novo group
Planning. Traffic. Development.

Integrated Transport Assessment

prepared for

HUGHES DEVELOPMENT LIMITED

160 Bangor Road, Darfield

3 July 2026

Integrated Transport Assessment

prepared for:

HUGHES DEVELOPMENT LIMITED

160 Bangor Road, Darfield

Novo Group Ltd
[redacted]
PO Box 365, Christchurch 8140
P: (03) 365 5570
E: info@novogroup.co.nz
W: www.novogroup.co.nz

Document Date:	3 July 2026
Document Version/Status:	REV 1 | FINAL
Project Reference:	0033067b
Project Manager:	Rhys Chesterman, Director and Traffic Engineer/Planner
Prepared by:	Rhys Chesterman, Director and Traffic Engineer/Planner Nick Fuller, Principal Transport Engineer Lisa Williams, Senior Transport Engineer

Executive Summary

Hughes Development Limited proposes to subdivide the site at 160 Bangor Road, Darfield, to create 741 residential Lots that will accommodate future residential dwellings, together with new roads, reserves, and supporting transport infrastructure (the Site) (the Project). The Site is located on the north-western edge of Darfield and is bounded by Bangor Road (SH77) and West Coast Road (SH73). Access is proposed from Bangor Road only, with no direct vehicle access to SH73.

a) The Project includes two new Bangor Road intersections, internal Collector and Local Roads, shared paths, footpaths, pedestrian links, reserves, and future connection opportunities to adjoining land, including towards Cridges Road.

b) This ITA considers the existing road network, crash history, walking and cycling provision, public transport availability, trip generation, Partially Operative Selwyn District Plan (District Plan) compliance, internal road layout, site access operation, construction effects, and wider network effects.

c) When complete, the Project is predicted to generate approximately 4,922 vehicle movements per day, including around 339 vehicle movements in the AM peak hour and 524 vehicle movements in the PM peak hour, based on locally surveyed residential trip rates for Darfield.

d) The proposed internal road network is considered suitable for the scale and nature of the Project . While several District Plan non-compliances have been identified, these largely arise because although the Site is zoned Large Lot Residential Zone (LLRZ), the majority of the Project has been generally designed to align with the rule requirements for the General Residential Zone (GRZ).

e) The proposed carriageway widths, corridor widths, intersection layouts, access arrangements, footpaths, shared paths, and future connection opportunities are considered appropriate for the anticipated residential traffic volumes and for supporting safe and efficient movement by vehicles, pedestrians and cyclists.

f) The eastern Bangor Road access, Road 1, is proposed as a four-leg intersection with Piako Drive and is expected to operate with no movement worse than Level of Service B, including under a 10% background traffic growth sensitivity test.

g) The western Bangor Road access, Road 5, is proposed as a T-intersection and is expected to operate with no movement worse than Level of Service A, including under the same sensitivity test.

h) The SH73 / SH77 intersection can accommodate development up to approximately 550 Lots before an upgrade or further assessment would be required. Beyond that point, an upgrade such as a roundabout, or another acceptable mitigation measure, should be required unless further assessment demonstrates that it is not necessary.

i) The Bangor Road / McLaughlins Road intersection is predicted to operate within capacity. However, a dedicated right-turn bay on Bangor Road is recommended before development exceeds 182 Lots to address existing observed driver behaviour and provide a safer right-turn waiting area.

j) The Project includes frontage upgrades on Bangor Road, including intersection-related widening, kerb and channel, lighting, drainage integration, and improved walking and cycling facilities.

k) A 2.5m wide shared path is proposed to connect the Site with Darfield township, including an upgraded route past Darfield High School. The internal network also provides shared paths, footpaths, links through cul-de-sac heads and a central reserve connection.

l) Public transport services in Darfield are currently limited, but the proposed internal road network could accommodate buses if services are expanded in the future.

Overall, the Project can be safely and efficiently integrated with Bangor Road and the wider transport network subject to the recommended design, staging, detailed design, and construction traffic

management measures. The internal network is fit-for-purpose for the anticipated residential development, appropriate active mode connections are provided and any wider network upgrades can be managed through suitable consent conditions. On this basis, the transport effects of the Project are considered **acceptable** and **less than minor**.

Table of Contents

List of Figures and Tables

Appendices

Introduction

1. Hughes Development Limited has commissioned Novo Group to prepare an Integrated Transport Assessment (ITA) for the development of 741 residential lots and supporting amenities and infrastructure on the Site at 160 Bangor Road, Darfield.

2. This report provides an assessment of the transport aspects of the Project. It also describes the transport environment in the vicinity of the Site, the transport related components of the Project, and identifies the extent of compliance achieved by the Project with the transport provisions in the District Plan. It has been prepared broadly in accordance with the Integrated Transportation Assessment Guidelines specified in New Zealand Transport Agency Research report 422, November 2010. The authors experience and qualifications are set out in **Appendix 1**.

3. The Site comprises approximately 130.4ha and is located on the northwestern periphery of Darfield. The Site is bounded by West Coast Road (State Highway 73) and Bangor Road (State Highway 77).

4. The Project involves subdividing the Site into 741 residential lots which will each accommodate a single dwelling. It also includes the construction of new roads and reserves to be vested in Council, with two new intersections onto Bangor Road and additional roads providing internal access, circulation, and future connections to adjoining land. The Project is expected to generate around 4,922 vehicle trips per day, including 339 – 524 trips during peak hours.

5. The location of the Site is shown in **Figure 1** and a copy of the proposed subdivision layout is provided in **Appendix 2**.

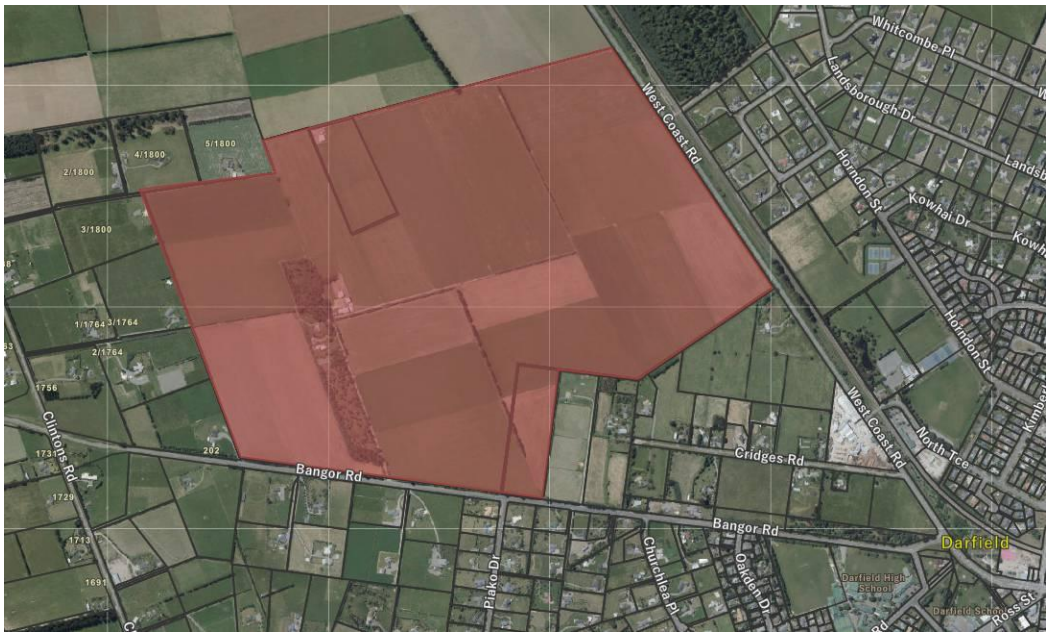


Figure 1: Site Location (Canterbury Maps).

6. The Site is currently zoned LLRZ in the District Plan and is subject to the Darfield DEV-DA3 Development Area as shown in **Figure 2**.

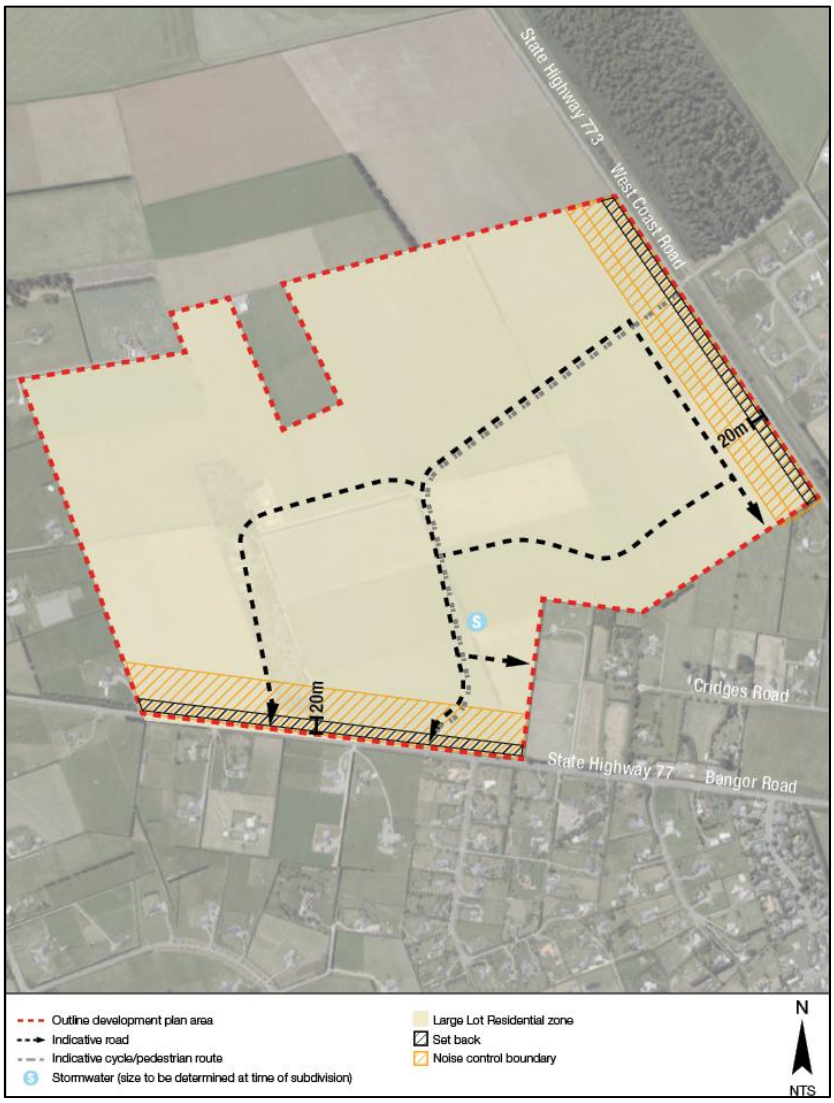


Figure 2: Darfield DEV-DA3 Development Area (Partially Operative Selwyn District Plan)

7. The relevant Access and Transport narrative for DEV-DA3 includes:

> *The roading hierarchy within the area is intended to remain at the local road level, given the number of potential private sites and the resulting traffic demand. The roading pattern shown on the ODP includes the primary roading only and it is anticipated that additional roading will be required at subdivision design stage. When considering a subdivision layout, rear sections should be avoided where possible.*
>
> *No direct access from the area shall be made to State Highway 73, with all vehicle based traffic directed through either roading links to Bangor Road, or through a potential future roading connection on State Highway 73 to the south of the area. No direct access shall be made to Bangor Road from the area west of the second access on State Highway 77, with all vehicle based traffic being directed to the internal roading network.*
>
> *…consideration should be given to a dedicated off-road pedestrian/cycleway path to connect from Bangor Road through to a non-vehicular link to State Highway 73 approximately opposite Horndon Street, to provide a loop track for Darfield.*

8. The Project provides for a higher density of development than anticipated under DEV-DA3 for the LLRZ and therefore requires a more robust approach to road design and access. As shown

in the subdivision layout below, the two main road connections to Bangor Road are retained. Consistent with DEV-DA3 and NZTA principles, no access is proposed to SH73.

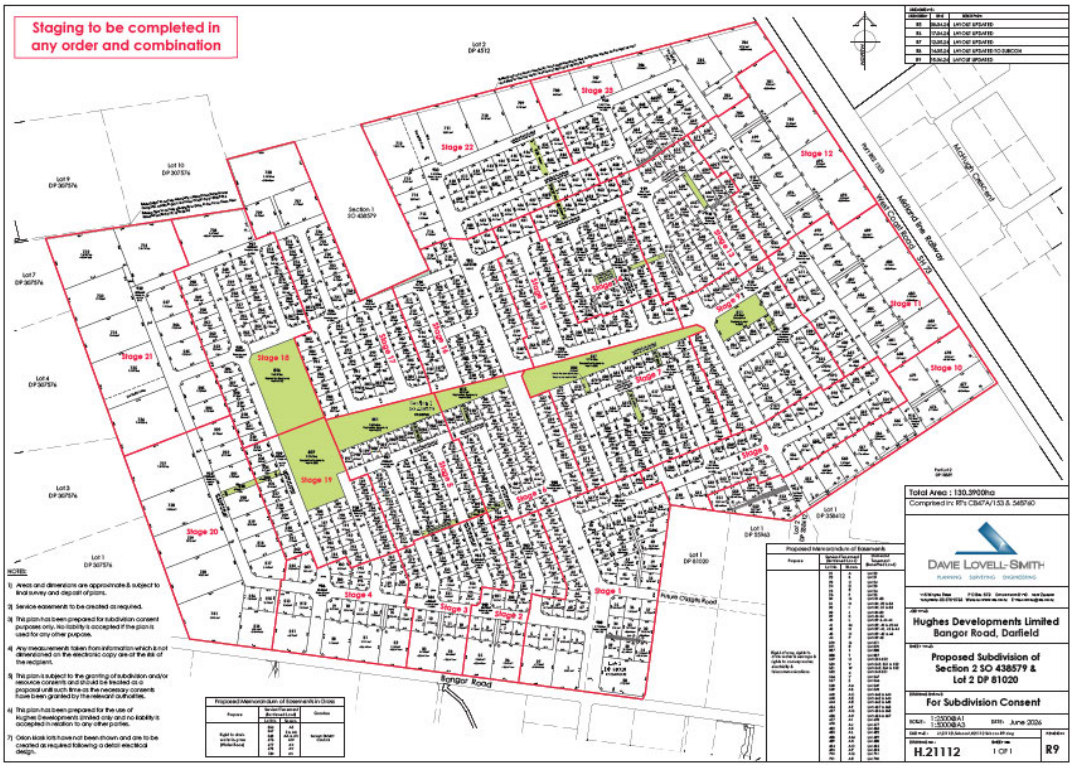


Figure 3: Proposed Subdivision Layout [Source: Davie Lovell-Smith]

9. This report assesses the transport-related aspects of the proposal and is structured as follows:

- **Transport Network:** This sets out the context of the current transport network surrounding the Site and the key corridors to get to / from the wider transport network;
- **The Project:** Sets out the transport aspects of the Project and anticipated activities;
- **District Plan Compliance:** Reviews the proposed subdivision against the transport requirements of the District Plan;
- **Assessment of Transport Effects:** Discusses the transport effects of the proposed activity; and
- **Summary & Conclusions:** Draws together the key findings of this assessment.

Transport Environment

Existing Road Network

Site Frontage Road Summaries

10. The Site fronts West Coast Road (SH73) and Bangor Road (SH77), with direct access provided to Bangor Road only and including a new road intersection opposite Piako Drive. The key characteristics of these roads are summarised in **Table 1** below.

Table 1: Summary of the Frontage Road Characteristics.

Key Feature	Bangor Road (SH77)	West Coast Road (SH73)	Piako Drive
Road Classification	State Highway	State Highway	Local, Cul-de-sac
Cross-Section Description	24m corridor width ~7.0m carriageway (3.5m lane in each direction, measured edge-line to edge-line) ~1.0m sealed shoulder	60m corridor width (including the adjacent Rail corridor) ~7.0m carriageway (3.5m lane in each direction, measured edge-line to edge-line) ~1.0m sealed shoulder	20m corridor width ~6.5m carriageway with flush grass shoulders (no kerb and channel; edge-line markings near the Bangor Road intersection).
Traffic Volumes	~4,000vpd (5 day average, counted March 2026)	~3,900vpd (Mobile Road, west of SH77 intersection) ~5,900vpd (Mobile Road, Township/east of SH77 intersection)	~180vpd (5 day average, counted March 2026)
Speed	80km/h at Piako Drive 100km/h futher west of Piako Drive 50/30km/h (from 31 May 2026) east of Oakden Drive and outside High School.	100 km/h past the application site 50km/h through the Darfield township	50km/h
Cycling Infrastructure	Nil	Nil	Nil
Pedestrian Infrastructure	~1.5m footpath is provided on the southern (opposite) side of Bangor Road from the Darfield Township to Piako Drive.	Nil	No footpaths are provided along Piako Drive however a shared path is provided from the southern cul de sac head through to Stott Drive.
Public Transport	None available	The wider Darfield area is serviced by the Metro 86 route, which provides connections to West Melton and through to the Christchurch City Centre. This route offers one bus departure in the morning and one return trip in the evening, on weekdays only, and operates as an express service with limited stops. (see **Figure 10** for bus stop locations)	None available

State Highway Traffic Volumes

11. Annual Average Daily Traffic volume (AADT) data from the NZ Transport Agency for SH77 and SH73 is presented in **Figure 4**. This data indicates that traffic volumes on these roads have been trending downwards since 2020. The volumes on SH73 (east of SH77) have reduced from 6,219 to 5,869 vehicles per day (6% reduction) and the volumes on SH77 (west of SH73) have reduced from 3,158 to 2,529 vehicles per day (20% reduction).

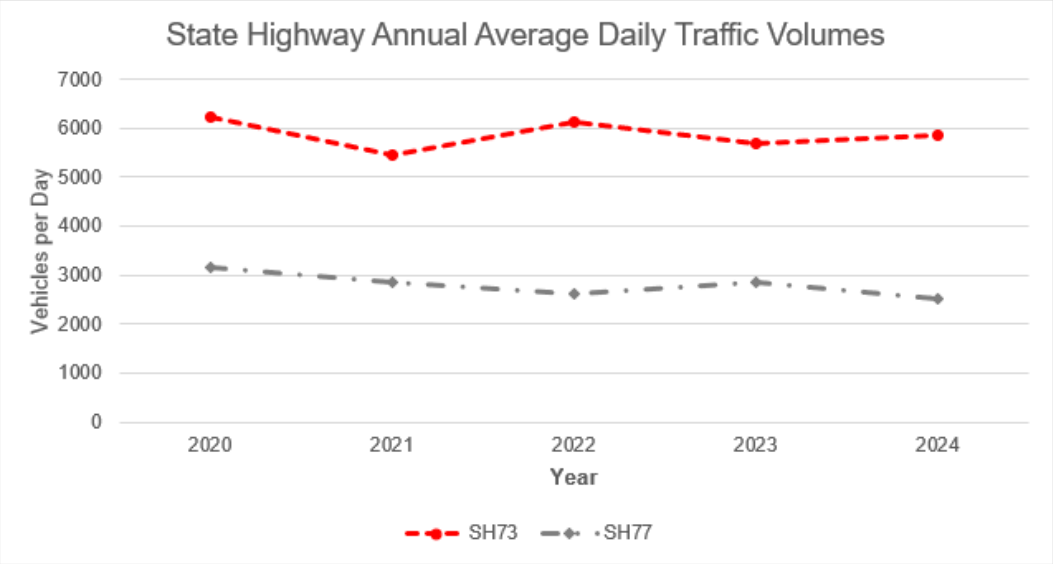


Figure 4: State Highway AADT Information

12. The traffic volumes on these roads will be further discussed in **paragraph 19**.

Other Roads Nearby

13. The nearest road to the west of the Site is Clintons Road and the details of this road are set out further below.

14. Development Area Plan DEV-DA3 also makes provision for future connections towards Cridges Road, which already has an intersection with SH73. This road is to the east of the Site and is again addressed in further detail below.

15. McLaughlins Road also connects with Bangor Road/SH77 at the eastern (township) end. Most notably, this passes Darfield High School and also provides linkages with other parts of Darfield south, mainly via Greendale Road.

16. The key characteristics of the above roads are summarised in **Table 2** below.

Table 2: Summary of Other Nearby Roads

Key Feature	Clintons Road	Cridges Road	McLaughlins Road
Road Classification	Local Road	Local (Currently with an informal cul-de-sac head)	Collector
Cross-Section Description	20 corridor width ~6m sealed carriageway with no centreline, except on the approach to SH77 Flush grass berms (no kerb and channel).	20m corridor width ~5.5m sealed carriageway with no centreline, except on the approach to SH73 Flush grass berms (no kerb and channel).	20m corridor width ~12-14m wide sealed carriageway with kerb and channel. One traffic lane in each direction and kerb-side parking (notably outside and near the school), No stopping around intersections.
Traffic Volumes	<100vpd north of SH77 <250vpd south of SH77 (Mobile Road Estimate 2025).	<100vpd (Mobile Road estimate 2025).	1,800vpd outside High School (Mobile Road estimate 2025)
Speed	100km/h	50km/h	50 Km/h between Bangor Road and the 60km/h transition located 70m west of Scott Drive which extends for approximately 500m then increases to 100km/h. 30km/h variable school speed limit applies at the northern (High School) end.
Cycling Infrastructure	Nil	Nil	Nil
Pedestrian Infrastructure	Nil	Nil	A footpath on both sides of McLaughlins Road between Cressy Place and High School. A footpath on the western (school) side of McLaughlins Road from the school to Bangor Road. The footpath on the eastern side continues adjacent the Trinity Church site to SH73 and the Darfield township. A footpath on the northern side only between Cressy Place and Stott Drive. (There are no connecting footpaths on Stott Drive)
Public Transport	None available	None available	None available (11 School Bus Parking Bays provided on the school site, opposite Avoca Place)

Existing Intersections

17. Several key intersections are located near the Site, including Bangor Road / West Coast Road, McLaughlins Road / Bangor Road, Piako Drive / Bangor Road, and Clintons Road / Bangor Road.

Bangor Road / West Coast Road Intersection

18. The Bangor Road / West Coast Road intersection is a stop-controlled T-intersection featuring a right-turn bay and left-turn slip lane on West Coast Road, together with left- and right-turn lanes and a median island on Bangor Road, as shown below in **Figure 5**.

Figure 5: West Coast Road (SH73) and Bangor Road (SH77) Intersection (Source: Canterbury Maps).

19. Turning counts were undertaken at the SH73 / SH77 intersection on 26 March 2026 from 07:00 to 09:00 and 16:00 to 18:00. The peak hours within the surveys were identified as 08:00 to 09:00 and 16:30 to 17:30, with the traffic volumes illustrated diagrammatically in **Appendix 3**.

20. A SIDRA model has been created of the SH73 / SH77 intersection based on the surveyed traffic volumes, observed delays and the existing intersection geometry. The default SIDRA parameters have typically been adopted, with the exception of the gap acceptance as the delays in the initial model runs did not match those observed for the AM peak hour.

21. The 'two-way sign control' calibration has been turned off and the gap acceptance and follow-up headway values set out in **Table 3** have been adopted to better match the observed delays. **Table 3** also sets out the values recommended in default values in the SIDRA manual, which indicates the adopted values are generally consistent with the default values, although the operation of the right turn out of Bangor Road has been worsened to better match the observed conditions. Although not required to calibrate the PM peak hour model, the adopted values have been included in the AM and PM peak hour models to provide a consistent, robust basis for assessment.

Table 3: Gap Acceptance & Follow-Up Headway – SH73 / SH77

Turning Movement	Adopted Value		SIDRA Value	
	Critical Gap	Follow-up Headway	Critical Gap	Follow-up Headway
Bangor Road Left Turn	5	3	5	3
Bangor Road Right Turn	6.5	4.5	5	3
West Coast Road Left Turn	5	3	5	3
West Coast Road Right Turn	4	2	4	2

22. The model results of the existing operation are included in **Appendix 4**, which indicate that the SH73 / SH77 intersection is currently operating well.

McLaughlins Road / Bangor Road Intersection

23. The Bangor Road / McLaughlins Road intersection is a give-way controlled T-intersection, as shown in **Figure 6**, located approximately 95m west of the Bangor Road / West Coast Road intersection.

Figure 6: Bangor Road and McLaughlins Road Intersection (Source: Canterbury Maps)

24. Turning counts were undertaken at the SH77 / McLaughlins Road intersection on 26 March 2026 from 07:00 to 09:00 and 16:00 to 18:00. The same peak hours for the SH73 / SH77 were assumed, as that is considered to be the critical location on the road network. The traffic volumes are also illustrated in in **Appendix 3**.

25. A SIDRA model has been created of the Bangor Road / McLaughlins Road intersection based on the surveyed traffic volumes, observed delays and the existing intersection geometry. The default SIDRA

parameters have typically been adopted, with the exception of the gap acceptance as the delays in the initial model runs did not match those observed for the AM peak hour.

The 'two-way sign control' calibration has been turned off and the gap acceptance and follow-up headway values set out in **Table 4 have been** adopted to better match the observed delays. **Table 4** also sets out the values recommended in default values in the SIDRA manual, which indicates the adopted values are generally consistent with the default values although the operation of the right turn out of McLaughlins Road has been worsened to better match the observed conditions. Again, although not required to calibrate the PM peak hour model, the adopted values have been included in the AM and PM peak hour models to provide a consistent, robust basis for assessment.

Table 4: Gap Acceptance & Follow-Up Headway – Bangor Rd / McLaughlins Rd

Turning Movement	Adopted Value		SIDRA Value	
	Critical Gap	Follow-up Headway	Critical Gap	Follow-up Headway
McLaughlins Road Left Turn	5	3	5	3
McLaughlins Road Right Turn	5.7	3.9	5	3
Bangor Road Left Turn	5	3	5	3
Bangor Road Right Turn	4	2	4	2

26. The model results of the existing operation are included in **Appendix 5**, which indicate that the Bangor Road / McLaughlins Road intersection is currently operating well. That said, our observations are that eastbound drivers are using the shoulder and verge of Bangor Road to pass traffic that is waiting to turn right into McLaughlins Road, particularly during the AM peak hour when school buses are right turning.

Bangor Road / Piako Drive Intersection

27. The Bangor Road / Piako Drive intersection is a give-way controlled T-intersection, as shown in **Figure 7**. The Project will add a fourth leg on the northern side of the intersection.

Figure 7: Piako Drive and Bangor Road Intersection (Source: Canterbury Maps).

28. A week-long traffic count was undertaken of the volumes on Piako Drive in March 2026. The traffic volumes into and out of Piako Drive have been distributed in the same proportions as the traffic for a

turning count undertaken at the nearby Oakden Drive intersection and the resultant traffic is illustrated in **Appendix 3**.

Bangor Road / Clintons Road Intersection

29. The Bangor Road / Clintons Road intersection is located approximately 500m west of the proposed Road 5 intersection with Bangor Road. Both Clintons Road approaches are controlled by give-way signs and meet Bangor Road at an angle of approximately 120 degrees.

30. Clintons Road carries reasonably low traffic volumes (refer to **Table 2**) and the Project is anticipated to distribute little traffic to the west (as is set out in **paragraph 57**).Traffic counts have not been undertaken at this intersection as it is not anticipated to be critical to the effects of this Project.

Figure 8: Bangor Road and Clinton Road Intersection (Source: Canterbury Maps

Crash History

31. The NZ Transport Agency Crash Analysis System (CAS) was reviewed to identify reported crashes on Bangor Road near the Site, including at the Bangor Road / West Coast Road and Bangor Road / Clintons Road intersections. The review covers the most recent five-year period (2021–2025) and includes 2026 data available as at 6 May 2026. The search area and crash locations are shown in **Figure 9**.

Figure 9: NZTA Crash Analysis System (2021-May 2026).

32. A total of four reported crashes has been identified for the search period reviewed, including two non-injury crashes along Bangor Road, one serious injury crash on Bangor Road (west of Clintons Road) and another on West Coast Road. The crash summary report is provided in **Appendix 6**. The reported crashes are summarised below:

- Loss of control on Bangor Road, mid-block, west of Clintons Road (serious injury)[1].
- Loss of control on Bangor Road near the intersection with Clintons Road, swerved to miss wild animal (non-injury)[2].
- Loss of control on Bangor Road, mid-block, west of Piako Drive, speed and alcohol were listed as crash factors (non-injury)[3].
- Loss of control on West Coast Road, mid-block, motor-cyclist's front brakes locked and caused driver to go over handlebars (serious injury)[4].

33. The presence of loss of control type crashes in the vicinity of the Site partly reflects the 100km/h speed limit, although other factors included vehicle failures, wild animals and driver behaviour. These crashes do not suggest inherent safety issues which will be exacerbated by the Project.

Alternative Transport Modes

Pedestrian/Cycle Network

34. A sealed 1.5m wide footpath is provided on the southern (opposite) side of Bangor Road. This extends from the Town Centre to Piako Drive. There is no connecting footpath on Piako Drive, although there is a footpath link provided from the Piako Drive cul de sac head through to Stott Drive. Stott Drive also

[1] Crash ID 2024284247
[2] Crash ID 2021193503
[3] Crash ID 2023271031
[4] Crash ID 2021175790

does not have any footpaths, although this road connects through with McLaughlins Road which is accompanied with a footpath on the northern side to the High School.

35. No pedestrian infrastructure is provided on SH73 along the Site frontage.

36. Footpaths are provided along both sides of South Terrace (SH73) within the Darfield Town Centre. The footpath from Bangor Road runs through and adjacent to the Trinity Church site, which links with South Terrace. This includes a refuge island on South Terrace to assist pedestrians across the road.

37. No dedicated cycle infrastructure (i.e. on-road cycle lanes) is provided in Darfield.

Public Transport

38. There are no public transport links within the vicinity of the Site; however, there are two bus stops provided on South Terrace (one on each side) and one bus stop provided outside Darfield Primary School on Ross Street.

