
APPENDIX E

Intersections' Upgrade

Appendix E-1

LOCATION MAP OF INTERSECTIONS DESIGNED

Appendix E-2

DESIGN PHILOSOPHY NOTE

Appendix E-3

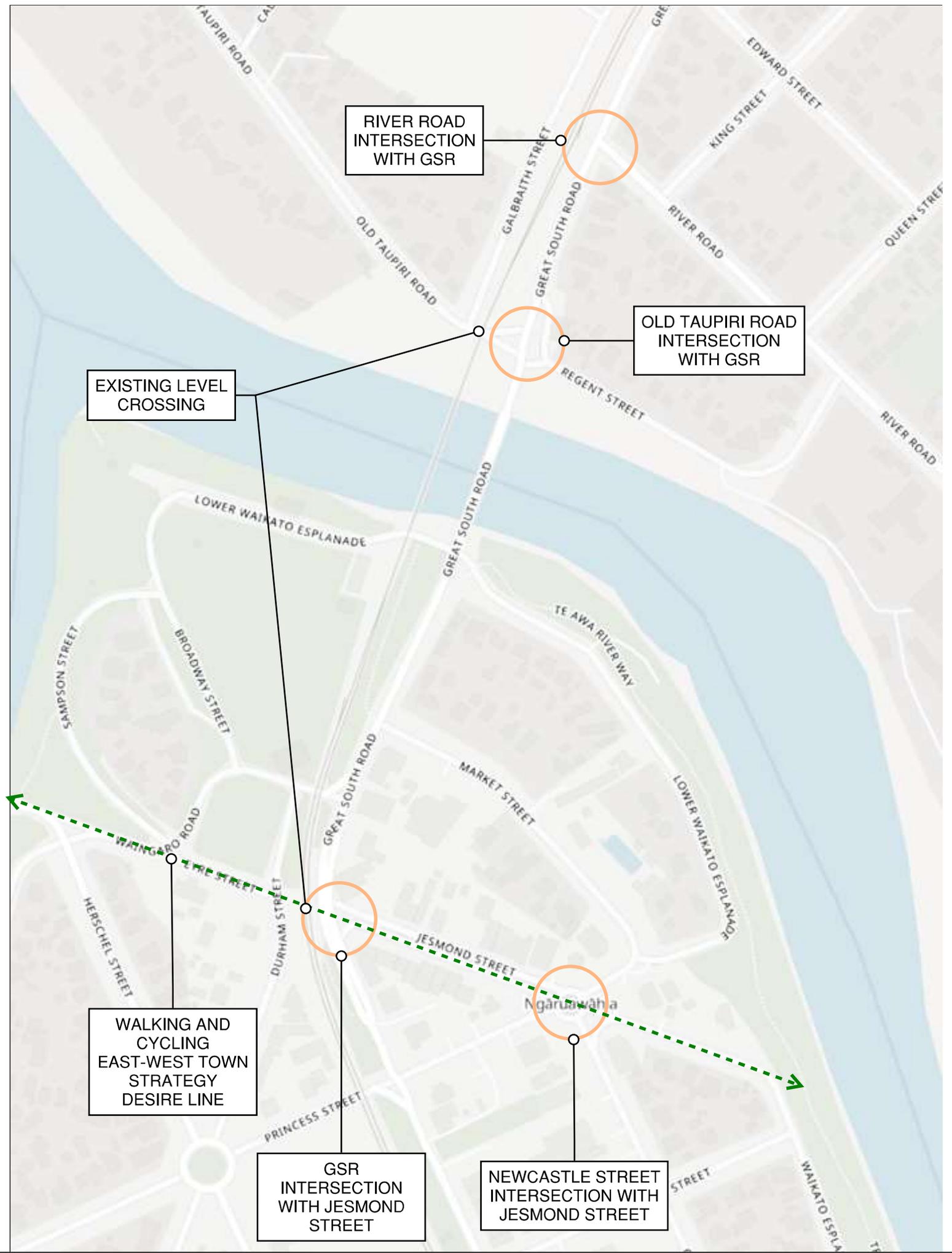
JESMOND STREET INTERSECTIONS WITH GREAT SOUTH ROAD AND NEWCASTLE STREET

Appendix E-4

GREAT SOUTH ROAD INTERSECTIONS WITH OLD TAUPIRI ROAD (SOUTH) AND RIVER ROAD

Appendix E-1

LOCATION MAP OF INTERSECTIONS DESIGNED



LOCATION MAP

PROJECT	TRANSPORT ASSESSMENT FOR NGĀRUAWĀHIA, TAUPIRI AND HOPUHOPU
SUBJECT	DESIGN PHILOSOPHY MEMO FOR INTERSECTIONS' DESIGNS
TO	WAIKATO DISTRICT COUNCIL
FROM	RONAK GUPTA
REVIEWED BY	SHARMIN CHOUDHURY
DATE	6 NOVEMBER 2023
UPDATED	22 JANUARY 2024 – NOTES ON GSR INTERSECTION

1 PURPOSE

The purpose of this note is to provide the design philosophy for the design of the following intersections:

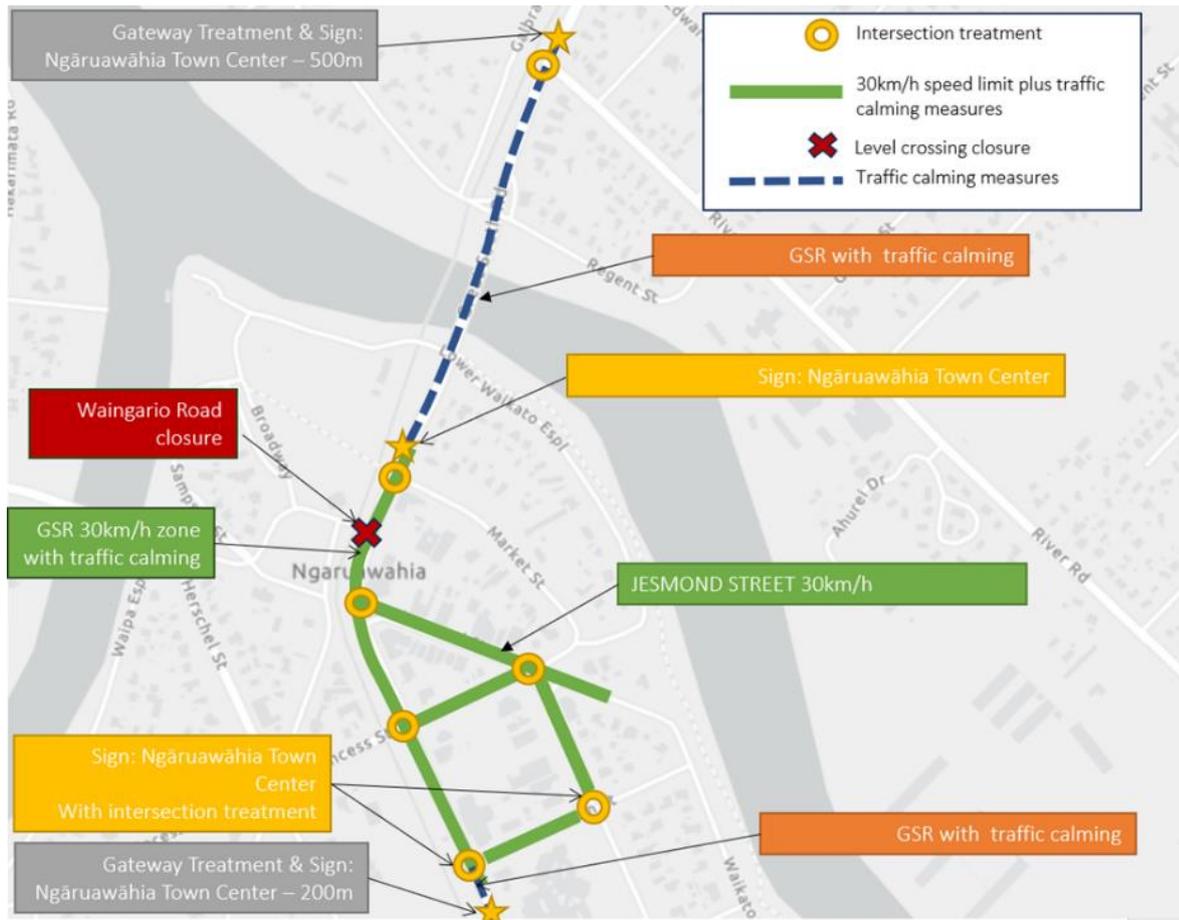
- ◆ Jesmond Street/Great South Road Intersection
- ◆ Jesmond Street/Newcastle Street/Market Street Intersection
- ◆ River Road/Great South Road Intersection
- ◆ Old Taupiri Road/Great South Road/Regent Street Intersection

2 SPEED ENVIRONMENT

The current speed limit across Great South Road and in Ngāruawāhia Town Centre is 50 km/h. There has been a recent change in speed limits to 30km/h on Jesmond Street. Our proposal aims to modify the speed environment in Ngāruawāhia Town Centre by implementing changes, as noted below as well as depicted in Figure 1 below:

- ◆ Introduce a **Gateway treatment** and signage on Great South Road, positioned approximately 500 meters north of the Market Street/Great South Road junction and 200 meters south of the Martin Street/Great South Road intersection. Additionally, signs indicating Ngāruawāhia Town Centre should be placed before these intersections.
- ◆ Implement **traffic calming measures** on Great South Road to the north of the Market Street/Great South Road junction, while maintaining a speed limit of 50 km/h. This will effectively reduce the approach speed of incoming traffic heading into Ngāruawāhia Town Centre.
- ◆ **Decrease the speed limit** to 30 km/h within Ngāruawāhia Town Centre, covering portions of Great South Road, Jesmond Street, New Castle Street, Martin Street, and Galileo Street.
- ◆ **Upgrade intersections** shown in Figure 1, with narrower approach lanes and raised tables on the approaches to these intersections.
- ◆ **The proposed upgrade to roundabouts** for the Great South Road intersections with River Road and Jesmond Street will help to strengthen the gateway treatments to Ngāruawāhia and its town centre.

Figure 1: Proposed speed limit reduction



3 HEAVY VEHICLE ROUTE

The current over dimension route in Ngāruawāhia primarily utilizes Great South Road but deviates onto Lower Waikato Esplanade, Market Street, and Galileo Street before reconnecting with Great South Road for a short distance. Notably, there is no direct connection from Great South Road to Lower Waikato Esplanade, therefore we assume the route was meant to connect from Great South Road to Market Street.

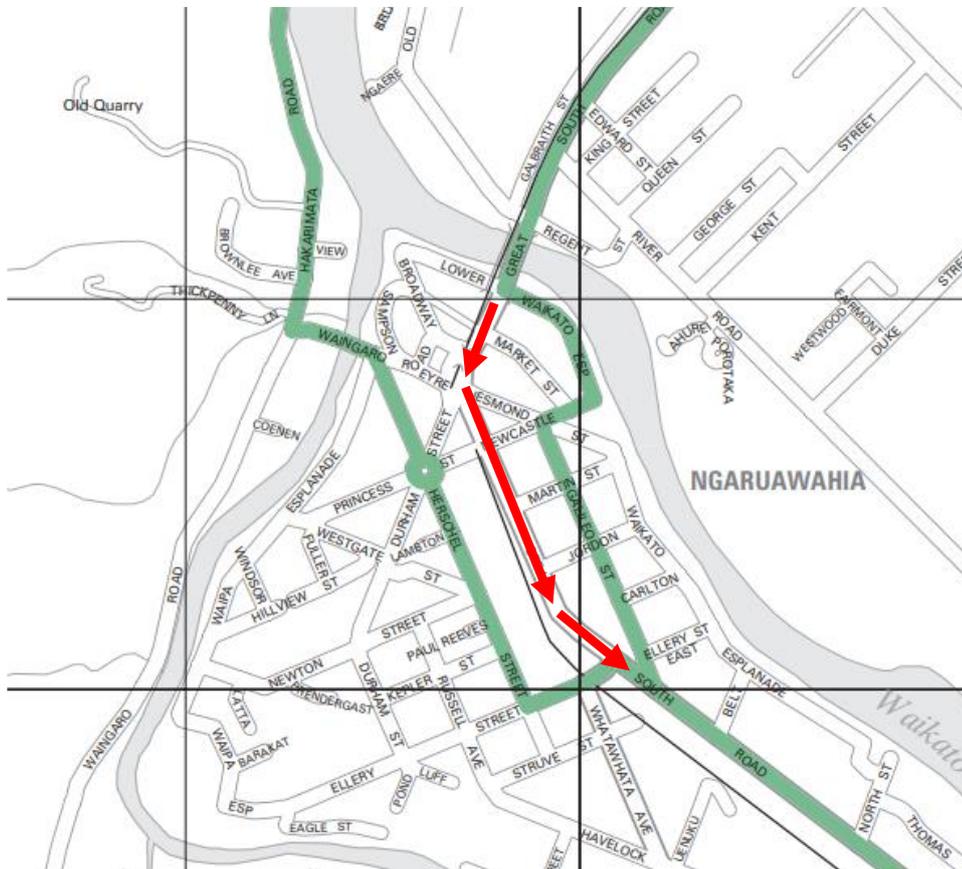
We suggest rerouting the over-dimension route via Great South Road, which will provide the opportunity for the town centre intersections to be tightened and made safer for people on foot and bikes.

Our proposal would simplify the route for over-dimension vehicles by keeping them on Great South Road without turning into smaller streets. However, Great South Road will need to be reviewed and upgraded to ensure that it is able to provide the envelope required for the over-dimension vehicles.

For the purpose of the intersections' upgrade design, WDC has asked Flow to assume that the over-dimension route will run through Great South Road and avoid the Newcastle Street/Jesmond Street/Market Street intersection. This will allow for the intersection design to better serve the needs of people on foot and bikes. We believe this change could lead to improved safety of the town centre.

Figure 2 below shows the existing over dimension route for Ngāruawāhia and the red arrows indicating the proposed new over dimension route.

Figure 2: Over Dimension Route - Ngāruawāhia



4 DESIGN STANDARDS

Table 1 below shows the design parameters used for the intersection designs.

Table 1: Design parameters

Parameters	Minimum Standards	Design
Footpath Width	1.5m ¹	1.8 - 3.0m
Shared Path	3.0m ²	3.0m
Cycle Lane Width	1.5m ²	2.0m
Traffic lane Width	3.2m ³	3.2m
Radius of Roundabout (50kmph)	8.0m ⁴	3.5m
Radius of Roundabout (30kmph)	5.0m ⁴	4.5m - 7.0m

¹ RITS suggests referring to Table 3.2 NZS 4404

² RITS suggests referring to AUSTRROADS 6A - Pedestrian and Cycle path & NZTA cycle network guidelines

³ Austroads Part 3 – geometric Design 2021

⁴ Guide to Road Design part 4B - Roundabouts

5 INTERSECTION 1 – JESMOND STREET/GREAT SOUTH ROAD

The current Jesmond Street/Great South Road intersection is a Stop controlled T-intersection with Great South Road being the main road. Great South Road has one lane in each direction with about 1.0m wide central island at the intersection. Vehicles cannot turn right into Jesmond Street from Great South Road and vice versa. The existing layout of the intersection is shown in the figure below.

Figure 3 - Great South Road/Jesmond Street intersection - Existing Layout

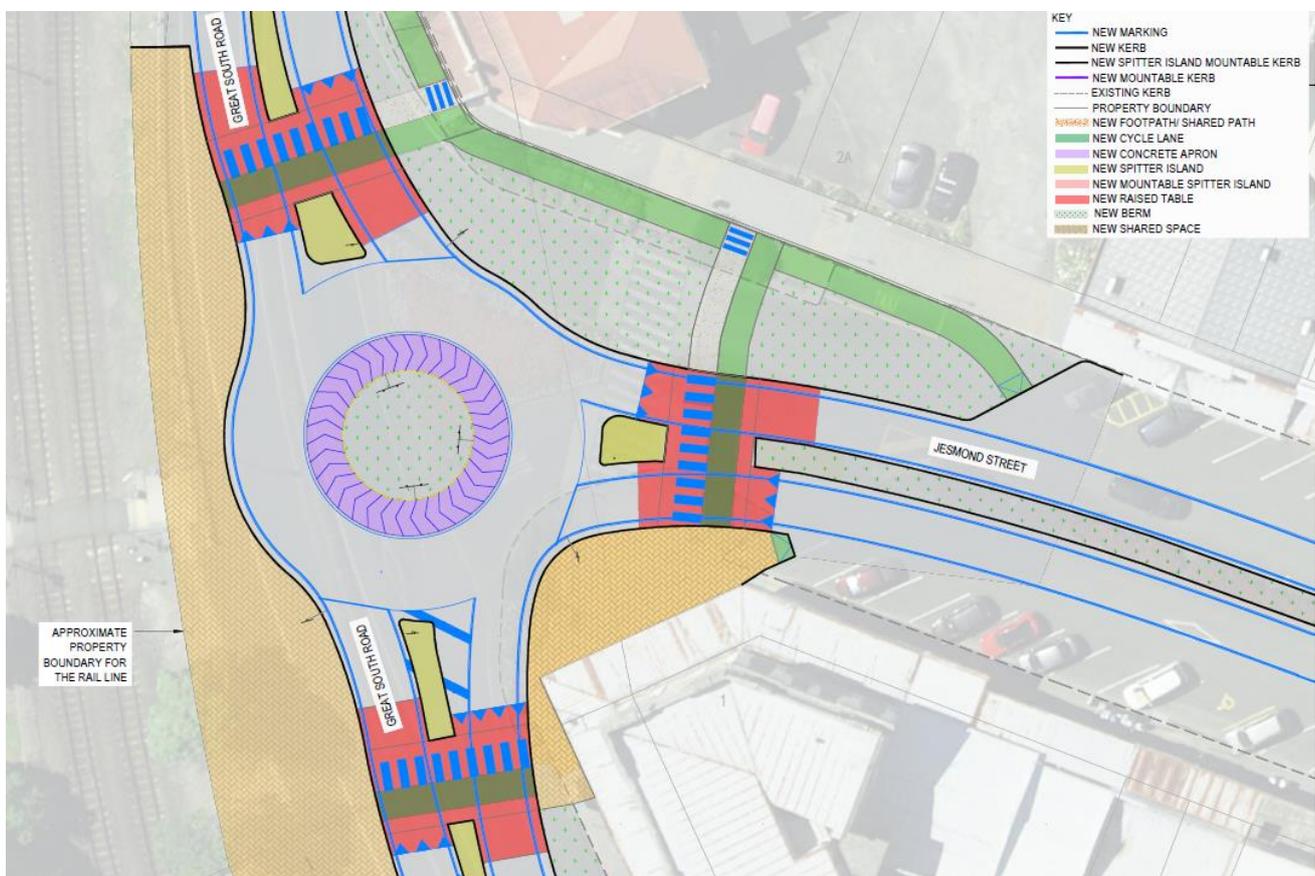


The proposed design upgrade to the intersection are outlined as below:

- ◆ Single Lane three-leg roundabout
- ◆ Raised pedestrian/cyclist crossing on all approaches to the intersection
- ◆ New cycle lane introduced from the eastern side of Great South Road connecting to Jesmond Street
- ◆ New Shared path introduced on the western side of Great South Road
- ◆ We propose that the level crossing on the western side of Great South Road is relocated further north and made wider with more safety features such as those
- ◆ The diameter of the roundabout is 14.0m, including a 2.5m wide apron provided for trucks to turn. A width of 5.0m is provided for the circulatory lane.
- ◆ 1 parking space was removed as part of the roundabout design. This loss is however offset by the proposed carpark on Waikato Esplanade
- ◆ As per the Regional Infrastructure Technical Specifications (RITS) and confirmation with WDC, the following are the design and check vehicles used for this intersection:

- North south movements along Great South Road
 - Design vehicle = semi-trailer
 - Check vehicle = B-train
- All other turning movements
 - Design vehicle = large rigid truck
 - Check vehicle = tour coach
- ◆ The tour coach will need to do a right-turn-U-turn to undertake a left turn from Jesmond Street to Great South Road.
- ◆ Figure 4 below shows the overview of the intersection design.

Figure 4: Great South Road/Jesmond Street intersection upgrades



6 INTERSECTION 2 – JESMOND STREET/MARKET STREET/GALILEO STREET/NEWCASTLE STREET

The current Jesmond Street/Market Street/Galileo Street/Newcastle Street intersection is a 5-leg roundabout with one approach and exit lane on each leg. Slip lanes are provided on Newcastle Street and Waikato Esplanade for left turns. The diameter of the roundabout is 16.0m with a circulatory lane width of 6.5m. The existing layout of the intersection is shown in the figure below.

Figure 5 - Newcastle Street/Jesmond Street intersection - Existing Layout



The proposed design upgrade to the intersection is outlined as below:

- ◆ Single Lane four-leg roundabout. Vehicular access to the intersection from Waikato Esplanade approach is closed.
- ◆ This design removes 8 existing parking spaces. The existing parking spaces between Market Street and Waikato Esplanade are proposed to be removed and planted with new berm. Few parking spaces are removed on Jesmond Street too as part of the roundabout design.
- ◆ The loss of a total of 9 parking spaces along Jesmond Street is offset with the proposed carpark on Waikato Esplanade which provides 16 new parking spaces. Access to the new carpark is via Waikato Esplanade.
- ◆ New Zealand Police Ngāruawāhia has an existing access in Waikato Esplanade. They have been provided access to the intersection via Galileo Street.
- ◆ New plants to be planted at between the roundabout and the Waikato Esplanade leg to provide a visual cue to vehicles at the roundabout regarding no access directly into Waikato Esplanade

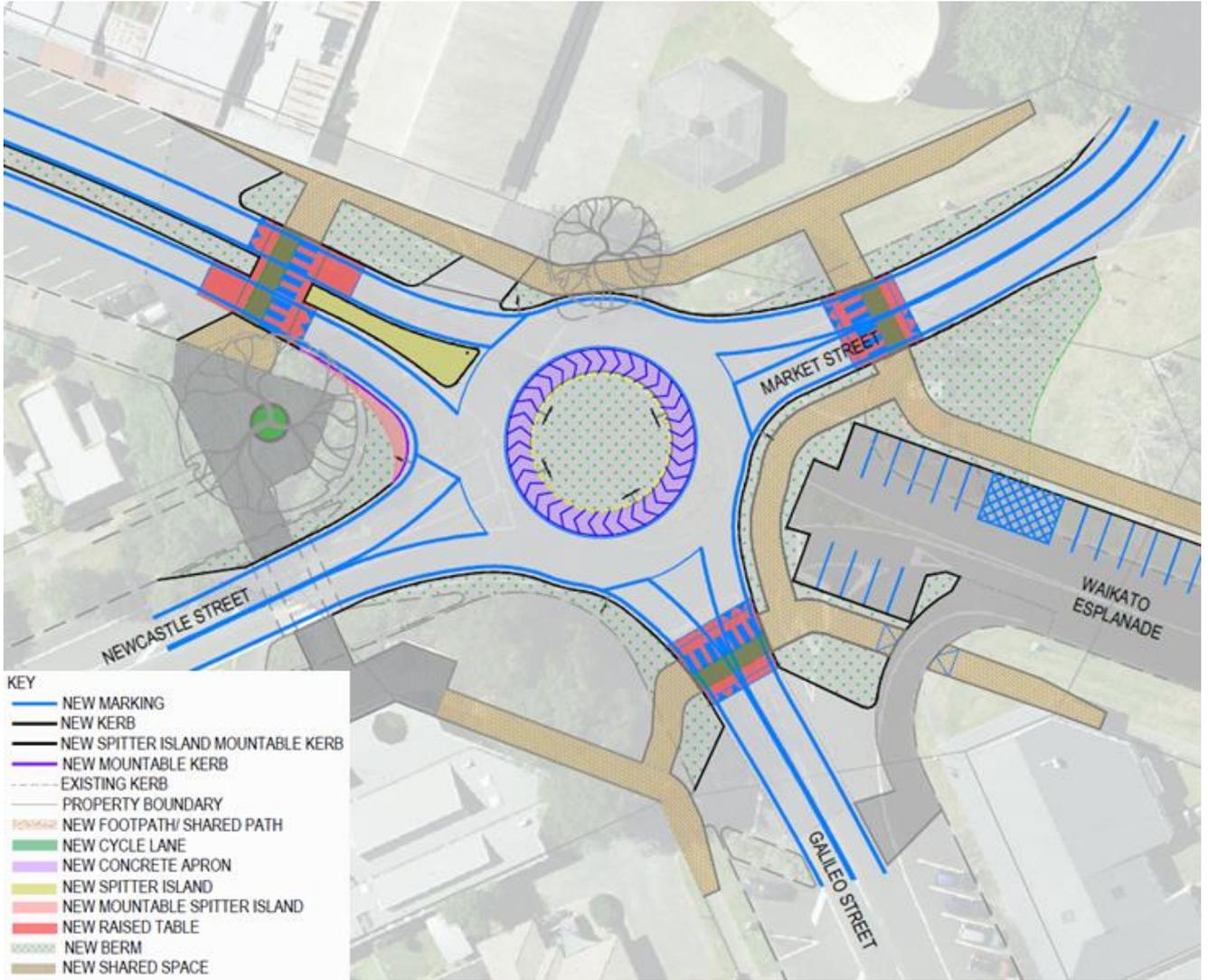
- ◆ Raised pedestrian/cyclist crossings to be provided on the four legs of the intersection. The existing raised crossing on Newcastle Street to be widened to allow for a paired pedestrian and cycle crossing.
- ◆ A 3.0m wide shared path to be provided on all four approaches
- ◆ Existing footpaths to be widened to 3.0m on both sides of Newcastle Road
- ◆ The diameter of the roundabout is 19.0m, including a 2.5m wide apron provided for trucks to turn, with a circulatory lane width of 5.0m.
- ◆ All existing protected trees to be retained. The protected trees are shown in the figure below which has been extracted from the Notified Version

Figure 6 - Protected Trees along Jesmond Street



- ◆ As per Regional Infrastructure Technical Specifications (RITS), and confirmation with WDC, the following are the design and check vehicles used for this intersection:
 - For all movements except the left turn from Newcastle into Jesmond
 - Design vehicle = large rigid truck
 - Check vehicle = tour coach
 - Remove left turn slip lane from Newcastle into Jesmond and allow for left turns by
 - Design vehicle = medium rigid truck
 - Check vehicle = large rigid truck
 - A tour coach to be able to undertake a right/u-turn from Newcastle Street into Jesmond Street
- ◆ Tour coach will have to do a right-turn-U-turn to undertake a left turn from Newcastle Road to Jesmond Street.
- ◆ Figure 7 below shows the overview of the intersection design.

Figure 7: Jesmond Street/Newcastle Street/Market Street/Galileo Street intersection upgrades



7 INTERSECTION 3 – RIVER ROAD/GREAT SOUTH ROAD

The current River Road/Great South Road intersection is a Stop controlled T-intersection with Great South Road being the primary road. Great South Road has one lane in each direction with a 3.0m wide flush median. A right turn bay is provided on Great South Road for vehicles to turn right into River Road. The existing layout of the intersection is shown in the figure below.

Figure 8 - River Road / Great South Road intersection - Existing Layout



The proposed design upgrade to the intersection is outlined as below:

- ◆ Single Lane three-leg roundabout.
- ◆ Few on-street parking spaces to be removed on River Road and Great South Road due to the realignment of the approach and exit lanes as part of the roundabout design
- ◆ Existing footpaths to be designed and pushed towards the property boundary on both corners of River Road
- ◆ Raised dedicated pedestrian crossings are provided on the south and east approaches which connect to the shared paths at the intersection. A raised speed platform is provided on the north approach.
- ◆ Speed limit to remain 50km/h but the approach speed will be reduced by adding in Traffic Calming and a gateway treatment north of the intersection, at the current location of the speed sign.
- ◆ The diameter of the central island is 10.0m, and a circulatory lane width of 4.0m. The central island is fully mountable to allow for large vehicle tracking
- ◆ All existing trees will be retained

8 INTERSECTION 4 – GREAT SOUTH ROAD AND OLD TAUPIRI ROAD (SOUTH)

The current Old Taupiri Road (south) and Great South Road intersection is a stop-controlled intersection with Great South Road being the primary road. Great South Road has one lane in each direction with a 3.0m wide flush median. A right turn bay is provided on Great South Road for vehicles to turn right into Old Taupiri Road (south). There is a level crossing located on Old Taupiri Road, about 30m back from the intersection. The existing layout of the intersection is shown in the figure below.

Figure 10 - Old Taupiri Road / Great South Road intersection - Existing Layout



The proposed design upgrade to the intersection is outlined as below:

- ◆ Single-lane roundabout. The diameter of the central island is 15.0m, including the apron provided for trucks to turn
- ◆ Walking and cycling connectivity has been provided across the intersection. Raised crossings are provided on all approaches which connect the shared paths at the intersection corners. The link between the shared paths to the possible future walking cycling bridge is shown.
- ◆ Parking in front of the shops has been relocated slightly north to provide space for the shared path as well as opportunity for urban design to improve amenity
- ◆ The option proposes undertaking a full safety upgrade of the level crossing (eg by installing barrier arms and pedestrian automated gates to prevent vehicle and pedestrian passage when a train is approaching or passing through).

Jesmond – GSR intersection

Task A-4

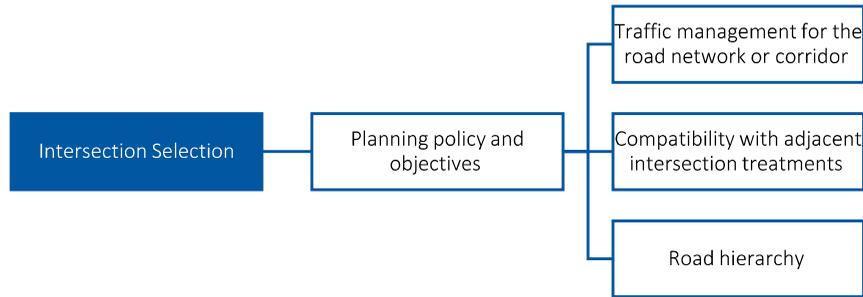
Appendix E-3.1

JESMOND STREET INTERSECTIONS WITH
GREAT SOUTH ROAD AND NEWCASTLE STREET

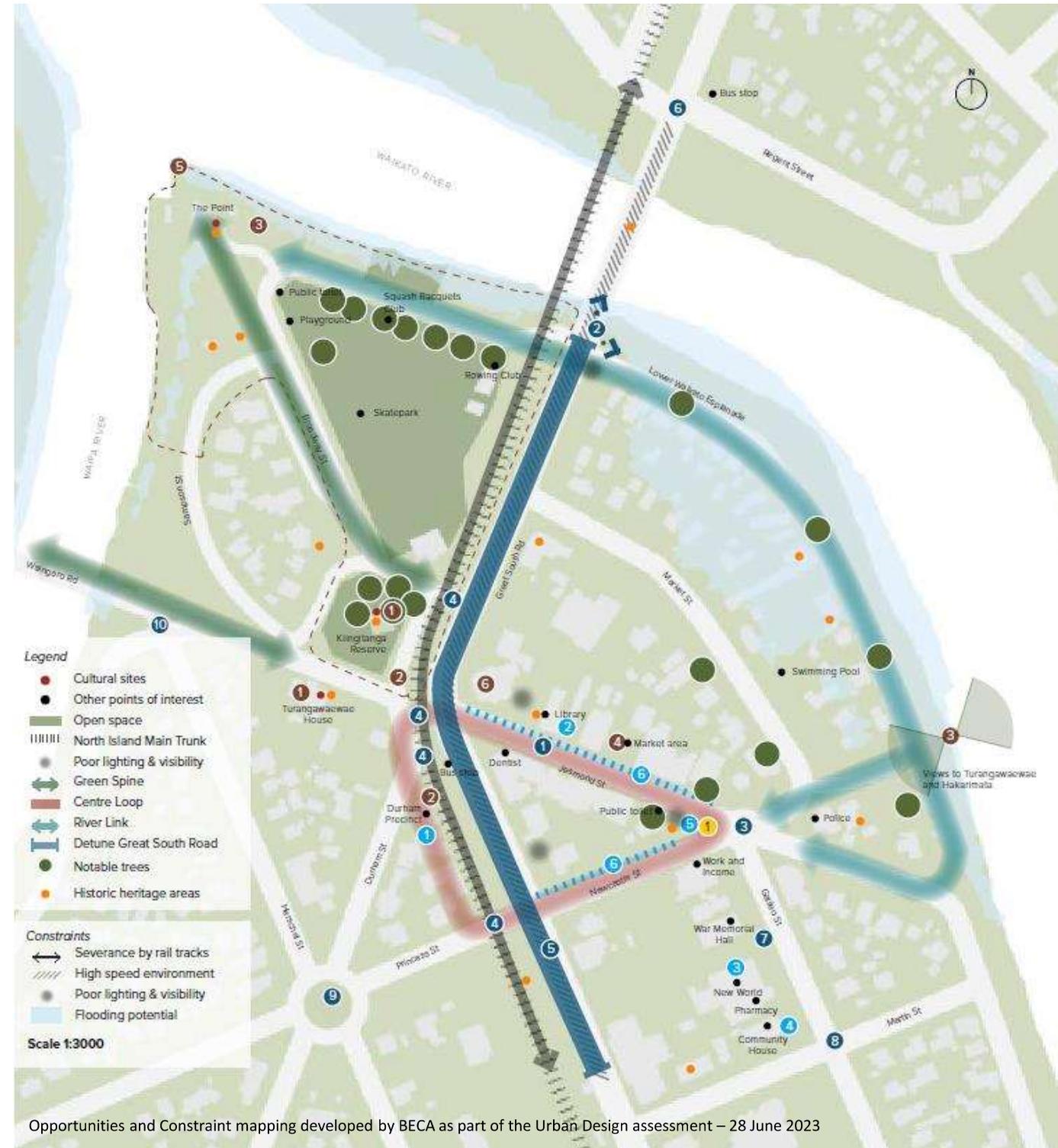
OPTIONS AT GREAT SOUTH ROAD / JESMOND STREET INTERSECTION

MCA

Key move priority



- ◆ Key moves considered highly important
- ◆ Traffic management of the corridor and surrounding network is summarised on the following slide



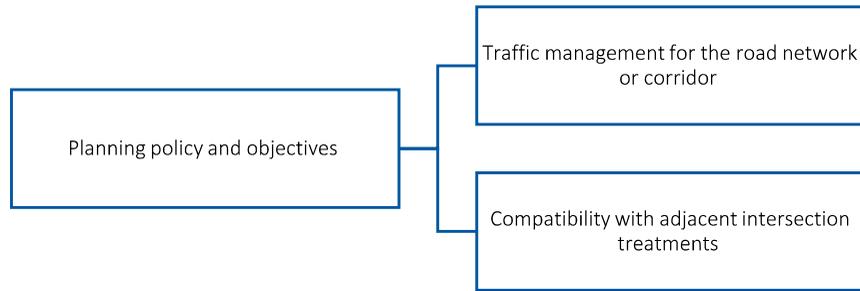
Feedback from WDC's Speed Management Plan Team

- ◆ Extend the lower speed limit on Great South Road to Martin Street to cover the pedestrian crossing, public toilets and shops.
- ◆ Lower the speed limit on Newcastle Street from GSR to Galileo Street to match Jesmond Street.
- ◆ Also consider including Martin Street and the section of Galileo Street from Martin Street to Jesmond Street in the lower speed limit (dashed lines below).
- ◆ Some form of engineering features on GSR and Galileo Street south of Martin Street to support the proposed speed limit change.
 - ◆ Putting the existing zebra crossing on GSR outside the toilets onto a raised platform may be an option.
 - ◆ A small roundabout at the Martin/Galileo Street int would create a threshold on that approach and effectively enable the 'CBD' to be ring-fenced.



