Attachment 3 – Draft Monitoring Framework and Safe Systems Assessment for interim scheme

Notes from Design and Standards on Great North Road interim option -risks and monitoring framework

1. The reduction in safety measures may not lead to the expected increase in volume of users because it won't feel as safe.
2. Requires a budget to be assigned for the entire monitoring period to allow for rapid remedial changes should safety be compromised.
3. Communication of the project needs to clearly explain why we adopted this approach and not the full Vision Zero option.
4. The interim design will not fully enable the uptake of users from the interested but concerned class (60% of people are in this category). Will cater primarily for the strong & fearless and enthused & confident classes (10-15% of population).
5. May particularly impact uptake of school age children walking/cycling due to perception of reduced safety.

No	Item to be altered	Safe system design factor / Reason in original design	Demand evidence	Trail option or mitigation	Risks	Monitoring framework to signal re introduction
1	Concrete cycle separators	The current standards provide appropriate separation for cyclists to be physically safe from errant vehicles.	AT undertaking investigations to explore the delivery of alternative materials including rubber and plastic	AT delivers alternative separators along entire route with required width provided.	Increase cost in medium to long term Alternatives are less robust and provide less physical separation leading to reductions in perceived and actual safety for people bikes. The Climate Change Adaptation Policy will require an assessment of the environmental impacts of the use of plastic or rubber to ensure that unintended consequences are mitigated e.g., where roads have no treatment for runoff.	Monitoring of rubber separators undertaken over 3-year period post construction. Defects identified and replaced with plastic replacement on an ongoing basis. After 36 months assessment undertaken on asset life, replacement costs and cost benefit of plastic vs concrete. Outcome of investigation leads to replacement to concrete or ongoing rubber. it may be necessary during the monitoring period to change some of the separators to concrete if near misses or DSIs occur along the corridor to improve the safety for people bikes.

No	Item to be altered	Safe system design factor / Reason in original design	Demand evidence	Trail option or mitigation	Risks	Monitoring framework to signal re introduction
2	Pedestrian crossing - raised safety platform.	To reduce impact on vulnerable road users to a 40kmh speed environment. Crossings provided for 3x walking school buses and 1 bus stop to bus stop transfer	Current speed environment 85% below 50kmh. Existing speed limit to be maintained – timeframe for 40kmh not known at this stage.	AT installs new and upgraded crossing facilities without raised tables. Tables deferred.	School age children involved in crash at mid-block. Vehicle speed involved in crash. Peak pedestrian use of the road doesn't align with measured 85%ile vehicle speed.	Monitoring of corridor for 36 months post construction. Assessment of crashes and qualitative interviews from crossing participants and schools' representatives. After 36-month period if no increase in crash stats and positive or neutral qualitative interviews – no further actions. Opposite then implementation of raised tables progressed
3	Carriageway reseal	Realignment of carriageway space provides ghost markings of flush median, lane lines and bus lane markings Ensures that the surface is appropriate for high friction application to signalised intersections/crossings.	Potential increase for crashes due to ghost markings in wet and in degraded light conditions High friction surface cannot be applied due to oxidised and cracked surface.	Inspect signalised crossing locations to ensure surface is free of cracks and oxidation. Defer reseal until prioritised in the maintenance programme – currently sitting in the 4 – 5 year envelope	High friction surfacing delaminates with asphalt from road pavement. Higher opportunity for crashes involving vehicles seeing ghost markings.	Assessment of timeframe for reseal as part of maintenance programme. Monitoring of corridor for 36 months post construction in regard to crashes and level of causes due to ghost markings. If higher rate found, then reseal bought forward.
4	Side road raised table and changes to kerb radii to reduce vehicle speeds	Due to existing crash history of minor crashes involving vulnerable road users across 22 intersections. Safe system design outcome to mitigate removal of flush median to reduce speeds of right turning vehicles and to manage left turn in speeds to side roads from main road.	Existing crash history. Mitigation for changes to road environment.	AT delivers on road cycle lanes by reallocating road space from flush medium and parking lane. No changes to side road entrances provided except for coloured surfacing treatment across intersection for vehicles and cyclists. Intersection left turn speeds controlled through intersection geometry using tactical approaches, e.g., separators.	Intersections do meet ATs Vision Zero outcomes. A reduced safety system outcome and reduction in elements to reduce vehicle speed turning in and out of a side road intersection. Reduction in actual or perceived safety for people on bikes.	Monitoring of corridor for 36 months post construction. Assessment of crashes and qualitative interviews from crossing participants and business, residents, and schools' representatives. After 36-month period if no increase in crash stats and positive or neutral qualitative interviews – no further action. Opposite then implementation of raised tables and kerb radia changes across side roads progressed

