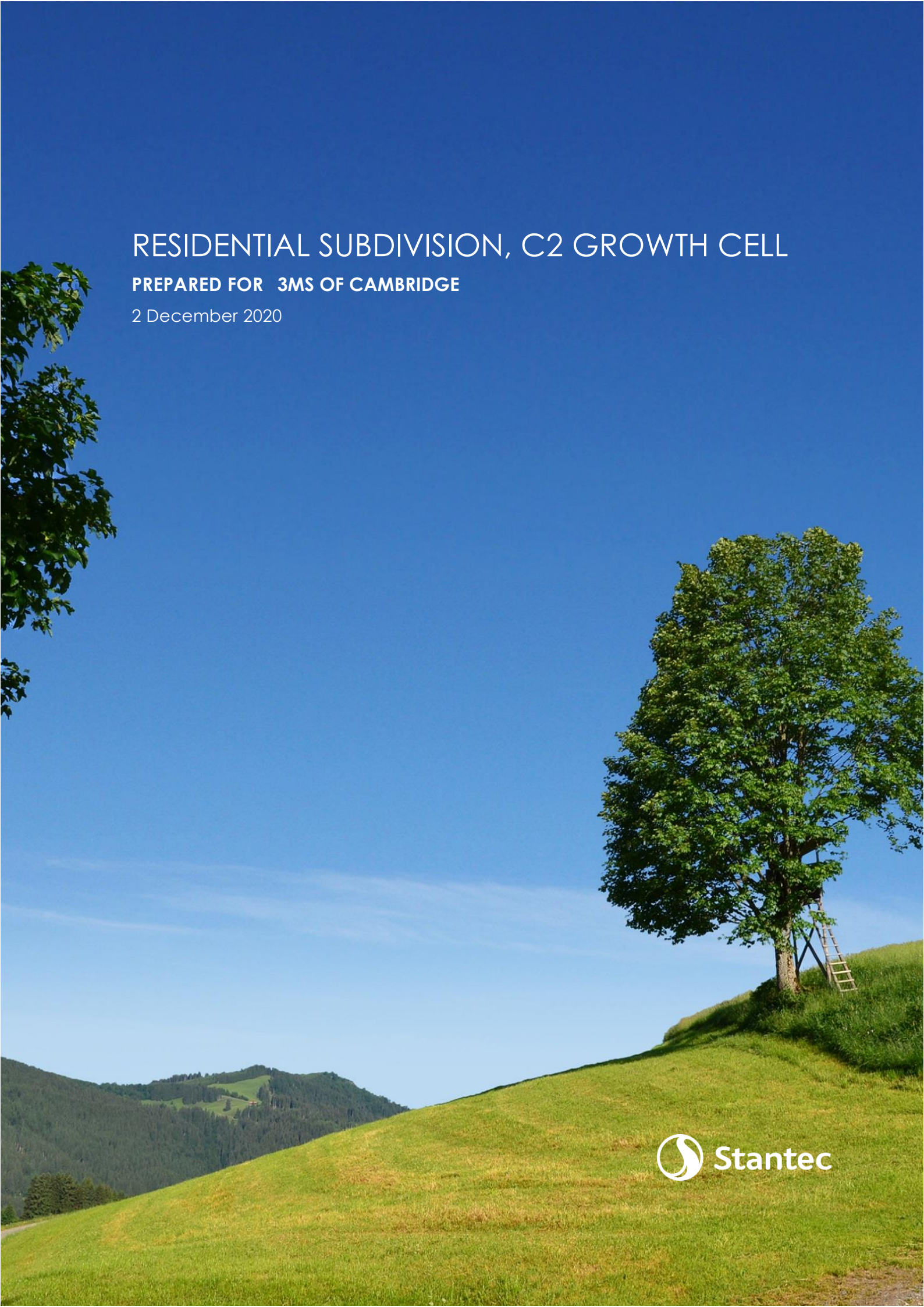
APPENDIX G

Integrated Transportation Assessment

RESIDENTIAL SUBDIVISION, C2 GROWTH CELL

PREPARED FOR 3MS OF CAMBRIDGE

2 December 2020



This document has been prepared for the benefit of 3Ms of Cambridge. No liability is accepted by this company or any employee or sub-consultant of this company with respect to its use by any other person.

This disclaimer shall apply notwithstanding that the report may be made available to Waipa District Council and other persons for an application for permission or approval to fulfil a legal requirement.

QUALITY STATEMENT

PROJECT MANAGER	PROJECT TECHNICAL LEAD
Mark Apeldoorn	Anna Wilkins

PREPARED BY		
Anna Wilkins	.....	2/12/2020
CHECKED BY		
Mark Apeldoorn	.....	2/12/2020
REVIEWED BY		
Mark Apeldoorn	.....	2/12/2020
APPROVED FOR ISSUE BY		
Mark Apeldoorn	.....	2/12/2020

TAURANGA
Level 1, 117 Willow Street, Tauranga 3110
PO Box 13-052, Armagh, Christchurch 8141
TEL +64 7 577 0555

REVISION SCHEDULE

Rev No.	Date	Description	Signature or Typed Name (documentation on file)			
			Prepared by	Checked by	Reviewed by	Approved by
A	13/11/2020	Draft	AJW	MA	MA	MA
B	17/11/2020	Final Draft	AJW	MA	MA	MA
C	2/12/2020	Final Report	AJW	MA	MA	MA

CONTENTS

LIST OF TABLES

LIST OF FIGURES

APPENDICES

1. Introduction

Stantec has been asked by 3MS of Cambridge to prepare an Integrated Transportation Assessment (ITA) for a proposed subdivision within the C2 growth cell in Cambridge.

The site is located on the western edge of Cambridge in Waipa District. It is therefore subject to the objectives, policies and rules of the Waipa District Plan. The proposed subdivision includes:

- 289 residential lots of varying sizes;
- A 'super lot' for a retirement village envisaged to provide 200 retirement units;
- 0.19 hectares (ha) of neighbourhood centre; and
- 4 ha for a future primary school.

The proposed land use and supporting transportation network is in general accordance with the Structure Plan for the area.

By way of an overall summary, it is concluded that the traffic and transport elements of the proposed subdivision have been appropriately planned and designed to ensure multi-modal integration with the broader C2 growth cell, and with the broader Cambridge area.

Conditions are recommended in relation to:

- Treatment of Cambridge Road along the site frontage with:
  - A 3m wide shared path on the northern side of the road;
  - Right turn bays at both proposed subdivision accesses;
  - Extension of the existing flush median from the Te Awa Lifecare access to Kelly Road;
- The Cambridge Road/Road 11 intersection converting to left in, left out only control once the C2/C3 roundabout is built; and
- Engagement with Council on a coordinated approach to setting the local road speed limit for the subject section of Cambridge Road;
- Establishment of a 40km/h speed limit and associated supporting traffic management measures across the neighbourhood area;
- An independent road safety audit of the final engineering designs, for Council approval prior to the authorisation of engineering plans for construction.

With these conditions in place it is concluded that the proposed subdivision can be appropriately integrated with the existing transportation environment, and the planned C2/C3 growth areas.

2. Site Location

The subject site is located on the north side of Cambridge Road, west of the established urban area of Cambridge. The site location in the context of the wider Cambridge area is shown on Figure 2-1.

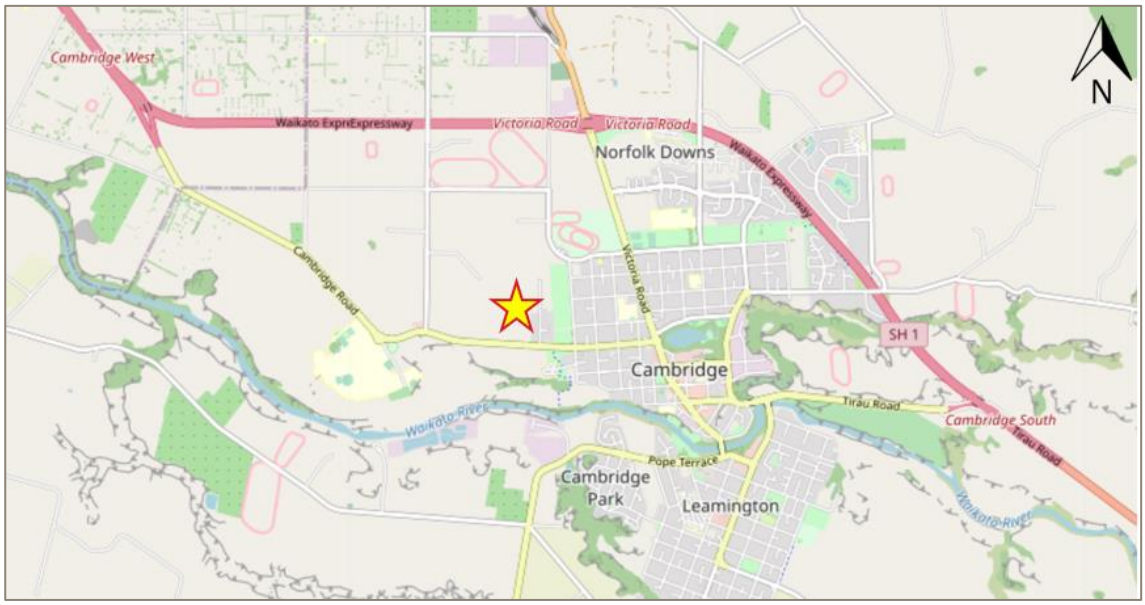


Figure 2-1: Site Location (Base Map Source: Open Street Maps)

The site is zoned Deferred Residential by the Waipa District Council (WDC) District Plan and is within the C2 Growth Cell Structure Plan area. The site location in the context of the surrounding zoning is shown as Figure 2-2.

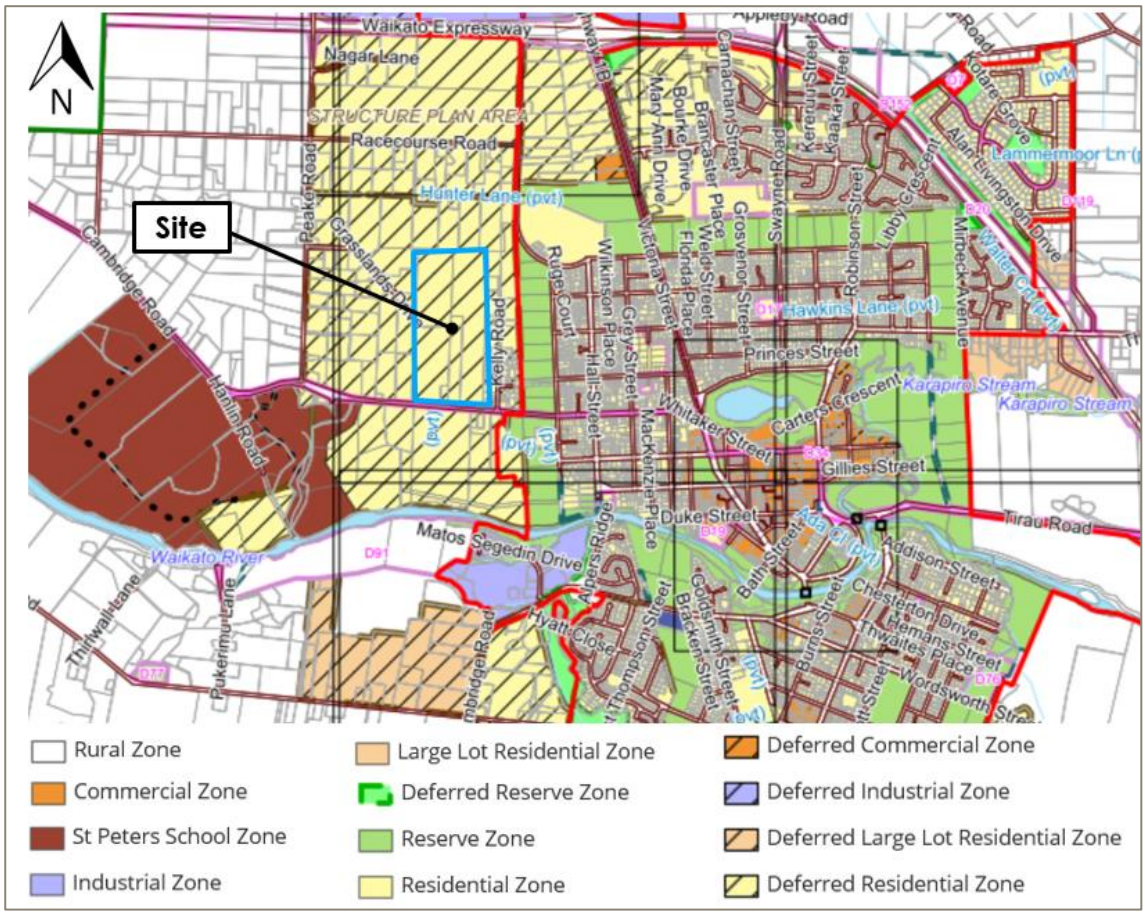


Figure 2-2: Site Location and Surrounding Zoning (Source: WDC IntraMaps)

The site itself is used for agricultural purposes and is surrounded by a mixture of rural and rural residential land uses. There is also a strip of smaller residential properties along the eastern boundary, on Kelly Road.

The Cambridge Town Centre is approximately 2km to the east. St Peter's School and the Avantidrome are approximately 1.2km to the west. The site location and existing local land use context are shown as Figure 2-3.

Figure 2-3: Site Location and Local Land Use Context (Base Map Source: WDC IntraMaps)

3. C2 Structure Plan

The C2 growth cell is one of four growth areas on the western side of Cambridge. These are shown below as Figure 3-1.

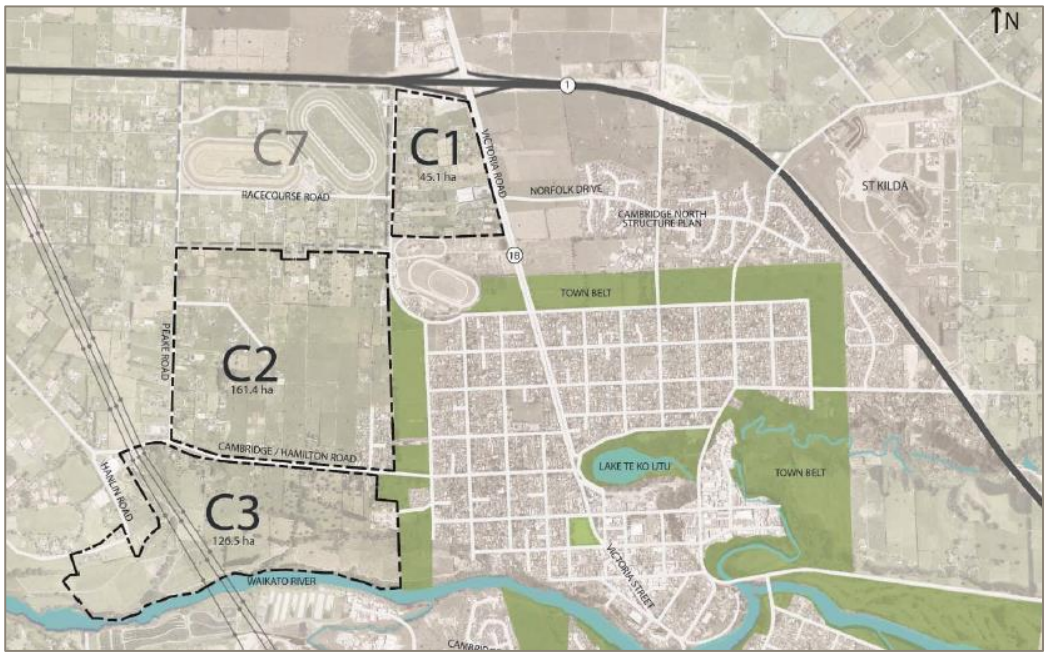


Figure 3-1: Cambridge Growth Cells (Source: WDC District Plan Appendix S19, Figure 1)

The C2 growth cell is approximately 161.6 hectares (ha) in size, including approximately 8.8 ha of land that is already developed for residential use along Kelly Road. The growth cell is generally flat and roughly square in shape (1.3km by 1.25km).

In total the C2 growth cell is expected to yield between 1,250 and 1,700 dwellings[1]. A preferred location has been identified for a future primary school, day care facility and neighbourhood centre within C2, which is included in the proposed subdivision.

The movement network for the C1, C2 and C3 cells has been holistically planned to accommodate vehicles and cyclists alongside a high-quality network of pedestrian paths. Off-road walkways and cycleways are also planned, linking through the stormwater network. An extract from the District Plan movement network diagram is shown below.

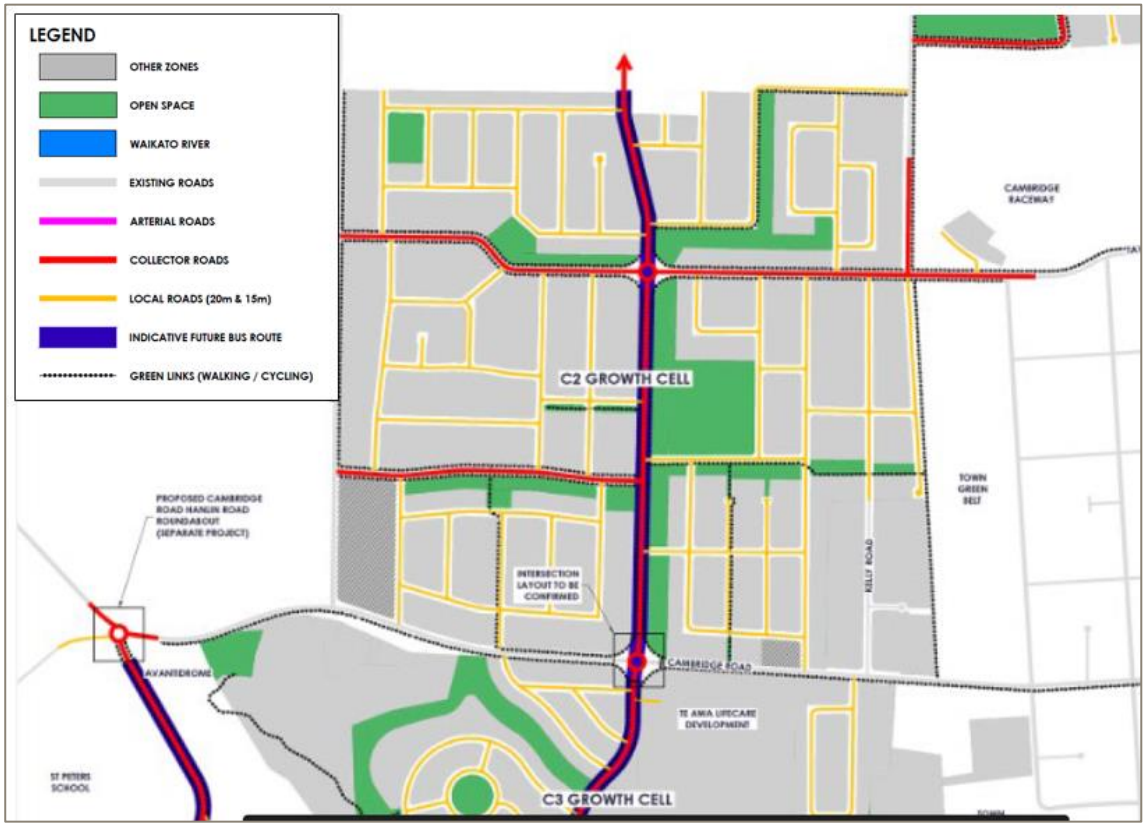


Figure 3-2: Movement Network (Source: WDC District Plan Appendix S19, Figure 13)

The planned movement network centres on a central collector road spine that runs north-south from Cambridge Road. There are two east-west collector road corridors supported by a network of local roads. The open space network is planned to generally follow these collector road corridors, providing a complete connection through the C2 cell from C3 in the south to C1 in the north.

A roundabout, known as the C2/C3 roundabout is proposed just beyond the western boundary of the site. This is planned to include grade-separated walking and cycling paths and ultimately two circulating lanes for traffic on Cambridge Road.

