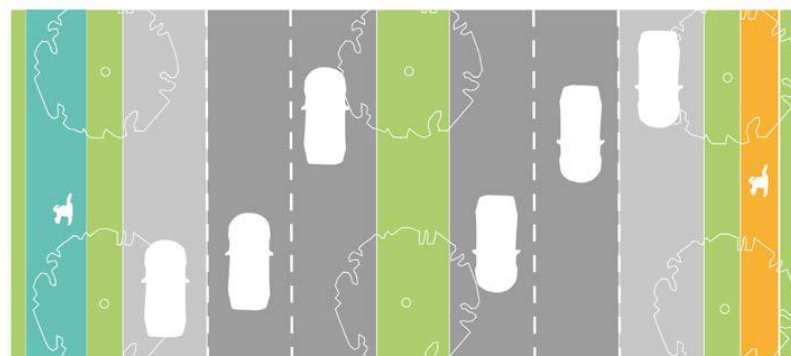
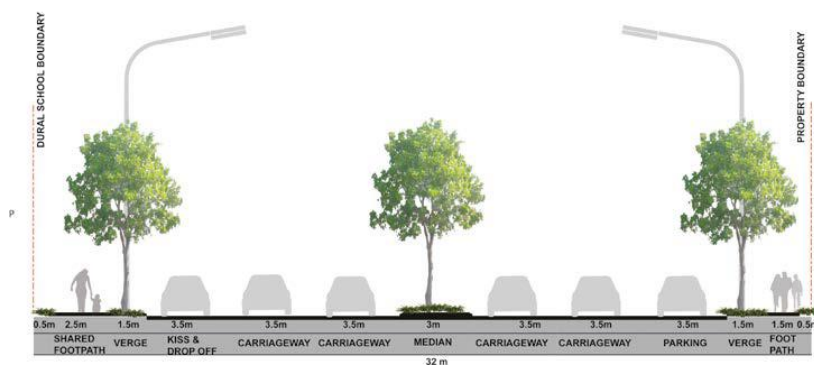
The proposed development will deliver a local collector road within this corridor reservation, providing one lane of traffic and a kiss and ride along the southern side and two lanes of traffic on the northern side. The parking lanes have been set at 3.5m wide, allowing for a consistent cross-section as the road approaches Old Northern Road, with parking lanes able to be switched to turning bays with no widening.

The cross section will provide space for a kiss 'n drop on the northern boundary of Dural Public School enabling relocation of the kiss 'n drop away from Old Northern Road. A total of 25 kiss 'n drop spaces will be provided along a 160m stretch on the northern frontage of Dural Public School. The road network layout has a roundabout just west of the school, enabling school traffic to make U-turn and return to Old Northern Road.



Source: Urbis, 2022

In future, this road can be expanded by others to support delivery of the Round Corner Bypass. A future expanded cross section is show in the figure below, and involves the delivery of two more general traffic lanes.



Source: Urbis, 2022

The cross-section has been designed for compatibility with expansion, by having the additional lanes be built into the verge width. The parking lane widths in the interim cross section have been prepared at 3.5m wide, allowing for use by a stopped bus or as a traffic lane in the final form.

Traffic impacts of proposal

An assessment was undertaken to measure the impact of the planning proposal on the new intersection between Old Northern Road and the local collector road. The proposal is expected to generate up to 109 movements in each peak period. These additional trips will have negligible impact on existing traffic conditions, representing less than 1% of current traffic demands.

The design of the proposed intersection of the local collector road / Old Northern Road will be subject to further engagement with Transport. This intersection would not currently meet signal warrant requirements, however there is a case that a signalised treatment would support improved safety outcomes given the traffic and pedestrian movements associated with Dural Public School. Modelling demonstrates that the intersection would perform well at a Level of Service A under a signalised arrangement or a seagull arrangement. Sensitivity analysis was performed on the signalised design and showed the design can cater for an additional 2,400 vehicles as a bypass before failure. This demonstrates the signalised arrangement has capacity to service movements far greater than the trips generated by this development.

In response to comments from Transport for NSW, a second stage of expanded traffic modelling is proposed to be undertaken if the proposal receives Council endorsement and a Gateway Determination to proceed. This second stage of traffic modelling is intended to assess broader traffic implications of Council's proposed Round Corner Bypass. While this does not entail the full extent of a regional land use and traffic assessment as suggested by Transport for NSW, the modelling scope (as detailed at **Appendix B**) is appropriate to better understand the traffic implications associated with the Round Corner Bypass and recognising that this Planning Proposal does not deliver the full bypass and that any future proposal to create the bypass would be subject to extensive traffic assessment at the time.

Conclusion

Overall, the proposal would have negligible impacts on the road network due to the small number of trips generated. The relocation of kiss 'n drop facilities for Dural Public School is a considerable benefit to community safety, and the reservation of a local corridor and delivery of local collector road that supports the Round Corner Bypass is consistent with Council's Local Strategic Planning Statement.

1.0 Introduction

1.1 Context

SCT Consulting has been tasked by Legacy Property to prepare this Traffic and Transport Impact Assessment (TIA) to support the planning proposal for a low-density residential development in Dural. The residential development consists of 110 dwellings located west of the Old Northern Road and surrounds Dural Public School, as illustrated in **Figure 1–1** below.

As part of this proposal, a corridor will be reserved to allow the future development of the Round Corner Bypass, between Annangrove Road and Old Northern Road.

This site was part of a previous planning proposal with an extensive history. The prior proposal included a 'northern' and southern' site with a proposed yield of approximately 180 dwellings. The northern site received support from the Independent Planning Commission (IPC) in September 2020. A revised proposal for the northern site was endorsed by The Hills Shire Council in February 2021 and received a Gateway Determination from the Department of Planning and Environment in July 2021. This proposal did not progress due to timeframes set in the Gateway Determination.

Figure 1–1 Site location



1.2 Purpose and scope of the report

This report reviews the potential traffic and transport impacts of the proposed development on the surrounding transport networks to determine the suitability of the proposal and whether any road upgrades are required. This includes an assessment of traffic impacts on road networks, as well as impacts on existing and future pedestrians.

1.3 Report structure

This report has been structured into the following sections:

- **Section 1** introduces this report, its context, and its purpose
- **Section 2** reviews the relevant strategic planning and transport planning context
- **Section 3** describes the existing transport conditions in and around the site for all modes of transport
- **Section 4** outlines the proposed development and proposed transport network
- **Section 5** discusses the traffic and transport appraisal which includes the traffic impacts of the development
- **Section 6** presents the conclusions of the assessment.

2.0 Strategic context

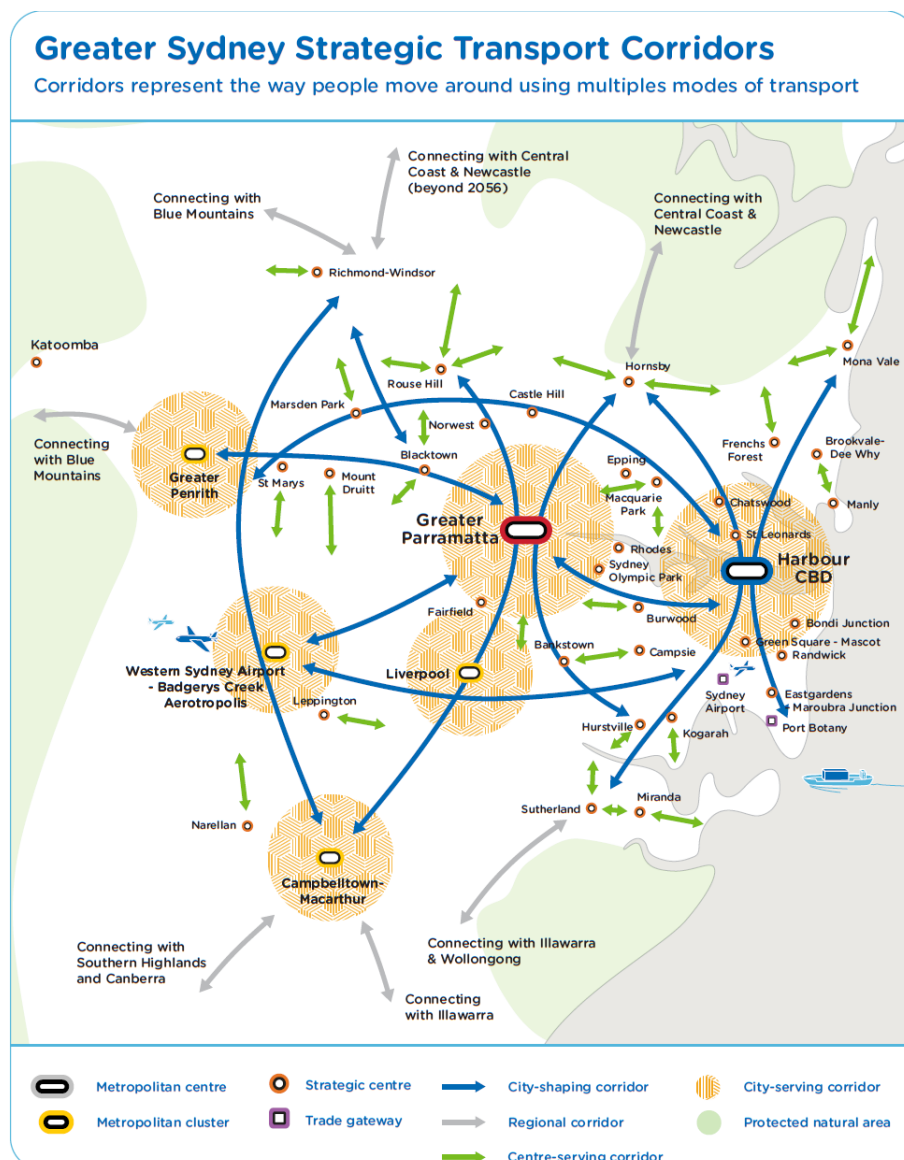
2.1 Future Transport Strategy 2056

Future Transport 2056 is a 40-year strategy developed by Transport for NSW (TfNSW) which outlines the directions and principles for mobility and transport investment as a guiding document. Future Transport 2056 builds on the achievements of the Long-Term Transport Master Plan, which has delivered local and international investment in the NSW transport network and placed a focus on customer-oriented planning.

The vision for Greater Sydney as a Metropolis of Three Cities, where people can access the majority of jobs and services within 30 minutes, will require a sustained and staged investment program to protect corridors and then develop an integrated transport system that includes city-shaping, city-serving, centre-serving and strategic freight networks. Key transport corridors connecting the major cities that will facilitate this vision are outlined in **Figure 2–1**.

The transport networks are proposed to expand to provide improved access to each metropolitan centre, particularly Greater Parramatta and the metropolitan cluster of centres in the Western Parkland City, including the safe and reliable movement of freight. These networks will be progressively developed through a range of infrastructure investments that will make key improvements to the city-shaping and road networks as well as upgrade local roads, and walking and bicycle paths, as detailed in the Greater Sydney Services and Infrastructure Plan.

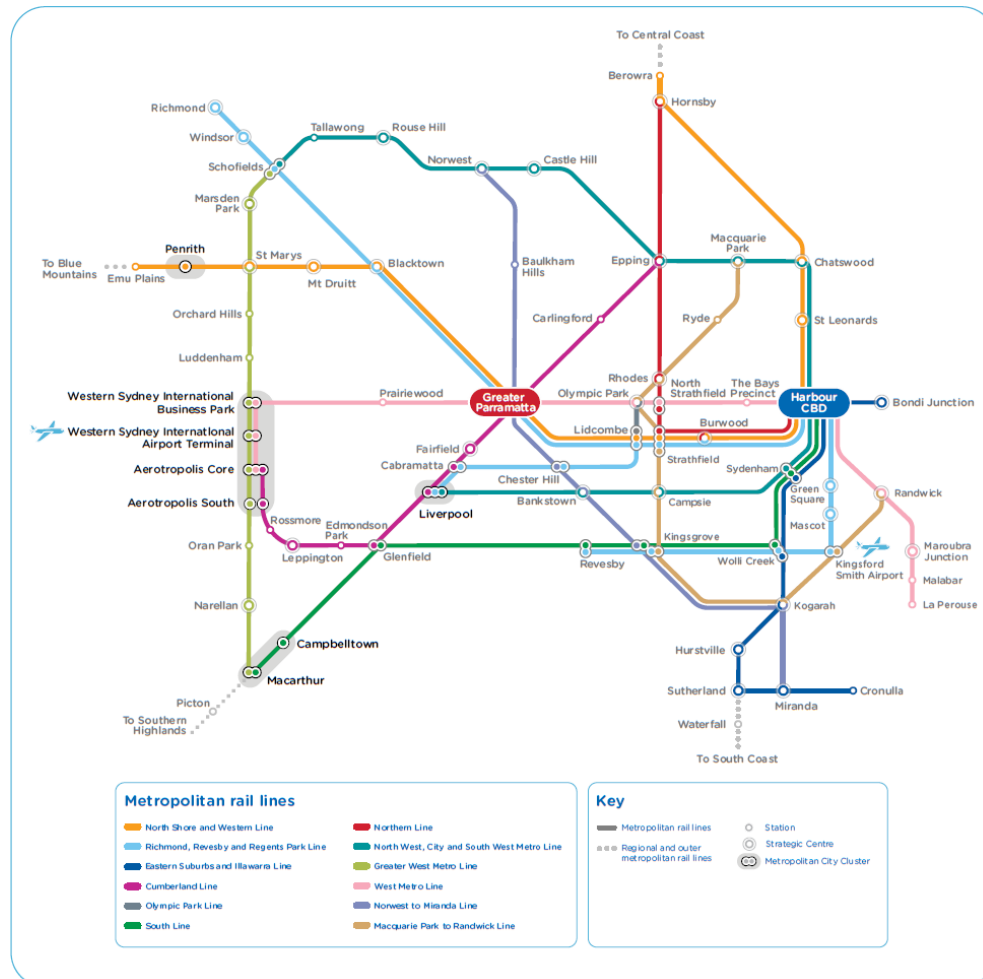
Figure 2–1 Greater Sydney strategic transport corridors



Source: Transport for NSW, 2021

The developing vision for the 2056 rail network is shown in **Figure 2–2**. It builds on Future Transport’s predominantly city-shaping network and includes further detail on the operating concepts, indicative alignments and key interchange locations. The 2056 vision aims to integrate these changes with planned fast rail, intercity and rail freight services within Greater Sydney. This includes determining the alignment and servicing of corridors approaching Greater Sydney from regional and outer metropolitan NSW, drawing on long-term metropolitan rail network planning, freight and fast rail project assumptions.

Figure 2–2 Greater Sydney 2056 indicative future rail network



Source: Transport for NSW, 2021

Implications for Dural North Planning Proposal: Dural is located just north of Castle Hill which has been identified as a strategic centre in Future Transport 2056. The development will likely benefit from its proximity to this strategic centre and the connecting rail services at Castle Hill Metro Station and road transport corridors which would provide further access to employment and services.

2.2 The Hills Development Control Plan 2012

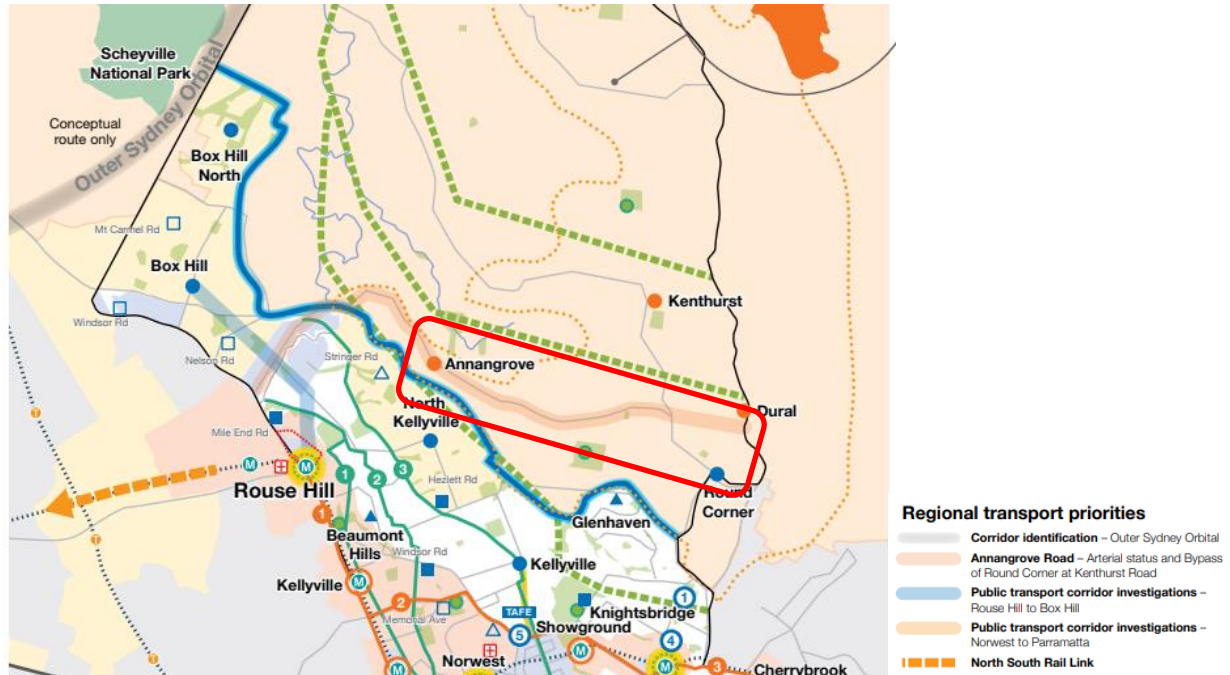
The Hills Development Control Plan (DCP) 2012, developed by The Hills Shire Council, outlines requirements for development within The Hills Shire. This DCP supports The Hills Local Environmental Plan 2019 in delivering the vision outlined in Hills Future 2036, the Local Strategic Planning Statement for The Hills Shire Council endorsed in 2019. The provisions outlined in the DCP have been specified to guide the preparation and assessment of development applications within The Hills Shire and include requirements for parking as well as local road development.

Implications for Dural North Planning Proposal: This planning proposal will be subject to requirements for residential dwellings outlined in the DCP as well as requirements for the development of local roads to support these developments.

