

**Hearing Stream 2 – Residential  
Wellington City Council**

**In the matter of** Proposed District Plan review incorporating the  
Intensification Streamlined Planning Process  
(ISPP), and the first schedule of the Resource  
Management Act.

Hearing 2 – Residential

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**Expert Evidence of Ian Leary on behalf of Pukehuia Ltd/Prime Property Ltd**

**Date: 15/03/2023**

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**Next Event Date:** 4<sup>th</sup> April 2023  
**Hearing Chair:** Trevor Robinson  
**Hearing Panel:** Robert Schofield, Heike Lutz, Liz Burge, Lindsay Daysh, Jane  
Black, Rawiri Faulkner, David McMahon.

## **INTRODUCTION**

- 1 My full name is Ian Thomas Leary. I am a Director of the firm of Spencer Holmes Limited.
- 2 My evidence is given on behalf of Pukehuia Ltd/Prime Property Group (PPG) who are owners and original developers of the Spenmoor Street area, who continue to have 'developable' land interests in the area subject to the submission.
- 3 I have been involved in the Spenmoor St development area since around 2007. I gave evidence in respect to District Plan Change 67 which related to the subject area. I have made a number of subdivision consent application in the area, including an application for 27 dwellings which is currently going through the consent process.

## **QUALIFICATIONS AND EXPERIENCE**

- 4 I have a degree in Land Surveying from the University of New South Wales (obtained in 1989) and a Post Graduate Diploma in Resource and Environmental Planning from the University of Waikato (obtained in 2001). I am a full member of the New Zealand Institute of Planners. I hold a current certificate from the Ministry of the Environment as a hearing Commissioner and have sat in that role for Wellington City Council on a number of occasions.
- 5 I have around 30 years of experience in land development, planning, resource management and surveying. I have been a director of Spencer Holmes Limited, a multi-discipline company since 2009. I had been employed by the firm as planning manager for 10 years prior to becoming a director.
- 6 During that time I have undertaken a broad range of planning work within the Wellington, Kapiti Coast, Hutt Valley and Wairarapa regions. I have prepared resource consent applications for activities such as landfills, quarries, recreation activities, subdivision developments,

multi-storied office buildings, residential apartment buildings, childcare facilities, residential housing and signs.

- 7 I have made numerous submissions and presented evidence and made recommendation decisions on plan changes in my career, including presenting evidence at the Environment Court.

### **CODE OF CONDUCT**

- 8 I have read the Code of Conduct for Expert Witnesses set out in the Environment Court's Practice Note 2023. Whilst this is a Council hearing, I have complied with the Code of Conduct in preparing my evidence and will continue to comply with it while giving oral evidence before the commissioners. My qualifications as an expert are set out above. Except where I state I rely on the evidence of another person, I confirm that the issues addressed in this statement of evidence are within my area of expertise, and I have not omitted to consider material facts known to me that might alter or detract from my expressed opinions.

### **ORIGINAL SUBMISSION**

- 9 The original submission made by PPG in opposition to the proposed Spennmoor Area and its specific provisions relating to multi unit development and consideration of additional traffic effects, which are additional to the other Medium Density residential zones of the city. The submission is as follows:

**The Spennmoor area defined in the district plan unfairly restricts any multi residential development in this area by seeking further assessments with respect to traffic. This will cause increased delays and costs as reports will need to be provided by experts and need to be reviewed by WCC traffic team.**

**A multi-unit housing will require a resource consent as four or more units are a restricted discretionary activity under MRZ R14.**

**This will require an assessment of environmental effects especially in relation to the surrounding road infrastructure, so this will make this policy redundant.**

**The extension of Spennmoor Street is the only area that is affected by Policy P12 and seeks to restrict development based on a traffic assessment. Spennmoor Street does not significantly differ from the roads within the surrounding suburb of Newlands,**

such as Edgecombe Street, Omega Street, Lomond Street, and Chetwode Grove. All three streets have an irregular legal road widths, standard width carriageways and have right of ways that come off this main road. There are also multi unit developments on these roads. However these roads are not subject to MRZ-P12 or any similar assessment restrictions.

A more detailed assessment into Medium Density Residential Zones will no doubt yield more narrow streets, with multi unit developments on them that do not require a separate policy surrounding a need for a detailed traffic assessment.

The intersection at Wakely and Newland Roads is scheduled for an upgrade. The installation of this facility will negate the requirement to consider traffic effects into the development of the Spenmoor St greenfield area.

## Hearing Stream 2 – S42A Report

10 The section 42A report states:

50. In response to the Prime Property Group [256.3], I do not support removal of the Spenmoor Street Area from the MRZ. I have recommended that MRZ-P12 is retained as notified, and my reasons for his recommendation are the same reasons that I recommend the Spenmoor Street Area is not removed.

374 I disagree with the submitter points from Prime Property Group [256.4] and Rongotai Investments Ltd [FS93.2], which seek to delete MRZ-P12. Plan Change 67 specified a 120 dwelling maximum when the land was re-zoned from rural to residential, due to issues relating to the roading network (as detailed in Plan Change 67). This housing limit has since been exceeded and any resource consent for new dwellings is required to address roading capacity constraints and mitigate the effects. I consider that MRZ-P12 is a necessary policy which signals to plan users that any multi-unit development in the Spenmoor Street area will have to consider the roading network by default. In addition, MRZ-P12 only applies to multi-unit housing and not to any development that results in three or less houses. Regardless, it is noted that developments resulting in three or less houses will likely be required to consider the roading network due to consent notices over the land.

## RESPONSE TO S42A REPORT

11 PPG, through Spencer Holmes Ltd (SHL) has been consistently submitting through the draft plan and proposed District Plans stages on the 'perceptions' by WCC officers that Spenmoor Street poses traffic

issues, that are somehow out of the ordinary in the 'norm' in Wellington residential areas.

12 The background to this is that the land in Spenmoor St had been Rural (Appendix Area) under the notified Proposed District Plan in 1994.

13 The land was subdivided under a notified resource consent under a 40 Lot subdivision approved in June 2006 and completed (titles issued) in 2007 (SR140292).

14 As part of the works to complete this subdivision, the developer was required to construct a 7 metre wide carriageway on the main access road, to install street lights and the turning head at the end of the subdivision was to allow for bus turning. These requirements significantly exceeded the requirements for Rural Subdivision and clearly were imposed by WCC roading to provide for future residential sized development. Otherwise in my view, this level of infrastructure would not have been required.

15 Nonetheless, the Council imposed a condition which required:

Household Unit Restriction:

(25) In order to limit the potential adverse effects of allowing a density of development within the site to a level greater than that envisaged by the provisions of Appendix 5 to the rural area rules of the District Plan, each rural residential allotment is restricted to a single household unit at all times and no further subdivision of these allotments will be permitted, except minor boundary adjustment where no additional lots are being created.

16 I have reviewed the decision and note that this original consent notice was imposed on the basis that the subdivision access road proposed and put to hearing, was much narrower than that which was actually built. The Council roading officers sought even higher level of construction effectively made the developer put in a bigger and wider road than should have been required to service the original 40 Lot rural subdivision. The Code of Practice for Rural roads at the time would have required only 5 metre wide carriageway.

17 Part of the land was rezoned to residential under District Plan Change 67. Part of the rezoning option was driven by the fact that the developer

had been required to install infrastructure (including fully reticulation of sewer, stormwater, water, roading and lighting,) which were for a residential subdivision standard (not rural).

- 18 Traffic evidence was presented at the hearing by Traffic Concepts and by WCC's traffic officer. At the time, Traffic Concepts Mr Clark provided evidence that Spenmoor Street could easily accommodate the likely traffic from the residential zoning. WCC Roading Engineer Mr Steve Spence provided a more conservative approach.
- 19 There was a considerable amount of opposition from the residents of existing section of Spenmoor St. There was opposition to the original Rural subdivision and the rezoning and this was well organised and all submissions were greatly concerned with traffic effects. Which is in my experience, is often the reaction whether it be a 1 lot to 100.
- 20 There was also an opinion from the independent commissioner under the plan change that Spenmoor Street, could not be widened to address any effects from Traffic effects.
- 21 The original commissioner subsequently recommended the plan change be declined. This Council's decision was appealed by the plan change requester and a mediated agreement was reached.
- 22 A restriction on the number of properties in the Spenmoor Street area was placed on the District Plan which stated:
- The number of household units shall not exceed 90 over Lots 8-10, 24-30 and 33 DP 403079 and the development must be consistent with the Pukehuia Structure Plan and the Pukehuia Design Guide<sup>1</sup>.
- 23 I never understood where the limitation of 90 household units came from. It was not consistent with the evidence from the plan change requester, WCC's traffic advice leading into the plan change. It was not to my recollection, subject to any recorded outcome in the process.

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<sup>1</sup> Appendix 23 Residential Area Rules Page 42 – Operative District Plan

- 24           Nonetheless, the lower end of Spenmoor Street has now been widened in several locations and whilst it is not two way throughout its length, it functions effectively for traffic without any perceivable issues. Attached to my evidence is the road widening plans by Spencer Holmes Numbered S17-0671-D1/E, D2/D, D3/D, LS1/B, XS3/E, XS2/F, XS4/E. These are annotated as Attachment 2.
- 25           I travel into Spenmoor Street regularly, having undertaken literally in the order of a hundred site visits since the widening has occurred. The street functions efficiently and safely in my view.
- 26           I have been involved in numerous additional resource consent applications to develop Spenmoor Street and have not become aware of any actual traffic issues in the lower end of Spenmoor Street and none have been brought to my attention by officers in the consent processing area.
- 27           Attached to my evidence is the latest traffic report for Spenmoor Street, submitted to Council as part of recent resource consents. The report is attached and annotated as Attachment 3.
- 28           This is by Traffic Concepts and authored by Gary Clark who concludes with respect to Spenmoor Street that:
- Accordingly, there are no capacity constraints for the suggested 300 homes for the Spenmoor Street Development.<sup>2</sup>
- 29           In my view, the Spenmoor Street area currently defined by the Proposed District Plan, would not likely exceed 300 houses and this exceeds the wider development potential.
- 30           Mr Clark has advised that Spenmoor Street currently has the highest Level of Service (LOS A) and that roads of this nature around the city, effectively function at the lower LOS C. He states:

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<sup>2</sup> Spenmoor Street Development, Newlands, Wellington City Road Capacity and Intersection Analysis Assessment – by Traffic Concepts – Page 8, paragraph 4.

Spenmoor Street is easily operating at LoS A and has capacity to accommodate higher traffic flows<sup>3</sup>

- 31 It is my view, that there is a perceived traffic issue amongst WCC officers, due to the planning history, but it is an issue that does not currently exist.
- 32 It has been acknowledged that when fully developed, that the capacity issue for development in the Spenmoor Street Area, is not Spenmoor Street, but the Wakely/Newlands Road intersection.
- 33 Traffic Concepts raise this in their attached letter. I also attach a concept plan developed by Stantec showing a new roundabout being proposed for this intersection. This concept plan is attached and is annotated as Attachment 4.
- 34 This is concept has been approved for construction and will be installed, within the next 6 -12 months at PPG's cost. This has been volunteered as a condition of recent resource consents.
- 35 The point raised by the submission, is that because of the earlier planning processes, the officers when dealing with applications for subdivision consent in the Spenmoor Street area, routinely ask for additional traffic reports and traffic assessments. In my view this is because of the existing consent notices (imposed under the Rural subdivision approval) and the subsequent Plan change provision relating to 90 households. This is despite roading improvements having been implemented and further improvements proposed.
- 36 The restriction on no more than 3 household units implied by the Spenmoor Street Area provisions creates the expectation of effects, higher than might otherwise occur in other areas of the city. Many of these local roading networks will be operating at a LOS well below that

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<sup>3</sup> Spenmoor Street Development, Newlands, Wellington City Road Capacity and Intersection Analysis Assessment – by Traffic Concepts – Page 4, paragraph 8.



of Spenmoor Street and the Wakely/Newlands Road intersection when the upgrade is complete.

37 I note also, that PPG have been required to pay for the total cost of the Spenmoor Street widening and the Wakely/Newlands Road upgrade, despite numerous other parties potentially enjoying the benefit.

38 The reward for this, is a restriction on the development potential of the sites past 3 dwellings, that does not exist on other properties who can potentially benefit from the upgrading, but have not contributed.

39 The commissioner's attention is drawn to Attachment 1. This is the District Plan Map showing the roading areas around the Spenmoor Area.

40 The lower end of Spenmoor Street, Miles Crescent, Lynfield Lane, Dungarvon Road and parts of the upper area of Blackrock Road, are all likely to have traffic entering Newlands Road via Wakely Road. None of these properties is subject to the specific limitation of 3 residential units proposed for the Spenmoor Area and not required to address traffic effects of development in this area, yet the LoS is comparable or likely lower than Spenmoor Streets current LoS A.

41 It is acknowledged that there are more currently undeveloped areas within the defined Spenmoor Area than in the abovementioned area, however within these adjacent MDRZ areas, developers can buy 2 or more adjoining properties and develop intensively any number of units.

42 The S42A officer offers no actual reason for the creation of the Spenmoor Street area or the specific requirements. The officers do not acknowledge the roading improvements already undertaken and repeat the out of date information provided in DPC 67. The argument of the officers that:

This housing limit has since been exceeded and any resource consent for new dwellings is required to address roading capacity constraints and mitigate the effects. I consider that MRZ-P12 is a necessary policy which signals to plan users that **any multi-unit development in the Spenmoor Street area will have to consider the roading network by default** [my emphasis]

- 43 This is the submitters exact point. There is an expectation that there will be further effects from developments above 3 units which are above the expectations of other areas within the MDRZ. The traffic reports provided, indicate that this is not the case and the Spenmoor Area should not be treated differently.
- 44 PPG have already considered the roading network and have been required to carry out extensive mitigation measures which potentially reward other parties who have not contributed to the mitigation. Furthermore, PPG and other owners within the Spenmoor Area will be asked to provide information and mitigation measures for something that has already been addressed.
- 45 The servicing capacity all round of Spenmoor Street, is in my view, not dissimilar to many locations in the city where no specific provisions are required.
- 46 Ultimately, the provisions are unwarranted and not a sustainable management of resources.

#### **FURTHER SUBMISSIONS**

- 47 The submission by NZTA (Waka Kotahi(WK) should be ignored as neither Spenmoor Street, Wakely Road or Newlands Road are State Highways.
- 48 If the restriction on development is applied to Spenmoor Area, then it should be provided to all of the city. The site is close to the motorway and has otherwise good connections to the city and is far better than say South Karori, areas in the hills of Tawa, Seatoun and Miramar in terms of time and distance to connect to the city and the capacity of State Highway connection.
- 49 The matters raised in the submissions of KO and BP have been addressed by the response covered above.

## CONCLUSION

50 The Spenmoor Area provisions have been opposed by PPG since the draft provisions were released and officers have entirely failed to engage with PPG, despite the information set out above and readily available to them.

51 In my view, there is a perception and history that supports an issue that does not exist in reality and has been challenged by expert reports on a number of occasions.

52 The site issues in the Spenmoor Area, do not justify the restrictions on the standard Medium Density Provisions for the city and the specific area map, related policy and provisions of the rules should be deleted. Aside from the map, this includes the following.

53 Under MRZ-R2, matters of discretion, line 2 which states:

For any site within the Spenmoor Street Area: the matters in MRZ-P2, MRZ-P3, MRZ-P5, MRZ-P6 and MRZ-P12

54 This should be deleted.

55 In respect to MRZ-P12 which states:

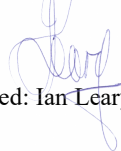
### **Roading capacity in the Spenmoor Street Area**

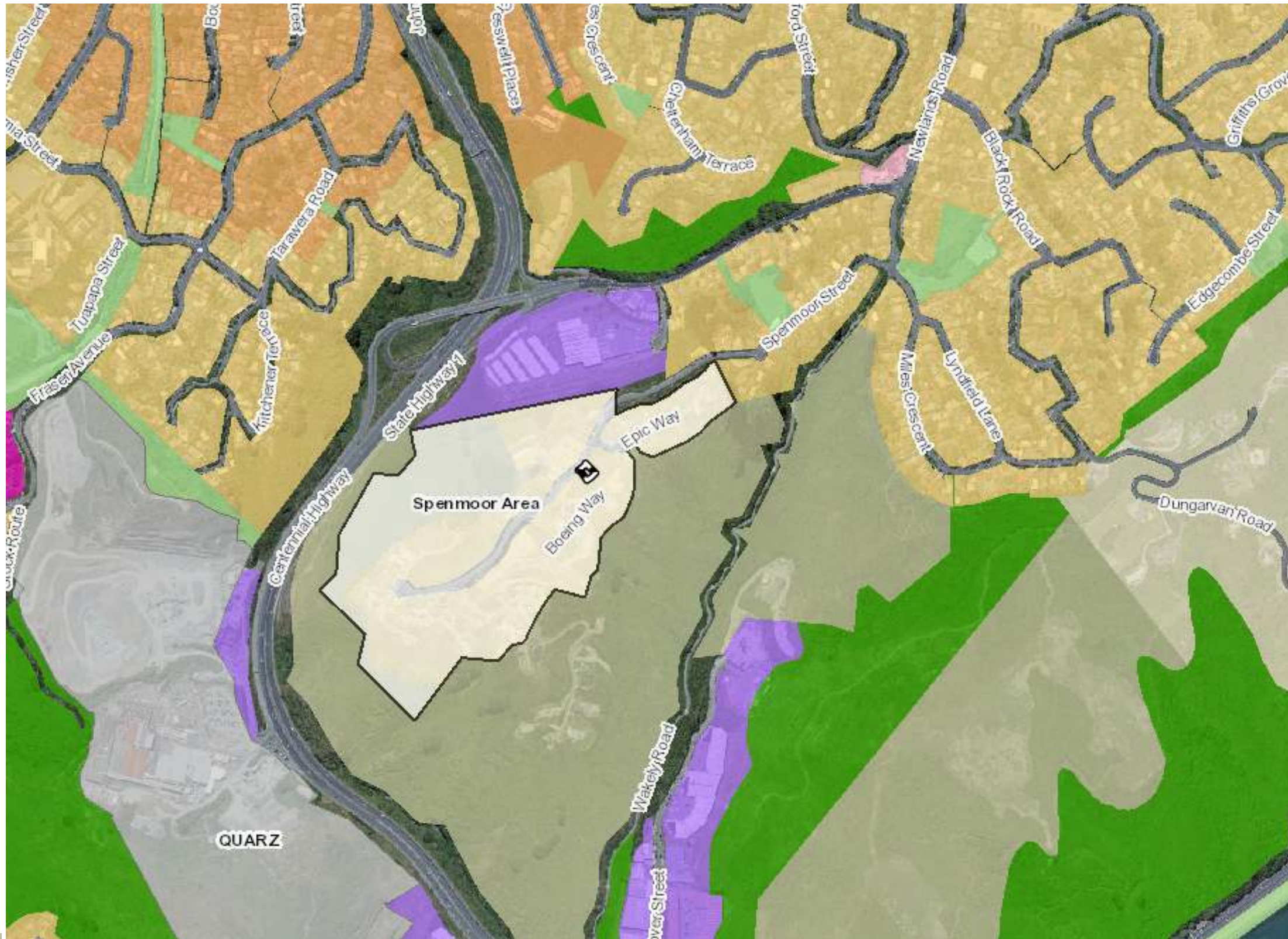
Only allow [multi-unit housing](#) where it can be demonstrated that the local roading network has the capacity to accommodate any increase in traffic associated with the new development, and that the safety and efficiency of the roading network will be maintained.