[1] WDC District Plan Appendix S19 Table 1, excluding existing dwellings along Kelly Road

4. Existing Transport Environment

4.1 Road Hierarchy

Cambridge Road is classified as a Major Arterial in the District Plan road hierarchy. As shown on Figure 4-1 below, it is one of three Major Arterial corridors connecting Cambridge to the west and south-west. The others are the Waikato Expressway to the north and Cambridge Road (Leamington) to the south.

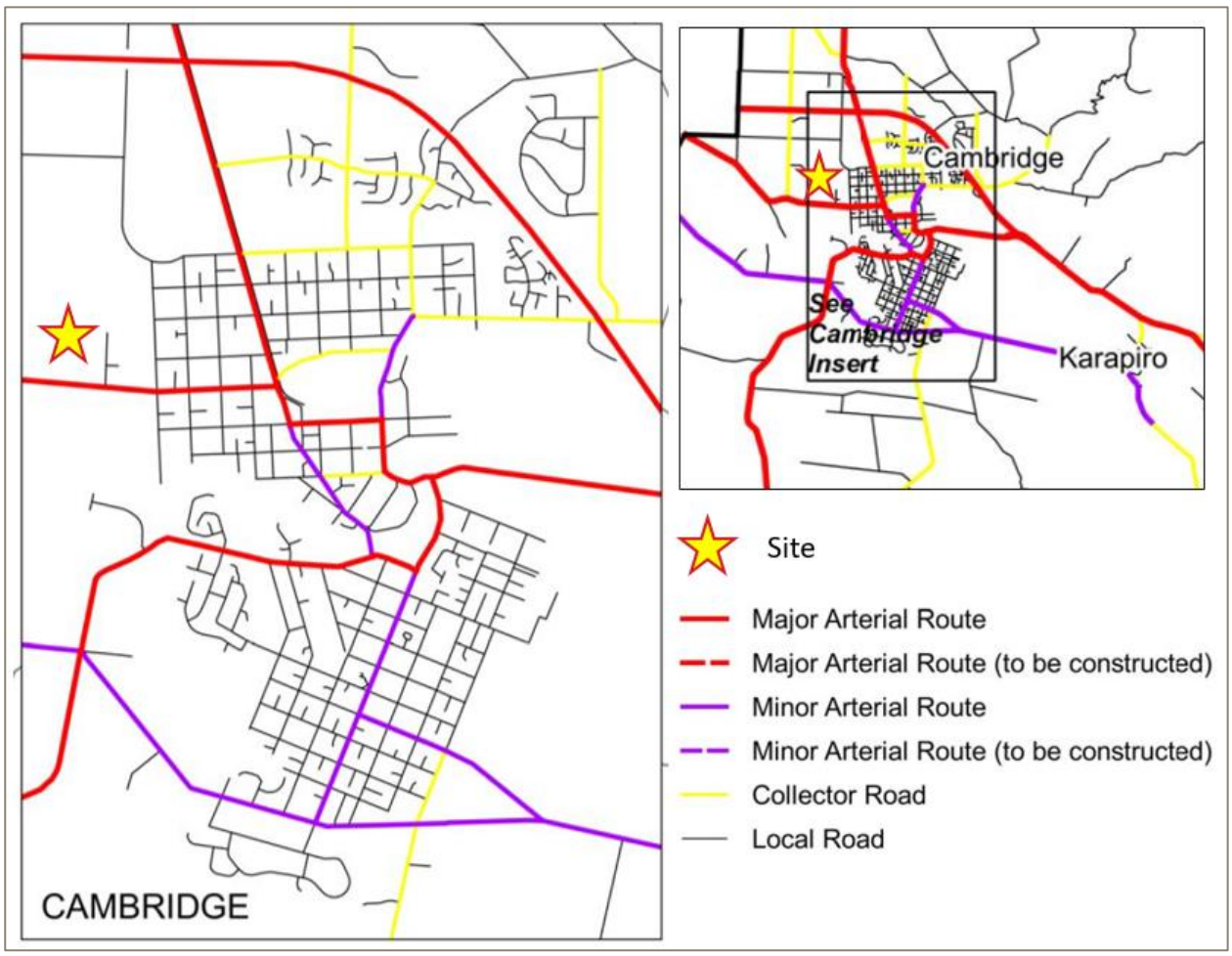


Figure 4-1: Road Hierarchy (Maps Sourced from WDC District Plan Map 48)

Peake Road is classified a Collector Road. It provides a north-south corridor from Cambridge Road over the Waikato Expressway. Racecourse Road, Kelly Road and other roads near the site are classified as local roads.

4.2 Physical Road Environment

4.2.1 Cambridge Road

Cambridge Road has a legal width that varies between approximately 20m and 25m in the vicinity of the site. The posted speed limit along the site frontage is 80km/h. This changes to 50km/h at a point approximately 160m west of Kelly Road.

The road provides one traffic lane in each direction with sealed shoulders of varying widths and a wide (double marked) centreline. To the east of the site, the Cambridge Road/Kelly Road intersection is

controlled by a Stop sign on Kelly Road. This intersection has a right turn bay within a flush median that extends beyond Vogel Street further east. Towards the western boundary of the site there is a right turn bay for the Te Awa Life Care Village on the opposite side of Cambridge Road.

The layout of Cambridge Road along the site frontage, and examples of some of these carriageway features are shown as Figure 4-2.

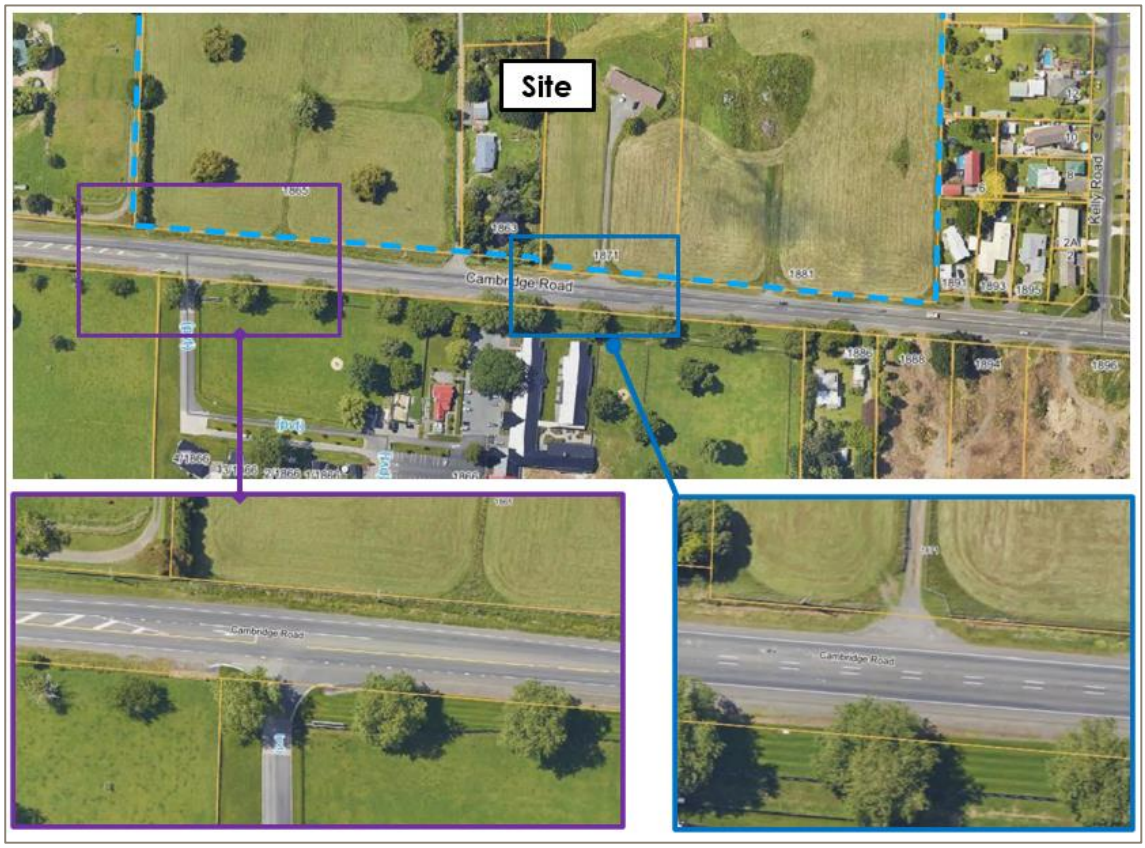


Figure 4-2: Cambridge Road Along Site Frontage (Source)

Cambridge Road was formerly part of State Highway 1 (SH1). This function was removed after the Waikato Expressway (Cambridge Section) was opened in December 2015. Shortly after the Expressway opened, the westbound passing lane that was in place along the site frontage was removed and replaced with a more urban wide centreline treatment that can be seen in the lower right of Figure 4-2. With continued urbanisation of the growth cells along this corridor, the operational speed limit is also expected to reduce to a more urban appropriate level.

4.2.2 Walking/Cycling Facilities

There are currently no formal footpath or cycle lane provisions on this part of Cambridge Road, reflecting the rural character of the area.

The Te Awa River Ride shared path (Avantidrome to Cambridge section) runs approximately 600m to the south of the site, along the northern bank of the Waikato River. There is also a shared path through the Cambridge town green belt to the east of the site. The local walking and cycling network is shown as Figure 4-3.

Figure 4-3: Cambridge Walking and Cycling Network (Source: WDC)

4.2.3 Public Transport Services

The Hamilton to Cambridge bus services runs along Cambridge Road. There are 'hail and ride' stops on both sides of the road near Peake Road and Kelly Road.

The service runs eight times daily in each direction on weekdays and four times daily in each direction at the weekend and on public holidays.

It connects Leamington and Cambridge to the Hamilton Transport Centre on Bryce Street, calling at various schools, shopping centres and commercial areas along the route.

5. Future Transport Network

The WDC Long Term Plan (LTP) (2018-2028) identifies the following transport projects (within C2) as being funded by Development Contributions from C2:

- Roading land purchases (C2 and C3);
- Structure Plan roading (C2 and C3);
- Kelly Road urbanisation; and
- Cambridge Road urbanisation.

The C2 cell is also noted as contributing to other improvements in Cambridge including:

- Victoria Road upgrade;
- CBD upgrades;
- Victoria Road interchange contribution;
- Cambridge Deferred Residential Collector Road – Norfolk West;

- Growth construction C1; and
- Cambridge growth cell roading land purchases (C1).

Project T11 of the infrastructure strategy with the LTP focusses on repurposing revoked state highways (of which Cambridge Road is one). Funding is allocated in various years to projects that bring intersections including Hanlin Road/Cambridge Road, Albert Road/Queen Street, Albert Road/Duke Street and Shakespeare Street/Tirau Street up to Council's level of service standards, as well as improving them for use by pedestrians and cyclists.

One of these projects, a new roundabout at Cambridge Road/Hanlin Road (approximately 1.2km west of the site) was recently opened to traffic.

As noted earlier, a roundabout is also proposed to the west of the site, providing primary access to the C2 and C3 growth cells. This is expected to be constructed in approximately 2023.

6. Traffic Volumes

The Mobileroad website gives the following traffic volumes for roads in the area:

- Cambridge Road (west of Kelly Road) 11,000 vehicles per day (vpd)
- Cambridge Road (east of Peake Road) 8,000 vpd
- Kelly Road 300 vpd
- Peake Road 1,160 vpd

A count arranged by Stantec in February 2020 recorded morning and evening peak hour volumes on Cambridge Road as 1,010 vehicles per hour (vph) in the morning (537 vph westbound, 473 eastbound) and 1,186 vph (492 westbound and 694 eastbound) in the evening.

Work completed by WSP Opus for WDC forecast that by 2041, the daily volume on this part of Cambridge Road would grow to some 26,700 vpd[2]. This is equivalent to an annual growth rate of approximately 6% per annum.

7. Road Safety

The current form of the local road safety environment expected to be impacted by the proposal has been assessed. A search has been made of the NZTA Crash Analysis System (CAS) database to determine the characteristics of the most recent five years (2015 to 2019, and any available data form 2020). The study area covered Cambridge Road for approximately 1.2km between Peake Road and Kelly Road, inclusive of both intersections.

Nine crashes were reported, two resulting in minor injury and seven in no injuries. Five of these crashes (one minor injury and four non-injury) occurred prior to December 2015 when Cambridge Road was still operating as SH1 and when the westbound passing lane was still in place. These five crashes can be summarised as:

[2] Traffic Assessment of the Cambridge Road and Collector Roads 1 and 4 Intersection, WSP Opus, 23 August 2019

- Three single-vehicle loss of control crashes, attributed to fatigue, distraction due to phone use and an unknown cause.
- A driver new to the country failing to give way at the Peake Road intersection.
- A driver intending to turn right off Cambridge Road, pulling over to the left then failing to see a vehicle behind them when they renetered the road (in what was the passing lane at the time).

The four crashes that occurred after opening of the Expressway and after removal of the westbound passing lane can be summarised as:

- Three single-vehicle loss of control crashes, two attributed to fatigue and one due to an unknown cause.
- One crash resulting from a driver failing to see and stop in time before a tree that had fallen on the road.

Spatially, the crashes were distributed:

- Two at/near the Cambridge Road/Peake Road intersection;
- Four on the bend approximately 480m east of Peake Road;
- Two approximately 340m west of Kelly Road; and
- One approximately 50m west of Kelly Road.

Loss of control crashes and the influence of fatigue appear several times in this crash history. Four of the crashes occurred in a common area on Cambridge Road, where there is a horizontal curve some 480m east of Peake Road. Four of the loss of control crashes saw vehicles coming to rest in the ditches either side of the road.

It is understood[3] that it is the intent of WDC to extend the 50km/h speed limit further west as the area becomes more urban. The design of the subdivision and its inteface with Cambridge Road should have regard for this. The lowering of the speed limit from 80km/h, combined with the recent changes at the Hanlin Road roundabout can be expected to be beneficial to the safety performance of this area.

8. Proposed Development

8.1 Overview

The proposed subdivision layout is shown as Figure 8-1. It involves residential development of varying densities, a retirement community, primary school, and neighbourhood centre as well as a network of open space, walking and cycling paths and transport corridors. A4 scale maps and diagrams showing the subdivision and how it integrates with the surrounding area are also contained in Appendix A.

[3] Traffic Assessment of the Cambridge Road and Collector Roads 1 and 4 Intersection, WSP Opus, 23 August 2019, Section 2

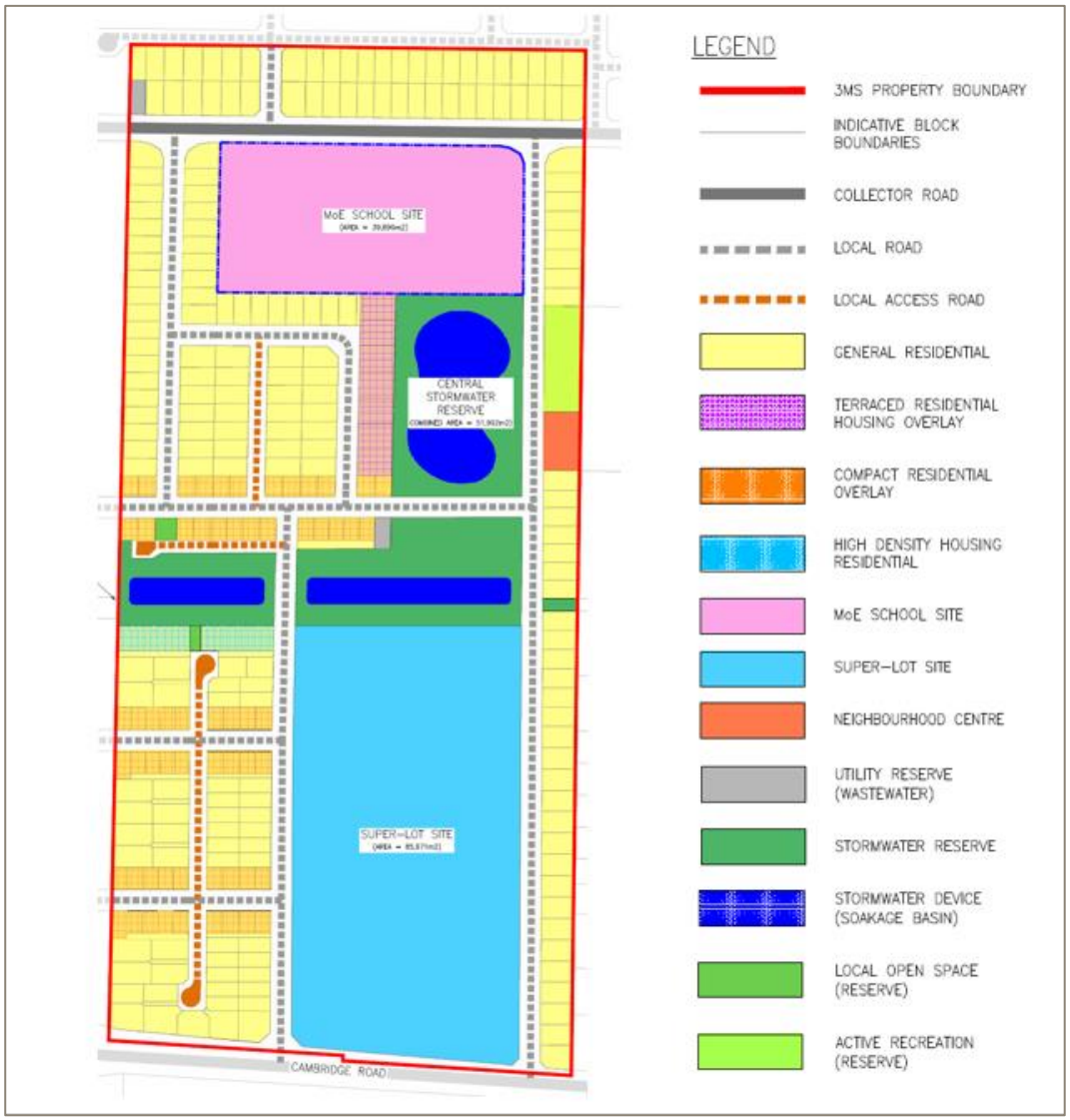


Figure 8-1: Proposed Development (Plans prepared by McCaffrey Engineering Consultants (MEC))

The proposed development mix is:

- 289 residential lots made up of:
  - 200 general residential lots
  - 14 terraced lots
  - 55 compact lots
  - 20 high-density lots
- A 'super lot' of 8.6ha for a retirement village envisaged to provide 200 retirement units;
- 0.19 hectares (ha) of neighbourhood centre; and
- 4 ha for a future primary school.

8.2 Transport, Access and Parking

8.2.1 Vehicular Access

It is proposed that two new local roads provide the principal points of vehicular access to the subdivision from Cambridge Road. As shown below on Figure 8-2, provision has also been made for four future connections to the west, one to the north and one to east.