2.3 Round corner bypass

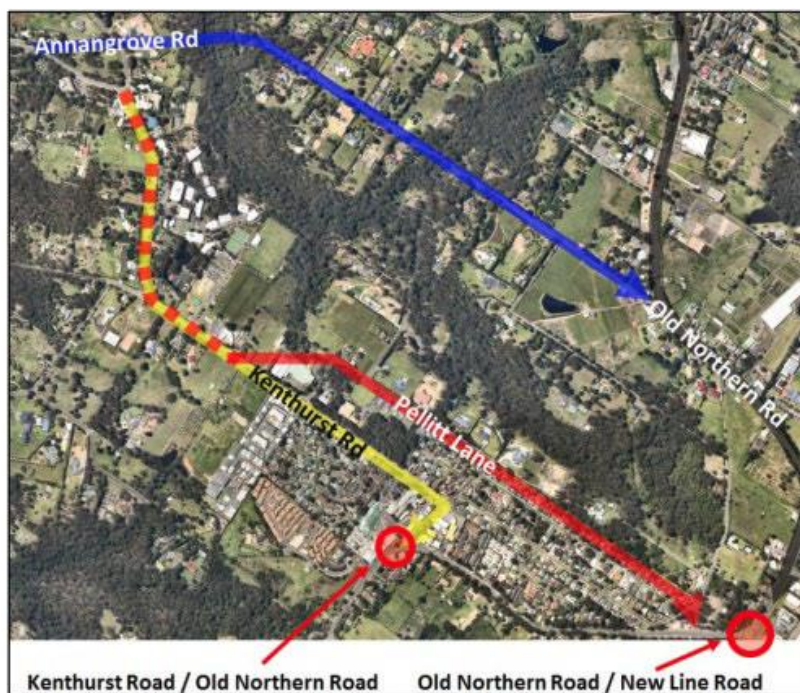
The proposal supports part of the proposed 'Round Corner Bypass' by providing a corridor reservation between Derriwong Road and Old Northern Road. The Round Corner Bypass is identified in The Hills Shire Council's Local Strategic Planning Statement (**Figure 2-3**) and is intended to alleviate congestion through Round Corner along Kenthurst Road at the approach to Old Northern Road (**Figure 2-4**).

Figure 2-3 Round Corner Bypass from Local Strategic Planning Statement (red)



Source: The Hills Shire Council LSPS

Figure 2-4 Round Corner Bypass options



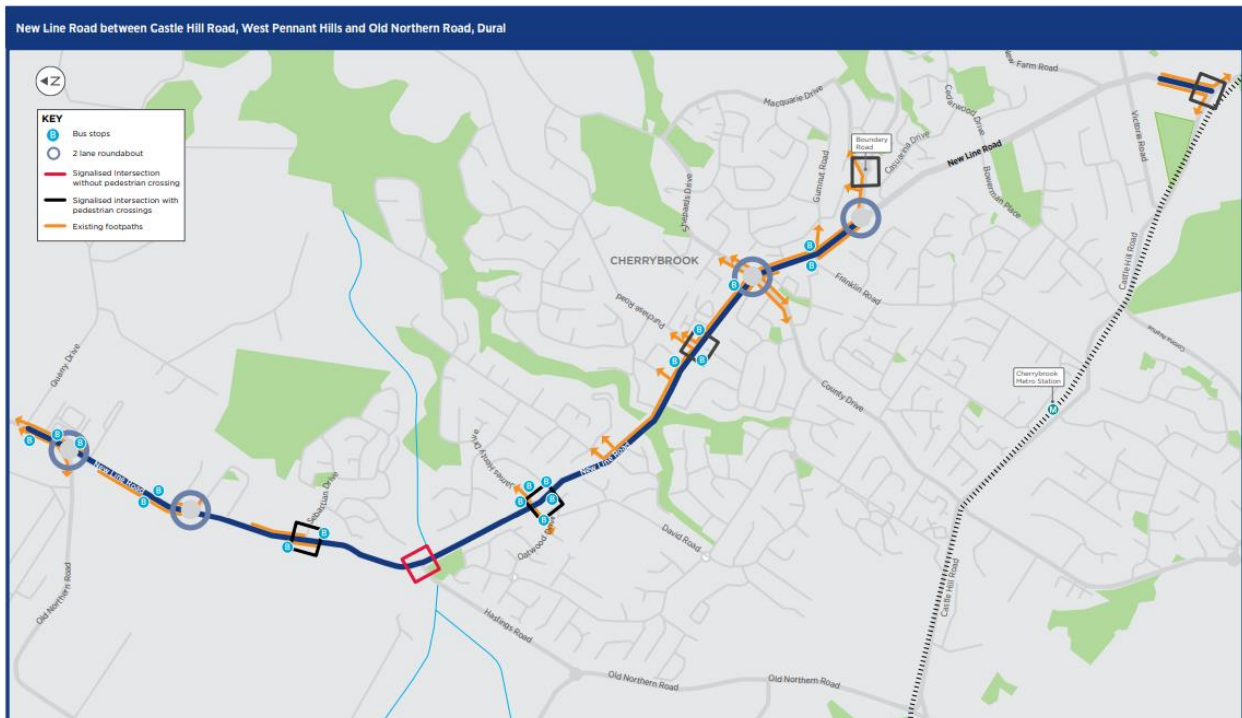
Source: The Hills Shire Council

Implications for Dural North Planning Proposal: The site delivers a connection between Derriwong Road and Old Northern Road, supporting Council's proposed Round Corner Bypass at no cost to government. Without these sites being redeveloped as outlined in this proposal, the bypass would cost more to achieve, requiring future land acquisition within this site.

2.4 New Line Road upgrade

New Line Road is also identified for an upgrade to a two-lane in each direction upgrade (**Figure 2-5**).

Figure 2-5 TfNSW New Line Road upgrade



Source: Transport for NSW, 2021

This initiative has been funded to a total of \$20m.

Implications for Dural North Planning Proposal: widening of New Line Road is supportive of increased traffic generation by the site. It reduces pinch points to the south of the site when accessing broader destinations.

3.0 Existing conditions

3.1 Site context

The site is located in the Local Government Area (LGA) of The Hills Shire and surrounds Dural Public School. The site is connected to the road network via Old Northern Road to the east and Derriwong Road to the south and west as illustrated in **Figure 3–1** below. Currently, the site is occupied by rural residential dwellings and open grassland.

Figure 3–1 Site context



3.2 Travel behaviour

3.2.1 General travel behaviour

The Household Travel Survey (HTS) collects travel information for residents within the Sydney Greater Metropolitan Area (GMA). This includes information for a wide range of trip purposes including commute, education and recreation, and is provided at the LGA level. The mode shares for The Hills Shire LGA in 2019/20 are summarised in **Table 3-1** below. A vast majority of trips are made using private vehicles, both driving and as a passenger, followed by walking as the second highest mode share. This is to be expected due to the limited public transport services in the area.

Table 3-1 Household Travel Survey mode shares

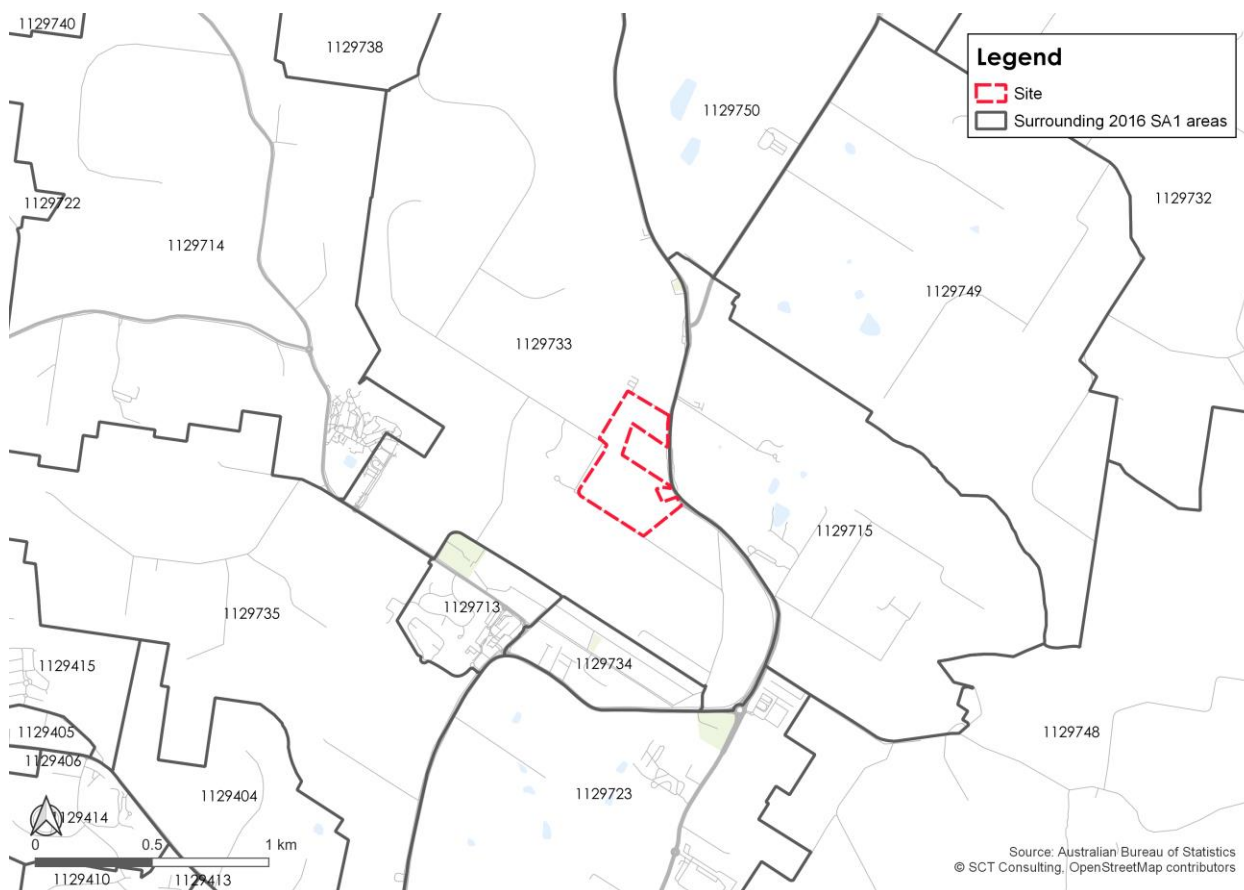
Mode	Mode share
Car, driver	56.9%
Car, passenger	24.8%
Train	2.5%
Bus	7.2%
Walk	8.2%
Other	0.4%

Source: Transport for NSW, 2022

3.2.2 Commuting behaviour

Commuting behaviour for the site and the surrounding areas were determined through analysis of Method of Travel to Work data collected by the Australian Bureau of Statistics (ABS) Census in 2016. This information is collected at the resolution of Statistical Area Level 1 (SA1) shown in **Figure 3–2** below. The site falls within SA1 1129733 which includes the area west of Old Northern Road.

Figure 3–2 SA1s surrounding the site



Summarised in **Table 3-2** below, the majority of trips made are by car followed by trips made by train and bus. The majority of public transport services in the area are bus services along Old Northern Road with the closest heavy rail service located at Castle Hill Metro Station.

Table 3-2 Method of Travel to Work mode share

Mode	Mode share
Car, driver	83%
Car, passenger	3%
Train	7%
Bus	4%
Bicycle	0%
Walk	0%
Other	3%

Note: Excludes working from home and those who did not go to work
Source: Australian Bureau of Statistics, 2022

Places of work for individuals living within the area are summarised in **Table 3-3** below. The largest portion of residents work in The Hills Shire LGA, followed by Hornsby and Sydney CBD. Commuters may be choosing to drive as a combination of convenience and travel time over public transport services in the area.

Table 3-3 Places of work

LGA	Mode share
The Hills Shire (A)	43%
Hornsby (A)	9%
Sydney (C)	6%
Blacktown (C)	6%
Ryde (C)	5%
Parramatta (C)	5%
North Sydney (A)	4%
Other / No fixed place of work	21%

Source: Australian Bureau of Statistics, 2022

3.2.3 Dural Public School

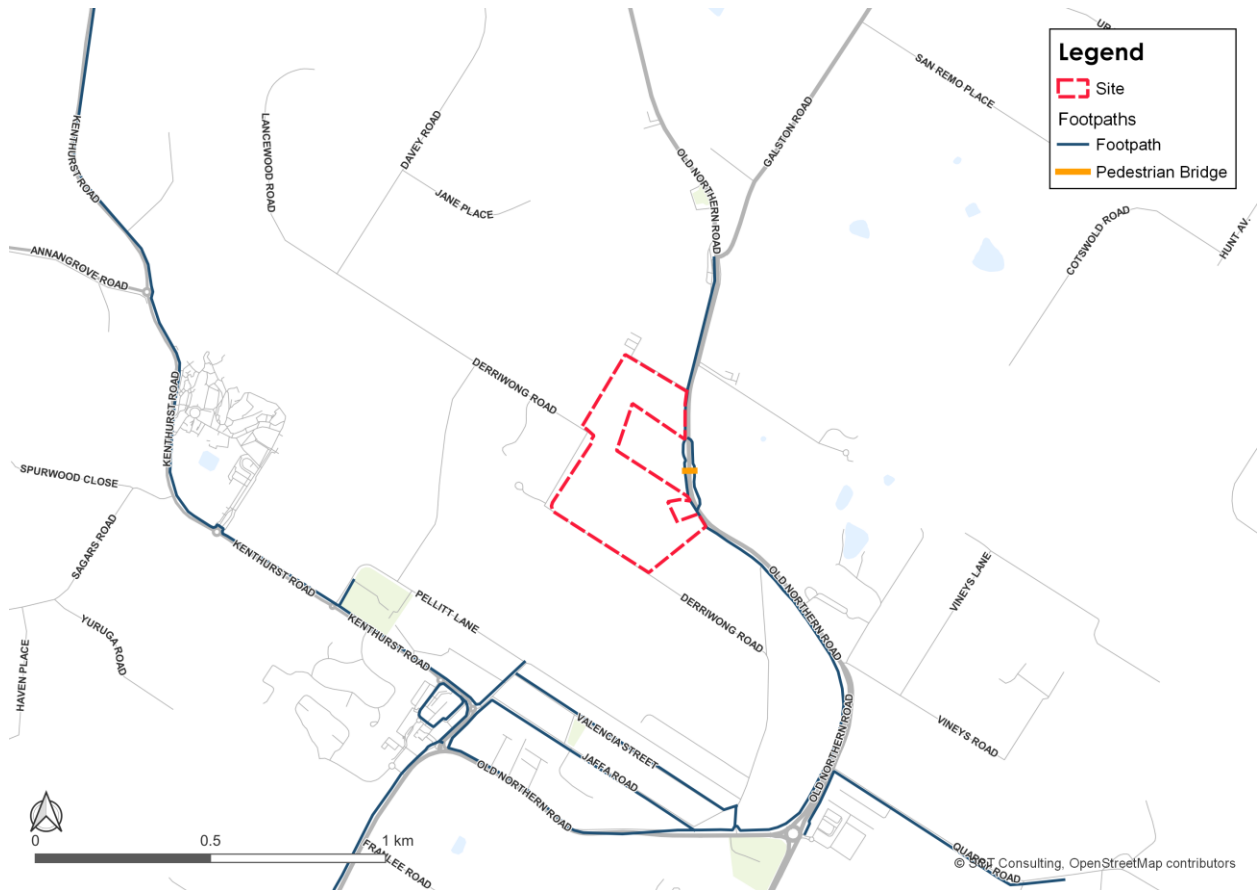
Dural Public School sits within the 'u' formed by the site. A public primary school, it caters for 397 students. Kiss 'n drop facilities are located on Old Northern Road adjacent to the school site.

The kiss 'n drop currently results in queuing on Old Northern Road during pick up and drop off times.

3.3 Walking and cycling infrastructure

The walking and cycling infrastructure around the site is scarce, as shown in **Figure 3–3**. There is a footpath along the western edge of Old Northern Road which extends south towards Dural Business Park and Dural Mall.

Figure 3–3 Walking and cycling infrastructure



Outside Dural Public School there is a vertically separated pedestrian crossing that allows parents to perform pick-up and drop-off activities on the opposite side of the road. As shown in **Figure 3–4** below, the pedestrian crossing has no elevators for mobility-impaired individuals.

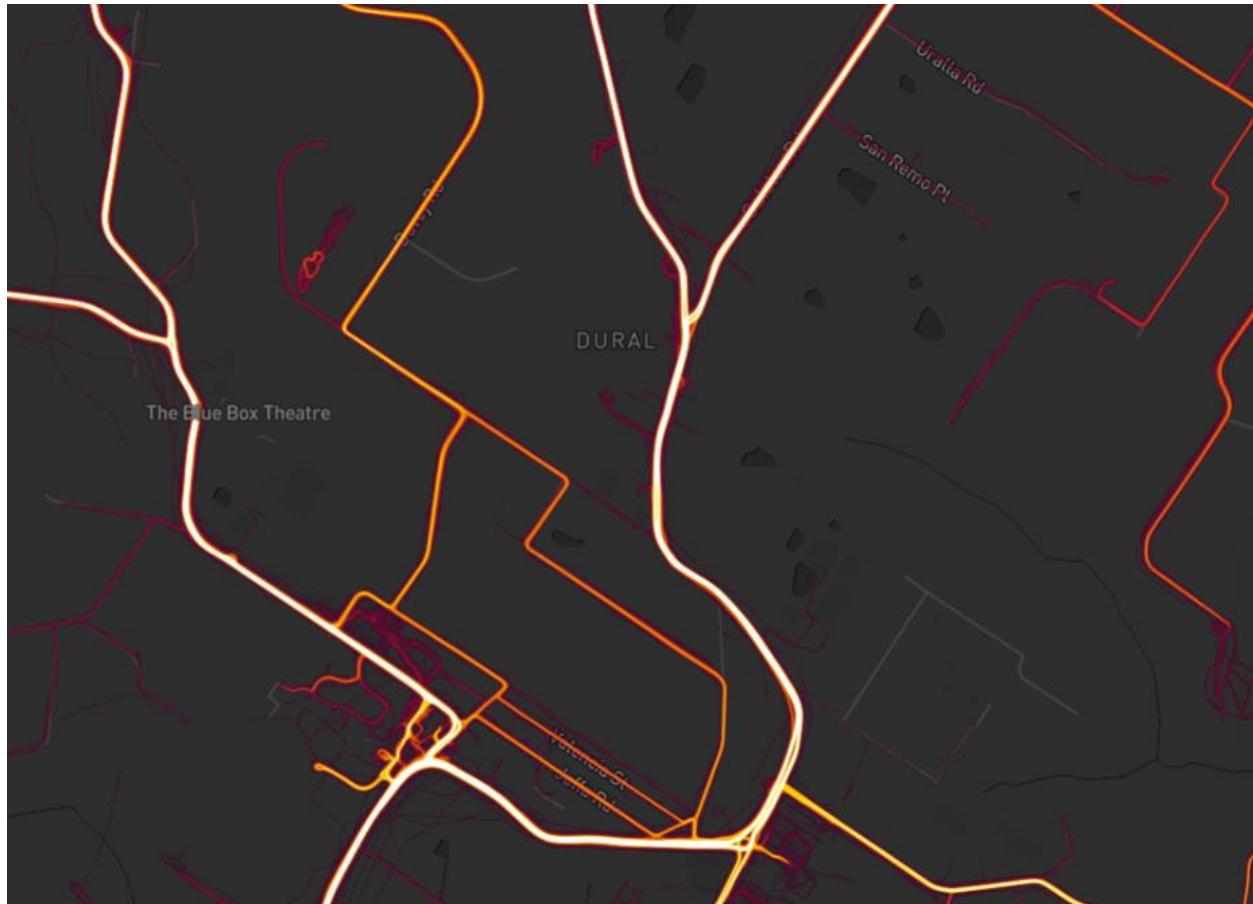
Figure 3–4 Pedestrian bridge over Old Northern Road



Source: Google StreetView, 2022

There is currently no dedicated cycling infrastructure in the area, however, there is a noticeable amount of recreational cycling activity on Old Northern Road. Strava activity, shown in **Figure 3–5** below, indicates a high volume of activity on Old Northern Road and Galston Road which forks off towards the east. There is also some activity on Derriwong Road and Davey Street to the west of the site. The Hills Shire identifies Kenthurst Road as a cycleway; however, this consists of a footpath on the northern side of the road.

