Appendix 12: Integrated Transport Assessment

novo group
Planning. Traffic. Development.

Integrated Transport Assessment

prepared for

GOULD DEVELOPMENTS LTD & FOUR STARS DEVELOPMENT LTD

Levi Road / Lincoln Rolleston Road

November 2020

Integrated Transport Assessment

prepared for

Gould Developments Ltd & Four Stars Development Ltd

Levi Road / Lincoln Rolleston Road

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Introduction

1. Gould Developments Limited and Four Stars Development Limited have commissioned Novo Group to prepare an Integrated Transport Assessment (ITA) for the proposed residential re-zoning of a block of land between Levi Road and Lincoln Rolleston Road.

2. This report provides an assessment of the transport aspects of the proposal. It also describes the transport environment in the vicinity of the site, describes the transport related components of the proposal. It has been prepared broadly in accordance with the Integrated Transportation Assessment Guidelines specified in New Zealand Transport Agency Research Report 422.

3. The proposal entails a change in zoning from Rural to Residential of a block of land to accommodate approximately 660 future residential dwellings. The location is shown in **Figure 1**.

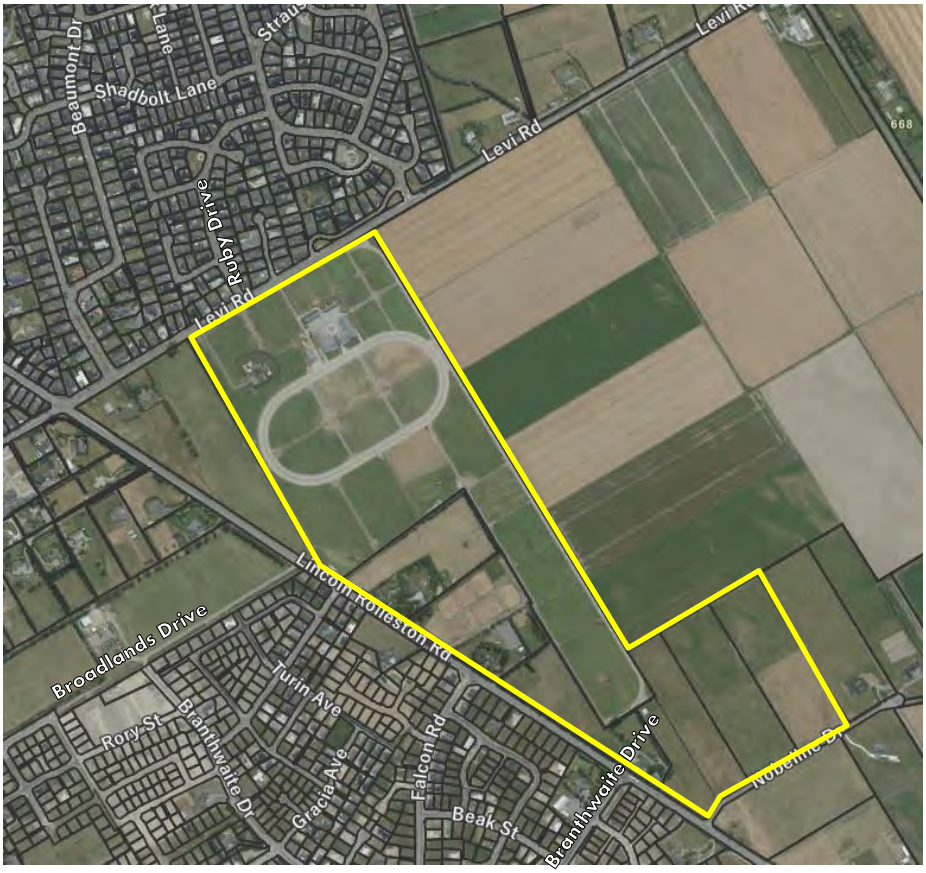


Figure 1: Site Location (source Canterbury Maps)

The Proposal

4. It is proposed to re-zone the site for residential use, this includes a deferred zone under the air noise contour. Overall, the proposal is for a total of 660 residential dwellings, of which approximately one third would be deferred.

5. The proposed road layout is shown in **Figure 2** and the key road connections are overlaid in blue.

Figure 2: Proposed Road Layout

6. The NZ Transport Agency Research Report 453 (*Trips and Parking Related to Land Use*) suggests an 85th percentile traffic generation rate of 0.9 vehicle movements per dwelling per hour in the peak hours. The ITE *Trip Generation* guidebook suggests a split of 63% arrivals and 37% departures in the weekday PM peak and 25% arrivals and 75% departures in the AM peak. This suggests **594 trips** in the **evening peak hour** of which 374 are arrivals and 220 are departures.

7. It is anticipated that the roads and intersections be generally laid out in accordance with the Transport Standards of the District Plan.

Transport Description

8. The following describes the key transport aspects of the proposal and surrounding road network:

9. Lincoln Rolleston Road forms part of the wider Arterial network linking toward the south of Christchurch and includes a cycleway between Rolleston and Lincoln. Council plans to upgrade the intersection of Lowes, Levi and Lincoln Rolleston Roads, and Masefield Drive.

10. A road connection is proposed as an extension to Broadlands Drive, providing a direct link to the future reserve to the east and schools and other destinations to the west. Another road connection is proposed as an extension of Brathwaite Drive extending east to cater for future development links. A road connection is provided between the Branthwaite Drive extension and Levi Road, although this will be designed to encourage through traffic flows to remain on the Lincoln-Rolleston Road and Levi Road Arterial route.

11. The remaining internal and local road layout will be formed to provide inter-connectivity, walkable blocks, and additional property access.

12. The transport network for the area shall integrate into the pedestrian and cycle network established in adjoining neighbourhoods and the wider township. A connection is proposed between the shared path on Lincoln Rolleston Road, through the Broadlands Drive extension connecting to the future reserve, a shared path is also proposed on the Branthwaite Drive extension. Cycling and walking will otherwise be contained within the road carriageway and incorporated in the design of any roads. Adequate space will be provided to accommodate cyclists and to facilitate safe and convenient pedestrian movements.

Other Transport Related Changes

13. Future development on the opposite side of Lincoln Rolleston Road (Referred to as “ODP Area 11” in the District Plan and “Rolleston 2 DEV” in the Proposed District Plan) includes the extension of Broadlands Drive through to Lincoln Rolleston Road near the south-eastern tip of “ODP Area 4” in the District Plan (“Rolleston 1 DEV” of the Proposed District Plan). It is therefore proposed to amend the ODP Area 4 / Rolleston 1 DEV to allow for the continuation of this road. This will provide a direct connection toward Clearview Primary School and Rolleston College.

14. It is also proposed to seek an amendment to allow for two future local road connections (as illustrated in **Figure 2)** as the Area 4 ODP / Rolleston 1 DEV does not currently include any road connections to its north-eastern boundary. This will provide for local road connections primarily for property access and walking and cycling connectivity. They are not anticipated to provide main through routes.

Transport Environment

Existing Road Network

16. The site fronts Lincoln Rolleston Road, Levi Road and Nobeline Drive and these roads are described in detail below along with a summary of other nearby transport infrastructure and future road networks.

Lincoln Rolleston Road

17. Lincoln Rolleston Road is classified as an Arterial Road near the site and a Collector Road south of the intersection with Selwyn Road. Lincoln Rolleston Road has a 60km/h speed limit, increasing to 100km/h south of the intersection with Nobeline Drive.

18. Near the site, Lincoln Rolleston Road typically has one, 3.5m wide traffic lane in each direction with variable sealed shoulders on the eastern side and a mixture of kerb and channel and sealed shoulders on the western side (relating to sections of developed vs. undeveloped land).

19. Along the western side of the road is a separated shared path providing a walking and cycling connection between Lincoln and Rolleston. There is no footpath on the eastern side.

20. The Councils RAMM database indicates a daily average volume of 6,038 vehicles per day on Lincoln Rolleston Road near the intersection with Levi Road and around 4,689 near the intersection with Nobeline Drive.

Levi Road

21. Levi Road is classified as an Arterial Road and has a 60km/h speed limit adjacent to the site, increasing to 80km/h east of the intersection with Bavaria Drive.

22. Near the site, Levi Road has one traffic lane in each direction with typically an 8m wide sealed carriageway. The north-western side of the carriageway has kerb and channel and a 1.6m wide footpath. The south-eastern side has grass berms adjacent to the existing rural zone.

23. The Councils RAMM database indicates a daily average volume of 5,483 vehicles per day on Levi Road near the site.

Nobeline Drive

24. Nobeline Drive has a 4.2m wide sealed carriageway with approximately 3.8m wide grass berms on either side. The Speed Limit Bylaw indicates Nobeline Drive has an 80km/h speed limit[1].

25. Nobeline Drive is currently formed as a cul de sac although there is an unformed / paper road connection to Brendean Drive to the east.

[1] However, no posted speed limit was found during the site visit (28/09/2020)

26. The Mobile Road website indicates an estimated daily traffic volume of 50 vehicles.

Other Roads

27. Levi Road forms a roundabout controlled intersection with Lincoln Rolleston Road, Lowes Road (south-west) and Masefield Drive (north-west). Masefield Drive provides the most direct connection to the Town Centre. Lowes Road currently provides the most direct link to Clearview Primary School and Rolleston College.

28. Opposite the site, Ruby Drive[2] forms a giveway controlled 'T' Intersection with Levi Road. The Councils RAMM database indicates a daily average volume of 757 vehicle movements per day on Ruby Drive.

29. Branthwaite Drive[3] forms a giveway controlled 'T' intersection with Lincoln Rolleston Road with a right turn lane provided on Lincoln Rolleston Road. The Councils RAMM database indicates a daily average volume of 105 vehicle movements per day on Branthwaite Drive, although this is anticipated to increase once the area west of Lincoln Rolleston Road is fully developed.

Peak Hour Traffic Volumes

30. Peak hour traffic volumes have been provided (as summarised in **Table 1**) from the Councils Paramics Model for 2018 and 2028; it is noted that this is an interim model although it is considered to be acceptable for the purposes of this assessment[4].

31. Additional detailed volumes (from the Model) for each link and for Broadlands Drive are provided in **Appendix 3**.

32. It is understood that the 2028 Model includes anticipated growth from development of existing planned residential areas (i.e., those zoned / within an existing ODP)[5].

