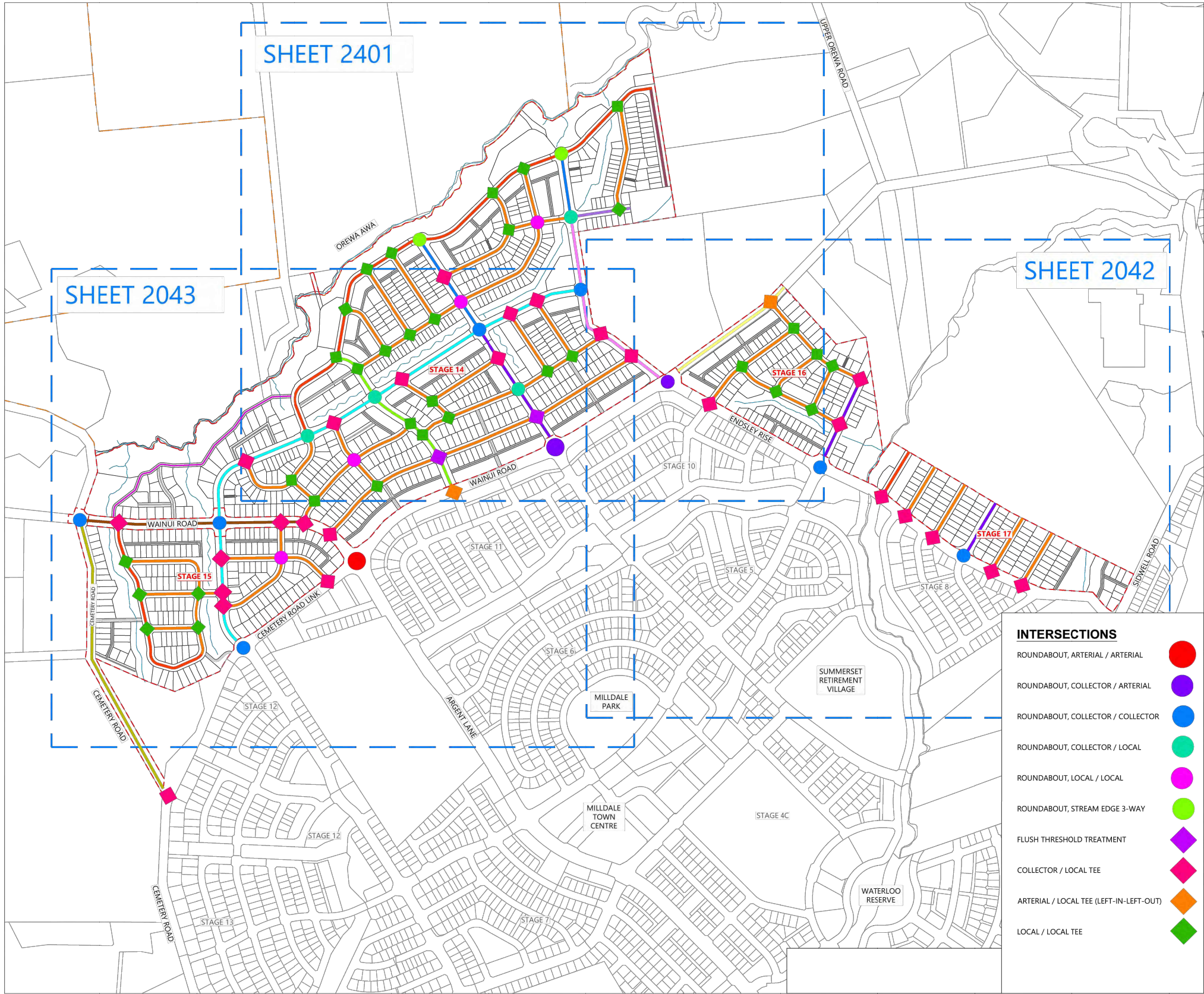


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LEGEND

- EXTENTS OF MILLDALE STAGES 14-17 DEVELOPMENT AREA
- EXTENTS OF TE KOROWAI O MARAEARIKI
- EXISTING BOUNDARY
- PROPOSED LOT BOUNDARY
- WATERCOURSES (TO BE RETAINED)
- STREETS
- STREAM-EDGE COLLECTOR ROAD (24.00m)
 - COLLECTOR ROAD (24.00m)
 - ENDSLEY RISE (COLLECTOR ROAD) (24.00m)
 - LOCAL ROAD 1 (24.00m)
 - LOCAL ROAD 2 (16.20m)
 - STREAM-EDGE ROAD (17.00m)
 - SCHOOL ACCESS LOCAL ROAD (18.00m)
 - SCHOOL FRONTING LOCAL ROAD (16.20m)
 - ACTIVE MODE CORRIDOR (24.00m)
 - ACTIVE MODE PATH (8.00m)
 - CEMETERY ROAD - PROPOSED UPGRADE (20.12m)
 - WAINUI ROAD WEST - PROPOSED UPGRADE (24.00m)
 - WAINUI ROAD - EASTERN EXTENSION (24.00m)
 - JOINTLY-OWNED ACCESS LOT (5.00m)
 - JOINTLY-OWNED ACCESS LOT (7.00m)
 - JOINTLY-OWNED ACCESS LOT (10.00m)
 - PEDESTRIAN ACCESSWAY (8.00m)

NOTES

1. EXISTING BOUNDARIES SHOWN INCLUDES FUTURE BOUNDARIES CONSENTED UNDER BUN60446761 AND BUN60430899. THESE BOUNDARIES ARE SUBJECT TO FINAL SURVEY APPROVAL.

REVISION DETAILS		BY	DATE
1	ISSUED FOR CONSENT	SK	AUG 2026

SURVEYED	WOODS	WAINUI ROAD MILLDALE AUCKLAND
DESIGNED	WOODS	
DRAWN	DH	
CHECKED	SK	
APPROVED	JW	WOODS.CO.NZ



MILLDALE STAGES 14-17 FAST-TRACK

PHASE 1: ROAD INTERSECTION TYPOLOGY PLAN

STATUS	ISSUED FOR CONSENT	REV
COUNCIL	AUCKLAND COUNCIL	1
DWG NO	P25-609-01-2040-RD	

File: C:\1205\DATA\WP-AK-APP-02\P25-609 - MILLDALE NORTH FAST-TRACK APPLICATION_22695\02 DRAWINGS\01 ENG\01 PHASE 1 - DEVELOPMENT AREA\P25-609-01-2040-RD-ROAD INTERSECTION TYPOLOGY PLAN.DWG

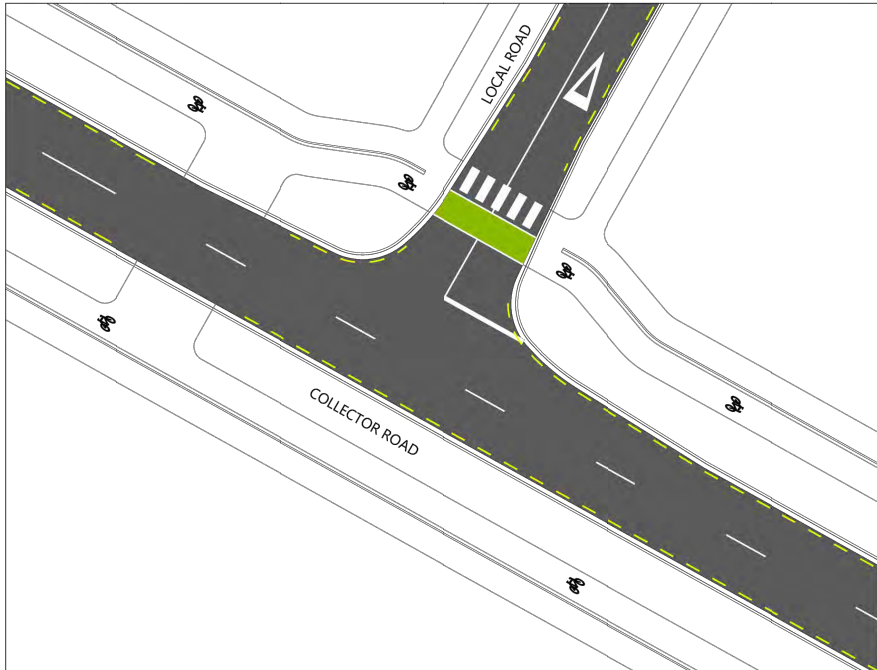
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MILLDALE NORTH FAST-TRACK INTERSECTION TYPOLOGY PLAN

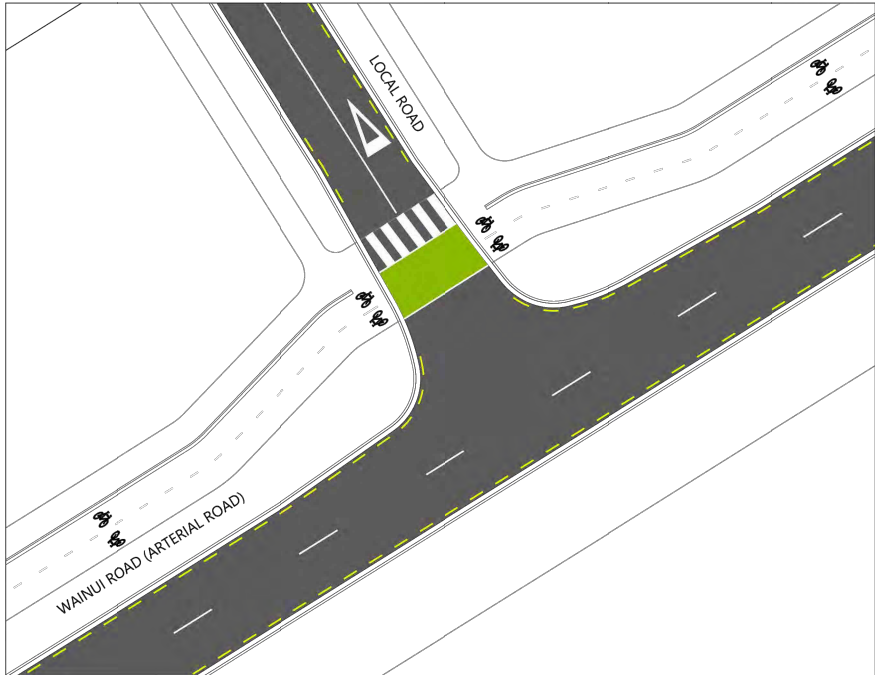
DRAWN: TLJ	---	---
DATE: 07.08.26	STATUS: RC	
SCALE: N.T.S		
DWG NO:310206516A2B		



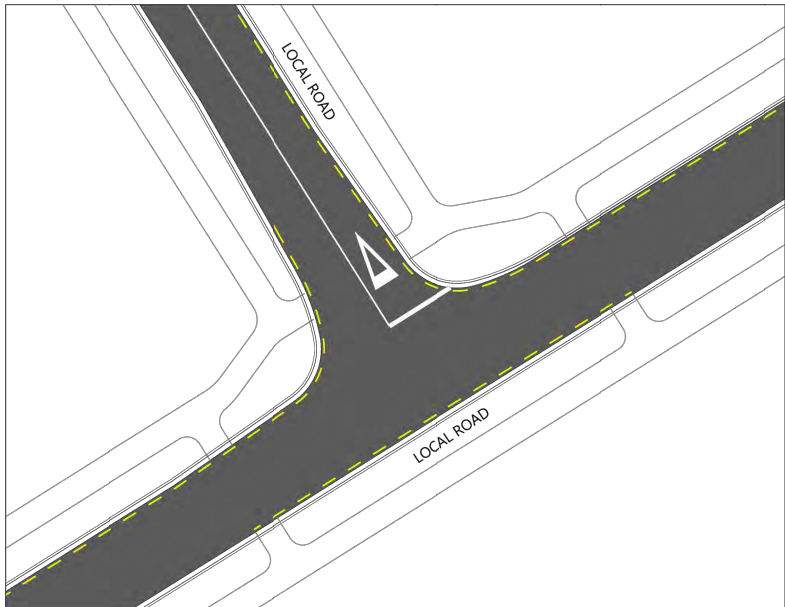
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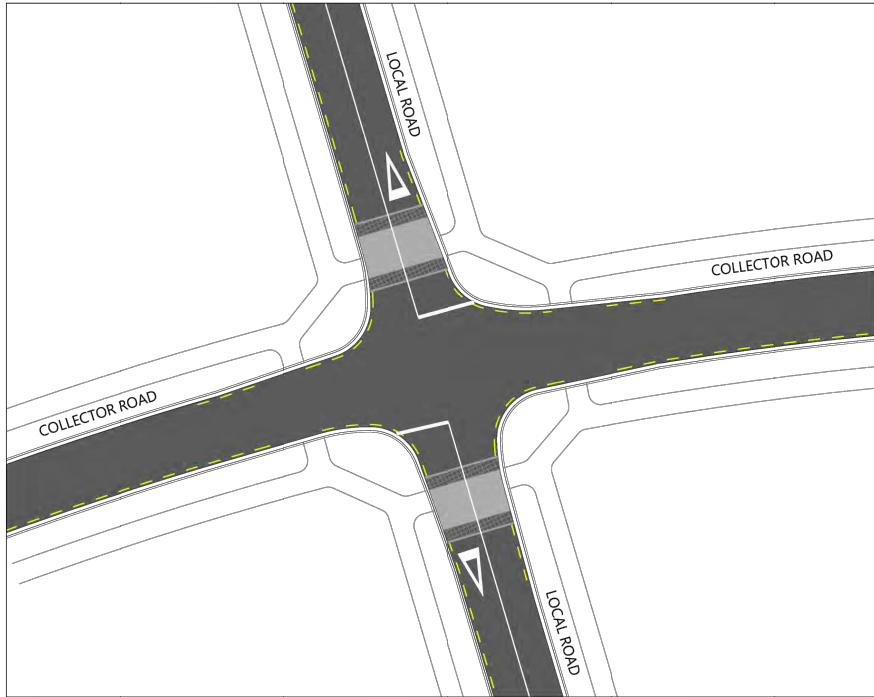
TYPICAL COLLECTOR/LOCAL TEE



TYPICAL ARTERIAL / LOCAL TEE (LEFT-IN-LEFT-OUT)



TYPICAL LOCAL / LOCAL PRIORITY TEE INTERSECTION



FLUSH THRESHOLD TREATMENT



NOTES

1. THE INTERSECTION DESIGN AND LAYOUT SHOWN IS INDICATIVE ONLY. FINAL DETAILED DESIGN AND LAYOUT TO BE DETERMINED AT ENGINEERING APPROVAL STAGE.
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REVISION DETAILS		BY	DATE
1	ISSUED FOR CONSENT	SK	AUG 2026

SURVEYED	WOODS	WAINUI ROAD MILLDALE AUCKLAND
DESIGNED	WOODS	
DRAWN	DH	
CHECKED	SK	
APPROVED	JW	WOODS.CO.NZ



MILLDALE
STAGES 14-17
FAST-TRACK

PHASE 1: TYPICAL INTERSECTION
LAYOUT SHEET 2

STATUS	ISSUED FOR CONSENT	REV
COUNCIL	AUCKLAND COUNCIL	1
DWG NO	P25-609-01-2045-RD	

FILE: C:\1205\DATA\WP-AKL-APP-02\P25-609 - MILLDALE NORTH FAST-TRACK APPLICATION, 22695\02 DRAWINGS\01 ENG\01 PHASE 1 - DEVELOPMENT AREA\P25-609-01-2045-RD-ROAD INTERSECTION TYPOLOGY PLAN.DWG

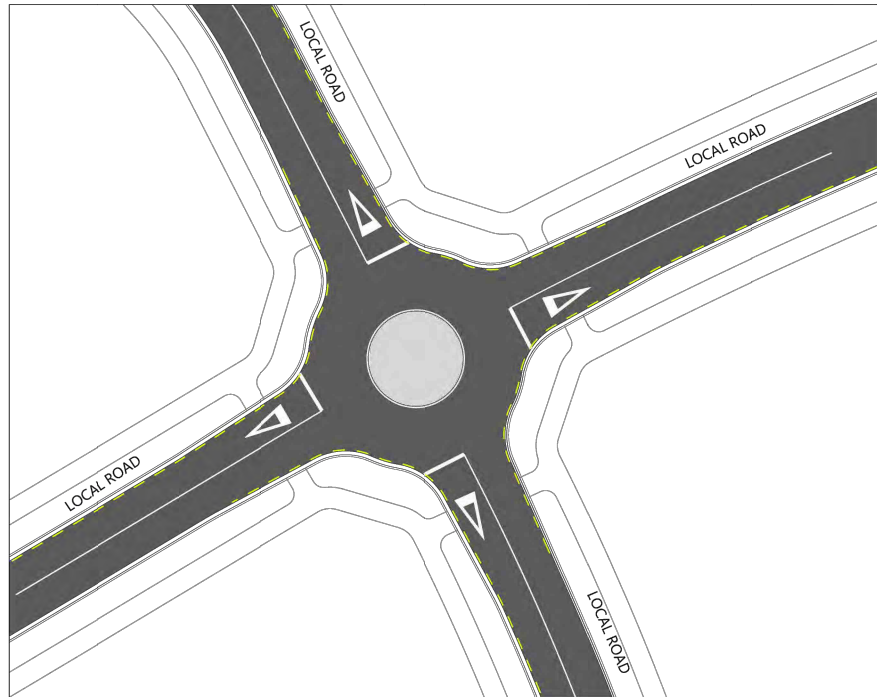
REV	DATE	DRN	CHK	DESCRIPTION
A	07.08.26	TLJ	----	Source: Woods Ltd issued August 2026

MILLDALE NORTH FAST-TRACK
TYPICAL TEE AND CROSSROADS TREATMENTS

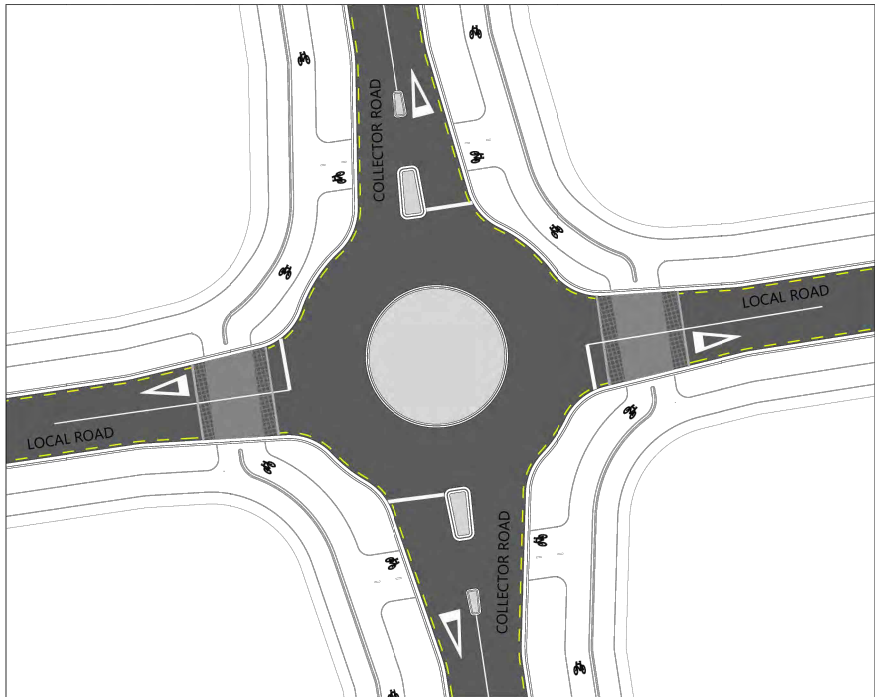
DRAWN: TLJ	---	---
DATE: 07.08.26	STATUS: RC	
SCALE: N.T.S		
DWG NO: 310206516A2B		



Friday, 7 August 2026 4:23:52 pm



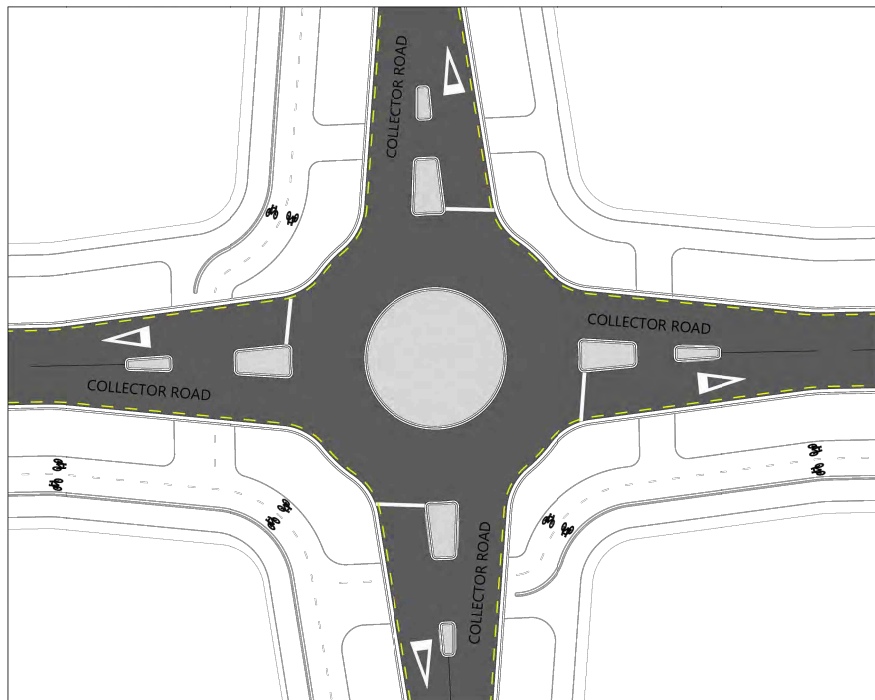
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 TYPICAL LOCAL / COLLECTOR ROAD ROUNDABOUT



 TYPICAL 3-WAY STREAM EDGE ROAD ROUNDABOUT



 TYPICAL COLLECTOR / COLLECTOR ROAD ROUNDABOUT



NOTES

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REVISION DETAILS		BY	DATE
1	ISSUED FOR CONSENT	SK	AUG 2026

SURVEYED	WOODS	WAINUI ROAD MILLDALE AUCKLAND
DESIGNED	WOODS	
DRAWN	DH	
CHECKED	SK	
APPROVED	JW	WOODS.CO.NZ



**MILLDALE
STAGES 14-17
FAST-TRACK**

PHASE 1: TYPICAL INTERSECTION
LAYOUTS SHEET 1

STATUS	ISSUED FOR CONSENT	REV
COUNCIL	AUCKLAND COUNCIL	1
DWG NO	P25-609-01-2044-RD	

FILE: C:\1205\DATA\WP-AKL-APP-02\P25-609 - MILLDALE NORTH FAST-TRACK APPLICATION 22050102 DRAWINGS\01 ENG\01 PHASE 1 - DEVELOPMENT AREA\P25-609-01-2044-RD-ROAD INTERSECTION TYPOLOGY PLANDWG

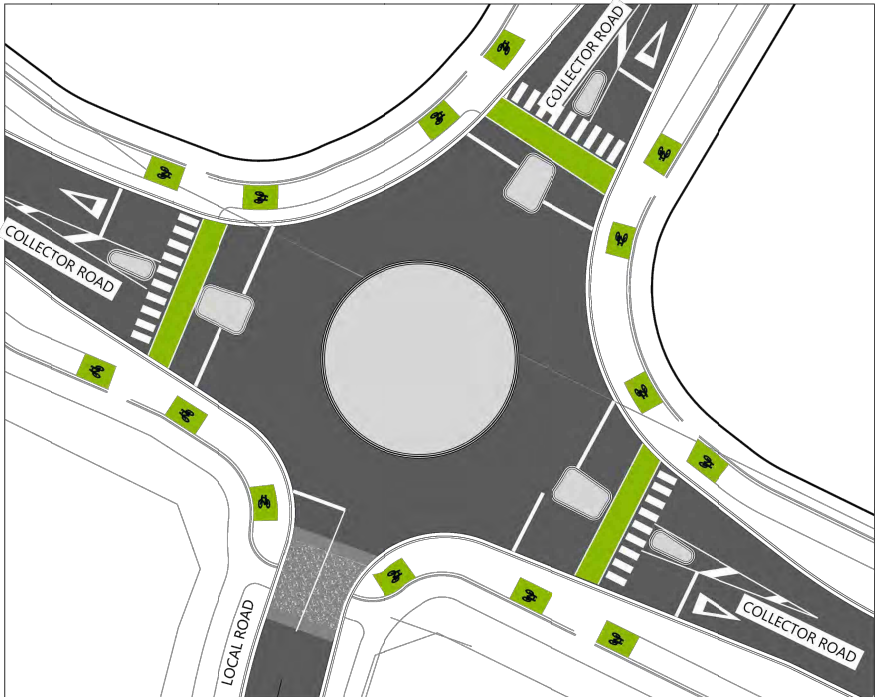
REV	DATE	DRN	CHK	DESCRIPTION
A	07.08.26	TLJ	----	Source: Woods Ltd issued August 2026

**MILLDALE NORTH FAST-TRACK
TYPICAL ROUNDABOUT TREATMENTS**

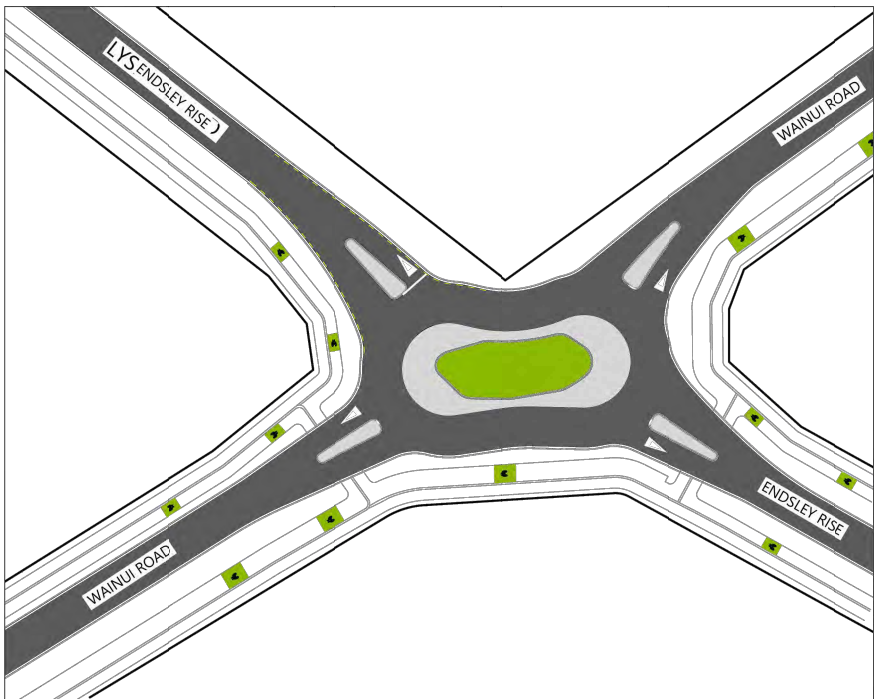
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DATE: 07.08.26	STATUS: RC	
SCALE: N.T.S		
DWG NO:310206516A2B		



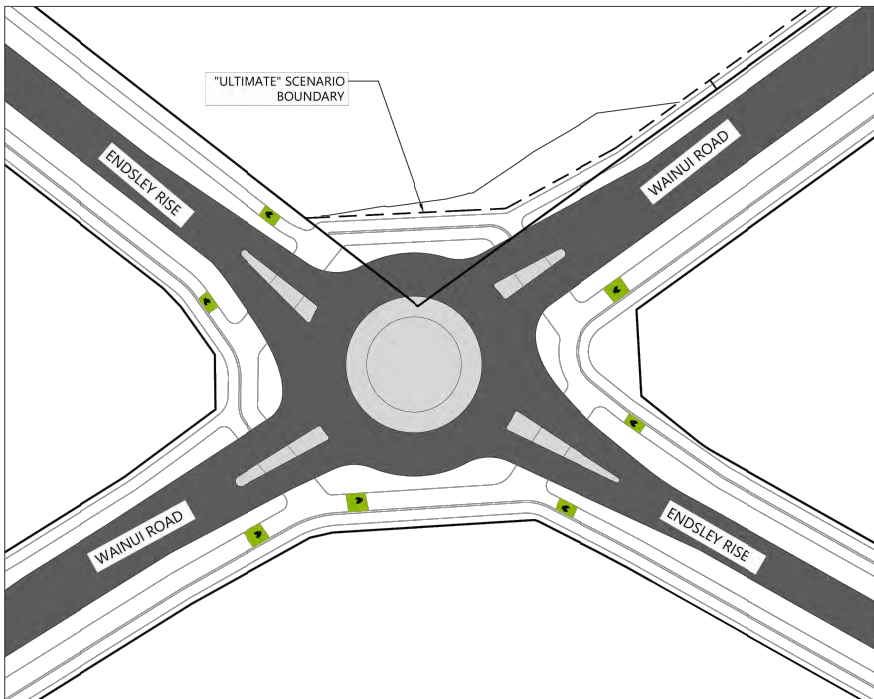
Friday, 7 August 2026 4:23:52 pm



● CONCEPT ENDSLEY RISE ROUNDABOUT UPGRADE



● CONCEPT WAINUI ROAD/ENDSLEY RISE ROUNDABOUT INTERIM DESIGN



● CONCEPT WAINUI ROAD/ENDSLEY RISE ROUNDABOUT ULTIMATE DESIGN



NOTES

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REVISION DETAILS		BY	DATE
1	ISSUED FOR CONSENT	SK	AUG 2026

SURVEYED	WOODS	WAINUI ROAD MILDALE AUCKLAND
DESIGNED	WOODS	
DRAWN	DH	
CHECKED	SK	
APPROVED	JW	
		WOODS.CO.NZ



MILDALE
STAGES 14-17
FAST-TRACK

PHASE 1: CONCEPT INTERSECTION
LAYOUT SHEET 3

STATUS	ISSUED FOR CONSENT	REV
COUNCIL	AUCKLAND COUNCIL	1
DWG NO	P25-609-01-2046-RD	

File: C:\12026516\technical\drawing\310206516A2B.dwg

REV	DATE	DRN	CHK	DESCRIPTION
A	07.08.26	TLJ	----	Source: Woods Ltd issued August 2026

MILDALE NORTH FAST-TRACK
BESPOKE ROUNDABOUT TREATMENTS

DRAWN: TLJ	---	---
DATE: 07.08.26	STATUS: RC	
SCALE: N.T.S		
DWG NO: 310206516A2B		



6.1.3 Walking Network

All proposed cross-sections and typologies include allowance for footpaths or shared pathways along the carriageway. The proposed infrastructure will also include an 'Active Mode Corridor' which forms an off-road route for direct access between key activity nodes. The 'Active Mode Corridor' is an entirely separate network from the roading network, with limited access points. As such, it provides a safe and convenient facility for active mode users. In particular, the proposal takes into consideration connectivity to the Milldale Local Centre.

The proposed pedestrian infrastructure will have connectivity with existing and on-going development through Milldale Stages 10-13. All connecting roads will have separated footpaths available. Similarly, Wainui Road will be likely to carry the greatest pedestrian demand and will be upgraded with suitable infrastructure to meet these demands, noting that this is addressed through a separate resource consent which has been approved. The Millwater Interchange Overbridge currently has footpaths and allows for residents to cross into the Millwater Development to the east of the SH1 Northern Motorway. Furthermore, as part of Milldale Stages 10-13, a shared path which extends off the end of Wainui Road and proceeds under the motorway to the north which connects the precinct with Millwater was completed in 2023.

The Highgate Overbridge also provides segregated footpaths providing direct pedestrian connectivity between Milldale and the Highgate commercial area and the Silverdale Village beyond.

Combined with the long-term pedestrian improvements planned by SGA, the development area is considered to be well-integrated with the surrounding network and SGA's northern package.

6.1.4 Cycling Strategy

The proposal seeks to establish cycle facilities on all collector roads within the Milldale Stage 14-17 area, with connectivity provided to the surrounding network via the off-road and on-road facilities. The cycle network provides a near complete circuit for cyclists to access the various activities within the development area as well as the Milldale Town Centre and educational facilities. In addition, the Millwater and Milldale areas can be easily accessed either via on-road or off-road facilities.

The proposed 'Active Mode Corridor' and stream network will provide excellent opportunities for direct off-road shared paths/cycle routes linking key destinations within the area and connecting to the wider urban area including the Milldale Local Centre, MoE landholdings, Hillside Park and Milldale Primary School. This network would also provide a link to Orewa West via Kowhai Road consistent with the aspirations of the Rodney West Local Paths (Greenways) Plan. The pedestrian / cycling link shown across Waterloo Creek would also support access between the proposed neighbourhood centre and MoE landholdings within the Milldale Stage 14-17 area, from the peninsula of land east of Endsley Rise.

Additional cycling infrastructure is expected to be developed in future years by SGA which identifies the number of walking and cycling improvements in the vicinity of the site. As such, the development will be well-connected with the surrounding traffic environment providing several safe and direct travel route choices.

Overall, the proposed cycle network and infrastructure provisions within the development and the wider Milldale area will offer future residents a viable alternative to the private vehicle and promote a greater use of active modes for travel.

6.1.5 Public Transport

All collector roads within the Milldale Stage 14-17 will be capable of supporting buses.

The east-west collector road, north of Wainui Road, would form the main public transport spine serving the development area, also providing a connection with MoE's landholdings with the wider area. This would also enable the majority of the Milldale Stage 14-17 area to be located within a 5-minute walking catchment of bus stops that could provide connections to other commercial and employment opportunities in Highgate and Silverdale. This will also include the Hibiscus Coast Bus Station, which will allow residents wider access to the regional Public Transport network.

It should be noted that whilst the proposed roading network has allowed for the provision of bus stops and road corridors which are capable of accommodating buses, it remains AT's remit to determine if public transport will be provided to the area and if so, what route it will follow and where stops would be located.

As shown earlier, one of SGA's Public Transport improvement proposals is to establish a new RTC route between Albany and Milldale. If implemented, this would provide residents with a high-quality public transport service facility that would provide an attractive and viable alternative transport choice.

Given the above and other infrastructure improvements planned across the wider area in future years, public transport connectivity to the Milldale Stage 14-17 area is considered appropriate for the level of development expected. With such good connectivity within the existing Milldale development and to other significant transport hubs such as the Hibiscus Coast bus station and Silverdale Village, plus the level of development and density proposed by the development, this will allow Public Transport to be a viable transport mode choice for future residents within the proposed area and the wider Milldale development.

Furthermore, this provides a valuable opportunity for FHLD and AT to work together at this early stage to ensure that future provisions are appropriate and adequate. This will ensure that future residents will be provided with a good level of accessibility to public transport and thereby make public transport a viable alternative to the private vehicle as the Milldale Stage 14-17 area becomes further developed.

6.2 Global Departures from Standards

For this Fast-Track application, FHLD proposes to rely on several departures from standards which have been utilised on previous resource consent applications within Milldale, and which have previously been approved by Auckland Transport. Specifically, the departures relate to the following:

- Vehicle Crossing Type A (for vehicle crossings fronting a local road with a front boundary width of less than 14m);
- Vehicle Crossing Type B (for vehicle crossings fronting a local road with a front boundary width of 14m or greater);
- Vehicle Crossing Type C (for vehicle crossings fronting a collector road); and
- Private driveway typical design details (gradients).

Figures illustrating the details are provided in **Appendix A**. Vehicle crossings and driveway designs will conform fully to these departures from standards.

7. Modelling

7.1 Background

Transportation modelling has been carried out to assess the effects of the Milldale Stage 14-17 development on the surrounding road network. As has been noted earlier, a separate Plan Change has recently been approved for Silverdale West. The modelling which has been undertaken for the Milldale Stage 14-17 development takes the recently approved Silverdale West Industrial Precinct into consideration and includes a level of development occurring in Silverdale West concurrently with the development of the Milldale Stage 14-17 area. The modelling has also considered the development of the Ara Hills and Delmore projects up to the full buildout of the Milldale Stage 14-17 area. The locations of these respective areas have been shown previously in **Figure 12**. The modelling also takes into consideration background traffic growth up to the point of full buildout of Milldale Stage 14-17 as anticipated in the wider regional model.

The modelling also has informed which infrastructure is required at certain years to match development and predicted traffic generation.

Traversal demands were extracted by the Auckland Forecasting Centre (“**AFC**”) from a cordon of the SGA Northern Region EMME³ traffic model (“**SGA Northern Model**”), to feed into an AIMSUN⁴ operational micro-simulation model. AIMSUN is a traffic modelling software package which is in common usage by transportation engineers throughout New Zealand and around the world.

The two-hour traversal demand matrices extracted from the cordoned SGA Northern Model were expanded to two four-hour peak periods (6am to 10am and 3pm to 7pm) to represent the morning and evening peak periods of the road network. The expanded four-hour demand matrices were then disaggregated into 15-minute time sliced demand matrices based on observed traffic patterns on roads in the surrounding area. Some of the zones from the SGA Northern Model were required to be separated into smaller sub-zones within the micro-simulation model to enable better traffic distribution within the model transportation network. As such, the matrices from the cordoned SGA Northern Model had 23 internal/external zones and this was increased to 79 internal/external zones in the micro-simulation model.