No	Item to be altered	Safe system design factor / Reason in original design	Demand evidence	Trail option or mitigation	Risks	Monitoring framework to signal re introduction
5	Bus stop type 2 facilities	Where corridor width provides separate cycle and bus passenger conflicts by delivery of type 2 bus stop facilities rather than type 1	Proposed cycle and bus passenger number and land available within corridor	Deliver type 1 bus stops for all bus stops reducing costs and still providing speed managed safe environment to reduce conflict between users	Type 1 does not provide an alternative option to reduce bus passenger and cyclist conflict resulting in potential increased journey times for cyclists. Fast bike users (e.g. EBikes) are not physically slowed, reliant on user behaviour to meet Vision Zero outcomes.	Monitor corridor bus stops for 36 months after construction to assess safety, speed and reported conflict risks of type 1 bus stops. If negative outcomes / crash rate increases are found, then type 2 stops delivered where achievable in existing corridor.
6	Plantings reduced	Enhanced public environment to improve personal and transport safety outcomes	CPTED and safety assessments	Deliver required street planting to meet resource consent requirements	Community acceptance of design outcomes. No contribution to improved environmental outcomes or the Ngaire Urban Forest strategy.	None – related to resource consent

flow
TRANSPORTATION SPECIALISTS

technical note

PROJECT	**CONNECTED COMMUNITIES**
SUBJECT	**SAFE SYSTEM ASSESSMENT FOR GREAT NORTH ROAD (NEWTON) UPGRADE TRIAL PROPOSAL**
TO	**MATTHEW REDNALL, STEVE WILLIS**
FROM	KATHRYN MUSGRAVE
REVIEWED BY	ANGIE CRAFER
DATE	12 MAY 2023

1 INTRODUCTION

Flow has been requested to update the Safe System Assessment for the Great North Road (Newton) Upgrade to understand the implications of the proposed trial. As such, this technical note should be read in conjunction with the Flow Technical notes dated 20 March 2020 and a subsequent technical note to consider the removal of the flush median dated 23 July 2021.

This update has followed the same process used previously using the safe system assessment framework developed by Austroads and the subsequent Safe System audit guidelines from Waka Kotahi. The framework considers key crash types that lead to fatal and serious crash outcomes, the risks associated with these crashes (exposure, likelihood and severity), and how these can be reduced.

The assessment detailed in this report provides a summary and scores of how closely the proposed road design and its operation align with Safe System objectives and a comparison to the previous design assessed in 2020.

1.1 Summary of the proposed changes to the design

- Progress with the removal of the flush median to deliver cycle lanes and extended bus lanes
- Remove all side road treatments and raised tables for pedestrian crossings
- Plastic separators instead of concrete separators
- No resurfacing of the existing carriageway, so there is a risk of ghost markings.
- Minimisation of replanting to meet Resource Consent conditions only
- All type 1 bus stops
- Bus lane enforcement cameras provided

2 SAFE SYSTEM APPROACH FRAMEWORK (SSAF) ASSESSMENT

This section includes the SSAF assessment for the existing situation as carried out previously in 2020 and the proposed layout with changes outlined above.

Firstly, the context is set for each scenario. Only points relevant to a given scenario were considered. Any change in parameters between scenarios is indicated by a different colour (red for changes with the proposed design).

The context has been subsequently used to populate the Safe System Matrix. Factors that affect the risk and severity have been marked using a tick (✓ - positive effect), zero (○ - neutral effect) and cross (× - negative effect). In addition, a change in rating or final product between scenarios has been highlighted by a different colour.