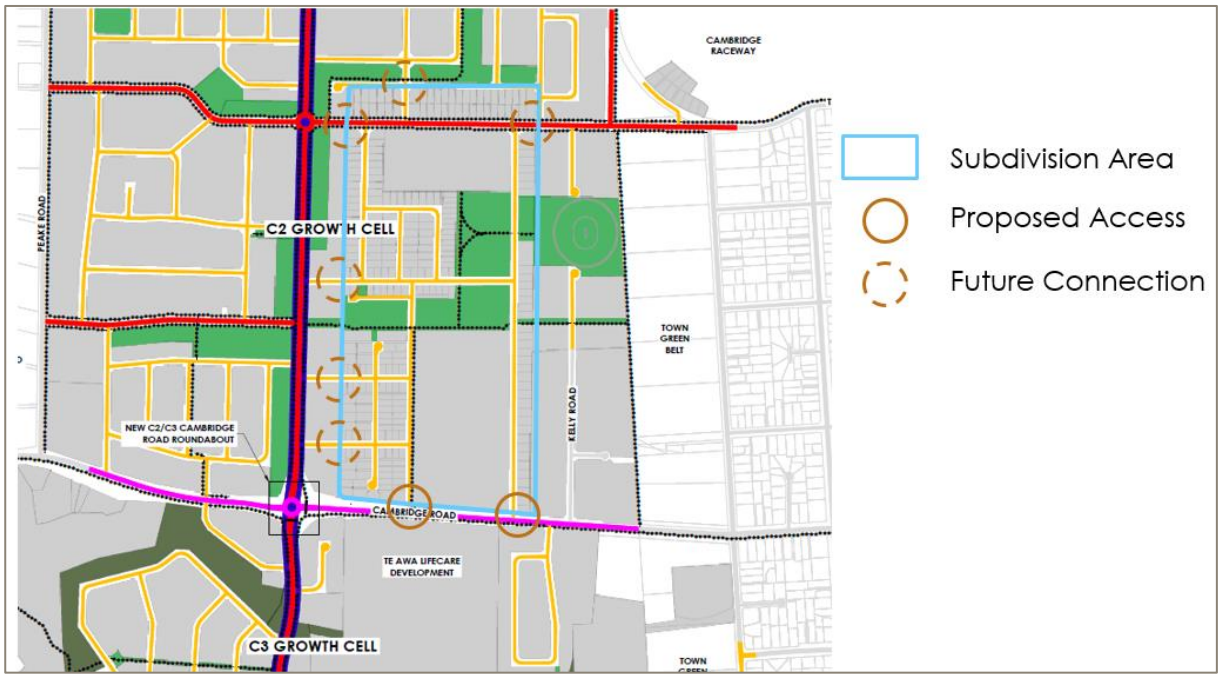


Figure 8-2: Structure Plan Road Network

The general roading arrangement is shown in more detail in Appendix B.

8.2.2 Walking and Cycling Access

The proposed walking and cycling networks are shown on Figure 8-3 below, in the context of the surrounding area. An A4 scale version of this plan is also contained in Appendix B.

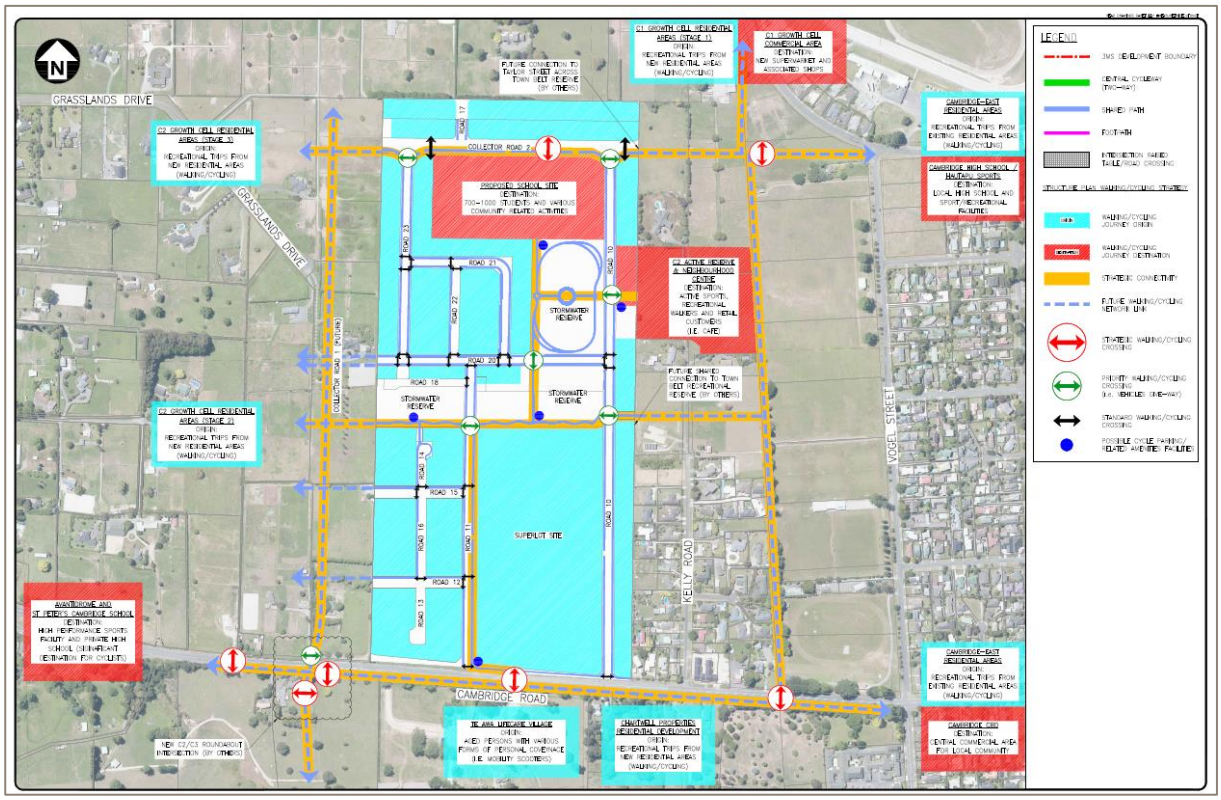


Figure 8-3: Structure Plan Walking and Cycling Network (Base plan prepared by MEC)

The network centres on a central north-south spine running along Road 11 and through the open space areas to the school. East-west connectivity is provided along the collector road corridor and through the open space areas. Walking and cycling paths are also provided on each road corridor, as outlined later in this report.

The relatively central location of the neighbourhood centre puts it within a 400m (5 minute) walk of most of the subdivision.

Overall, the walking and cycling network has been designed to create a permeable network with on and off-road options, providing access through the site and to adjacent areas and facilities. It is expected to create a sustainable and attractive network for pedestrians and cyclists.

8.3 Consistency with C2 Structure Plan

Figure 8-4 shows the proposed subdivision transport network on the right, with the originally planned Structure Plan movement network on the left. The boundary of the subdivision area is shown in blue on both.

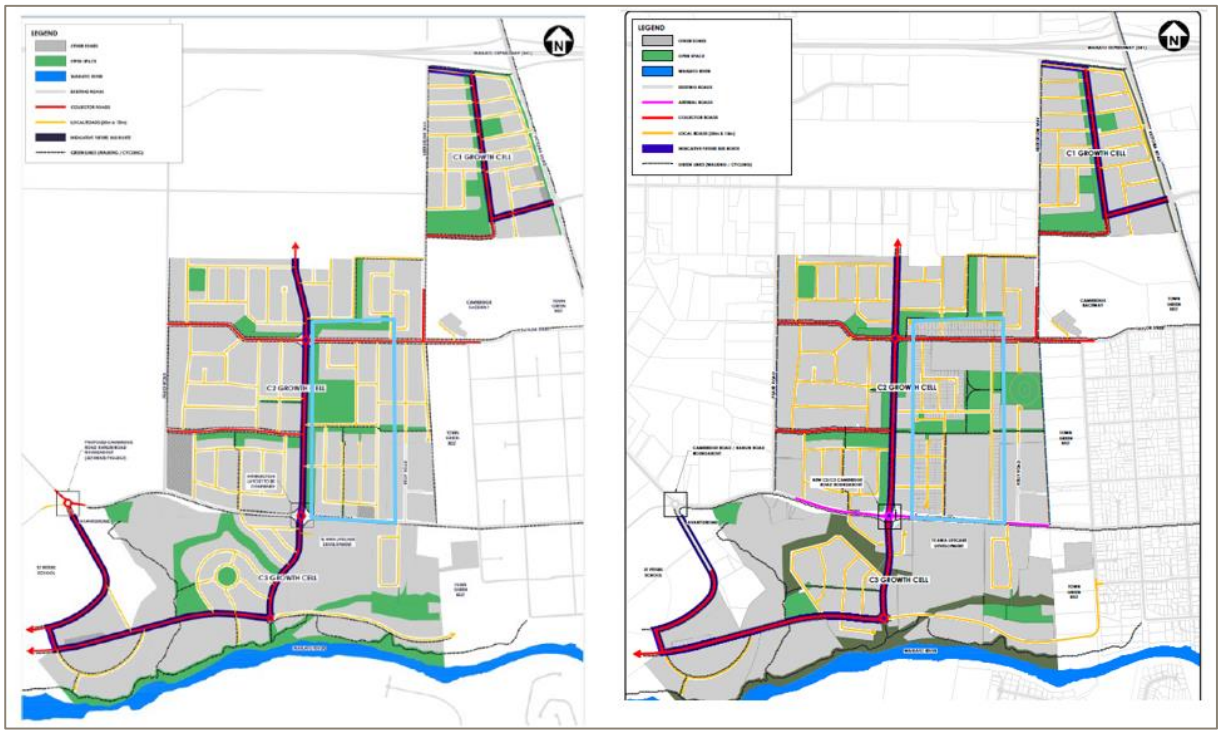


Figure 8-4: Proposed Structure Plan (Left) and Subdivision Transport Networks (Right)

It was recognised in the Structure Plan (S19.5.2.3) that local roads were indicative only. The Structure Plan acknowledged that their locations would be modified through detailed design. With that process now underway, and the location of the school and retirement community lots known, the pattern of local roads shown on the right has been adopted as most efficiently serving the land uses proposed.

The key differences to note are:

- The Structure Plan proposed three local road intersections on the collector road at the north of the site, all from the south. The subdivision layout also proposes three but has two from the south and one from the north. This reflects the presence of the school site and provides for better integration with land use and green spaces to the north.
- The Structure Plan proposed two local road and one collector road connections to the west. The subdivision retains one collector road connection and has three local road connections. As shown earlier on Figure 8-1, these local road connections enable more compact housing areas to have direct road frontage.
- To the east, the Structure Plan envisaged a connection east to an extension of Kelly Road. Green spaces are now proposed in this area, with Kelly Road envisaged to remain as a cul-de-sac. The subdivision therefore provides only a walking and cycling connection to the east, through the recreation reserve.
- The Structure Plan envisaged two connections to Cambridge Road, one providing for walking and cycling, and the being a local road. These are both now proposed to be local roads, with integrated walking and cycling paths. The western local road connection (Road 11) is proposed to revert to left in, left out only when the C2/C3 roundabout is constructed.

Collector roads were noted in the Structure Plan (S19.5.2.2) as generally fixed in location, subject to detailed design. Comparison of the left and right hand sides of Figure 8-4 shows that the east-west collector road through the subdivision has been retained in the position shown in the Structure Plan.

Overall, the proposed subdivision supports the originally planned transport network for the Structure Plan. There have been some changes to local road connectivity on Cambridge Road, and access arrangements to support this change are discussed later in this report.

9. Trip Generation, Distribution and Assignment

9.1 Trip Generation

The traffic generation of the subdivision has been assessed using the relevant rates and distributive assumptions that were adopted by Bloxam Burnett and Olliver (BBO) in previous phases of work completed for the growth cells on behalf of WDC.

Key points to note are:

- 60% of residential and school trips were assumed to be internal to the Structure Plan area. This has also been applied to the retirement community, which was not specifically assessed in the previous work;
- The neighbourhood centre has been assumed to draw 100% of its trips internally;
- 5% of trips are made by active modes; and
- 5% and 10% of internal and external trips respectively are made by public transport (PT).

The resulting morning (AM) and evening (PM) trip generation assessments are summarised below.

Table 9-1: Trip Generation Assessment (AM Peak Hour)

Land Use	Size	Unit Type	AM Peak Hour		Local/External		Mode Split		
			Rate	Trips	Local	External	Active	PT	Vehicle
Residential	289	Lots	1.2	347	208	139	21	24	302
Retirement[4]	200	Lots	0.3	60	36	24	4	4	52
Neighbourhood Centre	0.19	Ha	8	-	-	-	-	-	-
Primary School	1,000	Pupils	0.7	700	420	280	42	49	609
TOTAL	**-**	**-**	**-**	**1,107**	**664**	**443**	**66**	**77**	**963**

Table 9-2: Trip Generation Assessment (PM Peak Hour)

Land Use	Size	Unit Type	PM Peak Hour		Local/External		Mode Split		
			Rate	Trips	Local	External	Active	PT	Vehicle
Residential	289	Lots	1.2	347	208	139	21	24	302
Retirement	200	Lots	0.3	60	36	24	4	4	52
Neighbourhood Centre	0.19	Ha	8	152	152[5]	0	15	8	129
Primary School	1,000	Pupils	0.07[6]	70	42	28	4	5	61
TOTAL	**-**	**-**	**-**	**629**	**438**	**191**	**44**	**41**	**544**

In total, the subdivision is expected to generate 1,107 trips during the morning peak, 963 of which are expected to be made by car. During the afternoon peak, 629 trips are expected including 544 made by car.

[4] A retirement community was not specifically considered in the previous work therefore the RR453 85th percentile has been adopted
[5] Neighbour Centre assessed as 100% internal. All other uses 60% internal, 40% external.
[6] Schools generate very little activity in the evening commuter peak, so the previous work adopted 10% of the AM Peak rate

9.2 Trip Distribution and Assignment

Until the wider area develops (including the construction of the C2/C3 roundabout), the subdivision is to be accessed from two local road intersections with Cambridge Road (Road 11 and Road 10). Intersection turning movement volumes have been assessed using the following assumptions:

- Movements to/from the east (Cambridge) and to/from the west (Hamilton) are evenly distributed, in line with the previous BBO work.
- The western (Road 11) intersection will draw slightly more traffic (60%) because it the spatial arrangement within the subdivision makes it the most convenient route for more of the residential lots.
- Existing volumes Cambridge Road are taken from the February 2020 count arranged by Stantec.
- A background growth rate of 3% per annum (additional to the subdivision) is assumed on Cambridge Road. It is noted that the overall forecast growth rate is 6%, but much of this can be expected to come from the subdivision, over the time period being assessed. Hence 3% has been adopted.
- Opening year for the subdivision is 2022.

The resulting expected peak hour turning movements are shown below as Figure 9-1 and

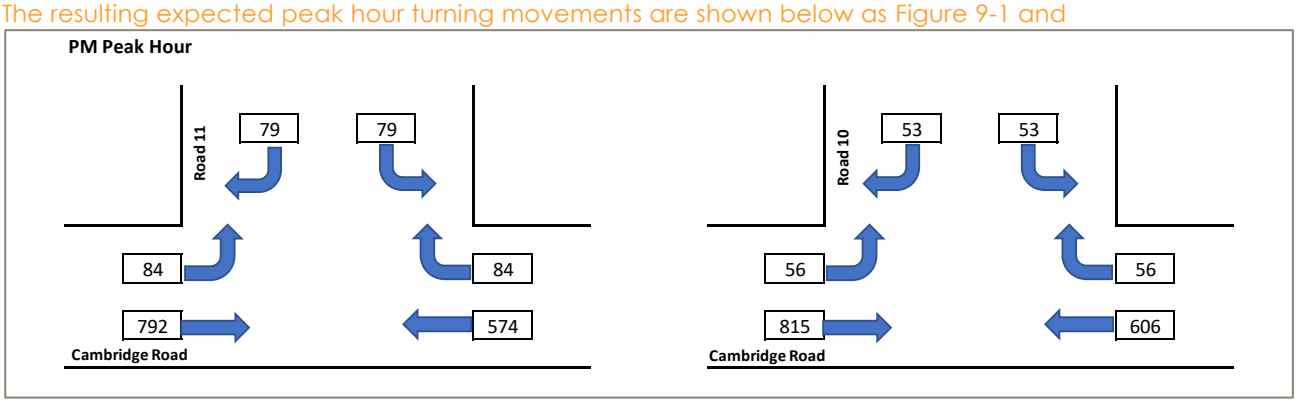


Figure 9-2.

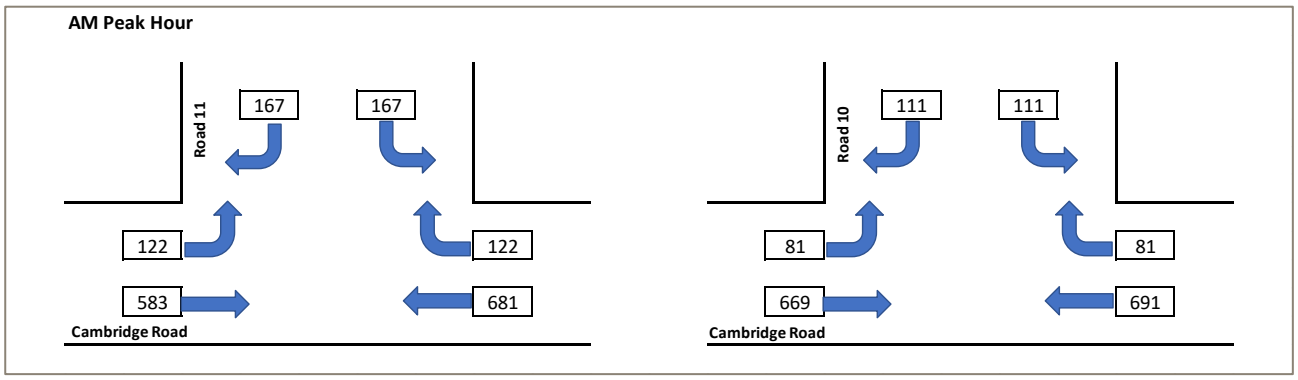


Figure 9-1: Expected Intersection Volumes, AM 2022 (vph)

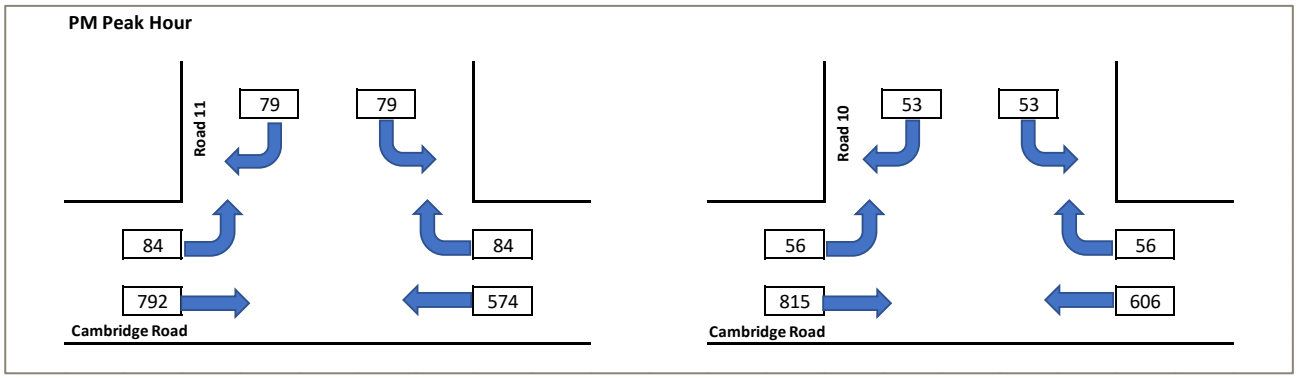


Figure 9-2: Expected Intersection Volumes, PM 2022 (vph)

The resulting intersection performance assessments and design forms are described in the following sections.

10. Transport Corridor Design

10.1 Overview

The road hierarchy within the subdivision is made of up four levels of road:

- Collector Road;
- Local Road;
- Local Road (Strategic Cycling Connection (SCC)); and
- Local Access Road.

Each road type is described in the following section with a comparison to the relevant category of road from the WDC District Plan (Appendix T4). Reference has also been made to the New Zealand Standard 4404 - Land Development and Subdivision Infrastructure (NZS4404) in some cases. A4 scale drawings of each road cross-section are also presented in Appendix C.

10.2 Collector Road

One section of collector road is proposed along the northern side of the school. The road location and the proposed cross-section are shown below.