[2] 50km/h speed limit
[3] 50km/h speed limit
[4] Possible changes to the model being considered by SDC would provide for additional connections that are anticipated to reduce traffic volumes on Levi Road and Lincoln Rolleston Road below that in Table 1.
[5] We are aware that other Plan Changes are being lodged in the vicinity of this site that will lead to additional traffic on the surrounding road network. That said, the status of those Plan Changes is not certain (i.e. they have not been approved / submissions on the proposed Plan have not closed, at the time of writing this report) and the adoption of the 2028 model forecasts is considered to be a reasonable basis for the future environment until such time as the status of other Plan Changes applications has been determined.

Table 1: 2018 and 2028 Peak Hour Traffic Volumes[6] [Source: SDC Paramics Model]

Location	2018 8am-9am	2028 8am-9am	2018 5pm-6pm	2028 5pm-6pm
Levi Rd Eastbound	80	896	47	382
Levi Rd Westbound	72	231	328	954
Ruby Rd Southbound	66	60	47	41
Ruby Rd Northbound	31	35	85	61
Lincoln Rolleston Rd Eastbound	294	278	261	470
Lincoln Rolleston Rd Westbound	181	442	370	472
Branthwaite Dr Southbound	17	271	6	122
Branthwaite Dr Northbound	5	100	15	269

Crash History

33. The NZ Transport Agency Crash Analysis System (CAS) has been reviewed to identify crashes that have been reported on the frontage roads between 2010 and 2020. The output from the CAS database is included in **Appendix 2** and summarised in **Table 2**.

Table 2: Summary of Reported Crashes 2010-2020

Crash Location	Crash Type	Crash Details
Intersection Masefield Drive, Levi Road, Lowes Road, Lincoln Rolleston Road	Vehicle SDB on Masefield Drive missed intersection	Alcohol suspected, cutting corner. 1 minor injury.
	Vehicle SDB on Levi Road hit cyclist	Driver failed to notice cyclist and giveway at roundabout
Levi Road 400m east Beaumont Drive	Vehicle EDB on Levi Road lost control, hit tree	Slippery road
Levi Road 40m east Beaumont Drive	Vehicle EDB on Levi Road hit parked vehicle	Driver attention diverted (inside car)
Lincoln Rolleston Road, 300m east of Branthwaite Drive	Vehicle WDB on Lincoln Rolleston Road lost control swerving to avoid an animal	Fatigued driver, swerved and hit roadside obstruction (e.g. tree / fence).
Lincoln Rolleston Road, 80m south of Branthwaite Drive	NDB vehicle hit stray animal	
Lincoln Rolleston Road, 340m west of Branthwaite Drive	Vehicle WDB on Lincoln Rolleston Road hit vehicle U-turning from same direction	Driver did not check correctly when U-turning. 1 serious injury.

[6] Link Node Averages, Refer to **Appendix 3** for individual link volumes in the 2028 PM peak hour.

Lincoln Rolleston Road, 390m west of Branthwaite Drive	Vehicle EDB on Lincoln Rolleston road hit rear end of truck turning right	Driver following too closely failed no notice truck turning at driveway.
Lincoln Rolleston Road, 112m west of Falcon Road	Vehicle WDB hit parked car	Attention diverted by phone.
Lincoln Rolleston Road, 2km north of Selwyn Road	Driver hit rear end of cyclist	Bright sun, driver too far left, 1 minor injury.
Lincoln Rolleston Road 380m east of Levi Road	Head-on collision on straight	Driver attention diverted by navigation device.
Weedons Road at or near intersection with Levi Road	load / trailer hit road and collided with another vehicle	30m south of Levi Road intersection.
	Vehicle EBD on Weedons Road missed intersection / end of road (stop controlled)	Driver failed to notice control, alcohol.
	Vehicles SDB on Weedons Road missed intersection / end of road (stop controlled)	Driver lost control under speed when turning, hit tree.
	Vehicle EDB on Levi Road missed intersection / end of road (Stop controlled)	Lost control breaking

34. The Weedons Road intersection with Levi Road is currently being upgraded which may address a number of the above crashes in that location. The intersection of Masefield Drive, Levi Road, Lowes Road and Lincoln Rolleston Road is also proposed to be upgraded (Long Term Plan 2018/2028). The other crashes suggested driver error, or relate to isolated events, and do not suggest any safety concerns with the road layout.

Future Road Networks

35. The Weedons Road intersection with Levi Road, and the Weedons Road / Weedons Ross Road interchange with SH1, are both under construction and will be completed prior to the development of this proposal.

36. Future development on the opposite side of Lincoln Rolleston Road includes the extension of Broadlands Drive through to Lincoln Rolleston Road.

37. The Councils Long Term Plan 2018/2028 includes funding for upgrading the intersection of Levi Road, Lincoln Rolleston Road, Lowes Road and Masefield Drive.

38. The Rolleston Structure plan also indicates a future road connecting between Lincoln Rolleston Road and Weedons Road which appears to transect the southern block of the proposal.

Passenger Transport

39. The nearest bus route is the “Yellow” line with bus stops on Lowes Road and Masefield Drive. The Yellow line connects Rolleston and Christchurch including Hornby, Riccarton,

Christchurch Hospital and Bus interchange Eastgate and New Brighton. There are typically two buses per hour and some express buses in the PM peak periods.

40. The site is also 1.2-3.6km from the Park 'n' Ride on the corner of Kidman Terrace and Rolleston Drive. This stop is serviced by the Yellow Line and by the #820 bus route which provides connections to Burnham and Lincoln.

Active Transport Modes

41. There are a variety of landuse destinations within walking and cycling distance of the site, as indicated in **Figure 3**.This includes schools, shops, and a future reserve.

Figure 3: Key landuse destinations [Aerial Source: Canterbury Maps]

42. The northern part of the site is approximately 750m walk to the shops on Masefield Drive (the eastern most extent of the town centre business zone) and an approximately 2.2km walk from the south-eastern end of the site.

43. There is a shared path along Lincoln Rolleston Road connecting Lincoln and Rolleston and along Lowes Road providing a connection to the schools. There is also a shared path on Branthwaite Drive.

Assessment of Effects

44. The following assessment considers both the proposed residential and deferred residential i.e., the total of 660 lots. Should only the residential be adopted (and not the deferred residential) any effects would be expected to be less because of the lower traffic volume associated with the lower number of dwellings. Should the deferred zone be excluded all three key intersections are still anticipated to be provided. This ensures sufficient capacity to service the north and south block separately.

Road Layout

45. The Broadlands Drive extension connects from the intersection with Lincoln-Rolleston Road through the southern corner of Area 4 ODP[7] / Rolleston 1 DEV[8] to the future reserve to the east of the site. The proposal includes a change to Area 4 ODP / Rolleston 1 DEV to ensure continuation of this road through to Lincoln Rolleston Road.

46. Branthwaite Drive is proposed to be extended through the southern end of the site to the eastern boundary which will ultimately allow for a future road connection to Weedons Road (subject to future development by others). This is consistent with the Rolleston Structure Plan.

47. A north-south connection is proposed between the extension of Branthwaite Drive to Levi Road, via a section of the Broadlands Drive extension. This connection has been designed as a less direct link, to avoid diverting traffic from the Arterial network (Lincoln-Rolleston Road and Levi Road).

48. Local road connections include an intersection with Nobeline Drive, two connections to the "Area 4 ODP" /"Rolleston 1 DEV" and future connections to the reserve. An additional Local Road connection is also anticipated to connect to Lincoln Rolleston Road. Other local road connections can be designed through the subsequent subdivision process to accommodate property access.

49. All roads are anticipated to be developed in accordance with the District Plan road layout requirements including provision of footpaths[9]. Additional pedestrian and cycle connections are proposed through to the reserve. A shared path is proposed along the Branthwaite Drive and Broadlands Drive extensions, providing a connection to the existing shared path on Lincoln Rolleston Road and Branthwaite Drive.

50. The proposed layout is considered to provide an appropriate structure of primary roads and local road connections to be consistent with and integrate into the existing road network and to provide for property access to future residential development. The proposed layout also provides for good connectivity for active modes towards existing public transport routes and key landuse destinations. As such the layout is considered to be appropriate for the proposed location and future use.

Connections to Existing Road Network

51. As outlined above, the proposal is anticipated to result in **594 trips peak hour** of which 374 are arrivals and 220 are departures in the evening peak and 149 are arrivals and 445 are departures in the morning peak.

52. In terms of distribution onto the road network it is assumed that 85% of the trips generated within the proposed area will occur via one of the three main intersections (505 trips) with the remaining 15% (89 trips) occurring via other future local road connections. Approximately 25% of trips are anticipated to use the Branthwaite Drive intersection (126

[7] Operative District Plan
[8] Proposed District Plan
[9] It is noted that these requirements are reasonably consistent between the Operative and Proposed Plan Transport Standards and either can be accommodated.

trips) with 45% using the Levi Road intersection (227 trips) and 30% the Broadlands Drive intersection (152 trips). This distribution reflects proximity of intersections to each part of the proposed development area and the existing traffic volumes on Lincoln Rolleston Drive and Levi Road.

53. The ITE Trip Generation guidebook suggests a split of 63% arrivals and 37% departures in the weekday PM peak and 25% arrivals and 75% departures in the AM peak. This has been applied to the three key, proposed, intersections to determine directional flow as shown in **Table 3**.

Table 3: Proposed Road Directional Flows

Location		AM Peak	PM Peak
Proposed connection to Levi Road	Arrival	57	143
	Departure	170	84
Proposed Broadlands Drive extension	Arrival	38	96
	Departure	114	56
Proposed Branthwaite Drive extension	Arrival	32	79
	Departure	95	47

54. An allowance has been made for 5% of north and south bound traffic as through traffic on at the Ruby Road[10] intersection, and 10% of Eastbound and Westbound traffic on Branthwaite Drive[11] and 20% on Broadlands Drive[12] intersections. The remaining departure trips and all arrival trips have then been allocated as turning movements proportionate to the directional traffic flows on Levi Road and Lincoln Rolleston Road[13]. The volumes on the existing roads (and future western arm of Broadlands Drive[14]) have been taken from the 2028 Paramics Model (refer to **Appendix 3**)

55. These three main intersections have been modelled using the SIDRA Intersection Software based on the 2028 AM and PM peak hours which illustrated that these intersections can operate within acceptable levels of service. The inputs and outputs are provided in **Appendix 4.** The proposed intersection layouts are summarised below:

- Broadlands Drive – Single Lane Roundabout

[10] A nominal amount assuming a small volume of trips to destinations within the residential area north of Levi Road and from that area to the future reserve.
[11] Assuming a small proportion use this to access the adjacent residential area and schools and for trips to the reserve from this area.
[12] Assuming a reasonable proportion use this for access between schools, reserve, residential areas and for travel within Rolleston towards the west.
[13] It is noted that for the non-dominate flow (i.e., out of the intersecting roads in the PM peak and into them in the AM peak this may vary, however this would likely balance between turning movements on either side of the intersection and is not anticipated to noticeably change the performance of the intersection. For this reason, proportional distribution has been assumed for consistency.
[14] Which the 2028 model assumes is completed.