39. The Darfield area is serviced by the Metro 86 route, which provides connections to West Melton and through to the Christchurch City Centre. This route offers one bus departure in the morning and one return trip in the evening, on weekdays only, and operates as an express service with limited stops.

40. The bus stop locations are shown below, the nearest bus stop is on Ross Street, approximately 1,600m from the nearest (eastern) corner of the Site.

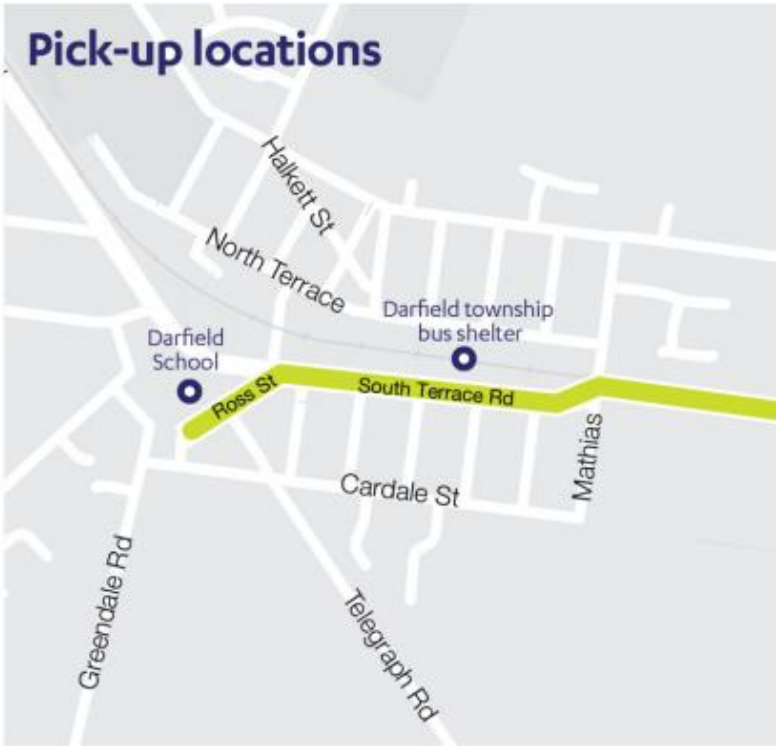


Figure 10: Bus Stop Locations, Route 86 (Metroinfo[5])

[5] https://www.metroinfo.co.nz/timetables/86-darfield-city/

Future / Planned Transport Network

Development Provided for Under DEV-DA3

41. Development in accordance with DEV-DA3 (refer to **Figure 2**) provides for two new road intersections with Bangor Road. This specifically includes new roading at a local level to provide for low-density residential style development.

42. It is understood that development in accordance with DEV-DA3 and the LLRZ zoning would allow for between 130 - 182 households. Based on the traffic generation provided for in **paragraph 55**, this would generate 83 to 129 vehicle movements per hour and 1,209 vehicle movements per day.

Planned Transport Upgrades

43. Pre-application discussions with NZTA in May 2026 confirmed that the 80km/h speed limit on Bangor Road would be reduced to 50km/h from 31 May 2026, as listed on the National Speed Limit Register, as part of the nationwide reduction in speeds around schools. It is understood that these changes are now in effect; however, that reduction has only occurred at the eastern end near Oakden Drive. The posted speed limits past Roads 1 and 5 remain 80km/h and 100km/h respectively. This reduces to 50km/h near the High School at the eastern end. NZTA cannot commit to further reduced speed limits past the site, however as the site develops, this can be reassessed.

44. It is understood that there are no planned upgrades for the remainder of the State Highway network in the vicinity of the Site.

45. The Selwyn District Council *Walking and Cycling Strategy* (2018) highlights footpath additions to Cridges Road, together with recognition of there being an important link along SH73 as illustrated in **Figure 11** below.

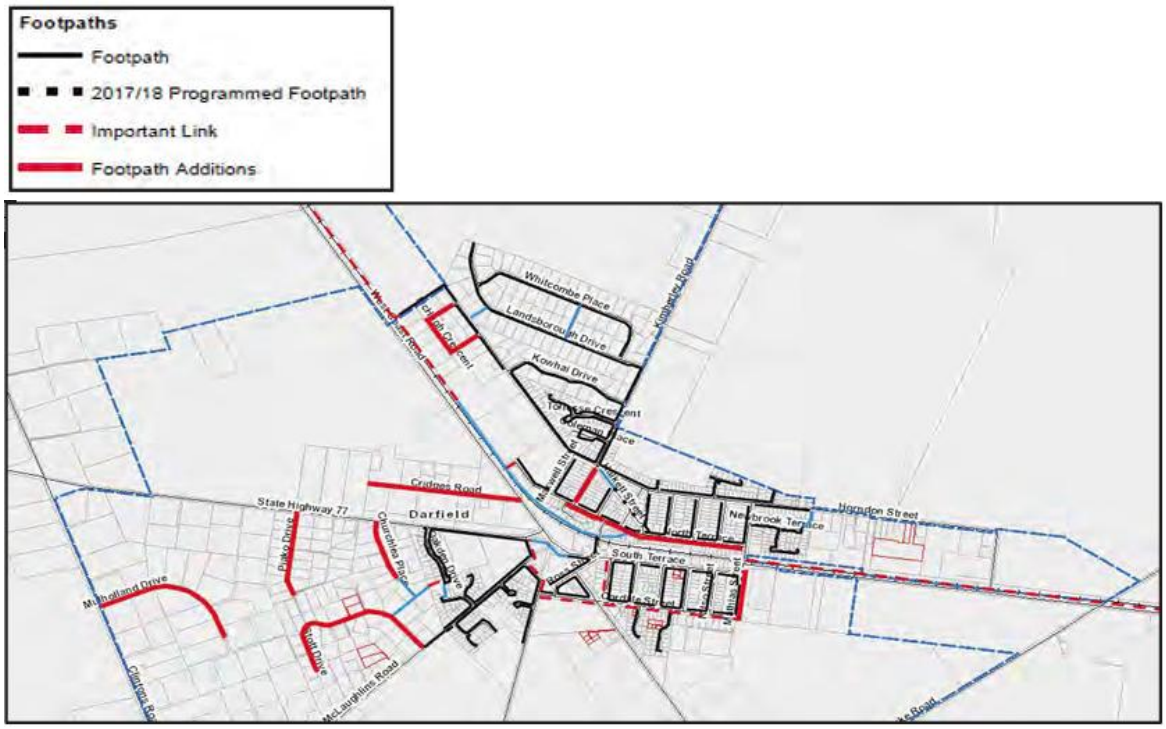


Figure 11: Footpath Strategy (extract from Appendix 1, SDC 2018 Walking and Cycling Strategy)

Project

46. The Project includes the subdivision of 741 residential lots – each of which will accommodate one residential unit. The Site will include two new road intersections to Bangor Road. The proposed subdivision layout, staging plan and road cross-sections are provided in **Appendix 2**. The key transport infrastructure for the Project comprises the following features:

- Bangor Road is proposed to be upgraded along the Site frontage to provide appropriate lane width, kerb and channel (along the Site frontage) at the two new intersections, street lighting, and supporting improvements such as right-turn bays to accommodate the expected traffic generation and turning movements.
- A network of 2.5m shared paths will provide connections across the wider Site. This network will ultimately connect to Bangor Road, where a crossing facility will be provided to the east of Road 1. The existing path on the southern side of Bangor Road will also be upgraded to 2.5m along its full length, including past the High School and through to SH73 and the Darfield township.
- A new collector road (Road 1) will extend from the Bangor Road / Piako Drive intersection to the northern boundary. The southern section will have a 37m legal width, enabling the water race to be retained within a planted median between two 5.5m traffic lanes. Swales will be provided on both sides, with a 2.5m shared path on the western side and a 1.8m footpath on the eastern side. The water race will continue along the northern section of Road 1, where the legal width reduces to 30m; the same cross-section elements will generally be retained, except for a reduced swale width.
- A new local road (Road 5) intersecting with Bangor Road and running in a northerly direction through the Site. This has a 20m legal width, generally comprising an 8.0m carriageway and either a footpath or a shared path on one side.
- With exception of Road 17, 20 & 21, all of the remaining roads are designed with 20m legal widths that mirror Road 5. Road 17, 20 & 21 have a legal width of 17m, however the carriageway and footpath elements still align with the 20m local roads.

47. As part of the Project, the applicant proposes to provide the following transport upgrades within the wider transport network:

- Localised upgrades to the Bangor Road / McLaughlins Road intersection, including a right-turn bay on Bangor Road, to be provided before the development exceeds 182 lots.
- Upgrade approximately 1.2km of footpath along the southern side of Bangor Road to SH77 to a 2.5m-wide shared path, including a refuge island to assist pedestrian and cycle movements across Bangor Road.
- A consent condition requiring an upgrade to the SH77 / SH73 intersection before the Project exceeds 550 lots, unless further assessment (to NZTA's satisfaction) confirms that the upgrade is not required. If intersection improvements are required, it is likely to include a roundabout.

48. The internal road network is proposed to operate with a maximum speed limit of 50km/h.

49. The Site provides future road connectivity options to the west (between Lot 735 & 736); and to the south and east to the adjoining LLRZ (and GIZ) zone through extensions of Roads 8 & 9. The latter specifically provides a potential link to Cridges Road, which already intersects with SH73 and is intended through Development Area DEV-DA3. The opportunity to possibly extend Road 1 & 8 to the north has also

been protected through application of no-build areas over properties immediately adjoining the northern boundary of the Site.

50. There are also reserves within the subdivision that provide additional connectivity for walking and cycling, most notably the central reserve which includes a 2.5m shared path running east-west through the Site.

51. None of the lots will have direct property access or vehicle crossings to either Bangor Road (SH77) or to West Coast Road (SH73).

52. Vehicle crossing locations will be confirmed when dwellings are developed on each lot and assessed against the relevant District Plan requirements for Residential Zones (RESZ). Any non-compliance with those requirements would require separate resource consent approval at that stage.

53. No changes are proposed to or along the West Coast Road (SH73) Site frontage.

Trip Generation

54. The Selwyn District Council's *Engineering Code of Practice* (Code of Practice) provides a household trip generation rate of 8.2 vehicles per day per dwelling and a peak hour trip rate of 0.9 vehicles per hour per dwelling (Dwelling - Outer Suburban). This rate appears to be based on the NZTA Research Report 453, *Trips and Parking Related to Land Use*, November 2011. These rates are not particularly relevant to emerging residential subdivisions in 'rural' townships and predate several changes to transport patterns, particularly the increased flexibility and shift towards working from home which has noticeably impacted on peak commuter traffic.

55. Noting this, Novo Group has commissioned surveys of traffic generation in Darfield in March 2026[6]. This included traffic from 28 residential properties located on Oakden Drive and the 85th percentile traffic generation rates from these surveys are summarised in **Table 5** along with the predicted traffic generation from the proposed 741 dwelling development.

Table 5: Traffic Generation Data

	Period	Arrivals	Departures	Total
Trip Generation Rate per dwelling	AM Peak Hour	0.133	0.324	0.457
	PM Peak Hour	0.495	0.212	0.707
	Daily	3.322	3.322	6.643
Development Traffic Generation	AM Peak Hour	98	240	339
	PM Peak Hour	367	157	524
	Daily	2461	2461	4922

56. The surveyed trip rates also align reasonably well with 2023 surveys of 130 households in West Melton, which recorded an average of 5.85 trips per dwelling per day and 0.59 and 0.62 trips in the AM and PM peaks respectively.

[6] 24/7 Tube counts by Low Down Data, Thursday 19 March 2026 through to Wednesday 25 March 2026.

Trip Distribution

57. Data collected in the *2023 New Zealand Census* (Census) provides sufficient insight into the general distribution of traffic for work/education trips. The data indicates that approximately 38% of departures travel from Darfield for work and school, with the remaining 62% live, and attend work/education in Darfield. Of the people travelling from Darfield, approximately 8% travel west, 1% travel north and the remaining 91% are assumed to travel south.

58. For the purposes of this assessment, it is assumed that 75% of the development generated traffic uses the eastern access to Bangor Road, with the remaining 25% using the western access. The distribution and assignment of development generated traffic is illustrated on the diagrams in **Appendix 3**, which also illustrate this traffic added to the existing traffic volumes on the network.

District Plan Compliance

59. The Site is currently within the LLRZ and within Development Area DEV-DA3 of the District Plan. The proposed layout has been reviewed against the Transport and Subdivision Rules of the District Plan, as shown in **Appendix 7**. **Table 6** summarises the identified non-compliances.

60. The Project is understood to be *non-complying* overall resulting from non-compliance with the minimum lot size requirements in the LLRZ.

Table 6: Summary of District Plan non-compliances.

Rule	Requirement	Nature of Non-Compliance	Status
TRAN-R1	TRAN-REQ19 Formation standards	None of the road designs comply with the maximum carriageway widths for the existing LLRZ. (Roads have instead been designed to a RESZ standard)	DIS
TRAN-R2	TRAN-REQ18 Land transport corridor creation standards	Road 1 (if assessed as a Collector in the RESZ) exceeds the 25m maximum legal width (30-37m proposed) (Note: There is no collector road standard in the LLRZ zone, therefore the RESZ standard applies)	DIS
	TRAN-REQ20 Intersection Spacing (TRAN-TABLE8)	The Road 5 intersection with Bangor Road is currently within the 100km/h speed limit and is less than 800m from the Road 1 intersection (~510m provided). The Road 5 intersection with Bangor Road is less than 800m from the Clintons Road intersection (~775m provided) The spacing between intersections along Road 1 (Collector) and Road 3, 22, 7, 23, 18, 4, 11 & 2 are not 123m	RDIS
TRAN-R4	TRAN-REQ4 Siting of vehicle crossings (TRAN-TABLE5)	Lots 116, 169, 410, 487, 516 & 666 cannot achieve a vehicle crossing with 45m sight distance because of their location on the inside of a curve.	RDIS
SUB-R1	1. Subdivision in the residential zone.	Any subdivision is RDIS.	RDIS
	SUB-REQ3 ODP	The proposed road intersection with Bangor Road is at the intersection with Piako Drive approx. 100m east of the location shown on DEV-DA3.	DIS

	The Road 5 intersection with Bangor Road is approximately 60m west of the location shown on the DEV-DA3. The internal pedestrian cycle connection to West Coast Road is not proposed.

Assessment of Effects

61. As the overall activity status is non-complying due to the proposed number and size of Lots, all transport-related effects can be assessed alongside the relevant assessment matters for the non-compliances identified in **Table 6**.

Lots and Access Arrangements

Parking and Loading

62. The District Plan rules associated with Residential Activities regarding parking and loading will be adopted for the Site. This is sufficient to confirm that parking and loading will be satisfactorily provided for in a functional and practical manner or else resource consents will be required at the time of developing individual Lots.

63. On-street parking will be available on all roads where permitted by the road design standards in the Selwyn District Council Engineering Code of Practice.

Accessway / Rights of Ways

64. All proposed shared accesses have complying legal widths enabling compliance with the formed width requirements of the District Plan. This includes compliance with TRAN-TABLE3 which sets out the minimum requirements for accessways for activities in residential zones.

Vehicle Crossings

65. No vehicle crossings are permitted or proposed to either SH73 or SH77. All Lots fronting the State Highways have a second road frontage or accessways / rights of ways to internal roads. There are already rules in the District Plan which ensure that vehicle crossings cannot be established as a permitted activity for any lots fronting the State Highways.

66. The District Plan vehicle crossing rules will apply which require minimum separation distances from intersections of 20m for Local Roads and 30m for Collector Roads, or location of a single vehicle crossing in the most complying location. The lot sizes and layouts are suitable to accommodate vehicle crossings for all sites with compliant separation from intersections.

67. TRAN-TABLE5 of the District Plan identifies a non-compliance for Lots 116, 169, 410, 487, 516 and 666. These lots are located on the inside of road curves and cannot achieve 45m sight distance in one direction.

68. The bends in Roads 1/2, 2/8, 10 and 11 each have a 10m centreline radius. Austroads *Guide to Road Design Part 3: Geometric Design* indicates that this corresponds to an operating speed of approximately 21km/h, which in turn requires a stopping sight distance of around 17m. Each affected Lot can locate its vehicle crossing more than 17m from the bend, allowing an approaching driver to stop safely. On that basis, the available visibility is considered acceptable and does not prevent a dwelling and vehicle crossing from being safely accommodated near these bends.

New Internal Roads

Intersection Separation Distances

69. The Road 5 intersection with Bangor Road is within the 100km/h speed limit area and is less than 800m from the Road 1 intersection, with approximately 510m separation provided. However, the speed limit at the Road 1 intersection is 80km/h, for which a separation distance of 248m would otherwise apply. This requirement is therefore met.

70. The Road 5 intersection is also less than 800m from the Bangor Road / Clintons Road intersection, with approximately 775m separation provided.

71. In both cases, the road alignment and horizontal geometry provide clear lines of sight. Roads 1 and 5 have been designed with suitable road and intersection standards, including appropriate line marking, right-turn bays, kerb and channel, and intersection lighting, all of which will make the intersections clearly visible to approaching drivers. The separation distances of approximately 510m and 775m are sufficient for drivers to identify the intersections, react, and stop if necessary. They also allow through traffic to pass safely through the new intersections, which provide adequate space and design features to support safe operation.

Road Legal Widths and Formations

72. The proposed legal and formed road widths do not comply with the District Plan requirements for Collector and Local Roads located within the LLRZ. The proposed roads have instead been designed to better align with the GRZ requirements which provides more density compared to the LLRZ. The proposed design also accounts for the water race and swales, which are a common feature on many of the internal roads.

Collector Road

73. There are no District Plan standards specifically for collector roads in the LLRZ. Road 1 is the primary north-south route through the Site and this has been designed to function as a Collector Road. Its proposed 30-37m legal width exceeds the 25m maximum permitted by the District Plan for all residential zones (RESZ), and the carriageway does not meet the required 11-12m width for that road standard. Instead, the carriageway is provided with two 5.5m traffic lanes, one in each direction, separated by a central water race. In all other respects, the design achieves the intended Collector Road function, including provision for general traffic, cycle facilities, bus stops or kerbside parking.

74. The Code of Practice identifies Collector Roads as providing links between Arterial Roads, such as Bangor Road/SH77, and Local Roads. In urban areas, Collector Roads commonly front residential development and may also accommodate bus routes.

75. Public transport services in Darfield are currently limited. However, the primary Collector Road through the Site, including any future northern connection or circulation via other 20m-wide local roads, would be capable of accommodating bus movements should Environment Canterbury establish routes in the future.

76. The Code of Practice also anticipates a speed environment of no more than 50km/h, with lower speeds preferred where appropriate. A 50km/h or lower speed environment is intended for this road.

Local Roads

77. Road 5 is the secondary north-south route through the Site and has been designed as a Local Road. This has a 20m legal width, generally comprising an 8.0m carriageway and a footpath or a shared path on one side and generally a swale on the other.

78. With exception of Road 17, 20 & 21, all of the remaining internal roads are designed with 20m legal widths that mirror Road 5. Road 17, 20 & 21 have a legal width of 17m, although the carriageway and footpath elements still align with the 20m Local Roads.

79. None of the internal road designs comply with the LLRZ maximum carriageway width of 6.5m. Instead, the roads have been designed with wider 8.0m carriageways and pedestrian facilities in accordance with the District Plan requirements for the GRZ. Given the scale and likely form of residential development anticipated, this is considered a more appropriate design standard to accommodate expected traffic volumes and provide for all modes. The proposed road designs are therefore considered suitable and fit-for-purpose.

80. Until future connections are provided to adjoining land (potentially via extensions to Road 1 and Road 8 to the north, Road 4 to the west, or Roads 8, 9 & 22 to the south), Road 5 will provide an important secondary link to the wider network. This will improve network resilience by ensuring access to the Project is not reliant on a single route in the event of an incident such as a crash or major road works. A secondary road connection is also required by the DEV-DA3 Development Area Plan.

New Road Intersection Separation Distances

81. Road 1 is intended to function and operate as a collector road. The District Plan requires a minimum of 123m separation between intersections on a Collector Road, whereas:

- The Road 1 intersections with Road 3 & 22 are separated by 70m;
- The Road 1 intersections with Road 7 & 10 are separated by 77m;
- The Road 1 intersections with Road 23 & 18 are separated by 103m;
- The Road 1 intersections with Road 18 & 4 are separated by 110m;
- The Road 1 intersections with Road 4 & 11 are separated by 86m;
- The Road 1 intersections with Road 11 & 2 are separated by 77m;

82. Austroads *Guide to Road Design Part 4A: Unsignalised and Signalised Intersections* recommends a spacing of at least five seconds of travel time at the design speed to provide time for drivers to process information relating to traffic, the road layout and traffic signs. In this instance, the anticipated internal design speeds will be in the order of 40km/h to 50km/h, leading to a suggested separation of 56m to 69m. This indicates that the proposed intersection separation will be acceptable as they all have more than 5 seconds of travel time between the spacings.

83. The subdivision layout has been designed to minimise cross-intersections. Instead, the internal network generally uses T-intersections, reducing conflict points and avoiding driver confusion where intersections are close together. In accordance with Section 11.8.1 of the Code of Practice, any at-grade four-way intersections on the internal road network are expected to be controlled by roundabouts.

Site Access Arrangement and Operation

Primary (Collector Road) Site Access

84. The primary eastern site access (Road 1) onto Bangor Road is proposed as abcross-roads intersection with Piako Drive located on the southern arm. A concept arrangement for this intersection is included in **Appendix 2**, which indicates right turn bays are proposed on Bangor Road to the site access and Piako Drive. The tapers at the intersection have been based on the existing 80km/h speed limit, although there is potential that this development triggers a lower speed limit review and shorter tapers could be provided.

85. No spatial constraints have been identified that would prevent further design refinements at this intersection. The final layout can be confirmed at detailed design stage and tailored to meet the requirements of the relevant road-controlling authorities.

86. A traffic capacity model of this intersection has been created in SIDRA using the proposed geometry, default parameters and traffic volumes in **Appendix 3**. The output of this model for the existing volumes plus proposed development are included in **Appendix 8**, which indicates that the intersection is predicted to operate well within capacity. Notably, no movement operates worse than LoS B[7].

87. Further to the above, a sensitivity test has been run that includes 10% growth in background traffic on the road network. This has been undertaken to provide some confidence that traffic growth on the surrounding road network could be accommodated, noting that traffic volumes have generally been declining on Bangor Road. The results from this test are included in **Appendix 9** and indicate that the intersection is still predicted to operate satisfactorily and with no movement operating worse than LoS B.

88. Give the above, the proposed eastern site access is considered to operate satisfactorily with the development added to the network.

Secondary (Local Road) Site Access

89. The secondary western site access (Road 5) is proposed to be a 'T' intersection with a right turn bay proposed on Bangor Road. A concept arrangement for this intersection is included in **Appendix 2** and the tapers at the intersection have been based on the existing 100km/h speed limit, although there is potential that this development triggers a lower speed limit review and shorter tapers could be provided. As with the eastern access, there are no spatial constraints that would prevent further design refinements at this intersection. The final layout can be confirmed at detailed design stage and tailored to meet the requirements of the relevant road-controlling authorities.

90. A traffic capacity model of this intersection has been created in SIDRA using the proposed geometry, default parameters and traffic volumes in **Appendix 3**. The output of this model for the existing volumes plus the Project are included in **Appendix 10**, which indicates that the intersection is predicted to operate well within capacity. Notably, no movement operates worse than LoS A.

91. As with the eastern access, a sensitivity test has again been undertaken that increases the background traffic volumes by 10%. The results of this test are included in **Appendix 11**, which indicates that no movement is predicted to operate worse than LoS A.

[7] LoS refers to Leve of Service based on average delay. Level of Service A is considered excellent operation with little delay, Level of Service E is at or approaching capacity and Level of Service F is over-capacity.

Road Upgrades & Improvements

92. The Project will increase traffic volumes on the surrounding road network and most traffic will use Bangor Road via proposed new Road 1 and Road 5. The Site may also connect to Cridges Road through future third-party development of adjoining land, providing an alternative route to SH73 and helping to distribute traffic more broadly. In the interim, all Site traffic will rely on Bangor Road, particularly via Road 1, which is intended to function as the main Collector Route through the development.

93. It is also important to note that additional traffic generation is already anticipated under the existing LLRZ zoning and the DEV-DA3 Development Area provisions. As discussed in **paragraph 42**, that zoning framework would enable between 130 - 182 households, which would also generate additional traffic on Bangor Road based on the trip generation assumptions outlined in **paragraph 55**. The proposed Site generated traffic volumes, together with the LLRZ baseline scenario assists in determining appropriate trigger points for road improvements.

94. As part of the Project (and in response to the increased traffic generation resulting from the Project), the applicant is proposing road upgrades that are proportionate to the scale and intensity of the subdivision and are necessary to accommodate traffic generated at full build-out. These include frontage improvements along Bangor Road, new intersection layouts for Road 1 (opposite Piako Drive) and Road 5, improvements at the Bangor Road / McLaughlins Road intersection, and potential upgrades at the Bangor Road (SH77) / West Coast Road (SH73) intersection.

- Intersection design and improvements associated with Road 1 and Bangor Road have already been addressed in **paragraph 84-88** above.
- Intersection design and improvements associated with Road 5 and Bangor Road have already been addressed in **paragraph 89-91** above.
- SH73 /SH77 intersection improvements (and capacity triggers) are addressed in further detail in **paragraph 96-101** below.
- Bangor Road / McLaughlins Road improvements are discussed in further detail in **paragraph 102-104** below.
- Bangor Road frontage upgrades are discussed in further detail below in **paragraph 105**.

Wider Network Effects

95. The assessment of the traffic effects of the Project on the wider transport network is focussed on the operation of the SH73 / SH77 intersection and the Bangor Road / McLaughlins Road intersection, being the primary routes to and from the Site.

Intersection Operation

SH73 / SH77 Intersection Operation

96. The traffic capacity model of the SH73 / SH77 intersection has been updated to include the full development traffic on the network using the 2026 base traffic volumes. The results of this model are included in **Appendix 12**, which indicate the following:

- **AM Peak Hour:** The intersection is predicted to be over-capacity because the right turn out of SH77 has a degree of saturation of greater than 0.85, which is considered to be the practical upper limit. The reported degree of saturation of 0.911 indicates that the intersection would be

susceptible to small increases in traffic volumes leading to notable increases in queuing and delays; and

- **PM Peak Hour:** The intersection is predicted to be over-capacity because the right turn out of SH77 has a degree of saturation of 0.967 and operates at LoS F. The actual operation of the intersection may not be as poor as predicted, because this model adopts the AM peak hour calibration for this right turn that is not strictly necessary for the PM peak.

97. Given the above, the intersection would be over-capacity with inclusion of the full development enabled by the Project based on the 2026 traffic volumes. As such, we have undertaken a review of the amount of development that could be accommodated prior to requiring an upgrade. The sensitivity test of an additional 10% of background traffic has been adopted for this test to provide some additional confidence regarding the threshold.

98. The results included in **Appendix 13** assume a development of 550 dwellings at the Site and indicate:

- **AM Peak Hour:** The intersection is within capacity. The worst operating movement is the right turn from SH77, which is predicted to have a degree of saturation 0.829 and LoS D. Although these are approaching capacity, they are within capacity.
- **PM Peak Hour:** The intersection is again within capacity. The worst operating movement is the right turn from SH77, which is predicted to have a degree of saturation 0.841 and LoS D. It is again reiterated that this model includes worsening of the performance of this right turn movement to be consistent with the AM peak hour model, although this is not strictly necessary for the PM peak model.

99. These results suggest that an upgrade to the SH77 / SH73 intersection is required to facilitate development of greater than 550 Lots at the Site. Noting that there are assumptions regarding background traffic growth, we consider it would be appropriate to have a condition that either requires an upgrade of the SH77 / SH73 intersection to occur prior to exceeding 550 Lots, or requires assessment (to the satisfaction of the NZ Transport Agency) that the upgrade is not required at that time. Alternative mitigation measures could be provided, such as an additional connection between the Site and SH73 via Cridges Road, that may negate the need for the roundabout to be constructed and/or may provide the option of alternative upgrade solutions for the SH77 / SH73 intersection.

100. A potential upgrade to the SH77 / SH73 intersection is a roundabout and a concept arrangement is included in **Appendix 14**. This roundabout has been modelled in SIDRA (for the full development and 10% additional background traffic) with the results are also included in **Appendix 14**. Those results indicate that a roundabout is predicted to operate well, with no movement being worse than LoS B.

101. The road reserve in this location provides sufficient space for alternative intersection designs or future refinements. The final layout can be confirmed at detailed design stage and tailored to meet the requirements of the relevant road-controlling authorities. Overall, there is confidence that appropriate improvements can be accommodated within the available space with any upgrade trigger, if required, able to be addressed through an appropriate condition of consent.

Bangor Road / McLaughlins Road Intersection

102. The traffic capacity model of the Bangor Road / McLaughlins Road intersection has been updated to include the full development traffic on the network using the 2026 base traffic volumes and again with the 2026 base traffic plus 10% and development sensitivity test volumes. The results of this model are included in **Appendix 15**. These results indicate that the intersection is predicted to operate well, with no movement being worse than LoS C.

103. Although the above operation would generally be considered acceptable, the description of the existing intersection operation (in **paragraph 26**) noted that drivers are using the shoulders and berm to pass right turning vehicles on Bangor Road. The increase in traffic on Bangor Road as a result of this proposal will exacerbate this currently unsatisfactory arrangement and we consider the intersection should be upgraded to provide a dedicated right turn bay on Bangor Road to facilitate a safe waiting location (see **Appendix 2**).