Figure 3–5 Recreational cycling activity



Source: Strava, 2022

3.4 Public transport network

The site is located on Old Northern Road which carries bus services to Castle Hill for further heavy rail connections via Sydney Metro Northwest. The closest bus stops to the site are located outside Dural Public School, as shown in **Figure 3–6**. The northbound bus stop has shelter and seating available, whereas the southbound bus stop has no facilities aside from a signpost. These two are connected by a pedestrian bridge to safely cross Old Northern Road however, there are no elevators for mobility-impaired individuals.

Figure 3–6 Public transport network

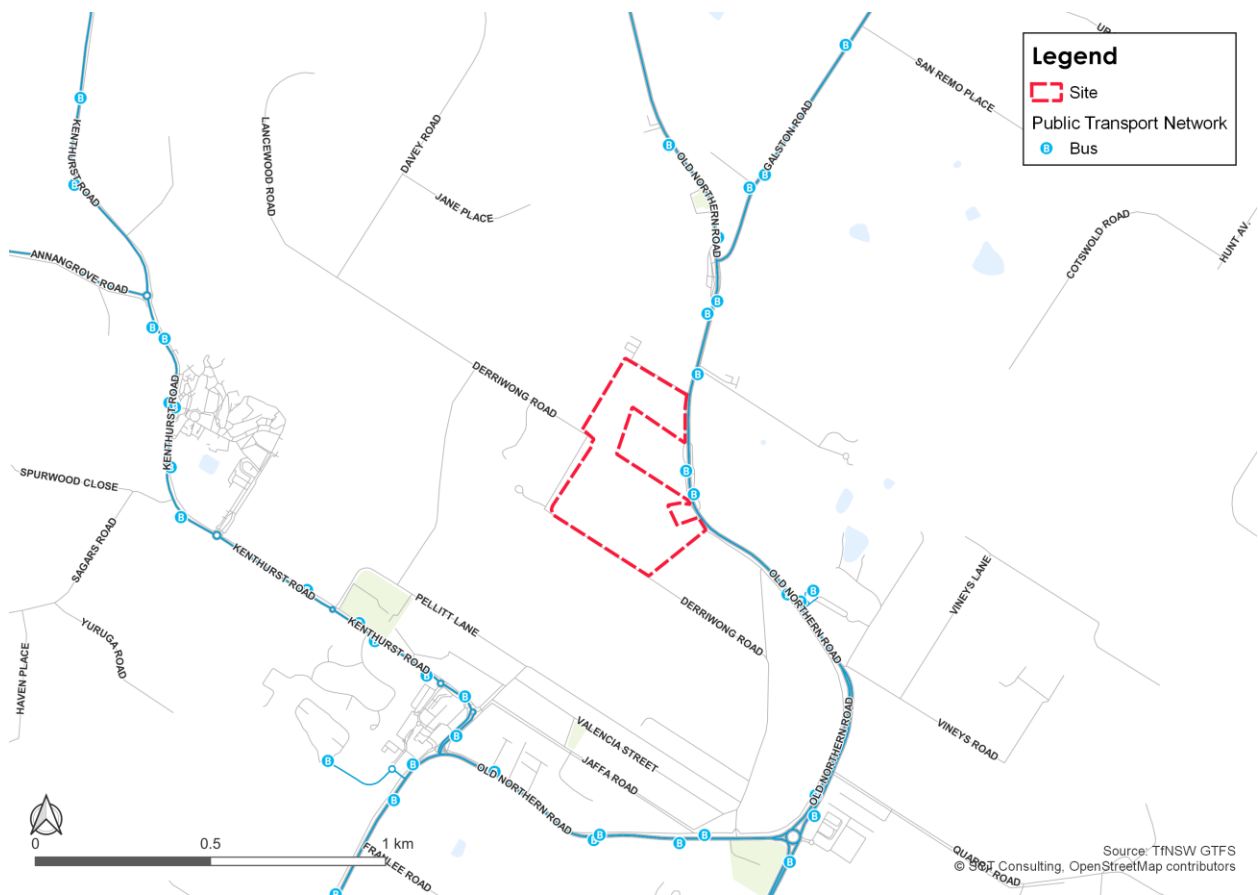
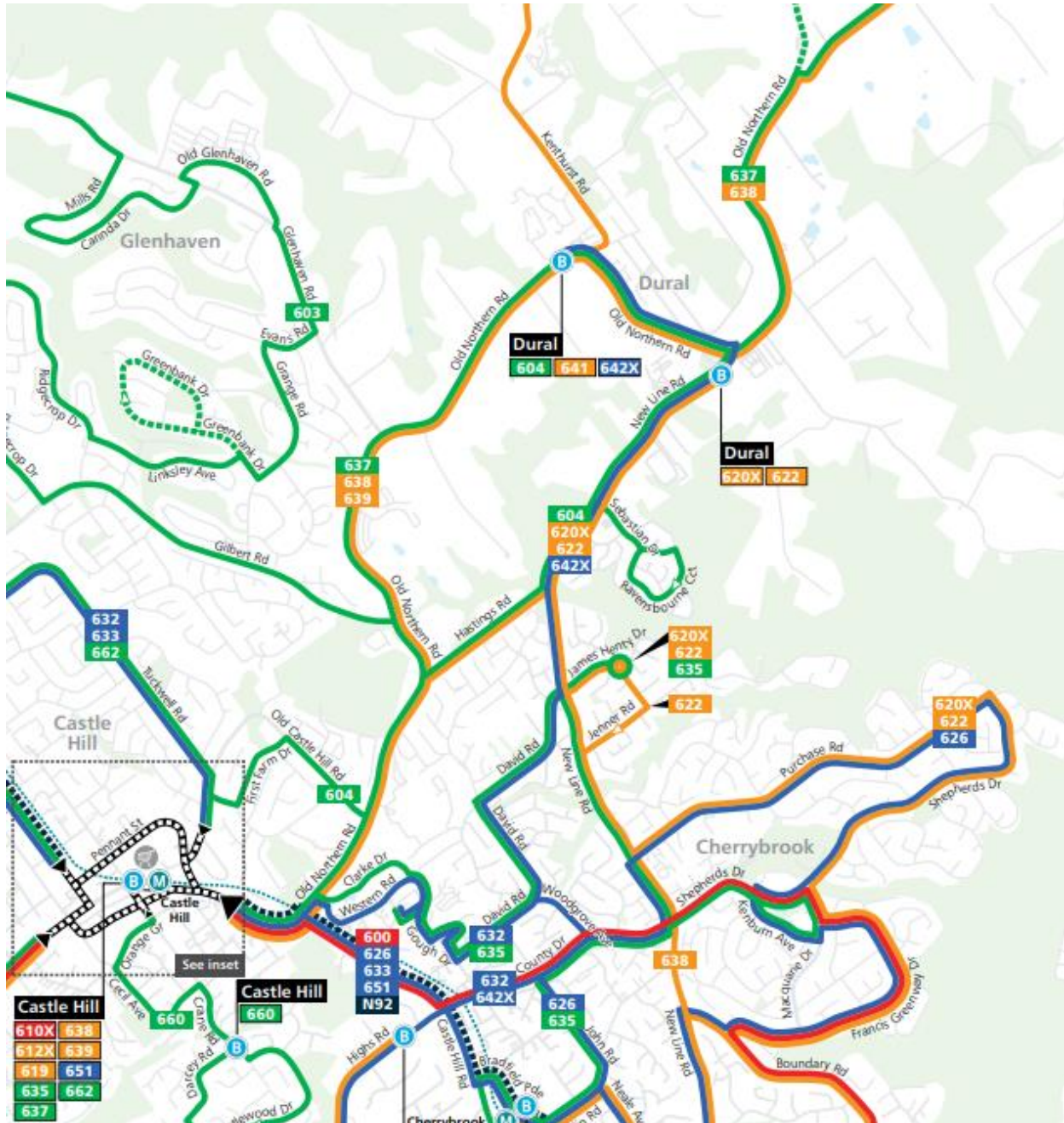


Figure 3–7 Bus network in Dural

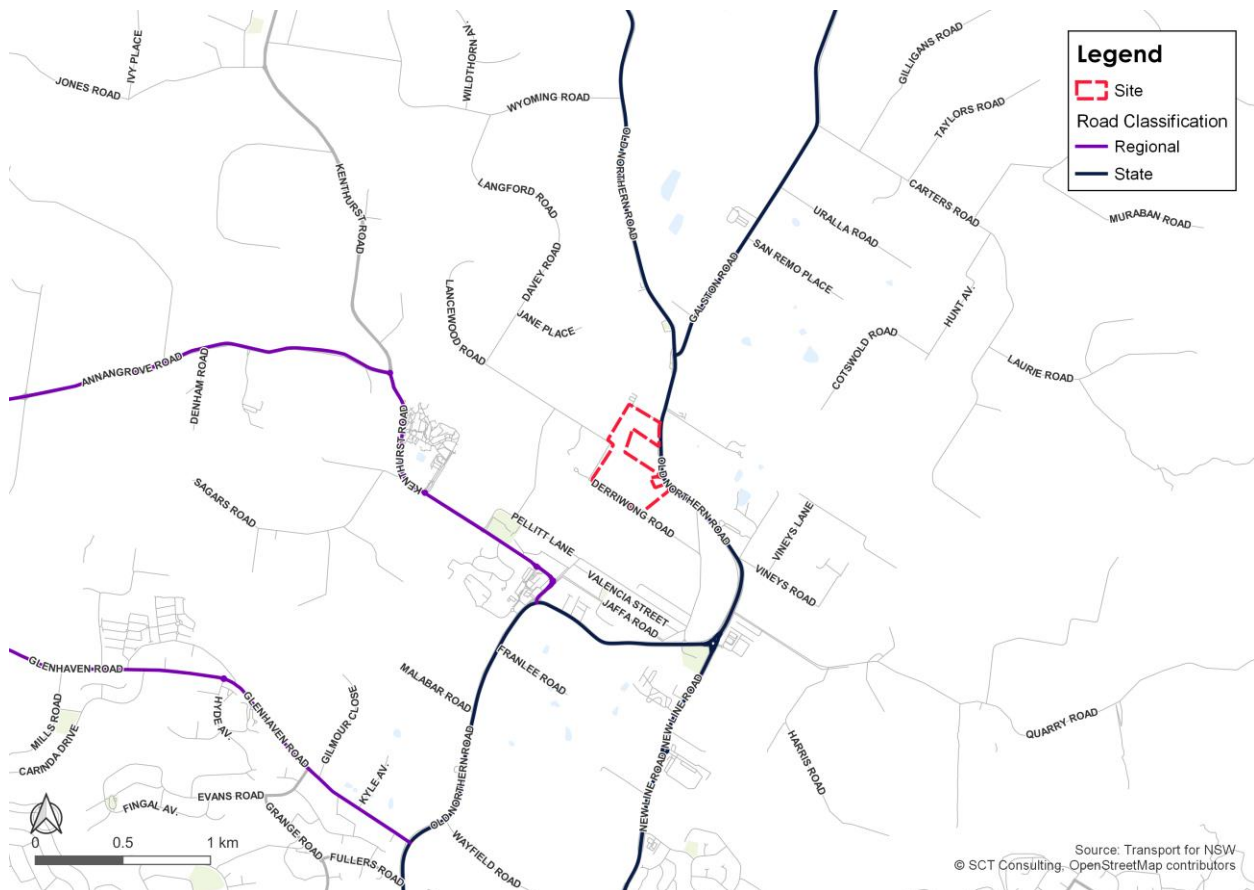


Public transport options from the site connect into the Castle Hill Metro Station, which provides turn up and go services that connect to Sydney's broader rail network. When Sydney Metro City and Southwest is delivered, residents of the site will be one bus and train trip away from major centres Epping, Chatswood, and Sydney CBD.

3.5 Road network and classification

The site is bounded by Old Northern Road to the east and Derriwong Road to the west. The Old Northern Road is classified as a State road (per the Roads Act), shown in **Figure 3–8**, and connects to Castle Hill and New Line Road to the south. To the north, it provides a connection to Maroota and Wisemans Ferry. Other state roads in the area include Galston Road and New Line Road. Kenthurst Road and Glenhaven Road to the southwest of the site are classified as regional roads.

Figure 3–8 Classified State and Regional road s



Old Northern Road acts as an arterial road in the area, typically with one lane in both directions and a posted speed limit of 60km/hr. At some intersections, such as the roundabout with New Line Road and at Galston Road, the road widens briefly into two lanes in both directions. Outside Dural Public School, there is a right turn short lane in the northbound direction which allows drivers to turn into a pick-up and drop-off area, shown in **Figure 3–9** below. This area has a speed limit of 40km/hr at all times whereas the school zone is only in effect on weekdays from 8.00 am to 9.30 am and 2.30 pm to 4.00 pm. The drivers exiting the pick-up drop-off area are required to turn left onto Old Northern Road, thus drivers wishing to travel north must find other opportunities to turn around.

Figure 3–9 Pick-up drop-off area outside Dural Public School



Source: Nearmap, 2022

3.6 Existing traffic conditions

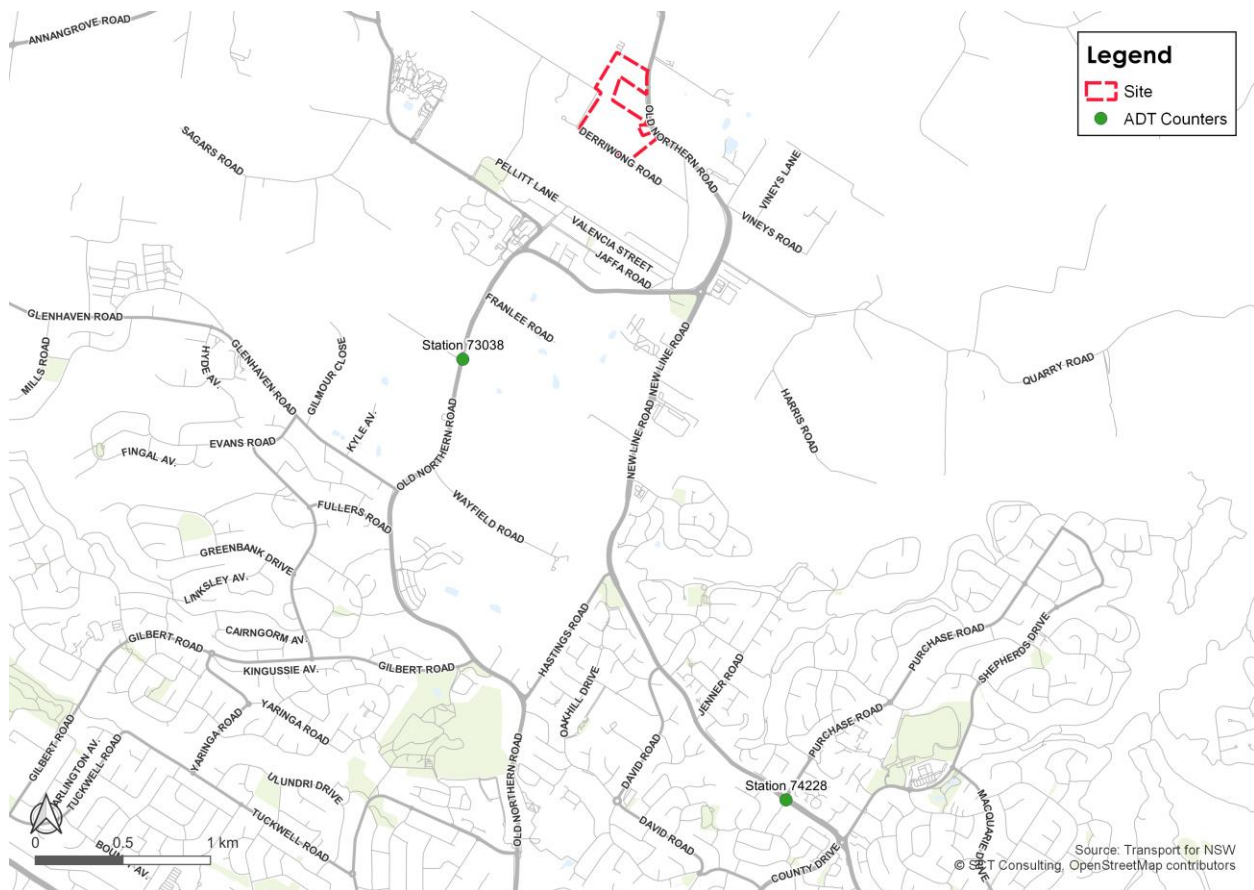
Traffic count data was collected on Old Northern Road outside Dural Public School on Thursday 18 August 2022. The peak traffic volumes during the AM and PM periods are summarised in **Table 3-4** below. In both peak periods, the traffic volume in the peak direction approaches 1,000 vehicles per hour, indicating that Old Northern Road is currently close to capacity.

Table 3-4 Peak traffic volumes on Old Northern Road

Peak Period	Northbound	Southbound	Total
7 am to 8 am	743	973	1,716
4 pm to 5 pm	981	768	1,749

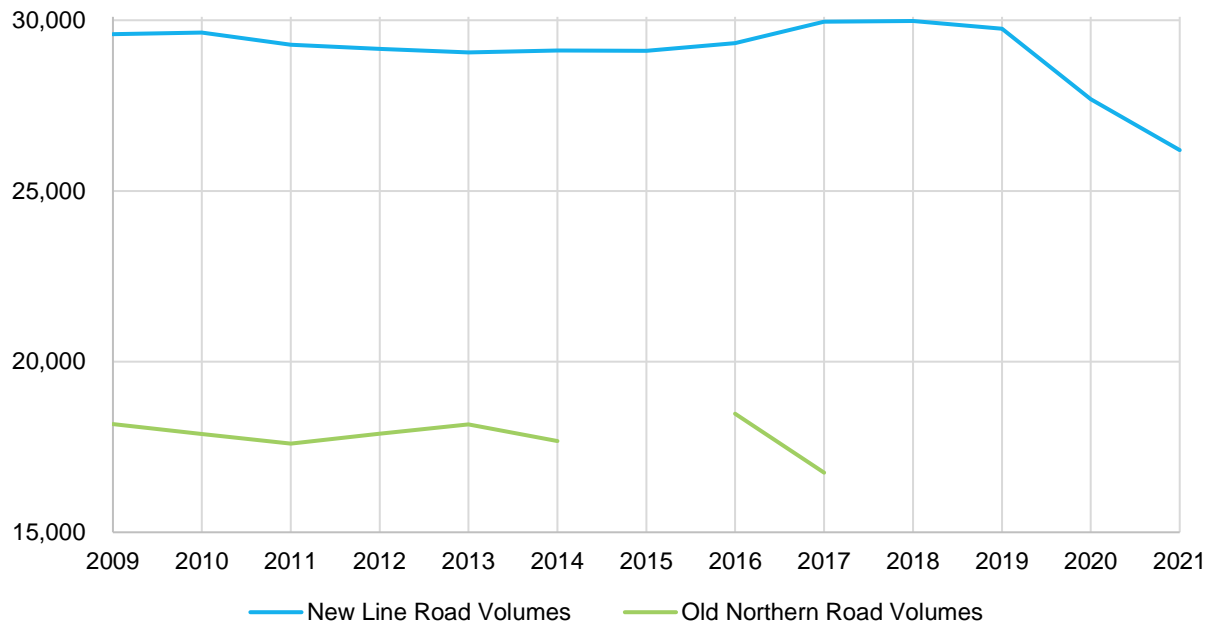
Average Daily Traffic (ADT) volumes are collected by count stations operated by Transport for NSW on New Line Road south of the site. Previously, there was an additional counter operating on Old Northern Road just south of Dural Mall, which was discontinued in 2017. These station locations are shown in **Figure 3-10** below.

