



Wellington Road Multi-Modal Corridor Study

Detailed Appraisal

Aberdeen City Council

Project number: 60597273

June 2021

Quality information

<u>Prepared by</u>	<u>Checked by</u>	<u>Verified by</u>	<u>Approved by</u>
Jo Duck Senior Consultant	Andrew Robb Principal Consultant	Richie Fraser Associate Director	Emma Gilmour Regional Director

Revision History

<u>Revision</u>	<u>Revision date</u>	<u>Details</u>	<u>Authorized</u>	<u>Name</u>	<u>Position</u>
0	17 May 2021	Working Draft for Client Comment	EG	Emma Gilmour	Project Director
1	27 May 2021	Updated Draft for Client Comment	EG	Emma Gilmour	Project Director
2	25 June 2021	Final following Client Comment	EG	Emma Gilmour	Project Director

Prepared for:

Aberdeen City Council
Marischal College
Broad Street
Aberdeen
AB10 1AB

Prepared by:

AECOM Limited
7th Floor, Aurora
120 Bothwell Street
Glasgow G2 7JS
United Kingdom

aecom.com

© 2021 AECOM Limited. All Rights Reserved.

This document has been prepared by AECOM Limited ("AECOM") for sole use of our client (the "Client") in accordance with generally accepted consultancy principles, the budget for fees and the terms of reference agreed between AECOM and the Client. Any information provided by third parties and referred to herein has not been checked or verified by AECOM, unless otherwise expressly stated in the document. No third party may rely upon this document without the prior and express written agreement of AECOM.

Table of Contents

1.	Introduction.....	7
1.1	Background.....	7
1.2	STAG Appraisal.....	7
1.3	Study Area	8
1.4	Aberdeen South Harbour Study	8
1.5	COVID-19.....	9
1.6	Report Structure.....	9
2.	Previous Work	10
2.1	Introduction.....	10
2.2	Initial Appraisal Summary	10
2.3	Preliminary Appraisal Summary	10
2.4	Aberdeen South Harbour Study	11
2.5	Summary	14
3.	Setting the Context.....	15
3.1	Introduction.....	15
3.2	Policy Context.....	15
3.3	Development Context.....	20
3.4	Environmental Context	22
3.5	Transport Context.....	23
3.6	Summary	23
4.	Transport Planning Objectives.....	24
4.1	Introduction.....	24
4.2	Final Transport Planning Objectives.....	24
4.3	SMART TPOs	24
4.4	Summary	27
5.	Option Development & Packaging	28
5.1	Introduction.....	28
5.2	Option Development.....	28
5.3	Option Packaging.....	29
5.4	Summary	31
6.	Consultation & Engagement	32
6.1	Part 1.....	32
6.2	Part 2.....	33
6.3	Summary	35
7.	Traffic Modelling.....	36
7.1	Introduction.....	36
7.2	Background.....	36
7.3	Do Minimum Model (2026).....	37
7.4	Final Package Components.....	37
7.5	Performance Indicators.....	40
7.6	Modelling Results.....	41
7.7	Model Observations.....	43
7.8	Modelling Conclusions.....	54
7.9	Summary	55
8.	TPO Appraisal.....	56
8.1	Introduction.....	56
8.2	Transport Planning Objectives	56
8.3	Do Minimum.....	56
8.4	Active Travel Package	56
8.5	Public Transport Package.....	59
8.6	Multi-Modal Travel & Transport Package	61
8.7	Additional Lane Sub-Test.....	64
8.8	Summary of TPO Appraisal.....	65
9.	STAG Criteria Appraisal.....	66
9.1	Introduction.....	66
9.2	Environment.....	66

9.3	Safety	77
9.4	Economy	81
9.5	Integration	85
9.6	Accessibility and Social Inclusion	89
9.7	Summary of STAG Criteria Appraisal	92
10.	Cost to Government	93
10.1	Introduction	93
10.2	Capital Costs	93
10.3	Operating and Maintenance Costs	94
10.4	Other Costs	95
10.5	Summary	95
11.	Implementability	96
11.1	Introduction	96
11.2	Feasibility	96
11.3	Affordability	99
11.4	Public Acceptability	99
11.5	Summary of Implementability Appraisal	102
12.	Risk & Uncertainty	103
12.1	Introduction	103
12.2	Risk Management	103
12.3	Risk and Uncertainties	103
12.4	Summary	107
13.	Monitoring & Evaluation	108
13.1	Introduction	108
13.2	Summary	109
14.	Summary & Conclusions	110
14.1	Introduction	110
14.2	Appraisal Outcomes	110
14.3	Conclusions	112
	Appendix A – Option Packages	
	Appendix B – Option Summary Tables	
	Appendix C – Appraisal Summary Tables	
	Appendix D – Online Consultation Results (Part 2)	
	Appendix E – Model Development Report	
	Appendix F – Modelling Outcomes: Additional Detail	
	Appendix G – Environmental Appraisal	
	Appendix H – Active Travel Economic Assessment	
	Appendix I – Package Costings	

Figures

Figure 1.1: Wellington Road Study Corridor	8
Figure 2.1: Problems, Issues, Constraints and Opportunities identified in ASH Study Part 1	12
Figure 3.1 : NTS2 Vision and Priorities	15
Figure 3.2: Aberdeen Proposed Low Emission Zone	22
Figure 3.3: Existing Active Travel Facilities	23
Figure 5.1: Study Corridor Sections	29
Figure 6.1: Level of Agreement with Packages	33
Figure 7.1: A956 Wellington Road Corridor – Modelled Area	36
Figure 7.2: Northbound Journey Time Profiles – Key Locations	43
Figure 7.3: Southbound Journey Time Profiles – Key Locations	43
Figure 7.4: Active Travel AM Peak General Traffic Journey Time Profiles	44
Figure 7.5: Active Travel AM Peak Bus Journey Time Profiles	45
Figure 7.6: Active Travel PM Peak General Traffic Journey Time Profiles	45
Figure 7.7: Active Travel PM Peak Bus Journey Time Profiles	46
Figure 7.8: Public Transport AM Peak General Traffic Journey Time Profiles	46
Figure 7.9: Public Transport AM Peak Bus Journey Time Profiles	47
Figure 7.10: Public Transport PM Peak General Traffic Journey Time Profiles	47
Figure 7.11: Public Transport PM Peak Buses Journey Time Profiles	48
Figure 7.12: Multi-Modal AM Peak General Traffic Journey Time Profiles	48
Figure 7.13: Multi-Modal AM Peak HGV Journey Time Profiles	49

Figure 7.14: Multi-Modal AM Peak Bus Journey Time Profiles	49
Figure 7.15: Multi-Modal PM Peak General Traffic Journey Time Profiles.....	50
Figure 7.16: Multi-Modal PM Peak HGV Journey Time Profiles.....	50
Figure 7.17: Multi-Modal PM Peak Bus Journey Time Profiles	51
Figure 7.18: Multi Modal (Sub-test) AM Peak General Traffic Journey Time Profiles	51
Figure 7.19: Multi Modal (Sub-test) AM Peak HGV Journey Time Profiles	52
Figure 7.20: Multi Modal (Sub-test) AM Peak Bus Journey Time Profiles.....	52
Figure 7.21: Multi-Modal (Sub-Test) PM Peak General Traffic Journey Time Profiles	53
Figure 7.22: Multi Modal (Sub-test) PM Peak HGV Journey Time Profiles.....	53
Figure 7.23: Multi-Modal (Sub-Test) PM Peak Bus Journey Time Profiles	54
Figure 7.24: ATC Surveys - HGV Counts on Wellington Road to the South of Hareness Roundabout	55
Figure 9.1: PAF Output 1.....	86
Figure 9.2: PAF Output 2.....	87
Figure 11.1: Opinion of Active Travel Package Components	100
Figure 11.2: Opinion of Public Transport Package Components.....	100
Figure 11.3: Opinion of Multi-Modal Package Components.....	101