104. Development of the Site in accordance with the existing zone provisions would facilitate between 130 - 182 dwellings without requiring an upgrade to the Bangor Road / McLaughlins Road intersection. As such, we consider that the provision of the right turn bay on Bangor Road for traffic turning into McLaughlins Road should be provided prior to 183 Lots being developed.

Bangor Road Frontage Upgrades

105. Bangor Road is proposed to be upgraded along the Site frontage to provide the seal widening required for the proposed intersection improvements. The works will include kerb and channel near the intersections, intersection lighting, and drainage measures that integrate with the proposed swales.

106. During consultation in May 2026, NZTA expressed an initial preference for the applicant to provide a shared path along the northern, application-site side of Bangor Road towards Darfield township. There is however no existing pathway on the northern side of Bangor Road for the proposed shared path to connect to and there are also spatial constraints along the northern side resulting from extensive and mature roadside planting that would also create shading. Consequently, the applicant is instead proposing that the shared path will cross Bangor Road approximately 50m east of the Road 1 / Piako Drive intersection via a dedicated pedestrian/cycle refuge island. It will then connect to the existing path on the southern side of Bangor Road, which will be upgraded to 2.5m wide to accommodate both pedestrians and cyclists. The upgraded path will extend past Darfield High School and into the township. It could connect either to the existing path adjacent to the Trinity Church site, or to a future roundabout arrangement incorporating a further pedestrian/cycle refuge island and links to paths on the opposite side of SH73, as shown indicatively in **Appendix 14**.

107. The proposed 2.5m shared path between the Site and Darfield township, including the section past the High School, will provide a logical, convenient and direct route for active modes. The wider network of 2.5m shared paths through the Site and including Bangor Road is shown below in **Figure 12.** All other internal roads throughout the Project also have a footpath on at least one side. Cyclists are also able to safely share the roads with general traffic, as internal traffic volumes and speeds will be low.

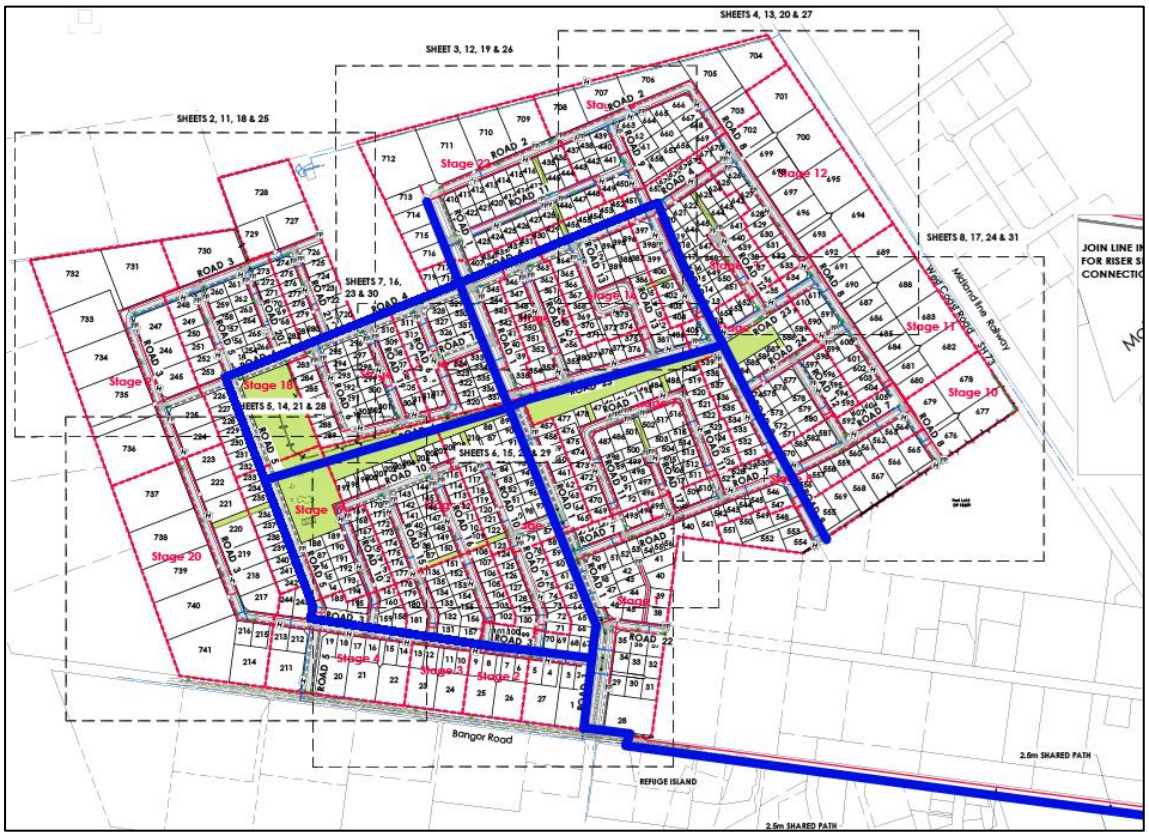


Figure 12: Proposed 2.5m Shared Paths

Consistency with DEV-DA3

108. The Site located within the DEV-DA3 Development Area of the District Plan. As identified in **Figure 2,** the proposed transport provisions are broadly consistent with that Development Area plan. Specifically, this includes at least two indicative road connections with Bangor Road (via proposed Road 1 & 5) and two further connections towards Cridges Road (via proposed Road 2, 8 and 9).

109. However, the proposed layout differs slightly from the Development Area Plan in the following respects:

- The proposed Road 1 intersection with Bangor Road is located approximately 100m east of the location shown on the Plan and is instead aligned with Piako Drive.
- The proposed Road 5 intersection with Bangor Road is located approximately 60m west of the location shown on the Plan.
- The indicative pedestrian/cycle connection to West Coast Road (SH73) is not proposed.

110. The key reason for the slight relocation of the Bangor Road intersections largely relate to the applicant's strong preference to retain and naturalise the water-races that run through the Site and where possible, ensuring they do not intersect with privately owned land.

111. Importantly, the road locations shown on the DEV-DA3 Development Area Plan are indicative only and are not fixed. In any event, the proposed locations are logical, being positioned on flat, straight sections of Bangor Road with suitable horizontal alignment. Traffic will be able to enter and exit the Site safely and efficiently, and existing traffic from Piako Drive is also expected to continue operating without undue delay. The same applies to other traffic movements on Bangor Road further west, noting specifically

that the Road 5 intersection does not interfere with other private property access locations on the opposite side of Bangor Road.

112. Direct pedestrian access to West Coast Road (SH73) is not proposed because of the infrastructure challenges associated with safely accommodating pedestrians and cyclists in this location. This approach follows pre-application consultation with NZTA in May 2026. West Coast Road has a posted speed limit of 100km/h and carries a high proportion of heavy vehicles[8]. NZTA has advised that there is no intention to reduce the speed limit on SH73 in this area and has expressed a clear preference for no access to this road. There are currently no footpaths or pedestrian crossing facilities on West Coast Road. In addition, the opposite side of the road has no corresponding pedestrian or cycle infrastructure and includes a water race, which cannot be traversed by pedestrians, together with the West Coast Railway Line. These constraints mean there are currently no safe or practical facilities for active modes in this location.

113. As shown in **Figure 11**, Council's *Walking and Cycling Strategy* identifies Cridges Road as requiring a footpath to be provided. The subdivision provides road and footpath access towards Cridges Road, which will in turn provide the necessary connection to West Coast Road. When that footpath is delivered, presumably in conjunction with wider development of that area, it will provide appropriate facilities linking back towards Darfield township and/or North Terrace, including the Darfield Recreation Centre.

114. No-build areas have also been provided at the northern ends of Road 1 and Road 8 to allow for future connections, if required. If the land to the north is developed in the future, a road connection to West Coast Road would likely be required and could provide a catalyst for additional walking and cycling facilities at that time. However, those works are not required for this application. In the meantime, pedestrians and cyclists will be directed back towards Bangor Road or, in the future, via connections to Cridges Road, which provides a closer and more direct route to the Darfield township.

High Trip Generating Activities and General Subdivision Assessment Matters

115. The High Trip Generating Activity rule (TRAN-R8) is not technically triggered by subdivision. However, any future land use activities established within the Project would trigger the rule if the thresholds in TRAN-TABLE2 are exceeded. This could include, for example, a preschool, which would also require separate resource consent approval for other matters. Accordingly, the current District Plan framework can specifically address any future high trip generating activities.

116. At the outset, it is also emphasised that the subdivision design and layout have been developed with regard to the likely traffic volumes. This includes a fit-for-purpose road network that is proportionate to the volume of traffic generated, together with intersection arrangements that can safely and efficiently accommodate those volumes. The road cross-sections and overall layout also provide for all modes, including walking, cycling, and potential future public transport routes.

117. In addition, the assessment matters in TRAN-MAT8 and TRAN-MAT9, which relate to high trip generating activities, address similar topics to the general transport-related matters of discretion for subdivision, particularly those in SUB-MAT2 & 9. The following assessment therefore uses the subdivision assessment matters as the primary framework, while also addressing the relevant aspects of TRAN-MAT 9 that have not otherwise been considered elsewhere.

[8] Mobile Road data from 2024 data suggests that SH73 carries 3,888vpd of which 26% is heavy traffic.

SUB-MAT2 Context and Infrastructure

118. The Project is consistent with the character of residential neighbourhoods in Darfield, although it provides for a higher, more suburban density (via smaller lot sizes) than anticipated by the LLRZ zoning. The Project provides for future connections to adjoining development and includes upgrades to the existing transport network, ensuring the Site can be effectively integrated with the wider transport network.

SUB-MAT9 Movement Networks

1. *The layout and formation of all existing and proposed land transport infrastructure, including:*

    a. *Ensuring the desired design speed is achieved with respect to the classification of roads and the surrounding environment.*

119. The proposed carriageway widths are consistent with the requirements for Local and Collector Roads in the GRZ, which is appropriate for the density and number of dwellings proposed. The road layout includes a series of small to medium-sized blocks and is consistent with a 50km/h speed environment.

120. NZTA has recently reduced the speed limit at the eastern end of Bangor Road, past the High School, to 50km/h as part of the school speed zone review. No further speed limit reduction is proposed at this stage. However, the proposed frontage upgrades and indicative intersection designs are suitable for the existing 80km/h speed environment at the Road 1 intersection and the 100km/h speed environment at Road 5. No property access is proposed to any of the new lots from Bangor Road. As the subdivision develops and dwellings are constructed, the speed limit can be reviewed further if required.

121. The anticipated reduction in speed limit on Bangor Road (referred to in **paragraph 43**) would have beneficial effects on the safety of the site access arrangements and for all users of Bangor Road. That said, this proposal is not reliant on that change.

    b. *Whether the roading pattern utilises opportunities to connect streets. Cul-de-sacs, except those that are short and straight and connected with pedestrian and cycle through routes, should be avoided.*

122. The proposed road network provides for future connections to the east via Road 4, to the north, if required, via potential extensions of Roads 1 and 8, and towards Cridges Road via extensions of Roads 8, 9 and 22. The two cul-de-sac roads, Roads 12 and 17, also include dedicated pedestrian connections to the reserves to the north.

    c. *Whether the existing and proposed land transport infrastructure is sufficient to accommodate the anticipated vehicle movements associated with the likely use of the land.*

123. The proposed road corridors are consistent with the District Plan requirements for roads in the GRZ, which are considered appropriate for the likely traffic volumes generated by residential dwellings. Intersection kerb radii will also be designed to accommodate the expected vehicle types, with this to be confirmed at the detailed design stage.

    d. *The extent to which road designs make a positive contribution to the amenity of the neighbourhood and meet the operational requirements of the street, such as waste collection, on-street parking, and emergency services access.*

124. The proposed road corridors are wide enough to accommodate the District Plan requirements, including shared paths, footpaths, underground services, berms and street trees. The carriageway widths are also suitable for emergency service access.

e. Whether the subdivision layout and road network supports walking, cycling, and public transport, including access to reserves, facilities, commercial areas, and public transport facilities.

125. The proposed road corridor widths and cross-section elements are consistent with the District Plan and Code of Practice. Footpaths, or shared paths, are provided on at least one side of all Local Roads, while the Collector Road provides footpaths or shared paths on both sides for its full length. The 5.5m single lane traffic lanes on the Collector Roads can accommodate general traffic, kerbside parking, or cycle lanes, with the final arrangement to be confirmed to Council's satisfaction at detailed design stage. Overall, the proposed cross-sections can accommodate a range of transport modes.

126. Public transport is not expected to operate on the internal roads, given the limited public transport service currently available in Darfield. However, if services are expanded in the future, the Collector Road component of the internal road layout is capable of accommodating public transport movements should Environment Canterbury choose to do so.

f. Whether service lanes, cycle ways, shared accessways, and pedestrian access ways are required or appropriate and are located and designed in a safe and efficient manner.

127. No service lanes are proposed or considered necessary. Accessways are generally avoided although are proposed to service rear Lots, which assists in avoiding direct property access to the State Highways. These accessways comply with the District Plan layout requirements and are considered appropriate.

128. A network of shared paths is provided to and around the Site as illustrated in **Figure 12.**

g. The provision of footpaths, lighting, and street furniture.

129. Footpaths are provided on all roads in accordance with the District Plan commensurate with the GRZ. It is expected that adequate crossing points, tactile paving and street lighting will be provided for at the detailed design stage.

2. The degree to which pedestrian and cycle access may be enhanced through the provision of cycleways and footpaths that are located and designed to meet best practice.

130. As discussed above, the Site includes footpaths and shared paths that connect the neighbourhood, including links through the two cul-de-sac heads and the central reserve. An off-site shared path is also proposed on Bangor Rod to connect to the Darfield township and High School. Overall, the subdivision provides well for walking and cycling.

3. Where any shared accessway will access any existing or proposed road, whether the existing and proposed land transport infrastructure is sufficient to accommodate on-street parking.

131. Only a limited number of shared accessways are proposed. The lots they serve are large enough to accommodate on-site parking, and the adjoining road frontages provide sufficient capacity for visitor parking or occasional overflow residential demand.

Construction Effects

132. A Construction Traffic Management Plan (CTMP) will be required to support the safe and effective movement of vehicles and personnel associated with the construction of the subdivision works. This would establish the controls necessary to minimise disruption to the State Highway network (and other roads), protect the safety of road users and site personnel, and comply with relevant regulatory requirements, including the Code of Practice for Temporary Traffic Management (CoPTTM), Environment Canterbury expectations, and Selwyn District Council guidelines.

133. A detailed CTMP will be prepared closer to the commencement of construction, with updated plans likely provided for each stage of work. The CTMP will address the following key elements:

- A description of the construction site and a programme and scope of the works.
- Routes to be used by construction traffic to access and egress the Site and the adoption of any measures on these routes to ensure a safe environment for all road users, including existing nearby residents and pedestrians, to ensure that the surrounding road network will continue to operate efficiently.
- The quantum of construction traffic expected during each stage of construction.
- Access for construction vehicles onto the road network from the Site and measures to be adopted at these access points to ensure a safe traffic environment for other road users, especially pedestrians and cyclists.
- Parking for contractor vehicles on the development site and its effects on the transport network are minimised.

134. Implementation of the CTMP can be secured through a condition of consent. Subject to an appropriate condition requiring certification or approval from the relevant road-controlling authorities, construction traffic effects are expected to be safely managed through preparation of, and adherence to, a comprehensive CTMP.

Conclusion

135. The Project has been assessed against the relevant transport provisions of the District Plan, including matters relating to road layout, intersection spacing, vehicle crossings, accessways, walking and cycling provision, and the capacity and safety of the surrounding transport network. While several technical non-compliances have been identified, these largely arise because the much of the Project has been designed to align with the GRZ rule requirements in conjunction with the existing LLRZ provisions.

136. Overall, the proposed internal road network is considered suitable for the anticipated residential traffic volumes and provides appropriate facilities for vehicles, pedestrians, cyclists, servicing, and emergency access. The proposed frontage and intersection upgrades, together with appropriate staging and detailed design confirmation, will enable the development to be safely and efficiently integrated with Bangor Road and the wider transport network.

137. On this basis, and subject to the recommended design, staging and construction management measures, the transport effects associated with the proposed subdivision are considered **acceptable** and **less than minor.**

Appendix 1. Author's Experience

1. This application was prepared by Rhys Chesterman and Nick Fuller.

2. Although this is not an Environment Court proceeding, we confirm that we have read and are familiar with the Environment Court's Code of Conduct for Expert Witnesses, contained in the Environment Court Practice Note 2023, and we agree to comply with it. Our qualifications as experts are set out below. Other than where we state that we are relying on the advice of another person, we confirm that the issues addressed in this assessment are within our area of expertise. We have not omitted to consider material facts known to us that might alter or detract from the opinions that we express.

Rhys Chesterman BRS, MRP, MET, MNZPI

3. Rhys Chesterman is an experienced Director and Transport Engineer with over 25 years in the planning and traffic engineering field. His expertise is centred on land use development and subdivisions, where he provides design and technical advice, prepares traffic impact assessments/integrated transport assessments, road safety audits, and offers expert evidence for Council and Environment Court.

4. His project experience is diverse, covering supermarkets, shopping malls, hotels, motels, retirement villages, hospitals, pre-schools, holiday parks, educational institutions, hospitals, residential and business plan changes, residential show homes, quarry developments, wind farms, and various retail, commercial, and industrial developments.

Nick Fuller BE (Civil)

5. Nick Fuller is a Principal Transport Engineer with over two decades of experience in traffic and transportation engineering across New Zealand, the United Kingdom, Australia, and the Pacific Islands. He specialises in land development projects and has a strong background in providing transport advice to developers, as well as the New Zealand Transport Agency and local authorities in Christchurch and Auckland. Nick's expertise includes Integrated Transport Assessments, concept intersection layouts, and Road Safety Audits.

6. Throughout his career, Nick has worked on numerous significant Plan Change applications, providing expert transport advice and assessments. Some of the notable recent projects include:

    i. West of Rolleston Residential Plan Changes: Rural to Residential rezoning to permit 3,770 dwellings plus associated local commercial centres to the west of Rolleston;

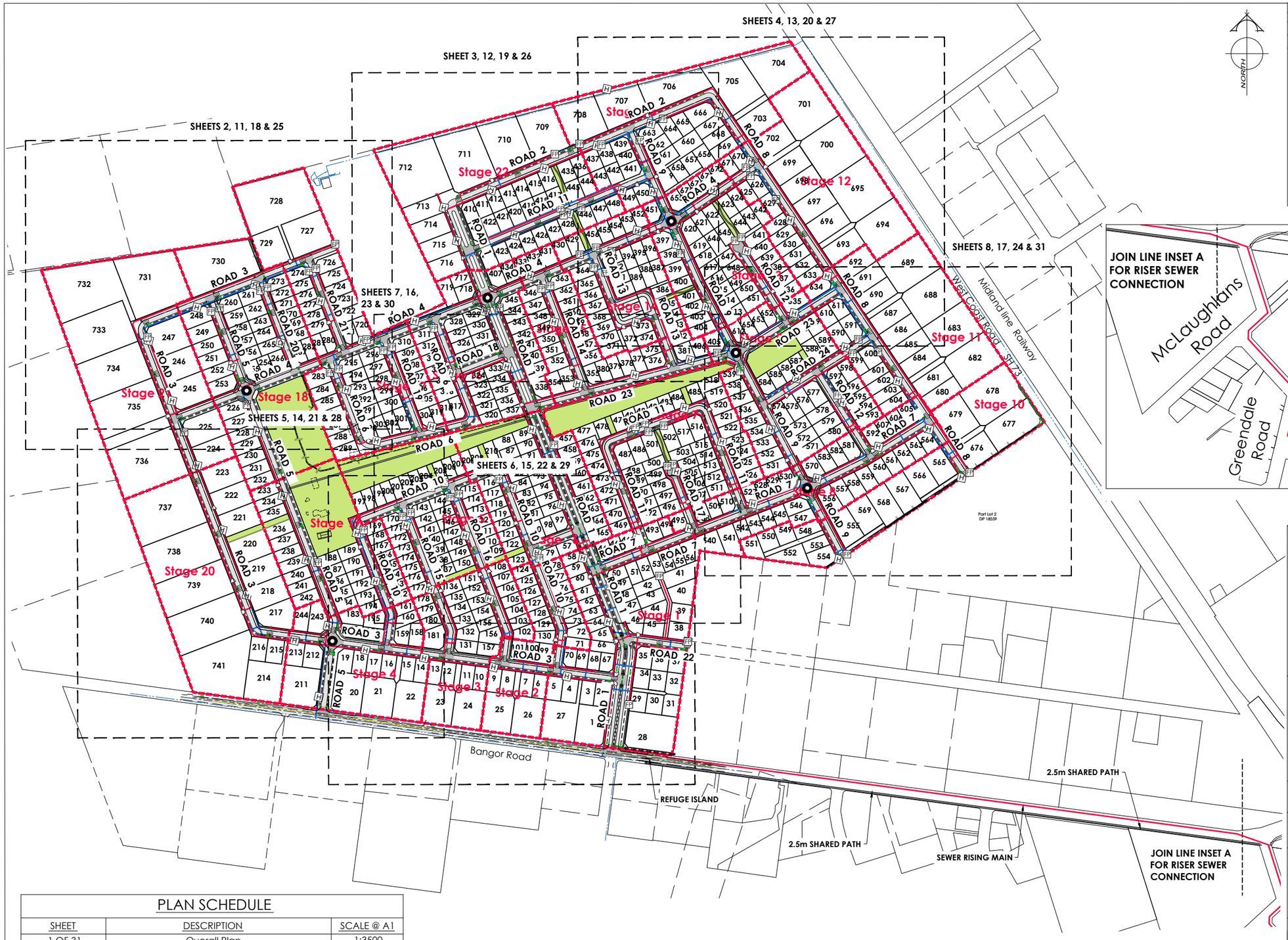
    ii. Two Chain Road Industrial Plan Change: Rezoning of 98Ha of Rural land to permit Industrial purposes to the north-west of Rolleston;

    iii. Lincoln South Plan Change: 1,710 dwellings plus associated commercial centres to the south of Lincoln, Selwyn; and

    iv. iPort Extension Plan Change: Rezoning of 27Ha of Rural land to permit Industrial purposes to the north of Rolleston

7. Both Rhys and Nick have provided Transport Assessments that relate to Fast Track applications. Both have also completed training in Safe Systems Assessments and are Road Safety Auditors and regularly undertake Road Safety Audits for subdivisions.

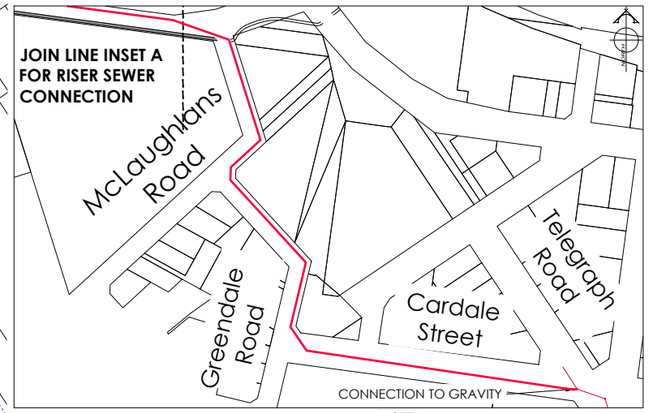
Appendix 2. Proposed Plans and Intersection Layouts



AMENDMENTS :		
AMENDMENT	DATE	DESCRIPTION
R5	11/06/26	ROADS 1 & 8 AMENDED
R6	3/07/26	ROUNDABOUTS ADDED

NOTES :

1) ALL WORKS IN ACCORDANCE WITH SDC CODE OF PRACTICE PARTS 1-11 STANDARDS, IF STANDARDS ARE UNSPECIFIED REFER TO CCC CSS PARTS 1-7.
2) ALL PLANS ARE TO BE READ AND DISTRIBUTED AS A COMPLETE SET. ANY DISCREPANCIES ARE TO BE BROUGHT TO THE ATTENTION OF THE ENGINEER FOR CLARIFICATION
3) ELECTRICITY & TELECOM SERVICES NOT SHOWN. REFER TO ELECTRICAL & COMMUNICATION PLANS FOR DUCT LOCATIONS.
4) TRENCHING AND INSTALLATION OF POWER AND TELECOM SERVICES TO BE PROVIDED IN ACCORDANCE WITH SERVICE PROVIDERS PLANS AND SPECIFICATIONS.
5) EXISTING SERVICES HAVE BEEN DIGITISED FROM SERVICE AUTHORITY PLANS; COMPLETENESS AND ACCURACY ARE NOT GUARANTEED. ALL SERVICES TO BE FULLY SEARCHED AND PILOTED PRIOR TO TRENCHING.



INSET A
SCALE : 1:3000@A1
1:6000@A3

LEGEND :
- CHIP SEAL
- AC SURFACING
- STORMWATER SWALE
- SOAKAGE PIT
- FLUSHING POINT (FP)
- NEW FOOTPATH
- REDUCER

EXISTING SERVICES: WATER (FH, VALVE), STORMWATER (MH), PRESSURE SEWER (BEC), KERB

PROPOSED SERVICES: WATER (FH, VALVE, METER), STORMWATER (MH), PRESSURE SEWER (BEC), KERB (CUT DOWN)

PLAN SCHEDULE

SHEET	DESCRIPTION	SCALE @ A1
1 OF 31	Overall Plan	1:3500
2 OF 31 - 8 OF 31	Roading Plans	1:1000
9 & 10 OF 31	Roading Cross Sections	As Shown
11 OF 31 - 17 OF 31	Stormwater Plans	1:1000
18 OF 31 - 24 OF 31	Water Plans	1:1000
25 OF 31 - 31 OF 31	Pressure Sewer Plans	1:1000

DAVIE LOVELL-SMITH
PLANNING SURVEYING ENGINEERING

116 Wrights Road P O Box 679 Christchurch 8140. New Zealand
Telephone: 03 379-0793 Website: www.dls.co.nz E-mail: office@dls.co.nz

JOB TITLE:
Bangor Road, Darfield

SHEET TITLE:
Engineering Concept Overall Plan

DRAWING STATUS
For Concept Purposes

SCALE : 1:3500@A1 1:7000@A3
DATE : July 2026
CAD FILE : J:\21112\ENG\Concept\H21112 Eng Concept Plans_R6.dwg
DRAWN : DG
DRAWING No : **H21112**
SHEET No: 1 OF 31
REVISION : **R6**

NORTH

ROAD 3
ROAD 20
ROAD 21
ROAD 5
ROAD 4
ROAD 6

Stage 18
Stage 21

EXISTING WATER RACE TO BE PIPED
HEADWALL
R10.00
R8.00

AMENDMENTS :

AMENDMENT	DATE	DESCRIPTION
R4	6/06/26	BOUNDARIES & ROADING LAYOUT UPDATED
R5	11/06/26	ROADS 1 & 8 AMENDED
R6	3/07/26	ROUNDABOUTS ADDED

NOTES :

1) ALL WORKS IN ACCORDANCE WITH SDC CODE OF PRACTICE PARTS 1-11 STANDARDS, IF STANDARDS ARE UNSPECIFIED REFER TO CCC CSS PARTS 1-7.

2) ALL PLANS ARE TO BE READ AND DISTRIBUTED AS A COMPLETE SET. ANY DISCREPANCIES ARE TO BE BROUGHT TO THE ATTENTION OF THE ENGINEER FOR CLARIFICATION

3) ELECTRICITY & TELECOM SERVICES NOT SHOWN. REFER TO ELECTRICAL & COMMUNICATION PLANS FOR DUCT LOCATIONS.

4) TRENCHING AND INSTALLATION OF POWER AND TELECOM SERVICES TO BE PROVIDED IN ACCORDANCE WITH SERVICE PROVIDERS PLANS AND SPECIFICATIONS.

5) EXISTING SERVICES HAVE BEEN DIGITISED FROM SERVICE AUTHORITY PLANS; COMPLETENESS AND ACCURACY ARE NOT GUARANTEED. ALL SERVICES TO BE FULLY SEARCHED AND PILOTED PRIOR TO TRENCHING.

LEGEND :

CHIP SEAL
AC SURFACING
NEW FOOTPATH

EXISTING SERVICES
KERB

PROPOSED SERVICES
KERB
CUT DOWN

DAVIE LOVELL-SMITH
PLANNING SURVEYING ENGINEERING

116 Wrights Road P O Box 679 Christchurch 8140. New Zealand
Telephone: 03 379-0793 Website: www.dls.co.nz E-mail: office@dls.co.nz

JOB TITLE:
Bangor Road, Darfield

SHEET TITLE:
Engineering Concept Roading Plan

DRAWING STATUS
For Concept Purposes

SCALE : 1:1000@A1 1:2000@A3
DATE : July 2026

CAD FILE : J:\21112\ENG\Concept\H21112 Eng Concept Plans_R6.dwg
DRAWN : DG

DRAWING No : **H21112**
SHEET No: 2 OF 31
REVISION : **R6**

AMENDMENTS :

AMENDMENT	DATE	DESCRIPTION
R4	6/06/26	BOUNDARIES & ROADING LAYOUT UPDATED
R5	11/06/26	ROADS 1 & 8 AMENDED
R6	3/07/26	ROUNDABOUTS ADDED

NOTES :

1) ALL WORKS IN ACCORDANCE WITH SDC CODE OF PRACTICE PARTS 1-11 STANDARDS. IF STANDARDS ARE UNSPECIFIED REFER TO CCC CSS PARTS 1-7.