MCA

Speed management policy



 Intersection treatment

 30km/h speed limit plus traffic calming measures

 Traffic calming measures

Gateway Treatment & Sign:
Ngāruawāhia Town Center – 500m

GSR with traffic calming

Sign: Ngāruawāhia Town Center

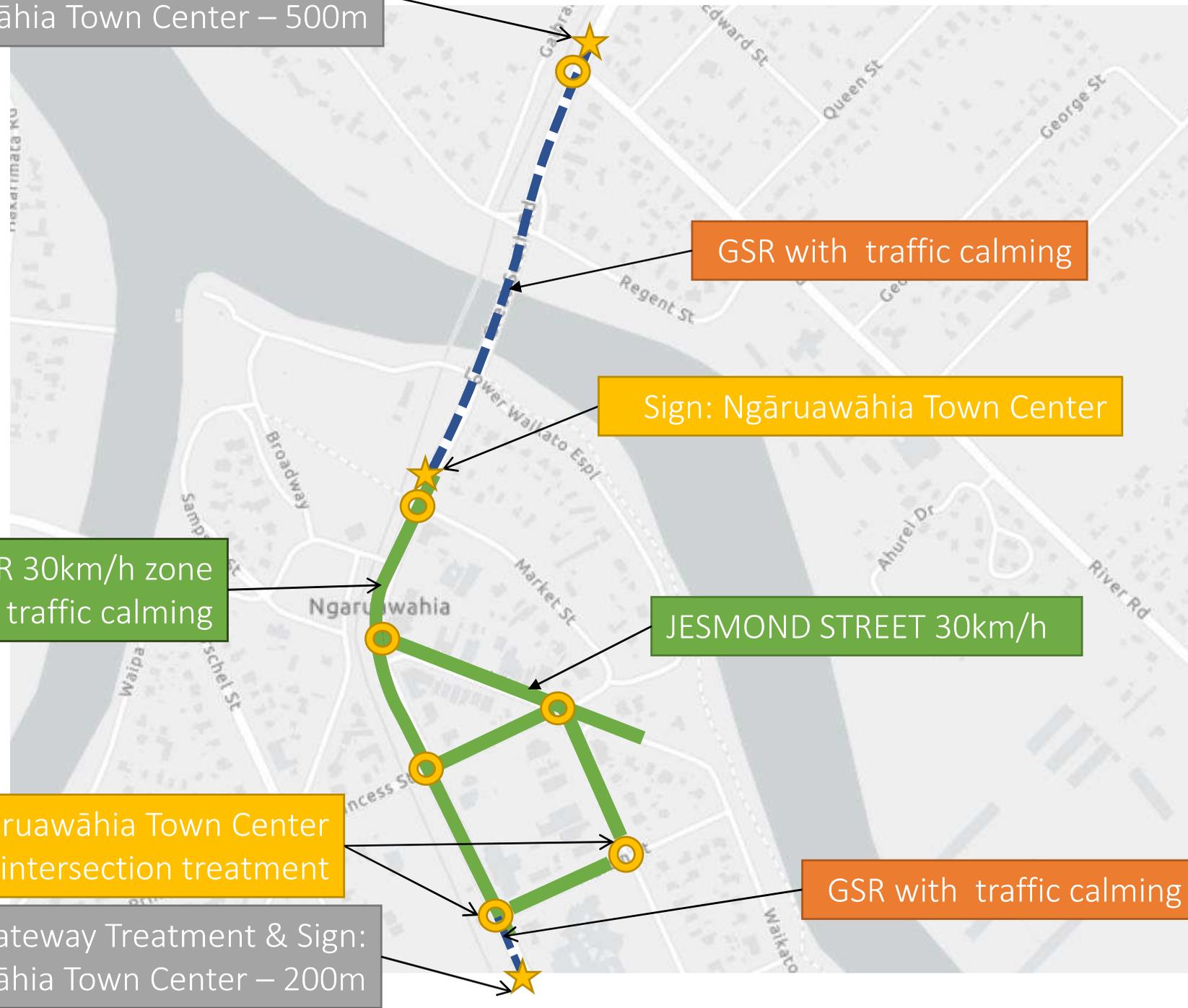
GSR 30km/h zone
with traffic calming

JESMOND STREET 30km/h

Sign: Ngāruawāhia Town Center
With intersection treatment

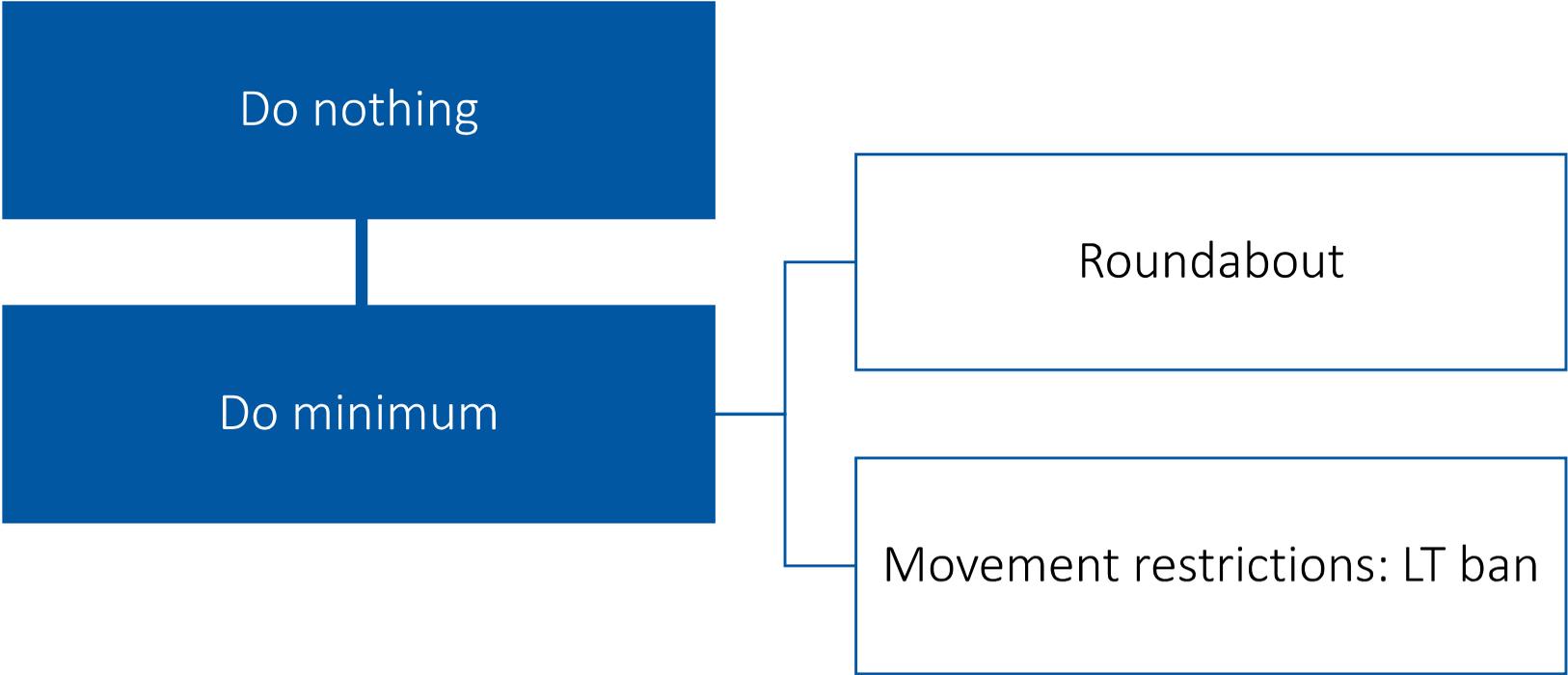
GSR with traffic calming

Gateway Treatment & Sign:
Ngāruawāhia Town Center – 200m



Great South Road / Jesmond Street

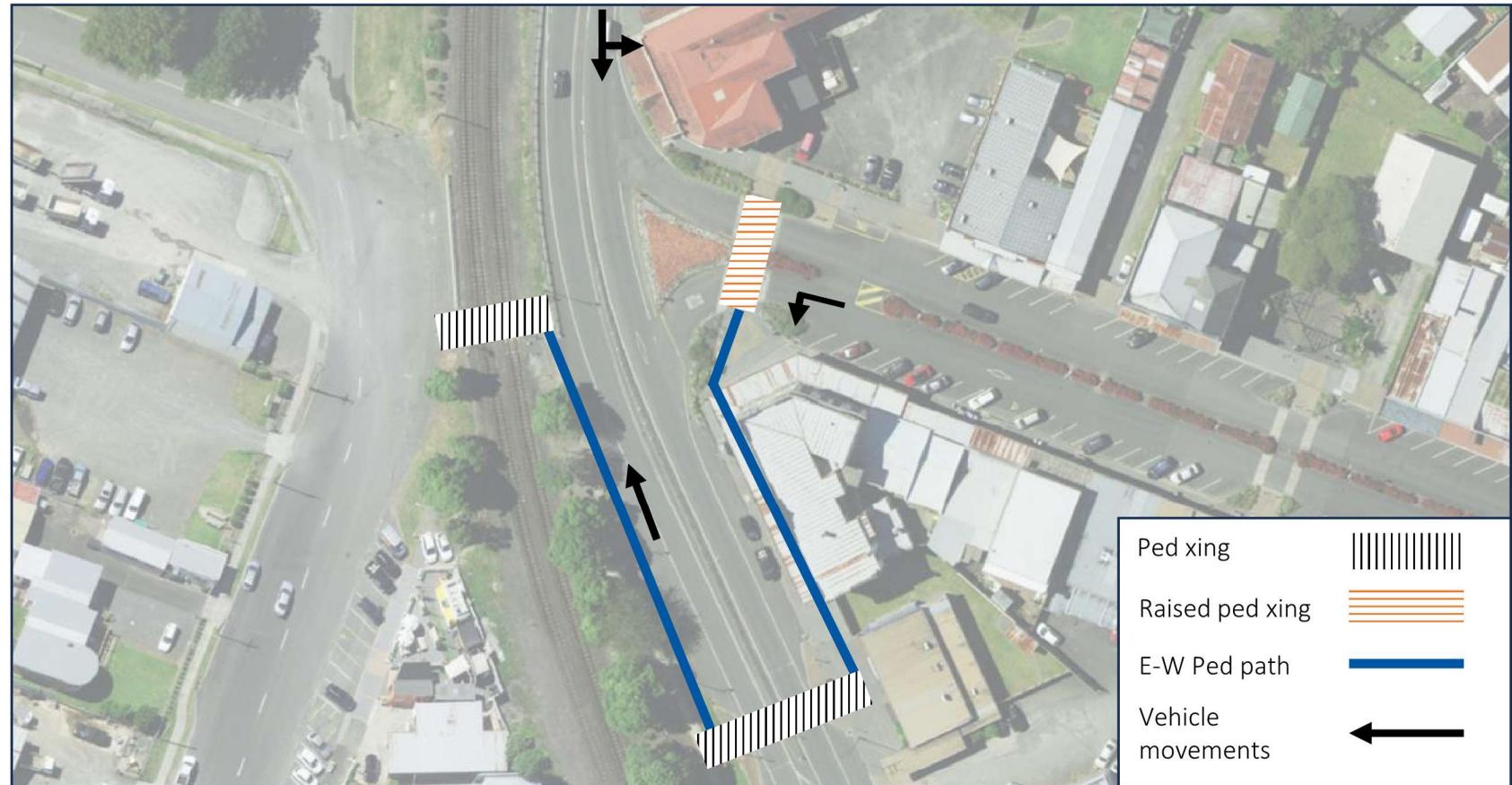
Intersection Options



Great South Road / Jesmond Street

Do nothing

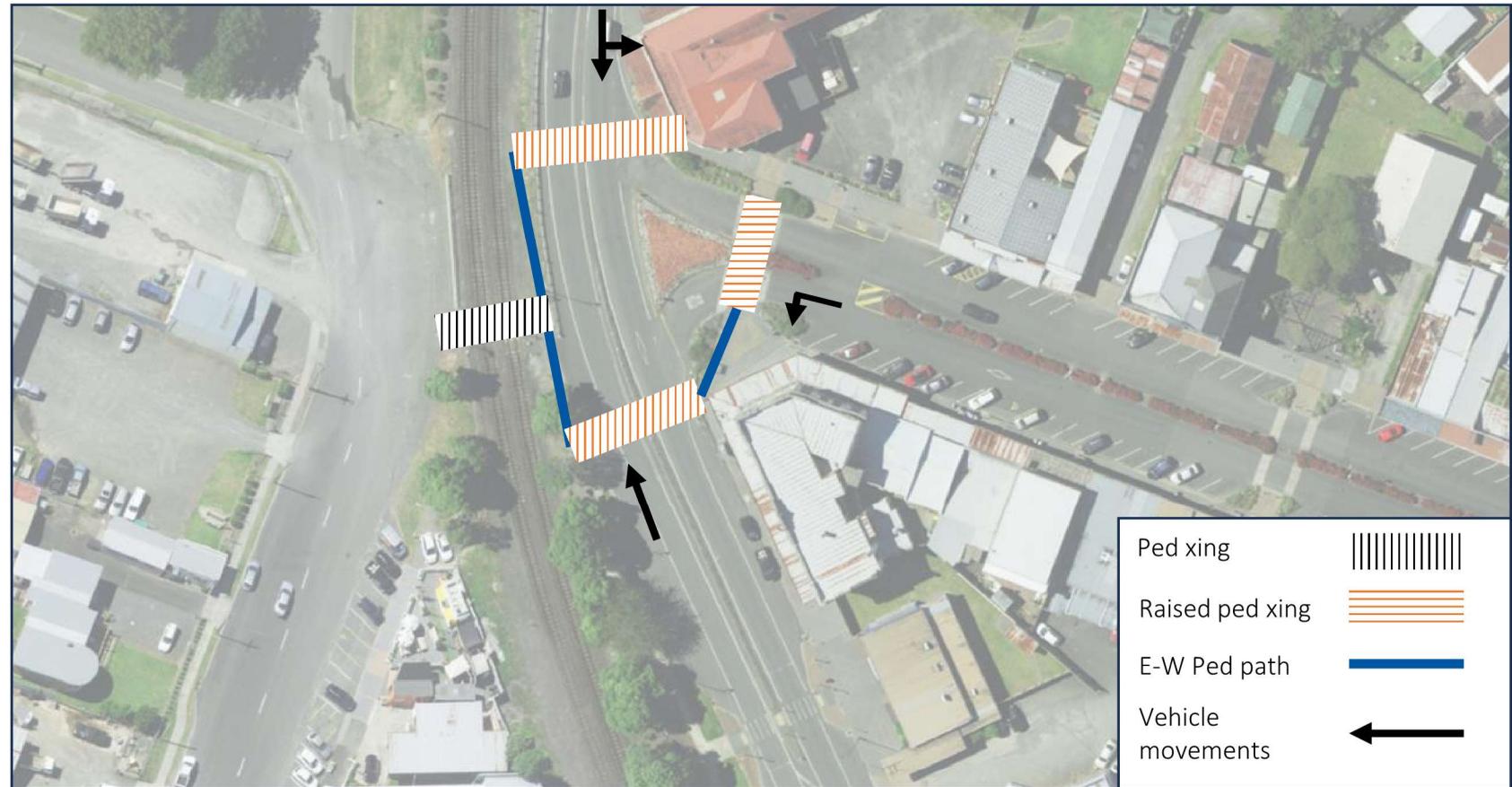
- ◆ Assumed operating speed remains at around 50 km/hr
- ◆ No vertical calming provided
- ◆ Retain banned right turn access into and out of Jesmond Rd for vehicles
- ◆ Retain existing pedestrian crossings on GSR and NIMT railway which includes a convoluted trip for pedestrians accessing the west.



Great South Road / Jesmond Street

Do minimum

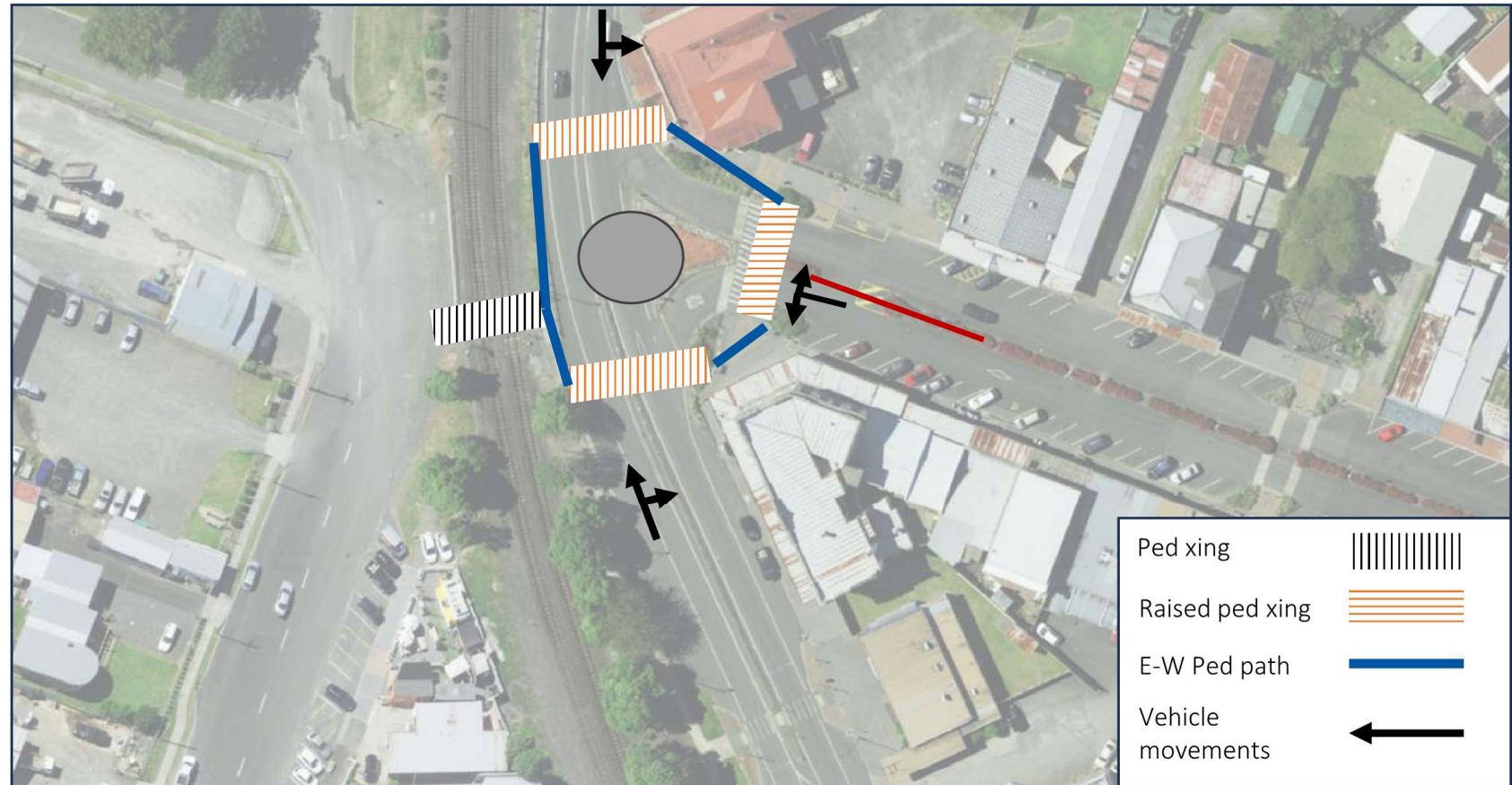
- ◆ Raised ped xing aligned to level rail xing on GSR (speed is around 25-30 km/h)
- ◆ Raised ped xing on Jesmond (speed is around 15-25 km/h)
- ◆ Left out of Jesmond retained
- ◆ Right out and into Jesmond ban retained
- ◆ Retained turning head on Jesmond Street



Great South Road / Jesmond Street

Roundabout

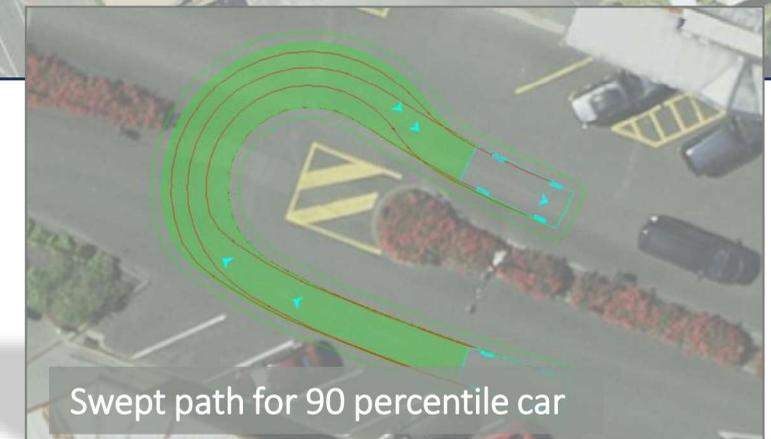
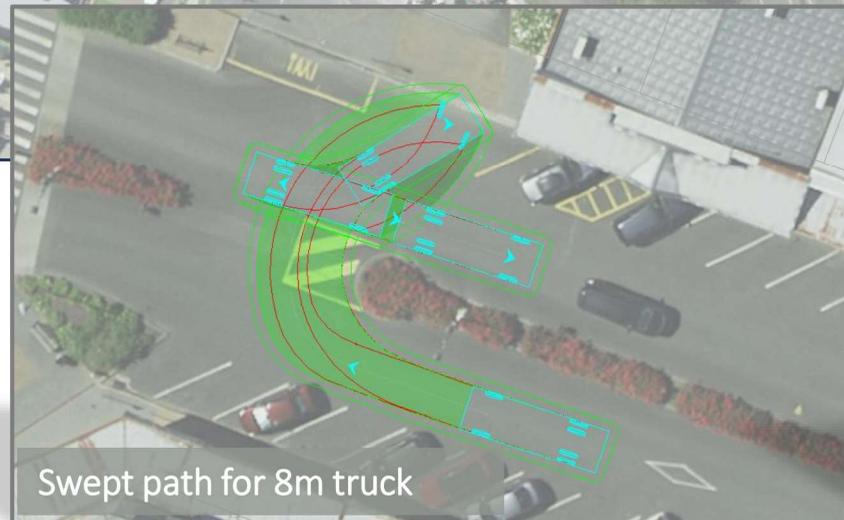
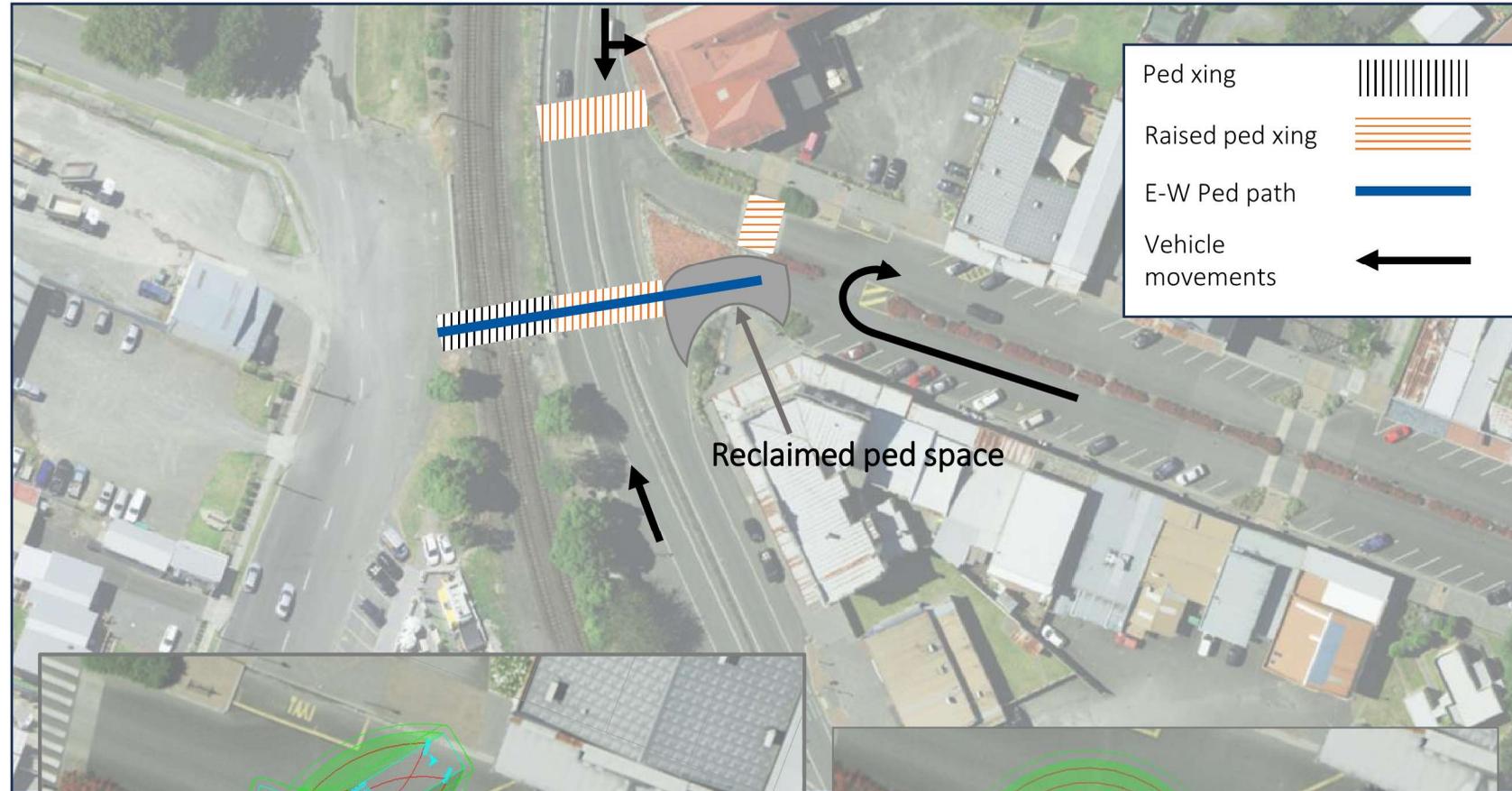
- ◆ Assumed single lane RAB with approach speed is around 15-25 km/h
 - ◆ Horizontal calming (deflection)
 - ◆ Vertical calming on all approaches (raised tables)
- ◆ Introduce right-turn access into Jesmond Rd from GSR for vehicles
- ◆ Pedestrian refuge island on approaches
- ◆ Assumes SISD is achieved even if the required sightlines cut across the northeastern corner property
- ◆ Assumes available footprint is sufficient
- ◆ Removal of turning head to reduce conflicts



Great South Road / Jesmond Street

Movement restrictions: Left Turn Ban

- ◆ Left turn out of Jesmond St banned
- ◆ Assumed approach speed is around 15-25 km/h
- ◆ Raised pedestrian crossing (unsignalised) is included at desire line to enable movement directly to the rail crossing
- ◆ Right turn ban into Jesmond Rd retained
- ◆ Less pedestrian delay due to the right turn ban.
- ◆ Retained turning head on Jesmond Street, which allows for cars to make u-turns, but 8m trucks would need to make at least a 2-point turn



Newcastle/Jesmond Intersection

VA-4

Appendix E-3.2

JESMOND STREET INTERSECTIONS WITH
GREAT SOUTH ROAD AND NEWCASTLE STREET

OPTIONS AT NEWCASTLE STREET / JESMOND STREET INTERSECTION

Newcastle Street / Jesmond Street

Do Nothing

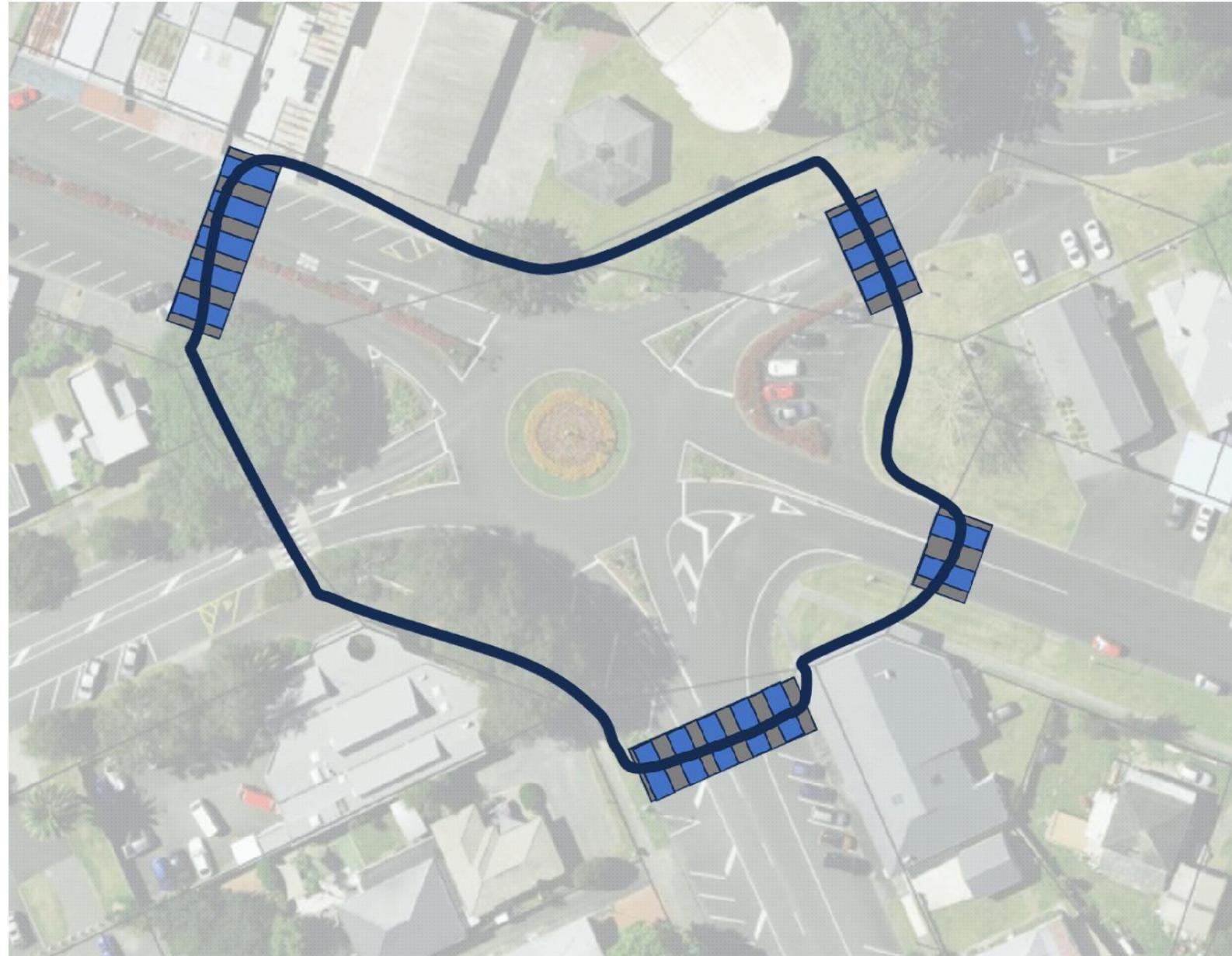
- ◆ Assumed operating speed remains at around 40-50 km/hr
- ◆ No vertical calming provided
- ◆ Retain all slip lanes
- ◆ Retains the existing pedestrian crossing on Newcastle Street



Newcastle Street / Jesmond Street

Option 1

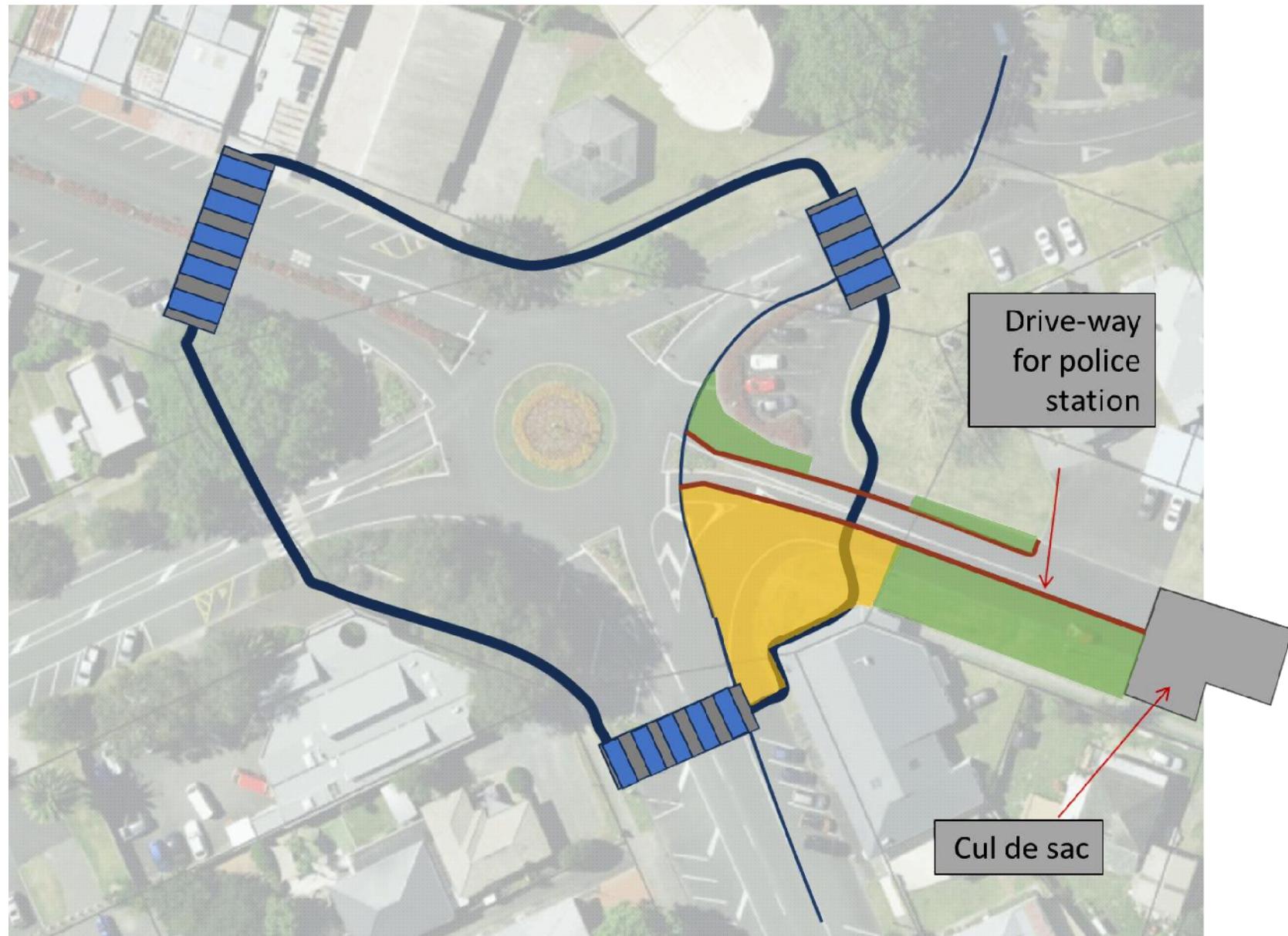
- ◆ Assumes operating speed reduces to around 30-40 km/h
- ◆ Introduces raised crossings on all approaches of the roundabout
- ◆ Widens existing footpaths to shared path widths and connects them to the raised pedestrian crossings at each corner.
- ◆ Retain all slip lanes
- ◆ Retains the existing pedestrian crossing on Newcastle Street



Newcastle Street / Jesmond Street

Option 2

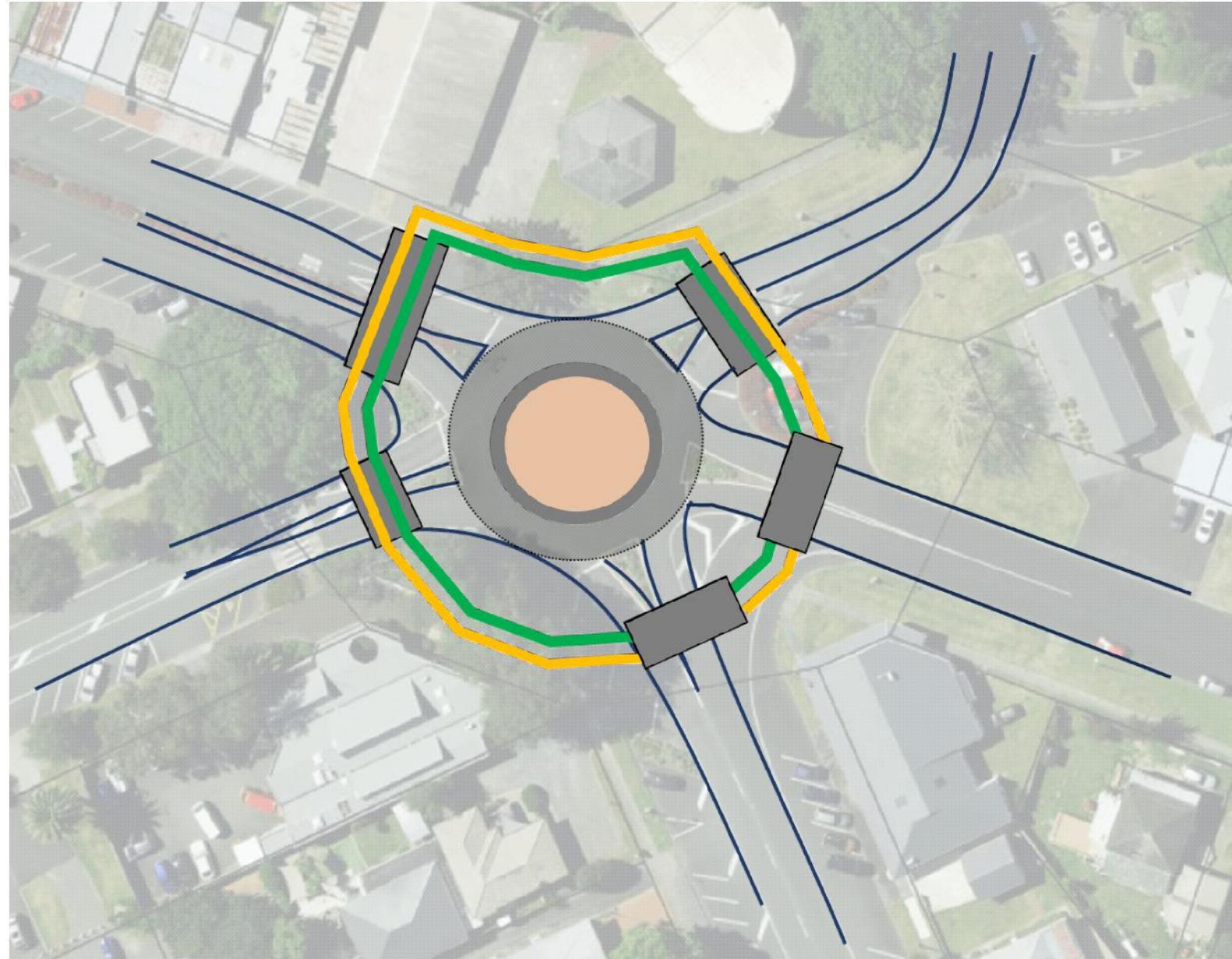
- ◆ Assumes operating speed reduces to around 30-40 km/h
- ◆ Introduces raised crossings on all approaches of the roundabout
- ◆ Widens existing footpaths to shared path widths and connects them to the raised pedestrian crossings at each corner.
- ◆ Removes the Waikato Esplanade Approach, including its slip lanes. Provides driveway access for the police station and an L-shaped turning head for the new cul-de-sac.
- ◆ Retains the existing pedestrian crossing on Newcastle Street



Newcastle Street / Jesmond Street

Option 3 –Dutch Roundabout

- ◆ Assumes operating speed reduces to around 30 km/h
- ◆ Tightens up the roundabout to enable separated circulatory pedestrian and cycle paths around the intersection
- ◆ Introduces raised crossings on all approaches of the roundabout
- ◆ Removes all slip lanes from all approaches



Appendix E-3.3

**JESMOND STREET INTERSECTIONS WITH
GREAT SOUTH ROAD AND NEWCASTLE STREET**

OPTIONS ASSESSMENT

Jesmond – GSR intersection

Task A-4

Appendix E-3.3.1

JESMOND STREET INTERSECTIONS WITH
GREAT SOUTH ROAD AND NEWCASTLE STREET

OPTIONS ASSESSMENT FOR
GREAT SOUTH ROAD / JESMOND STREET INTERSECTION

THE MCA ASSESSMENT

ASSESSMENT CRITERIA				OPTION: Do nothing					Do minimum					Roundabout					Movement restrictions				
Metric	Objective	Key Performance Indicator	Measure	Walking	Cycling	PT	Vehicles	Freight	Walking	Cycling	PT	Vehicles	Freight	Walking	Cycling	PT	Vehicles	Freight	Walking	Cycling	PT	Vehicles	Freight
Safety	To reduce deaths and serious injuries	Road safety risk assessment rating	Exposure	-1	-1	-1	-3	-3	-1	-1	-1	-3	-3	-2	-2	-2	-2	-2	2	2	2	2	2
			Likelihood	1	0	0	0	0	3	3	3	3	3	3	3	3	4	4	4	4	0	2	2
			Severity	-5	-5	-1	-1	-1	3	3	3	2	2	4	4	4	5	5	4	4	4	3	3
Amenity (travel quality and aesthetics)	Strategic direction of key move	Fit for purpose	Alignment with place and movement guide	-3	-3	0	-3	-3	3	3	0	4	4	3	3	0	5	5	5	5	0	0	0
	To provide quality travel options	Intensification and urban form	Encouragement of modes based on look and feel	-1	-1	0	4	4	3	3	0	3	3	4	-3	0	5	5	4	4	0	-1	-1
		Effects on biodiversity and other natural resources	Impacts on biodiversity, areas of sensitive natural and cultural interest	0	0	0	0	0	3	3	0	0	0	3	3	0	1	1	4	4	0	3	3
Accessibility	Provide alternative mode options to private vehicles	Promotion of alternative modes	Achieve a high LOS for pedestrians and cyclists	-2	-2	0	0	0	5	5	3	1	1	5	3	1	1	1	5	5	0	1	1
			Accessibility for vulnerable users	-3	-3	0	0	0	5	5	5	3	3	5	5	4	5	5	5	5	0	4	4
		Active mode and public transport mode share (combined) compared to private vehicles	Number of active mode and public transport trips (combined) compared to private vehicle trips	-2	-2	-1	0	0	4	4	2	2	2	4	4	2	2	2	4	4	3	2	2
	Access to transport and mobility is equitable for all people	Walking, cycling and micromobility network coverage and useability	Extent to which option improves the walking, cycling and micromobility network coverage	-2	-2	0	0	0	5	5	0	0	0	4	4	0	0	0	4	4	0	1	1
		Transport choice available for all people living in Ngāruawāhia to access the main street	Extent to which option improves alternative mode choice	-2	-2	0	0	0	3	3	0	3	3	4	4	0	5	4	3	3	0	-1	-1
		Perception of safety (all users and vulnerable users)	Change in perception of safety and harm (all users and vulnerable users)	-2	-3	0	4	4	5	5	1	3	3	5	5	3	5	5	5	5	4	1	1

THE MCA ASSESSMENT

ASSESSMENT CRITERIA				OPTION: Do nothing					Do minimum					Roundabout					Movement restrictions				
Metric	Objective	Key Performance Indicator	Measure	Walking	Cycling	PT	Vehicles	Freight	Walking	Cycling	PT	Vehicles	Freight	Walking	Cycling	PT	Vehicles	Freight	Walking	Cycling	PT	Vehicles	Freight
Mobility (travel time reliability, resilience of the route)	Maintain a reasonably consistent travel time for all modes (particularly freight)	Travel time to/from the main street	Reliability of alternative modes compared to general vehicles particularly for last leg walking trips	0	0	0	0	0	4	4	1	-1	-1	4	4	1	5	5	5	5	1	-2	-2
			Assessment of the impact on alternative routes	0	0	0	0	0	3	3	0	-4	-4	4	4	0	5	5	2	2	0	-4	-4
Cost/feasibility efficiency performance measures	Feasibility	Existing infrastructure used or reallocated to provide multimodal outcomes	Extent to which existing infrastructure can be used/reallocated to provide multimodal outcomes	0	0	0	0	0	5	5	5	5	5	5	3	0	0	0	5	5	5	5	5
			Engineering Feasibility	Assessment of constructability	0	0	0	0	0	5	5	0	4	4	4	3	0	4	4	5	5	0	5
		Economic Impact	Access to business and employment	-3	-3	0	-3	-3	1	1	0	-3	-3	3	1	0	5	5	2	2	0	-4	-4
		Stakeholders	Assessment of likely stakeholder impact	0	0	0	0	0	0	0	0	-2	-2	0	0	0	5	3	0	0	0	-4	-4
	Cost	Cost	Assessment of capital cost of infrastructure improvements	0	0	0	0	0	-2	-2	0	-1	-1	-2	-2	0	-5	-5	-1	-1	0	-1	-1
	Impacts on Te Ao Māori	Impacts on Te Ao Māori	Assessment of impact on Te Ao Māori including areas of significance for Māori, Māori land and Kiatiakitanga	0	0	0	0	0	4	4	0	0	0	4	4	0	0	0	4	4	0	0	0
			Protection of land, water and taonga	Level of protection of land, water and taonga incorporating mātauranga Māori	0	0	0	0	0	1	1	0	0	0	2	2	0	0	0	2	2	0	0
SCORE				-25	-27	-3	-2	-2	62	62	22	19	19	66	52	16	55	52	73	73	19	12	12
Total, equal weights per measure				-59					184					241					189				

THE MCA ASSESSMENT

ASSESSMENT CRITERIA				OPTION: Do nothing					Do minimum					Roundabout					Movement restrictions					
Metric	Objective	Key Performance Indicator	Measure	Walking	Cycling	PT	Vehicles	Freight	Walking	Cycling	PT	Vehicles	Freight	Walking	Cycling	PT	Vehicles	Freight	Walking	Cycling	PT	Vehicles	Freight	
Average, equal weights per objective																								
Safety			Weighting per objective																					
To reduce deaths and serious injuries			1	-1.67	-2.00	-0.67	-1.33	-1.33	1.67	1.67	1.67	0.67	0.67	1.67	1.67	1.67	2.33	2.33	3.33	3.33	2.00	2.33	2.33	
Amenity (travel quality and aesthetics)			Weighting per objective																					
Strategic direction of key move			1	-3.00	-3.00	0.00	-3.00	-3.00	3.00	3.00	0.00	4.00	4.00	3.00	3.00	0.00	5.00	5.00	5.00	5.00	0.00	0.00	0.00	
To provide quality travel options			1	-0.50	-0.50	0.00	2.00	2.00	3.00	3.00	0.00	1.50	1.50	3.50	0.00	0.00	3.00	3.00	4.00	4.00	0.00	1.00	1.00	
Accessibility			Weighting per objective																					
Provide alternative mode options to private vehicles			1	-2.33	-2.33	-0.33	0.00	0.00	4.67	4.67	3.33	2.00	2.00	4.67	4.00	2.33	2.67	2.67	4.67	4.67	1.00	2.33	2.33	
Access to transport and mobility is equitable for all people			1	-2.00	-2.33	0.00	1.33	1.33	4.33	4.33	0.33	2.00	2.00	4.33	4.33	1.00	3.33	3.00	4.00	4.00	1.33	0.33	0.33	
Mobility (travel time reliability, resilience of the route)			Weighting per objective																					
Maintain a reasonably consistent travel time for all modes (particularly freight)			1	0.00	0.00	0.00	0.00	0.00	3.50	3.50	0.50	-2.50	-2.50	4.00	4.00	0.50	5.00	5.00	3.50	3.50	0.50	-3.00	-3.00	
Cost/feasibility efficiency performance measures			Weighting per objective																					
Feasibility			1	-0.75	-0.75	0.00	-0.75	-0.75	2.75	2.75	1.25	1.00	1.00	3.00	1.75	0.00	3.50	3.00	3.00	3.00	1.25	0.50	0.50	
Cost			1	0.00	0.00	0.00	0.00	0.00	-2.00	-2.00	0.00	-1.00	-1.00	-2.00	-2.00	0.00	-5.00	-5.00	-1.00	-1.00	0.00	-1.00	-1.00	
Impacts on Te Ao Māori			1	0.00	0.00	0.00	0.00	0.00	2.50	2.50	0.00	0.00	0.00	3.00	3.00	0.00	0.00	0.00	3.00	3.00	0.00	0.00	0.00	
Average, equal weights per objective				-10.25	-10.92	-1.00	-1.75	-1.75	23.42	23.42	7.08	7.67	7.67	25.17	19.75	5.50	19.83	19.00	29.50	29.50	6.08	2.50	2.50	
Average, equal weights per objective				-26					69					89					70					