Tables

Table 2.1: Transport Planning Objectives	10
Table 2.2: Options Recommended for Further Assessment at Detailed Appraisal	11
Table 2.3: ASH Study - Final TPOs	13
Table 2.4: Final Options for ASH STAG Part 2 Study	13
Table 3.1: STPR2 Phase 1 Recommendations.....	16
Table 3.2: Strategic Transport Appraisal Measures Relevant to the Wellington Road Study	18
Table 3.3: Annual Mean Monitoring Results for Wellington Road AQMA.....	22
Table 4.1: Final Study Transport Planning Objectives	24
Table 4.2: SMART TPO Table.....	25
Table 5.1: Development of Options from Preliminary Appraisal	28
Table 5.2: Detailed Appraisal Packages in Relation to Initial Model Tests Undertaken.....	30
Table 5.3: Active Travel Package	31
Table 5.4: Public Transport Package.....	31
Table 5.5: Multi-Modal Travel & Transport Package.....	31
Table 6.1: Initial Consultation Feedback on Option Tests	32
Table 6.2: Key Feedback on Option Packages	33
Table 7.1: Approximate Lengths of Active Travel Infrastructure along Corridor	38
Table 7.2: Approximate Lengths of Bus Lane along Corridor	39
Table 7.3: Approximate Lengths of Intervention along Corridor	40
Table 7.4: All Vehicles Journey Time Change.....	41
Table 7.5: HGVs Journey Time Change	42
Table 7.6: Buses Journey Time Change.....	42
Table 7.7: Overview of Each Package.....	54
Table 7.8: ATC Survey Results on Wellington Road to the South of Hareness Roundabout (June 2019)	55
Table 8.1: Summary of TPO Appraisal	65
Table 9.1: STAG Seven-Point Scale.....	66
Table 9.2: Magnitude Criteria for Traffic Noise Impacts	68
Table 9.3: Short-Term Traffic Noise Impacts, Active Travel Package.....	68
Table 9.4: Short-Term Traffic Noise Impacts, Public Transport Package	71
Table 9.5: Short-Term Traffic Noise Impacts, Multi-Modal Package	74
Table 9.6: Environment Criteria Appraisal Summary	77
Table 9.7: Active Travel Package COBALT Summary	78
Table 9.8: Public Transport Package COBALT Summary.....	79
Table 9.9: Multi-Modal Travel & Transport Package COBALT Summary	80
Table 9.10: Safety Criteria Appraisal Summary.....	81
Table 9.11: Active Travel Package TUBA Summary	82
Table 9.12: Public Transport Package TUBA Summary	83
Table 9.13: Multi-Modal Travel & Transport Package TUBA Summary.....	84
Table 9.14: Economy Criteria Appraisal Summary	85
Table 9.15: Integration Appraisal Summary	89
Table 9.16: Accessibility & Social Inclusion Appraisal Summary	91
Table 9.17: Summary of STAG Criteria Appraisal	92
Table 10.1: Package Costing Assumptions.....	93
Table 10.2: Estimated Scheme Costs	94
Table 11.1: Accessibility & Social Inclusion Appraisal Summary	102
Table 12.1: Project Risks and Potential Mitigation Measures	103
Table 13.1: Potential Performance Indicators for Monitoring and Evaluation.....	108
Table 14.1: Summary of Appraisal against TPOs.....	110
Table 14.2: Summary of Appraisal against Implementability Criteria.....	110

Table 14.3: Summary of STAG Criteria Appraisal	111
Table 14.4: Interventions Proposed in 'Hybrid' Package.....	112
Table 14.5: Interventions Not Proposed in 'Hybrid' Package	113
Table 14.6: Potential 'Hybrid' Package by Corridor Section.....	114

1. Introduction

1.1 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 address current and future planned developments on the corridor. This Initial Appraisal (Case for Change) Study was published in January 2015¹ 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 2018² 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 report presents the findings of this stage of the appraisal and includes:

- 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.

1.2 STAG Appraisal

Scottish Transport Appraisal Guidance (STAG) is the appraisal framework developed by the Scottish Government to aid transport planners and decision-makers in the development of transport policies, plans, programmes, and projects in Scotland. It is a requirement that all transport projects are appraised in accordance with STAG where Scottish Government support or approval is required.

There are four parts to the STAG process as follows:

- **Initial Appraisal (Case for Change)** – an analysis of present and future problems, issues, constraints, and opportunities; the development of objectives; and option generation and sifting to establish the case for change;
- **Preliminary Appraisal** – a largely qualitative appraisal of impacts, designed to decide whether a proposal should proceed, subject to meeting the planning objectives and fitting with relevant policies;
- **Detailed Appraisal** – detailed appraisal of the options taken forward from the Preliminary Appraisal with specific consideration given to the STAG Criteria (Environment, Safety, Economy, Integration, Accessibility & Social Inclusion), Cost to Government, Implementability, and Risk and Uncertainty;
- **Post Appraisal** – development of a monitoring and evaluation plan to set out how the preferred option(s) will be assessed against the original appraisal once investment is committed and following implementation.

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>

1.3 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 1.1: Wellington Road Study Corridor

1.3.1 Roads Hierarchy

It should be noted that ACC and partners carried out a review of the roads hierarchy within Aberdeen City in 2019. The review concluded that Wellington Road is a priority route, which can be defined as a primary movement corridor that should be considered for the provision of segregated bus lanes and separately segregated cycle lanes for travel in both directions. Further detail on this study is provided in **Section 3.2.9**.

1.4 Aberdeen South Harbour Study

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 (hereafter referred to as ASH Study). This study considered transport connections to the new Aberdeen South Harbour located at the Bay of Nigg in Aberdeen, 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. A detailed review of the ASH Study is provided in **Chapter 2**.

1.5 COVID-19

Since March 2020, the COVID-19 pandemic has led to a significant change in people's travel behaviours and introduced uncertainty around future travel patterns including future attitudes to travel. The Government-enforced lockdown has necessitated a shift to home working for many and a reduction in overall travel demand, particularly on public transport. There is uncertainty as to whether some of the observed changes in travel patterns will be short-term or if they will result in a more structural change in how society operates. Implications of the COVID-19 pandemic are considered in more detail in **Chapter 12**.

1.6 Report Structure

Following this introduction, the remainder of the report is structured as follows:

- Chapter 2 – Previous Work;
- Chapter 3 – Setting the Context;
- Chapter 4 – Transport Planning Objectives;
- Chapter 5 – Option Development & Packaging;
- Chapter 6 – Consultation & Engagement;
- Chapter 7 – Traffic Modelling;
- Chapter 8 – TPO Appraisal;
- Chapter 9 – STAG Criteria Appraisal;
- Chapter 10 – Cost to Government;
- Chapter 11 – Implementability;
- Chapter 12 – Risk & Uncertainty;
- Chapter 13 – Monitoring & Evaluation; and
- Chapter 14 – Summary & Conclusions.

The following appendices support the detailed appraisal:

- Appendix A – Option Packages;
- Appendix B – Option Summary Tables;
- Appendix C – Appraisal Summary Tables;
- Appendix D – Online Consultation Results (Part 2);
- Appendix E – Model Development Report;
- Appendix F – Modelling Outcomes: Additional Detail;
- Appendix G – Environmental Appraisal;
- Appendix H – Active Travel Economic Assessment; and
- Appendix I – Package Costings.

2. Previous Work

2.1 Introduction

This chapter provides an overview of the work undertaken at the Initial Appraisal and Preliminary Appraisal stages of the study and provides a review of the ASH Study – which provides important context for the progression of the detailed appraisal.

2.2 Initial Appraisal Summary

The Initial Appraisal completed in 2015 provides a large quantity of information which continues to be relevant in the context of this detailed appraisal. A summary of findings from the Initial Appraisal is provided as follows:

- Wellington Road has been subject to a number of studies in recent years which have identified key issues relating to congestion on a corridor which has a range of competing transport demands for pedestrians, cyclists, public transport users and car drivers.
- The corridor is an important route for freight traffic.
- There are a number of key movements between Wellington Road and side road accesses on the corridor, particularly to/from the Altens and Tullos Industrial Estates.
- While the majority of accidents on the corridor are recorded as ‘damage only’, a number occur when vehicles are performing a right-turn manoeuvre between Wellington Road and side road accesses.
- There are a number of development proposals which may affect traffic flows and patterns on the corridor in the future including residential allocations within the Local Development Plan (LDP) and the extension of Aberdeen Harbour into Nigg Bay.