2) ALL PLANS ARE TO BE READ AND DISTRIBUTED AS A COMPLETE SET. ANY DISCREPANCIES ARE TO BE BROUGHT TO THE ATTENTION OF THE ENGINEER FOR CLARIFICATION

3) ELECTRICITY & TELECOM SERVICES NOT SHOWN. REFER TO ELECTRICAL & COMMUNICATION PLANS FOR DUCT LOCATIONS.

4) TRENCHING AND INSTALLATION OF POWER AND TELECOM SERVICES TO BE PROVIDED IN ACCORDANCE WITH SERVICE PROVIDERS PLANS AND SPECIFICATIONS.

5) EXISTING SERVICES HAVE BEEN DIGITISED FROM SERVICE AUTHORITY PLANS; COMPLETENESS AND ACCURACY ARE NOT GUARANTEED. ALL SERVICES TO BE FULLY SEARCHED AND PILOTED PRIOR TO TRENCHING.

LEGEND :

CHIP SEAL
AC SURFACING
NEW FOOTPATH

EXISTING SERVICES
KERB

PROPOSED SERVICES
KERB
CUT DOWN

DAVIE LOVELL-SMITH
PLANNING SURVEYING ENGINEERING

116 Wrights Road P O Box 679 Christchurch 8140. New Zealand
Telephone: 03 379-0793 Website: www.dls.co.nz E-mail: office@dls.co.nz

JOB TITLE:

Bangor Road, Darfield

SHEET TITLE:

Engineering Concept Roading Plan

DRAWING STATUS

For Concept Purposes

SCALE : 1:1000@A1 1:2000@A3

DATE : July 2026

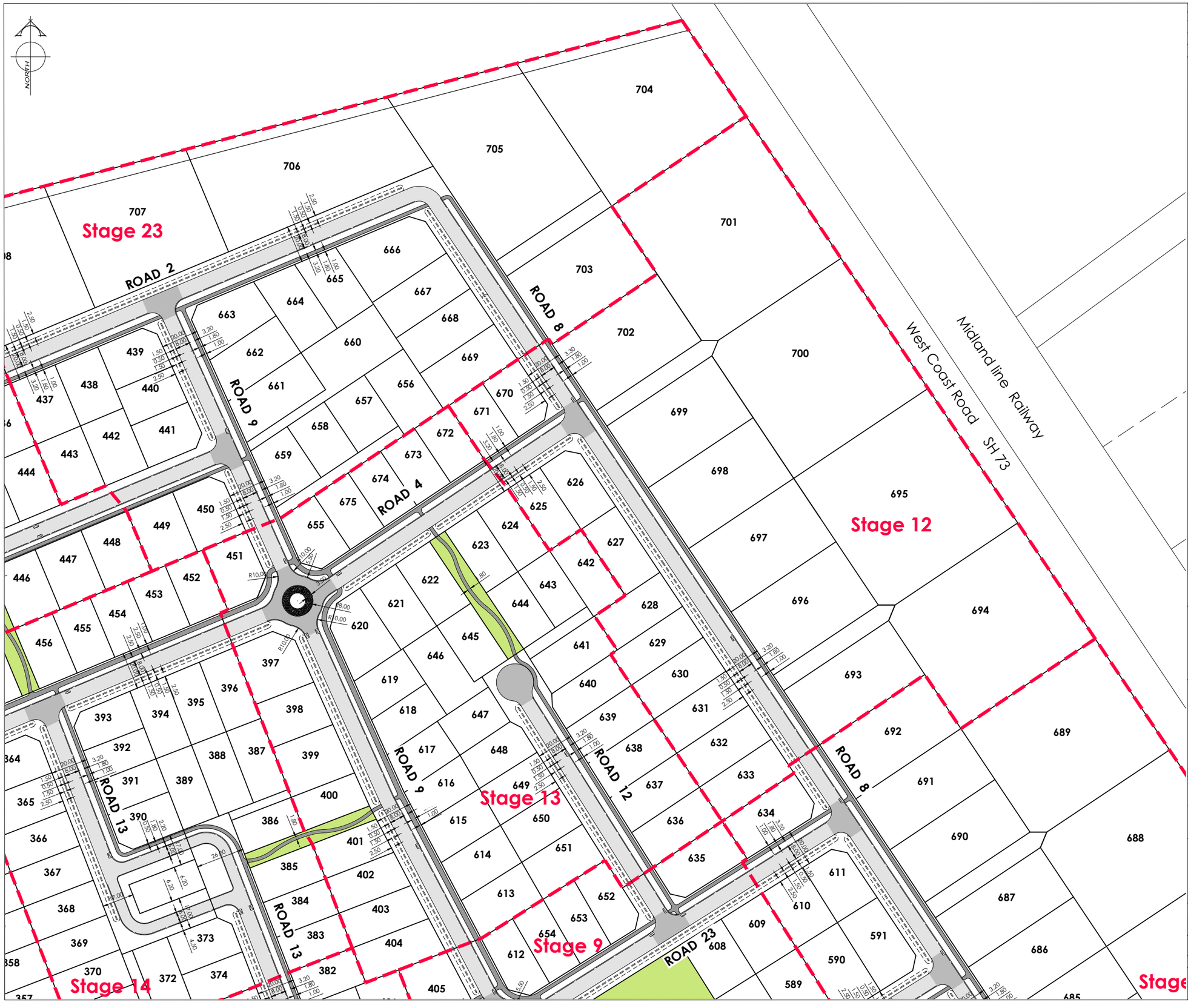
CAD FILE : J:\21112\ENG\Concept\H21112 Eng Concept Plans_R6.dwg

DRAWN : DG

DRAWING No : **H21112**

SHEET No: 3 OF 31

REVISION : **R6**



AMENDMENTS :

AMENDMENT	DATE	DESCRIPTION
R4	6/06/26	BOUNDARIES & ROADING LAYOUT UPDATED
R5	11/06/26	ROADS 1 & 8 AMENDED
R6	3/07/26	ROUNDABOUTS ADDED

NOTES :

1) ALL WORKS IN ACCORDANCE WITH SDC CODE OF PRACTICE PARTS 1-11 STANDARDS, IF STANDARDS ARE UNSPECIFIED REFER TO CCC CSS PARTS 1-7.

2) ALL PLANS ARE TO BE READ AND DISTRIBUTED AS A COMPLETE SET. ANY DISCREPANCIES ARE TO BE BROUGHT TO THE ATTENTION OF THE ENGINEER FOR CLARIFICATION

3) ELECTRICITY & TELECOM SERVICES NOT SHOWN. REFER TO ELECTRICAL & COMMUNICATION PLANS FOR DUCT LOCATIONS.

4) TRENCHING AND INSTALLATION OF POWER AND TELECOM SERVICES TO BE PROVIDED IN ACCORDANCE WITH SERVICE PROVIDERS PLANS AND SPECIFICATIONS.

5) EXISTING SERVICES HAVE BEEN DIGITISED FROM SERVICE AUTHORITY PLANS; COMPLETENESS AND ACCURACY ARE NOT GUARANTEED. ALL SERVICES TO BE FULLY SEARCHED AND PILOTED PRIOR TO TRENCHING.

LEGEND :

CHIP SEAL
AC SURFACING
NEW FOOTPATH

EXISTING SERVICES
KERB

PROPOSED SERVICES
KERB
CUT DOWN

DAVIE LOVELL-SMITH
PLANNING SURVEYING ENGINEERING

116 Wrights Road P O Box 679 Christchurch 8140. New Zealand
Telephone: 03 379-0793 Website: www.dls.co.nz E-mail: office@dls.co.nz

JOB TITLE:
Bangor Road, Darfield

SHEET TITLE:
Engineering Concept Roading Plan

DRAWING STATUS
For Concept Purposes

SCALE : 1:1000@A1 1:2000@A3
DATE : July 2026

CAD FILE : J:\21112\ENG\Concept\H21112 Eng Concept Plans_R6.dwg
DRAWN : DG

DRAWING No : **H21112**
SHEET No: 4 OF 31
REVISION : **R6**

AMENDMENTS :

AMENDMENT	DATE	DESCRIPTION
R4	6/06/26	BOUNDARIES & ROADING LAYOUT UPDATED
R5	11/06/26	ROADS 1 & 8 AMENDED
R6	3/07/26	ROUNDABOUTS ADDED

NOTES :

1) ALL WORKS IN ACCORDANCE WITH SDC CODE OF PRACTICE PARTS 1-11 STANDARDS, IF STANDARDS ARE UNSPECIFIED REFER TO CCC CSS PARTS 1-7.

2) ALL PLANS ARE TO BE READ AND DISTRIBUTED AS A COMPLETE SET. ANY DISCREPANCIES ARE TO BE BROUGHT TO THE ATTENTION OF THE ENGINEER FOR CLARIFICATION

3) ELECTRICITY & TELECOM SERVICES NOT SHOWN. REFER TO ELECTRICAL & COMMUNICATION PLANS FOR DUCT LOCATIONS.

4) TRENCHING AND INSTALLATION OF POWER AND TELECOM SERVICES TO BE PROVIDED IN ACCORDANCE WITH SERVICE PROVIDERS PLANS AND SPECIFICATIONS.

5) EXISTING SERVICES HAVE BEEN DIGITISED FROM SERVICE AUTHORITY PLANS; COMPLETENESS AND ACCURACY ARE NOT GUARANTEED. ALL SERVICES TO BE FULLY SEARCHED AND PILOTED PRIOR TO TRENCHING.

LEGEND :

CHIP SEAL
AC SURFACING
NEW FOOTPATH

EXISTING SERVICES
KERB

PROPOSED SERVICES
KERB
CUT DOWN

DAVIE LOVELL-SMITH
PLANNING SURVEYING ENGINEERING

116 Wrights Road P O Box 679 Christchurch 8140. New Zealand
Telephone: 03 379-0793 Website: www.dls.co.nz E-mail: office@dls.co.nz

JOB TITLE:
Bangor Road, Darfield

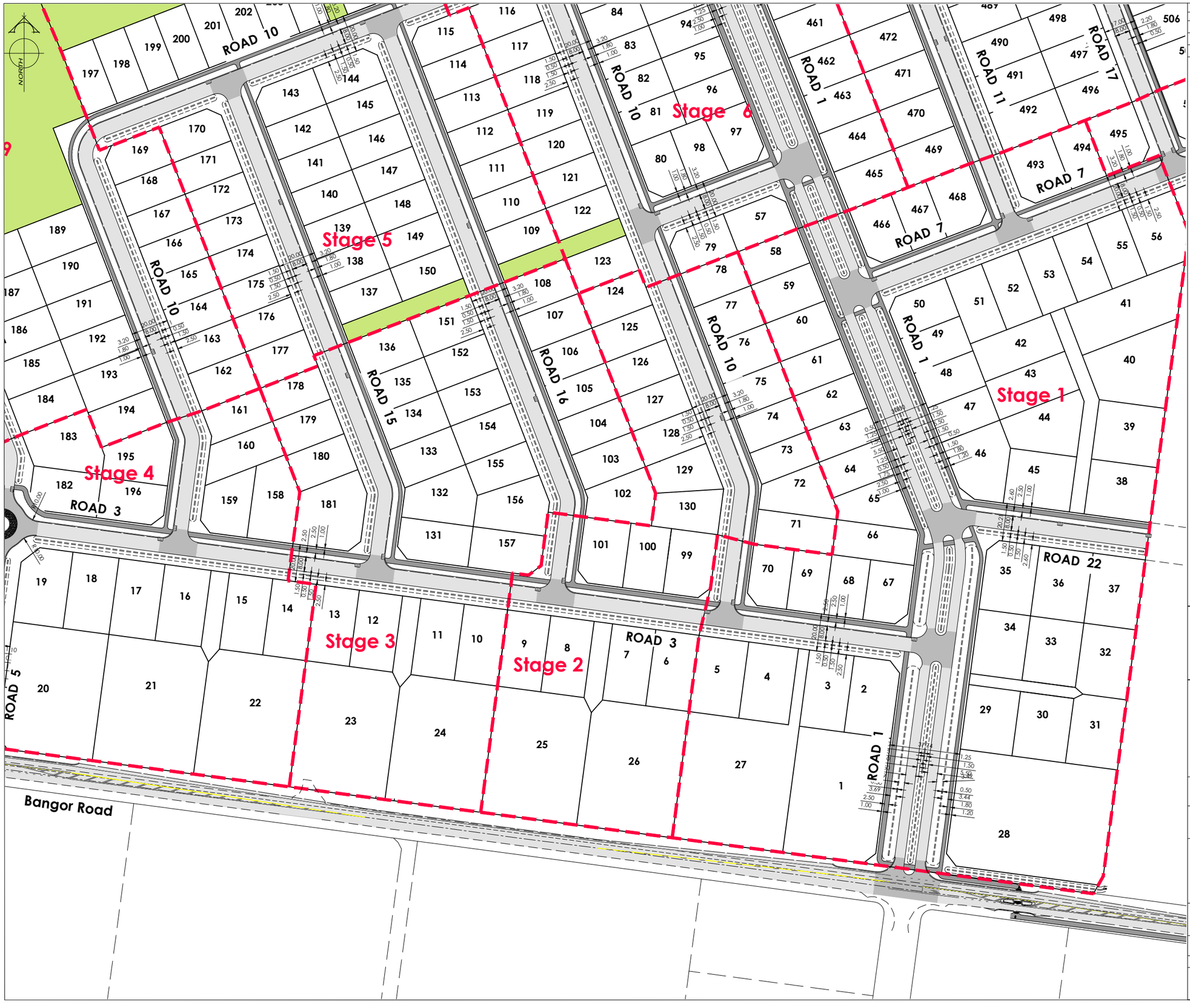
SHEET TITLE:
Engineering Concept Roading Plan

DRAWING STATUS
For Concept Purposes

SCALE : 1:1000@A1 1:2000@A3
DATE : July 2026

CAD FILE : J:\21112\ENG\Concept\H21112 Eng Concept Plans_R6.dwg
DRAWN : DG

DRAWING No : **H21112**
SHEET No: 5 OF 31
REVISION : **R6**



AMENDMENTS :

AMENDMENT	DATE	DESCRIPTION
R4	6/06/26	BOUNDARIES & ROADING LAYOUT UPDATED
R5	11/06/26	ROADS 1 & 8 AMENDED
R6	3/07/26	ROUNDABOUTS ADDED

NOTES :

1) ALL WORKS IN ACCORDANCE WITH SDC CODE OF PRACTICE PARTS 1-11 STANDARDS, IF STANDARDS ARE UNSPECIFIED REFER TO CCC CSS PARTS 1-7.

2) ALL PLANS ARE TO BE READ AND DISTRIBUTED AS A COMPLETE SET. ANY DISCREPANCIES ARE TO BE BROUGHT TO THE ATTENTION OF THE ENGINEER FOR CLARIFICATION

3) ELECTRICITY & TELECOM SERVICES NOT SHOWN. REFER TO ELECTRICAL & COMMUNICATION PLANS FOR DUCT LOCATIONS.

4) TRENCHING AND INSTALLATION OF POWER AND TELECOM SERVICES TO BE PROVIDED IN ACCORDANCE WITH SERVICE PROVIDERS PLANS AND SPECIFICATIONS.

5) EXISTING SERVICES HAVE BEEN DIGITISED FROM SERVICE AUTHORITY PLANS; COMPLETENESS AND ACCURACY ARE NOT GUARANTEED. ALL SERVICES TO BE FULLY SEARCHED AND PILOTED PRIOR TO TRENCHING.

LEGEND :

CHIP SEAL
AC SURFACING
NEW FOOTPATH

EXISTING SERVICES
KERB

PROPOSED SERVICES
KERB
CUT DOWN

DAVIE LOVELL-SMITH
PLANNING SURVEYING ENGINEERING

116 Wrights Road P O Box 679 Christchurch 8140. New Zealand
Telephone: 03 379-0793 Website: www.dls.co.nz E-mail: office@dls.co.nz

JOB TITLE:
Bangor Road, Darfield

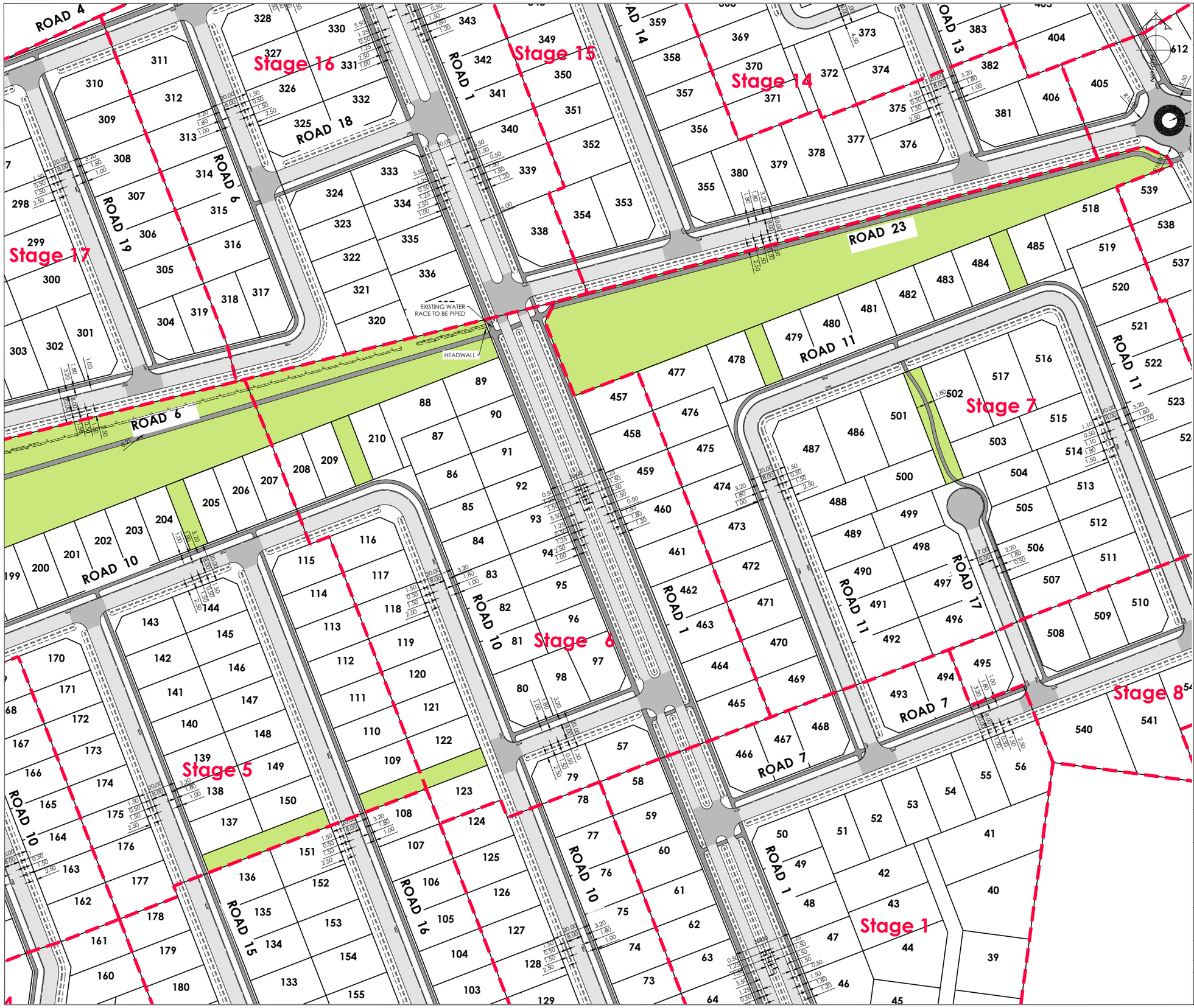
SHEET TITLE:
Engineering Concept Roading Plan

DRAWING STATUS
For Concept Purposes

SCALE : 1:1000@A1 1:2000@A3
DATE : July 2026

CAD FILE : J:\21112\ENG\Concept\H21112 Eng Concept Plans_R6.dwg
DRAWN : DG

DRAWING No : **H21112**
SHEET No: 6 OF 31
REVISION : **R6**



AMENDMENTS :

AMENDMENT	DATE	DESCRIPTION
R4	6/06/26	BOUNDARIES & ROADING LAYOUT UPDATED
R5	11/06/26	ROADS 1 & 8 AMENDED
R6	3/07/26	ROUNDABOUTS ADDED

NOTES :

1) ALL WORKS IN ACCORDANCE WITH SDC CODE OF PRACTICE PARTS 1-11 STANDARDS, IF STANDARDS ARE UNSPECIFIED REFER TO CCC CSS PARTS 1-7.

2) ALL PLANS ARE TO BE READ AND DISTRIBUTED AS A COMPLETE SET. ANY DISCREPANCIES ARE TO BE BROUGHT TO THE ATTENTION OF THE ENGINEER FOR CLARIFICATION

3) ELECTRICITY & TELECOM SERVICES NOT SHOWN. REFER TO ELECTRICAL & COMMUNICATION PLANS FOR DUCT LOCATIONS.

4) TRENCHING AND INSTALLATION OF POWER AND TELECOM SERVICES TO BE PROVIDED IN ACCORDANCE WITH SERVICE PROVIDERS PLANS AND SPECIFICATIONS.

5) EXISTING SERVICES HAVE BEEN DIGITISED FROM SERVICE AUTHORITY PLANS; COMPLETENESS AND ACCURACY ARE NOT GUARANTEED. ALL SERVICES TO BE FULLY SEARCHED AND PILOTED PRIOR TO TRENCHING.

LEGEND :

CHIP SEAL
AC SURFACING
NEW FOOTPATH

EXISTING SERVICES
KERB

PROPOSED SERVICES
KERB
CUT DOWN

DAVIE LOVELL-SMITH
PLANNING SURVEYING ENGINEERING

116 Wrights Road P O Box 679 Christchurch 8140. New Zealand
Telephone: 03 379-0793 Website: www.dls.co.nz E-mail: office@dls.co.nz

JOB TITLE:
Bangor Road, Darfield

SHEET TITLE:
Engineering Concept Roading Plan

DRAWING STATUS
For Concept Purposes

SCALE : 1:1000@A1 1:2000@A3
DATE : July 2026

CAD FILE : J:\21112\ENG\Concept\H21112 Eng Concept Plans_R6.dwg
DRAWN : DG

DRAWING No : **H21112**
SHEET No: 7 OF 31
REVISION : **R6**

AMENDMENTS :

AMENDMENT	DATE	DESCRIPTION
R4	6/06/26	BOUNDARIES & ROADING LAYOUT UPDATED
R5	11/06/26	ROADS 1 & 8 AMENDED
R6	3/07/26	ROUNDABOUTS ADDED

NOTES :

1) ALL WORKS IN ACCORDANCE WITH SDC CODE OF PRACTICE PARTS 1-11 STANDARDS, IF STANDARDS ARE UNSPECIFIED REFER TO CCC CSS PARTS 1-7.

2) ALL PLANS ARE TO BE READ AND DISTRIBUTED AS A COMPLETE SET. ANY DISCREPANCIES ARE TO BE BROUGHT TO THE ATTENTION OF THE ENGINEER FOR CLARIFICATION

3) ELECTRICITY & TELECOM SERVICES NOT SHOWN. REFER TO ELECTRICAL & COMMUNICATION PLANS FOR DUCT LOCATIONS.

4) TRENCHING AND INSTALLATION OF POWER AND TELECOM SERVICES TO BE PROVIDED IN ACCORDANCE WITH SERVICE PROVIDERS PLANS AND SPECIFICATIONS.

5) EXISTING SERVICES HAVE BEEN DIGITISED FROM SERVICE AUTHORITY PLANS; COMPLETENESS AND ACCURACY ARE NOT GUARANTEED. ALL SERVICES TO BE FULLY SEARCHED AND PILOTED PRIOR TO TRENCHING.

LEGEND :

CHIP SEAL
AC SURFACING
NEW FOOTPATH

EXISTING SERVICES
KERB

PROPOSED SERVICES
KERB
CUT DOWN

DAVIE LOVELL-SMITH
PLANNING SURVEYING ENGINEERING

116 Wrights Road P O Box 679 Christchurch 8140. New Zealand
Telephone: 03 379-0793 Website: www.dls.co.nz E-mail: office@dls.co.nz

JOB TITLE:
Bangor Road, Darfield

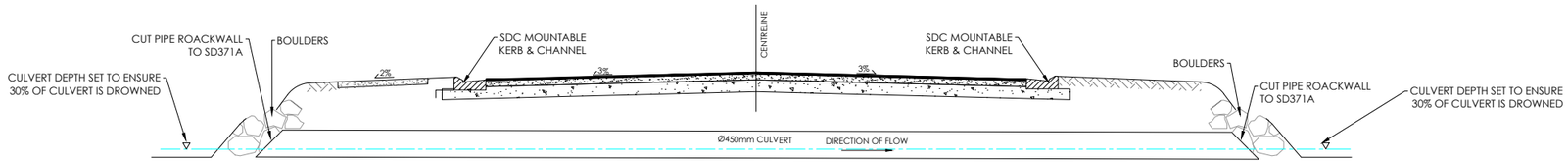
SHEET TITLE:
Engineering Concept Roading Plan

DRAWING STATUS
For Concept Purposes

SCALE : 1:1000@A1 1:2000@A3
DATE : July 2026

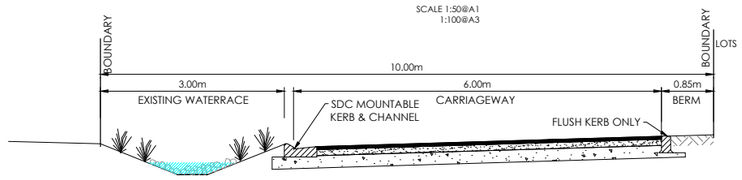
CAD FILE : J:\21112\ENG\Concept\H21112 Eng Concept Plans_R6.dwg
DRAWN : DG

DRAWING No : **H21112**
SHEET No: 8 OF 31
REVISION : **R6**



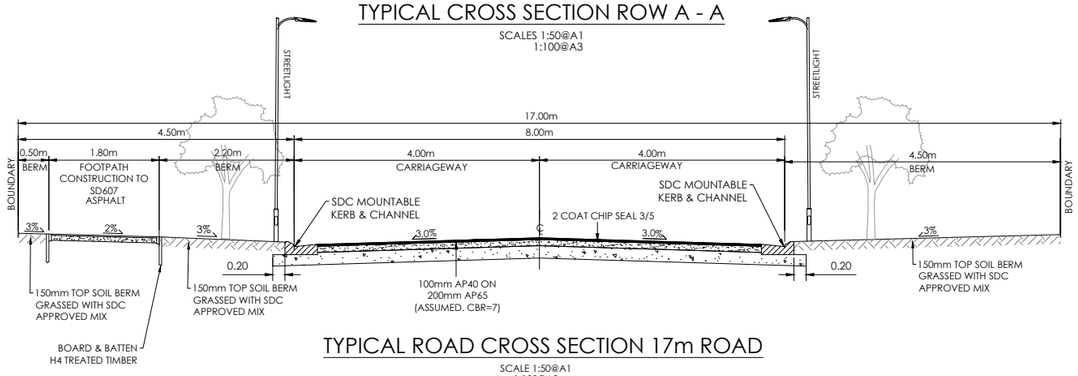
TYPICAL DETAIL FOR CULVERT CROSSING

SCALE 1:50@A1
1:100@A3



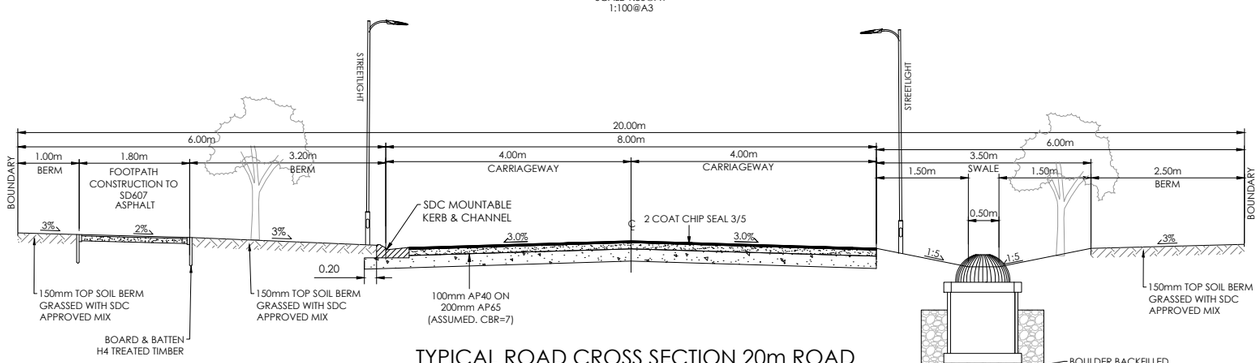
TYPICAL CROSS SECTION ROW A - A

SCALES 1:50@A1
1:100@A3



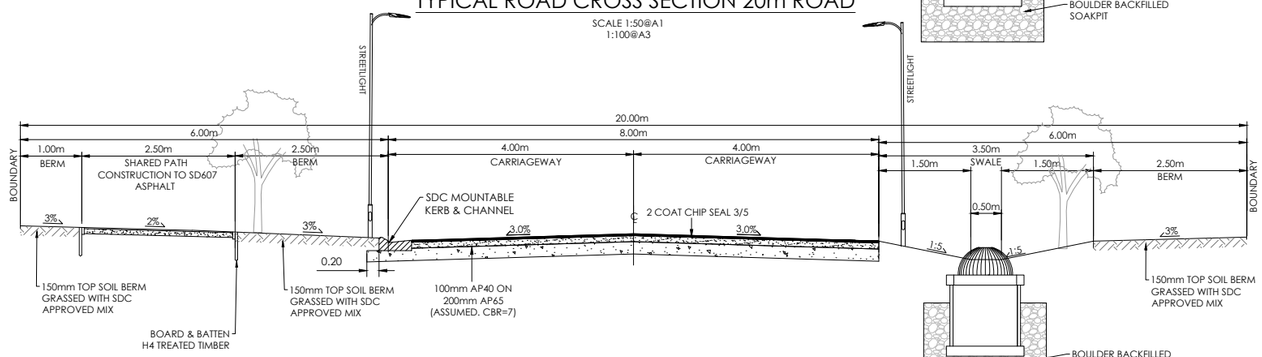
TYPICAL ROAD CROSS SECTION 17m ROAD

SCALE 1:50@A1
1:100@A3



TYPICAL ROAD CROSS SECTION 20m ROAD

SCALE 1:50@A1
1:100@A3



TYPICAL ROAD CROSS SECTION 20m ROAD WITH SHARED PATH

SCALE 1:50@A1
1:100@A3

AMENDMENTS :

AMENDMENT	DATE	DESCRIPTION
R4	6/06/26	24m ROAD CROSS SECTION REMOVED
R5	11/06/26	ROW A - A CROSS SECTION ADDED
R6	3/07/26	CULVERT DETAIL ADDED

NOTES :

1) ALL WORKS IN ACCORDANCE WITH SDC CODE OF PRACTICE PARTS 1-11 STANDARDS, IF STANDARDS ARE UNSPECIFIED REFER TO CCC CSS PARTS 1-7.