THE MCA ASSESSMENT - SENSITIVITY TESTING

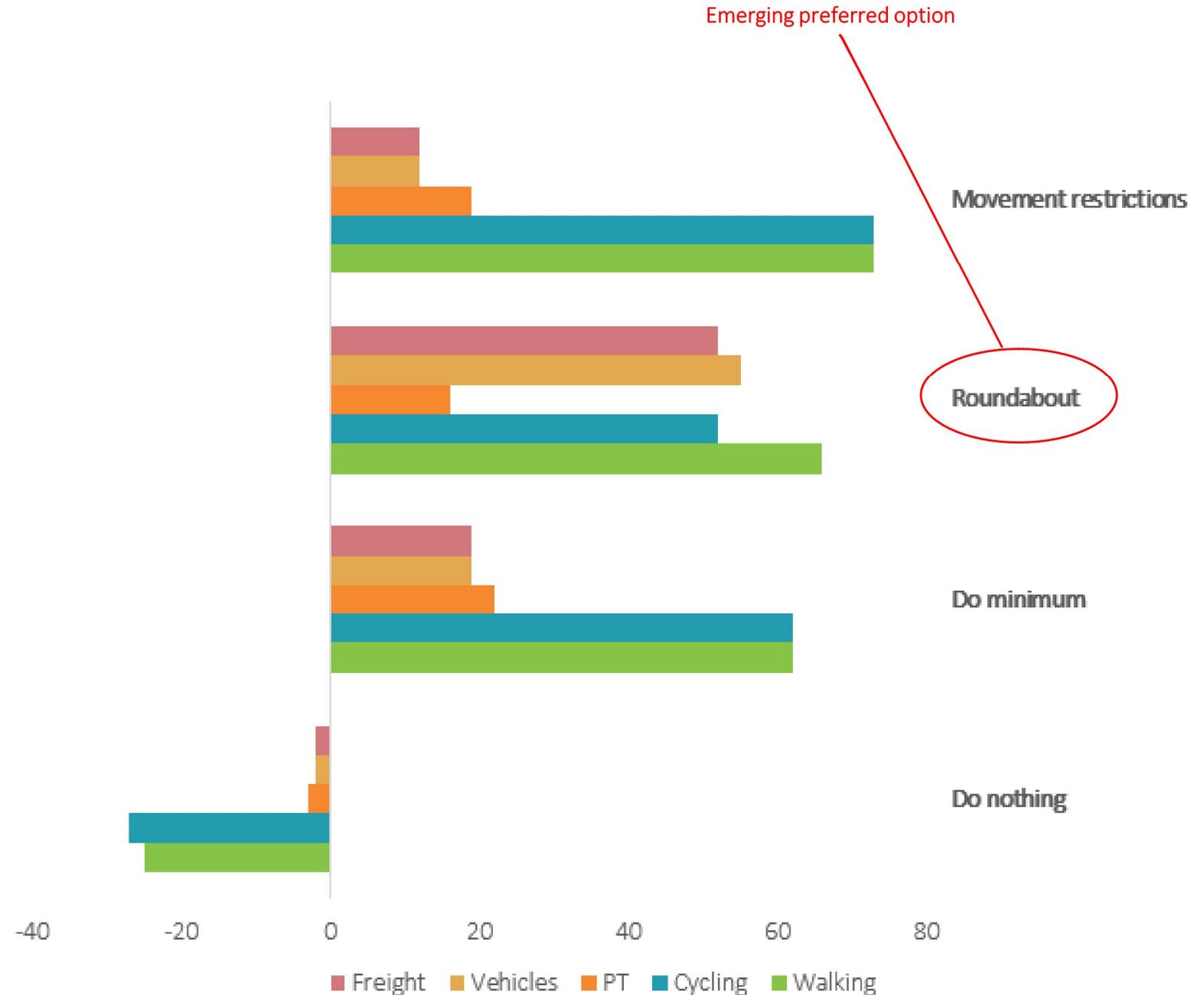
ASSESSMENT CRITERIA				OPTION:	Do nothing					Do minimum					Roundabout					Movement restrictions						
Metric	Objective	Key Performance Indicator	Measure	Weighting	Walking	Cycling	PT	Vehicles	Freight	Walking	Cycling	PT	Vehicles	Freight	Walking	Cycling	PT	Vehicles	Freight	Walking	Cycling	PT	Vehicles	Freight		
Safety	To reduce deaths and serious injuries	Road safety risk assessment rating	Exposure	1	-1	-1	-1	-3	-3	-1	-1	-1	-3	-3	-2	-2	-2	-2	-2	2	2	2	2	2		
			Likelihood	1	1	0	0	0	0	0	3	3	3	3	3	3	3	3	3	4	4	4	4	0	2	2
			Severity	1	-5	-5	-1	-1	-1	3	3	3	3	2	2	4	4	4	4	5	5	4	4	4	3	3
Amenity (travel quality and aesthetics)	Strategic direction of key move	Fit for purpose	Alignment with place and movement guide	3	-3	-3	0	-3	-3	3	3	0	4	4	3	3	0	5	5	5	5	0	0	0		
	To provide quality travel options		Intensification and urban form	Encouragement of modes based on look and feel	1	-1	-1	0	4	4	3	3	0	3	3	4	-3	0	5	5	4	4	0	-1	1	
			Effects on biodiversity and other natural resources	0.5	0	0	0	0	0	3	3	0	0	0	3	3	0	1	1	4	4	0	3	3		
Accessibility	Provide alternative mode options to private vehicles	Promotion of alternative modes	Achieve a high LOS for pedestrians and cyclists	1	-2	-2	0	0	0	5	5	3	1	1	5	3	1	1	1	5	5	0	1	1		
			Accessibility for vulnerable users	1.5	-3	-3	0	0	0	5	5	5	3	3	5	5	4	5	5	5	5	0	4	4		
			Active mode and public transport mode share (combined) compared to private vehicles	0.5	-2	-2	-1	0	0	4	4	2	2	2	4	4	2	2	2	4	4	3	2	2		
	Access to transport and mobility is equitable for all people	Walking, cycling and micromobility network coverage and useability	Extent to which option improves the walking, cycling and micromobility network coverage	0.5	-2	-2	0	0	0	5	5	0	0	0	4	4	0	0	0	4	4	0	1	1		
			Transport choice available for all people living in Ngāruawāhia to access the main street	0.5	-2	-2	0	0	0	3	3	0	3	3	4	4	0	5	4	3	3	0	-1	-1		
		Perception of safety (all users and vulnerable users)	Change in perception of safety and harm (all users and vulnerable users)	0.75	-2	-3	0	4	4	5	5	1	3	3	5	5	3	5	5	5	5	4	1	1		
Mobility (travel time reliability, resilience of the route)	Maintain a reasonably consistent travel time for all modes (particularly freight)	Travel time to/from the main street	Reliability of alternative modes compared to general vehicles particularly for last leg walking trips	1.5	0	0	0	0	0	4	4	1	-1	-1	4	4	1	5	5	5	5	1	-2	-2		
			Assessment of the impact on alternative routes	1	0	0	0	0	0	3	3	0	-4	-4	4	4	0	5	5	2	2	0	-4	-4		
Cost/feasibility efficiency performance measures	Feasibility	Existing infrastructure used or reallocated to provide multimodal outcomes	Extent to which existing infrastructure can be used/reallocated to provide multimodal outcomes	0.25	0	0	0	0	0	5	5	5	5	5	5	3	0	0	0	5	5	5	5	5		
			Engineering Feasibility	Assessment of constructability	0.5	0	0	0	0	0	5	5	0	4	4	4	3	0	4	4	5	5	0	5	5	
			Economic Impact	Access to business and employment	2	-3	-3	0	-3	-3	1	1	0	-3	-3	3	1	0	5	5	2	2	0	-4	-4	
			Stakeholders	Assessment of likely stakeholder impact	2	0	0	0	0	0	0	0	0	-2	-2	0	0	0	5	3	0	0	0	-4	-4	
	Cost	Cost	Assessment of capital cost of infrastructure improvements	0.5	0	0	0	0	0	-2	-2	0	-1	-1	-2	-2	0	-5	-5	-1	-1	0	-1	-1		
	Impacts on Te Ao Māori	Impacts on Te Ao Māori	Protection of land, water and taonga	Assessment of impact on Te Ao Māori including areas of significance for Māori, Māori land and Kiatiakitanga	1	0	0	0	0	0	4	4	0	0	0	4	4	0	0	0	4	4	0	0	0	
Level of protection of land, water and taonga incorporating mātauranga Māori				1	0	0	0	0	0	1	1	0	0	0	2	2	0	0	0	2	2	0	0	0		
SCORE					-32	-33.75	-2.5	-12	-12	59.5	59.5	20	14.5	14.5	66	52	16.75	75.25	70.75	75.5	75.5	13.25	-3.5	-3.5		
Total, unequal weights per measure					-92					168					281					157						

Assessment update

MCA scoring

The MCA assessment takes into account the following:

- Banning movements discourage use of vehicles while having a moderate impact to active modal choice,
- Slower vehicle speeds improve perception of safety,
- Reliability of alternative modes score well particularly where vehicle movement discouraged but active modes have improvement,
- Roundabout can provide more access opportunities for vehicles while banning movements restricts,
- Existing infrastructure can be used for banning movements options,
- Restricting vehicle movement will inspire opposition from businesses,
- Roundabout likely most expensive (may require land acquisition if site lines require improvement),
- Improved walking and cycling access to Turangawaewae House with limiting vehicle movements (improvement of safe options)
- the higher impact of a roundabout on land and runoff,
- the positive outcome of redistribution of land for people if road space for vehicles is reduced



Assessment update

MCA scoring

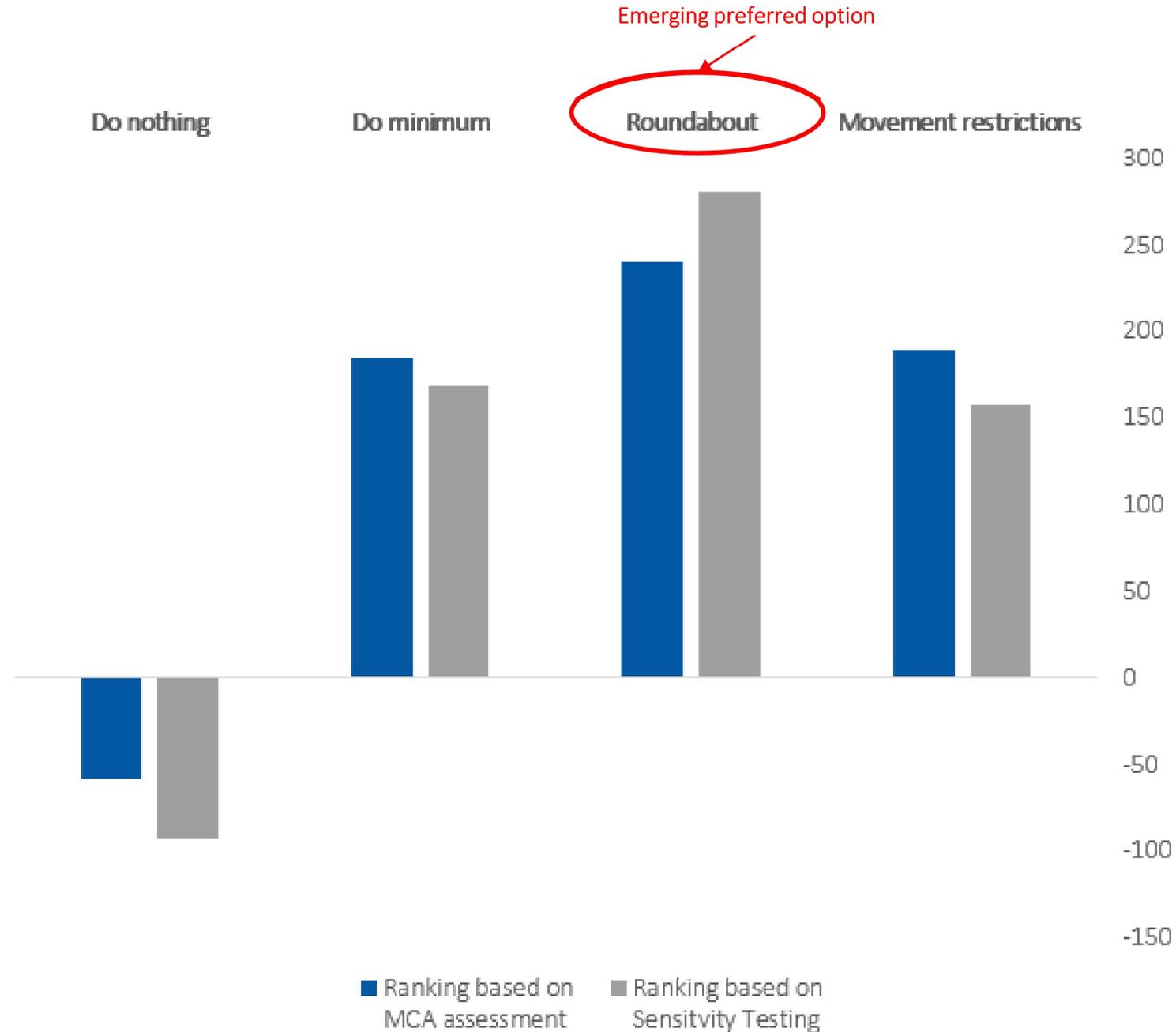
THE MCA ASSESSMENT SUMMARY

The movement restrictions option was not considered further primarily due to potential push back from the businesses.

The do-minimum option and movement restrictions option scored similarly with good outcomes for walking and cycling but poor outcomes for vehicles, buses and freight.

The roundabout option provided more balanced outcomes for all modes which is important at this location given the competing demands. The place and movement functions of the intersection could be considered almost equal. The movement function comes from Great South Road being a primary route for general traffic, buses and trucks. The place function comes from Jesmond Street which is a main street with aspirations of building strong east-west walking and cycling desire lines.

The roundabout option was therefore selected and confirmed with WDC as the preferred option to be progressed to design.



Newcastle/Jesmond Intersection

VA-4

Appendix E-3.3.2

JESMOND STREET INTERSECTIONS WITH
GREAT SOUTH ROAD AND NEWCASTLE STREET

OPTIONS ASSESSMENT FOR
NEWCASTLE STREET / JESMOND STREET INTERSECTION

THE MCA ASSESSMENT

ASSESSMENT CRITERIA				OPTION: Do Nothing Retain Existing					Option 1 Raised tables on each leg					Option 2 Option 1 plus close Waikato Esplanade to traffic					Option 3 Dutch style roundabout					
Metric	Objective	Key Performance Indicator	Measure	Walking	Cycling	PT	Vehicles	Freight	Walking	Cycling	PT	Vehicles	Freight	Walking	Cycling	PT	Vehicles	Freight	Walking	Cycling	PT	Vehicles	Freight	
Safety	To reduce deaths and serious injuries	Road safety risk assessment rating	Exposure	-3	-3	0	0	0	-1	-1	0	0	0	1	1	0	2	2	-1	-1	0	0	0	
			Likelihood	-5	-5	0	-1	-1	3	3	0	2	2	4	4	0	4	4	4	4	0	4	4	
			Severity	-2	-2	0	0	0	3	3	0	4	4	3	3	0	4	4	3	3	0	4	4	
Amenity (travel quality and aesthetics)	Strategic direction of key move	Fit for purpose	Alignment with place and movement guide	-2	-2	0	0	0	1	1	0	1	1	1	1	0	2	2	3	3	0	3	3	
	To provide quality travel options	Intensification and urban form	Encouragement of modes based on look and feel	-4	-5	0	3	0	2	0	0	0	0	3	2	0	1	0	4	4	0	3	0	
		Effects on biodiversity and other natural resources	Impacts on biodiversity, areas of sensitive natural and cultural interest	0	0	0	0	0	1	1	0	0	0	0	2	1	0	0	0	3	3	0	0	0
Accessibility	Provide alternative mode options to private vehicles	Promotion of alternative modes	Achieve a high LOS for pedestrians and cyclists	-1	-1	0	0	0	3	3	0	0	0	3	3	0	0	0	3	3	0	0	0	
			Accessibility for vulnerable users	-5	-5	-5	0	0	2	2	0	0	0	0	0	3	2	0	0	0	4	4	0	0
		Active mode and public transport mode share (combined) compared to private vehicles	Number of active mode and public transport trips (combined) compared to private vehicle trips	0	0	0	0	0	2	1	0	0	0	0	3	2	0	0	0	4	3	0	0	0
	Access to transport and mobility is equitable for all people	Walking, cycling and micromobility network coverage and useability	Extent to which option improves the walking, cycling and micromobility network coverage	-4	-4	0	0	0	2	2	0	0	0	0	3	3	0	0	0	4	4	0	0	0
			Ability to connect to Te Awa Cycleway	Extent to which option improves the walking, cycling connection to the Te Awa Cycleway	-1	-1	0	0	0	2	2	0	1	1	3	3	0	1	1	4	4	0	2	2
		Transport choice available for all people living in Ngāruawāhia to access the main street	Extent to which option improves alternative mode choice	0	0	0	0	0	2	2	2	1	0	3	3	2	2	0	5	5	4	3	0	
		Access to the Police Station	Extent to which option allows the movement to and from the police station	0	0	0	3	3	3	3	0	2	2	3	3	0	-1	-1	5	5	0	3	1	
		Perception of safety (all users and vulnerable users)	Change in perception of safety and harm (all users and vulnerable users)	0	0	0	0	0	3	3	0	3	3	4	3	0	4	3	4	3	0	4	3	

ASSESSMENT CRITERIA				OPTION: Do Nothing Retain Existing					Option 1 Raised tables on each leg					Option 2 Option 1 plus close Waikato Esplanade to traffic					Option 3 Dutch style roundabout				
Metric	Objective	Key Performance Indicator	Measure	Walking	Cycling	PT	Vehicles	Freight	Walking	Cycling	PT	Vehicles	Freight	Walking	Cycling	PT	Vehicles	Freight	Walking	Cycling	PT	Vehicles	Freight
Mobility	Ease of Access to the town centre for all walking and cycling and service delivery modes	Service delivery trucks	Impact on medium to large trucks' movement at this intersection to access the businesses on Jesmond Street	0	0	0	0	0	0	0	0	0	-2	0	0	0	0	-2	0	0	0	0	-2
		People on foot and people on bikes	Extent to which option improves the walking and cycling priority to access the town centre	0	0	0	0	0	2	2	0	0	0	3	3	0	0	0	4	4	0	0	0
Cost/feasibility efficiency performance measures	Feasibility	Existing infrastructure used or reallocated to provide multimodal outcomes	Extent to which existing infrastructure can be used/reallocated to provide multimodal outcomes	0	0	0	0	0	4	4	0	4	4	4	4	0	3	3	-2	-2	0	-3	-3
		Engineering Feasibility	Assessment of constructability	0	0	0	0	0	4	4	0	4	4	4	4	0	4	4	0	-1	0	-5	-4
		Economic Impact	Access to business and employment	0	0	0	0	0	2	2	0	0	0	3	2	0	-2	0	4	4	0	4	4
	Stakeholders	Assessment of likely stakeholder impact	-2	-1	0	2	0	2	1	0	1	-2	3	2	0	0	-2	4	4	0	1	-2	
	Cost	Cost	Assessment of capital cost of infrastructure improvements	0	0	0	0	0	-1	-1	0	-1	-1	-3	-3	0	-3	-3	-4	-4	0	-4	-4
	Impacts on Te Ao Māori	Impacts on Te Ao Māori	Assessment of impact on Te Ao Māori including areas of significance for Māori, Māori land and Kaitiakitanga	0	0	0	0	0	4	3	0	2	0	4	3	0	2	0	4	4	0	3	0
SCORE				-29	-29	-5	7	2	45	40	2	24	16	57	49	2	23	15	59	56	4	22	6
Total, equal weights per measure				-54					127					146					147				

THE MCA ASSESSMENT - SENSITIVITY TESTING

ASSESSMENT CRITERIA				OPTION: Do Nothing Retain Existing					Option 1 Raised tables on each leg					Option 2 Option 1 plus close Waikato Esplanade to traffic					Option 3 Dutch style roundabout					
Metric	Objective	Key Performance Indicator	Measure	Walking	Cycling	PT	Vehicles	Freight	Walking	Cycling	PT	Vehicles	Freight	Walking	Cycling	PT	Vehicles	Freight	Walking	Cycling	PT	Vehicles	Freight	
Safety	To reduce deaths and serious injuries	Road safety risk assessment rating	Exposure	-3	-3	0	0	0	-1	-1	0	0	0	1	1	0	2	2	-1	-1	0	0	0	
			Likelihood	-5	-5	0	-1	-1	3	3	0	2	2	4	4	0	4	4	4	4	0	4	4	
			Severity	-2	-2	0	0	0	3	3	0	4	4	3	3	0	4	4	3	3	0	4	4	
Amenity (travel quality and aesthetics)	Strategic direction of key move	Fit for purpose	Alignment with place and movement guide	-2	-2	0	0	0	1	1	0	1	1	1	1	0	2	2	3	3	0	3	3	
	To provide quality travel options	Intensification and urban form	Encouragement of modes based on look and feel	-4	-5	0	3	0	2	0	0	0	0	3	2	0	1	0	4	4	0	3	0	
		Effects on biodiversity and other natural resources	Impacts on biodiversity, areas of sensitive natural and cultural interest	0	0	0	0	0	1	1	0	0	0	0	2	1	0	0	0	3	3	0	0	0
Accessibility	Provide alternative mode options to private vehicles	Promotion of alternative modes	Achieve a high LOS for pedestrians and cyclists	-1	-1	0	0	0	3	3	0	0	0	3	3	0	0	0	3	3	0	0	0	
			Accessibility for vulnerable users	-5	-5	-5	0	0	2	2	0	0	0	0	0	3	2	0	0	0	4	4	0	0
		Active mode and public transport mode share (combined) compared to private vehicles	Number of active mode and public transport trips (combined) compared to private vehicle trips	0	0	0	0	0	2	1	0	0	0	0	3	2	0	0	0	4	3	0	0	0
	Access to transport and mobility is equitable for all people	Walking, cycling and micromobility network coverage and useability	Extent to which option improves the walking, cycling and micromobility network coverage	-4	-4	0	0	0	2	2	0	0	0	0	3	3	0	0	0	4	4	0	0	0
			Ability to connect to Te Awa Cycleway	Extent to which option improves the walking, cycling connection to the Te Awa Cycleway	-1	-1	0	0	0	2	2	0	1	1	3	3	0	1	1	4	4	0	2	2
		Transport choice available for all people living in Ngāruawāhia to access the main street	Extent to which option improves alternative mode choice	0	0	0	0	0	2	2	2	1	0	3	3	2	2	0	5	5	4	3	0	
		Access to the Police Station	Extent to which option allows the movement to and from the police station	0	0	0	3	3	3	3	0	2	2	3	3	0	-1	-1	5	5	0	3	1	
		Perception of safety (all users and vulnerable users)	Change in perception of safety and harm (all users and vulnerable users)	0	0	0	0	0	3	3	0	3	3	4	3	0	4	3	4	3	0	4	3	

THE MCA ASSESSMENT - SENSITIVITY TESTING

ASSESSMENT CRITERIA				OPTION: Do Nothing Retain Existing					Option 1 Raised tables on each leg					Option 2 Option 1 plus close Waikato Esplanade to traffic					Option 3 Dutch style roundabout				
Metric	Objective	Key Performance Indicator	Measure	Walking	Cycling	PT	Vehicles	Freight	Walking	Cycling	PT	Vehicles	Freight	Walking	Cycling	PT	Vehicles	Freight	Walking	Cycling	PT	Vehicles	Freight
Mobility	Ease of Access to the town centre for all walking and cycling and service delivery modes	Service delivery trucks	Impact on medium to large trucks' movement at this intersection to access the businesses on Jesmond Street	0	0	0	0	0	0	0	0	0	-2	0	0	0	0	-2	0	0	0	0	-2
		People on foot and people on bikes	Extent to which option improves the walking and cycling priority to access the town centre	0	0	0	0	0	2	2	0	0	0	3	3	0	0	0	4	4	0	0	0
Cost/feasibility efficiency performance measures	Feasibility	Existing infrastructure used or reallocated to provide multimodal outcomes	Extent to which existing infrastructure can be used/reallocated to provide multimodal outcomes	0	0	0	0	0	4	4	0	4	4	4	4	0	3	3	-2	-2	0	-3	-3
		Engineering Feasibility	Assessment of constructability	0	0	0	0	0	4	4	0	4	4	4	4	0	4	4	0	-1	0	-5	-4
		Economic Impact	Access to business and employment	0	0	0	0	0	2	2	0	0	0	3	2	0	-2	0	4	4	0	4	4
	Stakeholders	Assessment of likely stakeholder impact	-2	-1	0	2	0	2	1	0	1	-2	3	2	0	0	-2	4	4	0	1	-2	
	Cost	Cost	Assessment of capital cost of infrastructure improvements	0	0	0	0	0	-1	-1	0	-1	-1	-3	-3	0	-3	-3	-4	-4	0	-4	-4
	Impacts on Te Ao Māori	Impacts on Te Ao Māori	Assessment of impact on Te Ao Māori including areas of significance for Māori, Māori land and Kaitiakitanga	0	0	0	0	0	4	3	0	2	0	4	3	0	2	0	4	4	0	3	0
SCORE				-31.5	-30.5	-5	10.5	3.5	51.5	45.5	2	26.5	15.5	66	57	2	23	13	71.5	68.5	4	25.5	5.5
Total, equal weights per measure				-53					141					161					175				

THE MCA ASSESSMENT - SENSITIVITY TESTING

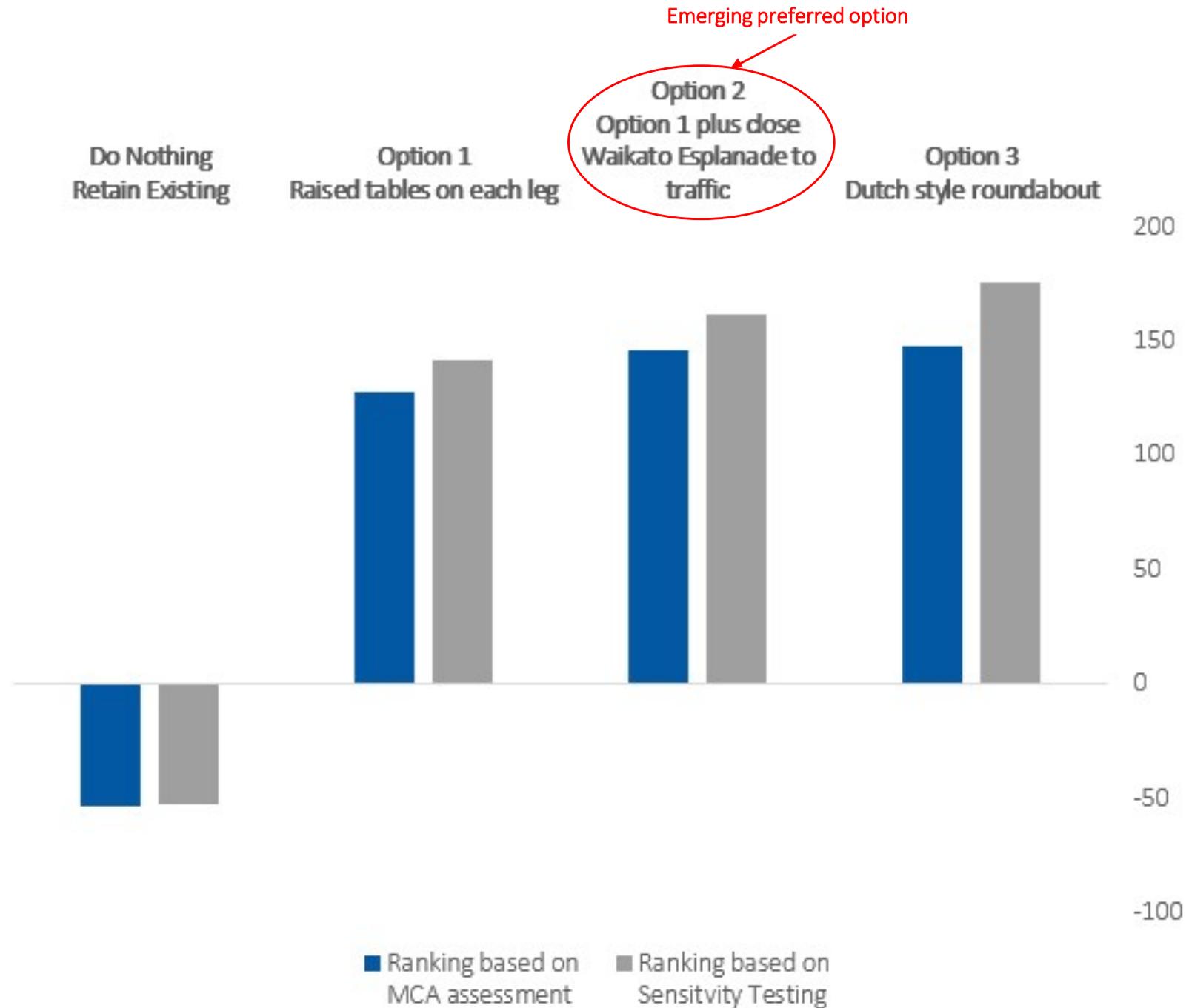
ASSESSMENT CRITERIA				OPTION: Do Nothing Retain Existing				Option 1 Raised tables on each leg				Option 2 Option 1 plus close Waikato Esplanade to traffic				Option 3 Dutch style roundabout				
Metric	Objective	Key Performance Indicator	Measure	Walking	Cycling	Vehicles	Freight	Walking	Cycling	Vehicles	Freight	Walking	Cycling	Vehicles	Freight	Walking	Cycling	Vehicles	Freight	
Safety	To reduce deaths and serious injuries	Road safety risk assessment rating	Exposure	-1	-1	0	0	-1	-1	0	0	1	1	2	2	1	1	2	2	
			Likelihood	-5	-5	-1	-1	3	3	2	2	4	4	4	4	4	4	4	4	4
			Severity	-2	-2	0	0	3	3	4	4	3	3	4	4	3	3	4	4	4
Amenity (travel quality and aesthetics)	Strategic direction of key move	Fit for purpose	Alignment with place and movement guide	-2	-2	0	0	1	1	1	1	1	1	2	2	3	3	3	3	
	To provide quality travel options	Intensification and urban form	Encouragement of modes based on look and feel	-4	-5	3	0	2	0	0	0	3	2	1	0	4	4	3	0	
		Effects on biodiversity and other natural resources	Impacts on biodiversity, areas of sensitive natural and cultural interest	0	0	0	0	1	1	0	0	2	1	0	0	3	3	0	0	
Accessibility	Provide alternative mode options to private vehicles	Promotion of alternative modes	Achieve a high LOS for pedestrians and cyclists	-2	-3	0	0	3	3	0	0	3	3	0	0	4	4	0	0	
			Accessibility for vulnerable users	-5	-5	0	0	2	2	0	0	3	2	0	0	4	4	0	0	
		Active mode and public transport mode share (combined) compared to private vehicles	Number of active mode and public transport trips (combined) compared to private vehicle trips	0	0	0	0	2	1	0	0	3	2	0	0	4	3	0	0	
	Access to transport and mobility is equitable for all people	Walking, cycling and micromobility network coverage and useability	Extent to which option improves the walking, cycling and micromobility network coverage	-4	-4	0	0	2	2	0	0	3	3	0	0	4	4	0	0	
		Ability to connect to Te Awa Cycleway	Extent to which option improves the walking, cycling connection to the Te Awa Cycleway	-1	-1	0	0	2	2	0	0	3	3	0	0	4	4	0	0	
		Transport choice available for all people living in Ngāruawāhia to access the main street	Extent to which option improves alternative mode choice	0	0	0	0	2	2	1	0	3	3	2	0	5	5	3	0	

Assessment update

MCA scoring

The MCA assessment takes into account the following:

- Exposure: The level of exposure remains the same for all options as the risks are the same.
- Likelihood: With the introduction of designated crossing facilities, the likelihood of incidents reduces.
- Severity: The severity of incidents decreases with traffic calming measures.
- Pedestrian friendly facilities: The more pedestrian-friendly facilities there are, the more attractive active modes of transportation will be. This will also decrease the attractiveness of cars.
- PT movement: There will be no public transportation movement through the intersection.
- Improved connection: Traffic calming and pedestrian facilities will improve the connection to other pedestrian-friendly facilities and walkways.
- Police service vehicles only: Option 3 will restrict movements to police service vehicles only (drive-way).
- Truck's preference: Trucks are likely to dislike speed tables.
- Improved access: Options 2-4 will improve walking and cycling access to the town center.
- Complexity: Constraints increase the complexity of design.
- Negative impact: Closing one of the approaches is likely to result in negative perceptions from businesses.
- Humps: Cars, especially freight (large trucks), are unlikely to like humps.
- Cost: Options become progressively more expensive.
- Impact of roundabout: The impact of a roundabout on land and runoff is higher.
- Redistribution of land: If road space for vehicles is reduced, there will be redistribution of land for people.



Assessment update

MCA scoring

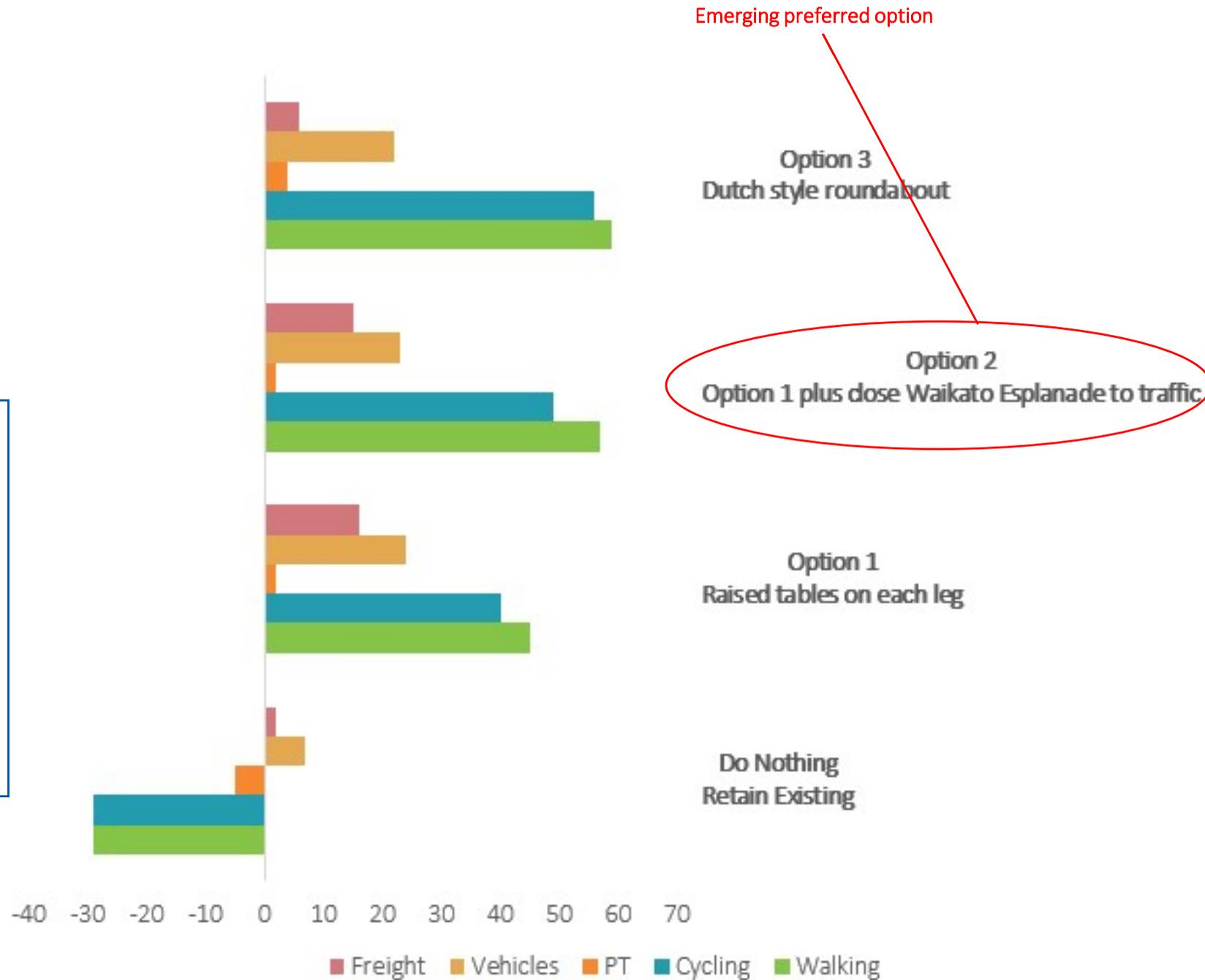
- MCA scores by mode

THE MCA ASSESSMENT SUMMARY

The dutch style roundabout was not considered further primarily due to feasibility issues. Given the number of approaches with two of them having slip lanes, a much larger roundabout is required to safely accommodate the five approaches. This would require more than the available road reserve space available.

Between option 1 and option 2, the option which proposes closing off Waikato Esplanade from accessing the intersection, Option 2, scored most favorably.

Option 2 was therefore selected and confirmed with WDC as the preferred option to be progressed to design.



Appendix E-3.4

**JESMOND STREET INTERSECTIONS WITH
GREAT SOUTH ROAD AND NEWCASTLE STREET**

DESIGN OF PREFERRED OPTION

NGĀRUAWĀHIA, HOPUHOPU AND TAUPIRI TRANSPORTATION ASSESSEMENT

JESMOND STREET INTERSECTIONS

CONCEPT DESIGNS

Project No.: WADC001

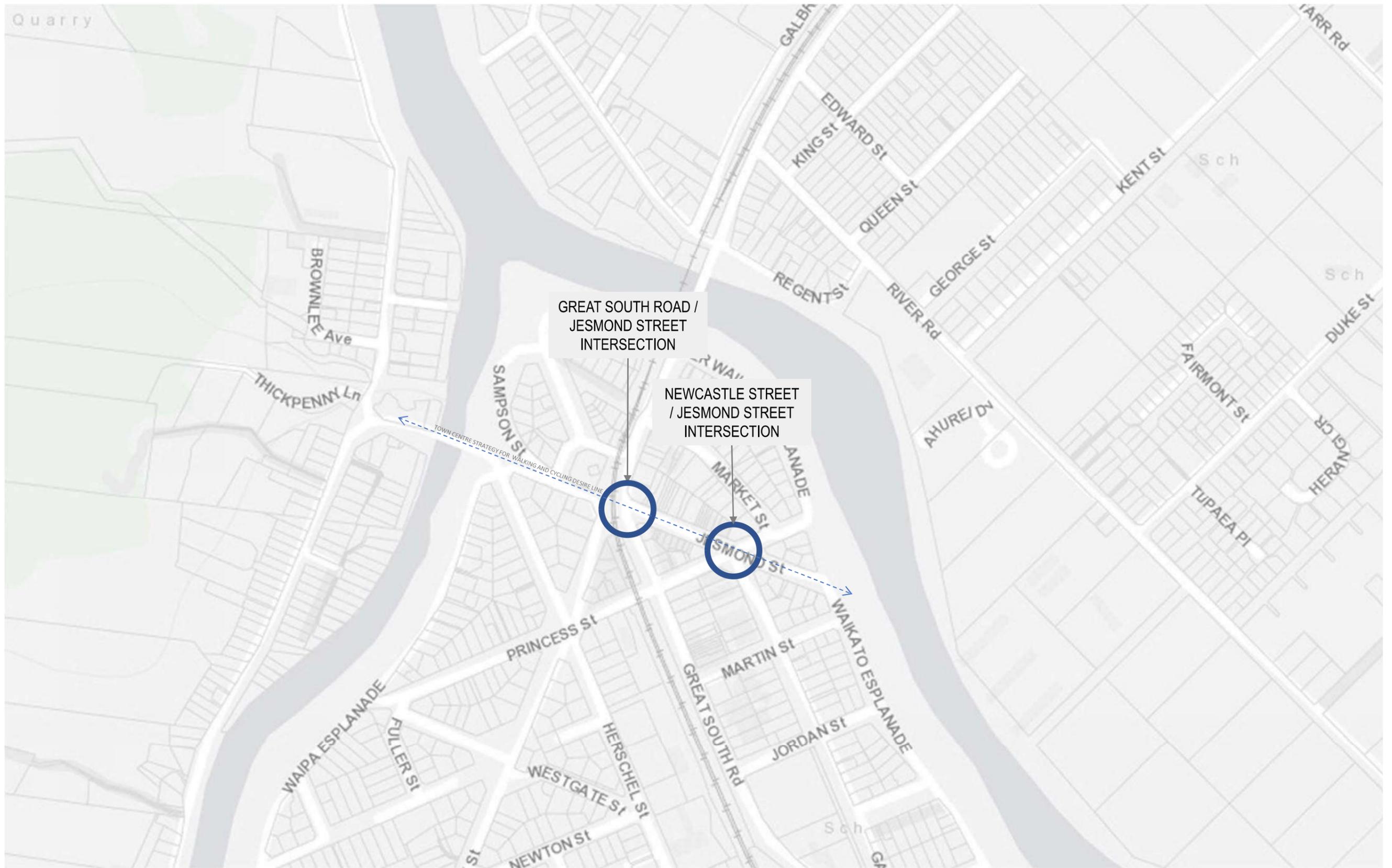
Date: October 2023

flow

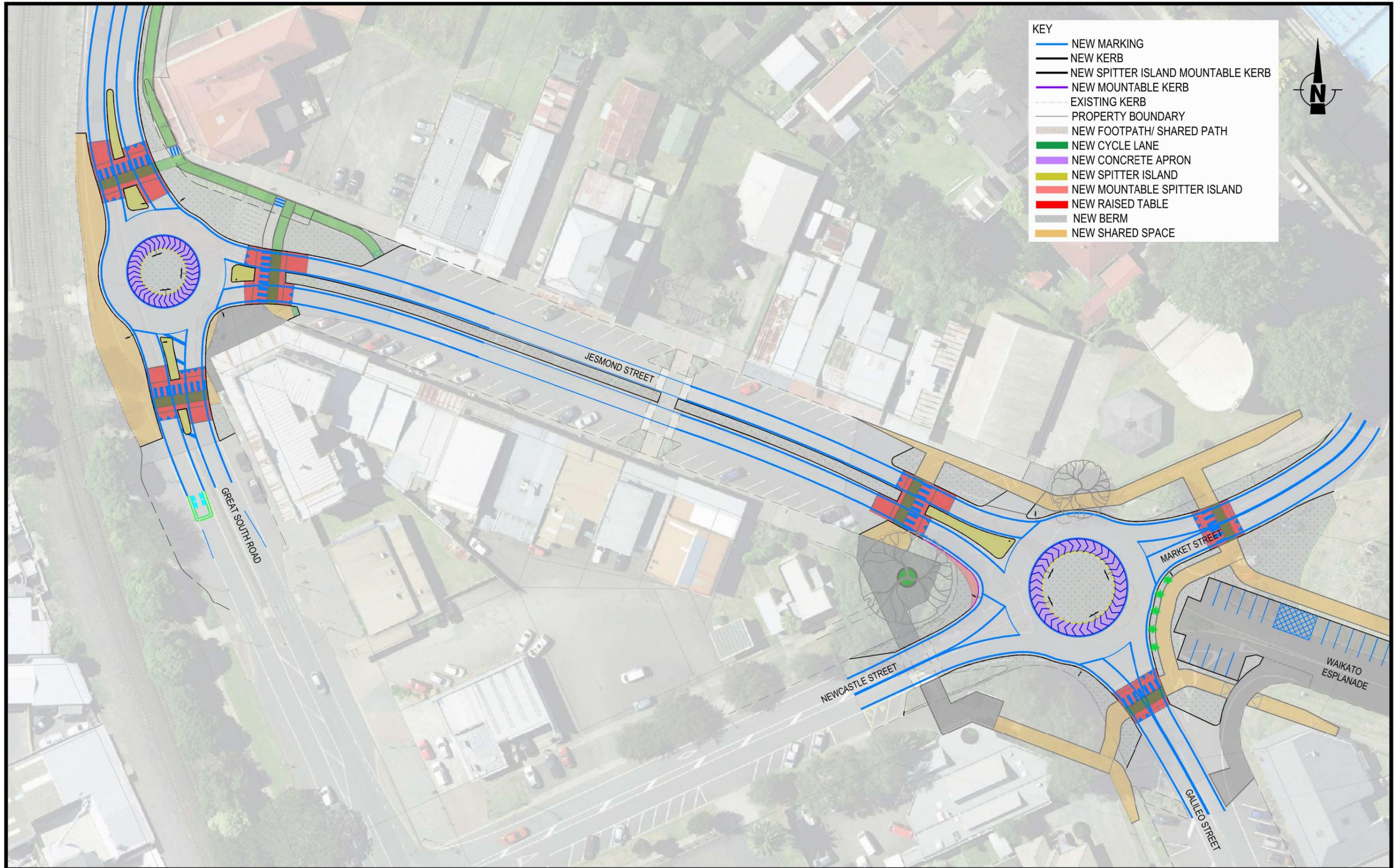
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LOCATION OF JESMOND STREET INTERSECTIONS



KEY

- NEW MARKING
- NEW KERB
- NEW SPITTER ISLAND MOUNTABLE KERB
- NEW MOUNTABLE KERB
- - - EXISTING KERB
- PROPERTY BOUNDARY
- NEW FOOTPATH/ SHARED PATH
- NEW CYCLE LANE
- NEW CONCRETE APRON
- NEW SPITTER ISLAND
- NEW MOUNTABLE SPITTER ISLAND
- NEW RAISED TABLE
- NEW BERM
- NEW SHARED SPACE



REV	AMENDMENT	DATE OF ISSUE	DESIGN: MWP	DRAWN: MWP
A	First Issue	03/10/2023	CHECKED: SC	DATE: 13/10/2023
B	Updated with dimensions	13/10/2023	SCALE: 0 20m NOT TO SCALE	

CLIENT: WAIKATO DISTRICT COUNCIL
 PROJECT: TRANSPORT ASSESSMENT OF NGĀRUAWĀHIA, HOPUHOPU & TAUPIRI
 LOCATION: JESMOND STREET, NGĀRUAWĀHIA