- Branthwaite Drive - Giveway controlled intersection with right turn lanes on Lincoln Rolleston Drive.

- Ruby Drive – Giveway controlled intersection with a separate left turn lane on the proposed road.

56. It is noted that some of the turning movements at the Ruby Drive and Branthwaite Drive intersections are anticipated to operate at LOS[15] D or E, which is acceptable in the peak hours although this may encourage some re-distribution of movements to the Broadlands Drive intersection. Noting that the Broadlands Drive intersection is anticipated to be operating with good levels of service (A or B) any redistribution of trips would be readily accommodated within this intersection.

57. In terms of intersection locations, these meet the Proposed District Plan[16] intersection separation distances with the exception of Ruby Drive which is not 151m from the existing intersection with Bellbird Place and the extension of Broadlands Drive which is approximately 120m from the intersection of Lincoln Rolleston Road and Reuben Avenue.

58. Noting that there is already an existing "T" intersection for Ruby Drive in this location and that Bellbird Place is a cul-de sac servicing only 16 properties there is not likely to be any noticeable impact on the safe or efficient operation of Levi Road. There is also good intervisibility between these two intersections.

59. Reuben Avenue is a low volume local road and forms a "T" Intersection with Lincoln Rolleston Road. The exact location of the intersection of Broadlands Drive requires co-ordination between several development areas, the approximately 120m separation distance will be sufficient to avoid conflict between turning vehicles and there is good visibility between these intersections. As such the location is considered to be acceptable (and generally consistent with that indicated on "ODP Area 11" in the District Plan).

60. All roads are anticipated to be formed to standard designs consistent with the District Plan[17] layouts. This would include an upgrade of adjacent sections of Levi Road and Lincoln Rolleston Road to include kerb and channel and footpaths.

61. Nobeline Drive may require an upgrade to kerb and channel adjacent to the site. The proposed road layout is intended to be designed to avoid use of Nobeline Drive for through traffic, that is it would provide for property access to lots located at the southern end rather than cater for traffic from the remainder of the area. This can be further supported by road design at the time of subdivision. Noting this, any increase in traffic flows at this intersection are anticipated to remain within the capacity of the existing 'T' Intersection.

62. All other proposed local road connections are also proposed to be designed such that they are not attractive through routes and primarily service low traffic volumes which can be catered for with basic giveway controlled intersections. Some property access to frontage roads is also anticipated.

[15] Level of Service (A – best; F worst)
[16] These are generally consistent with the Operative District Plan requirements and use of either would not change the conclusion in respect of intersection locations.
[17] Proposed or Operative (note there is no major difference between these standards and either can be accommodated)

63. For the above reasons, subject to appropriate detailed design at subdivision, the anticipated traffic can be safely and efficiently accommodated via the proposed connections to the existing road network.

Wider Road Network

64. The proposed road layout is consistent with the future development of the wider road network including extensions of Broadlands Drive and Branthwaite Drive to the future reserve and to create the potential for a future link to Weedons Road[18].

65. The intersection of Levi Road, Lincoln Rolleston Road, Lowes Road and Masefield Drive is proposed to be upgraded[19]. The proposed District Plan identifies that this would be a dual lane roundabout. It is understood that this upgrade is to cater for the anticipated growth on the Arterial Road network associated with traffic growth on the southern side of Rolleston and to improve traffic flows accessing the State Highway via the future Weedons Road interchange. However, noting the potential flow of pedestrians and cyclists across both Lincoln Rolleston Road (between the future reserve and schools) and across Levi Road / Lowes Road, to and from the town centre, consideration should be given to a signalised intersection as an alternative to a dual lane roundabout. Subject to appropriate design, a signalised intersection could be safer and offer higher levels of service for pedestrians and cyclists than a dual lane roundabout. It would also provide more flexibility for future management of the traffic flows through this intersection associated with longer term changes in traffic. Regardless, either intersection upgrade is anticipated to be sufficient to cater for the traffic associated with the proposed rezoning.

66. Further trips onto the wider road network are likely to be dispersed relative to the destination. Analysis of the 2013 Census data[20] shows that commute to work trips outside of Rolleston were split broadly across the following destinations.

[18] The Rolleston Structure Plan[18] (Figure 8.2 and Table 8.1) indicates a future road connection between Weedons Road and Lincoln Rolleston Road (2041 timeframe).
[19] Upgrade prior to 2028 -Refer to page 274 of the Long Term Plan https://www.selwyn.govt.nz/__data/assets/pdf_file/0004/279832/LTP-2018-2028-FINAL-DOC_WEB.pdf
[20] http://archive.stats.govt.nz/datavisualisation/commuterview/index.html?_ga=2.208046549.614093748.1538512253-1731882158.1453166719#

Table 4: Directions of Commute For Work from Rolleston NE

Destination	Distribution
Springston	1%
Selwyn Lakes	2%
Lincoln	6%
Kirwee	1%
West Melton	11%
Christchurch	79%

67. The proposed roads connect directly to the Arterial Road network providing appropriate access to locations outside of Rolleston. This includes connection to State Highway 1 via the Weedons Road / Weedons Ross Road interchange. There is also access to Christchurch via Lincoln Rolleston Road to Selwyn Road and Shands Road. These wider Arterial Road connections are being /have been upgraded to cater for anticipated growth within Rolleston, and Selwyn District generally. The location site is not likely to noticeably alter the commute period traffic flows to and from Christchurch beyond that anticipated from growth in Rolleston generally.

68. The remaining trip distribution is dispersed across a variety of road connections and is not likely to have any noticeable impact on the capacity of any one part of the road network.

69. For these reasons, no further detailed analysis of the wider road network has been undertaken.

District Plan Objectives and Policies

70. The Operative and Proposed Plan Transport Related Objectives and Policies are considered in **Appendix 5** and the proposal is considered to be generally consistent with those provisions from a transport perspective.

Conclusion

71. The proposed rural to residential rezoning will provide for an estimated 660 future residential dwellings. The proposed road layout has been designed to integrate with the existing and based on the assessment above can be appropriately designed to operate within acceptable levels of service at the 2028 design year.

72. The proposal is consistent with the existing road hierarchy and future / planned roads and intersection upgrades. The timing of development appears to be able to be well co-ordinated both in terms of proposed roads and planned upgrades on the wider road network.

73. The proposal includes provision for shared paths connections to provide access to the existing shared paths and good pedestrian and cycle links to the reserve, public transport

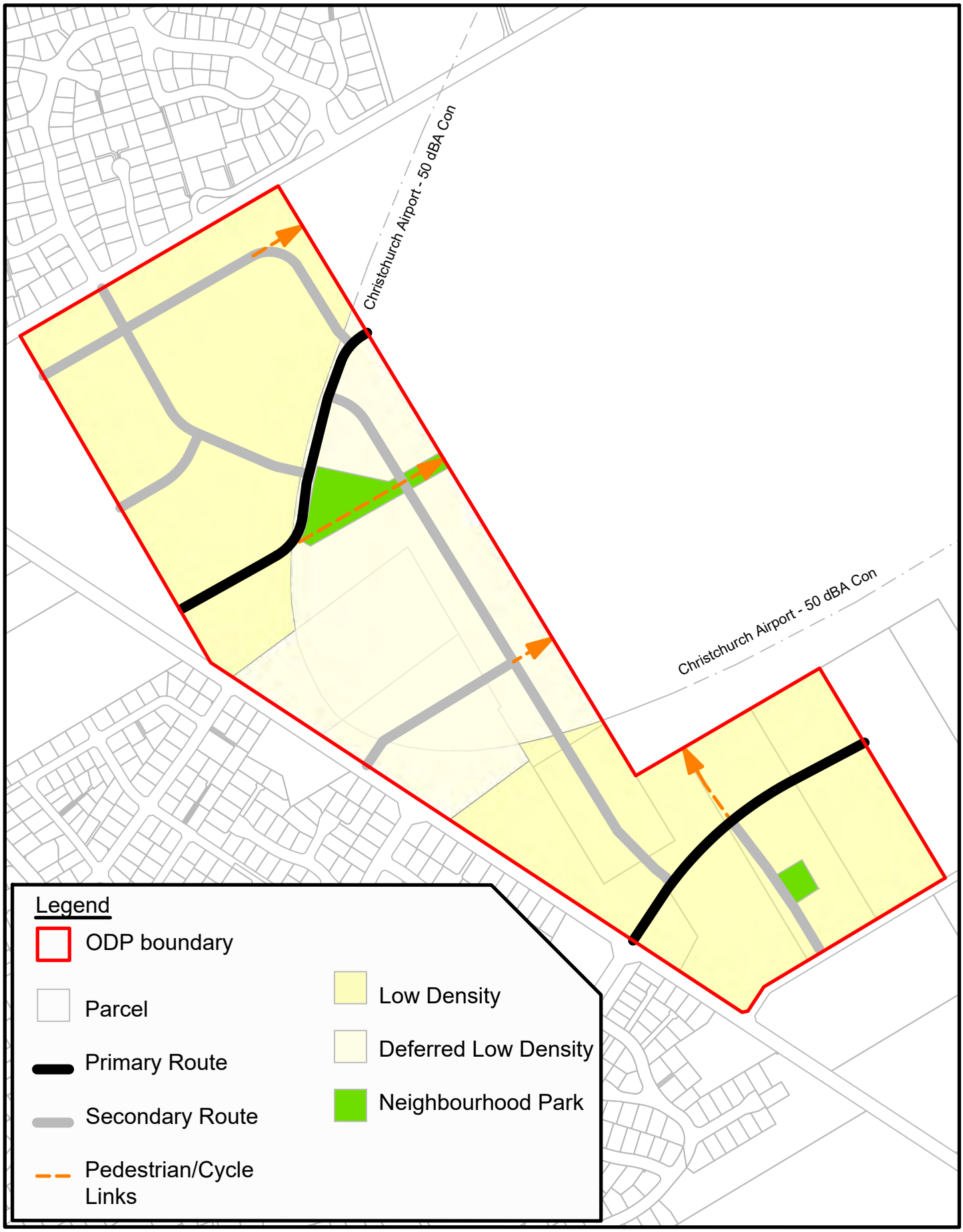
stops, schools, town centre and Rolleston. The site is well located to support travel by all modes.

