AECOM Imagine it. Delivered.

Wellington Road Multi-Modal Corridor Study

Detailed Appraisal – Executive Summary

Aberdeen City Council

Project number: 60597273

July 2021

Executive Summary

Background

In 2014, Nestrans commissioned AECOM to undertake a multi-modal transport study on the Wellington Road corridor, with the aim of generating and assessing options consistent with the aims and objectives of a previous 'locking in the benefits' study in relation to the Aberdeen Western Peripheral Route (AWPR) and that addresses current and future planned developments on the corridor. This Initial Appraisal (Case for Change) Study was published in January 2015[1] and included the identification of key problems, issues, opportunities and constraints on the corridor; development of Transport Planning Objectives (TPOs) for the study; generation of a long list of options; and a high level option appraisal to sift the long options list into a shorter list for more detailed consideration.

In 2017, Aberdeen City Council (ACC) commissioned AECOM to undertake a Preliminary Options Appraisal to define and assess options for improving strategic connections and active travel along the Wellington Road corridor, building on the previous work undertaken in 2014-15. This study was published in April 2018[2] and included revalidation of the problems, issues, opportunities, and constraints identified at the Initial Appraisal stage; identification of a series of options and packages for assessment within the Preliminary Appraisal assessment framework and recommended a shortlist of improvement options for more detailed appraisal.

Subsequently, AECOM was commissioned in November 2018 to undertake a Detailed Options Appraisal of the shortlisted options. This stage of the appraisal included further option development; updated context setting; assessment of the options against TPOs, STAG Criteria, Cost to Government, and Implementability Criteria noting key risks and uncertainties; and consultation and engagement, informing Public Acceptability of the option packages identified for detailed appraisal.

Study Area

The Wellington Road corridor is a strategic corridor which links Aberdeen city centre and the wider southern extents of Aberdeen City to the A92(T) and the AWPR via the A956(T). The corridor stretches for approximately three miles from the Charleston Interchange at the A92 to the Queen Elizabeth Bridge (QEB), which crosses the River Dee close to the city centre.

Figure 1: Wellington Road Study Corridor

[1] https://www.nestrans.org.uk/wp-content/uploads/2017/02/2015_01_21_WR_Multimodal_Corridor_Study_Final_Report.pdf
[2] https://www.aberdeencity.gov.uk/services/roads-transport-and-parking/wellington-road-transport-study

Aberdeen South Harbour Study

The development of Aberdeen South Harbour at the Bay of Nigg is being taken forward in response to constraints at the existing harbour in the city centre and is an expansion of activities aimed at capitalising on new and emerging markets as the harbour will be able to accommodate larger vessels. Once complete, Aberdeen South Harbour will provide:

- 1,400m of quay at water depths of up to 10.5m;
- A turning circle of 300m;
- A channel width of 165m;
- A laydown area of 125,000m^2; and
- Heavy lifting capacity.

The main access to Aberdeen South Harbour will be located close to the existing Coast Road/St Fittick's Road/Greyhope Road Junction. Aberdeen South Harbour is anticipated to be completed in 2022 and has the potential to stimulate growth in the economy, employment, and tourism.

The work undertaken as part of the Wellington Road Study has taken cognisance of the recently completed External Transportation Links to Aberdeen South Harbour STAG Appraisal. This study considered transport connections to the new harbour, including the identification of appropriate transport infrastructure and connectivity upgrades.

Additional traffic generated by the new harbour (and recently proposed Energy Transition Zone), as well as the infrastructure proposed under the various options being considered, has the ability to alter traffic flows, patterns, and routeing along the Wellington Road corridor. Collaboration has been ongoing throughout the process of developing the two studies to ensure that options developed are complementary.

Following completion of the study, a preferred road option was approved by ACC. This option involves improving the existing route towards Aberdeen South Harbour via Hareness Road through the provision of a new bridge over the railway on Coast Road and providing capacity improvements. An updated Strategic Business Case is currently being prepared prior to the next stage in the design and delivery process.

Transport Planning Objectives

In line with STAG, the TPO objective setting process for this study was driven by an understanding of the evidence-based problems and opportunities identified along the Wellington Road corridor during the Initial Appraisal stage of the study (and revalidated during the Preliminary Appraisal).

The final TPOs for the study are shown in the table below, as agreed with the Client Group in March 2021.

Table 1: Final Study Transport Planning Objectives

Ref	TPO at Preliminary Appraisal Stage
TPO1	Provide greater priority to sustainable modes of transport on the corridor and facilitate locking in of the benefits of the AWPR
TPO2	Facilitate efficient movement of freight on the corridor
TPO3	Reduce and manage traffic demands at key pinch points on the corridor, taking cognisance of the framework provided by the Roads Hierarchy
TPO4	Improve accessibility to employment and education areas on the corridor
TPO5	Promote a transport corridor which is safe for all users
TPO6	Promote a transport corridor which supports air quality improvement strategies and improves public health

Option Packaging

Following initial modelling tests undertaken, three packages were identified for appraisal:

- **Active Travel Package** – introduces interventions that aim to prioritise people walking and cycling on the corridor through dedicated cycling infrastructure and improvements at key junctions;
- **Public Transport Package** – introduces interventions that aim to prioritise bus users through bus lanes and bus priority through key junctions; and
- **Multi-Modal Travel and Transport Package** – introduces interventions that aim to provide balanced improvements across key modes for those walking, cycling, using public transport and for freight movements along the corridor.

Final Package Components

The final package components that formed the basis for appraisal are outlined below.

Active Travel Package

The final Active Travel Package for appraisal is made up of the following key components:

- With-flow kerb segregated cycleway;
- Removal of Souterhead Roundabout, with improved active travel facilities;
- Removal of Hareness Roundabout, with improved active travel facilities; and
- Right-turn ban from Wellington Road onto Abbotswell Road.

It should be noted that, given the focus on active travel as part of this package, the existing bus lane between Balnagask Road and QEB has not been retained. This package proposes conversion of the existing bus lane to an all vehicle lane, however, there would remain adequate space to retain the existing bus lane if desired.

Table 2 provides the approximate length of with-flow cycleway that is introduced along the various sections of the corridor, relative to the active travel infrastructure provided in the Do Minimum scenario. It should be noted that Section 2 (Souterhead Roundabout) and Section 4 (Hareness Roundabout) are omitted from the table as interventions in these locations have been covered separately above. This package increases the number of crossing points at Souterhead from 2no. to 7no. (staggered) and at Hareness from 2no.[3] to 4no.