Figure 3-10 Average Daily Traffic count stations



In 2017, Old Northern Road had an average daily traffic volume of 17,136 vehicles. Using the growth observed along New Line Road, illustrated in **Figure 3–11** below, there is expected to be no background growth in traffic volumes along Old Northern Road.

Figure 3–11 Average Daily Traffic volumes



Source: Transport for NSW, 2022

Note: No data was recorded on Old Northern Road in 2015 or after 2017.

As the proposed collector road does not currently exist, base year intersection modelling could not be completed. Despite this, there are also existing traffic issues associated with the kiss 'n drop at Dural Public School. The existing arrangement provides an off corridor drop off area and a right turn bay for northbound travelling vehicles to turn from. Upon exit, however, vehicles are unable to continue travelling northbound and are required to turn left and travel southbound by a left out only arrangement.

4.0 Proposed development

4.1 Overview

The Planning Proposal request seeks to rezone the site from RU6 Rural Transition to R2 Low Density Residential and SP2 Infrastructure (Local Road), facilitating the delivery of 110 residential lots and a new local park as illustrated in **Figure 4–1**. The proposal also seeks to amend the maximum height of buildings standard from 10 metres to 9 metres. The Planning Proposal request is accompanied by a site-specific development control plan and offer to enter into a Voluntary Planning Agreement to secure public benefits associated with the proposal.

The indicative subdivision layout submitted with the Planning Proposal request provides a mix of larger residential lots ranging from 600sqm to 3,400sqm. This will contribute additional housing supply, diversity, and choice in the local area, and support the viability of the Dural village centre.

The proposal includes reservation of a 32m local road corridor that would support The Hills Shire Council's proposed Round Corner Bypass. This bypass aims to provide an alternate connection between Annangrove Road and Old Northern Road and a proposed alignment through the development. The proposed layout will also provide potential rear access to three existing properties along the northern boundary of the development which currently have driveway access along Old Northern Road.

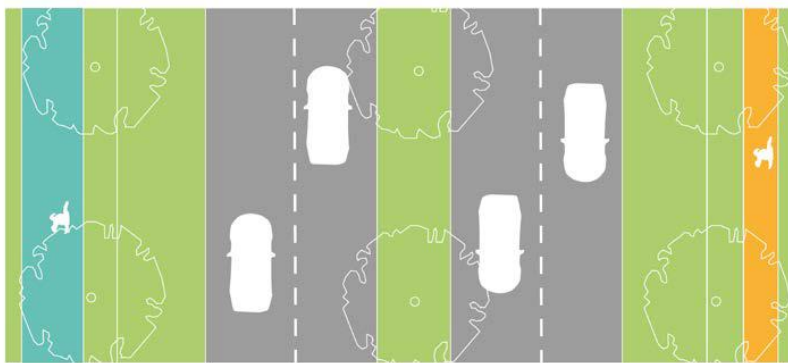
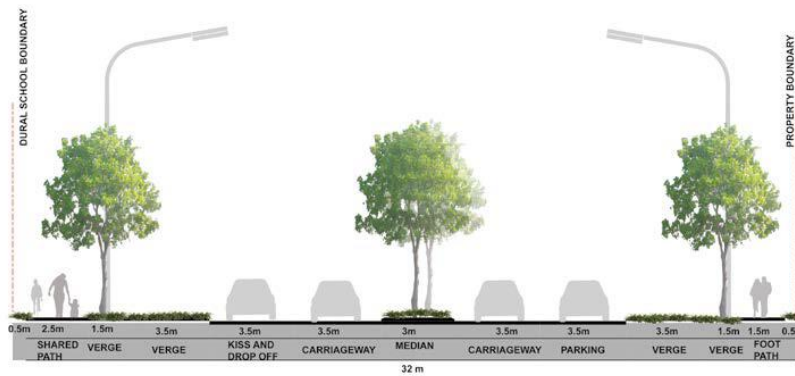
Figure 4–1 Dural Planning Proposal



Source: Legacy Property, 2022

Legacy Property will deliver an interim local collector road within the wider corridor reservation for the Round Corner Bypass. As illustrated in **Figure 4–2** below, the bypass will initially be constructed with one lane of traffic and a kiss and ride along the southern side and two lanes of traffic on the northern side. The parking lanes have been set at 3.5m wide, allowing for a consistent cross-section as the road approaches Old Northern Road, with parking lanes able to be switched to turning bays with no widening. Furthermore, wide verges will be provided on either side of the roadway with the intention of being converted into additional traffic lanes in the future.

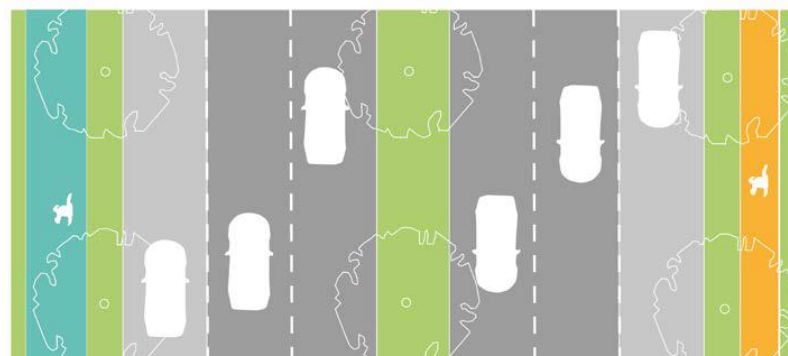
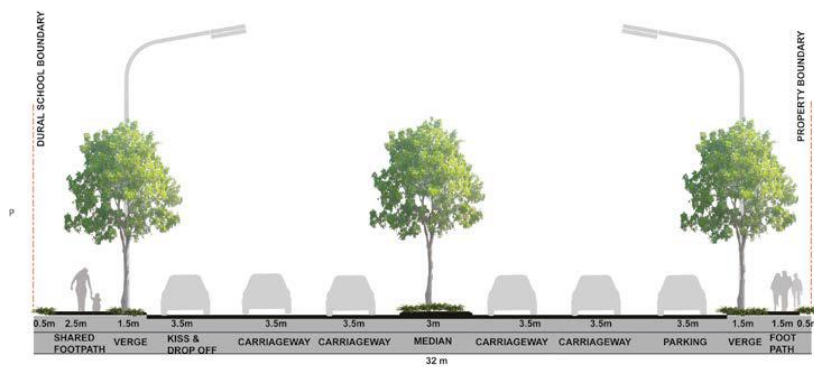
Figure 4–2 Intermediate bypass cross-section



Source: Urbis, 2022

If the Round Corner Bypass is fully implemented, the corridor cross section can be expanded in the future to provide two lanes of traffic in each direction (**Figure 4–3**).

Figure 4–3 Indicative final bypass cross-section



Source: Urbis, 2022

The cross-section has been designed for compatibility with expansion, by having the additional lanes be built into the verge width. The parking lane widths in the interim cross section have been prepared at 3.5m wide, allowing for use by a stopped bus or as a traffic lane in the final form.

The cross section will provide space for a kiss 'n drop to support the relocation and potential expansion of the Dural Public School kiss 'n drop away from Old Northern Road. This represents a significant strategic benefit associated with the proposal because it would allow the diversion of traffic away from Old Northern Road and reduce the associated queuing on Old Northern Road during school pick up and drop off periods. Preliminary consultation with School Infrastructure NSW indicates support for this outcome.

Further detailed planning will occur with SINSW after lodgement. The current design allows for at least 25 parking spaces to be provided on the frontage of the new bypass road on the frontage of Dural Public School, which is approximately the same as currently provided on Old Northern Road. A roundabout is provided at the western end of the local collector road, allowing drivers to make a U-turn and return to Old Northern Road.

4.2 Site access and internal road network

The proposed site plan shown in **Figure 4-1**, shows the internal road network as well as site access. The northern portion of the development will have direct access to Old Northern Road via the proposed local collector road. The southern portion of the development is connected by the internal road network to Derriwong Road to the south. Vehicles can then travel to Old Northern Road either via the local collector road to the north or by continuing south along Derriwong Road.

5.0 Traffic and transport impact appraisal

5.1 Road network impacts

Traffic modelling was conducted on the new intersection of Old Northern Road and the proposed local collector road. Scenarios for development traffic as well as sensitivity analysis was undertaken to identify the impacts of this new intersection on the existing operation of Old Northern Road.

A second stage of expanded traffic modelling is proposed to be undertaken if the proposal receives Council endorsement and a Gateway Determination to proceed. This second stage of traffic modelling is intended to assess broader traffic implications of Council's proposed Round Corner Bypass. A modelling scoping note has been included in **Appendix B**.

The intersection was not modelled in the existing conditions or future year without the development, as the intersection does not currently exist.

5.1.1 Modelling scenarios

To assess the road network impacts of the development, traffic modelling was undertaken using SIDRA Intersection 9 of the Old Northern Road / local collector road intersection. The following scenarios were modelled:

- 2031 Old Northern Road / local collector road intersection (signalised)
- 2031 Old Northern Road / local collector road intersection (seagull)
- Demand sensitivity scenario.

No base year scenario was modelled as no intersection currently exists between the Old Northern Road and proposed local collector road.

5.1.2 Background traffic growth

5.1.2.1 Background growth rate

As identified in **Section 3.6**, the average daily traffic volume along New Line Road has shown little to no growth since 2009 and has seen a slight decrease since 2020. To be conservative, the background growth rate has been assumed to be 0%.

5.1.3 Trip generation

The Roads and Maritime's Guide to *Traffic Generating Developments: Updated traffic surveys (TDT 2013/04a)* was used to determine the trip generation for the proposed development. The trip generation is summarised in **Table 5-1** below. Overall, less than 109 trips are generated by this development in both peaks.

Table 5-1 Trip generation

Peak period	Trip generation rate (trips per dwelling)	Yield (dwellings)	Trips generated
AM peak	0.95	110	105
PM peak	0.99		109

It was assumed that 90 per cent of trips in the AM peak would be outbound trips and 10 per cent be inbound trips. The reverse was assumed during the PM peak. The future flows in and out of the site are summarised in **Table 5-2** below.

Table 5-2 Inbound / outbound trip split

Peak period	Trips generated	Inbound trips	Outbound trips
AM peak	105	10	94
PM peak	109	98	11

5.1.4 Trip distribution and traffic assignment

Trip distribution and traffic assignment were determined based on the travel behaviour identified in the Method of Travel to Work data summarised in **Table 3-3**. As the access to the site is split between the proposed local collector road and Derriwong Road, the distribution of trips between these two roads is outlined in **Table 5-3**.

Table 5-3 Trip distribution

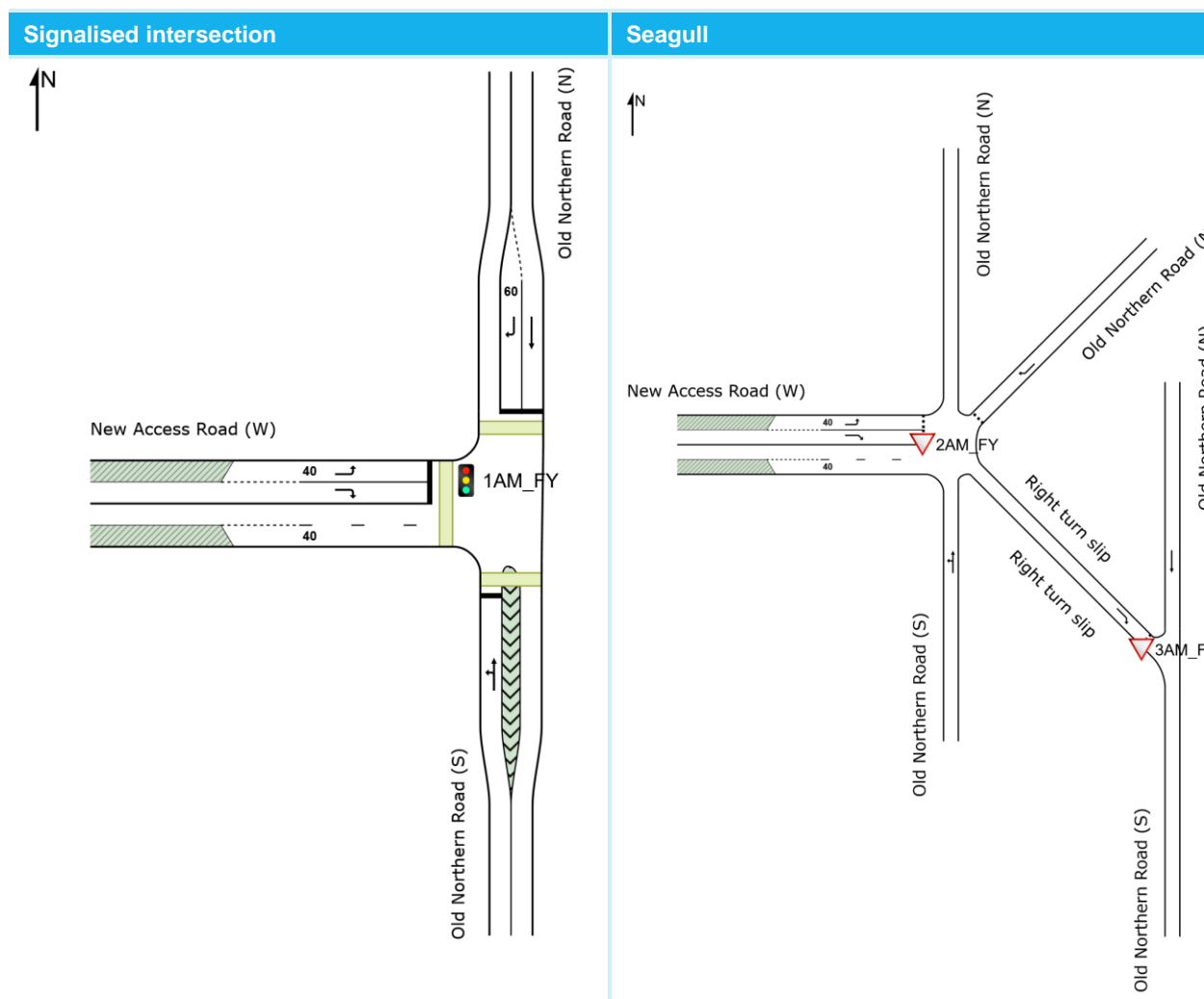
Road	Trip distribution	
	AM	PM
Old Northern Rd	67%	75%
Derriwong Rd	33%	25%

A majority of residents were found to be employed in areas accessed by travelling south along Old Northern Road, including The Hills Shire, Hornsby, and Sydney CBD. Therefore, it is assumed all traffic travelling away from the site will be travelling southbound along Old Northern Road.

5.1.5 Proposed intersection layout

The following layouts were used for the Old Northern Road / local collector road intersection. These are indicative layouts for traffic modelling purposes and are subject to civil design requirements. The seagull arrangement was modelled as a network in SIDRA Intersection 9 to accurately capture the delay of vehicles turning right from the local collector into Old Northern Road.

Table 5-4 SIDRA Intersection 9 layouts



It is noted that the SIDRA layout of a seagull intersection appears distorted in order to ensure that each of the give way movements that form part of the intersection are appropriately captured.

5.1.6 2031 future year intersection performance

5.1.6.1 Intersection level of service definition

Intersection Level of Service (LoS) is a typical design tool used by traffic engineers to identify when roads are congested. The Level of Service as defined in TfNSW Traffic Modelling Guidelines is provided in **Table 5-5**.

Table 5-5 Level of Service definitions

Level of Service	Average delay per vehicle	Performance explanation
A	Less than 14.5s	Good operation
B	14.5s to 28.4s	Good with acceptable delays and spare capacity
C	28.5s to 42.4s	Satisfactory
D	42.5s to 56.4s	Operating near capacity
E	56.5s to 70.4s	At capacity. At signals incidents will cause excessive delays. Roundabouts require another control method.
F	70.5s or greater	At capacity. At signals incidents will cause excessive delays. Roundabouts require another control method.

Source: Roads and Maritime Services (2002), Traffic Modelling Guidelines

The measure of **Degree of Saturation (DoS)** is also reported. Degree of Saturation is a measure of the volume/capacity for the worst turning movement at the intersection. A DoS of 1 implies the turning movement is at capacity.

5.1.6.2 Modelled intersection performance

Table 5-6 presents a summary of the modelled intersection performance for 2031. Overall, the Old Northern Road / local collector road intersection performs at Level of Service A as a signalised intersection and a seagull arrangement, and Level of Service B as a roundabout.

Table 5-6 2031 future year intersection performance

Intersection	2031 future year traffic performance					
	Delay	LoS	DoS	Delay	LoS	DoS
	Weekday AM Peak			Weekday PM Peak		
Old Northern Rd / local collector road (signalised intersection)	6.4s	A	0.73	5.7s	A	0.78
Old Northern Rd / local collector road (seagull)	9.4s	A	0.54	9.4s	A	0.58

Source: SCT Consulting, 2022

5.1.6.3 Signal warrants

The Old Northern Road / local collector road does not meet signal warrant requirements for signalisation outlined by Roads and Traffic Authority *Traffic Signal Design: Section 2 Warrants* issued in 2008. Despite this, there are benefits to signalisation such as pedestrian crossing safety, particularly for school children, and thus signalisation may be considered an appropriate outcome.

5.1.6.4 Sensitivity analysis

A sensitivity analysis was completed on the Old Northern Road / local collector road intersection to identify the maximum allowable demand should the Round Corner Bypass be fully implemented. This was calculated by increasing the right turn demand from the local collector road onto the Old Northern Road as well as the reverse

movement. **Table 5-7** outlines the demand achieved before Level of Service E. In all configurations, the intersection can service over 2,400 vehicles before failure. The seagull arrangement is able to support over 3,700 vehicles prior to failure.

Table 5-7 Demand sensitivity intersection performance (tested until just before failure)

Intersection	Demand sensitivity performance							
	Demand	Delay	LoS	DoS	Demand	Delay	LoS	DoS
	Weekday AM Peak				Weekday PM Peak			
Old Northern Rd / local collector road (signalised intersection)	2,426	55.9s	D	1.02	2,458	54.6s	D	1.02
Old Northern Rd / local collector road (seagull)	3,752	55.0s	D	1.04	3,784	55.4s	D	1.09

5.2 Pedestrian impacts

The relocation of pick-up and drop-off facilities from Old Northern Road to the local collector road creates a safer environment for pedestrians and students. The new drop-off area runs along the northern frontage of Dural Public School and thus reduces the need to cross a road with high traffic volumes. This shift also reduces the amount of traffic travelling adjacent to stopping vehicles and reduces the risk of sideswiping. The new 2.5m shared path also provides dedicated cycling infrastructure, providing cyclists with a safer alternative to traveling in mixed traffic.