2.1 Existing Arrangement – Context and safe system matrix

2.1.1 Context of the existing situation

Prompts	Comments
What is the reason for this assessment?	To assess the existing layout in terms of the Safe System Approach to serve as the baseline for a comparison with the proposed improved design
Is there a specific crash type risk? Are there specific issues such as poor speed limit compliance, road access, congestion, future traffic growth, freight movement, amenity concerns from the community, maintenance/asset renewal, etc.	◆ 131 crashes were recorded in the past 5 years, many involving vulnerable users ◆ A considerable number of driveways with some accommodating relatively large numbers of vehicles due to providing access to several sites or busy educational and commercial/retail activities ◆ Future growth – increased people using and living along the corridor ◆ Public concerns with car transporters unloading from the flush median and bus lanes

Prompts	Comments
What is the function of the road? Consider location, roadside land use, area type, speed limit, intersection type, presence of parking, public transport services and vehicle flows. What traffic features exist nearby (e.g. upstream and downstream)? What alternative routes exist?	◆ 4-lane major arterial (Great North Road) ◆ High traffic flows (>20,000 vpd) ◆ Bus route (peak bus lanes, off-peak parking) ◆ Flush median ◆ 23 side roads: T- or staggered intersections, give-way priority (except Bond Street, which is signalised) ◆ Relatively flat gradients ◆ Parallel routes: SH16, Williamson Ave ◆ Frontage is currently predominantly commercial/retail, a number of vehicle crossings and with a growing number of apartment buildings. ◆ Surrounding area residential (north), mixed residential (south) ◆ Auckland Council zoning allows for 'Mixed use' and 'Medium to high density residential development
What is the speed environment? What is the current speed limit? Has it changed recently? Is it similar to other roads of this type? How does it compare to Safe System speeds? What is the acceptability of lowering the speed limit at this location?	◆ 50 km/h speed limit ◆ Speed environment is not considered a safe system speed for pedestrians, cyclists and head-on impacts. ◆ 85th percentile speed is 49.8 km/hr, with 17% of vehicles exceeding the speed limit. ◆ Lowering the speed limit would affect bus operations (with a financial impact on contracted services)
What road users are present? Consider the presence of elderly, school children and cyclists. Also note what facilities are available to vulnerable road users (e.g. signalised crossings, bicycle lanes, school zone speed limits, etc.).	◆ Pedestrians ○ School children crossing from the Grey Lynn residential area to St Joseph's and Newton Central schools. ○ Pedestrians attending places of worship (St Joseph's Church) ○ Adequate footpath

Prompts	Comments
	○ Formal crossing facilities are limited to 3 signalised crossings (2 mid-block), 1 refuge island ○ Signalised crossings at the Bond Street intersection on 2 arms only ◆ Cyclists ○ 400 cyclists per day (cpd) in 2019 ○ Cyclists use the bus lane
What is the vehicle composition? Consider the presence of heavy vehicles (and what type), motorcyclists and other vehicles using the roadway	◆ 6% HCV (2019) ◆ Bus route ◆ Vehicle transporters for car dealerships offload from the flush median and bus lanes.

2.1.2 Safe System Matrix – Existing Situation

Risk	Run-off-road	Head-on	Intersection	Other	Pedestrian	Cyclist	Motorcyclist
Exposure	**Very high** $^{4}/_{4}$	**Very high** $^{4}/_{4}$	**Very high** $^{4}/_{4}$	**Very high** $^{4}/_{4}$	**Very high** $^{4}/_{4}$	**Very high** $^{4}/_{4}$	**High** $^{3}/_{4}$
Likelihood	**Unlikely** ✓ low speed[1] ✓ bus lanes create a buffer for general traffic ○ mostly straight with large radius bends	**Unlikely** ✓ flush median ○ medium speed[1] ○ mostly straight with large radius bends × No central barriers $^{2}/_{4}$	**Very Likely** ✓ flush median ○ medium speed[1] × give way control × restricted visibility (parked vehicles, uphill side roads, bend)	**Unlikely** ✓ low speed[1] ✓ central median ✓ dedicated traffic lanes × some rear-shunt accidents recorded $^{2}/_{4}$	**Likely** ✓ adequate footpaths × high speed[1] × poor provision of pedestrian crossing facilities × crossing not on all arms of Bond	**Likely** ○ some separation from general traffic in bus lanes × Number of sideroads and private accesses. × high speed[1]	**Likely** ○ some separation from general traffic in bus lanes × high speed[1] $^{3}/_{4}$