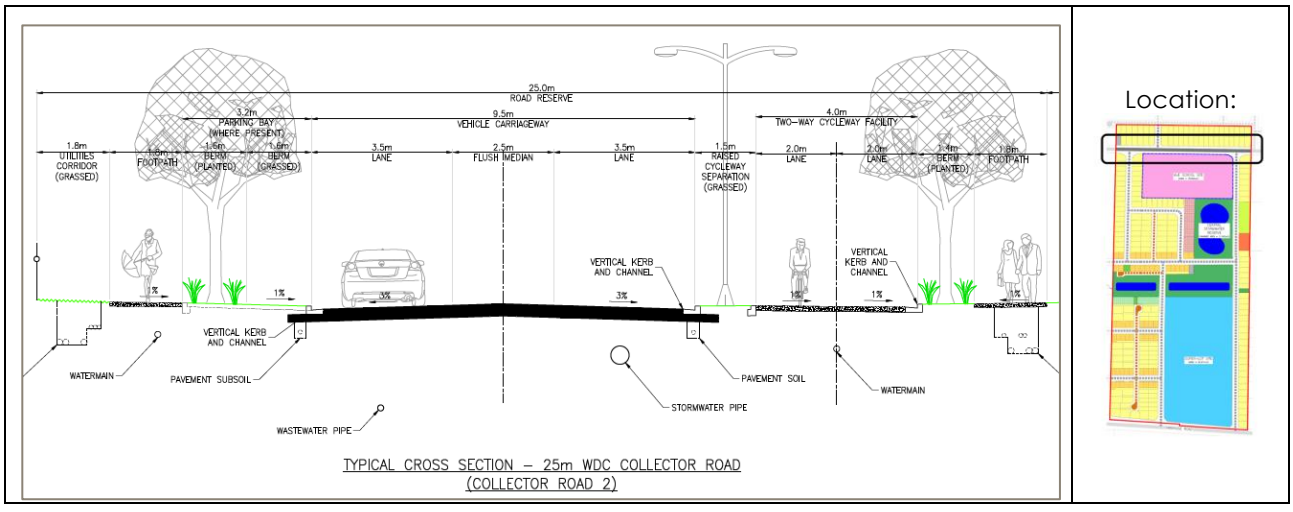


Figure 10-1: Collector Road Cross-Section (prepared by MEC) and Location

The collector road carriageway has been designed to provide a separated two-way cycle facility on the school side. On-street parking is provided only on the opposite side to the school. The proposed road elements are summarised in the following Table against the District Plan standard for collector roads.

Table 10-1: Collector Road cross-section summary

Road Element	WDC	Proposed
Road reserve width	25m	25m
Carriageway width	15m	9.5m
Lane width	2 @ 3.5m	2 @ 3.5m
Cycleway width	Both sides @ 1.5m	Two-way 4m cycleway on school side, 2.1m shared path on other side
Street parking width	1 park per lot @ 2.5m wide	2.5m where present (non-school side)
Front berm	Both sides	1m cycle separator on school side, grassed 1.0m on other side
Footpath width	2 @ 1.5m	2 @ 1.5m
Utilities corridor	Both sides @ 2.1m min	1.4m on school side, 2.0m and 1.5m other side

The proposed cross-section provides a legal width that is consistent with the WDC requirement for collector roads. Some cross-section elements differ, as the road has been designed with a stronger focus on cycling, because of the school. The cross-section is assessed as appropriate in this land use and transport setting.

10.3 Local Road

Local roads are proposed to serve most of the subdivision. Their locations and proposed cross-section are shown as Figure 10-2.

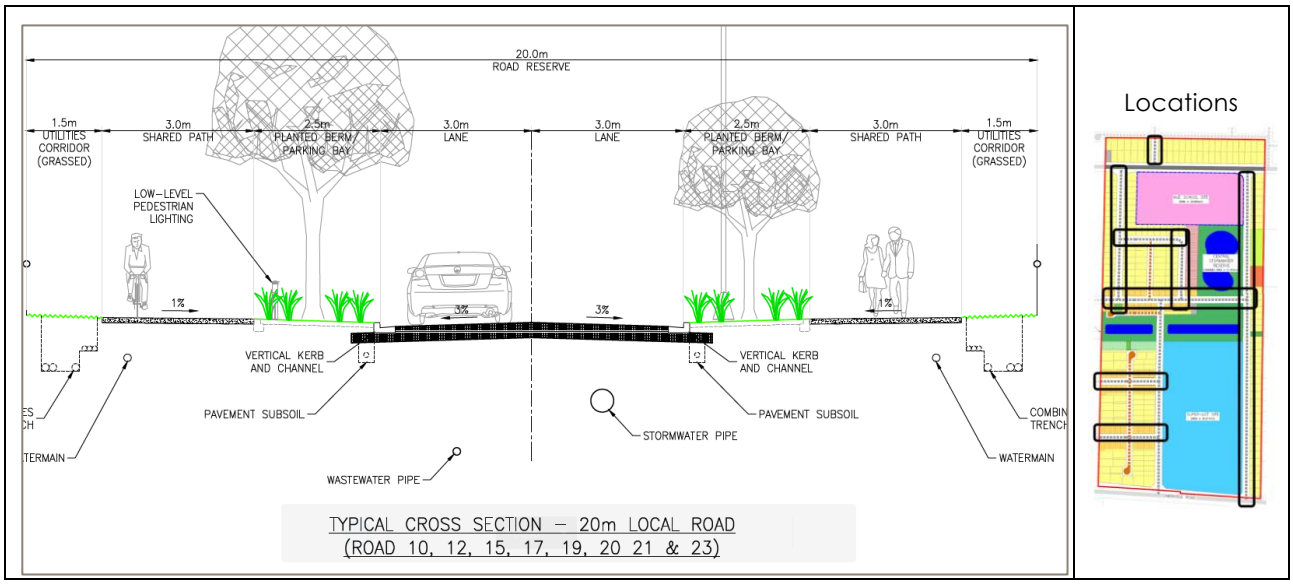


Figure 10-2: Local Road Cross-Section (prepared by MEC) and Locations

The proposed road elements are summarised in Table 10-2 against the District Plan standard for local through roads.

Table 10-2: Local Road cross-section summary

Road Element	WDC	Proposed
Road reserve width	21m	20

Road Element	WDC	Proposed
Carriageway width	11m	6m
Lane width	2 @ 3m	2 @ 3m
Cycleway width	Shared environment	3m shared paths both sides
Street parking width	1 park per lot @ 2.5m wide	2.5m where present both sides
Front berm	Both sides	2.5m both sides alternating with parking
Footpath width	2 @ 1.5m	3m shared path both sides
Utilities corridor	Both sides @ 2.1m min	1.5m both sides

The proposed cross-section provides a legal width of 20m rather than the WDC standard of 21m. The cross-sectional features are generally consistent however there is once again a greater focus on cycling, with 3m shared paths being provided rather than a shared on-road environment.

The difference in width relates to the width available for the utilities corridor. This is addressed by other parts of the Application. From a transport perspective, the proposed movement lanes, parking areas and walking and cycling provisions are appropriate for a local road in this area.

10.4 Local Road (Strategic Cycling Connection)

This road type is used on Road 11 which forms part of the north-south walking and cycling spine of the subdivision. The proposed cross-section and location are shown as Figure 10-3

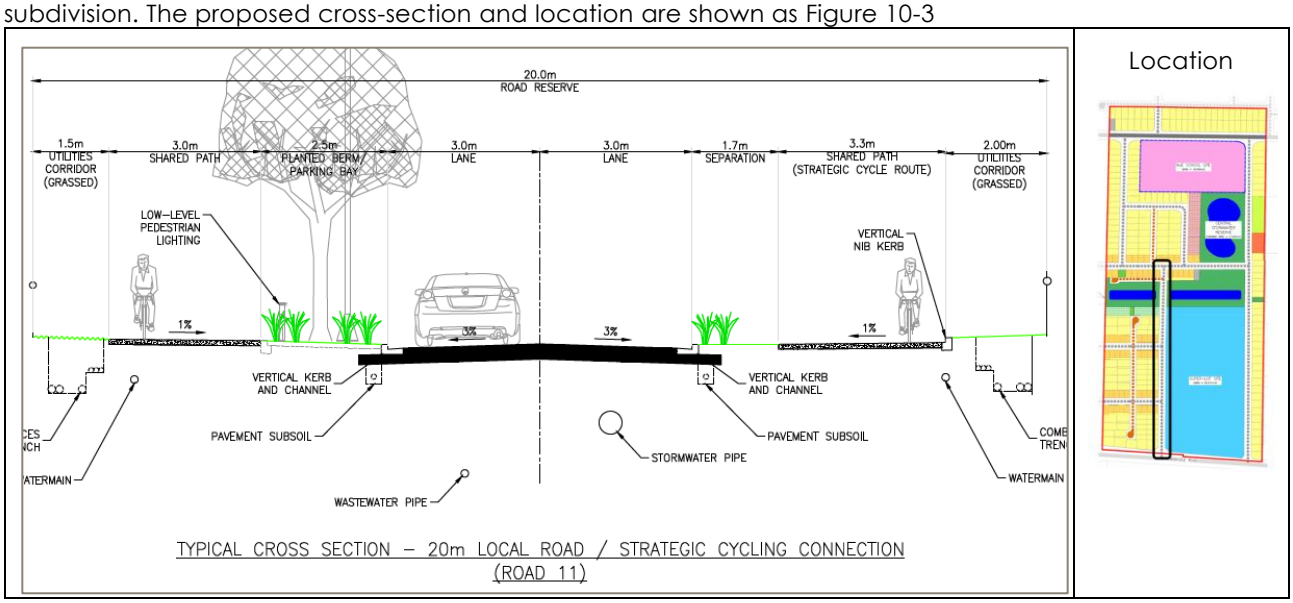


Figure 10-3: Local Road (SCC) Cross-Section (prepared by MEC) and Location

The proposed road elements are summarised in Table 10-3 against the District Plan standard for local through roads.

Table 10-3: Local Road (SCC) cross-section summary

Road Element	WDC	Proposed
Road reserve width	21m	20m
Carriageway width	11m	6m
Lane width	2 @ 3m	2 @ 3m
Cycleway width	Shared environment	3m shared path one side, 3.3m shared path on SCC side

Road Element	WDC	Proposed
Street parking width	1 park per lot @ 2.5m wide	2.5m one side, where present
Front berm	Both sides	2.5m both sides alternating with parking one side, 1.7m cycle separator on other side
Footpath width	2 @ 1.5m	3m shared path one side, 3.3m shared path on SCC side
Utilities corridor	Both sides @ 2.1m min	1.5m one side, 2.1m other side

The proposed cross-section provides a legal width of 20m rather than the WDC standard of 21m. The cross-sectional features are generally consistent however there is once again a greater focus on cycling, with 3m and 3.3m shared paths being provided rather than a shared on-road environment. It is also proposed that the internal road corridors be established at a safe 40km/h speed limit environment, with supporting speed management devices. In this context, the proposed carriageway environments are considered able to be safely established.

The difference in width again relates to the width available for the utilities corridor. This is addressed by other parts of the Application. From a transport perspective, the proposed movement lanes, parking areas and walking and cycling provisions are appropriate for a local road in this area.

10.5 Local Access Road

This road type is used in three locations, providing access to residential properties of varying densities. Some road sections are through roads and some are cul-de-sacs. The locations and proposed cross-section are shown below as Figure 10-4.

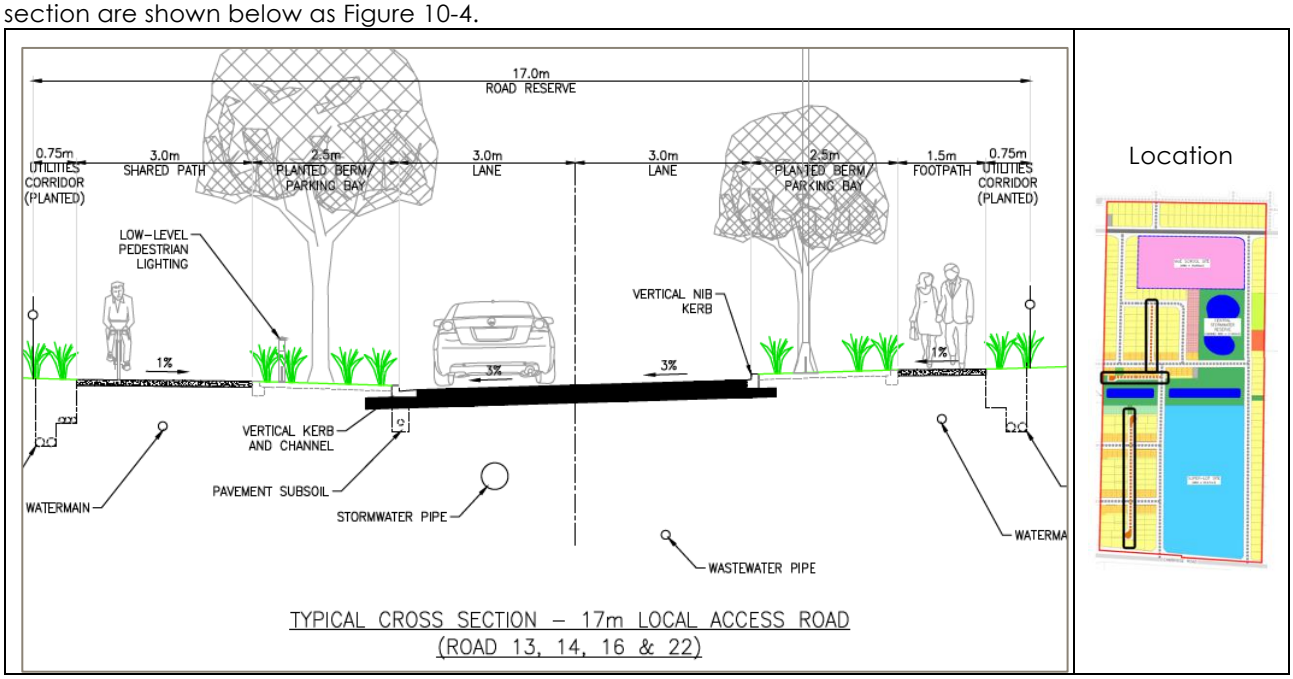


Figure 10-4: Local Access Road Cross-Section (prepared by MEC) and Locations

The proposed road elements are summarised in Table 10-4 against the District Plan standards for both local through roads and local road cul-de-sacs (<149m long). The New Zealand Standard for Land Development and Subdivision Infrastructure (NZS4404) recommendations for local roads (up to 200 dwellings) are also presented.

Table 10-4: Local Access Road cross-section summary

Road Element	WDC (Local Cul-de-sac < 149m)	WDC (Local Through Road)	Proposed	NZS 4404 (Local Through Road)
Road reserve width	21m	21m	17m	15m
Carriageway width	11m	11m	6m	11m maximum
Lane width	2 @ 3m	2 @ 3m	2 @ 3m	5.5-5.7m
Cycleway width	Shared environment	Shared environment	3m shared path one side	Shared environment
Street parking width	0.75 parks per lot @ 2.5m wide	1 park per lot @ 2.5m wide	2.5m both sides, where present	Shared parking in movement lane up to 100 dwellings
Front berm	One side only	Both sides	2.5m both sides alternating with parking	-
Footpath width	1 @ 1.5m	2 @ 1.5m	3m shared path one side, 1.5m footpath other side	1.5m each side for > 20 dwellings
Utilities corridor	Both sides @ 21.m	Both sides @ 2.1m min	0.75m both sides	-

The proposed cross-section provides a legal width of 17m rather than the WDC standard of 21m. The cross-sectional features are generally consistent however there is once again a greater focus on cycling, with 3m shared path on one side rather than only a shared on-road environment.

The difference in legal width again relates to the width available for the utilities corridor. This is addressed by other parts of the Application. From a transport perspective, the proposed movement lanes, parking areas and walking and cycling provisions are appropriate for a local access road in this area. The reduced overall width can also be supported on the basis of NZ4404.

A safe and lower speed limit neighbourhood environment is proposed. To support the safe speed outcomes, local traffic management together with carriageway width management measures are proposed. These, once fully developed are to be subject to a safety audit prior to council approval to the engineering design plans for construction, in accordance with the Regional Infrastructure Technical Specification (RITS) guidelines. Overall, whilst there are some minor departures from the WDC road standards, the proposed hierarchy of cross-sections is expected to provide a safe, well-managed and accessible movement environment.

11. Transport Effects and Mitigation

11.1 Access Layout

The proposed initial access layout and recommended supporting works on Cambridge Road are:

- A 3m wide shared path along the site frontage.
- No direct property access to Cambridge Road.
- Extension of the existing flush median from Kelly Road to the Te Awa Lifecare Village access.
- Right turn bays[7], integrated with the flush median on Cambridge Road at Road 10 and Road 11.
- Relocation of the existing 50/80 km/h speed limit change from west of Kelly Road to west of the Te Awa Lifecare access.

[7] The volume combinations in Figure 9-1 and Figure 9-2 both exceed the right turn bay warrants in Austroads Part 6.

These recommended works are shown on Figure 11-1. A4 scale plans are also contained in Appendix D.

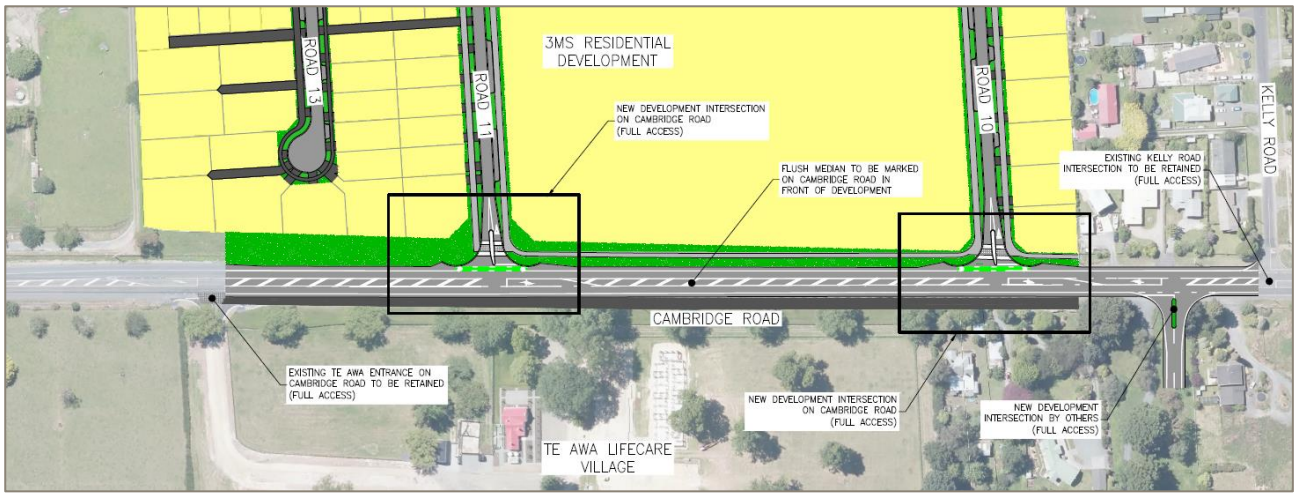


Figure 11-1: Initial Access Arrangements (Prepared by MEC)

The accesses are approximately 200m apart. The WDC District Plan does not contain guidance in relation to spacing between intersections so reference has been made to the Waikato Regional Infrastructure Technical Specifications (RITS). On arterial roads RITS[8] recommends a spacing of 90m between intersections on the same side of the road.

In a 50km/h speed environment, Austroads recommends safe intersection sight distance (SISD) of 90m (minimum) and 97m (desirable). Cambridge Road is straight and flat in this area and there are not expected to be any impediments to achieving appropriate sight distance for what is recommended to be a 50km/h speed environment in future.

When the C2/C3 roundabout is formed it is recommended that the Road 11/Cambridge Road intersection becomes left in and left out only. The Road 10/Cambridge Road intersection could remain unchanged, permitting all turning movements. This arrangement is shown below as Figure 11-2. An A4 scale plan is also included in Appendix D.