Two future years were adopted for the ITA modelling assessment, 2028 and 2038, consistent with the forecast years of the SGA Northern Model. The future land use assumptions which informed the SGA Northern model were the Scenario i11.6 land use (for 2028) and the Scenario i11.5 land use (for 2038)⁵. For the purposes of this assessment, the 2033 forecast year has been used as an approximate future year for when the Milldale Stage 14-17 area is anticipated to be fully developed.

It should be noted that the model used for the assessment is an extension of the model which was used to assess Milldale Stages 1-13. The original model was separately reviewed and approved by representatives of AT and Waka Kotahi as part of the process for delivering the ITA for this part of the development.

The extent of the model includes the following:

- The section of SH1 from a point some 4.5km south of the Silverdale interchange to a point around 1.9km north of the Grand Drive interchange, inclusive of the Silverdale, Millwater and Grand Drive interchange ramps;
- Hibiscus Coast Highway, between the Silverdale interchange and the Hibiscus Coast Highway / Whangaparāoa Road intersection;
- Wainui Road, between Silverdale Street and Cemetery Road;
- Dairy Flat Highway, between the Silverdale interchange a point around 500m south of the Kahikatea Flat Road intersection with Dairy Flat Highway;
- Wilks Road, and its intersections with Dairy Flat Highway and East Coast Road;

³ EMME – *Multimodal Transport Planning Software - INRO*

⁴ AIMSUN – *Advanced Interactive Microscopic Simulator for Urban and Non-Urban Networks – Yunex Traffic Group*

⁵ The Scenario i11.5 land use was used for the 2038 future year due to an error identified in the SGA model household projections assumed within the Milldale Precinct for the 2038 i11.6 land use.

- Millwater-Parkway, between the Millwater interchange and Whangaparāoa Road;
- East Coast Road, between Hibiscus Coast Highway and a point around 650m south of Wilks Road;
- Milldale precinct and internal roads; and
- The proposed internal roading network for the Wainui FUZ and the Silverdale West Industrial Precinct.

The full model extent (with the Milldale Stage 14-17 area bordered in red) is illustrated in **Figure 34**.

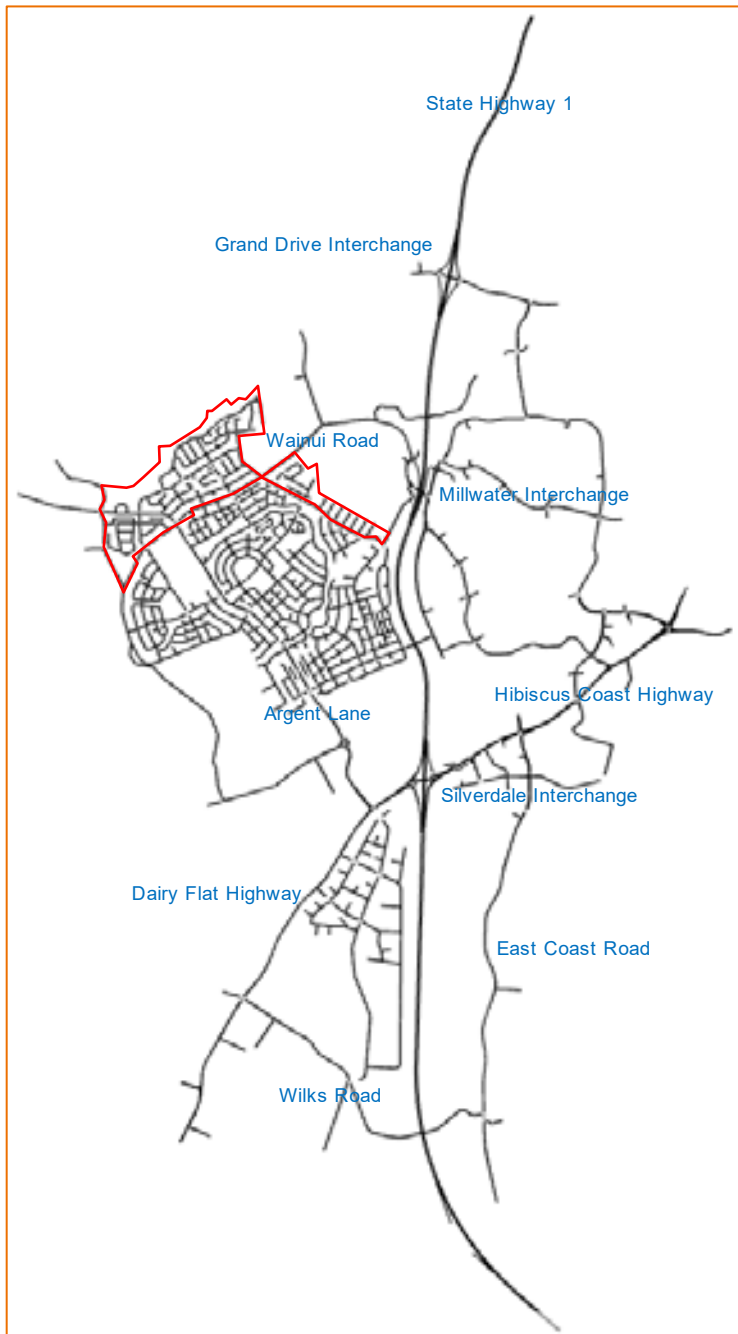


Figure 34: Micro-simulation Model Extent

7.2 General Assumptions

7.2.1 Land Use

As noted earlier, the Milldale Stage 14-17 area is proposed to be primarily residential.

The future years which have been assessed align with the AFC and SGA future years of 2028 and 2038. In 2028, it is assumed that around 300 dwellings will have been constructed (and occupied) within the Milldale Stage 14-17 area (~30% of the complete buildout). In 2033, the full buildout of 1,425 dwellings within the Milldale Stage 14-17 area has been assessed. Background traffic growth at 2033 has been pro-rated from the SGA model traversal demand matrices, assuming uniform growth between 2028 and 2038.

The modelling also considers development of the recently approved Silverdale West Industrial Precinct which anticipates a total of approximately 107ha (light industrial) gross area. It is assumed that 57% of that area (61ha) will be developable (Land Available for Development, or LAD) and that 40% of the developable area (24ha) will be GFA. It is forecast that Silverdale West would be around 88% developed by 2033.

Other external land uses within the model include:

- Highgate Business Park;
- Milldale Stages 1-13 (for modelling purposes, conservatively assumed to be fully complete by around 2028);
- Jack Hawken Lane development;
- Orewa 2 Precinct;
- Ara Hills development (as consented to 575 dwellings);
- Delmore Development (up to around 1,100 dwellings by 2033); and
- Any other land uses included within the SGA's model up to 2033.

7.2.2 Public Transport

Public transport assumptions are built into the SGA Northern Model and the traversal demands obtained from the model reflect the level of public transport anticipated in the area (the SGA Northern Model assumes bus shoulder lanes on SH1 between Silverdale and Oteha Valley Road). Notwithstanding this, as Milldale continues to be developed, opportunities for public transport servicing will increase and as noted earlier, as of November 2022, a new bus route commenced connecting Milldale with the Hibiscus Coast Bus Station via Argent Lane.

Whilst AT's proposed RTC route is unlikely to be complete by 2038, it will provide options for public transport integration for the area into the future, particularly with its proximity to Milldale.

7.2.3 Local Infrastructure Transport Upgrades

The model includes the following local infrastructure transport upgrades (recently completed or soon to be constructed):

- Highgate overbridge (connecting John Fair Drive with Highgate Parkway) - completed;
- Argent Lane / Wainui Road roundabout - consented with construction due to be completed by November 2027;
- Signalisation of the Pine Valley Road / Dairy Flat intersection and the realignment of Pine Valley Road between Argent Lane and Dairy Flat (land has been designated and acquired - detailed design is complete and construction has commenced and due to be completed by November 2027); and
- Completion of the internal roading network within Milldale (including the Argent Lane link between Pine Valley Road and Wainui Road which is due to be completed by November 2027).

Connections between the Milldale Stage 14-17 development area and the surrounding transport network and various localised mitigation measures identified through the modelling are summarised later in this report.

7.2.4 Wider Infrastructure Transport Upgrades

Relevant wider road network improvements which have been assumed include:

- SH1 widening (SH18 to Oteha Valley Road) (completed by 2038);
- O Mahurangi – Penlink project (currently under construction and scheduled for completion in late 2029; and
- The Puhoi to Warkworth improvements (completed and operational).

These upgrades have been accounted for in the matrices provided by the SGA Northern Model. The AFC have also advised that the regional model assumes that Penlink is a tolled route.

7.3 Modelling Assumptions

7.3.1 Trip Generation

A peak hour trip rate of 0.62 trips per dwelling has been adopted for the residences within Milldale Stage 14-17 area. This is consistent with the trip rate assumed for the existing Milldale development, and reflects the varying dwelling typologies anticipated within the site. It also takes into consideration the proposed public transport and active mode links within and around the development area.

The Silverdale West Industrial Precinct anticipates a mix of light industrial, manufacturing and warehousing activities with an assumed proportional breakdown based on current economic projections of:

- General Industrial 20%
- Industrial Park 15%
- Manufacturing 15%
- Warehousing / Distribution / Logistics 50%

Trip Generation rates from the Institute of Transportation Engineers (“ITE”) Trip Generation Guideline have been used to estimate the trip generation of the light industrial activities within Silverdale West. The ITE Guideline provides the following peak hour trip rates (for the adjacent road network) for light industrial activities:

- General Light Industrial – 0.75 trips per 100sqm GFA (AM peak), 0.68 trips per 100sqm GFA (PM peak);
- Industrial park (defined as multiple industrial uses in a single area) – 0.43 trips per 100sqm GFA (AM peak), 0.43 trips per 100sqm GFA (PM peak);
- Manufacturing – 0.67 trips per 100sqm GFA (AM peak), 0.72 trips per 100sqm GFA (PM peak);
- Warehousing – 0.18 trips per 100sqm GFA (AM peak), 0.20 trips per 100sqm GFA (PM peak)

With a gross area buildout of 107ha (or 61ha LAD, or 24ha GFA), the anticipated trip generation is around 990 trips per hour for the AM and PM peak hours for the fully developed Silverdale West Industrial Precinct. The trip generation for Silverdale West was accepted at the Plan Change hearing for that development. A uniform rate of growth within Silverdale West has been included in the modelling for Milldale Stages 14-17.

The assessment for the Ara Hills development used a conservative trip rate of 1 vehicle trip per dwelling in the peak hours. All vehicular trips were assumed to travel to and from the site via the Grand Drive interchange. The total trips assumed for the consented development was 575 trips in the peak hours.

The assessment for the Delmore Development assumed a trip generation rate of 0.67 per dwelling. Based on their staging plan as submitted with their application documents, some 1,100 dwellings are forecast, generating around 742 trips in the peak hour by the time Milldale Stages 14-17 is complete.

These generations have been input to the modelling for the assessment via an existing zone in the model and adopts the same distribution pattern for that zone.

7.3.2 Trip Distribution

The trip distribution associated with the activities within both the Silverdale Industrial Precinct and Milldale have been derived directly from the SGA Northern model. It should be noted that the SGA Northern model already assumes some level of development within the Silverdale West area, but for the purposes of this assessment, the demands have been adjusted in accordance with the anticipated buildout of the Silverdale West area.

Vehicle trips have been assigned to the network dynamically using the C-logit function and the default AIMSUN cost functions have been used for the micro-simulation.

7.4 Modelling Outcome

As noted earlier, the following transportation network upgrades are assumed to be in place prior to any development operational within the Milldale Stage 14-17 area:

- Highgate overbridge (connecting John Fair Drive with Highgate Parkway) - completed;
- Argent Lane / Wainui Road roundabout – consent lodged with Council but construction works currently underway for the realigned approaches;
- Signalisation of the Pine Valley Road / Dairy Flat intersection and the realignment of Pine Valley Road between Argent Lane and Dairy Flat (land has been designated and acquired - detailed design is complete and civil works is currently out for tender with a view for construction to be completed by mid-2027); and
- Completion of the internal roading network within Milldale (including the Argent Lane link between Pine Valley Road and Wainui Road) – due for completion by the end of 2026.

The modelling indicates that the Milldale Stage 14-17, Silverdale West Industrial Precinct, Delmore Development and Ara Hills trip generations can be accommodated by the surrounding transportation network with several targeted upgrades. These comprise:

- **Dairy Flat / Pine Valley Intersection Upgrade:** Upgrade of the Pine Valley Road / Dairy Flat Highway intersection to include an additional right turn bay into Pine Valley Road from Dairy Flat Highway;
- **Signalisation of the Wilks Road / Dairy Flat Highway intersection;**
- **Signalisation of the Wilks Road / East Coast Road intersection;**
- **Silverdale Interchange Upgrade:**
 - The addition of a left turn slip lane on the western approach to the Silverdale interchange, without which queues would extend back from the interchange along Dairy Flat Highway all the way down to the Wilks Road intersection at peak times; and
 - Extending the length of the left turn slip lane on the southbound off-ramp at the Silverdale interchange to around 150m and introducing a queue meter for the AM peak. Detector loops would be introduced on the southbound off-ramp and a traffic signal provided at the eastern end of the Silverdale overbridge. Once queues extend to the loops, the traffic signal will turn red, stopping eastbound traffic on the overbridge and allowing the queue on the off-ramp to dissipate. This is a similar set-up to the northbound off-ramp at the same interchange which operates in the PM peak. This mitigation measure is proposed in order to prevent queues from extending to the mainline of the state highway.
- **Double-laning of Pine Valley Road / Agent Lane roundabout.**

The derivation of the triggers for these mitigation measures was justified as part of the assessment for the Silverdale West Industrial Precinct Plan Change application which utilises the same traffic model for the Milldale Stage 14-17 assessment. The memo which provides a summary of why the measures are required is attached in **Appendix B**.

The operation of the key intersections in the vicinity of the development area has been analysed for the 2033 forecast year (at which time the Milldale Stage 14-17 development is anticipated to be completed). The intersections assessed are indicated as red circles in **Figure 35** which follows, with the Milldale Stage 14-17 boundary shown with a red border.

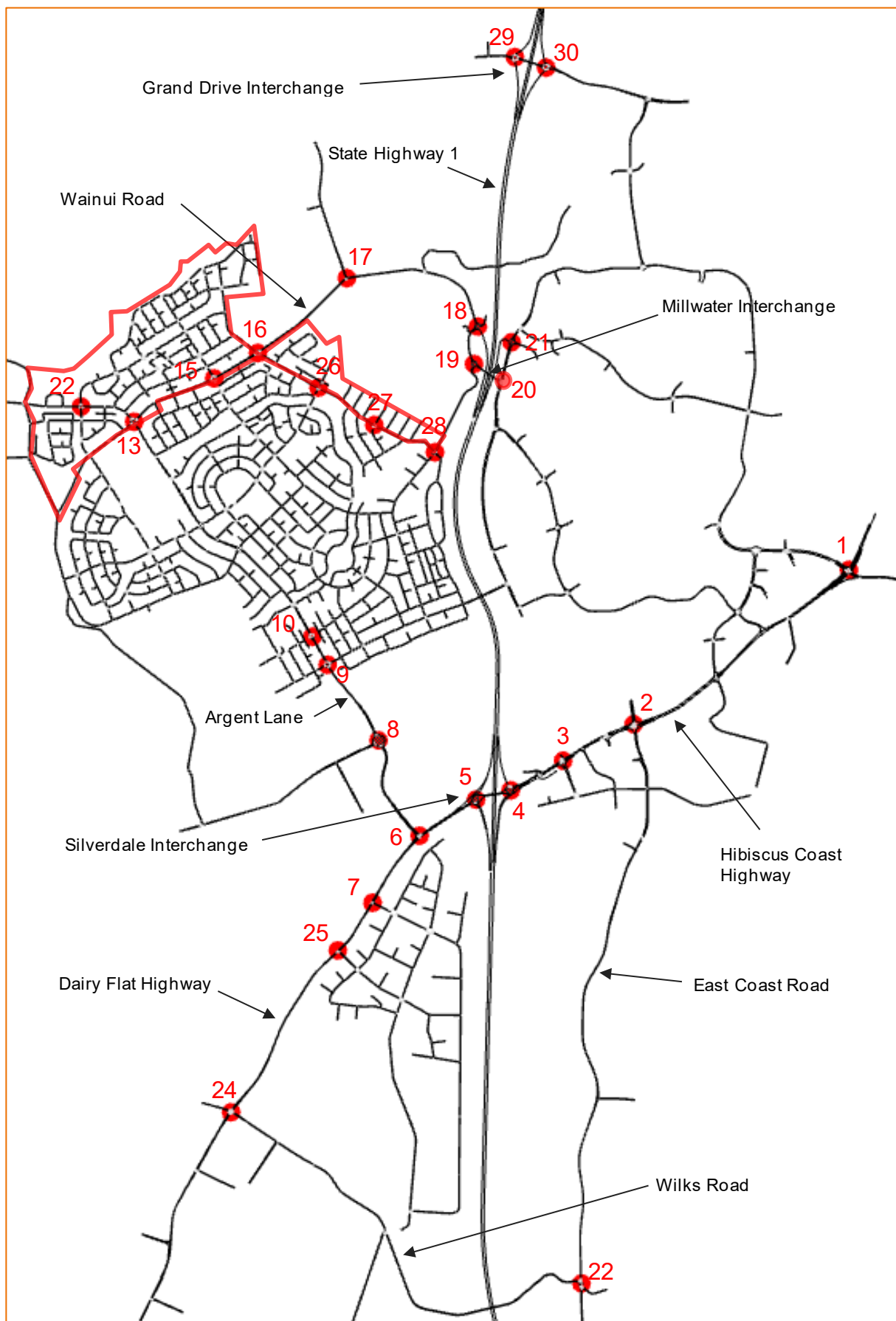


Figure 35: Key Intersections Assessed

By way of summary, the overall intersection performance is summarised in this section. Intersection performance is summarised in terms of the average delay in seconds and the Level of Service (**LOS**) which is defined as an incremental scale using the letters A through F, with LOS A indicating the best performance level and LOS F indicating the worst.

Table 2 describes traffic flow operation for each of the LOS scales, including a brief description of likely performance at a basic level.

LOS	General description of operation
A	Free flow conditions; little interaction between vehicles
B	Reasonably free flow conditions; speeds similar to LOS A but some movement is restricted due to interaction between vehicles within traffic streams
C	Stable flow conditions; ability to manoeuvre within traffic streams is notably restricted but roads remain below capacity
D	Approaching unstable flow; freedom to manoeuvre is much more limited and driver comfort levels decrease. This is the common level for urban streets during peak hours of travel
E	Unstable flow; operating at capacity; drivers comfort level becoming poor. This would be a more common standard in larger urban areas where some congestion is inevitable during peak hours
F	Forced or breakdown flow; vehicle movement very constrained; traffic demand generally higher than capacity

Table 2: LOS description

Amongst traffic engineers, LOS is a commonly used measure of qualitatively describing the operating conditions of transport infrastructure, including intersections and roadways. The results of the assessment are summarised in the following sections of this report.

A full set of detailed results is attached in **Appendix C**.

7.5 Traffic Effects Summary

7.5.1 AM Peak Hour

The performance of the key intersections for the AM peak hour is provided in **Table 3**. Within the table, the average intersection delay is reported in seconds/vehicle and the overall intersection LOS in the adjacent column.

Intersection Number	Intersection	Delay (sec/veh)	LOS
1	Hibiscus Coast Highway / Whangaparaoa Road	26	C
2	Hibiscus Coast Highway / East Coast Road	30	C
3	Hibiscus Coast Highway / Painton Road	23	C
4	Silverdale Interchange (Eastern roundabout)	19	B
5	Silverdale Interchange (Western roundabout)	20	C
6	Dairy Flat Highway / Pine Valley Road	47	D
7	Dairy Flat Highway / Silverdale West (Northern access)	35	C
25	Dairy Flat Highway / Silverdale West (Southern access)	17	B
24	Dairy Flat Highway / Wilks Road	30	C
22	East Coast Road / Wilks Road	29	C
8	Argent Lane / Pine Valley Road	7	A
9	Argent Lane / John Fair Drive	17	B
10	Argent Lane / Maryvale Road	14	B
13	Argent Lane / Wainui Road	7	A
15	Wainui Road / Waiwai Road	3	A
16	Wainui Road / Lysnar Road / Endsley Rise	5	A
17	Wainui Road / Upper Orewa Road	8	A
18	Millwater Interchange (off-ramp)	18	B
19	Wainui Road / Sidwell Road	17	B
20	Wainui Road / Millwater-Parkway	21	C
21	Millwater Interchange (on-ramp)	7	A
14	Wainui Road / Milldale Stage 14-17 western access (roundabout)	6	A
26	Endsley Rise / Milldale Drive	3	A
27	Endsley Rise / Pitau Street	4	A
28	Endsley Rise / Sidwell Road	3	A
30	Grand Drive Interchange (Eastern roundabout)	11	B
29	Grand Drive Interchange (Western roundabout)	5	A

Table 3: Intersection Performance (AM Peak Hour)

As indicated, the modelling predicts that all key intersections are expected to operate at LOS D or better for the AM peak and this is considered acceptable.

7.5.2 PM Peak Hour

The performance of the key intersections for the PM peak hour is provided in **Table 4**. Within the table, the intersection delay is reported in seconds/vehicle, with the overall intersection LOS shown in the adjacent column.

Intersection Number	Intersection	Delay (sec/veh)	LOS
1	Hibiscus Coast Highway / Whangaparaoa Road	35	D
2	Hibiscus Coast Highway / East Coast Road	33	C
3	Hibiscus Coast Highway / Painton Road	31	C
4	Silverdale Interchange (Eastern roundabout)	18	B
5	Silverdale Interchange (Western roundabout)	21	C
6	Dairy Flat Highway / Pine Valley Road	36	D
7	Dairy Flat Highway / Silverdale West (Northern access)	38	D
25	Dairy Flat Highway / Silverdale West (Southern access)	35	D
24	Dairy Flat Highway / Wilks Road	32	C
22	East Coast Road / Wilks Road	50	D
8	Argent Lane / Pine Valley Road	10	B
9	Argent Lane / John Fair Drive	12	B
10	Argent Lane / Maryvale Road	6	A
13	Argent Lane / Wainui Road	8	A
15	Wainui Road / Waiwai Road	3	A
16	Wainui Road / Lysnar Road / Endsley Rise	5	A
17	Wainui Road / Upper Orewa Road	15	C
18	Millwater Interchange (off-ramp)	9	A
19	Wainui Road / Sidwell Road	5	A
20	Wainui Road / Millwater-Parkway	20	B
21	Millwater Interchange (on-ramp)	5	A
14	Wainui Road / Milldale Stage 14-17 western access (roundabout)	6	A
26	Endsley Rise / Milldale Drive	3	A
27	Endsley Rise / Pitau Street	3	A
28	Endsley Rise / Sidwell Road	3	A
30	Grand Drive Interchange (Eastern roundabout)	5	A
29	Grand Drive Interchange (Western roundabout)	7	A

Table 4: Intersection Performance (PM Peak Hour)

As indicated, the modelling predicts that practically all of the key intersections are expected to operate at LOS D or better for the PM peak for all scenarios.

7.6 Development Thresholds and Infrastructure Upgrades

The modelling outcomes above have formed the basis for establishing the thresholds for development within the Milldale Stages 14-17. The thresholds are presented in terms of number of dwellings in **Table 5**.

Approximate Year	Development Threshold (Dwellings)	Infrastructure Upgrade	Status
2030	740 dwellings in Milldale Stage 14-17	Dairy Flat / Pine Valley Intersection upgrade	Designation in place and construction due to be completed by Nov-2027
2031	960 dwellings in Milldale Stage 14-17	- Signalisation of Wilks Road / Dairy Flat Highway - Signalisation of Wilks Road / East Coast Road	Trigger in the Silverdale West Precinct
2032	1,180 dwellings in Milldale Stage 14-17	Silverdale interchange upgrade	Trigger in Silverdale West Precinct
2033	1,425 dwellings in Milldale Stage 14-17	Double-laning of Pine Valley Road / Argent Lane roundabout	Trigger in the Silverdale West Precinct.

Table 5: Infrastructure Upgrades

Further explanation and descriptions of the infrastructure upgrades are included in **Appendix D**.

8. Unitary Plan Assessment

8.1 E27 Standards

An assessment of the proposal against the key relevant transport-related standards of the AUP has been undertaken. This is detailed in the following **Table 6**.

Table 6: Unitary Plan E27 Assessment

Standard	Description	Comments
E27.6.2.5 (6) Bicycle parking	(T81) 1 per 20 dwellings for visitor and 1 per dwelling without a dedicated garage.	Not Applicable Vacant Lot Subdivision.
E27.6.2.7 Loading spaces	(T114) Greater than 90,000m ² Three spaces plus 1 space for every additional 40,000m ²	Does not comply No specific loading spaces proposed but there is sufficient space for loading vehicles to park alongside roads or within JOALs for servicing, as occurs with any subdivision. As servicing will be relatively infrequent and generally of short duration, this is considered acceptable.
E27.6.3 Parking space and manoeuvring dimensions	As per the details of E27.6.3.1.1	Not Applicable Vacant Lot Subdivision.
E27.6.3.2 Size and location of loading spaces	(T138) Minimum length 8m and width 3.5m and have a maximum crossfall of 1:50 (2%) in all directions	Not applicable No loading spaces proposed.
E27.6.3.2A Accessible Parking	(2) For residential developments where car parking is provided on site, accessible parking spaces must be provided for developments of 10 or more dwellings.	Will comply The majority of the dwellings will be detached dwellings with their own individual garages. For Lots where special multi-space parking spaces are proposed, these carparks will provide the necessary accessible spaces.
E27.6.3.3 Access and Manoeuvring	(1) Every parking space must have driveways and aisles for entry and exit of vehicles to and from the road, and for vehicle manoeuvring within the site. Access and manoeuvring areas must accommodate the 85th percentile car tracking curves in Figure E27.6.3.3.1	Will comply
E27.6.3.4 Reverse manoeuvring	(1) Sufficient space must be provided on the site so vehicles do not need to reverse off the site or onto or off the road from any site where any of the following apply: (a) four or more parking spaces are served by a single access; (b) there is more than 30m between the parking space and the road boundary of the site; or (c) access would be from an arterial road or otherwise within a Vehicle Access Restriction covered in Standard E27.6.4.1.	Will comply All standalone dwellings will have separate driveways. Superlot layouts have not yet been determined but they will be served by individual JOALs. There are no accesses off arterial roads.
E27.6.3.5 Vertical Clearance	Minimum clearance must be 2.1m where access and/or parking for cars is provided for residential activities	Will comply

Standard	Description	Comments
E27.6.3.6 Formation and Gradient	Gradients for the surface of any parking space must not exceed 1:25 in any direction for accessible spaces and 1:20 in any direction for other spaces. The gradient for manoeuvring areas must not exceed 1:8.	Will comply
E27.6.4 Access	(3) Vehicle access restrictions apply and vehicle crossings must not be constructed or used to provide vehicle access across that part of a site boundary which: (a) is located within 10m of any intersection as measured from the property boundary, illustrated in Figure E27.6.4.4.1.1; (b) is subject to the following types of Vehicle Access Restriction as identified on the planning maps in the zones listed in Table E27.6.4.1.1; (c) has frontage to an arterial road as identified on the planning maps; or (d) is located closer than 30m from a railway level crossing limit line.	Does not comply (a) Whilst site layouts have not been formulated at this early stage, a number of sites have been identified for which vehicle accesses could be located within 10m of an intersection. These are assessed below. (b), (c) and (d) are not applicable.
E27.6.4.2.1 Separation distances between accesses	2m separation required. Where two crossings on adjacent sites can be combined and where the combined crossings do not exceed a total width of 6m at the property boundary, no minimum separation distance will comply.	Will comply
E27.6.4.3.1 Passing Bays	Where an access length exceeds 50m passing bays need to be provided at 50m intervals.	Will comply No long accesses are proposed
E27.6.4.3.2 Vehicle crossing and vehicle access widths	Details as shown in Table E27.6.4.3.2 of the AUP	Will generally comply Blanket consents are also being sought for vehicle crossing widths with 3.5m permitted and up to 4.8m wide proposed to allow for double garages fronting a road.
E27.6.4.3.3 Speed Management	Where a vehicle access exceeds 30m and serves four or more dwellings, speed management measures must be provided as per Table E27.6.4.3.3 of the AUP	Will comply
E27.6.4.4 Gradient of vehicle access	Details as shown in Table E27.6.4.4.1 of the AUP	May not comply However, global departures from standards for Milldale have been agreed with AT. Gradients will comply with these departures from standards.
E27.6.6 Pedestrian Access	Primary pedestrian access must be provided to each dwelling as per Table E27.6.6.1 of the AUP	Will comply
E27.6.7 Provision for Electric Vehicle charging	All undercover car parks for new dwellings (except new detached dwellings) must provide capability to install Electric Vehicle Supply Equipment.	Will comply

As noted in Table 6 above, a number of Lots have been identified for which vehicle accesses are likely to be located within 10m of an intersection. These are tabulated in **Table 7**.

Table 7: Lots for which Vehicle Crossings are Likely to be within 10m of Intersections

Stage	Lots
14A	55, 56
14C	83
14D	181, 182, 186, 187
14E	226, 227, 228, 271, 272, 273, 274, 278, 279, 280, 285, 286, 287
14F	296, 297
14G	337, 338
14I	393, 394, 438, 439
14J	461, 478, 526
16A	718, 719, 756, 757
16B	783, 784, 796, 797, 798, 824

In all instances the potential driveways would be located on the opposite side of a T-intersection. However, whilst it infringes the AUP standard, the other relevant standard AS/NZS2890.1:2004, upon which much of the AUP standards are based, indicates that for domestic driveways the 10m restriction does not apply to accesses opposite a T-intersection.

As such, the effect of the non-compliance is not considered significant.

8.2 Summary

In summary, the proposed provisions have been assessed against the requirements of the AUP. Whilst some non-compliances have been identified, these infringements have been assessed and overall, it is considered that they are not significant from a transportation perspective.

9. Transport Planning and Policy

This ITA has also been prepared with reference to the relevant statutory and non-statutory transport planning and land use policy framework at the national, regional, and local levels. These documents collectively promote a safe, integrated, accessible, and sustainable transport system, aligned with growth management objectives for Auckland's northern growth areas, including the development area.

9.1 National Policy Direction

9.1.1 Government Policy Statement

The Government Policy Statement on Land Transport (**GPS 2024**) on land transport sets out the government's desired outcomes and priorities for land transport investment over a 10-year period. The GPS also specifies how funding from the National Land Transport Fund (**NLTF**) will be spent on the various activity classes. The GPS is updated every 3 years, with the latest version being GPS 2021, issued in September 2020.

The GPS 2021 document outlines four strategic priorities for land transport investment:

- Safety – developing a transport network where no-one is killed or seriously injured;
- Better Travel Options – Providing people with better transport options to access social and economic opportunities;
- Climate Change – Developing a low carbon transport system that supports emissions reductions, while improving safety and inclusive access; and
- Improving Freight Connections – Improving freight connections for economic development.

The GPS aims to prioritise land transport investment which aligns with the above strategic priorities and enables the Transport Outcome Framework to be realised. This framework includes Inclusive access, Economic Prosperity, Resilience and Security, Environmental Sustainability and Healthy and Safe People.

The internal collector roads proposed provide four access locations off Wainui Road and further access via Endsley Rise to connect to the Millwater interchange. Connections to the Silverdale Centre via the Highgate Overbridge and to the Silverdale Interchange via Argent Lane ensures good connectivity to key strategic corridors and surrounding catchments.

- Safety – The design of the access locations and internal road network is such that it does not exacerbate any existing safety issues on the road network and limits the risk of road users being involved in serious injury or fatal incidents within and around the site.
- Climate Change – The internal road network for the site is designed to prevent severe congestion and enable safe and efficient connections to the adjacent road network. The reduction in congestion improves journey time reliability while reducing the impact of the transportation system on the environment. Furthermore, the provision of good walking, cycling and public transport infrastructure will encourage the use of alternative travel modes to travel within Milldale and through to neighbouring areas – these alternative modes will reduce reliance on the private car and thereby help reduce transport-related emission which is one of the main contributors to climate change.
- Better Travel Options – The inclusion of provisions for active mode travel and public transport in the development provides greater travel choice options for the development. Additionally, the proposed development will support the existing and proposed employment areas nearby (such as Highgate, Silverdale Industrial area and Silverdale West Industrial Precinct) and provide opportunity for substantial economic development and opportunities for those in the Silverdale-Orewa area as well as the wider Auckland region.

The development is therefore considered to align with the overarching strategic priorities of the GPS.

9.1.2 National Policy Statement on Urban Development

The National Policy Statement on Urban Development (**NPS-UD 2020**) directs local authorities to enable sufficient development capacity and promote well-functioning urban environments. Relevant provisions include:

- Integration of land use and transport planning
- Enabling higher-density housing in accessible locations
- Supporting multi-modal transport systems, including walking, cycling, and public transport

The development aligns with the NPS-UD by contributing to housing supply within a planned urban expansion area with good provisions for transport choice.

9.1.3 Emissions Reduction Plan

The Emissions Reduction Plan (“**ERP**”) was published by the Ministry for the Environment in May 2022 (updated June 2022). The Plan seeks to reduce emissions and help Aotearoa to contribute to the global effort to limit temperature rise on our planet to no more than 1.5 degrees Celsius. As noted in the ERP, “delivering on that purpose means setting long-term emissions targets to 2050” and the ERP indicates those targets to be met “through a series of ‘stepping stone’ emissions budgets and emissions reduction plans that include the policies and strategies for achieving those budgets”.

Of relevance to this application are Chapters 7 (Planning and Infrastructure) and 10 (Transport) of the ERP. Under Chapter 7 the following critical elements from a transportation perspective are included:

- Well-functioning urban environments which have good access to community amenities, and active and public transport;
- Medium and high-density development close to urban centres and active/public transport to provide more choice about where people live and how they travel;
- Urban environments which provide easy access to walking, cycling, scootering and public transport routes.

Under the Transport Section of the ERP the key focus area is to reduce reliance on cars and support people to walk cycle and use public transport to help reduce transport emissions.

There is a comprehensive network of active-mode paths and bus routes proposed within the Milldale Stage 14-17 area. These paths/routes link seamlessly with the paths/routes within the Milldale Precinct and will provide good connectivity to the local centre, schools (noting that a Primary School is already operational within Milldale and land is also set aside for a primary/secondary school adjacent to the Milldale Stage 14-17 area) by active and public transport modes. Furthermore, with the proximity of the Milldale Stage 14-17 area to employment hubs such as the Silverdale industrial area, the Highgate Business Park and the Silverdale West Industrial Precinct, will allow people to live closer to their workplaces and reduce travel distances or allow the use of alternative transport modes.

Overall, the development area aligns with the intent and strategies of the ERP.

9.1.4 Arataki

Arataki presents Waka Kotahi / NZ Transport Agency's 10-year view of what is needed to deliver on the government's current priorities and long-term outcomes for the land transport system. It provides the evidence-base that informs Waka Kotahi's view of those outcomes and helps better understand how its joint decisions and choices will shape the future land transport system.

The Arataki document outlines five step changes as the basis for action with regard to deliver the long-term outcomes desired by the Government, these being:

- Improve urban form
- Transform urban mobility
- Significantly reduce harms
- Tackle climate change
- Support regional development

The Milldale Stage 14-17 development seeks to continue to grow the population catchment of the northern Auckland region. The development area will support employment growth in the north, such as that envisaged within the Silverdale West Industrial Precinct and Highgate, as well as other established industrial areas in Silverdale, enabling shorter journeys without relying on crossing the Harbour Bridge.

Walking and cycling links within the development area, as well as educational provisions, will help enable alternative transport modes. Furthermore, public transport provisions will help integrate the Milldale Stage 14-17 area with the growing public transport network within the wider Milldale area to provide more efficient public transport connections in the area.

It should also be noted that there are long term plans to provide a RTC all the way to Milldale. Whilst this will not be completed within the timeframe of the proposed development, it will provide enhanced public transport connectivity for the development area in the future.

In this respect the Milldale Stage 14-17 development fully supports the intentions of Waka Kotahi's Arataki programme.

9.2 Regional Policy Framework (Auckland)

9.2.1 Auckland Unitary Plan (Operative in Part)

The Unitary Plan which has been operative since November 2016, lists the following objectives with regard to the regions' transport infrastructure:

1. Land use and all modes of transport are integrated in a manner that enables:
 - a. the benefits of an integrated transport network to be realised; and
 - b. the adverse effects of traffic generation on the transport network to be managed.
2. An integrated transport network including public transport, walking, cycling, private vehicles and freight, is provided for. Parking and loading supports urban growth and the quality compact urban form;
3. The provision of safe and efficient parking, loading and access is commensurate with the character, scale and intensity of the zone;
4. Pedestrian safety and amenity along public footpaths is prioritized; and
5. Road/rail crossings operate safely with neighbouring land use and development.

As noted above, the proposed development includes residential activities that can be accessed via the internal road network. Combined with consideration of site location relative to SH1 and the Silverdale interchange, as well as other complementary activities in the Silverdale-Orewa area, the Milldale Stage 14-17 development enables a high level of integration with the surrounding transport network.

