BEFORE THE HEARINGS PANEL

IN THE MATTER of the Resource Management Act 1991

AND

IN THE MATTER of proposed Plan Change G: Aokautere Urban Growth to the Palmerston North City Council District Plan

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STATEMENT OF REPLY EVIDENCE OF HARRIET FRASER ON BEHALF OF PALMERSTON NORTH CITY COUNCIL

TRANSPORTATION

Dated: 28 November 2023

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REPLY EVIDENCE OF HARRIET FRASER

A. INTRODUCTION

[1] My full name is Harriet Barbara Fraser.

[2] I prepared a s 42A report dated 15 September 2023 on Transportation (**s 42A Report**) on behalf of the Palmerston North City Council (**Council**) for proposed Plan Change G: Aokautere Urban Growth to the Palmerston North District Plan (**PCG**).

[3] My experience and qualifications are set out in my s 42A Report.

[4] I repeat the confirmation given in my s 42A Report that I have read and will comply with the Code of Conduct for Expert Witnesses in the Environment Court Practice Note 2023, and that my report has been prepared in compliance with that Code.

[5] I attended pre-hearing meetings on 25 and 26 September 2023 on the topics of:

(a) Structure plan and zoning, road layout, subdivision;

(b) Neighbourhood Centre/Local Business Zone, and housing matters; and

(c) Traffic and transport.

[6] I also attended expert conferencing on 14 November 2023 with Glenn Connelly of Waka Kotahi, and we prepared a joint witness statement (the Transportation (Safety) JWS) dated 14 November 2023. I confirm the contents of that document.

[7] Mr Connelly and I also agreed to undertake further consideration, outside of the time allotted for expert conferencing, to identify a threshold for the further upgrading of treatments for crossing SH57 Aokautere Drive beyond the works that are currently anticipated. The outcome of our further review is included in **Attachment 1**.

B. SCOPE

[8] My reply evidence responds to points made in evidence by:

(a) Glenn Connelly on behalf of Waka Kotahi regarding transport and in particular road safety and intersection capacity for SH57 Aokautere Drive;

(b) Sarah Jenkin on behalf of Waka Kotahi regarding transport-related planning matters;

(c) Sarah Downs on behalf of Waka Kotahi regarding transport-related matters;

(d) Christle Pilkington on behalf of Palmerston North Industrial and Residential Developments Ltd (now Brian Green Residential Developments Ltd) regarding transport-related planning matters;

(e) Pepa Moefili on behalf of Ngawai Farms Ltd regarding transport-related planning matters;

(f) Paul Thomas on behalf of CTS Investments Ltd, Woodgate Ltd and Terra Civil Ltd regarding transport-related planning matters;

(g) Les Fugle on behalf of CTS Investments Ltd, Woodgate Ltd and Terra Civil Ltd regarding transport matters;

(h) Amanda Coats on behalf of Heritage Estates (2000) Ltd regarding transport matters; and

(i) Chris Teo-Sherrell regarding transport matters.

[9] The fact that this reply statement does not respond to every matter raised in the evidence of witnesses in the areas of Transportation should not be taken as acceptance of the matters raised. Rather, I rely on my s 42A Report and technical reporting, and the Safe System Audit (**SSA**) undertaken by WSP and attached to my s 42A Report to address these matters.

C. RESPONSES TO SUBMITTER EVIDENCE

[10] Response to matters raised by Mr Connelly on behalf of Waka Kotahi:

Matter raised	Harriet Fraser response
At para 2.2, Mr Connelly explains that Waka Kotahi have plans to reduce the speed limit, in partnership with Council to install connected protected cycleways along the highway and introduce some minor improvements for pedestrians.	Further clarification regarding the intended works by Waka Kotahi are set out under Issue 3.4 in the JWS. We agreed that these works would address the existing and short-term safety concerns. This is the first time during the preparation of PCG that Waka Kotahi have provided this level of commitment to addressing road safety and severance along SH57 Aokautere Drive.
At para 2.3, Mr Connelly suggests that there is a need to include consideration of the speed limit and active mode provisions on SH57 between the rear entrance to Massey (Albany Drive) and Titirangi Drive.	While a reduced speed limit and active mode provisions on SH57 between Summerhill Drive and Albany Drive would have safety benefits, I do not consider that the traffic activity associated with PCG will have a significant adverse effect on this section of the highway beyond any existing safety concerns.
At para 2.4, Mr Connelly comments that: - With the safety improvements planned by Waka Kotahi, initial growth associated with PCG would not necessarily create an immediate significant adverse impact on safety. - Ultimately, traffic signals or roundabouts will be needed at the suggested state highway intersections. - Uncertainty around when the intersection upgrades would be needed.	I agree with these points. Regarding the first point, I consider that it is important that there is sufficient commitment from Waka Kotahi to undertake the identified safety works within the short term, if there is to be an associated relaxation in the proposed District Plan provisions to allow for some initial growth within the PCG area. With regard to the timing of the intersection upgrades, it is difficult to identify when they will be needed as, if the existing safety issues are addressed, they will be primarily driven by capacity and this in turn depends on background traffic growth associated with development outside the PCG area, rate of development of the PCG area and traffic route changes associated with the opening of Te Ahu a Turanga.
At para 2.5, Mr Connelly suggests a strategy of: - Reducing the speed limit on SH57 Aokautere Drive as the primary means of improving safety. - Improving walking and cycling infrastructure on SH57 Aokautere	In general, I agree with this approach. The challenge is how to provide for it through the District Plan provisions. The speed limit reduction is a process that would be led by Waka Kotahi, necessitates consultation, has uncertainty regarding the future speed limit although likely to be either 60km/h or 50km/h and sits outside the PCG process.

Matter raised	Harriet Fraser response
Drive to mitigate the risk of serious injury. - Intersection upgrades to avoid excessive delays at the appropriate time.	Waka Kotahi is making a commitment to improving the walking and cycling infrastructure along and across SH57 Aokautere Drive but a design has yet to be confirmed. I agree that the intersection upgrades are likely to be driven by capacity, but safety will need to be an ongoing consideration in the performance of the state highway given that it is uncertain what safety treatments will be included in the short term and whether these treatments would need to be modified over time.
At para 7.1, under the topic of Traffic Environment, Mr Connelly asks the question whether the intersection modelling has been correlated to observed queue lengths.	The intersection modelling has not been directly correlated to surveyed queue lengths. The driver behaviour for drivers turning right out of side roads was based on observations at the various intersections during a number of site visits. Typically, at peak times, drivers were observed to wait for a gap in both traffic flows rather than split the turn into two parts by waiting in the median. Drivers are likely to feel more comfortable waiting in the median within a reduced speed environment and/or a wider or protected median. The JWS includes a statement and agreement on this matter under Issue 1.4.
At para 7.1, under the topics of Traffic Flows, Trip Rate and Crash History, Mr Connelly agrees that the traffic flows provide a sound basis for assessment, he agrees that surveying the local traffic to determine the trip generation rate is best practice and notes that this observed trip rate is at the lower end of the scale and agrees with the crash information included in my reporting and evidence.	The observed trip rates are at the lower end of the scale included in Mr Connelly's evidence. My experience in general with surveying traffic activity to determine trip generation rates is that the daily rates are generally at the lower end of this range. I also note that moving forward the improved cycling and bus provisions can be expected to result in a reduction in trip generation rates. The JWS includes statements and agreement on these matters under Issues 1.1, 1.3 and 3.1.
At para 8.3, Mr Connelly provides data regarding historic traffic flows on SH57 and notes a substantial increase in traffic flows on SH57 to the east of Summerhill Drive between 2013 and 2022.	Looking at the data for the Aokautere Drive count site there is a marked increase in traffic for 2017 from 2016, an additional 1,623vpd. I suggest that this increase is mainly associated with closures of the Manawatū Gorge rather than ongoing background

Matter raised	Harriet Fraser response
	traffic growth. If this increase is discounted the traffic growth is similar to that for the Turitea site. The JWS includes a statement and agreement on this matter under Issue 1.1.
At paras 8.4 to 8.9, Mr Connelly provides detail regarding the historic safety record for SH57 Aokautere Drive and concludes that the crash numbers and risk are low.	I agree with Mr Connelly's assessment of the historic crash record, and this is reflected in the JWS Issue 1.3. However, historic crash data does not reflect that walking and cycling trips may not be being made due to safety concerns. My concern with road safety is ensuring that the adverse safety effects resulting from the significant increase in traffic activity associated with the development of the PCG area are mitigated such that the existing safety levels are maintained or improved upon, and that active mode travel is encouraged.
At paras 9.1 and 9.2, Mr Connelly agrees that there is the potential for significant additional vehicle traffic as a result of PCG and that the identified mitigation measures are likely to mitigate the safety risks associated with the additional traffic activity. He raises questions regarding timing and funding.	Issue 4.1 of the JWS includes a statement and agreed positions with regard to the nature of the mitigation measures on SH57 Aokautere Drive. Issue 5.1 of the JWS includes statements and agreed positions regarding the timeframes for mitigation. With regard to funding, items have been included in the draft Long Term Plan. This is discussed in more detail in the s 42A reporting of other technical experts including Ms Copplestone and Mr Murphy.
At para 9.4, Mr Connelly considers that the following improvements are routine matters that can be addressed by Waka Kotahi and Council as needed: - Pedestrian crossing point on SH57 Aokautere Drive in the vicinity of the Adderstone Reserve. - Additional footpath between Johnstone Drive and Pacific Drive. - Improvements to sightlines.	These are all works within the road reserve that is controlled by Waka Kotahi. Under Issue 3.4 in the JWS, Mr Connelly provided further commitment regarding the intended short-term works.
In Table 1, Mr Connelly discusses the proposed intersection treatments. Points raised which I provide comment on are:	I agree with Mr Connelly that when all factors are considered that the signalisation of the intersections is likely to be preferable to introducing roundabouts. However, the SSA