Table 2: Approximate Lengths of Active Travel Infrastructure along Corridor

	Section 1: Charleston to Souterhead		Section 3: Souterhead to Hareness		Section 5: Hareness to Craigshaw Rd		Section 6: Craigshaw Rd to Balnagask Rd		Section 7: Balnagask Rd to QEB	
	Do Min	AT Package	Do Min	AT Package	Do Min	AT Package	Do Min	AT Package	Do Min	AT Package
NB	Footway = 310m Shared Use = 1140m Gap = 700m	Footway = 1455m With-flow cycleway = 1455m Shared Use = 695m	Shared Use = 840m	Footway = 840m With-flow cycleway = 840m	Footway = 1020m	Footway = 1020m With-flow cycleway = 1020m	Footway = 410m	Footway = 410m With-flow cycleway = 410m	Footway = 650m Bus lane = 420m[4]	Footway = 650m With-flow cycleway = 650m
SB	Shared Use = 1635m Gap = 200m	Footway = 1460m	Shared Use = 850m	Footway = 850m	Footway = 1030m	Footway = 1030m	Footway = 410m	Footway = 410m	Footway = 650m	Footway = 650m

[3] Existing crossings are not located directly at Hareness Roundabout – 1no. 50m to the west on West Tullos Road and 1no. 65m north on Wellington Road (applicable in all packages). In all packages, the proposed improvements at Hareness would involve consolidation of the existing crossing points, meaning that the existing crossing on Wellington Road to the north of the roundabout would be removed.
[4] Bus lane use by cyclists is permitted.

	Section 1: Charleston to Souterhead		Section 3: Souterhead to Hareness		Section 5: Hareness to Craigshaw Rd		Section 6: Craigshaw Rd to Balnagask Rd		Section 7: Balnagask Rd to QEB	
	Do Min	AT Package	Do Min	AT Package	Do Min	AT Package	Do Min	AT Package	Do Min	AT Package
		With-flow cycleway = 1460m Shared Use = 375m		With-flow cycleway = 850m		With-flow cycleway = 1030m		With-flow cycleway = 410m		With-flow cycleway = 650m

As shown in the table above, there are gaps in active travel provision in Section 1, with no pedestrian or cycle infrastructure (including footways) provided for 700m northbound between Charleston and Souterhead (between Loirston Loch and Charleston Road North) and for 200m southbound in proximity to the Old Wellington Road Junction. Additionally, there is currently no dedicated infrastructure for cycling to the north of Hareness Roundabout. Where there is existing shared use infrastructure in the south of the corridor, some sections are relatively poor quality (e.g. between Souterhead and Hareness where the paths are generally less than 2m wide).

Public Transport Package

The final Public Transport Package for appraisal is made up of the following key components:

- Sections of bus lane in both directions;
- Existing Souterhead Roundabout, with bus priority signals southbound;
- Removal of Hareness Roundabout, with improved active travel facilities; and
- Right-turn ban from Wellington Road onto Abbotswell Road.

Table 3 provides the approximate length of bus lane that is introduced along the various sections of the corridor, relative to the Do Minimum scenario. It should be noted that Section 2 (Souterhead Roundabout) and Section 4 (Hareness Roundabout) are omitted from the table as interventions in these locations have been covered separately above. This package increases the number of crossing points at Hareness from 2no. to 4no.

Table 3: Approximate Lengths of Bus Lane along Corridor

	Section 1: Charleston to Souterhead		Section 3: Souterhead to Hareness		Section 5: Hareness to Craigshaw Rd		Section 6: Craigshaw Rd to Balnagask Rd		Section 7: Balnagask Rd to QEB	
	Do Min	PT Package	Do Min	PT Package	Do Min	PT Package	Do Min	PT Package	Do Min	PT Package
Northbound	0m	0m	0m	0m	0m	+575m	0m	+85m	405m	+85m
Southbound	0m	0m	0m	+160m	0m	+300m	0m	+160m	0m	+305m

Multi-Modal Package

The final Multi-Modal Package for appraisal is made up of the following key components:

- Two-way kerb segregated cycleway;
- Sections of shared bus/HGV lane in both directions;
- Existing Souterhead Roundabout, with additional toucan crossings on Souter Head Road, Langdykes Road and Wellington Circle;
- Removal of Hareness Roundabout, with improved active travel facilities; and
- Right-turn ban from Wellington Road onto Abbotswell Road.

Table 4 provides the approximate lengths of two-way cycleway and shared bus/HGV lane along the various sections of the corridor, relative to the Do Minimum scenario. It should be noted that Section 2 (Souterhead Roundabout) and Section 4 (Hareness Roundabout) are omitted from the table as interventions in these locations have been covered separately above. This package increases the number of crossing points at Hareness from 2no. to 4no. As noted above for the Active Travel Package, there is currently no dedicated infrastructure for cycling to the north of Hareness Roundabout. Where there is existing shared use infrastructure in the south of the corridor, some sections are relatively poor quality (e.g. between Souterhead and Hareness where the paths are generally less than 2m wide). It should be noted that there are gaps in active travel provision in Section 1, with no pedestrian or cycle infrastructure (including footways) provided for 700m northbound between Charleston and Souterhead (between Loirston Loch and Charleston Road North) and for 200m southbound in proximity to the Old Wellington Road Junction.

Table 4: Approximate Lengths of Intervention along Corridor

Intervention		Section 1: Charleston to Souterhead		Section 3: Souterhead to Hareness		Section 5: Hareness to Craigshaw Rd		Section 6: Craigshaw Rd to Balnagask Rd		Section 7: Balnagask Rd to QEB	
		Do Min	MM Package	Do Min	MM Package	Do Min	MM Package	Do Min	MM Package	Do Min	MM Package
Active Travel Infrastructure	**SB[5]**	Shared Use = 1635m Gap = 200m	Footway = 1460m Two-way cycleway = 1460m Shared Use = 375m	Shared Use = 850m	Two-way cycleway = 850m	Footway = 1030m	Two-way cycleway = 1030m	Footway = 410m	Two-way cycleway = 410m	Footway = 650m	Two-way cycleway = 650m
Shared bus/HGV lane	**NB**	0m	0m	0m	0m	0m	+355m	0m	+70m	Bus lane = 405m	+100m (converted to shared HGV/bus lane)
	SB	0m	0m	0m	+225m	0m	+170m	0m	0m	0m	+250m

[5] Assumed to be on the east side for the purposes of the assessment.