Drawing on the above issues, and a detailed analysis of problems, issues, opportunities and constraints on the study corridor, an initial set of TPOs were developed for the study at this stage.

A long list of multi-modal options to deliver the TPOs was developed and was subject to a high level assessment in line with STAG. The outcome from this exercise was a sifted list of options which were considered suitable for more detailed appraisal as part of the Preliminary Appraisal Study.

2.3 Preliminary Appraisal Summary

While TPOs were developed for the study at the Initial Appraisal stage from a detailed analysis of problems, issues, opportunities, and constraints on the study corridor, the TPOs were revised at the Preliminary Appraisal stage to reflect changes since the Initial Appraisal was developed. The TPOs are detailed in **Table 2.1** below.

Table 2.1: Transport Planning Objectives

Ref	Description
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

Further option development and sifting work to refine the option list from the Initial Appraisal Study was undertaken, with eight options taken forward for assessment as part of the Preliminary Appraisal Study.

The Preliminary Appraisal concluded that all eight of the options should be carried forward for further assessment as part of this detailed appraisal study.

The options recommended for further assessment are summarised in **Table 2.2**.

Table 2.2: Options Recommended for Further Assessment at Detailed Appraisal

Ref	Description
Do Minimum	Provides a basis on which to compare other options.
Strategic Cycle Improvements	Option considers provision of a segregated cycleway or shared walking and cycling facility on the Wellington Road corridor between QEB and Souterhead Roundabout. It also includes consideration of a toucan crossing on Langdykes Road.
Shared Bus/HGV Priority Lane	Option involves provision of a shared bus/HGV priority lane to provide greater priority for public transport and freight. This includes two alternative options, including i) shared lane between QEB and Souterhead Roundabout in both directions and ii) shared lane using existing Wellington Road bus lane.
Souterhead Roundabout Improvements + More/Better Crossings at Souterhead Roundabout	Option involves reconfiguration of Souterhead Roundabout to include full signalisation and junction realignment. It includes provision of crossing points to aid the movement of non-motorised users at the junction and assumes the removal of the existing roundabout to implement this reconfiguration.
Hareness Roundabout Improvements + More/Better Crossings at Hareness Roundabout	Option involves reconfiguration of Hareness Roundabout to include full signalisation and junction realignment. It includes provision of crossing points to aid the movement of non-motorised users at the junction and assumes the removal of the existing roundabout to implement this reconfiguration.
Additional Capacity between Souterhead and Hareness Roundabouts	Option involves provision of additional road capacity in the south of the study area. This includes two alternative options, including i) additional road lane between Charleston Road North and Hareness Roundabout (northbound) and ii) alternative i) + additional road lane between Hareness Roundabout and Souterhead Roundabout (southbound).
Upgrade to Dual Carriageway at Former HM Craiginchies Prison Site	Option involves upgrading the current single carriageway section of Wellington Road to provide a higher capacity route by removing this current pinch-point on the network and supporting wider programmed improvements across the city. The Preliminary Appraisal made the assumption that the additional capacity would be available for use by all road users.
Wellington Road Bus Quality Package	Option considers bus quality options for the corridor, including extending the existing bus lane south prior to the signals at Balnagask Road, providing a new bus lane southbound to extend the existing bus lay-by north of Grampian Place to the signalised Balnagask Road Junction and complementary package of measures including review of bus lane operating hours, enhanced public transport service frequencies/reconfiguration and bus stop infrastructure review and upgrades.
Wellington Road Corridor Right-Turn/Traffic Signals Priorities Review Package	Option considers prohibition of right-turns to/from Wellington Road with review of existing arrangements to alleviate congestion and potential road safety issues. The junctions identified for specific consideration include the Girdleness Road Junction and the Abbotswell Road Junction.

2.4 Aberdeen South Harbour Study

2.4.1 Overview

As noted in **Chapter 1**, cognisance has been taken of the ASH Study throughout the development of the Wellington Road Study. The studies are intrinsically linked, with a decision on the preferred routeing to the new harbour required to inform the detailed appraisal of options for the Wellington Road corridor at this stage of STAG.

2.4.2 Pre-Appraisal and STAG Part 1 Report

The first stage of the ASH Study included the Pre-Appraisal and Part 1 Appraisal and was completed in October 2018. The diagram overleaf provides a summary of the problems, issues, constraints, and opportunities identified at this stage of the study.

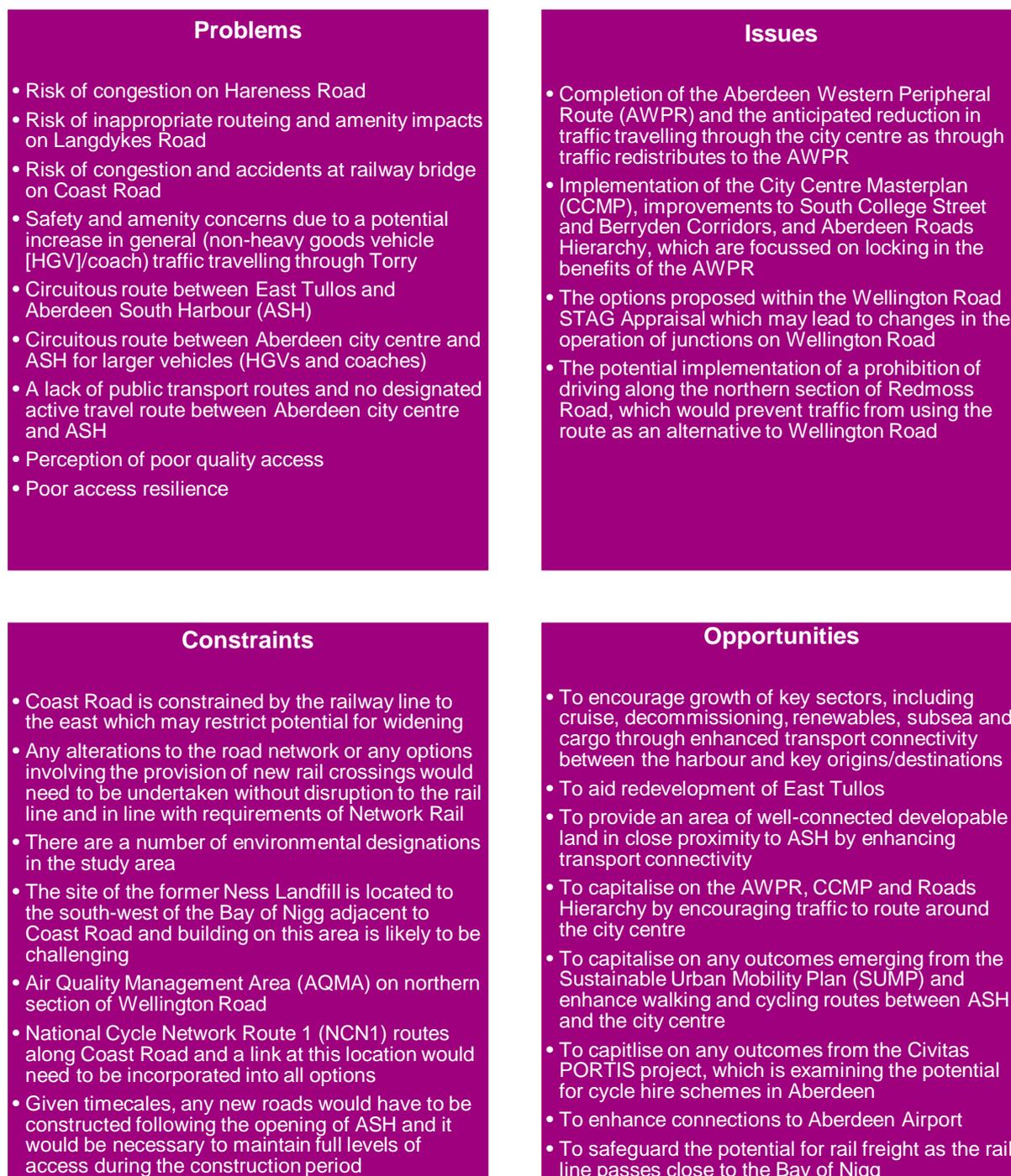


Figure 2.1: Problems, Issues, Constraints and Opportunities identified in ASH Study Part 1

Taking cognisance of the transport problems identified and the wider policy context, nine TPOs were developed to form the basis for the appraisal of options for external links to Aberdeen South Harbour. This was followed by the generation of an initial long-list of options. Following a sifting and development process, option packaging and further option development, a final list of eleven options was produced which were taken forward for the purposes of the STAG Part 1 appraisal. The options were assessed against the TPOs, STAG Criteria and Implementability Criteria, which allowed for the completion of a selection/rejection process. During this process, it was recommended that three options should be rejected, meaning that eight options were progressed to the STAG Part 2 appraisal stage.