Matter raised	Harriet Fraser response
- A preference for signals as they deliver safety benefits and allow for through traffic movements to be prioritised. - With a reduced speed limit drivers may be more comfortable using the flush median. - The proposed signals at the Summerhill Drive intersection with Ruapehu Drive would create platoons and gaps in traffic. - The Ruapehu Drive route provides an alternative so that drivers do not need to turn right out of Cashmere Drive. - The role of the Safe System Audit. - The immediate need for signals or a roundabout might be mitigated as a result of the short term works that Waka Kotahi plan to undertake.	identified that either treatment could deliver the necessary mitigation and so flexibility has been carried through into the provisions. I agree with Mr Connelly that, with a slower speed limit, drivers turning right out from side roads may be more comfortable to use the median. I disagree that signals at the Summerhill Drive intersection with Ruapehu Drive would create gaps in the traffic at the Old West Road intersection. The intersections are over one kilometre apart and the traffic flows will even out over that distance. I agree that city-bound drivers from Cashmere Drive could use Ruapehu Drive and they would also benefit from the signalisation of the intersection with Summerhill Drive. However local movements from Cashmere Drive to destinations within Aokautere will still rely on a right turn out onto SH57. The safety of this turn would be improved with a reduced speed limit on SH57 and some improvements to the sight line. Regarding the role of the SSA, in general I agree with Mr Connelly's interpretation. However, in the context of PCG it had a particular role of testing the proposed mitigation with the assessment (spreadsheet evaluation) being key rather than the audit. The concerns raised through the road safety audit of the existing infrastructure provide useful information to both Council and Waka Kotahi to help inform maintenance works but are not key to informing District Plan provisions for PCG. I agree that the short-term works identified by Mr Connelly could successfully address the immediate safety concerns associated with additional traffic activity from the PCG area. Council has up until now relied on the intersection treatments to deliver a slower vehicle environment to then facilitate the reduction of the speed limit by Waka Kotahi. If Waka Kotahi now plan to lead with a speed limit reduction, which can be expected to

Matter raised	Harriet Fraser response
	result in considerable safety benefits, the intersection upgrades will primarily be led by capacity and to a lesser degree by safety.
In Table 2, Mr Connelly discusses pedestrian and cyclist facilities along SH57 between Johnstone Drive and Pacific Drive. Points raised which I provide comment on are: - Cyclists and pedestrians can use the existing shoulder. - Some scope to improve the shoulder width although restrictions between Cashmere Drive and Johnstone Drive. - Shared paths may be an option and more feasible within a reduced speed environment. - Would be safety benefits of including a pedestrian refuge between Johnstone Drive and Cashmere Drive. Ideally should be in an environment with vehicle speeds managed to 30km/h as typically done with raised safety platform. - Improved facilities for active modes along and across SH57 Aokautere Drive should be progressed as soon as possible and are needed regardless of PCG.	Regarding cyclist and pedestrian movement along and across SH57 Aokautere Drive, existing safety concerns have been identified which will be exacerbated by the additional traffic from PCG and will deter active mode travel. I agree with Mr Connelly that improved facilities are already needed regardless of PCG. There are some challenges, primarily due to the gully drop-off on the southern side of SH57, which make balancing the different road users needs difficult. While separated cycle and pedestrian facilities are preferred as best practice, the provision of sections of shared path, or widening of the shoulder where this is not possible, will provide an improved safety outcome for pedestrians and cyclists.
At paras 10.4 a. to e., Mr Connelly summarises his view on the key messages from the Assessment of Safe System Alignment (spreadsheet evaluation) of the SSA.	I generally agree with Mr Connelly's interpretation. The exception is the statement that the corridor upgrade provides a similar or better safety outcome as the installing of traffic signals or a roundabout. The SSA considered the corridor and the intersections separately (see scope in Section 3.4 of the SSA). It is however correct that if corridor improvements are made in the short term, as now indicated by Waka Kotahi, the base scenario for the assessment for the change in safety of the intersections will change. This will likely result in a delay before the intersection

Matter raised	Harriet Fraser response
	upgrades would be triggered from a safety perspective.
At paras 10.4 f. to i. and paras 10.5 to 10.7, Mr Connelly summarises his view on the key messages from the Safety Concerns identified through the SSA.	As per an earlier response, I consider that the concerns raised through the road safety audit of the existing infrastructure provide useful information to both Council and Waka Kotahi to help inform maintenance works but are not key to informing District Plan provisions for PCG.
At paras 11.1 to 11.6, Mr Connelly summarises his position on the mitigation of traffic effects on SH57. He considers that the works now planned by Waka Kotahi to address existing safety concerns will delay the need for the intersection upgrades and suggests capacity thresholds of: - Overall intersection level of service of C/D; or - Individual movement level of service of E/F.	I agree that the safety works now proposed by Waka Kotahi would extend the timeframe for the intersection upgrades being triggered. My expectation, and as already supported by observations and the modelling of the intersections, is that the right turn out from the side roads will fail ahead of the overall level of service of the intersection declining to a C or D. Issue 5.2 of the JWS includes statements and agreed positions regarding thresholds to trigger any upgrades.

[11] Response to matters raised by Ms Jenkin on behalf of Waka Kotahi:

Matter raised	Harriet Fraser response
At para 3.7, Ms Jenkin comments that there are existing issues with the state highway in this area and that they are already being addressed by Waka Kotahi.	Prior to receiving the Waka Kotahi evidence for PCG I was not aware of the full extent of the works to address existing safety issues.
At para 3.8, Ms Jenkin while commenting that there is general agreement about the nature of the mitigation needed, she raises concerns regarding the timing and funding of the treatments.	With Waka Kotahi planning to address existing safety issues in the short term, the timing of the intersection upgrades will largely be driven by capacity and to a lesser degree safety considerations. I have discussed the timing of the intersection upgrades above in my comments on Mr Connelly's paras 9.1 and 9.2. Mr Murphy addresses funding in his s 42A Report from paragraph [51] and in his Statement of Reply Evidence from paragraph [27].

Matter raised	Harriet Fraser response
At para 3.12, Ms Jenkin suggests that there may be some existing spare capacity in the road network and proposes a consenting pathway.	The availability of spare capacity depends on Waka Kotahi delivering the safety works they are proposing in the short term, and that with the reduced speed environment there is an associated change in driver behaviour regarding the right turn out from side roads at peak times of traffic activity. That is, drivers are comfortable splitting the turn into two parts and waiting within the median. The overall level of service of an intersection, which is a capacity measure, based on average delay per vehicle, can be very good while an individual turning movement can have very large delays. The level of service does not include any consideration of safety.
At para 7.13, Ms Jenkin comments on the lack of reference to the Government Policy Statement on Transport (**GPS Transport**).	Reference to the GPS Transport is included in Sections 2 and 8 of my Transportation Assessment dated 28 July 2022 and attached to my s 42A Report. I note that the consultation period has recently closed for the Draft GPS Transport 2024. The proposed strategic priorities and primary objectives are: - Maintaining and operating the system: the condition of the existing transport system is efficiently maintained at a level that meets the current and future needs of users. - Increasing resilience: the transport system is better able to cope with natural and anthropogenic hazards. - Reducing emissions: transitioning to a lower carbon system. - Safety: transport is made substantially safer for all. - Sustainable urban and regional development: people can readily and reliably access social, cultural, and economic opportunities through a variety of transport options. Sustainable urban and regional development is focused on increasing housing supply, choice and affordability, and developing

Matter raised	Harriet Fraser response
	resilient and productive towns and cities through effective transport networks that provide a range of low emission transport options and low congestion. - Integrated freight system: well designed and operated transport corridors and hubs that provide efficient, reliable, resilient, multi-modal, and low-carbon connections to support productive economic activity. These are similar to the existing priorities and primary objectives, and as such I consider that there is a good alignment with the transport outcomes sought through PCG.
In paras 8.2 to 8.4, Ms Jenkin raises concerns regarding historic and ongoing traffic growth on SH57 associated with the development of rural-residential land outside the PCG area.	In Figure 3 of Mr Connelly's evidence, the traffic count for SH57 Aokautere has increased from 11,569vpd in 2017 to 12,345vpd in 2022. This is equivalent to a 1.3% increase in traffic per annum or an additional 155vpd per year. This is not a high rate of traffic growth. In recent years traffic flows on SH57 Aokautere Drive will have been influenced by local residential development both rural-residential and suburban, wider growth associated with long distance travel and as a result of construction activity associated with various windfarms. In my assessment I have assumed that any background growth (from outside the PCG area) over the next few years will be balanced by a reduction in traffic flows when Te Ahu a Turanga opens, noting that Mr Connelly's data shows an increase of 1,623vpd between 2016 and 2017 when the Manawatu Gorge was closed.
At paras 8.11 to 8.13, Ms Jenkin summarises areas of agreement and disagreement between me and Mr Connelly.	Reference should now be made to the JWS Transport. I agree that my approach was more conservative than that of Mr Connelly, but this was due to my understanding that the intersection upgrades would be needed to reduce speeds and provide for improved safety for active modes in the absence of a

Matter raised	Harriet Fraser response
	commitment by Waka Kotahi to a speed limit reduction.
At para 9.2, Ms Jenkin seeks changes to the proposed provisions in relation to the transport upgrades.	I agree that changes are needed based on the commitment from Waka Kotahi to address existing safety issues in the short term. Reference should now be made to the outcomes of the JWS Transport.