Traffic Modelling

To assist the detailed appraisal of options, the Wellington Road Corridor Microsimulation Model was developed using Paramics Discovery software. The model area of focus is highlighted in orange in **Figure 2** below with the Wellington Road Corridor shown in red. The network encompasses the Wellington Road corridor between the A92/A956 and QEB, including all the main connecting side roads. The modelled network also contains the Altens Industrial Estate east of the Wellington Road corridor and the Coast Road/Langdykes Road in Cove Bay.

Figure 2: A956 Wellington Road Corridor – Modelled Area

Do Minimum Model (2026)

The Wellington Road Corridor Microsimulation Model comprised the Do Minimum for the study, which was used in order to provide the basis for comparison of other options. The Do Minimum model included assumptions around background traffic growth, including committed development in the area and infrastructure changes to the network, as presented below.

Developments

- Stationfields, Cove;
- Loirston Development;
- Altens East and Peterseat, Altens Industrial Estate;
- Energy from Waste Plant, East Tullos;
- Aberdeen South Harbour; and
- Energy Transition Zone.

Infrastructure

- The linking up of Palmerston Road to North Esplanade West at the northern extent of the model. This enables vehicles travelling between North Esplanade West and South College Street to route via Palmerston Place instead of the roundabout of North Esplanade West/South College Street/Wellington Road/Riverside Drive.
- Removal of signals on Coast Road due to provision of a new bridge over the railway under the proposed improvements for Aberdeen South Harbour.
- Additional capacity at the Wellington Road/Greenwell Road Junction with a two-lane section extending back on Greenwell Road from the junction approximately 50m introduced in 2019.
- 'Ghost links' added to the model to enable route choice from the north. The ghost links were constrained to allow only light vehicle traffic associated with the new harbour and proposed Energy Transition Zone sites to use them. In this way, base traffic was maintained as is and HGV traffic associated with the harbour/proposed Energy Transition Zone sites was still required to route via the defined Aberdeen freight routes.

Additional Lane Sub-Test

In addition to the packages outlined, an additional sub-test was undertaken in the context of the Multi-Modal Package. This included an additional lane for use by buses and HGVs northbound between Charleston Road North and Hareness Junction. It should be noted that delivery of this additional lane in combination with the proposed two-way segregated cycleway would be anticipated to require removal of the central reservation or land acquisition on the west side of Wellington Road.

Modelling Conclusions

The option packages were tested within the Wellington Road Corridor Microsimulation Model. The following table provides a general overview of the performance of each package based on the end-to-end journey times anticipated for each model, relative to the Do Minimum. In the table below, the following guide has been used:

- **Less than 1 minute** = Negligible (-);
- **1-2 minutes** = Minor Benefit (✓) or Impact (×);
- **2-3 minutes** = Moderate Benefit (✓✓) or Impact (××); and
- **3+ minutes** = Major Benefit (✓✓✓) or Impact (×××).

Table 5: Overview of Each Package

		All Vehicles		HGVs		Buses	
		NB	SB	NB	SB	NB	SB
Active Travel Package	AM Peak (07:00-09:00)	-	××	-	××	-	-
	PM Peak (16:00-18:00)	×	-	××	×	×	-
Public Transport Package	AM Peak (07:00-09:00)	-	×	-	×	-	-
	PM Peak (16:00-18:00)	-	××	-	××	✓	×
Multi-Modal Package	AM Peak (07:00-09:00)	×	-	-	-	-	-
	PM Peak (16:00-18:00)	-	×××	✓	×	-	×
Sub-test	AM Peak (07:00-09:00)	-	-	✓✓	-	-	-
	PM Peak (16:00-18:00)	-	×××	✓	×	✓	×

It should be emphasised that the above guide has been used for the purposes of comparison of the operational performance of option packages within the Wellington Road Corridor Microsimulation Model. Whilst negative impacts are shown for a number of the packages above, it is unlikely that journey time increases of 1-2 minutes would be observed by the majority of users. Furthermore, given the Sustainable Travel Hierarchy and the requirement to reduce car kilometres by 20% by 2030, journey time increases for vehicles may have to be accommodated in order to encourage a modal shift from motorised transport.

Consultation & Engagement

Following the formulation of option packages, members of the public and stakeholders were given the opportunity to provide feedback on proposals for the Wellington Road corridor through an online survey hosted on ACC's Citizen Space portal from 12th April 2021 to 10th May 2021[6]. There were 130 responses received during this round of consultation, with the feedback received being used to inform the Public Acceptability element of the appraisal.

The results indicated support for the Active Travel and Multi-Modal Packages, with less overall support for the Public Transport Package. The diagram below highlights the extent to which respondents indicated their agreement with the three option packages.

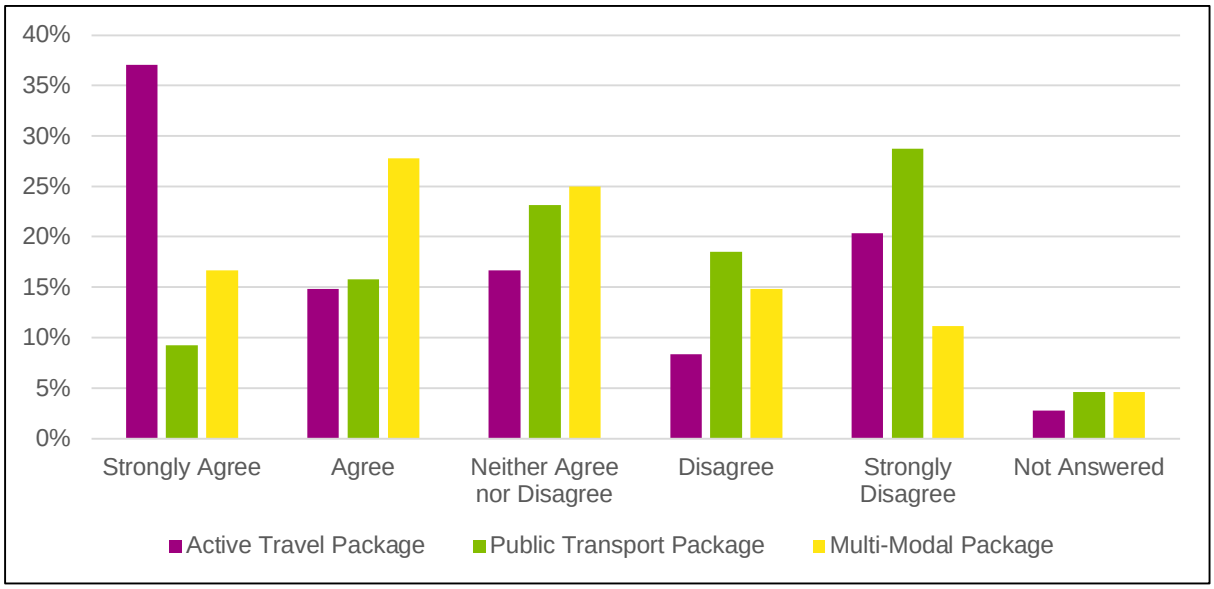

Figure 3: Level of Agreement with Packages

The table below provides an overview of the key types of comments made in support of and against the three packages.