The proposed transport infrastructure allows for provision of bus stops and routes at key locations within the site, allowing for a frequent bus route / collector route to be introduced once there is sufficient demand. As noted, before, all collector roads have separated cycle facilities and combined with the provision of off-road shared paths, trails, and on-road footpaths the site provides a well-integrated network for active modes travel. The proposed 'Active Mode Corridor' also allow for increased amenity and a segregated safe off-road facility for vulnerable road users. For private vehicle travel, the roads and intersections have been designed with consideration for road safety and resilience as noted above.

Overall, the proposed development aligns with the transport objectives of the Unitary Plan.

9.2.2 Auckland Regional Land Transport Plan

The Auckland Regional Land Transport Plan (**RLTP**), a collaborative effort by Auckland Transport, Waka Kotahi and KiwiRail identifies several transport-projects in the region prioritised for investment over a 10-year period. The most recent version of the RLTP 2021-2031 sets out the following strategic objectives:

- Enabling and supporting Auckland's growth, focusing on intensification in brownfield areas, and with some managed expansion into emerging greenfield areas.
- Providing and accelerating better travel choices for Aucklanders
- Better connecting people, places, goods and services
- Improving the resilience and sustainability of the transport system, significantly reducing the GHG emissions the system generates
- Making Auckland's transport system safe by eliminating harm to people
- Ensuring value for money across Auckland's transport system through well-targeted investment choices.

The Wainui FUZ area is identified as New Growth Area for managed expansion as part of the SGA which is referenced in the RLTP. The development area also complements the managed greenfields growth in the wider Silverdale-Orewa area allowing for employment and commercial activities to be in proximity to residential growth.

As noted previously, the transport network within Milldale and wider area includes safe and efficient travel options for all road users including pedestrians and cyclists. The internal road network and the connectivity to existing roads are designed such that the network is resilient and the potential for harm to road users is minimised and allows for better travel choices via the proposed walking and cycling infrastructure.

The proposed development therefore considered to be entirely consistent with the objectives of the RLTP.

9.2.3 Regional Public Transport Plan

The Regional Public Transport Plan (**RPTP**) seeks to create a safer, more accessible and reliable public transport system in Auckland. The plan sets out the overarching vision and what actions can enable that vision to be realised.

The vision of the RPTP for Auckland's public transport is "a system with seamless end-to-end customer journeys that are safe, accessible and reliable".

To achieve this vision, the public transport system will need to deliver:

- A continuously improving customer experience;
- Services that integrate with surrounding, and planned, land uses and contribute to placemaking;
- Affordable and equitable travel;
- An increasingly safe, secure and sustainable system; and
- Improved monitoring and value for money.

A number of public transport infrastructure and service improvements are planned for the area including the recent expansion of park and ride facilities at Hibiscus Coast Station and on-going investigation for the extension of the Northern Busway. These measures will provide public transport options that are more attractive and will potentially shift some of the private vehicle demand for travel to and from Auckland City to Silverdale.

The proposed development will create additional demand and offer the opportunity for expansion of the existing bus network to the area with increased bus frequencies and routes to service the development and its surroundings. The development has been designed to allow for bus stop infrastructure to be installed along key collector routes and activities within the internal network allowing for an extension of the current route between Milldale and Hibiscus Coast Station. The network of proposed routes provides for accessibility for all future residents. The proposed pedestrian and micro-mobility infrastructure will ensure a safe system and the proposed mitigation measures will ensure an efficient transport system for buses and other modes.

The development therefore aligns with and makes provision for the vision of the RPTP to be realised.

9.2.4 Auckland Transport Alignment Project

The Auckland Transport Alignment Project (**ATAP**) provides strategic direction for alignment of transport objectives and outcomes set out by Government and Auckland Council. ATAP 2021-2031 investment package is the most recent iteration which outlines the planned investment in Auckland over the next decade.

The direction of ATAP is based upon the latest GPS and Auckland Plan and focuses on outcomes such as is mode shift, employment accessibility, congestion, and safety. ATAP identifies several key projects that align with these outcomes and have been prioritised for investment. The projects which affect this proposal include the following:

Rapid transit:

- Northern Busway extension from Constellation to Albany (including a new Rosedale station); and
- Initial further enhancements to Northern Busway, such as station upgrades or city centre optimisation.

Strategic and local road network:

- Penlink;
- Additional Waitemata Harbour Connections ('planning for the future');
- Ara Tūhono Puhoi-Warkworth motorway; and
- Northern Corridor Improvements.

Rapid transit infrastructure upgrades to the North Shore provide opportunity for more competitive and attractive public transport connectivity between the Milldale Stage 14-17 area and Auckland. The busway has recently been extended to Albany Station and provides more reliable bus travel times and improved connectivity. The busway is proposed to be extended further north up to Hibiscus Coast Station in the future to accommodate growth in the area. Should this eventuate, along with the recent increase the number of park and ride facilities at the station, public transport travel options will become more attractive for travel between Auckland and the surrounding areas including the Wainui area.

As discussed in Section 8.1, Penlink will significantly impact the Milldale Stage 14-17 and the Silverdale-Orewa area by providing a more direct route between Whangaparaoa and SH1 thereby significantly reducing congestion at the Silverdale interchange and adjacent routes. The capacity created by this project will be able to absorb the traffic expected to be generated, creating a less congested and more resilient travel network.

ATAP 2021 allocates funding for a more detailed investigation for additional Waitematā Harbour Connections including road and rapid transit improvements. Funding also allows for any property purchases that may be needed to enable future investments. An additional harbour crossing would provide a more resilient connection across the harbour, potential for improved efficiency, more reliable travel times, and provisions for active modes and public transport. As such the project will benefit connectivity between the Milldale Stage 14-17 area and the rest of the city.

The recently completed Puhoi-Warkworth motorway extension, provides a motorway-standard connection between Puhoi to Warkworth north of the Silverdale West area. The project provides a more efficient and safer route for travel along the northern motorway connecting both the wider city area and the northern region. The additional capacity enabled by the motorway will be able to suitable accommodate development related traffic and allow for safer journeys and more reliable travel times.

The Northern Corridor Improvements seeks to improve several connections between SH18 and SH1, completed the final link between both motorways for continuous travel between the west and north. These improvements also include a shared walking and cycling path adjacent the motorway which will be integrated with the Northern Busway – Albany extension. These improvements will allow for more direct and safer travel options between the Milldale Stage 14-17 area and Auckland City, in particular, to and from the west.

The ATAP package is intended to support growth across Auckland. These projects will serve the proposed development at in and around the Wainui area allowing for more efficient and safe travel.

9.2.5 Future Development Strategy

As described in the 2023 document, the primary purpose of the Future Development Strategy (**FDS**) aims to set the direction for urban growth across the city by seeking to reduce urban sprawl, focus growth in existing urban areas and make the best use of existing and planned infrastructure. It signals the desire by Auckland Council to support the co-location or at least shorter distances between, employment and living locations. **Figure 36** below shows a graphical extract from the FDS for the sequencing and timing of the northern Auckland region.

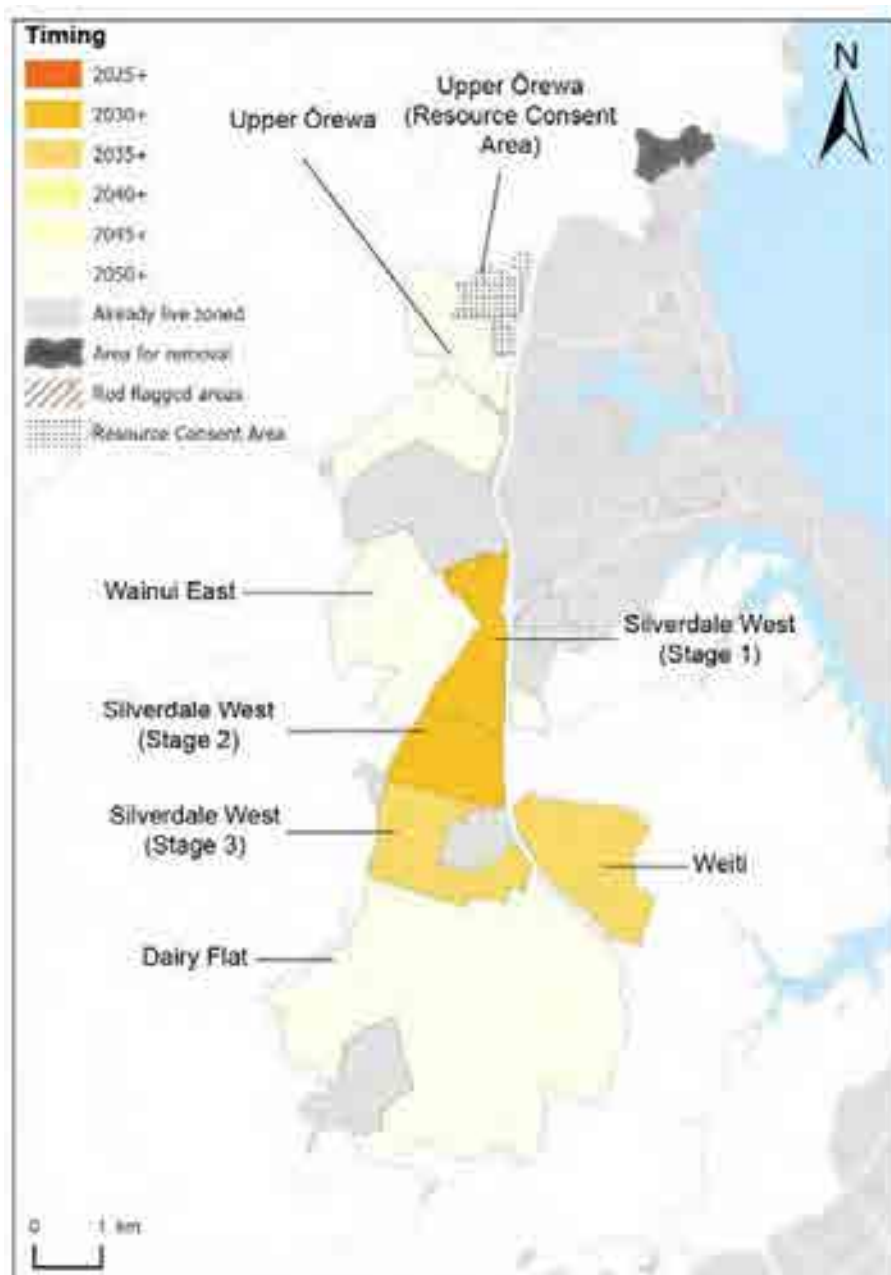


Figure 36: The Structure Plan area and wider Wainui, Silverdale and Dairy Flat area (FULSS)

As can be seen, the Wainui FUZ area has been identified within the FDS as 'Development Ready' post 2050. However, in 2018 a Government Special Purpose Vehicle ("SPV") was created in partnership with Auckland Council, Crown Infrastructure Partners and FHLD to fund \$91 million of roading and wastewater infrastructure to support the building of 9,000 homes at Wainui, north of Auckland. This included 4,000 homes in Milldale and 5,000 dwellings nearby.

With the roading infrastructure upgrades described in Section 3 above in place, from a transport perspective there is no reason to defer development within the development area to the FDS timing.

Furthermore, the proposed development aligns with the intent of the FDS with respect to reinforcing a residential area which is located in close proximity to the adjacent employment activities, particularly the Highgate commercial area and the recently approved Silverdale West Industrial Precinct.

9.3 Local Strategies and Plans

9.3.1 Auckland Plan 2050

The Auckland Plan 2050 is Auckland Council's long-term strategy to ensure that growth in the region occurs in a way that considers the challenges and opportunities that the city faces. The original Auckland Plan was produced in 2012, with the Auckland Plan 2050, a revised version, being adopted in June 2018. The Auckland Plan 2050 sets the direction that will be needed to face the challenges of the city's future.

The Auckland Plan 2050 is comprised of six outcomes targeting specific focus areas where strategic direction is provided. One of these outcomes; Transport and Access, focuses on creating an environment where Aucklanders will be able to get where they want to go more easily, safely, and sustainably. The Transport and Access outcome provides three directions:

1. Create an integrated transport system connecting people, places, goods and services;
2. Increase genuine travel choices for a healthy, vibrant and equitable Auckland; and
3. Maximise safety and environmental protection.

The Auckland Plan 2050 also includes seven focus areas for the transport and access outcome:

1. Make better use of existing transport networks;
2. Target new transport investment to the most significant challenges;
3. Maximise the benefits from transport technology;
4. Make walking, cycling and public transport preferred choices for many more Aucklanders;
5. Better integrate land use and transport decisions;
6. Move to a safe transport network, free from death and serious injury; and
7. Develop a sustainable and resilient transport system.

Combined with the presence of commercial, industrial and recreational facilities in the wider Silverdale-Orewa area, the development will be part of an integrated transport system with complementary land-uses that connect people, places, goods and services locally. The integration of land-use and transport alongside provision of more sustainable travel infrastructure (greenways, footpaths, public transport infrastructure and cycleways) allows for residents to make shorter local trips by more sustainable travel options and help make walking, cycling and public transport preferred choices for residents.

As discussed previously, the design of the internal road network and its connection to the surroundings are such that severe congestion is minimised and the intersections can operate safely and efficiently for all road users. Cyclists will have separated cycle facilities on all collector roads and the 'Active Mode Corridor' proposed allow for off-road shared path / cycle route options. Together with footpath provisions on all roads, vulnerable road users will be able to travel with minimal potential for conflict with on-road vehicles.

As noted previously, the designed road network is resilient, in that each activity block has multiple road connections allowing for multiple route options to be available should any one section of the infrastructure fail.

Overall, the proposed development aligns well with the strategic direction and outcomes specified in the Auckland Plan.

9.3.2 Transport Emissions Reduction Pathway

The Transport Emissions Reduction Pathway (“TERP”) is a document which has been developed by Auckland Council and Auckland Transport to provide a pathway in order to achieve a goal of halving Tamaki Makaurau’s emissions by 2030, which is prefaced on Te Taruke-a-Tawhiri: Auckland’s Climate Plan. One of the required transformations described in the TERP to reduce emissions include reducing the reliance on cars and support people to walk, cycle and use public transport.

As described within this ITA, a high level of network permeability for active and public transport modes is proposed within the development area which will readily connect to the routes already allowed for in the adjacent Milldale Precinct. This will provide safe and efficient connectivity to key destinations such as the local centre, schools and parks/reserves in the surrounding area by active and public transport modes. In addition, proximity to employment areas such as the Highgate Business Park, Silverdale industrial area and the recently approved Silverdale West Industrial Precinct will help reduce travel distances for commutes and also promote opportunities for the use of alternative transport modes.

In summary, the infrastructure proposed for the development area is consistent with and will support achieving the goal of the TERP.

9.3.3 Supporting Growth Alliance

SGA is a collaborative programme between AT, Auckland Council and Waka Kotahi which seeks to investigate and plan for transport projects that would be able to support urban growth in Auckland over the next 30 years. By 2050 Auckland’s population is expected to grow by another one million people. Around 30 percent of this new growth will go into future urban zoned areas (greenfield sites) identified in the Auckland Unitary Plan. SGA seeks to plan for transport infrastructure that will serve these new growth areas. The SGA programme recognises that growth areas for Auckland are focussed in:

- Warkworth;
- Silverdale, Dairy Flat, Wainui and Orewa in the North;
- Kumeū-Huapai, Redhills, Whenuapai and Riverhead in the North West; and
- Takanini, Ōpāheke, Drury, Paerata and Pukekohe in the South.

Of relevance, Silverdale, Dairy Flat, Wainui and Orewa areas are expected to accommodate some 400,000 new homes and over 600 hectares of new business land. The following long-term projects have been proposed by SGA to support growth in this area:

- A new 16km rapid transit corridor from Albany via Dairy Flat and onto Milldale providing efficient, frequent, high-quality public transport;
- Improved public transport connections for the wider area with bus priority on key routes including a high frequency bus route connecting Ōrewa and Silverdale;
- 25km of new walking and cycling paths across North Auckland; and
- Improvements to SH1 including additional space to cater for more people moving around in the future, upgraded interchanges at Redvale and Silverdale and a new interchange at Wilks Road.

Following community consultation in August 2022, SGA released the following map shown in **Figure 37** for the area identifying the envisaged strategic transport network.



Figure 37: Strategic Transport Network (Updated 2022)

This diagram includes the upgraded transport corridors on Wainui Road and Upper Orewa Road that would directly serve development area. Additionally, transport infrastructure in the wider area includes active modes provisions, interchange upgrades and new/upgraded transport corridors.

Subsequently, in November 2023, NORs were notified for submissions for the various package of network upgrades for the northern region as illustrated previously in Figure 11 and in Figure 37 above.

Of note, the upgrades include a new road connection between Wainui Road and Grand Drive as well as the upgrade of Wainui Road to urban standards inclusive of walking and cycling infrastructure. Strategic walking and cycling corridors are also planned along SH1 adjacent to the development area and the surrounding region. In the wider context, the area will see various upgraded transport corridors (including public transport improvements) and road upgrades that will provide a greater level of accessibility and transport mode choice for the region.

The layout and zoning of the Milldale Stage 14-17 area does not conflict with any of these initiatives. Additionally, the collector roads and transport infrastructure planned for the development would tie-in well with the local road and active mode improvements proposed on Wainui Road and SH1 allowing for a continuous, integrated high-quality transport experience for users.

The proposed development within the area aligns well with the timing and planned strategic infrastructure for the region by SGA, thereby allowing for a well-integrated, safe and efficient transport network to be realised.

9.3.4 Vision Zero for Tamaki Makaurau

Auckland Transport's Vision Zero strategy aims to eliminate deaths and serious injuries. Key principles include:

- Safe system approach
- Speed management
- Safe road design

The development incorporates these principles through appropriate road typologies, traffic calming, and multimodal prioritisation.

9.4 Summary

Two key themes are observed across the various policy and strategy documents assessed:

- Safety, and
- Sustainable travel options.

These policy and strategy documents are generally consistent with the expected development in the Wainui area in that it enables land-use integration, provides suitable transport alternatives and allows traffic (from all modes) to be safely and efficiently managed on the transport network.

Within the development, safe and sustainable travel is also a key design and planning consideration.

The proposed development achieves this in two ways.

- The location and land-use integration of the development that would be enabled by the proposal enables the development to have a compact urban form close to existing transport infrastructure such as SH1 allowing for freight trips serving the industrial area to be shorter and managed away from other activities. The proximity to the Hibiscus Coast Station also allows for private vehicle trips to be potentially shorter or replaced by alternative sustainable transport options. Additionally, the complementary activities in the wider surroundings will allow for some employment related travel to be shorter and able to be undertaken via active modes.
- The development area includes plans for safe and segregated walking and cycling infrastructure within the development and connecting to the surrounding traffic environment. The rezoning and development it will facilitate also includes provisions for bus stops that could serve the area. Together these provide safe sustainable transport options for the area that are likely to reduce private vehicle trips.

The site will readily be able to realise the high-level policy goals and can deliver a development which supports safe and sustainable alternative travel modes within the area and integrates with wider area public transport infrastructure. Additionally, as stated before, as a residential development, the location of the site relative to SH1 and the Millwater Interchange, as well as the industrial areas of Silverdale including the recently approved Silverdale West Industrial Precinct, allows travel to / from work journeys to be safer and more efficient. Proximity to new schools and to holiday destinations such as Orewa will help reduce long journeys for educational and recreational purposes. Vehicles will have shorter durations on the road minimising conflict with other road users while reducing carbon emissions and allowing for economic development and employment opportunities in the area.

10. Summary and Conclusions

An assessment of the transportation effects of Milldale Stage 14-17 comprising around 99 hectares of Future Urban zoned land within the wider Wainui FUZ Structure Plan area has been undertaken. The proposed development provides an opportunity to deliver much-needed housing to support the forecast population growth in Auckland, particularly in the northern region.

The internal road network proposed within the sites will feature off-road walking and cycling paths. There are four new connections to support the Milldale Stage 14-17 area, these being three roundabouts and a priority left-in, left-out intersections off Wainui Road. The proposed internal roads and new road connections ensure that the development is suitably integrated with the surrounding road network.

Detailed modelling has been undertaken to assess the likely effects of the development from a transportation perspective. The modelling has relied on outputs from the SGA's Northern model and supplemented with a more detailed micro-simulation model to assess the likely effects on the transportation network.

Improvements to the road network are recommended in order to ensure that the performance of the surrounding road network remains within acceptable levels. These upgrades and anticipated timing of the upgrades are summarised in Section 6.6 of this report and further detailed within Appendix D. The results of the modelling indicate that with these mitigation measures in place (or with suitable planning provisions to deliver them in a timely manner) the integrity of the surrounding road system and the motorway can be maintained.

The relevant high-level policy documents directing transportation planning and delivery throughout Auckland have been reviewed and it has been found that the development is consistent with the policies and objectives in the respective documents. The Milldale Stage 14-17 development will integrate well with the Silverdale West Industrial Precinct, the Highgate Business area and other areas of employment in the northern region. On this basis it is considered that the Fast Track Panel can confidently accept the proposal as a positive step forward for future growth in Auckland.

With the recommended roading infrastructure implemented, there are no transport planning or engineering reasons to preclude approval of the Milldale Stage 14-17 development proposal.

Stantec New Zealand

Appendices

Appendix A Global Departures from Standards

SUBMISSION FOR DEPARTURE FROM STANDARDS

PROJECT NAME	P17-005 Milldale
APPLICANT ORGANISATION	Woods
CONTACT DETAILS:	Phuong Luong [REDACTED] [REDACTED]
APPLICANT REF	P17-005
HIGHWAY AUTHORITY REF	
DATE SUBMITTED	AUGUST 2020

1) PROJECT DETAILS

A	Description	Milldale is a large-scale greenfield subdivision development, with approximately 4000 lots.
B	Location	Milldale
C	Road category and type	Collector and Local
D	Design speed and speed limit	50km/hr
E	Traffic and NMU flows	N/A

2) DEPARTURE DETAILS

A	Discipline	Road Geometric Design
	Type	Civil
B	Relevant Standard(s)	TDM – Urban and Rural Roadway Design, Section 9 – Vehicle crossings TDM – Vehicle Crossings Standard Engineering Details- Detail VX0103 -14/02/20 –Version A
	Clause	N/A
C	Difference between Standard(s) and Proposed Design	The width at kerb is 4.5m, which is shorter than 6.2m as specified in the standard.

D	Reason for Departure (overview)	Milldale has tight road reserve with limited space and the full crossing widths creates challenges when coordinated with rain gardens, sumps, streetlights, parking etc. A reduced width requires more detail design but frees up space in the road corridor for other necessary infrastructure Furthermore, tracking proves the design achieves desired outcome both in terms of movement and safety.
E	Associated Project Departures	We are seeking to establish a standard vehicle crossing detail for the Milldale development to suit the developer's requirements and provide a consistent solution.

F	Other options considered	To accommodate the standard AT vehicle crossing it would reduce streetscape area. This option is not efficient with space, cost or environmental impact and will lead to less houses, and more concrete.
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3) JUSTIFICATION (POTENTIAL POSITIVE AND NEGATIVE IMPACTS)

A	Safety	Reduced vehicle speed entering the vehicle crossing from the road.
B	Congestion/ delay	Not applicable
C	Environmental/ Sustainability	Reduces paved area of crossings by 17%, increasing berm area for planting and street trees.
D	Capital and Whole Life Cost/Value	N/A private asset
E	Accessibility	Provides more kerb space for parking bays, delivering parking closer houses, and reducing distance for walking.
F	Integration	Reduced width crossing aligns with reduced width road corridor & allows more space for other infrastructure.
G	Structural	N/A private asset
H	Network Resilience & Maintenance	N/A private asset

4) COMPENSATORY MEASURES

A	Included Measures	
B	Rejected Options	

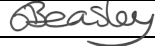
5) ATTACHMENTS & OTHER INFORMATION

A	List of Attachments	Vehicle Crossing Design- Departure from Standard -Memo Milldale Stage 3C -TYPICAL VEHICLE CROSSING - STANDARD DETAIL -Approved Plans MILLDALE STAGE 2 - P17-002-900-902
B	Consultations	
C	Other information	

6) DESIGN ORGANISATION'S CONCLUDING REMARKS

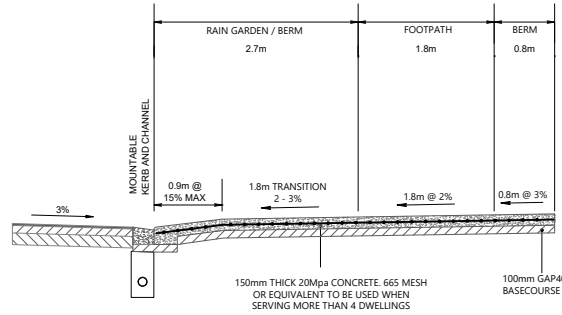
The proposed vehicle crossings require less use of concrete and maintain/improve safety. Such designs are already being applied and built on site by individual builders.

7) DECISION

Reviewer	Design Strategy & Standards		Signature		Date	22/04/2021
Approver	Chief Engineer		Signature		Date	28/07/2021
Decision	☐ Approved	☒ Approved with comments			☐ Rejected with reasons	
*COMMENTS or *REASONS FOR REJECTION (*delete as applicable)	To be used only within the Milldale Precinct and in locations meeting the road categories and conditions specified in this Departure.					

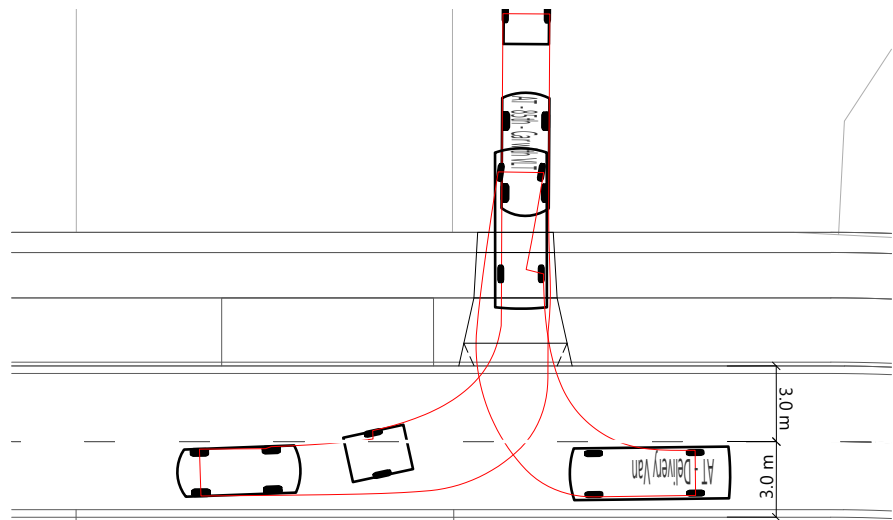
Notes for Completion

- 1 This form must be provided with a signed cover sheet giving full details of the applicant's staff and checking process in accordance with the Quality Assurance procedures in place. The Departures submission should be considered as a "report".
- 2 If a particular box is not relevant, do not leave it blank, instead state "not applicable" or similar.
- 3 Names and signatures associated with the Decision (see Section 6) should be inserted in accordance with agreed responsibility and competency matrix set out by the highway authority policy.
- 4 When completing section 2A, please refer to list of choices provided by highway authority which will normally be broadly based on DMRB/volume or SHW/series categorization.



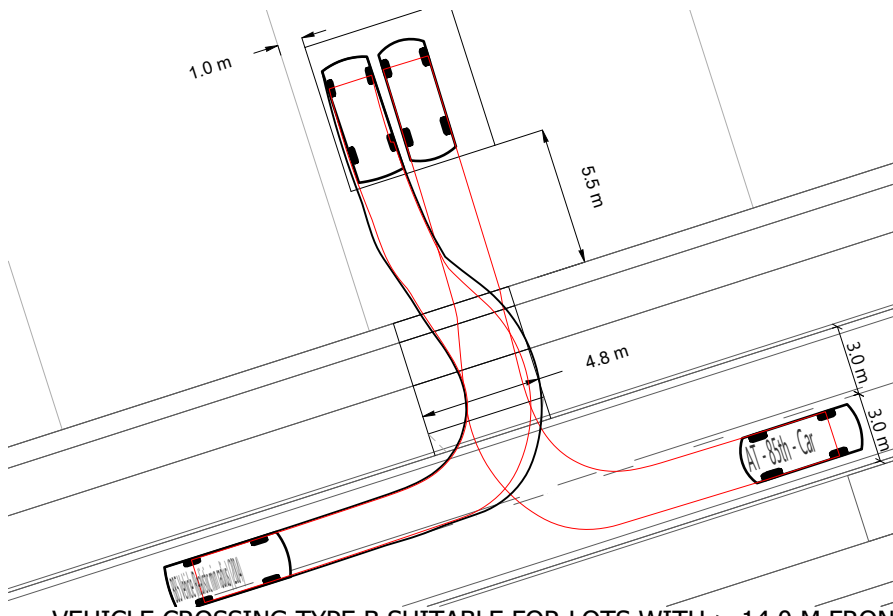
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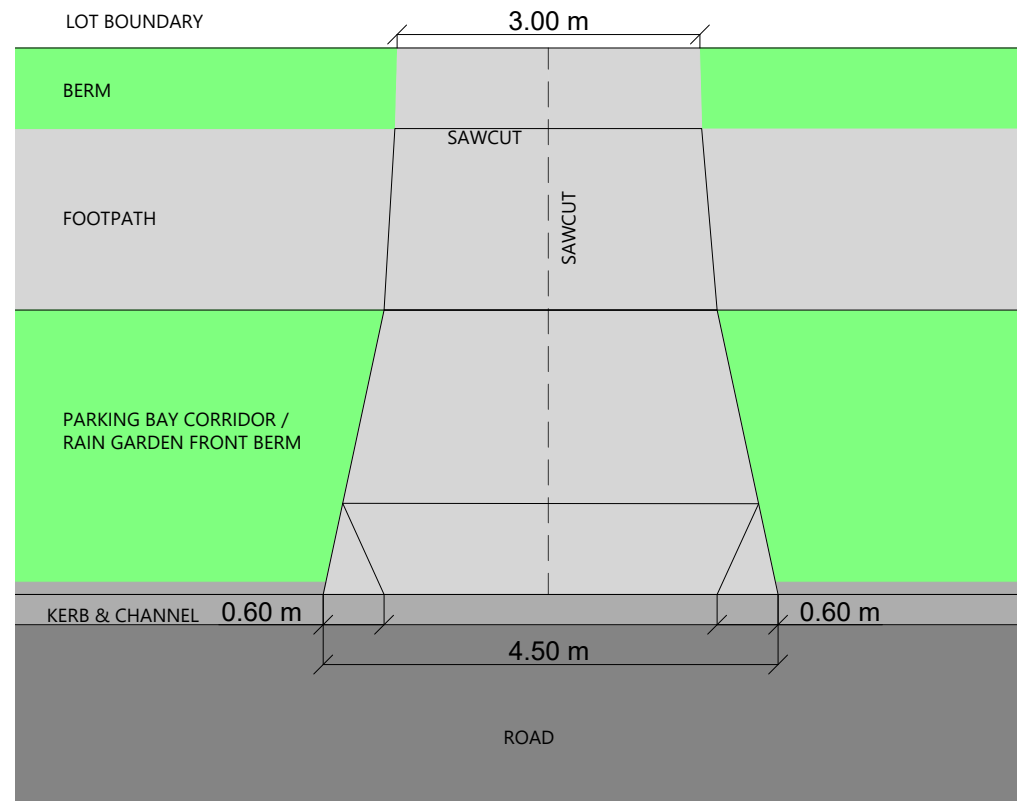
VEHICLE CROSSING TYPE A SUITABLE FOR LOTS WITH < 14.0 M FRONTAGE

Scale: 1:75



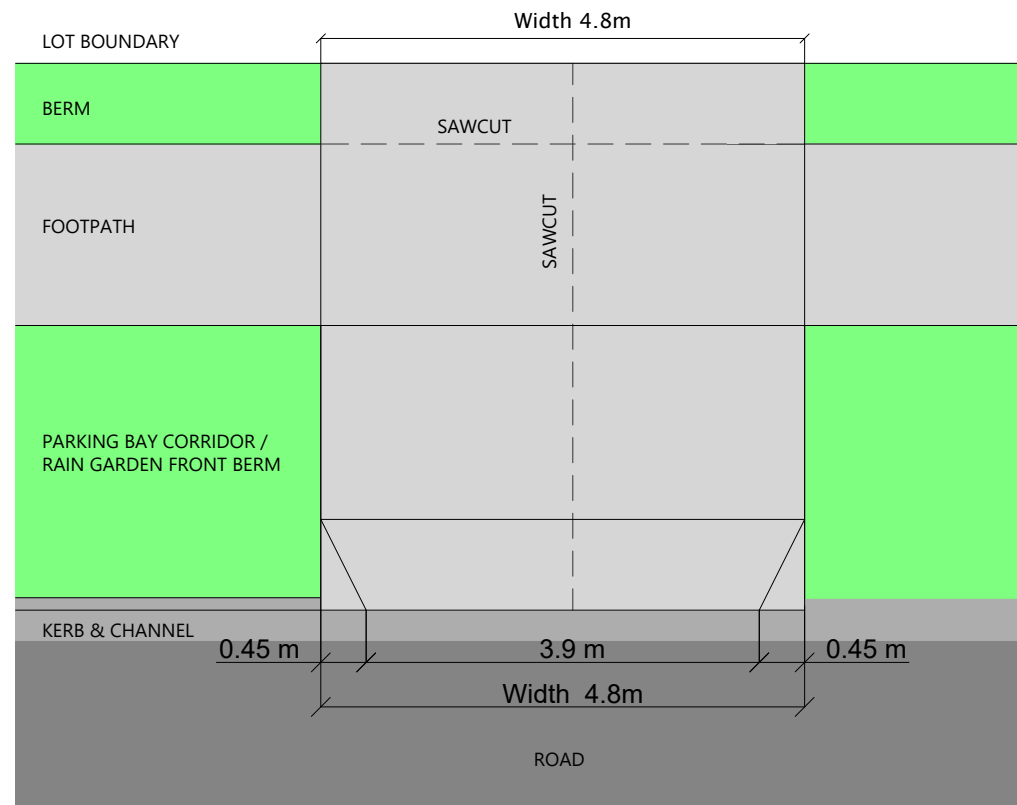
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Scale: 1:75



VEHICLE CROSSING TYPE A SUITABLE FOR LOTS WITH < 14.0 M FRONTAGE

Scale: 1:75

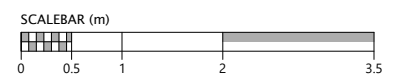


VEHICLE CROSSING TYPE B SUITABLE FOR LOTS WITH > 14.0 M FRONTAGE

Scale: 1:75

NOTES

1. ALL LOTS FRONTING ONTO LOCAL ROADS WITH A FRONT BOUNDARY WIDTH OF LESS THAN 14m SHALL CONSTRUCT A TYPE A VEHICLE CROSSING.
2. ALL LOTS FRONTING ONTO LOCAL ROADS WITH A FRONT BOUNDARY WIDTH OF 14m OR GREATER SHALL CONSTRUCT EITHER A TYPE A VEHICLE CROSSING OR A TYPE B VEHICLE CROSSING.
3. ALL LOTS FRONTING ONTO COLLECTOR ROADS SHALL CONSTRUCT A TYPE B VEHICLE CROSSING.
4. ALL CORNER LOTS SHALL CONSTRUCT A TYPE B VEHICLE CROSSING.