[1] For given impact type as per Austroads Guide to Traffic Management Part 13

Risk	Run-off-road	Head-on	Intersection	Other	Pedestrian	Cyclist	Motorcyclist
	× no barriers × trees and lighting column in close proximity $^{2}/_{4}$		× dedicated lanes (issues with visibility over stationary vehicles) × frequent accidents at intersections recorded $^{4}/_{4}$		Street intersection × frequent side streets and driveways × accidents involving pedestrians recorded $^{3}/_{4}$	× frequent side road crossings × no dedicated provision for cyclists $^{3}/_{4}$	
Severity	**Low** ✓ Low speed[1] × infrequent trees and lighting columns $^{2}/_{4}$	**High** ○ medium speed[1] $^{3}/_{4}$	**High** ○ medium speed[1] × side impacts $^{3}/_{4}$	**Low** ✓ Low speed[1] $^{2}/_{4}$	**Very high** × high speed[1] $^{4}/_{4}$	**Very high** × high vehicle speed[1] × high relative velocity[1] $^{4}/_{4}$	**High** × high speed[1] ○ low relative velocity[1] ○ typically wears protective gear $^{3}/_{4}$
Product	$^{16}/_{64}$	$^{24}/_{64}$	$^{48}/_{64}$	$^{16}/_{64}$	$^{48}/_{64}$	$^{48}/_{64}$	$^{27}/_{64}$
TOTAL	$\mathbf{^{227}/_{448}}$						

2.2 Proposed Arrangement Trial Scheme– context and safe system matrix

2.2.1 Proposed Design - Context

Prompts	Comments
What is the reason for the project?	◆ To assess the proposed layout in terms of the Safe Systems Approach and ascertain what improvements it delivers over the existing arrangement ◆ To improve safety for people on bikes, make bus journeys during peak times faster and more reliable and improve pedestrian and road safety in general.
Is there a specific crash type risk? Is it addressing specific issues such as poor speed limit compliance, road access, congestion, future traffic growth, freight movement, amenity concerns from the community, maintenance/asset renewal, etc.	◆ Protected/separated cycling infrastructure ◆ Improved public transport facilities
What is the function of the road? Consider location, roadside land use, area type, speed limit, intersection type, presence of parking, public transport services and vehicle flows. What traffic features exist nearby (e.g. upstream and downstream)? What alternative routes exist?	◆ 4-lane major arterial ◆ High traffic flows (>20,000 vpd) ◆ Bus route (peak bus lanes, off-peak parking) ◆ Flush median removed ◆ 23 side roads: T- or staggered intersections, give-way priority (except Bond Street), Grosvenor Street converted to one-way in. ◆ Relatively flat gradients ◆ Parallel routes: SH16, Williamson Ave ◆ Frontage is currently predominantly commercial/retail, a number of vehicle crossings and with a growing number of apartment buildings. ◆ Surrounding area residential (north), mixed residential (south) ◆ Auckland Council zoning allows for 'Mixed use' and 'Medium to high density residential development

Prompts	Comments
What is the speed environment? What is the current speed limit? Has it changed recently? Is it similar to other roads of this type? How does it compare to Safe System speeds? What is the acceptability of lowering the speed limit at this location?	◆ 50 km/h speed limit Adequate for the road type; but Above critical speeds for pedestrian, cyclist and head-on impacts
What road users are present? Consider the presence of elderly, school children and cyclists. Also note what facilities are available to vulnerable road users (e.g. signalised crossings, bicycle lanes, school zone speed limits, etc.).	◆ **Pedestrians** Crossing school children from the Grey Lynn residential area to St Joseph's and Newton Central Schools Demand at places for worship (St Joseph's Church) Adequate footpath Crossing facilities – a total of 4 mid-block crossings (additional 3) together with full signalised facilities at Bond Street Intersection ◆ **Cyclists** Estimated 1,000 up to 1,400 cpd in 2028 (depending on infrastructure elsewhere) Separated on-carriageway cycle lanes proposed (plastic separators)
What is the vehicle composition? Consider the presence of heavy vehicles (and what type), motorcyclists and other vehicles using the roadway	◆ 6% HCV ◆ Bus route