56 This also should be deleted for the reasons set out above.

Date: 15/03/2023

Signed: Ian Leary





**Attachment 1**  
**Spenmoor St Area**

Evidence of Ian Leary

NO	REVISION	BY	DATE
1	ISSUE FOR CONSTRUCTION	CPD	15-10-2018
2	FOR CONSTRUCTION	CPD	15-10-2018
3	FOR CONSTRUCTION	CPD	15-10-2018
4	FOR CONSTRUCTION	CPD	15-10-2018
5	FOR CONSTRUCTION	CPD	15-10-2018

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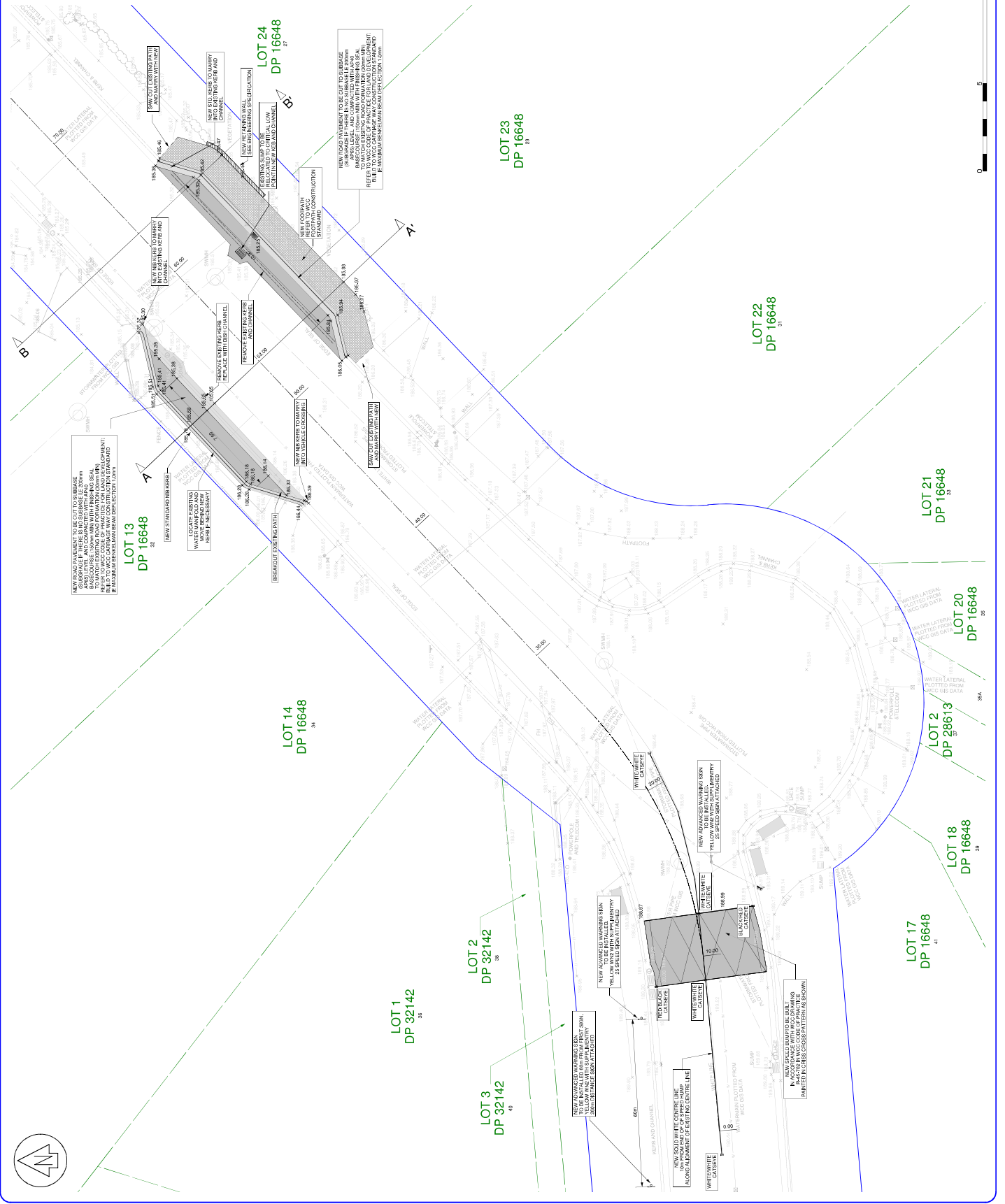
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**SPENMOOR STREET**

COMPANETIC  
**PROPOSED ROAD WIDENING**

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REV	E



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B	CHANGES FROM COUNCIL		
C	FOR CONSTRUCTION		
D	FOR CONSTRUCTION		

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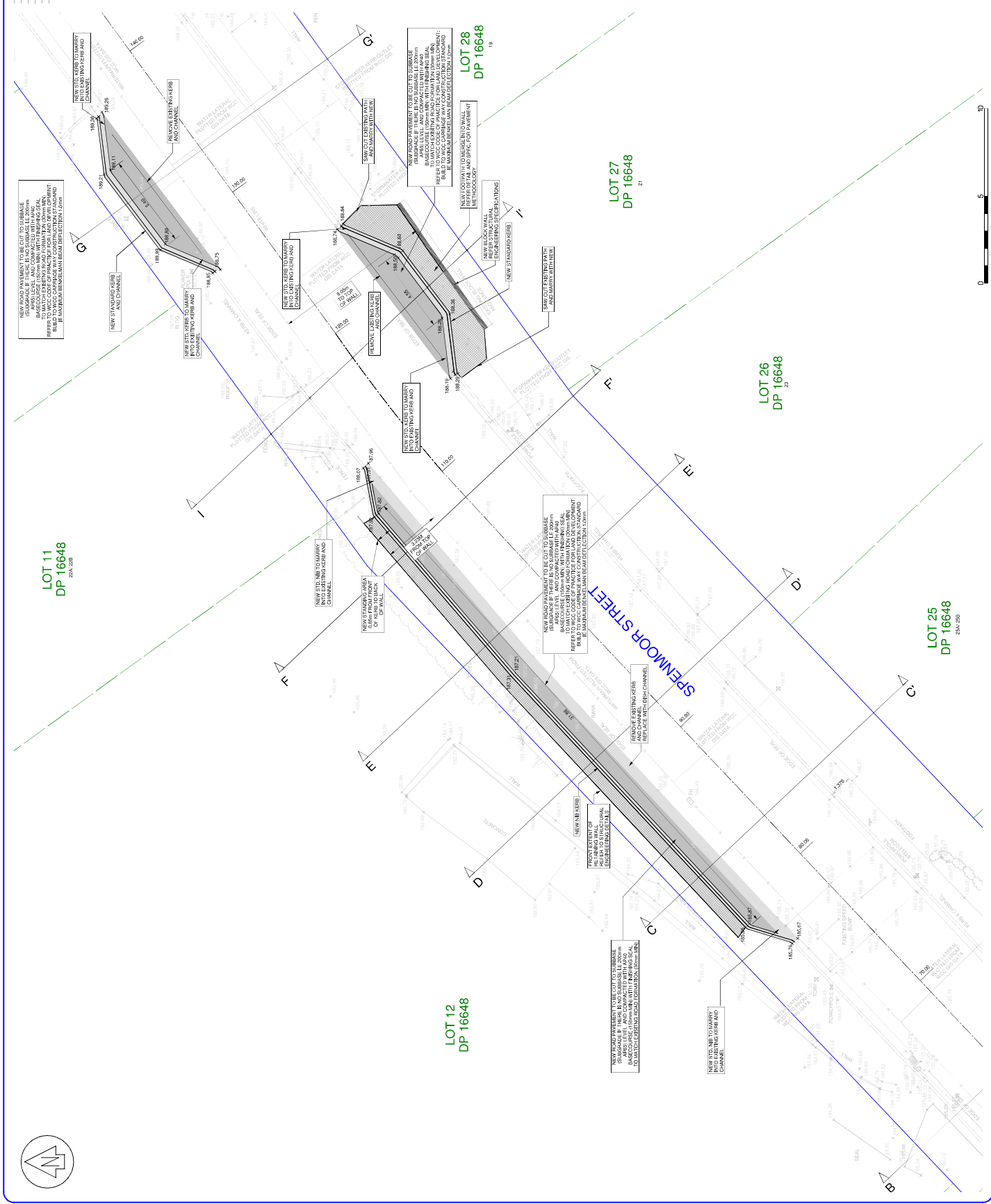
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3	REVISED FOR PERMIT	LV	12/12/2018
4	REVISED FOR PERMIT	LV	12/12/2018
5	CONSTRUCTION PERMIT	LV	12/28/2018



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PROJECT  
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PROPOSED ROAD  
**WIDENING**

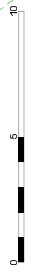
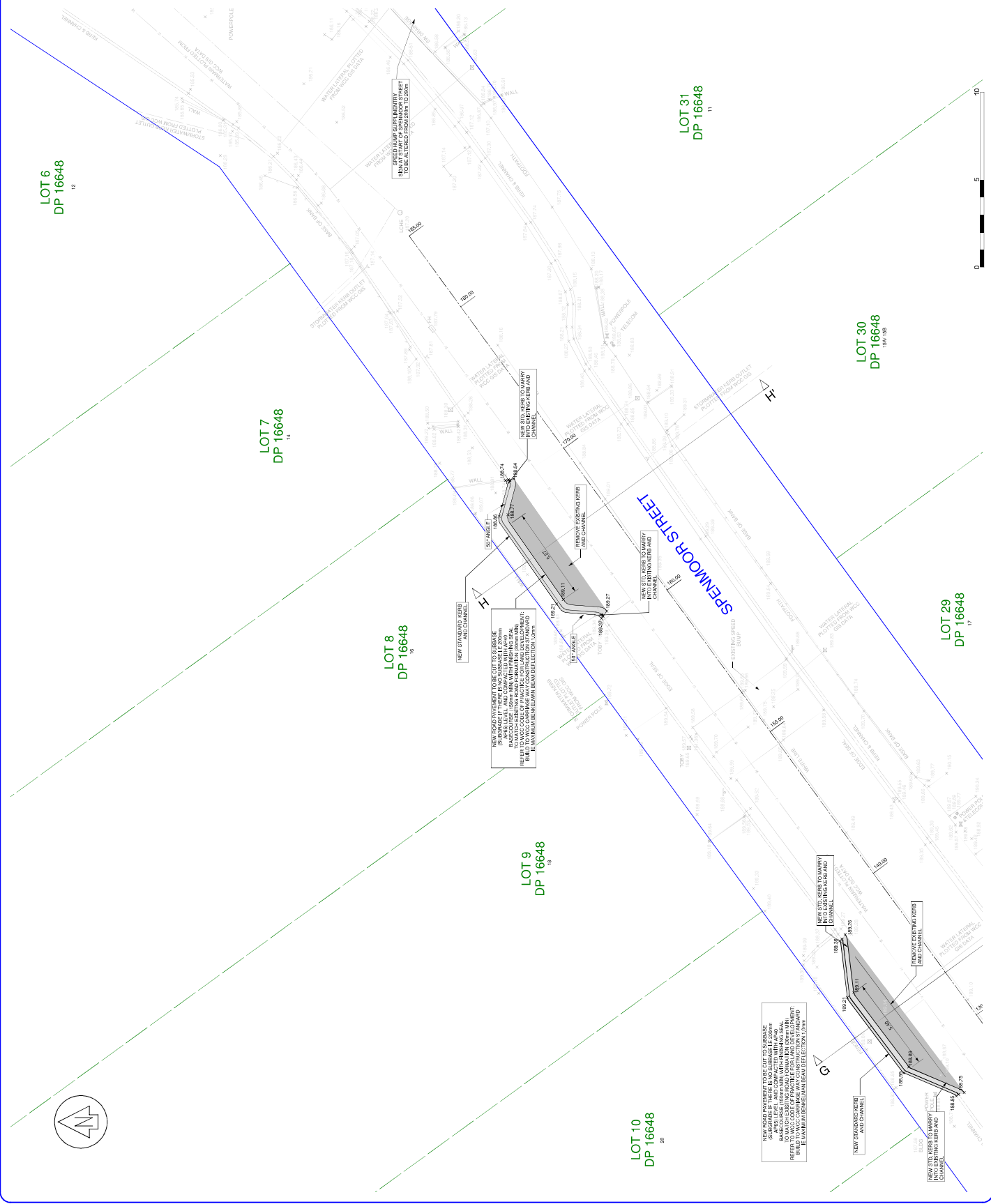
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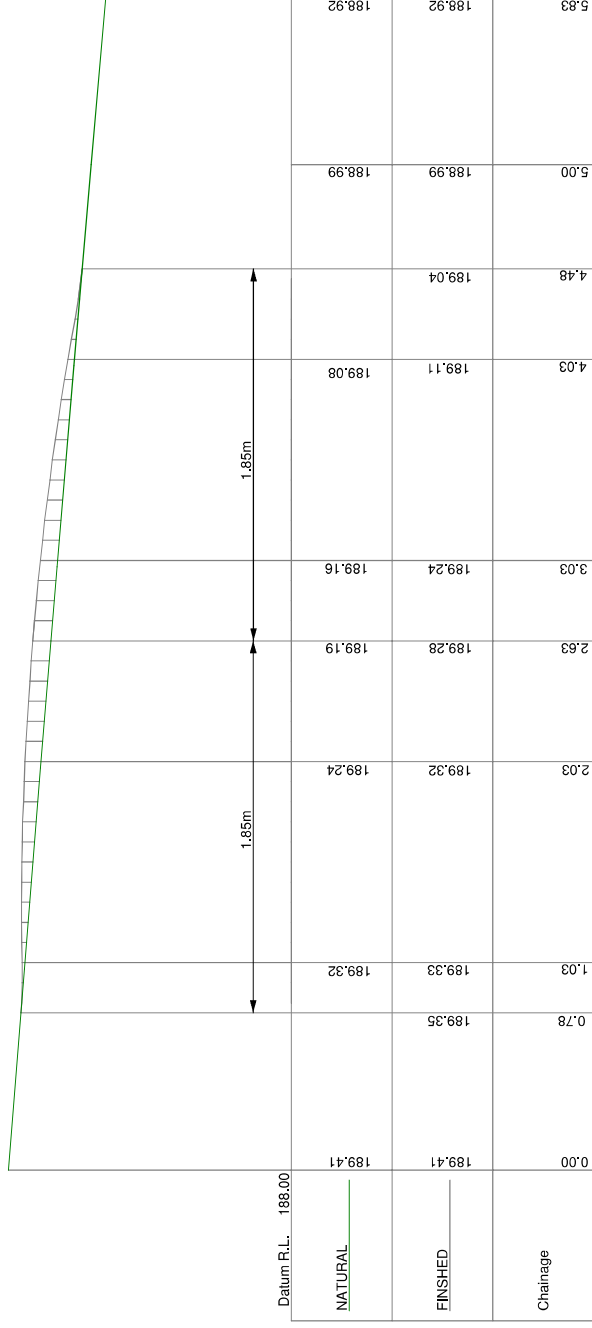
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NOTES:  
REV B - FOR CONSTRUCTION



## SPEED HUMP LONG SECTION

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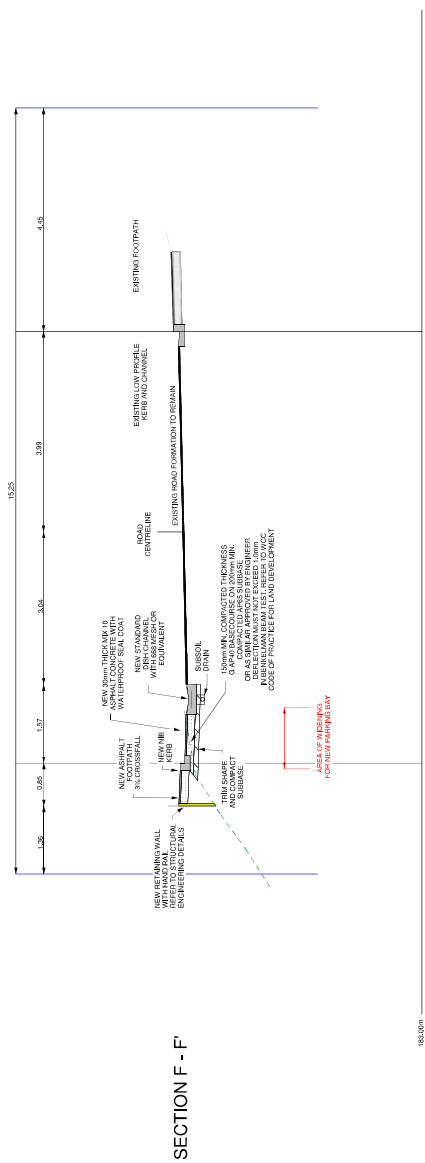
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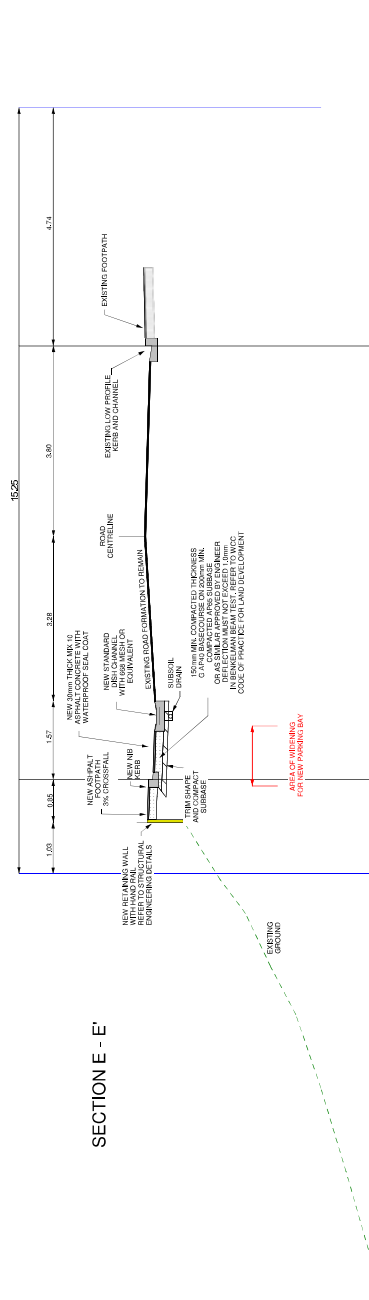
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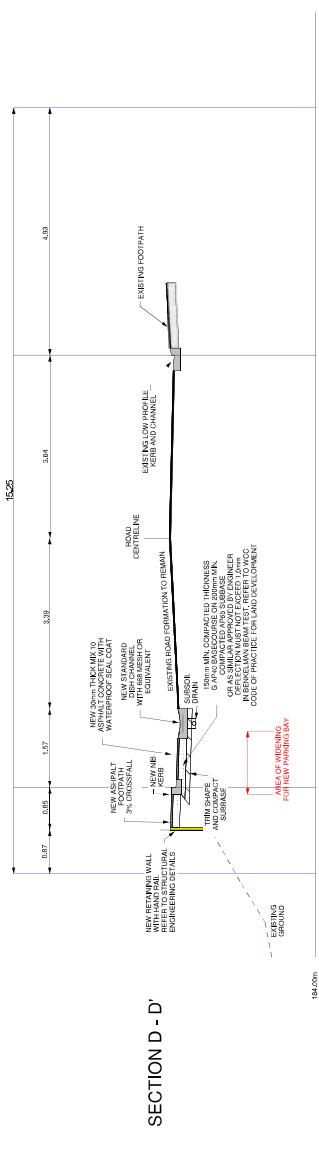
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SECTION F - F'