REVISION DETAILS		INT	DATE	SURVEYED		
1	AT COMMENTS AMENDMENT	EY	SEP 2020	DESIGNED	KH	SIDWELL ROAD MILLDALE AUCKLAND
				DRAWN	EY	
				CHECKED	PL	
				APPROVED	JW	WOODS.CO.NZ

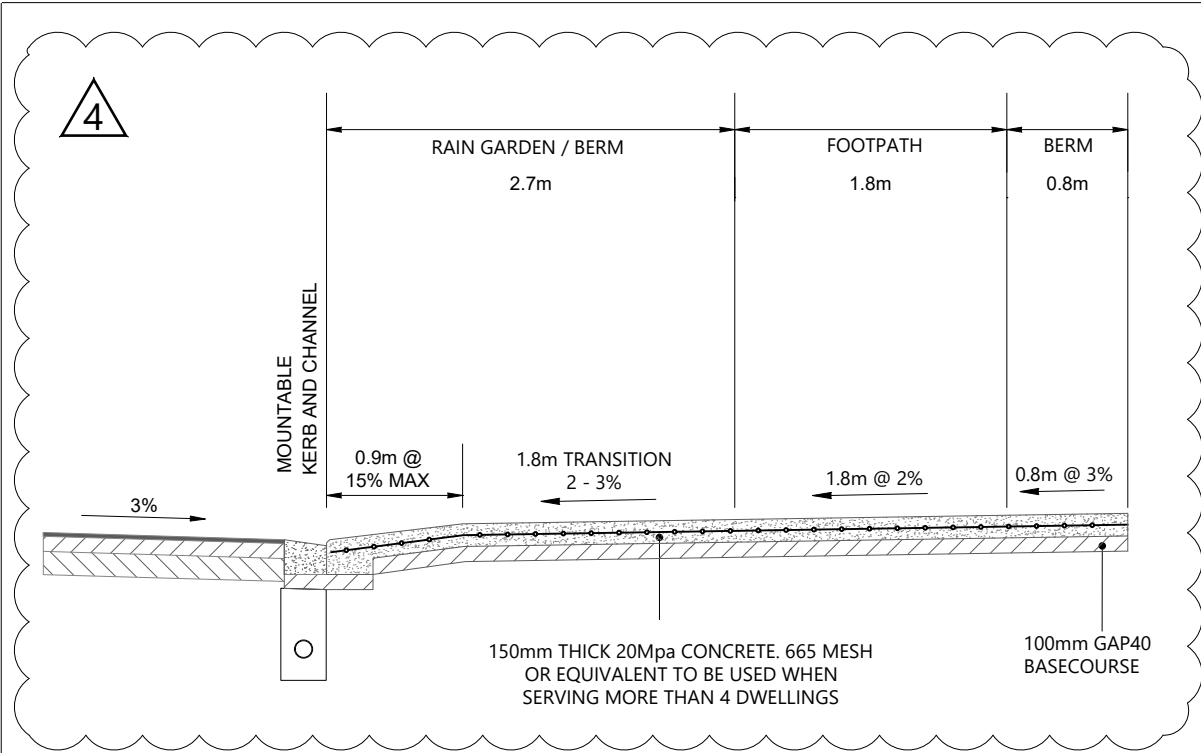


MILLDALE

VEHICLE CROSSINGS TYPES

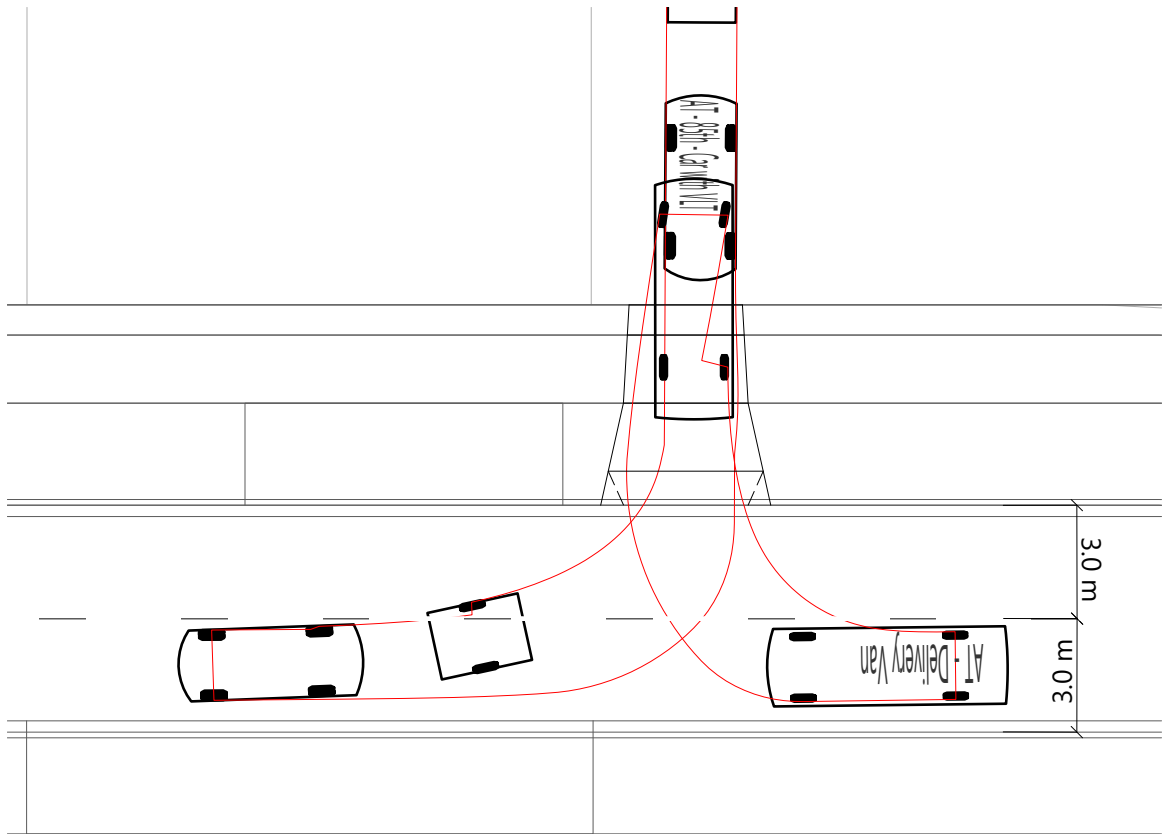


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DWG NO	P17-005-900A-RD	



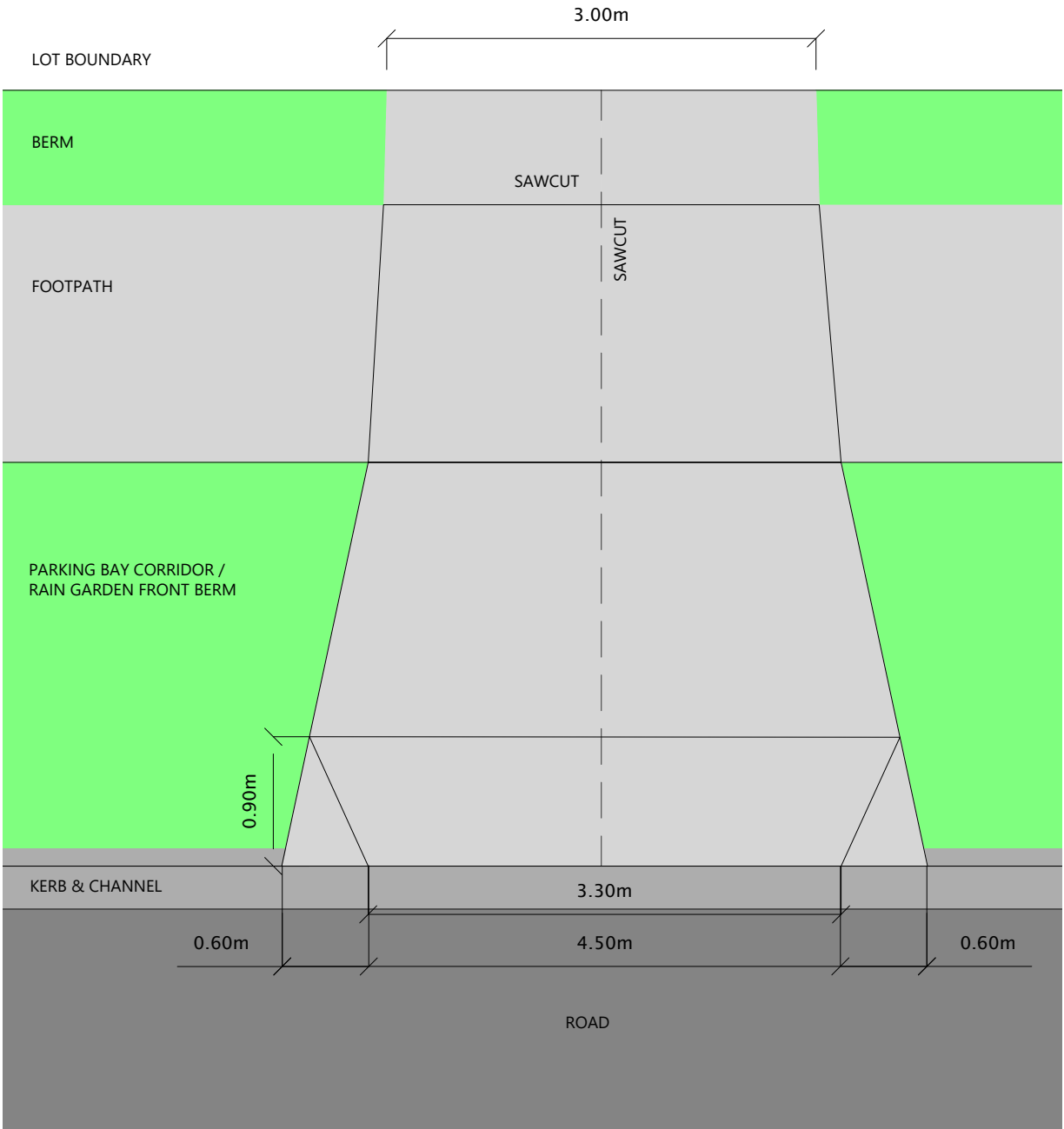
VEHICLE CROSSING TYPE A TYPICAL DETAIL

Scale: 1:50



VEHICLE CROSSING TYPE A TYPICAL DETAIL

Scale: 1:50



VEHICLE CROSSING TYPE A TYPICAL DETAIL

Scale: 1:50

NOTES

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2. ALL LOTS FRONTING ONTO LOCAL ROADS WITH A FRONT BOUNDARY WIDTH OF 14m OR GREATER SHALL CONSTRUCT EITHER A TYPE A VEHICLE CROSSING OR A TYPE B VEHICLE CROSSING.
3. ALL LOTS FRONTING ONTO COLLECTOR ROADS SHALL CONSTRUCT A TYPE B VEHICLE CROSSING.
4. ALL CORNER LOTS SHALL CONSTRUCT A TYPE B VEHICLE CROSSING.



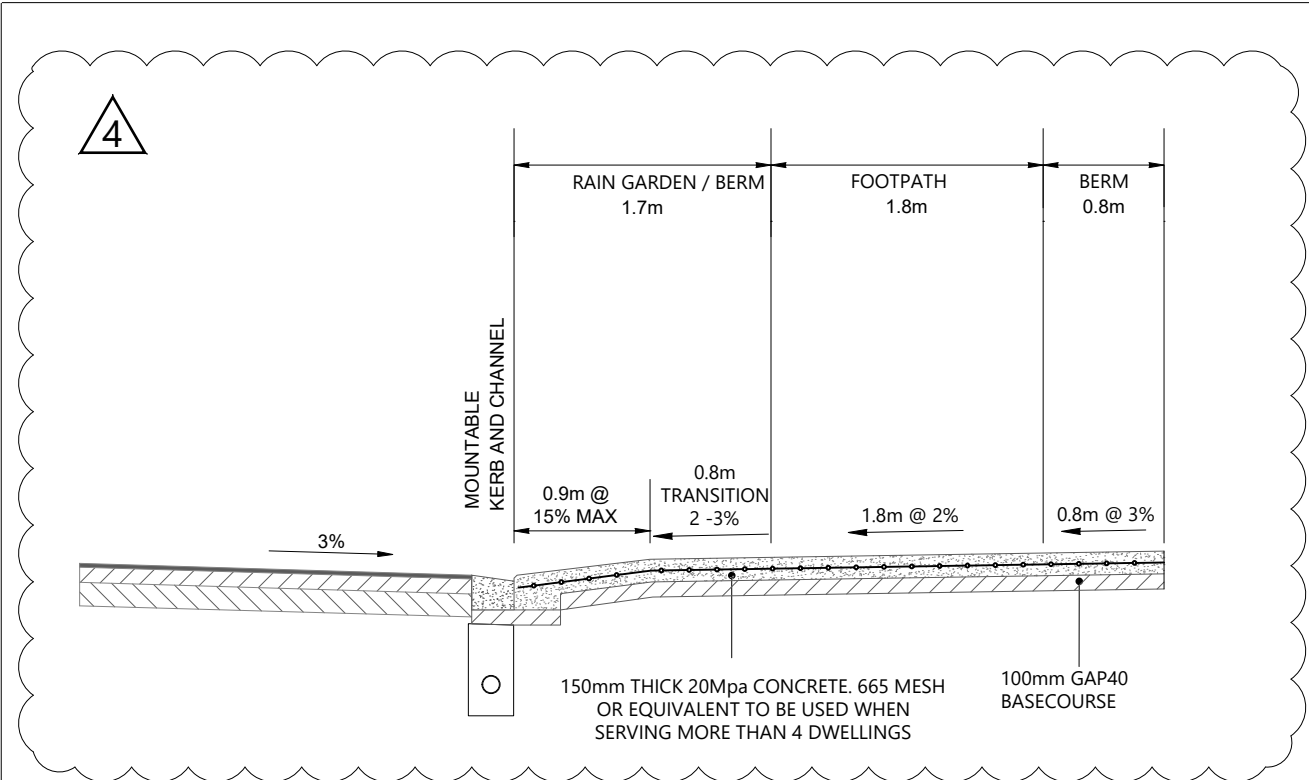
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2	s.92 AMENDMENT	KH	JULY 2020	DRAWN	
3	AT COMMENTS AMENDMENT	PL	SEP 2020	CHECKED	
4	REVISED SECTION	KH	NOV 2020	APPROVED	



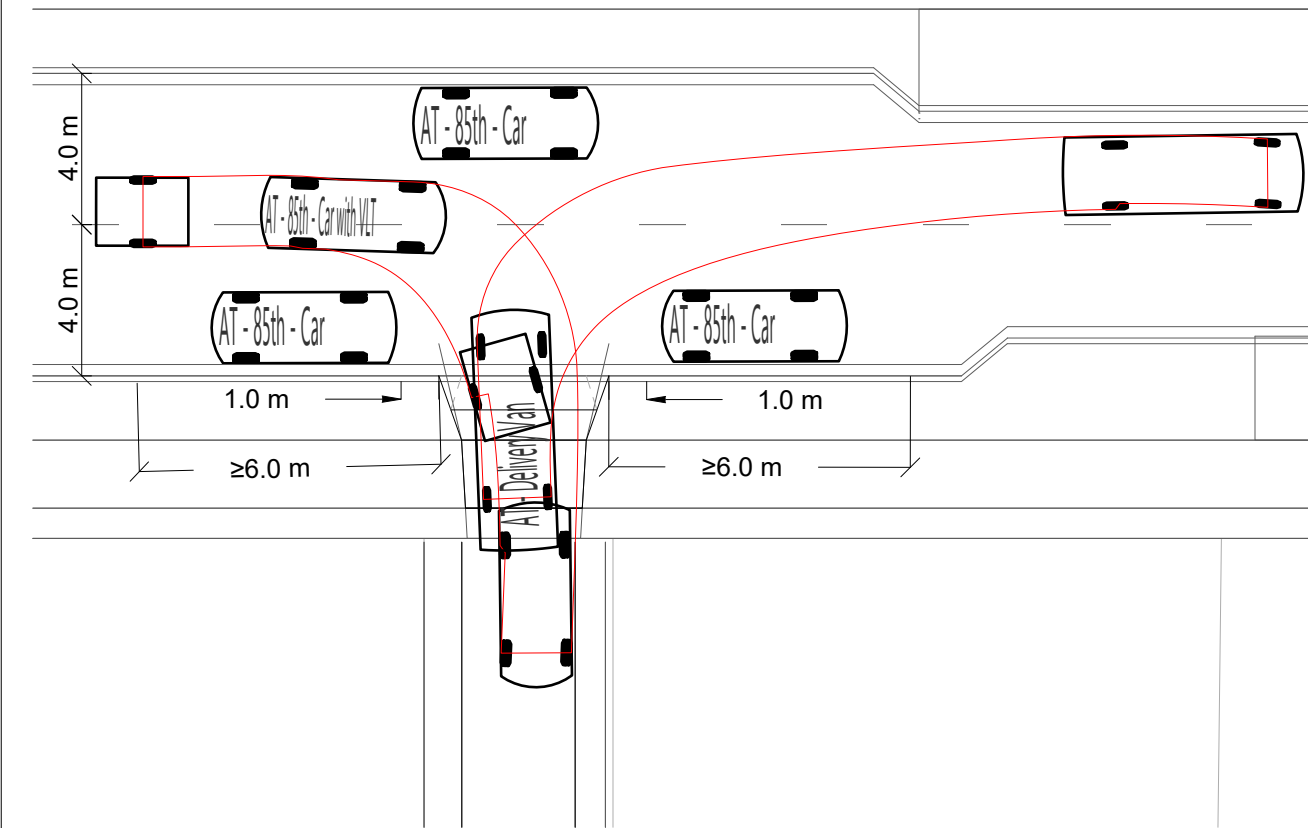
MILLDALE
TYPICAL VEHICLE CROSSING TYPE A- STANDARD DETAIL
SUBURBAN STREET



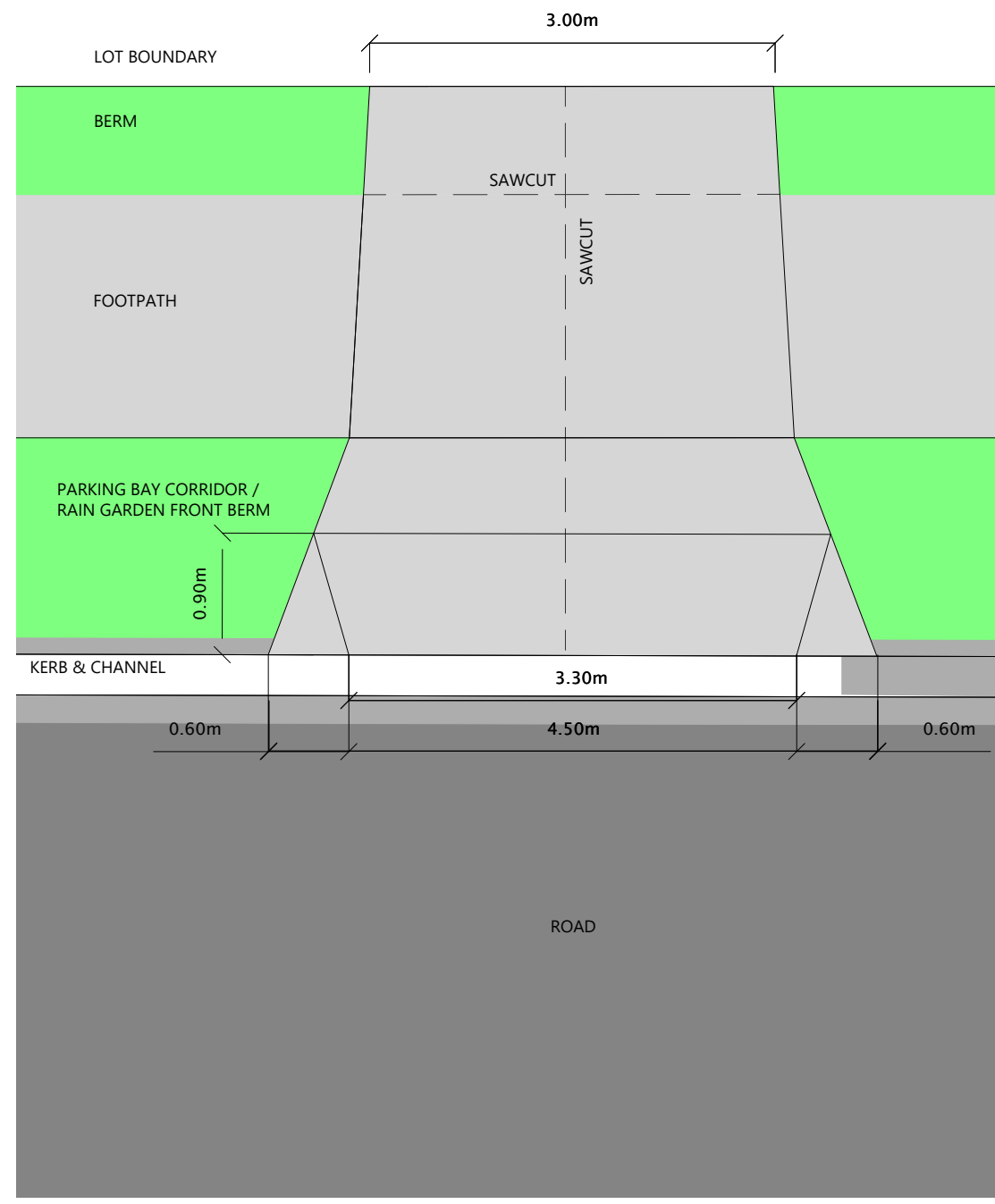
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SCALE	AS SHOWN	3
COUNCIL	AUCKLAND COUNCIL	
DWG NO	P17-005-900-RD	



VEHICLE CROSSING TYPE A TYPICAL SECTION - SUBURBAN STREET TYPE 2
Scale: 1:50



VEHICLE CROSSING TYPE A TYPICAL SECTION - SUBURBAN STREET TYPE 2
Scale: 1:50



VEHICLE CROSSING TYPE A TYPICAL SECTION - SUBURBAN STREET TYPE 2
Scale: 1:50

NOTES

1. ALL LOTS FRONTING ONTO LOCAL ROADS WITH A FRONT BOUNDARY WIDTH OF LESS THAN 14m SHALL CONSTRUCT A TYPE A VEHICLE CROSSING.
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4. ALL CORNER LOTS SHALL CONSTRUCT A TYPE B VEHICLE CROSSING.



REVISION DETAILS					INT	DATE	SURVEYED		
1	ISSUED FOR CONSENT				KH	MAY 2020	DESIGNED	KH	
2	S.92 AMENDMENT				KH	JULY 2020	DRAWN	KH	
3	AT COMMENTS AMENDMENT				PL	SEP 2020	CHECKED	PL	
4	REVISED SECTION				KH	NOV 2020	APPROVED	JW	

SIDWELL ROAD
MILLDALE
AUCKLAND

CLIENT:

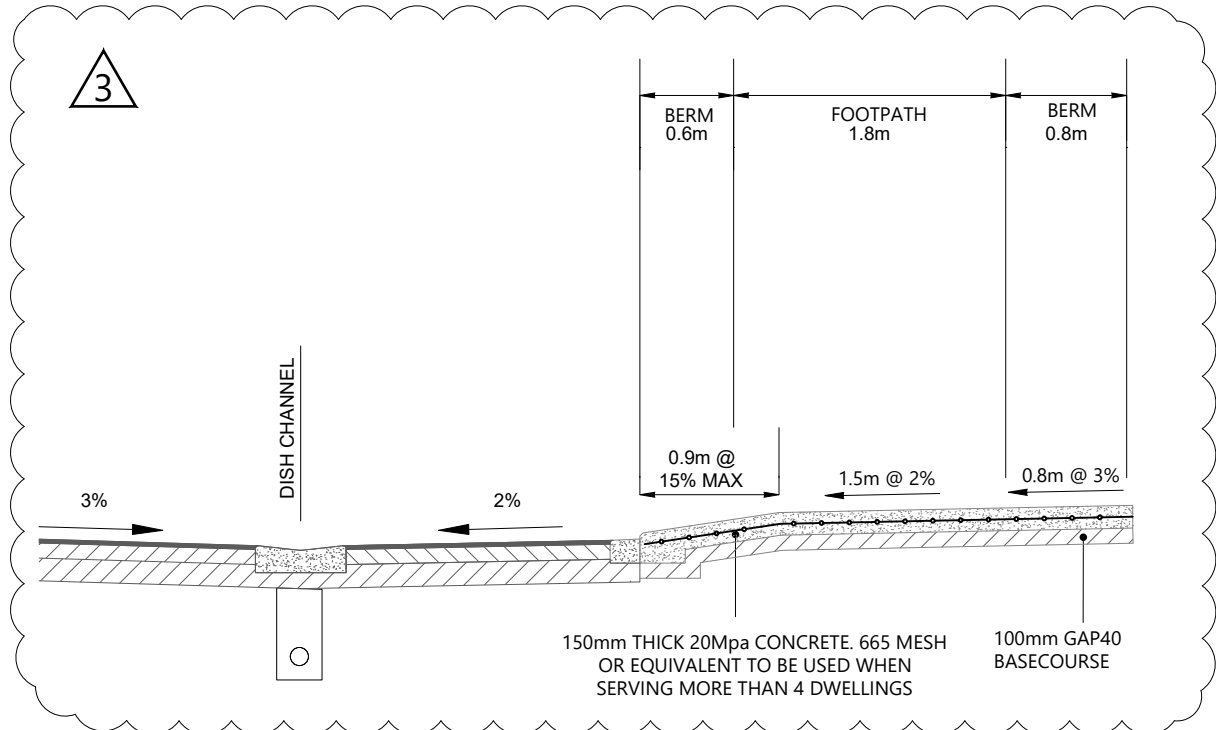


MILLDALE

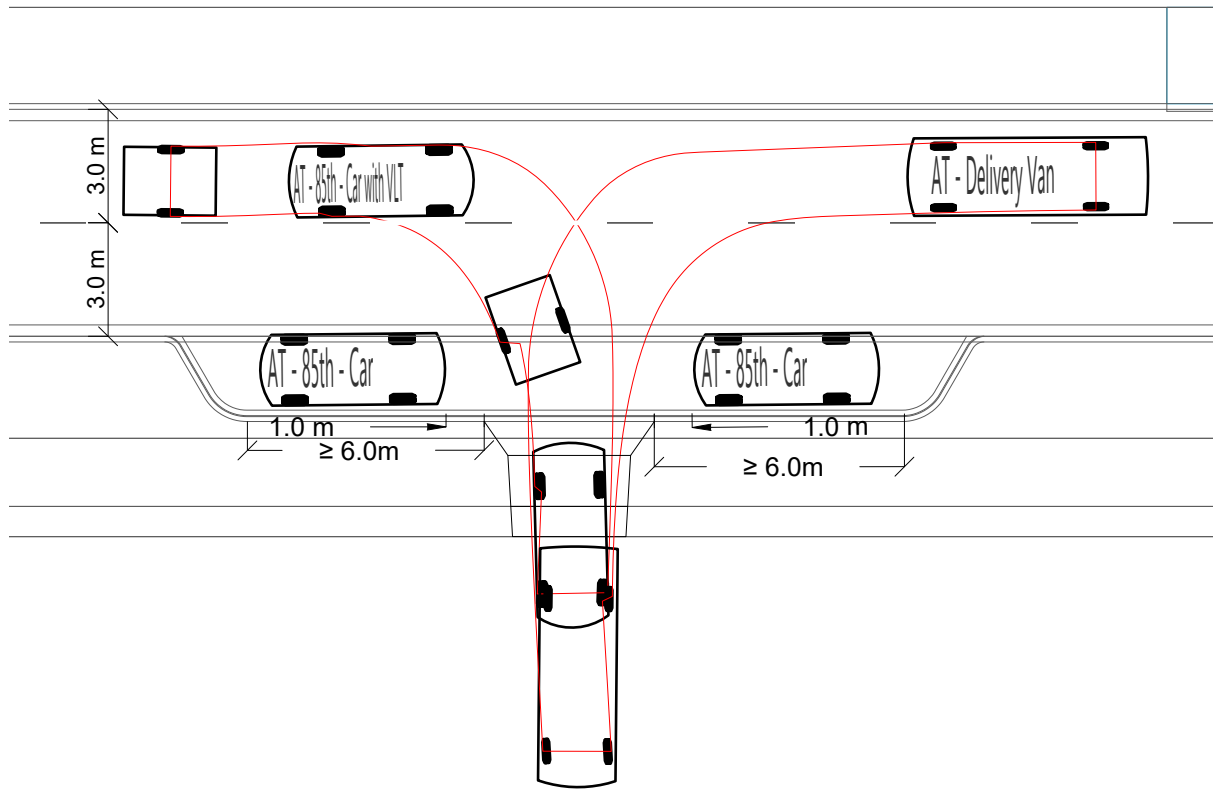
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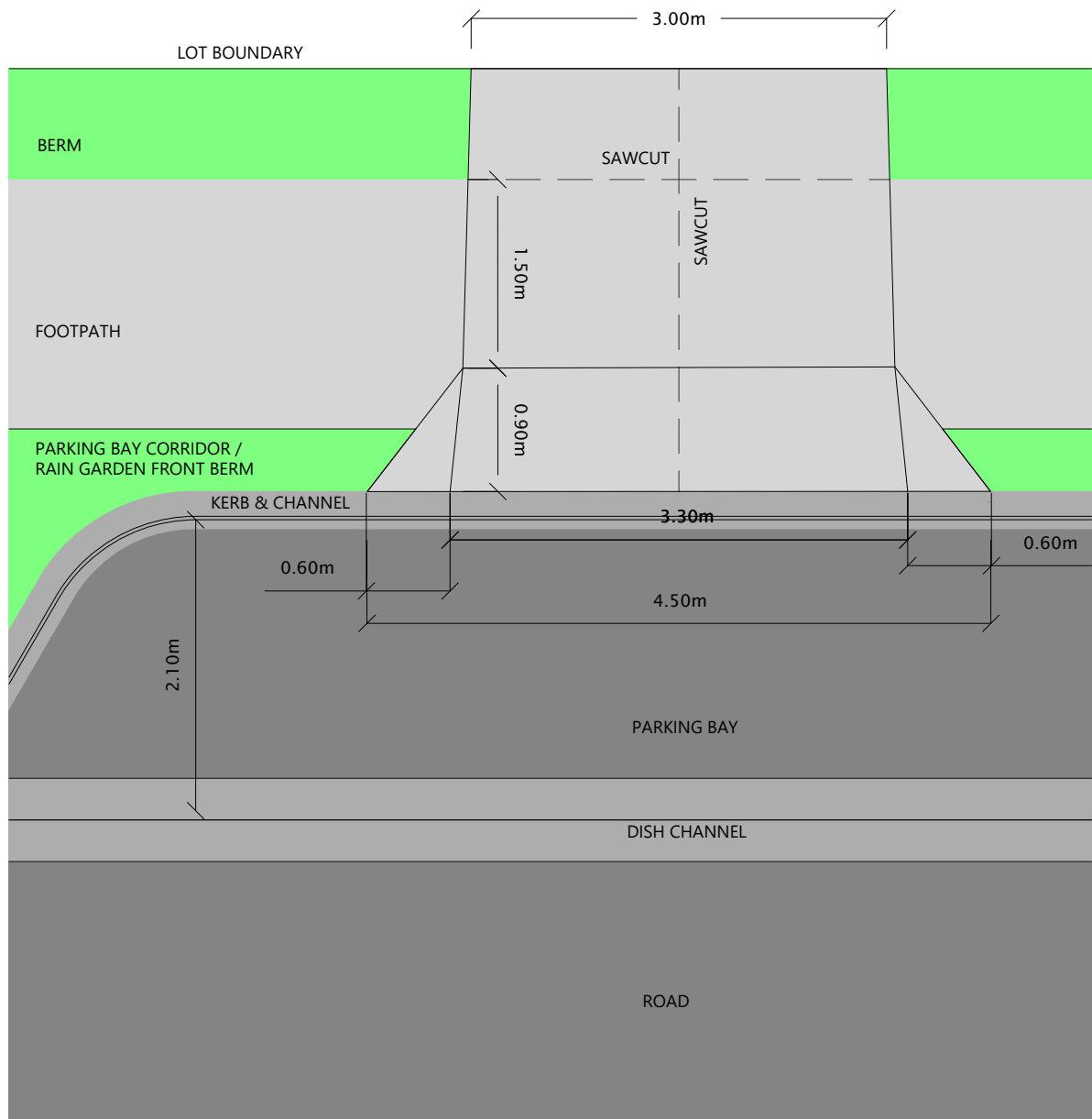
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SCALE	AS SHOWN	3
COUNCIL	AUCKLAND COUNCIL	
DWG NO	P17-005-901-RD	



VEHICLE CROSSING TYPE A TRACKING CURVES - SUBURBAN STREET WITH PARKING BAY
SCALE 1:200



VEHICLE CROSSING TYPE A TRACKING CURVES - SUBURBAN STREET WITH PARKING BAY
SCALE 1:200



VEHICLE CROSSING TYPE A TRACKING CURVES - SUBURBAN STREET WITH PARKING BAY
SCALE 1:200

NOTES

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2. ALL LOTS FRONTING ONTO LOCAL ROADS WITH A FRONT BOUNDARY WIDTH OF 14m OR GREATER SHALL CONSTRUCT EITHER A TYPE A VEHICLE CROSSING OR A TYPE B VEHICLE CROSSING.
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4. ALL CORNER LOTS SHALL CONSTRUCT A TYPE B VEHICLE CROSSING.



REVISION DETAILS					SIDWELL ROAD MILLDALE AUCKLAND WOODS.CO.NZ
1	ISSUED FOR CONSENT	KH	JULY 2020	DESIGNED	
2	AT COMMENTS AMENDMENT	PL	SEP 2020	DRAWN	
3	REVISED SECTION	KH	NOV 2020	CHECKED	
				APPROVED	



MILLDALE
TYPICAL VEHICLE CROSSING TYPE A - STANDARD DETAIL
SUBURBAN STREET WITH PARKING BAY

	STATUS	ISSUED FOR CONSENT	2
	SCALE	AS SHOWN	
	COUNCIL	AUCKLAND COUNCIL	
	DWG NO	P17-005-902-RD	

SUBMISSION FOR DEPARTURE FROM STANDARDS

PROJECT NAME	P17-005 Milldale
APPLICANT ORGANISATION	Woods
CONTACT DETAILS:	Phuong Luong [REDACTED] [REDACTED]
APPLICANT REF	
HIGHWAY AUTHORITY REF	
DATE SUBMITTED	

1) PROJECT DETAILS

A	Description	Milldale is a large-scale greenfield subdivision development.
B	Location	Milldale
C	Road category and type	Collector and Local
D	Design speed and speed limit	50km/hr
E	Traffic and NMU flows	

2) DEPARTURE DETAILS

A	Discipline	Road Geometric Design
	Type	Civil
B	Relevant Standard(s)	TDM – Urban and Rural Roadway Design, Section 9 – Vehicle crossings TDM – Vehicle Crossings Standard Engineering Details - Detail VX0103 -14/02/20 – Version A
	Clause	N/A
C	Difference between Standard(s) and Proposed Design	<u>Box Double Vehicle Crossing</u> It is a 4.8m rectangular design without splay, and the widths at both rear and front depart from the standard.

D	Reason for Departure (overview)	Milldale has tight road reserve with limited space and the full crossing widths creates challenges when coordinated with rain gardens, sumps, streetlights, parking etc. A reduced width requires more detail design but frees up space in the road corridor for other necessary infrastructure Furthermore, tracking proves the design achieves desired outcome both in terms of movement and safety. On previous Milldale stages the builders have had issues with vehicle tracking for double garages, causing houses to be set further back from the road. The proposed double vehicle crossing will resolve these issues allowing for more room for vehicle turning, and a better product.
E	Associated Project Departures	We are seeking to establish a standard vehicle crossing detail for the Milldale development to suit the developer's requirements and provide a consistent solution.

F	Other options considered	To accommodate the standard vehicle crossing it would reduce streetscape area and cause houses to be built further from the road. These options are not efficient with space, cost or environmental impact and will lead to less houses, more concrete.
----------	---------------------------------	---

3) JUSTIFICATION (POTENTIAL POSITIVE AND NEGATIVE IMPACTS)

A	Safety	Reduced vehicle speed entering the vehicle crossing from the road
B	Congestion/ delay	Not applicable
C	Environmental/ Sustainability	Reduces paved area of crossings by 17%, increasing berm area for planting and street trees.
D	Capital and Whole Life Cost/Value	N/A private asset
E	Accessibility	Provides more kerb space for parking bays, delivering parking closer houses, and reducing distance for walking.
F	Integration	Reduced width crossing aligns with reduced width road corridor & allows more space for other infrastructure.
G	Structural	N/A private asset
H	Network Resilience & Maintenance	N/A private asset

4) COMPENSATORY MEASURES

A	Included Measures	
B	Rejected Options	

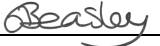
5) ATTACHMENTS & OTHER INFORMATION

A	List of Attachments	Vehicle Crossing Design- Departure from Standard -Memo MILLDALE STAGE 2 - TYPICAL BOX VEHICLE CROSSING - STANDARD DETAIL - P17-002-903-905
B	Consultations	
C	Other information	

6) DESIGN ORGANISATION'S CONCLUDING REMARKS

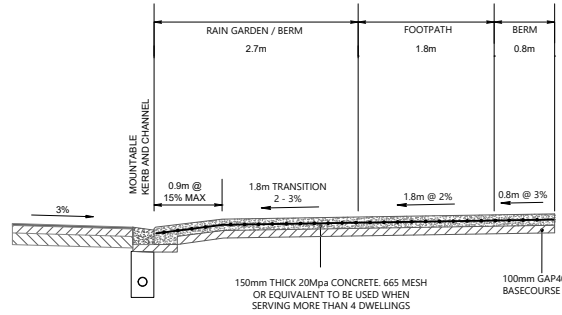
The proposed vehicle crossings require less use of concrete and maintain/improve safety. Such designs are already being applied and built on site by individual builders.

7) DECISION

Reviewer	Design Strategy & Standards	Signature		Date	22/04/2021
Approver	Chief Engineer	Signature		Date	28/07/2021
Decision	☐ Approved ☒ Approved with comments ☐ Rejected with reasons				
*COMMENTS or *REASONS FOR REJECTION (*delete as applicable)	To be used only within the Milldale Precinct and in locations meeting the road categories and conditions specified in this Departure.				