74. For the avoidance of doubt, the above assessment considers both the proposed residential and deferred residential i.e., the total of 660 lots. Should only the residential be adopted (and not the deferred residential) any effects would be expected to be less because of the lower traffic volume associated with the lower number of dwellings. Should the deferred zone be excluded, all three key intersections are still anticipated to be provided. This ensures sufficient capacity to service the north and south block separately.

75. Overall, from a transport perspective there is no reason that the proposed development cannot be integrated into the transport network in a safe, efficient, and appropriate manner which provides for travel by all modes.

Appendix 1

Proposed Plan



Note:
Up to15% of the ODP may be developed as Medium Density to be determined at the time of subdivision.

Outline Development Plan

OVERALL Plan

Area 4 - Rolleston

N

NTS

Appendix 2

NZTA CAS Data

Untitled query

Saved sites

Levi

Crash year

2010 — 2020

Plain English report

15 results from your query.

1-15 of 15

Crash road	Distance	Direction	Reference station	Route position	Side road	Easting	Northing	Longitude	Latitude	ID	Date	Day of week	Time	Description of events	Crash factors	Surface condition	Natural light	Weather	Junction	Control	Crash count fatal	Crash count severe	Crash count minor	Social cost $(m)
LEVI RD		I			MASEFIELD DRIVE	1551068	5172636	172.393768	-43.597641	201898754	18/10/2018	Thu	19:15	Car/Wagon1 SDB on Levi Road hit Cyclist2 (Age 26) merging from the right	CAR/WAGON1, did not check/notice another party from other dirn, failed to give way at priority traffic control	Dry	Bright sun	Fine	Roundabout	Give way	0	0	0	0.02
LEVI ROAD	400m	E			BEAUMONT DRIVE	1551502	5172889	172.399155	-43.595394	201171746	05/07/2011	Tue	08:47	SUV1 EDB on LEVI ROAD lost control; went off road to left, SUV1 hit non specific fence, non specific tree, non specific other,	SUV1, lost control - road conditions, ENV: road slippery due to frost or ice	Ice or Snow	Bright sun	Fine	Nil (Default)	Unknown	0	0	0	0.04
LEVI ROAD	40m	E			BEAUMONT DRIVE	1551191	5172707	172.395294	-43.597012	201831261	18/01/2018	Thu	13:30	Van1 EDB on Levi road hit parked veh, Van1 hit non specific parked	VAN1, alcohol test below limit, attention diverted by food, cigarettes, beverages, too far left	Dry	Bright sun	Fine	Nil (Default)	Unknown	0	0	0	0.02
LEVI ROAD		I			WEEDONS ROAD	1552531	5173493	172.411957	-43.590023	201733122	19/02/2017	Sun	21:40	Van1 EDB on Levi Rd missed intersection or end of road	VAN1, failed to notice control, lost control under braking, speed approaching a traffic control	Dry	Dark	Fine	T Junction	Stop	0	0	0	0.02
LINCOLN ROLLESTON ROAD	300m	E			BRANTHWAITE DRIVE	1552433	5171734	172.410599	-43.605854	201831179	28/01/2018	Sun	05:00	Car/Wagon1 WDB on Lincoln Rolleston Road lost control; went off road to right, Car/Wagon1 hit non specific traffic sign, non specific fence, non specific pole,	CAR/WAGON1, other fatigue, swerved to avoid animal	Dry	Dark	Fine	Nil (Default)	Unknown	0	0	0	0.04
LINCOLN ROLLESTON ROAD	80m	S			BRANTHWAITE DRIVE	1552249	5171854	172.408325	-43.604759	201845874	04/08/2018	Sat	23:00	Car/Wagon1 NDB on Lincoln Tai Tapu Road hit obstruction, Car/Wagon1 hit non specific animal	CAR/WAGON1, alcohol test below limit, ENV: farm animal straying, other street lighting	Dry	Dark	Fine	Nil (Default)	Unknown	0	0	0	0.04
LINCOLN ROLLESTON ROAD	340m	W			BRANTHWAITE DRIVE	1551897	5172083	172.403976	-43.602676	201614217	23/06/2016	Thu	10:10	Car/Wagon1 WDB on LINCOLN ROLLESTON ROAD hit Van2 U-turning from same direction of travel	VAN2, did not check/notice another party from other dirn, other failed to give way	Dry	Bright sun	Fine	Nil (Default)	Unknown	0	1	0	1.11
LINCOLN ROLLESTON ROAD	390m	W			BRANTHWAITE DRIVE	1551855	5172110	172.403458	-43.602428	201753942	16/11/2017	Thu	13:30	Van1 EDB on Lincoln rolleston hit rear of Truck2 EDB on Lincoln rolleston turning right from centre line	VAN1, failed to notice indication of vehicle in front, following too closely	Dry	Bright sun	Fine	Driveway	Nil	0	0	0	0.04
LINCOLN ROLLESTON ROAD	112m	W			FALCON ROAD	1551783	5172156	172.402587	-43.602008	2020157112	03/07/2020	Fri	23:10	Car/Wagon1 WDB on LINCOLN ROLLESTON ROAD hit parked veh, Car/Wagon1 hit parked (unattended) vehicle	CAR/WAGON1, alcohol test below limit, attention diverted by cell phone, too far left	Wet	Dark	Fine	Nil (Default)	Nil	0	0	0	
LINCOLN ROLLESTON ROAD	380m	E			LEVI ROAD	1551383	5172417	172.397644	-43.599636	201747756	20/08/2017	Sun	15:14	Car/Wagon1 EDB on Lincoln rolleston road hit Car/Wagon2 headon on straight, Car/Wagon1 hit non specific fence	CAR/WAGON1, attention diverted by navigation device, too far right	Wet	Overcast	Light rain	Nil (Default)	Unknown	0	0	0	0.04
LINCOLN ROLLESTON ROAD		I			MASEFIELD DRIVE	1551071	5172619	172.393798	-43.597789	2020156928	16/06/2020	Tue	05:00	SUV1 SDB on MASEFIELD DRIVE missed inters or end of road	SUV1, alcohol suspected, cutting corner at intersection	Dry	Dark	Fine	Crossroads	Give way	0	0	1	

Crash road	Distance	Direction	Reference station	Route position	Side road	Easting	Northing	Longitude	Latitude	ID	Date	Day of week	Time	Description of events	Crash factors	Surface condition	Natural light	Weather	Junction	Control	Crash count fatal	Crash count severe	Crash count minor	Social cost $(m)
LINCOLN ROLLESTON ROAD	2000m	N			SELWYN ROAD	1551999	5172017	172.405243	-43.603275	201416718	04/08/2014	Mon	17:00	Car/Wagon1 NDB on LINCOLN ROLLESTON ROAD hit rear end of Cyclist2 (Age 17) stopped/moving slowly	CAR/WAGON1, too far left	Dry	Bright sun	Fine	Nil (Default)	Unknown	0	0	1	0.11
WEEDONS ROAD	30m	S			LEVI ROAD	1552544	5173466	172.412125	-43.590263	201534480	25/04/2015	Sat	13:35	load or trailer from Van1 NDB on WEEDONS ROAD hit VEHB	VAN1, load too heavy, other lost control	Dry	Bright sun	Fine	Nil (Default)	Unknown	0	0	0	0.04
WEEDONS ROAD		I			LEVI ROAD	1552531	5173493	172.411957	-43.590023	201273526	19/10/2012	Fri	00:02	Car/Wagon1 EDB on WEEDONS ROAD missed intersection or end of road	CAR/WAGON1, alcohol test above limit or test refused, failed to notice control	Dry	Dark	Fine	T Junction	Stop	0	0	0	0.04
WEEDONS ROAD		I			LEVI ROAD	1552531	5173493	172.411957	-43.590023	201370357	24/02/2013	Sun	21:15	SUV1 SDB on WEEDONS ROAD missed intersection or end of road, SUV1 hit non specific tree	SUV1, lost control when turning, speed entering corner/curve	Dry	Dark	Fine	T Junction	Stop	0	0	0	0.04

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Appendix 3

Traffic Flows from SDC Paramics Model 2028


2028 AM Link Counts
08:00 to 09:00
0.0 to 1100.0
08:00:00


2028 PM Link Counts
17:00 to 18:00
0.0 to 1100.0
17:00:00

Appendix 4

SIDRA Intersection Summaries

MOVEMENT SUMMARY

Site: 101 [Branthwaite Extension 2028 AM (Site Folder: General)]

Branthwaite Extension
Site Category: Future Conditions 1
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Lincoln Rolleston (North-West bound)														
1	L2	57	5.0	60	5.0	0.236	5.7	LOS A	0.0	0.0	0.00	0.08	0.00	57.3
2	T1	351	10.0	369	10.0	0.236	0.1	LOS A	0.0	0.0	0.00	0.08	0.00	59.1
3	R2	18	5.0	19	5.0	0.015	6.8	LOS A	0.1	0.5	0.41	0.57	0.41	48.8
Approach		426	9.1	448	9.1	0.236	1.1	NA	0.1	0.5	0.02	0.10	0.02	58.3
East: Branthwaite Extension														
4	L2	37	5.0	39	5.0	0.347	8.6	LOS A	1.4	10.6	0.72	0.90	0.92	41.4
5	T1	10	5.0	11	5.0	0.347	19.1	LOS C	1.4	10.6	0.72	0.90	0.92	39.5
6	R2	48	5.0	51	5.0	0.347	27.5	LOS D	1.4	10.6	0.72	0.90	0.92	41.5
Approach		95	5.0	100	5.0	0.347	19.2	LOS C	1.4	10.6	0.72	0.90	0.92	41.3
North: Lincoln Rolleston (south-east bound)														
7	L2	14	5.0	15	5.0	0.183	5.6	LOS A	0.0	0.0	0.00	0.03	0.00	57.8
8	T1	302	10.0	318	10.0	0.183	0.1	LOS A	0.0	0.0	0.00	0.03	0.00	59.6
9	R2	43	5.0	45	5.0	0.041	7.3	LOS A	0.2	1.2	0.48	0.64	0.48	48.6
Approach		359	9.2	378	9.2	0.183	1.1	NA	0.2	1.2	0.06	0.10	0.06	58.0
West: Branthwaite														
10	L2	138	5.0	145	5.0	0.764	19.0	LOS C	6.6	48.5	0.80	1.39	2.07	37.8
11	T1	27	5.0	28	5.0	0.764	31.1	LOS D	6.6	48.5	0.80	1.39	2.07	36.2
12	R2	106	5.0	112	5.0	0.764	37.8	LOS E	6.6	48.5	0.80	1.39	2.07	37.9
Approach		271	5.0	285	5.0	0.764	27.6	LOS D	6.6	48.5	0.80	1.39	2.07	37.7
All Vehicles		1151	7.8	1212	7.8	0.764	8.8	NA	6.6	48.5	0.27	0.47	0.59	50.1

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

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.