2.2.2 Safe System Matrix – Proposed Design

Risk	Run-off-road	Head-on	Intersection	Other	Pedestrian	Cyclist	Motorcyclist
Exposure	**Very high** $^{4}/_{4}$	**Very high** $^{4}/_{4}$	**Very high** $^{4}/_{4}$	**Very high** $^{4}/_{4}$	**Very high** $^{4}/_{4}$	**Very high** $^{4}/_{4}$	**High** $^{3}/_{4}$

Risk	Run-off-road	Head-on	Intersection	Other	Pedestrian	Cyclist	Motorcyclist
Likelihood	**Unlikely** ✓ low speed[1] ✓ bus lanes create a buffer for general traffic ✓ some additional deflection by separators barriers ○ mostly straight with large radius bends × trees and lighting column in close proximity $1.5/4$	**Likely** ○ medium speed ○ mostly straight with large radius bends × No central barriers × No central median × Narrower lanes × Ghost Markings $3/4$	**Very Likely** ○ medium speed[1] × give way control × no central median × restricted visibility (parked vehicles, uphill side roads, bends) × dedicated lanes (issues with visibility over stationary vehicles) × frequent accidents at intersections recorded $4/4$	**Likely** ✓ low speed ✓ dedicated traffic lanes × no central median × Narrower lanes × Ghost Markings × some rear-shunt accidents recorded $3/4$	**likely** ✓ adequate footpaths ✓ adequate provision of pedestrian crossing facilities ✓ crossing on all arms of Bond Street intersection × high speed × frequent side streets × cyclist vs pedestrian crashes × accidents involving pedestrians recorded $2.5/4$	**likely** ✓ midblock sections have a good level of separation from vehicular traffic in dedicated cycling facilities ○ painted cycle facility past side roads × frequent side streets × high speed × cyclist vs pedestrian crashes $2.5/4$	**Likely** ○ some separation from general traffic in bus lanes × high speed $3/4$
Severity	**Low** ✓ Low speed × infrequent trees and lighting columns $2/4$	**High** ○ medium speed $3/4$	**High** ○ medium speed × side impacts $3/4$	**Low** ✓ Low speed $2/4$	**Very high** × high speed $4/4$	**Very high** × high vehicle speed × high relative velocity $4/4$	**High** × high speed ○ low relative velocity ○ typically wears protective gear $3/4$

Risk	Run-off-road	Head-on	Intersection	Other	Pedestrian	Cyclist	Motorcyclist
Product	$^{12}/_{64}$	$^{36}/_{64}$	$^{48}/_{64}$	$^{24}/_{64}$	$^{40}/_{64}$	$^{40}/_{64}$	$^{27}/_{64}$
TOTAL	$^{\mathbf{227}}/_{\mathbf{448}}$						

2.3 Improvements to Proposed Layout Trial Scheme: Introduction of vertical deflection on mainline.

We have undertaken further assessments following discussions with the project team on how to increase further the overall safety rating for the proposed layout of the trial scheme.

This assessment includes:

- Vertical deflection of all mid-block crossings.
- Vertical deflection at high conflict points between pedestrians and cyclists on uni-directional cycleways.

2.3.1 Safe System Matrix

Risk	Run-off-road	Head-on	Intersection	Other	Pedestrian	Cyclist	Motorcyclist
Exposure	**Very high** $^{4}/_{4}$	**Very high** $^{4}/_{4}$	**Very high** $^{4}/_{4}$	**Very high** $^{4}/_{4}$	**Very high** $^{4}/_{4}$	**Very high** $^{4}/_{4}$	**High** $^{3}/_{4}$
Likelihood	**Very Unlikely** ✓ low speed[2] ✓ bus lanes create a buffer	**Likely** ○ medium speed[2] ○ mostly straight with large radius bends	**Very Likely** ○ medium speed[1] × give way control	**Likely** ✓ low speed ✓ dedicated traffic lanes	**Unlikely** ✓ adequate footpaths ✓ adequate provision of pedestrian	**likely** ✓ midblock sections have a good level of separation from vehicular traffic	**Likely** ○ some separation from general traffic in bus lanes