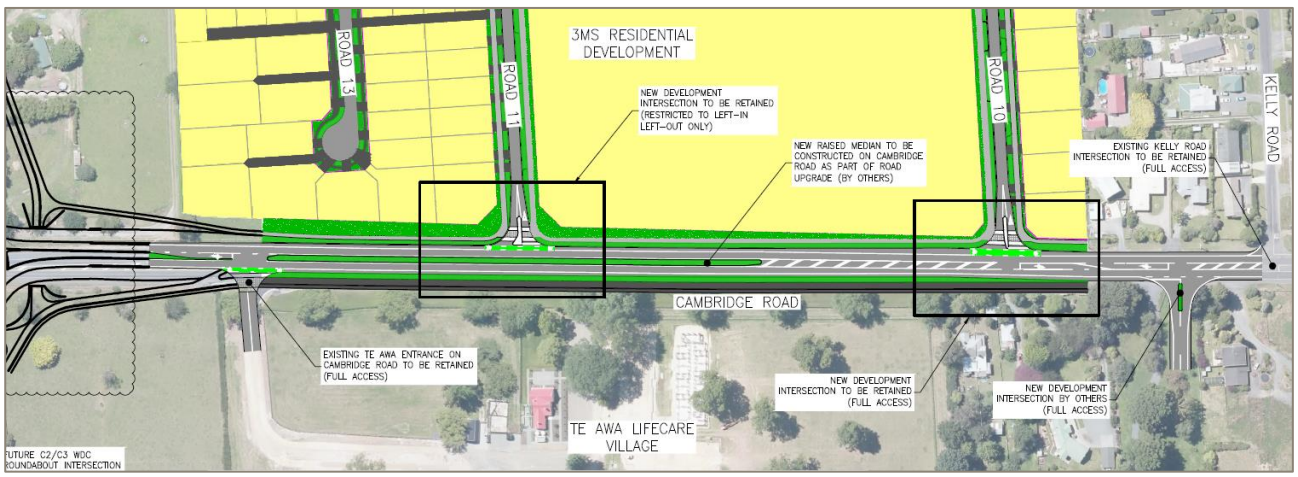


Figure 11-2: Ultimate Access Arrangements (Prepared by MEC)

11.2 Intersection Performance

[8] RITS Table 3-4 Minimum Intersection Spacing

The proposed intersections on Cambridge Road have been modelled using the isolated intersection analysis package SIDRA. The expected degree of saturation (DoS), average delay, level of service (LOS) and 95-th percentile queue length are summarised below for the Cambridge Road/Road 11 intersection, which is expected to carry the highest traffic volumes. Results for the Road 10 intersection are also presented in Appendix E.

Table 11-1 presents the AM peak analysis. Table 11-2 presents the PM peak. Both intersections have been modelled with the 2022 volumes presented earlier as Figure 9-1 and Figure 9-2. The assumed intersection layout has right turn bay on the Cambridge Road (east) approach, two exit lanes from the development, and a single lane approach from Cambridge Road (west). The layouts are also shown in Appendix E.

Table 11-1: SIDRA results (AM Peak, 2022)

Road	Movement	Volume (vph)	DoS	Average Delay (s/veh)	LOS	95% Back of Queue (m)
Cambridge Road (East)	T	681	0.383	0.1	A	0.0
	R	122	0.123	8.6	A	4.1
Road 11 (North)	L	167	0.157	7.9	A	5.0
	R	167	0.661	26.9	D	20.6
Cambridge Road (West)	L	122	0.397	5.6	A	0.0
	T	583	0.397	0.1	A	0.0
Intersection	-	1,841	0.661	-	-	-

Table 11-2: SIDRA results (PM Peak, 2022)

Road	Movement	Volume (vph)	DoS	Average Delay (s/veh)	LOS	95% Back of Queue (m)
Cambridge Road (East)	T	574	0.322	0.0	A	0.0
	R	84	0.115	10.2	B	3.5
Road 11 (North)	L	79	0.102	9.3	A	2.9
	R	79	0.366	23.4	C	8.7
Cambridge Road (West)	L	84	0.491	5.7	A	0.0
	T	792	0.491	0.1	A	0.0
Intersection	-	1,692	-	-	-	-

The tables show that the critical movement in both time periods is the right turn out of Road 11. This operates at LOS D (AM) and LOS C (PM) with an expected average delay of 26.9 seconds/vehicle in the morning and 23.4 seconds/vehicle in the afternoon. The 95th percentile back of queue is some 20m in the morning, equivalent to 3 vehicles in length.

It is understood that the roundabout that will ultimately connect Cambridge Road with the C2 and C3 growth cells (collector roads 1 and 4) is expected to be constructed by late 2023. Further, wider northern and western trip distribution is expected as those land development areas progress. These local roading integrations are expected to further diminish the demands expected at the Cambridge Road interface and also to further support alternative transport mode outcomes. To assess how long the priority-controlled intersections could serve the proposed subdivision, the most critical scenario (AM peak at Road 11) was modelled with annual increases in traffic volume on Cambridge Road.

This analysis showed that the upper limit of LOS D was reached for the critical movement (the right turn exit) in the year 2025 (with 15% growth in the observed 2020 volumes). On this basis it can be concluded that the proposed access arrangement can be supported until at least 2025, when additional connectivity may be required or there is an acceptance of the increased delay for some movements which lead to supporting the long term mode shift outcomes for public transport. The SIDRA results for this scenario are presented in Appendix E.

12. District Plan

Table 12-1 below summarises compliance against the relevant rules of the WDC District Plan Section 16 (Transportation).

Table 12-1: District Plan Rules Assessment

Rule	Requirement	Compliance
Road Hierarchy		
16.4.2.1	All structure plans, plan changes, developments, and subdivision must be consistent with the road hierarchy, as contained in Appendix T5.	Complies The subdivision is consistent with the approved Structure Plan for the C2 Growth Cell.
16.4.2.2	To maintain the effectiveness of the road hierarchy, a road network must be designed so that a road connects to a road at the same level in the hierarchy, or directly above or below its place in the hierarchy	Does not comply. The approved Structure Plan has one local road (Road 10) connecting to a major arterial (Cambridge Road) and a further connection is proposed. The rest of the subdivision road layout complies with this rule through its mixture of collector and local roads. The principle of local roads intersecting Cambridge Road is established in the Structure Plan. Access mitigation works are proposed to incorporate the planned intersection with Road 10 and the second intersection at Road 11. The non-compliance is assessed as generating less than minor effects on that basis.
16.4.2.3	To maintain the effectiveness of the road hierarchy, when a site has two road frontages, vehicle access and egress must be from the lesser road type	Complies The site has one road frontage.
Vehicular Access to Sites in All Zones		
16.4.2.4	Every site shall be provided with vehicle access to a formed road that is constructed to a permanent standard. The vehicle access shall be designed to accommodate the demands of all traffic from the activity on that site, taking into account the form and function of the road.	Complies All lots have access to a formed road. Subdivision roads will be built to permanent standard.
Vehicle Entrance Separation from Intersections and Other Vehicle Entrances		
16.4.2.5	The minimum distance of a vehicle entrance (accessway) from an intersection or other entrance shall be as follows: (posted speed limit of 40km/h or 50km/h): 30m from an intersection (on the major road), and 20m from an intersection (on the minor road). Accesses should be less than 4m apart or greater than 11m apart.	A high degree of compliance expected. Most lots will be able to comply with these rules. Some corner lots and lots opposite intersections may not. This is common in residential areas where lot size can limit the opportunity to achieve 20-30m separation from intersections. Potential adverse effects can be mitigated at the time individual accesses are designed by placing them on the lower classification road (where two frontages are available) and siting them as far as practicable from intersections.
Vehicle Entrance Separation from Railway Level Crossings		
16.4.2.6	New vehicle access ways shall be located a minimum of 30m from a railway level crossing.	N/A

Rule	Requirement	Compliance
		No level crossings are near the site.
Minimum Sight Distance Requirements for a Railway Level Crossing		
16.4.2.7	Any buildings, structure or land use shall be located to comply with the minimum rail level crossing sightline requirements within Appendix T2.	N/A No level crossings are near the site.
Vehicle Access to Compact Housing Development		
16.4.2.8	Compact housing development must only have one access point to a strategic road	Complies Compact housing areas have no access to strategic roads.
Parking, Loading and Manoeuvring Area		
16.4.2.13	All activities that involve the erection, construction or substantial reconstruction, alteration or addition to a building on any site, or changes the use of any land or building, shall provide parking and loading/unloading for vehicles on the site as set out in Appendix T1.	Compliance expected Activities on individual lots have not been designed at this stage. Compliance with Appendix T1 is expected and lots have adequate size to comply. Departures, if these are proposed by individual lot owners/developers, will be subject to separate applications in the usual way.
16.4.2.14	Where assessment of the number of parking spaces required results in a fractional space being calculated, any fraction less than one-half shall be disregarded, and any fraction greater than or equal to one-half shall be counted as one space	Compliance expected
16.4.2.15	Vehicle parking, loading/unloading, and manoeuvring areas shall: (a) Not encroach on any setback, outdoor living area, or bicycle parking spaces; and loading/unloading areas and manoeuvring areas shall not encroach over vehicle parking spaces; and (b) Be designed, formed, and constructed in accordance with Appendix T2 and ensure that the surface of the required area provides a dust free environment; and (c) Provide for the safe and efficient disposal of surface stormwater clear of any adjoining access or road surface in a way that does not result in ponding or scouring; and (d) Be constructed to accommodate the anticipated use of the area by all traffic likely to access the site in the zone in which it is located, including construction traffic taking into account pavement, surfacing, demarcation of spaces, aisles and circulation roads; and (e) Be provided on the site on which the building, activity or proposal is located, except where the provisions of Rules 16.4.2.16 and 16.4.2.17 apply.	Compliance expected Individual lots have not been designed at this stage. Compliance with the relevant rules is expected and lots have adequate size to comply. Departures, if these are proposed by individual lot owners/developers, will be subject to separate applications in the usual way.
16.4.2.18	The design and layout of sites shall ensure that access to each required vehicle parking, loading and unloading space is directly from the required access or manoeuvring area	Compliance expected Individual lots have not been designed at this stage. Compliance with the relevant rules is expected and lots have adequate size to comply.
16.4.2.19	Vehicle manoeuvring areas and parking spaces, including those spaces located in a garage, and loading and unloading spaces, shall be provided on a site, of a standard adequate to accommodate a 99.8 percentile car, or a 99 percentile truck, in order to ensure that all vehicles have the ability to access the adjoining road in a forward direction after no more than a three point	Compliance expected Individual lots have not been designed at this stage. Compliance with the relevant rules is expected and lots have adequate size to comply.

Rule	Requirement	Compliance
	turning manoeuvre on the site, except where Rule 16.4.2.17 applies	
Provision of Access and Car Parking for Listed Heritage Items		
16.4.2.21	Where the proposed development, or activity incorporates a heritage item identified in Appendix N1 of the Plan, then any additional car parks required in accordance with Appendix T1 Minimum Vehicle Parking and Loading/Unloading Standards, contained need not be provided, and a financial contribution for the provision of public car parking need not be paid, provided that the total number of car parks provided on the site prior to the proposed development, or activity is not reduced.	N/A The site does not include any heritage items
Car Park Landscaping and Lighting		
16.4.2.23	Other than in the St Peters School Zone, all car parks must: (a) Provide at least one tree planted for every 5 car parking spaces at a grade of no less than PB95. For the avoidance of doubt, PB95 is equivalent to a tree that is at least 1.5m tall at the time of planting; and (b) Ensure lighting is designed to avoid shading areas or isolating areas of public use.	Compliance expected. Non-residential activities expected to comply with the relevant rules.
Provision of Bicycle Parking Facilities		
16.4.2.24	In areas other than the Rural Zone and Pedestrian Frontages, activities employing more than ten people must provide bicycle parking facilities at a rate of one bicycle park for every ten people employed	Compliance expected. Non-residential activities employing more than ten people expected to comply with the relevant rules.
Provision of an Integrated Transportation Assessment		
16.4.2.25	A Simple or Broad Integrated Transport Assessment (ITA) shall be prepared for activities as required by this rule.	The subdivision is expected to generate more than 1,500vpd and therefore requires a Broad ITA.

Overall, the proposed subdivision layout demonstrates a high degree of compliance with the rules that can be assessed at subdivision stage. There is one identified non-compliance in relation to local roads intersecting Cambridge Road. Mitigation works shown on Figure 11-1 are proposed to support this arrangement.

There are no evident reasons why future individual activities and lot designs cannot also achieve a high degree of compliance with the relevant on-site and individual access rules of the District Plan.

13. Conclusions and Recommendations

The proposed subdivision provides a mixture of residential lot types along sites for a school, retirement community and neighbourhood centre. A multi-modal transport network has been designed to support the subdivision with a permeable network of collector and local roads providing on-road and off-road shared user paths options for walking and cycling.

The proposal is generally consistent with the transport networks that were planned for the wider area as part of the C2 and C3 Structure Plans.

In the short-term, primary access to the subdivision is provided by two local road intersections on Cambridge Road. Provision has been made throughout the subdivision for road and path connections west, east and north as adjacent land develops.

To enable the creation of two intersections on Cambridge Road it is recommended that:

- The existing flush median is extended from Kelly Road to the Te Awa Lifecare Village access;
- Right turn bays are provided on Cambridge Road at Road 10 and Road 11;
- The existing 50 km/h speed zone is extended west of the Te Awa Lifecare access.;

It is also recommended that a 3m wide shared path is provided along the site frontage on the northern side of Cambridge Road. No direct property access is proposed to Cambridge Road in this area.

Modelling of the intersections under existing traffic loading indicates that it will operate with no worse than LOS C. It is assessed that acceptable operation could be retained until at least 2025, at which point the C2/C3 roundabout is expected to be in place. A condition is recommended to change the Road 11 intersection to left in, left out only control following construction of the roundabout.

The proposed subdivision layout achieves a high degree of compliance with the District Plan transportation rules. There is one non-compliance in relation to local road-major arterial road connectivity however this is an anticipated outcome of the Structure Plan in this area and can be supported on the basis of the above access conditions.

The local neighbourhood environment is to be established to operate within a safe 40km/h speed restriction. Aligned with this is the detailed design of traffic speed management measures including management of the carriageway/corridor widths as has been described. These are recommended to be subject to an independent road safety audit (as per the RITS requirements) and made available for Council approval prior to the issue of engineering approval for construction.

With these access arrangements in place, the proposed subdivision can be appropriate integrated with the surrounding transportation networks, with less than minor effects.

Appendices

Appendix A Structure Plan Diagrams

READ DRAWINGS CAREFULLY #MEASURETWICECUTONCE

DRAWING SCALE BAR (IN MILLIMETRES): 0 2 4 6 8 10 20 30 40 50 60 70 80 90 100

LEGEND

- 3MS PROPERTY BOUNDARY
- INDICATIVE BLOCK BOUNDARIES
- COLLECTOR ROAD
- LOCAL ROAD
- LOCAL ACCESS ROAD
- GENERAL RESIDENTIAL
- TERRACED RESIDENTIAL HOUSING OVERLAY
- COMPACT RESIDENTIAL OVERLAY
- HIGH DENSITY HOUSING RESIDENTIAL
- MoE SCHOOL SITE
- SUPER–LOT SITE
- NEIGHBOURHOOD CENTRE
- UTILITY RESERVE (WASTEWATER)
- STORMWATER RESERVE
- STORMWATER DEVICE (SOAKAGE BASIN)
- LOCAL OPEN SPACE (RESERVE)
- ACTIVE RECREATION (RESERVE)

FUTURE 3MS DEVELOPMENT SITE

MoE SCHOOL SITE
(AREA = 39,896m2)

CENTRAL STORMWATER RESERVE
COMBINED AREA = 45,723m2)

3Ms PROPERTY BOUNDARY

SUPER–LOT SITE
(AREA = 85,971m2)

KELLY ROAD

CAMBRIDGE ROAD

TE AWA LIFECARE DEVELOPMENT

PROPERTY ASSESSMENT

BASED ON THE REFINED STRUCTURE PLAN:	
GENERAL RESIDENTIAL – AREA	10.49 Ha
GENERAL RESIDENTIAL – No. LOTS	186 LOTS
TERRACED RESIDENTIAL – AREA	0.56 Ha
TERRACED RESIDENTIAL – No. LOTS	14 LOTS
COMPACT RESIDENTIAL – AREA	1.80 Ha
COMPACT RESIDENTIAL – No. LOTS	56 LOTS
HIGH DENSITY HOUSING – AREA	0.32 Ha
HIGH DENSITY HOUSING – No. LOTS	20 LOTS
R.O.W ACCESS LOTS – AREA	0.27 Ha
WDC COLLECTOR ROAD AREA	1.07 Ha
ROAD RESERVE AREA	6.81 Ha
UTILITY RESERVE AREA	0.04 Ha
STORMWATER RESERVE AREA	4.57 Ha
RECREATIONAL RESERVE AREA	0.58 Ha
NEIGHBOURHOOD CENTRE AREA	0.33 Ha
SUPER–LOT SITE	8.60 Ha
MOE SCHOOL SITE	3.99 Ha
FUTURE DEVELOPMENT SITE	1.41 Ha
TOTAL AREA	40.84 Ha
TOTAL RESIDENTIAL LOTS	276 LOTS
TOTAL SUPER–LOT DWELLINGS (ASSUMED)	200 UNITS
GROSS DENSITY	15.1 LOTS/Ha
NET DENSITY	21.6 LOTS/Ha

NOTES

1. LAYOUT SHOWN IS INDICATIVE AND HAS BEEN DEVELOPED FOR COMPARISON PURPOSES ONLY
2. STRUCTURE PLAN SHOWN IS BASED ON THE APPROVED LAYOUT CONFIRMED AS PART OF PLAN CHANGE 7 INCLUDING AMENDMENTS WITHIN THE 3MS PROPERTY TO ACCOMMODATE CLIENT DEVELOPMENT REQUIREMENTS
3. PROPOSED SCHOOL SITE SHOWN HAS BEEN AMENDED TO ACHIEVE A MINIMUM LOT SIZE OF 4.0Ha (AS REQUESTED BY THE MINISTRY OF EDUCATION)
4. INDIVIDUAL RESIDENTIAL LOTS SHOWN ARE INDICATIVE ONLY AND ARE BASED ON THE FOLLOWING SIZE PARAMETERS:
   - COMPACT – LESS THAN 400m^2
   - GENERAL – GREATER THAN 400m^2

DESIGNED BY	DATE	DRAWN BY	DATE	APPROVED BY	DATE	APPROVAL STATUS
L. MCCAFFREY	25.08.20	L. MCCAFFREY	25.08.20	–	–	FOR INFORMATION

PROJECT NAME: 3M RESIDENTIAL DEVELOPMENT PROJECT

REV	DESCRIPTION	BY	DATE
J	FOR INFORMATION	LPM	30.11.20
I	FOR INFORMATION	LPM	10.11.20
H	FOR INFORMATION	LPM	29.10.20
G	FOR INFORMATION	LPM	28.10.20

CLIENT NAME: 3MS

DRAWING TITLE: 3Ms PROPERTY LAYOUT

ALTERNATIVE DEVELOPMENT LAYOUT

PRODUCED BY: MCCAFFREY ENGINEERING CONSULTANTS

DRAWING SCALE: 1:3000

REVISION No.: J

DISCIPLINE: CIVIL ENGINEERING

DRAWING No.: 17001–SK–094

DATE PRINTED: 8 December 2020

FILE NAME: 17001–SK–094.dwg

READ DRAWINGS CAREFULLY #MEASURETWICECUTONCE

LEGEND

- EXISTING CADASTRAL BOUNDARIES
- ARTERIAL ROAD
- COLLECTOR ROAD
- LOCAL ROAD (INDICATIVE LOCATION)
- WALKING AND CYCLING LINKS (INDICATIVE LOCATION)
- STORMWATER CULVERT / PIPE (INDICATIVE LOCATION)
- EXISTING DEVELOPMENT
- RESIDENTIAL (NET DENSITY = 12.5 DWELLINGS/Ha)
- COMPACT HOUSING OVERLAY
- VISITOR ACCOMMODATION OVERLAY
- ENVIRONMENTAL RESERVE/BUFFER
- LOCAL OPEN SPACE (RESERVE)
- ACTIVE RECREATION (RESERVE)
- STORMWATER WETLAND / BASIN
- OPEN CHANNEL / GREEN SPACE NETWORK
- ST PETERS' SCHOOL ZONE
- NEIGHBOURHOOD CENTRE
- LOCAL CENTRE OVERLAY
- INDICATIVE PRIMARY SCHOOL / PRE-SCHOOL AREA
- HV — OVERHEAD TRANSMISSION POWERLINES
- SITES OF CULTURAL SIGNIFICANCE

N

WAIKATO EXPRESSWAY (SH1)