2.4.3 STAG Part 2 Report

The ASH STAG Part 2 report was completed in January 2021 and the findings were subsequently approved by ACC's City Growth and Resources Committee in February 2021.

The focus of the ASH Study at STAG Part 2 was required to widen in response to the publication of ACC's Proposed 2020 LDP, which set out new proposed land use changes in the immediate vicinity of the harbour. In the Proposed LDP, a 70-acre site has been earmarked for the city's first 'Energy Transition Zone'. The Energy Transition Zone

would be used for the development of low or zero carbon or renewable energy industries, with businesses focussing on wind, biomass, solar and tidal sectors. It would also see the creation of a hydrogen production plant and a shoreside energy hub. The emergence of the proposed Energy Transition Zone has required the ASH Study to not only consider access to and from the new harbour, but also to and from the proposed Energy Transition Zone and subsequently access between the harbour and the Energy Transition Zone site. Furthermore, consideration had to be given to connections with industrial estates at Altens and East Tullis, as well as other estates within the wider Aberdeen area.

The widened focus of the study required a review of the previously established TPOs and options to take account of the anticipated additional traffic volumes and different traffic composition that the proposed Energy Transition Zone may generate. The final TPOs set for the study are shown in the table below.

Table 2.3: ASH Study - Final TPOs

Ref	Objective
TPO1	Provide a designated Heavy Goods Vehicle (HGV) route to/from ASH/proposed ETZ sites which is more efficient than alternative routes to: <ul style="list-style-type: none"> Minimise journey times to AWPR/Charleston Junction and King George VI Bridge; and Help minimise inappropriate routeing and environmental and nuisance impacts
TPO2a	Maximise connectivity by all modes (car, public transport, and active travel) between ASH/ETZ and prospective workers at the sites
TPO2b	Maximise connectivity between proposed ETZ and other energy-related businesses in the Aberdeen area (business to business)
TPO3	Futureproof access to the proposed ETZ/ASH for the widest range of abnormal loads possible and minimise the impact of abnormal loads travelling from and to the proposed ETZ/ASH
TPO4	Improve the resilience of transport connections to and from ASH/proposed ETZ
TPO5	Maximise the intermodal opportunities between the proposed ETZ and the existing rail network

The review of the options resulted in revisions to the public transport and active travel options to ensure improved connectivity to the new harbour and the proposed Energy Transition Zone by all transport modes. The final set of options appraised at the detailed appraisal stage are outlined in the table below.

Table 2.4: Final Options for ASH STAG Part 2 Study

Mode	Option	Option Description
Road	A2 a/b	New road connection from Greenwell Road/Greenbank Road via St Fitticks Community Park to Coast Road with a new underbridge under the railway line
	A3 a/b	New road connection from Greenwell Road/Greenbank Road via the former Ness Landfill site and a new bridge over the railway. Instead of this new bridge, a variant of Option A3 includes an additional link around the perimeter of the landfill site to a location south of the existing bridge on Coast Road
	A4	Improve the existing route via Hareness Road through the provision of a new bridge over the railway on Coast Road and capacity improvements
	A5	New road connection between Coast Road and Souter Head Road and a new bridge over the railway on Coast Road
Public Transport	B1	Extend/enhance existing bus services between ASH/proposed ETZ sites (at both St Fitticks and Doonies Farm) and Aberdeen city centre
	B2	New bus service between ASH and Aberdeen city centre for cruise passengers
	B4	New direct bus service linking Aberdeen city centre with ASH and proposed ETZ site(s)
	B5	New direct bus service linking Aberdeen city centre with ASH, proposed ETZ site (at St Fitticks) and East Tullis Industrial Estate (dependent on new road link between proposed ETZ and East Tullis)
Active Travel	C1	Enhanced active travel routes between ASH/proposed ETZ sites and Aberdeen city centre
	C4	Enhanced active travel routes between ASH/proposed ETZ sites and Wellington Road (south)

The appraisal findings suggest that Options A4 and A5 are the best performing of the road options; public transport options B1, B2 and B4 all generally perform well against the appraisal criteria and both active travel options C1 and C4 also perform well against the appraisal criteria.

2.4.4 City Growth and Resources Committee

The outcomes of the study were reported to ACC's City Growth and Resources Committee on 03 February 2021. The committee agreed:

- i) to note the contents and outcomes of the Aberdeen South Harbour (ASH) Scottish Transport Appraisal Guidance (STAG) Part 2 study...;*
- ii) to approve the progression of recommended Road (Option A4), Public Transport (Options B1 and B2) and Active Travel (Options C1 and C4) from the External Transportation Links to the Aberdeen South Harbour Scottish Transport Appraisal Guidance (STAG) STAG Part 2 Appraisal Report...;*
- iii) that subject to approval of the of options in (ii), instruct the Chief Officer – Capital to develop a business case for these options and to report this to the City Region Deal Joint Committee upon completion; and*
- iv) that subject to approval of the of options in (ii), instruct the Chief Officer – Strategic Place Planning to continue with the Wellington Road Multimodal Corridor Study, ensuring that subsequent appraisal work reflects the decision of this Committee on a preferred option from the External Transportation Links to the Aberdeen South Harbour study, and to report the outcomes of the Wellington Road STAG Part 2 appraisal to this Committee in June 2021.*

2.5 Summary

This chapter has provided an overview of the work undertaken at the Initial Appraisal and Preliminary Appraisal stages of the study and has provided a review of the ASH Study, which provides important context when considering interventions along the Wellington Road corridor. **Chapter 3** sets the policy, development, environment, and transport context that the study is being progressed within.

3. Setting the Context

3.1 Introduction

This chapter provides an updated policy, development, environment, and transport context for the detailed appraisal, taking account of policy and study documents that have been developed since the time of finalising the Preliminary Appraisal report in April 2018 as well as changes to environmental considerations and the transport network in the last three years.

3.2 Policy Context

An extensive review of policy and relevant studies was undertaken as part of the Preliminary Appraisal. This section summarises the key policy and study documents developed since the time of writing the Preliminary Appraisal that provide additional – and current – context for the detailed appraisal.

3.2.1 National Transport Strategy 2 (2020)

The National Transport Strategy 2 (NTS2)³ was published in February 2020. As shown in **Figure 3.1**, the NTS2 priorities include reducing inequality, taking climate action, helping to deliver inclusive economic growth, and improving health and wellbeing; all priorities that align with the aims and objectives of the Wellington Road Study.

The strategy notes that Transport Scotland will embed the Sustainable Travel Hierarchy in decision making, promoting walking, wheeling, cycling, public transport and shared transport options in preference to single occupancy car use.

It further notes that the Sustainable Investment Hierarchy will be used to inform budgetary decisions. This will consider: investment aimed at reducing the need to travel unsustainably; investment aimed at maintaining and safely operating existing assets taking due consideration of the need to adapt to the impacts of climate change; investment promoting a range of measures, including innovative solutions to make better use of existing capacity, ensuring that existing transport networks and systems are fully optimised; and finally investment involving targeted infrastructure improvements.