SECTION E - E'



SECTION D - D'

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**ROAD WIDENING CROSS SECTIONS**

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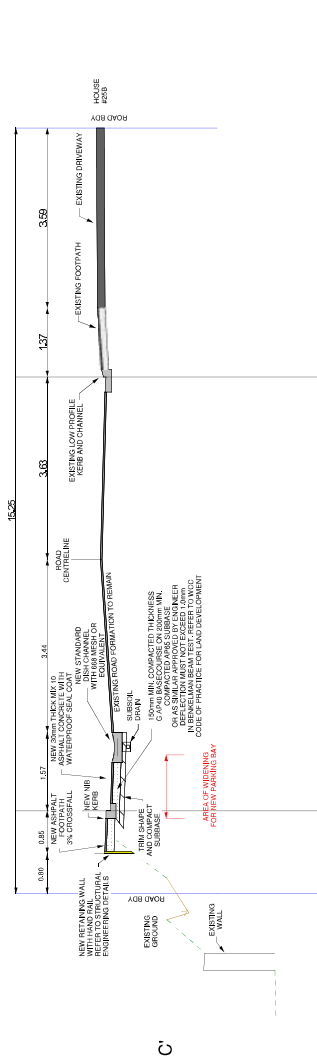
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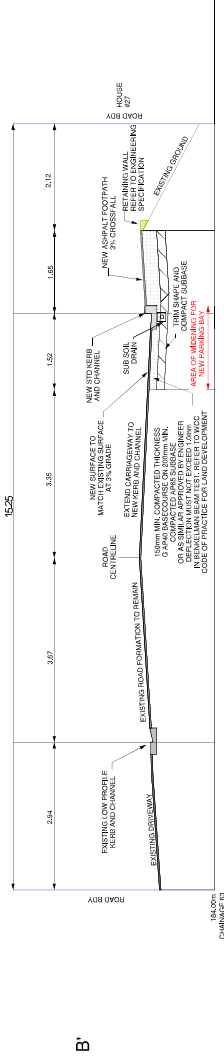
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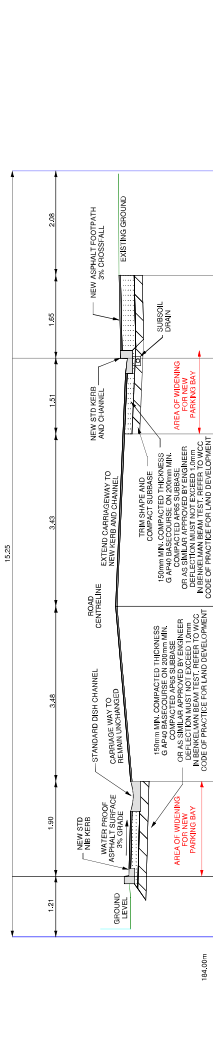
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SECTION C - C'



SECTION B - B'



SECTION A - A'



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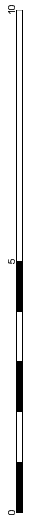
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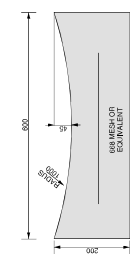
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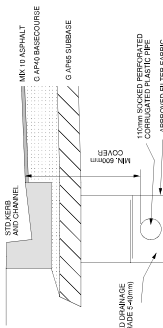
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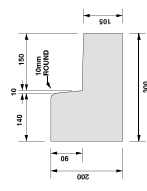
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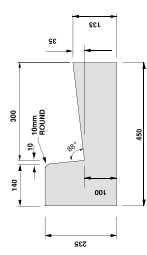
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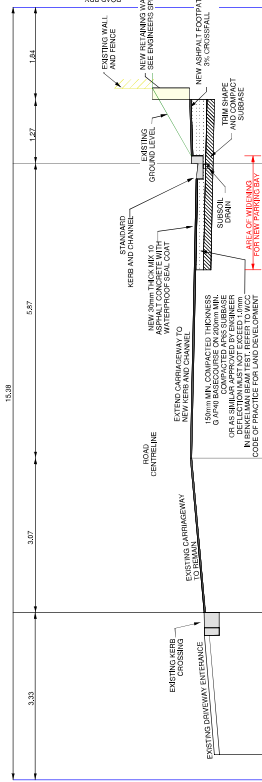
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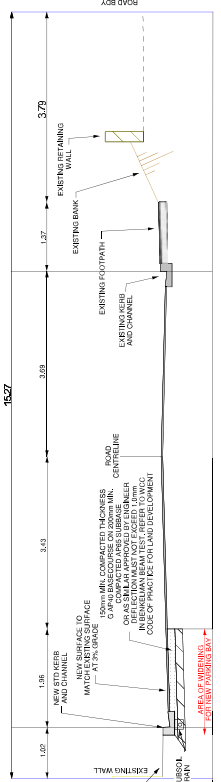
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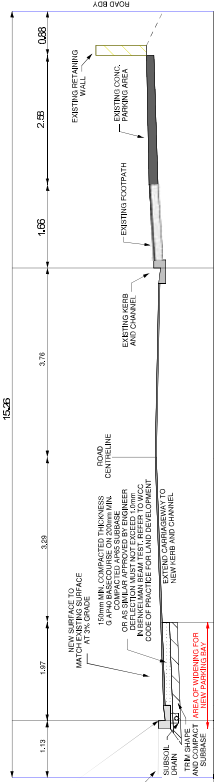
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**SECTION I - I'**



**SECTION H - H'**



**SECTION G - G'**



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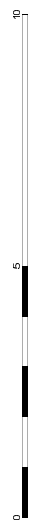
PROJECT  
**SPENMOOR STREET**

ROADWAY TYPE  
**ROAD WIDENING  
CROSS SECTIONS  
AND ROAD DETAILS**

DESKTOP CONSULTANT

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27 August 2021

Ref: 0697

Cedric Carter  
Project Manager  
Prime Property Limited  
**WELLINGTON**

Dear Cedric

**Spenmoor Street Development, Newlands, Wellington City  
Road Capacity and Intersection Analysis Assessment**

Traffic Concepts has been commissioned to provide an assessment of the potential road capacity for the older section of Spenmoor Street and the performance of the Intersection of the Wakely Road/Newlands Road intersection. I have now completed my analysis which has included the following:

- site visits
- collecting traffic data
- turning movement surveys
- review of previous reports by other consultants
- SIDRA modelling of the proposed roundabout at Wakely Road/Newlands Road intersection
- Assessment of the capacity of Spenmoor Street

These matters are discussed in detail in the assessment below. The assessment below also draws on past information completed as part of the past consent applications which includes technical analysis completed by other consultants.

## 1. Introduction

The demand for houses in Wellington City is leading to greater pressure to use good available land to meet the future needs of the residents for the city. In recognition of this need it is proposed to increase the number of lots within the Spenmoor Street development.

The Spenmoor Street development has a consent limit on the number of lots due to downstream constraints which include the lower section of Spenmoor Street and the intersection of Wakely Road and Newlands Road. The limit on the number of lots came from work undertaken on the performance of the Wakely Road/Newlands Road intersection which showed that the Level of Service (Los) reached E at certain times of the day. A limit of 230 homes was put on the Spenmoor Street development to address this adverse effect.

With the increase in housing needs some options were investigated around how the capacity of the intersection of Wakely Road and Newlands Road could be increased. A concept design for a mini roundabout was developed and presented to Wellington City Council as a possible mitigation measure to address the existing performance issues at the intersection. Initial SIDRA work also showed that this significantly improved the LoS at the intersection for the increased traffic from the 230 homes. It also suggested that more homes could be built within the Spenmoor Street Development with the LoS/delays being no worse than the already approved 230 lots.

Provisionally Wellington City Council is allowing for 300 homes within the Spenmoor Street Development in its forward planning. This report looks at the ability of lower sections of Spenmoor Street and the intersection of Wakely Road and Newlands Road to accommodate the 300 homes.

The analysis below is broken into two components - the road capacity assessment of the lower section of Spenmoor Street and the performance of the Wakely Road/Newlands Road intersection based on 300 homes.

## 2. Spenmoor Street

This section provides an assessment of the road capacity for the lower section of Spenmoor Street. The analysis includes traffic count data, trip generation calculations and an analysis of the road capacity.

### 2.1. Traffic Counts

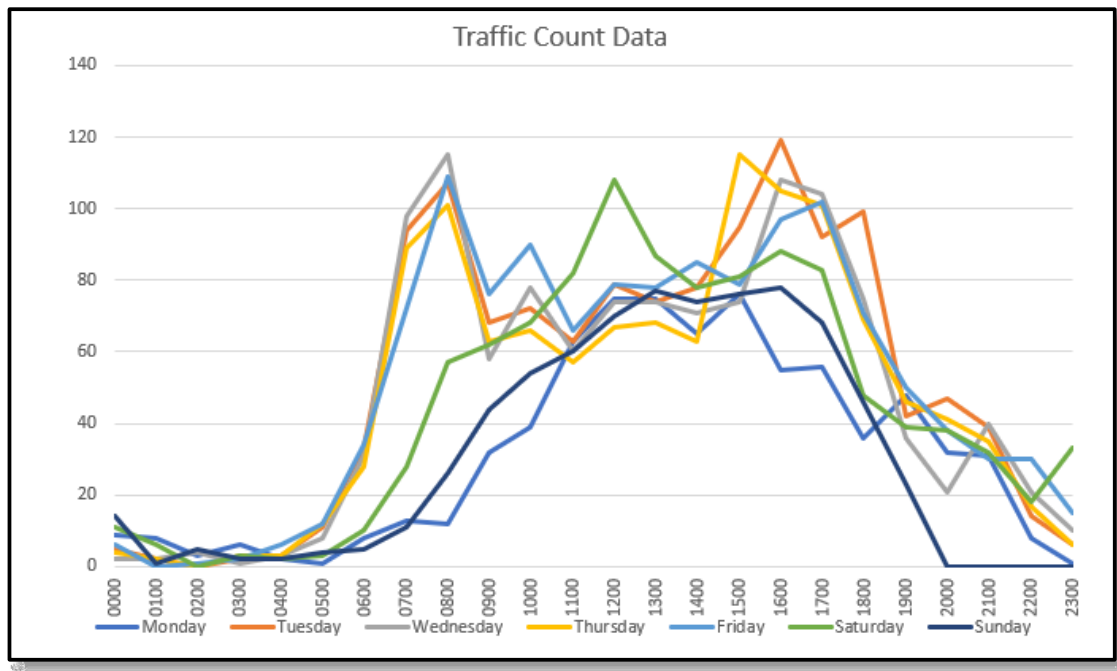
A traffic count was completed on the lower section of Spenmoor Street to better understand the existing traffic volumes on this road and also assist in calculating a more accurate and robust trip generation rate for the upper development. The trip

generation rate for new homes (which will be based on the existing homes) is the key factor in determining the capacity of Spenmoor Street and the performance of the nearby intersection.

The traffic count was carried out from 04 June 2021 to 13 June 2021. It should be noted that 07 June 2021 was a public holiday (Queens Birthday). The recorded traffic flow on the Monday were around 65% of the normal daily flows.

The traffic counter was located outside 7 Spenmoor Street and collected vehicle movements in both directions.

**Figure 1** shows the traffic count data for the virtual count week.



**Figure 1: Spenmoor Street Weekly Count**

As shown the traffic flows on the Monday are much lower than the rest of the week which was due to the public holiday. The adjusted weekday flows (over four days) were around 1,230 vehicles per day. The Saturday flows were relatively high compared to the weekday and Sunday flows. The flows on Monday (public holiday) and Sunday were very similar (around 745 vehicles per day).

The peak hourly flows for the weekday were 108 vehicles in the AM Peak (08:00-09:00) and 107 in the PM Peak (16:00-17:00).

The traffic counter also picked up the vehicles associated with the construction of homes within the Spenmoor Street Development. A count of construction vehicles within the development area showed around 80 vehicles. This was a snapshot of construction traffic and did not account for some day-to-day movements of other construction traffic. Accordingly, there are around 240 vehicle movements (one in and

one out for each vehicle) associated with the construction of homes. It is likely that these trade vehicles noted within the development would also make other trips during the day for breaks and/or picking up materials.

## **2.2. Trip Generation**

As noted above, the collection of traffic count data will assist in determining the trip generation of the existing homes within the Spenmoor Street Development. The trip generation rate calculation included some of the homes on the lower section of Spenmoor Street. The construction traffic was removed from the calculation of the dwelling trip generation rate.

For the purpose of calculating the trip generation rate, it was assumed that there were around 240 construction trips per day for the period of the traffic count. This allowed for the vehicle count noted in the survey and other movements that would occur during the day.

A trip generation rate of eight trips per dwelling per day was calculated which excludes construction traffic. More details around the trip generation and traffic are provided below.

It should be noted that the trip generation rate used for the initial assessment of the performance of the Wakely Road/Newlands Road intersection was 9.7 trips per dwelling per day. This trip rate included construction traffic as it had a limited amount of development in the Spenmoor Street Development area.

## **2.3. Road Capacity**

The operating capacity of the lower section of Spenmoor Street is constrained by the existing carriageway width and parked vehicles on the road. While the management of on-street parking will assist in improving the capacity of Spenmoor Street, the carriageway width will be the determining factor of its overall capacity.

It is also important to note that the calculation of road capacity relates to the Level of Service (LoS) which incorporates delays and safety. Consideration and use of some of the technical information provided in past reports has also been used in this analysis which is mainly Tim Kelly's report dated June 2014. This analysis did not consider the different LoS for Spenmoor Street.

The LOS is a qualitative measure of the operational conditions within a traffic stream. There are six different LoS ranging from A through to F, a LoS A being free flow and LoS F being a congested road network. It is not practical to provide LoS for all road networks as it is too costly. Typically, the most efficient LoS for urban roads is around LoS C or D. Spenmoor Street is easily operating at LoS A and has capacity to accommodate higher traffic flows.

The technical capacity of a road depends on a number of different factors including speed, road geometry, number of intersections/accesses, headway gaps, vehicle composition and driver population. In perfect conditions the capacity of a traffic lane is 2,400 vehicles per hour and is a LoS A. However, in most ideal situations the capacity is around 1,800 vehicles per hour per lane which is still a LoS A.

The capacity of Spenmoor Street will be much lower than the ideal situation above due to the geometry of the road and the presence of on-street parking. The road geometry restricts the capacity due to its width, with opposing traffic needing to slow down to pass each other safely where residents are parked on both sides of the road. The operating speeds are also lower than the optimal travelling speed which further reduces the road capacity.

Another determining factor is the makeup of the driving population. The different needs of different drivers change the capacity. A broad example of these differences is a person going to work will drive differently to a person going on holiday. Also, the driving abilities of different drivers, as well as age affect the driver population.

The carriageway width of Spenmoor Street is between 6.6 metres to 8.8 metres wide. The narrowest section of 6.6 metres is marked with broken yellow lines to improve its moving lane width. Generally, the available road width is around 7.2 metres along most of its length.

Inset parking bays were installed in 2019 to increase the available road width. Notably this was completed after the analysis of Tim Kelly in 2014. These improvements along with broken yellow lines has been effective in managing the available road width for the movements of vehicles and increasing the capacity of the road.

Spenmoor Street, following these changes allows for two-way traffic flow along most of its length within a comfortable carriageway width of more than 6.6 metres. In calculating Spenmoor Street's operating capacity, the ability to provide for two-way traffic along its length and within an effective unimpeded carriageway will significantly increase the through movement. It should be noted that some areas such as the start of Spenmoor Street and at the old turning head parking on both sides may reduce the roadway to one lane. This may need to be managed if two-way traffic is to be maintained.

There are a number of documents widely used in New Zealand to assess the capacity of roads. The commonly used NZS:4404 standards for Land Development and Subdivision provide guidance around road classification and expected traffic flows. It should be noted that this is not a calculation of capacity but merely guidance. It is also important to note that modern thinking around liveable streets deliberately seeks to narrow roads,



to provide better outcomes for all road users of the streets and those that live next to them.

Table 3.2 within NZS 4404:2010 provides a series of road cross sections along with the function of the road and the typical traffic volumes. Based in the information the traffic volumes are likely to be aimed at LoS A.