[12] Response to matters raised by Ms Downs on behalf of Waka Kotahi:

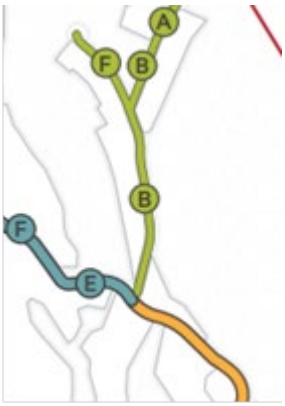
Matter raised	Harriet Fraser response
At para 1.5, Ms Downs states that PCG is inconsistent with PNITI and that the delivery of the short and medium term PNITI programme is needed to ensure any negative effects from growth is mitigated.	I have commented on the alignment of PCG with PNITI in paras 21 to 29 of my s 42A Report. I concluded that any additional travel time on Summerhill Drive and SH57 Aokautere Drive as a result of speed limit reduction and intersection upgrades is not expected to adversely affect the primary traffic and freight routes identified in the PNITI programme. I also note that there is estimated to be an undeveloped yield of at least 500 dwellings within residentially zoned land in the PCG catchment before notification of PCG.
At paras 9.1 to 9.6, Ms Downs describes SH57 as a nationally and regionally significant transport route including for freight and High Productivity Motor Vehicles.	As per my comment above, I consider that any additional travel time on Summerhill Drive and SH57 Aokautere Drive as a result of a speed limit reduction and intersection upgrades is not expected to adversely affect the primary traffic and freight routes. For instance, with a series of traffic signals priority can be given to the through route along SH57. Testing some journey times in Google Maps, I note that the travel time between Wellington Port and Ashhurst (taken as the start of Te Ahu a Turanga) varies by only 4 minutes off peak between each of the SH56-Bunnythorpe-Ashhurst route, SH57-Fitzherbert Bridge- SH3 Ashhurst route and SH57-Ashhurst route. With a 9am weekday departure from Wellington there is a 20 minute variability in each of the travel times

Matter raised	Harriet Fraser response
	for the three routes with the SH57-Ashhurst route being 10 minutes faster. There are existing route options, and this can be expected to continue.
At paras 10.2 to 10.7, Ms Downs describes how Waka Kotahi plan to address existing safety concerns on SH57 Aokautere Drive.	I agree that these measures will make a meaningful contribution to the safety of the route for all road users. There is an element of risk associated with the outcome and timing of the speed limit review but with a commitment from Waka Kotahi that this section will be included in the 2024-2027 review and that the Safe and Appropriate Speed for this section has been identified as 60km/h regardless of the additional traffic associated with the development of the PCG area, there can be some degree of confidence that there will be a speed limit reduction in the short term.
At para 11.1, Ms Downs states that PNITI does not identify any short- or medium-term investment in the Aokautere Drive section of SH57.	My understanding is that in developing the PNITI programmes, reliance would have been placed on the forecast road network performance as shown by the traffic model. For the reasons set out in paras 24 and 25 in my s 42A Report it is likely that the modelled forecast traffic flows in this part of the network were significantly underestimated resulting in potential deficiencies being overlooked.
At paras 12.1 to 12.4, Ms Downs seeks more information regarding how the greenfield development within the PCG area aligns with the goals for VKT and transport emissions reductions.	The May 2022 Aotearoa New Zealand's First Emissions Reduction Plan includes goals of: - The total distance travelled by the light fleet is reduced by 20% by 2035 - Faster, frequent and convenient buses and trains and safe walkways and cycle lanes through our cities. Aokautere is on an existing bus route and the existing growth in Aokautere is facilitating an improvement and extension to that service. Ongoing improvements can reasonably be expected as a result of future additional growth. Aokautere is also within cycling distance of a number of employment and study destinations, assisted by the increased uptake in electric bikes which make the hilly

Matter raised	Harriet Fraser response
	topography easier to navigate. The Structure Plan and associated provisions support the delivery of safe and connected cycle infrastructure within the PCG area and mitigation, along with programmed works beyond the PCG area, will help provide connectivity with the expanding city-wide cycle network. These measures provide meaningful options for bus and cycle travel, for existing and future residents in the Aokautere area.

[13] Response to matters raised by Ms Pilkington on behalf of Palmerston North Industrial and Residential Developments Ltd (now Brian Green Residential Developments Ltd):

Matter raised	Harriet Fraser response
At para 42, Ms Pilkington is concerned that the structure plan map has not been amended to reflect the yet to be lodged Valley Views Stage 9. She requests the change shown in the extract below. 	The proposed roading arrangement is as shown in the extract from the structure plan below. I recommend that the short section of blue F between the Pacific Drive extension and the orange peri-urban road is changed to peri-urban. This would allow for some flexibility for where the peri-urban road connects with the urban network. 
At para 49, Ms Pilkington requests the roading change shown in the extract below, regarding the boundary between the Waters Block and the Green Block.	If the topography allows for it, it would be logical for the connection to be provided within the Green Block. As per the extract from the structure plan below, flexibility is included regarding the location of the green B road. This built-in flexibility could be used at the time of an

Matter raised	Harriet Fraser response
	application to wholly achieve the link within the Green Block. 

[14] Response to matters raised by Mr Moefili on behalf of Ngawai Farms Ltd:

Matter raised	Harriet Fraser response
At para 3.9, Mr Moefili requests that a proposed roading link is added from the watertank road into the Waters Block towards the north east as per the image below. 	I do not consider that the full length of the road needs to be shown, but am of the view that the inclusion of an access point from the watertank road in the location shown has merit.

[15] Response to matters raised by Mr Thomas on behalf of CTS Investments Ltd, Woodgate Ltd and Terra Civil Ltd:

Matter raised	Harriet Fraser response
At para 92, Mr Thomas comments that Council have approved a 450mm stormwater pipe under the lot at 131 Pacific Drive which has previously been anticipated to be a road link. The structure plan shows this lot being developed for retail purposes.	The road link though 129 Pacific Drive avoids the existing driveway to 133 Pacific Drive being close to the proposed intersection. The driveway to 127 Pacific Drive is located away from the boundary with 129 Pacific Drive.

Matter raised	Harriet Fraser response
At para 122, Mr Thomas comments that he considers that there is a need for a cross gully link from Alan Miers Drive but that it only needs to be shown diagrammatically on the structure plan. The link in question is the blue link with the labels D, C, D and E shown below.  	The structure plan already includes flexibility for the alignment of C and D Connector Roads. Any road will need to be designed to ensure the necessary alignment with the engineering standards. Whether it goes all the way down and up the gully or partway down and across a structure either earth or other, is not important from a transport perspective. I understand that there are other drivers to the location of the alignment, and these are discussed in the reporting of other technical experts, including those of Ms Copplestone, Mr Burns, and Ms Baugham.
At para 133, Mr Thomas questions the basis for the traffic thresholds recommended in the proposed provisions.	The proposed provisions included in the s 42A reporting have now been modified in response to material included in the Waka Kotahi evidence and the subsequent expert conferencing.

[16] Response to matters raised by Mr Fugle on behalf of CTS Investments Ltd, Woodgate Ltd and Terra Civil Ltd:

Matter raised	Harriet Fraser response
At para 19, Mr Fugle has concerns regarding the discouragement of including cul de sacs within the road layout design. He mentions the use of cul de sacs where there is no possibility to have a 'connecting' road.	It is recognised that there is some need for cul de sacs within the structure plan due to the gully network. However, cul de sacs typically lead to poor connectivity outcomes, increasing the travel distances for all road users. The Structure Plan approach assists with ensuring that there is a connected road network and that the use of cul de sacs can be minimised.
At para 30, Mr Fugle questions the rationale for the Abby Road link.	The planning for this link has been done ahead of PCG.

Matter raised	Harriet Fraser response
At paras 32 to 35, Mr Fugle has concerns regarding the gully crossing from Alan Miers Drive. He is concerned that the road as shown cannot be constructed and meet the Council's engineering standards.	See response above to Mr Thomas' para 122. The structure plan includes flexibility regarding the alignment of the road. Mr Fugle considers there is a possible alternative that could be assessed. There may be others which include a different balance between road grades and elevation of the road as it crosses the bottom of the gully. The consideration of alternative options is not precluded, although any proposed alignment would need to deliver on the outcomes of the plan change, of which transport (which I comment on) is one.
At paras 52 to 57, Mr Fugle sets out concerns regarding the road upgrades required through the proposed provisions. At para 54 he questions Council's concern regarding traffic congestion.	I understand that the proposed provisions included in the s 42A reporting have now been modified in response to material included in the Waka Kotahi evidence and the subsequent expert conferencing. The primary concern with regard to the performance of SH57 Aokautere Drive and Summerhill Drive is safety, and the Safe System Audit has confirmed that there are existing safety concerns and that the traffic associated with PCG will exacerbate these concerns. Waka Kotahi have now confirmed that they intend to address the existing safety concerns (as I have detailed above), and this will allow for some ongoing development before intersection capacity constraints will need to be addressed.

[17] Response to matters raised by Ms Coats on behalf of Heritage Estates (2000) Ltd:

Matter raised	Harriet Fraser response
At para 10(d), Ms Coats requests that road names are added onto Map 7A.4 for existing streets.	I agree that this will assist plan users with navigating the structure plan. These are matters of minor detail which can be addressed readily.
At para 10(e), Ms Coats requests that dashed and solid lines are used in Map 7A.4A to differentiate between built and unbuilt roads.	Again, I agree that this will assist plan users with navigating the structure plan. Again, these are matters of minor detail that can be addressed readily.

Matter raised	Harriet Fraser response
At para 10(f), Ms Coats comments that roading infrastructure bridges are not shown on the cross-gully links.	There are a number of ways of providing the road links across the gullies.
At para 14, Ms Coats identifies that the Engineering Standards include a maximum grade of 1 in 8 or 12.5% for roads other than arterials. Then at para 19, and based on 3D modelling, describes a 16m level change down into the northernmost gully (Alan Miers Drive link) and 20m up onto the promontory.	By my calculation at the maximum grade a length of 128m would be needed for the descent and at least 160m for the ascent. My interpretation of the alignment shown on the structure plan is that there is sufficient length for the ascent but the descent from Alan Miers Drive won't be long enough at the maximum grade. As per my earlier responses, the structure plan includes flexibility for how this link is delivered. Options include providing the descent over a longer distance or raising the level of the link across the gully floor.
At para 30, Ms Coats questions the timing and costs of the cross-gully links and is critical that designations have not been included in PCG.	For the cross-gully links necessary flexibility has been included regarding the alignment of these links. My understanding is that the designation of some of the connector road network could follow the PCG process.