CONCEPT DESIGN

SHEET TITLE: **PROPOSED INTERSECTION LAYOUT
 JESMOND STREET INTERSECTIONS**

DRAWING NUMBER: WADC01-JES-CD01-B

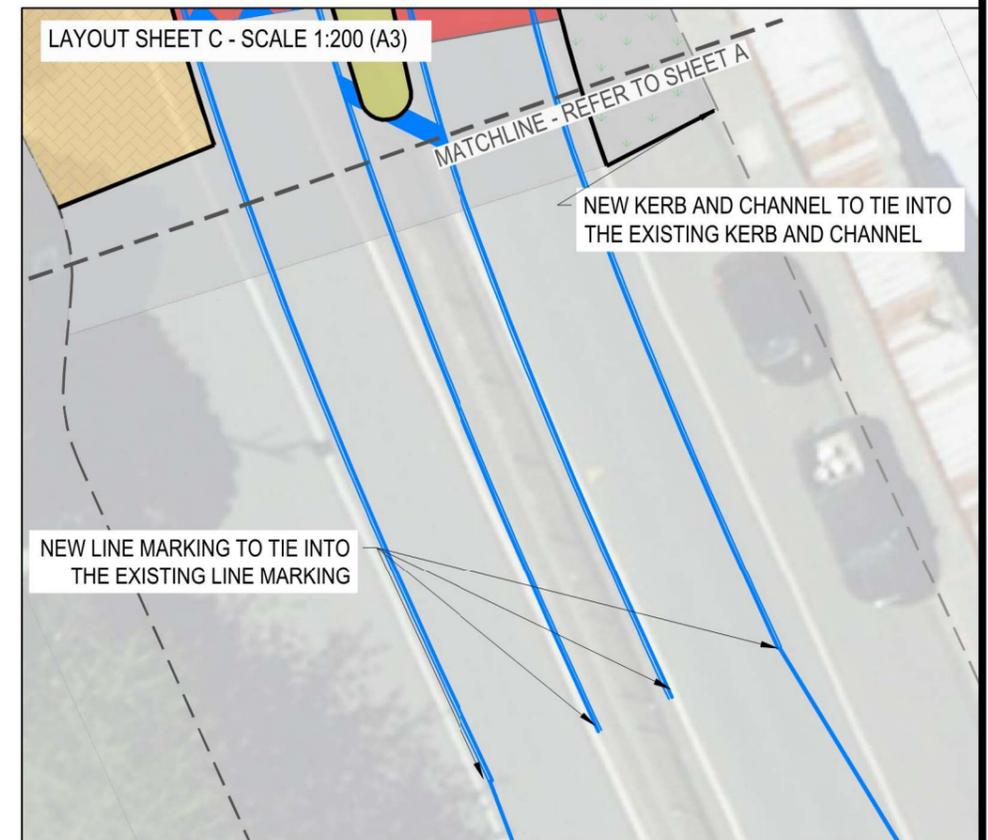
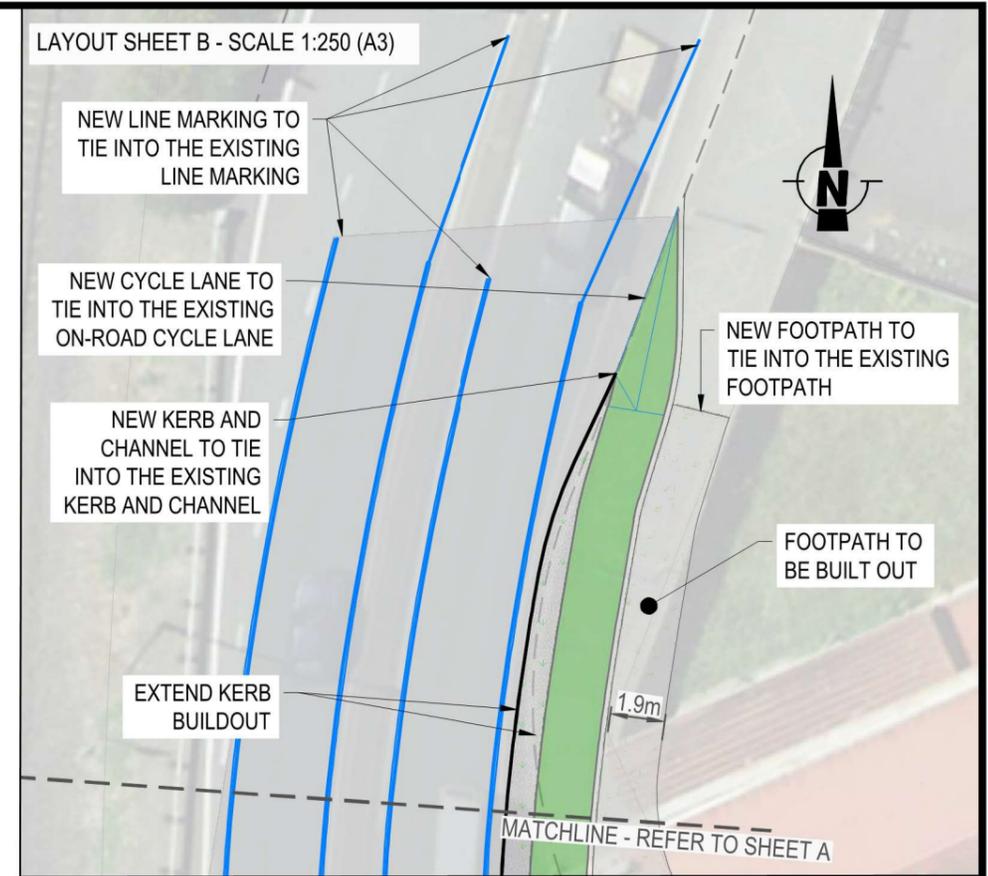
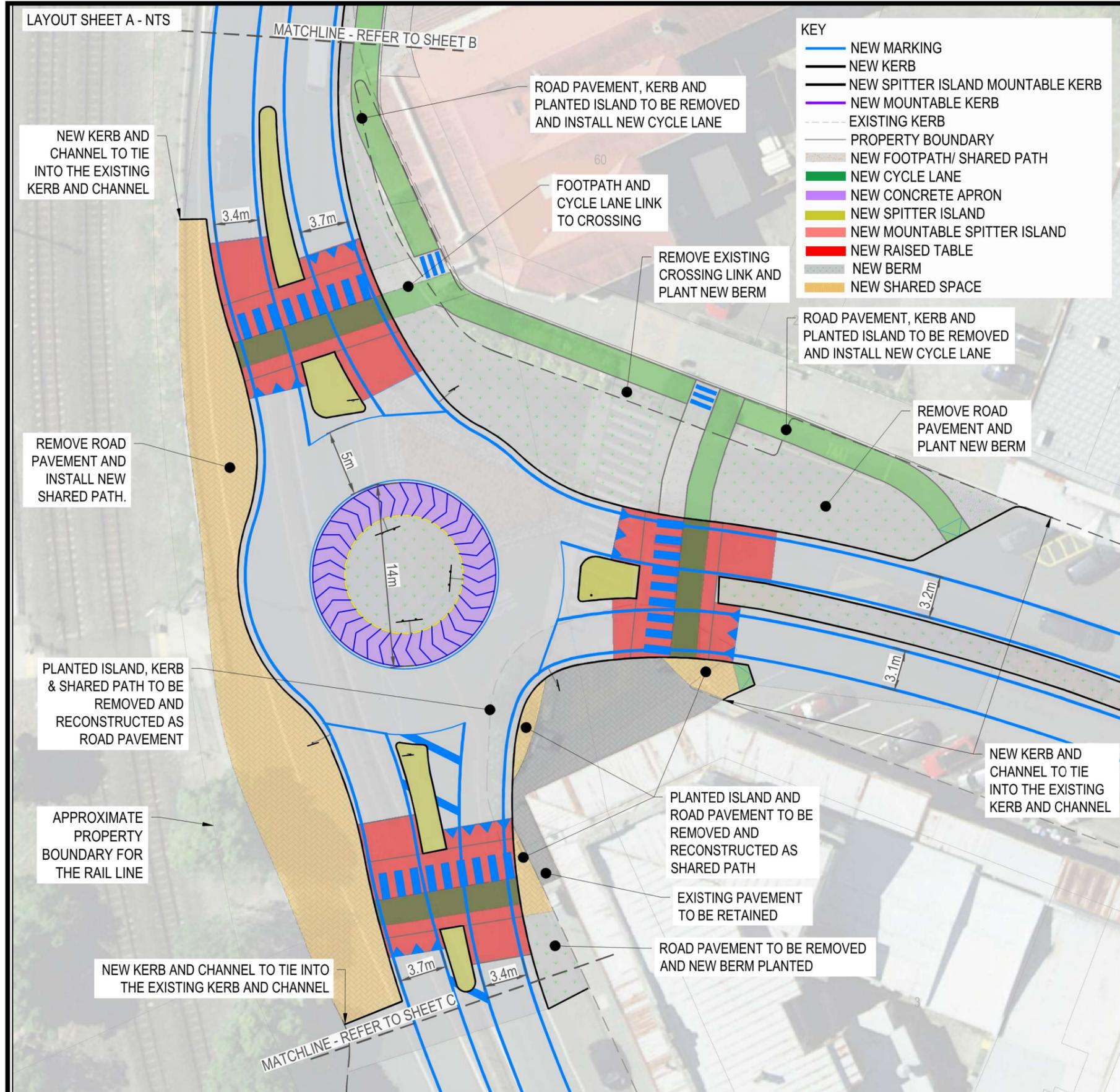
SHEET: **01** of 14

REV: **A**

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A	First Issue	03/10/2023	CHECKED: SC	DATE: 13/10/2023
B	Updated with dimensions	13/10/2023		

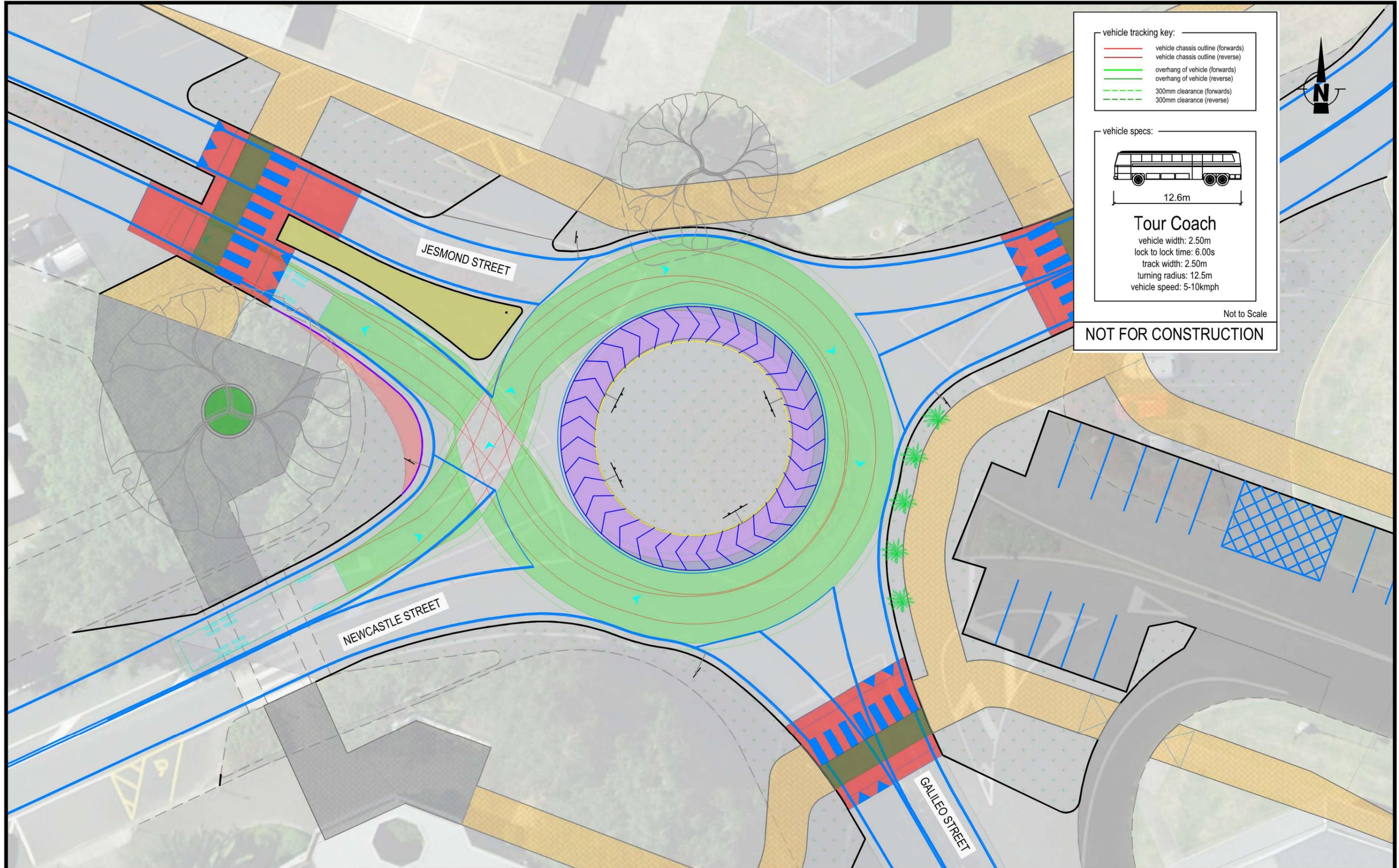
SCALE: 0 10m
NOT TO SCALE

CLIENT: WAIKATO DISTRICT COUNCIL
 PROJECT: TRANSPORT ASSESSMENT OF NGĀRUAWĀHIA, HOPUHOPU & TAUPIRI
 LOCATION: JESMOND STREET, NGARUAWAHIA
CONCEPT DESIGN

SHEET TITLE: **GENERAL LAYOUT**
 DRAWING NUMBER: WADC01-JES-CD01-B

SHEET: 02 of 14
 REV: A

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vehicle tracking key:

- vehicle chassis outline (forwards)
- vehicle chassis outline (reverse)
- overhang of vehicle (forwards)
- overhang of vehicle (reverse)
- - - 300mm clearance (forwards)
- - - 300mm clearance (reverse)

vehicle specs:

Tour Coach
 vehicle width: 2.50m
 lock to lock time: 6.00s
 track width: 2.50m
 turning radius: 12.5m
 vehicle speed: 5-10kmph

Not to Scale

NOT FOR CONSTRUCTION

REV	AMENDMENT	DATE OF ISSUE	DESIGN: MWP	DRAWN: MWP
A	First Issue	03/10/2023	CHECKED: SC	DATE: 13/10/2023
B	Updated with dimensions	13/10/2023		
		SCALE: 0 10m		
		1:250 @ A3		

CLIENT: WAIKATO DISTRICT COUNCIL
 PROJECT: TRANSPORT ASSESSMENT OF NGĀRUAWĀHIA, HOPUHOPI & TAUPIRI
 LOCATION: JESMOND STREET, NGĀRUAWĀHIA

CONCEPT DESIGN

SHEET TITLE: **VEHICLE TRACKING**

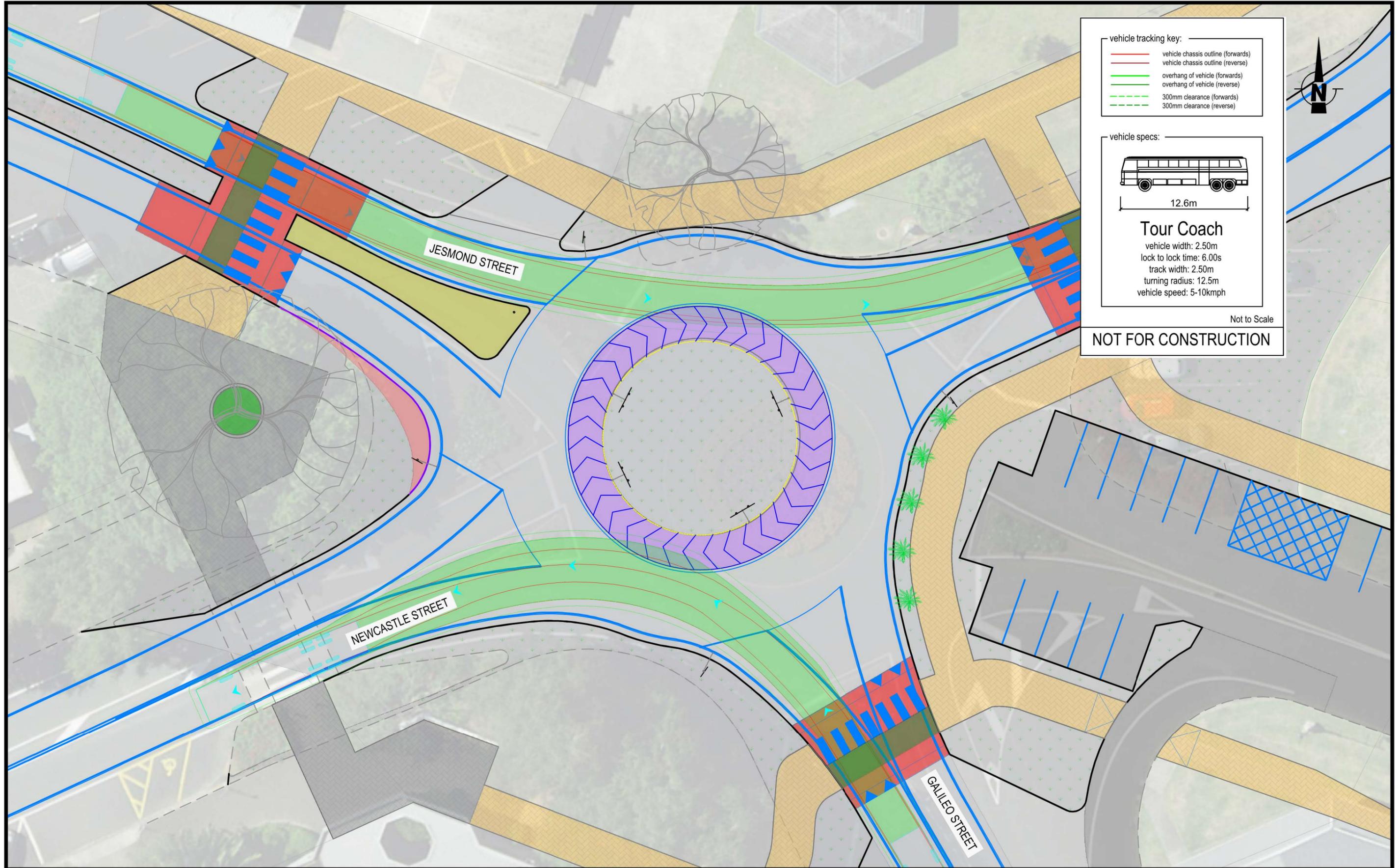
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SHEET: **04** of 14

REV: **A**

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vehicle tracking key:

- vehicle chassis outline (forwards)
- vehicle chassis outline (reverse)
- overhang of vehicle (forwards)
- overhang of vehicle (reverse)
- 300mm clearance (forwards)
- 300mm clearance (reverse)

vehicle specs:

Tour Coach
 vehicle width: 2.50m
 lock to lock time: 6.00s
 track width: 2.50m
 turning radius: 12.5m
 vehicle speed: 5-10kmph

Not to Scale

NOT FOR CONSTRUCTION

REV	AMENDMENT	DATE OF ISSUE	DESIGN: MWP	DRAWN: MWP
A	First Issue	03/10/2023	CHECKED: SC	DATE: 13/10/2023
B	Updated with dimensions	13/10/2023		

SCALE: 0 10m

1:250 @ A3

CLIENT: WAIKATO DISTRICT COUNCIL
 PROJECT: TRANSPORT ASSESSMENT OF NGĀRUAWĀHIA, HOPUHOPU & TAUPIRI
 LOCATION: JESMOND STREET, NGĀRUAWĀHIA

CONCEPT DESIGN

SHEET TITLE: **VEHICLE TRACKING**

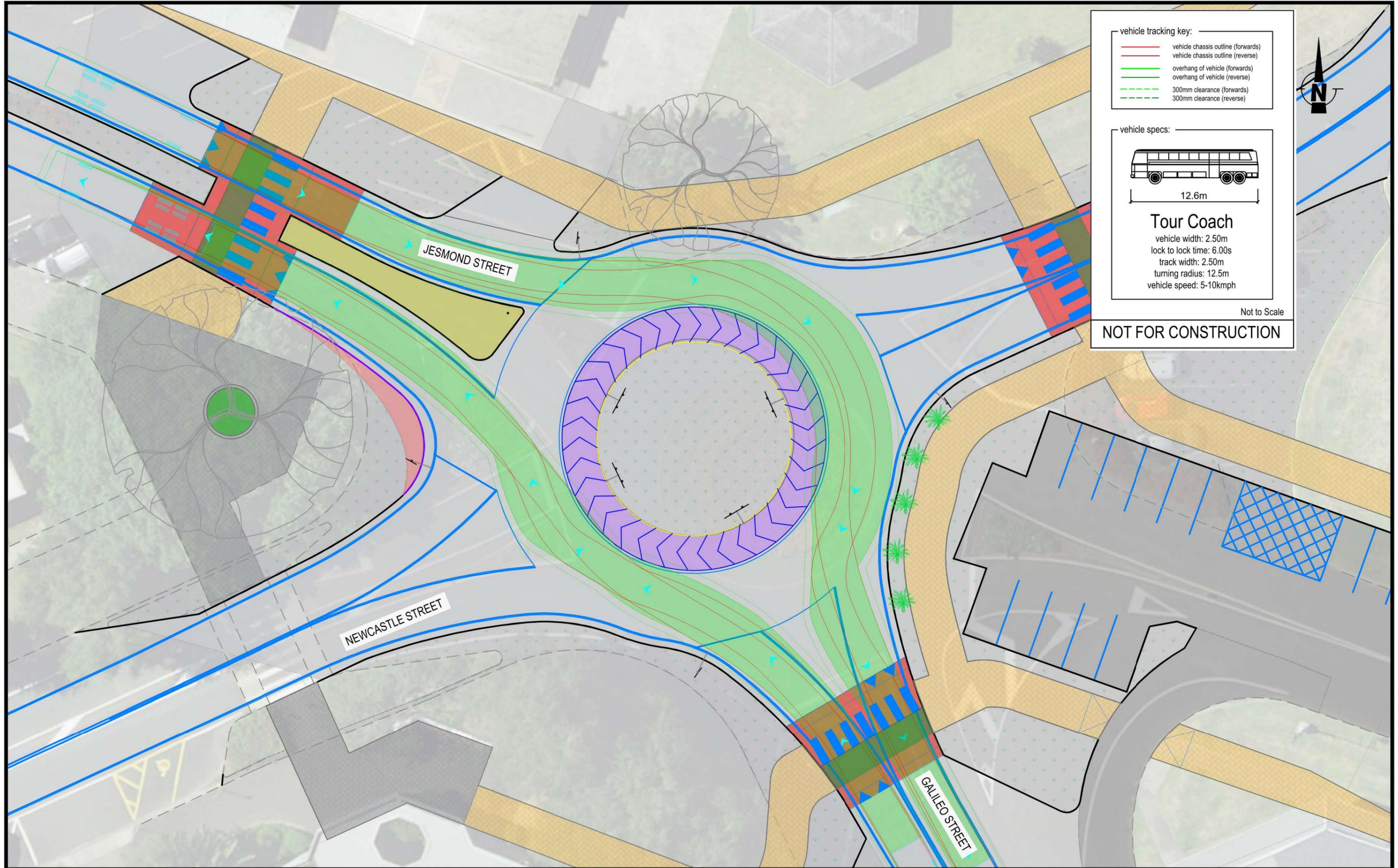
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SHEET: **06** of 14

REV: **A**

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vehicle tracking key:

- vehicle chassis outline (forwards)
- vehicle chassis outline (reverse)
- overhang of vehicle (forwards)
- overhang of vehicle (reverse)
- - - 300mm clearance (forwards)
- - - 300mm clearance (reverse)

vehicle specs:

Tour Coach
 vehicle width: 2.50m
 lock to lock time: 6.00s
 track width: 2.50m
 turning radius: 12.5m
 vehicle speed: 5-10kmph

Not to Scale

NOT FOR CONSTRUCTION

REV	AMENDMENT	DATE OF ISSUE	DESIGN: MWP	DRAWN: MWP
A	First Issue	03/10/2023	CHECKED: SC	DATE: 13/10/2023
B	Updated with dimensions	13/10/2023		
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			1:250 @ A3	

CLIENT: WAIKATO DISTRICT COUNCIL
 PROJECT: TRANSPORT ASSESSMENT OF NGĀRUAWĀHIA, HOPUHOPI & TAUPIRI
 LOCATION: JESMOND STREET, NGĀRUAWĀHIA

CONCEPT DESIGN

SHEET TITLE: **VEHICLE TRACKING**

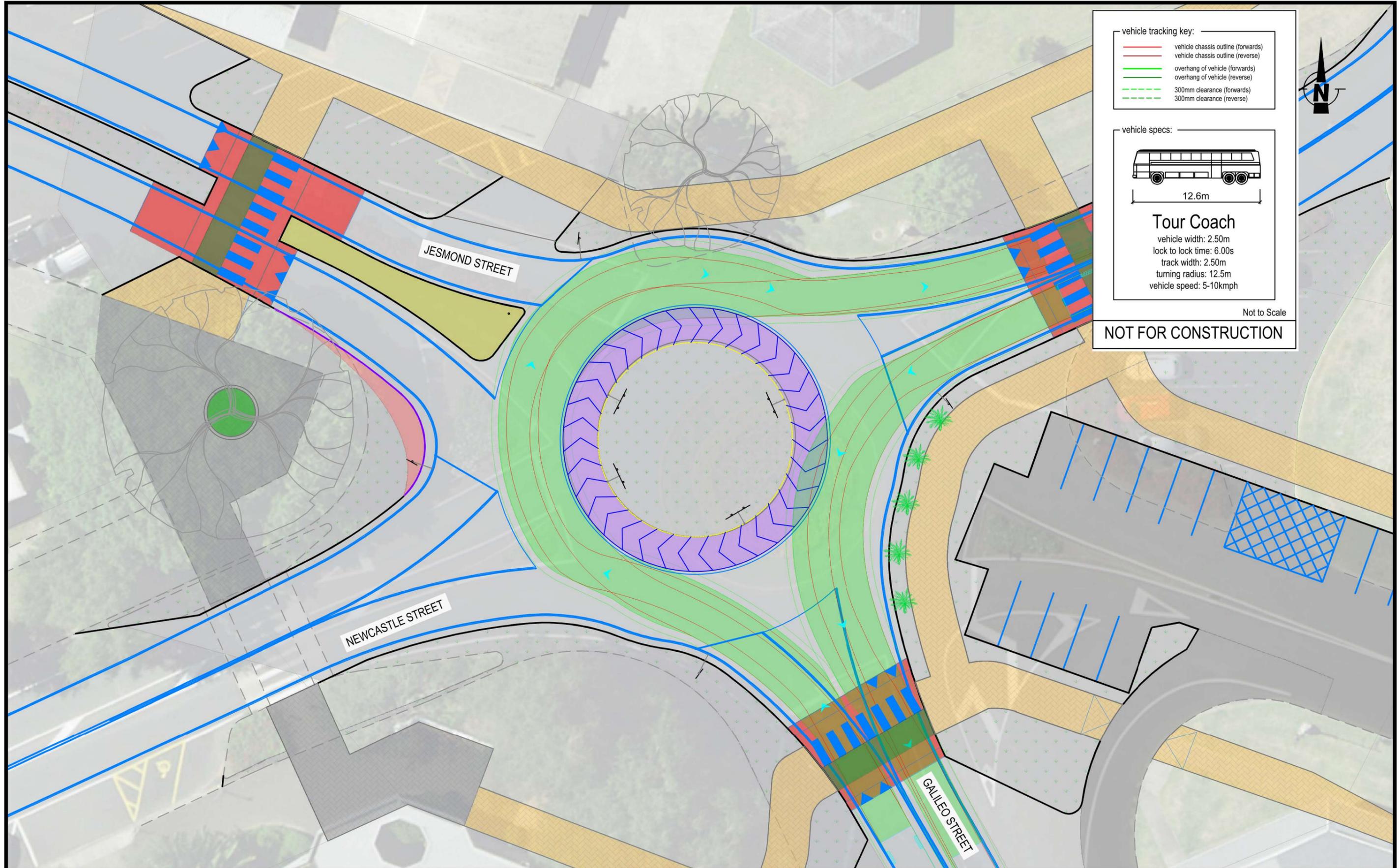
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SHEET: **07** of 14

REV: **A**

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vehicle tracking key:

- vehicle chassis outline (forwards)
- vehicle chassis outline (reverse)
- overhang of vehicle (forwards)
- overhang of vehicle (reverse)
- 300mm clearance (forwards)
- 300mm clearance (reverse)

vehicle specs:

Tour Coach
 vehicle width: 2.50m
 lock to lock time: 6.00s
 track width: 2.50m
 turning radius: 12.5m
 vehicle speed: 5-10kmph

Not to Scale

NOT FOR CONSTRUCTION

REV	AMENDMENT	DATE OF ISSUE	DESIGN: MWP	DRAWN: MWP
A	First Issue	03/10/2023	CHECKED: SC	DATE: 13/10/2023
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			1:250 @ A3	

CLIENT: WAIKATO DISTRICT COUNCIL
 PROJECT: TRANSPORT ASSESSMENT OF NGĀRUAWĀHIA, HOPUHOPI & TAUPIRI
 LOCATION: JESMOND STREET, NGĀRUAWĀHIA

CONCEPT DESIGN

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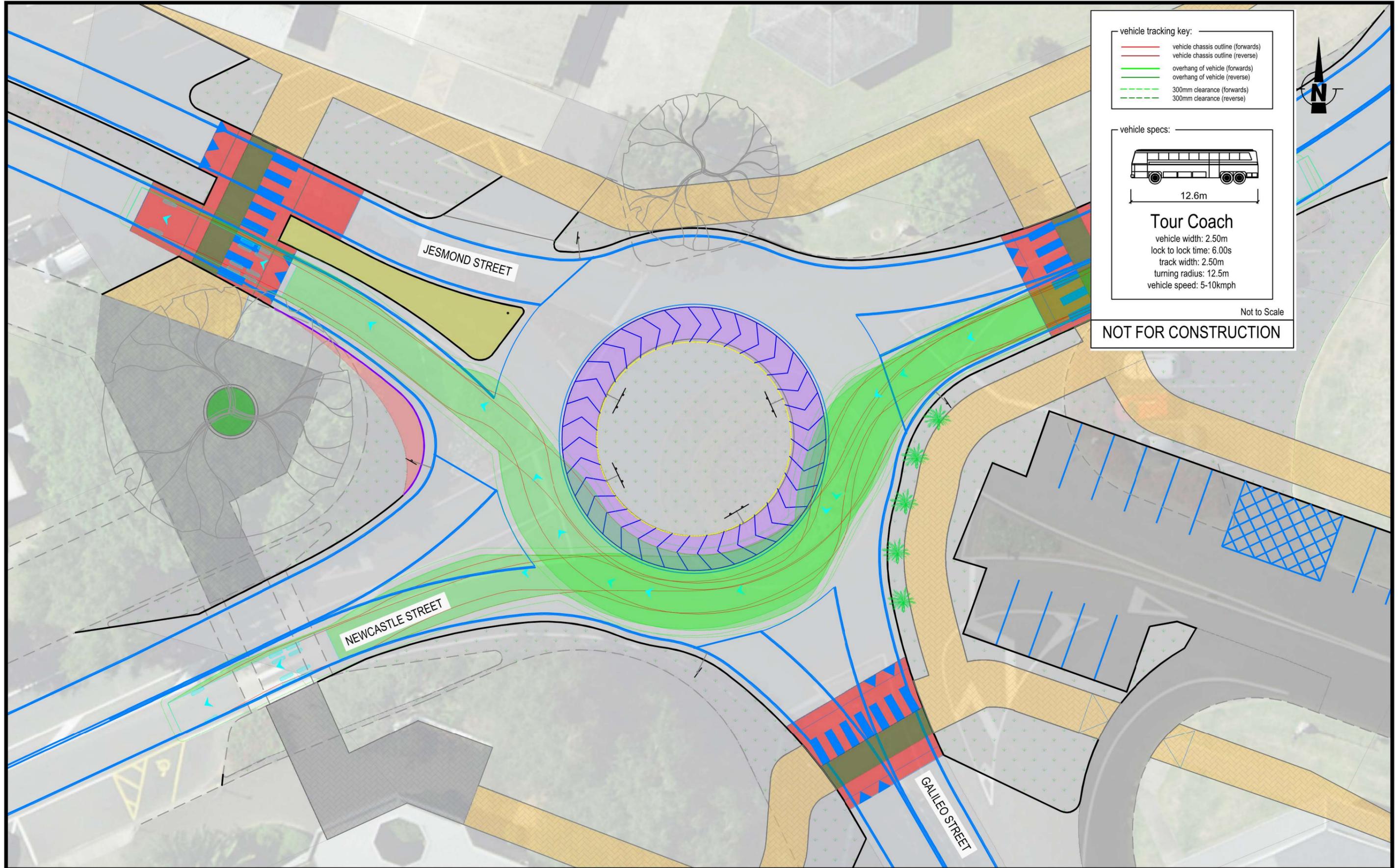
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SHEET: **08** of 14

REV: **A**

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vehicle tracking key:

- vehicle chassis outline (forwards)
- vehicle chassis outline (reverse)
- overhang of vehicle (forwards)
- overhang of vehicle (reverse)
- 300mm clearance (forwards)
- 300mm clearance (reverse)

vehicle specs:

Tour Coach
 vehicle width: 2.50m
 lock to lock time: 6.00s
 track width: 2.50m
 turning radius: 12.5m
 vehicle speed: 5-10kmph

Not to Scale

NOT FOR CONSTRUCTION

REV	AMENDMENT	DATE OF ISSUE	DESIGN: MWP	DRAWN: MWP
A	First Issue	03/10/2023	CHECKED: SC	DATE: 13/10/2023
B	Updated with dimensions	13/10/2023		
		SCALE: 0 10m		
		1:250 @ A3		

CLIENT: WAIKATO DISTRICT COUNCIL
 PROJECT: TRANSPORT ASSESSMENT OF NGĀRUAWĀHIA, HOPUHOPI & TAUPIRI
 LOCATION: JESMOND STREET, NGĀRUAWĀHIA

CONCEPT DESIGN

SHEET TITLE: **VEHICLE TRACKING**

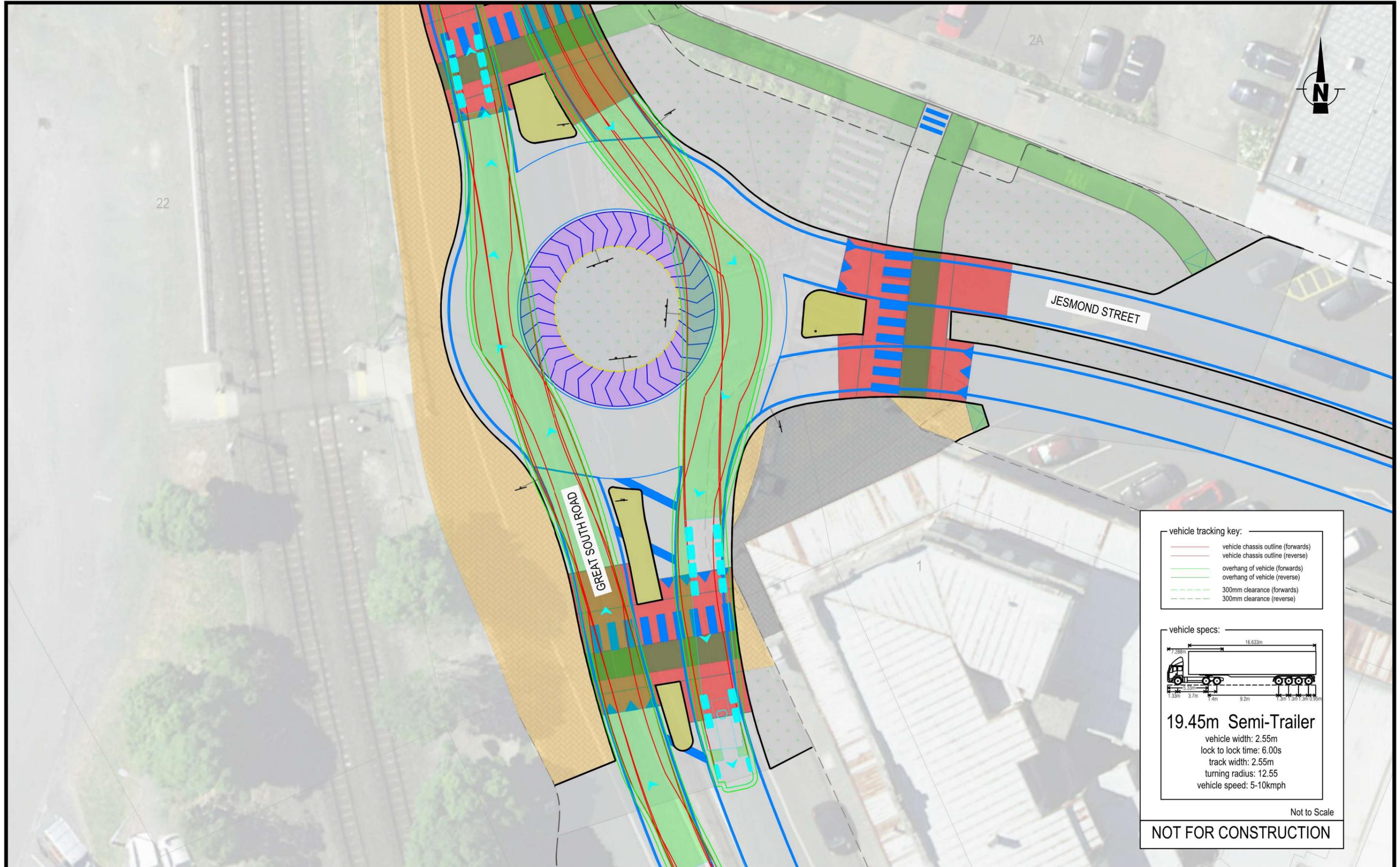
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SHEET: **09** of 14

REV: **A**

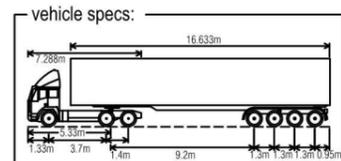
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vehicle tracking key:

	vehicle chassis outline (forwards)
	vehicle chassis outline (reverse)
	overhang of vehicle (forwards)
	overhang of vehicle (reverse)
	300mm clearance (forwards)
	300mm clearance (reverse)



19.45m Semi-Trailer
 vehicle width: 2.55m
 lock to lock time: 6.00s
 track width: 2.55m
 turning radius: 12.55
 vehicle speed: 5-10kmph

Not to Scale

NOT FOR CONSTRUCTION

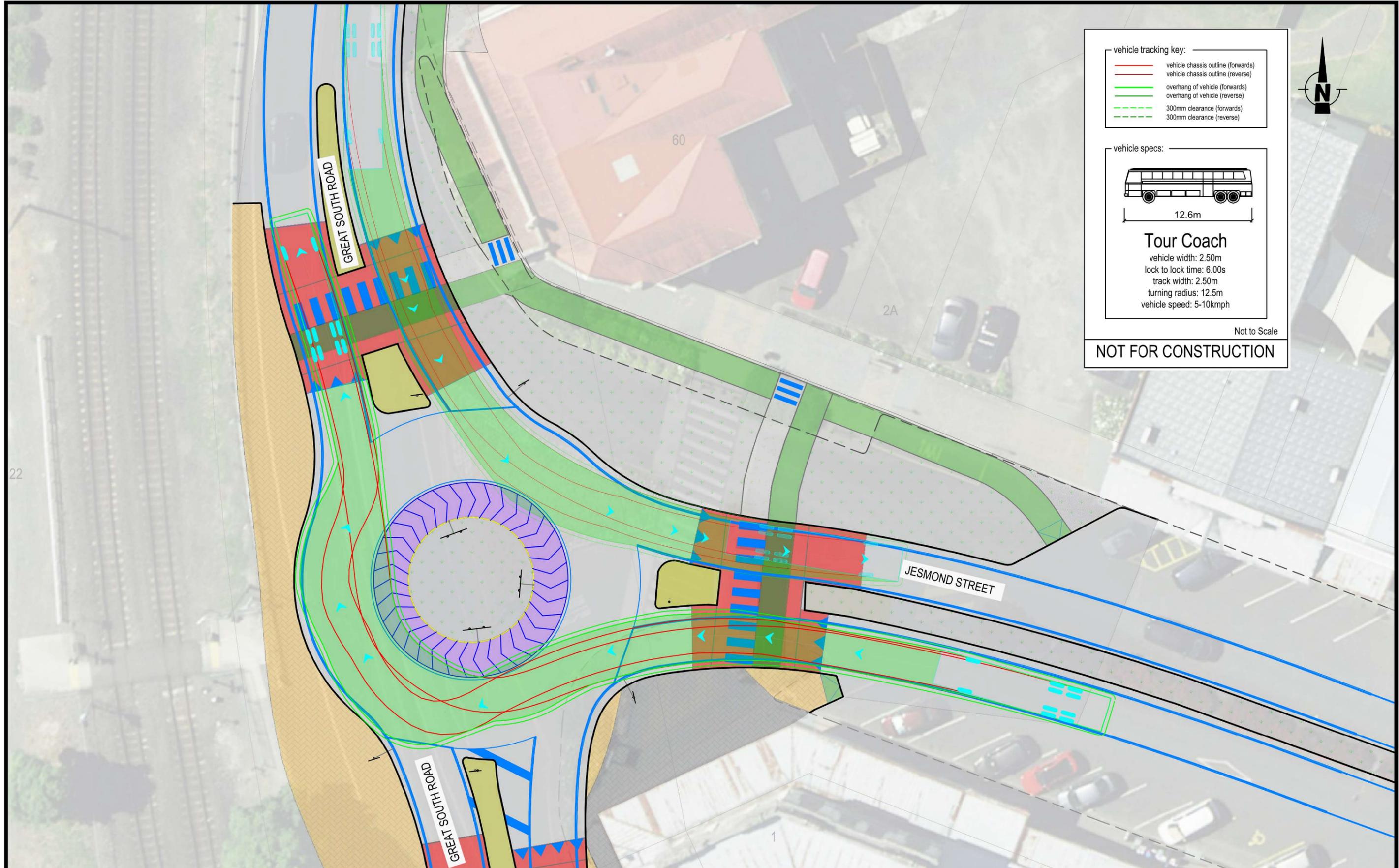
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B	Updated with dimensions	13/10/2023	SCALE: 0 10m	
1:250 @ A3				

CLIENT: WAIKATO DISTRICT COUNCIL
 PROJECT: TRANSPORT ASSESSMENT OF NGĀRUAWĀHIA, HOPUHOPI & TAUPIRI
 LOCATION: JESMOND STREET, NGARUAWAHIA
CONCEPT DESIGN

SHEET TITLE: **VEHICLE TRACKING**
 DRAWING NUMBER: WADC01-JES-CD01-B

SHEET: 10 of 14
 REV: A

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vehicle tracking key:

- vehicle chassis outline (forwards)
- vehicle chassis outline (reverse)
- overhang of vehicle (forwards)
- overhang of vehicle (reverse)
- - - 300mm clearance (forwards)
- - - 300mm clearance (reverse)

vehicle specs:

Tour Coach
 vehicle width: 2.50m
 lock to lock time: 6.00s
 track width: 2.50m
 turning radius: 12.5m
 vehicle speed: 5-10kmph

Not to Scale

NOT FOR CONSTRUCTION

22

REV	AMENDMENT	DATE OF ISSUE	DESIGN: MWP	DRAWN: MWP
A	First Issue	03/10/2023	CHECKED: SC	DATE: 13/10/2023
B	Updated with dimensions	13/10/2023	SCALE: 0 10m	
		1:250 @ A3		

CLIENT: WAIKATO DISTRICT COUNCIL
 PROJECT: TRANSPORT ASSESSMENT OF NGĀRUAWĀHIA, HOPUHOPI & TAUPIRI
 LOCATION: JESMOND STREET, NGARUAWAHIA