Table 6: Key Feedback on Option Packages

Option Test	Positive	Negative
Active Travel Package	• Improved feelings of safety for active travel users • Encourage increased walking and cycling	• Concerns about delays to general traffic, particularly freight vehicles • Concerns about the topography of Wellington Road for cycling
Public Transport Package	• Supporting modal shift (and reduced vehicle emissions) • Improved opportunities for those without access to a car	• Relatively low number of bus services currently operating on the corridor • Concerns about delays to general traffic
Multi-Modal Package	• Equal share of road space across modes • Improved feelings of safety for active travel users • Desire to see with-flow option included within this package	• Concerns about the safety of the two-way cycleway in comparison to the with-flow option • Concerns about delays to general traffic and difficulties for HGVs turning right at Hareness Road

[6] The full scope of the public and stakeholder engagement exercise is set out in Chapter 6 of the main report.

Appraisal Findings

The option packages were appraised against the TPOs, the STAG Criteria (Environment, Safety, Economy, Integration, and Accessibility and Social Inclusion), and Implementability Criteria (Feasibility, Affordability, and Public Acceptability).

TPOs

The results of the appraisal against the TPOs are summarised in the table below.

Table 7: Summary of Appraisal against TPOs

Package	Performance vs TPO					
	TPO1 – Sustainable Modes Priority	TPO2 – Freight	TPO3 – Traffic Management	TPO4 - Accessibility	TPO5 - Safety	TPO6 – Air Quality & Public Health
Do Minimum	-	-	-	-	-	-
Active Travel	✓✓	××	××	✓	-	-
Public Transport	✓	××	××	-	-	×
Multi-Modal	✓✓	✓	××	✓	✓	-

The key outcomes from the TPO appraisal are as follows:

- TPO1 – All packages are considered to generate benefits in terms of providing greater priority to sustainable modes of transport relative to the Do Minimum. The Active Travel and Multi-Modal Packages are considered to provide more significant benefits than the Public Transport Package due to the inclusion of dedicated cycling infrastructure along the corridor and improved infrastructure for active travel users at Souterhead.
- TPO2 – The Active Travel Package and Public Transport Package are considered to generate moderate negative impacts in terms of facilitating efficient movement of freight to Aberdeen South Harbour and the proposed Energy Transition Zone due to the delays caused to general traffic on the network (for some movements). The Multi-Modal Package provides minor benefits to HGVs due to the introduction of some HGV priority as part of this package.
- TPO3 – All packages are considered to generate moderate negative impacts in terms of traffic management due to delays caused on the network as a result of the proposed interventions. Analysis of the modelling results indicates the potential for the introduction of a number of mitigation measures to minimise delays caused by the packages, including exclusion of the Souterhead Junction improvement in the Active Travel Package, exclusion of southbound bus lanes in the Public Transport Package, and exclusion of the southbound shared bus/HGV lanes in the Multi-Modal Package.
- TPO4 – All packages provide variable impacts in terms of accessibility to employment and education, with the Active Travel and Multi-Modal Packages providing significant accessibility improvements for pedestrians and cyclists, whilst slightly reducing accessibility for bus and car users. Given the significant accessibility improvements for active travel users, these packages were assessed as providing minor beneficial impacts overall. It is considered that the Public Transport Package could provide slight benefits to active travel users and bus users whilst reducing accessibility by car. Given the slight benefits provided to active travel users relative to the Active Travel and Multi-Modal Packages, the Public Transport Package is considered to provide no benefit or impact overall.
- TPO5 – The Active Travel Package and Public Transport Package are considered to provide no benefit or impact in terms of safety for users. For the Active Travel Package, this reflects the balance between safety improvements (associated with dedicated cycling infrastructure and improvements for active travel users at major junctions) and potential negative safety implications (associated with the increased accident severity for general traffic due to the reconfiguration at Hareness and Souterhead and the proposed removal of the central reservation between Hareness and Polwarth Road). The Public Transport Package offers safety improvements for active travel users through the introduction of signal control at Hareness, whilst having the potential to introduce negative safety implications for general traffic. The Multi-Modal Package is considered to provide minor safety improvements through dedicated cycling infrastructure, additional toucan crossing points at Souterhead and signal control at Hareness (with benefits for active travel users). The introduction of

signal control at Hareness, in line with the other packages, could introduce negative safety implications for general traffic.

- TPO6 – The Active Travel Package and Multi-Modal Package are considered to provide no benefit or impact in terms of air quality and health, reflecting the potential for positive impacts relating to modal shift against the adverse impacts that would be caused by congestion on the road network. The Public Transport Package is considered to result in negative impacts in terms of air quality and health as it is not anticipated that interventions included within the package would result in significant mode shift and therefore it is considered that there could be negative overall impacts associated with increased delays on the road network.

Implementability Criteria

The results of the appraisal against the Implementability Criteria are summarised in the table below.

Table 8: Summary of Appraisal against Implementability Criteria

Package	Feasibility	Affordability	Public Acceptability
Do Minimum	-	-	-
Active Travel	×	**Very High Cost**	✓
Public Transport	×	**Low Cost**	××
Multi-Modal	××	**High Cost**	✓

The key outcomes from the Implementability appraisal are as follows:

- Feasibility – The feasibility considerations associated with the implementation of the option packages are considered to provide a minor risk to the deliverability of the Active Travel and Public Transport Packages, primarily in relation to the requirement for land purchase in the northern section of the corridor at the former HM Craiginches Prison Site. Feasibility considerations are considered to provide a moderate risk to the deliverability of the Multi-Modal Package as currently presented due to the constraints north of Grampian Place, which would require significant works to be undertaken in order to deliver a shared bus/HGV lane in this location in combination with a two-way segregated cycleway. It is therefore anticipated that there would be a requirement to prioritise one intervention over the other in this location.
- Affordability – The Active Travel Package is anticipated to constitute a very high cost in terms of capital construction costs; the Multi-Modal Package is anticipated to constitute a high cost and the Public Transport Package is anticipated to constitute a low cost. For all packages, varying maintenance costs would also be required.
- Public Acceptability – The online survey that was undertaken indicated a level of support for the Active Travel and Multi-Modal Packages whereas the Public Transport Package generated a significant level of opposition.