For road widths around 5.5 metres the traffic volumes are less than 2,000 vehicles per day. The road classifications then jump up to a traffic lane width of 8.4 metres (two lanes at 4.2 metres) which are expected to carry volumes of up to 8,000 vehicles per day. These traffic volumes are conservative as real-life examples such as Mt Victoria Tunnel in Wellington carries more than 30,000 vehicles per day within a carriageway less than seven metres. Other narrow roads with narrow vehicle lanes that carry high traffic flows include Adelaide Road and Constable Street.

Spenmoor Street has an effective road width of seven metres which falls between the two cross sectional examples in NZS 4404:2010. Accordingly, it is reasonable to assume that Spenmoor Street can carry flows between 2,000 and 8,000 vehicles per day and closer to 8,000 vehicle per day. Conservatively Spenmoor Street could carry around 5,000 vehicles per day as it is able to provide two-way flow.

The calculation of the road capacity of Spenmoor Street below is based on Austroads Guide to Traffic Management “Roadway Capacity - Part 2” and “Traffic Studies and Analysis – Part 3”.

Table 5.1 of Guide to Traffic Management Part 3 sets out typical hourly mid-block capacities for urban roads. Within this table the typical rates for one direction of traffic range from 600 to 900 vehicles per hour which is equivalent to around 6,000 plus vehicles per day.

Section 3 of Guide to Traffic Engineering Practice Part 2 – Road Capacity provides formulas to calculate the capacity of a road. It should be noted that this is for a rural road but does provide some level of guidance.

As noted above there are six different LoS ranging from A through to F. LoS A is a condition of free-flowing stable traffic stream with LoS F being unstable with long delays and queues. Typically, arterial roads have a target LoS service being no worse than LoS D. The existing LoS for Spenmoor Street is estimated to be around LoS A with traffic moving relatively freely along the road with the need to stop being relatively low. The target operating LoS for this type of road is expected to be around LoS C. This would suggest more traffic can use the road.

The practical operating capacity of any road is around 2,400 vehicles per hour per lane. However, this is under ideal situations (motorway for example) for short sections of

road. The realistic operating capacity of a road has been measured as high as 2,200 vehicles per lane per hour with 1,800 vehicles per lane per hour as the accepted operating design capacity. The formula for calculating operating capacity uses the 1,800 vehicles per lane per hour and applies adjustment factors for the key elements noted above, such as road layout. Road capacity is reduced when there are reduced or no shoulders, reduced lane widths, vehicle composition, type and terrain.

However, the peak operational capacity of a two lane, two-way road (one lane in each direction) is more practically around 2,800 vehicles per hour (total for both directions). This operational flow is for a road with traffic lanes being 3.7 metres in width and shoulders of 2.0 metres (parking lane).

By using Austroads we can calculate the road capacity for Spenmoor Street. This is done with the formula (Austroads Guide to Traffic Engineering – Part 2 Page 8) is provided below:

$$SF_i = 2,800(v/c)_i f_d f_w f_{hv}$$

The various parts of the equation are adjustment factors that are provided in the Austroads guide noted above. The key component of the calculation relates to the use  $i$  which is the LoS.

Using an expected LoS of C the total Service Flow Rate (SFi) for a road in rolling terrain, with a directional distribution of 80/20 and width of 3000mm with no shoulders, the calculated road capacity is around 566 vehicles per hour. This calculation assumes a road width of 6000mm. Accordingly, the road capacity would be more than 566 vehicles per hour calculated as the road width is wider than 6000mm.

However, the calculation is useful in helping understand what the capacity could be.

Therefore, based on the above different approaches to assessing the capacity of Spenmoor Street, it is reasonable to assume that the operational capacity of Spenmoor Street is at least 600 vehicles per hour at peak times and around 6,000 vehicles per day.

It should be noted that while this is the operational capacity of the road, it is not suggested that it is appropriate for traffic volumes this high to occur along Spenmoor Street.

The existing flows on Spenmoor Street are around 1,230 vehicles per day with peak flows of around 110 vehicles per hour. There are around 124 homes that were within the traffic count area. This along with the construction excluded equates to a trip generation rate of 7.9 (say eight) trips per dwelling per household.

Assuming a lot yield of 300 homes within the Spenmoor Street Development and an assumed trip rate of eight per dwelling per day, the increase in the total daily flow would be around 2,400 vehicles per day or around 240 trips in the peak hour. It should be noted

that there are already around 90 homes within the Spenmoor Street Development that have been counted in the traffic count in June 2021. Accordingly based on 7.9 trips per dwelling there are 720 vehicles per day already on the network.

Therefore, based on a trip generation rate of eight trips per day per dwelling and the total movements that would be generated by the existing and future residents the expected total traffic flows coming from Spenmoor Street are estimated to be around 2,910 (1,230 + 1,680) vehicles per day or around 300 movements in the peak hour.

As a sensitivity check against the trip rate, the following calculation takes a higher generation of 10 trips per dwelling per day. Based on this higher rate the existing and future residents would lead to traffic flows of around 3,300 (1,230 + 2,100) per day or around 330.

The expected flows of 2,910 vehicles per day are well below the assessed road capacity of around 6,000 vehicles per day or 6,000 vehicles in the peak hour. Even increasing the trip generation rate to 10 trips per dwelling per day is still below the 6,000 vehicles per day calculated capacity. Accordingly, there are no capacity constraints for the suggested 300 homes for the Spenmoor Street Development.

#### 2.4. Road Safety

A detailed search of the Waka Kotahi crash database was undertaken for Spenmoor Street for the five-years from 2016 to 2020. The part crash year of 2021 was also included in the search.

There have been two reported crashes within the search area since 2016.

**Table 1** provides details of the reported crashes.

Road	Location	Date	Collision Ref	Accident Description	Severity
Spenmoor Street	Outside Number 27	30/10/2019	201973081	A motorist was carrying out a u turn and accelerated too hard and went over a retaining wall.	Minor injury
		03/03/2018	201812053	The driver had a few beers before the crash. The rider of a moped lost control turning at Grumman Lane and slid over. The rider had been drinking at a party.	Minor Injury

**Table 1: Crash History (Source: Waka Kotahi)**

As noted above, there have been two reported crashes within the search area. Both crashes were not related to the road environment or geometry. There are no inherent safety deficiencies on Spenmoor Street based on the crash data.

Generally, the road environment provides for two-way traffic with traffic calming being implemented to reduce vehicle speeds. Spenmoor Street provides a safe environment for road users.

### **3. Wakely Road and Newlands Road Intersection**

This section builds on the analysis above around anticipated traffic flows assuming 300 lots are completed in the Spenmoor Street Development area. It should be noted that around 40 homes have already been completed so the analysis considers the impacts of traffic generated from 260 homes on the intersection of Wakely Road and Newlands Road.

The existing intersection operates reasonably well for the Newlands Road traffic. However, with increased flows now coming from Wakely Road long delays are starting to develop, especially for the right turn out of Wakely Road.

In reviewing the performance of the existing intersection, an alternative layout (mini roundabout) was tested to see if further development could be accommodated on the Wakely Road approach and the intersection overall. This simplified testing assessment showed some noticeable improvements in the operation of the intersection. Council considered the outputs from SIDRA and in principle agreed that a roundabout would provide a good solution at the intersection on capacity and safety grounds.

Accordingly, the analysis below includes assumptions around trip distribution, traffic generation and uses SIDRA to assess the performance of the intersection. It should be noted that SIDRA has been used in previous assessments of the intersection which shows that the construction of more than 230 homes in the Spenmoor Street Development area would start to adversely affect the operation of the junction. In response to the need for more homes in Wellington City, it is proposed to construct a mini roundabout at the intersection to improve safety and capacity at this junction. The analysis below tests the performance of the new intersection layout.

#### **3.1. Traffic Count Data**

As noted above the traffic flows anticipated from Spenmoor Street will include the existing homes and future homes. The total number of movements from the existing homes along with the remaining future dwellings has been estimated to be around 3,000 vehicles per day, which equates to around 300 vehicles in the peak hour.

Traffic distribution and turning movements have been calculated based on previous survey data and assuming the completed development has 300 homes. The intersection

turning counts were carried out in 2016 and 2019. The two sets of turning counts showed very good alignment especially when considering they were three years apart. The flows on Newlands Road were slightly higher for 2019, but the trip distribution of the flows through the intersection for the two surveys were similar.

An adjustment was also made to the PM peak to account for the longer lower peak at this time due to the different trips' commuters have when they come home from work. Such trips include going to the supermarket, restaurants and bars and recreational activities.

**Table 2** shows the anticipated turning movements upon the completion of the development with 300 homes.

Approach	Newlands Road (heading towards Newlands)		Wakely Road		Newlands Road (heading towards the city)	
	Thru	Right	Left	Right	Left	Thru
07:00-08:00	239	53	188	53	6	1038
17:00-18:00	1075	115	40	38	33	298

*Table 2: Future turning movements – 300 homes*

As shown the flows in and out of Wakely Road increase. As expected, the left turn from Wakely Road in the morning and the right turn into Wakely Road in the evening are noticeably higher as a result of the development when compared to the existing flows (due to the possible 300 lots).

It is also interesting to note that the turning counts showed almost equal exiting flows from Wakely Road in the PM peak.

### 3.2. SIDRA Analysis

The trip distribution and turning count analysis provided above has been used to develop a SIDRA model of the intersection to enable an assessment of the intersection performance to be completed.

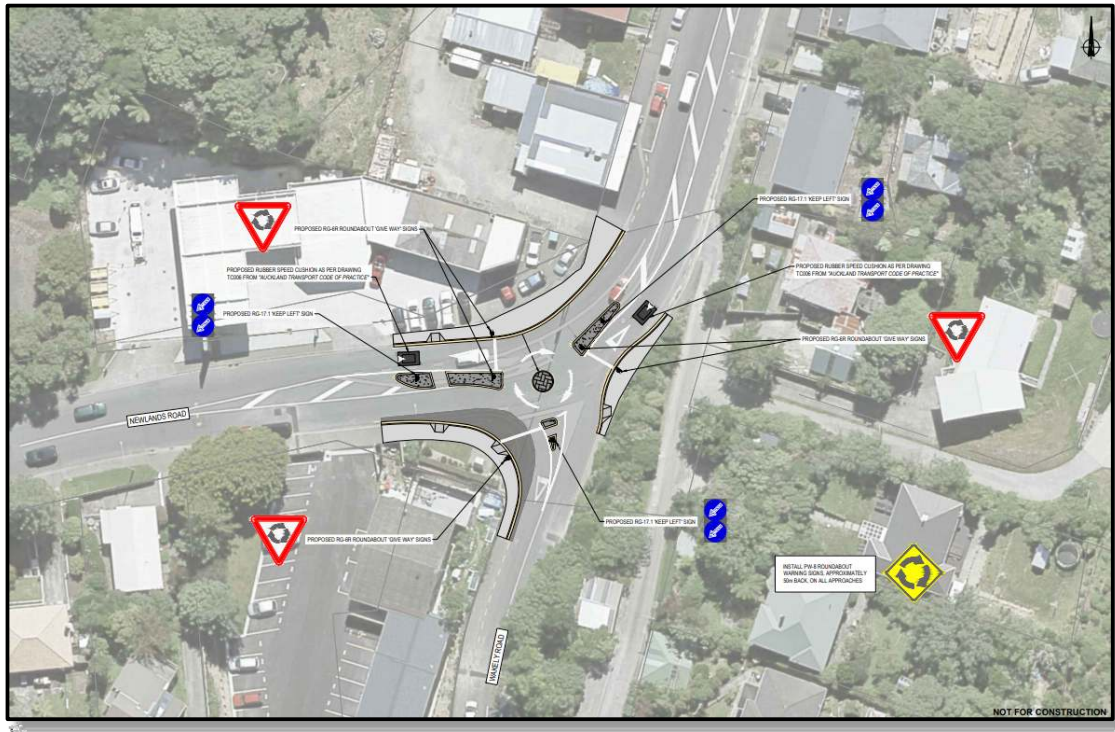
The SIDRA model that was used was peer reviewed and accepted by Council as part of the previous assessment for the Spenmoor Street Development area and has been used for the analysis. The SIDRA model was calibrated against the queue lengths at the intersection and provided a fair representation of the performance of the junction.

The SIDRA model was set up with a tee intersection to reflect the existing layout. The analysis will assess the performance of the intersection with a mini roundabout.

The preliminary design of the mini roundabout has been accepted by Council and also has had a safety audit completed. Changes were made to the design as part of the

recommendations of the safety audit. It is understood that Council will consult with the community about the proposed change to the intersection.

**Figure 2** shows the proposed intersection layout with a roundabout.



**Figure 2: Proposed Mini Roundabout (Source: Stantec)**

As shown, each approach has one lane with a short right turn lane provided for the movement from Newlands Road into Wakely Road. Apart from the installation of the roundabout, the most significant change is the introduction of median islands which will provide pedestrian refuges to assist in crossing the roads.

This layout was coded into the SIDRA model to test the performance of the intersection with the traffic flows upon completion of the Spenmoor Street Development area.

### 3.3. SIDRA Outputs

As noted, the new intersection layout with the turning flows (Table 2) were coded in the SIDRA software which allows for the performance of the intersection to be tested.

The same input parameters used for the existing intersection will be included in the new SIDRA model for the mini roundabout. Changes to the intersection layout and input traffic volumes were the main changes made to the SIDRA model. The outputs include geometric delay.

For completeness the outputs from the previous SIDRA modelling for the intersection have been included below. This table shows the testing of the tee intersection with different scenarios relating to how many homes are constructed. This was done to set

a threshold on the limit of the Spenmoor Street Development area. This formed part of the approval for 230 homes.

**Table 3** shows the outputs from the previous SIDRA testing for the existing tee intersection at the AM peak. The SIDRA outputs showed that the AM peak was the critical time period.

		177 Homes		220 homes		230 homes		250 homes	
		LoS	Delay	LoS	Delay	LoS	Delay	LoS	Delay
Wakely Rd	L	LOS C	16.6	LOS C	18.9	LOS C	19.4	LOS C	20.5
	R	LOS D	28.9	LOS D	33.0	LOS D	33.6	LOS D	35.0
		LOS C	19.3	LOS C	21.9	LOS C	22.5	LOS C	23.7
Newlands Rd	R	LOS A	4.3	LOS A	4.6	LOS A	4.7	LOS A	4.7
	L	LOS A	4.1	LOS A	4.4	LOS A	4.4	LOS A	4.5
		NA	4.1	NA	4.4	NA	4.4	NA	4.5
Newlands Rd	L	LOS A	4.2	LOS A	4.2	LOS A	4.2	LOS A	4.2
	R	LOS A	4.6	LOS A	4.6	LOS A	4.6	LOS A	4.6
		NA	4.2	NA	4.3	NA	4.3	NA	4.3
Intersection		NA	5.5	NA	6.4	NA	6.6	NA	6.9

**Table 3: Tee Intersection Scenario Testing (Source: Traffic Concepts Peer Review Report dated 1 July 2019)**

As shown, and as one would expect, as the number of homes increases the LoS becomes worse, and delays increase. Wakely Road is the only significantly affected approach which is largely due to the priority control at the intersection.

**Table 4** provides the outputs from the SIDRA model with the mini roundabout for the two peak periods for 300 homes. The table also includes the SIDRA outputs for the existing intersection with 230 homes as approved.

		AM				PM			
		Existing		Future		Existing		Future	
		LoS	Delay	LoS	Delay	LoS	Delay	LoS	Delay
Wakely Rd	L	LoS C	19.4	LoS B	15.1	LoS A	5.7	LoS A	2.6
	R	LoS D	33.6	LoS B	15.7	LoS A	9.7	LoS A	3.2
Newlands Rd	T	LoS A	4.7	LoS A	5.3	LoS A	0.0	LoS A	5.3

(to the city)	L	LoS A	4.4	LoS A	3.3	LoS A	4.6	LoS A	3.3
Newlands Rd (to Newlands)	T	LoS A	4.2	LoS A	3.0	LoS A	0.1	LoS A	4.6
	R	LoS A	4.6	LoS A	4.0	LoS A	6.1	LoS A	4.4
Intersection		N/A	5.5	LoS A	6.4	N/A	1.7	LoS A	4.6

Table 4: Mini Roundabout Intersection Performance

As shown the future intersection overall operates with a LoS of A with average delays of 6.4 seconds and 4.6 seconds for the AM and PM peak respectively. As expected, there is a little more queuing for the through traffic as a result of needing to slow down and possibly give way. However, these approaches still operate at a LoS A which is very good for a busy urban arterial road.

As noted above the AM peak is the one most affected by any change in flows from Wakely Road.

### 3.4. Sensitivity Testing

It was considered appropriate to carry out sensitivity testing on the proposed roundabout to better understand what effects may occur with different scenarios. The scenarios that were tested included a higher trip generation from the homes in the Spennor Street Development area.

Table 5 shows the SIDRA outputs based on 10 trips per dwelling per day for 300 homes within the development area.

		AM				PM			
		Eight Trips		Ten Trips		Eight Trips		Ten Trips	
		LoS	Delay	LoS	Delay	LoS	Delay	LoS	Delay
Wakely Rd	L	LoS B	15.1	LoS B	17.9	LoS A	2.6	LoS A	2.6
	R	LoS B	15.7	LoS B	18.5	LoS a	3.2	LoS A	3.3
Newlands Rd (to the city)	T	LoS A	5.3	LoS A	5.4	LoS A	5.3	LoS A	5.4
	L	LoS A	3.3	LoS A	3.5	LoS A	3.3	LoS A	3.4
Newlands Rd (to Newlands)	T	LoS A	3.0	LoS A	3.1	LoS A	4.6	LoS A	4.8
	R	LoS A	4.0	LoS A	4.0	LoS A	4.4	LoS A	4.6
Intersection		LoS A	6.4	LoS A	7.2	LoS A	4.6	LoS A	5.7

Table 5: Mini Roundabout Intersection Performance - 10 trips per dwelling test



As shown the LoS for all approaches is still operating very well at LoS A. The average delay increases slightly for all approaches and the overall intersection delay also increases slightly. However, overall, the intersection still operates efficiently.

The remaining test is to understand when the performance starts to become a problem for the intersection. This is related to the increase in the number of lots over 300 or overall increases in traffic flows at the intersection. For the purpose of this test scale factors were applied to all approaches to represent traffic growth.

When the traffic flows were scaled up by 40% the Wakely Road approach moved from LoS A to LoS C. This would suggest that the roundabout continues to operate efficiently with noticeably more traffic travelling through the intersection.

#### **4. Conclusions**

The assessment above provides an analysis of two matters relating to the Spennor Street Development Area. The need for more housing in Wellington City has generated the need to explore opportunities where more growth can be provided.