[18] Response to matters raised by Mr Teo-Sherrell:

Matter raised	Harriet Fraser response
At paras 12 to 15, Mr Teo-Sherrell seeks that bus routes do not go through the Neighbourhood Centre.	The PCG provisions cannot determine where bus routes will operate as this is a matter for Horizons Regional Council to consider outside of this process. However, the intention is that any of the Urban Connector Roads will be able to accommodate possible bus routes. I consider that it is most likely that the bus route would go along Pacific Drive and not through the centre. I note that there is the potential for bus stops on Pacific Drive to be within less than 100m of the heart of the Neighbourhood Centre.
At paras 24 to 26, Mr Teo-Sherrell seeks that the Connector Route heading into the neighbourhood centre be downgraded to a Local Street and Activity Street.	I consider that the Activity Street classification is appropriate and signals the need to address and balance the needs of

Matter raised	Harriet Fraser response
	both movement and place within the Neighbourhood Centre.
At paras 17 and 18, Mr Teo-Sherrell seeks early inclusion of bus facilities and services.	This will be a matter for Horizons Regional Council, but it can reasonably be expected that the medium density area, planned for close to the Neighbourhood Centre, will have access to bus services along Pacific Drive.
At para 26, Mr Teo-Sherrell seeks that the Connector Road leading into the Neighbourhood Centre within the medium density area is classified as sections of Local and Activity Street.	I understand that the sections of Connector Road are as highlighted in the extract below.  This route has an important collector function as well as having the potential to accommodate a bus route. I consider that the Activity Street status of the route through the Neighbourhood Centre appropriately reflects the need for balancing movement and place functions in this location. I disagree with the changes proposed by Mr Teo-Sherrell.
At paras 27 to 70, regarding the cross-sections and design of the **Connector Roads**, Mr Teo-Sherrell seeks a number of changes which include: i. Inclusion of a buffer between on-road cycle lanes and vehicle lanes; ii. Separation of cyclists and pedestrians; iii. Target operating speed of 40km/h; iv. No-stopping on the links across the gullies; v. Where only one footpath for it to be on the uphill side; and	I consider that there is merit in several of Mr Teo-Sherrell's requests and have included in **Attachment 2** some recommended changes to the cross-sections including: i. Inclusion of on-road cycle lanes rather than shared paths; ii. A 0.5m wide buffer between the cycle lane and traffic lane; iii. 1.6m wide cycle lanes where not adjacent to parking and 1.8m wide where next to parking. I do not consider that there is a need for a buffer between the

Matter raised	Harriet Fraser response
vi. Reduced widths of traffic lanes, footpaths, berms and raingarden/parking to achieve additional width for above provisions.	parking lane and prefer the use of a wider 1.8m cycle lane; iv. Reduction in two-way traffic width to 6m (6.5m on existing section of Pacific Drive); v. Reduction in property berm width to 0.6m as per Drawings 1.2 and 1.2.1 in the Council's Engineering Standards; and vi. Reduction in the rain garden width to 2.1m as per Drawing 1.2.1 in the Council's Engineering Standards. Regarding the target operating speed, the Connector Roads are the major traffic routes and I consider a 50km/h target speed in line with the 50km/h speed limit to be appropriate. The inclusion of narrower traffic lanes to create the cycle lanes and buffers will help with keeping the speed environment to within the speed limit. Where the Connector Roads cross the gullies, the horizontal and vertical geometry is likely to result in slower vehicle speeds. I agree that it is likely that there would be no stopping lines along the cross-gully links apart from in designated parking bays. The words on the cross-sections could be strengthened to 'parking only within designated parking bays' or similar. I consider that there is only need for a footpath on one side of the cross-gully links and that a continuous path will be provided down, across and up the gully. Access to the footpath at the upper ends would be via standard drop kerbs with associate tactile paving. I disagree with narrowing the footpaths, it is best practice to provide a width of at least 1.8m where possible and this is reflected in the Council's Engineering Standards.
At paras 71 to 105, regarding **Local Streets**, Mr Teo-Sherrell seeks a number of changes which include:	As for the Connector Roads, I consider that there is merit in several of Mr Teo-Sherrell's requests and have included in **Attachment 2**

Matter raised	Harriet Fraser response
i. Reduced target operating speeds supported by traffic calming treatments; ii. In the medium density area for Local Street A to become Local Street F typology; iii. Inclusion of footpaths along both sides of Local Street D; iv. Reduced width of boardwalk along Local Street E to reduce risk of being used as a shared path by cyclists; and v. Reduced widths of footpaths, berms and raingarden/parking to support above changes.	some recommended changes to the cross-sections including: i. Reduction in property berm width to 0.6m as per Drawings 1.2 and 1.2.1 in the Council's Engineering Standards; ii. Reduction in the rain garden width to 2.1m as per Drawing 1.2.1 in the Council's Engineering Standards; and iii. Reduction in footpath width to 1.8m along Local Street D. The rationale for the property berm and rain garden/parking width reductions and the 1.8m footpath width are as for the Connector Roads. I do not consider that any changes are needed to the target operating speeds and my expectation is that where necessary, the desired speed environment would be supported by traffic calming treatments. Local Street A within the medium density area will provide several functions including collecting traffic with some through traffic flows and also providing parking given that there is no requirement to provide on-site parking. I do not agree with Mr Teo-Sherrell's suggested change from Local Street A to Local Street F in the medium density area. Local Streets D have a park or open space along one side. Any footpaths on that side might be better integrated into the open space design than provided along the road edge. I agree that there could be a risk of cyclists using the boardwalk along Local Street E but note that there are methods available to prevent cyclists using the path while maintaining a high amenity pedestrian space.
At paras 106 to 117, regarding **Activity Streets**, Mr Teo-Sherrell seeks a number of changes which include: i. Reduced target operating speeds;	I have included in **Attachment 2** some recommended changes to the cross-sections including:

Matter raised	Harriet Fraser response
ii. Reduced widths of footpaths and raingarden/parking to support addition of buffers to the cycle lanes; and iii. Removal of the one-way vehicle lane and parallel parking in front of the anchor store within the Neighbourhood Centre.	i. Adjustments to allow for a buffer between the cycle lane and the traffic lane; ii. Reduction in the rain garden width to 2.1m as per Drawing 1.2.1 in the Council's Engineering Standards; and iii. Replacement of perpendicular parking to parallel parking to avoid vehicles reversing out of the parking and into the cycle lane. The Activity Streets have a target operating speed of 30km/h. In practice I expect that vehicle speeds will be lower than this, as a result of cars moving to and from parked spaces and busy pedestrian activity. Paving and landscaping delivered through detailed design will also have an influence. I am confident that a slow speed environment will be achieved. The target operating speed could be lowered but I do not think that it is necessary. I do not agree with the removal of the vehicle lane and parking along the frontage to the anchor store. There is a need for some parking to be available close to the centre, in particular for use by people with mobility impairments, and the key matter is ensuring slow vehicle speeds and the safe interaction between all road users.
At paras 119 to 133, regarding SH57 Aokautere Drive, Mr Teo-Sherrell seeks: i. Provision of separate pedestrian and cycle facilities along both sides of SH57 between Johnstone Drive and Pacific Drive; ii. Inclusion of pedestrian crossing points at the intersections and mid-block along SH57 Aokautere Drive; and iii. Dwellings not to be occupied until the speed limit on SH57 Aokautere Drive is reduced to 50km/h.	i. This has been discussed with Waka Kotahi, see para 17 of **Attachment 1**. ii. This has been discussed with Waka Kotahi, see **Attachment 1**. iii. The speed limit review is managed through a separate process outside of the process for PCG. It is anticipated that a reduced speed limit will be in place during the period 2024 to 2027.

Matter raised	Harriet Fraser response
At para 134, he supports upgrades to the Summerhill Drive and Aokautere Drive intersections.	

[19] The changes that I have recommended to the road cross-sections result in the following changes to the overall road reserve widths compared with those included in the s 42A reporting.

Street Typology	Legal Width s 42A Version (m)	Legal Width Amended (m)
Urban Connector A	21.4	21.4
Urban Connector B	19.8	19.6
Urban Connector C	13.5	13.2+
Urban Connector D	Varies	13.2+
Urban Connector E	17.6	17.3+
Urban Connector F	18.1	19.6
Activity Street A	19.4	19.4
Activity Street B	20.6	20.6
Activity Street C	22.4 + central area	21.9 + central area
Local Street A	15.7	15.0
Local Street B	15.9	15.0-15.4
Local Street C	Varies	0.5 reduction
Local Street D	9.65	9.1
Local Street E	14.85	14.1-14.5
Local Street F	13.45	12.9
Peri-Urban Road A	13	13

[20] As shown, the changes in the legal width of the streets as a result of the proposed amendments are small with the exception of Urban Connector F. As a result of the

inclusion of on-road cycle lanes and associated buffers, the cross-section width for this street typology increases by 1.5m. The cross-section for Urban Connector Roads F would become the same as that for Urban Connector Roads B. I recommend that the Urban Connector Road F typology be removed and replaced with Urban Connector Road B.

D. OTHER MATTERS

[21] In response to my recommendations, Ms Copplestone included the following thresholds for mitigation in Table 7A.1: Transport Network upgrades for the Aokautere Structure Plan Area, for local intersections with Pacific Drive, in her s 42A Report:

Pacific Drive		
Intersection of Pacific Drive/Abby Road	Average traffic delays of more than 35 seconds per vehicle for vehicles turning either left or right from Abby Road during weekday peak times.	Signals or roundabout with safe provision for active modes
Intersection of Pacific Drive/Johnstone Drive	Average traffic delays of more than 35 seconds per vehicle for vehicles turning either left or right from Johnstone Drive during weekday peak times.	Signals or roundabout with safe provision for active modes
Intersection of Pacific Drive /Activity Street A (Map 7A.4D)	Average traffic delays of more than 35 seconds per vehicle for vehicles turning either left or right from Activity Street A during weekday peak times	Signals or roundabout with safe provision for active modes
Intersection of Pacific Drive /Urban Connector F (Map 7A.4D)	Average traffic delays of more than 35 seconds per vehicle on vehicles turning either left or right from Urban Connector F during peak times.	Signals or roundabout with safe provision for active modes

[22] The threshold of average traffic delays of more than 35 seconds per vehicle is associated with a change in the Level of Service of the turning movement from D to E. The bands for each level of service category are set out in Section 3.3 of the Transportation Assessment. Levels of Service for the performance of intersections, in terms of capacity, is a well understood parameter by traffic engineers, and for simplicity I recommend that Level of Service thresholds are used for all the intersections (state highway and local). This means that:

(a) For the local Pacific Drive intersections, the 35 second threshold should be replaced with a Level of Service of E.

(b) A Level of Service of F, which is equivalent to average traffic delays of more than 50 seconds per vehicle, is recommended for the turning movements at the SH57 intersections given the busier nature of the intersections and the anticipated greater acceptance of some delay at busy times.