6.0 Conclusion

The Planning Proposal request seeks to rezone the site from RU6 Rural Transition to R2 Low Density Residential and SP2 Infrastructure (Local Road), facilitating the delivery of 110 residential lots and a new local park. A key strategic outcome associated with the proposal is securing a corridor reservation that supports The Hills Shire Council's proposed future Round Corner Bypass.

This Traffic and Transport Impact Assessment demonstrates that the proposed development will have negligible impact on existing traffic conditions given its small scale and limited generation of additional trips. The new intersection of Old Northern Road and the local collector road will perform at Level of Service A as a signalised intersection, however, the traffic conditions expected at this intersection do not meet signal warrant requirements. Without signalisation, a seagull arrangement would also provide Level of Service A..

A second stage of expanded traffic modelling is proposed to be undertaken if the proposal receives Council endorsement and a Gateway Determination to proceed. This second stage of traffic modelling is intended to assess broader traffic implications of Council's proposed Round Corner Bypass.

In summary, the proposed development will not result in adverse traffic impacts and delivers a range of strategic traffic and transport benefits.

APPENDIX A

SIDRA Intersection 9 Results

MOVEMENT SUMMARY

 **Site: 1AM_FY [ONR_NAR_31_AM_FY (Site Folder: General)]**

Old Nothern Road / New Access Road

Site Category: Future Conditions 1

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 70 seconds (Site Optimum Cycle Time - Minimum Delay)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV] veh/h	[Total veh/h	HV] %				[Veh. veh	Dist] m				
						v/c	sec							km/h
South: Old Northern Road (S)														
1	L2	7	0	7	0.0	* 0.731	11.3	LOS A	19.5	143.5	0.61	0.57	0.61	50.9
2	T1	962	57	1013	5.9	* 0.731	5.7	LOS A	19.5	143.5	0.61	0.57	0.61	55.4
Approach		969	57	1020	5.9	0.731	5.7	LOS A	19.5	143.5	0.61	0.57	0.61	55.4
North: Old Northern Road (N)														
8	T1	731	66	769	9.0	0.562	4.3	LOS A	11.6	87.1	0.48	0.44	0.48	56.5
9	R2	1	0	1	0.0	0.004	17.4	LOS B	0.0	0.1	0.57	0.61	0.57	41.7
Approach		732	66	771	9.0	0.562	4.3	LOS A	11.6	87.1	0.48	0.44	0.48	56.5
West: New Access Road (W)														
10	L2	1	0	1	0.0	0.007	37.0	LOS C	0.0	0.2	0.93	0.58	0.93	32.7
12	R2	63	0	66	0.0	0.417	39.9	LOS C	2.3	16.2	0.99	0.75	0.99	33.5
Approach		64	0	67	0.0	0.417	39.8	LOS C	2.3	16.2	0.99	0.75	0.99	33.5
All Vehicles		1765	123	1858	7.0	0.731	6.4	LOS A	19.5	143.5	0.57	0.52	0.57	54.7

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

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Delay Model: SIDRA Standard (Geometric Delay is included).

Queue Model: SIDRA Standard.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

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

* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Effective Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		[Ped ped	Dist] m			sec	m	m/sec
South: Old Northern Road (S)												
P1	Full	50	53	29.3	LOS C	0.1	0.1	0.92	0.92	191.9	211.4	1.10
North: Old Northern Road (N)												
P3	Full	50	53	29.3	LOS C	0.1	0.1	0.92	0.92	192.3	211.9	1.10
West: New Access Road (W)												
P4	Full	50	53	29.3	LOS C	0.1	0.1	0.92	0.92	194.9	215.2	1.10
All Pedestrians		150	158	29.3	LOS C	0.1	0.1	0.92	0.92	193.0	212.8	1.10

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: 1PM_FY [ONR_NAR_31_PM_FY (Site Folder: General)]**

Old Nothern Road / New Access Road

Site Category: Future Conditions 1

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 70 seconds (Site Optimum Cycle Time - Minimum Delay)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV] veh/h	[Total veh/h	HV] %				[Veh. veh	Dist] m				
South: Old Northern Road (S)														
1	L2	74	0	78	0.0	* 0.777	11.6	LOS A	22.4	162.9	0.66	0.63	0.66	50.4
2	T1	964	46	1015	4.8	* 0.777	6.1	LOS A	22.4	162.9	0.66	0.63	0.66	54.8
Approach		1038	46	1093	4.4	0.777	6.5	LOS A	22.4	162.9	0.66	0.63	0.66	54.5
North: Old Northern Road (N)														
8	T1	747	27	786	3.6	0.556	4.2	LOS A	11.7	84.3	0.47	0.43	0.47	56.5
9	R2	1	0	1	0.0	0.004	19.4	LOS B	0.0	0.2	0.61	0.62	0.61	40.6
Approach		748	27	787	3.6	0.556	4.2	LOS A	11.7	84.3	0.47	0.43	0.47	56.5
West: New Access Road (W)														
10	L2	1	0	1	0.0	0.007	37.0	LOS C	0.0	0.2	0.93	0.58	0.93	32.7
12	R2	8	0	8	0.0	0.053	37.9	LOS C	0.3	1.9	0.94	0.66	0.94	34.2
Approach		9	0	9	0.0	0.053	37.8	LOS C	0.3	1.9	0.94	0.65	0.94	34.0
All Vehicles		1795	73	1889	4.1	0.777	5.7	LOS A	22.4	162.9	0.58	0.55	0.58	55.2

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

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Delay Model: SIDRA Standard (Geometric Delay is included).

Queue Model: SIDRA Standard.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

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

* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Effective Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		[Ped ped	Dist] m			sec	m	m/sec
South: Old Northern Road (S)												
P1	Full	50	53	29.3	LOS C	0.1	0.1	0.92	0.92	191.9	211.4	1.10
North: Old Northern Road (N)												
P3	Full	50	53	29.3	LOS C	0.1	0.1	0.92	0.92	192.3	211.9	1.10
West: New Access Road (W)												
P4	Full	50	53	29.3	LOS C	0.1	0.1	0.92	0.92	194.9	215.2	1.10
All Pedestrians		150	158	29.3	LOS C	0.1	0.1	0.92	0.92	193.0	212.8	1.10

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: 2AM_FY [ONR_NAR_31_AM_FY - Seagull West (Site Folder: General)]

Network: 2-3AM_FY [ONR_NAR_31_AM_FY - Seagull (Network Folder: General)]

Old Nothern Road / New Access Road
Site Category: Future Conditions 1
Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	DEMAND FLOWS		ARRIVAL FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV %	[Total veh/h	HV %	v/c	sec		[Veh. veh	Dist] m				km/h
South: Old Northern Road (S)														
1	L2	7	0.0	7	0.0	0.543	5.8	LOS A	0.0	0.0	0.00	0.00	0.00	57.8
2	T1	1013	5.9	1013	5.9	0.543	0.3	LOS A	0.0	0.0	0.00	0.00	0.00	59.5
Approach		1020	5.9	1020	5.9	0.543	0.4	NA	0.0	0.0	0.00	0.00	0.00	59.5
NorthEast: Old Northern Road (N)														
26a	R1	1	0.0	1	0.0	0.001	4.3	LOS A	0.0	0.0	0.50	0.52	0.50	43.1
Approach		1	0.0	1	0.0	0.001	4.3	LOS A	0.0	0.0	0.50	0.52	0.50	43.1
West: New Access Road (W)														
10	L2	1	0.0	1	0.0	0.002	9.4	LOS A	0.0	0.0	0.71	0.66	0.71	46.2
12a	R1	66	0.0	66	0.0	0.034	4.8	LOS A	0.1	0.8	0.51	0.65	0.51	40.7
Approach		67	0.0	67	0.0	0.034	4.9	LOS A	0.1	0.8	0.51	0.65	0.51	40.9
All Vehicles		1088	5.5	1088	5.5	0.543	0.6	NA	0.1	0.8	0.03	0.04	0.03	58.9

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.

Delay Model: SIDRA Standard (Geometric Delay is included).

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

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

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MOVEMENT SUMMARY

Site: 3AM_FY [ONR_NAR_31_AM_FY - Seagull East (Site Folder: General)]

Network: 2-3AM_FY [ONR_NAR_31_AM_FY - Seagull (Network Folder: General)]

Merge From Right
Site Category: Future Conditions 1
Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	DEMAND FLOWS		ARRIVAL FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV %	[Total veh/h	HV %				[Veh. veh	Dist] m				
North: Old Northern Road (N)														
8	T1	769	9.0	769	9.0	0.418	4.4	LOS A	0.0	0.0	0.00	0.53	0.00	54.9
Approach		769	9.0	769	9.0	0.418	4.4	NA	0.0	0.0	0.00	0.53	0.00	54.9
NorthWest: Right turn slip														
29a	R1	66	0.0	66	0.0	0.033	2.7	LOS A	0.1	0.7	0.39	0.57	0.39	52.7
Approach		66	0.0	66	0.0	0.033	2.7	LOS A	0.1	0.7	0.39	0.57	0.39	52.7
All Vehicles		836	8.3	836	8.3	0.418	4.2	NA	0.1	0.7	0.03	0.53	0.03	54.8

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.

Delay Model: SIDRA Standard (Geometric Delay is included).

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

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

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MOVEMENT SUMMARY

Site: 2PM_FY [ONR_NAR_31_PM_FY - Seagull West (Site Folder: General)]

Network: 2-3AM_FY [ONR_NAR_31_PM_FY - Seagull (Network Folder: General)]

Old Nothern Road / New Access Road
Site Category: Future Conditions 1
Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	DEMAND FLOWS		ARRIVAL FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV %	[Total veh/h	HV %	v/c	sec		[Veh. veh	Dist m				km/h
South: Old Northern Road (S)														
1	L2	78	0.0	78	0.0	0.578	5.9	LOS A	0.0	0.0	0.00	0.04	0.00	57.4
2	T1	1015	4.8	1015	4.8	0.578	0.4	LOS A	0.0	0.0	0.00	0.04	0.00	59.1
Approach		1093	4.4	1093	4.4	0.578	0.8	NA	0.0	0.0	0.00	0.04	0.00	59.0
NorthEast: Old Northern Road (N)														
26a	R1	1	0.0	1	0.0	0.001	4.4	LOS A	0.0	0.0	0.52	0.54	0.52	43.0
Approach		1	0.0	1	0.0	0.001	4.4	LOS A	0.0	0.0	0.52	0.54	0.52	43.0
West: New Access Road (W)														
10	L2	1	0.0	1	0.0	0.002	9.4	LOS A	0.0	0.0	0.71	0.65	0.71	46.3
12a	R1	8	0.0	8	0.0	0.004	4.8	LOS A	0.0	0.1	0.51	0.59	0.51	40.7
Approach		9	0.0	9	0.0	0.004	5.3	LOS A	0.0	0.1	0.53	0.60	0.53	41.9
All Vehicles		1103	4.4	1103	4.4	0.578	0.8	NA	0.0	0.1	0.01	0.05	0.01	58.9

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.

Delay Model: SIDRA Standard (Geometric Delay is included).

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

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

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MOVEMENT SUMMARY

▼ Site: 3PM_FY [ONR_NAR_31_PM_FY - Seagull East (Site Folder: General)]

■ Network: 2-3AM_FY [ONR_NAR_31_PM_FY - Seagull (Network Folder: General)]

Merge From Right
Site Category: Future Conditions 1
Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	DEMAND FLOWS		ARRIVAL FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV %	[Total veh/h	HV %	v/c	sec		[Veh. veh	Dist m				km/h
North: Old Northern Road (N)														
8	T1	786	3.6	786	3.6	0.413	4.3	LOS A	0.0	0.0	0.00	0.53	0.00	55.1
Approach		786	3.6	786	3.6	0.413	4.3	NA	0.0	0.0	0.00	0.53	0.00	55.1
NorthWest: Right turn slip														
29a	R1	8	0.0	8	0.0	0.004	2.6	LOS A	0.0	0.1	0.38	0.51	0.38	52.7
Approach		8	0.0	8	0.0	0.004	2.6	LOS A	0.0	0.1	0.38	0.51	0.38	52.7
All Vehicles		795	3.6	795	3.6	0.413	4.3	NA	0.0	0.1	0.00	0.53	0.00	55.1

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.

Delay Model: SIDRA Standard (Geometric Delay is included).

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

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

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MOVEMENT SUMMARY

 **Site: 1AM_S [ONR_NAR_31_AM_S (Site Folder: Sensitivity)]**

Old Nothern Road / Round Corner Bypass

Site Category: Sensitivity

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 90 seconds (Site Optimum Cycle Time - Minimum Delay)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV] veh/h	[Total veh/h	HV] %				[Veh. veh	Dist] m				
						v/c	sec							km/h
South: Old Northern Road (S)														
1	L2	277	0	292	0.0	1.018	79.3	LOS F	97.7	711.1	1.00	1.37	1.64	24.5
2	T1	962	57	1013	5.9	* 1.018	73.7	LOS F	97.7	711.1	1.00	1.37	1.64	27.9
Approach		1239	57	1304	4.6	1.018	75.0	LOS F	97.7	711.1	1.00	1.37	1.64	27.1
North: Old Northern Road (N)														
8	T1	731	66	769	9.0	0.617	8.6	LOS A	18.5	139.6	0.60	0.55	0.60	53.4
9	R2	1	0	1	0.0	0.012	52.8	LOS D	0.0	0.3	0.98	0.57	0.98	28.2
Approach		732	66	771	9.0	0.617	8.6	LOS A	18.5	139.6	0.60	0.55	0.60	53.3
West: New Access Road (W)														
10	L2	1	0	1	0.0	0.003	36.1	LOS C	0.0	0.3	0.83	0.59	0.83	33.0
12	R2	333	0	351	0.0	* 1.000	88.6	LOS F	24.0	168.3	1.00	1.22	1.83	22.8
Approach		334	0	352	0.0	1.000	88.5	LOS F	24.0	168.3	1.00	1.22	1.83	22.8
All Vehicles		2305	123	2426	5.3	1.018	55.9	LOS D	97.7	711.1	0.87	1.09	1.34	31.5

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

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Delay Model: SIDRA Standard (Geometric Delay is included).

Queue Model: SIDRA Standard.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

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

* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Effective Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		[Ped ped	Dist] m			sec	m	m/sec
South: Old Northern Road (S)												
P1	Full	50	53	39.3	LOS D	0.1	0.1	0.94	0.94	201.9	211.4	1.05
North: Old Northern Road (N)												
P3	Full	50	53	39.3	LOS D	0.1	0.1	0.94	0.94	202.3	211.9	1.05
West: New Access Road (W)												
P4	Full	50	53	39.3	LOS D	0.1	0.1	0.94	0.94	204.8	215.2	1.05
All Pedestrians		150	158	39.3	LOS D	0.1	0.1	0.94	0.94	203.0	212.8	1.05

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: 1PM_FY [ONR_NAR_31_PM_S (Site Folder: Sensitivity)]

Old Nothern Road / Round Corner Bypass

Site Category: Sensitivity

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 90 seconds (Site Optimum Cycle Time - Minimum Delay)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV] veh/h	[Total veh/h	HV] %				[Veh. veh	Dist] m				
						v/c	sec							km/h
South: Old Northern Road (S)														
1	L2	344	0	362	0.0	1.018	77.3	LOS F	103.0	742.7	1.00	1.35	1.62	24.9
2	T1	964	46	1015	4.8	* 1.018	71.8	LOS F	103.0	742.7	1.00	1.35	1.62	28.2
Approach		1308	46	1377	3.5	1.018	73.2	LOS F	103.0	742.7	1.00	1.35	1.62	27.4
North: Old Northern Road (N)														
8	T1	747	27	786	3.6	0.581	6.8	LOS A	16.8	121.1	0.53	0.49	0.53	54.6
9	R2	1	0	1	0.0	0.012	52.8	LOS D	0.0	0.3	0.98	0.57	0.98	28.2
Approach		748	27	787	3.6	0.581	6.9	LOS A	16.8	121.1	0.53	0.49	0.53	54.6
West: New Access Road (W)														
10	L2	1	0	1	0.0	0.004	38.9	LOS C	0.0	0.3	0.86	0.59	0.86	32.0
12	R2	278	0	293	0.0	* 1.014	95.7	LOS F	20.7	145.0	1.00	1.26	1.95	21.7
Approach		279	0	294	0.0	1.014	95.5	LOS F	20.7	145.0	1.00	1.26	1.94	21.8
All Vehicles		2335	73	2458	3.1	1.018	54.6	LOS D	103.0	742.7	0.85	1.06	1.31	31.8

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

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Delay Model: SIDRA Standard (Geometric Delay is included).

Queue Model: SIDRA Standard.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

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

* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Effective Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		[Ped ped	Dist] m			sec	m	m/sec
South: Old Northern Road (S)												
P1	Full	50	53	39.3	LOS D	0.1	0.1	0.94	0.94	201.9	211.4	1.05
North: Old Northern Road (N)												
P3	Full	50	53	39.3	LOS D	0.1	0.1	0.94	0.94	202.3	211.9	1.05
West: New Access Road (W)												
P4	Full	50	53	39.3	LOS D	0.1	0.1	0.94	0.94	204.8	215.2	1.05
All Pedestrians		150	158	39.3	LOS D	0.1	0.1	0.94	0.94	203.0	212.8	1.05

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: 2AM_S [ONR_NAR_31_AM_S - Seagull West (Site Folder: Sensitivity)]

Network: 2-3AM_FY [ONR_NAR_31_AM_S - Seagull (Network Folder: Sensitivity)]

Old Nothern Road / New Access Road

Site Category: Sensitivity

Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	DEMAND FLOWS		ARRIVAL FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV %	[Total veh/h	HV %	v/c	sec		[Veh. veh	Dist] m				km/h
South: Old Northern Road (S)														
1	L2	955	0.0	955	0.0	1.053	37.7	LOS C	0.0	0.0	0.00	0.17	0.00	31.3
2	T1	1013	5.9	1013	5.9	1.053	35.6	LOS C	0.0	0.0	0.00	0.17	0.00	31.0
Approach		1967	3.0	1967	3.0	1.053	36.6	NA	0.0	0.0	0.00	0.17	0.00	31.1
NorthEast: Old Northern Road (N)														
26a	R1	1	0.0	1	0.0	0.011	34.9	LOS C	0.0	0.2	0.97	0.99	0.97	22.8
Approach		1	0.0	1	0.0	0.011	34.9	LOS C	0.0	0.2	0.97	0.99	0.97	22.8
West: New Access Road (W)														
10	L2	1	0.0	1	0.0	0.002	9.4	LOS A	0.0	0.0	0.71	0.66	0.71	46.2
12a	R1	1014	0.0	1014	0.0	1.037	55.0	LOS D	36.1	253.0	1.00	4.48	12.20	15.4
Approach		1015	0.0	1015	0.0	1.037	55.0	LOS D	36.1	253.0	1.00	4.48	12.19	15.4
All Vehicles		2983	2.0	2983	2.0	1.053	42.9	NA	36.1	253.0	0.34	1.63	4.15	27.2

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.