Figure 3.1 : NTS2 Vision and Priorities

3.2.2 Climate Change (Emissions Reduction Targets) (Scotland) Act (2019)

The Climate Change (Emissions Reduction Targets) (Scotland) Act⁴ received Royal Assent on 31 October 2019. The Act sets targets to reduce Scotland's emissions of all greenhouse gases to net zero by 2045 at the latest, with interim targets of at least 56% by 2020, 75% by 2030, and 90% by 2040. A net zero emissions target by 2045 is five years ahead of the UK and is firmly based on what the Committee on Climate Change (CCC) advise is achievable.

In December 2020, the Scottish Government published its Climate Change Delivery Plan Update⁵ setting out proposals for a green recovery from COVID-19 and setting out its commitment to:

- Reduce car kilometres by 20% by 2030;

³ <https://www.transport.gov.scot/media/47052/national-transport-strategy.pdf>

⁴ <https://www.legislation.gov.uk/asp/2019/15/contents/enacted>

⁵ <https://www.gov.scot/publications/securing-green-recovery-path-net-zero-update-climate-change-plan-20182032/>

- Phase out the need for new petrol and diesel cars and vans by 2040 and light commercial vehicles by 2025;
- Ensure that the majority of new buses purchased from 2024 are zero emission;
- Support transformational active travel projects; and
- Develop a Work Local Programme which will work to drive the establishment of 20 minute neighbourhoods.

3.2.3 Strategic Transport Projects Review 2 (Ongoing)

Transport Scotland is currently progressing the second Strategic Transport Projects Review (STPR2). STPR2 involves a Scotland-wide review of the strategic transport network across all transport modes, including walking, wheeling, cycling, bus, rail, and car, as well as reviewing wider island and rural connectivity. It will help to deliver the vision, priorities and outcomes for transport set out in the NTS2 and will identify interventions required to support the delivery of Scotland's Economic Strategy.

Due to the impacts of COVID-19, the STPR2 programme has been revised and is now being taken forward in a two-phased approach. The first phase (published in February 2021⁶) made recommendations on transport interventions for investment in the short term, as the world deals with the COVID-19 pandemic and the Scottish Government plans for a green recovery. The second phase is due to report later in 2021 and will give Scottish Ministers a programme of potential transport investment opportunities for the period 2022-2042.

The Phase 1 recommendations and associated impact assessment progress reports published by Transport Scotland in February 2021 resulted in 20 interventions being recommended under eight themes as outlined in the table below. Phase 1 makes recommendations for investments or progression of interventions in the short-term (up to five years).

Table 3.1: STPR2 Phase 1 Recommendations

Theme	Intervention
Supporting smart and sustainable travel across Scotland	1. Development and delivery of Active Freeways
	2. Expansion of 20mph zones
	3. Influencing travel choices
Creating smart and sustainable towns and villages	4. Transport's contribution to placemaking principles in neighbourhoods
	5. Guidance and framework for delivering mobility hubs
Improving accessibility in rural and peripheral areas and for vulnerable groups	6. Investment in Demand Responsive Transport and Mobility as a Service
Transforming Cities	7. Reallocation of road space for active travel
	8. Enhancing facilities at major rail stations (Rail Station Redevelopment)
	9. Development of Glasgow Metro & Edinburgh Mass Transit strategies
Enhancing public transport provision	10. Reallocation of road space for buses
	11. Supporting integrated journeys at ferry terminals
	12. Infrastructure to provide access for all at rail stations
Supporting transition to low-zero carbon	13. Investment in low carbon and alternative fuel transport systems
	14. Delivery of Rail Decarbonisation Programme (Phase 1)
Supporting a viable freight industry	15. Strategy for improving rest and welfare facilities for hauliers
	16. Infrastructure to encourage rail freight
Enhancing safety and resilience on the strategic transport network	17. Investment in the trunk road network asset
	18. Access to Argyll and Bute (A83)
	19. Investment in ferries and ports
	20. Speed Management Plan

⁶ <https://www.transport.gov.scot/publication/update-and-phase-1-recommendations-february-2021-stpr2/>

3.2.4 Nestrans Regional Transport Strategy 2040 (2020)

Nestrans published the draft Regional Transport Strategy 2040 (RTS 2040)⁷ in August 2020. The draft strategy was subject to public consultation for a period of 10 weeks until 16 October 2020 and thereafter, amendments to the strategy were informed by comments received. A final version of the strategy was approved by the Nestrans Board on 10 February 2021. The strategy was submitted to the Cabinet Secretary of Transport, Infrastructure and Connectivity for approval in March 2021.

The vision of the RTS 2040 is 'to provide a safer, cleaner, more inclusive, accessible and resilient transport system in the North East, which protects the natural and built environment and contributes to healthier, more prosperous and fairer communities'. To support this vision, the strategy has been developed under four pillars, which align with the pillars outlined in the NTS2:

- **Equality** – Promoting equality across the North East;
- **Climate** – Reducing our impact on climate change and protecting the environment;
- **Prosperity** – Help deliver inclusive economic growth across the North East; and
- **Wellbeing** – Improving health, safety, and wellbeing across the North East.

The pillars are supported by six headline principles that will set the tone and direction for the strategy overall, with a range of more detailed indicators and targets reflecting the broad scope of the strategy. The headline principles include:

- Improved journey efficiencies to enhance connectivity;
- Reduced carbon emissions to support net-zero;
- Accessibility for all;
- A step change in public transport and active travel enabling a 50:50 mode split;
- Air quality that is cleaner than World Health Organisation standards for emissions from transport; and
- Zero fatalities on the road network.

The strategy notes that achieving the desired mode shift will require a fresh approach to public transport in the region. Central to this will be the development of a high quality, high frequency mass transit network across the city, anchored by Park & Ride (P&R) facilities on each corridor. Although more detailed scheme development is required, it is envisaged that Aberdeen Rapid Transit (ART) will take the form of a Bus Rapid Transit system. ART is initially being considered for four corridors, one of which links Craibstone P&R, Aberdeen International Airport and TECA (The Event Complex Aberdeen) to Altens and the south via the city centre and Wellington Road.

3.2.5 Strategic Transport Appraisal (2018-2020)

The Aberdeen City Region Deal (CRD) Strategic Transport Appraisal (STA) was developed in order to collate and rationalise the current and future problems and opportunities within the North East transport system, and to act as a mechanism to facilitate the delivery of transport projects to support the Regional Economic Strategy. The NTS2 and STPR2 are establishing the overarching strategic objectives for Scotland's transport system and the associated transport investment programme at the national level, whilst the STA identifies key themes to drive future direction of action and develops TPOs upon which to appraise the likely effectiveness of future interventions at the Aberdeen City and Aberdeenshire levels. The STA takes a 20-year strategic view (up to 2040) across all modes including road and rail and is based on STAG.

The first stage of the work, the 'Aberdeen CRD STA, Initial Appraisal: Case for Change'⁸ Study was completed in 2018. This report identified a range of problems and opportunities across the region, developed seven key themes and subsequently defined six TPOs. Option generation and sifting exercises were undertaken in 2018/19, which identified a list of 42 options for further development. These reports were approved by ACC, Aberdeenshire Council, Nestrans and the Aberdeen City Region Deal Joint Board committees in Summer 2018 and Summer 2019 respectively.

Throughout 2020, a Preliminary Options Appraisal⁹ was undertaken. Given the evolution of supporting policies, the TPOs were revisited and aligned with the six RTS2040 priorities and associated objectives. The original 42 options were also revisited and an option rationalisation exercise resulted in a reduced list of 29 options. The appraisal of options found that many of the options considered have merit in being taken forward for further detailed appraisal and therefore, five option categories were established to provide a structured framework for delivery. The five option categories developed were city connectivity; demand management; rural connectivity; safety; and strategic

⁷ <https://www.nestrans2040.org.uk/>

⁸ <https://www.transport.gov.scot/publication/north-east-region-option-sifting-update-report-feb-2021-stpr2/>

⁹ https://www.nestrans2040.org.uk/wp-content/uploads/2021/03/Aberdeen-City-Region-Deal-Strategic-Transport-Appraisal-Preliminary-Options-Appraisal_Finalnew.pdf

connectivity. The measures considered to be the most relevant to the Wellington Road Study are outlined in the table below.