[23] I note that in the final row of the extract above, there is a reference to an Urban Connector F, this could change to an Urban Connector B based on my recommendation above regarding the street typologies.

28 November 2023

Harriet Fraser

E. ATTACHMENTS

Attachment 1 – Further expert transport assessment

Attachment 2 - Recommended cross-sections

ATTACHMENT 1 – Further expert transport assessment

PCG Further Transport Assessment

Under Issue 5.2 in the JWS, which addresses triggers and thresholds for when mitigation is needed, we (Mr Connelly and Ms Fraser) agreed to undertake further analysis to further consider threshold/s for upgrades of pedestrian crossing treatments on SH57 Aokautere Drive beyond what is planned by Waka Kotahi in the short term.

1. There are three locations where the pedestrian desire lines for crossing SH57 Aokautere Drive are strongest. These locations are shown approximately in the image below. The location identified by the blue arrow is in the vicinity of the Summerhill shopping centre where there is an existing pedestrian refuge within the median. The red arrow is in the vicinity of the entry to the Adderstone Reserve and the yellow arrow is in the vicinity of Johnstone Drive and the pedestrian link to Waicola Drive. There is variation in the amount of existing pedestrian activity in each location and the degree to which each site will be affected by PCG, both in terms of increased pedestrian numbers and conflicting traffic.

2. The second image in Figure 1 is an updated and larger version of the Strava data included in Figures 6 and 8 of Ms Fraser's Evidence.

Figure 1: Existing Locations Where Pedestrians Cross SH57 Aokautere Drive

3. The crossing location in the vicinity of the Summerhill shopping centre is a key link to the shopping precinct, Ruapehu Drive and development on the northern side of SH57 and crosses

the busiest section of SH57 Aokautere Drive in terms of traffic flows. This location is shown in more detail in the image below.

Figure 2: Aokautere Dr Aerial Photograph– Existing Pedestrian Refuge

4. The Transport Choices project as per the recommendation of the Safe System Audit, suggests the left turn slip lane into Ruapehu Drive is removed providing an opportunity to narrow the crossing width for pedestrians. Figure 3 below shows the progressed detail design for this treatment. The traffic lanes will have a width of 3.2-3.4m and Mr Connelly has requested consideration be given to a refuge islands being included between the traffic lanes and cycle lanes such that pedestrians can cross the cycle lane and traffic lane in two stages. A perspective of the treatment is shown in Figure 4.

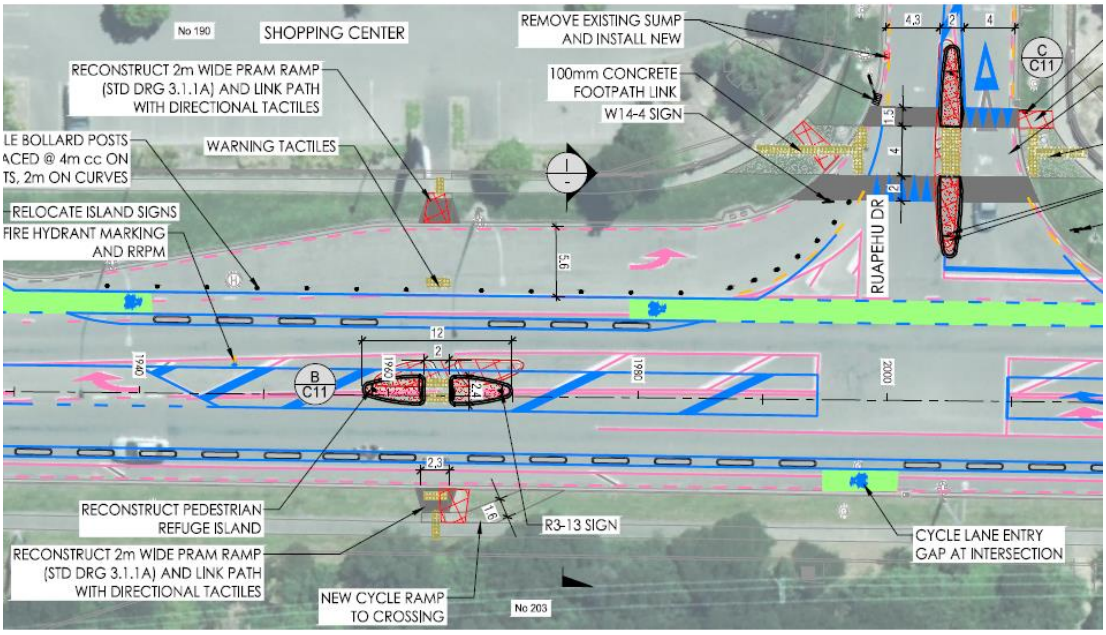


Figure 3: Aokautere Dr – Pedestrian Refuge Concept with Reduced Crossing Distance

Figure 4: Aokautere Dr – Pedestrian Refuge Concept – Artists Impression

5. The Waka Kotahi Pedestrian Network Guidance includes a mid-block crossing selection flowchart. Included below is the upper portion of the flowchart which applies to crossings on roads carrying more than 7,500vpd.

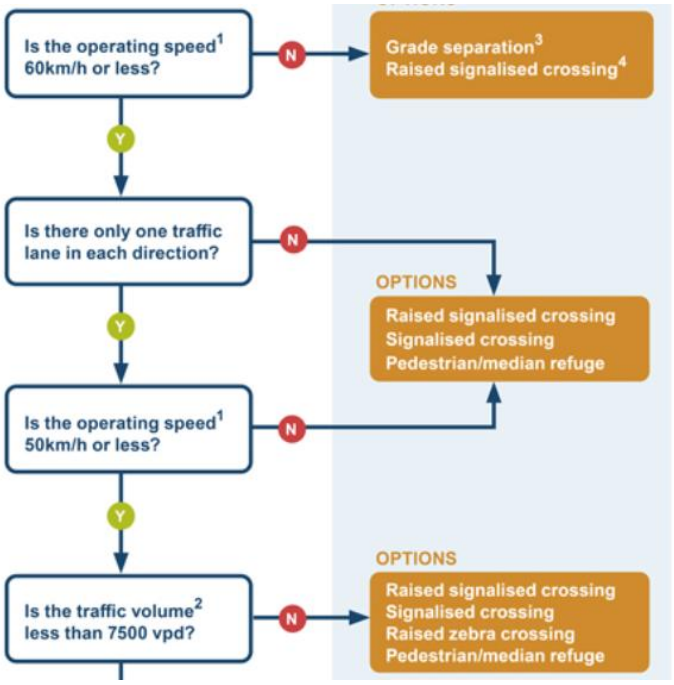


Figure 5: Mid-block Crossing Facility Selection Flowchart - Pedestrian Network Guidance

6. Using this flowchart results in the following fundamental crossing options, depending on the speed limit on SH57 Aokautere Drive:

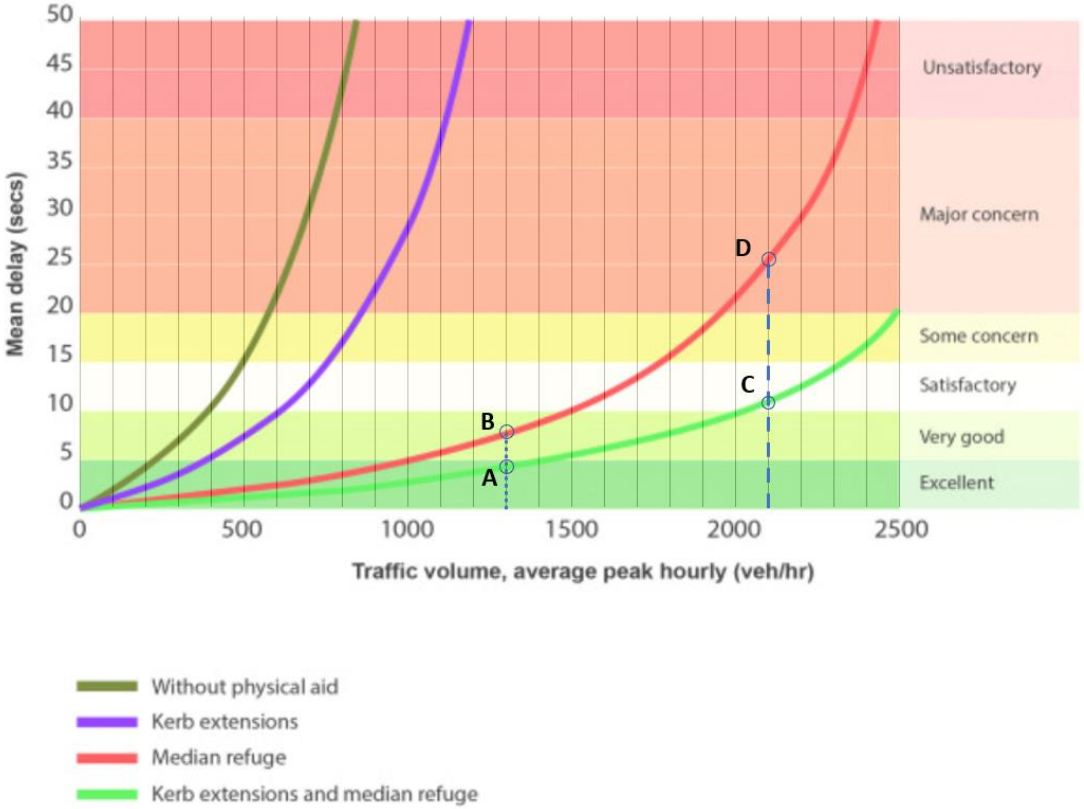
    a. 70km/h - the existing speed limit,

either grade separated or a raised signalised crossing;

b. 60km/h - the identified Safe and Appropriate Speed for the existing context, raised signalised crossing or signalised crossing or pedestrian/median refuge; and

c. 50km/h – the potential future speed limit,
as per 60km/h but with added option of a raised zebra treatment.