STAG Criteria

The results of the appraisal against the STAG Criteria are summarised in the table below.

Table 9: Summary of STAG Criteria Appraisal

	ENVIRONMENT								SAFETY		ECONOMY			INTEGRATION			ACCESSIBILITY & SOCIAL INCLUSION			
	Noise & Vibration	Global Air Quality	Local Air Quality	Water Quality, Drainage & Flood Defence	Biodiversity & Habitats	Landscape & Visual Amenity	Cultural Heritage	Physical Fitness	Accidents	Security	Transport Economic Efficiency (TEE)	Wider Economic Impacts (WEIs)	Active Travel Economic Assessment	Transport Integration	Transport & Land Use Integration	Policy Integration	Public Transport Network Coverage	Local Accessibility	Impacts by People Group	Impacts by Geographical Location
Do Minimum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Active Travel	××	×	××	××	××	✓	-	✓✓✓	-	-	××	✓	-	✓	-	✓✓	-	✓✓	✓	-
Public Transport	×	×	×	×	×	-	-	✓	-	-	×××	✓	-	-	-	-	-	-	-	-
Multi-Modal	×	×	-	×	×	✓	-	✓✓	✓	-	××	✓	✓	✓	✓	✓✓	-	✓✓	✓	-

The key outcomes from the STAG Criteria appraisal are as follows:

- Environment – All packages generate some environmental concerns relating to noise and vibration, air quality, water quality, drainage and flood defence, and biodiversity and habitats, with the Active Travel Package generating more significant concerns primarily due to the more significant intervention at Souterhead Junction in this package. There are potential measures that could be implemented to mitigate these impacts. There are anticipated benefits in terms of landscape and visual amenity, and physical fitness, particularly with the Active Travel and Multi-Modal Packages.
- Safety – None of the packages are considered to generate any security concerns. The Active Travel Package and Public Transport Package are considered to provide no benefit or impact in terms of safety for users. For the Active Travel Package, this reflects the balance between safety improvements (associated with dedicated cycling infrastructure and improvements for active travel users at major junctions) and potential negative safety implications (associated with the increased accident severity for general traffic due to the reconfigurations of Hareness and Souterhead and the proposed removal of the central reservation between Hareness and Polwarth Road). The Public Transport Package offers safety improvements for active travel users through the introduction of signal control at Hareness, whilst having the potential to introduce negative safety implications for general traffic. The Multi-Modal Package is considered to provide minor safety improvements for active travel users through dedicated cycling infrastructure, additional toucan crossing points at Souterhead and signal control at Hareness. The introduction of signal control at Hareness, in line with the other packages, could introduce negative safety implications for general traffic.
- Economy – There are significant negative impacts in terms of the TEE analysis, however, there are potential mitigation measures that could be implemented to minimise impacts to general traffic in all packages, to a greater or lesser extent. Some minor benefits would be anticipated in terms of wider economic impacts for all packages, primarily in terms of providing businesses with access to a wider pool of labour due to improved accessibility. The two-way segregated cycleway element of the Multi-Modal Package is anticipated to generate a low to medium value for money and has therefore been assessed as providing a minor beneficial impact in terms of the active travel economic assessment.
- Integration – The Public Transport Package is considered to provide negligible impacts in terms of integration, with limited impacts anticipated in terms of transport integration and policy integration. The Active Travel and Multi-Modal Packages perform well against the transport integration and the policy integration criteria due to the tie-in with the wider active travel network and the support the interventions provide to policy priorities at the national, regional, and local level.
- Accessibility & Social Inclusion – All packages are considered to generate a negligible impact in terms of public transport network coverage as it is anticipated that the minor improvements to bus journey times (for some journeys) in the Public Transport and Multi-Modal Packages would not be significant enough to generate knock-on service improvements. In addition, none of the packages are anticipated to generate impacts by geographical area. The Active Travel and Multi-Modal Packages would be anticipated to generate beneficial impacts in terms of local accessibility and impacts by people group overall.

Cost to Government

The outline costs for each package are provided in the table below, with numbers rounded to the nearest £100. It is noted that design is in early stages and through design development and value engineering, the costs of schemes can be managed.

It should be noted that package costs do not include pricing of further investigation/survey, land purchase, relocation of utilities, structures, retaining walls, enhanced drainage, path lighting, TROs etc. Costs have been informed by the application of similar local authority framework rates and, where appropriate, priced from similar schemes. Outline costs are inclusive of optimism bias at 44%.

Table 10: Estimated Scheme Costs

Cost Element	Active Travel Package	Public Transport Package	Multi-Modal Package
TOTAL PACKAGE COST	£17,963,000	£2,113,700	£10,894,600

Risk & Uncertainty

The table below outlines the main project risks that are considered to be relevant in the context of this study and identifies potential mitigation measures that could be implemented.