Table 3.2: Strategic Transport Appraisal Measures Relevant to the Wellington Road Study

City Connectivity Measures
Mass transit provision, such as Bus Rapid Transit, on high demand corridors (including connections to Altens and south towards Portlethen), anchored with a ring of P&R sites
Bus priority improvements on other corridors
Bus 'feeder' services from more rural areas to link to the mass transit system
Bus Service Improvement Partnerships (BSIPs) to ensure service levels and vehicle quality
Improvements to ticketing
High quality and safe active travel in key corridors linking to the city
Development of Montrose to Inverurie as a high-volume commuter rail corridor with new stations
Demand Management Measures
Low Emission Zone
Road-space reallocation in favour of public transport and active travel
Workplace parking charges
Increased on-street and off-street parking charges/extension of the current 'controlled' parking area
Safety Measures
Community safety through the consideration of 20mph zones, school zones and other traffic calming measures
On-going safety, management and improvement measures on the key road routes in the region
Strategic Connectivity Measures
Improved access to the region's ports (including to ASH)

3.2.6 Aberdeen City and Shire Strategic Development Plan (2020)

The Aberdeen City and Shire Strategic Development Plan (SDP)¹⁰ was approved by Scottish Ministers in August 2020. It sets the strategic framework for development across the region over a 20-year period, focussing development in four strategic growth areas aligned with the region's strategic transport corridors. The Plan emphasises the importance of Aberdeen South Harbour and notes that Wellington Road is identified as one of the seven movement connections that require intervention in order to efficiently support the future growth aspirations of Aberdeen City. The Plan also identifies the importance of improving cross-city active travel connections.

3.2.7 Cumulative Transport Appraisal (2018)

The Cumulative Transport Appraisal (CTA)¹¹ was established to support the SDP and its growth aspirations through identifying the future predicted transport impacts that may arise and subsequently interventions that will be required to mitigate the impacts. The CTA identified that road junction and operational efficiency enhancements were required on the Wellington Road corridor.

The CTA identifies the following interventions, which may impact on the Wellington Road corridor:

- A package of options on Wellington Road, including bus priority lanes; signal priority; potential right-turn bans; enhanced bus service provision and bus stops review. Shared bus/HGV priority lanes are also a variation of this option.
- Cross city/orbital routes would be optimised to take account of the findings from the Aberdeen Cross City Transport Connections Study, such as a package of orbital bus routes; connecting shuttle buses; and feeder services to serve key locations, including Tullos, Altens, Dyce and Wellington Road/Hareness Roundabout.
- Opening of new rail stations to the north and south of Aberdeen, for example Newtonhill, Aberdeen North and Aberdeen South.
- Encourage increased uptake of car-sharing and car club schemes and carry out behavioural change initiatives at key development sites.
- Hareness Roundabout improvements and upgrade to dual carriageway at former HM Craiginches Prison site.

¹⁰ <http://www.aberdeencityandshire-sdpa.gov.uk/>

¹¹ <https://www.nestrans.org.uk/wp-content/uploads/2019/06/20190515-Nestrans-CTA-Option-Testing-Report-v1.1.pdf>

- A956 Wellington Road – changes to the lane arrangements from Old Wellington Road to provide two left-turn lanes onto the A956 towards the AWPR.
- Signalise roundabouts on bus corridors providing bus priority.

3.2.8 Regional Economic Strategy (2018)

The Regional Economic Strategy (RES)¹² aims to maximise economic recovery in the short term and in the longer term, sustain and secure the wellbeing of the city region and its people by delivery a more balanced and resilient economy and achieving inclusive economic growth that benefits all. It recognises the importance of infrastructure if the region is to remain an internationally competitive business environment with transport connectivity, information and communications technologies, business land and property and housing all being key. The key themes within the RES and Action Plan are:

- Investment in infrastructure;
- Innovation;
- Inclusive economic growth; and
- Internationalism.

3.2.9 A Climate-Positive City at the Heart of the Global Energy Transition (2020)

In April 2020, ACC set out its net zero vision for Aberdeen in the 'Vision and Prospectus for Aberdeen' document¹³. It outlines the following vision:

We want Aberdeen to become a climate positive city, at the same time helping to lead the world on the rapid shift to a net zero future by leveraging its unique assets and capabilities to support the global energy transition.

It outlines a series of co-dependent objectives that will be key to ensuring success:

- Leading the Global Transition – A world-class destination for inward investment in alternative energy research, innovation, and commercialisation;
- Accelerating Transition Demand – An anchor of demand and aligned local investment for alternative energy technologies, infrastructure and services;
- Resilient, Productive and Dynamic Place – Recognised the world over as the resilient, productive and dynamic place at the heart of a world-class energy transition cluster;
- Climate Positive Exemplar – A climate positive advocate and exemplar playing its full part in limiting average global warming to 1.5°C; and
- Putting People First – Everyone contributes to and shares in the proceeds of an equitable, sustainable and prosperous transition and future.

3.2.10 ACC Climate Change Plan 2021-2025 (2021)

In March 2021, ACC published a climate change plan¹⁴ to outline its ambitions and support progress with public sector climate duties. It sets a net zero target for ACC's own assets and operations and drives a significant increase in actions to reduce carbon emissions and build resilience.

The plan outlines aspirations to achieve net zero corporate carbon emissions by 2045, with interim targets of a reduction of at least 48% by 2025 and a reduction of at least 75% by 2030 against the ACC 2015/16 reporting baseline.

The plan sets out a range of projects up to 2025 across five themes covering ACC assets and operations:

- Buildings – Council buildings and Council housing;
- Mobility – Fleet and staff travel;
- Other Operations – Street lighting, internal waste, nature based action;
- Leadership & Governance – Process, procurement and decision making; and
- Awareness and Behaviour Change – Communications, participation and training.

¹² https://investaberdeen.co.uk/images/uploads/Regional_Economic_Strategy_0.pdf

¹³ https://www.aberdeencity.gov.uk/sites/default/files/2021-03/Aberdeen%20Energy%20Transition%20Vision%202020_0.pdf

¹⁴ <https://committees.aberdeencity.gov.uk/documents/s118541/Climate%20Change%20Appendix%201.pdf>

3.2.11 North East Scotland Roads Hierarchy Study (2019)

ACC and partners carried out a review of the roads hierarchy¹⁵ within Aberdeen City in response to significant investment in the transport network at a local, regional, and national level. The review of the roads hierarchy aimed to:

- Support the effective and efficient distribution and management of traffic around the city;
- Develop a network that makes best use of the AWPR by taking advantage of the newly freed-up road capacity within the city to lock in the benefits of investment by giving more priority to sustainable transport journeys;
- Facilitate delivery of the transport elements of the CCMP by providing a means of reducing through-traffic in the city centre, reflecting the role of the city centre as a destination rather than a through-route for traffic; and
- Form a basis for identifying future transport priorities for the region, along with the RTS, LTS and CRD STA.

In the revised hierarchy, Wellington Road is identified as a priority route, which is defined in the study as being a primary movement corridor, linking the strategic road network to principal destinations and secondary routes. It is noted that priority routes should be considered for the provision of segregated bus lanes and separately segregated cycle lanes, for travel in both directions. The revised hierarchy identifies an upgrade of West Tullos Road and Hareness Road to secondary in the roads hierarchy, which are defined in the study as being secondary movement corridors facilitating access from secondary destinations to principal destinations, and from priority routes to local routes. It is noted that secondary routes should be considered for the provision of segregated bus lanes where they are a bus route with greater than 100 number of buses per day and separately segregated cycle lanes where there are high levels of general traffic movement.