MOVEMENT SUMMARY

Site: 101v [Broadlands Extension 2028- AM (Site Folder: General)]

Broadlands
Site Category: Future Conditions 1
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Lincoln Rolleston (North-west bound)														
1	L2	63	5.0	66	5.0	0.399	4.9	LOS A	3.2	24.1	0.45	0.50	0.45	49.7
2	T1	375	10.0	395	10.0	0.399	5.1	LOS A	3.2	24.1	0.45	0.50	0.45	54.4
3	R2	24	5.0	25	5.0	0.399	9.7	LOS A	3.2	24.1	0.45	0.50	0.45	51.0
Approach		462	9.1	486	9.1	0.399	5.3	LOS A	3.2	24.1	0.45	0.50	0.45	53.5
East: Broadlands Extension														
4	L2	33	5.0	35	5.0	0.125	5.0	LOS A	0.7	5.4	0.54	0.62	0.54	48.3
5	T1	23	5.0	24	5.0	0.125	4.9	LOS A	0.7	5.4	0.54	0.62	0.54	46.4
6	R2	58	5.0	61	5.0	0.125	9.4	LOS A	0.7	5.4	0.54	0.62	0.54	49.2
Approach		114	5.0	120	5.0	0.125	7.2	LOS A	0.7	5.4	0.54	0.62	0.54	48.4
North: Lincoln Rolleston (South-east bound)														
7	L2	14	5.0	15	5.0	0.232	4.6	LOS A	1.6	12.2	0.36	0.48	0.36	49.8
8	T1	220	10.0	232	10.0	0.232	4.8	LOS A	1.6	12.2	0.36	0.48	0.36	54.5
9	R2	35	5.0	37	5.0	0.232	9.4	LOS A	1.6	12.2	0.36	0.48	0.36	51.1
Approach		269	9.1	283	9.1	0.232	5.4	LOS A	1.6	12.2	0.36	0.48	0.36	53.8
West: Broadlands Road														
10	L2	73	5.0	77	5.0	0.187	6.4	LOS A	1.2	8.6	0.68	0.70	0.68	48.1
11	T1	29	5.0	31	5.0	0.187	6.3	LOS A	1.2	8.6	0.68	0.70	0.68	46.1
12	R2	42	5.0	44	5.0	0.187	10.9	LOS B	1.2	8.6	0.68	0.70	0.68	49.0
Approach		144	5.0	152	5.0	0.187	7.7	LOS A	1.2	8.6	0.68	0.70	0.68	47.9
All Vehicles		989	8.0	1041	8.0	0.399	5.9	LOS A	3.2	24.1	0.47	0.53	0.47	52.1

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

Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
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.

MOVEMENT SUMMARY

Site: 101 [Levi Ruby Rd Extension 2028 - AM (Site Folder: General)]

Levi Ruby Rd Extension 2028
Site Category: Future Conditions 1
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Proposed Road														
1	L2	34	5.0	36	5.0	0.027	5.3	LOS A	0.1	0.8	0.30	0.53	0.30	48.8
2	T1	9	5.0	9	5.0	0.792	40.2	LOS E	4.0	29.0	0.96	1.29	2.06	30.6
3	R2	128	5.0	135	5.0	0.792	46.2	LOS E	4.0	29.0	0.96	1.29	2.06	31.7
Approach		171	5.0	180	5.0	0.792	37.7	LOS E	4.0	29.0	0.83	1.14	1.71	34.0
East: Levi Road														
4	L2	12	5.0	13	5.0	0.132	10.2	LOS B	0.3	1.9	0.12	0.05	0.12	52.7
5	T1	202	10.0	213	10.0	0.132	0.6	LOS A	0.3	1.9	0.12	0.05	0.12	58.5
6	R2	7	5.0	7	5.0	0.132	12.7	LOS B	0.3	1.9	0.12	0.05	0.12	52.5
Approach		221	9.6	233	9.6	0.132	1.5	NA	0.3	1.9	0.12	0.05	0.12	58.0
North: Ruby Road														
7	L2	45	5.0	47	5.0	0.171	10.5	LOS B	0.5	4.0	0.77	0.89	0.77	44.3
8	T1	2	5.0	2	5.0	0.171	17.9	LOS C	0.5	4.0	0.77	0.89	0.77	41.9
9	R2	12	5.0	13	5.0	0.171	24.3	LOS C	0.5	4.0	0.77	0.89	0.77	44.1
Approach		59	5.0	62	5.0	0.171	13.5	LOS B	0.5	4.0	0.77	0.89	0.77	44.2
West: Levi Road														
10	L2	28	5.0	29	5.0	0.491	6.8	LOS A	0.8	6.4	0.08	0.05	0.09	53.3
11	T1	803	10.0	845	10.0	0.491	0.2	LOS A	0.8	6.4	0.08	0.05	0.09	59.2
12	R2	45	5.0	47	5.0	0.491	7.2	LOS A	0.8	6.4	0.08	0.05	0.09	53.2
Approach		876	9.6	922	9.6	0.491	0.7	NA	0.8	6.4	0.08	0.05	0.09	58.6
All Vehicles		1327	8.8	1397	8.8	0.792	6.2	NA	4.0	29.0	0.21	0.23	0.33	52.8

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

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.

MOVEMENT SUMMARY

Site: 101 [Branthwaite Extension 2028 PM (Site Folder: General)]

Branthwaite Extension
Site Category: Future Conditions 1
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Lincoln Rolleston (North-West bound)														
1	L2	135	5.0	142	5.0	0.274	5.7	LOS A	0.0	0.0	0.00	0.17	0.00	56.5
2	T1	338	10.0	356	10.0	0.274	0.1	LOS A	0.0	0.0	0.00	0.17	0.00	58.3
3	R2	40	5.0	42	5.0	0.036	7.2	LOS A	0.2	1.1	0.46	0.62	0.46	48.7
Approach		513	8.3	540	8.3	0.274	2.1	NA	0.2	1.1	0.04	0.20	0.04	56.9
East: Branthwaite Extension														
4	L2	21	5.0	22	5.0	0.186	6.4	LOS A	0.6	4.5	0.71	0.81	0.71	42.3
5	T1	5	5.0	5	5.0	0.186	24.6	LOS C	0.6	4.5	0.71	0.81	0.71	40.3
6	R2	21	5.0	22	5.0	0.186	26.6	LOS D	0.6	4.5	0.71	0.81	0.71	42.4
Approach		47	5.0	49	5.0	0.186	17.3	LOS C	0.6	4.5	0.71	0.81	0.71	42.1
North: Lincoln Rolleston (south-east bound)														
7	L2	40	5.0	42	5.0	0.218	5.7	LOS A	0.0	0.0	0.00	0.06	0.00	57.5
8	T1	336	10.0	354	10.0	0.218	0.1	LOS A	0.0	0.0	0.00	0.06	0.00	59.3
9	R2	135	5.0	142	5.0	0.140	8.0	LOS A	0.6	4.4	0.54	0.72	0.54	48.4
Approach		511	8.3	538	8.3	0.218	2.6	NA	0.6	4.4	0.14	0.24	0.14	55.8
West: Branthwaite														
10	L2	55	5.0	58	5.0	0.484	11.9	LOS B	2.3	16.7	0.77	1.01	1.17	39.2
11	T1	12	5.0	13	5.0	0.484	29.2	LOS D	2.3	16.7	0.77	1.01	1.17	37.5
12	R2	55	5.0	58	5.0	0.484	35.2	LOS E	2.3	16.7	0.77	1.01	1.17	39.3
Approach		122	5.0	128	5.0	0.484	24.1	LOS C	2.3	16.7	0.77	1.01	1.17	39.1
All Vehicles		1193	7.8	1256	7.8	0.484	5.2	NA	2.3	16.7	0.18	0.33	0.22	53.3

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

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.

MOVEMENT SUMMARY

Site: 101v [Broadlands Extension 2028 PM (Site Folder: General)]

Broadlands
Site Category: Future Conditions 1
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Lincoln Rolleston (North-west bound)														
1	L2	106	5.0	112	5.0	0.423	4.9	LOS A	3.4	25.8	0.45	0.51	0.45	49.7
2	T1	344	10.0	362	10.0	0.423	5.2	LOS A	3.4	25.8	0.45	0.51	0.45	54.4
3	R2	43	5.0	45	5.0	0.423	9.8	LOS A	3.4	25.8	0.45	0.51	0.45	51.0
Approach		493	8.5	519	8.5	0.423	5.5	LOS A	3.4	25.8	0.45	0.51	0.45	53.0
East: Broadlands Extension														
4	L2	25	5.0	26	5.0	0.081	7.1	LOS A	0.5	3.6	0.70	0.69	0.70	47.6
5	T1	11	5.0	12	5.0	0.081	7.0	LOS A	0.5	3.6	0.70	0.69	0.70	45.6
6	R2	20	5.0	21	5.0	0.081	11.5	LOS B	0.5	3.6	0.70	0.69	0.70	48.4
Approach		56	5.0	59	5.0	0.081	8.6	LOS A	0.5	3.6	0.70	0.69	0.70	47.5
North: Lincoln Rolleston (South-east bound)														
7	L2	53	5.0	56	5.0	0.474	4.7	LOS A	4.2	31.7	0.43	0.49	0.43	49.6
8	T1	443	10.0	466	10.0	0.474	5.0	LOS A	4.2	31.7	0.43	0.49	0.43	54.2
9	R2	86	5.0	91	5.0	0.474	9.6	LOS A	4.2	31.7	0.43	0.49	0.43	50.9
Approach		582	8.8	613	8.8	0.474	5.6	LOS A	4.2	31.7	0.43	0.49	0.43	53.3
West: Broadlands Road														
10	L2	37	5.0	39	5.0	0.105	5.8	LOS A	0.6	4.6	0.62	0.65	0.62	48.3
11	T1	17	5.0	18	5.0	0.105	5.7	LOS A	0.6	4.6	0.62	0.65	0.62	46.3
12	R2	30	5.0	32	5.0	0.105	10.2	LOS B	0.6	4.6	0.62	0.65	0.62	49.2
Approach		84	5.0	88	5.0	0.105	7.4	LOS A	0.6	4.6	0.62	0.65	0.62	48.2
All Vehicles		1215	8.2	1279	8.2	0.474	5.8	LOS A	4.2	31.7	0.46	0.52	0.46	52.5

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

Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
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.