Delay Model: SIDRA Standard (Geometric Delay is included).

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

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

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MOVEMENT SUMMARY

▼ Site: 3AM_S [ONR_NAR_31_AM_S - Seagull East (Site Folder: Sensitivity)]

■ Network: 2-3AM_FY [ONR_NAR_31_AM_S - Seagull (Network Folder: Sensitivity)]

Merge From Right
Site Category: Sensitivity
Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	DEMAND FLOWS		ARRIVAL FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV %	[Total veh/h	HV %				[Veh. veh	Dist] m				
North: Old Northern Road (N)														
8	T1	769	9.0	769	9.0	0.418	4.4	LOS A	0.0	0.0	0.00	0.53	0.00	54.9
Approach		769	9.0	769	9.0	0.418	4.4	NA	0.0	0.0	0.00	0.53	0.00	54.9
NorthWest: Right turn slip														
29a	R1	1014	0.0	1009	0.0	0.502	3.4	LOS A	2.6	18.2	0.50	0.80	0.69	52.1
Approach		1014	0.0	1009 ^N ₁	0.0	0.502	3.4	LOS A	2.6	18.2	0.50	0.80	0.69	52.1
All Vehicles		1783	3.9	1779 ^N ₁	3.9	0.502	3.8	NA	2.6	18.2	0.28	0.68	0.39	53.7

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.

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.

Delay Model: SIDRA Standard (Geometric Delay is included).

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

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

^{N1} Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

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MOVEMENT SUMMARY

Site: 2PM_S [ONR_NAR_31_PM_S - Seagull West (Site Folder: Sensitivity)]

Network: 2-3AM_FY [ONR_NAR_31_PM_S - Seagull (Network Folder: Sensitivity)]

Old Nothern Road / New Access Road

Site Category: Sensitivity

Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	DEMAND FLOWS		ARRIVAL FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV %	[Total veh/h	HV %	v/c	sec		[Veh. veh	Dist] m				km/h
South: Old Northern Road (S)														
1	L2	1025	0.0	1025	0.0	1.089	55.4	LOS D	0.0	0.0	0.00	0.10	0.00	25.2
2	T1	1015	4.8	1015	4.8	1.089	54.4	LOS D	0.0	0.0	0.00	0.10	0.00	24.8
Approach		2040	2.4	2040	2.4	1.089	54.9	NA	0.0	0.0	0.00	0.10	0.00	25.0
NorthEast: Old Northern Road (N)														
26a	R1	1	0.0	1	0.0	0.011	34.9	LOS C	0.0	0.2	0.97	0.99	0.97	22.8
Approach		1	0.0	1	0.0	0.011	34.9	LOS C	0.0	0.2	0.97	0.99	0.97	22.8
West: New Access Road (W)														
10	L2	1	0.0	1	0.0	0.002	9.4	LOS A	0.0	0.0	0.71	0.65	0.71	46.3
12a	R1	956	0.0	956	0.0	1.001	34.8	LOS C	21.3	149.3	1.00	3.22	8.26	20.6
Approach		957	0.0	957	0.0	1.001	34.8	LOS C	21.3	149.3	1.00	3.22	8.25	20.7
All Vehicles		2998	1.6	2998	1.6	1.089	48.5	NA	21.3	149.3	0.32	1.10	2.63	24.3

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.

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.

Delay Model: SIDRA Standard (Geometric Delay is included).

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

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

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MOVEMENT SUMMARY

▼ Site: 3PM_S [ONR_NAR_31_PM_S - Seagull East (Site Folder: Sensitivity)]

■ Network: 2-3AM_FY [ONR_NAR_31_PM_S - Seagull (Network Folder: Sensitivity)]

Merge From Right
Site Category: Sensitivity
Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	DEMAND FLOWS		ARRIVAL FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV %	[Total veh/h	HV %				[Veh. veh	Dist] m				
North: Old Northern Road (N)														
8	T1	786	3.6	786	3.6	0.413	4.3	LOS A	0.0	0.0	0.00	0.53	0.00	55.1
Approach		786	3.6	786	3.6	0.413	4.3	NA	0.0	0.0	0.00	0.53	0.00	55.1
NorthWest: Right turn slip														
29a	R1	956	0.0	956	0.0	0.474	3.3	LOS A	2.4	16.5	0.48	0.78	0.65	52.2
Approach		956	0.0	956	0.0	0.474	3.3	LOS A	2.4	16.5	0.48	0.78	0.65	52.2
All Vehicles		1742	1.6	1742	1.6	0.474	3.8	NA	2.4	16.5	0.26	0.67	0.36	53.9

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.

Delay Model: SIDRA Standard (Geometric Delay is included).

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

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

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APPENDIX B

Further Modelling Scoping Note

Technical Advisory Note

Quality Information			
Project:	Derriwong Road Dural Planning Proposal		
Project Number:	SCT_00331		
Document Name:	Transport assessment scoping note		
Version:	3.0	Date:	12 September 2022
Author:	Matthew Cen	Senior Consultant	
Reviewer:	Jonathan Busch	Associate Director	
Authoriser:	Jonathan Busch	Associate Director	

1.0 Introduction

1.1 Background

Legacy Property has tasked SCT Consulting to prepare a Traffic and Transport Impact Assessment to support a planning proposal for 110 low-density residential dwellings in Dural. This planning proposal will create a neighbourhood around Dural Public School as well as provide land provisions to futureproof the Round Corner Bypass, a road connection between Annangrove Road and Old Northern Road.

A transport assessment has been prepared for the lodgement of the planning proposal. In parallel with the lodgement process, SCT Consulting intends to work through TfNSW's modelling requests in parallel with this process.

Based on previous engagement with Transport for NSW, the following requests have been raised:

- *"TfNSW has concerns that the future corridor design and reservation is being identified only within the subject site and as a separate exercise to the remaining corridor. Given Council has undertaken various traffic assessments in support of a future bypass, work to identify a corridor design and reservation should be undertaken and completed by Council in its entirety, ensuring that traffic assessment gaps which were previously identified by TfNSW are addressed. Should Council decide that the southern section of the proposed bypass (subject of this pre planning proposal) can be determined by the proponent, TfNSW will need a level of assurance that the proposed corridor design and reservation for the southern section has been appropriately assessed taking into account future land use and traffic growth along the entire corridor.*
- *In light of the above concerns, TfNSW reiterates previous advice outlining the need for a regional land use and transport assessment that assesses future development uplift and associated traffic and transport improvements required to support housing growth as a prerequisite to the consideration of future planning proposals in this locality. TfNSW is of the view this work should precede any rezoning of land for housing and encourages Council, not the proponent, to undertake this work prior to this proposal being considered. This will ensure that the ultimate corridor design/reservation and associated land components for the local road bypass (and other potential transport improvements) have been identified in the event the subject site creates a precedence for other rezonings in the surrounding area. A particular concern for TfNSW is the ultimate form of the bypass' intersection with Old Northern Road which will depend on the scale of future development uplift at this location.*

- *Consultation with SINSW should be undertaken prior to the lodgement of a planning proposal with Council to clearly identify their concerns with a future bypass adjacent to their site and to inform a future corridor design that addresses their road safety and traffic efficiency concerns.”¹*

In response to TfNSW’s request for a regional land use study, Hills Shire Council notes “Critically, Council is not in a position to fund a regional land use and transport assessment at this time, as requested by TfNSW. While Council has previously given support to a planning proposal at this location [sic], it should be noted that this was contingent on the proposal being able to service the proposed residential yield with new local and regional infrastructure, at no cost to Council, including the resolution of ongoing discussions with State and Federal Government surrounding the funding for required regional road upgrades.”²

Hills Shire Council goes on to note:

“Council had previously commissioned the “Urban Capability and Capacity Assessment of the Dural Locality” which was prepared by Cardno in 2019. This report concluded that:

“The investigations have found that there are no state government plans to intensify development within the investigation area. The Central City District Plan maps the investigation area within the Metropolitan Rural Area, the intention being that the area would remain rural in character and development density would reflect this. The investigation area has not been identified for future growth in the District Plan. Nor have other state or local strategic plans identified the area as having potential for future growth.

Based on the results of the investigation, Cardno concludes that:

- *There are no government plans to encourage additional growth in the investigation area.*
- *The investigation area has some physical capability for development uplift.*
- *Constraints arising from lack of capacity in transport and service infrastructure would be likely to preclude any development uplift in the investigation area. At this time, there is no government will to invest in upgrades to these services. Private investment in infrastructure would be necessary to facilitate any substantial development uplift.”*

On 26 March 2019, Council considered the outcomes of this Cardo investigation and resolved, in part, that:

1. *Council receive the report outlining the outcomes of the Urban Capability and Capacity Assessment for the Dural locality.*
2. *Council discontinue any further investigations with respect to the rezoning of rural land for urban development within the Dural locality at this time.*
3. *If the proponent of any future planning proposal to rezone land within the Dural locality is able to demonstrate that they can deliver the required local and regional infrastructure upgrades at no cost to Council, Council consider such a planning proposal and review its position with respect to rezoning within the Dural locality at that time.”³*

1.2 Project objective

The purpose of this project is to rightly size the current and future transport network requirements to support both the planning proposal of Derriwong Dural and Hills Shire Council’s Round Corner Bypass.

1.3 Scope of work

Traffic modelling scope is overviewed in **Table 1-1** and explained in more detail in this memo.

¹ TfNSW letter of 28 July 2022, ref Syd21/00845

² Hills Shire Council letter of 5 August 2022, ref FP35

³ Ibid.

Table 1-1 Traffic modelling scope

Element	Scope
Surveys	<p>Intersection turning counts and queue surveys at:</p> <ul style="list-style-type: none"> – Old Northern Rd / access – Old Northern Rd / New Line Rd – Old Northern Rd / Quarry Rd – Kenthurst Rd / Annangrove Rd – Old Northern Rd / Derriwong Rd – Old Northern Rd / Kenthurst Rd <p>Number-plate recognition survey with gates at:</p> <ul style="list-style-type: none"> – Kenthurst Rd near Annangrove Rd – Annangrove near Kenthurst Rd – Old Northern Road north of Dural Public School – Old Northern Road south of Kenthurst Rd – New Line Rd south of Old Northern Rd
Base year model	<p>SIDRA Network model calibrated to TfNSW Traffic Modelling Guidelines with the following intersections:</p> <ul style="list-style-type: none"> – Old Northern Rd / access – Old Northern Rd / New Line Rd – Old Northern Rd / Quarry Rd – Old Northern Rd / Derriwong Rd – Kenthurst Rd / Annangrove Rd – Old Northern Rd / Kenthurst Rd
Future year model	<p>Future 2036 with background growth only</p> <p>Future 2036 with background growth and development traffic</p> <p>Future 2036 with background growth, development traffic and mitigations</p> <p>Future 2036 with maximum network demand prior to failing agreed performance benchmark</p>

1.4 Stakeholders

The key stakeholders are:

- The Hills Shire Council
- School Infrastructure NSW
- Transport for NSW
- Legacy Property (landowner).

The site is fronted by Old Northern Road, which is a classified State road under the Roads Act. This road would require access as part of the proposal.

1.5 Report outline

This report has been structured into the following sections:

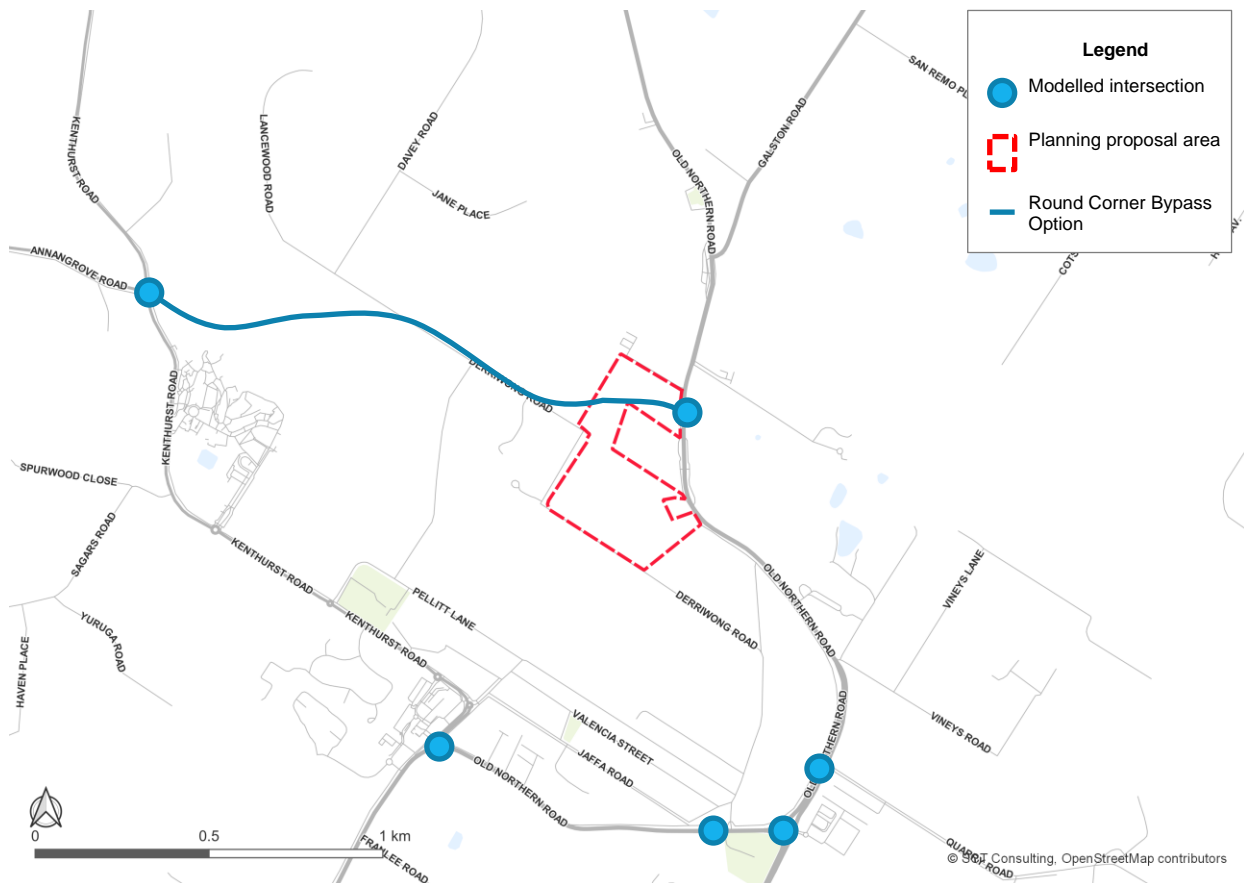
- **Section 1** introduces this report, its context, and its purpose
- **Section 2** describes the project in more detail
- **Section 3** explains the traffic surveys and other input data to the models
- **Section 4** describes the modelling methodology
- **Section 5** captures the minutes of the inception meeting.

2.0 Project description

2.1 Study area

The site is located in the Local Government Area (LGA) of The Hills Shire and surrounds Dural Public School. The site is connected to the road network via Old Northern Road to the east and Derriwong Road to the southwest as illustrated in **Figure 2-1** below. Currently, the site is occupied by rural residential dwellings, open grassland, and woodlands.

Figure 2-1 Site context



2.2 Land use

The site has an area of 12.879 hectares and comprises five existing lots.

The Planning Proposal request seeks to rezone the site from RU6 Rural Transition to R2 Low Density Residential and SP2 Infrastructure (Local Road), facilitating the delivery of 110 residential lots and a new local park. The proposal also seeks to amend the maximum height of buildings standard from 10 metres to 9 metres. The Planning Proposal request is accompanied by a site-specific development control plan and offer to enter into a Voluntary Planning Agreement to secure public benefits associated with the proposal.

The indicative subdivision layout submitted with the Planning Proposal request provides a mix of larger residential lots ranging from 600sqm to 3,400sqm. This will contribute additional housing supply, diversity, and choice in the local area, and support the viability of the Dural village centre.

An illustration of the development concept is provided in **Figure 2-2**.

Figure 2-2 Dural Planning Proposal



Source: Legacy Property, 2022

This site was part of a previous planning proposal with an extensive history. The prior proposal included a 'northern' and southern' site with a proposed yield of approximately 180 dwellings. The northern site received support from the Independent Planning Commission (IPC) in September 2020. A revised proposal for the northern site was endorsed by The Hills Shire Council in February 2021 and received a Gateway Determination from the Department of Planning and Environment in July 2021. This proposal did not progress due to timeframes set in the Gateway Determination.

Per Hills Shire Council comments in **Section 1.1**, the Urban Capability and Capacity Assessment of the Dural Locality concludes there is no intent to encourage urban development in Dural and *"Private investment in infrastructure would be necessary to facilitate any substantial development uplift."*⁴.

It is therefore concluded that except for the subject site, Council is of the view that there is no potential for land use uplift in Dural.

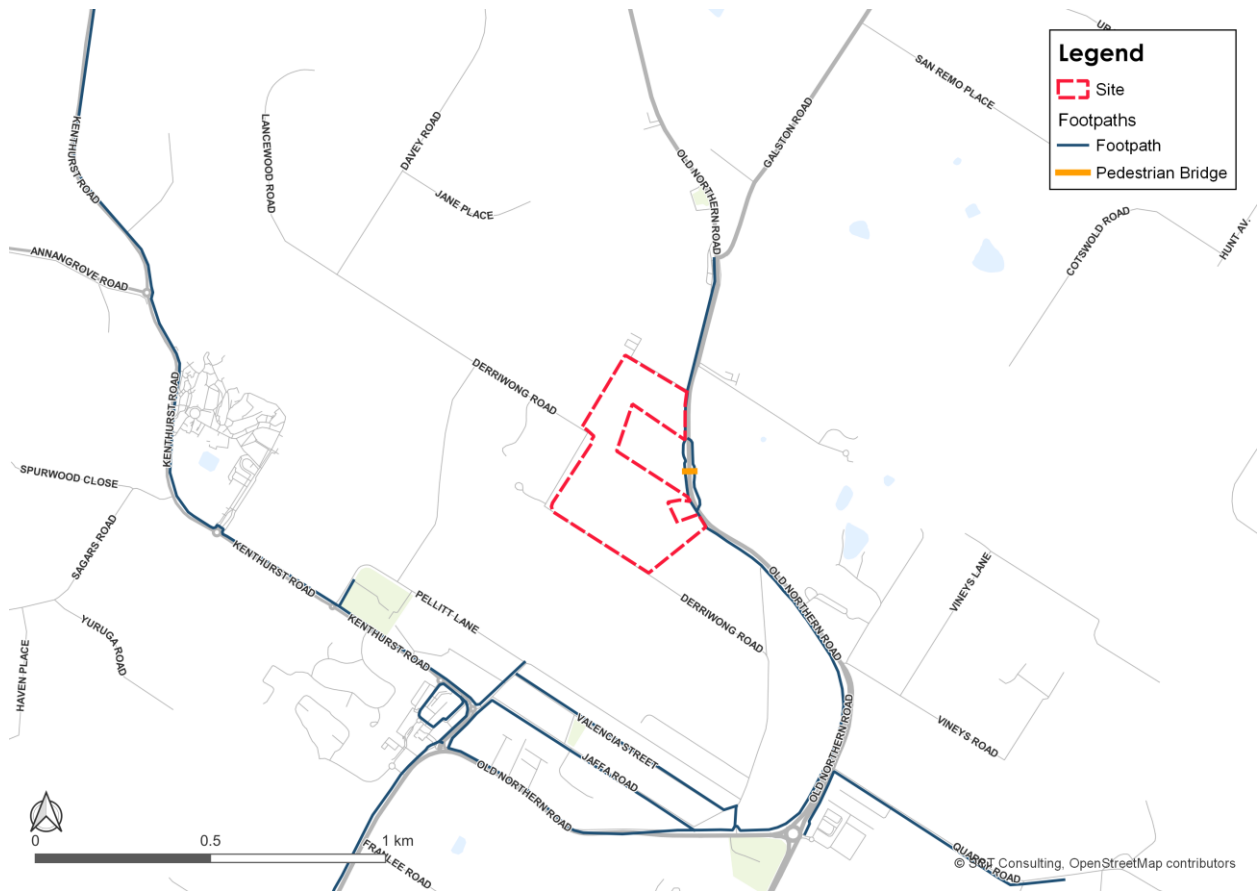
2.3 Transport infrastructure

2.3.1 Walking and cycling infrastructure

The walking and cycling infrastructure around the site is scarce, as shown in **Figure 2-3**. There is a footpath along the western edge of Old Northern Road which extends south towards Dural Business Park and Dural Mall.