CONCEPT DESIGN

SHEET TITLE: **VEHICLE TRACKING**

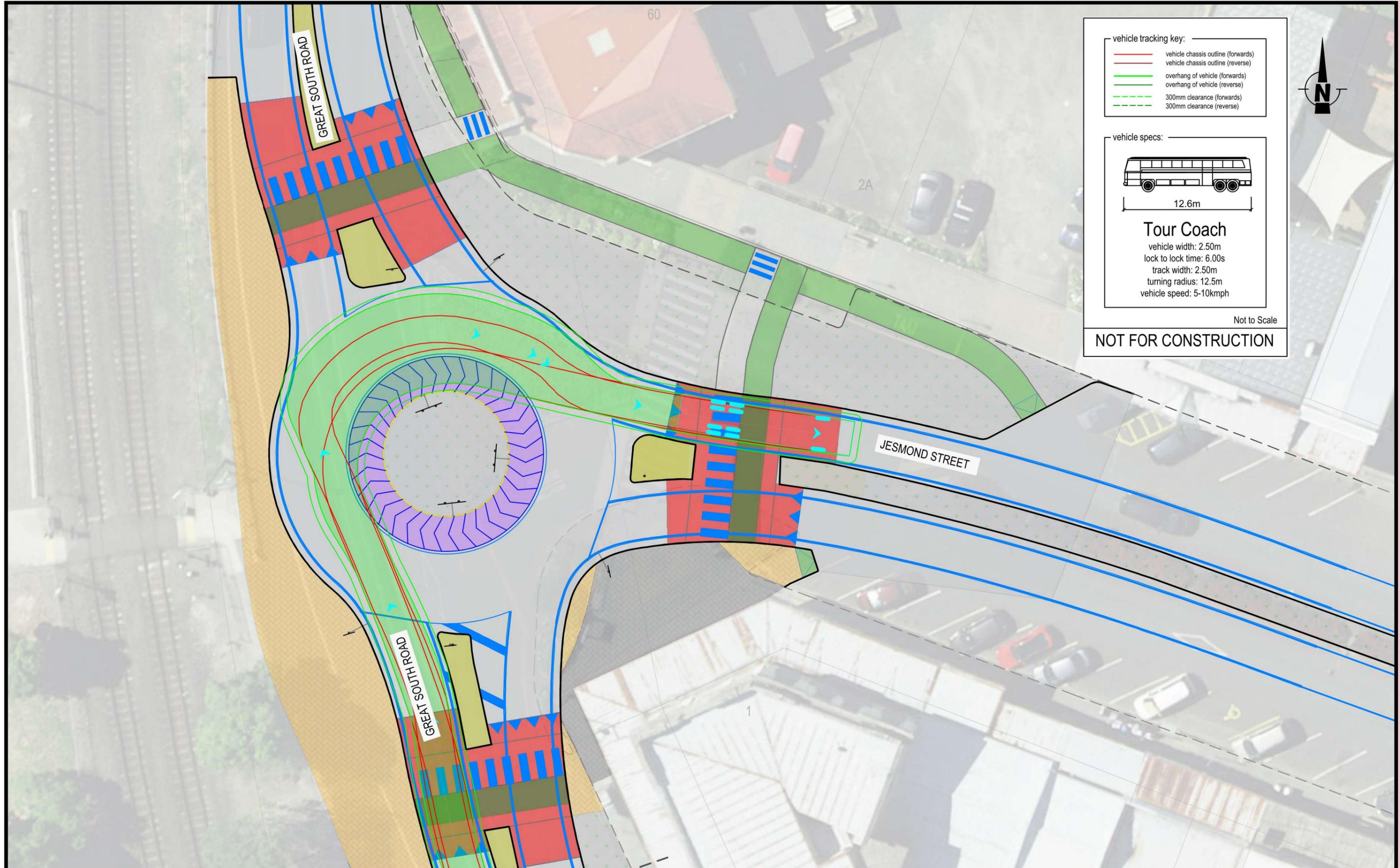
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SHEET: 11 of 14

REV: A

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vehicle tracking key:

- vehicle chassis outline (forwards)
- vehicle chassis outline (reverse)
- overhang of vehicle (forwards)
- overhang of vehicle (reverse)
- 300mm clearance (forwards)
- 300mm clearance (reverse)

vehicle specs:

Tour Coach
 vehicle width: 2.50m
 lock to lock time: 6.00s
 track width: 2.50m
 turning radius: 12.5m
 vehicle speed: 5-10kmph

Not to Scale

NOT FOR CONSTRUCTION

REV	AMENDMENT	DATE OF ISSUE
A	First Issue	03/10/2023
B	Updated with dimensions	13/10/2023

DESIGN:	MWP	DRAWN:	MWP
CHECKED:	SC	DATE:	13/10/2023
SCALE:		0 10m	
		1:250 @ A3	

CLIENT: WAIKATO DISTRICT COUNCIL
 PROJECT: TRANSPORT ASSESSMENT OF NGĀRUAWĀHIA, HOPUHOPI & TAUPIRI
 LOCATION: JESMOND STREET, NGARUAWAHIA

CONCEPT DESIGN

SHEET TITLE: **VEHICLE TRACKING**

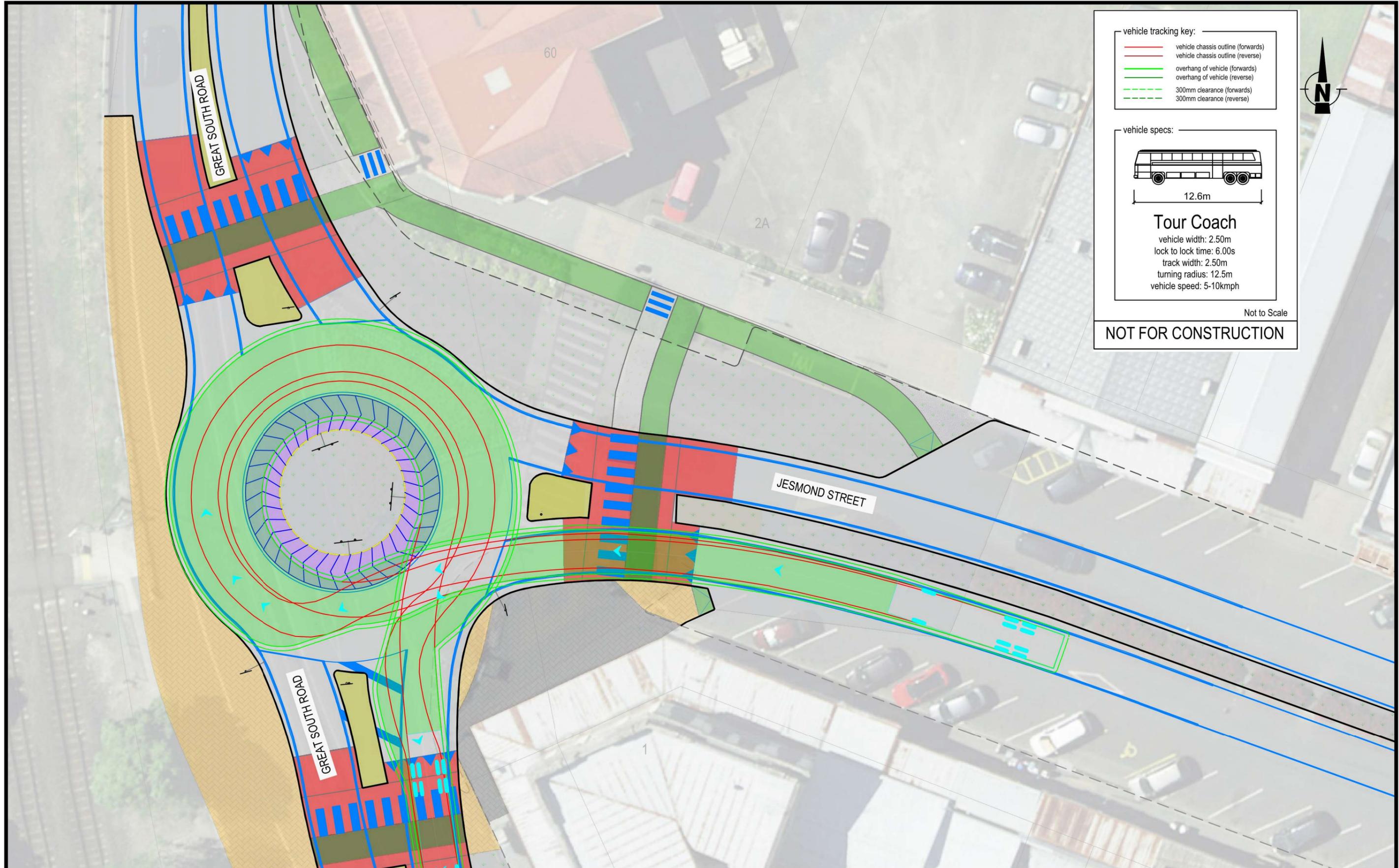
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SHEET: 12 of 14

REV: A

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vehicle tracking key:

- vehicle chassis outline (forwards)
- vehicle chassis outline (reverse)
- overhang of vehicle (forwards)
- overhang of vehicle (reverse)
- - - 300mm clearance (forwards)
- - - 300mm clearance (reverse)

vehicle specs:

Tour Coach
 vehicle width: 2.50m
 lock to lock time: 6.00s
 track width: 2.50m
 turning radius: 12.5m
 vehicle speed: 5-10kmph

Not to Scale

NOT FOR CONSTRUCTION

REV	AMENDMENT	DATE OF ISSUE	DESIGN: MWP	DRAWN: MWP
A	First Issue	03/10/2023	CHECKED: SC	DATE: 13/10/2023
B	Updated with dimensions	13/10/2023		
		SCALE: 0 10m		
		1:250 @ A3		

CLIENT: WAIKATO DISTRICT COUNCIL
 PROJECT: TRANSPORT ASSESSMENT OF NGĀRUAWĀHIA, HOPUHOPI & TAUPIRI
 LOCATION: JESMOND STREET, NGARUAWAHIA

CONCEPT DESIGN

SHEET TITLE: **VEHICLE TRACKING**

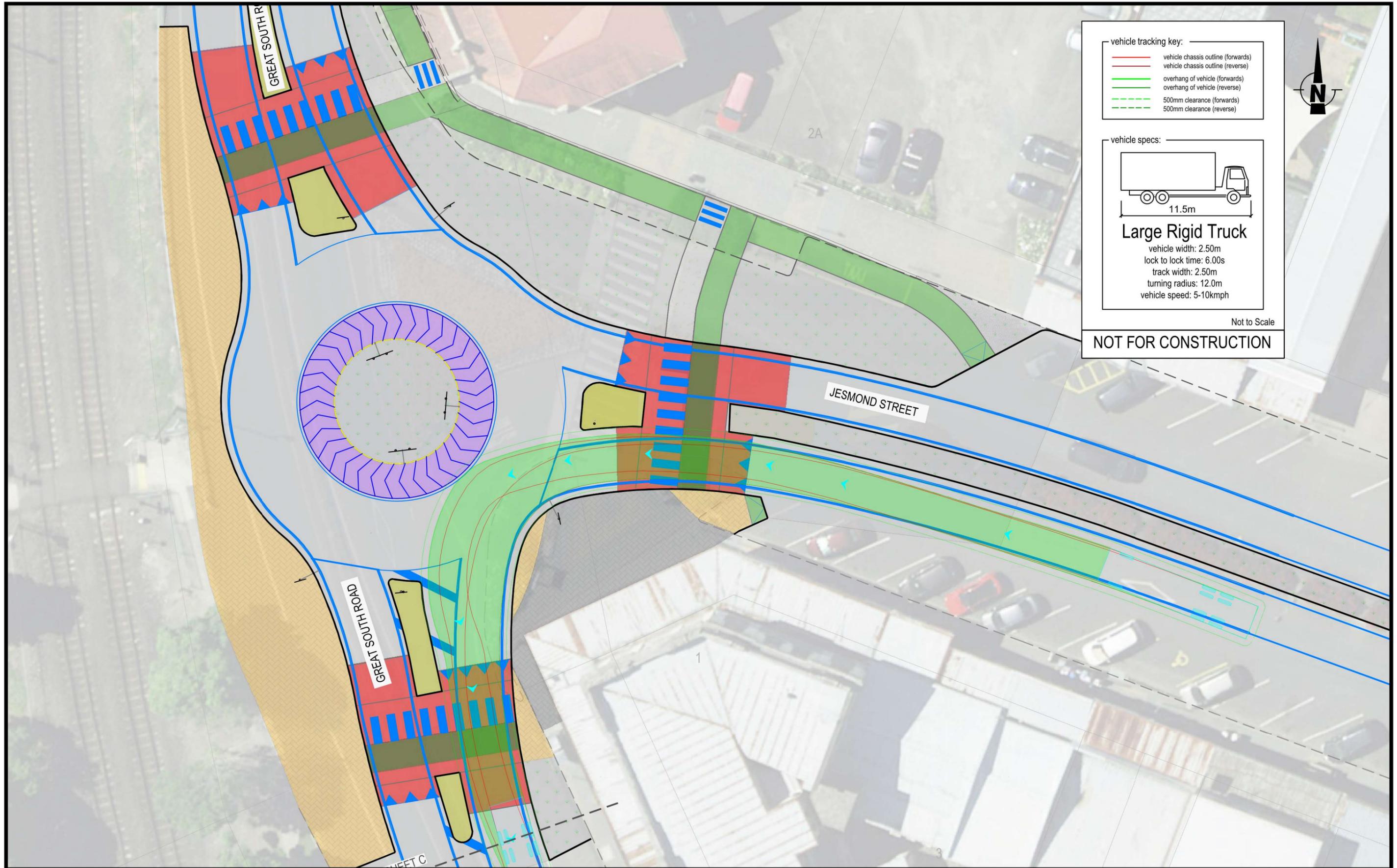
DRAWING NUMBER: WADC01-JES-CD01-B

SHEET: 13 of 14

REV: A

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vehicle tracking key:

- vehicle chassis outline (forwards)
- vehicle chassis outline (reverse)
- overhang of vehicle (forwards)
- overhang of vehicle (reverse)
- - - 500mm clearance (forwards)
- - - 500mm clearance (reverse)

vehicle specs:

Large Rigid Truck
 vehicle width: 2.50m
 lock to lock time: 6.00s
 track width: 2.50m
 turning radius: 12.0m
 vehicle speed: 5-10kmph

Not to Scale

NOT FOR CONSTRUCTION



REV	AMENDMENT	DATE OF ISSUE	DESIGN: MWP	DRAWN: MWP
A	First Issue	03/10/2023	CHECKED: SC	DATE: 13/10/2023
B	Updated with dimensions	13/10/2023		
SCALE: 0 10m			1:250 @ A3	

CLIENT: WAIKATO DISTRICT COUNCIL
 PROJECT: TRANSPORT ASSESSMENT OF NGĀRUAWĀHIA, HOPUHOPU & TAUPIRI
 LOCATION: JESMOND STREET, NGARUAWAHIA

CONCEPT DESIGN

SHEET TITLE: **VEHICLE TRACKING**

DRAWING NUMBER: WADC01-JES-CD01-B

SHEET: 14 of 14

REV: A

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Appendix E-3.5

**JESMOND STREET INTERSECTIONS WITH
GREAT SOUTH ROAD AND NEWCASTLE STREET**

COST ESTIMATES

Memorandum

To Sharmin Choudhury, Flow NZ
From Morgan Raby, Alta
Date 26 January 2024
Reference J000624
Subject Ngāruawāhia, Hopuhopu and Taupiri Transportation Assessment– Cost Estimate

Dear Sharmin,

Alta has been engaged by Flow NZ to provide a cost estimate for the upgrade of two intersections in Ngāruawāhia, the Waikato region. Figure 1 below shows the plan view of the two intersections to be upgraded. On the left of Figure 1 is the Great South Road (GSR)/ Jesmond Street T intersection upgrade to a roundabout. On the right is the upgrade of an existing five-legged roundabout that intersects Jesmond Street, Newcastle Street, Market Street, Galileo Street and Waikato Esplanade.

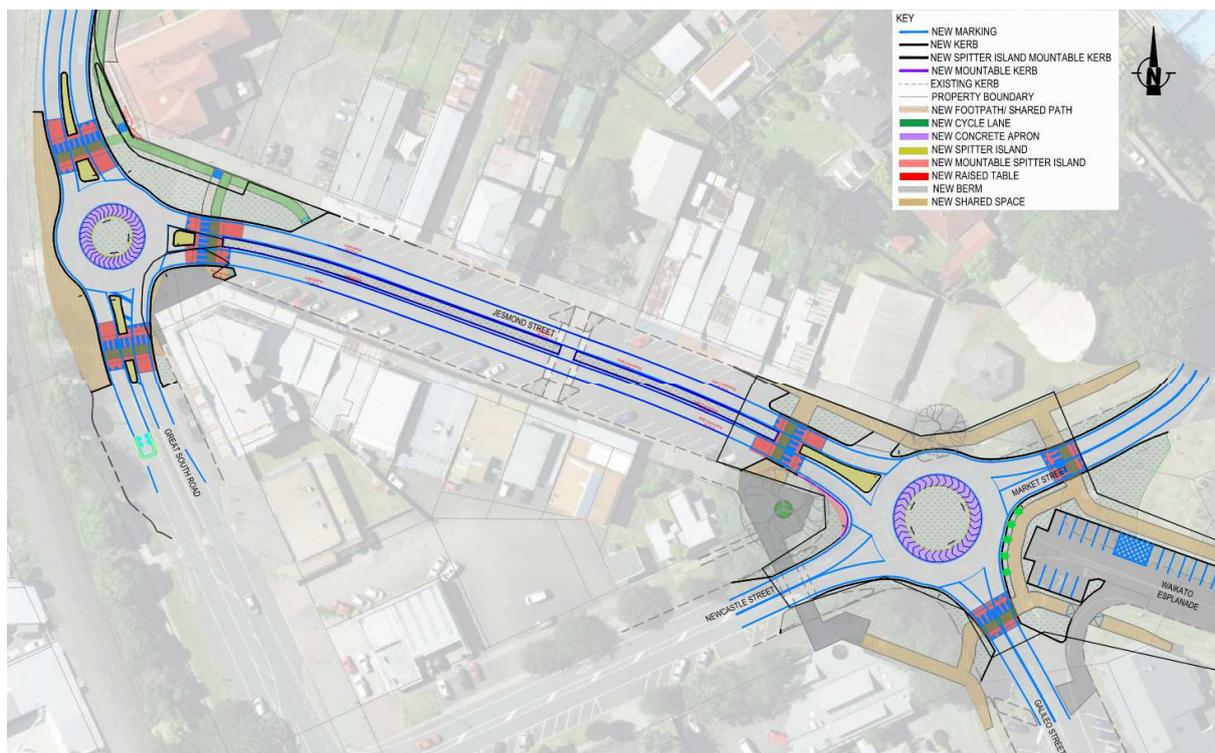


Figure 1 – Overall site plan – GSR/ Jesmond St Intersection and the 5-legged Roundabout Proposed Upgrade

In Brief

The scope of works covered by this estimate is listed below:

- Site Clearance
- Earthworks
- Utilities
- Stormwater

- Traffic Services
- Pavement
- Landscaping
- TTM & Temporary Works
- Preliminary and General
- Offsite Overheads

Estimate Summary

The estimate was prepared based on the project brief provided by Flow NZ, concept design drawings, and Alta assumptions stated in this memorandum. The estimate has a base date of November 2023. All rates and prices are current as of November 2023 and no allowance has been made for any future cost escalation.

Our project cost estimate for the GSR/ Jesmond Street Upgrade is:



Our project cost estimate for the Five-Legged Roundabout Upgrade is:



Project Base Estimate

Base Estimate is the sum of the elements that make up an estimate. It is the cost of the known work which excludes contingencies and escalation.

Project Expected Estimate (p50)

The project expected estimate is the base estimate plus an allowance for contingency. It is the statistical mean of the project's estimated cost after including threat and opportunity risk costs.

95th Percentile Project Estimate (p95)

95th Percentile Project Estimate or Funding Risk allowance includes an additional provision for known/unknown risk between the Expected and 95th Percentile Estimates. This allowance is to cover the difference between the statistical mean and the statistical 95th percentile of threats and opportunities.

CONTINGENCY

We have made allowance for contingency against each element of works which has then been calculated as a weighted average across the project.

The split between base estimate and contingency is noted in the assumptions below. Note that the cost estimate is aligned with the current concept design, and any significant change to the scope will not be covered in the current budget.

- We have applied a contingency of 35% to the Base Estimate to derive the expected estimate (P50).
- An additional 25% has been added to the expected estimate to derive the P95 Funding Risk Contingency estimate.

Assumptions and Allowances

DOCUMENTS PROVIDED

The estimate was developed based on the following information provided by Flow NZ:

- WADC01-JES-CD01-B Concept Design Drawings 1, 2 and 3.
- Cost estimate – Alta Queries and Flow responses, email dated 16.11.2023.
- Proposed rail crossing, email dated 21.11.2023.

SITE CLEARANCE

- General site clearance has been allowed for, this involves removing debris, rubbish, and tidying up the work area prior to construction.
- All existing street furniture and lighting is assumed to be relocated rather than removed and replaced.
- Only one of the existing phone boxes at the GSR/ Jesmond St intersection will be relocated as it clashes with the proposed pedestrian crossing, the other phone box will remain as is.
- The existing guardrail at GSR/ Jesmond Street intersection, at the location of the proposed shared path, will be removed and a new terminal will be installed at the end of the shared path.

- It is assumed that all existing trees can remain, and an allowance has been made for the trimming of larger trees only.

EARTHWORKS

- All topsoil is assumed to be stockpiled on site and then spread from stockpile to complete the final landscaping.
- A small allowance, assumed to be 5% of the estimated total excavation has been allowed for contaminated land, and similarly 5% of the estimated total excavation has been allowed for undercut.

UTILITIES

- An allowance has been made to locate and expose existing services during construction and relocate services due to clashes with the proposed design.
- An allowance has been made to adjust the lid heights of existing utility lids due to change in finished level of the proposed design.

STORMWATER

- No allowance has been made to upgrade existing pipework.
- Two existing catchpits are to be relocated; it is assumed that they can be tied into existing manholes and no allowance has been made for new manholes.
- Rodding eyes have been allowed per 100m of subsoil.

TRAFFIC SERVICES

- Allowance has been made to install two new streetlights with beacon discs at each pedestrian crossing for the GSR/ Jesmond Street intersection.
- At the five-legged roundabout, an allowance has been made for two streetlights with beacon discs only at the Galileo Street pedestrian crossing. Due to existing street lighting, the remaining two crossings are assumed to have new beacon discs only.
- New road markings and the removal of existing road marking at both intersections has been included in this estimate.
- We have included an allowance for new signage, where required.
- At the GSR/ Jesmond Street intersection, an allowance has been made to construct a full safety upgrade at the existing rail crossing. This upgrade includes widening the existing crossing, tactiles, providing new automated pedestrian arms, fencing, signage, and new signals.

PAVEMENT

- New pavement has been allowed for the GSR/ Jesmond Street intersection only. Pavement makeup is assumed to be 300mm of Gap65 with 150mm of compacted AP40 basecourse and an asphalt topping.
- A small allowance has been made for testing and compacting the existing subgrade and to undercut for the construction of new pavement.
- Minor reshaping of the roundabout has been allowed at both intersections.
- Speed tables are assumed to be concrete.
- Pram crossings have been allowed at either end of each pedestrian crossing and as shown in the design drawings.
- Shared path paving is assumed to be standard brick paving.
- Cycleway makeup is 100mm of granular fill, with 50mm of AC10 green surfacing.

- Footpath makeup is 100mm of granular fill and a reinforced concrete topping.

LANDSCAPING

- Fencing has been allowed for the GSR/ Jesmond Street intersection; it has been detailed as per the Regional-Infrastructure-Technical-Specification (D3.8.9).
- An allowance has been made to maintain the landscaping throughout the estimated construction duration.
- The new tall plants shown in the five-legged roundabout design have been assumed to be low-cost hedge planting similar to Griselinia.
- A small lump sum has been allowed for new street furniture only, it is assumed that new bins and/ or seating will be required at the new shared space locations.

TRAFFIC MANAGEMENT AND TEMPORARY WORKS

- This item includes all temporary traffic management, traffic management crews, temporary traffic lights, VMS boards, barriers, signs, and fencing.
- Traffic management allowance is based on an assumed construction programme of 3.5 months per intersection. The traffic management crew make up is assumed to be 1 STMS, 2 TCs, and 1 TMA.

NON-CONSTRUCTION COSTS

- Non-construction costs are estimated as a percentage of the total construction direct costs.
- Preliminary and general equates to 18% of the direct costs.
- We have applied 12.5% uplift on all direct costs for off-site overheads and profit.



Yours sincerely,

Morgan Raby
Alta Consulting Ltd
022 388 5300

Reviewed by: [Tim Lancaster](#)

Appendix A – Estimate Schedule

Project Estimate - Form B

IBE

Project Name: Ngāruawāhia, Hopuhopu, Taupiri – Cost Estimate
GSR/ Jesmond Intersection Summary

Indicative Business Case Estimate

Item	Description	Base Estimate	Contingency	Funding Risk Contingency
A	Total Property Cost	Nil	Nil	Nil
B	Project Development Phase			
	- Consultancy Fees	\$ 151,400.00	\$ 53,000.00	\$ 37,900.00
	- WDC Managed Costs	\$ 60,600.00	\$ 21,200.00	\$ 15,200.00
	Total Project Development	\$ 212,000.00	\$ 74,200.00	\$ 53,100.00
C	Pre-Implementation Phase			
	- Consultancy Fees	\$ 90,800.00	\$ 31,800.00	\$ 22,700.00
	- WDC Managed Costs	\$ 60,600.00	\$ 21,200.00	\$ 15,200.00
	Total Pre-implementation	\$ 151,400.00	\$ 53,000.00	\$ 37,900.00
D	Implementation Phase			
	Implementation Fees			
	- Consultancy Fees	\$ 75,700.00	\$ 26,500.00	\$ 18,900.00
	- WDC Managed Costs	\$ 45,400.00	\$ 15,900.00	\$ 11,400.00
	Sub Total Base Implementation Fees	\$ 121,100.00	\$ 42,400.00	\$ 30,300.00
	Physical Works			
	1 Site Clearance	\$ 70,600.00	\$ 24,700.00	\$ 17,700.00
	2 Earthworks	\$ 13,265.00	\$ 4,600.00	\$ 3,300.00
	3 Utilities	\$ 92,500.00	\$ 32,400.00	\$ 23,100.00
	4 Stormwater	\$ 33,350.00	\$ 11,700.00	\$ 8,300.00
5 Traffic Services	\$ 218,580.00	\$ 76,500.00	\$ 54,600.00	
6 Pavement	\$ 391,985.00	\$ 137,200.00	\$ 98,000.00	
7 Landscaping	\$ 88,900.00	\$ 31,100.00	\$ 22,200.00	
8 TTM & Temporary works	\$ 250,700.00	\$ 87,700.00	\$ 62,700.00	
9 Preliminary and General & Offsite Overheads	\$ 354,000.00	\$ 123,900.00	\$ 88,500.00	
	Sub Total Base Physical Works	\$ 1,513,880.00	\$ 529,800.00	\$ 378,400.00
	Total for Implementation Phase	\$ 1,635,000.00	\$ 572,000.00	\$ 409,000.00
E	Project Base Estimate (A+B+C+D)	\$ 1,998,000.00		
	Project Base Estimate (rounded)			
F	Contingency (Assessed/Analysed) (A+B+C+D)		\$ 699,200.00	
G	Project Expected Estimate (E+F)		\$ 2,697,000.00	
	Project Expected Estimate (rounded)			
	Total Property Cost Expected Estimate			Nil
	Project Development Phase Expected Estimate		\$ 286,000.00	
	Pre-implementation phase Expected Estimate		\$ 204,400.00	
	Implementation Phase Expected Estimate		\$ 2,207,000.00	
H	Funding Risk Contingency (Assessed/Analysed) (A+B+C+D)			\$ 500,000.00
I	95th percentile Project Estimate (G+H)			\$ 3,197,000.00
	95th percentile Project Estimate (rounded)			
	Total Property Cost 95th percentile Estimate			Nil
	Project Development Phase 95th percentile Estimate		\$ 339,000.00	
	Pre-implementation Phase 95th percentile Estimate		\$ 242,000.00	
	Implementation Phase 95th percentile Estimate		\$ 2,616,000.00	
Date estimate prepared		Base Date (Nov-23)		
Estimate prepared by Morgan Raby		Signed		
Estimate internal peer review by Tim Lancaster		Signed		
Estimate external peer review by		Signed		
Estimate accepted by FlowNZ		Signed		

Ngāruawāhia, Hopuhopu, Taupiri – Cost Estimate								
Construction Costs								
Item	Road	Task	Description	Quantity	Unit	Rate	Net Construction Total	Comments
A Jesmond Street/ GSR intersection							\$ 1,159,909.40	
1.1		Site Clearance					\$ 70,600.00	
1.1.1		General Site Clearance		2,500.00	m2	\$ 2.50	\$ 6,250.00	Entire Area general clearance
1.1.2		Kerb removal		165.00	m	\$ 40.00	\$ 6,600.00	
1.1.3		Relocation of existing street light		2.00	each	\$ 3,500.00	\$ 7,000.00	
1.1.4		Relocation of existing street furniture		1.00	each	\$ 25,000.00	\$ 25,000.00	Chairs, signs, bike rack, bollards, drinking fountain
1.1.5		Relocation of existing phone box		1.00	each	\$ 3,000.00	\$ 3,000.00	
1.1.6		Removal of traffic signage		1.00	each	\$ 1,500.00	\$ 1,500.00	
1.1.7		Removal of road pavement		30.00	m2	\$ 140.00	\$ 4,200.00	Cut to waste
1.1.8		Remove existing median fencing		80.00	m	\$ 30.00	\$ 2,400.00	
1.1.9		Breakout and dispose existing traffic island		191.00	m2	\$ 50.00	\$ 9,550.00	
1.1.10		Remove existing guardrail		35.00	m	\$ 60.00	\$ 2,100.00	Including one terminal
1.1.11		Tree trimming		2.00	each	\$ 1,500.00	\$ 3,000.00	
1.2		Earthworks					\$ 13,265.00	
1.2.1		Erosion and Sediment Controls		1.00	LS	\$ 5,000.00	\$ 5,000.00	
1.2.2		Topsail Strip to stockpile		42.00	m3	\$ 60.00	\$ 2,520.00	
1.2.3		Cut to Waste		31.50	m3	\$ 110.00	\$ 3,465.00	
1.2.4		E/O Contaminated		4.00	m3	\$ 300.00	\$ 1,200.00	Assumed 5% of excavation
1.2.5		E/O undercut		4.00	m3	\$ 270.00	\$ 1,080.00	Assumed 5% of excavation
1.3		Utilities					\$ 92,500.00	
1.3.1		Hydrovac		150.00	m	\$ 150.00	\$ 22,500.00	
1.3.2		Lid Adjustments		5.00	each	\$ 2,000.00	\$ 10,000.00	1 lid for every 30m
1.3.3		Existing Services Allowance		100.00	m	\$ 100.00	\$ 10,000.00	Protection
1.3.4		Relocation of existing services		1.00	LS	\$ 50,000.00	\$ 50,000.00	Relocation clashes
1.4		Stormwater					\$ 33,350.00	
1.4.1		Pipework - 225mm		15.00	m	\$ 400.00	\$ 6,000.00	
1.4.2		New catchpit		2.00	each	\$ 5,500.00	\$ 11,000.00	
1.4.3		Subsoil		205.00	m	\$ 70.00	\$ 14,350.00	
1.4.4		Rodding eyes		2.00	each	\$ 1,000.00	\$ 2,000.00	
1.7		Traffic Services					\$ 218,580.00	
1.7.1		New Linemarking		1,000.00	m	\$ 25.00	\$ 25,000.00	Change to linear metre of carriageway
1.7.2		Removal existing linemarking		1.00	LS	\$ 5,000.00	\$ 5,000.00	
1.7.3		Green surfacing		288.00	m2	\$ 60.00	\$ 17,280.00	
1.7.4		Signage		1.00	LS	\$ 10,000.00	\$ 10,000.00	
1.7.5		Street lighting with beacon disc		6.00	ea	\$ 7,500.00	\$ 45,000.00	
1.7.6		New guardrail terminal and tie in.		1.00	LS	\$ 2,800.00	\$ 2,800.00	
1.7.7		Electrical cable		50.00	m	\$ 150.00	\$ 7,500.00	
1.7.8		Ducting		50.00	m	\$ 120.00	\$ 6,000.00	
1.7.9		Full safety upgrade at rail crossing		1.00	LS	\$ 100,000.00	\$ 100,000.00	Widened, new automated pedestrian arms and signals.
1.8		Pavement					\$ 391,985.00	
1.8.1		Test and Compact existing Subgrade		80.00	m2	\$ 15.00	\$ 1,200.00	
1.8.2		E/O Undercut allowance		1.60	m3	\$ 800.00	\$ 1,280.00	10% of area assumed 200mm depth
1.8.3		New Pavement		53.00	m2	\$ 210.00	\$ 11,130.00	Makeup is 300mm of GAP65 with 150mm compacted AP40 basecourse
1.8.4		Minor reshaping at roundabout		1.00	LS	\$ 10,000.00	\$ 10,000.00	
1.8.5		Cycleway - Granular		219.00	m2	\$ 120.00	\$ 26,280.00	Allowance for 100mm depth
1.8.6		Cycleway - AC		219.00	m2	\$ 60.00	\$ 13,140.00	50mm AC10
1.8.7		Cyclepath ramps		3.00	ea	\$ 200.00	\$ 600.00	
1.8.9		Footpath		34.00	m2	\$ 120.00	\$ 4,080.00	Allowance for 100mm granular depth with concrete topping
1.8.10		Shared Path Paving		340.00	m2	\$ 150.00	\$ 51,000.00	Assumed standard brick pavers
1.8.11		Speed Tables		354.00	m2	\$ 450.00	\$ 159,300.00	Concrete speed table
1.8.12		Kerb and Channel		203.00	m	\$ 120.00	\$ 24,360.00	Including along new shared path, as shown in drawings
1.8.13		New Mountable kerb		156.00	m	\$ 135.00	\$ 21,060.00	
1.8.14		Traffic splitter islands		79.00	m2	\$ 155.00	\$ 12,245.00	
1.8.15		Grassed traffic island		214.00	m2	\$ 165.00	\$ 35,310.00	
1.8.16		Concrete apron at roundabout		100.00	m2	\$ 120.00	\$ 12,000.00	
1.8.17		Driveways		-	m2	\$ 175.00	\$ -	
1.8.18		Chequer plates at pram crossings		6.00	ea	\$ 1,500.00	\$ 9,000.00	
1.10		Landscaping					\$ 88,900.00	
1.10.1		Street Furniture		1.00	each	\$ 5,000.00	\$ 5,000.00	Additional bins
1.10.2		Fencing		65.00	m	\$ 250.00	\$ 16,250.00	
1.10.3		New grassed berm		370.00	m2	\$ 45.00	\$ 16,650.00	Planting area dimensions
1.10.4		Tactiles		90.00	m2	\$ 500.00	\$ 45,000.00	Based on the number of Pram crossings
1.10.5		Maintenance		3	month	\$ 2,000.00	\$ 6,000.00	
1.11 TTM & Temporary works							\$ 250,700.00	
1.11.1		TM crew		74.00	days	\$ 2,541.00	\$ 188,034.00	Level 2/3 - STMS + 2 TC +1 driver + 1 TMA , assumed total duration 3.5 months
1.11.2		TM crew - night		12.00	days	\$ 3,049.20	\$ 36,590.40	Level 2/3 - STMS + 2 TC +1 driver + 1 TMA - @1.2 x rate
1.11.3		Fencing		1.00	LS	\$ 5,000.00	\$ 5,000.00	
1.11.4		Barrier - crowd control		1.00	LS	\$ 5,000.00	\$ 5,000.00	
1.11.5		Temporary Traffic lights		30	days	\$ 150.00	\$ 4,440.00	40% of project duration
1.11.6		VMS boards		37	days	\$ 45.00	\$ 1,665.00	2 VMS 50% of project duration
1.11.7		Temporary works		1.00	LS	\$ 10,000.00	\$ 10,000.00	
1.12 P&G and Offsite Overheads							\$ 354,000.00	
1.12.1		P&G total					\$ 209,000.00	
1.12.2		Offsite overheads					\$ 145,000.00	

Project Estimate - Form B

IBE

Project Name: Ngāruawāhia, Hopuhopu, Taupiri – Cost Estimate
Five-legged Roundabout Summary

Indicative Business Case Estimate

Item	Description	Base Estimate	Contingency	Funding Risk Contingency
A	Total Property Cost	Nil	Nil	Nil
B	Project Development Phase			
	- Consultancy Fees	\$ 142,000.00	\$ 49,700.00	\$ 35,500.00
	- WDC Managed Costs	\$ 56,800.00	\$ 19,900.00	\$ 14,200.00
B	Total Project Development	\$ 198,800.00	\$ 69,600.00	\$ 49,700.00
C	Pre-Implementation Phase			
	- Consultancy Fees	\$ 85,200.00	\$ 29,800.00	\$ 21,300.00
	- WDC Managed Costs	\$ 56,800.00	\$ 19,900.00	\$ 14,200.00
C	Total Pre-implementation	\$ 142,000.00	\$ 49,700.00	\$ 35,500.00
D	Implementation Phase			
	Implementation Fees			
	- Consultancy Fees	\$ 71,000.00	\$ 24,900.00	\$ 17,800.00
	- WDC Managed Costs	\$ 42,600.00	\$ 14,900.00	\$ 10,700.00
	Sub Total Base Implementation Fees	\$ 113,600.00	\$ 39,800.00	\$ 28,500.00
	Physical Works			
	1 Site Clearance	\$ 131,500.00	46,000	32,900
	2 Earthworks	\$ 27,400.00	9,600	6,900
	3 Utilities	\$ 115,500.00	40,400	28,900
	4 Stormwater	\$ 73,500.00	25,700	18,400
5 Traffic Services	\$ 97,300.00	34,100	24,300	
6 Pavement	\$ 317,500.00	111,100	79,400	
7 Landscaping	\$ 90,000.00	31,500	22,500	
8 TTM & Temporary works	\$ 235,500.00	82,400	58,900	
9 Preliminary and General & Offsite Overheads	\$ 332,000.00	116,200	83,000	
Sub Total Base Physical Works	\$ 1,420,200.00	\$ 497,000.00	\$ 355,200.00	
D	Total for Implementation Phase	\$ 1,534,000.00	\$ 537,000.00	\$ 384,000.00
E	Project Base Estimate (A+B+C+D)	\$ 1,875,000.00		
	Project Base Estimate (rounded)			
F	Contingency (Assessed/Analysed) (A+B+C+D)		\$ 656,300.00	
G	Project Expected Estimate (E+F)		\$ 2,531,000.00	
	Project Expected Estimate (rounded)			
	Total Property Cost Expected Estimate			Nil
	Project Development Phase Expected Estimate		\$ 268,000.00	
	Pre-implementation phase Expected Estimate		\$ 191,700.00	
	Implementation Phase Expected Estimate		\$ 2,071,000.00	
H	Funding Risk Contingency (Assessed/Analysed) (A+B+C+D)			\$ 469,000.00
I	95th percentile Project Estimate (G+H)			\$ 3,000,000.00
	95th percentile Project Estimate (rounded)			
	Total Property Cost 95th percentile Estimate			Nil
	Project Development Phase 95th percentile Estimate		\$ 318,000.00	
	Pre-implementation Phase 95th percentile Estimate		\$ 227,000.00	
	Implementation Phase 95th percentile Estimate		\$ 2,455,000.00	
Date estimate prepared		Base Date (Nov-23)		
Estimate prepared by Morgan Raby		Signed		
Estimate internal peer review by Tim Lancaster		Signed		
Estimate external peer review by		Signed		
Estimate accepted by FlowNZ		Signed		

Note: (1) These estimates are exclusive of escalation and GST.
(2) Refer to Section 6.6 for guidance on rounding.

B	Roundabout						\$	1,088,083.40	
1.1	Site Clearance						\$	131,500.00	
1.1.1	General Site Clearance	3,760.00	m2		\$	2.50	\$	9,400.00	Entire Area general clearance
1.1.2	Relocation of existing street light	5.00	no		\$	3,500.00	\$	17,500.00	
1.1.3	Kerb removal	280.00	m		\$	35.00	\$	9,800.00	
1.1.4	Relocation of existing street furniture	1.00	LS		\$	5,000.00	\$	5,000.00	
1.1.5	Removal of road pavement	500.00	m2		\$	140.00	\$	70,000.00	Cut to waste
1.1.6	Breakout and dispose existing traffic island	335.00	m2		\$	50.00	\$	16,750.00	
1.1.7	Tree trimming	2.00	each		\$	1,500.00	\$	3,000.00	
1.2	Earthworks						\$	27,400.00	
1.2.1	Erosion and Sediment Controls	1.00	LS		\$	10,000.00	\$	10,000.00	
1.2.2	Topsoil Strip to Waste	90.00	m3		\$	60.00	\$	5,400.00	
1.2.3	Cut to Waste	67.50	m3		\$	110.00	\$	7,425.00	
1.2.4	E/O Contaminated	8.00	m3		\$	300.00	\$	2,400.00	Assumed 5% of excavation
1.2.5	E/O undercut	8.00	m3		\$	270.00	\$	2,160.00	Assumed 5% of excavation
1.3	Utilities						\$	115,500.00	
1.3.1	Hydrovac	230.00	m		\$	150.00	\$	34,500.00	
1.3.2	Lid Adjustments	8.00	each		\$	2,000.00	\$	16,000.00	1 lid for every 30m
1.3.3	Existing Services Allowance	150.00	m		\$	100.00	\$	15,000.00	Protection
1.3.4	Relocation of existing services	1.00	LS		\$	50,000.00	\$	50,000.00	Relocation clashes
1.4	Stormwater						\$	73,500.00	
1.4.1	Pipework - 225mm	30.00	m		\$	400.00	\$	12,000.00	15m each catchpit, potentially need an additional MH
1.4.2	New catchpit	6.00	each		\$	5,500.00	\$	33,000.00	
1.4.3	Subsoil	350.00	m		\$	70.00	\$	24,500.00	
1.4.4	Rodding eyes	4.00	each		\$	1,000.00	\$	4,000.00	
1.7	Traffic Services						\$	97,300.00	
1.7.1	New Linemarking	1,140.00	m		\$	25.00	\$	28,500.00	
1.7.2	Removal of existing linemarking	1.00	LS		\$	7,500.00	\$	7,500.00	
1.7.3	Green surfacing	55.00	m2		\$	60.00	\$	3,300.00	At speed tables
1.7.4	Signage	1.00	LS		\$	10,000.00	\$	10,000.00	
1.7.5	Street Lighting with beacons	2.00	ea		\$	7,500.00	\$	15,000.00	
1.7.6	Pole with belisha beacon	4.00	ea		\$	1,500.00	\$	6,000.00	
1.7.7	Electrical cable	100.00	m		\$	150.00	\$	15,000.00	
1.7.8	Ducting	100.00	m		\$	120.00	\$	12,000.00	
1.8	Pavement						\$	317,500.00	
1.8.1	Pram Crossings	2.00	each		\$	700.00	\$	1,400.00	
1.8.2	Shared Path Paving	340.00	m2		\$	150.00	\$	51,000.00	Assumed standard brick pavers
1.8.3	Shared path tie in	6.00	ea		\$	4,000.00	\$	24,000.00	
1.8.4	Speed Tables	240.00	m2		\$	450.00	\$	108,000.00	
1.8.5	Minor reshaping at roundabout	1.00	LS		\$	10,000.00	\$	10,000.00	
1.8.6	Kerb and Channel	316.00	m		\$	120.00	\$	37,920.00	
1.8.7	New Mountable kerb	20.00	m		\$	135.00	\$	2,700.00	
1.8.8	K&C tie in	7.00	ea		\$	600.00	\$	4,200.00	
1.8.9	Traffic splitter island	43.00	m2		\$	160.00	\$	6,880.00	
1.8.10	Grassed traffic island	255.00	m2		\$	170.00	\$	43,350.00	
1.8.11	Concrete apron at roundabout	147.00	m2		\$	120.00	\$	17,640.00	
1.8.12	Driveways	2.00	ea		\$	700.00	\$	1,400.00	Remediate after construction
1.8.13	Chequer plates at pram crossings	6.00	ea		\$	1,500.00	\$	9,000.00	
1.10	Landscaping						\$	90,000.00	
1.10.1	Street Furniture	1.00	each		\$	5,000.00	\$	5,000.00	
1.10.2	Planting - new tall plants	30.00	m2		\$	75.00	\$	2,250.00	lowest cost hedge planting eg Griselinia, conifers, etc
1.10.3	Grassed berm	705.00	m2		\$	45.00	\$	31,725.00	
1.10.4	Tactiles	90.00	m2		\$	500.00	\$	45,000.00	Based on the number of Pram crossings
1.10.5	Maintenance	3	month		\$	2,000.00	\$	6,000.00	
1.11	TTM & Temporary works						\$	235,500.00	
1.11.1	TM crew	74.00	days		\$	2,541.00	\$	188,034.00	Level 2/3 - STMS + 2 TC +1 driver + 1 TMA, assumed total duration 3.5 months
1.11.2	TM crew - night	7.00	days		\$	3,049.20	\$	21,344.40	x rate
1.11.3	Fencing	1.00	LS		\$	5,000.00	\$	5,000.00	
1.11.4	Barrier - crowd control	1.00	LS		\$	5,000.00	\$	5,000.00	
1.11.5	Temporary Traffic lights	30	days		\$	150.00	\$	4,440.00	40% of project duration
1.11.6	VMS boards	37	days		\$	45.00	\$	1,665.00	2 VMS 50% of project duration
1.11.7	Temporary works	1.00	LS		\$	10,000.00	\$	10,000.00	
1.12	P&G						\$	332,000.00	
1.12.1	P&G total						\$	196,000.00	
1.12.2	Offsite overheads						\$	136,000.00	
TOTAL							\$	2,933,992.80	

Appendix E-4.1

**GREAT SOUTH ROAD INTERSECTIONS WITH
OLD TAUPIRI ROAD (SOUTH) AND RIVER ROAD**

OPTIONS ASSESSMENT

THE OPTIONS

For the options assessment, we agreed with WDC, that the intersections designs will assume the speed management strategy for GSR is in place.