3.2.12 Marywell Cycle Route Study (2019)

ACC commissioned this study to consider options for improving walking and cycling provision between the Wellington Road corridor and the settlement of Marywell near the Aberdeen City and Aberdeenshire boundary. The overarching aim of this work was to develop a range of options to encourage local sustainable travel journeys. The study concluded that the preferred option was a route along the alignment of Old Stonehaven Road. It notes that delivery of this route would require the following:

- Upgrading the Old Stonehaven Road/Old Wellington Road Junction at Marywell to ensure a coherent connection to the developing route towards Stonehaven. This could range from improved signage to upgrades to existing walking/cycling infrastructure and junction modelling.
- Upgrading the Old Stonehaven Road corridor from Marywell to the junction with Cove Road. There is no existing active travel provision along this route. This could take the form of a shared use path along one side of the carriageway, a dedicated pedestrian facility combined with a contraflow cycle lane, or a 'quiet street' type layout, which may be appropriate given the fairly low volumes of traffic expected on this route. This measure should also include added street lighting and a reduction in the maximum speed limit (currently 60mph) to no more than 30mph.
- Upgrading the infrastructure on the section of Old Stonehaven Road between Cove Road and the A956. The existing shared use path is of a relatively good quality, so this would likely involve improving signage and wayfinding, although improvements to the surface condition may be considered.
- Extending the shared use path on the southern side of the A956 to complete the missing link between the A956/Old Stonehaven Road Junction.
- Improving the junction between the A956 and Old Wellington Road. This may necessitate a set of signals to allow cycle and pedestrian traffic to continue north towards the existing shared use path along the eastern side of the A956 towards the Sainsbury's Local.
- Extending the width of the shared use path along the eastern end of the A956.

3.2.13 Aberdeen to Laurencekirk Multi-Modal Feasibility Study (Ongoing)

Nestrans is currently progressing a study on the Aberdeen to Laurencekirk strategic corridor, considering current and future strategic accessibility problems and opportunities. This work will look to identify options for achieving increased public transport and sustainable mode share for trips along the corridor, particularly peak-period commuting. The study is being progressed with support from the Scottish Government's Local Rail Development Fund and is anticipated to consider the implementation of additional rail stations to the south of Aberdeen.

3.3 Development Context

The development context for the Wellington Road area was set in the Wellington Road Multi-Modal Corridor Study Preliminary Appraisal Report based on proposals included within the Aberdeen City LDP adopted in 2017. Since

¹⁵ <https://www.nestrans.org.uk/wp-content/uploads/2019/06/North-East-Scotland-Roads-Hierarchy-Study-2019.pdf>
Prepared for: Aberdeen City Council

completion of the previous LDP, the following developments have been completed within the vicinity of the study corridor:

- Lochside Academy – opened in August 2018 to the west of Wellington Road and is accessed via Wellington Circle, with an additional access for non-motorised users from Redmoss Road. Lochside Academy has a school roll of approximately 1,100 pupils, bringing together the previous Kincorth Academy and Torry Academy.
- Balmoral Stadium – opened in July 2018 to the west of Wellington Road. This is the home ground of Cove Rangers Football Club. There is a small car park at the ground, which can be accessed from Wellington Road via Wellington Circle and pedestrian access is also available from Redmoss Road.
- Recycling Centre – opened in 2017 and is accessed from Hareness Place to the east of Wellington Road.
- Costa – ‘drive-thru’ facility opened in 2018 and is accessed from Abbotswell Road.
- Former Craiginches Prison Site – 124 residential units completed in 2018 between Grampian Place and Polwarth Road.

3.3.1 Aberdeen South Harbour

The most significant development in the area is Aberdeen South Harbour at the Bay of Nigg. It is located to the east of Wellington Road and approximately 1km south of the existing harbour in the city centre. The development is being taken forward in response to constraints at the existing harbour 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 125,000m²; 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 ASH Study has considered access routes to this new facility (and the proposed Energy Transition Zone discussed below), as has been discussed in more detail in **Section 2.4**.

3.3.2 Energy from Waste Facility

An Energy from Waste facility is being developed at the former gas holder site in East Tullos Industrial Estate to the east of Greenbank Crescent in response to new legislation which means it will no longer be possible to landfill waste from 2025. The Energy from Waste Facility will burn non-recyclable waste from the three local authorities of ACC, Aberdeenshire Council and The Moray Council. Planning permission for the plant was granted in 2016 and it is anticipated to be built and operational by 2022.

It is anticipated that 60% of the non-recyclable waste delivered to the plant will arrive in bulk via the AWPR and access the plant through East Tullos Industrial Estate via Wellington Road. The remaining waste will be collected from across Aberdeen City by ACC's collection vehicles. The planning permission for the site restricts the number of vehicles that can deliver waste to the plant to a maximum of 307 vehicles a week, which is around 7 vehicles an hour¹⁶.

3.3.3 Proposed Energy Transition Zone

The Proposed Aberdeen LDP 2020 identifies additional sites within the vicinity of Wellington Road, most notably in relation to plans for the development of an Energy Transition Zone. A 70-acre site (split between two areas) has been identified close to the new harbour, which currently includes green space and the existing East Tullos Industrial Estate. Under the proposals, the land would be set aside for the development of low or zero carbon or renewable energy industries, with businesses focussing on wind, biomass, solar and tidal sectors. It would also see the creation of a hydrogen production plant and a shoreside energy hub.

In June 2020, the Scottish Government announced £62m in funding to support the oil and gas sector and it is understood that a proportion of this funding will be used to support the development of the Energy Transition Zone. Opportunity North East is leading on the development of an Outline Business Case (OBC) for the proposed Energy Transition Zone, which includes the development of an outline masterplan to support the OBC.

¹⁶ <http://www.nessenergy.co.uk/#>
Prepared for: Aberdeen City Council

3.4 Environmental Context

This section provides an update on environmental designations within the vicinity of the Wellington Road Study area.

3.4.1 Air Quality Management Areas

There remain three designated Air Quality Management Areas (AQMAs) in Aberdeen City, including on the northern section of Wellington Road between QEB and Balnagask Road. This AQMA was declared in 2008 due to exceedances of nitrogen dioxide (NO₂) and particulate matter (PM₁₀).

Progress reporting indicates that concentrations of NO₂ and PM₁₀ have been decreasing in recent years across all sites. Concentrations of NO₂ at the Wellington Road site have been below the annual mean air quality objective of 40µg/m³ since 2017 and concentrations of PM₁₀ have been below the annual mean objective of 18µg/m³ since 2015.

Table 3.3: Annual Mean Monitoring Results for Wellington Road AQMA

Pollutant	Annual Mean Concentration (µg/m ³)				
	2015	2016	2017	2018	2019
NO ₂	40	46	39	39	35
PM ₁₀	20	16	13	17	14

3.4.2 Low Emission Zones

The Scottish Government has committed to the introduction of Low Emission Zones (LEZs) in Scotland's four biggest cities (Aberdeen, Dundee, Edinburgh, and Glasgow) and has introduced legislation to enable this to happen through the Transport (Scotland) Act. LEZs are defined areas where the only vehicles that can be driven without penalty are those which meet standards for exhaust emissions.

ACC identified eight options that were subject to public and stakeholder engagement during September and October 2020 before detailed traffic and air quality monitoring was undertaken. A preferred option was identified as shown in **Figure 3.2**. This includes the northern section of Market Street and a traffic restriction at Millburn Street.



Figure 3.2: Aberdeen Proposed Low Emission Zone¹⁷

¹⁷ <https://committees.aberdeencity.gov.uk/documents/s122336/LEZ%20-%20Final%20Report.pdf>
Prepared for: Aberdeen City Council

The preferred option was presented to ACC's City Growth and Resources Committee on 24 June 2021, where the outcomes of the LEZ option appraisal were agreed, including the preferred option outlined above, and the Chief Officer – Strategic Place Planning was instructed to undertake a further eight week period of public and stakeholder consultation and engagement on the proposed boundary.