2) ALL PLANS ARE TO BE READ AND DISTRIBUTED AS A COMPLETE SET. ANY DISCREPANCIES ARE TO BE BROUGHT TO THE ATTENTION OF THE ENGINEER FOR CLARIFICATION

3) ELECTRICITY & TELECOM SERVICES NOT SHOWN. REFER TO ELECTRICAL & COMMUNICATION PLANS FOR DUCT LOCATIONS.

4) TRENCHING AND INSTALLATION OF POWER AND TELECOM SERVICES TO BE PROVIDED IN ACCORDANCE WITH SERVICE PROVIDERS PLANS AND SPECIFICATIONS.

5) EXISTING SERVICES HAVE BEEN DIGITISED FROM SERVICE AUTHORITY PLANS; COMPLETENESS AND ACCURACY ARE NOT GUARANTEED. ALL SERVICES TO BE FULLY SEARCHED AND PILOTED PRIOR TO TRENCHING.

DAVIE LOVELL-SMITH
PLANNING SURVEYING ENGINEERING

116 Wrights Road P O Box 679 Christchurch 8140. New Zealand
Telephone: 03 379-0793 Website: www.dls.co.nz E-mail: office@dls.co.nz

JOB TITLE:
Bangor Road, Darfield

SHEET TITLE:
Engineering Concept Roading Cross Sections

DRAWING STATUS
For Concept Purposes

SCALE : As Shown DATE : July 2026

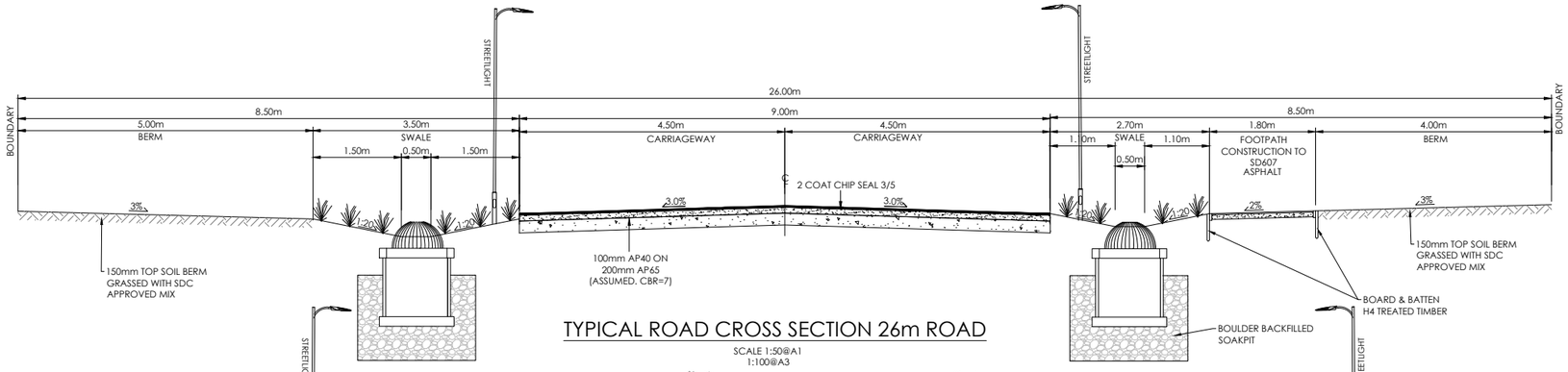
CAD FILE : J:\21112\ENG\Concept\H21112 Eng Concept Plans_R6.dwg DRAWN : DG

DRAWING No : **H21112** SHEET No: 9 OF 31 REVISION : **R6**

AMENDMENTS :		
AMENDMENT	DATE	DESCRIPTION
R4	6/06/26	24m ROAD CROSS SECTION REMOVED
R5	11/06/26	ROW A - A CROSS SECTION ADDED
R6	3/07/26	NO CHANGE THIS SHEET

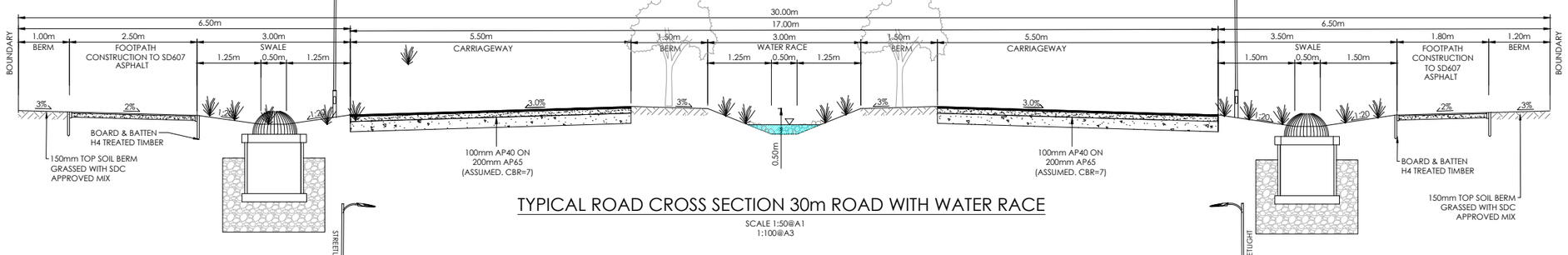
NOTES :

1) ALL WORKS IN ACCORDANCE WITH SDC CODE OF PRACTICE PARTS 1-11 STANDARDS, IF STANDARDS ARE UNSPECIFIED REFER TO CCC CSS PARTS 1-7.
2) ALL PLANS ARE TO BE READ AND DISTRIBUTED AS A COMPLETE SET. ANY DISCREPANCIES ARE TO BE BROUGHT TO THE ATTENTION OF THE ENGINEER FOR CLARIFICATION
3) ELECTRICITY & TELECOM SERVICES NOT SHOWN. REFER TO ELECTRICAL & COMMUNICATION PLANS FOR DUCT LOCATIONS.
4) TRENCHING AND INSTALLATION OF POWER AND TELECOM SERVICES TO BE PROVIDED IN ACCORDANCE WITH SERVICE PROVIDERS PLANS AND SPECIFICATIONS.
5) EXISTING SERVICES HAVE BEEN DIGITISED FROM SERVICE AUTHORITY PLANS; COMPLETENESS AND ACCURACY ARE NOT GUARANTEED. ALL SERVICES TO BE FULLY SEARCHED AND PILOTED PRIOR TO TRENCHING.



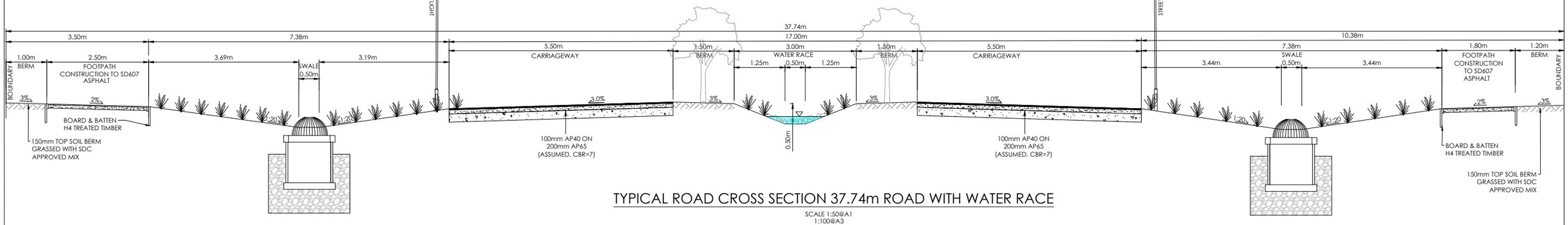
TYPICAL ROAD CROSS SECTION 26m ROAD

SCALE 1:50@A1
1:100@A3



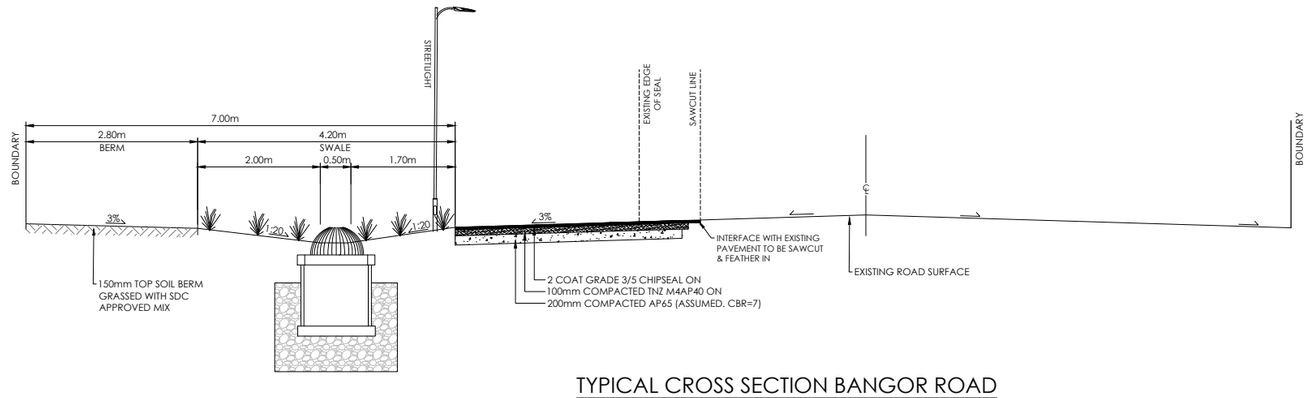
TYPICAL ROAD CROSS SECTION 30m ROAD WITH WATER RACE

SCALE 1:50@A1
1:100@A3



TYPICAL ROAD CROSS SECTION 37.74m ROAD WITH WATER RACE

SCALE 1:50@A1
1:100@A3



TYPICAL CROSS SECTION BANGOR ROAD

SCALE 1:50@A1
1:100@A3

DAVIE LOVELL-SMITH
PLANNING SURVEYING ENGINEERING

116 Wrights Road P O Box 679 Christchurch 8140. New Zealand
Telephone: 03 379-0793 Website: www.dls.co.nz E-mail: office@dls.co.nz

JOB TITLE:

Bangor Road, Darfield

SHEET TITLE:

Engineering Concept Roading Cross Sections

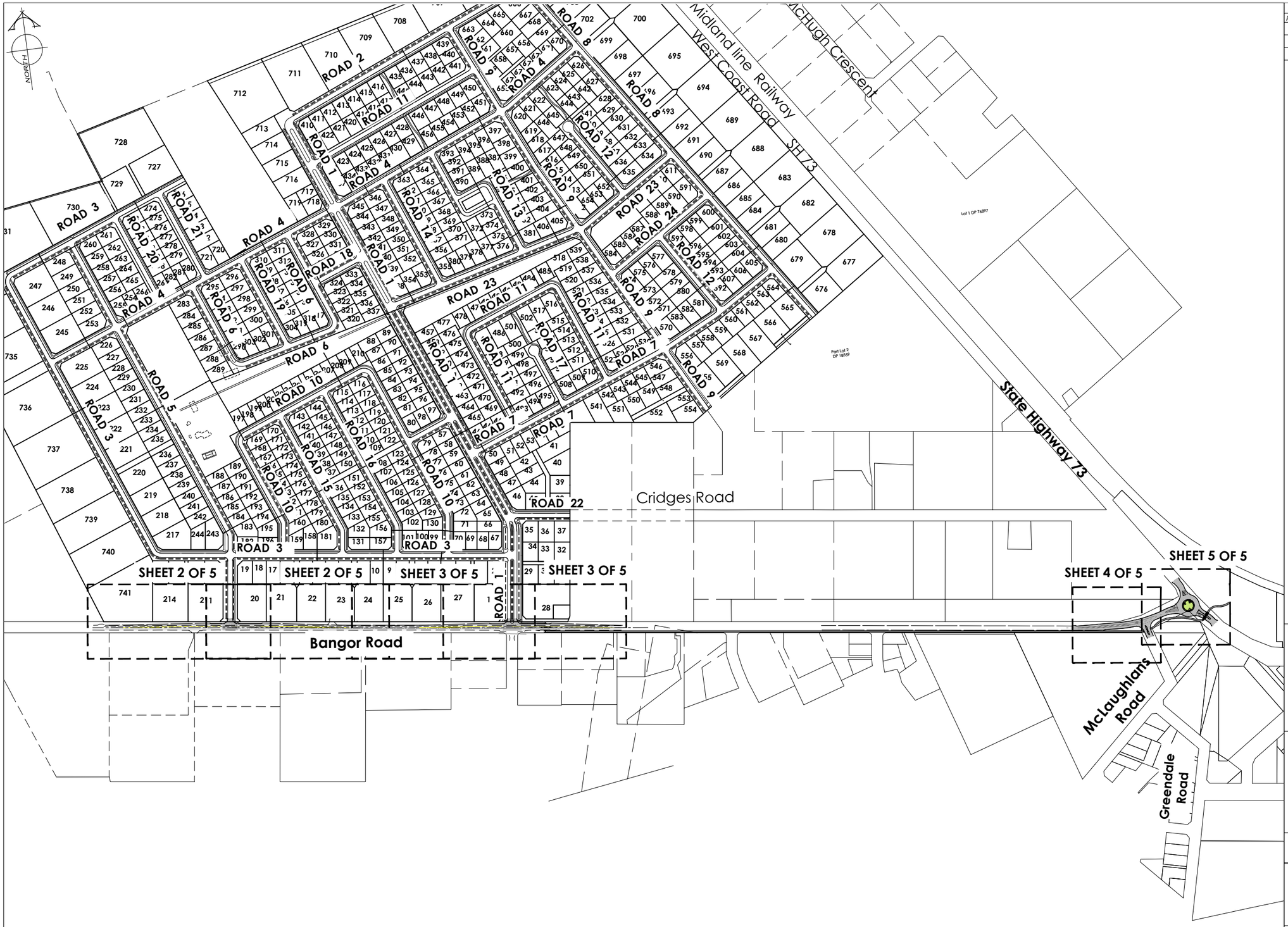
DRAWING STATUS

For Concept Purposes

SCALE : As Shown DATE : July 2026

CAD FILE : J:\21112\ENG\Concept\H21112 Eng Concept Plans_R6.dwg DRAWN : DG

DRAWING No : **H21112** SHEET No: 10 OF 31 REVISION : **R6**



PLAN SCHEDULE		
SHEET	DESCRIPTION	SCALE @ A1
1 of 5	Overall Plan	1:3500
2 of 5 - 3 of 5	Bangor Road Intersections Plan	1:500
4 of 5	McLaughlins Intersection	1:250
5 of 5	SH73 Roadabout	1:250

AMENDMENTS :

AMENDMENT	DATE	DESCRIPTION
R1	7.07.26	NO CHANGE THIS SHEET

NOTES :

1) ALL WORKS IN ACCORDANCE WITH SDC CODE OF PRACTICE PARTS 1-11 STANDARDS, IF STANDARDS ARE UNSPECIFIED REFER TO CCC CSS PARTS 1-7.

2) ALL PLANS ARE TO BE READ AND DISTRIBUTED AS A COMPLETE SET. ANY DISCREPANCIES ARE TO BE BROUGHT TO THE ATTENTION OF THE ENGINEER FOR CLARIFICATION

3) ELECTRICITY & TELECOM SERVICES NOT SHOWN. REFER TO ELECTRICAL & COMMUNICATION PLANS FOR DUCT LOCATIONS.

4) TRENCHING AND INSTALLATION OF POWER AND TELECOM SERVICES TO BE PROVIDED IN ACCORDANCE WITH SERVICE PROVIDERS PLANS AND SPECIFICATIONS.

5) EXISTING SERVICES HAVE BEEN DIGITISED FROM SERVICE AUTHORITY PLANS; COMPLETENESS AND ACCURACY ARE NOT GUARANTEED. ALL SERVICES TO BE FULLY SEARCHED AND PILOTED PRIOR TO TRENCHING.

HUGHES DEVELOPMENTS

LEGEND :

STORMWATER SWALE
NEW ASPHALT PAVEMENT
NEW FOOTPATH
CHIP SEAL
EXISTING SERVICES
PROPOSED SERVICES
EXISTING EDGE OF SEAL
KERB
KERB
CUT DOWN

DAVIE LOVELL-SMITH
PLANNING SURVEYING ENGINEERING

116 Wrights Road P O Box 679 Christchurch 8140, New Zealand
Telephone: 03 379-0793 Website: www.dls.co.nz E-mail: office@dls.co.nz

JOB TITLE:

Bangor Road Upgrade, Darfield

SHEET TITLE:

Overall Plan

DRAWING STATUS

For Concept Purposes

SCALE : 1:3500@A1 1:7000@A3

DATE : July 2026

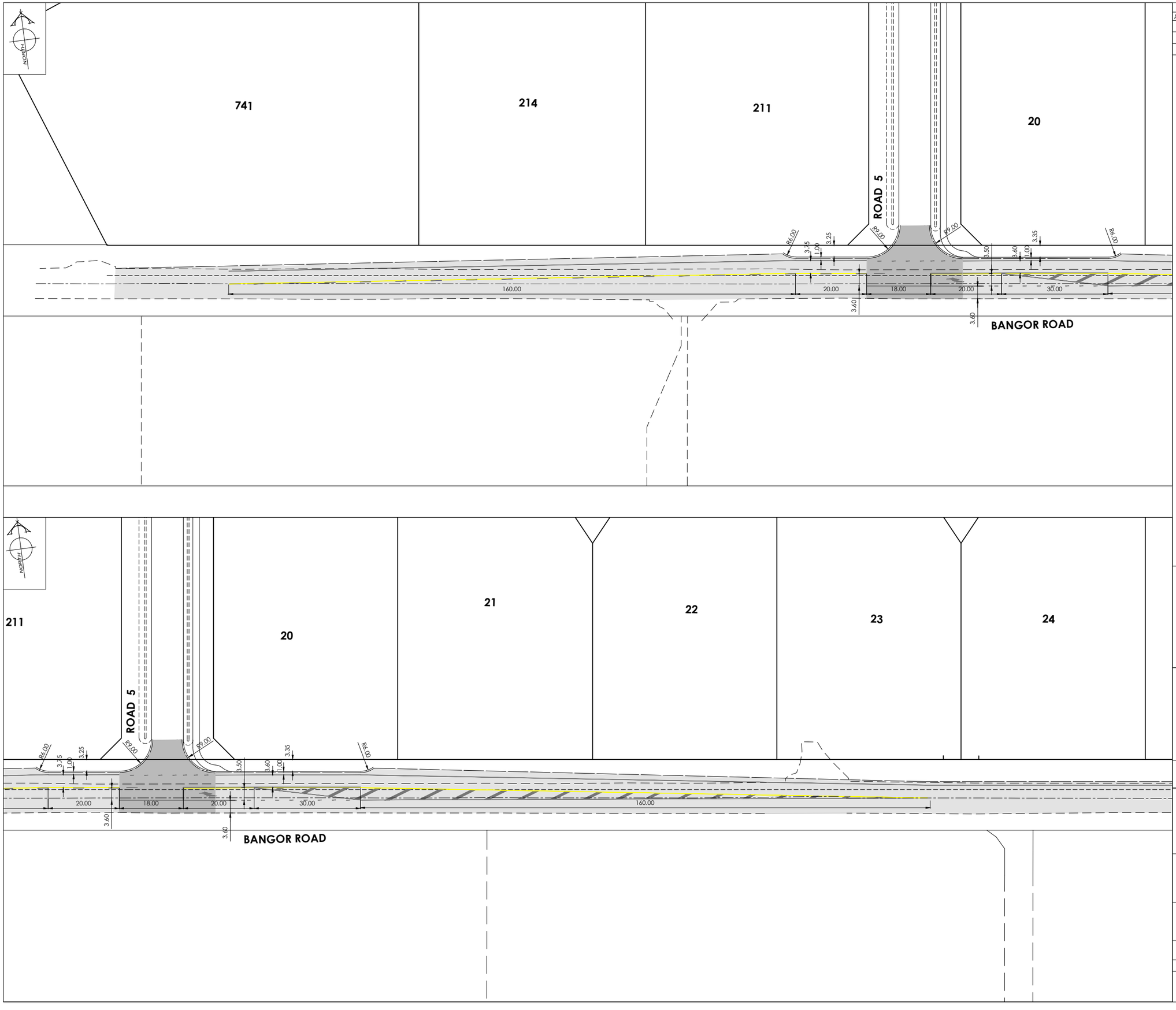
CAD FILE : J:\21112\DWG\Drawings\Bangor Road Upgrade\H21112_ Bangor Rd Upgrade RD1-2_R1.dwg

DRAWN : DG

DRAWING No : **H21112**

SHEET No: 1 of 5

REVISION : **R1**



AMENDMENTS :

AMENDMENT	DATE	DESCRIPTION
R1	7.07.26	NO CHANGE THIS SHEET

NOTES :

1. ALL WORKS IN ACCORDANCE WITH SDC CODE OF PRACTICE PARTS 1-11 STANDARDS, IF STANDARDS ARE UNSPECIFIED REFER TO CCC CSS PARTS 1-7.
2. ORIGIN OF LEVELS
   IS III DP 33396 (BCTN)
   STAINLESS STEEL PIN IN CONCRETE
   RL=73.076m.
   LOCATED IN THE BERM ON JOWERS ROAD.

   LEVELS ARE IN TERMS OF NEW ZEALAND VERTICAL DATUM 2016.
3. METAL DEPTHS TO BE CONFIRMED OR INCREASED BY ENGINEER FOLLOWING CHECKING OF SUBGRADE CBR STRENGTH ONCE EXCAVATED.
4. ELECTRICITY & TELECOM SERVICES NOT SHOWN. REFER TO ELECTRICAL / TELECOM STREETLIGHT RETICULATION PLANS FOR RELEVANT DETAILS.
5. EXISTING SERVICES HAVE BEEN DIGITISED FROM SERVICE AUTHORITY PLANS; COMPLETENESS AND ACCURACY ARE NOT GUARANTEED. ALL SERVICES TO BE FULLY SEARCHED & PILOTED PRIOR TO TRENCHING.
6. CARRIAGEWAY & FOOTPATH ACCEPTANCE TESTING IN ACCORDANCE WITH SDC CODE OF PRACTICE PART 8, CCC CSS PART 6 & CCC IDS.
7. FOOTPATH BASECOURSE TESTING - MINIMUM CLEGG HAMMER VALUE OF 25 REQUIRED FOR FOOTPATHS & RESIDENTIAL CROSSINGS. 35 FOR COMMERCIAL CROSSINGS.
8. KERB & CHANNEL BASECOURSE TESTING - MINIMUM DRY DENSITY OF 2100kg/m³ WITH 75% EQUAL OR EXCEEDING 2150kg/m³.
9. ROAD BASECOURSE TESTING - MAXIMUM BENKELMAN BEAM DEFLECTION OF 1.6m WITH 95% OF RESULTS BELOW 2.0mm & 1.2mm FOR SH73.
10. AP65 SUB-BASE TESTING. MINIMUM DRY DENSITY 95% MDD ON EACH 150mm LIFT.
11. ALL AC FOOTPATHS TO CCC CSS SD607; SD608 CONCRETE.
12. DRAWINGS TO BE DISTRIBUTED AND READ AS A COMPLETE SET. ANY DISCREPANCIES ARE TO BE BROUGHT TO THE ATTENTION OF THE ENGINEER FOR CLARIFICATION.
13. TACTILE AND DIRECTIONAL PAVERS TO BE INSTALLED IN ACCORDANCE WITH RTS14. ICONS SHOWN ARE INDICATIVE ONLY.
14. STREET LIGHT LOCATIONS TO BE CONFIRMED.

HUGHES DEVELOPMENTS

LEGEND :

- STORMWATER SWALE
- NEW ASPHALT PAVEMENT
- NEW FOOTPATH
- CHIP SEAL
- EXISTING SERVICES
- PROPOSED SERVICES
- EXISTING EDGE OF SEAL
- KERB
- KERB
- CUT DOWN

DAVIE LOVELL-SMITH
PLANNING SURVEYING ENGINEERING

116 Wrights Road P O Box 679 Christchurch 8140. New Zealand
Telephone: 03 379-0793 Website: www.dls.co.nz E-mail: office@dls.co.nz

JOB TITLE:

Bangor Road Intersection, Darfield

SHEET TITLE:

Roading Layout

DRAWING STATUS

For Concept Purposes

SCALE : 1:500@A1 1:1000@A3

DATE : July 2026

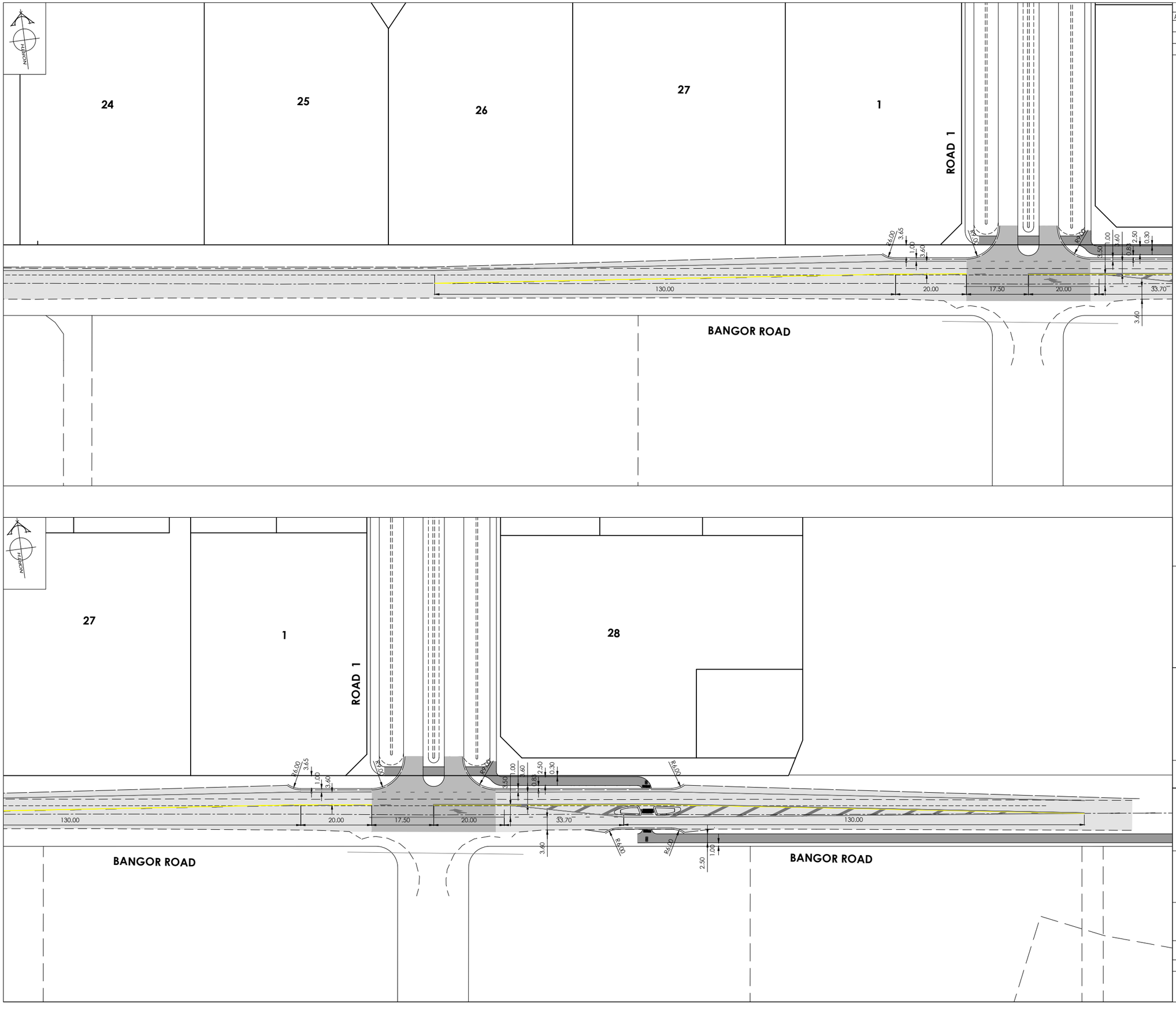
CAD FILE : J:\21112\ENG\Drawings\Bangor Road Upgrade\H21112_ Bangor Rd Upgrade E01 D_R1.dwg

DRAWN : DG

DRAWING No : **H21112**

SHEET No: 2 of 5

REVISION : **R1**



AMENDMENTS :

AMENDMENT	DATE	DESCRIPTION
R1	7.07.26	NO CHANGE THIS SHEET

NOTES :

1. ALL WORKS IN ACCORDANCE WITH SDC CODE OF PRACTICE PARTS 1-11 STANDARDS, IF STANDARDS ARE UNSPECIFIED REFER TO CCC CSS PARTS 1-7.
2. ORIGIN OF LEVELS
   IS III DP 33396 (BCTN)
   STAINLESS STEEL PIN IN CONCRETE
   RL=73.076m.
   LOCATED IN THE BERM ON JOWERS ROAD.