The following options for the Old Taupiri Road/GSR intersection were agreed with WDC for options assessment:

Option 1 - Old Taupiri Road will operate as a left-in left-out intersection. Galbraith Street will be closed at the end of the existing urban area. River Road intersection with Great South Road will be upgraded to a roundabout.

The level crossing will be retained as existing. However there will be less exposure due to removal of right turn from Great South Road.

There will be a slight increase in travel distance with the removal of the right turn into Old Taupiri Road. For people exiting River Road and wanting to enter into Old Taupiri Road (south), the SIDRA assessment assumes that 50% traffic will use Old Taupiri Road(North) & GSR Road Intersection, and the remaining 50% will travel straight on Great South Road, loop around the Jesmond/GSR roundabout and turn left at GSR-Old Taupiri Road and Regent Road intersection. Therefore, this option relies on the Jesmond Street intersection with Great South Road, to be upgraded to a roundabout, to avoid scenarios where people undertake undesirable/ unsafe u-turns or long diversions.

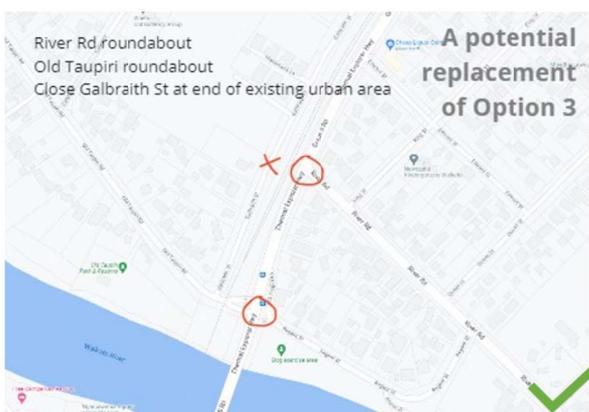
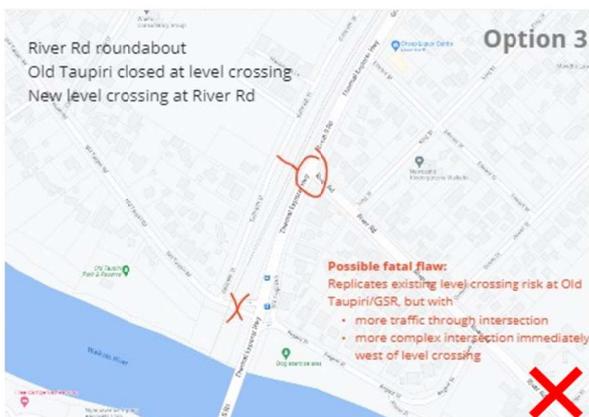
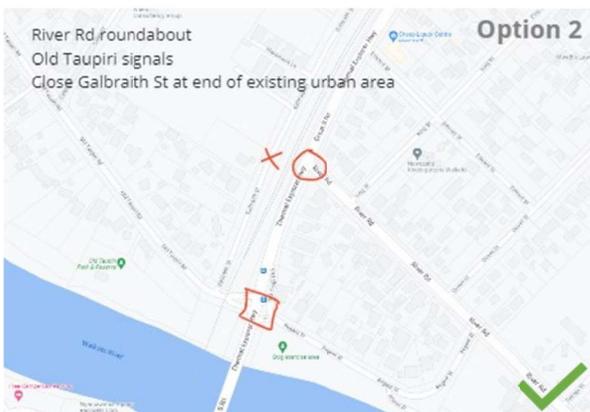
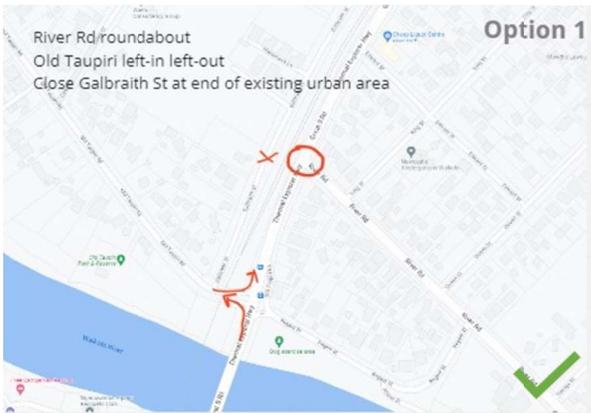
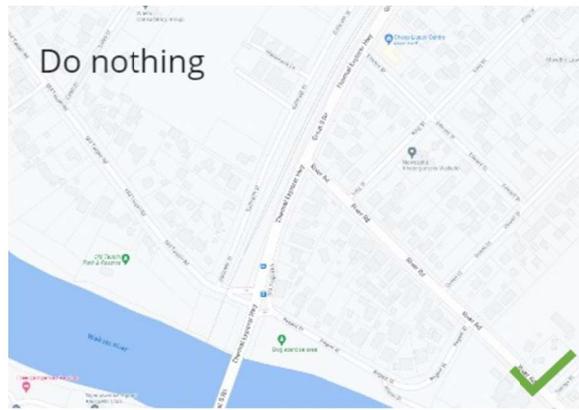
Option 2 - The intersection will be signalised. Galbraith Street will be closed at the end of the existing urban area. River Road intersection with Great South Road will be upgraded to a roundabout.

The level crossing will be included into the signalised intersection and therefore is expected to significantly improve the safety at the level crossing compared to the existing scenario.

Option 3a - proposes to remove vehicular access at Old Taupiri Road and provide an access from Galbraith Road to the River Road intersection. River Road intersection with Great South Road will be upgraded to a roundabout. This will close the level crossing at Old Taupiri Road and introduce a new one opposite the River Road intersection.

The team considered that Option 3a would replicate the existing safety concerns at the Great South Road/Old Taupiri Road intersection, albeit at a new location, with higher overall traffic volumes and therefore higher risk. Kiwirail are also very unlikely to allow a new level crossing on their network, even if it replaced an existing level crossing. For these reasons, Option 3a was considered to have a **fatal flaw**.

Option 3 - proposes to upgrade the Old Taupiri Road intersection to a roundabout. Galbraith Street will be closed at the end of the existing urban area. River Road intersection with Great South Road will be upgraded to a roundabout



THE MCA ASSESSMENT

ASSESSMENT CRITERIA				OPTION: Do Nothing Retain Existing					Option 1 River Road roundabout Old Taupiri RT in RT out ban Close Galbraith St					Option 2 River Road roundabout Old Taupiri signals Close Galbraith St					Option 3 River Road roundabout Old Taupiri roundabout Close Galbraith St				
				Metric	Objective	Key Performance Indicator	Measure	Walking	Cycling	PT	Vehicles	Freight	Walking	Cycling	PT	Vehicles	Freight	Walking	Cycling	PT	Vehicles	Freight	Walking
Safety	To reduce deaths and serious injuries	Road safety risk assessment rating	Exposure	0	0	0	0	0	-1	-1	0	3	0	-3	-3	0	1	0	-2	-2	0	1	0
			Likelihood	0	0	0	0	0	1	1	3	3	3	3	3	2	2	2	2	2	3	3	3
			Severity	0	0	0	0	0	2	2	4	4	4	3	3	2	2	2	3	3	3	3	3
	Safety at the rail level crossing	Improvements to the safe operation of the Old Taupiri Rd rail level crossing	0	0	-2	-2	0	0	0	2	2	0	5	5	4	4	0	0	0	2	2	0	
Amenity (travel quality and aesthetics)	Strategic direction of key move	Fit for purpose	Alignment with place and movement guide	0	0	0	0	0	1	1	1	1	1	3	3	3	3	3	3	3	4	4	4
	To provide quality travel options	Efficiency of the transport network	Impact on increased travel distance/time	0	0	0	0	0	0	0	-1	-4	-1	-1	-1	-2	-2	-2	2	2	-1	-1	-1
		Sustainability	Impacts on emissions	0	0	0	0	0	0	0	-1	-3	-3	0	0	-2	-3	-3	0	0	0	0	0
Accessibility	Provide alternative mode options to private vehicles	Promotion of alternative modes	Achieve a high LOS for pedestrians and cyclists	0	0	0	0	0	1	1	0	0	0	2	2	0	0	0	3	3	0	0	0
			Accessibility for vulnerable users	0	0	0	0	0	1	1	0	0	0	3	3	0	0	0	2	2	0	0	0
		Active mode and public transport mode share (combined) compared to private vehicles	Number of active mode and public transport trips (combined) compared to private vehicle trips	0	0	0	0	0	1	1	0	0	0	2	2	0	-1	0	3	3	0	0	0
	Access to transport and mobility is equitable for all people	Walking, cycling and micromobility network coverage and useability	Extent to which option improves the walking, cycling and micromobility network coverage	0	0	0	0	0	1	1	0	0	0	2	2	0	0	0	2	2	0	0	0
		Ability to connect to Te Awa Cycleway	Extent to which option improves the walking, cycling connection to the Te Awa Cycleway	0	0	0	0	0	1	1	0	0	0	2	2	0	0	0	1	1	0	0	0
		Transport choice available for all people living in Ngāruawāhia to access the main street	Extent to which option improves alternative mode choice	0	0	0	0	0	1	0	0	0	0	3	1	0	1	0	2	1	0	-2	0
		Intersection operation	SIDRA outputs	0	0	0	0	0	0	0	-1	-1	-1	-3	-3	-4	-4	-4	0	0	-1	-1	-1

THE MCA ASSESSMENT

ASSESSMENT CRITERIA				OPTION: Do Nothing Retain Existing					Option 1 River Road roundabout Old Taupiri RT in RT out ban Close Galbraith St					Option 2 River Road roundabout Old Taupiri signals Close Galbraith St					Option 3 River Road roundabout Old Taupiri roundabout Close Galbraith St				
Metric	Objective	Key Performance Indicator	Measure	Walking	Cycling	PT	Vehicles	Freight	Walking	Cycling	PT	Vehicles	Freight	Walking	Cycling	PT	Vehicles	Freight	Walking	Cycling	PT	Vehicles	Freight
		Perception of safety (all users and vulnerable users)	Change in perception of safety and harm (all users and vulnerable users)	0	0	0	0	0	2	2	2	2	2	5	5	3	3	3	4	4	4	4	4
Mobility	Ease of Access to the town centre for all modes	Vehicle routing	Impact on vehicles accessing Old Taupiri Road Sth	0	0	0	0	0	0	0	-4	-5	-5	0	0	0	3	3	0	0	0	3	3
		People on foot and people on bikes	Extent to which option improves the walking and cycling priority to access the town centre	0	0	0	0	0	1	1	0	0	0	3	3	0	0	0	3	3	0	0	0
Cost/feasibility efficiency performance measures	Feasibility	Existing infrastructure used or reallocated to provide multimodal outcomes	Extent to which existing infrastructure can be used/reallocated to provide multimodal outcomes	0	0	0	0	0	2	2	2	2	2	-2	-2	-2	-2	-2	-3	-3	-3	-3	-3
		Engineering Feasibility	Assessment of constructability	0	0	0	0	0	2	2	2	2	2	-2	-2	-2	-2	-2	-4	-4	-4	-4	-4
		Economic Impact	Access to business and employment	0	0	0	0	0	1	1	0	-1	-1	2	2	0	2	2	2	2	0	2	2
		Stakeholders	Assessment of likely stakeholder impact	0	0	0	0	0	1	1	-3	-5	-3	4	4	0	-1	-1	3	3	3	3	3
	Cost	Cost	Assessment of capital cost of infrastructure improvements	0	0	0	0	0	-1	-1	-1	-1	-1	-3	-3	-3	-3	-3	-3	-3	-5	-5	-5
	Impacts on Te Ao Māori	Impacts on Te Ao Māori	Assessment of impact on Te Ao Māori including areas of significance for Māori, Māori land and Kītiakitanga	0	0	0	0	0	0	0	0	1	1	1	1	0	1	1	1	1	0	1	1
SCORE				0	0	-2	-2	0	17	16	5	0	0	29	27	-1	4	-1	24	23	5	10	9
Total, equal weights per measure				-4					38					58					71				

THE MCA ASSESSMENT

ASSESSMENT CRITERIA				OPTION: Do Nothing Retain Existing					Option 1 River Road roundabout Old Taupiri RT in RT out ban Close Galbraith St					Option 2 River Road roundabout Old Taupiri signals Close Galbraith St					Option 3 River Road roundabout Old Taupiri roundabout Close Galbraith St					
Metric	Objective	Key Performance Indicator	Measure	Walking	Cycling	PT	Vehicles	Freight	Walking	Cycling	PT	Vehicles	Freight	Walking	Cycling	PT	Vehicles	Freight	Walking	Cycling	PT	Vehicles	Freight	
Average, equal weights per objective																								
Safety			Weighting per objective																					
To reduce deaths and serious injuries			1	0.00	0.00	0.00	0.00	0.00	0.67	0.67	2.33	3.33	2.33	1.00	1.00	1.33	1.67	1.33	1.00	1.00	2.00	2.33	2.00	
Amenity (travel quality and aesthetics)			Weighting per objective																					
Strategic direction of key move			1	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	4.00	4.00	4.00	
To provide quality travel options			1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-1.00	-3.50	-2.00	-0.50	-0.50	-2.00	-2.50	-2.50	1.00	1.00	-0.50	-0.50	-0.50	
Accessibility			Weighting per objective																					
Provide alternative mode options to private vehicles			1	0.00	0.00	0.00	0.00	0.00	1.00	1.00	0.00	0.00	0.00	2.33	2.33	0.00	-0.33	0.00	2.67	2.67	0.00	0.00	0.00	
Access to transport and mobility is equitable for all people			1	0.00	0.00	0.00	0.00	0.00	1.00	0.80	0.20	0.20	0.20	1.80	1.40	-0.20	0.00	-0.20	1.80	1.60	0.60	0.20	0.60	
Mobility			Weighting per objective																					
Ease of Access to the town centre for all modes			1	0.00	0.00	0.00	0.00	0.00	0.50	0.50	-2.00	-2.50	-2.50	1.50	1.50	0.00	1.50	1.50	1.50	1.50	0.00	1.50	1.50	
Cost/feasibility efficiency performance measures			Weighting per objective																					
Feasibility			1	0.00	0.00	0.00	0.00	0.00	1.50	1.50	0.25	-0.50	0.00	0.50	0.50	-1.00	-0.75	-0.75	-0.50	-0.50	-1.00	-0.50	-0.50	
Cost			1	0.00	0.00	0.00	0.00	0.00	-1.00	-1.00	-1.00	-1.00	-1.00	-3.00	-3.00	-3.00	-3.00	-3.00	-3.00	-3.00	-5.00	-5.00	-5.00	
Impacts on Te Ao Māori			1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	
				0	0	0	0	0	5	4	0	-2	-1	8	7	-2	1	0	8	8	0	3	3	
Average, equal weights per objective				0					6					14					23					

THE MCA ASSESSMENT - SENSITIVITY TESTING

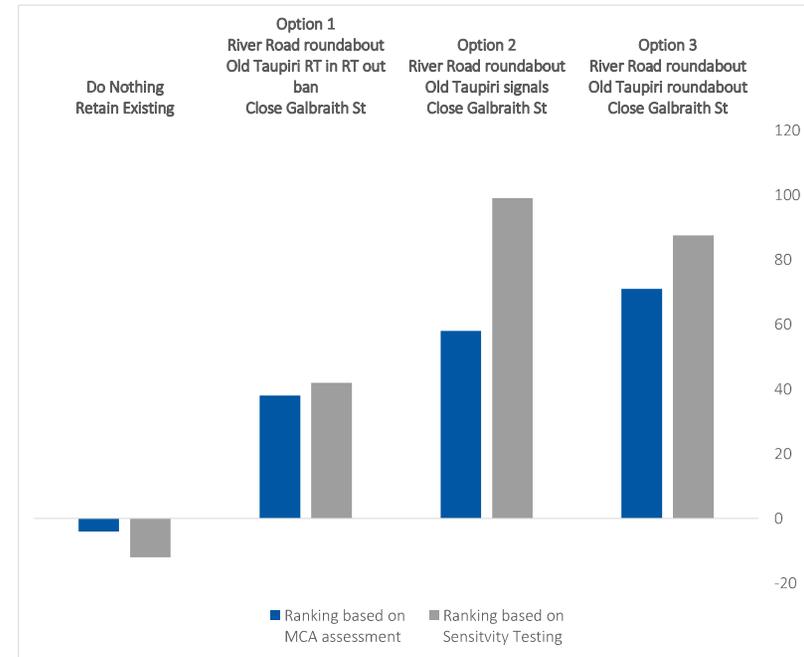
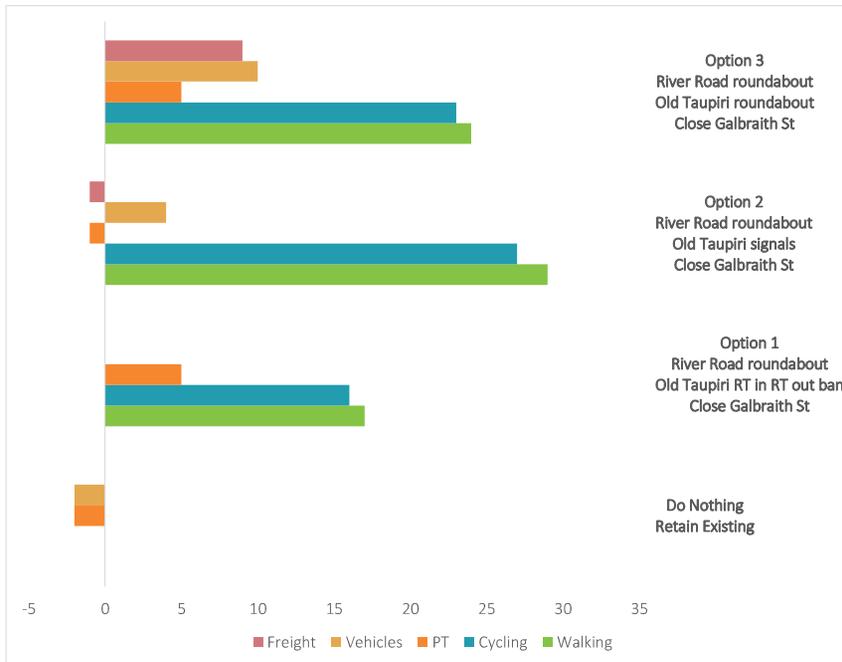
ASSESSMENT CRITERIA				OPTION: Do Nothing Retain Existing					Option 1 River Road roundabout Old Taupiri RT in RT out ban Close Galbraith St					Option 2 River Road roundabout Old Taupiri signals Close Galbraith St					Option 3 River Road roundabout Old Taupiri roundabout Close Galbraith St				
Metric	Objective	Key Performance Indicator	Measure	Walking	Cycling	PT	Vehicles	Freight	Walking	Cycling	PT	Vehicles	Freight	Walking	Cycling	PT	Vehicles	Freight	Walking	Cycling	PT	Vehicles	Freight
Safety	To reduce deaths and serious injuries	Road safety risk assessment rating	Exposure	0	0	0	0	0	-1	-1	0	3	0	-3	-3	0	1	0	-2	-2	0	1	0
			Likelihood	0	0	0	0	0	1	1	3	3	3	3	3	2	2	2	2	2	3	3	3
			Severity	0	0	0	0	0	2	2	4	4	4	3	3	2	2	2	3	3	3	3	3
	Safety at the rail level crossing	Improvements to the safe operation of the Old Taupiri Rd rail level crossing	0	0	-2	-2	0	0	0	2	2	0	5	5	4	4	0	0	0	2	2	0	
Amenity (travel quality and aesthetics)	Strategic direction of key move	Fit for purpose	Alignment with place and movement guide	0	0	0	0	0	1	1	1	1	1	3	3	3	3	3	3	3	4	4	4
	To provide quality travel options	Efficiency of the transport network	Impact on increased travel distance/time	0	0	0	0	0	0	0	-1	-4	-1	-1	-1	-2	-2	-2	2	2	-1	-1	-1
		Sustainability	Impacts on emissions	0	0	0	0	0	0	0	-1	-3	-3	0	0	-2	-3	-3	0	0	0	0	0
Accessibility	Provide alternative mode options to private vehicles	Promotion of alternative modes	Achieve a high LOS for pedestrians and cyclists	0	0	0	0	0	1	1	0	0	0	2	2	0	0	0	3	3	0	0	0
			Accessibility for vulnerable users	0	0	0	0	0	1	1	0	0	0	3	3	0	0	0	2	2	0	0	0
		Active mode and public transport mode share (combined) compared to private vehicles	Number of active mode and public transport trips (combined) compared to private vehicle trips	0	0	0	0	0	1	1	0	0	0	2	2	0	-1	0	3	3	0	0	0
	Access to transport and mobility is equitable for all people	Walking, cycling and micromobility network coverage and useability	Extent to which option improves the walking, cycling and micromobility network coverage	0	0	0	0	0	1	1	0	0	0	2	2	0	0	0	2	2	0	0	0
			Ability to connect to Te Awa Cycleway	Extent to which option improves the walking, cycling connection to the Te Awa Cycleway	0	0	0	0	0	1	1	0	0	0	2	2	0	0	0	1	1	0	0
		Transport choice available for all people living in Ngāruawāhia to access the main street	Extent to which option improves alternative mode choice	0	0	0	0	0	1	0	0	0	0	3	1	0	1	0	2	1	0	-2	0

THE MCA ASSESSMENT - SENSITIVITY TESTING

ASSESSMENT CRITERIA				OPTION: Do Nothing Retain Existing					Option 1 River Road roundabout Old Taupiri RT in RT out ban Close Galbraith St					Option 2 River Road roundabout Old Taupiri signals Close Galbraith St					Option 3 River Road roundabout Old Taupiri roundabout Close Galbraith St				
Metric	Objective	Key Performance Indicator	Measure	Walking	Cycling	PT	Vehicles	Freight	Walking	Cycling	PT	Vehicles	Freight	Walking	Cycling	PT	Vehicles	Freight	Walking	Cycling	PT	Vehicles	Freight
		Intersection operation	SIDRA outputs	0	0	0	0	0	0	0	-1	-1	-1	-3	-3	-4	-4	-4	0	0	-1	-1	-1
		Perception of safety (all users and vulnerable users)	Change in perception of safety and harm (all users and vulnerable users)	0	0	0	0	0	2	2	2	2	2	5	5	3	3	3	4	4	4	4	4
Mobility	Ease of Access to the town centre for all modes	Vehicle routing	Impact on vehicles accessing Old Taupiri Road Sth	0	0	0	0	0	0	0	-4	-5	-5	0	0	0	3	3	0	0	0	3	3
		People on foot and people on bikes	Extent to which option improves the walking and cycling priority to access the town centre	0	0	0	0	0	1	1	0	0	0	3	3	0	0	0	3	3	0	0	0
Cost/feasibility efficiency performance measures	Feasibility	Existing infrastructure used or reallocated to provide multimodal outcomes	Extent to which existing infrastructure can be used/reallocated to provide multimodal outcomes	0	0	0	0	0	2	2	2	2	2	-2	-2	-2	-2	-2	-3	-3	-3	-3	-3
		Engineering Feasibility	Assessment of constructability	0	0	0	0	0	2	2	2	2	2	-2	-2	-2	-2	-2	-4	-4	-4	-4	-4
		Economic Impact	Access to business and employment	0	0	0	0	0	1	1	0	-1	-1	2	2	0	2	2	2	2	0	2	2
	Cost	Stakeholders	Assessment of likely stakeholder impact	0	0	0	0	0	1	1	-3	-5	-3	4	4	0	-1	-1	3	3	3	3	3
		Cost	Cost	Assessment of capital cost of infrastructure improvements	0	0	0	0	0	-1	-1	-1	-1	-1	-3	-3	-3	-3	-3	-3	-3	-5	-5
	Impacts on Te Ao Māori	Impacts on Te Ao Māori	Assessment of impact on Te Ao Māori including areas of significance for Māori, Māori land and Kiatiakitanga	0	0	0	0	0	0	0	0	1	1	1	1	0	1	1	1	1	0	1	1
SCORE				0	0	-6	-6	0	19.5	18.5	7	-0.5	-2.5	43	41	6	11	-2	26.5	25.5	9.5	15.5	10.5
Total, equal weights per measure				-12					42					99					87.5				

THE MCA ASSESSMENT - SENSITIVITY TESTING

ASSESSMENT CRITERIA				OPTION: Do Nothing Retain Existing					Option 1 River Road roundabout Old Taupiri RT in RT out ban Close Galbraith St					Option 2 River Road roundabout Old Taupiri signals Close Galbraith St					Option 3 River Road roundabout Old Taupiri roundabout Close Galbraith St							
Metric	Objective	Key Performance Indicator	Measure	Walking	Cycling	PT	Vehicles	Freight	Walking	Cycling	PT	Vehicles	Freight	Walking	Cycling	PT	Vehicles	Freight	Walking	Cycling	PT	Vehicles	Freight			
Average, equal weights per objective																										
Safety			Weighting per objective																							
To reduce deaths and serious injuries			1	0.00	0.00	0.00	0.00	0.00	0.67	0.67	2.33	3.33	2.33	1.00	1.00	1.33	1.67	1.33	1.00	1.00	2.00	2.33	2.00			
Amenity (travel quality and aesthetics)			Weighting per objective																							
Strategic direction of key move			2	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	4.00	4.00	4.00			
To provide quality travel options			1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-1.00	-3.50	-2.00	-0.50	-0.50	-2.00	-2.50	-2.50	1.00	1.00	-0.50	-0.50	-0.50			
Accessibility			Weighting per objective																							
Provide alternative mode options to private vehicles			1	0.00	0.00	0.00	0.00	0.00	1.00	1.00	0.00	0.00	0.00	2.33	2.33	0.00	-0.33	0.00	2.67	2.67	0.00	0.00	0.00			
Access to transport and mobility is equitable for all people			1	0.00	0.00	0.00	0.00	0.00	1.00	0.80	0.20	0.20	0.20	1.80	1.40	-0.20	0.00	-0.20	1.80	1.60	0.60	0.20	0.60			
Mobility			Weighting per objective																							
Ease of Access to the town centre for all modes			1	0.00	0.00	0.00	0.00	0.00	0.50	0.50	-2.00	-2.50	-2.50	1.50	1.50	0.00	1.50	1.50	1.50	1.50	0.00	1.50	1.50			
Cost/feasibility efficiency performance measures			Weighting per objective																							
Feasibility			1.5	0.00	0.00	0.00	0.00	0.00	1.50	1.50	0.25	-0.50	0.00	0.50	0.50	-1.00	-0.75	-0.75	-0.50	-0.50	-1.00	-0.50	-0.50			
Cost			2	0.00	0.00	0.00	0.00	0.00	-1.00	-1.00	-1.00	-1.00	-1.00	-3.00	-3.00	-3.00	-3.00	-3.00	-3.00	-3.00	-5.00	-5.00	-5.00			
Impacts on Te Ao Māori			1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00			
Average, equal weights per objective				0	0	0	0	0	5	5	0	-2	-1	8	7	-2	0	0	8	8	-1	2	2			
				0					7					13					18							



THE MCA ASSESSMENT SUMMARY

Traffic modelling was undertaken to understand the impact of the options on the intersection's efficiency. The results of the SIDRA analysis (provided in Appendix C) was used to inform the MCA scoring. Safety at the level crossing was taken into account when scoring the safety criterion for each option. Option 1 assumes the proposed roundabout at the Jesmond Street intersection with Great South Road, is already in place thereby avoiding scenarios where people undertake undesirable/unsafe u-turns or long diversions.

The chart on the right indicates that the Roundabout option at intersection with Old Taupiri Road scores higher. The score per mode shown on the left chart, indicates that the roundabout option scores better for Freight, Cars, and Buses than the signalised option.

However, the sensitivity test where safety at the level crossing is weighted higher, the signalised option performs better.

Primarily the issues with the signalised option is the delays for the Freight, Cars, and Buses compared to a roundabout which is typical with signalised options. The existing layout and the signalised intersection are predicted to operate close to capacity in the 2051 peak period.

On contrary, the roundabout performs very well even at 2051. Therefore the emerging preferred option could be a roundabout at Old Taupiri Road intersection, with a full safety upgrade of the level crossing (eg barrier arms which go down each time there is a train passing, as well as pedestrian electric gates, etc). An LCSIA may be undertaken to identify the upgrade attributes required for the level crossing.

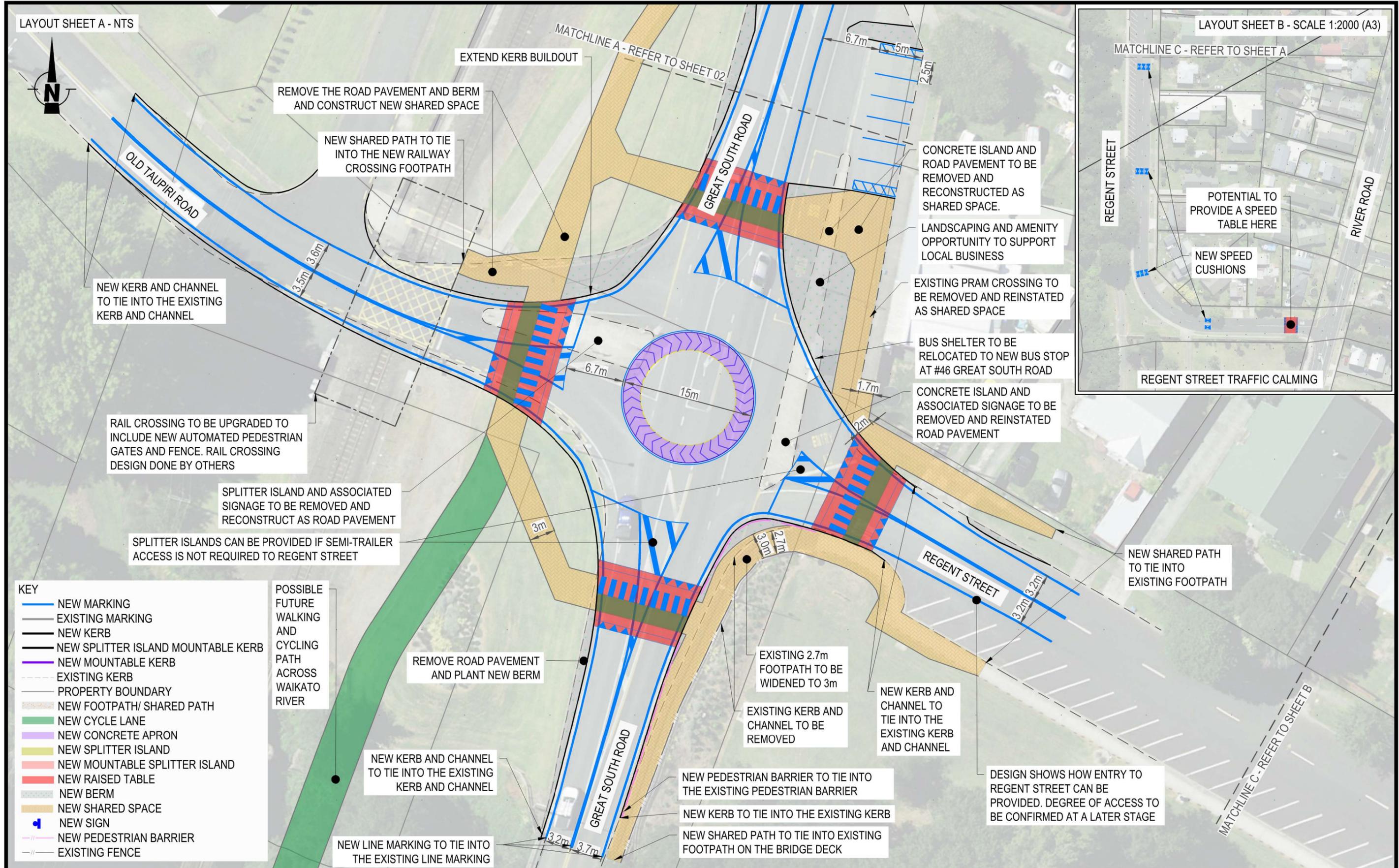
Appendix E-4.2

GREAT SOUTH ROAD INTERSECTIONS WITH OLD TAUPIRI ROAD (SOUTH) AND RIVER ROAD DESIGN OF PREFERRED OPTIONS

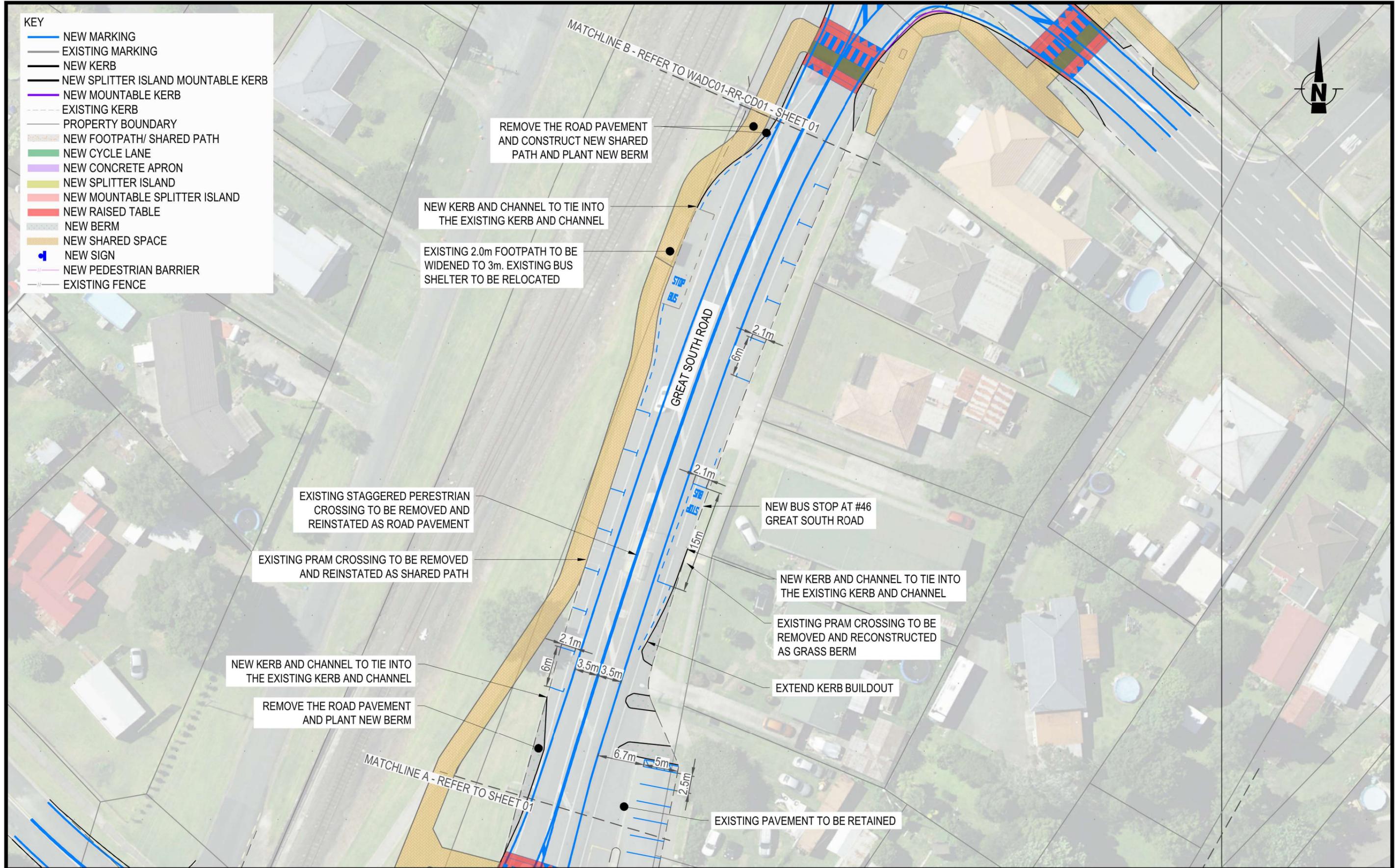
Appendix E-4.2.1

GREAT SOUTH ROAD INTERSECTION WITH OLD TAUPIRI ROAD (SOUTH)

DESIGN OF PREFERRED OPTION



REV	AMENDMENT	DATE OF ISSUE	DESIGN: MWP	DRAWN: MWP	CLIENT: WAIKATO DISTRICT COUNCIL	SHEET TITLE: GENERAL LAYOUT	SHEET: 01 of 12
A	First Issue	24/11/2023	CHECKED: SC	DATE: 10/11/2023	PROJECT: TRANSPORT ASSESSMENT OF NGĀRUAWĀHIA, HOPUHOPU & TAUPIRI		
B	Includes Comments & Regent Street Traffic Calming	25/01/2024			LOCATION: OLD TAUPIRI ROAD, NGARUAWAHIA		
			SCALE: 0 20m		CONCEPT DESIGN	DRAWING NUMBER: WADC01-OT-CD01-A-	REV: B
			NOT TO SCALE				<p>flow TRANSPORTATION SPECIALISTS</p> <p>Level 1, 11 Blake Street, Ponsonby, Auckland PO Box 47497 Ponsonby p 09 970 3820 f 09 970 3890 www.flownz.com</p>



REV	AMENDMENT	DATE OF ISSUE
A	First Issue	24/11/2023
B	Second Issue - Includes Comments	25/01/2024

DESIGN: MWP	DRAWN: MWP
CHECKED: SC	DATE: 10/11/2023
SCALE: 0 20m	
1:500 @ A3	

CLIENT: WAIKATO DISTRICT COUNCIL
PROJECT: TRANSPORT ASSESSMENT OF NGĀRUAWĀHIA, HOPUHOPU & TAUPIRI
LOCATION: OLD TAUPIRI ROAD, NGARUAWAHIA
CONCEPT DESIGN

SHEET TITLE: GENERAL LAYOUT
DRAWING NUMBER: WADC01-OT-CD01-A-

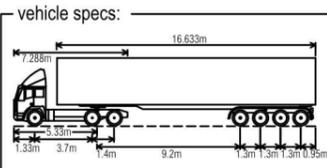
SHEET: 02 of 12
REV: B

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vehicle tracking key:

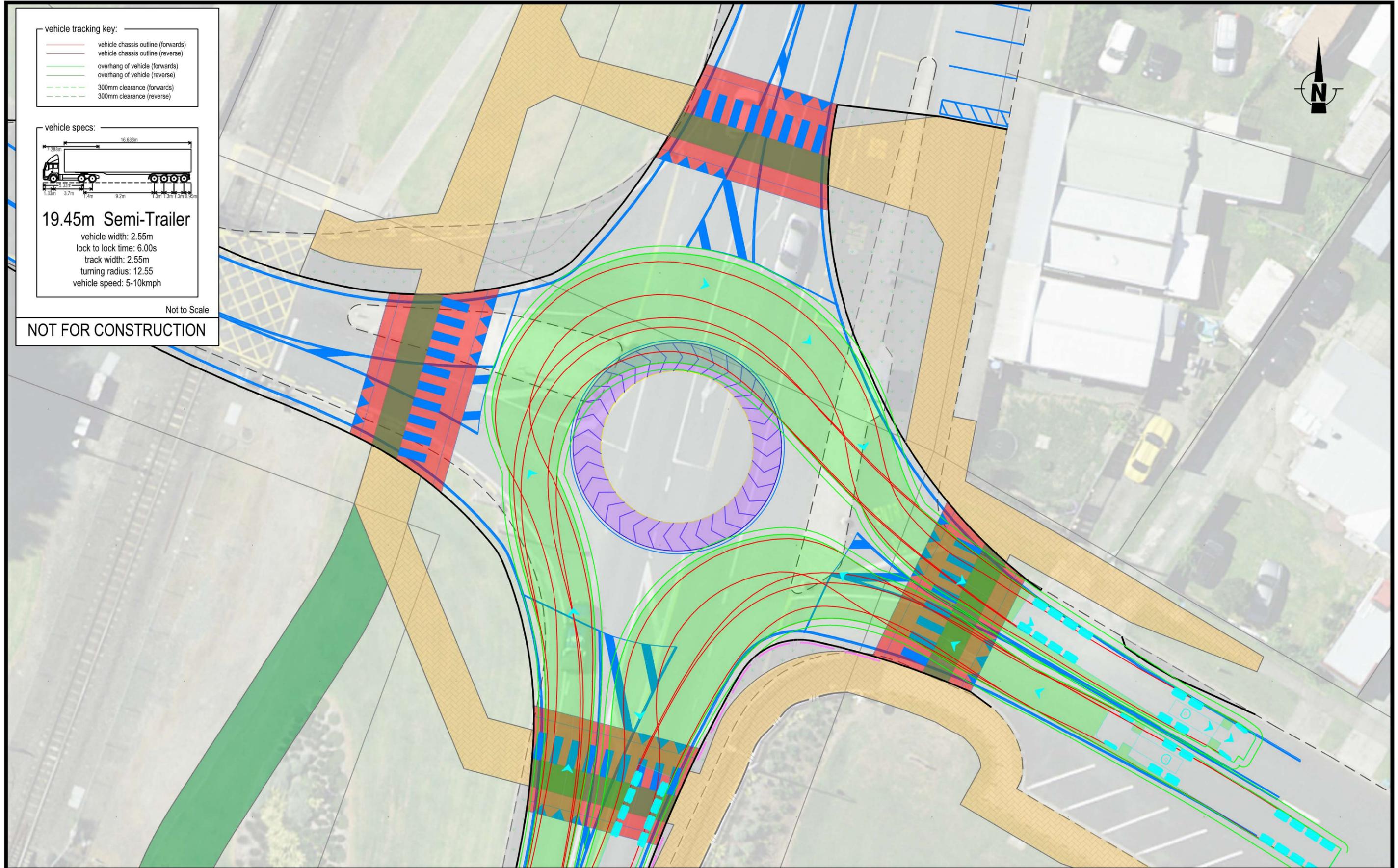
	vehicle chassis outline (forwards)
	vehicle chassis outline (reverse)
	overhang of vehicle (forwards)
	overhang of vehicle (reverse)
	300mm clearance (forwards)
	300mm clearance (reverse)