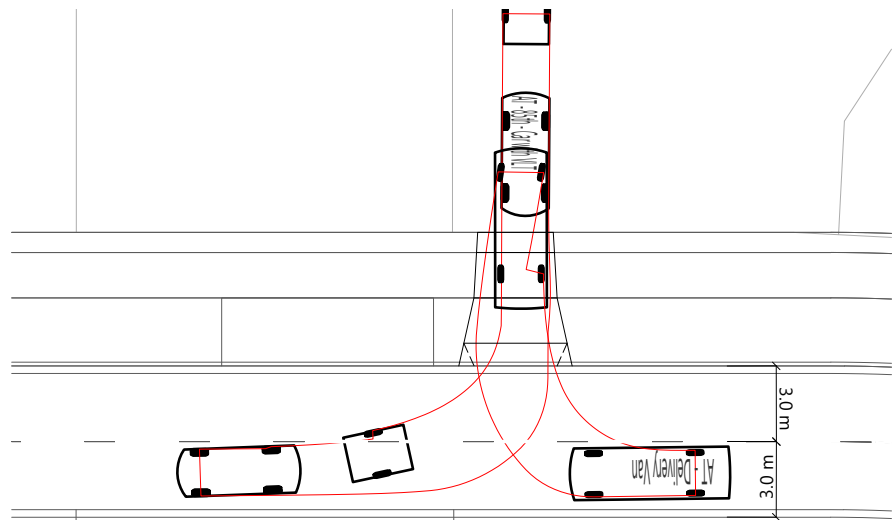
Notes for Completion

- 1 This form must be provided with a signed cover sheet giving full details of the applicant's staff and checking process in accordance with the Quality Assurance procedures in place. The Departures submission should be considered as a "report".
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- 3 Names and signatures associated with the Decision (see Section 6) should be inserted in accordance with agreed responsibility and competency matrix set out by the highway authority policy.
- 4 When completing section 2A, please refer to list of choices provided by highway authority which will normally be broadly based on DMRB/volume or SHW/series categorization.



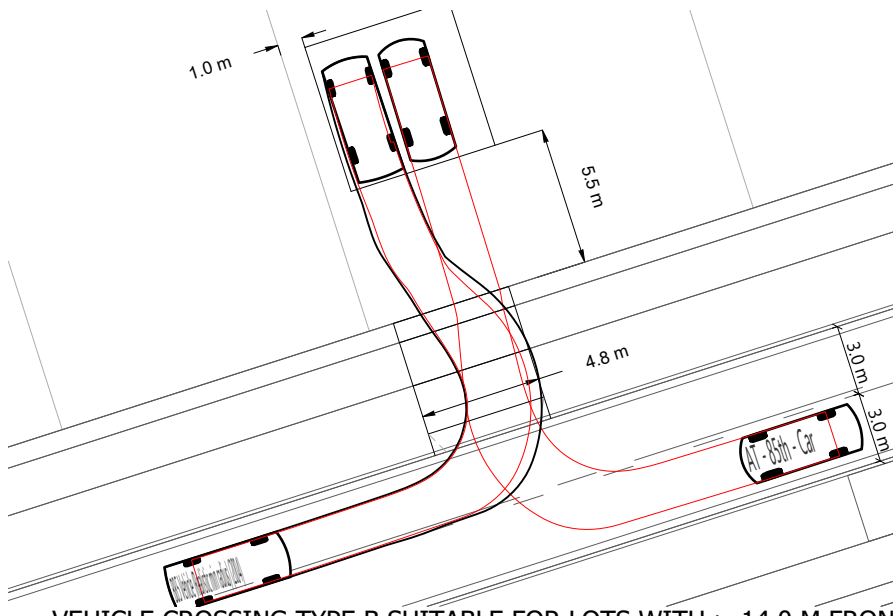
VEHICLE CROSSING - TYPICAL LONGSECTION TYPE A & TYPE B

Scale: 1:75



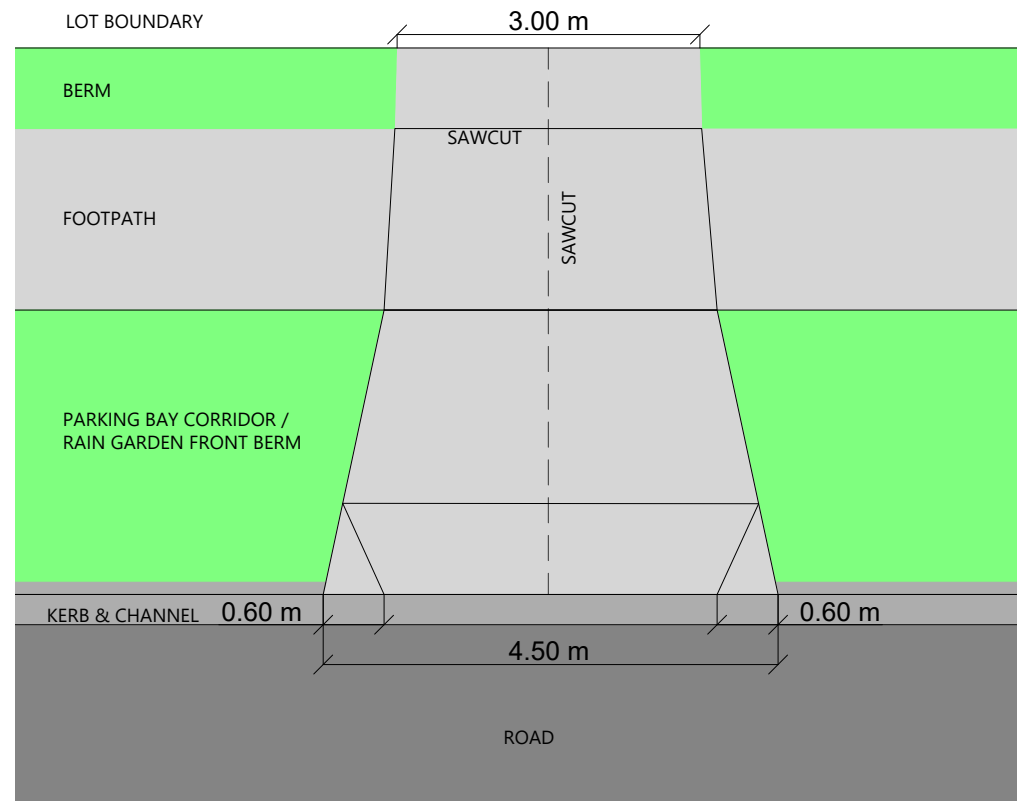
VEHICLE CROSSING TYPE A SUITABLE FOR LOTS WITH < 14.0 M FRONTAGE

Scale: 1:75



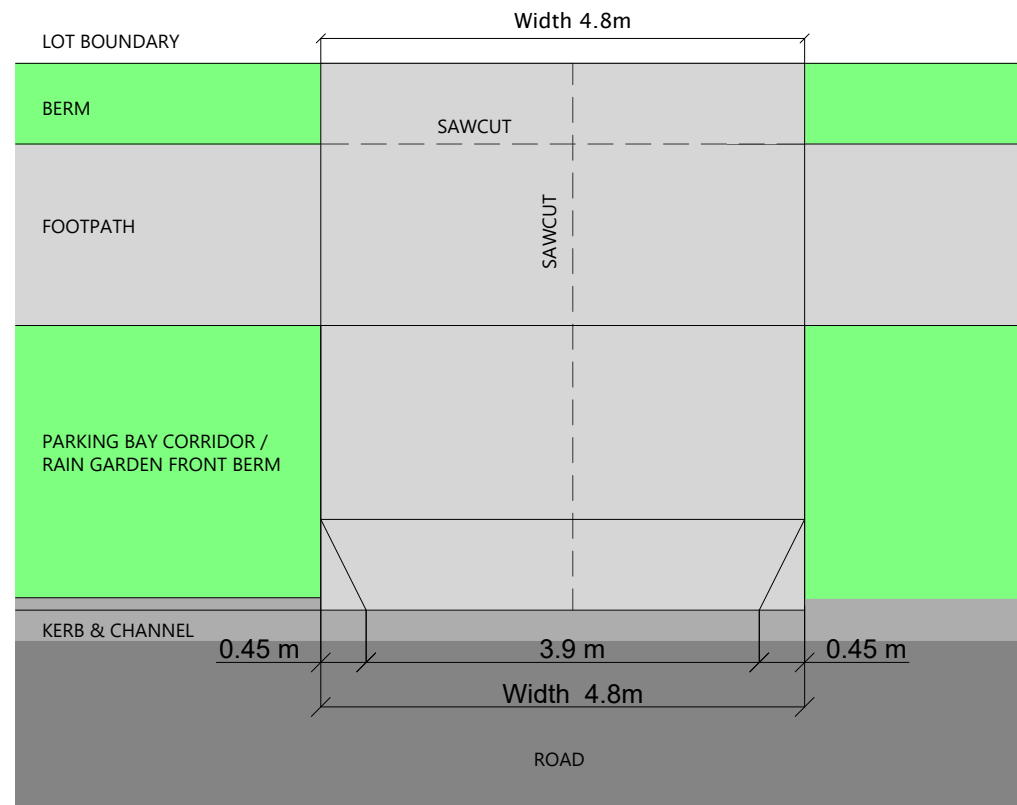
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Scale: 1:75



VEHICLE CROSSING TYPE A SUITABLE FOR LOTS WITH < 14.0 M FRONTAGE

Scale: 1:75

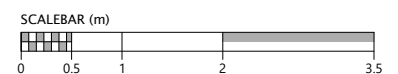


VEHICLE CROSSING TYPE B SUITABLE FOR LOTS WITH > 14.0 M FRONTAGE

Scale: 1:75

NOTES

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REVISION DETAILS		INT	DATE	SURVEYED		
1	AT COMMENTS AMENDMENT	EY	SEP 2020	DESIGNED	KH	SIDWELL ROAD MILLDALE AUCKLAND
				DRAWN	EY	
				CHECKED	PL	
				APPROVED	JW	WOODS.CO.NZ

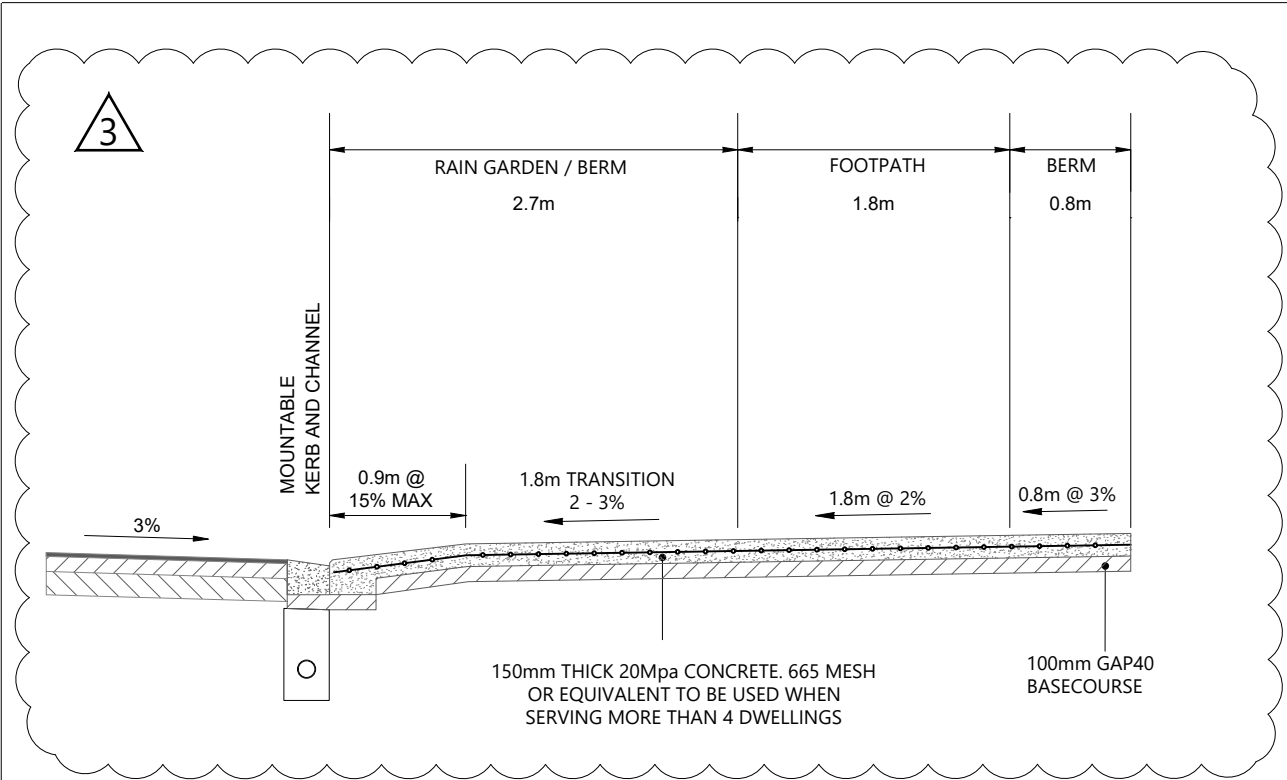


MILLDALE

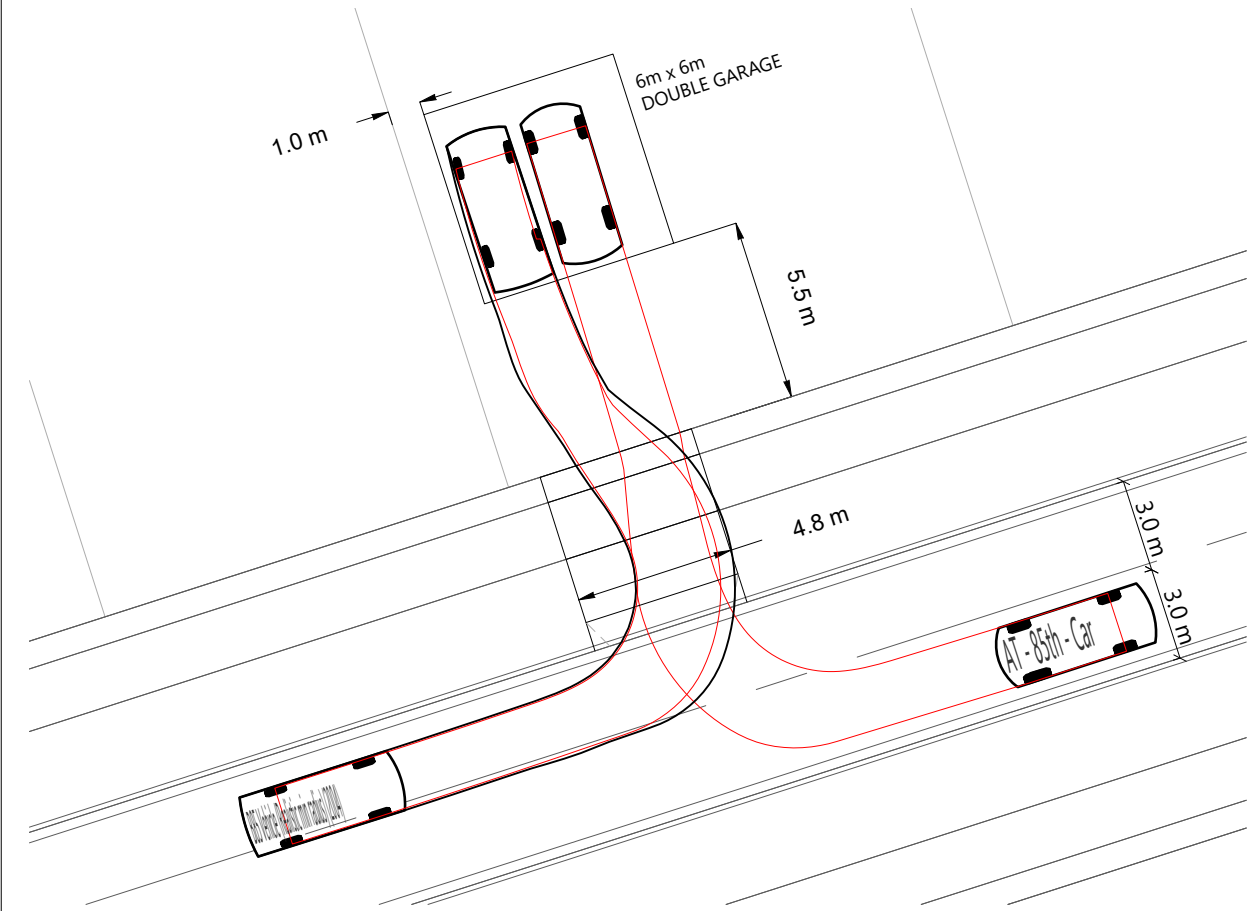
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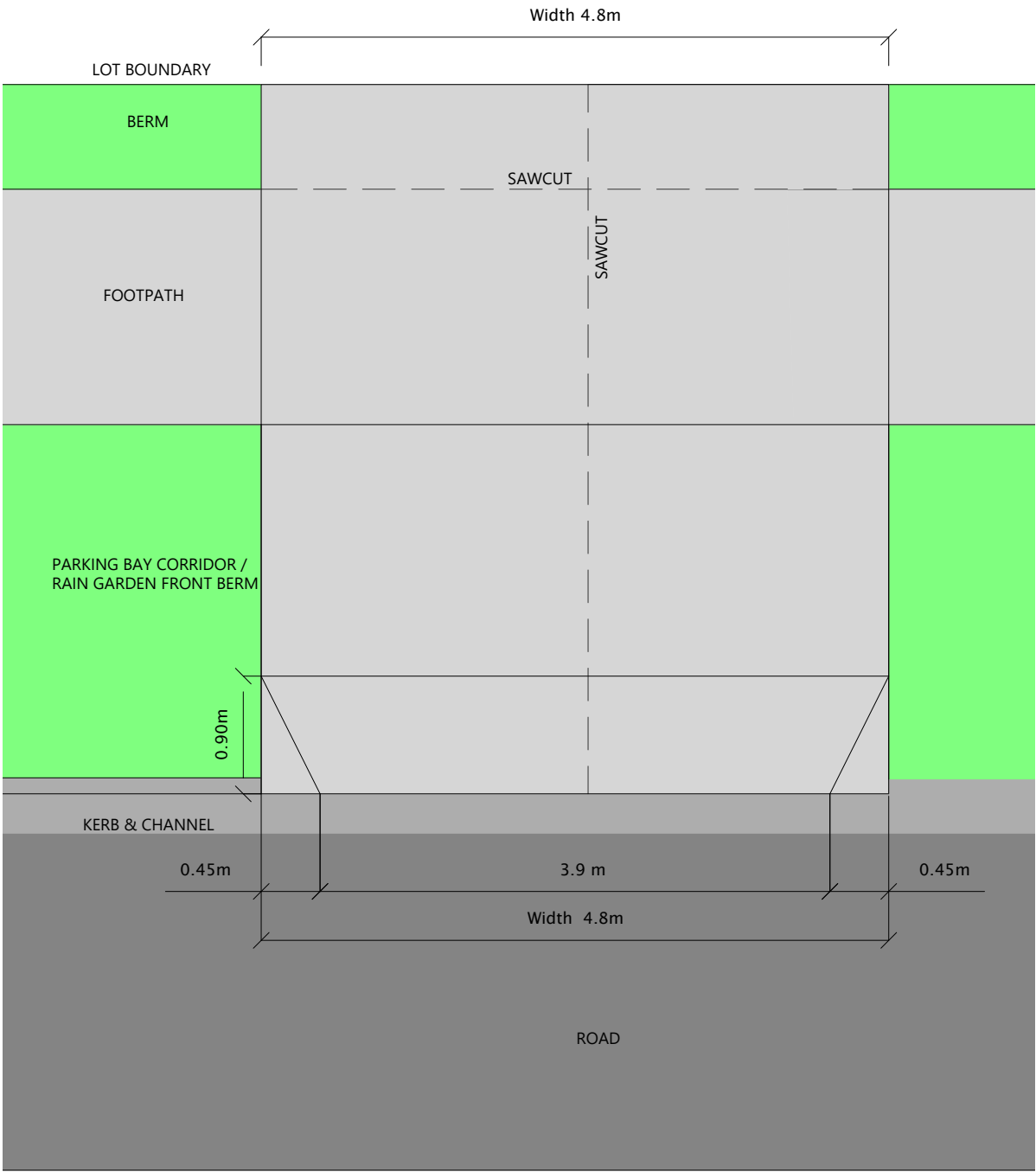
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SCALE	AS SHOWN	1
COUNCIL	AUCKLAND COUNCIL	
DWG NO	P17-005-900A-RD	



VEHICLE CROSSING TYPE B TYPICAL SECTION - SUBURBAN STREET
Scale: 1:50



VEHICLE CROSSING TYPE B TYPICAL SECTION - SUBURBAN STREET
Scale: 1:50



VEHICLE CROSSING TYPE B TYPICAL SECTION - SUBURBAN STREET
Scale: 1:50

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REVISION DETAILS	INT	DATE	SURVEYED		
1 S92 AMENDMENT	KH	JULY 2020	DESIGNED	KH	
2 AT COMMENTS AMENDMENT	PL	SEP 2020	DRAWN	KH	
3 REVISED SECTION	KH	NOV 2020	CHECKED	PL	
			APPROVED	JW	

SIDWELL ROAD
MILLDALE
AUCKLAND

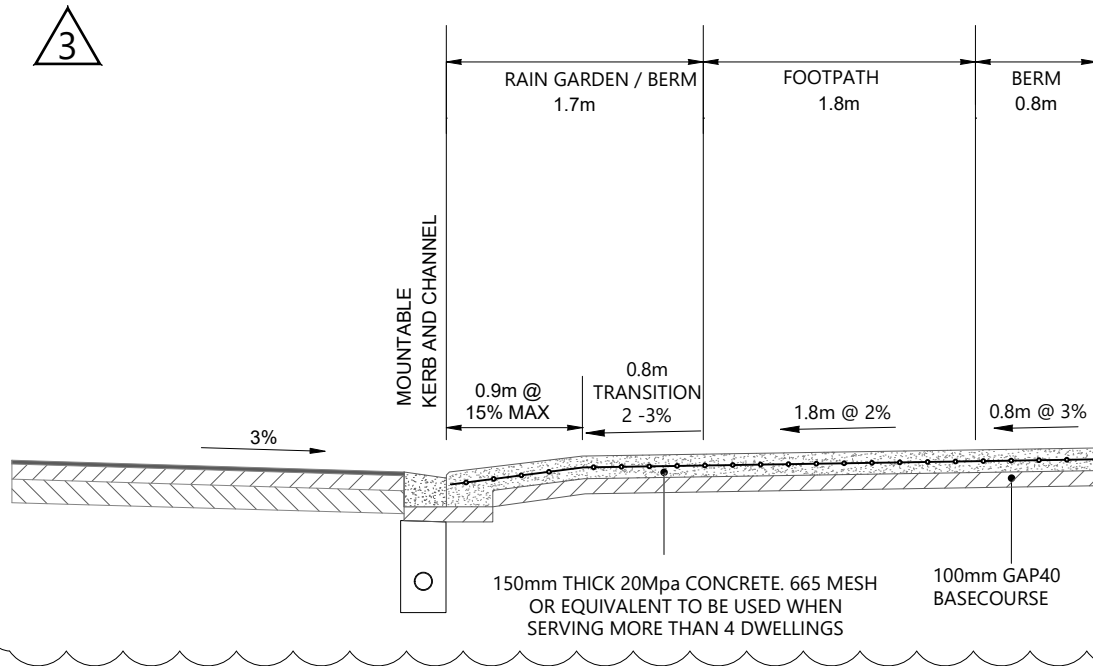
WOODS.CO.NZ



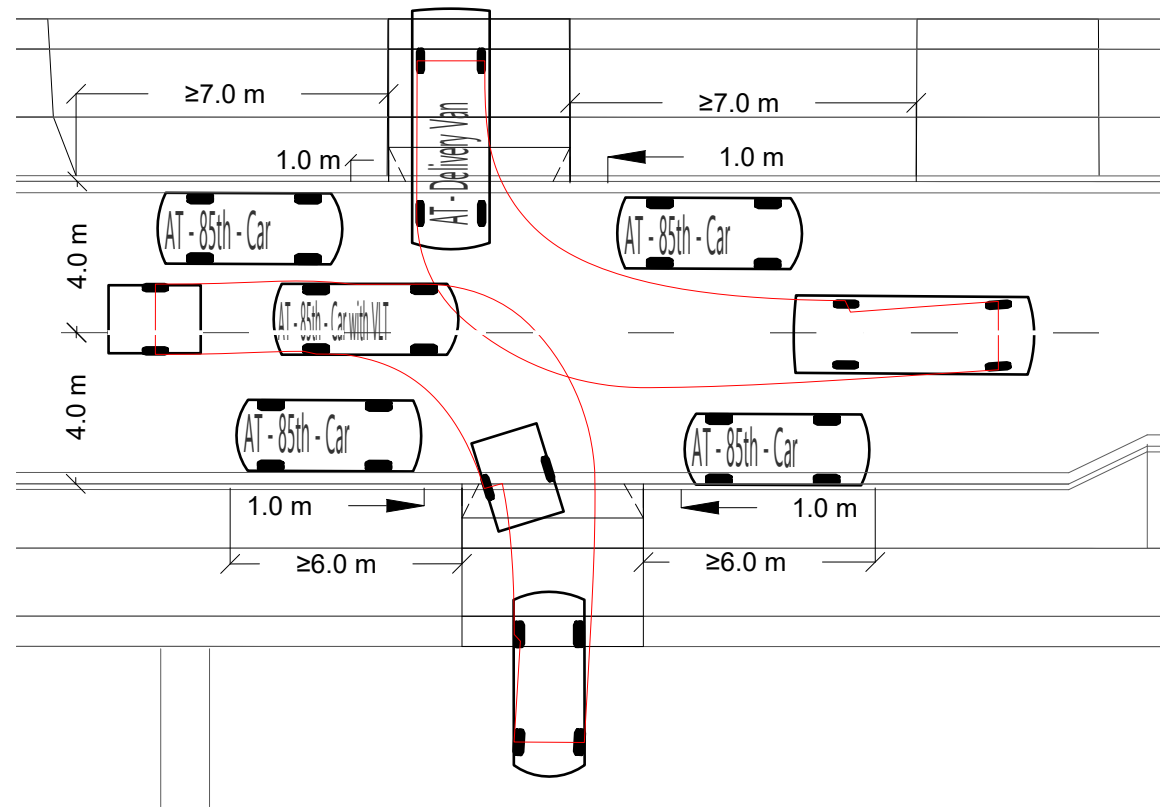
MILLDALE
TYPICAL VEHICLE CROSSING TYPE B- STANDARD DETAIL
SUBURBAN STREET



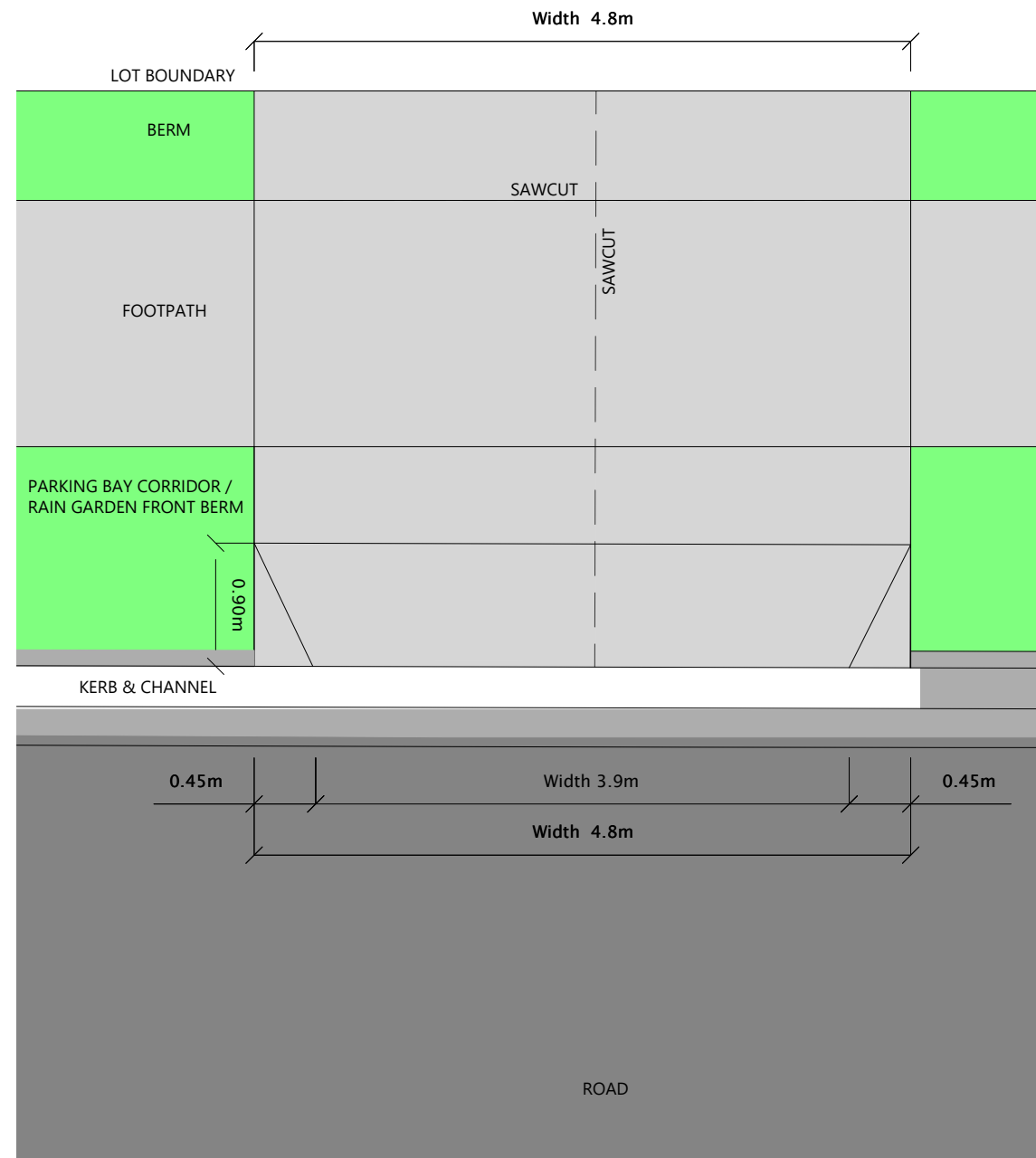
STATUS	ISSUED FOR CONSENT	REV
SCALE	AS SHOWN	2
COUNCIL	AUCKLAND COUNCIL	
DWG NO	P17-005-903-RD	



VEHICLE CROSSING TYPE B TRACKING CURVES - SUBURBAN STREET TYPE 2
SCALE 1:200



VEHICLE CROSSING TYPE B TRACKING CURVES - SUBURBAN STREET TYPE 2
SCALE 1:200



VEHICLE CROSSING TYPE B TRACKING CURVES - SUBURBAN STREET TYPE 2
SCALE 1:200

NOTES

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REVISION DETAILS	INT	DATE	SURVEYED		
1 S.92 AMENDMENT	KH	JULY 2020	DESIGNED	KH	
2 AT COMMENTS AMENDMENT	PL	SEP 2020	DRAWN	KH	
3 REVISED SECTION	KH	NOV 2020	CHECKED	PL	
			APPROVED	JW	

SIDWELL ROAD
MILLDALE
AUCKLAND
WOODS.CO.NZ

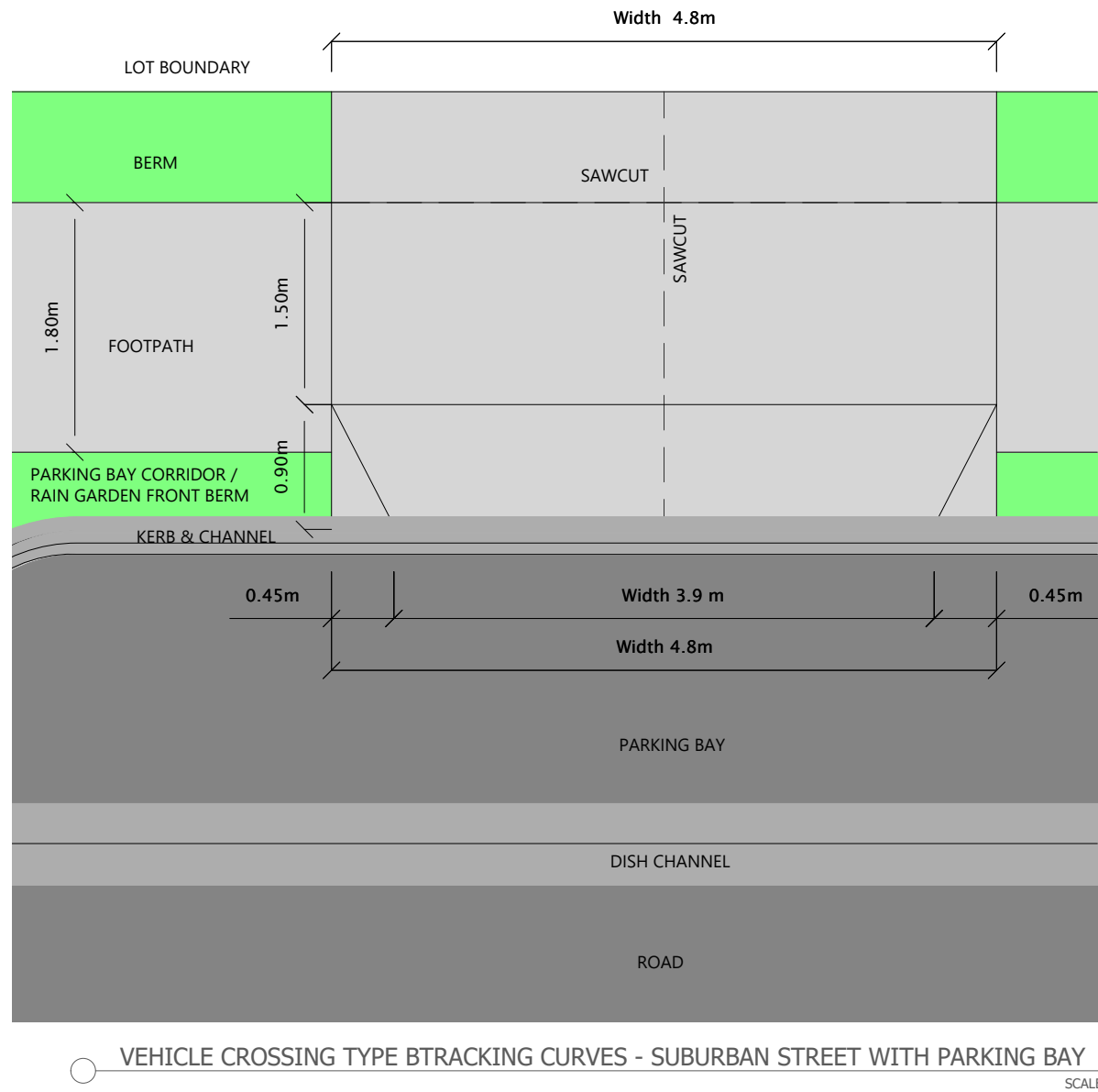
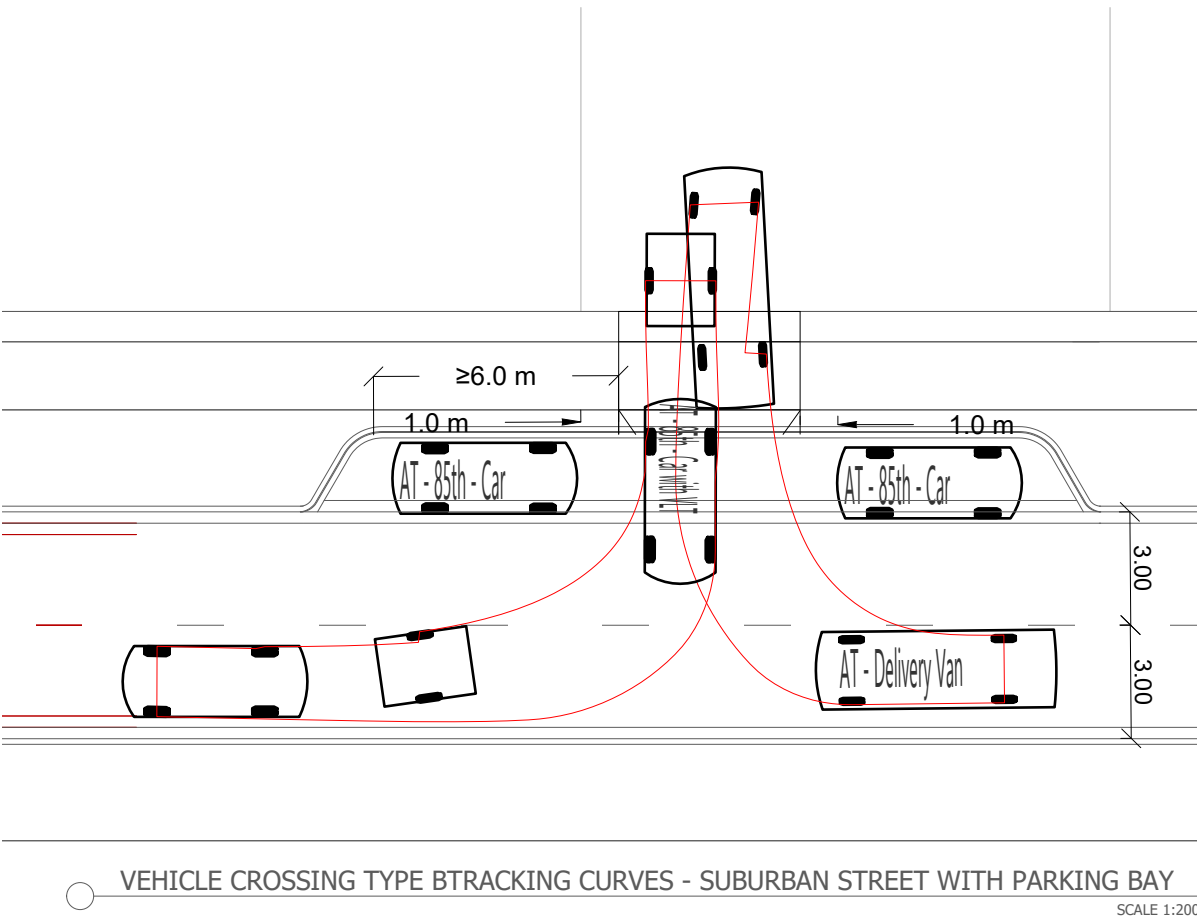
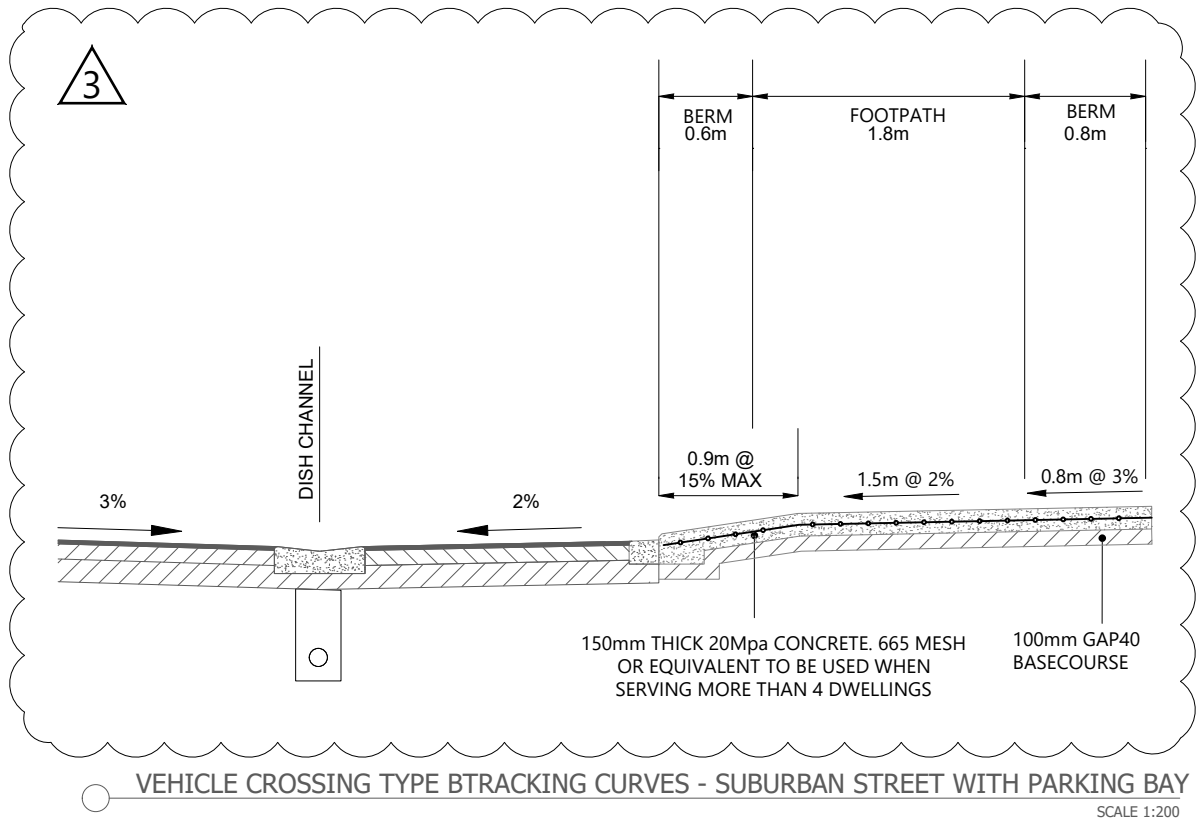