Table 11: Project Risks and Potential Mitigation Measures

Type of Risk		Anticipated Significance for Wellington Road Study	Potential Mitigation Measures
Risk on delivering the asset	**Construction risk**	Medium risk – there are moderate risks associated with construction of interventions associated with the packages. As pricing of further investigation/survey, land purchase, relocation of utilities, structures, retaining walls, enhanced drainage, path lighting and TROs etc. has not been undertaken as part of the study, there is additional uncertainty placed on any additional risks associated with the construction of the interventions.	Early contractor engagement would provide an opportunity to consider construction phasing in more depth. An experienced contractor may be able to offer alternative solutions for phasing these works, and for minimising any closure of side roads. Obtaining early contractor input could also offer some design and construction cost efficiencies and may support risk mitigation. It is recommended that a construction noise and vibration assessment is undertaken as part of the Construction Environment Management Plan (CEMP) to provide an indication of likely impacts and identify where additional mitigation may be required.
	Planning risk	Medium risk – each of the packages under consideration as part of the study would require development of land at the former HM Craiginches Prison Site that is not currently owned by ACC and therefore, land acquisition would be required. It should be noted that planning consent may be required for the development of options on the land at the former prison site. There is also a risk that there could be statutory objections to Orders that would require to be introduced for delivery of some interventions. If an objection is not withdrawn, this would automatically trigger a Public Local Inquiry, which could cause significant delays and additional costs for delivery.	It is understood that ACC has previously engaged in discussions regarding the land at the former HM Craiginches Prison Site with the Scottish Government – continuation of these discussions would determine whether planning risks can be mitigated. The project programme and Risk Register should include for the statutory objection period and consider project risk caused by the submission and maintenance of an objection to relevant Road Orders.
Risk on operating the asset	**Operational risk**	Active Travel Package: the reconfiguration of Souterhead as part of this package is shown to introduce a 1-3 minute delay for all vehicles, which would have impacts on the movement of bus and freight vehicles along the corridor (as well as cars). Public Transport Package: it is considered that the addition of northbound bus lanes is relatively low risk in terms of the impacts on other road users. The addition of southbound bus lanes risks delays (approx. 1-3 minutes) to all vehicles, including buses, particularly during the PM peak. Multi-Modal Package: the shared bus/HGV lanes and reconfiguration at Hareness results in a delay for all traffic of 1-2 minutes (northbound) through Hareness in the AM and a 2-3 minute delay (southbound) in the PM. There	Active Travel Package: exclusion of the Souterhead Junction improvement would be anticipated to minimise delays for general traffic along the corridor. Public Transport Package: exclusion of the southbound bus lanes would be anticipated to minimise delays for all vehicles along the corridor. Multi-Modal Package: exclusion of the southbound shared bus/HGV lanes would be anticipated to minimise delays for all vehicles along the corridor. Exclusion of the shared bus/HGV lane in the sensitive section northbound would minimise delays for buses and HGVs. Right-turn ban risks could be mitigated through communications with the public. Risks associated with signalisation at Hareness and minor additional delay could be mitigated by communications with the public regarding

Type of Risk		Anticipated Significance for Wellington Road Study	Potential Mitigation Measures
		is a sensitive section of northbound shared bus/HGV lane between Craigshaw Road and Balnagask Road. In all packages, there is a risk in terms of drivers obeying the signage associated with the implementation of the right-turn ban from Wellington Road onto Abbotswell Road. In all packages, signalisation of Hareness causes minor delays (less than 1 minute) in peak periods. This could present perception issues for motorised users of the corridor that are considered to constitute a low-medium risk.	implementation of signals to improve the safety and directness of walking and cycling crossing points.
	Inflation risk	Low risk – the risk that actual inflation differs from assumed inflation rates. It is possible that the construction costs developed as part of this study could vary in the future.	Construction costs should be kept under review as interventions are developed further.
	Maintenance risk	Medium risk – ACC is generally seeking to rationalise maintenance costs where practical. Some of the interventions in this study (e.g. junction signalisation) would introduce a maintenance burden on the Council, as would maintenance of, for example, cycleway schemes. However, with no new major structures proposed as part of the option packages, none are considered to present a significant risk with regard to maintenance.	ACC should mitigate costs of maintenance in line with existing practices.
Risks on demand and revenue	**Demand risk**	Low risk – the COVID-19 pandemic has led to significant change in people's travel behaviours (e.g. increased home working, reduced public transport use, increased levels of walking and cycling) and introduced uncertainty around future travel patterns. There is uncertainty as to whether some of the changes observed will be short-term or if they will result in a more structural change in how society operates. Wellington Road is expected to continue its function as a priority route into the future and therefore, it is expected to continue to generate significant demand for traffic to facilitate movement of people and goods.	Further future scenario testing.
	Design risk	Low risk – in order to obtain funding through Sustrans or other funding sources, such as the Bus Partnership Fund, certain standards of design will be required. This is considered to be low risk in the context of the proposed active travel interventions, which have been designed in accordance with Sustrans guidance as far as possible. As the cycleways are at concept design stage, there would be a requirement to develop the designs during Developed Design as part of the normal design process. Medium risk – the Public Transport Package and Multi-Modal Package propose lengthening bus lanes on approach to QEB, which could introduce safety implications.	Mitigation measures will be identified and assessed as part of the detailed design process. The lengthening of bus lanes on approach to QEB would require a detailed safety design check in the north of the corridor. Additional environmental survey work, including flood risk modelling and Phase 1 habitat surveys will be required to support and inform technical design work. Consistency risks can be mitigated by implementing as much of a modal type along the route as is possible using the Sustainable Travel Hierarchy

Type of Risk		Anticipated Significance for Wellington Road Study	Potential Mitigation Measures
		Further design considerations inherent with all projects include uncertainty over underground conditions, utilities, geotechnics, and drainage issues etc. There may additionally be design requirements relating to increased areas of hardstanding (e.g. for SEPA). There is currently a lack of consistency of junction types, public transport, and active travel provision along the route. The packages aim to bring consistency along the corridor, however, based on the appraisal, it may not be possible to be fully consistent along the length of the route to meet all the objectives of the study.	and focussing on areas that lack existing provision of any type (for example, there is no cycling provision between Hareness Roundabout and QEB at present).
	Volume risk	Low risk – the risk that actual usage of the service varies from the level forecast. It is possible that usage of the proposed cycling facilities could differ from the levels predicted, which could reduce the predicted benefits generated by the schemes. It is also possible that the volume of vehicles could reduce in line with Scottish Government targets to reduce private car trips and associated with impacts from COVID-19. Furthermore, the volume of traffic may rise into the future as a result of emerging technologies such as Connected and Autonomous Vehicle (CAV) technology.	Further future scenario testing.
	Technology risk	Low risk – the risk that changes in technology result in services being provided using non-optimal technology. It is possible that where technological solutions are provided as part of the study (e.g. traffic signals), obsolescence can occur over time. Furthermore, there are emerging technologies (such as CAV) which could present a risk to the proposed interventions due to the uncertain impact on travel patterns.	ACC should ensure that optimal technology is adopted at the time of implementation of any interventions on the Wellington Road corridor.