19.45m Semi-Trailer
 vehicle width: 2.55m
 lock to lock time: 6.00s
 track width: 2.55m
 turning radius: 12.55
 vehicle speed: 5-10kmph

Not to Scale

NOT FOR CONSTRUCTION



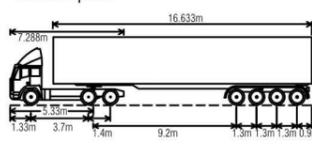
REV	AMENDMENT	DATE OF ISSUE	DESIGN: MWP	DRAWN: MWP	CLIENT: WAIKATO DISTRICT COUNCIL	SHEET TITLE: VEHICLE TRACKING	SHEET: 03 of 12
A	First Issue	24/11/2023	CHECKED: SC	DATE: 10/11/2023	PROJECT: TRANSPORT ASSESSMENT OF NGĀRUAWĀHIA, HOPUHOPU & TAUPIRI		
			SCALE: 0 10m		LOCATION: OLD TAUPIRI ROAD, NGARUAWAHIA		
			1:250 @ A3		CONCEPT DESIGN	DRAWING NUMBER: WADC01-OT-CD01-A-	REV: A

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vehicle tracking key:

	vehicle chassis outline (forwards)
	vehicle chassis outline (reverse)
	overhang of vehicle (forwards)
	overhang of vehicle (reverse)
	300mm clearance (forwards)
	300mm clearance (reverse)

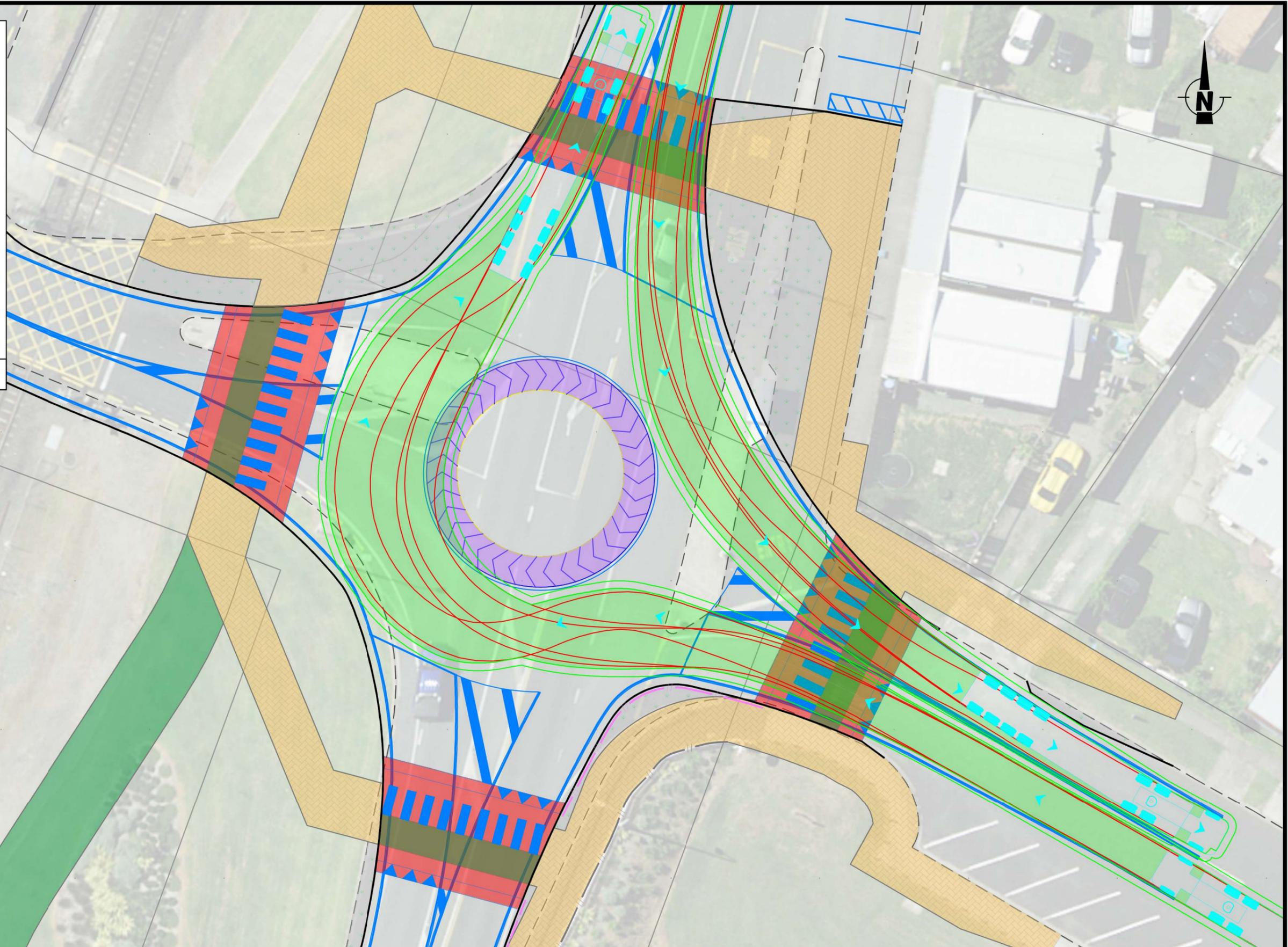
vehicle specs:



19.45m Semi-Trailer
 vehicle width: 2.55m
 lock to lock time: 6.00s
 track width: 2.55m
 turning radius: 12.55
 vehicle speed: 5-10kmph

Not to Scale

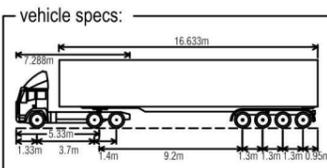
NOT FOR CONSTRUCTION



REV	AMENDMENT	DATE OF ISSUE	DESIGN: MWP	DRAWN: MWP	CLIENT: WAIKATO DISTRICT COUNCIL	SHEET TITLE: VEHICLE TRACKING	SHEET: 04 of 12
A	First Issue	24/11/2023	CHECKED: SC	DATE: 10/11/2023	PROJECT: TRANSPORT ASSESSMENT OF NGĀRUAWĀHIA, HOPUHOPU & TAUPIRI		
			SCALE: 0 10m		LOCATION: OLD TAUPIRI ROAD, NGARUAWAHIA		
			1:250 @ A3		CONCEPT DESIGN	DRAWING NUMBER: WADC01-OT-CD01-A-	REV: A

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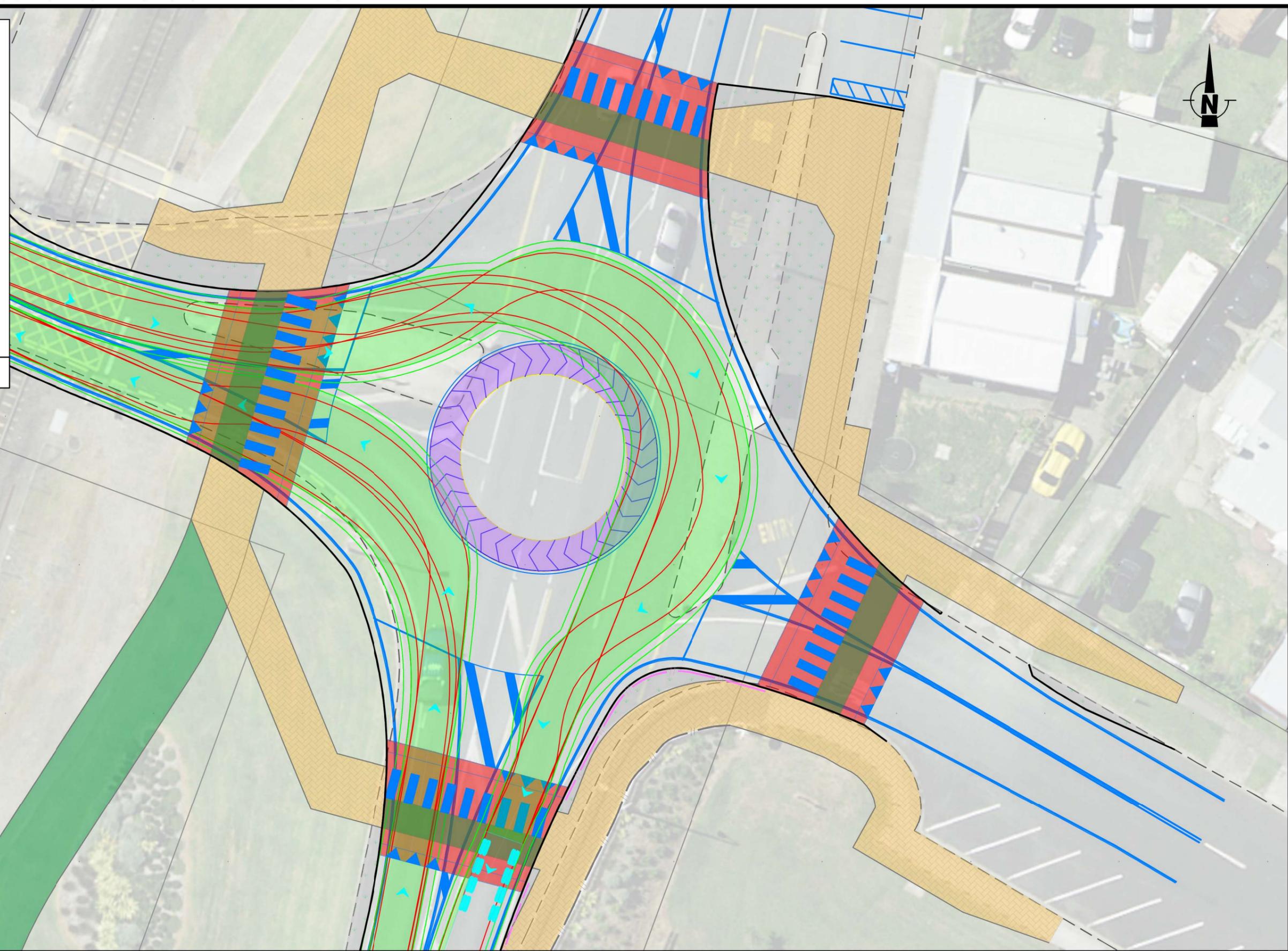
- vehicle tracking key:
- vehicle chassis outline (forwards)
 - - - vehicle chassis outline (reverse)
 - overhang of vehicle (forwards)
 - - - overhang of vehicle (reverse)
 - - - 300mm clearance (forwards)
 - - - 300mm clearance (reverse)



19.45m Semi-Trailer
 vehicle width: 2.55m
 lock to lock time: 6.00s
 track width: 2.55m
 turning radius: 12.55
 vehicle speed: 5-10kmph

Not to Scale

NOT FOR CONSTRUCTION



REV	AMENDMENT	DATE OF ISSUE	DESIGN: MWP	DRAWN: MWP
A	First Issue	24/11/2023	CHECKED: SC	DATE: 10/11/2023
		SCALE: 0 10m		
		1:250 @ A3		

CLIENT: WAIKATO DISTRICT COUNCIL
 PROJECT: TRANSPORT ASSESSMENT OF
 NGĀRUAWĀHIA, HOPUHOPU & TAUPIRI
 LOCATION: OLD TAUPIRI ROAD, NGARUAWAHIA

CONCEPT DESIGN

SHEET TITLE: **VEHICLE TRACKING**

DRAWING NUMBER: WADC01-OT-CD01-A-

SHEET: **05** of 12

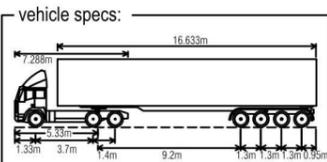
REV: **A**

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vehicle tracking key:

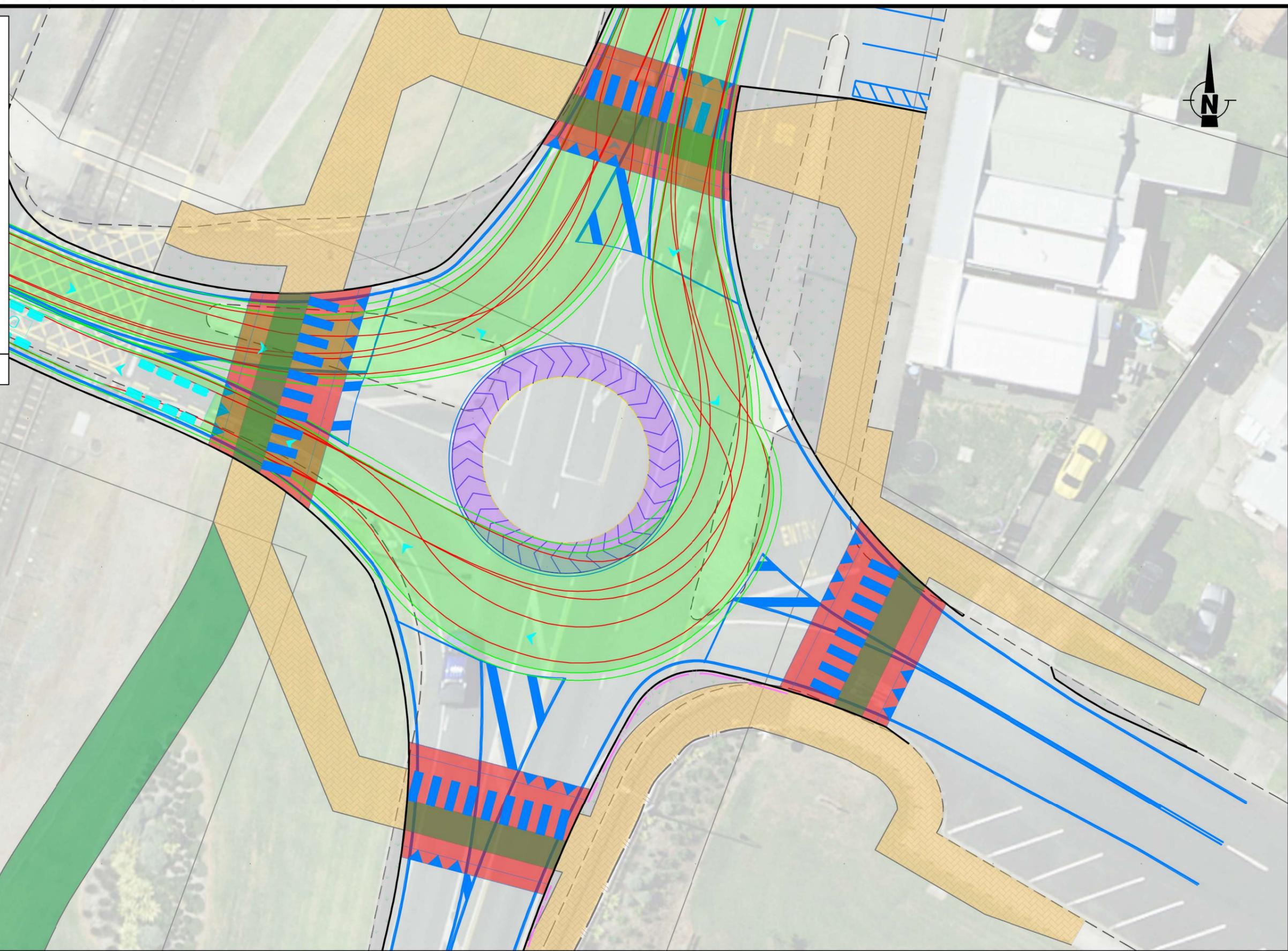
- vehicle chassis outline (forwards)
- vehicle chassis outline (reverse)
- overhang of vehicle (forwards)
- overhang of vehicle (reverse)
- - - 300mm clearance (forwards)
- - - 300mm clearance (reverse)



19.45m Semi-Trailer
 vehicle width: 2.55m
 lock to lock time: 6.00s
 track width: 2.55m
 turning radius: 12.55
 vehicle speed: 5-10kmph

Not to Scale

NOT FOR CONSTRUCTION



REV	AMENDMENT	DATE OF ISSUE	DESIGN: MWP	DRAWN: MWP
A	First Issue	24/11/2023	CHECKED: SC	DATE: 10/11/2023
			SCALE: 0	10m
			1:250 @ A3	

CLIENT: WAIKATO DISTRICT COUNCIL
 PROJECT: TRANSPORT ASSESSMENT OF
 NGĀRUAWĀHIA, HOPUHOPU & TAUPIRI
 LOCATION: OLD TAUPIRI ROAD, NGARUAWAHIA

CONCEPT DESIGN

SHEET TITLE: **VEHICLE TRACKING**

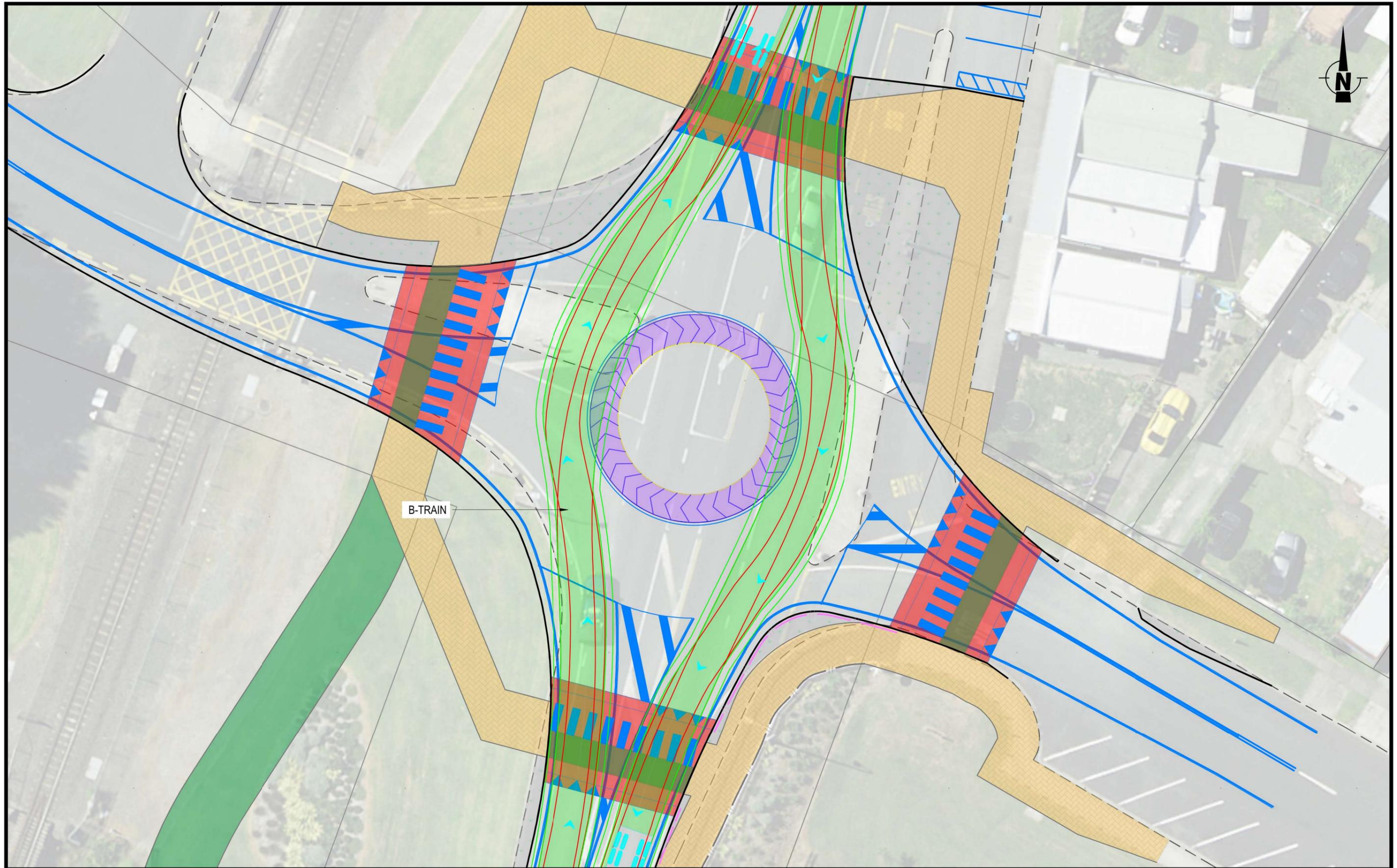
DRAWING NUMBER: WADC01-OT-CD01-A-

SHEET: **06 of 12**

REV: **A**

flow
 TRANSPORTATION SPECIALISTS

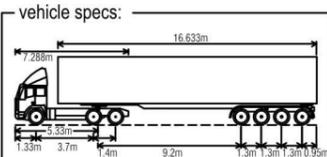
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REV	AMENDMENT	DATE OF ISSUE	DESIGN: MWP	DRAWN: MWP	CLIENT: WAIKATO DISTRICT COUNCIL	SHEET TITLE: VEHICLE TRACKING	SHEET: 07 of 12
A	First Issue	24/11/2023	CHECKED: SC	DATE: 10/11/2023	PROJECT: TRANSPORT ASSESSMENT OF NGĀRUAWĀHIA, HOPUHOPI & TAUPIRI		
			SCALE: 0 10m		LOCATION: OLD TAUPIRI ROAD, NGARUAWAHIA		
			1:250 @ A3		CONCEPT DESIGN	DRAWING NUMBER: WADC01-OT-CD01-A-	REV: A

flow
 TRANSPORTATION SPECIALISTS
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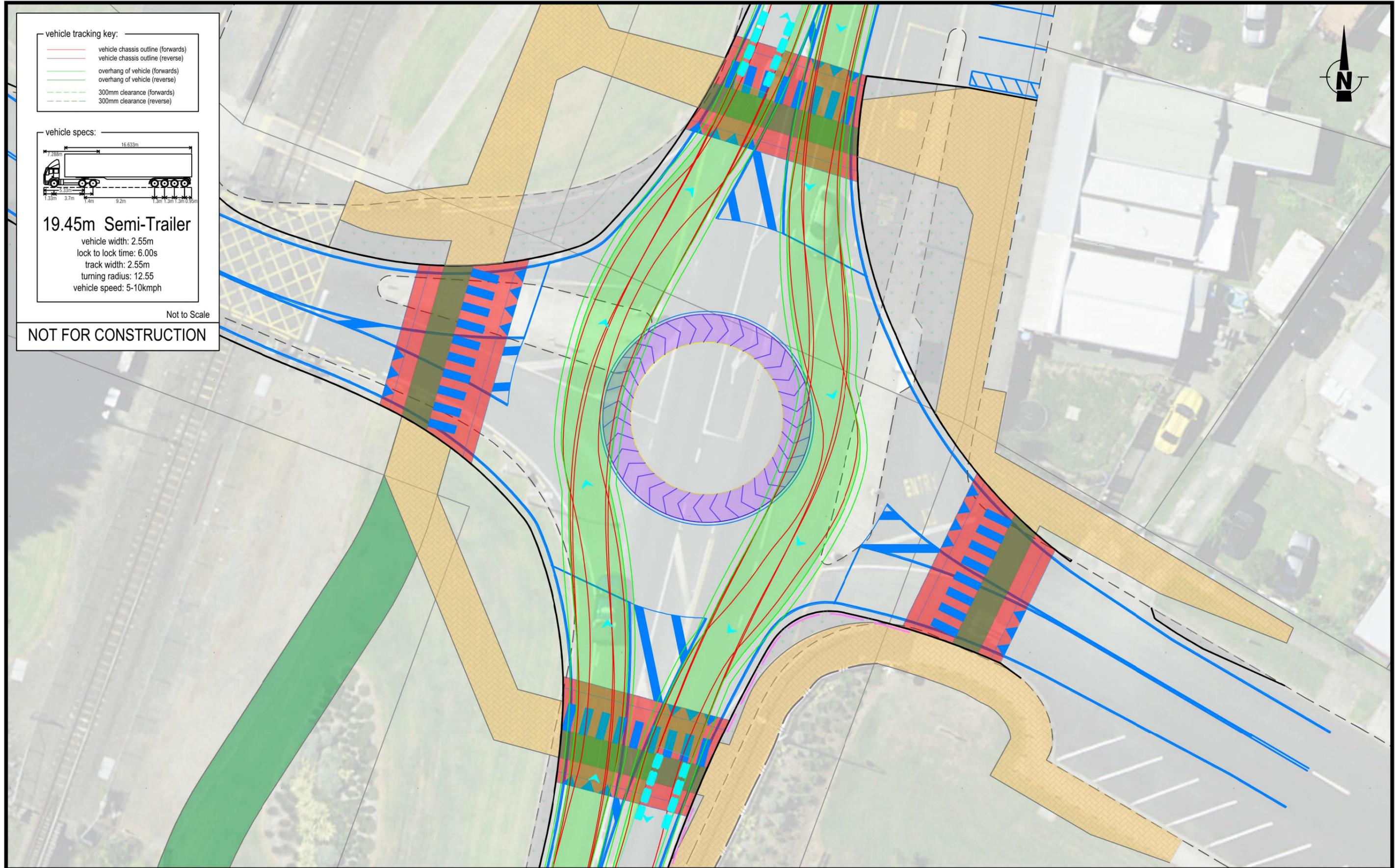
- vehicle tracking key:
- vehicle chassis outline (forwards)
 - - - vehicle chassis outline (reverse)
 - overhang of vehicle (forwards)
 - - - overhang of vehicle (reverse)
 - · - · - 300mm clearance (forwards)
 - · - · - 300mm clearance (reverse)



19.45m Semi-Trailer
 vehicle width: 2.55m
 lock to lock time: 6.00s
 track width: 2.55m
 turning radius: 12.55
 vehicle speed: 5-10kmph

Not to Scale

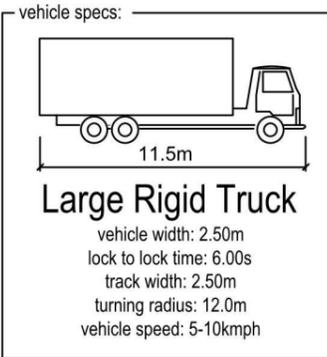
NOT FOR CONSTRUCTION



REV	AMENDMENT	DATE OF ISSUE	DESIGN: MWP	DRAWN: MWP	CLIENT: WAIKATO DISTRICT COUNCIL	SHEET TITLE: VEHICLE TRACKING	SHEET: 08 of 12
A	First Issue	24/11/2023	CHECKED: SC	DATE: 10/11/2023	PROJECT: TRANSPORT ASSESSMENT OF NGĀRUAWĀHIA, HOPUHOPU & TAUPIRI		
			SCALE: 0 10m		LOCATION: OLD TAUPIRI ROAD, NGARUAWAHIA		
			1:250 @ A3		CONCEPT DESIGN	DRAWING NUMBER: WADC01-OT-CD01-A-	REV: A

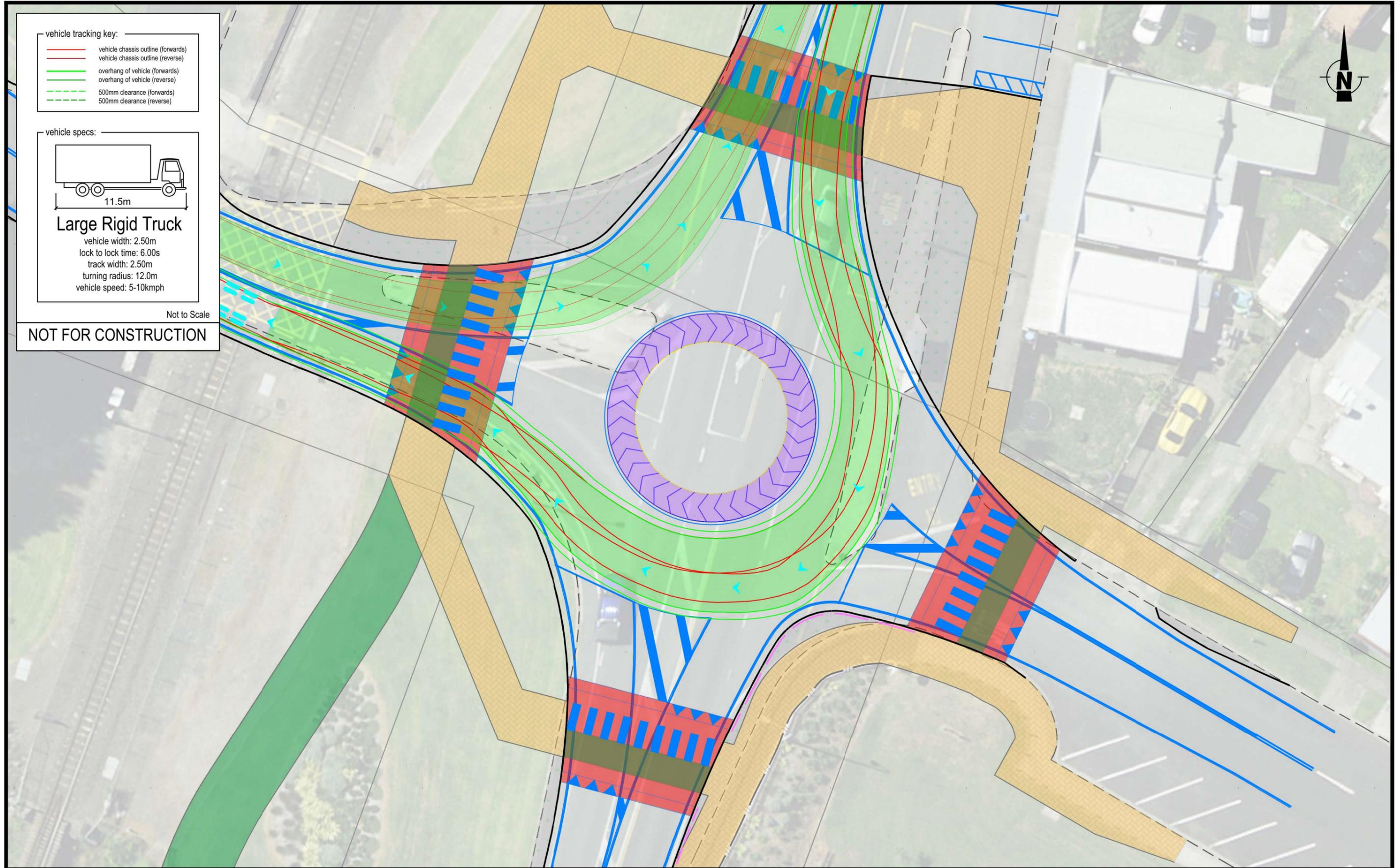
flow
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- vehicle tracking key:
- vehicle chassis outline (forwards)
 - - - vehicle chassis outline (reverse)
 - overhang of vehicle (forwards)
 - - - overhang of vehicle (reverse)
 - - - 500mm clearance (forwards)
 - - - 500mm clearance (reverse)



Not to Scale

NOT FOR CONSTRUCTION

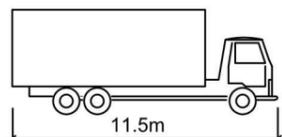


REV	AMENDMENT	DATE OF ISSUE	DESIGN: MWP	DRAWN: MWP	CLIENT: WAIKATO DISTRICT COUNCIL	SHEET TITLE: VEHICLE TRACKING	SHEET: 09 of 12
A	First Issue	24/11/2023	CHECKED: SC	DATE: 10/11/2023	PROJECT: TRANSPORT ASSESSMENT OF NGĀRUAWĀHIA, HOPUHOPU & TAUPIRI		
			SCALE: 0 10m		LOCATION: OLD TAUPIRI ROAD, NGARUAWAHIA		
			1:250 @ A3		CONCEPT DESIGN	DRAWING NUMBER: WADC01-OT-CD01-A-	REV: A

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- vehicle tracking key:
- vehicle chassis outline (forwards)
 - - - vehicle chassis outline (reverse)
 - overhang of vehicle (forwards)
 - - - overhang of vehicle (reverse)
 - · - · - 500mm clearance (forwards)
 - · - · - 500mm clearance (reverse)

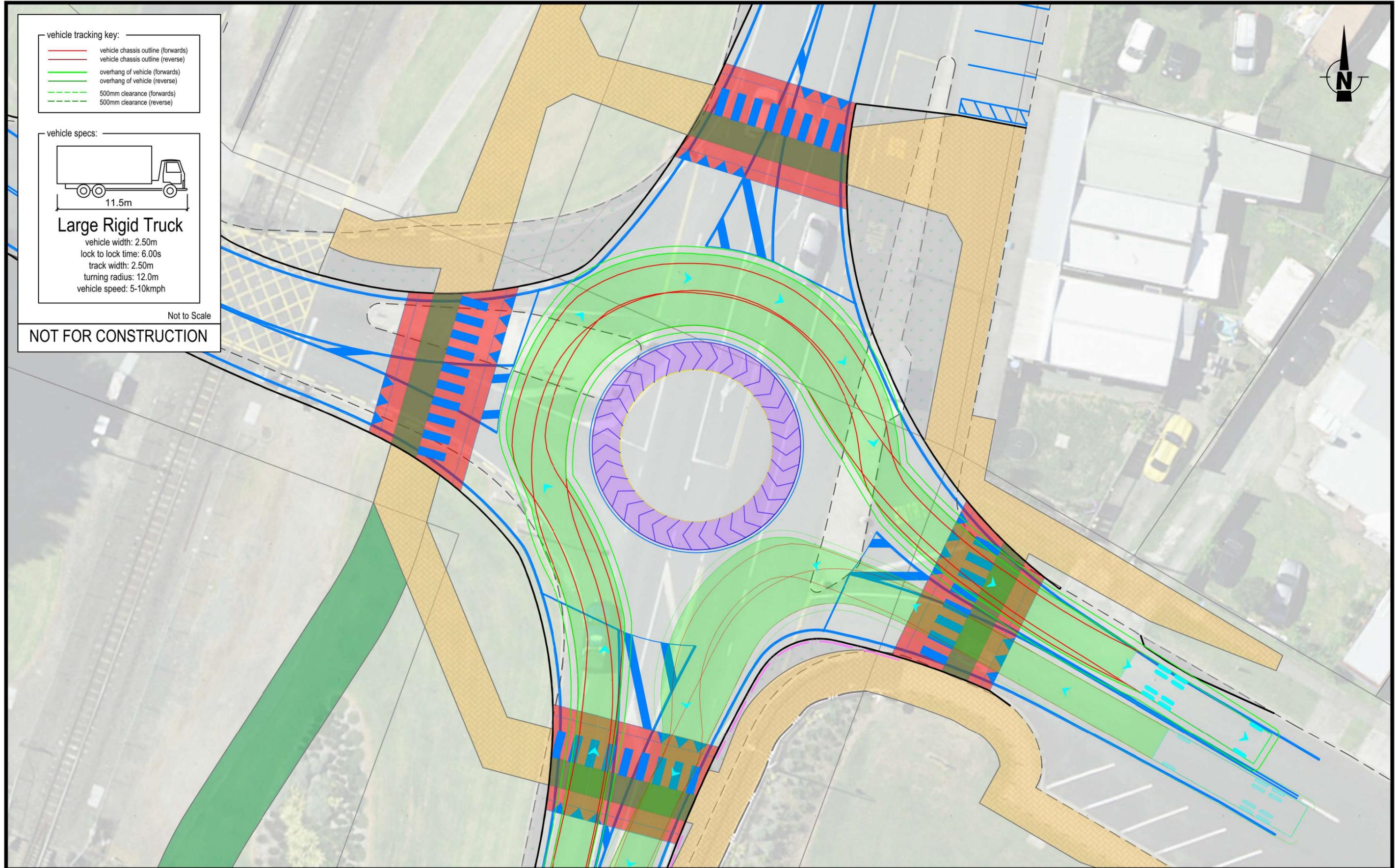
vehicle specs:



Large Rigid Truck
 vehicle width: 2.50m
 lock to lock time: 6.00s
 track width: 2.50m
 turning radius: 12.0m
 vehicle speed: 5-10kmph

Not to Scale

NOT FOR CONSTRUCTION

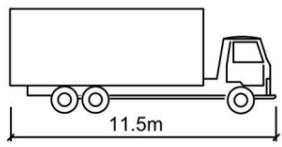


REV	AMENDMENT	DATE OF ISSUE	DESIGN: MWP	DRAWN: MWP	CLIENT: WAIKATO DISTRICT COUNCIL	SHEET TITLE: VEHICLE TRACKING	SHEET: 10 of 12
A	First Issue	24/11/2023	CHECKED: SC	DATE: 10/11/2023	PROJECT: TRANSPORT ASSESSMENT OF NGĀRUAWĀHIA, HOPUHOPU & TAUPIRI		
			SCALE: 0 10m		LOCATION: OLD TAUPIRI ROAD, NGARUAWAHIA		
			1:250 @ A3		CONCEPT DESIGN	DRAWING NUMBER: WADC01-OT-CD01-A-	REV: A

flow
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- vehicle tracking key:
- vehicle chassis outline (forwards)
 - - - vehicle chassis outline (reverse)
 - overhang of vehicle (forwards)
 - - - overhang of vehicle (reverse)
 - · - · - 500mm clearance (forwards)
 - · - · - 500mm clearance (reverse)

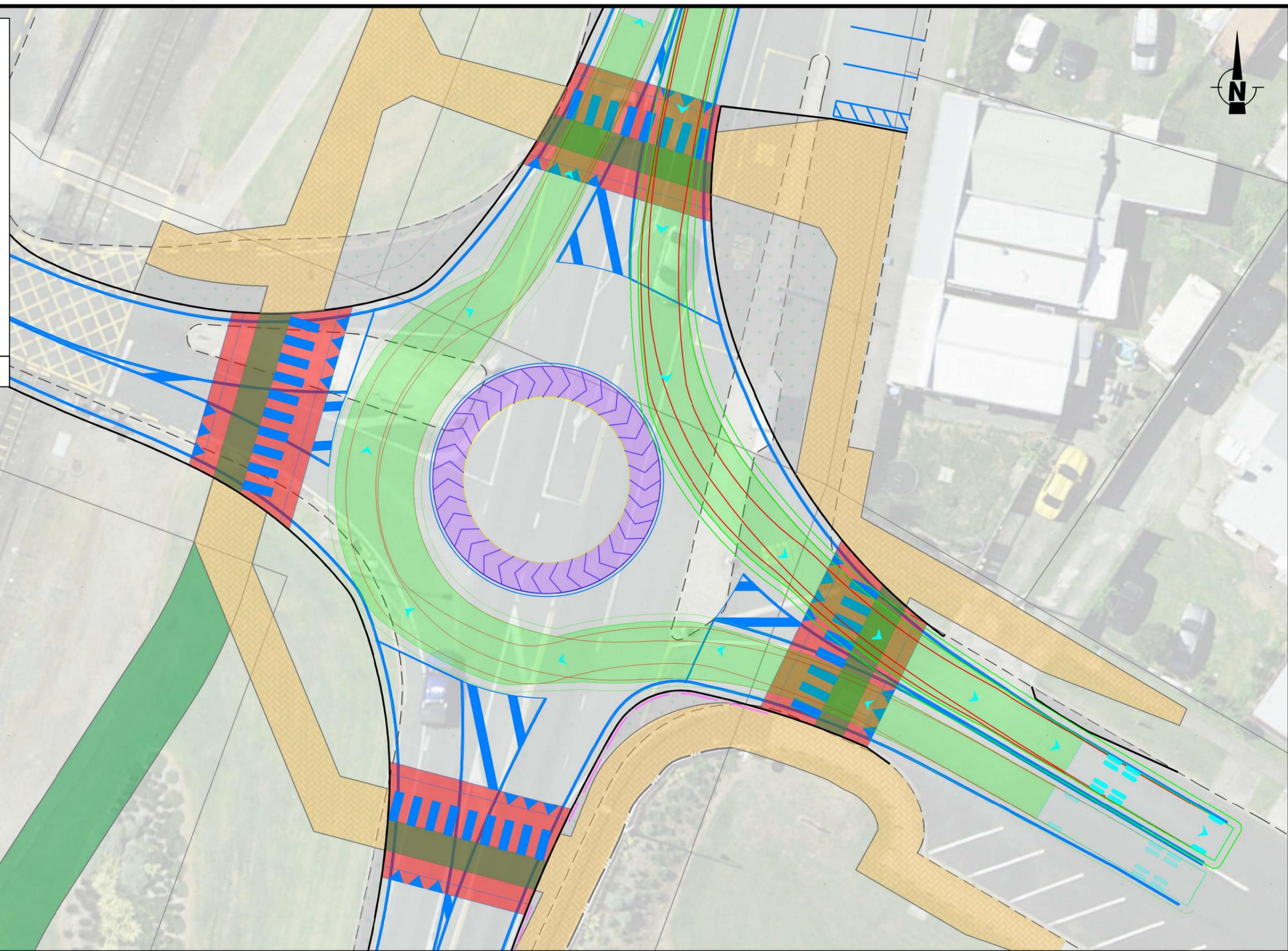
vehicle specs:



Large Rigid Truck
 vehicle width: 2.50m
 lock to lock time: 6.00s
 track width: 2.50m
 turning radius: 12.0m
 vehicle speed: 5-10kmph

Not to Scale

NOT FOR CONSTRUCTION



REV	AMENDMENT	DATE OF ISSUE	DESIGN: MWP	DRAWN: MWP
A	First Issue	24/11/2023	CHECKED: SC	DATE: 10/11/2023
		SCALE: 0  10m		
		1:250 @ A3		

CLIENT: WAIKATO DISTRICT COUNCIL
 PROJECT: TRANSPORT ASSESSMENT OF
 NGĀRUAWĀHIA, HOPUHOPU & TAUPIRI
 LOCATION: OLD TAUPIRI ROAD, NGARUAWAHIA