The Spennor Street Development area is located relatively close to the city, has good connections to public transport facilities and is near the arterial road network. The development has approval to provide 230 homes of which around 90 have been completed.

Council and the developer see the value in maximising the lot yield in this area but there are concerns around the lower section of Spennor Street to accommodate the increased flows and the ability of the Wakely Road/Newlands Road intersection to meet increased flows.

It was clear from the past analysis that the intersection of Wakely Road/Newlands Road could not accommodate any additional traffic over 230 lots without some noticeable effects starting to occur. Preliminary investigations testing a mini roundabout showed that this treatment could significantly improve the intersection performance and also provide additional benefits such as a safe intersection and better provision for pedestrians.

Some work was completed around how many lots could be formed within the Spennor Street development which showed that up to 300 sections could be developed. The figure of 300 lots has been used in this assessment to calculate and understand the impacts.

Accordingly, this report has firstly provided an analysis of the road capacity for Spennor Street. The analysis and assessment show that even with adopting a high

trip generation rate than what has been measured, there is easily enough capacity to accommodate 300 homes on the Spenmoor Street development.

The second part of the report looks at the performance of the Wakely Road/Newlands Road intersection if it was changed to a mini roundabout. The traffic flows associated with 300 lots on the Spenmoor Street Development area were assigned to various movements based on turning counts. The outputs from SIDRA show that the intersection will perform significantly better and operate at LoS A. The current tee intersection is expected to have some approaches that could fall to a LoS E as the development progresses.

Overall, the road network and Wakely Road/Newlands Road intersection can easily accommodate the expected flows from 300 lots within the Spenmoor Street Development area. The construction of a mini roundabout at Wakely Road/Newlands Road has an overall positive effect on the operation and safety of the intersection.

We are happy to provide any further clarification if required.

Regards



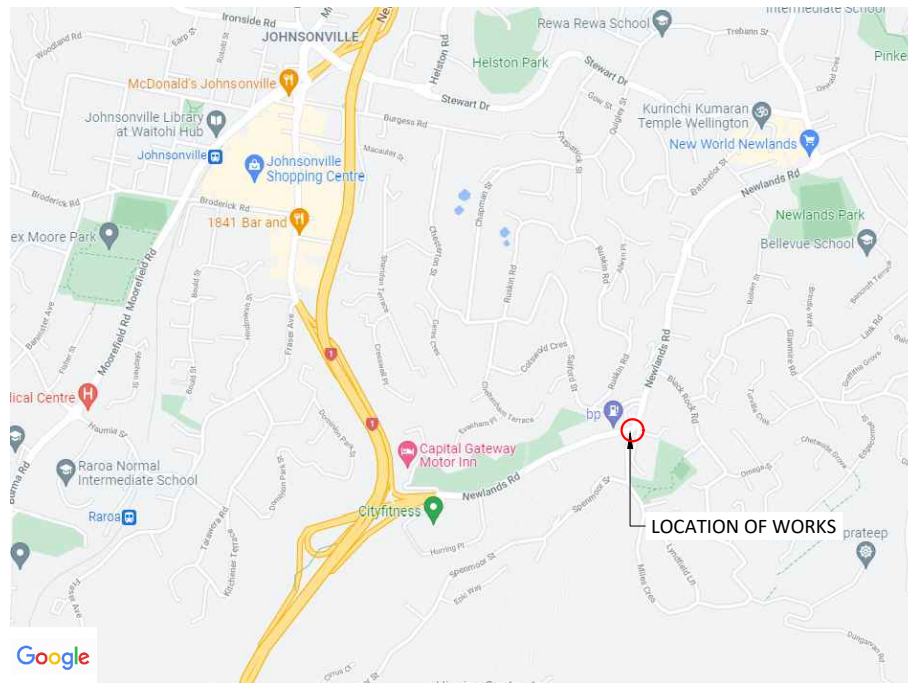
Gary Clack

Director

NZCE (Civil), REA, MIPENZ, CPEng

# TRAFFIC CONCEPTS

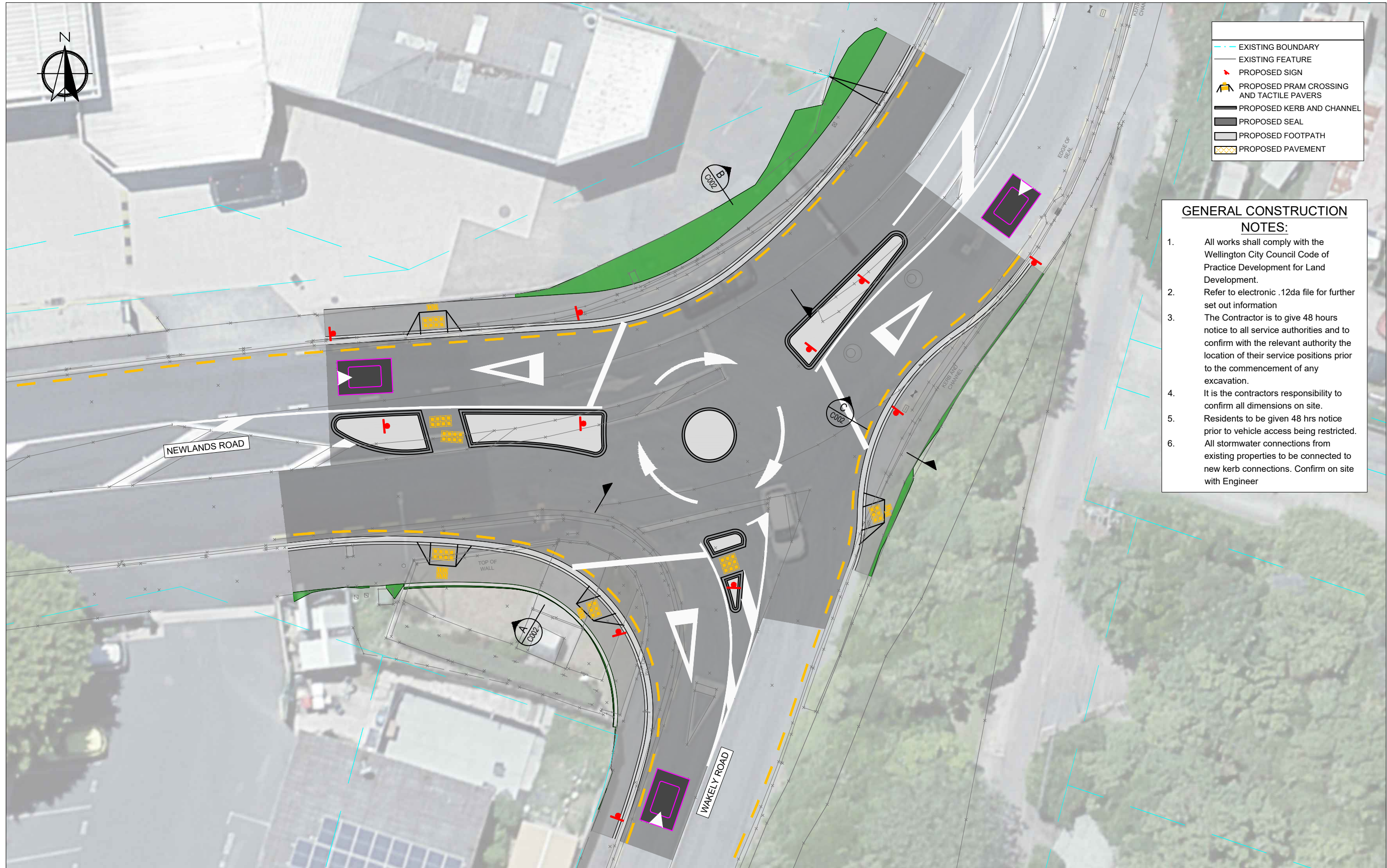
## NEWLANDS ROAD / WAKELY ROAD ROUNDABOUT



DRAWING INDEX		
DRAWING NO.	SHEET TITLE	REV
21-002-20-G001	COVER SHEET, LOCALITY PLAN & DRAWING INDEX	A
21-002-20-C001	OVERALL LAYOUT PLAN	A
21-002-20-C002	TYPICAL CROSS SECTIONS & STANDARD DETAILS	A
21-002-20-C003	CONSTRUCTION PLAN	A
21-002-20-C101	PLAN AND LONGITUDINAL SECTION RSK1 & RSK2	A
21-002-20-C102	PLAN AND LONGITUDINAL SECTION RSK3	A
21-002-20-C201	CROSS SECTIONS - RSK1	A
21-002-20-C202	CROSS SECTIONS - RSK2	A
21-002-20-C203	CROSS SECTIONS - RSK3	A
21-002-20-C301	SERVICES PLAN	A
21-002-20-C401	ROAD MARKING AND SIGNAGE PLAN	A

NOT FOR CONSTRUCTION

					NAME		 	TRAFFIC CONCEPTS LIMITED		DRAWING STATUS:	
					DESIGNED J. ORRIDGE			NEWLANDS ROAD / WAKELY ROAD ROUNDABOUT		PRELIMINARY	
					DRAWN J. ORRIDGE			COVER SHEET, LOCALITY PLAN & DRAWING INDEX		PLOT DATE: 12.11.2021 SCALE AT A1:	
					REVIEWED G. CLARK					DRAWING NO. 21-002-20-G001 REV A	
A	ISSUED FOR DISCUSSION				JO	GC	11.11.21				
REV	REVISION DESCRIPTION				DRAWN	CHECKED	APPROVED	DATE	APPROVED		



- EXISTING BOUNDARY
- EXISTING FEATURE
- ▲ PROPOSED SIGN
- ▲ PROPOSED PRAM CROSSING AND TACTILE PAVERS
- PROPOSED KERB AND CHANNEL
- PROPOSED SEAL
- PROPOSED FOOTPATH
- PROPOSED PAVEMENT

**GENERAL CONSTRUCTION NOTES:**

1. All works shall comply with the Wellington City Council Code of Practice Development for Land Development.
2. Refer to electronic .12da file for further set out information
3. The Contractor is to give 48 hours notice to all service authorities and to confirm with the relevant authority the location of their service positions prior to the commencement of any excavation.
4. It is the contractors responsibility to confirm all dimensions on site.
5. Residents to be given 48 hrs notice prior to vehicle access being restricted.
6. All stormwater connections from existing properties to be connected to new kerb connections. Confirm on site with Engineer

NOT FOR CONSTRUCTION

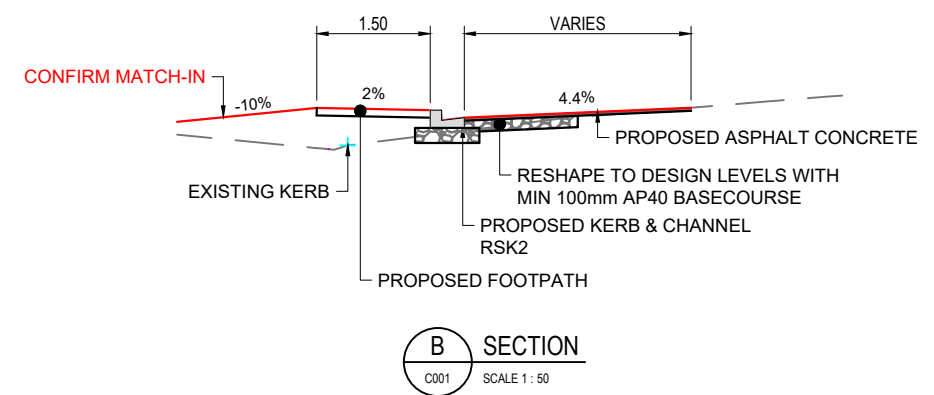
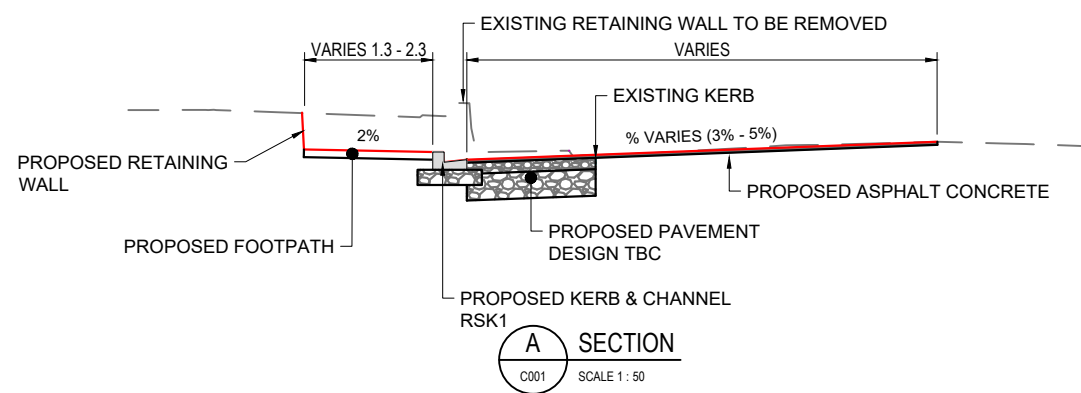
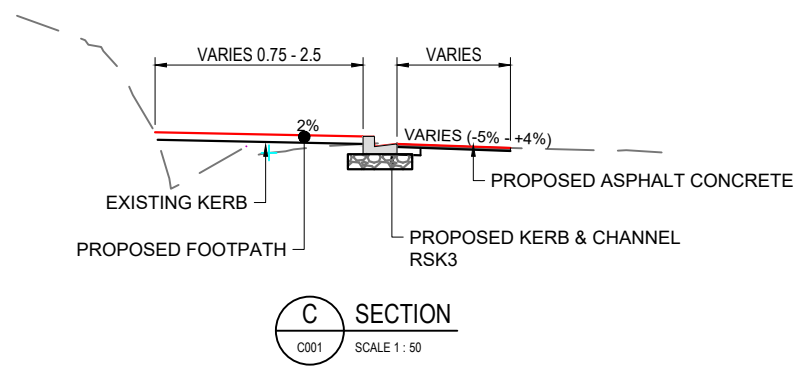
REV	REVISION DESCRIPTION	DRAWN	CHECKED	APPROVED	DATE
A	ISSUED FOR DISCUSSION	JO	GC		11.11.21

NAME	DESIGNED
J. ORRINGE	J. ORRINGE
J. ORRINGE	J. ORRINGE
G. CLARK	G. CLARK



TRAFFIC CONCEPTS LIMITED  
 NEWLANDS ROAD / WAKELY ROAD ROUNDABOUT  
 OVERALL LAYOUT PLAN

DRAWING STATUS: <b>PRELIMINARY</b>	
PLOT DATE: 12.11.2021	SCALE AT A1: AS SHOWN
DRAWING NO. <b>21-002-20-C001</b>	REV <b>A</b>



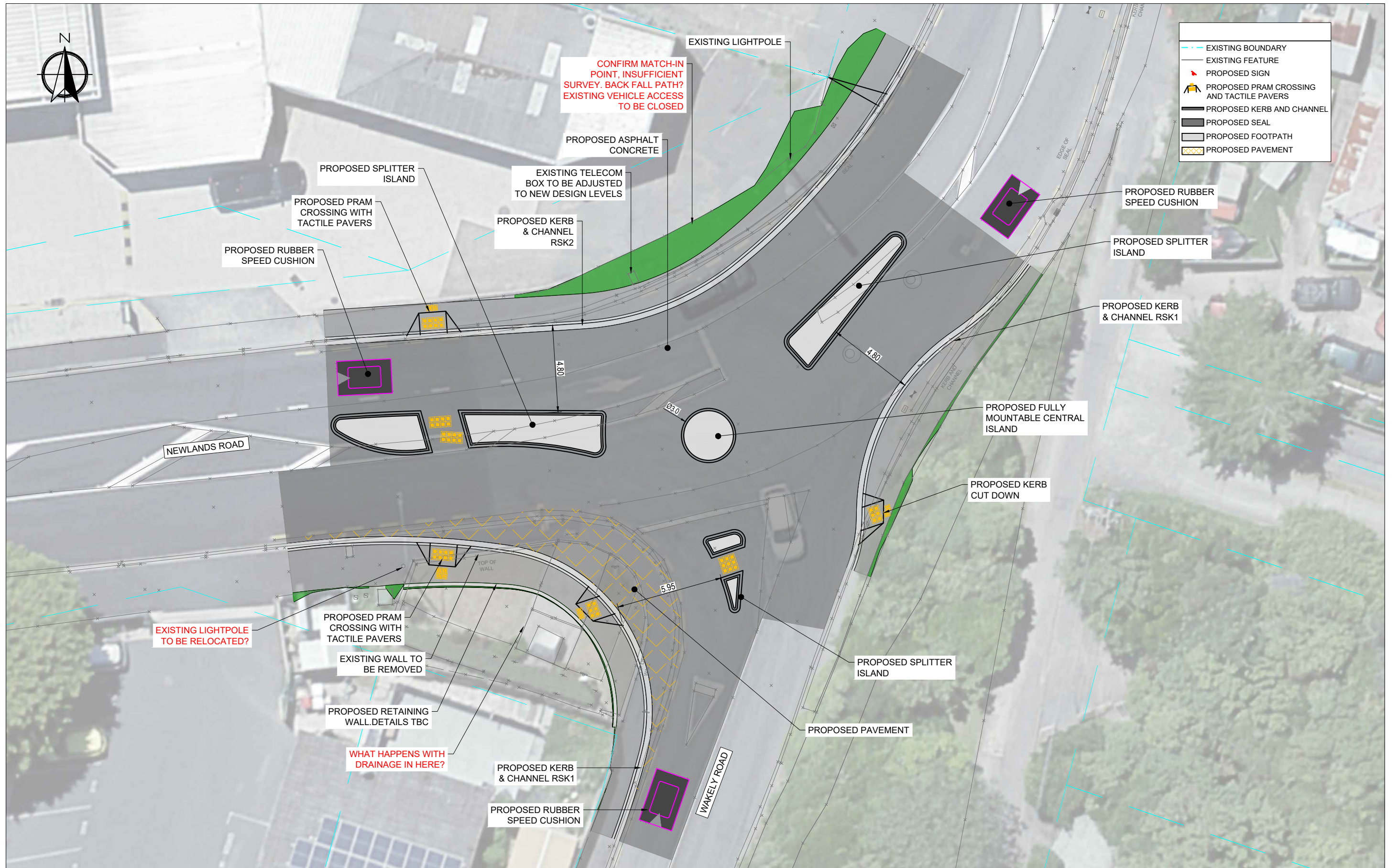
NOT FOR CONSTRUCTION

REV	ISSUED FOR DISCUSSION	JO	GC	11.11.21	APPROVED	DATE	APPROVED	NAME
							DESIGNED	J. ORRINGE
							DRAWN	J. ORRINGE
							REVIEWED	G. CLARK
							APPROVED	