MILLDALE

TYPICAL VEHICLE CROSSING TYPE B- STANDARD DETAIL SUBURBAN STREET TYPE 2



STATUS	ISSUED FOR CONSENT	REV
SCALE	AS SHOWN	2
COUNCIL	AUCKLAND COUNCIL	
DWG NO	P17-005-904-RD	



- NOTES
- ALL LOTS FRONTING ONTO LOCAL ROADS WITH A FRONT BOUNDARY WIDTH OF LESS THAN 14m SHALL CONSTRUCT A TYPE A VEHICLE CROSSING.
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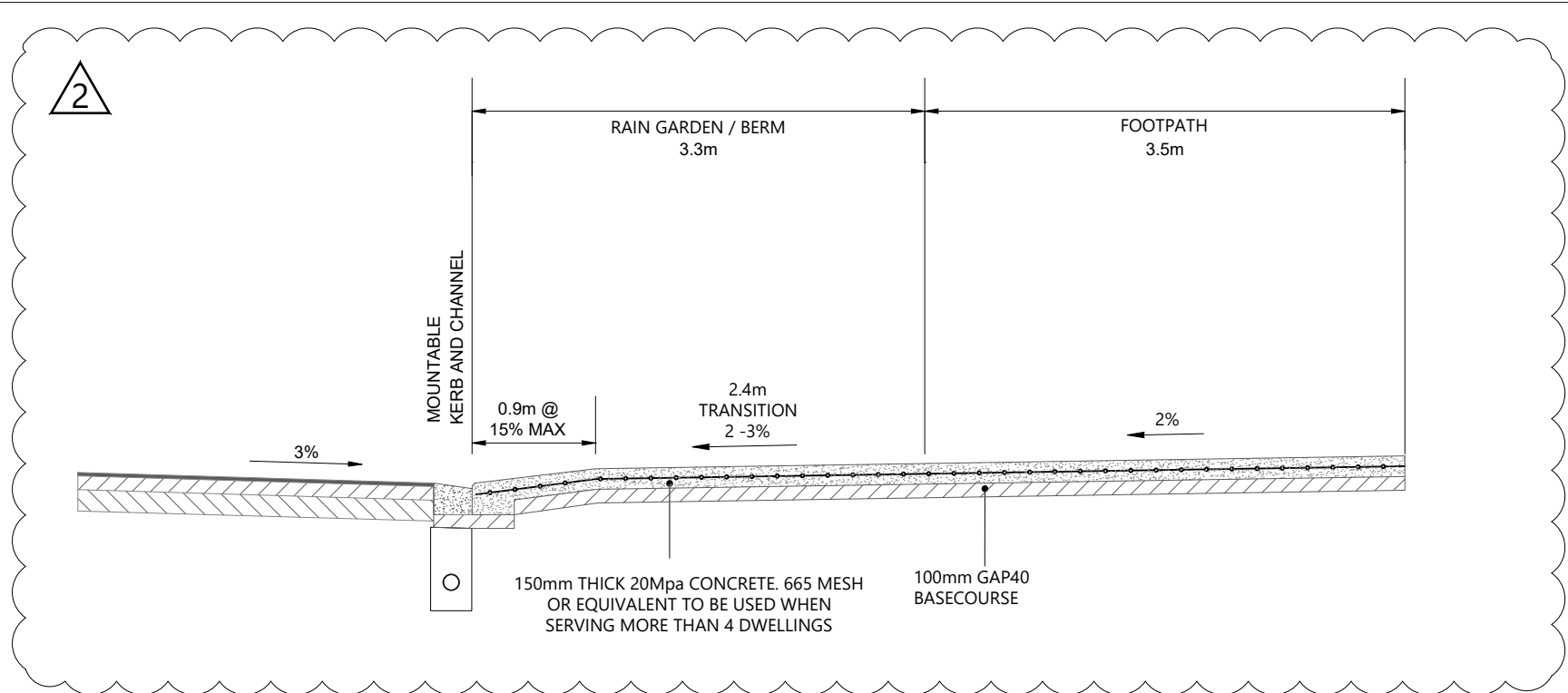
REVISION DETAILS					SIDWELL ROAD MILLDALE AUCKLAND WOODS.CO.NZ
1	S92 AMENDMENT	KH	JULY 2020	DESIGNED	
2	AT COMMENTS AMENDMENT	PL	SEP 2020	DRAWN	
3	REVISED SECTION	KH	NOV 2020	CHECKED	
				APPROVED	JW



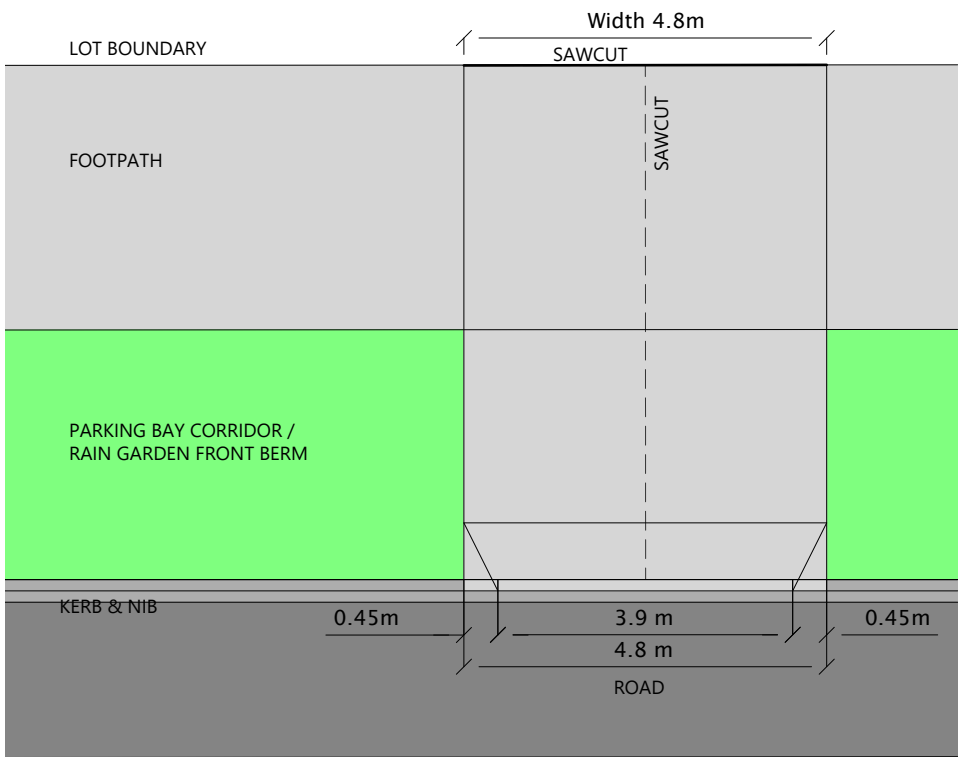
MILLDALE
TYPICAL VEHICLE CROSSING TYPE B - STANDARD DETAIL
SUBURBAN STREET WITH PARKING BAY



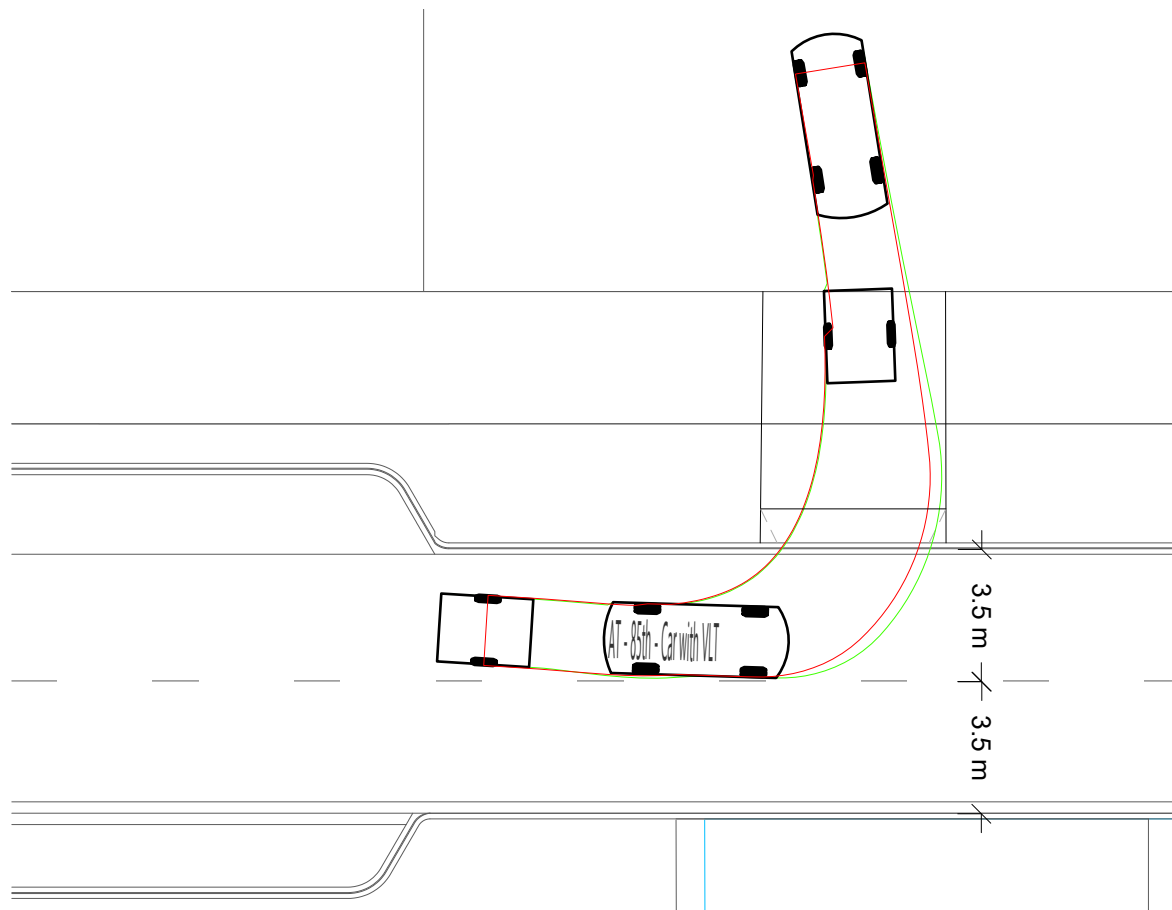
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DWG NO	P17-005-905-RD	



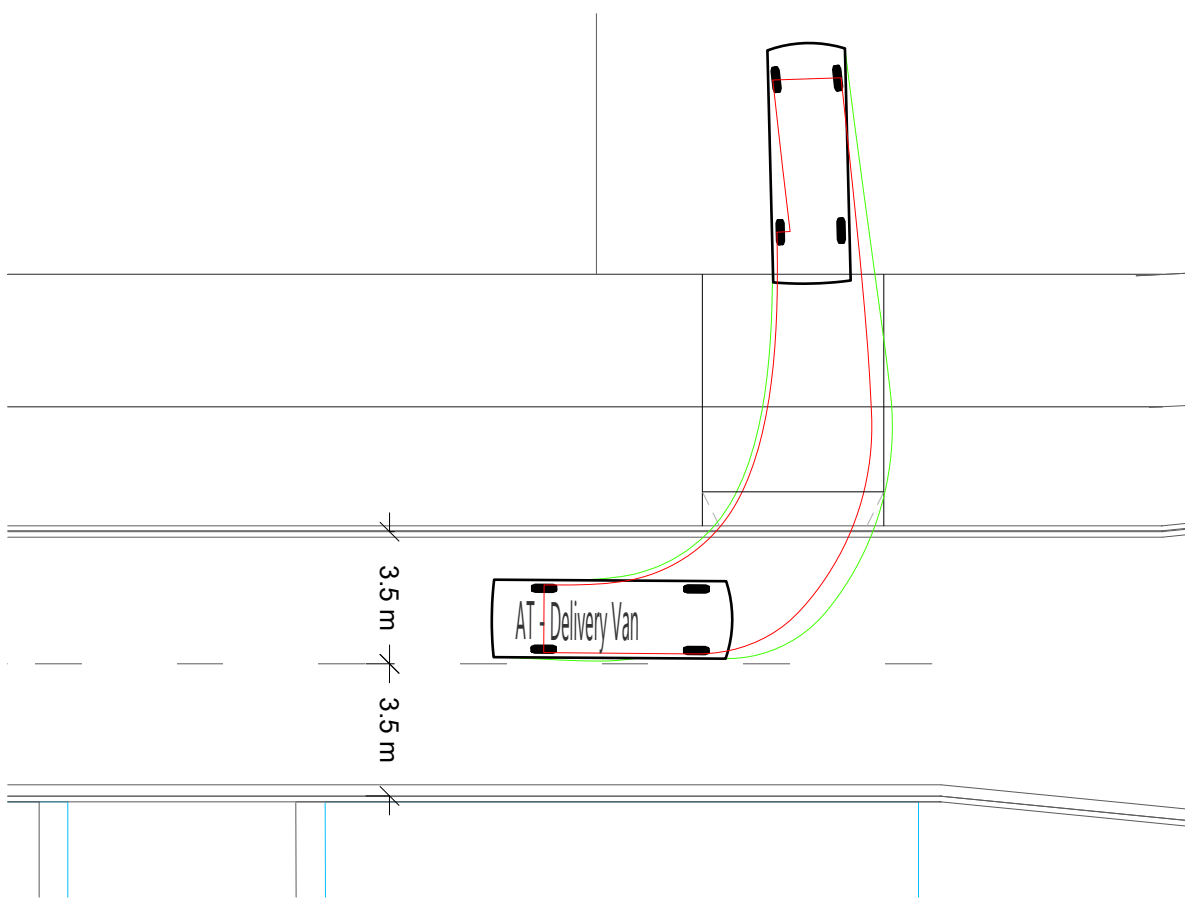
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Scale: 1:100



VEHICLE CROSSING TYPE B TYPICAL DETAIL - COLLECTOR ROAD TYPE 1
Scale: 1:100



VEHICLE CROSSING TYPE B TYPICAL DETAIL - COLLECTOR ROAD TYPE 1
Scale: 1:100



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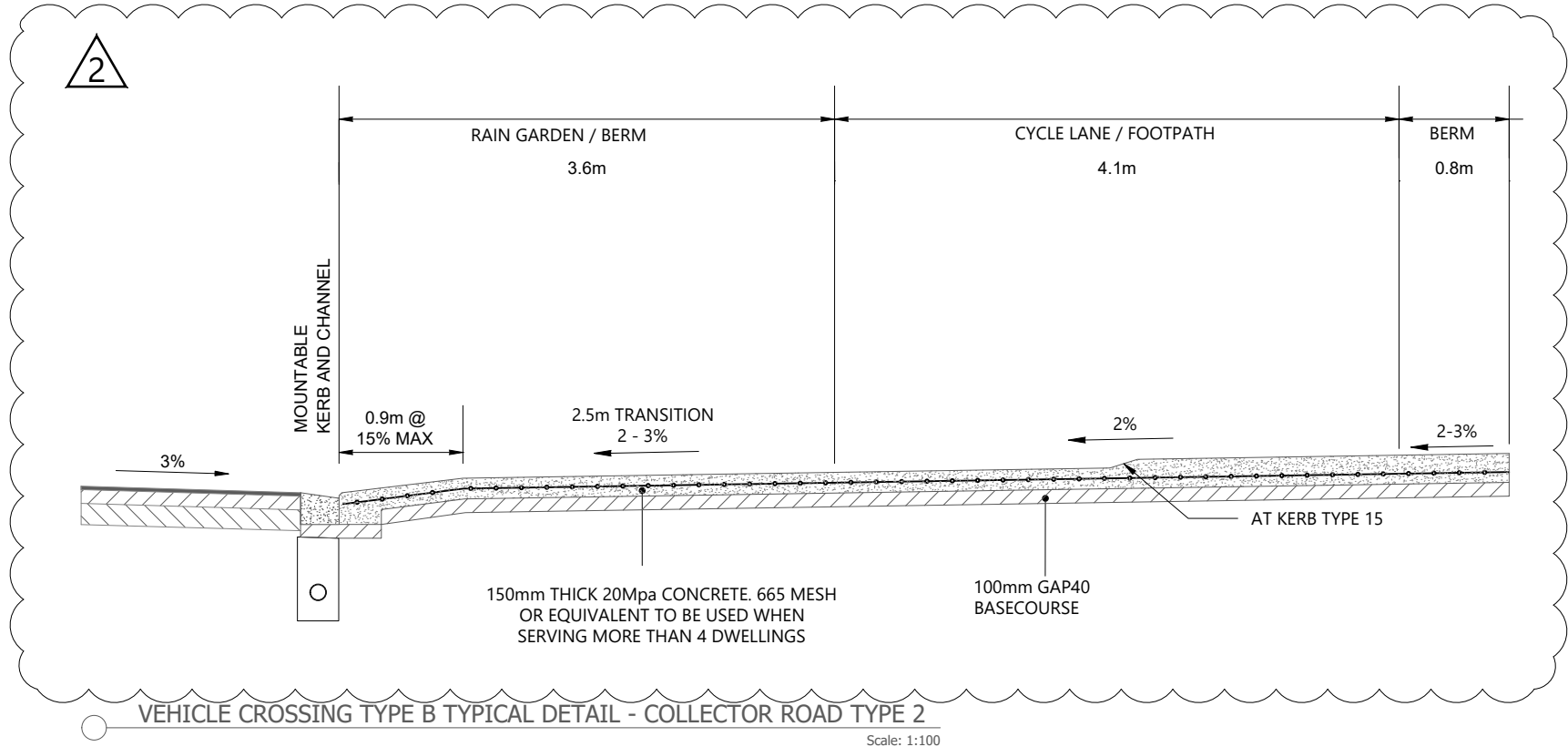
REVISION DETAILS					INT	DATE	SURVEYED	PL	SIDWELL ROAD MILLDALE AUCKLAND WOODS.CO.NZ
1	AT COMMENTS AMENDMENT	PL	SEP 2020	DESIGNED	PL				
2	REVISED SECTION	KH	NOV 2020	DRAWN	EY				
				CHECKED	PL				
				APPROVED	JW				



MILLDALE
TYPICAL VEHICLE CROSSING TYPE B - STANDARD DETAIL
COLLECTOR ROAD 1

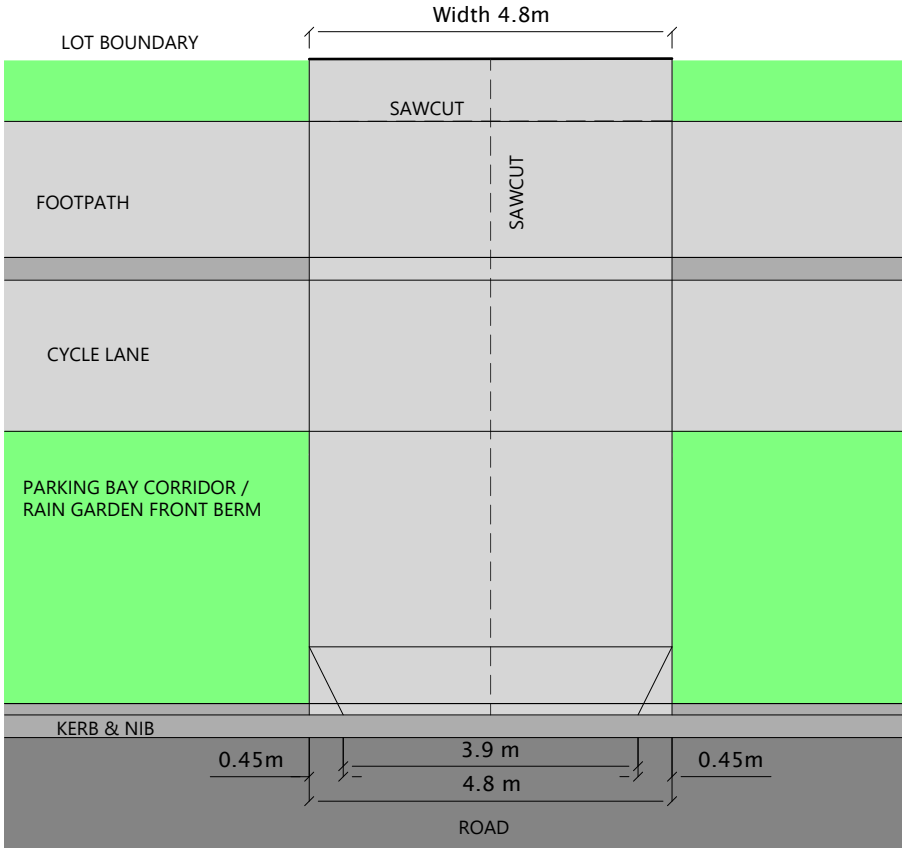


STATUS	ISSUED FOR CONSENT	REV
SCALE	AS SHOWN	1
COUNCIL	AUCKLAND COUNCIL	
DWG NO	P17-005-906-RD	



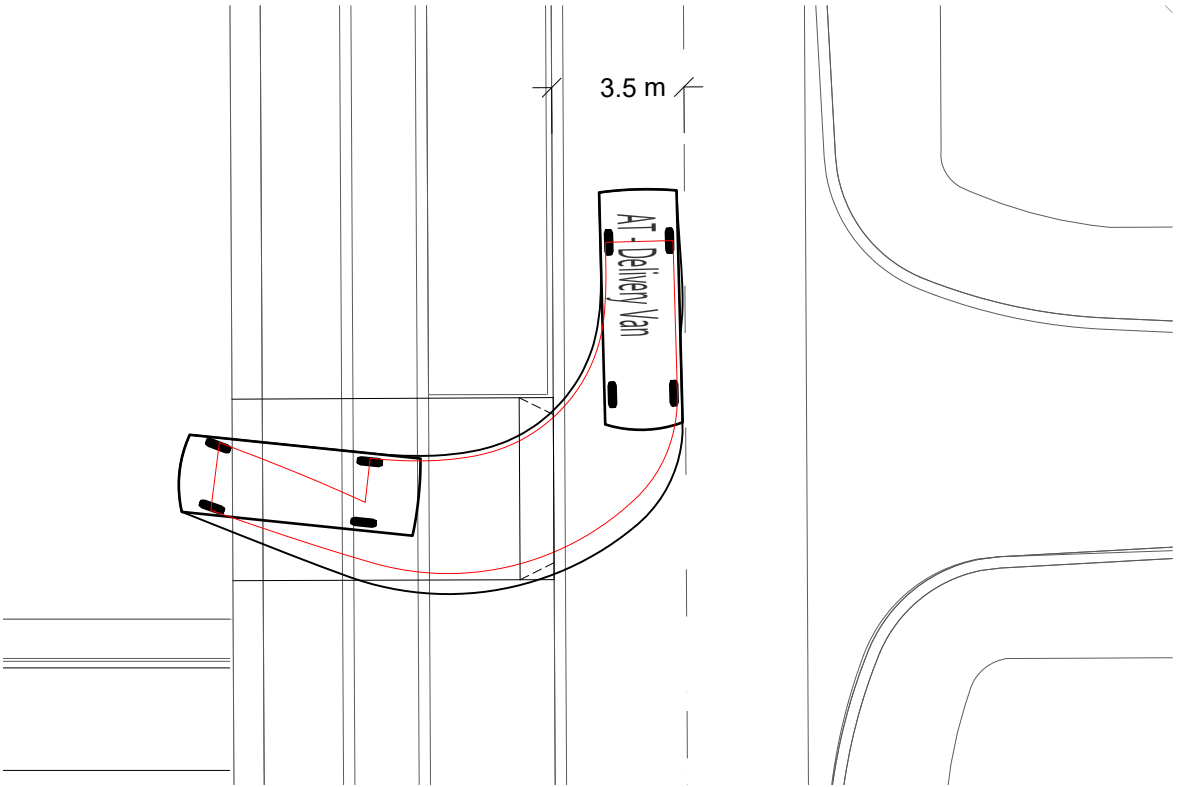
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Scale: 1:100



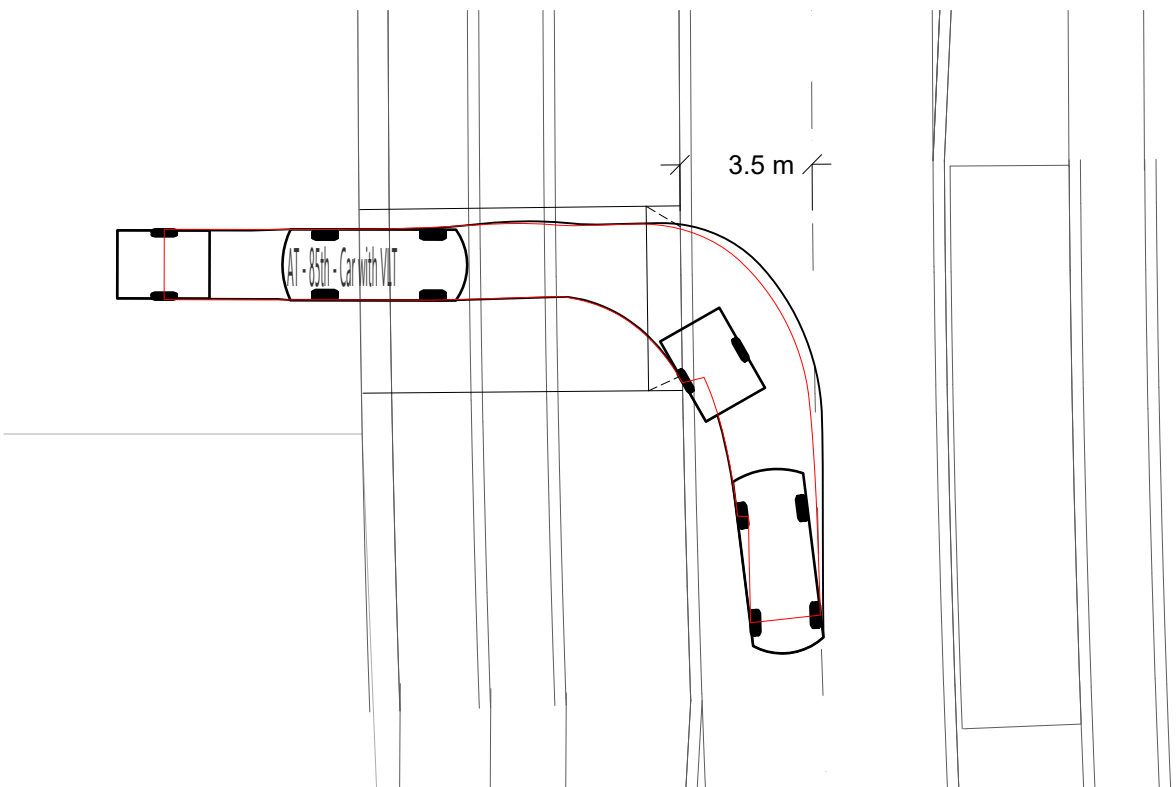
VEHICLE CROSSING TYPE B TYPICAL DETAIL - COLLECTOR ROAD TYPE 2

Scale: 1:100



VEHICLE CROSSING TYPE B TYPICAL DETAIL - COLLECTOR ROAD TYPE 2

Scale: 1:100



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REVISION DETAILS					SIDWELL ROAD MILLDALE AUCKLAND
1	AT COMMENTS AMENDMENT	PL	SEP 2020	DESIGNED	
2	REVISED SECTION	KH	NOV 2020	DRAWN	
				CHECKED	
				APPROVED	

CLIENT:



MILLDALE
Connecting Lifespaces

MILLDALE
TYPICAL VEHICLE CROSSING TYPE B - STANDARD DETAIL
COLLECTOR ROAD 2



STATUS	ISSUED FOR CONSENT	1
SCALE	AS SHOWN	
COUNCIL	AUCKLAND COUNCIL	
DWG NO	P17-005-907-RD	

Appendix B Derivation of Triggers

Project: Silverdale West Private Plan Change

Project No: 310205431

To: Ross Cooper (Tattico)
Karl Cook (Barker Associates)
Don McKenzie (DM Consulting)
Maddie Dillon (Fletcher Industrial)

Date: 27 March 2024

From: Trevor Lee-Joe

RE: Derivation of Triggers for the Plan Change Assessment

This memorandum summarises the assessment undertaken to derive the transport triggers for the mitigation measures proposed for the Silverdale West plan Change application. The memorandum should be read in conjunction with the Integrated Transportation Assessment (ITA) produced for the Plan Change dated 27 March 2024.

Upgrade 2 (Table IX.6.7.1 (b) of the Precinct Provisions)

Upgrade of the Pine Valley Road / Dairy Flat Highway intersection to include a second right turn short bay from the east.

The trigger for Upgrade 2 was derived from an assessment of queues at the Pine Valley Road / Dairy Flat intersection, and primarily related to the evening (**PM**) peak period. The principal driver was the extent of queuing on the eastern approach to the intersection where queues were observed in the model to extend to the Silverdale interchange, affecting traffic on the northbound offramp, southbound on ramp and extending along Hibiscus Coast Highway. The queuing pattern on the eastern approach at the Pine Valley Road / Dairy Flat intersection for the PM period is illustrated in **Figure 1**.

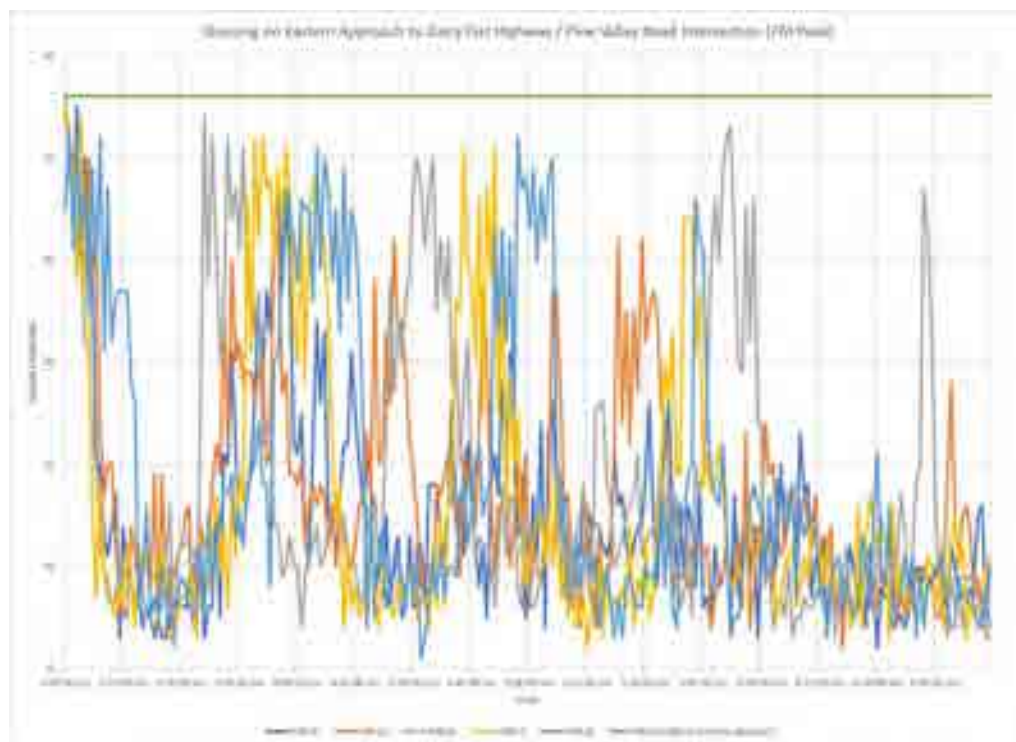


Figure 1: Queue Pattern (eastern approach to the Dairy Flat / Pine Valley Road intersection) – PM Peak

The green line in Figure 1 represents the distance from the Dairy Flat Highway / Pine Valley Road intersection to the Silverdale Interchange. Whilst the graph appears to show that the eastern approach queuing capacity is never fully exceeded, it however, does not show the queuing on the other links leading to the eastern approach, such as the northbound off-ramp and the Silverdale overbridge which are affected by the queuing on the eastern approach.