CONCEPT DESIGN

SHEET TITLE: **VEHICLE TRACKING**

DRAWING NUMBER: WADC01-OT-CD01-A-

SHEET: 11 of 12

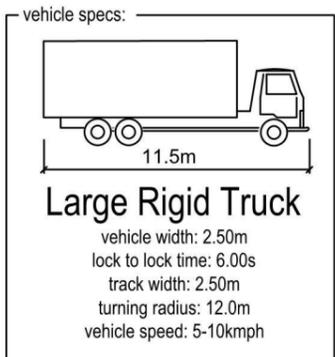
REV: A



flow
 TRANSPORTATION SPECIALISTS

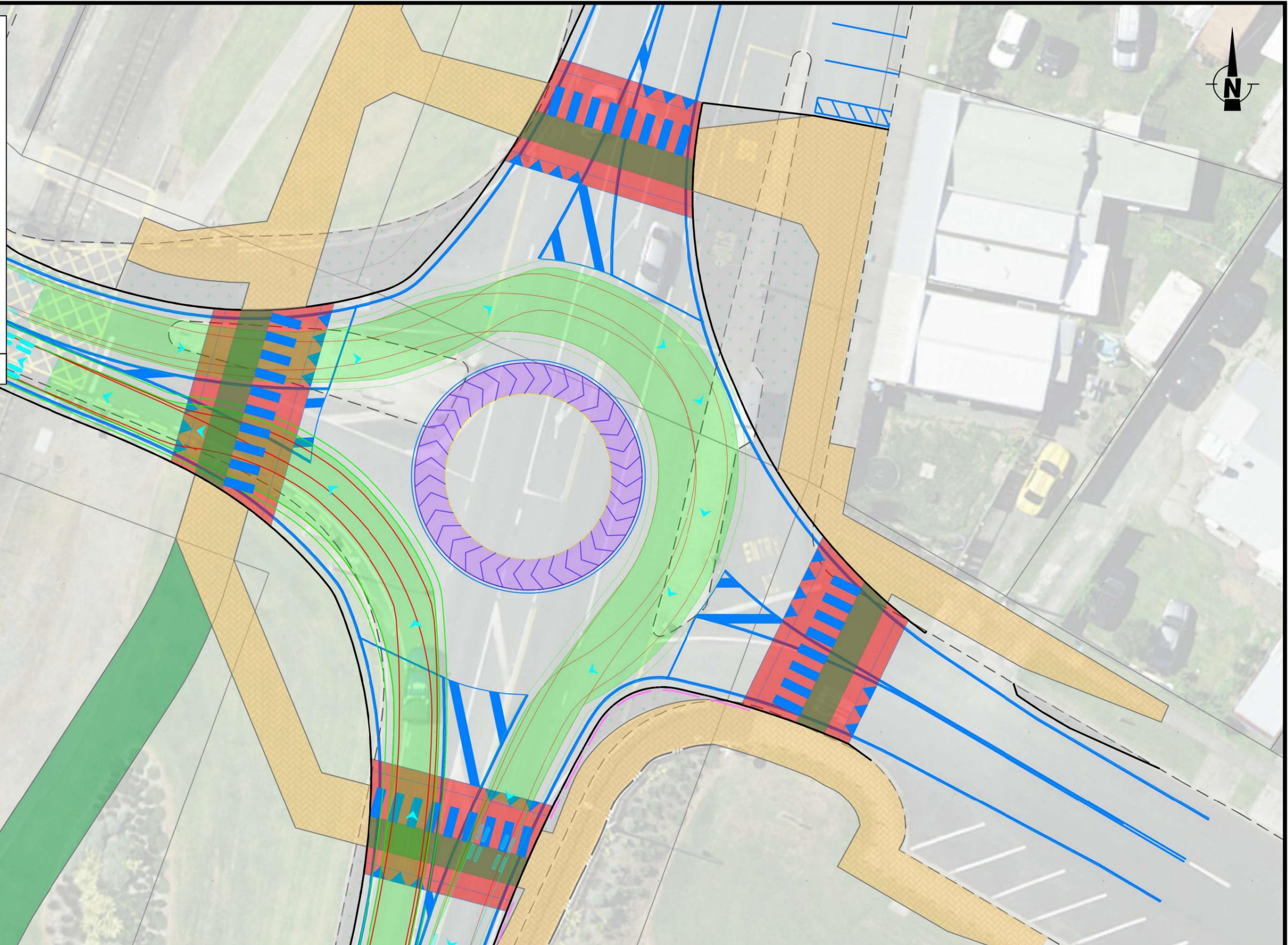
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- vehicle tracking key:
- vehicle chassis outline (forwards)
 - - - vehicle chassis outline (reverse)
 - overhang of vehicle (forwards)
 - - - overhang of vehicle (reverse)
 - · - · - 500mm clearance (forwards)
 - · - · - 500mm clearance (reverse)



Not to Scale

NOT FOR CONSTRUCTION



REV	AMENDMENT	DATE OF ISSUE	DESIGN: MWP	DRAWN: MWP
A	First Issue	24/11/2023	CHECKED: SC	DATE: 10/11/2023
			SCALE:	0 10m
			1:250 @ A3	

CLIENT: WAIKATO DISTRICT COUNCIL
 PROJECT: TRANSPORT ASSESSMENT OF NGĀRUAWĀHIA, HOPUHOPI & TAUPIRI
 LOCATION: OLD TAUPIRI ROAD, NGARUAWAHIA

CONCEPT DESIGN

SHEET TITLE: **VEHICLE TRACKING**

DRAWING NUMBER: WADC01-OT-CD01-A-

SHEET: 12 of 12

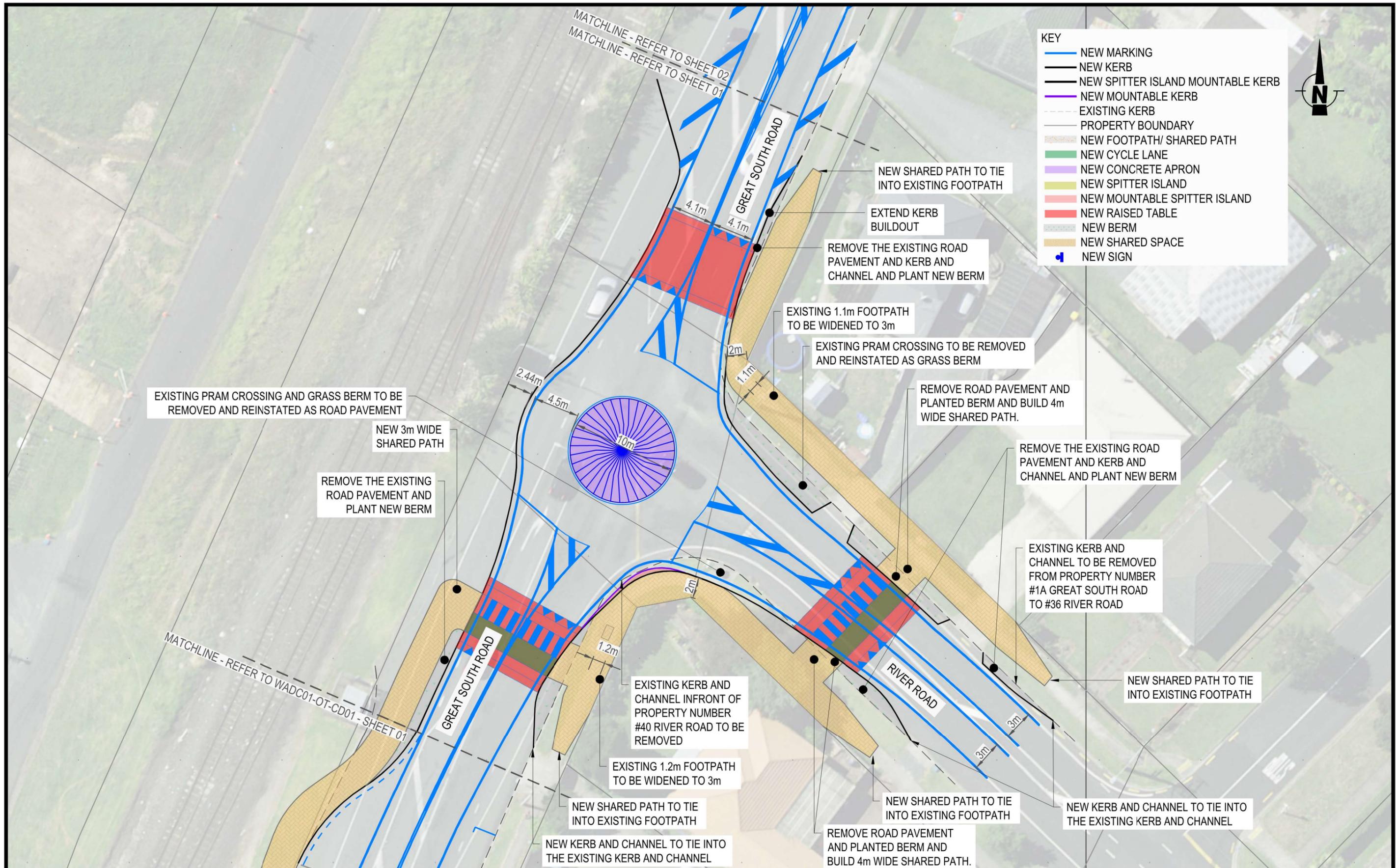
REV: A

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Appendix E-4.2.2

**GREAT SOUTH ROAD INTERSECTION WITH
RIVER ROAD**

DESIGN OF PREFERRED OPTION



REV	AMENDMENT	DATE OF ISSUE	DESIGN: MWP	DRAWN: MWP
A	First Issue	23/01/2024	CHECKED: SC	DATE: 10/11/2023
		SCALE: 0 20m		
		NOT TO SCALE		

CLIENT: WAIKATO DISTRICT COUNCIL
 PROJECT: TRANSPORT ASSESSMENT OF NGĀRUAWĀHIA, HOPUHOPU & TAUPIRI
 LOCATION: RIVER ROAD, NGARUAWAHIA

CONCEPT DESIGN

SHEET TITLE: **GENERAL LAYOUT**

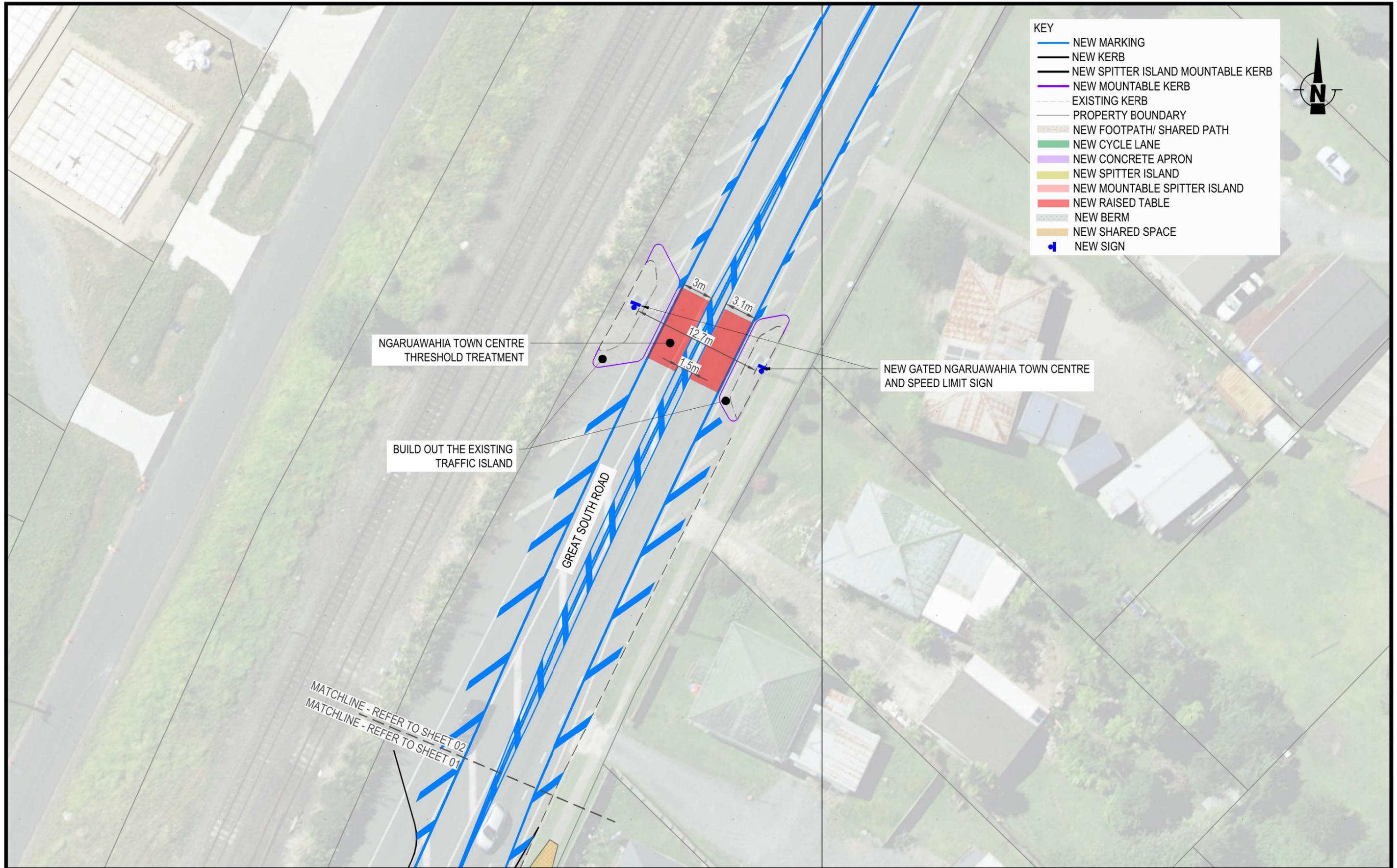
DRAWING NUMBER: **WADC01-RR-CD01-A-**

SHEET: **01 of 08**

REV: **A**

flow
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KEY	
	NEW MARKING
	NEW KERB
	NEW SPITTER ISLAND MOUNTABLE KERB
	NEW MOUNTABLE KERB
	EXISTING KERB
	PROPERTY BOUNDARY
	NEW FOOTPATH/ SHARED PATH
	NEW CYCLE LANE
	NEW CONCRETE APRON
	NEW SPITTER ISLAND
	NEW MOUNTABLE SPITTER ISLAND
	NEW RAISED TABLE
	NEW BERM
	NEW SHARED SPACE
	NEW SIGN



REV	AMENDMENT	DATE OF ISSUE	DESIGN: MWP	DRAWN: MWP
A	First Issue	23/01/2024	CHECKED: SC	DATE: 10/11/2023
		SCALE: 0 20m		
		NOT TO SCALE		

CLIENT: WAIKATO DISTRICT COUNCIL
 PROJECT: TRANSPORT ASSESSMENT OF NGĀRUAWĀHIA, HOPUHOPI & TAUPIRI
 LOCATION: RIVER ROAD, NGARUAWAHIA

CONCEPT DESIGN

SHEET TITLE: **GENERAL LAYOUT**

DRAWING NUMBER: **WADC01-RR-CD01-A-**

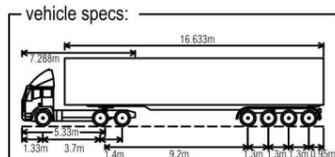
SHEET: **02 of 08**

REV: **A**

flow
 TRANSPORTATION SPECIALISTS

Level 1, 11 Blake Street, Ponsonby, Auckland | PO Box 47497 Ponsonby
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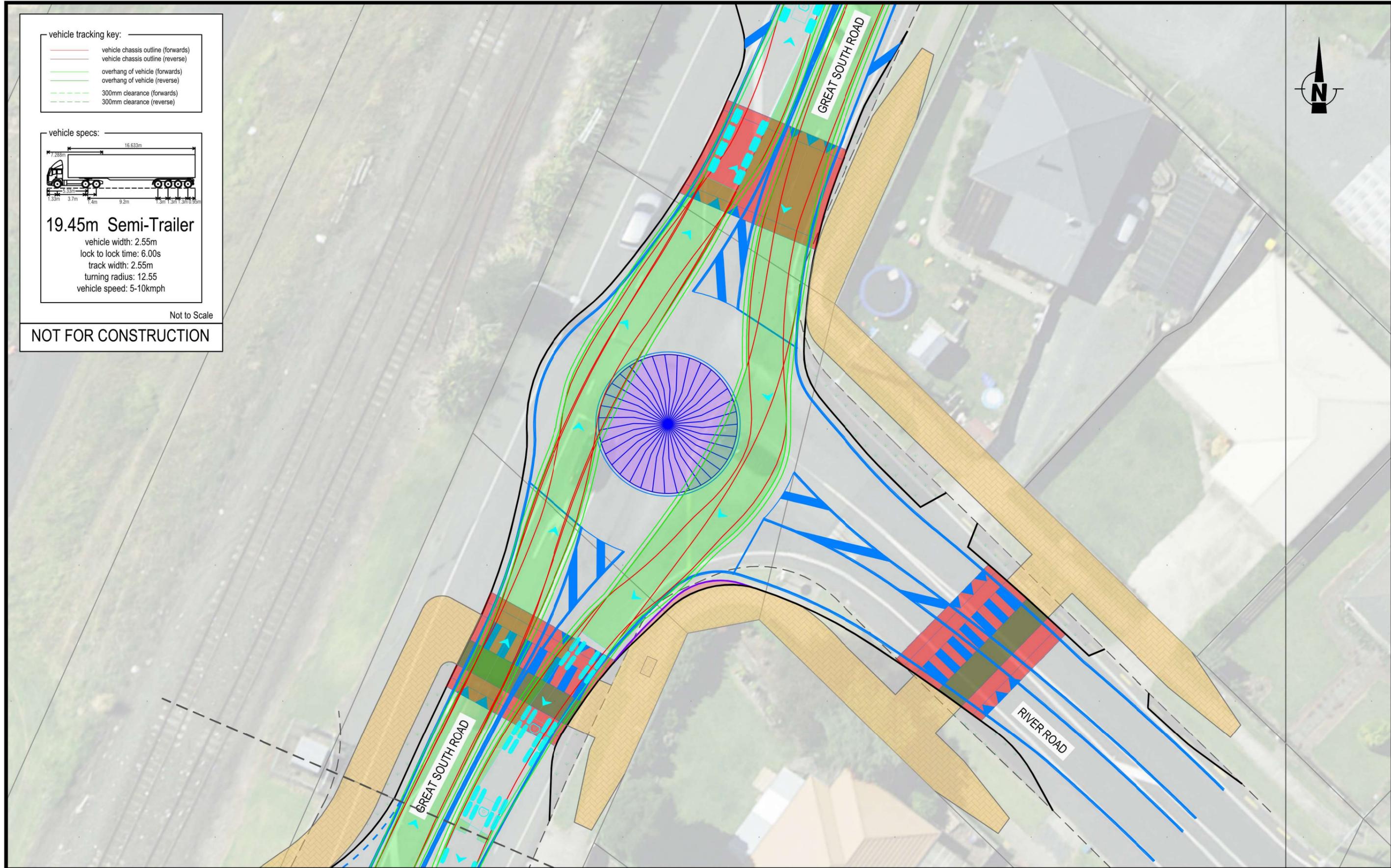
- vehicle tracking key:
- vehicle chassis outline (forwards)
 - - - vehicle chassis outline (reverse)
 - overhang of vehicle (forwards)
 - - - overhang of vehicle (reverse)
 - - - 300mm clearance (forwards)
 - - - 300mm clearance (reverse)



19.45m Semi-Trailer
 vehicle width: 2.55m
 lock to lock time: 6.00s
 track width: 2.55m
 turning radius: 12.55
 vehicle speed: 5-10kmph

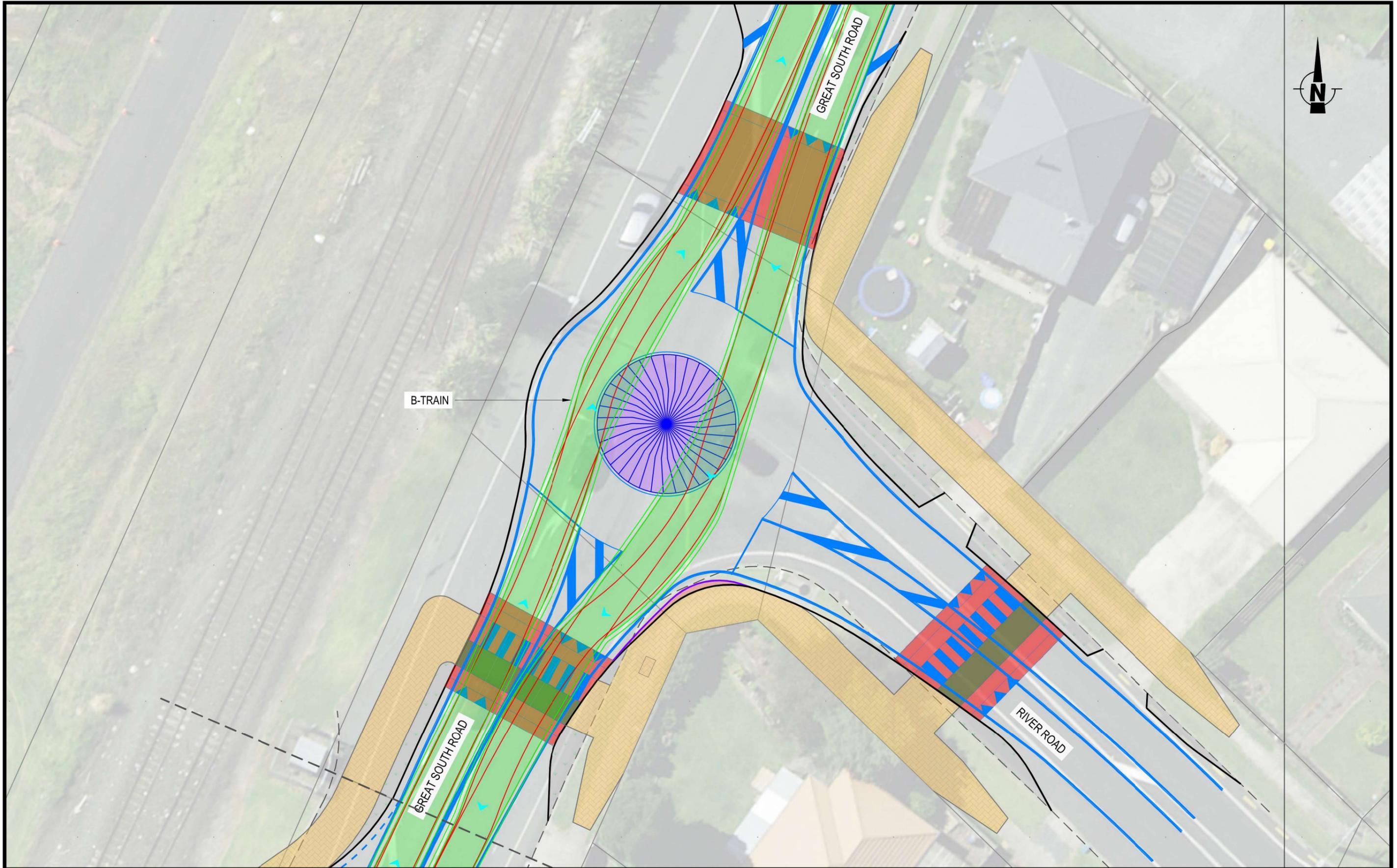
Not to Scale

NOT FOR CONSTRUCTION



REV	AMENDMENT	DATE OF ISSUE	DESIGN: MWP	DRAWN: MWP	CLIENT: WAIKATO DISTRICT COUNCIL	SHEET TITLE: VEHICLE TRACKING	SHEET: 03 of 08
A	First Issue	23/01/2024	CHECKED: SC	DATE: 10/11/2023	PROJECT: TRANSPORT ASSESSMENT OF NGĀRUAWĀHIA, HOPUHOPU & TAUPIRI		
			SCALE: 0 10m		LOCATION: RIVER ROAD, NGARUAWAHIA		
			1:250 @ A3		CONCEPT DESIGN	DRAWING NUMBER: WADC01-RR-CD01-A-	REV: A

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REV	AMENDMENT	DATE OF ISSUE	DESIGN: MWP	DRAWN: MWP
A	First Issue	23/01/2024	CHECKED: SC	DATE: 10/11/2023
			SCALE: 0 10m	
			1:250 @ A3	

CLIENT: WAIKATO DISTRICT COUNCIL
 PROJECT: TRANSPORT ASSESSMENT OF NGĀRUAWĀHIA, HOPUHOPU & TAUPIRI
 LOCATION: RIVER ROAD, NGARUAWAHIA
CONCEPT DESIGN

SHEET TITLE: **VEHICLE TRACKING**
 DRAWING NUMBER: WADC01-RR-CD01-A-

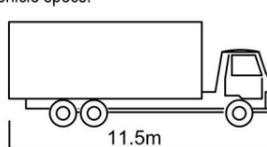
SHEET: **04 of 08**
 REV: **A**

flow
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vehicle tracking key:

- vehicle chassis outline (forwards)
- vehicle chassis outline (reverse)
- overhang of vehicle (forwards)
- overhang of vehicle (reverse)
- - - 500mm clearance (forwards)
- - - 500mm clearance (reverse)

vehicle specs:



Large Rigid Truck
 vehicle width: 2.50m
 lock to lock time: 6.00s
 track width: 2.50m
 turning radius: 12.0m
 vehicle speed: 5-10kmph

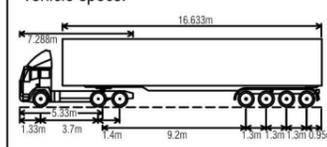
Not to Scale

NOT FOR CONSTRUCTION

vehicle tracking key:

- vehicle chassis outline (forwards)
- vehicle chassis outline (reverse)
- overhang of vehicle (forwards)
- overhang of vehicle (reverse)
- - - 300mm clearance (forwards)
- - - 300mm clearance (reverse)

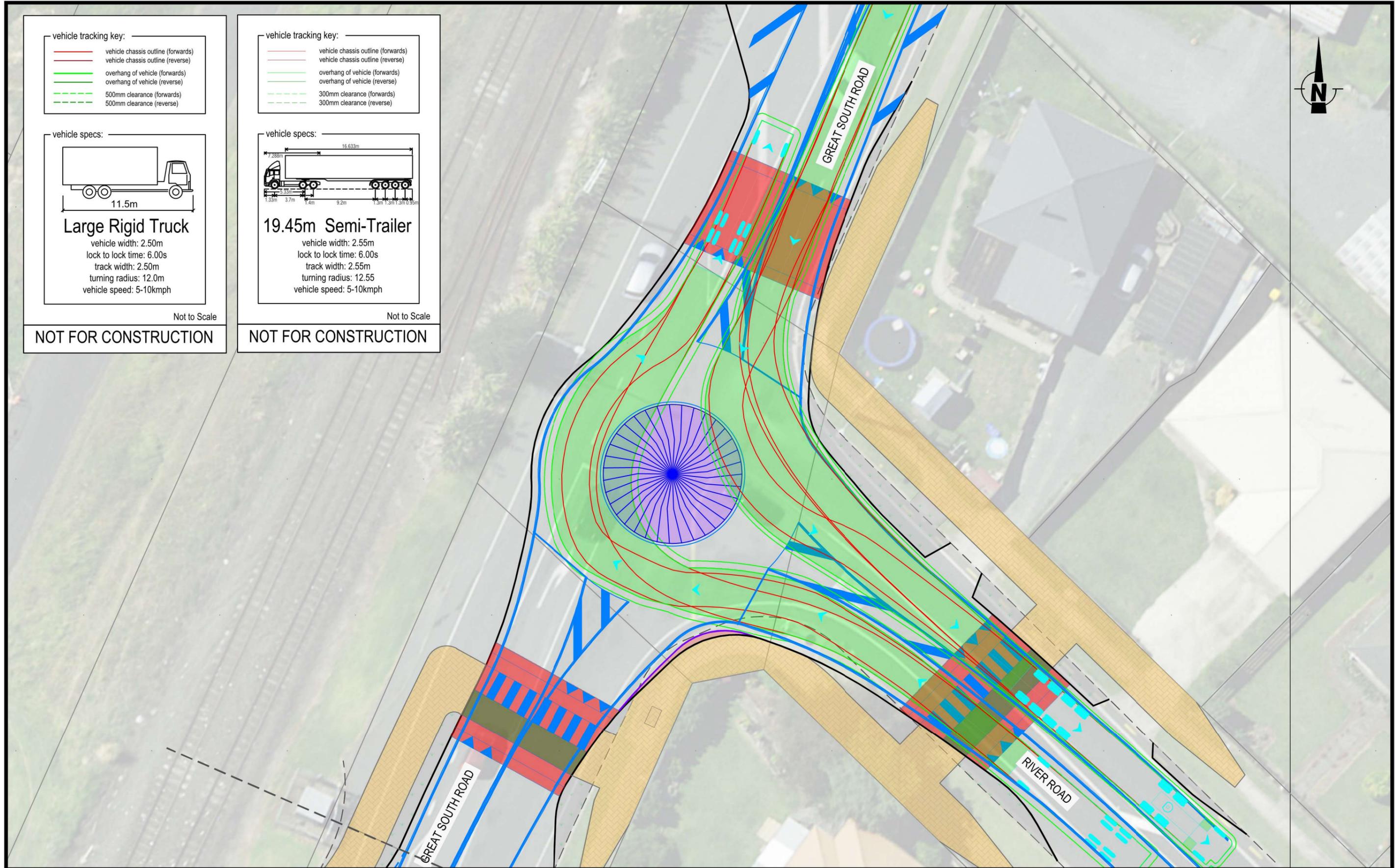
vehicle specs:



19.45m Semi-Trailer
 vehicle width: 2.55m
 lock to lock time: 6.00s
 track width: 2.55m
 turning radius: 12.55
 vehicle speed: 5-10kmph

Not to Scale

NOT FOR CONSTRUCTION



REV	AMENDMENT	DATE OF ISSUE	DESIGN: MWP	DRAWN: MWP
A	First Issue	23/01/2024	CHECKED: SC	DATE: 10/11/2023
		SCALE: 0 10m		
		1:250 @ A3		

CLIENT: WAIKATO DISTRICT COUNCIL
 PROJECT: TRANSPORT ASSESSMENT OF NGĀRUAWĀHIA, HOPUHOPU & TAUPIRI
 LOCATION: RIVER ROAD, NGARUAWAHIA

CONCEPT DESIGN

SHEET TITLE: **VEHICLE TRACKING**

DRAWING NUMBER: WADC01-RR-CD01-A-

SHEET: 05 of 08

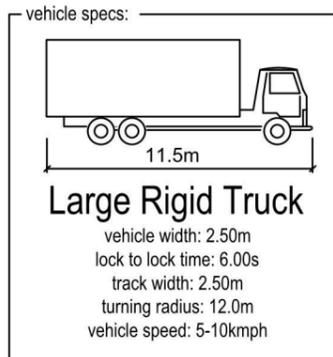
REV: A

flow
 TRANSPORTATION SPECIALISTS

Level 1, 11 Blake Street, Ponsonby, Auckland | PO Box 47497 Ponsonby
 p 09 970 3820 | f 09 970 3890 | www.flownz.com

vehicle tracking key:

	vehicle chassis outline (forwards)
	vehicle chassis outline (reverse)
	overhang of vehicle (forwards)
	overhang of vehicle (reverse)
	500mm clearance (forwards)
	500mm clearance (reverse)

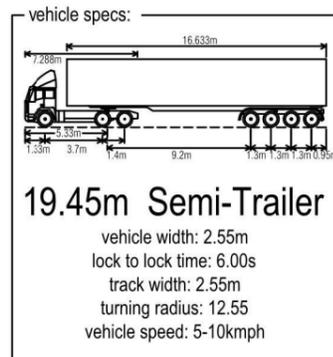


Not to Scale

NOT FOR CONSTRUCTION

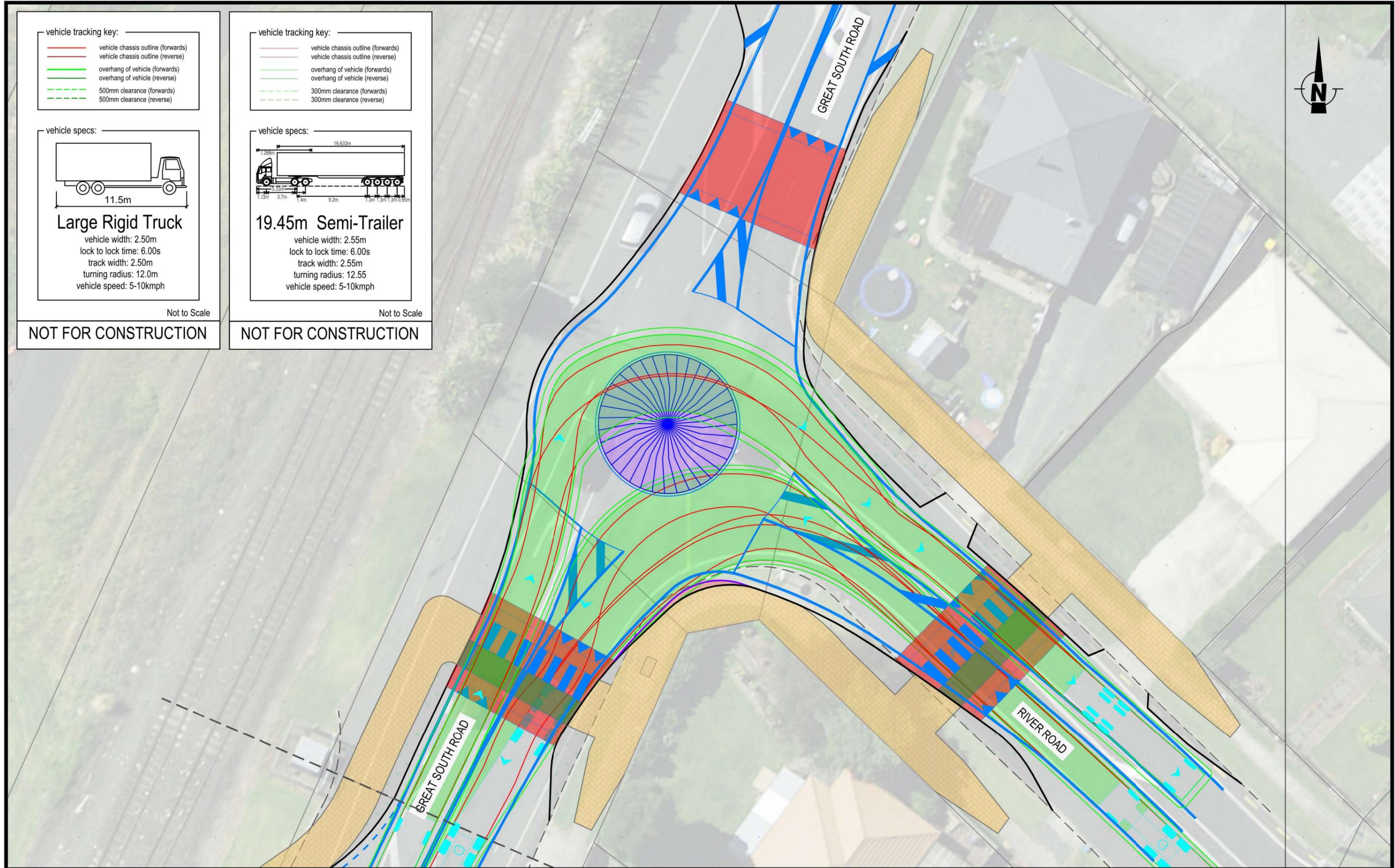
vehicle tracking key:

	vehicle chassis outline (forwards)
	vehicle chassis outline (reverse)
	overhang of vehicle (forwards)
	overhang of vehicle (reverse)
	300mm clearance (forwards)
	300mm clearance (reverse)



Not to Scale

NOT FOR CONSTRUCTION



REV	AMENDMENT	DATE OF ISSUE	DESIGN: MWP	DRAWN: MWP
A	First Issue	23/01/2024	CHECKED: SC	DATE: 10/11/2023
		SCALE: 0 10m		
		1:250 @ A3		

CLIENT: WAIKATO DISTRICT COUNCIL
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CONCEPT DESIGN

SHEET TITLE: **VEHICLE TRACKING**

DRAWING NUMBER: WADC01-RR-CD01-A-

SHEET: **06 of 08**

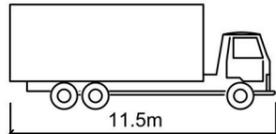
REV: **A**

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- - - vehicle chassis outline (reverse)
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- - - overhang of vehicle (reverse)
- - - 500mm clearance (forwards)
- - - 500mm clearance (reverse)

vehicle specs:



Large Rigid Truck

- vehicle width: 2.50m
- lock to lock time: 6.00s
- track width: 2.50m
- turning radius: 12.0m
- vehicle speed: 5-10kmph

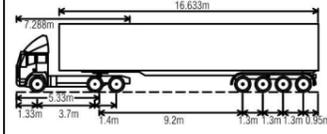
Not to Scale

NOT FOR CONSTRUCTION

vehicle tracking key:

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- - - vehicle chassis outline (reverse)
- overhang of vehicle (forwards)
- - - overhang of vehicle (reverse)
- - - 300mm clearance (forwards)
- - - 300mm clearance (reverse)

vehicle specs:

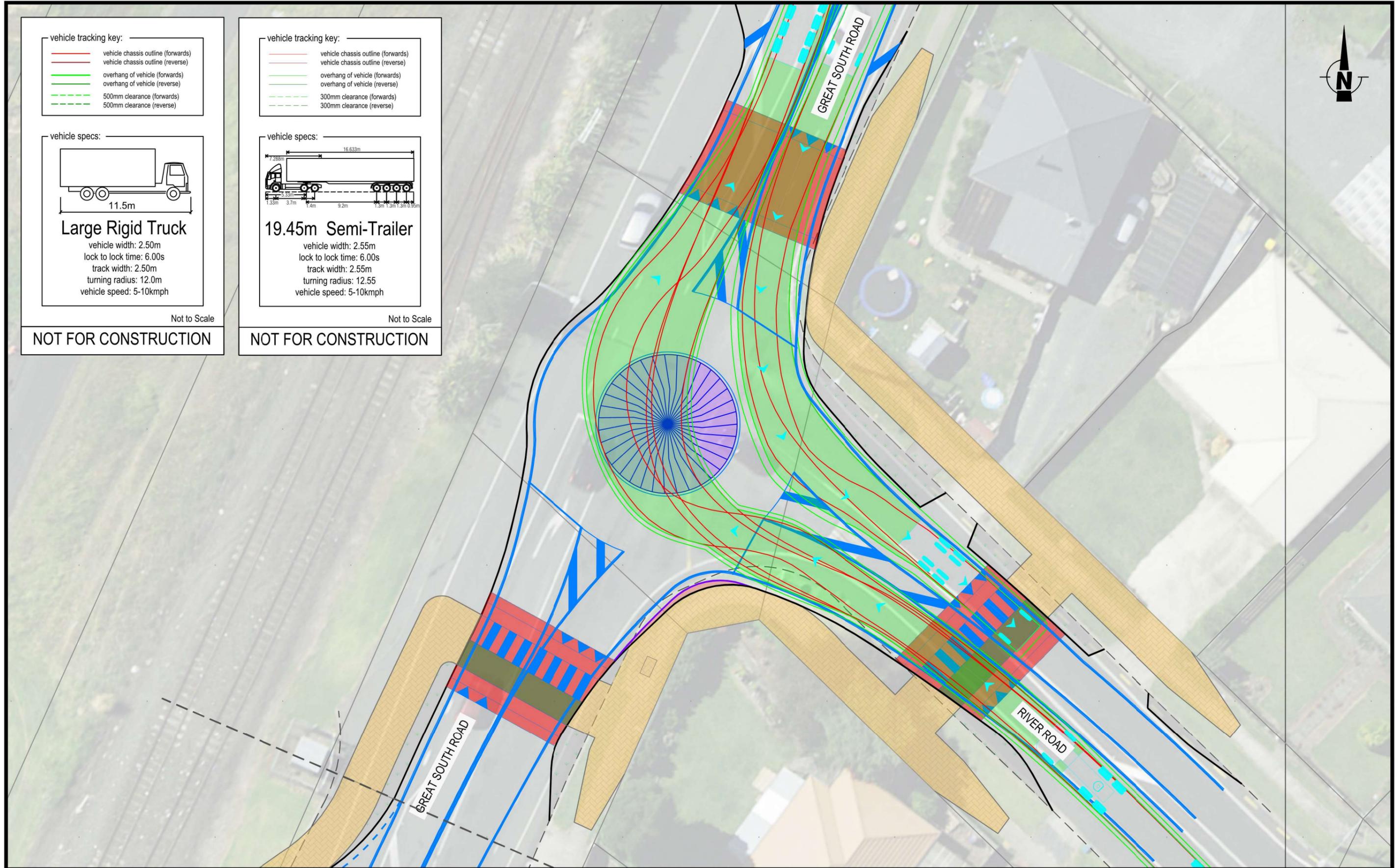


19.45m Semi-Trailer

- vehicle width: 2.55m
- lock to lock time: 6.00s
- track width: 2.55m
- turning radius: 12.55
- vehicle speed: 5-10kmph

Not to Scale

NOT FOR CONSTRUCTION



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SHEET TITLE: **VEHICLE TRACKING**

DRAWING NUMBER: WADC01-RR-CD01-A-

SHEET: **07 of 08**

REV: **A**

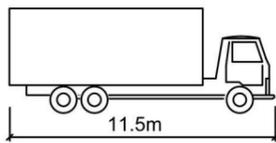
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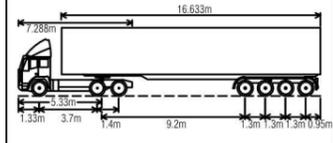
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NOT FOR CONSTRUCTION

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- - - 300mm clearance (forwards)
- - - 300mm clearance (reverse)

vehicle specs:

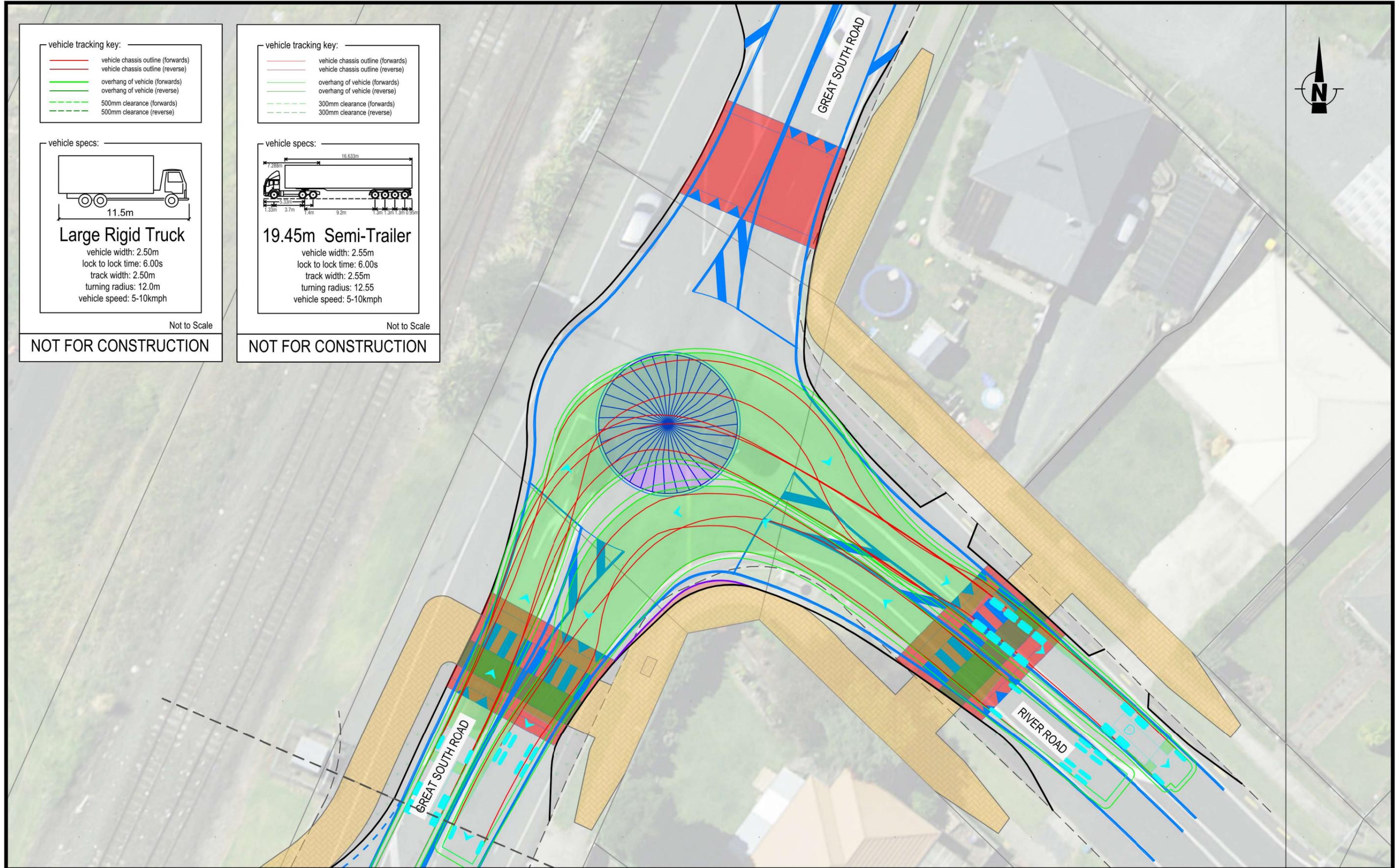


19.45m Semi-Trailer

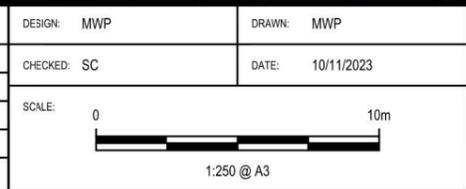
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