   LEVELS ARE IN TERMS OF NEW ZEALAND VERTICAL DATUM 2016.
3. METAL DEPTHS TO BE CONFIRMED OR INCREASED BY ENGINEER FOLLOWING CHECKING OF SUBGRADE CBR STRENGTH ONCE EXCAVATED.
4. ELECTRICITY & TELECOM SERVICES NOT SHOWN. REFER TO ELECTRICAL / TELECOM STREETLIGHT RETICULATION PLANS FOR RELEVANT DETAILS.
5. EXISTING SERVICES HAVE BEEN DIGITISED FROM SERVICE AUTHORITY PLANS; COMPLETENESS AND ACCURACY ARE NOT GUARANTEED. ALL SERVICES TO BE FULLY SEARCHED & PILOTED PRIOR TO TRENCHING.
6. CARRIAGEWAY & FOOTPATH ACCEPTANCE TESTING IN ACCORDANCE WITH SDC CODE OF PRACTICE PART 8, CCC CSS PART 6 & CCC IDS.
7. FOOTPATH BASECOURSE TESTING - MINIMUM CLEGG HAMMER VALUE OF 25 REQUIRED FOR FOOTPATHS & RESIDENTIAL CROSSINGS. 35 FOR COMMERCIAL CROSSINGS.
8. KERB & CHANNEL BASECOURSE TESTING - MINIMUM DRY DENSITY OF 2100kg/m³ WITH 75% EQUAL OR EXCEEDING 2150kg/m³.
9. ROAD BASECOURSE TESTING - MAXIMUM BENKELMAN BEAM DEFLECTION OF 1.6m WITH 95% OF RESULTS BELOW 2.0mm & 1.2mm FOR SH73.
10. AP65 SUB-BASE TESTING. MINIMUM DRY DENSITY 95% MDD ON EACH 150mm LIFT.
11. ALL AC FOOTPATHS TO CCC CSS SD607; SD608 CONCRETE.
12. DRAWINGS TO BE DISTRIBUTED AND READ AS A COMPLETE SET. ANY DISCREPANCIES ARE TO BE BROUGHT TO THE ATTENTION OF THE ENGINEER FOR CLARIFICATION.
13. TACTILE AND DIRECTIONAL PAVERS TO BE INSTALLED IN ACCORDANCE WITH RTS14. ICONS SHOWN ARE INDICATIVE ONLY.
14. STREET LIGHT LOCATIONS TO BE CONFIRMED.

HUGHES DEVELOPMENTS

LEGEND :

STORMWATER SWALE
NEW ASPHALT PAVEMENT
NEW FOOTPATH
CHIP SEAL
EXISTING SERVICES
PROPOSED SERVICES
EXISTING EDGE OF SEAL
KERB
KERB
CUT DOWN

DAVIE LOVELL-SMITH
PLANNING SURVEYING ENGINEERING

116 Wrights Road P O Box 679 Christchurch 8140. New Zealand
Telephone: 03 379-0793 Website: www.dls.co.nz E-mail: office@dls.co.nz

JOB TITLE:

Bangor Road Intersection, Darfield

SHEET TITLE:

Roading Layout

DRAWING STATUS

For Concept Purposes

SCALE : 1:500@A1
1:1000@A3

DATE : July 2026

CAD FILE : J:\21112\ENG\Drawings\Bangor Road Upgrade\H21112_ Bangor Rd Upgrade E01 (1_R1.dwg

DRAWN : DG

DRAWING No : **H21112**

SHEET No: 3 of 5

REVISION : **R1**

AMENDMENTS :		
AMENDMENT	DATE	DESCRIPTION
R1	7.07.26	SHEET ADDED

NOTES :

1) ALL WORKS IN ACCORDANCE WITH SDC CODE OF PRACTICE PARTS 1-11 STANDARDS, IF STANDARDS ARE UNSPECIFIED REFER TO CCC CSS PARTS 1-7.
2) ALL PLANS ARE TO BE READ AND DISTRIBUTED AS A COMPLETE SET. ANY DISCREPANCIES ARE TO BE BROUGHT TO THE ATTENTION OF THE ENGINEER FOR CLARIFICATION
3) ELECTRICITY & TELECOM SERVICES NOT SHOWN. REFER TO ELECTRICAL & COMMUNICATION PLANS FOR DUCT LOCATIONS.
4) TRENCHING AND INSTALLATION OF POWER AND TELECOM SERVICES TO BE PROVIDED IN ACCORDANCE WITH SERVICE PROVIDERS PLANS AND SPECIFICATIONS.
5) EXISTING SERVICES HAVE BEEN DIGITISED FROM SERVICE AUTHORITY PLANS; COMPLETENESS AND ACCURACY ARE NOT GUARANTEED. ALL SERVICES TO BE FULLY SEARCHED AND PILOTED PRIOR TO TRENCHING.

LEGEND :

AC SURFACING		NEW FOOTPATH	
EXPOSED AGGREGATE		COLORED CONCRETE	
COBBLES		LANDSCAPING	

EXISTING SERVICES	PROPOSED SERVICES
KERB	KERB
	CUT DOWN

DAVIE LOVELL-SMITH
PLANNING SURVEYING ENGINEERING

116 Wrights Road P O Box 679 Christchurch 8140. New Zealand
Telephone: 03 379-0793 Website: www.dls.co.nz E-mail: office@dls.co.nz

JOB TITLE:

McLaughlins Intersection Concept Layout

SHEET TITLE:

Roading Layout

DRAWING STATUS

For Concept Purposes

SCALE : 1:250@A1 1:500@A3 DATE : July 2026

CAD FILE : J:\21112\ENG\Drawings\Bangor Road Upgrade\H21112_ Bangor Rd Upgrade 001 D_R1.dwg DRAWN : DG

DRAWING No : **H21112** SHEET No: 4 OF 5 REVISION : **R1**

AMENDMENTS :

AMENDMENT	DATE	DESCRIPTION
R1	7.07.26	SHEET ADDED

NOTES :

1) ALL WORKS IN ACCORDANCE WITH SDC CODE OF PRACTICE PARTS 1-11 STANDARDS, IF STANDARDS ARE UNSPECIFIED REFER TO CCC CSS PARTS 1-7.

2) ALL PLANS ARE TO BE READ AND DISTRIBUTED AS A COMPLETE SET. ANY DISCREPANCIES ARE TO BE BROUGHT TO THE ATTENTION OF THE ENGINEER FOR CLARIFICATION

3) ELECTRICITY & TELECOM SERVICES NOT SHOWN. REFER TO ELECTRICAL & COMMUNICATION PLANS FOR DUCT LOCATIONS.

4) TRENCHING AND INSTALLATION OF POWER AND TELECOM SERVICES TO BE PROVIDED IN ACCORDANCE WITH SERVICE PROVIDERS PLANS AND SPECIFICATIONS.

5) EXISTING SERVICES HAVE BEEN DIGITISED FROM SERVICE AUTHORITY PLANS; COMPLETENESS AND ACCURACY ARE NOT GUARANTEED. ALL SERVICES TO BE FULLY SEARCHED AND PILOTED PRIOR TO TRENCHING.

LEGEND :

AC SURFACING		NEW FOOTPATH	
EXPOSED AGGREGATE		COLORED CONCRETE	
COBBLES		LANDSCAPING	

EXISTING SERVICES	PROPOSED SERVICES
KERB	KERB
	CUT DOWN

DAVIE LOVELL-SMITH
PLANNING SURVEYING ENGINEERING

116 Wrights Road P O Box 679 Christchurch 8140. New Zealand
Telephone: 03 379-0793 Website: www.dls.co.nz E-mail: office@dls.co.nz

JOB TITLE:

SH73 Roundabout Concept Layout

SHEET TITLE:

Roading Layout

DRAWING STATUS

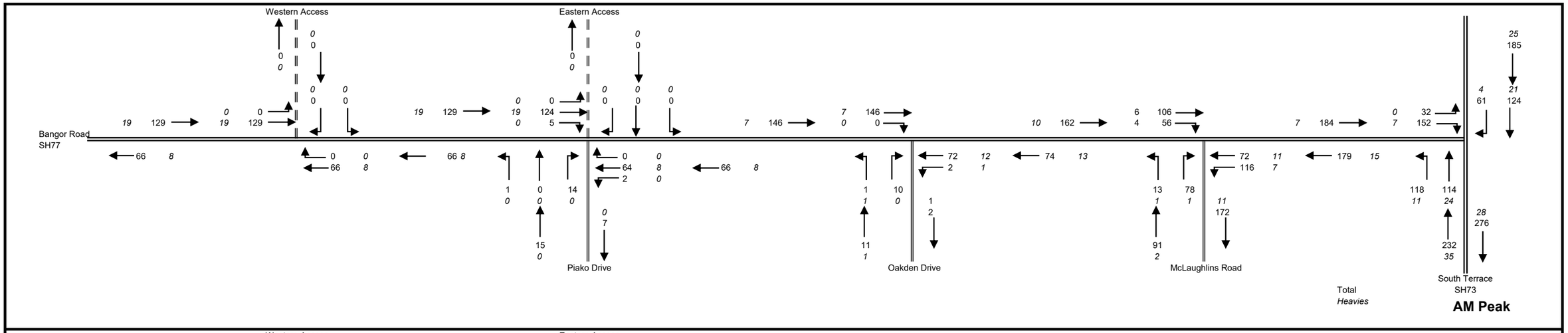
For Concept Purposes

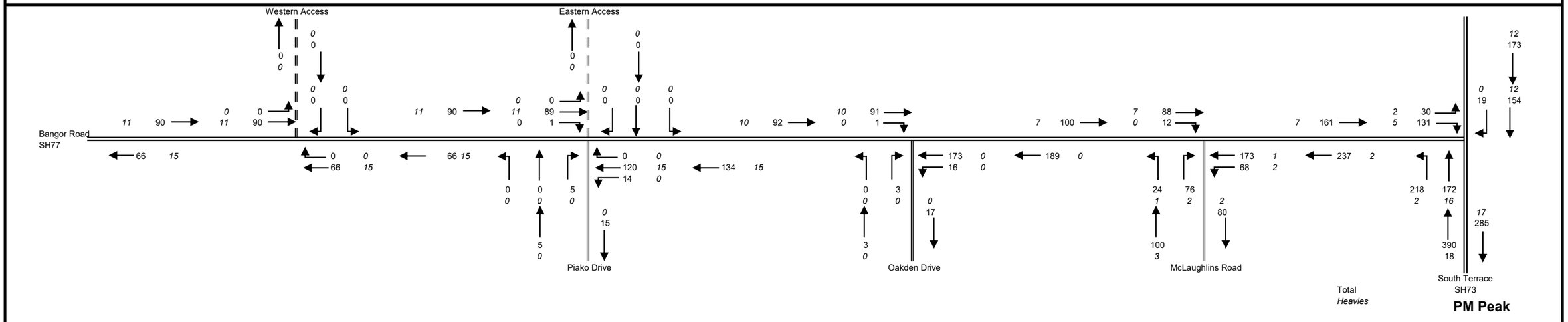
SCALE : 1:250@A1 1:500@A3 DATE : July 2026

CAD FILE : J:\21112\ENG\Drawings\Bangor Road Upgrade\H21112_ Bangor Rd Upgrade E01.2_R1.dwg DRAWN : DG

DRAWING No : **H21112** SHEET No: 5 OF 5 REVISION : **R1**

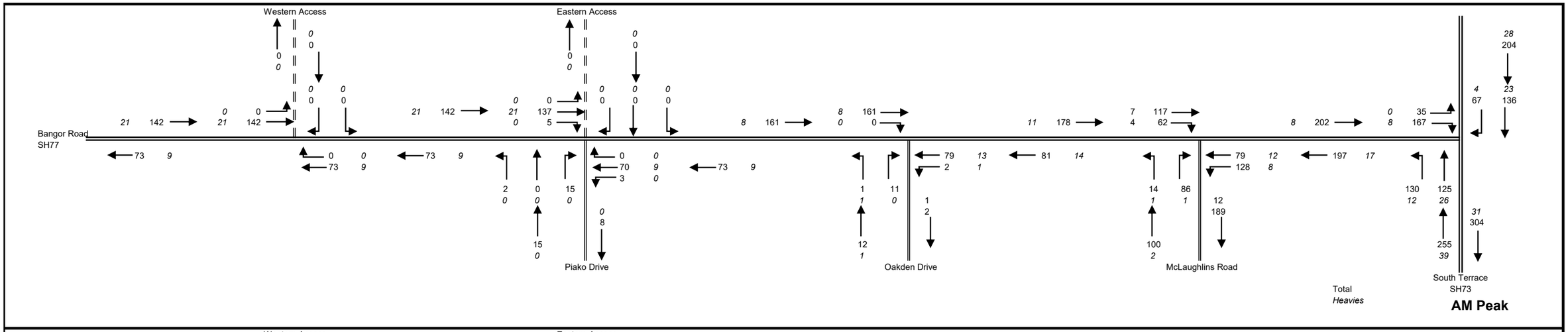
Appendix 3. Traffic Volume Diagrams

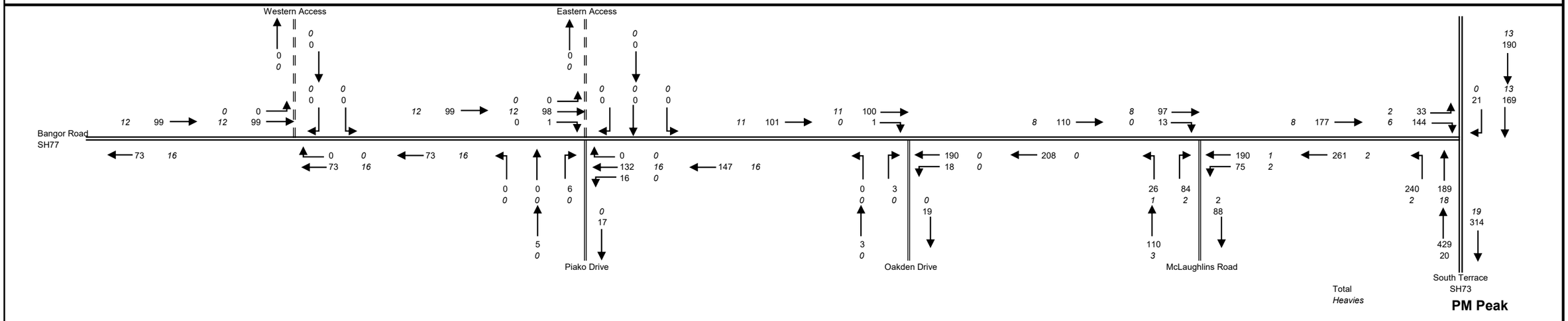




novo group
Planning. Traffic. Development.

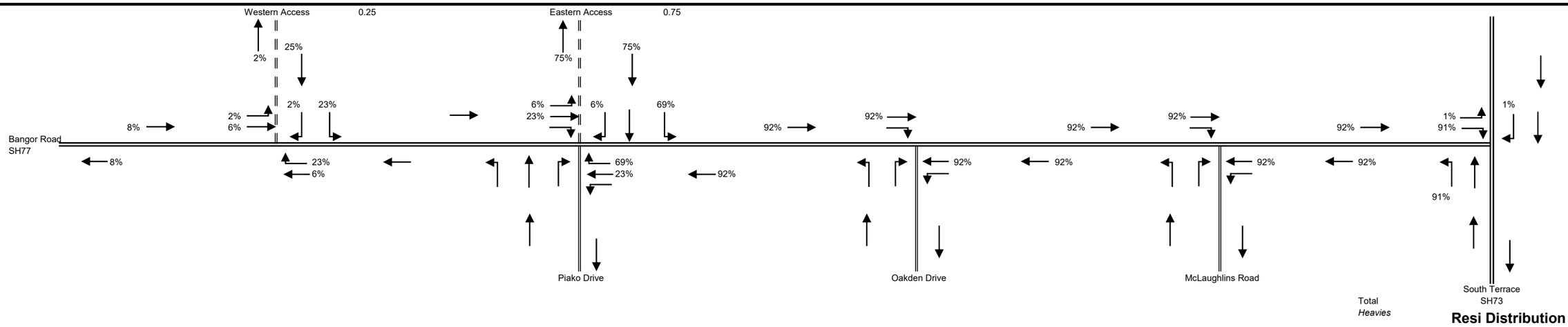
0033-067b: Bangor Road, Darfield
2026 Existing Traffic Volumes



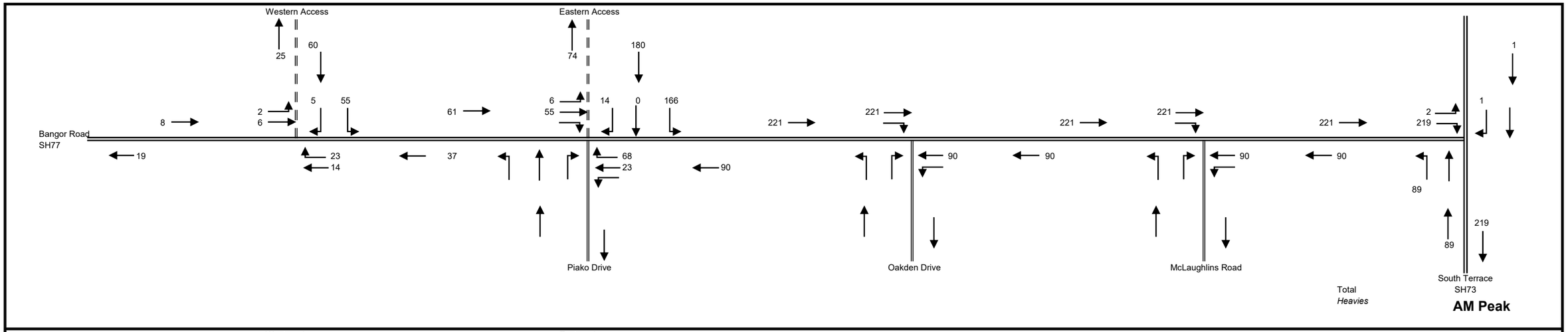


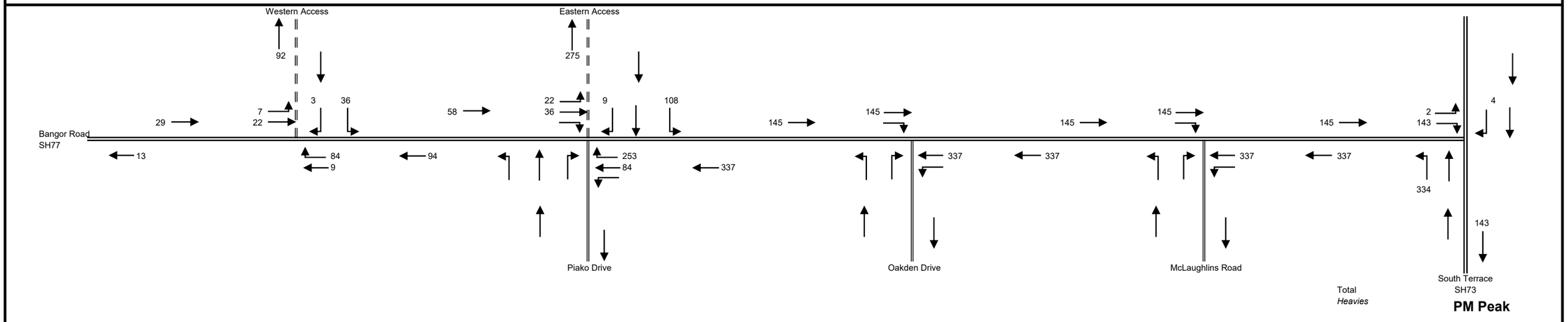
novo group
Planning. Traffic. Development.

0033-067b: Bangor Road, Darfield
Base Traffic Volumes - Sensitivity
10%



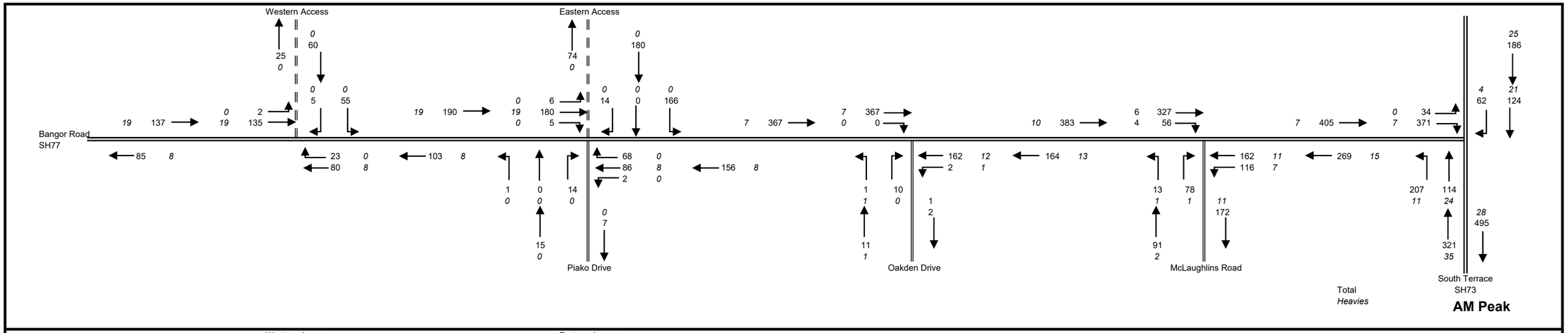
Resi Distribution

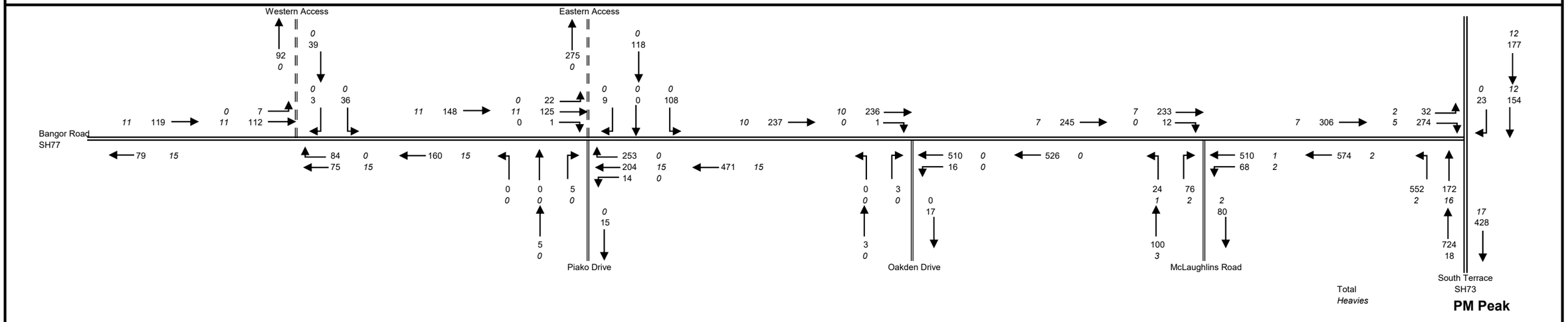




novo group
Planning. Traffic. Development.

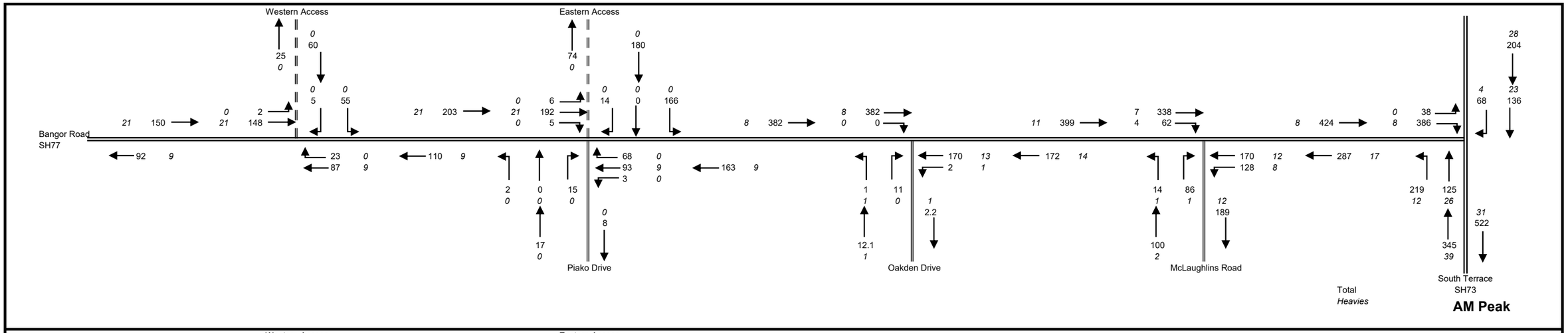
0033-067b: Bangor Road, Darfield
Residential Traffic Assignment

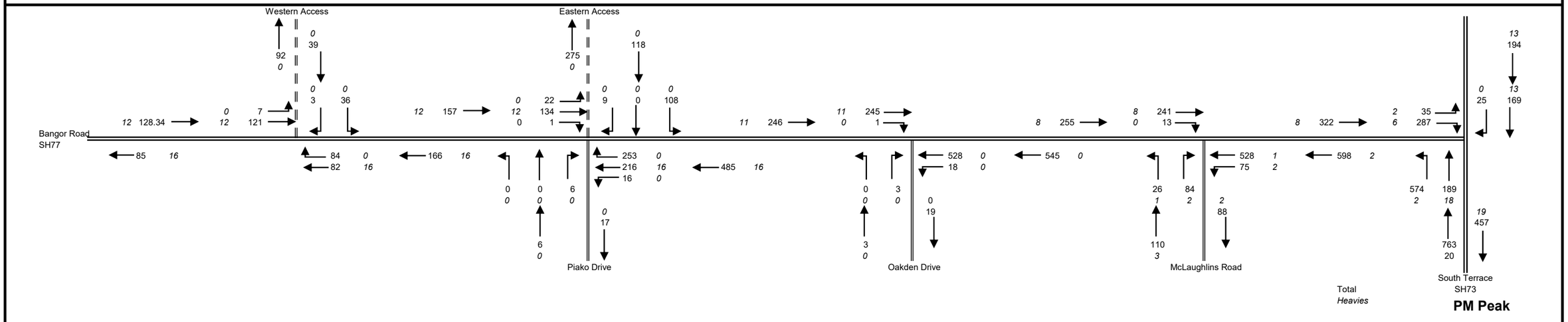




novo group
Planning. Traffic. Development.

0033-067b: Bangor Road, Darfield
2026 + Development Traffic Volumes





novo group
Planning. Traffic. Development.