In order to illustrate the flow-on effects, some screenshots from the simulation model are provided in the following series of diagrams (**Figure 2 to Figure 5**)

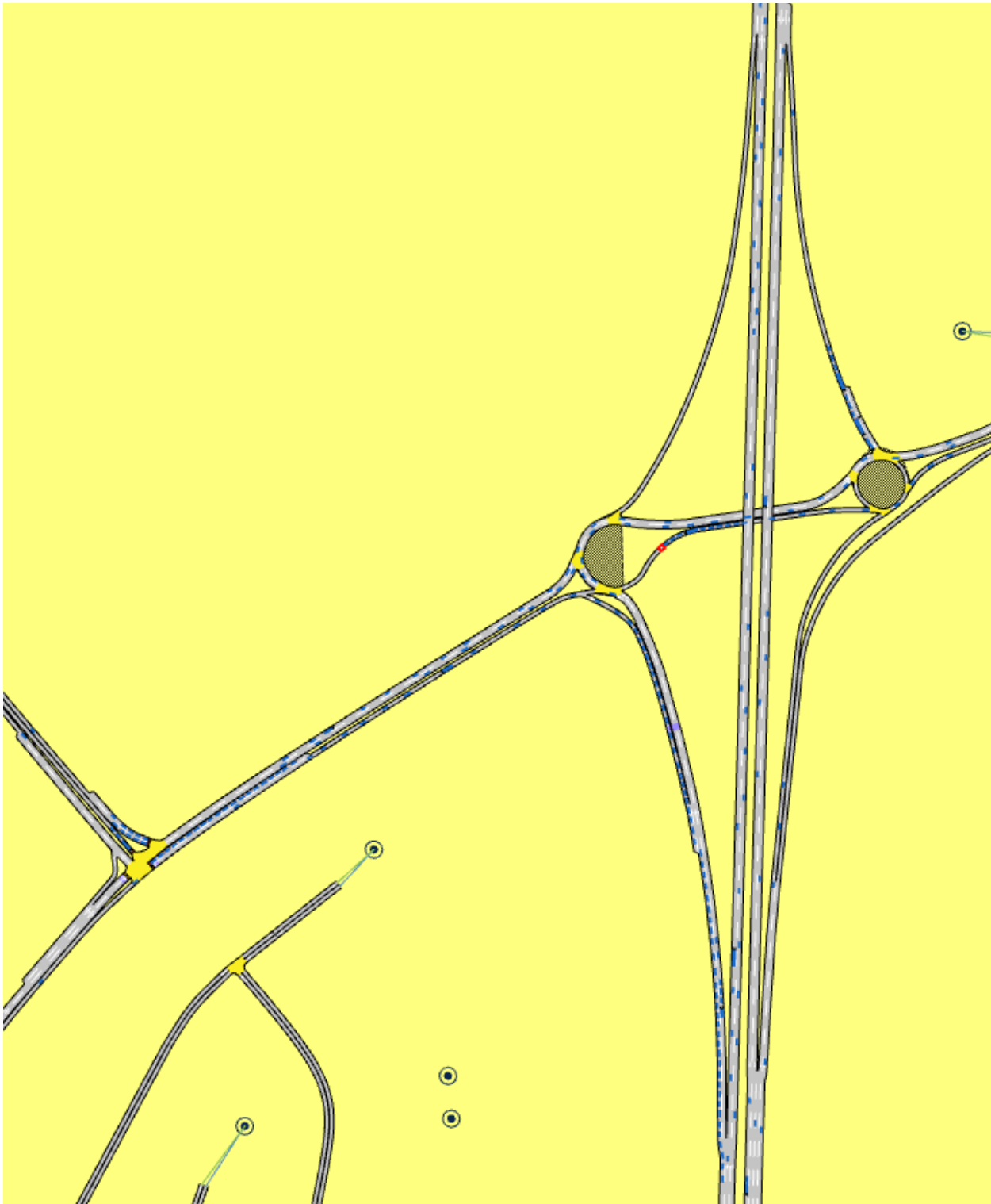


Figure 2: Screenshot at 3pm

Figure 2 indicates noticeable queuing on the northbound off-ramp, extending back to the motorway. The queuing is caused primarily by the right turn demand into Pine Valley Road at the Pine Valley Road / Dairy Flat intersection. The queues activate the ramp meter and this in turn, stops traffic heading westbound across the Silverdale overbridge.

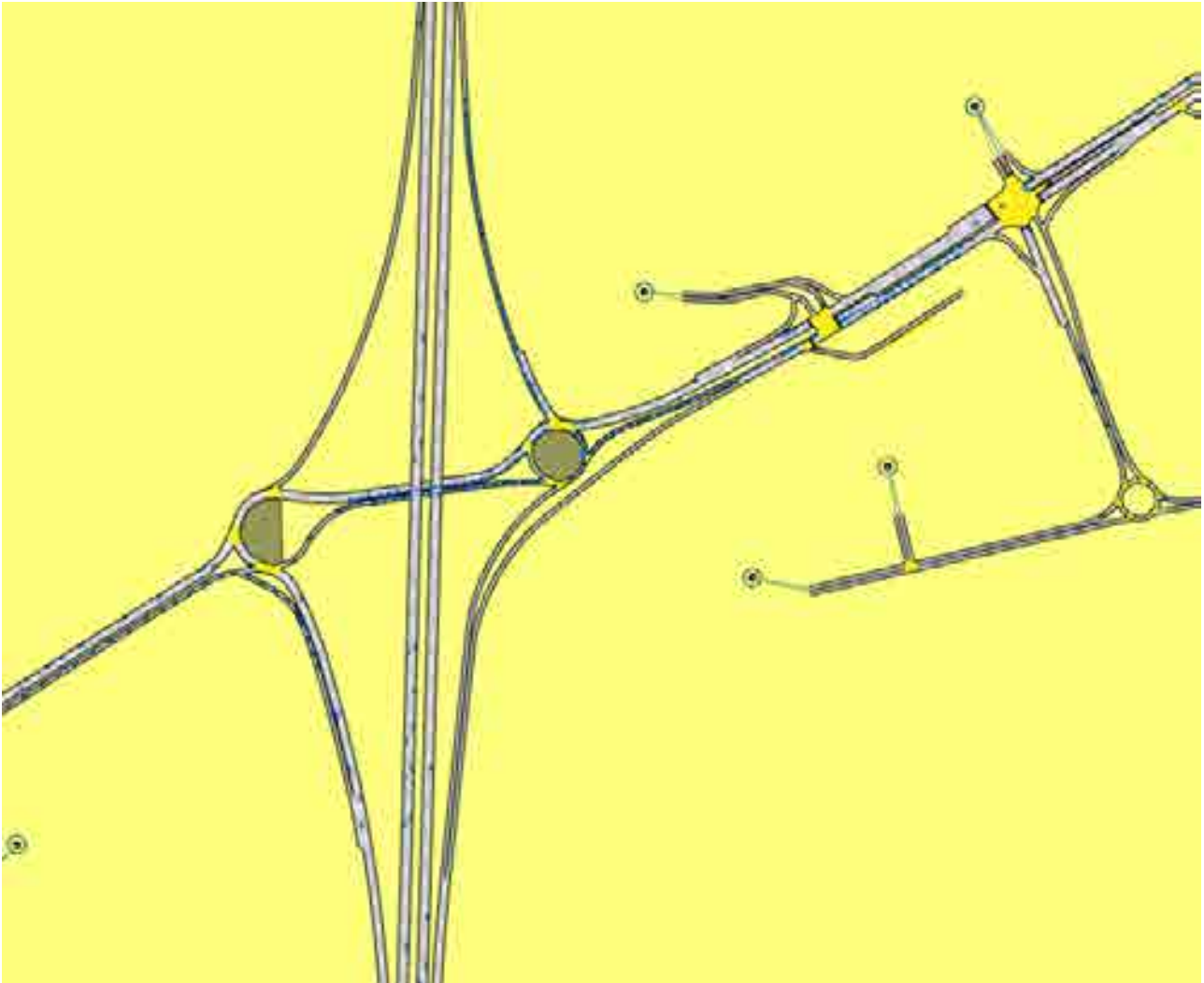


Figure 3: Screenshot at 3:03pm

Figure 3 illustrates the queues building up on the Silverdale Overbridge and having a flow on effect on Hibiscus Coast Highway, with queues extending back to the Painton Road / Hibiscus Coast Highway intersection which serves the Park and Ride station. Queues are also observed to build up on the southbound off-ramp.

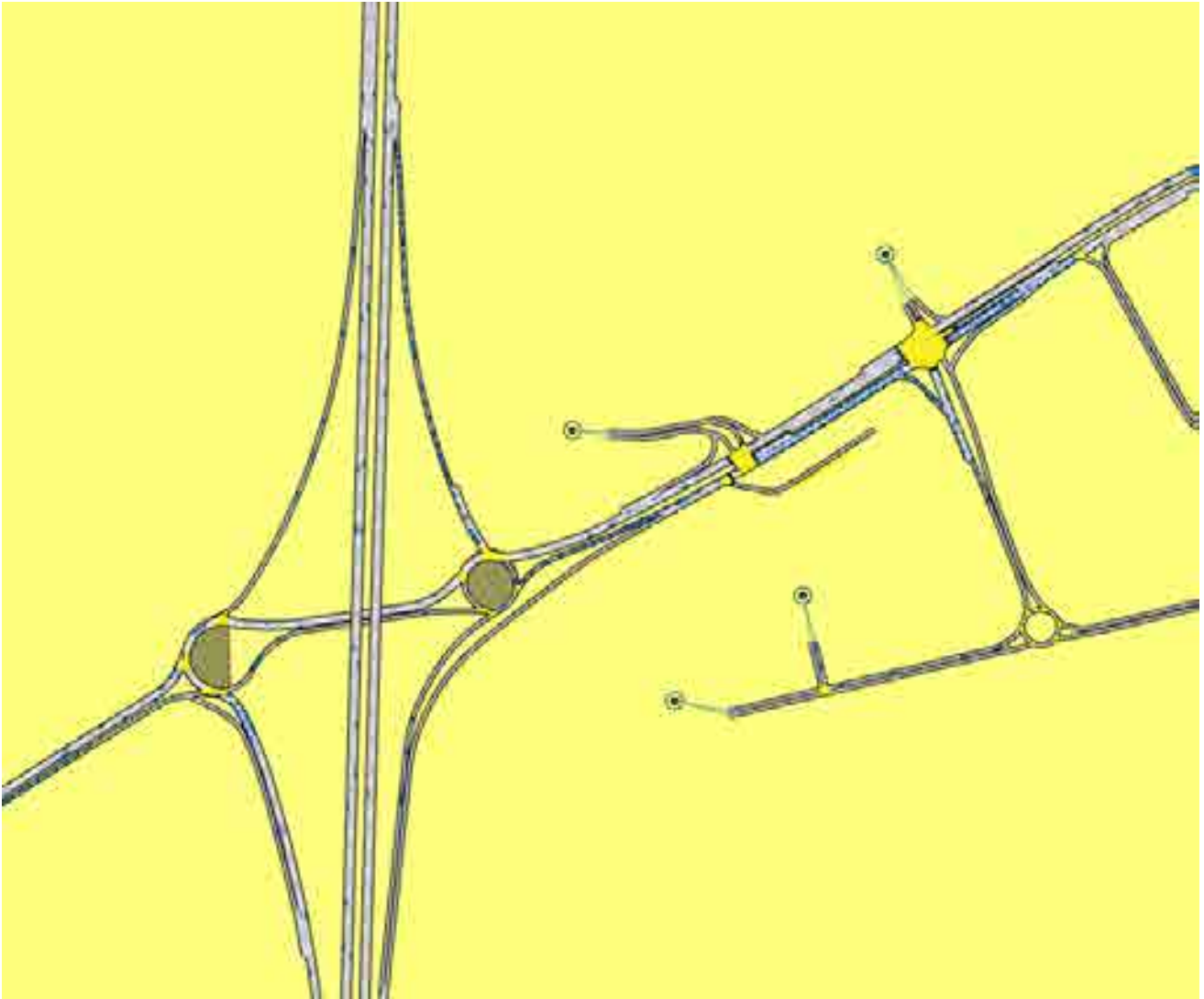


Figure 4: Screenshot at 3:07pm

Figure 4 indicates a queue which extends to the motorway at the southbound off-ramp and queuing past the Painton Road / Hibiscus Coast Highway intersection on Hibiscus Coast Highway, as well as queues on Painton Road.

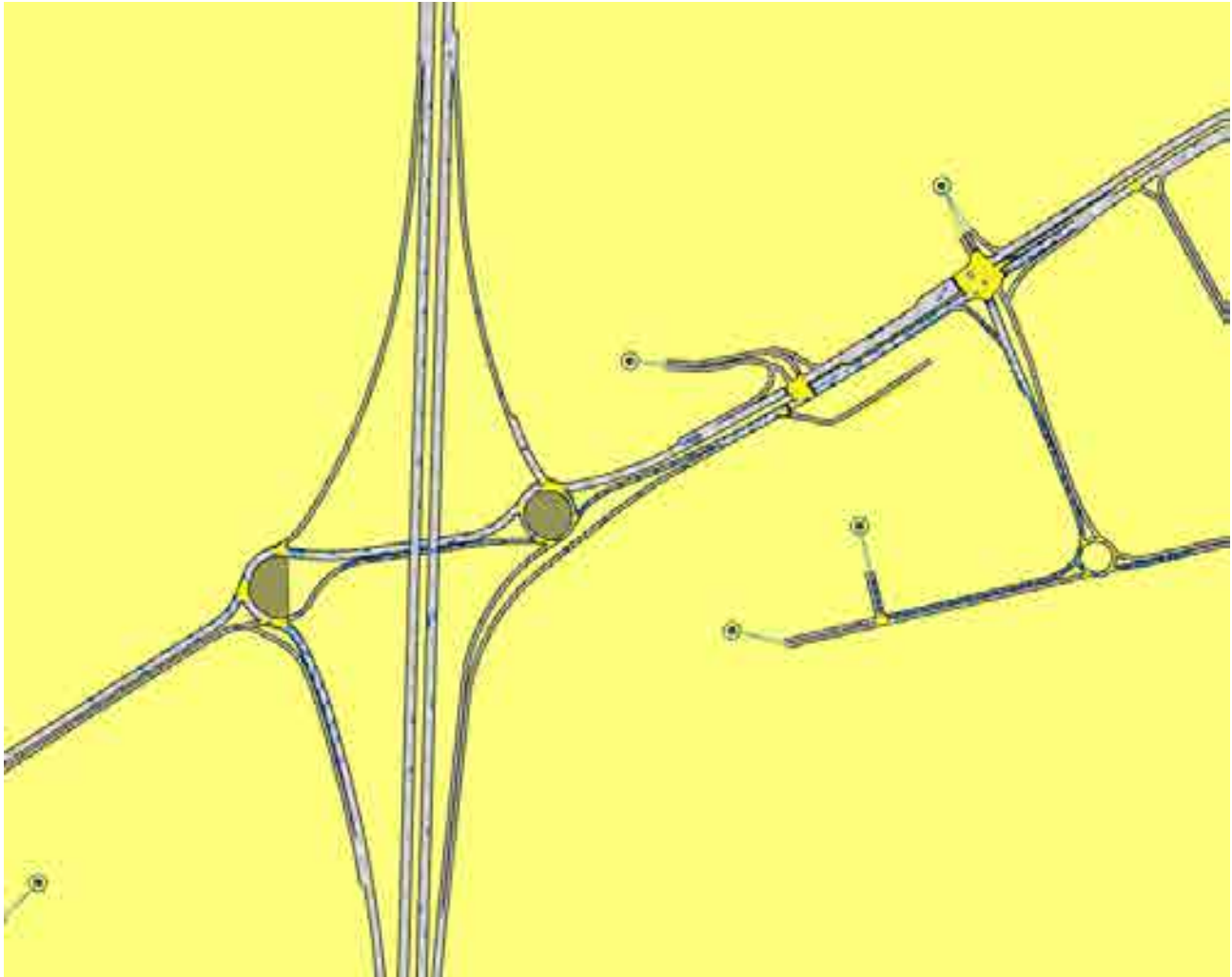


Figure 5: Screenshot at 3:11pm

Figure 5 indicates queues cleared on the on and off ramps but extending into the Park and Ride Station carpark.

From around 3:18pm, queuing issues are resolved. However, at around 4pm, similar issues arise, with queues extending back from the Pine Valley Road / Dairy Flat Highway intersection to the Silverdale interchange, although the issues are not as widespread as the 3pm period.

Nevertheless, queuing onto the mainline of the motorway is considered to be a potential safety issue and the proposed upgrade to the Pine Valley / Dairy Flat Highway intersection will help mitigate the issues.

Upgrade 3 (Table IX.6.7.1 (c) of the Precinct Provisions)

Signalisation of the Wilks Road / Dairy Flat Highway intersection

The trigger for Upgrade 3 was derived from an assessment of delays at the Wilks Road / Dairy Flat Highway intersection.

The operation of the intersection in the morning (**AM**) and PM peak hours, without the proposed signalisation of the intersection, are shown below.

AM 2031_Avg

07:45 - 08:45

Intersection	Appr & Turn	Count	Mvmt Delay	App Delay	App LOS	Int Del	Int LOS	
Dairy Flat highway & Wilks (Priority)	S Left	38	13	29	D	130	F	B
	S Thru	151	17					C
	S Right	108	29					D
	E Left	58	81	130	F			E
	E Thru	34	110					F
	E Right	80	111					F
	N Left	115	14	17	C			B
	N Thru	435	14					B
	N Right	189	17					C
	W Left	308	11	31	D			B
	W Thru	17	31					D
	W Right	42	30					D

PM 2031_Avg

16:30 - 17:30

Intersection	Appr & Turn	Count	Mvmt Delay	App Delay	App LOS	Int Del	Int LOS	
Dairy Flat highway & Wilks (Priority)	S Left	27	9	23	C	202	F	A
	S Thru	468	12					B
	S Right	79	23					C
	E Left	86	136	202	F			E
	E Thru	35	178					F
	E Right	65	202					F
	N Left	105	14	19	C			B
	N Thru	342	14					B
	N Right	190	18					C
	W Left	343	13	26	D			B
	W Thru	25	25					D
	W Right	52	26					D

As indicated, the model indicates a significant deterioration in the level of operation of the priority intersection in the forecast 2031 year. Being a priority intersection, the overall performance is determined by the worst approach and in this instance the eastern approach (Wilks Road east) was anticipated to experience delays of around 130 seconds and 200 seconds respectively for the AM and PM peak hours (or a Level of Service (**LOS**) of F). This was not considered to be sustainable and therefore signalisation of the intersection was proposed to be consistent with the signalisation proposed for the site accesses and the signals at Dairy Flat Highway / Pine Valley Road. Furthermore, the ramp metering at the Silverdale interchange also provides an ad-hoc signal arrangement for the northbound off-ramp.

Upgrade 4 (Table IX.6.7.1 (c) of the Precinct Provisions)

Signalisation of the Wilks Road / East Coast Road intersection

The trigger for Upgrade 4 was derived from an assessment of delays at the Wilks Road / East Coast Road intersection.

The operation of the intersection in the morning AM and PM peak hours, without the proposed signalisation of the intersection, are shown below.

AM 2031_Avg

07:45 - 08:45

Intersection	Appr & Turn	Count	Mvmt Delay	App Delay	App LOS	Int Del	Int LOS	
East Coast Road & Wilks (Priority)	S Left	141	2	10	B	23	D	A
	S Thru	113	3					A
	S Right	4	10					B
	E Left	4	9	22	C			A
	E Thru	2	18					C
	E Right	9	22					C
	N Left	4	8	8	A			A
	N Thru	852	6					A
	N Right	54	7					A
	W Left	74	18	33	D			C
	W Thru	1	22					C
	W Right	165	33					D

PM 2031_Avg

16:30 - 17:30

Intersection	Appr & Turn	Count	Mvmt Delay	App Delay	App LOS	Int Del	Int LOS	
East Coast Road & Wilks (Priority)	S Left	154	8	9	A	62	F	A
	S Thru	518	8					A
	S Right	7	9					A
	E Left	5	20	29	D			C
	E Thru	2	29					D
	E Right	7	19					C
	N Left	7	9	11	B			A
	N Thru	289	9					A
	N Right	108	11					A
	W Left	88	46	68	F			F
	W Thru	5	68					F
	W Right	173	68					F

As indicated, whilst the intersection is anticipated to operate satisfactorily for the AM peak, in the PM peak the western approach is predicted to drop to an LOS of F.

Signalisation has been proposed to provide the most compact footprint, and enables the Jackson Way approach to be tied into the intersection within the current road reserve boundaries.

Upgrade 5 (Table IX.6.7.1 (d) of the Precinct Provisions)

Provision of a slip lane on the western approach to the Silverdale interchange which connects to the northbound on-ramp

The trigger for Upgrade 5 was derived from a combined assessment of delays and queuing on the western approach to the Silverdale Interchange, specifically for the PM peak.

The operation of the western roundabout at the Silverdale Interchange, without the proposed mitigation, is shown below.

PM 2032_Avg 16:30 - 17:30

Intersection	App & Turn	Count	Mvmt Delay	App Delay	App LOS	Int Del	Int LOS	
Silverdale Interchange West (Roundabout)	S Left	515	12	91	C	43	D	B
	S Right	870	42					D
	E Thru	741	8	4	A			A
	E Right	555	3					A
	W Left	931	97	99	F			F
	W Thru	710	100					F

As shown, without mitigation the western approach is forecast to drop to an LOS of F, with delays being in the order of 100 seconds/vehicle for the left and through movements.

The model (five simulation runs) indicates queue lengths on the western approach as per the graph below in **Figure 6**.

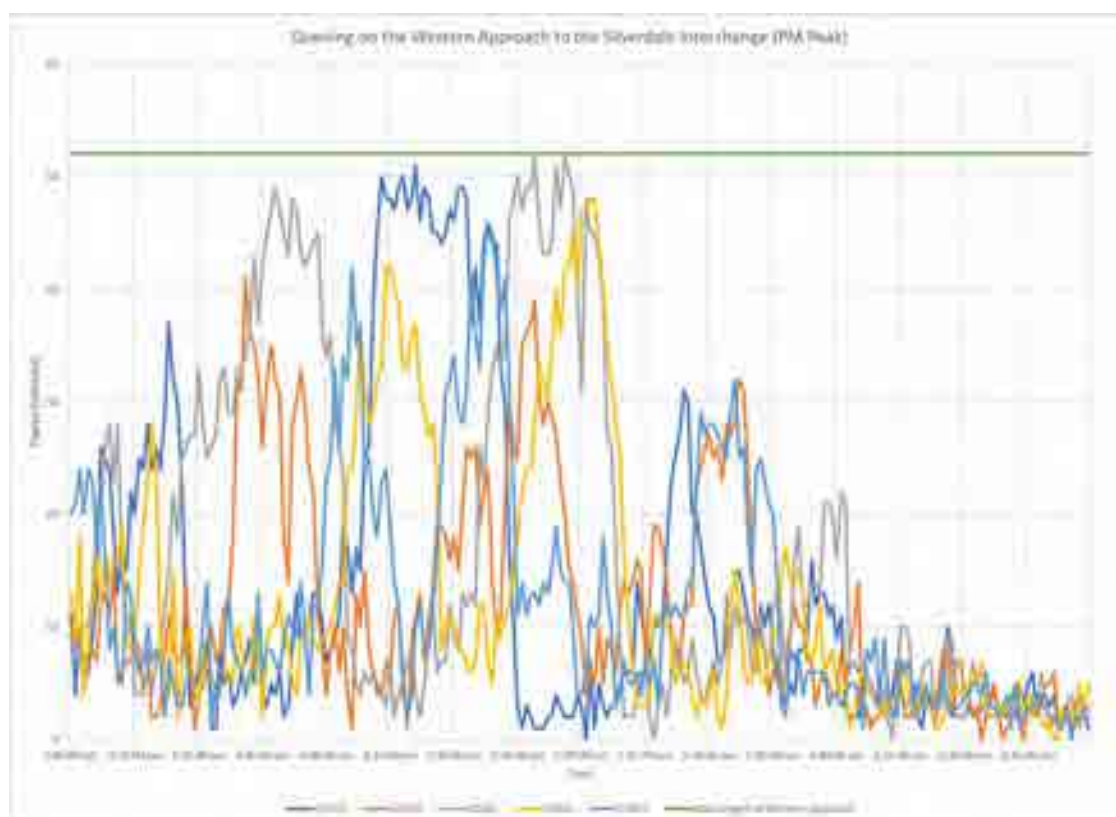


Figure 6: Queue Length on the Western Approach to the Silverdale Interchange (PM Peak) without mitigation

The horizontal green line in Figure 6 indicates the distance between the Dairy Flat Highway / Pine Valley Road intersection to the Silverdale Interchange. As shown, at peak times queues extended back to the Dairy Flat Highway / Pine Valley Road intersection from the interchange.

Based on the delay and queuing reported by the model, an upgrade to the western roundabout of the Silverdale Interchange was considered necessary.

Upgrade 6 (Table IX.6.7.1 (d) of the Precinct Provisions)

Extending the length of the left turn slip lane on the southbound off-ramp at the Silverdale interchange to around 150m and introducing a ramp meter for the AM peak

The trigger for Upgrade6 was derived from a combined assessment of delays and queuing on the southbound off-ramp at the Silverdale Interchange, specifically for the AM peak.

The operation of the southbound off-ramp, without the proposed mitigation, is shown below.

AM 2032_Avg 07:45 - 08:45

Intersection	App & Turn	Count	Mvmt Delay	App Delay	App LOS	Int Del	Int LOS	
Silverdale Interchange East (Roundabout)	E Left	810	81	10	A	21	C	A
	E Thru	448	20					C
	N Left	368	81	98	F			F
	N Right	270	122					F
	W Thru	1350	3	3	A			A
	W Right	812	3					A

As shown, the AM peak hour delay on the off-ramp is predicted to be around 98 seconds/vehicle (81 seconds/vehicle for the left turn and 122 seconds/vehicle for the right turn), or a Level of Service of F for the approach and for individual movements without the proposed mitigation.

The model indicates queue lengths as per the graph below in **Figure 6**.

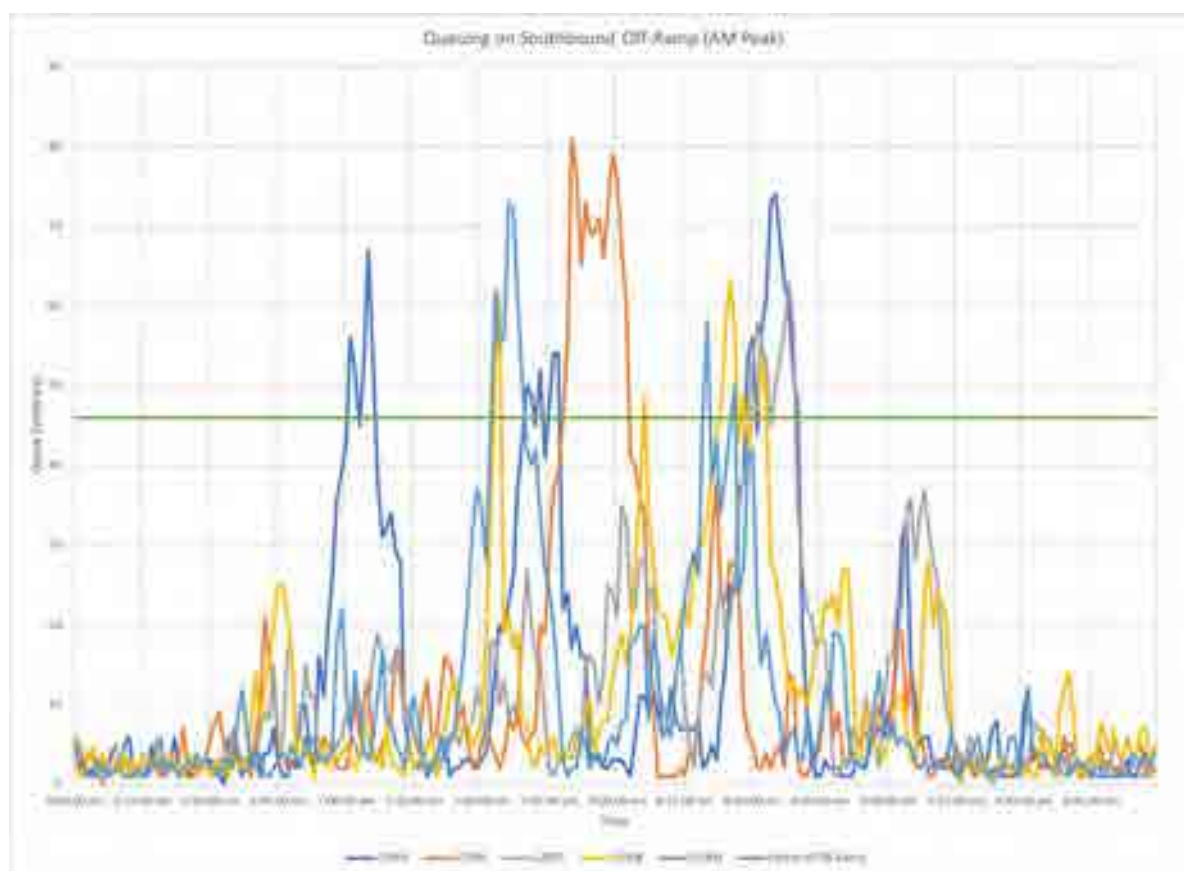


Figure 7: Queue Length on the Southbound Off-Ramp (AM Peak) without mitigation

The horizontal green line in Figure 7 indicates the maximum queue capacity of the off-ramp. As indicated, each model run predicts queues extending past the end of the off-ramp and onto the motorway.

As such, the mitigation measures for the southbound off-ramp were considered to be required.

Upgrade 8 (Table IX.6.7.1 (e) of the Precinct Provisions)

Double-laning of the Argent Lane / Pine Valley Road roundabout

The trigger for Upgrade 8 was derived from a combined assessment of delays and queuing on the western approach to the Pine Valley Road / Argent Lane roundabout, specifically for the PM peak period between 3pm and 4pm.

The operation of the roundabout, without the proposed mitigation, is shown below.

PM_2033_Avg (Winnit F02 - 2,540 Dwellings)		15:00 - 16:00					
Intersection	Appr & Turn	Count	Mvmt Delay	App Delay	App LOS	Int Del	Int LOS
Argent & Pine Valley (Roundabout)	S Left	224	19	21	C	26	C
	S Thru	1049	23				
	S U-Turn	0	0				
	N Thru	425	5	5	A		
	N Right	93	6				
	N U-Turn	0	0				
	W Left	100	77	77	E		
	W Right	243	76				
	W U-Turn	0	0				

As indicated, whilst the overall intersection operates at an LOS of C, the western approach suffers relatively high delays at around 77 seconds/vehicle (LOS E) and noting that this is marginally less than an LOS of F (at 80 seconds/vehicle)

In addition, the modelled queue lengths are as shown below in **Figure 8**.

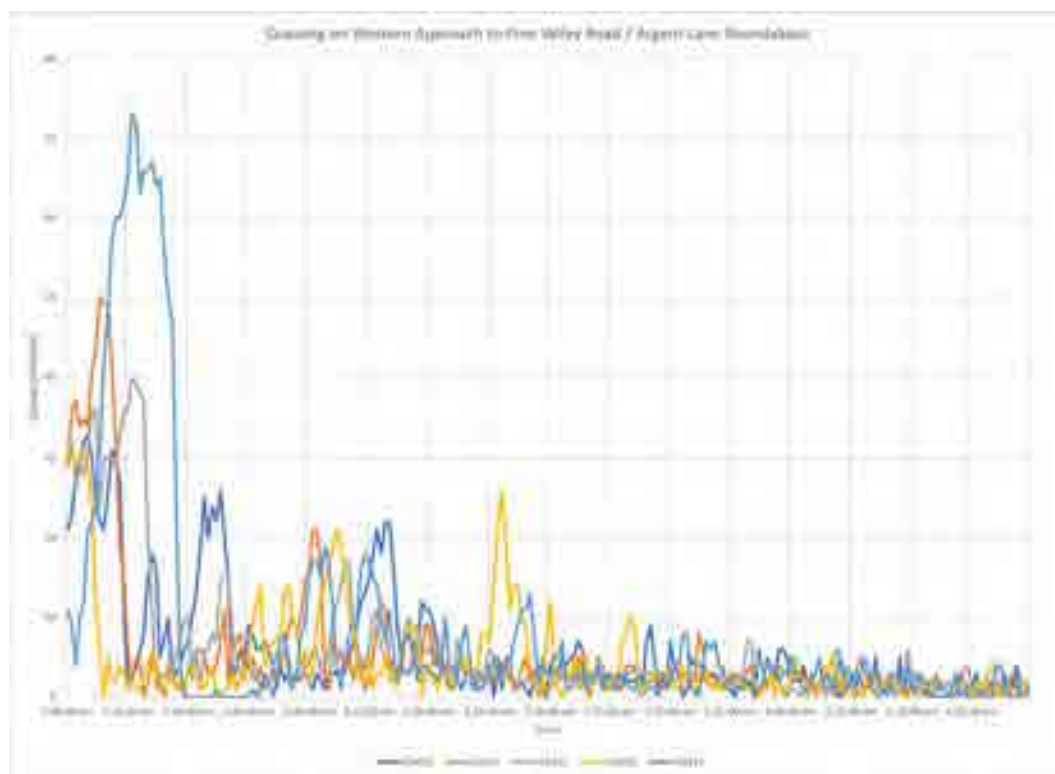


Figure 8: Queue Length on the Western Approach to the Pine Valley Road / Argent Lane Roundabout (PM Peak) - without mitigation

As shown, queues varied from around 30 to 70 vehicles (approximately 210 to 490m, assuming 7m per vehicle in a queued state) during the 3 to 4pm period.

Based on the delays and queues observed in the model, an upgrade to the roundabout was considered warranted.

In summary, as summarised in this memorandum, substantial work using the modelling tool developed for the Silverdale West Pan Change has been undertaken to derive the various mitigation measures proposed. It is our opinion that the mitigation measures are warranted to ensure that the impacts of the anticipated trip generation of the future activities within the Plan Change area will be able to be managed without affecting the performance of the surrounding transportation network.