In addition to the project risks outlined in the table above, there is further uncertainty regarding:

- **Availability of Funding** – at present, there is no allocated budget to support the progression of interventions through to delivery and construction. Whilst funding sources exist (e.g. through Sustrans), ACC will require to apply for this funding to make the case for the interventions proposed. Overall, this is considered to present a medium risk to delivery.
- **Bridge of Dee** – previous work has been completed regarding the potential for a new crossing of the River Dee, with a STAG Part 2 Study completed in 2017. It was agreed that the outcomes of this work should be reviewed at a suitable period after the opening of the AWPR to enable any changes in traffic patterns to be accurately assessed. Should this work be progressed, it would have an impact on traffic movements along the Wellington Road corridor.
- **Low Emission Zone** – in accordance with the Scottish Government's Programme for Government, ACC is considering options for a Low Emission Zone in Aberdeen. Whilst the preferred option does not include the area of the Wellington Road corridor, it will still be necessary for ACC to take cognisance of the impact of traffic exiting the Wellington Road priority route and accessing Aberdeen city centre (and the LEZ). Any modal shift changes facilitated by the implementation of schemes in the detailed appraisal may have wider impacts in terms of the composition of vehicle types moving in the city centre (and consequently may influence the number of vehicles which are eligible to access any LEZ).

Conclusions

The Wellington Road corridor is a priority route on the local road network. It is a key artery of the transport system linking the trunk road network (including the AWPR) to the south of Aberdeen city centre. The corridor plays a key role in access to ports for freight, for public transport from growing southern residential areas and it is a spine for industrial and employment uses along its length. It is also used for access on foot and by bike to local services, including retail and education uses. This study has systematically reviewed problems and issues, identified potential solutions to meet the net zero emissions ambition of the city as well as other policy drivers following Scottish Government guidance. The study has involved extensive consultation with stakeholders and the wider community and has modelled predicted transport impacts of selected intervention packages.

Further design work is necessary to further develop and assess the technical aspects of the interventions within the detailed appraisal packages on the Wellington Road corridor. Going forward, it will be key for ACC to obtain agreement on the overarching principles from the packages and determine the appropriate treatments at the key junctions (Souterhead and Hareness).

The key issues of concern that interventions should look to support include:

- Consistency of provision for active travel and public transport;
- Poor pedestrian provision through junctions at Souterhead and Hareness;
- The lack of any infrastructure for cyclists to the north of Hareness;
- Missing links in northbound active travel provision between Loirston Loch and Charleston Road North;
- The need to continue to provide priority route access for HGVs, including to Aberdeen South Harbour, the proposed Energy Transition Zone and the city centre; and
- Encouraging public transport with as much priority as is feasible.

Given the competing demands along the corridor, delivery of a more attractive corridor for all modes of travel will require difficult decisions to be made. The appraisal of the three option packages against the study objectives and STAG Criteria has indicated that the Do-Minimum performs more favourably than the option packages as they are currently presented. Therefore, based on the findings of the appraisal and the modelling results, a fourth 'hybrid' package is proposed, which is considered to provide benefits for the majority of users of the corridor. The proposed elements of this proposed package are summarised in the table below, with further details provided by corridor section in **Table 14**.

Table 12: Interventions Proposed in 'Hybrid' Package

Intervention	Description	Rationale
Cycleways	With-flow cycleway proposed between the tie-in with existing shared use facilities at Old Wellington Road and Hareness; a detailed design process would be required to determine the configuration between Hareness and QEB, though it will be important to ensure consistency of provision along this section.	• To the south of Hareness, with-flow segregated cycling infrastructure can be provided with limited impact on the road network. • There is no pedestrian or cycle infrastructure (including footways) provided for 700m northbound between Loirston Loch and Charleston Road North and for 200m southbound in proximity to the Old Wellington Road Junction. • To the north of Hareness, there is no existing dedicated cycling infrastructure.
Souterhead Junction – toucan crossings	Additional toucan crossing facilities at Langdykes Road, Souter Head Road and Wellington Circle.	• Toucan crossing infrastructure provides safety and accessibility improvements for pedestrians and cyclists whilst maintaining efficient vehicle flows through the junction.
Hareness Junction	Conversion of the roundabout to a signalised junction, with integrated pedestrian and cycle crossing facilities.	• The existing roundabout is uncontrolled, with two crossing points provided which are remote from the roundabout.

Intervention	Description	Rationale
		• Reconfiguration of Hareness Roundabout would provide safety improvements for active travel users and provide more direct routes.
Northbound bus lanes	Introduction of northbound bus lane between Craigshaw Drive and Abbotswell Road, avoiding the approach to and the junctions at Craigshaw Drive, Greenbank Road and Abbotswell Road, and a small extension to the existing bus lane towards QEB, subject to detailed design review.	• Considered to be low risk in terms of impacts on other traffic, including in terms of movements to Aberdeen South Harbour and the proposed ETZ. • Opportunity to "lock-in" the benefits of the AWPR by allocating road space for public transport where it can be accommodated.

A number of elements are not proposed to be promoted as part of this 'hybrid' package, with rationale provided in the table below.

Table 13: Interventions Not Proposed in 'Hybrid' Package

Intervention	Rationale
Southbound bus lanes	The modelling results indicated that southbound bus lanes did not achieve the intended benefits on the corridor in terms of journey times due to queue back at junctions.
Shared bus/HGV lanes	The modelling results indicate that in the northbound direction, allowing HGVs to access the bus lanes proposed in the 'Hybrid' package provided limited benefits. Therefore, restricting any proposals to northbound bus lanes only supports the promotion of exclusivity of bus priority. In the southbound direction, the modelling results indicate that the most efficient solution for buses and HGVs is to maintain movements with general traffic.
Additional lane northbound between Charleston Road North and Hareness	Whilst the additional lane northbound would provide efficiency improvements in the south of the corridor for northbound movements, providing additional space for vehicles is counter to current policy position and it could introduce safety implications for active travel users by increasing crossing lengths.
Reconfiguration of Souterhead Roundabout	The appraisal indicated that there would be significant disbenefits in reconfiguring the existing roundabout to signals for motorised users, both in terms of safety and economy. The appraisal also indicated that there could be environmental implications associated with a full junction reconfiguration in terms of surface water flooding and impacts on biodiversity and habitats, with the woodland to the north-east of Souterhead Roundabout identified as a key area of risk. While the junction reconfiguration would generate safety and accessibility improvements for active travel users, it is considered that the addition of toucan crossing points (as proposed) would generate some benefits.
Right-turn ban from Wellington Road onto Abbotswell Road	The implementation of a right-turn ban from Wellington Road to Abbotswell Road was not shown to generate any significant benefits or disbenefits against the majority of appraisal criteria. This intervention was developed in response to a queueing problem in this location, identified at the previous stage of the study. Since the opening of the AWPR, results of surveys undertaken to facilitate development of the Wellington Road Corridor Microsimulation Model indicated that queueing has dissipated and therefore, it is not considered that this intervention is addressing an existing problem on the network.
Conversion of the existing bus lane north of Balnagask Road to an all vehicle lane	Maintenance and extension of existing bus lane towards QEB considered to be low risk in terms of impacts on other traffic, including in terms of movements to Aberdeen South Harbour and the proposed ETZ. As noted under the key considerations above, it will be important to encourage public transport with as much priority as is feasible and therefore, it is not considered appropriate to remove existing areas of bus priority provision.