0033-067b: Bangor Road, Darfield
2026 +10% + Development Traffic Volumes

Appendix 4. Bangor Road / West Coast Road Base Model Results

MOVEMENT SUMMARY

Site: 101 [Bangor Rd / West Coast Rd - 2026 AM (Site Folder: 2026 Base Models)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival 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	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: SH73															
1	L2	All MCs	124	9.3	124	9.3	0.116	4.9	LOS A	0.4	3.4	0.17	0.48	0.17	45.7
2	T1	All MCs	120	21.1	120	21.1	0.069	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	50.0
Approach			244	15.1	244	15.1	0.116	2.5	LOS A	0.4	3.4	0.09	0.24	0.09	47.7
North: SH73															
8	T1	All MCs	131	16.9	131	16.9	0.073	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	50.0
9	R2	All MCs	64	6.6	64	6.6	0.042	5.0	LOS A	0.2	1.4	0.24	0.50	0.24	45.3
Approach			195	13.5	195	13.5	0.073	1.7	NA	0.2	1.4	0.08	0.17	0.08	48.3
West: SH77															
10	L2	All MCs	34	0.0	34	0.0	0.027	8.0	LOS A	0.1	0.8	0.27	0.85	0.27	44.3
12	R2	All MCs	160	4.6	160	4.6	0.358	14.0	LOS B	1.5	11.0	0.55	1.04	0.69	41.8
Approach			194	3.8	194	3.8	0.358	13.0	LOS B	1.5	11.0	0.50	1.01	0.62	42.2
All Vehicles			633	11.1	633	11.1	0.358	5.5	NA	1.5	11.0	0.21	0.45	0.25	46.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options 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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [Bangor Rd / West Coast Rd - 2026 PM (Site Folder: 2026 Base Models)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival 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	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: SH73															
1	L2	All MCs	229	0.9	229	0.9	0.196	4.6	LOS A	0.8	5.8	0.09	0.47	0.09	46.0
2	T1	All MCs	181	9.3	181	9.3	0.096	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	50.0
Approach			411	4.6	411	4.6	0.196	2.6	LOS A	0.8	5.8	0.05	0.26	0.05	47.7
North: SH73															
8	T1	All MCs	162	7.8	162	7.8	0.086	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	50.0
9	R2	All MCs	20	0.0	20	0.0	0.013	5.1	LOS A	0.1	0.4	0.29	0.50	0.29	45.3
Approach			182	6.9	182	6.9	0.086	0.6	NA	0.1	0.4	0.03	0.06	0.03	49.4
West: SH77															
10	L2	All MCs	32	6.7	32	6.7	0.034	8.7	LOS A	0.1	0.9	0.30	0.88	0.30	44.1
12	R2	All MCs	138	3.8	138	3.8	0.351	15.5	LOS C	1.4	10.2	0.60	1.06	0.76	41.1
Approach			169	4.3	169	4.3	0.351	14.3	LOS B	1.4	10.2	0.54	1.03	0.67	41.6
All Vehicles			762	5.1	762	5.1	0.351	4.7	NA	1.4	10.2	0.16	0.38	0.18	46.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options 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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Appendix 5. Bangor Road / McLaughlins Road Base Model Results

MOVEMENT SUMMARY

Site: 101 [Bangor Rd / McLaughlins Rd - 2026 AM (Site Folder: 2026 Base Models)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival 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	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: McLaughlins Rd															
1	L2	All MCs	14	7.7	14	7.7	0.013	5.0	LOS A	0.0	0.3	0.18	0.50	0.18	45.4
3	R2	All MCs	82	1.3	82	1.3	0.130	7.0	LOS A	0.4	3.0	0.40	0.65	0.40	44.6
Approach			96	2.2	96	2.2	0.130	6.7	LOS A	0.4	3.0	0.37	0.63	0.37	44.7
East: Bangor Rd															
4	L2	All MCs	122	6.0	122	6.0	0.106	4.6	LOS A	0.0	0.0	0.00	0.33	0.00	46.8
5	T1	All MCs	76	15.3	76	15.3	0.106	0.0	LOS A	0.0	0.0	0.00	0.33	0.00	48.0
Approach			198	9.6	198	9.6	0.106	2.9	NA	0.0	0.0	0.00	0.33	0.00	47.3
West: Bangor Rd															
11	T1	All MCs	112	5.7	112	5.7	0.100	0.4	LOS A	0.4	2.8	0.24	0.27	0.24	48.3
12	R2	All MCs	59	7.1	59	7.1	0.100	5.4	LOS A	0.4	2.8	0.24	0.27	0.24	47.0
Approach			171	6.2	171	6.2	0.100	2.1	NA	0.4	2.8	0.24	0.27	0.24	47.9
All Vehicles			464	6.8	464	6.8	0.130	3.4	NA	0.4	3.0	0.16	0.37	0.16	46.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options 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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [Bangor Rd / McLaughlins Rd - 2026 PM (Site Folder: 2026 Base Models)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival 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	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: McLaughlins Rd															
1	L2	All MCs	25	4.2	25	4.2	0.026	5.5	LOS A	0.1	0.7	0.29	0.53	0.29	45.2
3	R2	All MCs	80	2.6	80	2.6	0.130	7.2	LOS A	0.4	3.0	0.41	0.66	0.41	44.5
Approach			105	3.0	105	3.0	0.130	6.8	LOS A	0.4	3.0	0.38	0.63	0.38	44.7
East: Bangor Rd															
4	L2	All MCs	72	2.9	72	2.9	0.127	4.6	LOS A	0.0	0.0	0.00	0.15	0.00	47.9
5	T1	All MCs	182	0.6	182	0.6	0.127	0.0	LOS A	0.0	0.0	0.00	0.15	0.00	49.1
Approach			254	1.2	254	1.2	0.127	1.3	NA	0.0	0.0	0.00	0.15	0.00	48.8
West: Bangor Rd															
11	T1	All MCs	93	8.0	93	8.0	0.057	0.2	LOS A	0.1	0.7	0.10	0.11	0.10	49.3
12	R2	All MCs	13	0.0	13	0.0	0.057	5.4	LOS A	0.1	0.7	0.10	0.11	0.10	48.1
Approach			105	7.0	105	7.0	0.057	0.8	NA	0.1	0.7	0.10	0.11	0.10	49.2
All Vehicles			464	2.9	464	2.9	0.130	2.4	NA	0.4	3.0	0.11	0.25	0.11	47.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options 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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Appendix 6. NZTA Reported Crashes

Plain English report

Export this report as CSV

4 results from your query.

1-4 of 4

Crash road	Side road	Feature	Distance from side road/feature	Direction	Reference station	Route position	Easting	Northing	Longitude	Latitude	ID	Date	Day of week	Time	Description of events	Crash factors	Surface condition	Natural light	Weather	Junction	Control	Casualty count fatal	Casualty count serious	Casualty count minor	Social cost $(m)
BANGOR ROAD	CLINTONS ROAD		273.00m	W			1524946	5184931	172.071854	-43.484779	2024284247	03/04/2024	Wed	13:55	Car/Wagon1 EDB on BANGOR ROAD lost control; went off road to left, Car/Wagon1 hit power pole, fence	CAR/WAGON1, alcohol test below limit, other lost control	Dry	Bright sun	Fine	Nil (Default)	Nil	0	1	0	1.84
BANGOR ROAD	CLINTONS ROAD			I			1525202	5184878	172.075012	-43.485280	2021193503	04/07/2021	Sun	18:30	Car/Wagon1 WDB on BANGOR ROAD lost control; went off road to left, Car/Wagon1 hit fence	CAR/WAGON1, alcohol test below limit, lost control avoiding another party, ENV: wild animal	Dry	Dark	Fine	Crossroads	Give way	0	0	0	0.05
BANGOR ROAD	PIAKO DRIVE		94.00m	W			1526372	5184703	172.089456	-43.486972	2023271031	26/08/2023	Sat	15:45	Car/Wagon1 EDB on BANGOR ROAD lost control; went off road to left, Car/Wagon1 hit hedge	CAR/WAGON1, alcohol test above limit or test refused, too far left	Dry	Bright sun	Fine	Nil (Default)	Nil	0	0	0	0.05
WEST COAST ROAD	HORNDON STREET		141.00m	S			1526999	5185613	172.097331	-43.478838	2021175790	05/01/2021	Tue	09:00	Motorcycle1 WDB on WEST COAST ROAD lost control; went off road to left	MOTORCYCLE1, alcohol test below limit, other brakes	Dry	Overcast	Fine	Nil (Default)	Nil	0	1	0	1.84

1-4 of 4

Appendix 7. Transport and Subdivision Compliance Assessment

TRAN - RULES	ASSESSMENT	STATUS
TRAN-R1 – Works and activities in a land transport corridor		
All Zones		
1. Land transport infrastructure works or activities within a land transport corridor Where: a. They are undertaken by, on behalf of, or pursuant to authorisation from, a road controlling authority; or b. They are being undertaken in accordance with an approved subdivision consent; or c. Are subject to a designation listed in this District Plan. And this activity complies with the following rule requirements: TRAN-REQ1 Location of works TRAN-REQ19 Formation standards TRAN-REQ21 PREC6 formation standard TRAN-REQ24 Signage TRAN-REQ25 Lighting TRAN-REQ26 Noise TRAN-REQ27 Waterbody Setbacks NH-REQ4 Natural Hazards and Earthworks NH-REQ6 Natural Hazards and Land Transport Infrastructure ECO-REQG Earthworks and Ecosystems and indigenous biodiversity	Complies except for: TRAN-REQ19: None of the road designs comply with the maximum carriageway widths for the existing LLRZ. (Roads have instead been designed to a RESZ standard)	**Does not comply with TRAN-REQ19**
TRAN-R2 – Creation of a new land transport corridor		
All Zones		
1. The creation of a new or expansion to an existing land transport corridor Where: The new or expanded land transport corridor: a. is to be vested or dedicated in the road controlling authority; and b. is not located within a ONL or VAL; and c. is not located with a Site or Area of Significance to Māori; and d. is not located within the Coastal Environment Overlay; and e. is not located within a significant natural area; and f. is not within a heritage item setting, or the area includes a heritage item; and	Complies except for: TRAN-R2.1.h because land transport corridor connects with SH77 TRAN-REQ18: Road 1 (if assessed as a Collector in the RESZ) exceeds the 25m maximum legal width (30-37m proposed) TRAN-REQ20: The Road 5 intersection with Bangor Road is currently within the 100km/h speed limit and is less than 800m from the Road 1 intersection (~510m).	**Does not comply with TRAN-R2.1.h, TRAN-REQ18 and TRAN-REQ20.**

g. area does not include a notable tree; and h. does not result in a land transport corridor connecting to a state highway. And this activity complies with the following rule requirements: TRAN-REQ18 Land transport corridor creation standards TRAN-REQ20 Intersection spacing TRAN-REQ27 Waterbody Setbacks NH-REQ5 Natural Hazards and Infrastructure NH-REQ6 Natural Hazards and Land Transport Infrastructure Advisory note: Advice should be sought from Waka Kotahi NZTA and approval obtained for any land transport corridor intended to connect to a State Highway.	The Road 5 intersection with Bangor Road is less than 800m from the Clintons Road intersection (~775m) The spacing between intersections along Road 1 (Collector) and Road 3, 22, 7, 23, 18, 4, 11 & 2 are not 123m	
TRAN-R4 – Vehicle crossings		
CMUZ GIZ PORTZ KNOZ RESZ		
5. The establishment of a vehicle crossing Where: The vehicle crossing: a. is located in PREC6 - Rolleston Industrial Precinct and generates no more than 250vm/d; or b. provides shared access to sites which cumulatively generate no more than 250vm/d; or c. otherwise provides access to a single site (outside PREC6 - Rolleston Industrial Precinct). And the activity complies with the following rule requirements: TRAN-REQ2 Access restrictions TRAN-REQ3 Number of vehicle crossings TRAN-REQ4 Siting of vehicle crossings TRAN-REQ5 Vehicle crossing design and construction TRAN-REQ6 Vehicle crossing surface	Complies except for: TRAN-REQ4: Lots 116, 169, 410, 487, 516 & 666 cannot achieve a vehicle crossing with 45m sight distance because of their location on the inside of a curve.	**Does not comply with TRAN-REQ4.**
TRAN-R5 – Vehicle accessways		
All Zones		
1. The establishment and use of an accessway. Where the activity complies with the following rule requirements: TRAN-REQ7 Accessway design, formation and use NH-REQ4 Natural Hazards and Earthworks	The legal width of accessways comply with TRAN-TABLE3, therefore the formed width and passing requirements can comply at the time of construction	**Complies.**
TRAN-R6 – Parking, manoeuvring and loading areas		
All Zones		
1. Any parking, manoeuvring and loading areas associated with a residential activity.	Not applicable, as no dwellings are proposed.	**N/A**

Where the activity complies with the following rule requirements: TRAN-REQ9 On-site parking TRAN-REQ11 Cycle parks and facilities TRAN-REQ14 Access gradients TRAN-REQ16 Vehicle manoeuvring TRAN-REQ28 Landscape Strip for Parking Areas	(Can/will comply otherwise future resource consent will be required for any non-compliances)	
TRAN-R8 – High trip generating activities		
RESZ GRUZ CMUZ GIZ CHVZ CORZ FHSVZ GRAZ HOHZ KNOZ MPZ PORTZ PRZ TEZ		
1. The establishment of a new, or expansion of an existing activity listed in TRAN-TABLE2 - HTGA thresholds and ITA requirements Where: a. The activity does not exceed the basic ITA threshold in TRAN-TABLE2 - HTGA thresholds and ITA requirements; or b. The activity does exceed the basic ITA threshold in TRAN-TABLE2 - HTGA thresholds and ITA requirements but an ITA has already been approved for the site as part of a granted resource consent and the activity is within the scope of that ITA and in accordance with the resource consent, unless the resource consent has lapsed. Advisory Note: Further guidance is available from New Zealand Transport Agency Research Report No.422 'Integrated Transport Assessment Guidelines', Abley et al, November 2010	No applicable for subdivision. The HTG rule can still be applied to future land use activities	**Complies** **(still assessed broader subdivision matters)**

TRAN – RULE REQUIREMENTS	ASSESSMENT	STATUS
TRAN-REQ1 – Location of works		
All Zones		
1. The forming of any road on land shall have: a. an average slope of less than 20°; and b. a gradient no steeper than 1:6 vertical.	The site is flat and all slopes can be achieved.	**Complies.**
3. The land transport infrastructure works or activity comply with: HH-R1 Maintenance or repairs; HH-R2 Earthquake strengthening; HH-R3 Alterations and repairs; HH-R4 Works within a heritage setting; HH-R5 Relocation of a heritage item within its setting; HH-R6 Relocation of a heritage item outside its setting; HH-R7 Partial demolition; and HH-R8 Demolition.	N/A or assessed by others.	**N/A**
5. The land transport infrastructure works or activity comply with:	N/A or assessed by others.	**N/A**

TREE-R1 Maintenance pruning; TREE-R2 Gardening and cultivation; TREE-R3 Activities close to scheduled notable trees; TREE-R4 Unsafe scheduled notable trees; TREE-R5 Power lines; TREE-R6 Fixing scheduled notable trees; and TREE-R7 Destruction or removal		
7. The land transport infrastructure works or activity comply with: ECO-RC Indigenous vegetation clearance outside of significant natural areas ECO-RD Indigenous vegetation clearance within significant natural areas ECO-R3 Potential Pest Species	N/A or assessed by others.	**N/A**
TRAN-REQ2 – Vehicle crossing access restrictions		
RESZ		
1. A vehicle crossing shall not be formed on an arterial road where the posted speed limit is 60km/hr or more.	No vehicle crossings are proposed to arterial roads.	**Complies.**
TRAN-REQ3 – Number of vehicle crossings		
1. There is no more than one vehicle crossing per site, except where: a. The site has frontage to a collector road or local road, there may be a maximum of two vehicle crossings per site if each vehicle crossing is a single exit or entry (one-way flow); or b. The site has a road frontage of more than 100m in length, there may be a maximum of three vehicle crossings per site; or c. Access can be obtained to either road where the site accesses a collector road or local road, but not both; and d. The road is maintained by a road controlling authority.	No sites are proposed to have more than one vehicle crossing. (If future sites are proposed to be constructed with an additional vehicle crossing and it did not comply with the District Plan, they would require separate resource consent approval)	**Complies.**
TRAN-REQ4 – Siting of vehicle crossings		
All Zones		
1. Vehicle crossing(s) shall: a. comply with TRAN-TABLE4 - Vehicle crossing distances from intersections as illustrated in TRAN-DIAGRAM1 - Accessway separation from intersections; and b. be located a minimum distance of 10m from the end of any splitter or approach island to a roundabout; and c. comply with TRAN-TABLE5 - Vehicle crossing sight distances as illustrated in TRAN-DIAGRAM2 - Sight distance measurements and values; and	No vehicle crossings will be provided to the state highways. All lots can achieve vehicle crossings that are 20m on a local road from an intersection or 30m on a collector road from an intersection or provided in the most complying location. All lots can achieve 45m sight distance except Lots 116, 169, 410, 487, 516 & 666 which are	**Does not comply.**

d. not be formed within a State Highway.	located in the inside curve of a road.	
5. Vehicle crossing(s) shall be no closer than 30m to the intersection of any railway line when measured from the nearest edge of the vehicle crossing to the limit line at the level rail crossing.	Not applicable.	**N/A**
9. Where a vehicle crossing(s) is to be formed it shall comply with the minimum access separation distances listed in TRAN-TABLE6A - Accessway separation from other accessways.	N/A to speeds below 70km/h.	**N/A**
13. No vehicle crossing(s) shall be located on Hoskyns Road between State Highway 1 and Jones Road.	Not applicable.	**N/A**
TRAN-REQ5 – Vehicle crossing design and construction		
RESZ		
1. Vehicle crossing design and construction shall comply with TRAN-TABLE6 - Vehicle crossing width requirements and illustrated in TRAN-DIAGRAM3 - Vehicle crossing widths and separation distances.	All vehicle crossing widths can comply (3-6m wide).	**Complies.**
TRAN-REQ6 – Vehicle crossing surface		
All Zones		
1. Vehicle crossings where they adjoin a sealed carriageway shall be sealed for the full width and length of the vehicle crossing between the carriageway and the site boundary.	All vehicle crossings will be sealed.	**Complies.**

<table>
<tr><th colspan="3">TRAN-REQ7 – Accessway design, formation and use</th></tr>
<tr><th colspan="3">GRZ / LLRZ</th></tr>
<tr><td>1. (GRZ) Accessway(s) shall :
a. be formed to comply with the design requirements listed in TRAN-TABLE3 - Minimum Requirements for Accessways and TRAN-TABLE6A - Accessway Separation from Other Accessways; and
b. have a minimum height clearance of 4.5m; and
c. not directly access:
i. Railway Road from the area identified in PREC6 - Rolleston Industrial Precinct; or
ii. Hoskyns Road from the area identified as Area 2 in PREC6 - Rolleston Industrial Precinct.
iii. Maddisons Road from the area identified as Area 3 in PREC6 - Rolleston Industrial Precinct; or
iv. Two Chain Road, Runners Road or Walkers Road (north of the primary road intersection) from the area identified in PREC6A - Rolleston West Industrial Precinct.
5. (LLRZ) Accessways are formed to comply with the design requirements listed in TRAN-TABLE3 - Minimum requirements for accessways and TRAN-TABLE6A - Accessway separation from other accessways.
Table 3 (For GRZ / LLRZ)
Minimum Requirements for Accessways
<table>
<tr><th>Potential number of sites (Excludes sites with direct road frontage)</th><th>Length (m)</th><th>Legal width (m)</th><th>Carriageway width (m)</th><th>Turning area</th><th>Passing bay</th></tr>
<tr><td rowspan="2">1</td><td>0-90</td><td>3.5</td><td>3.0</td><td rowspan="2">Optional</td><td rowspan="2">Optional</td></tr>
<tr><td>Over 90</td><td>4.5</td><td>4.0</td></tr>
<tr><td rowspan="2">2-3</td><td>0-90</td><td>4.5</td><td>3.0</td><td rowspan="2">Optional</td><td rowspan="2">Optional</td></tr>
<tr><td>Over 90</td><td>5.5</td><td>4.0</td></tr>
<tr><td rowspan="2">4-6</td><td>0-50</td><td>5.0</td><td>3.5</td><td>Optional</td><td>Optional</td></tr>
<tr><td>Over 50</td><td>6.5</td><td>4.5</td><td>Optional</td><td>Required</td></tr>
</table></td><td>All accessways can comply with TRAN-TABLE3
Table 6A does not apply to speeds below 70km/h.</td><td>Complies.</td></tr>
<tr><th colspan="3">REZ Excluding MRZ</th></tr>
<tr><td>8. Formed accessway widths are no greater than the maximum vehicle crossing width listed in TRAN-TABLE6 - Vehicle Crossing Width Requirements.
9. Every accessway serving more than two sites are formed and sealed.</td><td>The access widths and vehicle crossing widths will be formed to comply.</td><td>Complies.</td></tr>
<tr><th colspan="3">LLRZ; GRZ</th></tr>
<tr><td>14. Where access is shared to more than six sites this shall be via a road.</td><td>The accessways are proposed to service less than six lots.</td><td>Complies.</td></tr>
</table>

TRAN-REQ18 Land Transport Corridor creation standard		
All Zones		
1. All land transport corridors shall comply with the legal widths listed in TRANTABLE7 - Road formation standards, unless provided for in TRAN-REQ18.3 or TRAN-REQ18.5. [Table 7 requires: Local GRZ (13-20m) Local LLRZ (18-20m) Collector REZ (20-25m) Cycle / pedestrian accessways (6-10m)]	Road 1 (if assessed as a Collector in the RESZ) exceeds the 25m maximum legal width (30-37m proposed)	**Does not comply.**
TRAN-REQ19 Formation standards		
RESZ		
1. Land transport infrastructure shall be formed to the standards contained in TRAN-TABLE7 - Road formation standards, except that roads in PREC6 - Rolleston Industrial Precinct are formed in accordance with TRAN-DIAGRAM9 - PREC6 - Rolleston Industrial Precinct Boulevard Road Options and TRAN-DIAGRAM10 - PREC6 - Rolleston Industrial Precinct Secondary Roads. [Table7 requires: Collector Roads: 11-12m carriageway; cycle provision and footpaths both sides. Local Roads LLRZ: 6-6.5m carriageway footpath one side. Local Roads GRZ7:.5-8.0m carriageway and footpaths one side. Cycle Pedestrian accessways: 2.5-3.0m wide path for pedestrians and cyclists.] 2. Footpaths shall be constructed as a sealed strip within the berm of the road. 3. All areas of the berm that are not sealed in footpath shall be maintained in grass or landscaping. 4. Footpaths shall be formed on both sides of local roads in locations where: a. The road is shown on an ODP; or b. The road adjoins a site that contains, or is proposed through the subdivision to contain, Small Site Development or Comprehensive Development.	None of the road designs comply with the maximum carriageway widths for the existing LLRZ. (Roads have instead been designed to a RESZ standard)	**Does not comply.**
6. Where a cul de sac is formed it shall comply with the Local Road (in all other RESZ) standards listed in TRAN-TABLE7 - Road formation standards, and include: a. A maximum length of 150m; b. A walking and cycling connection to a through road that is not to another cul de sac and is a minimum average width of 6m, and is a minimum width of 4m; c. A turning head with a minimum diameter of 22m measured from the kerb to the kerb; and	Can comply. Walking and cycle connections are proposed to and from the cul-de-sac heads.	**N/A.**

<table>
<tr><td>d. Line of sight to adjoining roads.</td><td></td><td></td></tr>
<tr><td>10. (LLRZ) Land transport infrastructure shall be formed to the standards contained in TRAN-TABLE7 - Road formation standards, and as illustrated in TRAN-DIAGRAM8 - Large Lot Residential Zone-Indicative Road cross sections.</td><td>As above.

None of the road designs comply with the maximum carriageway widths for the existing LLRZ.

(Roads have instead been designed to a RESZ standard</td><td>Does not comply.</td></tr>
<tr><td colspan="3">TRAN-REQ20 Intersection spacing</td></tr>
<tr><td colspan="3">All Zones (excluding PREC6)</td></tr>
<tr><td>1. The spacing between road intersections complies with the separation distances listed in TRAN-TABLE8 - Minimum distances between intersections.

TRAN-TABLE8 Minimum Distances Between Intersections
<table><tr><th>Posted Speed Limit (km/hr)</th><th>Road type</th><th>Distance (m)</th></tr><tr><td>100</td><td>All</td><td>800</td></tr><tr><td>90</td><td>All</td><td>248</td></tr><tr><td>80</td><td>All</td><td>214</td></tr><tr><td>70</td><td>All</td><td>181</td></tr><tr><td>60</td><td>All</td><td>151</td></tr><tr><td>50 or less</td><td>State Highways, Arterial, and Collectors</td><td>123</td></tr></table>
2. Where new roads are proposed on a site subject to any ODP:
a. The intersection spacing is designed for the proposed (future) speed limit within the ODP area and on immediately adjoining roads.</td><td>The Road 5 intersection with Bangor Road is currently within the 100km/h speed limit and is less than 800m from the Road 1 intersection.

The Road 5 intersection with Bangor Road is less than 800m from the Clintons Road intersection (~775m)

The spacing between intersections along Road 1 (Collector) and Road 3, 22, 7, 23, 18, 4, 11 & 2 are not 123m</td><td>Does not comply</td></tr>
<tr><td colspan="3">TRAN-REQ24 – Signage</td></tr>
<tr><td colspan="3">All Zones</td></tr>
<tr><td>1. All activities or works shall comply with SIGN-R1 General signs.</td><td>Assumed to comply in future design stages.</td><td>Complies.</td></tr>
<tr><td colspan="3">TRAN-REQ25 – Lighting</td></tr>
<tr><td colspan="3">All Zones</td></tr>
<tr><td>1. All activities or works shall comply with LIGHT-R2 Artificial outdoor lighting.</td><td>Assumed to comply in future design stages.</td><td>Complies.</td></tr>
<tr><td colspan="3">TRAN-REQ27 Waterbody Setbacks</td></tr>
<tr><td colspan="3">All Zones</td></tr>
<tr><td>1. All activities or works shall comply with:
a. NATC-R1 Setbacks from surface water bodies - earthworks and stockpiles; and</td><td>Assessed by others</td><td>N/A</td></tr>
</table>

b. NATC-R2 Setbacks from surface water bodies - structures.		

SUB - RULES	ASSESSMENT	STATUS
SUB-R1 – Subdivision in the Residential Zone		
LLRZ / GRZ		
Activity status: RDIS 1. Subdivision not subject to any of SUB-R12, SUB-R13, SUB-R14, or SUB-R15. Where this activity complies with the following rule requirements: (N/A to transport) … SUB-REQ3 ODP SUB-REQ4 Road Frontage Width SUB-REQ6 Access SUB-REQ7 Walkable Blocks SUB-REQ8 Corner Splays …(N/A to transport) Matters for discretion: 2. The exercise of discretion in relation to SUB-R1.1 is restricted to the following matters: All matters set out in SUB – Matters for Control or Discretion. NH-MAT3 Geotechnical Considerations. Notification: 3. Any application arising from SUB-R1.1 shall not be subject to public or limited notification and shall be processed on a non-notified basis.	See below.	**Does not comply with:** **SUB-REQ3 (DIS)** **and SUB-REQ7 (RDIS)** **Otherwise RDIS**

SUB – RULE REQUIREMENTS	ASSESSMENT	STATUS
SUB-REQ3 Outline Development Plan		
All Zones		
1. If the site is within an area that is subject to an operative Outline Development Plan within the District Plan: a. the subdivision complies with that Outline Development Plan; and	The proposed road intersection with Bangor Road is at the intersection with Piako Drive approx. 100m east of the location shown on the ODP.	**Does not comply**

b. where the site is within any area shown within the Outline Development Plan as a Neighbourhood Centre or Local Centre, it shall be subject to the provisions of the NCZ or LCZ, with a consent notice or similar mechanism to be registered on the Certificate of Title for these sites advising owners that the site is subject to the NCZ Chapter or LCZ Chapter provisions.	The Road 2 intersection with Bangor Road is approximately 60m west of the location shown on the ODP. The pedestrian cycle connection to West Coast Road is not proposed.	
SUB-REQ4 Road Frontage Width		
LLRZ LRZ GRZ SETZ		
1. Every site created, but excluding any rear site, contains a road frontage width not less than set out in SUB-TABLE5 – Minimum road frontage widths.	Assessment matters not relevant to transport (amenity only).	Assessed by others.
SUB-REQ6 Access		
All Zones		
1. Every site created, including any balance site, has legal access to a road, and that access is not obtained by crossing a railway line.	Each lot has access to the proposed internal roading network, which is to be vested in Council.	**Complies.**
3. Every site created, including any balance site, has legal access to a formed road maintained by Council.	The new roads are to be vested in Council following completion.	**Complies.**
6. Every site created, including any balance site, has legal access to a road that is not an Arterial Road listed in APP2 – Roading Hierarchy where the posted speed limit is 60km/hr or greater.	No access is proposed to an arterial road	**Complies.**
RESZ		
9. Every site created, including any balance site, has legal access to a road that is not a State Highway where the posted speed limit is 60km/h or greater.	No access is proposed to a State Highway.	**Complies.**
SUB-REQ7 Walkable Blocks		
GRZ (Does not apply to LLRZ)		
1. Blocks shall achieve all the following maximum perimeter lengths, unless precluded by an existing pattern of development: a. Average perimeter not more than 800m; b. Maximum perimeter not more than 1000m; and c. Maximum length of any one side of a block not more than 250m Block perimeters shall be measured by the shortest distance which it is possible to walk entirely around on publically accessible land.	Does not apply to LLRZ but all bocks are less than 800m except the block including Bangor Road	**Complies**
SUB-REQ8 Corner Splays		
RESZ		
1. The corner of any site at any road intersection shall be splayed with a rounded minimum radius of 3m.	All proposed intersections have compliant corner splays provided.	**Complies.**