MOVEMENT SUMMARY

Site: 101 [Levi Ruby Rd Extension 2028 PM (Site Folder: General)]

Levi Ruby Rd Extension 2028
Site Category: Future Conditions 1
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Proposed Road														
1	L2	54	5.0	57	5.0	0.315	11.4	LOS B	1.0	7.4	0.76	0.90	0.82	42.4
2	T1	4	5.0	4	5.0	0.315	31.8	LOS D	1.0	7.4	0.89	0.99	1.04	35.9
3	R2	26	5.0	27	5.0	0.315	39.6	LOS E	1.0	7.4	0.89	0.99	1.04	37.5
Approach		84	5.0	88	5.0	0.315	21.1	LOS C	1.0	7.4	0.81	0.94	0.90	40.4
East: Levi Road														
4	L2	96	5.0	101	5.0	0.526	7.2	LOS A	1.4	10.4	0.12	0.08	0.18	52.7
5	T1	788	10.0	829	10.0	0.526	0.5	LOS A	1.4	10.4	0.12	0.08	0.18	58.5
6	R2	41	5.0	43	5.0	0.526	9.6	LOS A	1.4	10.4	0.12	0.08	0.18	52.5
Approach		925	9.3	974	9.3	0.526	1.6	NA	1.4	10.4	0.12	0.08	0.18	57.5
North: Ruby Road														
7	L2	13	5.0	14	5.0	0.271	8.8	LOS A	0.8	6.1	0.84	0.93	0.95	37.5
8	T1	2	5.0	2	5.0	0.271	34.3	LOS D	0.8	6.1	0.84	0.93	0.95	35.8
9	R2	26	5.0	27	5.0	0.271	37.8	LOS E	0.8	6.1	0.84	0.93	0.95	37.4
Approach		41	5.0	43	5.0	0.271	28.4	LOS D	0.8	6.1	0.84	0.93	0.95	37.3
West: Levi Road														
10	L2	20	5.0	21	5.0	0.332	15.1	LOS C	2.1	15.6	0.38	0.10	0.50	50.2
11	T1	392	10.0	413	10.0	0.332	3.2	LOS A	2.1	15.6	0.38	0.10	0.50	55.4
12	R2	47	5.0	49	5.0	0.332	15.9	LOS C	2.1	15.6	0.38	0.10	0.50	50.2
Approach		459	9.3	483	9.3	0.332	5.0	NA	2.1	15.6	0.38	0.10	0.50	54.6
All Vehicles		1509	8.9	1588	8.9	0.526	4.4	NA	2.1	15.6	0.26	0.16	0.33	54.5

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

Queue Model: SIDRA Standard.

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

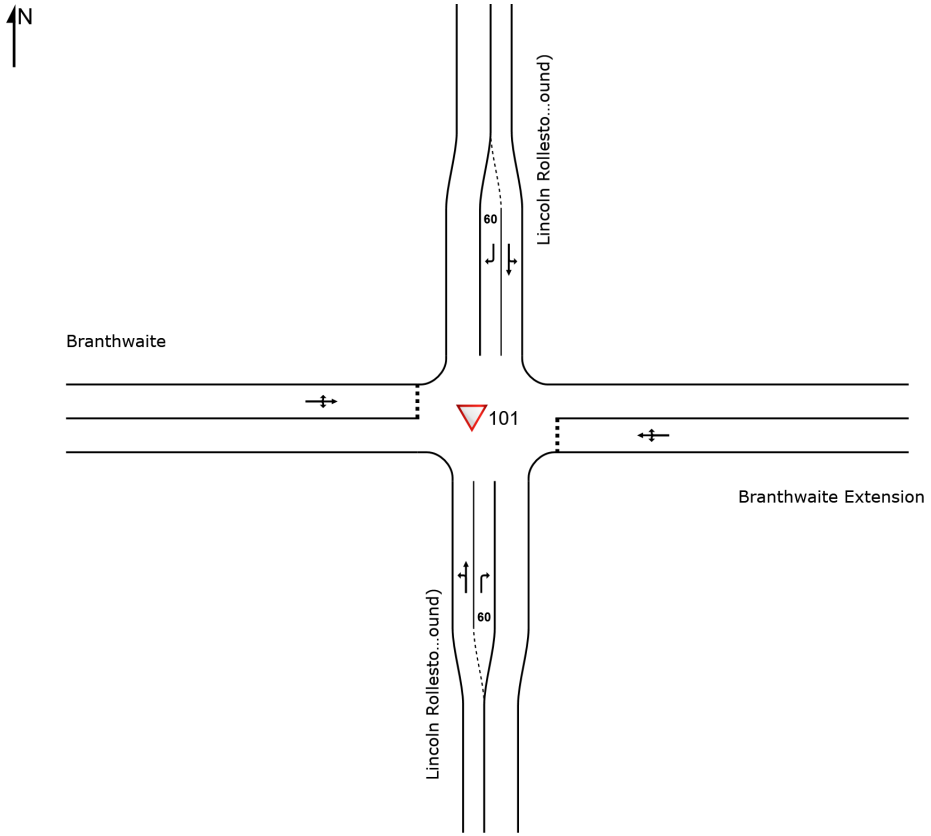
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SITE LAYOUT

Site: 101 [Branthwaite Extension 2028 AM (Site Folder: General)]

Branthwaite Extension
Site Category: Future Conditions 1
Give-Way (Two-Way)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.

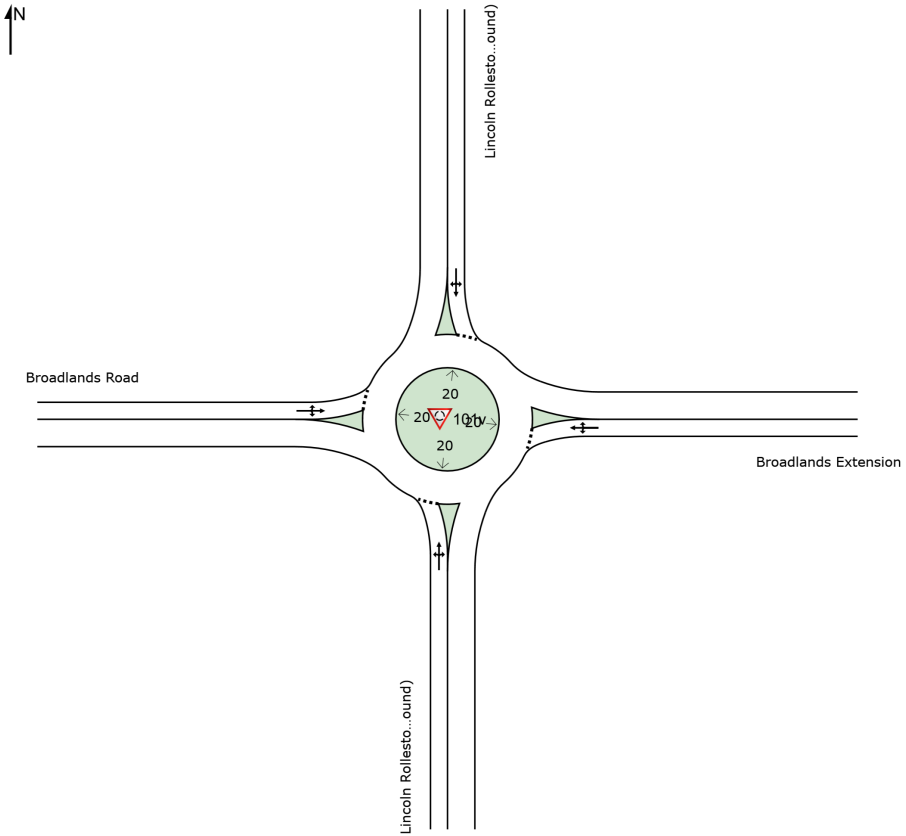


SITE LAYOUT

Site: 101v [Broadlands Extension 2028- AM (Site Folder: General)]

Broadlands
Site Category: Future Conditions 1
Roundabout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.

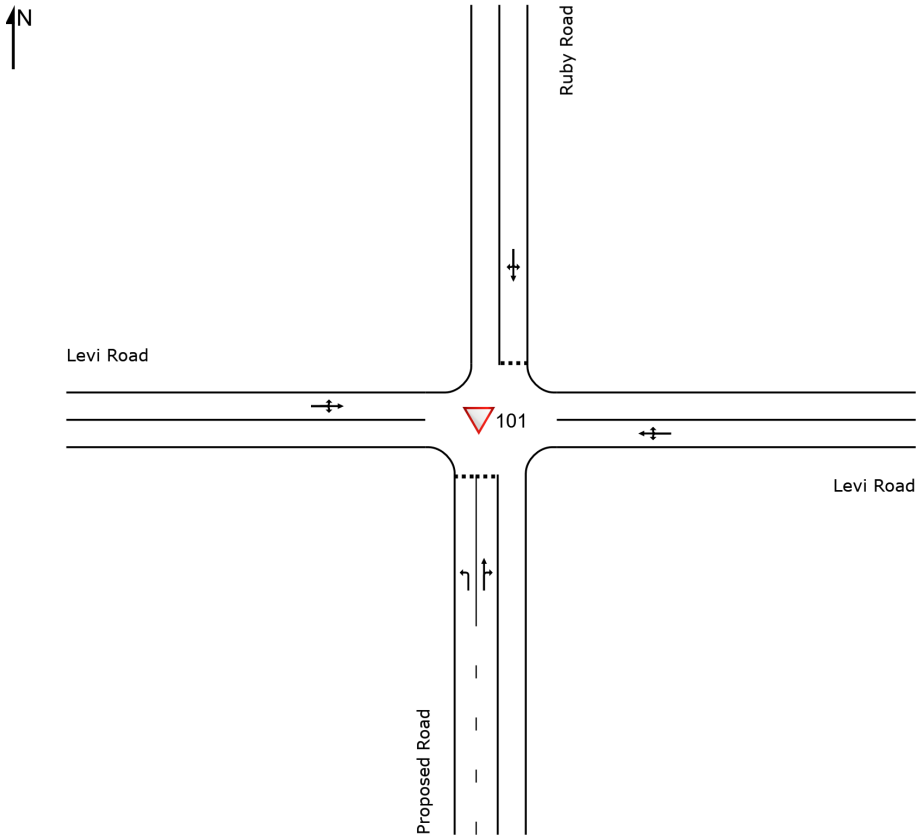


SITE LAYOUT

Site: 101 [Levi Ruby Rd Extension 2028 - AM (Site Folder: General)]

Levi Ruby Rd Extension 2028
Site Category: Future Conditions 1
Give-Way (Two-Way)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