⁴ Ibid.

Figure 2-3 Walking and cycling infrastructure



Outside Dural Public School there is a vertically separated pedestrian crossing that allows parents to perform pick-up and drop-off activities on the opposite side of the road. As shown in **Figure 2-4** below, the pedestrian crossing has no elevators for mobility-impaired individuals.

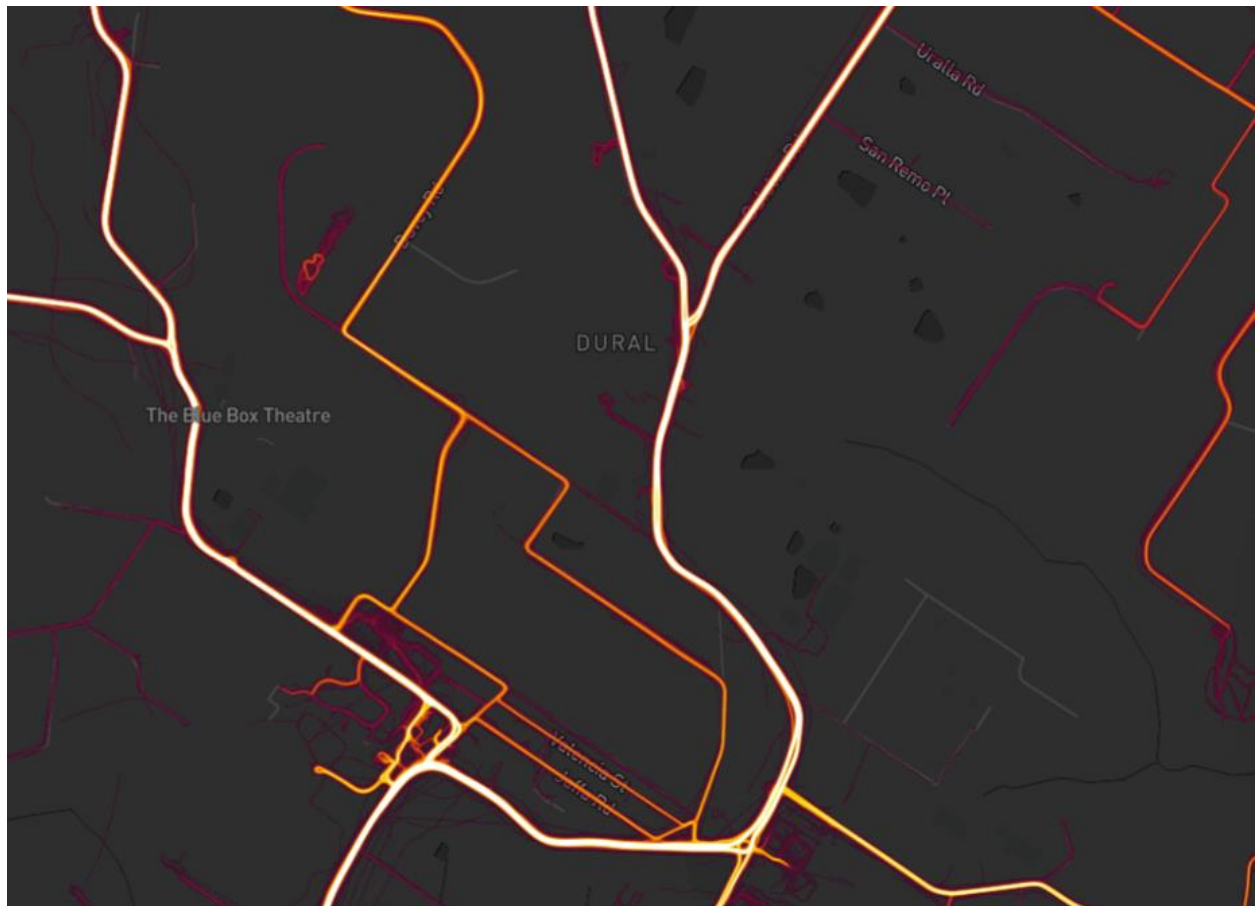
Figure 2-4 Pedestrian bridge over Old Northern Road



Source: Google StreetView, 2022

There is currently no dedicated cycling infrastructure in the area, however, there is a noticeable amount of recreational cycling activity on Old Northern Road. Strava activity, shown in **Figure 2-5** below, indicates a high volume of activity on Old Northern Road and Galston Road which forks off towards the east. There is also some activity on Derriwong Road and Davey Street to the west of the site. The Hills Shire identifies Kenthurst Road as a cycleway; however, this consists of a footpath on the northern side of the road.

Figure 2–5 Recreational cycling activity

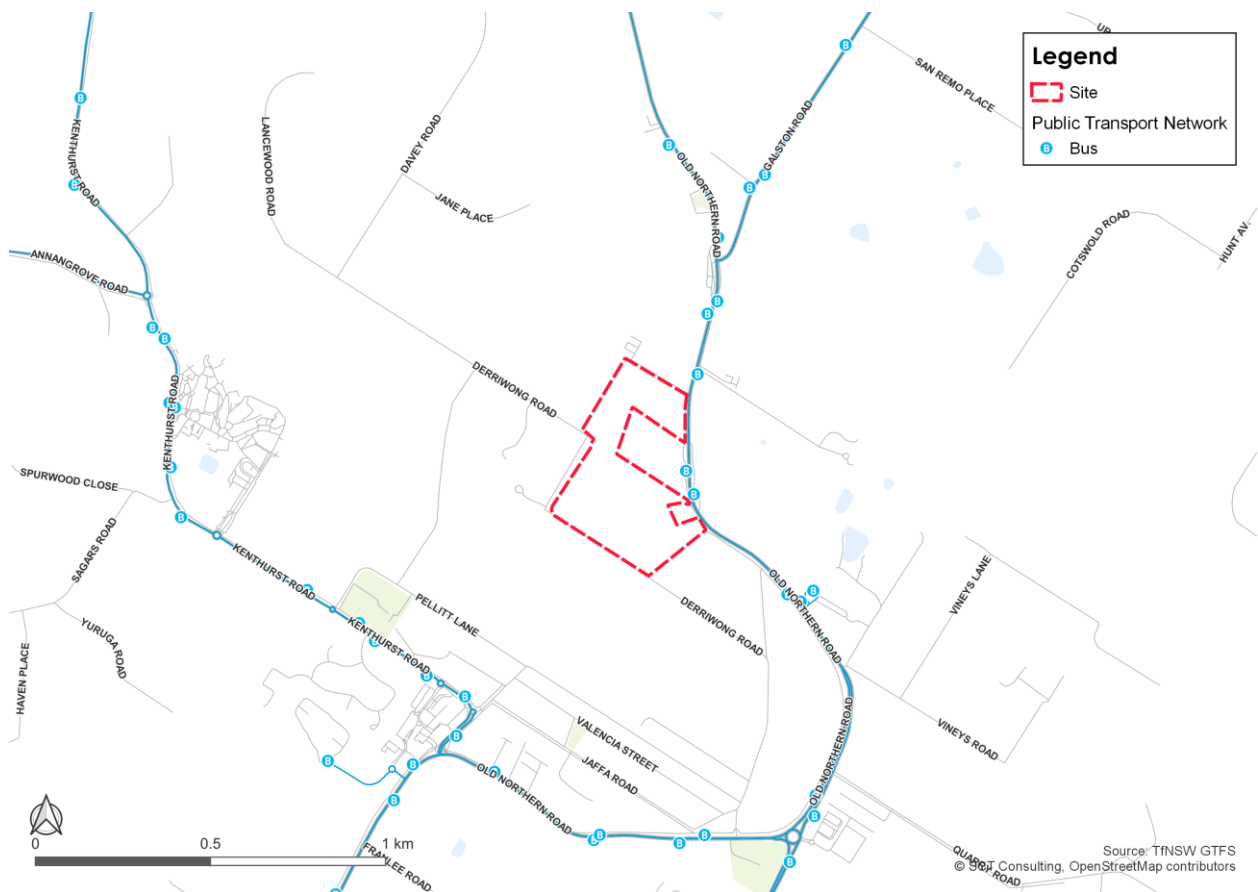


Source: Strava, 2022

2.3.2 Public transport network

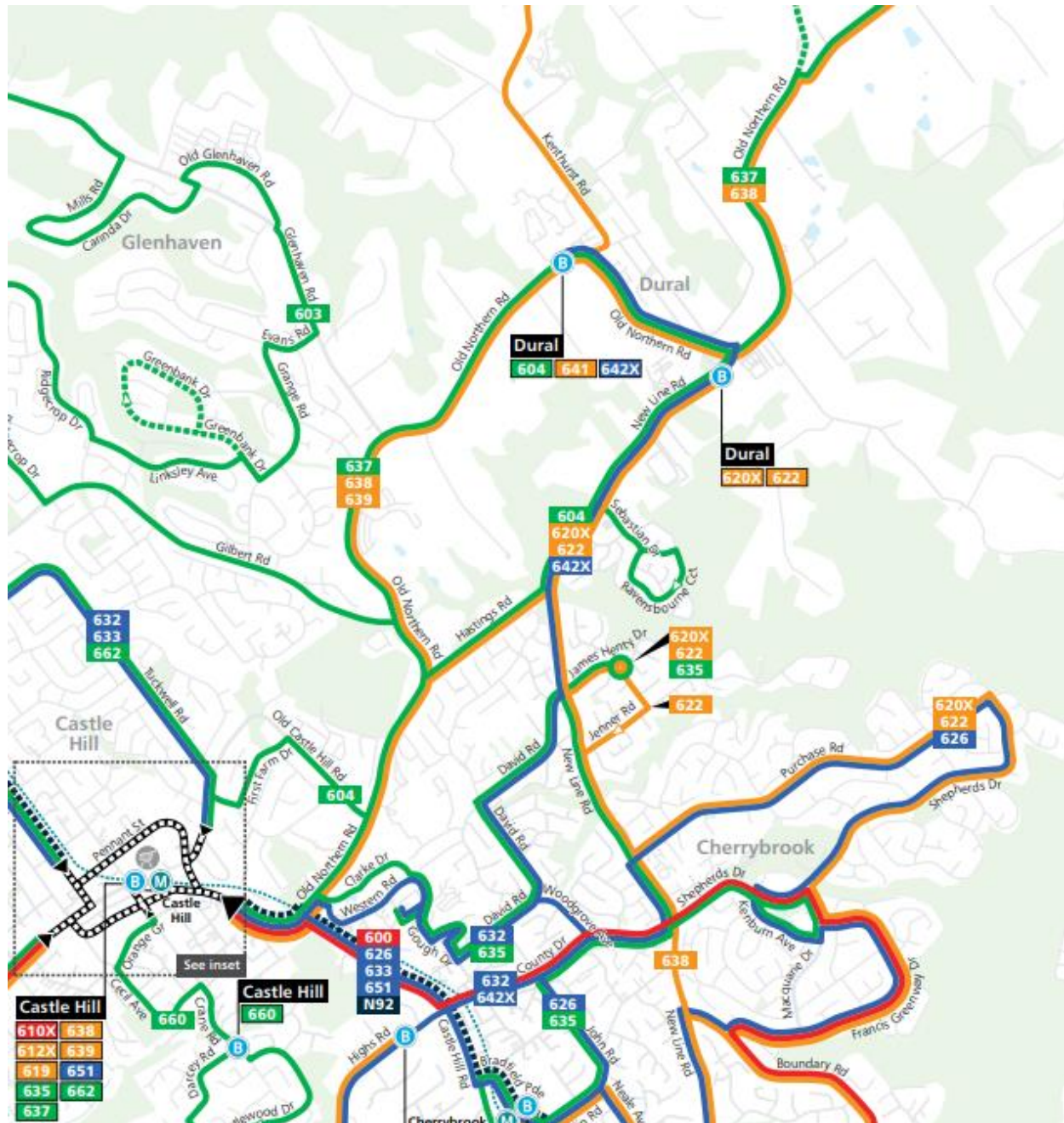
The site is located on Old Northern Road which carries bus services to Castle Hill for further heavy rail connections via Sydney Metro Northwest. The closest bus stops to the site are located outside Dural Public School, as shown in **Figure 2–6**. The northbound bus stop has shelter and seating available, whereas the southbound bus stop has no facilities aside from a signpost. These two are connected by a pedestrian bridge to safely cross Old Northern Road however, there are no elevators for mobility-impaired individuals.

Figure 2–6 Public transport network



As shown in **Figure 2–7** below, bus routes 637 and 638 travel immediately outside the site and connect to Glenorie and Berrilee respectively. Bus Route 637 operates hourly whilst 638 operates roughly every 30 minutes during peak periods. Further bus connections can be made from Dural Mall including bus routes 604, 641 and 642X. These connect to Parramatta, Rouse Hill and Sydney CBD respectively.

Figure 2-7 Bus network in Dural

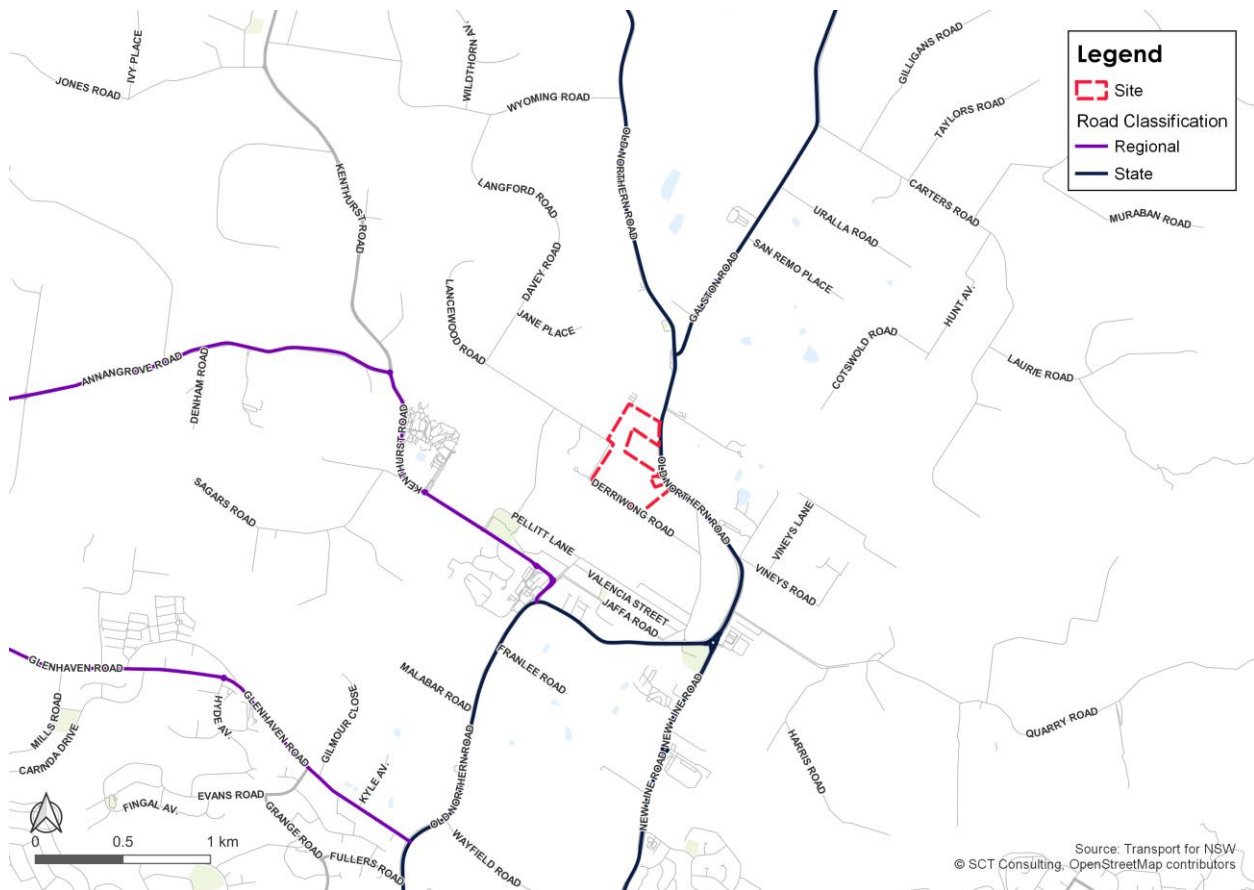


Source: CDC NSW, 2022

2.3.3 Road network and classification

The site is bounded by Old Northern Road to the east and Derriwong Road to the west. The Old Northern Road is classified as a state road (per the Roads Act), shown in **Figure 2–8**, and connects to Castle Hill and New Line Road to the south. To the north, it provides a connection to Maroota and Wisemans Ferry. Other state roads in the area include Galston Road and New Line Road. Kenthurst Road and Glenhaven Road to the southwest of the site are classified as regional roads.

Figure 2–8 Classified State and Regional roads



Old Northern Road acts as an arterial road in the area, typically with one lane in both directions and a posted speed limit of 60km/hr. At some intersections, such as the roundabout with New Line Road and at Galston Road, the road widens briefly into two lanes in both directions. Outside Dural Public School, there is a right turn short lane in the northbound direction which allows drivers to turn into a pick-up and drop-off area, shown in **Figure 2–9** below. This area has a speed limit of 40km/hr at all times whereas the school zone is only in effect on weekdays from 8.00 am to 9.30 am and 2.30 pm to 4.00 pm. The drivers exiting the pick-up drop-off area are required to turn left onto Old Northern Road, thus drivers wishing to travel north must find other opportunities to turn around.