7. As such, the guidance includes an option of a pedestrian/ median refuge similar to that shown in Figure 3 within a reduced speed environment (50 or 60km/h). In terms of safe system design, this treatment remains a secondary treatment as vehicle speeds are more than 30km/h at the conflict point. The Pedestrian Network Guidance also includes some consideration of types of crossing facilities and associated pedestrian delay. The extract below shows mean waiting delay for pedestrians crossing at various facilities on a two-lane, two-way urban road within a 50km/h speed limit where traffic flows are not interrupted by nearby signals.[1] If signals were introduced at any nearby intersections, the operation of the crossing would also improve with the signals creating platoons and gaps in the traffic streams.



[1] The following assumptions are included in the estimation of mean delay:
a. Without physical aid – 14m kerb to kerb crossing distance;
b. Kerb extensions – 9m crossing distance;
c. Median refuge – two 6m crossings separated by the median; and
d. Kerb extension and median refuge – two 4.5m crossings.

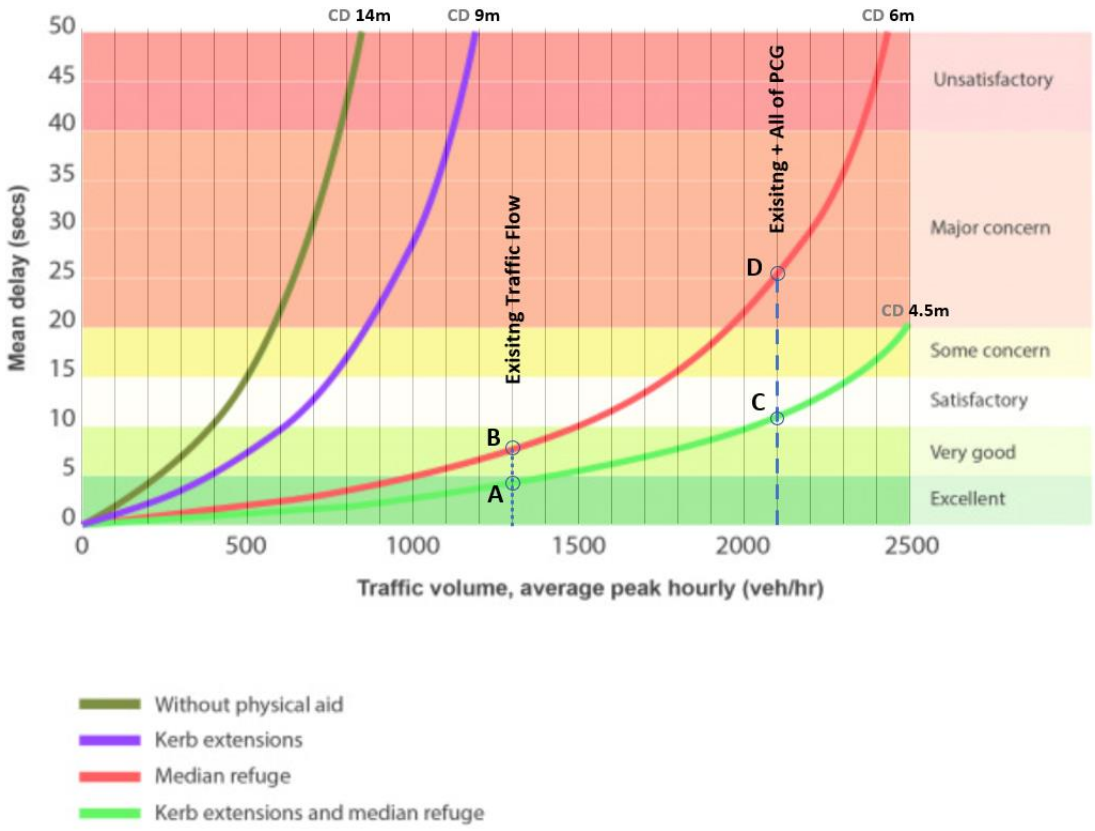


Figure 6: Mean waiting delay for pedestrians crossing at various facilities on a two-lane, two-way urban road (uninterrupted flow) - [Pedestrian Network Guidance]

8. The existing peak hour traffic flows on this section of SH57 Aokautere Drive are around 1,300vph both ways (Figure 6 - Points A and B), and with the PCG area fully developed are forecast to increase to around 2,100vph (Figure 6 - Points C and D). The indication is that a crossing with a median refuge and crossing distances of 6m or less each side would perform well (Figure 6 - Points A and B within the 'very good' or 'excellent' categories) in terms of pedestrian delay with the existing traffic volumes of 1,300 vph. With the additional traffic flows from PCG and flows of 2,100 vph on Aokautere Drive, the width of the crossing distances becomes critical as the pedestrian delay would escalate and become a 'major concern' with pedestrians having to cross 6m of carriageway (Figure 6 - Point D). A crossing distance of closer to 4.5m would be needed for the delay to be considered 'satisfactory' (Figure 6 - Point D). At this stage crossing distances of less than 4.5m look to be achievable in the vicinity of the Summerhill Shopping Centre. It should also be noted that this guidance is for a 50km/h speed environment with a more conservative position needed if the speed limit is 60km/h.

9. On the basis of the information included in the Pedestrian Network Guidance and the assessment above, we are comfortable that assuming that there is a speed limit reduction to 60km/h or lower, and that the pedestrian crossing distances either side of a refuge are kept to as close to 4.5m as possible, that a median refuge treatment can provide for pedestrians until such time as the nearby intersections are upgraded and provide for improved crossing facilities in those locations. It is also noted that within a 50km/h speed environment, there is an option to introduce a raised signalised intersection or raised zebra crossings which would provide a

primary safe system solution, mitigating the risk of death or serious injury. These improvements could respond to wider transport and social needs, as might for example occur when the proposed school on Ruapehu Drive opens.

10. With regard to other potential crossing locations along SH57 Aokautere Drive, the same guidance applies given that the traffic volumes can be expected to be above the 7,500vpd threshold in Figure 5. Pedestrian median refuges are acceptable treatments with zebra or signalised pedestrian crossings unlikely to be needed given the lower traffic volumes in these locations.

11. Less confident cyclists will also be able to cross SH57 Aokautere Drive if there were pedestrian median refuges. To support cyclists turning right into either Pacific Drive or Johnstone Drive from SH57 Aokautere Drive, short sections of shared path could be added along the sections highlighted in blue in Figure 7 to make use of existing and / or future central refuge islands. Such treatments could be accommodated within the road reserve as needed.

Figure 7: Possible Sections of Shared Path to Facilitate Right Turns into Side Roads for Cyclists

12. An alternative treatment, as illustrated in Figures 8 and 9, includes the positioning and use of a median refuge a short distance beyond the intersection to support less confident cyclists. This would allow right turning cyclists to make a right turn in two stages crossing each stream of traffic separately as per Figure 9. These figures illustrate a concept design at the Old West Road SH57 intersection with similar designs possible at the Pacific Drive and Johnstone Drive intersections with SH57.

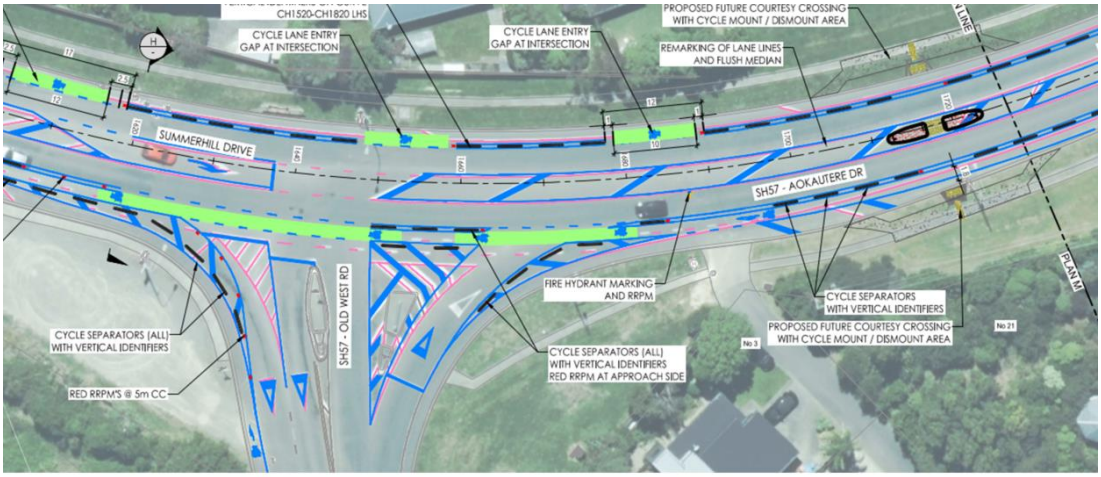


Figure 8: Concept Design for Right Turn Cycle Movements into Side Roads

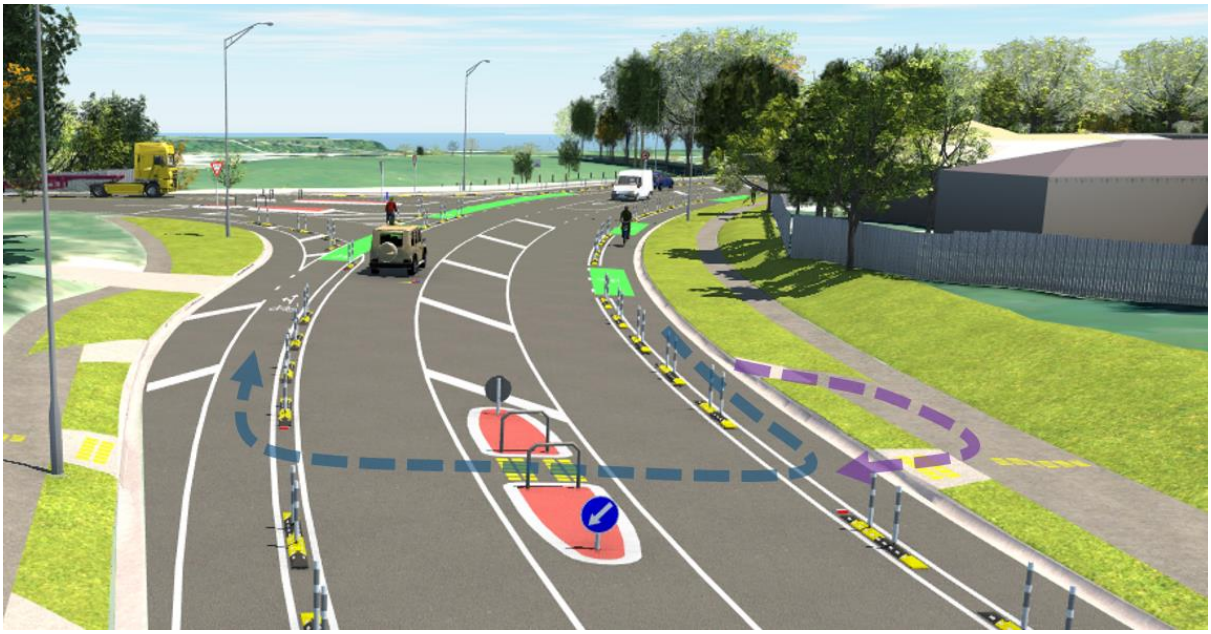


Figure 9: Perspective View and Annotated Cycle Path Through Treatment

13. Based on the review above, we do not consider that there is a need to include thresholds for upgrades to pedestrian (or cyclist) crossing points across SH57 Aokautere Drive in the District Plan provisions. Pedestrian median refuges, existing and future, can be expected to operate satisfactorily with the planned lower speed limit until the intersection upgrades are completed. Accordingly, we consider that the entry in Table 7A.1 regarding the crossing of SH57 Aokautere Drive can be deleted.