Appendix 5

District Plan Objectives and Policies

Operative District Plan Provision	Comment / Assessment
Objective B2.1.1 *An integrated approach to land use and transport planning to ensure the safe and efficient operation of the District's roads, pathways, railway lines and airfields is not compromised by adverse effects from activities on surrounding land or by residential growth.*	The assessment concludes the proposed road and shared paths will provide for safe and convenience connections and the proposed development can be appropriately integrated into the existing transport network
Objective B2.1.2 *An integrated approach to land use and transport planning to manage and minimise adverse effects of transport networks on adjoining land uses, and to avoid "reverse sensitivity" effects on the operation of transport networks.*	
Objective B2.1.3 *Future road networks and transport corridors are designed, located and protected, to promote transport choice and provide for: a range of sustainable transport modes; and alternatives to road movement of freight such as rail.*	The assessment above outlines that the site is well located for travel by private vehicle, public transport, walking and cycling.
Policy B2.1.2 *Manage effects of activities on the safe and efficient operation of the District's existing and planned road network, considering the classification and function of each road in the hierarchy.*	The proposed development and occupation of dwellings / generation of traffic, will be co-ordinated with the proposed upgrades through subdivision and CSM2 upgrades will be completed well before development occurs, additional local upgrades on the wider road network outlined in the assessment are scheduled prior to 2028 and will be available to provide sufficient capacity
Policy B2.1.4(a) *Ensure all sites, allotments or properties have legal access to a legal road which is formed to the standard necessary to meet the needs of the activity considering:* *the number and type of vehicle movements generated by the activity;* *the road classification and function; and* *any pedestrian, cycle, public transport or other access required by the activity.*	The assessment above does not identify any constraints in achieving this.
Policy B2.1.5 *Ensure the development of new roads is:* *integrated with existing and future transport networks and landuses; and* *is designed and located to maximise permeability and accessibility;* *through achieving a high level of connectivity within and through new developments to encourage use of public and active transport; whilst having regard to the road hierarchy.*	The assessment above concludes that the proposal can be well integrated with the existing and future transport network. The proposal includes direct links for active modes towards the Rolleston Town Centre, to the existing shared path on Lincoln Rolleston Road and to existing public transport routes and key landuse destinations (such as schools via the future Broadlands Drive connection). The site is in close proximity to existing public transport routes.
Policy B2.1.12 *Address the impact of new residential or business activities on both the local roads around the site and the District's road network, particularly Arterial Road links with Christchurch City.*	The assessment above concludes that the proposal can be readily accommodated in this respect.

Policy B2.1.13 *Minimise the effects of increasing transport demand associated with areas identified for urban growth by promoting efficient and consolidated land use patterns that will reduce the demand for transport.*	The assessment of effects above outlines that the site is well located in this respect.
Policy B2.1.14 *Encourage people to walk or cycle within and between townships by providing a choice of routes for active transport modes and ensuring there is supporting infrastructure such as parking for cycles, at destinations.*	As outlined above the site is close to the town centre and the existing shared path between Lincoln and Rolleston.
Policy B2.1.15 *Require pedestrian and cycle links in new and redeveloped residential or business areas, where such links are likely to provide a safe, attractive and accessible alternative route for pedestrians and cyclists, to surrounding residential areas, business or community facilities*	Shared Paths are proposed on the Branthwaite Drive and Broadlands Drive extensions connecting to the existing facilities.
Policy B4.2.10 *Ensure that new residential blocks are small in scale, easily navigable and convenient to public transport services and community infrastructure such as schools, shops, sports fields and medical facilities, particularly for pedestrians and cyclists.*	The primary roads provide an appropriate structure for a subdivision layout of the local roads and pedestrian connections to accommodate this.
Objective B4.3.4 *New areas for residential or business development support the timely, efficient and integrated provision of infrastructure, including appropriate transport and movement networks through a coordinated and phased development approach*	As outlined above the timing of future roads and development is and can be well co-ordinated.
Policy B4.3.8 *Each Outline Development Plan shall include:* *Principal through roads, connection and integration with the surrounding road networks, relevant infrastructure services and areas for possible future development;* *…..* *Indicate how required infrastructure will be provided and how it will be funded;* *……* *Demonstrate how effective provision is made for a range of transport options, including public transport systems, pedestrian walkways and cycleways, both within and adjoining the ODP area;* *Show how other potential adverse effects on and/or from nearby existing or designated strategic infrastructure (including requirements for designations, or planned infrastructure) will be avoided, remedied or appropriately mitigated;* *…..*	These matters are achieved and addressed in the assessment of effects above.

Proposed District Plan Provision	Comment / Assessment
TRAN-O1 People and places are connected through safe, efficient, and convenient land transport corridors and land transport infrastructure which is well integrated with land use activities and subdivision development.	The assessment concludes the proposed road and shared paths will provide for safe and convenience connections and the proposed development can be appropriately integrated into the existing transport network
TRAN-O2 Land transport corridors and land transport infrastructure are protected from incompatible land use activities and subdivision development.	The assessment above concluded the site is suitable for the proposed landuse and associated traffic generation
TRAN-O3 Land transport corridors and land transport infrastructure support the needs of people and freight, while ensuring adverse effects on the surrounding environment from their establishment and operation are managed.	The assessment above concludes this can be achieved.
TRAN-P1 The safety and efficiency of the District's land transport network and systems are enabled through integrated land use and subdivision development that: *Manages the levels of service, formation standards and the types of land transport corridors and land transport infrastructure, including through the network road classifications and compliance with the design and operational standards;* *Provides land transport infrastructure that is consistent with the form, function, and character of each zone;* *Ensures there is enough space within land transport corridors to support the efficient and effective operation of network utilities;* *Provides for the safe and efficient movement and operation of emergency services; and* *Recognises cross-boundary connections with adjoining districts.*	The assessment above outlines that appropriate priority has been given to road classifications and the proposed roads can be developed in accordance with the standard design. The proposed road structure is consistent with and specifically designed to cater for residential landuse. The proposed road layout will provide good access for emergency services. The proposed site is appropriately located to utilise existing Arterial and SH1 connections to Christchurch District.
TRAN-P2 Manage any extensions to the District's land transport network to ensure it occurs in an integrated way by: *Co-coordinating the timing of land use activities and subdivision development with the availability of capacity in land transport corridors;* *Providing a range of travel modes and ensuring these are integrated, including between walking, cycling, public transport, freight and private vehicle modes; and* *Ensuring land use activities and subdivision development do not foreclose on the opportunity for land transport corridors to meet future land transport needs.*	The proposed development and occupation of dwellings / generation of traffic, will be co-ordinated with the proposed upgrades through subdivision and CSM2 upgrades will be completed well before development occurs, additional local upgrades on the wider road network outlined in the assessment are scheduled prior to 2028 and will be available to provide sufficient capacity. The assessment above includes considerations of travel by all modes. The proposed road layout has been specifically designed for connection to future reserve land and a future road connection between Weedons Road and Lincoln Rolleston Road as indicated on the Rolleston Structure Plan.
TRAN-P5 Promote a range of transport options to reduce the number of trips and distances travelled in private motor vehicles by: *Encouraging land use activities and subdivision development to include connected walking and cycling networks and access to public transport and public transport facilities, including within and between townships; and* *Managing the design, layout and function of new land transport infrastructure to ensure they integrate with existing and future land transport corridors.*	The proposal includes direct links for active modes towards the Rolleston Town Centre, to the existing shared path on Lincoln Rolleston Road and to existing public transport routes and key landuse destinations (such as schools via the future Broadlands Drive connection).

	As outlined above the proposal has been specifically designed to integrate with existing and future transport connections.
TRAN-P6 Enable safe, multi-modal connections that support walking, cycling, and access to public transport and public transport facilities through land use activities and subdivision development that: *Establish levels of service and multi-modal transport options based on the network road classifications, including the provision of strategic level walking and cycling connections where they are identified in Development Plans or ODP;* *Encourage residential blocks to be small, navigable and convenient to move around through legible, convenient and attractive walking and cycling routes to public transport facilities and between residential areas, business centres, community facilities, recreation space and local services;* *Manage the number and design of cul de sacs, rear lots and accessways;* *Provide for the interaction between vehicle access and manoeuvring, loading and parking areas when determining on-site pedestrian and cycling routes; and* *Align street layouts to maximise views and landscape features to promote attractive streets.*	The assessment above concludes that the proposal appropriately provides for connections for all modes.
TRAN-P7 Recognise and protect the function of the District's land transport network and systems by managing land use activities and subdivision development to ensure the safe and efficient movement of people and goods by: *Managing adverse effects from activities on land transport corridors and land transport infrastructure, particularly where it may reduce safe and efficient traffic flows within the strategic transport network and links with Christchurch City;* *Ensuring land transport corridors and land transport infrastructure can support the volume and type of transport movements based on the network road classifications; and* *Requiring the design, positioning, and maintenance of accessways, corner splays, vehicle crossings, intersections, footpaths, plantings, and signs to ensure appropriate sightline visibility is provided to road users to support safe and efficient vehicle, pedestrian, and cycle movements.*	The assessment above concludes that the site is appropriately location in respect of road connections to Chch, the volume of traffic anticipated, and road function.

25 January 2021

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Aston Consultants
Attention: Fiona Aston

By email: Fiona@astonconsultants.co.nz

PLAN CHANGE 71 ROLLESTON TRANSPORT RFI RESPONSE:

1. Please find below a response to the transport matters raised in the RFI response from Selwyn District Council in respect of Plan Change 71 in Rolleston. Each matter has been responded to in turn.

The Application refers to Council undertaking an upgrade of the Levi/Lowes/Masefield Dr/Lincoln Rolleston Rd intersection. This is proposed for 2025/26 In the Draft Long Term Plan. While I originally envisaged a roundabout, recent work undertaken with the SH1/Rolleston Access Business Case with the NZTA suggested traffic signals, with this PC and likely development and more pedestrians cyclists in the area this would add weight to this. LTP funding should cover either decision but if this PC was approved it would likely cement traffic signals relating to the extra local traffic generated in the area.

2. Noted, we support the adoption of traffic signals at this intersection.

The alteration of original ODP 4 is really important to get that section of Broadlands Dr to line up across Lincoln Rolleston Road.

3. Agreed, it is understood that changes to this ODP are being sought through the District Plan Review to ensure the alignment of Broadlands Drive.

Note that a section of Broadlands Dr ext is still under the noise contours – I pushed back on that originally as that section would be on unzoned land and they could build it to a lesser standard, but if they build it to a full urban standard from the outset to service any future urban development inside the contour area if its lifted, then that's OK so we then don't have any inconsistencies of standard from the outset or asked to upgrade it later on if the contours get pulled back.