[2] For given impact type

Risk	Run-off-road	Head-on	Intersection	Other	Pedestrian	Cyclist	Motorcyclist
	for general traffic ✓ additional deflection by separators barriers ○ mostly straight with large radius bends × trees and lighting column in close proximity $^{1}/_{4}$	× No central barriers × No central median × Narrower lanes $^{3}/_{4}$	× no central median × restricted visibility (parked vehicles, uphill side roads, bends) × dedicated lanes (issues with visibility over stationary vehicles) × frequent accidents at intersections recorded $^{4}/_{4}$	× no central median × Narrower lanes × Ghost Markings × some rear-shunt accidents recorded $^{3}/_{4}$	crossing facilities ✓ crossing on all arms of Bond Street intersection × high speed × frequent side streets × cyclist vs pedestrian crashes × accidents involving pedestrians recorded ✓ Very high operating speeds managed through vertical deflection (cycleway and mid-block crossings) $^{2}/_{4}$	in dedicated cycling facilities. ○ painted cycle facility past side roads × frequent side streets × high speed × cyclist vs pedestrian crashes $2.5/_{4}$	× high speed $^{3}/_{4}$
Severity	**Low** ✓ Low speed[2] × infrequent trees and lighting columns $^{2}/_{4}$	**High** ○ medium speed[2] $^{3}/_{4}$	**High** ○ medium speed[2] × side impacts $^{3}/_{4}$	**Low** ✓ Low speed[2] $^{2}/_{4}$	**Very high** × high speed[2] $^{4}/_{4}$	**Very high** × high vehicle speed[2] × high relative velocity[2] $^{4}/_{4}$	**High** × high speed[2] ○ low relative velocity[2] ○ typically wears protective gear

Risk	Run-off-road	Head-on	Intersection	Other	Pedestrian	Cyclist	Motorcyclist
							$^{3}/_{4}$
Product	$^{8}/_{64}$	$^{36}/_{64}$	$^{48}/_{64}$	$^{24}/_{64}$	$^{32}/_{64}$	$^{40}/_{64}$	$^{27}/_{64}$
TOTAL	$\mathbf{^{213}/_{448}}$						

2.4 Improvements to Proposed Layout Trial Scheme: Introduction of vertical deflection on mainline and sideroad treatments at selected high-risk intersections

Further enhancement to the overall safety rating for the proposed layout of the trial scheme would be provided through the inclusion of side road treatments at the following intersections:

- Burns Street
- Waima Street
- Kirk Street
- Pollen Street
- Mackelvie Street
- Turakina Street
- Ariki Street
- Maidstone Street

2.3.1 Safe System Matrix

Risk	Run-off-road	Head-on	Intersection	Other	Pedestrian	Cyclist	Motorcyclist
Exposure	**Very high** $^4/_4$	**Very high** $^4/_4$	**Very high** $^4/_4$	**Very high** $^4/_4$	**Very high** $^4/_4$	**Very high** $^4/_4$	**High** $^3/_4$
Likelihood	**Very Unlikely** ✓ low speed[3] ✓ bus lanes create a buffer for general traffic ✓ additional deflection by separators barriers ○ mostly straight with large radius bends × trees and lighting column in close proximity $^1/_4$	**Likely** ○ medium speed[2] ○ mostly straight with large radius bends × No central barriers × No central median × Narrower lanes $^3/_4$	**Very Likely** ○ medium speed[1] × give way control × no central median × restricted visibility (parked vehicles, uphill side roads, bends) × dedicated lanes (issues with visibility over stationary vehicles) × frequent accidents at intersections recorded $^4/_4$	**Likely** ✓ low speed ✓ dedicated traffic lanes × no central median × Narrower lanes × Ghost Markings × some rear-shunt accidents recorded $^3/_4$	**Unlikely** ✓ adequate footpaths ✓ adequate provision of pedestrian crossing facilities ✓ crossing on all arms of Bond Street intersection × high speed × frequent side streets × cyclist vs pedestrian crashes × accidents involving pedestrians recorded ✓ Very high operating speeds	**Unlikely** ✓ midblock sections have a good level of separation from vehicular traffic in dedicated cycling facilities ○ frequent side road crossings, albeit improved × high speed × cyclist vs pedestrian crashes $^2/_4$	**Likely** ○ some separation from general traffic in bus lanes × high speed $^3/_4$