ABERGELDIE WAY

VICTORIA ROAD

C1 GROWTH CELL

CAMBRIDGE RACEWAY

TOWN GREEN BELT

TAYLOR STREET

SCHOOL SITE

PEAKE ROAD

C2 GROWTH CELL

VOGEL STREET

TOWN GREEN BELT

CAMBRIDGE ROAD / HANLIN ROAD ROUNDABOUT

NEW C2/C3 CAMBRIDGE ROAD ROUNDABOUT

KELLY ROAD

CAMBRIDGE ROAD

AVANTIDROME

EXISTING STREAM

TE AWA LIFECARE DEVELOPMENT

ST PETERS SCHOOL

C3 GROWTH CELL

TOWN GREEN BELT

WAIKATO RIVER

COMBINED C1/C2/C3 OUTFALL STRUCTURE (LOCATION INDICATIVE)

3MS

3MS RESIDENTIAL DEVELOPMENT

STRUCTURE PLAN INTEGRATION GENERAL ARRANGEMENT

DRAWING REVISION: G

DATE PRINTED: 30 November 2020 FILE NAME: 17001-SK-100.dwg

READ DRAWINGS CAREFULLY #MEASURETWICECUTONCE

LEGEND

- OTHER ZONES
- OPEN SPACE
- WAIKATO RIVER
- EXISTING ROADS
- ARTERIAL ROADS
- COLLECTOR ROADS
- LOCAL ROADS (20m & 15m)
- INDICATIVE FUTURE BUS ROUTE
- GREEN LINKS (WALKING / CYCLING)

N

WAIKATO EXPRESSWAY (SH1)

ABERGELDIE WAY

VICTORIA ROAD

C1 GROWTH CELL

CAMBRIDGE RACEWAY

TOWN GREEN BELT

TAYLOR STREET

PEAKE ROAD

C2 GROWTH CELL

TOWN GREEN BELT

CAMBRIDGE ROAD / HANLIN ROAD ROUNDABOUT

NEW C2/C3 CAMBRIDGE ROAD ROUNDABOUT

KELLY ROAD

CAMBRIDGE ROAD

AVANTIDROME

TE AWA LIFECARE DEVELOPMENT

ST PETERS SCHOOL

C3 GROWTH CELL

TOWN GREEN BELT

WAIKATO RIVER

3MS

3MS RESIDENTIAL DEVELOPMENT

STRUCTURE PLAN INTEGRATION TRANSPORT NETWORK

DRAWING REVISION: C

DATE PRINTED: 1 December 2020 FILE NAME: 17001-SK-103.dwg

READ DRAWINGS CAREFULLY #MEASURETWICECUTONCE

LEGEND

- OTHER ZONING (i.e. RESIDENTIAL)
- ROADS
- SOAKAGE BASIN / WETLAND
- OPEN SWALE / GREEN LINK (RESERVE)
- LOCAL OPEN SPACE (RESERVE)
- ACTIVE RECREATION (RESERVE)
- AMENITY SPACE
- CIVIC SPACE
- SITES OF CULTURAL SIGNIFICANCE
- SHARED PATH NETWORK (WALKING / CYCLING)
- KEY ROAD CROSSING (WALKING / CYCLING)
- PEDESTRIAN SHED (400m RADIUS / 5min WALK)

N

WAIKATO EXPRESSWAY (SH1)

ABERGELDIE WAY

COLLECTOR ROAD 6

VICTORIA ROAD

C1 GROWTH CELL

COLLECTOR ROAD 7

COLLECTOR ROAD 6

COLLECTOR ROAD 1

CAMBRIDGE RACEWAY

TOWN GREEN BELT

TAYLOR STREET

COLLECTOR ROAD 2 (GRASSLANDS DR)

COLLECTOR ROAD 2

SCHOOL ZONE

PEAKE ROAD

C2 GROWTH CELL

COLLECTOR ROAD 3

COLLECTOR ROAD 1

KELLY ROAD

TOWN GREEN BELT

CAMBRIDGE ROAD

AVANTIDROME

TE AWA LIFECARE DEVELOPMENT

ST PETERS SCHOOL

COLLECTOR ROAD 4

C3 GROWTH CELL

TOWN GREEN BELT

COLLECTOR ROAD 5

WAIKATO RIVER

3MS

3MS RESIDENTIAL DEVELOPMENT

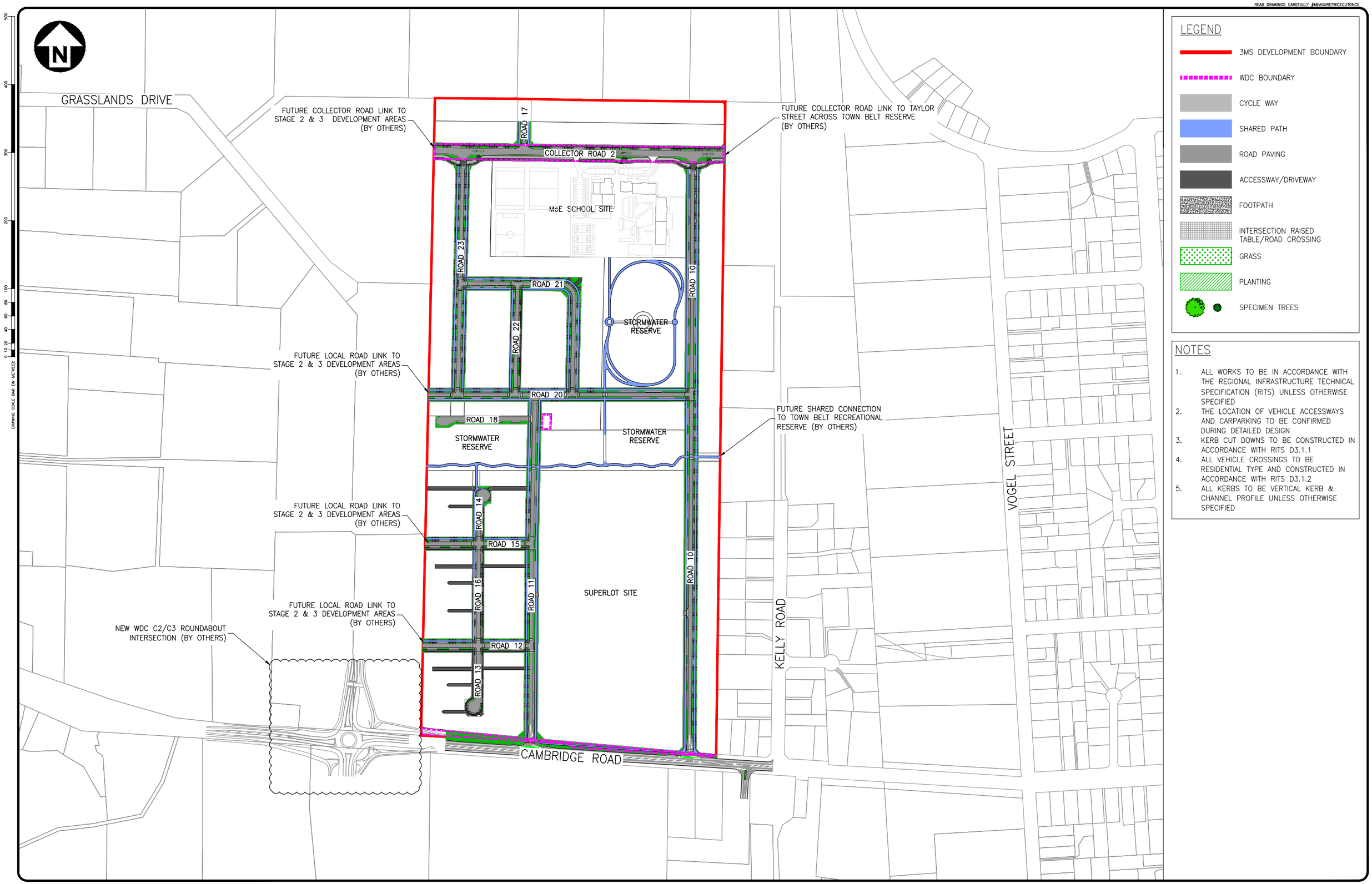
STRUCTURE PLAN INTEGRATION
WALKING & CYCLING

DRAWING REVISION: C

DATE PRINTED: 8 December 2020 FILE NAME: 17001-SK-104.dwg

Appendix B General Network Arrangements

READ DRAWINGS CAREFULLY // MEASURETWICECUTONCE



LEGEND

- 3MS DEVELOPMENT BOUNDARY
- WDC BOUNDARY
- CYCLE WAY
- SHARED PATH
- ROAD PAVING
- ACCESSWAY/DRIVEWAY
- FOOTPATH
- INTERSECTION RAISED TABLE/ROAD CROSSING
- GRASS
- PLANTING
- SPECIMEN TREES

NOTES

1. ALL WORKS TO BE IN ACCORDANCE WITH THE REGIONAL INFRASTRUCTURE TECHNICAL SPECIFICATION (RITS) UNLESS OTHERWISE SPECIFIED
2. THE LOCATION OF VEHICLE ACCESSWAYS AND CARPARKING TO BE CONFIRMED DURING DETAILED DESIGN
3. KERB CUT DOWNS TO BE CONSTRUCTED IN ACCORDANCE WITH RITS D3.1.1
4. ALL VEHICLE CROSSINGS TO BE RESIDENTIAL TYPE AND CONSTRUCTED IN ACCORDANCE WITH RITS D3.1.2
5. ALL KERBS TO BE VERTICAL KERB & CHANNEL PROFILE UNLESS OTHERWISE SPECIFIED

REV	DESCRIPTION	BY	DATE
C	FOR INFORMATION	GCJ	08.12.20
B	FOR INFORMATION	GCJ	17.04.20
A	FOR INFORMATION	GCJ	30.03.20

APPROVAL STATUS: FOR INFORMATION

DESIGNED BY	L. MCCAFFREY	DATE 30.03.20
DRAWN BY	G. JONES	DATE 30.03.20
APPROVED BY	–	DATE –

CLIENT NAME: 3MS

PROJECT NAME: 3MS RESIDENTIAL DEVELOPMENT

MASTER PLAN

DRAWING TITLE: ROADING GENERAL ARRANGMENT

PRODUCED BY: MCCAFFREY ENGINEERING CONSULTANTS

DATE PRINTED: 8 December 2020

DRAWING SCALE: 1:5000

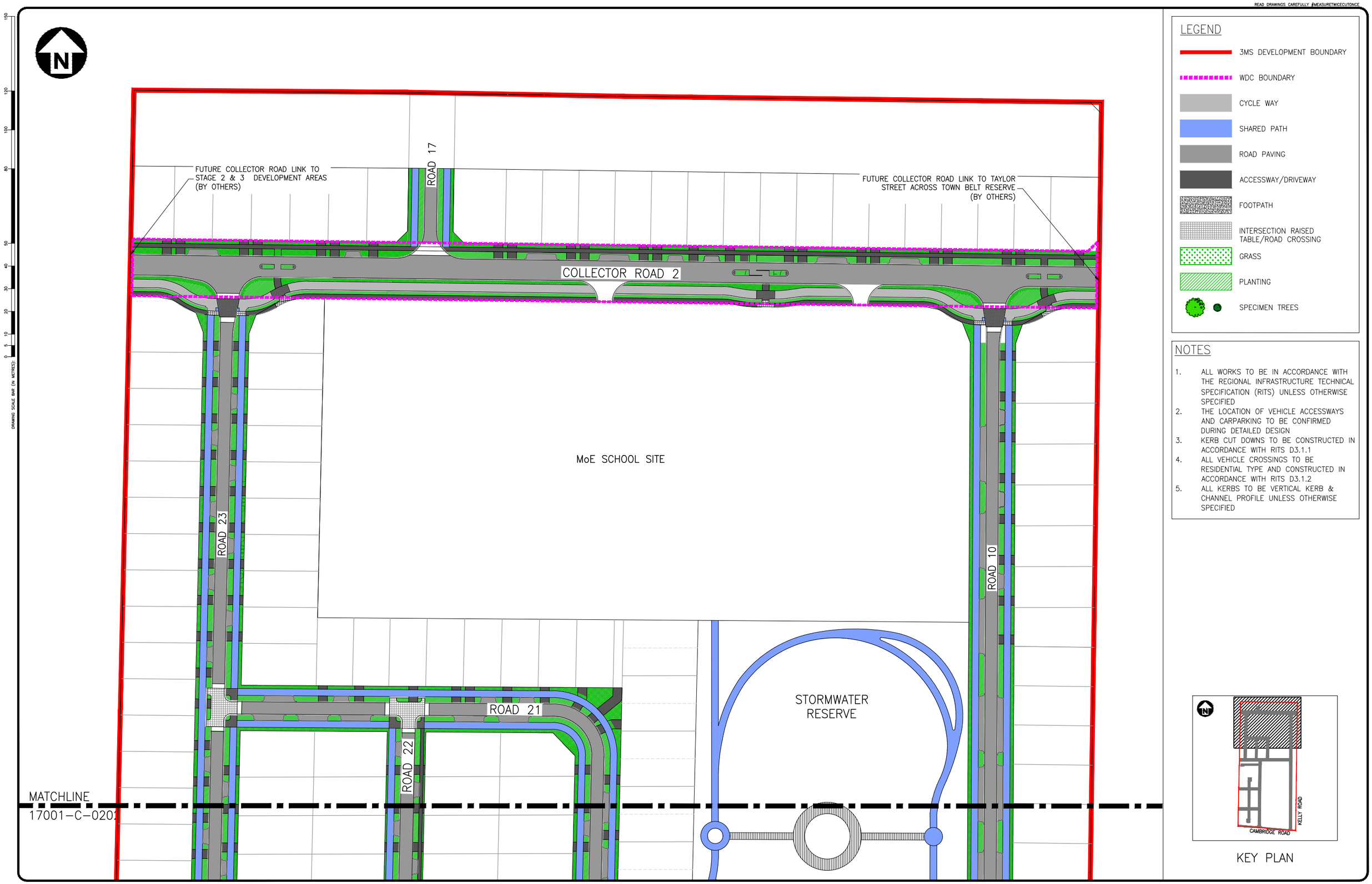
REVISION No.: C

DISCIPLINE: CIVIL ENGINEERING

DRAWING No.: 17001-C-0200

FILE NAME: 17001-C-0200.dwg

READ DRAWINGS CAREFULLY // MEASURETWICECUTONCE



LEGEND

- 3MS DEVELOPMENT BOUNDARY
- WDC BOUNDARY
- CYCLE WAY
- SHARED PATH
- ROAD PAVING
- ACCESSWAY/DRIVEWAY
- FOOTPATH
- INTERSECTION RAISED TABLE/ROAD CROSSING
- GRASS
- PLANTING
- SPECIMEN TREES

NOTES

1. ALL WORKS TO BE IN ACCORDANCE WITH THE REGIONAL INFRASTRUCTURE TECHNICAL SPECIFICATION (RITS) UNLESS OTHERWISE SPECIFIED
2. THE LOCATION OF VEHICLE ACCESSWAYS AND CARPARKING TO BE CONFIRMED DURING DETAILED DESIGN
3. KERB CUT DOWNS TO BE CONSTRUCTED IN ACCORDANCE WITH RITS D3.1.1
4. ALL VEHICLE CROSSINGS TO BE RESIDENTIAL TYPE AND CONSTRUCTED IN ACCORDANCE WITH RITS D3.1.2
5. ALL KERBS TO BE VERTICAL KERB & CHANNEL PROFILE UNLESS OTHERWISE SPECIFIED

KEY PLAN

REV	DESCRIPTION	BY	DATE
C	FOR INFORMATION	GCJ	08.12.20
B	FOR INFORMATION	GCJ	17.04.20
A	FOR INFORMATION	GCJ	30.03.20

APPROVAL STATUS: FOR INFORMATION

DESIGNED BY	L. MCCAFFREY	DATE 30.03.20
DRAWN BY	G. JONES	DATE 30.03.20
APPROVED BY	–	DATE –

CLIENT NAME: 3MS

PROJECT NAME: 3MS RESIDENTIAL DEVELOPMENT

MASTER PLAN

DRAWING TITLE: ROADING LAYOUT PLAN

SHEET 1 OF 3

PRODUCED BY: MCCAFFREY ENGINEERING CONSULTANTS

DATE PRINTED: 8 December 2020

DRAWING SCALE	1:1500
REVISION No.	C
DISCIPLINE	CIVIL ENGINEERING
DRAWING No.	17001-C-0201

FILE NAME: 17001-C-0201.dwg

READ DRAWINGS CAREFULLY // MEASURETWICECUTONCE

DRAWING SCALE BAR (IN METRES): 0 5 10 20 30 40 50 80 100 120 150

17001–C–0201
MATCHLINE

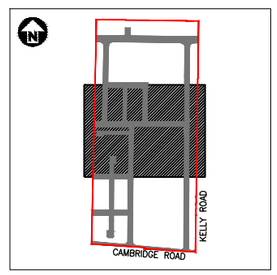
ROAD 23
ROAD 22
ROAD 21
ROAD 10
STORMWATER RESERVE
FUTURE LOCAL ROAD LINK TO STAGE 2 & 3 DEVELOPMENT AREAS (BY OTHERS)
ROAD 20
ROAD 18
FUTURE SHARED CONNECTION TO TOWN BELT RECREATIONAL RESERVE (BY OTHERS)
STORMWATER RESERVE
STORMWATER RESERVE
ROAD 10
ROAD 11
SUPERLOT SITE
ROAD 14
MATCHLINE
17001–C–0203

LEGEND

- 3MS DEVELOPMENT BOUNDARY
- WDC BOUNDARY
- CYCLE WAY
- SHARED PATH
- ROAD PAVING
- ACCESSWAY/DRIVEWAY
- FOOTPATH
- INTERSECTION RAISED TABLE/ROAD CROSSING
- GRASS
- PLANTING
- SPECIMEN TREES

NOTES

1. ALL WORKS TO BE IN ACCORDANCE WITH THE REGIONAL INFRASTRUCTURE TECHNICAL SPECIFICATION (RITS) UNLESS OTHERWISE SPECIFIED
2. THE LOCATION OF VEHICLE ACCESSWAYS AND CARPARKING TO BE CONFIRMED DURING DETAILED DESIGN
3. KERB CUT DOWNS TO BE CONSTRUCTED IN ACCORDANCE WITH RITS D3.1.1
4. ALL VEHICLE CROSSINGS TO BE RESIDENTIAL TYPE AND CONSTRUCTED IN ACCORDANCE WITH RITS D3.1.2
5. ALL KERBS TO BE VERTICAL KERB & CHANNEL PROFILE UNLESS OTHERWISE SPECIFIED



KEY PLAN

REV	DESCRIPTION	BY	DATE
C	FOR INFORMATION	GCJ	08.12.20
B	FOR INFORMATION	GCJ	17.04.20
A	FOR INFORMATION	GCJ	30.03.20

APPROVAL STATUS: FOR INFORMATION

DESIGNED BY	L. MCCAFFREY	DATE 30.03.20
DRAWN BY	G. JONES	DATE 30.03.20
APPROVED BY	—	DATE —

CLIENT NAME: 3MS

PROJECT NAME: 3MS RESIDENTIAL DEVELOPMENT

MASTER PLAN

DRAWING TITLE: ROADING LAYOUT PLAN

SHEET 2 OF 3

PRODUCED BY: MCCAFFREY ENGINEERING CONSULTANTS

DATE PRINTED: 8 December 2020

DRAWING SCALE	1:1500
REVISION No.	C
DISCIPLINE	CIVIL ENGINEERING
DRAWING No.	17001–C–0202

FILE NAME: 17001–C–0202.dwg

READ DRAWINGS CAREFULLY // MEASURETWICECUTONCE

DRAWING SCALE BAR (IN METRES): 0 5 10 20 30 40 50 80 100 120 150

N

17001-C-0202
MATCHLINE

ROAD 15

FUTURE LOCAL ROAD LINK TO STAGE 2 & 3 DEVELOPMENT AREAS (BY OTHERS)

ROAD 16

ROAD 11

FUTURE LOCAL ROAD LINK TO STAGE 2 & 3 DEVELOPMENT AREAS (BY OTHERS)