4. It is proposed that Broadlands Drive would be constructed to the Local Major Standards of the District Plan (being 16-20m legal, 8.5-9m carriageway) and footpath on at least one side and with provision for connection to the existing cycleway on Lincoln Rolleston Road.

I note a couple of LoS E issues with the Ruby Drive/new ODP road intersection etc on Levi Rd. As Levi Rd is the main arterial route from the Weedons Interchange it is important that this route is still effective. I would like to query what more could be considered here.

5. This relates to the through and right turn volumes from the proposed Road, rather than relating to traffic on the Levi Road approaches. As such, the efficiency of Levi Road would not be affected. It is noted that LOS E is generally considered acceptable in peak hour conditions, it also affects only the proposed road with Levi Road and Ruby Road approaches all operating at LOS A-C.

6. A preliminary analysis suggested that providing additional lanes on the minor arms or median strips did not improve the performance of the right and through movements from the proposed road. A roundabout could be considered, although this would likely reduce efficiency for traffic on Levi Road and risk encouraging undesirable short-cutting through the Plan Change Area (i.e., avoiding the arterial route along Lincoln Rolleston Road, Levi Road).

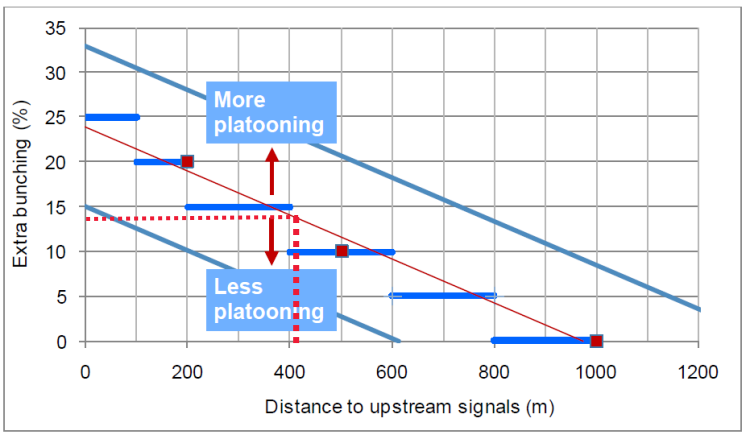
7. In terms of traffic flows, it is noted that a reasonably high proportion of traffic generated by the Plan Change area has been attributed to the Levi Road – Ruby Drive intersection (noting the direct link to the State highway). During the peak hours, a higher delay for right turning vehicles may result in some of that traffic, particularly from the southern end of the Plan Change area diverting via Broadlands Drive and using the proposed roundabout to turn onto Lincoln Rolleston Road and then the future signals to turn right from Lincoln Rolleston Road onto Levi Road. Noting there is ample capacity at the Broadlands Drive roundabout (refer to the SIDRA Results in the TA) this would be acceptable.

8. Regardless of the above, we have reassessed the capacity of the Levi Road / Ruby Drive / Proposed Road intersection in light of the proposed traffic signals at the Levi Road / Lincoln Rolleston Road / Lowes Road / Masefield Drive intersection. The traffic lights will result in some bunching of traffic (i.e., gaps in traffic will occur between signal phases), which will make it easier to turn at the Levi Road - Ruby Road intersection.

9. The Levi Road / Ruby Drive intersection is approximately 420m from the Lincoln Rolleston Road - Levi Road intersection and based on Table 5.2.1 of the Sidra Intersection User Guide a bunching factor of approximately 13% is appropriate.

Table 5.2.1 - A rough guide for specifying Extra Bunching when the Input option is selected

Distance to upstream signals (m)	< 100	100-200	200-400	400-600	600-800	> 800
(ft)	< 350	350-700	700-1300	1300-2000	2000-2600	> 2600
Extra bunching (%)	25	20	15	10	5	0



10. Once this is applied to the SIDRA Model the through and right turn movements are predicted to operate at LOS D[1] in the morning peak hour as shown in the movement summaries in **Attachment 1**. In the evening peak hour, the right turn movement remains at LOS E but with a delay of 35.9 seconds it is on the threshold with LOS D (being 25-35 seconds). There is a relatively small volume undertaking this right turn movement (26 vehicles per hour) and as outlined above there are alternative routes available if drivers find this delay to be unacceptable.

11. For these reasons we consider that the basic intersection layout shown in the TA and signalisation of the Levi Road, Lincoln Rolleston Road, Lowes Road, Masefield Drive intersection is the most preferable outcome.

On the ODP it shows these ped/cycle connections which is fine, but I would like to see these as also able to accommodate roading as well in case there is a need to service the District Park with say road extensions into it to for carparks etc. Maybe a "future transport link"?

12. It is agreed these should be amended to allow flexibility over the use of these links.

As per normally expected the frontages of Lincoln Rolleston Rd and Levi Road are to be upgraded to an urban standard as will be expecting direct lot access. Same with ODP4 to be consistent.

13. Noted / agreed.

14. We trust the above will address the transport related questions raised by Council, however, should you require any further clarification, please do not hesitate to contact me directly.

Yours sincerely,

Novo Group Limited

Lisa Williams

Transport Engineer / Planner

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[1] The operation is well within the LOS D range being 32.9 seconds delay (LOS D ranging from 25-35 seconds).

ATTACHMENT 1: SIDRA RESULTS – LEVI ROAD / RUBY ROAD INTERSECTION WITH BUNCHING

MOVEMENT SUMMARY

Site: 101 [Levi Ruby Rd Extension 2028 - AM - with Bunching (Site Folder: General)]

Levi Ruby Rd Extension 2028
Site Category: Future Conditions 1
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Proposed Road														
1	L2	34	5.0	36	5.0	0.027	5.3	LOS A	0.1	0.8	0.30	0.53	0.30	48.8
2	T1	9	5.0	9	5.0	0.669	27.9	LOS D	3.1	22.5	0.93	1.17	1.63	34.4
3	R2	128	5.0	135	5.0	0.669	32.9	LOS D	3.1	22.5	0.93	1.17	1.63	35.9
Approach		171	5.0	180	5.0	0.669	27.1	LOS D	3.1	22.5	0.80	1.04	1.36	37.8
East: Levi Road														
4	L2	12	5.0	13	5.0	0.130	9.8	LOS A	0.2	1.9	0.11	0.05	0.11	52.8
5	T1	202	10.0	213	10.0	0.130	0.6	LOS A	0.2	1.9	0.11	0.05	0.11	58.6
6	R2	7	5.0	7	5.0	0.130	12.2	LOS B	0.2	1.9	0.11	0.05	0.11	52.6
Approach		221	9.6	233	9.6	0.130	1.4	NA	0.2	1.9	0.11	0.05	0.11	58.0
North: Ruby Road														
7	L2	45	5.0	47	5.0	0.151	10.1	LOS B	0.5	3.8	0.73	0.87	0.73	44.8
8	T1	2	5.0	2	5.0	0.151	15.9	LOS C	0.5	3.8	0.73	0.87	0.73	42.4
9	R2	12	5.0	13	5.0	0.151	21.1	LOS C	0.5	3.8	0.73	0.87	0.73	44.6
Approach		59	5.0	62	5.0	0.151	12.5	LOS B	0.5	3.8	0.73	0.87	0.73	44.7
West: Levi Road														
10	L2	28	5.0	29	5.0	0.491	6.8	LOS A	0.8	6.0	0.07	0.05	0.07	53.3
11	T1	803	10.0	845	10.0	0.491	0.2	LOS A	0.8	6.0	0.07	0.05	0.07	59.2
12	R2	45	5.0	47	5.0	0.491	7.2	LOS A	0.8	6.0	0.07	0.05	0.07	53.3
Approach		876	9.6	922	9.6	0.491	0.7	NA	0.8	6.0	0.07	0.05	0.07	58.7
All Vehicles		1327	8.8	1397	8.8	0.669	4.8	NA	3.1	22.5	0.20	0.21	0.28	54.0

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

MOVEMENT SUMMARY

Site: 101 [Levi Ruby Rd Extension 2028 PM - With Bunching (Site Folder: General)]

Levi Ruby Rd Extension 2028
Site Category: Future Conditions 1
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Proposed Road														
1	L2	54	5.0	57	5.0	0.293	11.3	LOS B	1.0	7.0	0.76	0.90	0.82	42.6
2	T1	4	5.0	4	5.0	0.293	28.9	LOS D	1.0	7.0	0.87	0.98	1.01	37.0
3	R2	26	5.0	27	5.0	0.293	35.9	LOS E	1.0	7.0	0.87	0.98	1.01	38.7
Approach		84	5.0	88	5.0	0.293	19.7	LOS C	1.0	7.0	0.80	0.93	0.89	41.0
East: Levi Road														
4	L2	96	5.0	101	5.0	0.525	7.3	LOS A	1.5	11.4	0.13	0.08	0.18	52.7
5	T1	788	10.0	829	10.0	0.525	0.5	LOS A	1.5	11.4	0.13	0.08	0.18	58.5
6	R2	41	5.0	43	5.0	0.525	9.5	LOS A	1.5	11.4	0.13	0.08	0.18	52.4
Approach		925	9.3	974	9.3	0.525	1.6	NA	1.5	11.4	0.13	0.08	0.18	57.5
North: Ruby Road														
7	L2	13	5.0	14	5.0	0.246	8.0	LOS A	0.8	5.6	0.82	0.90	0.90	38.6
8	T1	2	5.0	2	5.0	0.246	31.0	LOS D	0.8	5.6	0.82	0.90	0.90	36.8
9	R2	26	5.0	27	5.0	0.246	34.2	LOS D	0.8	5.6	0.82	0.90	0.90	38.4
Approach		41	5.0	43	5.0	0.246	25.7	LOS D	0.8	5.6	0.82	0.90	0.90	38.4
West: Levi Road														
10	L2	20	5.0	21	5.0	0.332	15.1	LOS C	1.8	13.8	0.38	0.10	0.48	50.2
11	T1	392	10.0	413	10.0	0.332	3.1	LOS A	1.8	13.8	0.38	0.10	0.48	55.4
12	R2	47	5.0	49	5.0	0.332	15.9	LOS C	1.8	13.8	0.38	0.10	0.48	50.2
Approach		459	9.3	483	9.3	0.332	5.0	NA	1.8	13.8	0.38	0.10	0.48	54.6
All Vehicles		1509	8.9	1588	8.9	0.525	4.3	NA	1.8	13.8	0.26	0.16	0.33	54.7

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

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.