TRAFFIC CONCEPTS LIMITED  
NEWLANDS ROAD / WAKELY ROAD ROUNDABOUT  
TYPICAL SECTIONS AND STANDARD DETAILS

DRAWING STATUS:		<b>PRELIMINARY</b>	
PLOT DATE:	12.11.2021	SCALE AT A1:	AS SHOWN
DRAWING NO.	21-002-20-C002	REV	A



NOT FOR CONSTRUCTION

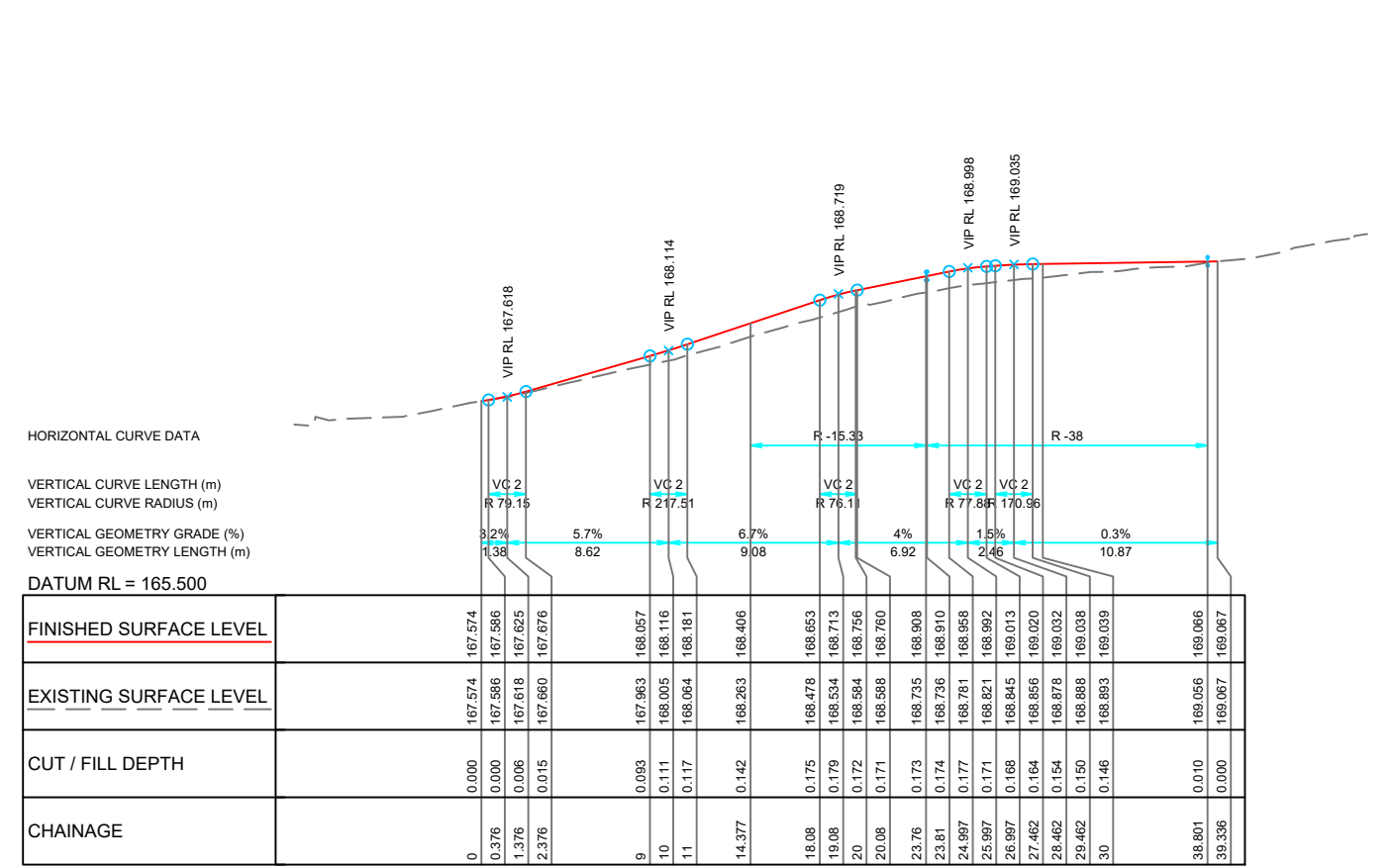
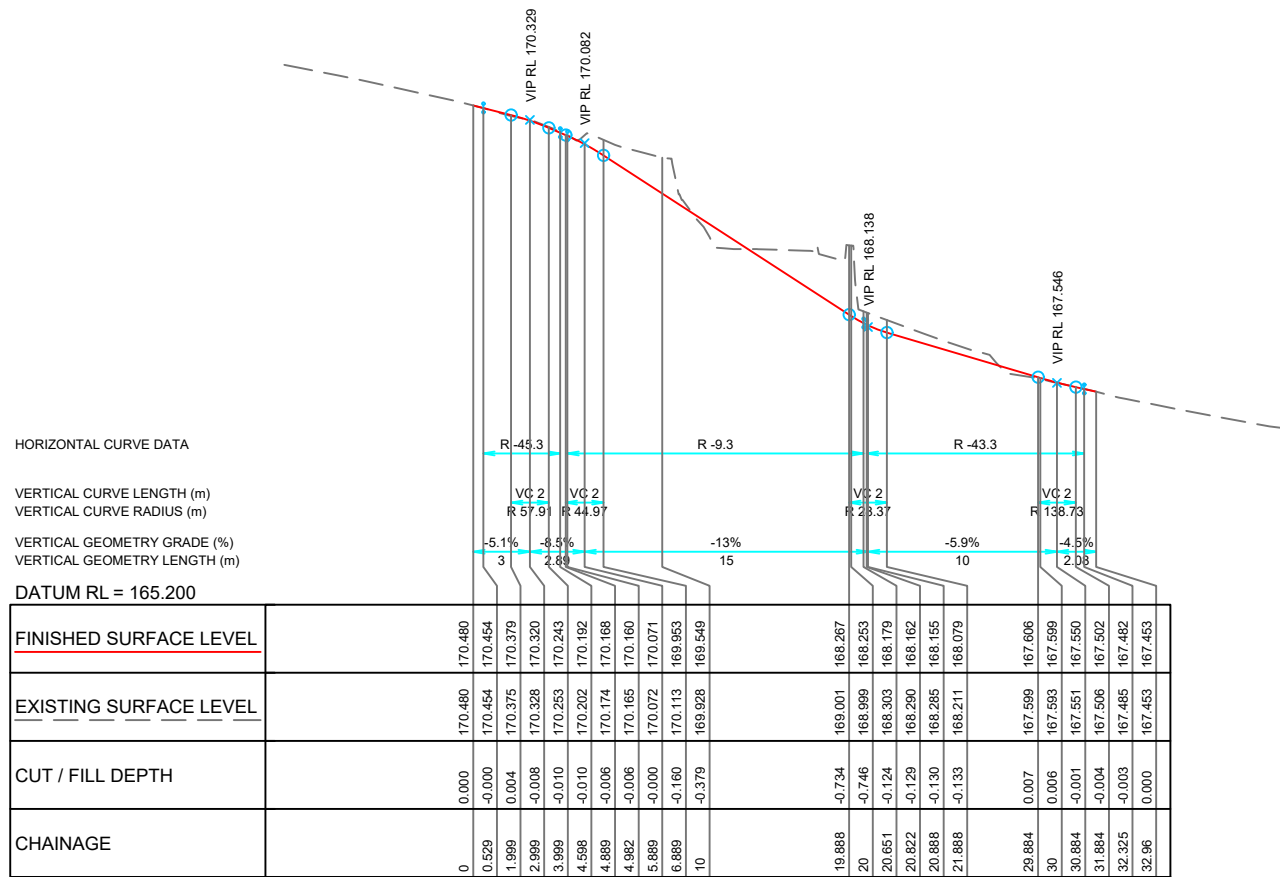
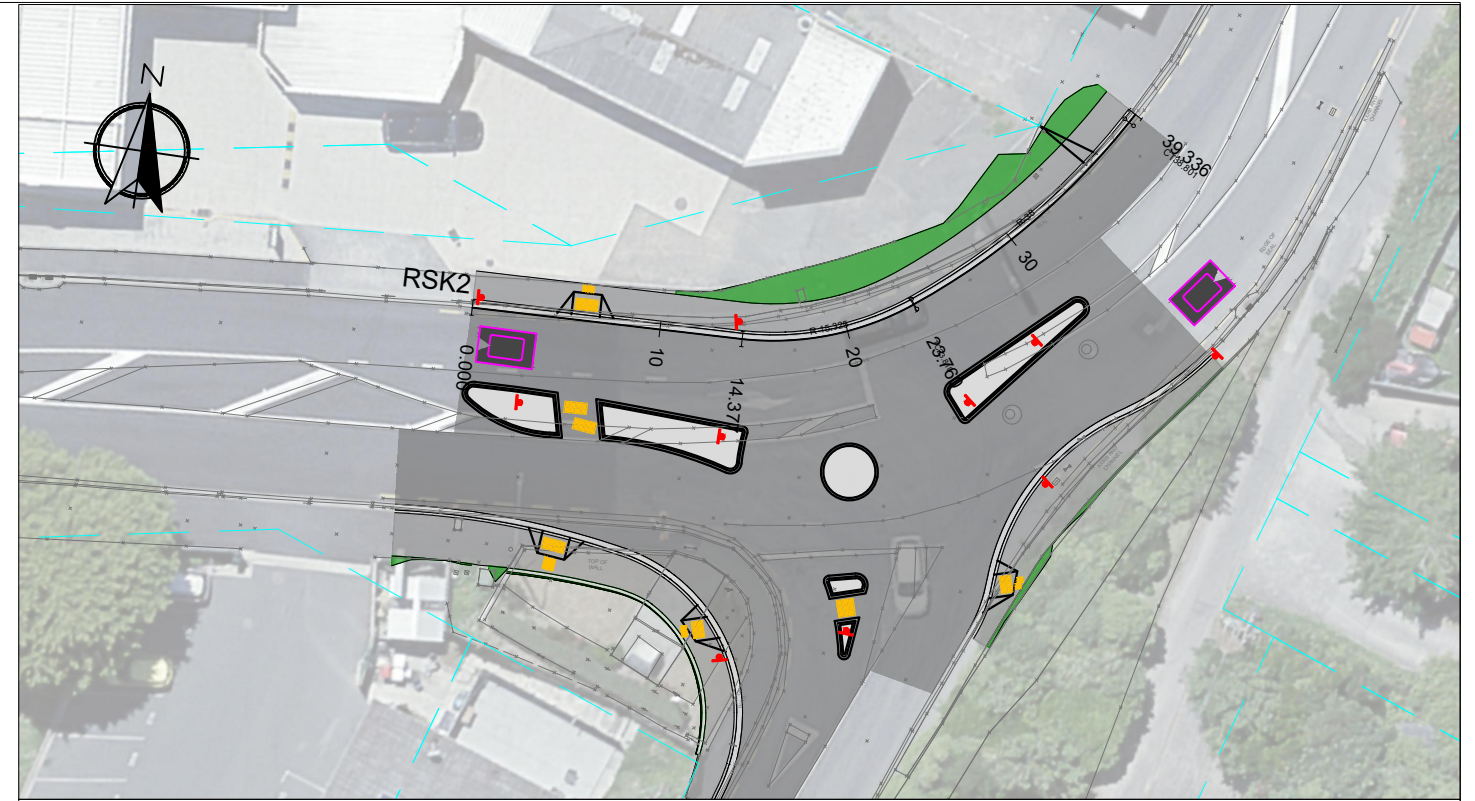
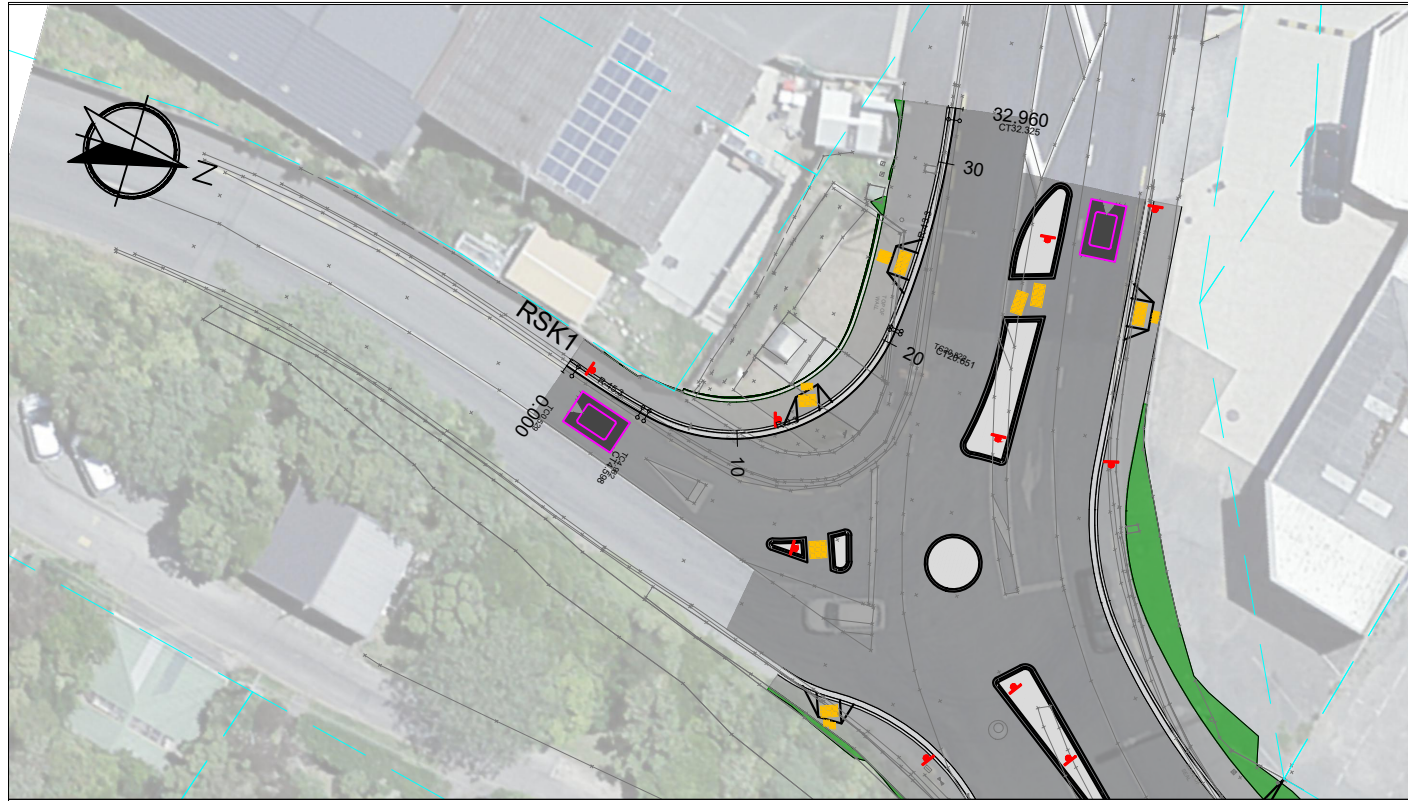
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A	ISSUED FOR DISCUSSION	JO	GC	11.11.21
REV	REVISION DESCRIPTION	DRAWN	CHECKED	APPROVED

NAME
DESIGNED J. ORRINGE
DRAWN J. ORRINGE
REVIEWED G. CLARK
APPROVED



TRAFFIC CONCEPTS LIMITED  
 NEWLANDS ROAD / WAKELY ROAD ROUNDABOUT  
 CONSTRUCTION PLAN

DRAWING STATUS: <b>PRELIMINARY</b>	
PLOT DATE: 12.11.2021	SCALE AT A1: AS SHOWN
DRAWING NO. 21-002-20-C003	REV A



A1 SCALE: H 1:200, V 1:40  
LONGITUDINAL SECTION RSK1

A1 SCALE: H 1:200, V 1:40  
LONGITUDINAL SECTION RSK2

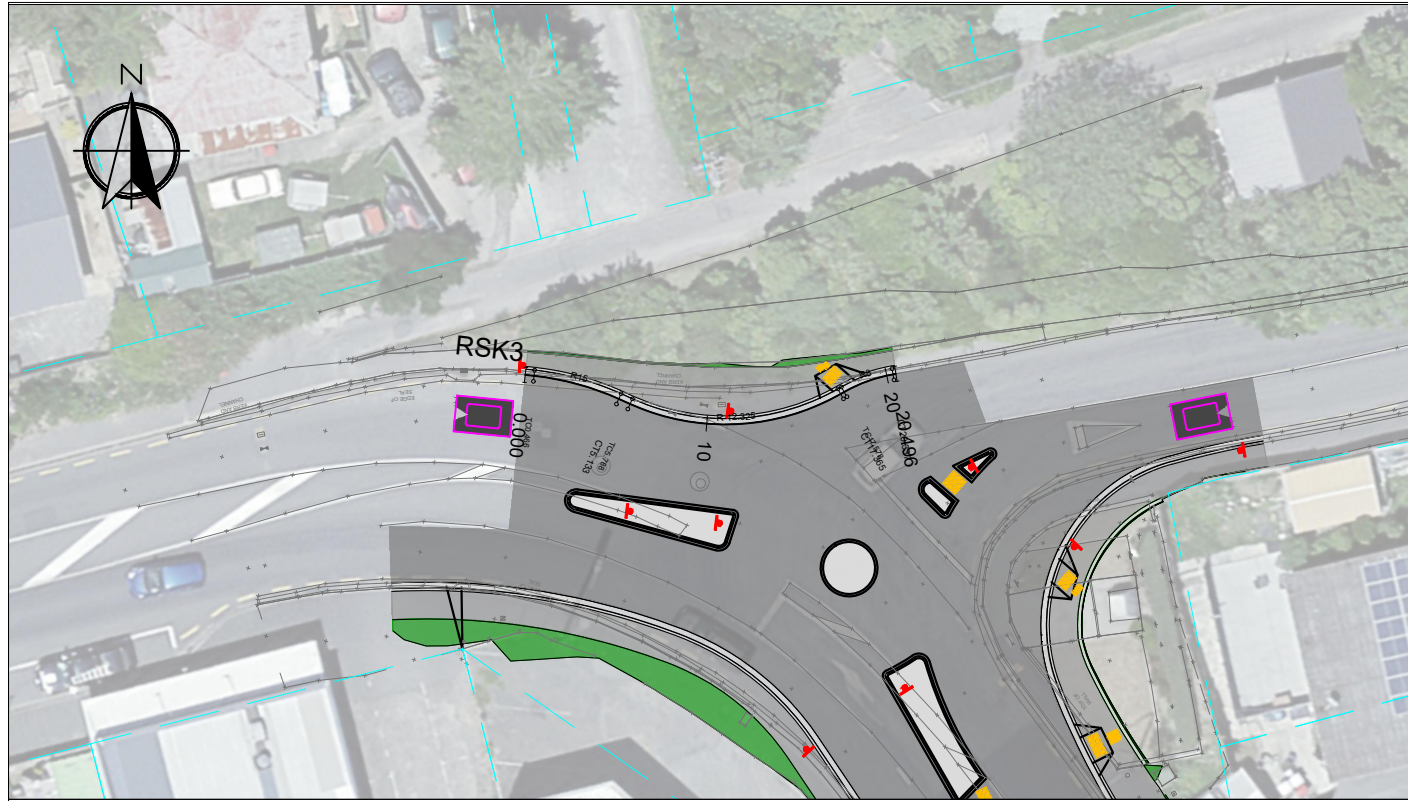
NOT FOR CONSTRUCTION

REV	ISSUED FOR DISCUSSION	JO	GC	11.11.21	DESIGNED	J. ORRIDGE	DRAWN	J. ORRIDGE	REVIEWED	G. CLARK	APPROVED	DATE
A	ISSUED FOR DISCUSSION	JO	GC	11.11.21	DESIGNED	J. ORRIDGE	DRAWN	J. ORRIDGE	REVIEWED	G. CLARK	APPROVED	DATE
REV	REVISION DESCRIPTION	DRAWN	CHECKED	APPROVED	DATE	APPROVED						