ROAD 12

ROAD 13

SUPERLOT SITE

ROAD 10

PROPOSED INTERFACE WITH EXISTING CAMBRIDGE ROAD CORRIDOR. REFER TO 17001-C-0208 FOR FURTHER DETAILS

CAMBRIDGE ROAD

LEGEND

- 3MS DEVELOPMENT BOUNDARY
- WDC BOUNDARY
- CYCLE WAY
- SHARED PATH
- ROAD PAVING
- ACCESSWAY/DRIVEWAY
- FOOTPATH
- INTERSECTION RAISED TABLE/ROAD CROSSING
- GRASS
- PLANTING
- SPECIMEN TREES

NOTES

1. ALL WORKS TO BE IN ACCORDANCE WITH THE REGIONAL INFRASTRUCTURE TECHNICAL SPECIFICATION (RITS) UNLESS OTHERWISE SPECIFIED
2. THE LOCATION OF VEHICLE ACCESSWAYS AND CARPARKING TO BE CONFIRMED DURING DETAILED DESIGN
3. KERB CUT DOWNS TO BE CONSTRUCTED IN ACCORDANCE WITH RITS D3.1.1
4. ALL VEHICLE CROSSINGS TO BE RESIDENTIAL TYPE AND CONSTRUCTED IN ACCORDANCE WITH RITS D3.1.2
5. ALL KERBS TO BE VERTICAL KERB & CHANNEL PROFILE UNLESS OTHERWISE SPECIFIED

KEY PLAN

REV	DESCRIPTION	BY	DATE
C	FOR INFORMATION	GCJ	08.12.20
B	FOR INFORMATION	GCJ	17.04.20
A	FOR INFORMATION	GCJ	30.03.20

APPROVAL STATUS: FOR INFORMATION

DESIGNED BY	L. MCCAFFREY	DATE	30.03.20
DRAWN BY	G. JONES	DATE	30.03.20
APPROVED BY	—	DATE	—

CLIENT NAME: 3MS

PROJECT NAME: 3MS RESIDENTIAL DEVELOPMENT

MASTER PLAN

DRAWING TITLE: ROADING LAYOUT PLAN

SHEET 3 OF 3

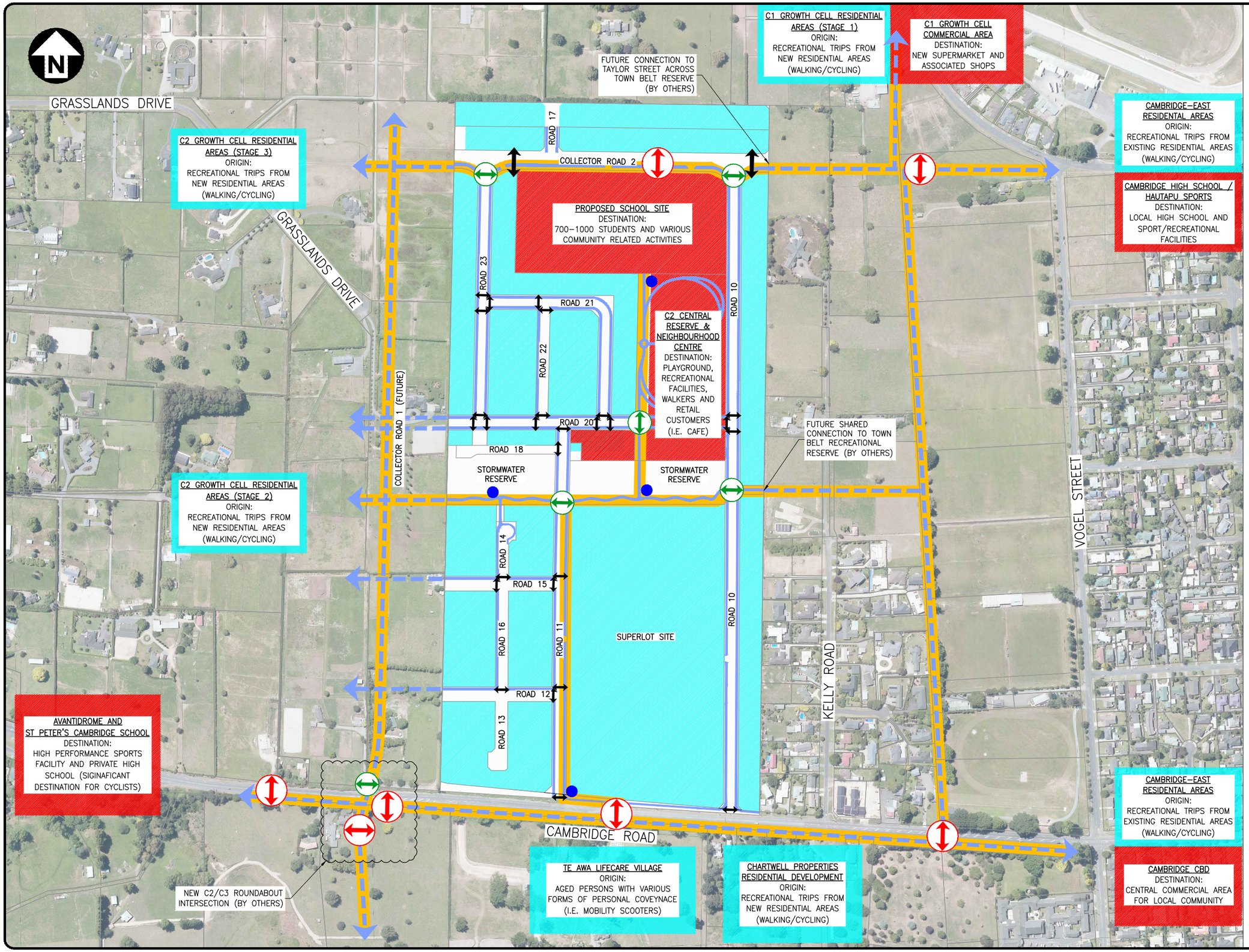
PRODUCED BY: MCCAFFREY ENGINEERING CONSULTANTS

DATE PRINTED: 8 December 2020

DRAWING SCALE	1:1500
REVISION No.	C
DISCIPLINE	CIVIL ENGINEERING
DRAWING No.	17001-C-0203

FILE NAME: 17001-C-0203.dwg

READ DRAWINGS CAREFULLY & MEASURETWICEBEFORECUTONCE



LEGEND

- 3MS DEVELOPMENT BOUNDARY
- CENTRAL CYCLEWAY (TWO–WAY)
- SHARED PATH
- FOOTPATH
- INTERSECTION RAISED TABLE/ROAD CROSSING

STRUCTURE PLAN WALKING/CYCLING STRATEGY

- ORIGIN — WALKING/CYCLING JOURNEY ORIGIN
- DESTINATION — WALKING/CYCLING JOURNEY DESTINATION
- STRATEGIC CONNECTIVITY
- FUTURE WALKING/CYCLING NETWORK LINK
- STRATEGIC WALKING/CYCLING CROSSING
- PRIORITY WALKING/CYCLING CROSSING (i.e. VEHICLES GIVE–WAY)
- STANDARD WALKING/CYCLING CROSSING
- POSSIBLE CYCLE PARKING/ RELATED AMENITIES FACILITIES

REV	DESCRIPTION	BY	DATE
D	FOR INFORMATION	GCJ	08.12.20
C	FOR INFORMATION	LPM	17.03.20
B	FOR INFORMATION	GCJ	30.03.20
A	FOR INFORMATION	LPM	31.01.20

APPROVAL STATUS: FOR INFORMATION

DESIGNED BY	L. MCCAFFREY	DATE 31.01.20
DRAWN BY	L. MCCAFFREY	DATE 31.01.20
APPROVED BY	–	DATE –

CLIENT NAME: 3MS

PROJECT NAME: 3MS RESIDENTIAL DEVELOPMENT

MASTER PLAN

DRAWING TITLE: TRANSPORT NETWORK WALKING & CYCLING NETWORK

GENERAL ARRANGEMENT

PRODUCED BY: MCCAFFREY ENGINEERING CONSULTANTS

DATE PRINTED: 8 December 2020

DRAWING SCALE: 1:5000

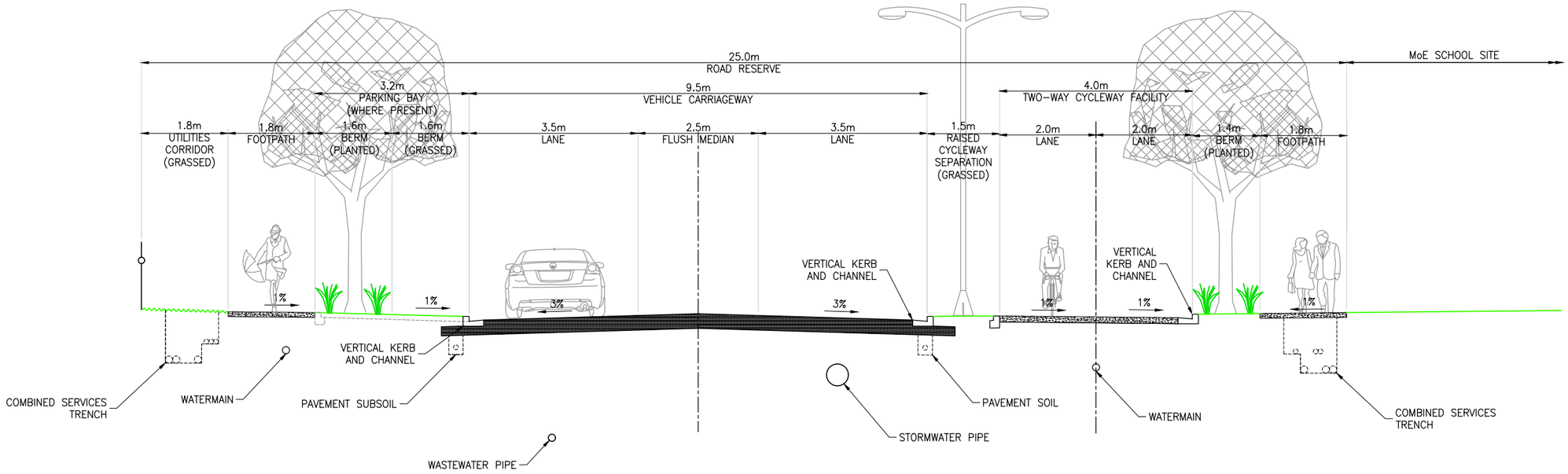
REVISION No.: D

DISCIPLINE: CIVIL ENGINEERING

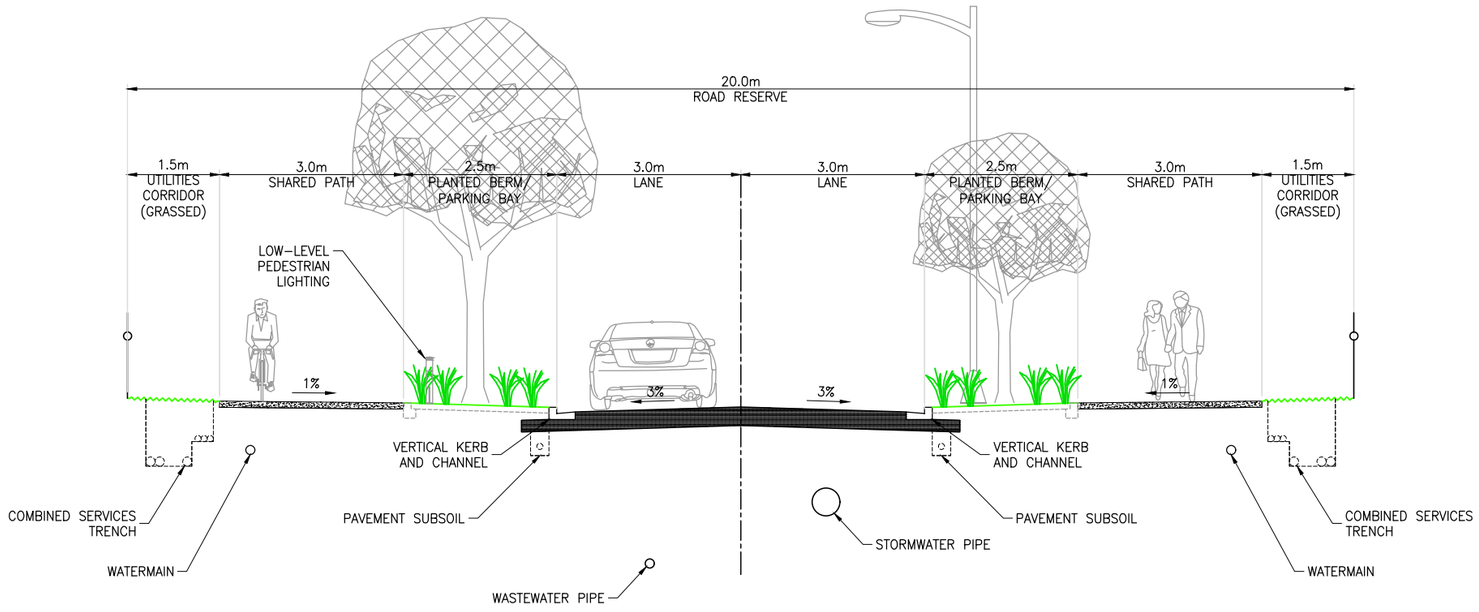
DRAWING No.: 17001–C–0207

FILE NAME: 17001–C–0207.dwg

Appendix C Road Cross-Sections



TYPICAL CROSS SECTION – 25m WDC COLLECTOR ROAD
(COLLECTOR ROAD 2)



TYPICAL CROSS SECTION – 20m LOCAL ROAD
(ROAD 10, 12, 15, 17, 19, 20 21 & 23)

NOTES:

1. TYPICAL SECTIONS SHOWN ARE CONCEPTS FOR DISCUSSION PURPOSES ONLY.
2. LOCATION OF WATER SERVICES SHOWN IS INDICATIVE ONLY AND SUBJECT TO FURTHER DESIGN.

REV	DESCRIPTION	BY	DATE
I	FOR INFORMATION – COLLECTOR ROAD UPDATED	LPM	27.11.20
H	FOR INFORMATION – 3MS ONLY UPDATE	LPM	04.11.20
G	FOR INFORMATION	GCJ	10.08.20
F	FOR INFORMATION	GCJ	17.04.20

APPROVAL STATUS: FOR INFORMATION

DESIGNED BY	L. MCCAFFREY	DATE 15.01.20
DRAWN BY	G. JONES	DATE 15.01.20
APPROVED BY	–	DATE –

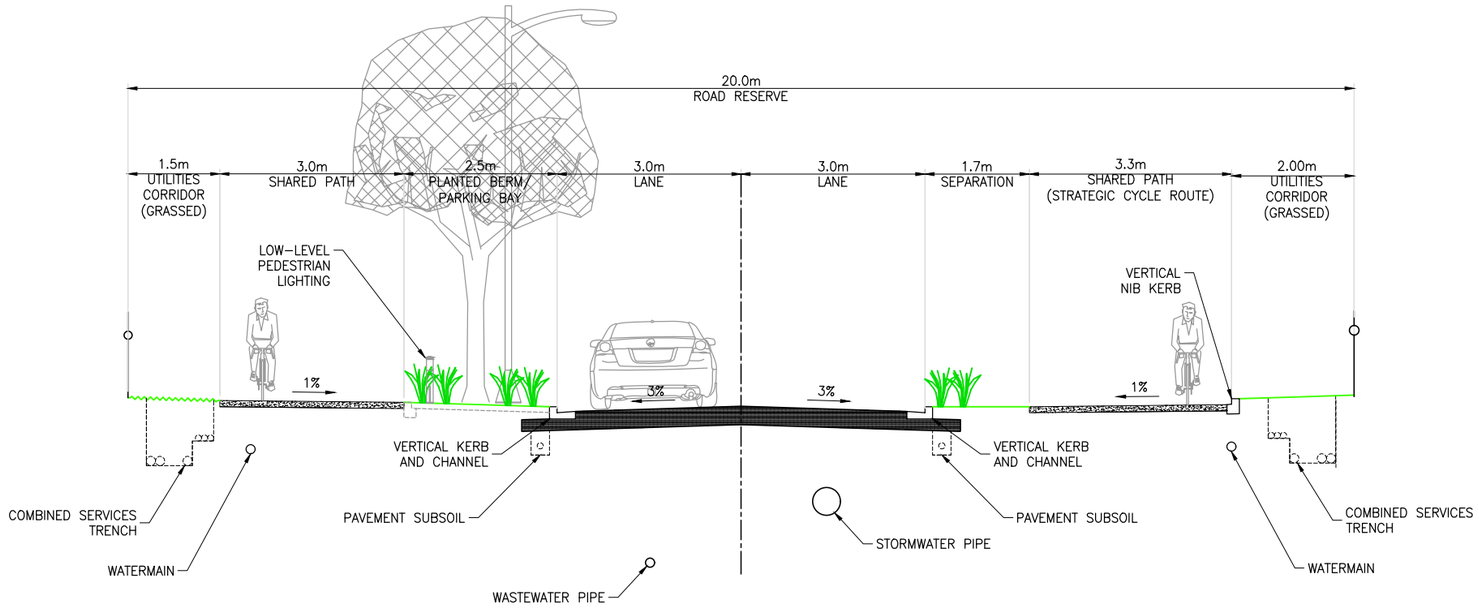
CLIENT NAME: 3MS

PROJECT NAME: 3MS RESIDENTIAL DEVELOPMENT
MASTER PLAN

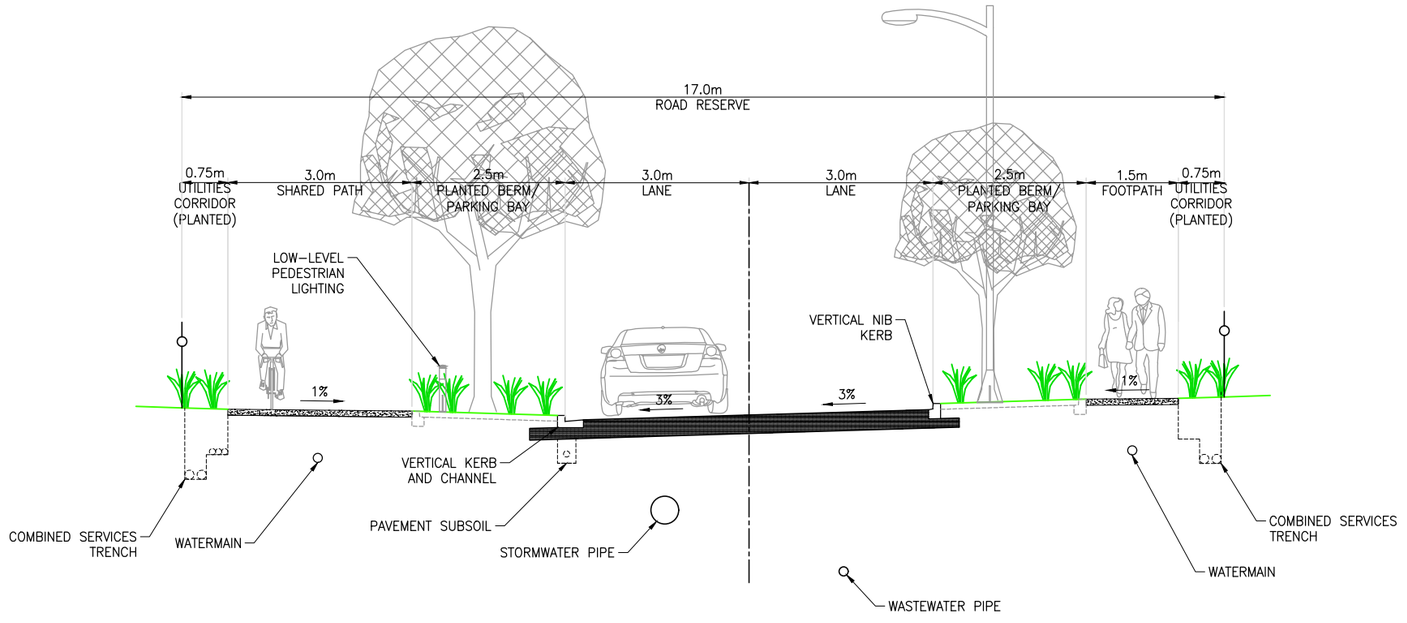
DRAWING TITLE: ROADING NETWORK
TYPICAL CROSS SECTIONS
SHEET 1

PRODUCED BY: MCCAFFREY ENGINEERING CONSULTANTS
DATE PRINTED: 8 December 2020

DRAWING SCALE: 1:100
REVISION No.: I
DISCIPLINE: CIVIL ENGINEERING
DRAWING No.: 17001-C-0204
FILE NAME: 17001-C-0204.dwg



TYPICAL CROSS SECTION – 20m LOCAL ROAD / STRATEGIC CYCLING CONNECTION (ROAD 11)



TYPICAL CROSS SECTION – 17m LOCAL ACCESS ROAD (ROAD 13, 14, 16 & 22)

NOTES:

1. TYPICAL SECTIONS SHOWN ARE CONCEPTS FOR DISCUSSION PURPOSES ONLY.
2. LOCATION OF WATER SERVICES SHOWN IS INDICATIVE ONLY AND SUBJECT TO FURTHER DESIGN.