[3] For given impact type

					managed through vertical deflection (cycleway and mid-block crossings) $^{2}/_{4}$		
Severity	**Low** ✓ Low speed[2] × infrequent trees and lighting columns $^{2}/_{4}$	**High** ○ medium speed[2] $^{3}/_{4}$	**High** ○ medium speed[2] × side impacts $^{3}/_{4}$	**Low** ✓ Low speed[2] $^{2}/_{4}$	**Very high** × high speed[2] $^{4}/_{4}$	**Very high** × high vehicle speed[2] × high relative velocity[2] $^{4}/_{4}$	**High** × high speed[2] ○ low relative velocity[2] ○ typically wears protective gear $^{3}/_{4}$
Product	$^{8}/_{64}$	$^{36}/_{64}$	$^{48}/_{64}$	$^{24}/_{64}$	$^{32}/_{64}$	$^{32}/_{64}$	$^{27}/_{64}$
TOTAL	$^{207}/_{448}$						

3 COMPARISON OF RESULTS

3.1 Summary of SSAF matrix scores

Scenario	Run-off-road	Head-on	Intersection	Other	Pedestrian	Cyclist	Motorcyclist	TOTAL
Existing	$^{16}/_{64}$	$^{24}/_{64}$	$^{48}/_{64}$	$^{16}/_{64}$	$^{48}/_{64}$	$^{48}/_{64}$	$^{27}/_{64}$	$^{\mathbf{227}}/_{\mathbf{448}}$

Scenario	Run-off-road	Head-on	Intersection	Other	Pedestrian	Cyclist	Motorcyclist	TOTAL
Previous SSAF	$^{8}/_{64}$	$^{36}/_{64}$	$^{48}/_{64}$	$^{24}/_{64}$	$^{32}/_{64}$	$^{32}/_{64}$	$^{27}/_{64}$	$^{\mathbf{207}}/_{\mathbf{448}}$
Updated SSAF Trial Scheme	$^{12}/_{64}$	$^{36}/_{64}$	$^{48}/_{64}$	$^{24}/_{64}$	$^{40}/_{64}$	$^{40}/_{64}$	$^{27}/_{64}$	$^{\mathbf{227}}/_{\mathbf{448}}$
Updated SSAF Trial Scheme with a vertical deflection on mainline	$^{8}/_{64}$	$^{36}/_{64}$	$^{48}/_{64}$	$^{24}/_{64}$	$^{32}/_{64}$	$^{40}/_{64}$	$^{27}/_{64}$	$^{\mathbf{213}}/_{\mathbf{448}}$
Updated SSAF Trial Scheme with vertical deflection and side road treatments	$^{8}/_{64}$	$^{36}/_{64}$	$^{48}/_{64}$	$^{24}/_{64}$	$^{32}/_{64}$	$^{32}/_{64}$	$^{27}/_{64}$	$^{\mathbf{207}}/_{\mathbf{448}}$

3.2 DSI and potential savings

Scenario	DSI equivalent	% reduction	SSA Score
Existing	8.3		$^{\mathbf{227}}/_{\mathbf{448}}$
Previous SSAF	7.6	8.8%	$^{\mathbf{207}}/_{\mathbf{448}}$
Updated SSAF Trial Scheme	8.3	0%	$^{\mathbf{227}}/_{\mathbf{448}}$

Updated SSAF Trial Scheme with a vertical deflection on mainline	7.8	6.6%	$^{213}/_{448}$
Updated SSAF Trial Scheme with vertical deflection and side road treatments	7.6	8.8%	$^{207}/_{448}$

3.3 Discussion & Recommendations

Our assessment demonstrates that the trial scheme will have the same overall safety rating as the current layout. This is due to removing the central median balancing the safety improvements provided by the provision of the separated cycle facilities and improved crossing facilities.

It is recommended that vertical deflection on the mainline and sideroad treatments at the higher-risk intersections be incorporated into the trial, which would reduce the score to be comparable to the full scheme; however, this will need to be monitored to enable an understanding of the adequacy of interventions to manage the likelihood of crashes occurring with further improvements implemented if required to manage side road conflicts and operating speeds of all modes.

Reference: \\flow-dc01\Projects\ATCC\002 SP2\Great North Road _NEWTON _1 City to New Lynn\T1A230508 GNR Newton DRAFT SSAF FLOW update following design changes.docx