TRAFFIC CONCEPTS LIMITED  
NEWLANDS ROAD / WAKELY ROAD ROUNDABOUT  
PLAN AND LONGITUDINAL SECTION  
RSK1 & RSK2

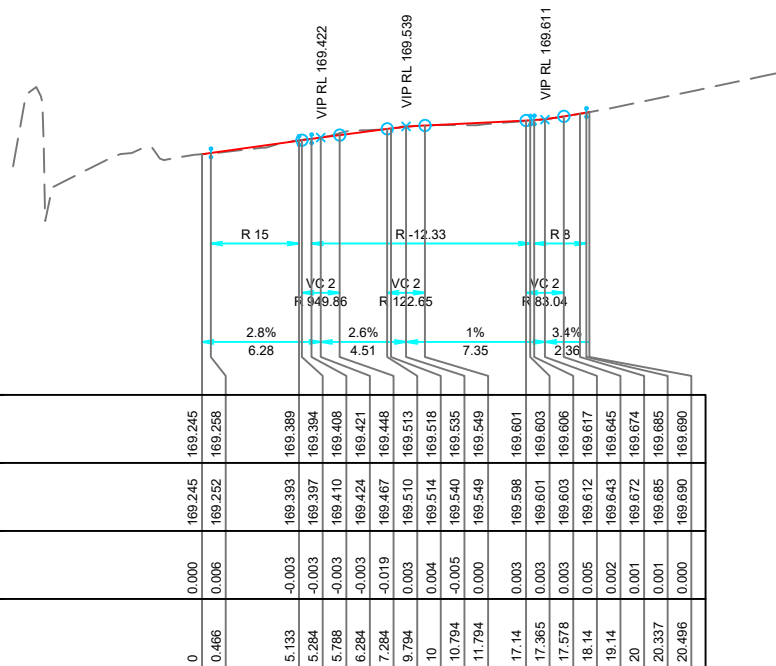
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PRELIMINARY	
PLOT DATE: 12.11.2021	SCALE AT A1: 1:200 H, 1:50 V
DRAWING NO. 21-002-20-C101	REV A



HORIZONTAL CURVE DATA

VERTICAL CURVE LENGTH (m)  
 VERTICAL CURVE RADIUS (m)  
 VERTICAL GEOMETRY GRADE (%)  
 VERTICAL GEOMETRY LENGTH (m)

DATUM RL = 166.700



CHAINAGE	EXISTING SURFACE LEVEL	CUT / FILL DEPTH	FINISHED SURFACE LEVEL
0	169.245	0.000	169.245
0.466	169.252	0.006	169.258
5.133	169.383	-0.003	169.389
5.284	169.397	-0.003	169.394
5.786	169.410	-0.003	169.408
6.284	169.424	-0.003	169.421
7.284	169.467	-0.019	169.448
9.794	169.510	0.003	169.513
10.794	169.514	0.004	169.518
11.794	169.540	-0.005	169.535
11.794	169.549	0.000	169.549
17.14	169.588	0.003	169.601
17.365	169.601	0.003	169.603
17.578	169.603	0.003	169.606
18.14	169.612	0.005	169.617
19.14	169.643	0.002	169.645
20	169.672	0.001	169.674
20.337	169.685	0.001	169.685
20.496	169.690	0.000	169.690

A1 SCALE: H 1:200, V 1:40

LONGITUDINAL SECTION RSK3

NOT FOR CONSTRUCTION

REV	REVISION DESCRIPTION	DRAWN	CHECKED	APPROVED	DATE
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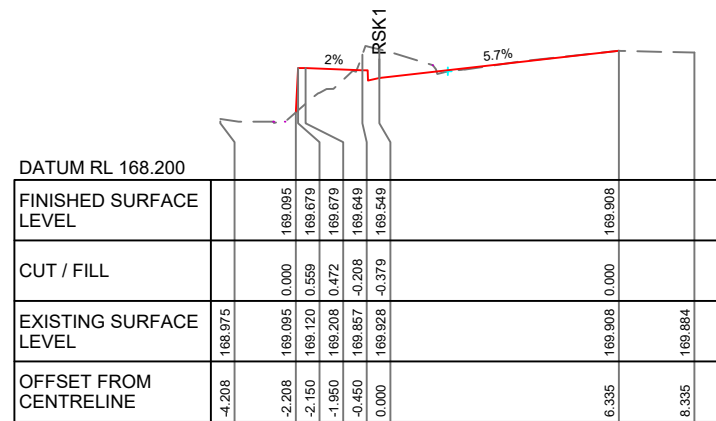
NAME	DESIGNED	DRAWN	REVIEWED	APPROVED
J. ORRIDGE	J. ORRIDGE	J. ORRIDGE	G. CLARK	



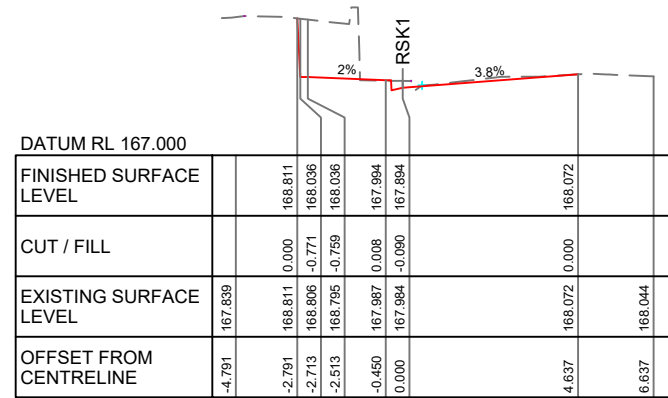
TRAFFIC CONCEPTS LIMITED  
 NEWLANDS ROAD / WAKELY ROAD ROUNDABOUT  
 PLAN AND LONGITUDINAL SECTION  
 RSK3

DRAWING STATUS: <b>PRELIMINARY</b>	
PLOT DATE: 12.11.2021	SCALE AT A1: 1:200 H, 1:50 V
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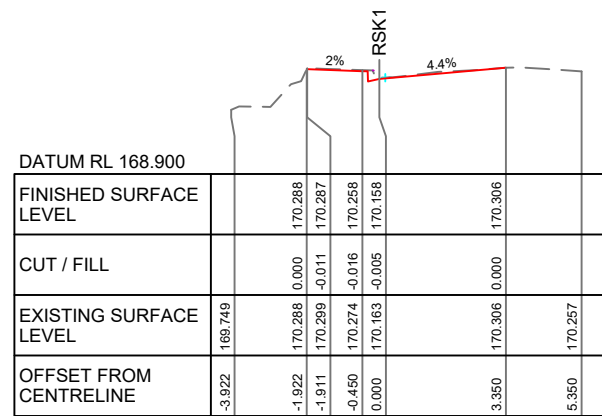




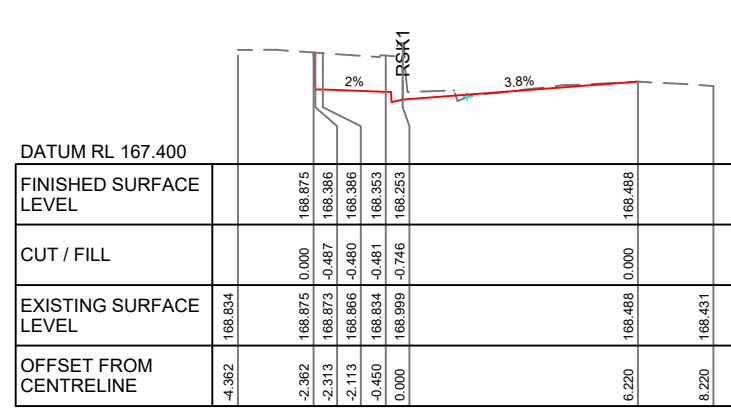
CH 10



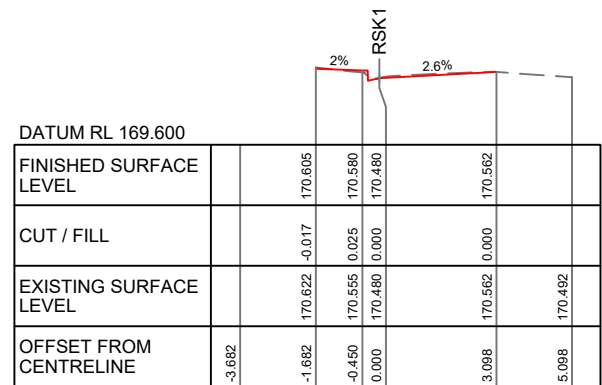
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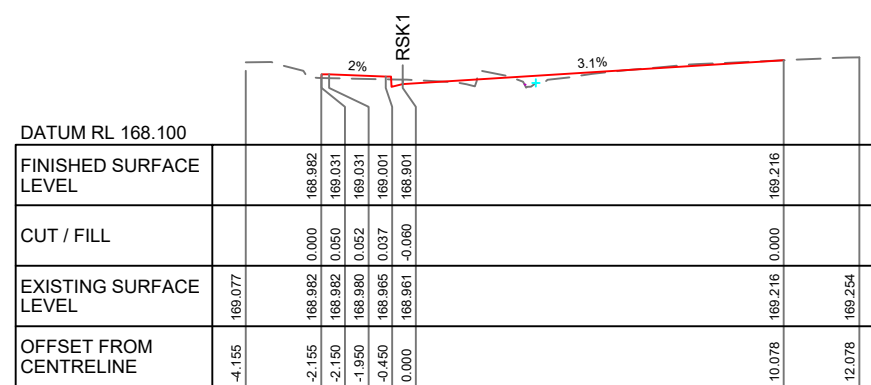
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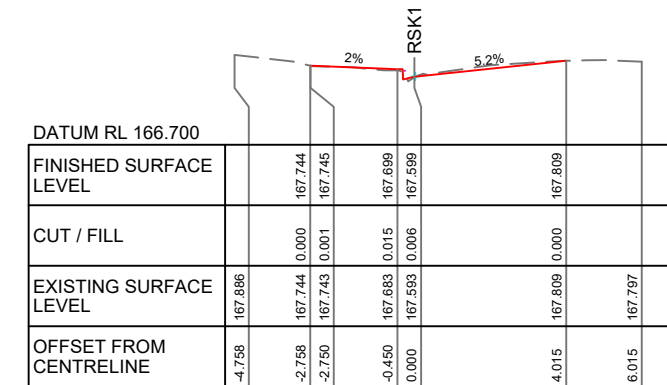
CH 20



CH 0



CH 15



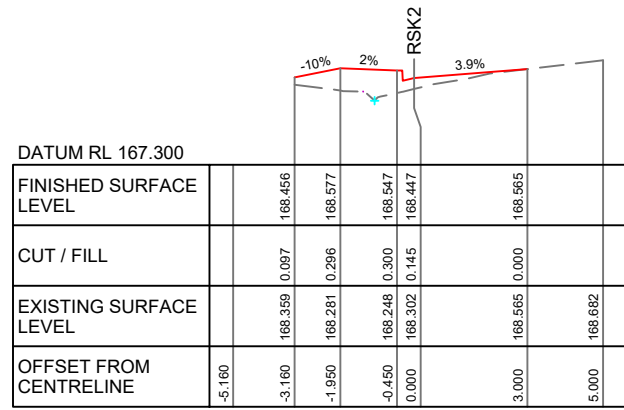
CH 30

NOT FOR CONSTRUCTION

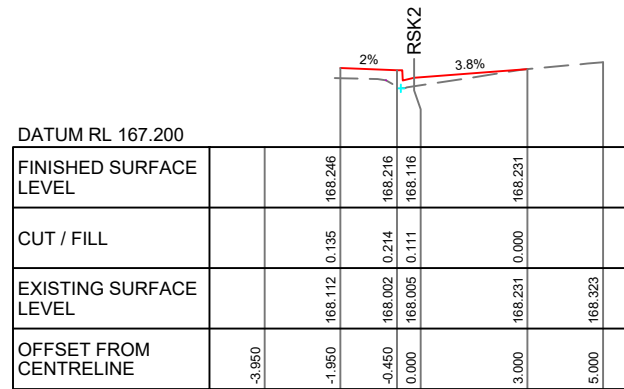
REV	ISSUED FOR DISCUSSION	JO	GC	11.11.21	APPROVED	DATE	APPROVED
A	ISSUED FOR DISCUSSION	JO	GC	11.11.21	REVIEWED	G. CLARK	
	REVISION DESCRIPTION	DRAWN	CHECKED	APPROVED	DATE	APPROVED	

TRAFFIC CONCEPTS LIMITED  
 NEWLANDS ROAD / WAKELY ROAD ROUNDABOUT  
 CROSS SECTIONS  
 RSK1

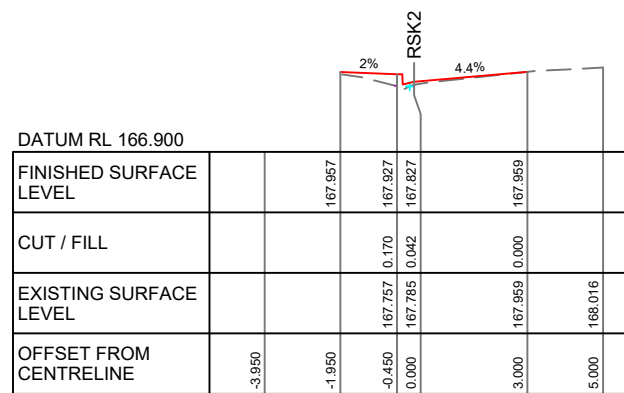
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PLOT DATE: 12.11.2021	SCALE AT A1: 1:100 H, 1:50 V
DRAWING NO. 21-002-20-C201	REV A



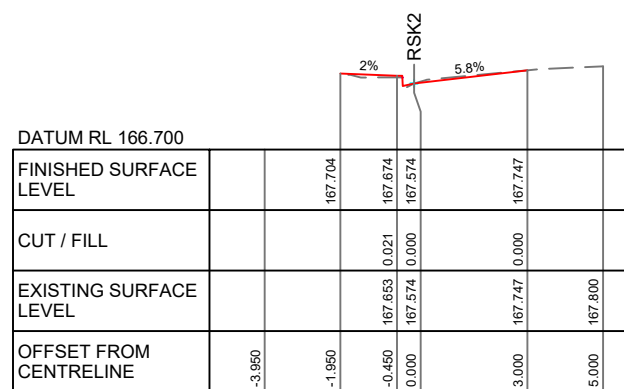
CH 15



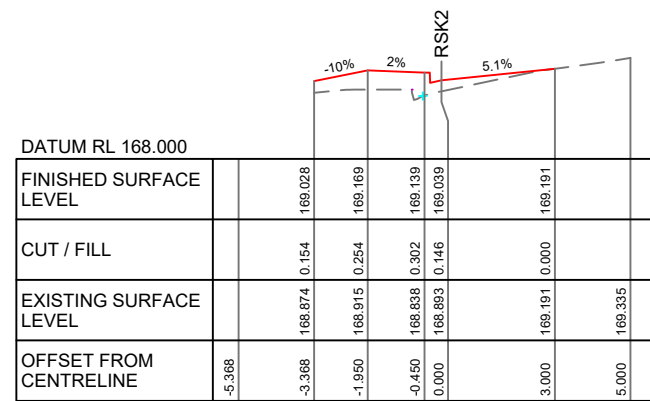
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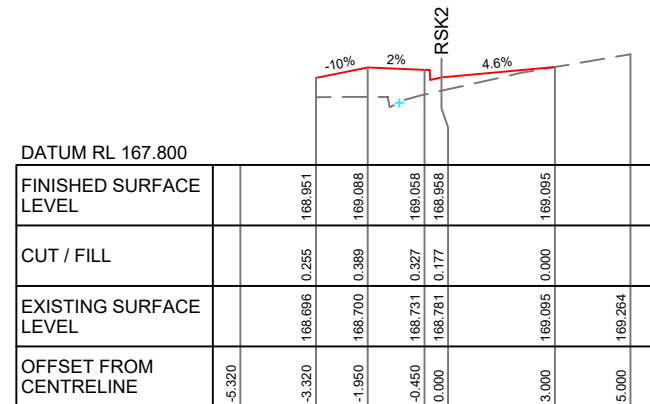
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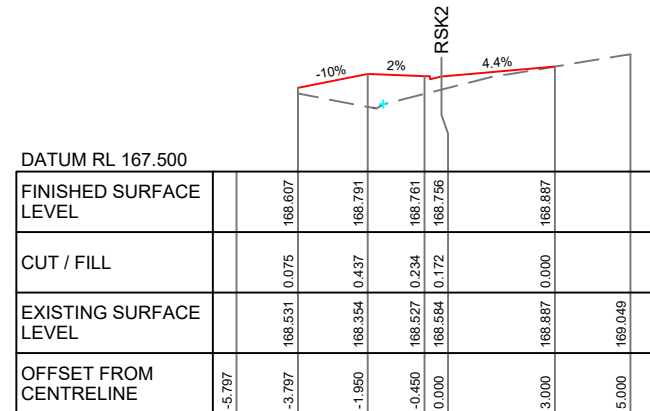
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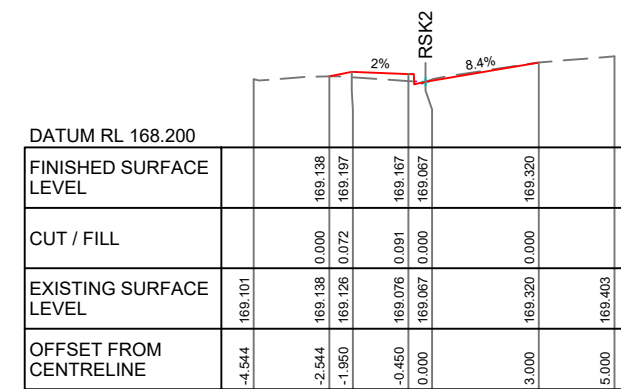
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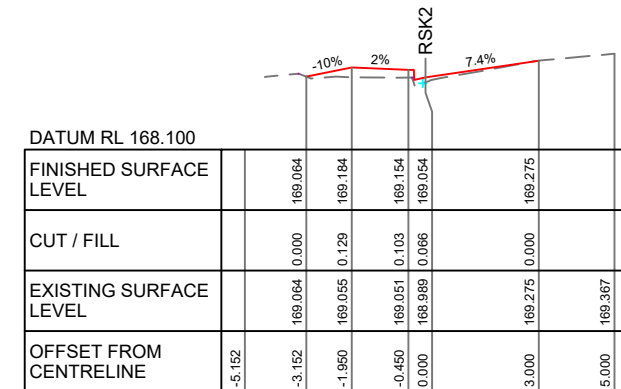
CH 25