14. We have also been asked to address some additional matters that have arisen as the planners have been working through the editing of the provisions as a result of their own expert conferencing. We address these matters in turn below.

15. To assist plan users, Ms Fraser recommended that the time period for assessing the forecast levels of service for the various intersections be specified as the weekday peak hour traffic periods.

16. The Section 42A version of Table 7A.1 includes a threshold for the provision of a shared path along the southern side of SH57 Aokautere Drive between Johnstone Drive and Pacific Drive. Since the drafting of the Section 42A version, the likelihood of a speed limit reduction on this section of SH57 has increased with it to be included in the 2024-2027 review period, and Mr Connelly has explained that there will shortly be a reseal of this section of the road with an opportunity to adjust the road markings to provide some additional width on the shoulder along this section. While not delivering a shared path, the combination of these measures will make a significant contribution to improving safety for pedestrians and cyclists moving along the shoulder. It is also noted that on this section of SH57 to the east of Pacific Drive, the number of additional road users (vehicles, cyclists and pedestrians) associated with the development of PCG is small as most of the traffic will travel west of Pacific Drive. Accordingly, we consider that the entry in Table 7A.1 regarding the shared path along SH57 Aokautere Drive can be deleted.

17. The Section 42A version of R7A.5.2.2 Performance Standards for Restricted Discretionary Activity includes in:

> (i) Transport Network Requirements for Aokautere Structure Plan
>
> > (i) All of the following transport network upgrades must be completed, and certified by the relevant road controlling authority, ……

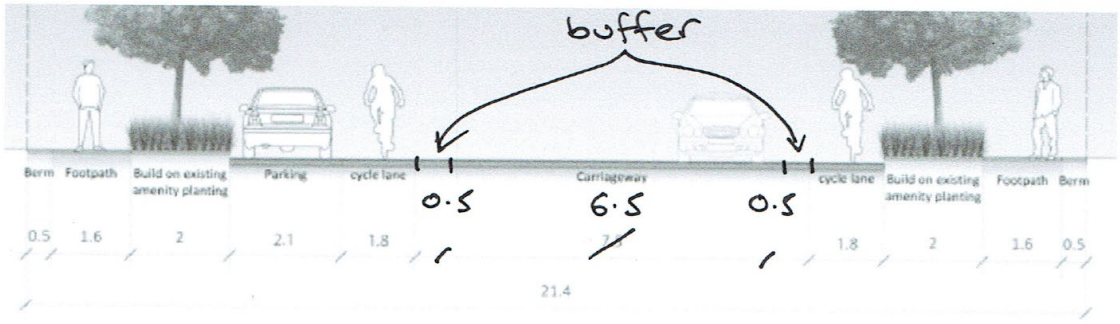
18. The planners are proposing to simplify the wording and replace 'completed, and certified by the relevant road controlling authority' with 'operational'. We agree that this simplified wording achieves the same outcome.

Harriet Fraser and Glenn Connelly

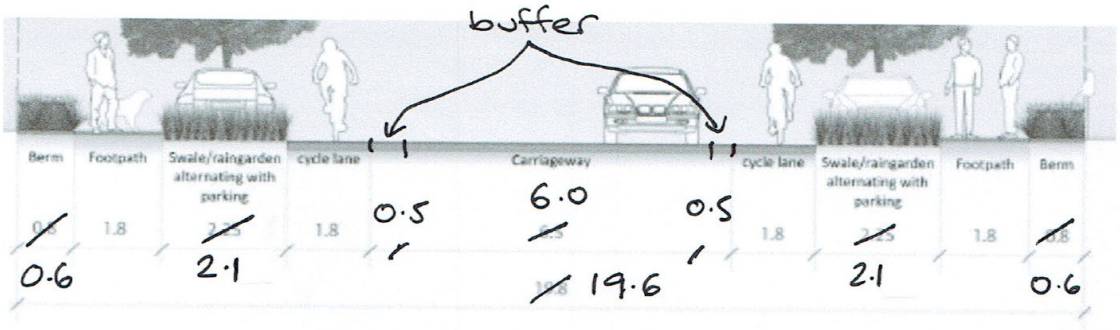
24/11/2023

ATTACHMENT 2 – Recommended cross-sections

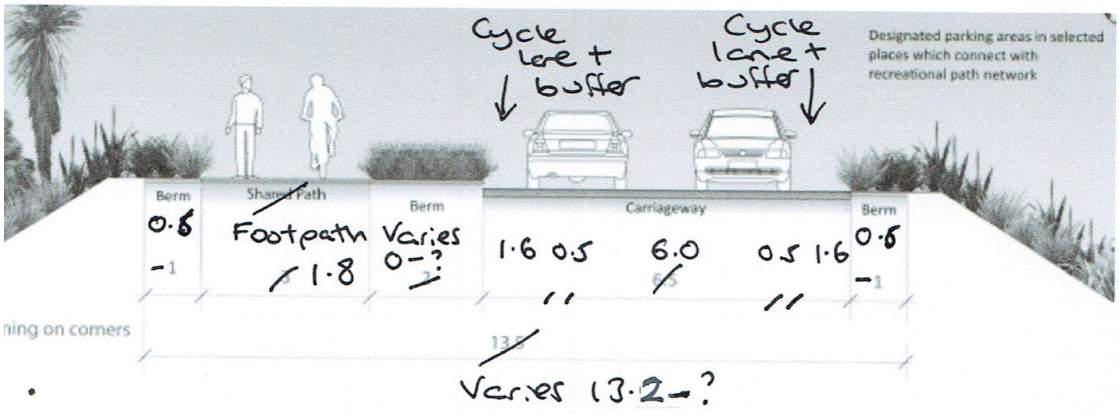
Urban Connector A (7A.4D 1)



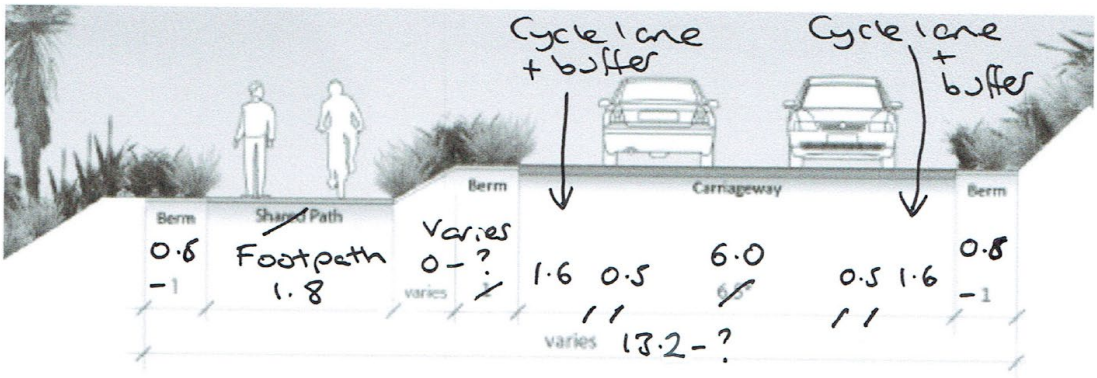
Urban Connector B (7A.4D 2)



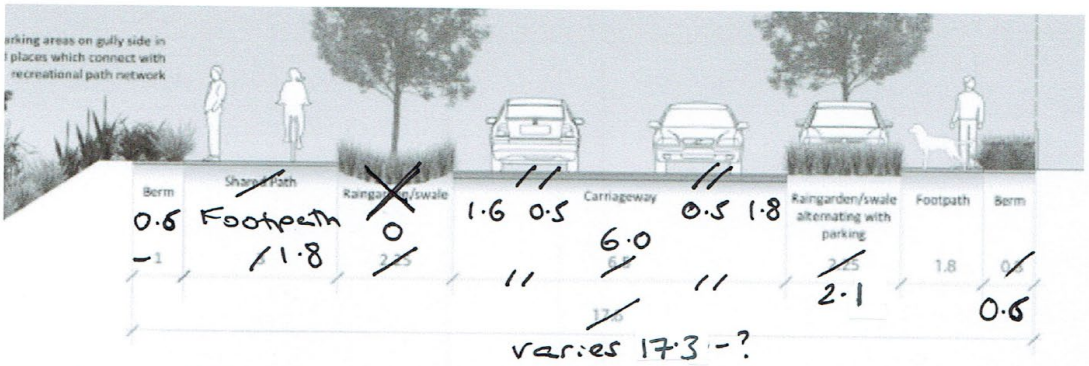
Urban Connector C (7A.4D 3)