Yours sincerely

Stantec New Zealand



Trevor Lee-Joe
Principal Transportation Engineer

Appendix C Detailed Modelling Outputs

AM

#	Intersection	Appr & Turn	Count	Mvmt Delay (s/veh)	App Delay (s/veh)	App LOS	App 95% Q (veh)	App Avg Q (m)	Int Del (s/veh)	Int LOS
1	HCH & Whangaparaoa (Signals)	S Left	916	4	14	B	74	61	26	C
		S Thru	301	40						
		S Right	11	59						
		E Left	3	3	35	D	74	61		
		E Thru	885	34						
		E Right	173	40						
		N Left	87	4	30	C	27	21		
		N Thru	50	26						
		N Right	246	40						
		W Left	11	5	31	C	59	45		
		W Thru	328	22						
		W Right	450	38						
		2	HCH & East Coast (Signals)	S Left	66	9	26	C		
S Thru	5			27						
S Right	405			29						
E Left	430			11	40	D	158	108		
E Thru	1228			50						
E Right	20			46						
N Left	3			6	30	C	3	1		
N Thru	2			46						
N Right	3			45						
W Left	25			2	15	B	45	31		
W Thru	648			9						
W Right	317			28						
3	HCH & Painton (Signals)			S Left	135	8	12	B	118	72
		S Thru	0	0						
		S Right	14	58						
		E Left	207	31	39	D	118	72		
		E Thru	1070	40						
		E Right	2	46						
		N Left	2	4	39	D	3	0		
		N Thru	0	0						
		N Right	2	61						
		W Left	2	1	13	B	98	79		
		W Thru	1012	2						
		W Right	839	27						
		4	Silverdale Interchange East (Roundabout)	E Left	810	4	15	B	93	63
E Thru	381			38						
N Left	480			25	48	D	112	86		
N Right	395			76						
W Thru	1363			8	9	A	76	33		
W Right	631			11						
5	Silverdale Interchange West (Roundabout)	S Left	371	29	21	C	31	11	20	C
		S Right	611	16						
		E Thru	748	4	4	A	31	11		
		E Right	80	6						
		W Left	153	5	28	C	107	62		
		W Thru	1434	31						
6	Dairy Flat & Pine Valley (Signals)	E Thru	815	56	59	E	200	139	47	D
		E Right	301	67						
		N Left	1177	37	49	D	158	102		
		N Right	480	76						
		W Left	179	4	26	C	51	38		
		W Thru	520	33						
7	Dairy Flat & SW1 (Signals)	S Thru	535	8	12	B	28	21	35	C
		S Right	97	39						
		E Left	36	16	28	C	28	21		
		E Right	165	30						
		N Left	564	41	46	D	187	142		
		N Thru	741	50						
25	Dairy Flat & SW2 (Signals)	S Thru	610	8	18	B	17	11	17	B
		S Right	164	56						
		E Left	68	28	32	C	17	11		
		E Right	27	43						
		N Left	70	11	14	B	70	45		
		N Thru	710	15						
8	Argent & Pine Valley (Roundabout)	S Left	120	9	8	A	---	---	7	A
		S Thru	366	8						
		S U-Turn	0	0	7	A	17	7		
		N Thru	1353	7						
		N Right	69	9	6	A	13	7		
		N U-Turn	0	0						
		W Left	59	3						
		W Right	282	6						
W U-Turn	0	0								
9	Argent & John Fair (Roundabout)	S Left	15	6	6	A	118	59	17	B
		S Thru	241	6						
		S Right	166	7						
		S U-Turn	0	0						
		E Left	255	52	54	D	118	59		
		E Thru	5	73						
		E Right	16	74						
		E U-Turn	0	0						
		N Left	30	15	13	B	39	22		
		N Thru	1115	13						
		N Right	0	0						
		N U-Turn	0	0						
		W Left	2	5	6	A	4	2		
		W Thru	9	4						
		W Right	48	6						
		W U-Turn	0	0						

8

07:45 - 08:45

#	Intersection	Appr & Turn	Count	Mvmt Delay (s/veh)	App Delay (s/veh)	App LOS	App 95% Q (veh)	App Avg Q (m)	Int Del (s/veh)	Int LOS
10	Argent & Maryvale (Roundabout)	S Left	13	5	5	A	62	27	14	B
		S Thru	219	5						
		S Right	25	6						
		S U-Turn	0	0						
		E Left	98	59	58	E	62	27		
		E Thru	5	73						
		E Right	10	43						
		E U-Turn	0	0						
		N Left	35	10	12	B	39	12		
		N Thru	1030	12						
		N Right	30	11						
		N U-Turn	0	0						
		W Left	12	2	3	A	1	1		
		W Thru	8	2						
		W Right	16	5						
		W U-Turn	0	0						
11	Argent & TC1 (Roundabout)	S Left	14	3	4	A	15	8	6	A
		S Thru	169	4						
		S Right	45	4						
		S U-Turn	0	0						
		E Left	137	10	10	B	15	8		
		E Thru	7	10						
		E Right	18	9						
		E U-Turn	0	0						
		N Left	3	5	6	A	13	7		
		N Thru	655	6						
		N Right	0	0						
		N U-Turn	0	0						
		W Left	2	1	3	A	4	2		
		W Thru	5	1						
		W Right	80	3						
		W U-Turn	0	0						
12	Argent & TC2 (Roundabout)	S Left	14	4	5	A	7	4	5	A
		S Thru	170	5						
		S Right	5	5						
		S U-Turn	0	0						
		E Left	25	6	6	A	7	4		
		E Thru	20	6						
		E Right	46	7						
		E U-Turn	0	0						
		N Left	13	4	5	A	7	3		
		N Thru	562	5						
		N Right	4	5						
		N U-Turn	0	0						
		W Left	5	1	2	A	4	1		
		W Thru	18	2						
		W Right	47	2						
		W U-Turn	0	0						
13	Argent & Wainui (Roundabout)	S Left	0	0	7	A	28	15	7	A
		S Thru	219	7						
		S Right	0	0						
		S U-Turn	0	0						
		E Left	10	19	14	B	28	15		
		E Thru	0	0						
		E Right	224	14						
		E U-Turn	0	0						
		N Left	0	0	5	A	16	6		
		N Thru	493	5						
		N Right	0	0						
		N U-Turn	1	0						
		W Left	0	0	6	A	4	2		
		W Thru	0	0						
		W Right	27	11						
		W U-Turn	0	0						
15	Wainui & Waiwai (Roundabout)	S Left	19	1	1	A	3	1	3	A
		S Thru	17	1						
		S Right	15	1						
		S U-Turn	0	0						
		E Left	27	3	3	A	3	1		
		E Thru	227	3						
		E Right	4	4						
		E U-Turn	0	0						
		N Left	9	4	4	A	4	1		
		N Thru	39	4						
		N Right	7	4						
		N U-Turn	0	0						
		W Left	6	2	3	A	3	1		
		W Thru	288	3						
		W Right	22	3						
		W U-Turn	0	0						

8

07:45 - 08:45

#	Intersection	Appr & Turn	Count	Mvmt Delay (s/veh)	App Delay (s/veh)	App LOS	App 95% Q (veh)	App Avg Q (m)	Int Del (s/veh)	Int LOS
16	Wainui & Lysnar (Roundabout)	S Left	9	1	1	A	7	3	5	A
		S Thru	4	1						
		S Right	7	1						
		S U-Turn	0	0						
		E Left	37	6	6	A	7	3		
		E Thru	249	5						
		E Right	50	6						
		E U-Turn	0	0						
		N Left	111	4						
		N Thru	23	4						
		N Right	0	0						
		N U-Turn	0	0						
		W Left	0	0	5	A	4	1		
		W Thru	258	4						
		W Right	53	5						
		W U-Turn	0	0						
17	Wainui & Upper Orewa (Priority)	E Thru	274	2	7	A	8	5	8	A
		E Right	112	7						
		N Left	259	7	8	A	17	11		
		N Right	64	8						
		W Left	25	4	4	A	0	0		
		W Thru	351	3						
18	Wainui & Millioff (Roundabout)	S Left	128	23	29	C	72	28	18	B
		S Thru	192	34						
		N Right	613	17	17	B	11	4		
		W Left	193	4	4	A	70	15		
19	Wainui & Sidwell (Roundabout)	S Left	1	0	7	A	3	1	17	B
		S Right	502	7						
		S U-Turn	0	0						
		E Left	74	4	5	A	3	1		
		E Thru	192	5						
		E U-Turn	0	0						
		W Thru	715	27	27	C	112	58		
		W Right	33	25						
		W U-Turn	0	0						
		20	Wainui & Millwater (Signals)	S Left	13	2	38	D		
S Thru	208			40						
N Thru	99			21	39	D	60	40		
N Right	252			47						
W Left	1122			12	12	B	97	58		
W Right	95			18						
21	Millwater & MillOn (Roundabout)	S Left	819	8	8	A	4	2	7	A
		S Thru	496	8						
		S Right	6	7						
		S U-Turn	9	8						
		E Left	2	2	5	A	4	2		
		E Thru	25	5						
		E Right	9	6						
		E U-Turn	0	0						
		N Left	5	3	3	A	4	1		
		N Thru	342	3						
		N Right	286	3						
		N U-Turn	1	6						
22	East Coast Road & Wilks (Signals)	S Left	229	13	18	B	4	2	29	C
		S Thru	312	22						
		S Right	5	50						
		E Left	4	30	37	D	4	2		
		E Thru	2	38						
		E Right	6	42						
		N Left	8	35	41	D	83	60		
		N Thru	395	37						
		N Right	133	53						
		W Left	78	18	26	C	34	24		
		W Thru	2	15						
		W Right	194	29						
23	Postman Road & Wilks (Priority)	S Left	132	7	7	A	---	---	7	A
		S Thru	229	7						
		N Thru	175	3	7	A	14	7		
		N Right	125	7						
		W Left	85	4	4	A	13	8		
		W Thru	98	0						
24	Dairy Flat Highway & Wilks (Signals)	S Left	42	29	30	C	32	25	30	C
		S Thru	453	28						
		S Right	117	40						
		E Left	86	19	30	C	32	25		
		E Thru	31	28						
		E Right	170	37						
		N Left	170	25	30	C	52	40		
		N Thru	409	28						
		N Right	191	39						
		W Left	154	22	27	C	31	21		
		W Thru	20	31						
		W Right	44	43						

8

#	Intersection	Appr & Turn	Count	Mvmt Delay (s/veh)	App Delay (s/veh)	App LOS	App 95% Q (veh)	App Avg Q (m)	Int Del (s/veh)	Int LOS			
30	Grand Drive Interchange East (Roundabout)	E Left	719	19	20	B	63	36	11	B			
		E Thru	236	21									
		N Left	80	7	7	A	8	5					
		N Thru	0	0									
		N Right	27	8									
		W Thru	604	3	3	A	3	0					
		W Right	426	3									
29	Grand Drive Interchange West (Roundabout)	S Left	116	2	4	A	0	0	5	A			
		S Thru	0	0									
		S Right	430	4									
		E Thru	197	3	4	A	0	0					
		E Right	66	4									
		W Left	67	6	5	A	24	15					
		W Thru	598	5									
14	Wainui_MilldaleN_West_Roundabout (Roundabout)	S Left	1	11	12	B	7	2	6	A			
		S Thru	2	12									
		S Right	14	11									
		S U-Turn	0	0	6	A	7	2					
		E Left	2	8									
		E Thru	434	6									
		E Right	3	7									
		E U-Turn	1	8	10	A	4	2					
		N Left	3	10									
		N Thru	3	9									
		N Right	25	10									
		N U-Turn	0	0	6	A	6	2					
		W Left	6	5									
		W Thru	670	6									
		W Right	4	7									
		W U-Turn	0	0	1	A	3	1					
		S Left	11	0									
S Thru	4	1											
S Right	97	0											
S U-Turn	0	0											
E Left	38	4											
E Thru	13	4											
E Right	5	4											
E U-Turn	0	0	1	A	4	1							
N Left	26	1											
N Thru	9	2											
N Right	1	4											
N U-Turn	0	0	5	A	1	0							
W Left	1	4											
W Thru	144	5											
W Right	9	5											
W U-Turn	0	0	27	Endsley & Pitau (Roundabout)	S Left	1	1	1	A	1	0	4	A
S Thru	0	0											
S Right	0	0											
S U-Turn	0	0			3	A	1	0					
E Left	0	0											
E Thru	48	3											
E Right	2	3											
E U-Turn	0	0			5	A	0	0					
N Left	7	5											
N Thru	0	0											
N Right	1	5											
N U-Turn	0	0			4	A	0	0					
W Left	1	5											
W Thru	272	4											
W Right	2	4											
W U-Turn	0	0	28	Endsley & Sidwell (Roundabout)	E Thru	20	3	2	A	0	0	3	A
E Right	200	2											
E U-Turn	0	0											
N Left	305	3			3	A	0	0					
N Thru	34	0											
N U-Turn	0	0											
W Left	60	4			4	A	15	7					
W Thru	45	3											
W U-Turn	0	0											

PM

PM_2034_Avg

16:00 - 17:00

5

(Milldale North - 1,425 Dwellings)

#	Intersection	Appr & Turn	Count	Mvmt Delay (s/veh)	App Delay (s/veh)	App LOS	App 95% Q (m)	App Avg Q (m)	Int Del (s/veh)	Int LOS
1	HCH & Whangaparaoa (Signals)	S Left	448	2	22	C	48	37	35	D
		S Thru	358	45						
		S Right	8	60						
		E Left	15	9	43	D	48	37		
		E Thru	444	41						
		E Right	229	47						
		N Left	288	13	29	C	29	22		
		N Thru	118	29						
		N Right	228	49						
		W Left	50	8	41	D	123	98		
		W Thru	720	49						
		W Right	1163	37						
2	HCH & East Coast (Signals)	S Left	77	9	42	D	50	37	33	C
		S Thru	27	48						
		S Right	842	45						
		E Left	265	3	24	C	50	37		
		E Thru	688	25						
		E Right	123	69						
		N Left	305	25	33	C	32	24		
		N Thru	54	48						
		N Right	129	45						
		W Left	162	12	34	C	168	108		
		W Thru	1262	35						
		W Right	77	50						
3	HCH & Panton (Signals)	S Left	461	37	39	D	150	79	31	C
		S Thru	2	58						
		S Right	193	42						
		E Left	11	21	73	E	150	79		
		E Thru	900	73						
		E Right	3	112						
		N Left	3	4	13	B	1	0		
		N Thru	0	0						
		N Right	2	29						
		W Left	6	5	8	A	48	32		
		W Thru	1351	5						
		W Right	182	27						
4	Silverdale Interchange East (Roundabout)	E Left	581	3	30	C	248	161	18	B
		E Thru	766	50						
		N Left	212	11	43	D	114	61		
		N Right	317	64						
		W Thru	1340	1	2	A	8	3		
		W Right	437	3						
5	Silverdale Interchange West (Roundabout)	S Left	552	12	28	C	38	11	21	C
		S Right	819	40						
		E Thru	760	3	4	A	38	11		
		E Right	324	5						
		W Left	525	6	27	C	105	56		
		W Thru	957	40						
6	Dairy Flat & Pine Valley (Signals)	E Thru	531	14	30	C	76	62	36	D
		E Right	781	41						
		N Left	511	14	24	C	28	19		
		N Right	211	50						
		W Left	577	17	45	D	164	122		
		W Thru	964	62						
7	Dairy Flat & SW1 (Signals)	S Thru	993	60	61	E	84	63	38	D
		S Right	10	95						
		E Left	74	21	26	C	84	63		
		E Right	556	26						
		N Left	203	11	19	B	85	53		
		N Thru	540	22						
25	Dairy Flat & SW2 (Signals)	S Thru	989	43	47	D	31	21	35	D
		S Right	103	83						
		E Left	178	28	28	C	31	21		
		E Right	13	29						
		N Left	12	13	17	B	78	42		
		N Thru	605	17						
8	Argent & Pine Valley (Roundabout)	S Left	212	14	13	B	---	---	10	B
		S Thru	1152	12						
		S U-Turn	0	0						
		N Thru	496	4	4	A	7	4		
		N Right	89	5						
		N U-Turn	0	0						
		W Left	75	7	13	B	21	14		
		W Right	230	15						
9	Argent & John Fair (Roundabout)	W U-Turn	0	0						
		S Left	87	15	16	B	24	13	12	B
		S Thru	724	16						
		S Right	415	17						
		S U-Turn	0	0						
		E Left	173	5	6	A	24	13		
		E Thru	37	6						
		E Right	139	7						
		E U-Turn	0	0						
		N Left	72	7	8	A	18	11		
		N Thru	394	8						
		N Right	2	7						
		N U-Turn	0	0						
		W Left	1	26	17	B	6	3		
		W Thru	8	17						
		W Right	18	17						
		W U-Turn	0	0						

5

#	Intersection	Appr & Turn	Count	Mvmt Delay (s/veh)	App Delay (s/veh)	App LOS	App 95% Q (m)	App Avg Q (m)	Int Del (s/veh)	Int LOS
10	Argent & Maryvale (Roundabout)	S Left	57	7	7	A	6	2	6	A
		S Thru	769	7						
		S Right	36	6						
		S U-Turn	0	0						
		E Left	34	4	4	A	6	2		
		E Thru	10	4						
		E Right	35	4						
		E U-Turn	0	0						
		N Left	25	6	6	A	8	4		
		N Thru	410	6						
		N Right	29	6						
		N U-Turn	0	0						
		W Left	24	8	9	A	7	4		
		W Thru	13	8						
		W Right	23	10						
		W U-Turn	0	0						
11	Argent & TC1 (Roundabout)	S Left	70	4	4	A	6	3	5	A
		S Thru	501	4						
		S Right	189	5						
		S U-Turn	0	0						
		E Left	65	3	3	A	6	3		
		E Thru	10	3						
		E Right	5	3						
		E U-Turn	0	0						
		N Left	5	5	5	A	10	5		
		N Thru	341	5						
		N Right	1	6						
		N U-Turn	0	0						
		W Left	3	8	5	A	4	2		
		W Thru	5	5						
		W Right	24	5						
		W U-Turn	0	0						
12	Argent & TC2 (Roundabout)	S Left	84	5	5	A	3	1	4	A
		S Thru	404	5						
		S Right	19	6						
		S U-Turn	0	0						
		E Left	6	3	3	A	3	1		
		E Thru	25	2						
		E Right	14	3						
		E U-Turn	0	0						
		N Left	11	4	4	A	4	2		
		N Thru	317	4						
		N Right	7	5						
		N U-Turn	0	0						
		W Left	11	6	4	A	6	2		
		W Thru	19	3						
		W Right	32	3						
		W U-Turn	0	0						
13	Argent & Wainui (Roundabout)	S Left	0	0	11	B	22	13	8	A
		S Thru	320	11						
		S Right	0	0						
		S U-Turn	0	0						
		E Left	2	8	8	A	22	13		
		E Thru	0	0						
		E Right	377	8						
		E U-Turn	0	0						
		N Left	0	0	4	A	8	3		
		N Thru	309	4						
		N Right	0	0						
		N U-Turn	0	0						
		W Left	0	0	9	A	4	2		
		W Thru	0	0						
		W Right	16	12						
		W U-Turn	0	0						
15	Wainui & Waiwai (Roundabout)	S Left	19	2	2	A	6	2	3	A
		S Thru	67	2						
		S Right	18	2						
		S U-Turn	0	0						
		E Left	53	3	3	A	6	2		
		E Thru	427	4						
		E Right	1	4						
		E U-Turn	0	0						
		N Left	7	0	5	A	4	1		
		N Thru	35	5						
		N Right	5	5						
		N U-Turn	0	0						
		W Left	18	2	3	A	3	1		
		W Thru	187	2						
		W Right	38	3						
		W U-Turn	0	0						

5

#	Intersection	Appr & Turn	Count	Mvmt Delay (s/veh)	App Delay (s/veh)	App LOS	App 95% Q (m)	App Avg Q (m)	Int Del (s/veh)	Int LOS
16	Wainui & Lysnar (Roundabout)	S Left	3	3	4	A	4	1	5	A
		S Thru	17	4						
		S Right	10	5						
		S U-Turn	0	0						
		E Left	36	5	6	A	4	1		
		E Thru	473	6						
		E Right	170	6						
		E U-Turn	0	0						
		N Left	46	3	3	A	3	1		
		N Thru	6	3						
		N Right	1	3						
		N U-Turn	0	0						
		W Left	1	3	4	A	6	2		
		W Thru	194	4						
		W Right	16	4						
		W U-Turn	0	0						
17	Wainui & Upper Orewa (Priority)	E Thru	652	3	6	A	13	6	15	C
		E Right	226	6						
		N Left	145	3	15	C	10	6		
		N Right	31	15						
		W Left	35	4	4	A	0	0		
		W Thru	215	3						
18	Wainui & MillOff (Roundabout)	S Left	375	11	11	B	39	26	9	A
		S Thru	563	12						
		N Right	358	5	5	A	21	13		
		W Left	317	6						
19	Wainui & Sidwell (Roundabout)	S Left	1	1	3	A	13	6	5	A
		S Right	149	3						
		S U-Turn	0	0	6	A	13	6		
		E Left	182	5						
		E Thru	316	6						
		E U-Turn	0	0						
		W Thru	592	4	4	A	11	6		
		W Right	140	4						
		W U-Turn	0	0						
		S Left	66	4						
S Thru	271	24								
N Thru	114	10	32	C	78	56				
N Right	431	38								
W Left	634	9	10	B	44	32				
W Right	106	19								
21	Millwater & MillOn (Roundabout)	S Left	332	5	5	A	3	1	5	A
		S Thru	536	6						
		S Right	20	6						
		S U-Turn	19	5						
		E Left	0	0	6	A	3	1		
		E Thru	8	6						
		E Right	7	7						
		E U-Turn	0	0						
		N Left	9	3	3	A	6	2		
		N Thru	527	3						
		N Right	113	3						
		N U-Turn	3	4						
22	East Coast Road & Wilks (Signals)	S Left	191	34	43	D	6	2	50	D
		S Thru	560	45						
		S Right	3	79	57	E	6	2		
		E Left	3	45						
		E Thru	3	58						
		E Right	6	62						
		N Left	10	62	79	E	127	80		
		N Thru	298	72						
		N Right	146	94						
		W Left	139	22						
		W Thru	3	35	30	C	48	35		
		W Right	236	34						
23	Postman Road & Wilks (Priority)	S Left	177	8	8	A	---	---	8	A
		S Thru	163	7						
		N Thru	229	4	7	A	18	10		
		N Right	134	7						
		W Left	118	4	4	A	15	10		
		W Thru	151	0						
24	Dairy Flat Highway & Wilks (Signals)	S Left	42	30	33	C	36	26	32	C
		S Thru	608	31						
		S Right	80	47	35	C	36	26		
		E Left	77	25						
		E Thru	25	30						
		E Right	164	40						
		N Left	192	23	30	C	46	39		
		N Thru	403	27						
		N Right	181	41						
		W Left	324	27						
		W Thru	39	44	31	C	56	44		
		W Right	63	44						

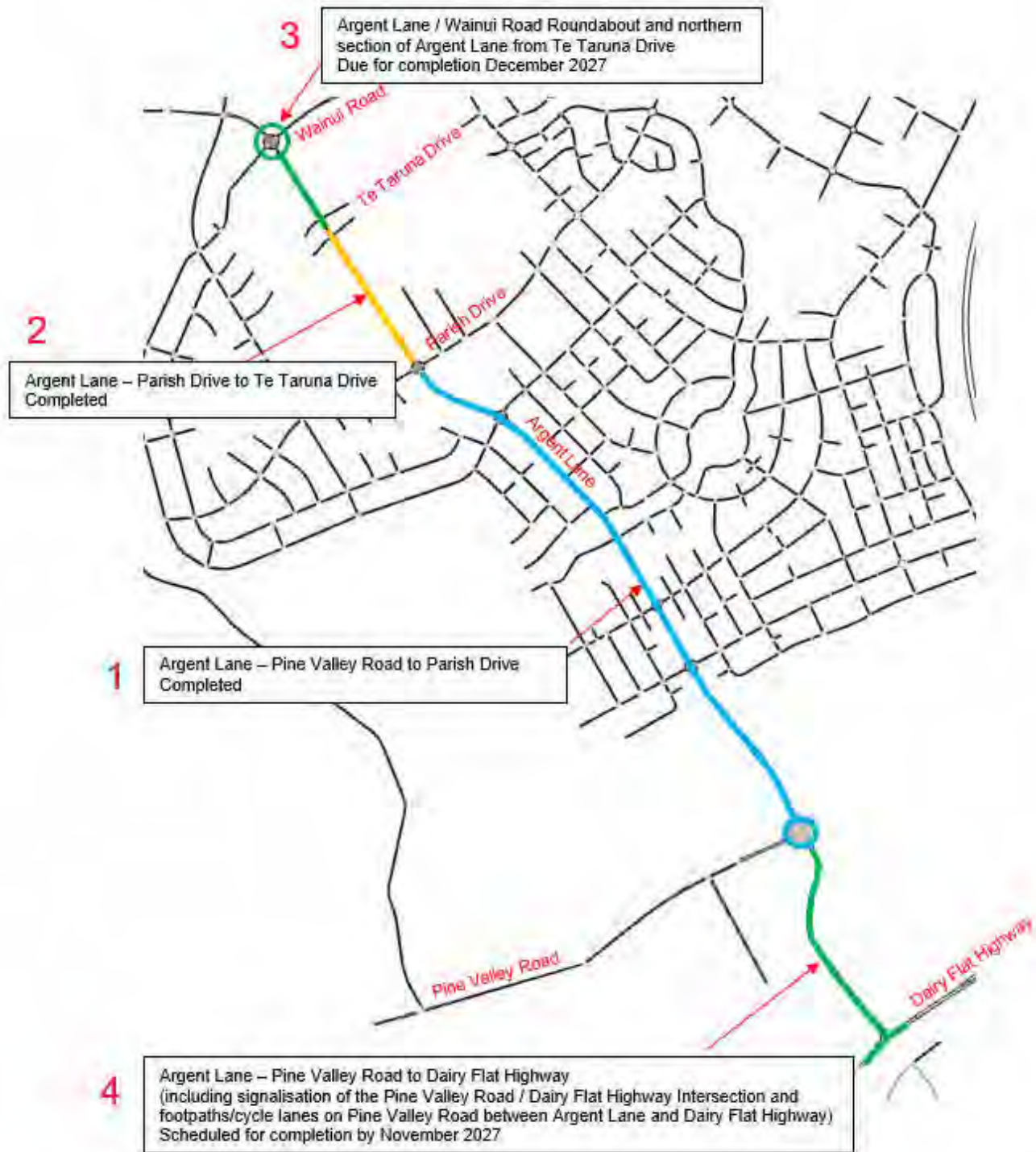
5

[illegible]

#	Intersection	Appr & Turn	Count	Mvmt Delay (s/veh)	App Delay (s/veh)	App LOS	App 95% Q (m)	App Avg Q (m)	Int Del (s/veh)	Int LOS
30	Grand Drive Interchange East (Roundabout)	E Left	402	8	8	A	17	9	5	A
		E Thru	295	8						
		N Left	100	10	10	B	14	8		
		N Thru	0	0						
		N Right	57	11						
		W Thru	896	2	3	A	1	0		
		W Right	143	3						
29	Grand Drive Interchange West (Roundabout)	S Left	338	4	7	A	0	0	7	A
		S Thru	0	0						
		S Right	700	8						
		E Thru	228	4	4	A	0	0		
		E Right	125	4						
		W Left	38	8	9	A	27	15		
		W Thru	341	9						
14	Wainui_MilldaleN_West_Roundabout (Roundabout)	S Left	1	9	14	B	7	3	6	A
		S Thru	4	18						
		S Right	11	14						
		S U-Turn	0	0						
		E Left	0	0	7	A	7	3		
		E Thru	670	7						
		E Right	12	8						
		E U-Turn	5	7						
		N Left	3	7	8	A	3	1		
		N Thru	3	7						
		N Right	14	8						
		N U-Turn	0	0						
		W Left	13	5	5	A	6	2		
		W Thru	464	5						
		W Right	7	5						
		W U-Turn	0	0						
		26	Endsley & Milldale (Roundabout)	S Left	17	0	1	A		
S Thru	10			2						
S Right	52			0						
S U-Turn	0			0						
E Left	91			4	4	A	0	0		
E Thru	37			4						
E Right	12			4						
E U-Turn	0			0						
N Left	11			1	1	A	1	0		
N Thru	8			1						
N Right	1			3						
N U-Turn	0			0						
W Left	1			3	4	A	1	0		
W Thru	35			4						
W Right	6			4						
W U-Turn	0			0						
27	Endsley & Pitau (Roundabout)			S Left	2	1	1	A	0	0
		S Thru	0	0						
		S Right	0	0						
		S U-Turn	0	0						
		E Left	0	0	3	A	0	0		
		E Thru	145	3						
		E Right	4	3						
		E U-Turn	0	0						
		N Left	3	3	4	A	0	0		
		N Thru	0	0						
		N Right	1	4						
		N U-Turn	0	0						
		W Left	0	0	3	A	0	0		
		W Thru	88	3						
		W Right	2	3						
		W U-Turn	0	0						
		28	Endsley & Sidwell (Roundabout)	E Thru	62	3	3	A	0	0
E Right	61			3						
E U-Turn	0			0						
N Left	88			4	4	A	0	0		
N Thru	28			0						
N U-Turn	0			0						
W Left	169			1	1	A	3	1		
W Thru	155			1						
W U-Turn	0	0								

Appendix D Concept Layouts

Pre-Development Upgrades



1: Argent Lane (Pine Valley Road to Parish Drive)

- Two-lane vehicle carriageway
- Single lane roundabouts at the Parish Drive, Maryvale Road and John Fair Drive intersections
- Footpaths on both sides of the road
- Segregated cycle facilities

2: Argent Lane (Parish Drive to Te Taruna Drive)

- As per (1)

3: Argent Lane / Wainui Road Roundabout and northern section of Argent Lane from Te Taruna Drive

- Single Lane roundabout
- Footpaths and cycle provisions
- Argent Lane improvements as per (1)

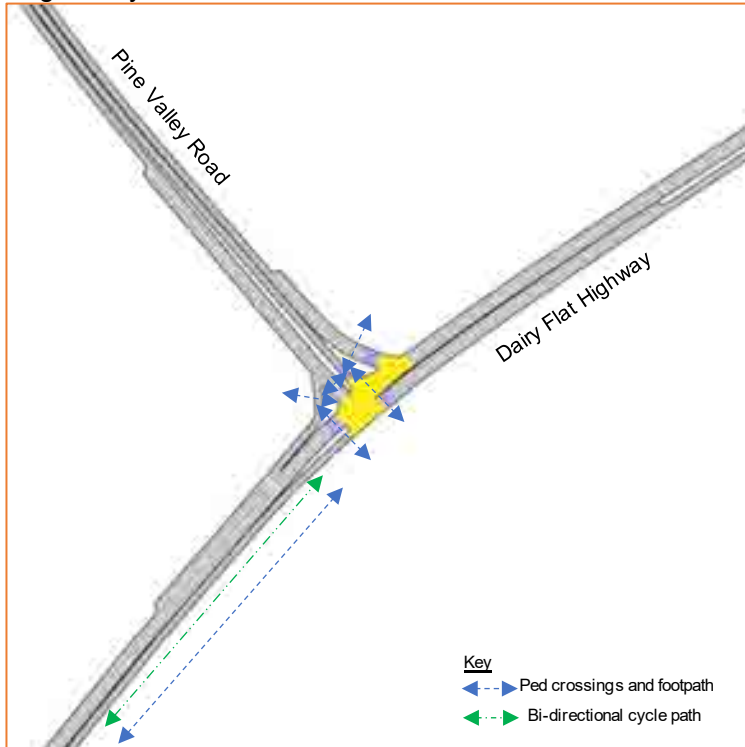
4: Argent Lane (Pine Valley Road to Dairy Flat Highway)

- Realignment of Pine Valley Road
- Two-lane vehicle carriageway
- Signalisation of the Pine Valley Road / Dairy Flat Highway intersection (inclusive of pedestrian crossings on all legs and advance cycle boxes)
- Cycle lane and footpaths on both sides of Pine Valley Road between Argent Lane and Dairy Flat Highway

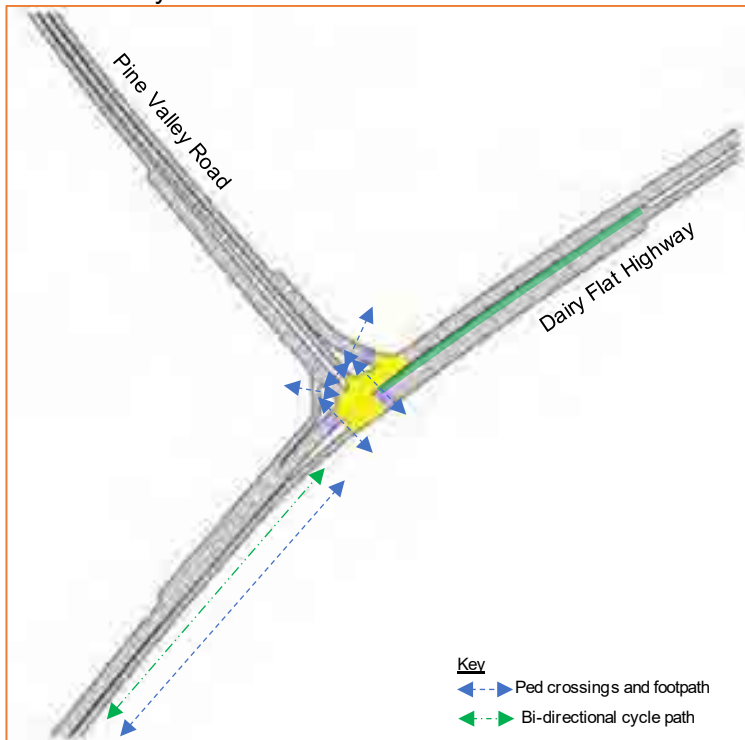
Upgrade 1

- Upgrade of the Pine Valley Road / Dairy Flat Highway intersection to include a second right turn short bay from the east (turns into Pine Valley Road) (approximately 135m)
 - o formal pedestrian crossings incorporated within the intersection layout, plus advance cycle boxes

Original layout:



Amended layout:



Upgrade 2

- Signalisation of the Wilks Road / Dairy Flat Highway intersection
 - o signalised pedestrian crossings incorporated within the intersection layout
 - o advance cycle boxes assumed

Original layout:



Amended layout:



Upgrade 3

- Signalisation of the Wilks Road / East Coast Road intersection
 - o signalised pedestrian crossings incorporated within the intersection layout
 - o advance cycle boxes assumed

Original layout:



Amended layout:

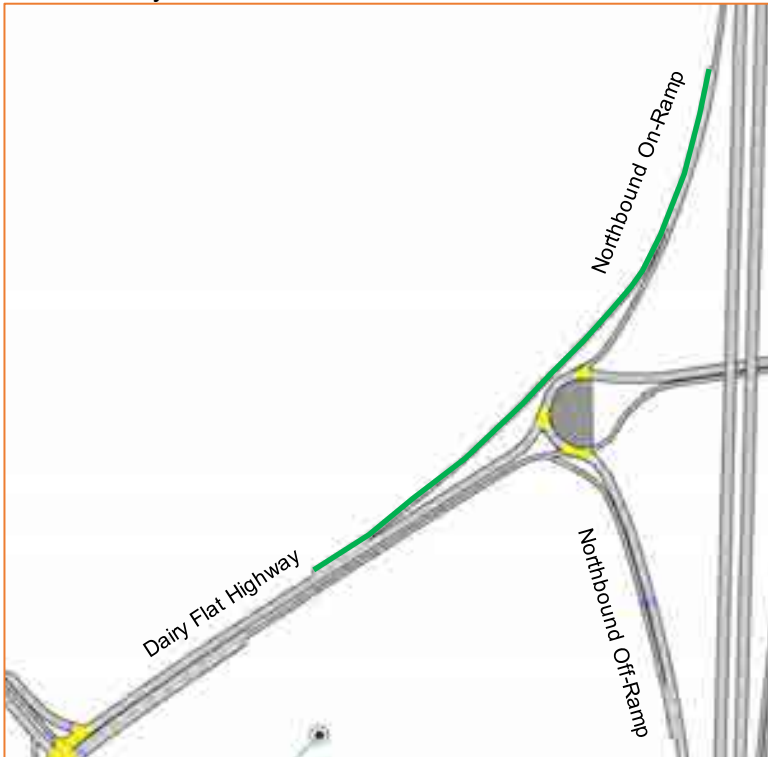


Upgrade 4a

- Provision of a slip lane on the western approach to the Silverdale interchange which connects to the northbound on-ramp
- Original layout:



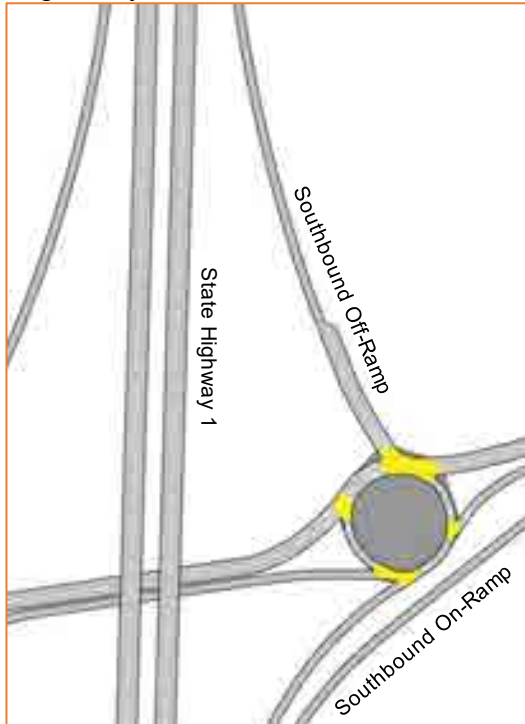
Amended layout:



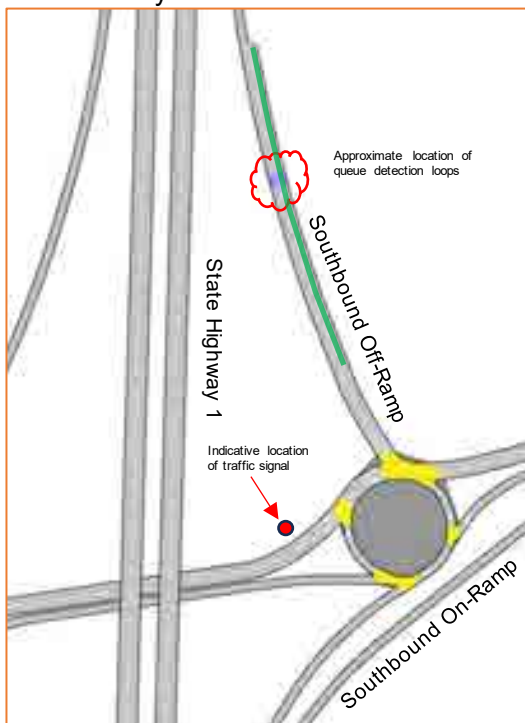
Upgrade 4b

- Extending the length of the left turn slip lane on the southbound off-ramp at the Silverdale interchange to around 150m and introducing queue metering for the AM peak. Queue detection loops are positioned around 115m north of the eastern roundabout and if queues extend to this position a red signal for eastbound traffic on the overbridge will be activated to allow the on-ramp queues to clear. This is similar to the way that the northbound off-ramp works for the PM peak.

Original layout:



Amended layout:



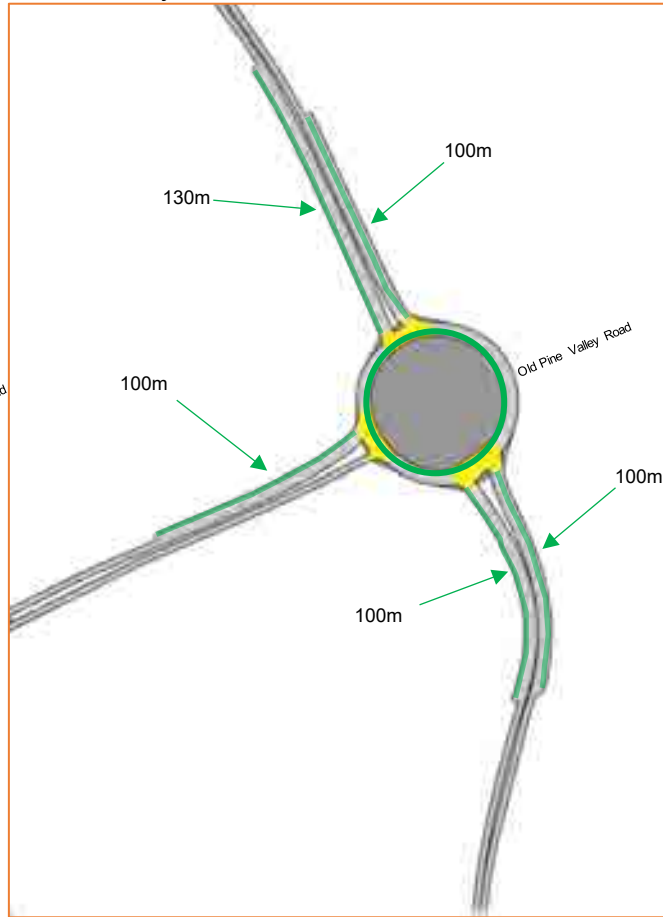
Upgrade 5

- Double-laning of the Argent Lane / Pine Valley Road roundabout
- Additional widening of approaches and departure lanes:
 - o 100m additional short lane on Pine Valley Road (western approach)
 - o 100m additional short lane on Argent Lane (northern approach)
 - o 100m additional short lane on Pine Valley Road (southern approach)
 - o 100m additional short lane on Pine Valley Road (southern departure)
 - o 130m additional short lane on Argent Lane (southern departure)

Original layout:



Amended layout:



It should be noted that Old Pine Valley Road has not been specifically included in the model as it is a no-exit road with only a small number of properties accessing it. It can be included once a notable level of future development along the road is identified.

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Level 3, Stantec House, 111 Carlton Gore Road
PO Box 13-052, Armagh, Christchurch, 8141
New Zealand: +64 9 580 4500 | www.stantec.com