Table 14 outlines the proposed interventions by section along the Wellington Road corridor and sets out a series of further considerations that should be borne in mind in progressing interventions to business case stage.

Table 14: Potential 'Hybrid' Package by Corridor Section

Corridor Section	Potential Interventions Proposed	Further Considerations
Section 1: Charleston to Souterhead	With-flow cycleway from tie-in with existing shared use facilities to the west of Old Wellington Road to Souterhead.	• Further studies should be undertaken in the vicinity of Loirston Loch to establish appropriate pollution control measures. • Phase 1 habitat survey should be undertaken to establish the quality of the habitats and species they support in the vicinity of Loirston Loch.
Section 2: Souterhead Junction	Toucan crossings on Langdykes Road, Souter Head Road and Wellington Circle arms of the roundabout.	• Further design work will be required to determine the tie-in with with-flow cycleway facilities to the north and south of the junction. It should be noted that existing designs have assumed shared use facilities are provided through Souterhead Junction.
Section 3: Souterhead to Hareness	With-flow cycleway between Souterhead and Hareness.	• Further design work will be required to determine the tie-in with facilities at Souterhead and Hareness junctions.
Section 4: Hareness Junction	Removal of the roundabout for the introduction of a signalised junction with improved crossing facilities for active travel users.	• Further design work will be required to determine the tie-in with cycle facilities to the north and south of the junction. It should be noted that the 'CYCLOPS' arrangement shown in **Appendix A** was not the design that was modelled as part of the Active Travel Package due to the significant delays that were caused as a result of reduced capacity from a lower number of approach lanes and alternative crossing arrangements. Subsequent design should ensure that there is sufficient capacity at the junction to operate effectively (e.g. as proposed for the Multi-Modal Package). • The signalisation acts as a segregation safety measure to control users of the junction. As other interventions encourage increased use by people walking and cycling on the Wellington Road corridor, the segregation of users should support the ability of freight, public transport and other vehicular users to respect the movement of pedestrians and cyclists in a more controlled way than exists as present, where the only priorities that exist are remote and are not direct or fully inclusive.
Section 5: Hareness to Craigshaw Road	Cycleway between Hareness and Craigshaw Road.	• Detailed design required to determine the type of cycleway between Hareness and QEB – a with-flow cycleway requires removal of the central reservation between Hareness and Polwarth Road; a two-way cycleway requires removal of the central reservation between Greenbank Road and Polwarth Road. • Removal of the central reservation and all proposed designs would require a Road Safety Audit (RSA) to comment on the safety implications. • Further consideration should be given to options for retaining the central reservation, including reduced width or increased use of verge space. A detailed survey of pedestrian movements would be recommended to support these design decisions.

Corridor Section	Potential Interventions Proposed	Further Considerations
	Northbound bus lane between Craigshaw Drive and Abbotswell Road, avoiding the approach to and the junctions at Craigshaw Drive, Greenbank Road and Abbotswell Road.	• Further testing and design review should be undertaken to determine the exact locations of northbound bus lane at the next stage of design development.
Section 6: Craigshaw Road to Balnagask Road	Cycleway between Craigshaw Road and Balnagask Road.	• Detailed design required to determine the type of cycleway between Hareness and QEB – a with-flow cycleway requires removal of the central reservation between Hareness and Polwarth Road; a two-way cycleway requires removal of the central reservation between Greenbank Road and Polwarth Road. • Removal of the central reservation and all proposed designs would require a Road Safety Audit (RSA) to comment on the safety implications. • Further consideration should be given to options for retaining the central reservation, including reduced width or increased use of verge space. A detailed survey of pedestrian movements would be recommended to support these design decisions.
Section 7: Balnagask Road to QEB	Cycleway between Balnagask Road and QEB. Northbound bus lane (small extension to existing bus lane towards QEB)	• Land purchase would be required at the former HM Craiginches Prison Site. • Flood risk modelling should be undertaken if land purchase is progressed due to the increased area of impermeable hardstanding. • Detailed design required to determine the type of cycleway between Hareness and QEB – a with-flow cycleway requires removal of the central reservation between Hareness and Polwarth Road; a two-way cycleway requires removal of the central reservation between Greenbank Road and Polwarth Road. • Removal of the central reservation and all proposed designs would require a Road Safety Audit (RSA) to comment on the safety implications. • Further consideration should be given to options for retaining the central reservation, including reduced width or increased use of verge space. A detailed survey of pedestrian movements would be recommended to support these design decisions. • Further design work will be required to consider the tie-in to the existing layout at QEB, including opportunities for controlled crossing points for pedestrians and cyclists at the Craig Place/South Esplanade West Roundabout. • Onward connections to NCN1 crossing QEB to South Esplanade West and from Craig Place requires further consideration of improvements for active travel.

Going forward, ACC should consider the outcomes of this study and determine next steps in terms of progressing any interventions to business case stage. Overall, key considerations will be the purchase of land at the former HM Craiginches Prison Site in order to facilitate provision of segregated active travel infrastructure in the northern section of the corridor and the form of dedicated cycling infrastructure to the north of Hareness. With-flow segregated cycleways are considered to provide safety and accessibility benefits relative to two-way segregated cycleways and would also offer consistency of provision with what is proposed to the south of Hareness. However, delivery of with-flow cycleways may require an additional 800m of central reservation to be removed (relative to the requirements for the two-way cycleway), introducing safety concerns, particularly along this steep section of the corridor. Further consideration

should be given to delivery of cycleway schemes with retention of the central reservation, either through reduced width or increased use of verge space, for use by pedestrians informally crossing the wide road.

In summary, the potential 'Hybrid' package brings together the most effective parts of the Active Travel, Public Transport and Multi-Modal Packages as evidenced in this study. It proposes a step-change in active travel provision on the Wellington Road corridor and promotes improved northbound bus lanes, increasing lengths by 100% from existing levels. Access by freight is supported by retaining existing road provision to Hareness and full southbound provision from QEB. Freight and public transport are also supported by a proposal to provide signal control to Hareness Junction to provide segregation and controlled priority of all users