Figure 2–9 Pick-up drop-off area outside Dural Public School

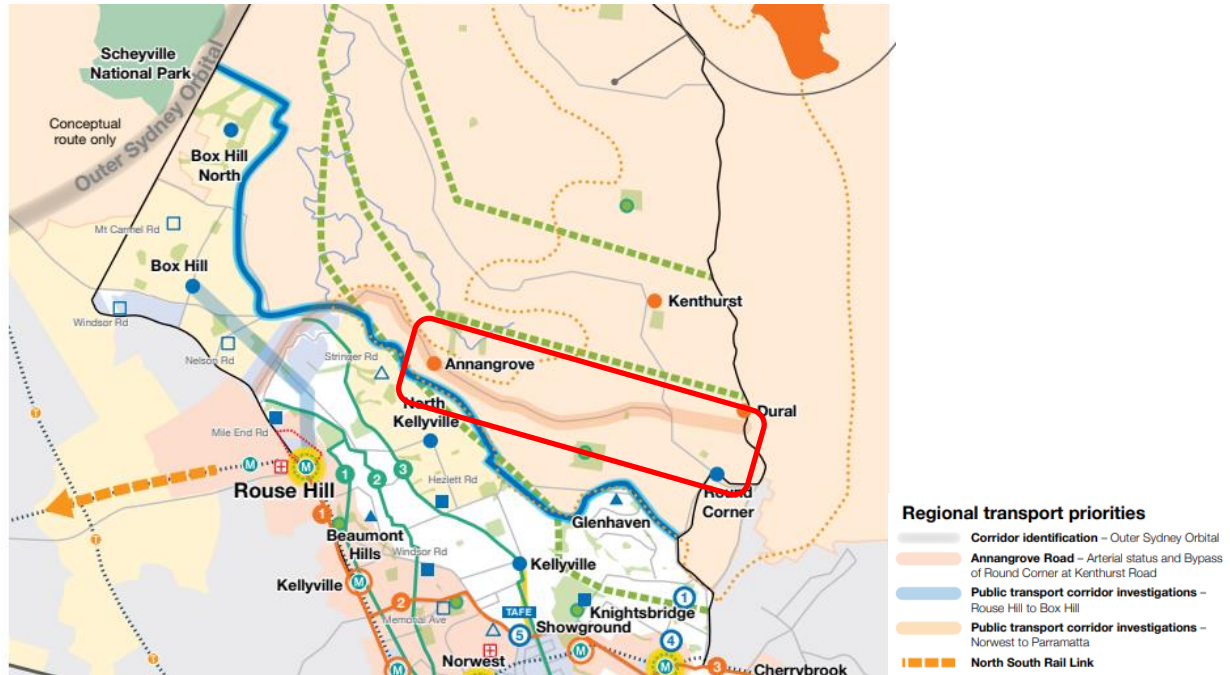


Source: Nearthmap, 2022

2.3.4 Round corner bypass

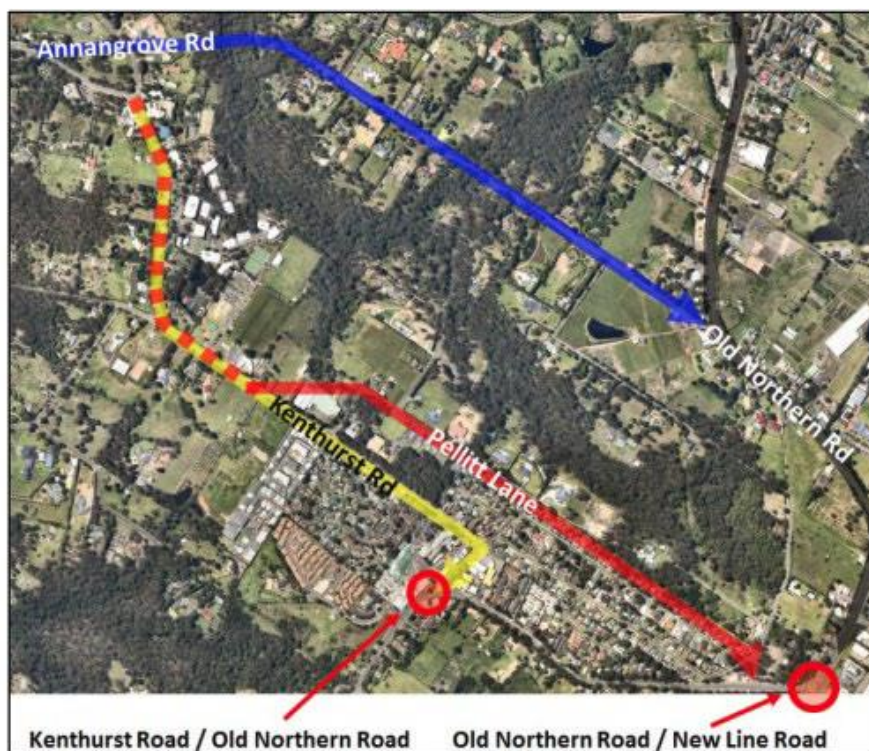
The proposal supports part of the proposed 'Round Corner Bypass' by providing a corridor reservation between Derriwong Road and Old Northern Road. The bypass is identified in the Local Strategic Planning Statement (**Figure 2–10**), the bypass is intended to alleviate congestion along Kenthurst Road at the approach to Old Northern Road (**Figure 2–11**).

Figure 2–10 Round Corner Bypass from Local Strategic Planning Statement (red)



Source: The Hills Shire Council LSPS

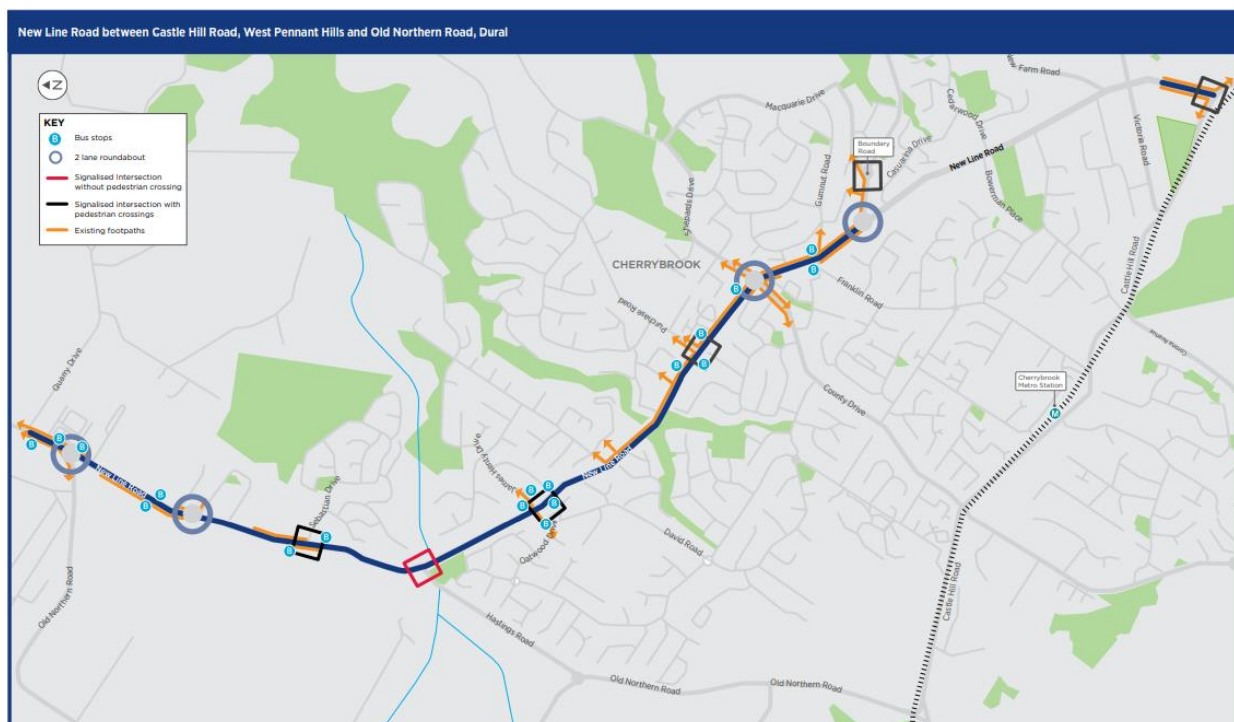
Figure 2–11 Round Corner Bypass options



Source: The Hills Shire Council

New Line Road is also identified for an upgrade to a two-lane in each direction upgrade (**Figure 2-12**).

Figure 2-12 TfNSW New Line Road upgrade



Source: Transport for NSW, 2021

This initiative has been funded to a total of \$20m.

2.4 Assessment years and time periods

It is proposed that the uplift and bypass will be assessed at 2036 to ensure that the site is fully occupied.

Given the proposal is for a residential subdivision, the key focus of modelling is the weekday commuter morning and evening peak.

Traffic count data was collected on Old Northern Road outside Dural Public School on Thursday 18 August 2022. The peak traffic volumes during the AM and PM periods are summarised in **Table 2-1** below. In both peak periods, the traffic volume in the peak direction approaches 1,000 vehicles per hour, indicating that Old Northern Road is currently close to capacity.

Table 2-1 Peak traffic volumes on Old Northern Road

Peak Period	Northbound	Southbound	Total
7 am to 8 am	743	973	1,716
4 pm to 5 pm	981	768	1,749

As the model is proposed to be SIDRA Network, there is no need for warm-up and cool-down periods.

3.0 Input data

3.1 Traffic surveys

The traffic surveys proposed are identified in **Table 3-1**.

Table 3-1 Traffic surveys proposed

Element	Locations
Intersection turning counts (classified to light and heavy traffic plus pedestrians) and queue length surveys during morning and evening peak periods (7-9am and 3-5pm)	<ul style="list-style-type: none"> – Old Northern Rd / access – Old Northern Rd / New Line Rd – Old Northern Rd / Quarry Rd – Kenthurst Rd / Annangrove Rd – Old Northern Rd / Derriwong Rd – Old Northern Rd / Kenthurst Rd
Number-plate recognition survey during morning and evening peak periods (7-9am and 3-5pm)	Gates at: <ul style="list-style-type: none"> – Kenthurst Rd near Annangrove Rd – Annangrove near Kenthurst Rd – Old Northern Road north of Dural Public School – Old Northern Road south of Kenthurst Rd – New Line Rd south of Old Northern Rd

Source: SCT Consulting, 2022

Intersection turning count surveys and queue length surveys are to develop calibrated SIDRA network sites that reflect local conditions.

The number plate recognition survey will be used to determine the potential demand for the bypass.

3.2 Assumptions

The assumptions used will be in line with the TfNSW Traffic Modelling Guidelines (2013). Parameters will be consistent unless they are required to be changed to meet calibration/validation requirements, such as queue lengths or Degree of Saturation <1.0.

Table 3-2 identifies the hierarchy of intervention that will be used to meet calibration/validation requirements.

Table 3-2 Calibration and validation intervention hierarchy

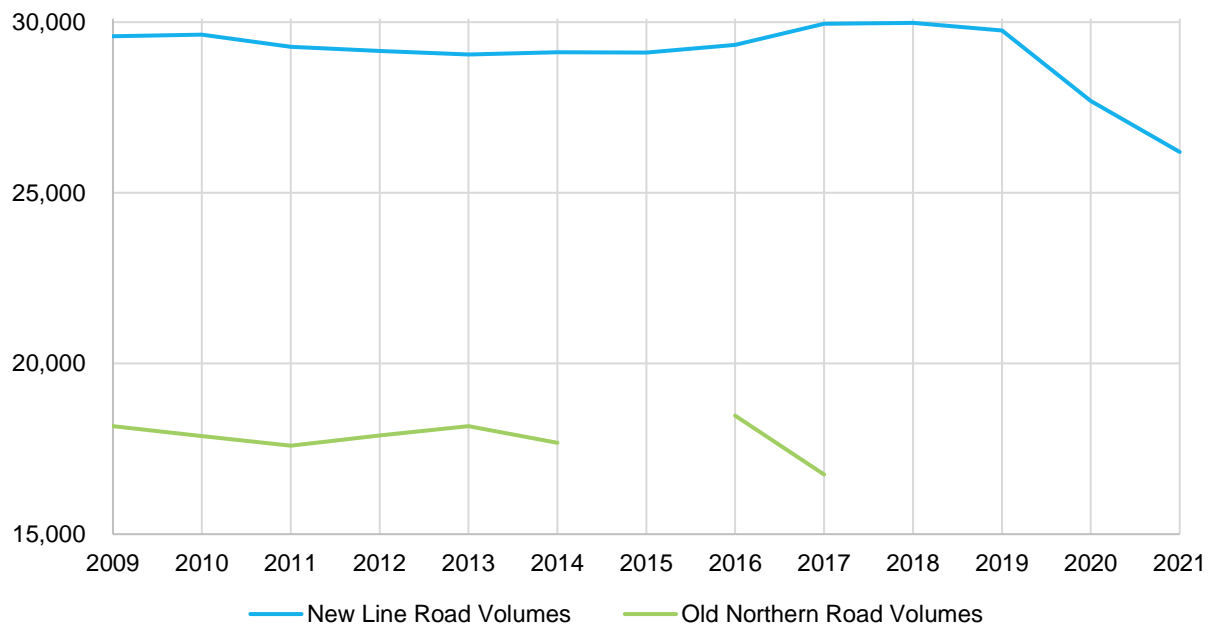
	Signals	Priority intersections
Use first	Adjustment of gap acceptance parameters within the range identified in TfNSW Traffic Modelling Guidelines Appendix E	
	Modified start loss / end gain	Roundabout environment factors
	Changed signal timing	Gap acceptance factor
Use last	Capacity adjustment	Capacity adjustment

Source: SCT Consulting, 2022

3.3 Strategic model

In 2017, Old Northern Road had an average daily traffic volume of 17,136 vehicles. Using the growth observed along New Line Road, illustrated in **Figure 3-1** below, there is expected to be no background growth in traffic volumes along Old Northern Road.

Figure 3–1 Average Daily Traffic volumes



Source: Transport for NSW, 2022

Note: No data was recorded on Old Northern Road in 2015 or after 2017.

Dural has experienced a net decline in traffic over time. A strategic model run is therefore not required.

3.4 Traffic signals

Data will be requested from SCATS.Traffic.Signal.Data@transport.nsw.gov.au and is to be charged at standard cost rates.

4.0 Methodology

4.1 Base model

4.1.1 Modelling Platform

The base modelling platform will be SIDRA 9.0. SIDRA is considered an appropriate tool for the following reasons:

- The actual potential bypass traffic will be derived from survey data and wholly reassigned to the bypass rather than using an assignment model. This takes a conservative view of the maximum traffic that could use the bypass.
- SIDRA provides an accurate estimation of capacity at the intersection level, which is typically the most constrained part of the traffic network in urban areas.
- SIDRA supports rapid turnaround of sensitivity tests, enabling stakeholders to evaluate alternatives quickly.

4.1.2 Traffic demand

Traffic demand will be developed using a spreadsheet model of existing turning count data, classified by turn into light and heavy vehicles. Pedestrians will be coded for all signalised intersections (they do not affect performance at priority intersections).

4.1.3 Traffic zones/input

There are no zones in a SIDRA network model.

4.1.4 Traffic profile

The peak flow factor traffic profile will be set using turning count data at a whole-of-network level.

4.1.5 Road type

SIDRA does not employ road types, jam densities etc. Roads will be coded to their posted speed limit at each period.

4.1.6 Driving behaviour and speed profile

No speed profiles are included in SIDRA. Gap acceptance behaviour will be per TfNSW Traffic Modelling Guidelines, except where required for calibration/validation (refer to **Section 3.2**).

4.1.7 Public transport

Existing public transport services will be coded as a separate vehicle class.

4.1.8 Traffic signals

Traffic signals will be coded per industry standards in the following way:

Table 4-1 Traffic surveys proposed methodology for the base year

Element	Explanation
Signal timing	Set to user-given phase times based on SCATS history data from the same date as turning count surveys. Phase lengths are determined by the sum of total elapsed time by phase.
Phase specifications	Phasing structure coded per TCS graphic Red and amber times to be supplied by TfNSW
Pedestrian crossing call frequency	To be coded per SCATS data, if part of data provided by TfNSW. If not part of the data provided, this will be estimated using pedestrian crossing volumes.

Element	Explanation
Coordination	Signals will be coordinated per information provided by TfNSW, including offsets. If required, cycle times will be set at a network level to that of the master controller.

Source: SCT Consulting, 2022

4.1.9 Pedestrians and cyclists

Pedestrians will be coded for all traffic signals.

Cyclist volumes are expected to be low and are not proposed to be included.

4.1.10 Assignment type

There is no assignment type in a SIDRA model.

4.2 Future model

4.2.1 Scenario testing

The following scenarios will be tested:

- **Future 2036 with background growth only:** using historical Annual Average Daily Traffic data, growth will be applied to the network. If there are any known proposals that Hills Shire Council or TfNSW can share, these will also be included.:
- **Future 2036 with background growth and development traffic:** development traffic will be added to the network without any mitigations to determine the upper limit of the impacts of the subject planning proposal.
- **Future 2036 with background growth, development traffic and short-term mitigations:** the proposed mitigations that are funded as part of the planning proposal will be modelled in isolation. This will show to Hills Shire Council and Transport for NSW that the impacts can be adequately mitigated.
- **Future 2036 with background growth, development traffic and long-term mitigations:** the proposed Round Corner Bypass will be assumed to be fully delivered at this point, in addition to the upgrades funded as part of the planning proposal.
- **Future 2036 with maximum network demand prior to failing agreed performance benchmark:** to provide Council and TfNSW with an idea of the total capacity of the bypass, a scenario will be tested that reviews the total demand feasible before failure.

The year 2036 is considered appropriate because it allows for the full completion of the site. With the relatively small yield of 110 dwellings, this is considered feasible.

4.2.2 Future base case assumptions

In general, the network assumptions will remain identical to the existing conditions model, except where expressed below.

4.2.3 Traffic demand/growth

Per **Section 3.3**, it is not proposed to model any growth in the area. Traffic counters in the area show that Dural is declining in traffic demands, which has been part of a long-term trend, pre-dating COVID-19.

4.2.4 Traffic profile

The traffic profile (peak flow factor) derived from existing turning count data will not be modified in the future as there is no evidence there will be a substantial change in the profile of traffic arising from the additional residential dwellings or the Round Corner Bypass.

4.2.5 Public transport

It is expected that there not be any changes to the public transport network in Dural in the future.

4.2.6 Traffic signals

Traffic signals will generally remain similar to the base year model unless there are justifiable reasons for their modification.

Table 4-2 Cycle time updates

Situation	Explanation
Minor reduction in demands, no change to demands and/or no change phasing	Cycle times will remain at the same level as the base year. Phase times will be optimised. Coordination (offsets) will remain the same as base year data.
Increases in demands, new intersection approaches, new traffic signals	Phasing will be set to optimised with a maximum of 120 seconds for a three-way intersection and 140 seconds for a four-way intersection. Offsets will be optimised.
Major decreases in demands	Cycle times will be set to a minimum of 60 seconds. Offsets will be optimised.

Source: SCT Consulting, 2022

4.2.7 Assignment type

Bypass traffic will be determined using spreadsheet assessment. It will be assumed that 100% of traffic that benefits from the bypass will use the bypass. This will be assessed using travel time analysis from Google Maps to compare alternatives. Other key assumptions are:

- The bypass will operate at 60km/h (free-flow speed)
- Only traffic from collected gates in the number plate recognition survey will be considered for diversion.

5.0 Inception meeting outcome

No inception meeting has occurred. This will be populated should this occur.

Attachment A – TfNSW Correspondence