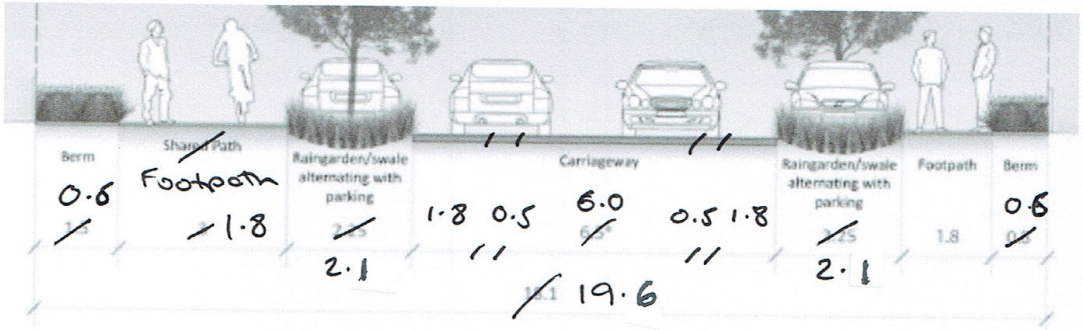
Urban Connector D (7A.4D 4)



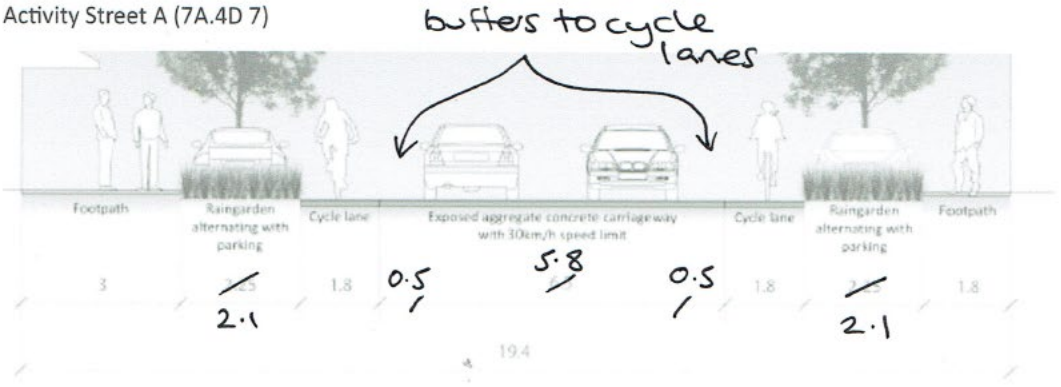
Urban Connector E (7A.4D 5)



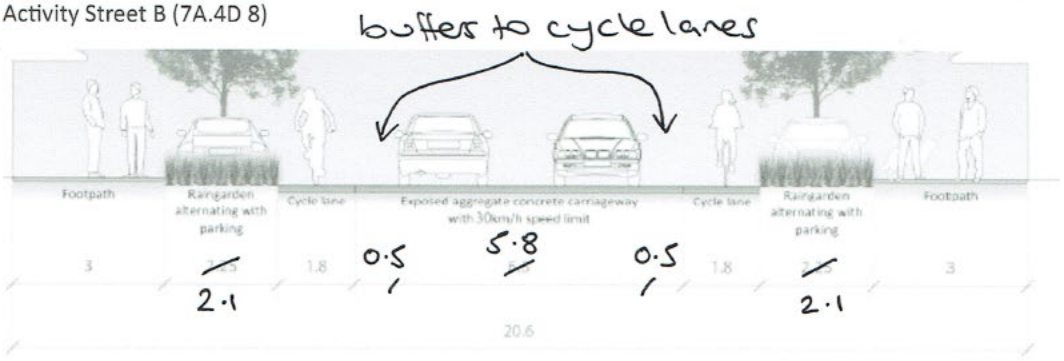
Urban Connector F (7A.4D 6)



Activity Street A (7A.4D 7)

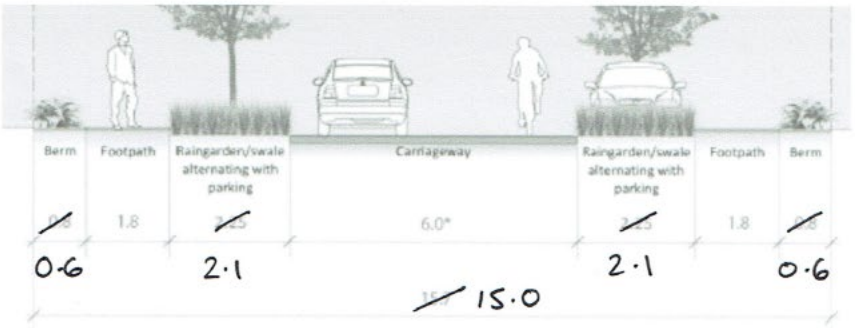


Activity Street B (7A.4D 8)

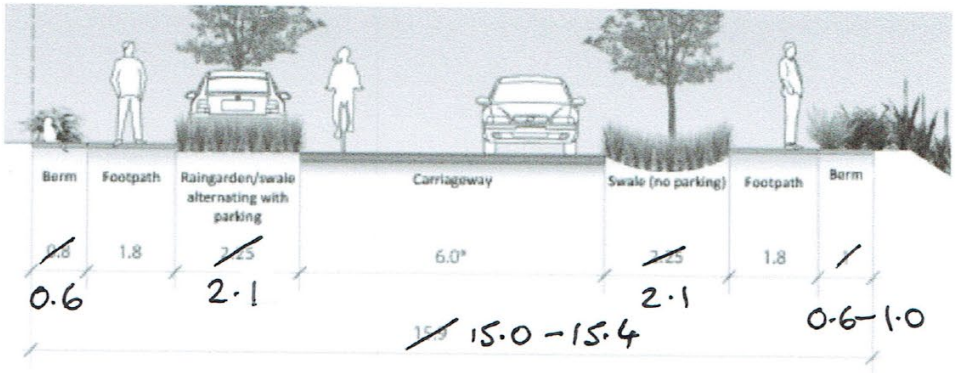


Activity Street C (7A.4D 9)

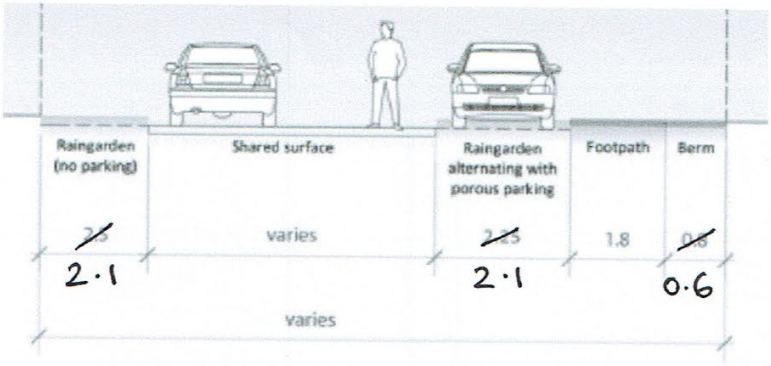
Local Street A (7A.4D 10)



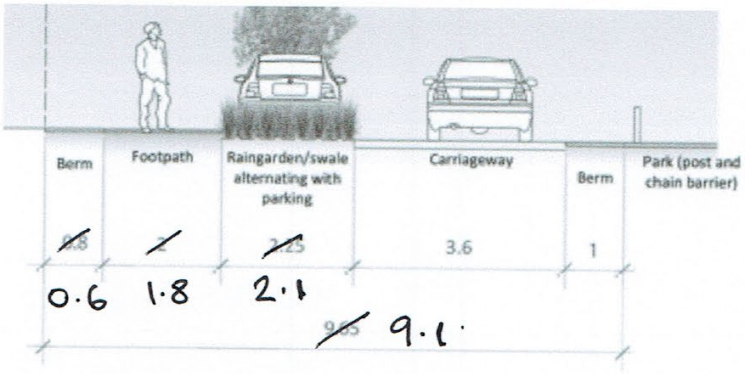
Local Street B (7A.4D 11)



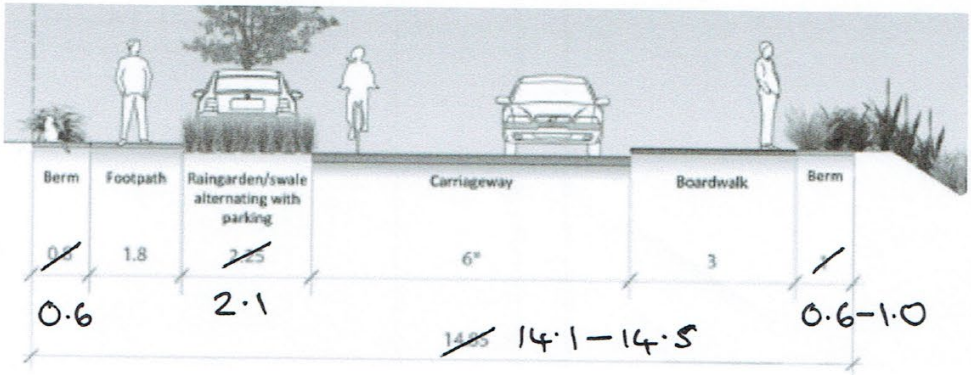
Local Street C (7A.4D 12)



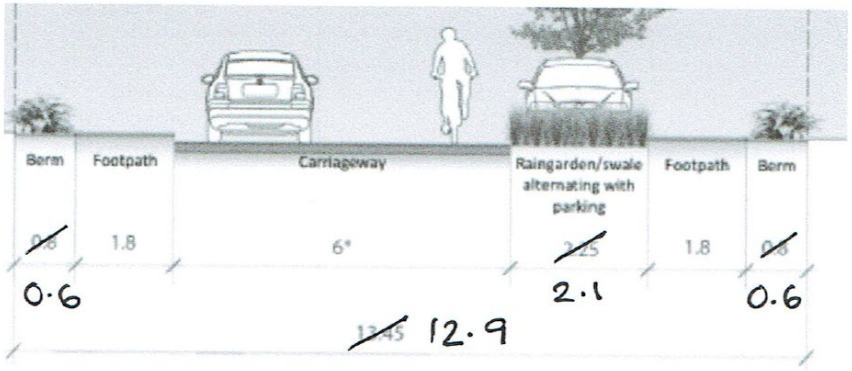
Local Street D (7A.4D 13)



Local Street E (7A.4D 14)



Local Street F (7A.4D 15)



Peri-Urban Road A (7A.4D 16)