Appendix 8. Road 1 / Bangor Road Base Model Results

MOVEMENT SUMMARY

Site: 101 [Eastern Access - AM (Site Folder: 2026 Base Dev)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival 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	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Piako Dr															
1	L2	All MCs	1	0.0	1	0.0	0.036	4.9	LOS A	0.1	0.9	0.55	0.67	0.55	49.8
2	T1	All MCs	1	0.0	1	0.0	0.036	6.4	LOS A	0.1	0.9	0.55	0.67	0.55	43.3
3	R2	All MCs	15	0.0	15	0.0	0.036	10.5	LOS B	0.1	0.9	0.55	0.67	0.55	49.7
Approach			17	0.0	17	0.0	0.036	9.9	LOS A	0.1	0.9	0.55	0.67	0.55	49.3
East: Bangor Road															
4	L2	All MCs	2	0.0	2	0.0	0.050	7.0	LOS A	0.0	0.0	0.00	0.01	0.00	73.3
5	T1	All MCs	91	9.3	91	9.3	0.050	0.0	LOS A	0.0	0.0	0.00	0.01	0.00	79.7
6	R2	All MCs	72	0.0	72	0.0	0.048	7.3	LOS A	0.2	1.5	0.31	0.60	0.31	52.8
Approach			164	5.1	164	5.1	0.050	3.3	NA	0.2	1.5	0.13	0.27	0.13	65.1
North: Site Access															
7	L2	All MCs	175	0.0	175	0.0	0.186	5.5	LOS A	0.7	5.2	0.34	0.57	0.34	52.6
8	T1	All MCs	1	0.0	1	0.0	0.186	7.1	LOS A	0.7	5.2	0.34	0.57	0.34	45.5
9	R2	All MCs	15	0.0	15	0.0	0.186	8.9	LOS A	0.7	5.2	0.34	0.57	0.34	52.5
Approach			191	0.0	191	0.0	0.186	5.8	LOS A	0.7	5.2	0.34	0.57	0.34	52.5
West: Bangor Road															
10	L2	All MCs	6	0.0	6	0.0	0.106	7.0	LOS A	0.0	0.0	0.00	0.02	0.00	73.2
11	T1	All MCs	189	10.6	189	10.6	0.106	0.0	LOS A	0.0	0.0	0.00	0.02	0.00	79.5
12	R2	All MCs	5	0.0	5	0.0	0.003	6.9	LOS A	0.0	0.1	0.19	0.58	0.19	53.1
Approach			201	9.9	201	9.9	0.106	0.4	NA	0.0	0.1	0.01	0.04	0.01	78.3
All Vehicles			573	5.0	573	5.0	0.186	3.3	NA	0.7	5.2	0.17	0.30	0.17	63.2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options 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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [Eastern Access - PM (Site Folder: 2026 Base Dev)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival 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	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Piako Dr															
1	L2	All MCs	1	0.0	1	0.0	0.020	5.4	LOS A	0.1	0.5	0.62	0.71	0.62	48.1
2	T1	All MCs	1	0.0	1	0.0	0.020	9.7	LOS A	0.1	0.5	0.62	0.71	0.62	42.1
3	R2	All MCs	5	0.0	5	0.0	0.020	14.3	LOS B	0.1	0.5	0.62	0.71	0.62	48.1
Approach			7	0.0	7	0.0	0.020	12.3	LOS B	0.1	0.5	0.62	0.71	0.62	47.2
East: Bangor Road															
4	L2	All MCs	15	0.0	15	0.0	0.121	7.0	LOS A	0.0	0.0	0.00	0.04	0.00	72.8
5	T1	All MCs	215	7.4	215	7.4	0.121	0.0	LOS A	0.0	0.0	0.00	0.04	0.00	79.1
6	R2	All MCs	266	0.0	266	0.0	0.171	7.2	LOS A	0.8	5.9	0.29	0.61	0.29	52.8
Approach			496	3.2	496	3.2	0.171	4.1	NA	0.8	5.9	0.16	0.35	0.16	62.3
North: Site Access															
7	L2	All MCs	114	0.0	114	0.0	0.125	5.1	LOS A	0.5	3.3	0.29	0.54	0.29	52.7
8	T1	All MCs	1	0.0	1	0.0	0.125	10.8	LOS B	0.5	3.3	0.29	0.54	0.29	45.6
9	R2	All MCs	9	0.0	9	0.0	0.125	13.3	LOS B	0.5	3.3	0.29	0.54	0.29	52.7
Approach			124	0.0	124	0.0	0.125	5.8	LOS A	0.5	3.3	0.29	0.54	0.29	52.6
West: Bangor Road															
10	L2	All MCs	23	0.0	23	0.0	0.083	7.0	LOS A	0.0	0.0	0.00	0.10	0.00	71.9
11	T1	All MCs	132	8.8	132	8.8	0.083	0.0	LOS A	0.0	0.0	0.00	0.10	0.00	78.0
12	R2	All MCs	1	0.0	1	0.0	0.001	7.3	LOS A	0.0	0.0	0.32	0.55	0.32	52.8
Approach			156	7.4	156	7.4	0.083	1.1	NA	0.0	0.0	0.00	0.10	0.00	76.8
All Vehicles			783	3.5	783	3.5	0.171	3.8	NA	0.8	5.9	0.15	0.33	0.15	62.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options 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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Appendix 9. Road 1 / Bangor Road Base Model Results - Sensitivity Test

MOVEMENT SUMMARY

Site: 101 [Eastern Access - AM (Site Folder: 2026 Base Dev + 10%)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival 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	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Piako Dr															
1	L2	All MCs	2	0.0	2	0.0	0.041	4.9	LOS A	0.1	1.0	0.55	0.66	0.55	49.7
2	T1	All MCs	1	0.0	1	0.0	0.041	6.7	LOS A	0.1	1.0	0.55	0.66	0.55	43.3
3	R2	All MCs	16	0.0	16	0.0	0.041	10.9	LOS B	0.1	1.0	0.55	0.66	0.55	49.6
Approach			19	0.0	19	0.0	0.041	10.0	LOS B	0.1	1.0	0.55	0.66	0.55	49.2
East: Bangor Road															
4	L2	All MCs	3	0.0	3	0.0	0.054	7.0	LOS A	0.0	0.0	0.00	0.02	0.00	73.2
5	T1	All MCs	98	9.7	98	9.7	0.054	0.0	LOS A	0.0	0.0	0.00	0.02	0.00	79.6
6	R2	All MCs	72	0.0	72	0.0	0.049	7.3	LOS A	0.2	1.5	0.32	0.61	0.32	52.8
Approach			173	5.5	173	5.5	0.054	3.2	NA	0.2	1.5	0.13	0.26	0.13	65.6
North: Site Access															
7	L2	All MCs	175	0.0	175	0.0	0.189	5.6	LOS A	0.8	5.3	0.36	0.58	0.36	52.5
8	T1	All MCs	1	0.0	1	0.0	0.189	7.3	LOS A	0.8	5.3	0.36	0.58	0.36	45.4
9	R2	All MCs	15	0.0	15	0.0	0.189	9.2	LOS A	0.8	5.3	0.36	0.58	0.36	52.5
Approach			191	0.0	191	0.0	0.189	5.9	LOS A	0.8	5.3	0.36	0.58	0.36	52.5
West: Bangor Road															
10	L2	All MCs	6	0.0	6	0.0	0.113	7.0	LOS A	0.0	0.0	0.00	0.02	0.00	73.2
11	T1	All MCs	202	10.9	202	10.9	0.113	0.0	LOS A	0.0	0.0	0.00	0.02	0.00	79.5
12	R2	All MCs	5	0.0	5	0.0	0.003	6.9	LOS A	0.0	0.1	0.20	0.57	0.20	53.1
Approach			214	10.3	214	10.3	0.113	0.4	NA	0.0	0.1	0.01	0.03	0.01	78.4
All Vehicles			596	5.3	596	5.3	0.189	3.3	NA	0.8	5.3	0.17	0.29	0.17	63.5

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options 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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [Eastern Access - PM (Site Folder: 2026 Base Dev + 10%)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival 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	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Piako Dr															
1	L2	All MCs	1	0.0	1	0.0	0.025	5.5	LOS A	0.1	0.6	0.63	0.73	0.63	47.7
2	T1	All MCs	1	0.0	1	0.0	0.025	10.1	LOS B	0.1	0.6	0.63	0.73	0.63	41.8
3	R2	All MCs	6	0.0	6	0.0	0.025	14.8	LOS B	0.1	0.6	0.63	0.73	0.63	47.7
Approach			8	0.0	8	0.0	0.025	13.1	LOS B	0.1	0.6	0.63	0.73	0.63	46.8
East: Bangor Road															
4	L2	All MCs	17	0.0	17	0.0	0.129	7.0	LOS A	0.0	0.0	0.00	0.05	0.00	72.8
5	T1	All MCs	227	7.4	227	7.4	0.129	0.0	LOS A	0.0	0.0	0.00	0.05	0.00	79.0
6	R2	All MCs	266	0.0	266	0.0	0.172	7.3	LOS A	0.9	6.0	0.31	0.61	0.31	52.8
Approach			511	3.3	511	3.3	0.172	4.0	NA	0.9	6.0	0.16	0.34	0.16	62.6
North: Site Access															
7	L2	All MCs	114	0.0	114	0.0	0.127	5.2	LOS A	0.5	3.4	0.30	0.54	0.30	52.6
8	T1	All MCs	1	0.0	1	0.0	0.127	11.3	LOS B	0.5	3.4	0.30	0.54	0.30	45.5
9	R2	All MCs	9	0.0	9	0.0	0.127	13.8	LOS B	0.5	3.4	0.30	0.54	0.30	52.6
Approach			124	0.0	124	0.0	0.127	5.9	LOS A	0.5	3.4	0.30	0.54	0.30	52.6
West: Bangor Road															
10	L2	All MCs	23	0.0	23	0.0	0.088	7.0	LOS A	0.0	0.0	0.00	0.09	0.00	72.0
11	T1	All MCs	141	9.0	141	9.0	0.088	0.0	LOS A	0.0	0.0	0.00	0.09	0.00	78.1
12	R2	All MCs	1	0.0	1	0.0	0.001	7.4	LOS A	0.0	0.0	0.34	0.55	0.34	52.7
Approach			165	7.6	165	7.6	0.088	1.0	NA	0.0	0.0	0.00	0.10	0.00	77.0
All Vehicles			808	3.6	808	3.6	0.172	3.8	NA	0.9	6.0	0.15	0.33	0.15	62.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options 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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Appendix 10. Road 5 / Bangor Road Base Model Results

MOVEMENT SUMMARY

Site: 101 [Western Access - AM (Site Folder: 2026 Base Dev)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival 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	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
East: Bangor Road															
5	T1	All MCs	84	10.0	84	10.0	0.045	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	100.0
6	R2	All MCs	24	0.0	24	0.0	0.015	7.9	LOS A	0.1	0.5	0.26	0.60	0.26	56.1
Approach			108	7.8	108	7.8	0.045	1.8	NA	0.1	0.5	0.06	0.13	0.06	85.1
North: Access															
7	L2	All MCs	58	0.0	58	0.0	0.046	5.0	LOS A	0.2	1.3	0.25	0.52	0.25	55.9
9	R2	All MCs	5	0.0	5	0.0	0.046	6.1	LOS A	0.2	1.3	0.25	0.52	0.25	55.8
Approach			63	0.0	63	0.0	0.046	5.1	LOS A	0.2	1.3	0.25	0.52	0.25	55.9
West: Bangor Road															
10	L2	All MCs	2	0.0	2	0.0	0.079	7.8	LOS A	0.0	0.0	0.00	0.01	0.00	87.1
11	T1	All MCs	142	14.1	142	14.1	0.079	0.0	LOS A	0.0	0.0	0.00	0.01	0.00	99.6
Approach			144	13.9	144	13.9	0.079	0.1	NA	0.0	0.0	0.00	0.01	0.00	99.4
All Vehicles			316	9.0	316	9.0	0.079	1.7	NA	0.2	1.3	0.07	0.15	0.07	81.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options 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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [Western Access - PM (Site Folder: 2026 Base Dev)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival 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	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
East: Bangor Road															
5	T1	All MCs	79	20.0	79	20.0	0.045	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	100.0
6	R2	All MCs	88	0.0	88	0.0	0.055	7.8	LOS A	0.3	1.8	0.24	0.61	0.24	56.1
Approach			167	9.4	167	9.4	0.055	4.1	NA	0.3	1.8	0.13	0.32	0.13	70.7
North: Access															
7	L2	All MCs	38	0.0	38	0.0	0.029	4.9	LOS A	0.1	0.8	0.22	0.51	0.22	56.0
9	R2	All MCs	3	0.0	3	0.0	0.029	6.3	LOS A	0.1	0.8	0.22	0.51	0.22	55.9
Approach			41	0.0	41	0.0	0.029	5.0	LOS A	0.1	0.8	0.22	0.51	0.22	56.0
West: Bangor Road															
10	L2	All MCs	7	0.0	7	0.0	0.067	7.8	LOS A	0.0	0.0	0.00	0.04	0.00	86.3
11	T1	All MCs	118	9.8	118	9.8	0.067	0.0	LOS A	0.0	0.0	0.00	0.04	0.00	98.6
Approach			125	9.2	125	9.2	0.067	0.5	NA	0.0	0.0	0.00	0.04	0.00	97.8
All Vehicles			334	8.2	334	8.2	0.067	2.9	NA	0.3	1.8	0.09	0.24	0.09	76.2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options 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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Appendix 11. Road 5 / Bangor Road Base Model Results – Sensitivity Test

MOVEMENT SUMMARY

Site: 101 [Western Access - AM (Site Folder: 2026 Base Dev + 10%)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival 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	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
East: Bangor Road															
5	T1	All MCs	92	10.3	92	10.3	0.049	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	100.0
6	R2	All MCs	24	0.0	24	0.0	0.016	7.9	LOS A	0.1	0.5	0.27	0.60	0.27	56.0
Approach			116	8.2	116	8.2	0.049	1.7	NA	0.1	0.5	0.06	0.13	0.06	85.9
North: Access															
7	L2	All MCs	58	0.0	58	0.0	0.047	5.1	LOS A	0.2	1.3	0.27	0.52	0.27	55.8
9	R2	All MCs	5	0.0	5	0.0	0.047	6.2	LOS A	0.2	1.3	0.27	0.52	0.27	55.8
Approach			63	0.0	63	0.0	0.047	5.2	LOS A	0.2	1.3	0.27	0.52	0.27	55.8
West: Bangor Road															
10	L2	All MCs	2	0.0	2	0.0	0.087	7.8	LOS A	0.0	0.0	0.00	0.01	0.00	87.1
11	T1	All MCs	156	14.2	156	14.2	0.087	0.0	LOS A	0.0	0.0	0.00	0.01	0.00	99.6
Approach			158	14.0	158	14.0	0.087	0.1	NA	0.0	0.0	0.00	0.01	0.00	99.4
All Vehicles			337	9.4	337	9.4	0.087	1.6	NA	0.2	1.3	0.07	0.15	0.07	82.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options 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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [Western Access - PM (Site Folder: 2026 Base Dev + 10%)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival 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	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
East: Bangor Road															
5	T1	All MCs	86	19.5	86	19.5	0.049	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	100.0
6	R2	All MCs	88	0.0	88	0.0	0.056	7.9	LOS A	0.3	1.8	0.25	0.62	0.25	56.1
Approach			175	9.6	175	9.6	0.056	4.0	NA	0.3	1.8	0.13	0.31	0.13	71.6
North: Access															
7	L2	All MCs	38	0.0	38	0.0	0.030	4.9	LOS A	0.1	0.8	0.24	0.51	0.24	55.9
9	R2	All MCs	3	0.0	3	0.0	0.030	6.4	LOS A	0.1	0.8	0.24	0.51	0.24	55.9
Approach			41	0.0	41	0.0	0.030	5.1	LOS A	0.1	0.8	0.24	0.51	0.24	55.9
West: Bangor Road															
10	L2	All MCs	7	0.0	7	0.0	0.072	7.8	LOS A	0.0	0.0	0.00	0.04	0.00	86.4
11	T1	All MCs	127	9.9	127	9.9	0.072	0.0	LOS A	0.0	0.0	0.00	0.04	0.00	98.7
Approach			135	9.4	135	9.4	0.072	0.4	NA	0.0	0.0	0.00	0.04	0.00	97.9
All Vehicles			351	8.4	351	8.4	0.072	2.7	NA	0.3	1.8	0.09	0.23	0.09	77.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options 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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Appendix 12. Bangor Road / West Coast Road with Development Model Results

MOVEMENT SUMMARY

Site: 101 [Bangor Rd / West Coast Rd - 2026 AM (Site Folder: 2026 Base Dev)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival 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	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: SH73															
1	L2	All MCs	218	5.3	218	5.3	0.200	4.9	LOS A	0.8	6.1	0.19	0.48	0.19	45.7
2	T1	All MCs	120	21.1	120	21.1	0.069	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	50.0
Approach			338	10.9	338	10.9	0.200	3.2	LOS A	0.8	6.1	0.12	0.31	0.12	47.1
North: SH73															
8	T1	All MCs	131	16.9	131	16.9	0.073	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	50.0
9	R2	All MCs	65	6.5	65	6.5	0.042	5.0	LOS A	0.2	1.4	0.24	0.50	0.24	45.3
Approach			196	13.4	196	13.4	0.073	1.7	NA	0.2	1.4	0.08	0.17	0.08	48.3
West: SH77															
10	L2	All MCs	36	0.0	36	0.0	0.034	8.0	LOS A	0.1	0.8	0.24	0.88	0.24	44.3
12	R2	All MCs	391	1.9	391	1.9	0.911	33.4	LOS D	12.9	91.7	0.90	1.79	3.04	34.5
Approach			426	1.7	426	1.7	0.911	31.3	LOS D	12.9	91.7	0.85	1.71	2.80	35.1
All Vehicles			960	7.3	960	7.3	0.911	15.3	NA	12.9	91.7	0.44	0.90	1.30	41.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options 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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [Bangor Rd / West Coast Rd - 2026 PM (Site Folder: 2026 Base Dev)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival 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	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: SH73															
1	L2	All MCs	581	0.4	581	0.4	0.497	4.7	LOS A	3.1	22.1	0.15	0.47	0.15	45.8
2	T1	All MCs	181	9.3	181	9.3	0.096	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	50.0
Approach			762	2.5	762	2.5	0.497	3.6	LOS A	3.1	22.1	0.12	0.36	0.12	46.8
North: SH73															
8	T1	All MCs	162	7.8	162	7.8	0.086	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	50.0
9	R2	All MCs	24	0.0	24	0.0	0.016	5.1	LOS A	0.1	0.5	0.29	0.50	0.29	45.3
Approach			186	6.8	186	6.8	0.086	0.7	NA	0.1	0.5	0.04	0.07	0.04	49.3
West: SH77															
10	L2	All MCs	34	6.3	34	6.3	0.036	8.7	LOS A	0.1	0.9	0.30	0.88	0.30	44.1
12	R2	All MCs	288	1.8	288	1.8	0.967	57.5	LOS F	13.0	92.3	0.98	2.03	4.18	28.1
Approach			322	2.3	322	2.3	0.967	52.4	LOS F	13.0	92.3	0.91	1.91	3.77	29.2
All Vehicles			1271	3.1	1271	3.1	0.967	15.5	NA	13.0	92.3	0.30	0.71	1.03	40.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options 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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Appendix 13. Bangor Road / West Coast Road Threshold Test

MOVEMENT SUMMARY

Site: 101 [Bangor Rd / West Coast Rd - 2026 AM Partial (Site Folder: 2026 Base Dev + 10%)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival 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	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: SH73															
1	L2	All MCs	203	6.2	203	6.2	0.189	5.0	LOS A	0.8	5.7	0.20	0.48	0.20	45.7
2	T1	All MCs	132	20.8	132	20.8	0.075	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	50.0
Approach			335	11.9	335	11.9	0.189	3.0	LOS A	0.8	5.7	0.12	0.29	0.12	47.2
North: SH73															
8	T1	All MCs	143	16.9	143	16.9	0.080	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	50.0
9	R2	All MCs	72	5.9	72	5.9	0.047	5.1	LOS A	0.2	1.5	0.26	0.51	0.26	45.3
Approach			215	13.2	215	13.2	0.080	1.7	NA	0.2	1.5	0.09	0.17	0.09	48.3
West: SH77															
10	L2	All MCs	39	0.0	39	0.0	0.038	8.1	LOS A	0.1	0.9	0.25	0.88	0.25	44.3
12	R2	All MCs	339	2.5	339	2.5	0.829	26.4	LOS D	8.2	58.7	0.84	1.50	2.22	36.8
Approach			378	2.2	378	2.2	0.829	24.5	LOS C	8.2	58.7	0.78	1.43	2.01	37.5
All Vehicles			927	8.3	927	8.3	0.829	11.5	NA	8.2	58.7	0.38	0.73	0.88	42.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options 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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [Bangor Rd / West Coast Rd - 2026 PM Partial (Site Folder: 2026 Base Dev + 10%)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival 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	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: SH73															
1	L2	All MCs	501	0.4	501	0.4	0.429	4.7	LOS A	2.4	17.1	0.14	0.47	0.14	45.9
2	T1	All MCs	187	10.1	187	10.1	0.100	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	50.0
Approach			688	3.1	688	3.1	0.429	3.4	LOS A	2.4	17.1	0.10	0.34	0.10	46.9
North: SH73															
8	T1	All MCs	178	7.7	178	7.7	0.094	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	50.0
9	R2	All MCs	24	0.0	24	0.0	0.016	5.1	LOS A	0.1	0.5	0.29	0.51	0.29	45.3
Approach			202	6.8	202	6.8	0.094	0.6	NA	0.1	0.5	0.04	0.06	0.04	49.4
West: SH77															
10	L2	All MCs	36	5.9	36	5.9	0.038	8.7	LOS A	0.1	1.0	0.30	0.88	0.30	44.1
12	R2	All MCs	258	2.4	258	2.4	0.841	33.9	LOS D	6.9	49.1	0.91	1.51	2.48	34.3
Approach			294	2.9	294	2.9	0.841	30.8	LOS D	6.9	49.1	0.83	1.44	2.22	35.3
All Vehicles			1184	3.6	1184	3.6	0.841	9.7	NA	6.9	49.1	0.27	0.56	0.61	43.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options 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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Appendix 14. Bangor Road / West Coast Road Roundabout Layout & Model Results

MOVEMENT SUMMARY

Site: 101v [Bangor Rd / West Coast Rd - 2026 AM (Site Folder: 2026 Base Dev + 10%)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival 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	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: SH73															
1	L2	All MCs	231	5.5	231	5.5	0.270	3.1	LOS A	2.0	15.0	0.30	0.36	0.30	46.8
2	T1	All MCs	132	20.8	132	20.8	0.270	3.2	LOS A	2.0	15.0	0.30	0.36	0.30	46.9
Approach			362	11.0	362	11.0	0.270	3.2	LOS A	2.0	15.0	0.30	0.36	0.30	46.8
North: SH73															
8	T1	All MCs	143	16.9	143	16.9	0.260	6.3	LOS A	1.7	13.1	0.69	0.64	0.69	44.7
9	R2	All MCs	72	5.9	72	5.9	0.260	10.6	LOS B	1.7	13.1	0.69	0.64	0.69	44.2
Approach			215	13.2	215	13.2	0.260	7.8	LOS A	1.7	13.1	0.69	0.64	0.69	44.5
West: SH77															
10	L2	All MCs	40	0.0	40	0.0	0.421	3.8	LOS A	3.4	23.9	0.51	0.57	0.51	44.2
12	R2	All MCs	406	2.1	406	2.1	0.421	9.0	LOS A	3.4	23.9	0.51	0.57	0.51	43.8
Approach			446	1.9	446	1.9	0.421	8.5	LOS A	3.4	23.9	0.51	0.57	0.51	43.8
All Vehicles			1023	7.5	1023	7.5	0.421	6.5	LOS A	3.4	23.9	0.47	0.51	0.47	45.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options 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 (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101v [Bangor Rd / West Coast Rd - 2026 PM (Site Folder: 2026 Base Dev + 10%)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival 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	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: SH73															
1	L2	All MCs	604	0.3	604	0.3	0.500	2.9	LOS A	5.0	35.9	0.21	0.34	0.21	47.1
2	T1	All MCs	199	9.5	199	9.5	0.500	2.9	LOS A	5.0	35.9	0.21	0.34	0.21	47.3
Approach			803	2.6	803	2.6	0.500	2.9	LOS A	5.0	35.9	0.21	0.34	0.21	47.1
North: SH73															
8	T1	All MCs	178	7.1	178	7.1	0.211	5.0	LOS A	1.3	9.9	0.60	0.54	0.60	45.5
9	R2	All MCs	26	0.0	26	0.0	0.211	9.5	LOS A	1.3	9.9	0.60	0.54	0.60	45.0
Approach			204	6.2	204	6.2	0.211	5.5	LOS A	1.3	9.9	0.60	0.54	0.60	45.5
West: SH77															
10	L2	All MCs	37	5.7	37	5.7	0.352	4.3	LOS A	2.5	17.7	0.55	0.60	0.55	44.1
12	R2	All MCs	302	2.1	302	2.1	0.352	9.5	LOS A	2.5	17.7	0.55	0.60	0.55	43.8
Approach			339	2.5	339	2.5	0.352	9.0	LOS A	2.5	17.7	0.55	0.60	0.55	43.8
All Vehicles			1346	3.1	1346	3.1	0.500	4.8	LOS A	5.0	35.9	0.35	0.44	0.35	46.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options 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 (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Appendix 15. Bangor Road / McLaughlins Road with Development Model Results

MOVEMENT SUMMARY

Site: 101 [Bangor Rd / McLaughlins Rd - 2026 AM (Site Folder: 2026 Base Dev)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival 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	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: McLaughlins Rd															
1	L2	All MCs	14	7.7	14	7.7	0.014	5.5	LOS A	0.0	0.4	0.28	0.52	0.28	45.2
3	R2	All MCs	82	1.3	82	1.3	0.212	11.7	LOS B	0.7	4.9	0.63	0.83	0.66	42.2
Approach			96	2.2	96	2.2	0.212	10.8	LOS B	0.7	4.9	0.58	0.79	0.61	42.6
East: Bangor Rd															
4	L2	All MCs	122	6.0	122	6.0	0.153	4.7	LOS A	0.0	0.0	0.00	0.22	0.00	47.4
5	T1	All MCs	171	6.8	171	6.8	0.153	0.0	LOS A	0.0	0.0	0.00	0.22	0.00	48.7
Approach			293	6.5	293	6.5	0.153	2.0	NA	0.0	0.0	0.00	0.22	0.00	48.1
West: Bangor Rd															
11	T1	All MCs	344	1.8	344	1.8	0.221	0.3	LOS A	0.5	3.8	0.16	0.17	0.16	49.1
12	R2	All MCs	59	7.1	59	7.1	0.221	6.0	LOS A	0.5	3.8	0.16	0.17	0.16	47.8
Approach			403	2.6	403	2.6	0.221	1.1	NA	0.5	3.8	0.16	0.17	0.16	48.9
All Vehicles			792	4.0	792	4.0	0.221	2.6	NA	0.7	4.9	0.15	0.27	0.15	47.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options 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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [Bangor Rd / McLaughlins Rd - 2026 PM (Site Folder: 2026 Base Dev)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival 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	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: McLaughlins Rd															
1	L2	All MCs	25	4.2	25	4.2	0.043	8.5	LOS A	0.1	1.0	0.52	0.71	0.52	43.8
3	R2	All MCs	80	2.6	80	2.6	0.301	17.8	LOS C	1.0	7.2	0.77	0.94	0.92	39.5
Approach			105	3.0	105	3.0	0.301	15.5	LOS C	1.0	7.2	0.71	0.88	0.82	40.4
East: Bangor Rd															
4	L2	All MCs	72	2.9	72	2.9	0.301	4.7	LOS A	0.0	0.0	0.00	0.06	0.00	48.3
5	T1	All MCs	537	0.2	537	0.2	0.301	0.1	LOS A	0.0	0.0	0.00	0.06	0.00	49.5
Approach			608	0.5	608	0.5	0.301	0.6	NA	0.0	0.0	0.00	0.06	0.00	49.4
West: Bangor Rd															
11	T1	All MCs	245	3.0	245	3.0	0.138	0.3	LOS A	0.2	1.1	0.08	0.09	0.08	49.6
12	R2	All MCs	13	0.0	13	0.0	0.138	7.4	LOS A	0.2	1.1	0.08	0.09	0.08	48.3
Approach			258	2.9	258	2.9	0.138	0.6	NA	0.2	1.1	0.08	0.09	0.08	49.5
All Vehicles			972	1.4	972	1.4	0.301	2.2	NA	1.0	7.2	0.10	0.16	0.11	48.2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options 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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [Bangor Rd / McLaughlins Rd - 2026 AM (Site Folder: 2026 Base Dev + 10%)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival 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	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: McLaughlins Rd															
1	L2	All MCs	15	7.1	15	7.1	0.016	5.6	LOS A	0.1	0.4	0.29	0.53	0.29	45.2
3	R2	All MCs	91	1.2	91	1.2	0.247	12.7	LOS B	0.8	5.9	0.66	0.86	0.74	41.7
Approach			105	2.0	105	2.0	0.247	11.7	LOS B	0.8	5.9	0.61	0.82	0.68	42.2
East: Bangor Rd															
4	L2	All MCs	135	6.3	135	6.3	0.164	4.7	LOS A	0.0	0.0	0.00	0.23	0.00	47.4
5	T1	All MCs	179	7.1	179	7.1	0.164	0.0	LOS A	0.0	0.0	0.00	0.23	0.00	48.6
Approach			314	6.7	314	6.7	0.164	2.0	NA	0.0	0.0	0.00	0.23	0.00	48.1
West: Bangor Rd															
11	T1	All MCs	356	2.1	356	2.1	0.233	0.4	LOS A	0.6	4.3	0.17	0.19	0.17	49.0
12	R2	All MCs	65	6.5	65	6.5	0.233	6.1	LOS A	0.6	4.3	0.17	0.19	0.17	47.7
Approach			421	2.8	421	2.8	0.233	1.3	NA	0.6	4.3	0.17	0.19	0.17	48.8
All Vehicles			840	4.1	840	4.1	0.247	2.9	NA	0.8	5.9	0.16	0.28	0.17	47.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options 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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [Bangor Rd / McLaughlins Rd - 2026 PM (Site Folder: 2026 Base Dev + 10%)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival 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	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: McLaughlins Rd															
1	L2	All MCs	27	3.8	27	3.8	0.031	6.9	LOS A	0.1	0.8	0.50	0.65	0.50	44.6
3	R2	All MCs	88	2.4	88	2.4	0.354	19.5	LOS C	1.2	8.7	0.80	0.97	1.00	38.7
Approach			116	2.7	116	2.7	0.354	16.6	LOS C	1.2	8.7	0.73	0.89	0.88	40.0
East: Bangor Rd															
4	L2	All MCs	79	2.7	79	2.7	0.314	4.7	LOS A	0.0	0.0	0.00	0.07	0.00	48.2
5	T1	All MCs	556	0.2	556	0.2	0.314	0.1	LOS A	0.0	0.0	0.00	0.07	0.00	49.5
Approach			635	0.5	635	0.5	0.314	0.7	NA	0.0	0.0	0.00	0.07	0.00	49.3
West: Bangor Rd															
11	T1	All MCs	254	3.3	254	3.3	0.144	0.3	LOS A	0.2	1.3	0.09	0.10	0.09	49.5
12	R2	All MCs	14	0.0	14	0.0	0.144	7.6	LOS A	0.2	1.3	0.09	0.10	0.09	48.3
Approach			267	3.1	267	3.1	0.144	0.7	NA	0.2	1.3	0.09	0.10	0.09	49.5
All Vehicles			1018	1.4	1018	1.4	0.354	2.5	NA	1.2	8.7	0.11	0.17	0.12	48.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options 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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.