REV	DESCRIPTION	BY	DATE
G	FOR INFORMATION – 3MS ONLY UPDATE	LPM	03.11.20
F	FOR INFORMATION	GCJ	10.08.20
E	FOR INFORMATION	GCJ	17.04.20
D	FOR INFORMATION	LPM	30.03.20

APPROVAL STATUS: FOR INFORMATION

DESIGNED BY	L. MCCAFFREY	DATE 15.01.20
DRAWN BY	G. JONES	DATE 15.01.20
APPROVED BY	—	DATE —

CLIENT NAME: 3MS

PROJECT NAME: 3MS RESIDENTIAL DEVELOPMENT

MASTER PLAN

DRAWING TITLE: ROADING NETWORK TYPICAL CROSS SECTIONS

SHEET 2

PRODUCED BY: MCCAFFREY ENGINEERING CONSULTANTS

DRAWING SCALE: 1:100

REVISION No.: G

DISCIPLINE: CIVIL ENGINEERING

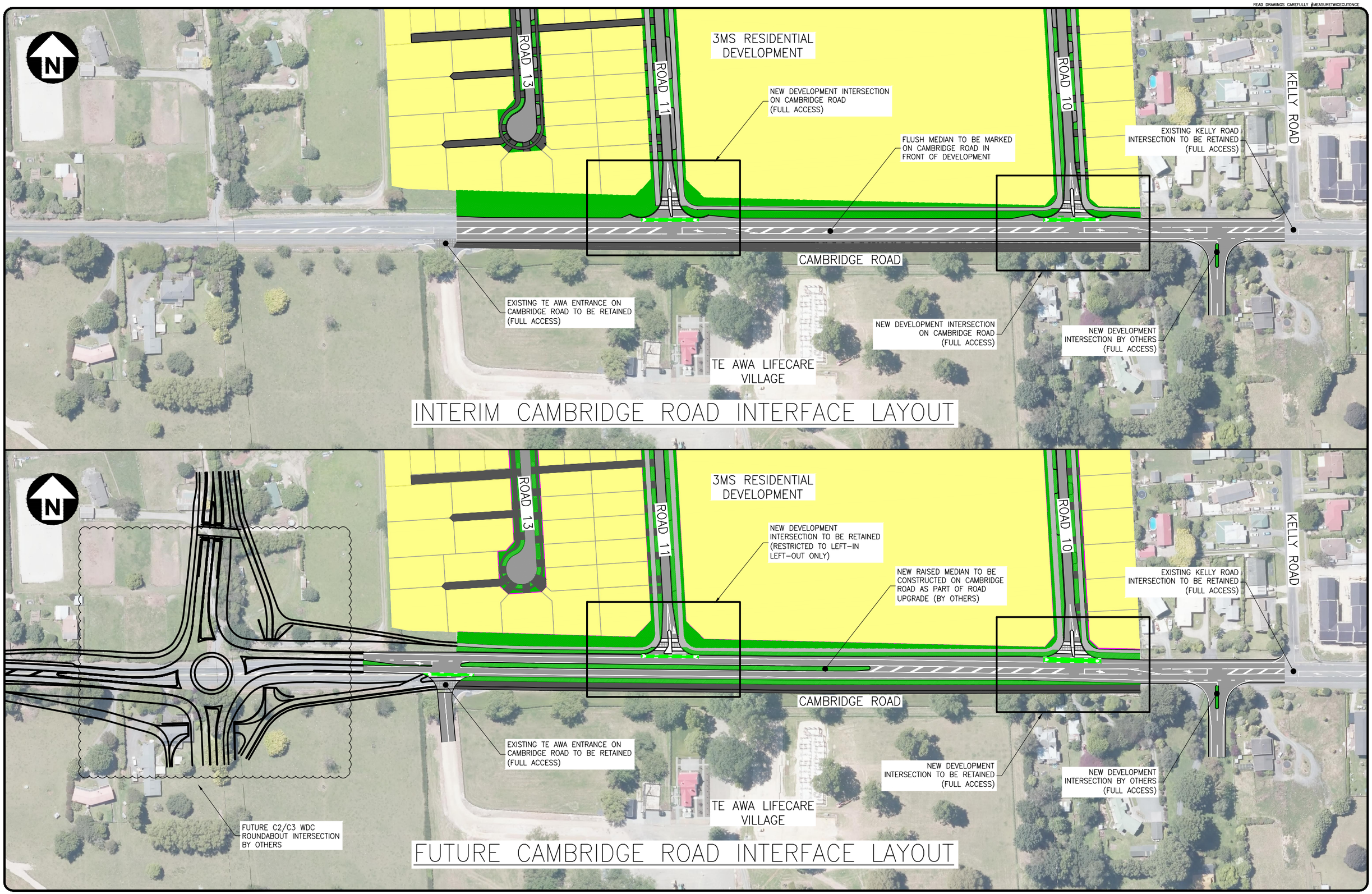
DRAWING No.: 17001-C-0205

DATE PRINTED: 8 December 2020

FILE NAME: 17001-C-0205.dwg

Appendix D Cambridge Road Interface

READ DRAWINGS CAREFULLY // MEASURETWICECUTONCE



INTERIM CAMBRIDGE ROAD INTERFACE LAYOUT

FUTURE CAMBRIDGE ROAD INTERFACE LAYOUT

REV	DESCRIPTION	BY	DATE
A	FOR INFORMATION	LPM	08.12.20

APPROVAL STATUS: FOR INFORMATION

DESIGNED BY: L. MCCAFFREY	DATE: 08.12.20
DRAWN BY: L. MCCAFFREY	DATE: 08.12.20
APPROVED BY: –	DATE: –

CLIENT NAME: 3MS

PROJECT NAME: 3MS RESIDENTIAL DEVELOPMENT

MASTER PLAN

DRAWING TITLE: TRANSPORT NETWORK CAMBRIDGE ROAD INTERFACE

INTERIM AND FUTURE LAYOUT

PRODUCED BY: MCCAFFREY ENGINEERING CONSULTANTS

DATE PRINTED: 8 December 2020

DRAWING SCALE: 1:2000	REVISION No.: A
DISCIPLINE: CIVIL ENGINEERING	
DRAWING No.: 17001-C-0208	

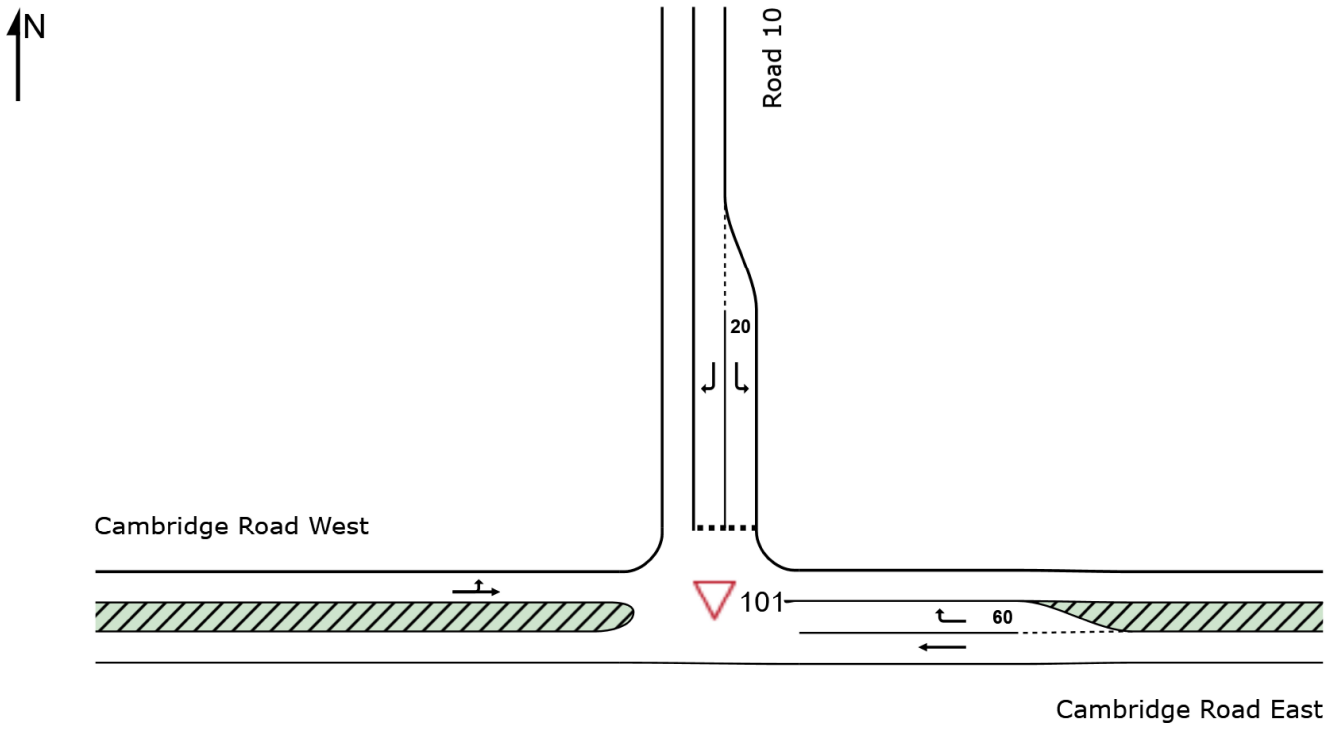
FILE NAME: 17001-C-0208.dwg

Appendix E SIDRA Outputs

SITE LAYOUT

Site: 101 [Cambridge Road/Road 10 AM 2022]

New Site
Site Category: (None)
Giveway / Yield (Two-Way)



MOVEMENT SUMMARY

Site: 101 [Cambridge Road/Road 10 AM 2022]

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
East: Cambridge Road East												
5	T1	727	5.0	0.388	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
6	R2	85	5.0	0.088	8.9	LOS A	0.4	2.9	0.65	0.79	0.65	50.7
Approach		813	5.0	0.388	1.0	NA	0.4	2.9	0.07	0.08	0.07	58.8
North: Road 10												
7	L2	117	5.0	0.118	8.4	LOS A	0.5	3.5	0.59	0.78	0.59	51.3
9	R2	117	5.0	0.470	23.6	LOS C	1.7	12.2	0.90	1.04	1.21	41.9
Approach		234	5.0	0.470	16.0	LOS C	1.7	12.2	0.74	0.91	0.90	46.1
West: Cambridge Road West												
10	L2	85	5.0	0.420	5.7	LOS A	0.0	0.0	0.00	0.06	0.00	57.5
11	T1	704	5.0	0.420	0.1	LOS A	0.0	0.0	0.00	0.06	0.00	59.3
Approach		789	5.0	0.420	0.7	NA	0.0	0.0	0.00	0.06	0.00	59.1
All Vehicles		1836	5.0	0.470	2.8	NA	1.7	12.2	0.12	0.18	0.14	56.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Cambridge Road/Road 10 PM 2022]

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

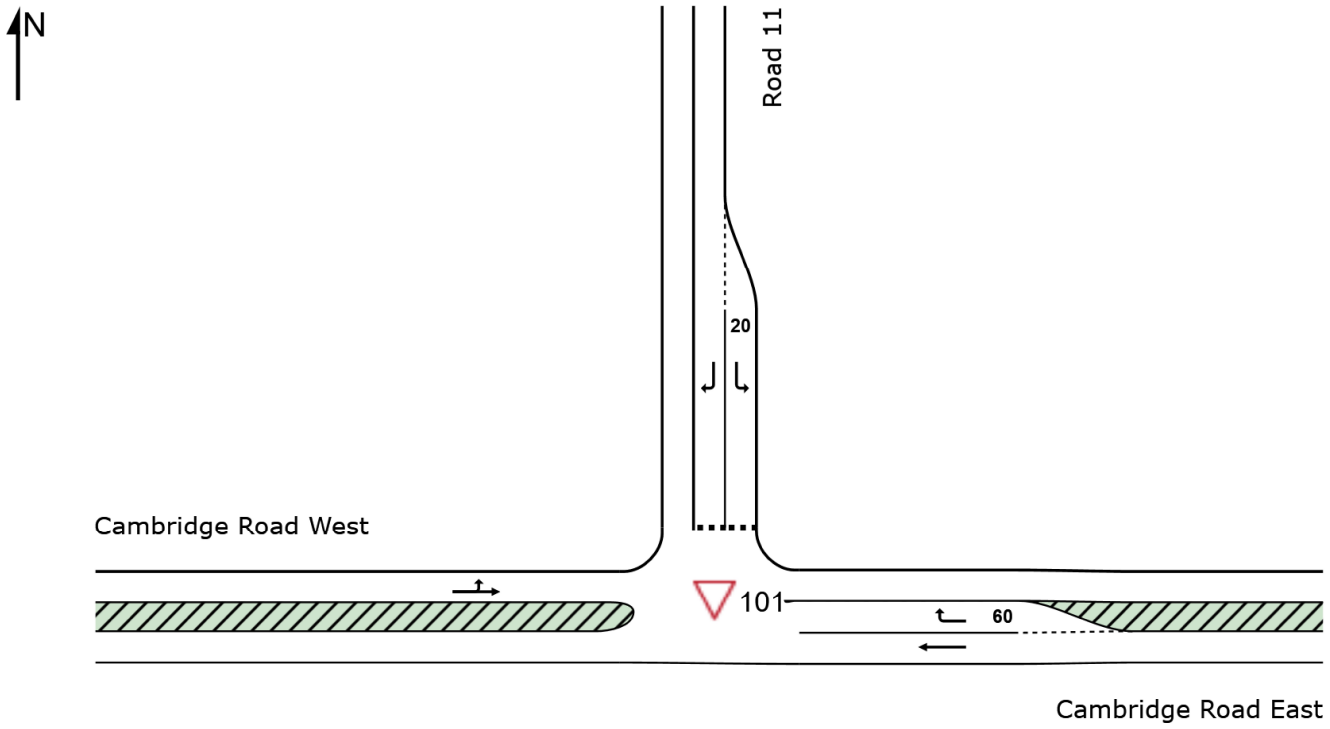
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
East: Cambridge Road East												
5	T1	638	5.0	0.340	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
6	R2	59	5.0	0.076	10.0	LOS B	0.3	2.3	0.69	0.84	0.69	49.9
Approach		697	5.0	0.340	0.9	NA	0.3	2.3	0.06	0.07	0.06	58.9
North: Road 10												
7	L2	56	5.0	0.071	9.5	LOS A	0.3	2.0	0.64	0.82	0.64	50.6
9	R2	56	5.0	0.254	22.1	LOS C	0.8	5.6	0.88	0.97	0.97	42.6
Approach		112	5.0	0.254	15.8	LOS C	0.8	5.6	0.76	0.90	0.81	46.3
West: Cambridge Road West												
10	L2	59	5.0	0.487	5.7	LOS A	0.0	0.0	0.00	0.04	0.00	57.7
11	T1	858	5.0	0.487	0.1	LOS A	0.0	0.0	0.00	0.04	0.00	59.5
Approach		917	5.0	0.487	0.4	NA	0.0	0.0	0.00	0.04	0.00	59.4
All Vehicles		1725	5.0	0.487	1.6	NA	0.8	5.6	0.07	0.11	0.08	58.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SITE LAYOUT

Site: 101 [Cambridge Road/Road 11 AM 2022]

New Site
Site Category: (None)
Giveway / Yield (Two-Way)



MOVEMENT SUMMARY

Site: 101 [Cambridge Road/Road 11 AM 2022]

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
East: Cambridge Road East												
5	T1	717	5.0	0.383	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
6	R2	128	5.0	0.123	8.6	LOS A	0.6	4.1	0.64	0.79	0.64	50.9
Approach		845	5.0	0.383	1.4	NA	0.6	4.1	0.10	0.12	0.10	58.3
North: Road 11												
7	L2	176	5.0	0.157	7.9	LOS A	0.7	5.0	0.57	0.75	0.57	51.7
9	R2	176	5.0	0.661	26.9	LOS D	2.8	20.6	0.93	1.13	1.58	40.4
Approach		352	5.0	0.661	17.4	LOS C	2.8	20.6	0.75	0.94	1.07	45.3
West: Cambridge Road West												
10	L2	128	5.0	0.397	5.6	LOS A	0.0	0.0	0.00	0.10	0.00	57.2
11	T1	614	5.0	0.397	0.1	LOS A	0.0	0.0	0.00	0.10	0.00	59.0
Approach		742	5.0	0.397	1.0	NA	0.0	0.0	0.00	0.10	0.00	58.6
All Vehicles		1939	5.0	0.661	4.1	NA	2.8	20.6	0.18	0.26	0.24	55.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Cambridge Road/Road 11 PM 2022]

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
East: Cambridge Road East												
5	T1	604	5.0	0.322	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
6	R2	88	5.0	0.115	10.2	LOS B	0.5	3.5	0.70	0.87	0.70	49.8
Approach		693	5.0	0.322	1.3	NA	0.5	3.5	0.09	0.11	0.09	58.4
North: Road 11												
7	L2	83	5.0	0.102	9.3	LOS A	0.4	2.9	0.63	0.83	0.63	50.7
9	R2	83	5.0	0.366	23.4	LOS C	1.2	8.7	0.89	1.00	1.09	42.0
Approach		166	5.0	0.366	16.4	LOS C	1.2	8.7	0.76	0.92	0.86	45.9
West: Cambridge Road West												
10	L2	88	5.0	0.491	5.7	LOS A	0.0	0.0	0.00	0.06	0.00	57.5
11	T1	834	5.0	0.491	0.1	LOS A	0.0	0.0	0.00	0.06	0.00	59.3
Approach		922	5.0	0.491	0.6	NA	0.0	0.0	0.00	0.06	0.00	59.1
All Vehicles		1781	5.0	0.491	2.4	NA	1.2	8.7	0.11	0.16	0.11	57.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Cambridge Road/Road 11 AM 2025]

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
East: Cambridge Road East												
5	T1	780	5.0	0.417	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
6	R2	128	5.0	0.134	9.0	LOS A	0.6	4.4	0.66	0.82	0.66	50.6
Approach		908	5.0	0.417	1.3	NA	0.6	4.4	0.09	0.12	0.09	58.4
North: Road 11												
7	L2	176	5.0	0.168	8.2	LOS A	0.7	5.2	0.59	0.78	0.59	51.4
9	R2	176	5.0	0.801	39.9	LOS E	3.9	28.5	0.96	1.26	2.09	35.3
Approach		352	5.0	0.801	24.1	LOS C	3.9	28.5	0.78	1.02	1.34	41.9
West: Cambridge Road West												
10	L2	128	5.0	0.425	5.7	LOS A	0.0	0.0	0.00	0.10	0.00	57.2
11	T1	667	5.0	0.425	0.1	LOS A	0.0	0.0	0.00	0.10	0.00	59.0
Approach		796	5.0	0.425	1.0	NA	0.0	0.0	0.00	0.10	0.00	58.7
All Vehicles		2056	5.0	0.801	5.1	NA	3.9	28.5	0.17	0.26	0.27	54.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Tauranga
Level 1, 117 Willow Street
Tauranga 3110
PO Box 13-052, Armagh
Christchurch 8141
Tel +64 7 577 0555

Please visit **www.stantec.com** to learn more about how Stantec design with community in mind.

Stantec