CH 20



CH 39




CH 35

NOT FOR CONSTRUCTION

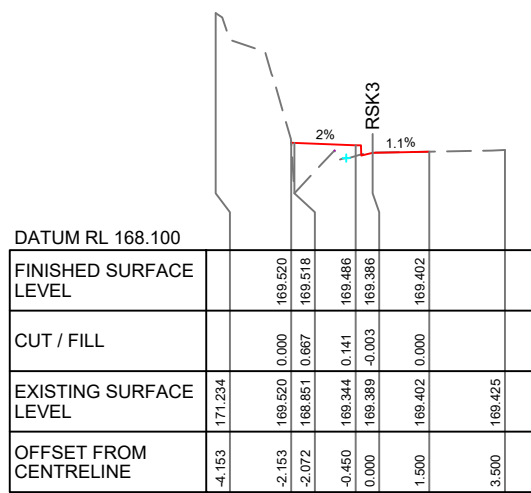
REV	ISSUED FOR DISCUSSION	JO	GC	11.11.21
	REVISION DESCRIPTION	DRAWN	CHECKED	APPROVED

NAME	
DESIGNED	J. ORRINGE
DRAWN	J. ORRINGE
REVIEWED	G. CLARK
APPROVED	

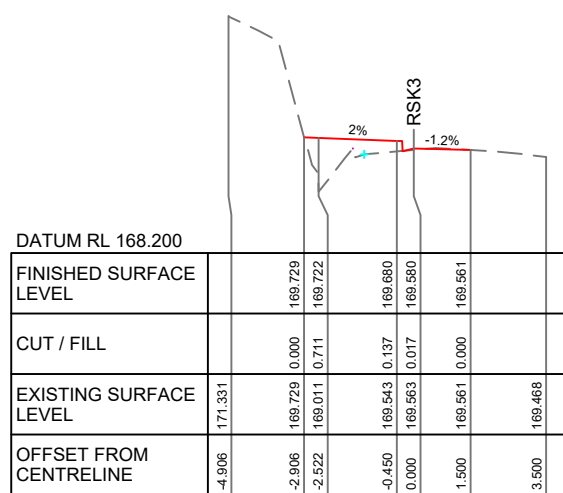



TRAFFIC CONCEPTS LIMITED  
 NEWLANDS ROAD / WAKELY ROAD ROUNDABOUT  
 CROSS SECTIONS  
 RSK2

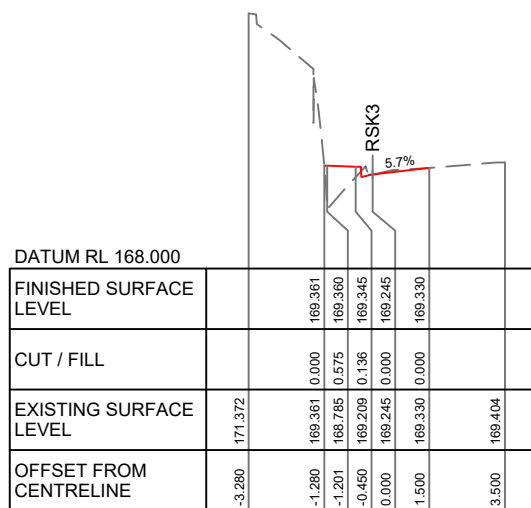
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PLOT DATE:	SCALE AT A1:
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DRAWING NO.	REV
21-002-20-C202	A



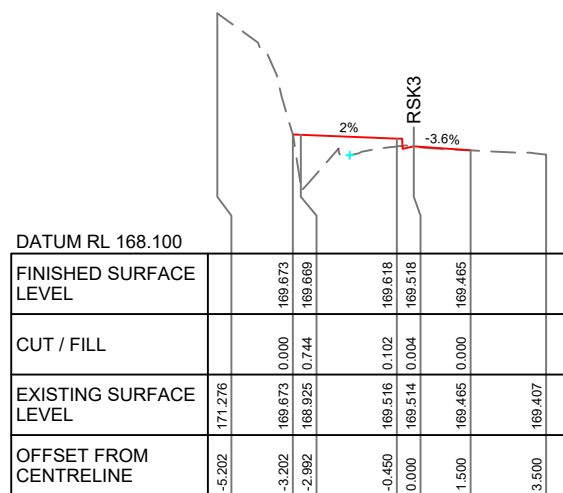
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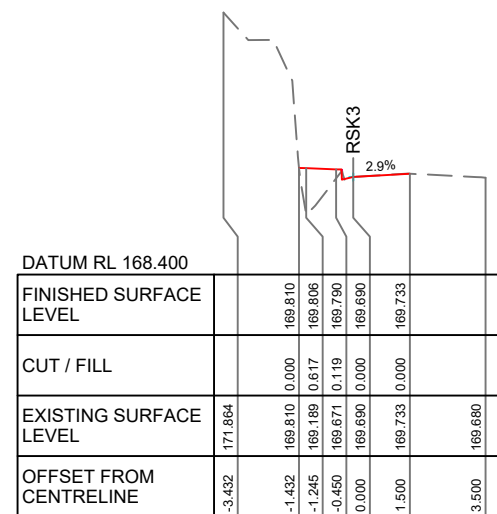
CH 15



CH 0



CH 10



CH 20

NOT FOR CONSTRUCTION

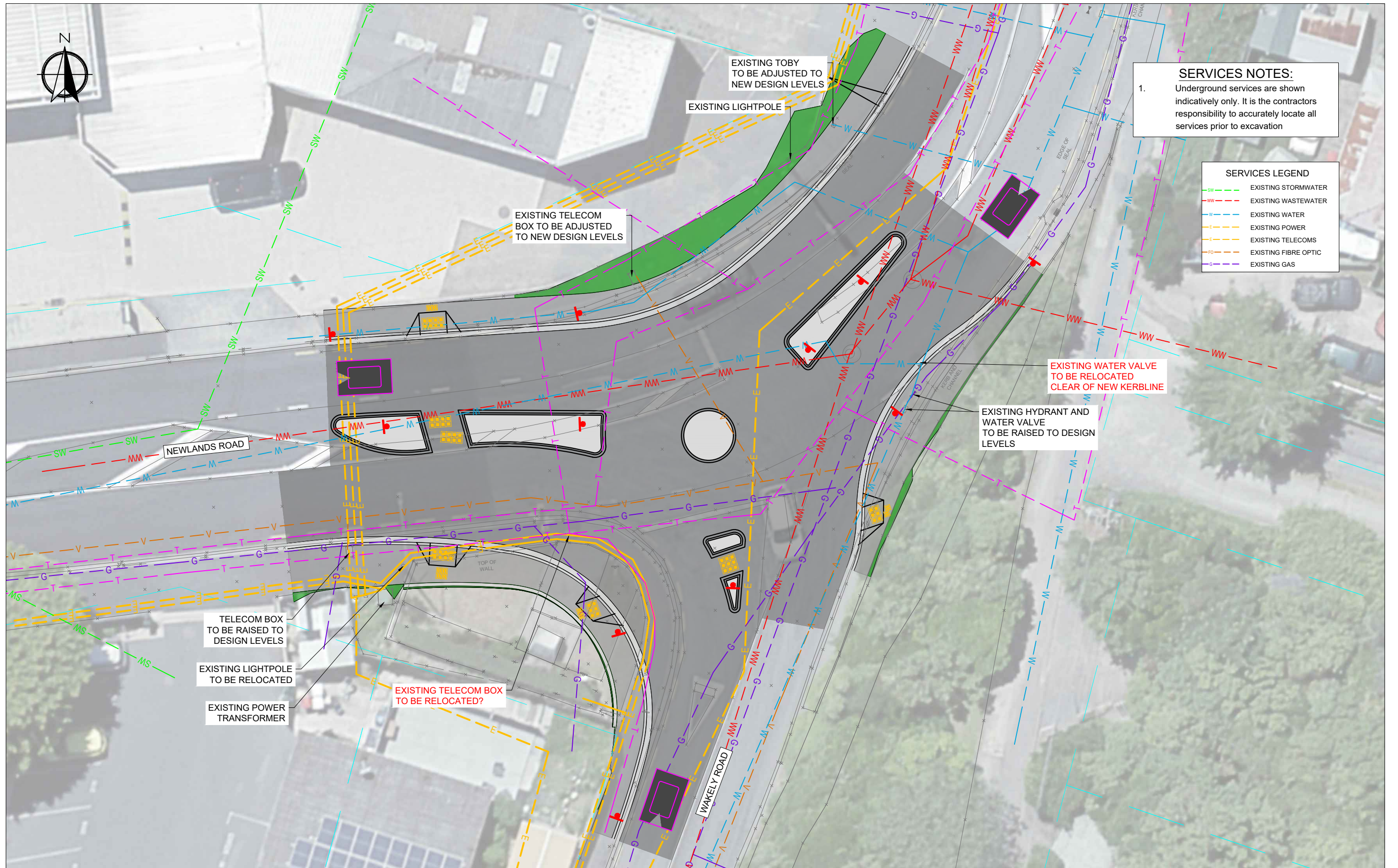
REV	ISSUED FOR DISCUSSION	JO	GC	11.11.21	APPROVED
	REVISION DESCRIPTION	DRAWN	CHECKED	APPROVED	DATE

NAME	DESIGNED	J. ORRIDGE
NAME	DRAWN	J. ORRIDGE
NAME	REVIEWED	G. CLARK
NAME	APPROVED	



TRAFFIC CONCEPTS LIMITED  
 NEWLANDS ROAD / WAKELY ROAD ROUNDABOUT  
 CROSS SECTIONS  
 RSK3

DRAWING STATUS:	
PRELIMINARY	
PLOT DATE: 12.11.2021	SCALE AT A1: 1:100 H, 1:50 V
DRAWING NO. 21-002-20-C203	REV A



**SERVICES NOTES:**  
 1. Underground services are shown indicatively only. It is the contractors responsibility to accurately locate all services prior to excavation

SERVICES LEGEND	
SW	EXISTING STORMWATER
WW	EXISTING WASTEWATER
W	EXISTING WATER
E	EXISTING POWER
T	EXISTING TELECOMS
FO	EXISTING FIBRE OPTIC
G	EXISTING GAS

NOT FOR CONSTRUCTION

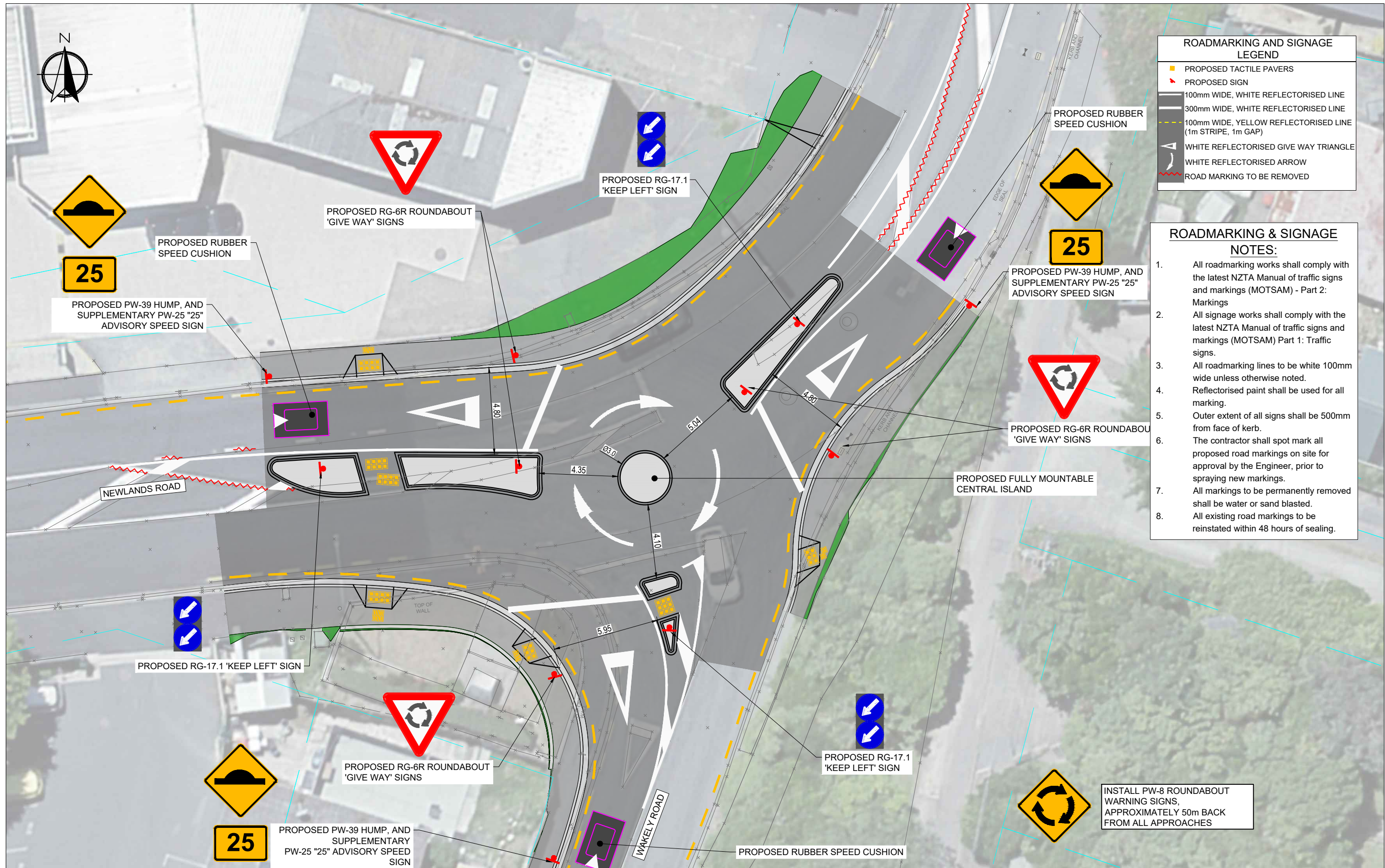
REV	REVISION DESCRIPTION	DRAWN	CHECKED	APPROVED	DATE
A	ISSUED FOR DISCUSSION	JO	GC		11.11.21

	NAME
DESIGNED	J. ORRINGE
DRAWN	J. ORRINGE
REVIEWED	G. CLARK
APPROVED	



TRAFFIC CONCEPTS LIMITED  
 NEWLANDS ROAD / WAKELY ROAD ROUNDABOUT  
 SERVICES PLAN

DRAWING STATUS: <b>PRELIMINARY</b>	
PLOT DATE: 12.11.2021	SCALE AT A1: AS SHOWN
DRAWING NO. 21-002-20-C301	REV A



ROADMARKING AND SIGNAGE LEGEND	
	PROPOSED TACTILE PAVERS
	PROPOSED SIGN
	100mm WIDE, WHITE REFLECTORISED LINE
	300mm WIDE, WHITE REFLECTORISED LINE
	100mm WIDE, YELLOW REFLECTORISED LINE (1m STRIPE, 1m GAP)
	WHITE REFLECTORISED GIVE WAY TRIANGLE
	WHITE REFLECTORISED ARROW
	ROAD MARKING TO BE REMOVED

- ROADMARKING & SIGNAGE NOTES:**
- All roadmarking works shall comply with the latest NZTA Manual of traffic signs and markings (MOTSAM) - Part 2: Markings
  - All signage works shall comply with the latest NZTA Manual of traffic signs and markings (MOTSAM) Part 1: Traffic signs.
  - All roadmarking lines to be white 100mm wide unless otherwise noted.
  - Reflectorised paint shall be used for all marking.
  - Outer extent of all signs shall be 500mm from face of kerb.
  - The contractor shall spot mark all proposed road markings on site for approval by the Engineer, prior to spraying new markings.
  - All markings to be permanently removed shall be water or sand blasted.
  - All existing road markings to be reinstated within 48 hours of sealing.

NOT FOR CONSTRUCTION

REV	ISSUED FOR DISCUSSION	JO	GC	11.11.21	DATE	APPROVED
A	ISSUED FOR DISCUSSION	JO	GC	11.11.21		
	REVISION DESCRIPTION	DRAWN	CHECKED	APPROVED	DATE	APPROVED

NAME	DESIGNED	J. ORRINGE
	DRAWN	J. ORRINGE
	REVIEWED	G. CLARK
	APPROVED	



TRAFFIC CONCEPTS LIMITED  
 NEWLANDS ROAD / WAKELY ROAD ROUNDABOUT  
 ROAD MARKING AND SIGNAGE PLAN

DRAWING STATUS:	
PRELIMINARY	
PLOT DATE:	SCALE AT A1:
12.11.2021	AS SHOWN
DRAWING NO.	REV
21-002-20-C401	A