It is anticipated that the LEZ would be introduced by May 2022. The formal declaration of Aberdeen's LEZ will be followed by a grace period for enforcement of the restrictions so that people and businesses have time (if necessary) to change their vehicles or their journey patterns. It is proposed that a grace period of two years is introduced.

3.5 Transport Context

Since the completion of the previous stage of work, the AWPR fully opened to traffic in February 2019. The southern extents of Wellington Road provide a strategic connection to the AWPR at the Charleston Junction, west to Cleanhill on the A956(T) and south to Dundee and Perth via the A92(T).

As part of the scheme, active travel facilities were introduced at the Charleston Junction. The extents of the facilities are shown in the plan below. On the north side, there is a 1.9m wide footway with an island crossing of Redmoss Road and signalised pedestrian crossings of the A92(T) on-slip and off-slip. On the south side, there is a 3.0m wide footway that links to Old Stonehaven Road. There is a cycle symbol printed onto both footways close to the connection with Old Stonehaven Road suggesting that the route is suitable for cyclists, however there are no shared use signs in place and the route is not wide enough in some locations to accommodate shared use facilities. As shown, the footway on the south side terminates approximately 50m west of the Old Wellington Road Junction.

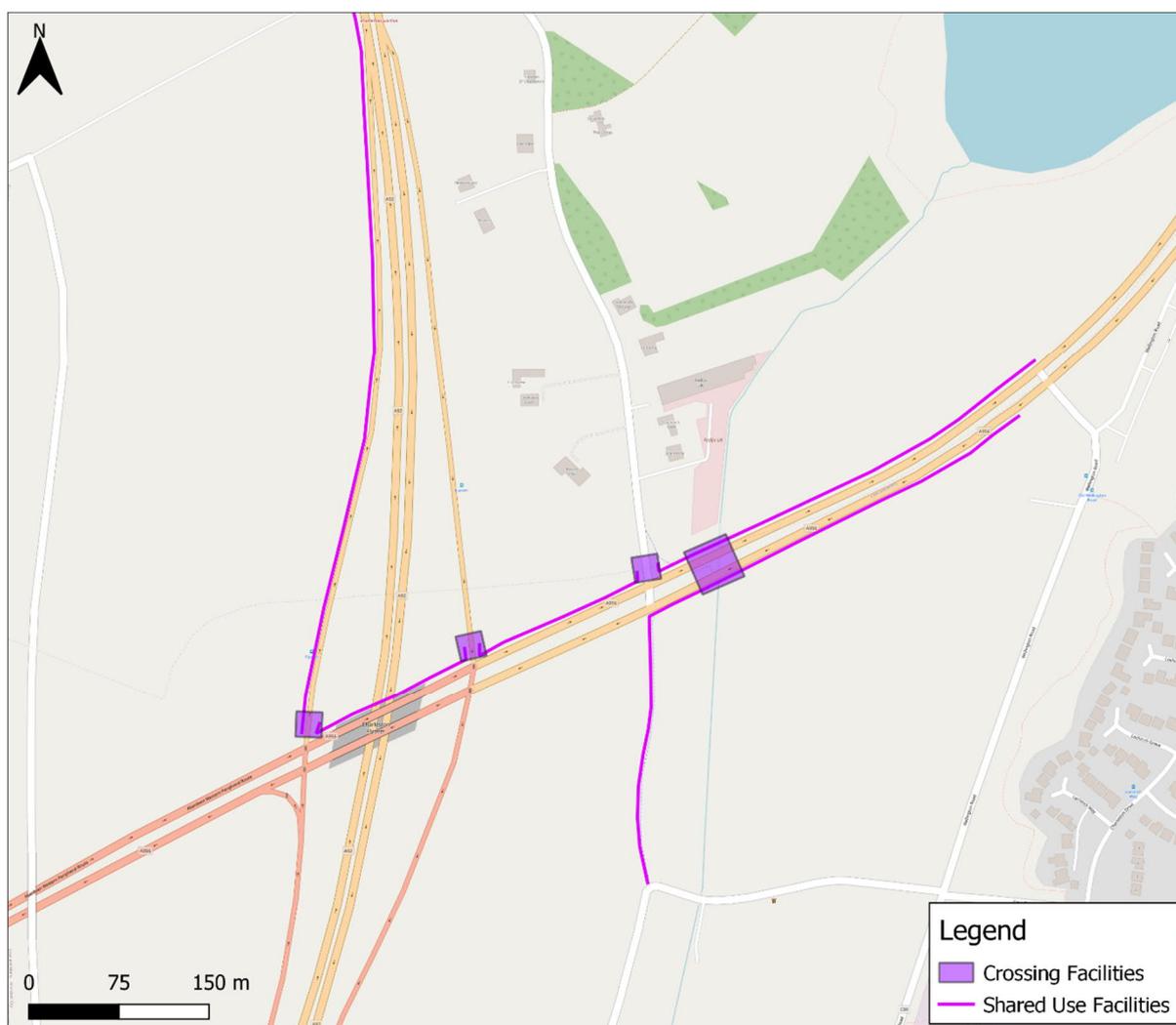


Figure 3.3: Existing Active Travel Facilities

3.6 Summary

This chapter has provided an updated policy, development, environment, and transport context for the detailed appraisal, taking account of policy and study documents that have been developed since the time of finalising the Preliminary Appraisal report in April 2018 as well as changes to environmental considerations and the transport network in the last three years. **Chapter 4** sets out the final TPOs for the study.

4. Transport Planning Objectives

4.1 Introduction

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). This chapter outlines the final TPOs for the study and presents a 'SMARTening' exercise to support ACC in the future monitoring and evaluation of the objectives.

4.2 Final Transport Planning Objectives

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

In line with STAG, TPOs have been kept under review throughout the appraisal process and refined as more detail became available. For this study, it is considered that the TPOs developed at the previous stage of the study remain valid, however, TPO2 has been expanded to include reference to Aberdeen South Harbour and the proposed Energy Transition Zone, as shown in the table below.

Table 4.1: Final Study Transport Planning Objectives

Ref	TPO at Preliminary Appraisal Stage	Final TPO at Detailed Appraisal Stage
TPO1	Provide greater priority to sustainable modes of transport on the corridor and facilitate locking in of the benefits of the AWPR	No change – TPO as at Preliminary Appraisal stage
TPO2	Facilitate efficient movement of freight on the corridor	Facilitate efficient movement of freight on the corridor, promoting access to Aberdeen South Harbour and the proposed Energy Transition Zone
TPO3	Reduce and manage traffic demands at key pinch points on the corridor, taking cognisance of the framework provided by the Roads Hierarchy	No change – TPO as at Preliminary Appraisal stage
TPO4	Improve accessibility to employment and education areas on the corridor	No change – TPO as at Preliminary Appraisal stage
TPO5	Promote a transport corridor which is safe for all users	No change – TPO as at Preliminary Appraisal stage
TPO6	Promote a transport corridor which supports air quality improvement strategies and improves public health	No change – TPO as at Preliminary Appraisal stage

4.3 SMART TPOs

STAG notes that it is imperative that TPOs are developed with 'SMART' principles in mind. This means that the objective is:

- **Specific** – it says in precise terms what is sought;
- **Measurable** – there exists means to establish to stakeholders' satisfaction whether or not the objective has been achieved;
- **Attainable** – there is general agreement that the objectives set can be reached;
- **Relevant** – the objective is a sensible indicator or proxy for the change which is sought; and
- **Timed** – the objective is associated with an agreed future point by which it will have been met.

A SMART table is provided overleaf.

Table 4.2: SMART TPO Table

TPO	Specific	Measurable (Outcomes)	Measurable (Indicators)	Attainable	Relevant	Timed
TPO1: Provide greater priority to sustainable modes of transport on the corridor and facilitate locking in of the benefits of the AWPR	TPO identifies the need to promote increased sustainable travel on the Wellington Road corridor.	Increase the number of people using active modes	Census TTW Tables	Delivery of TPO will require detailed design of option packages. Land required at former Craiginches Prison Site to enable schemes to be delivered.	TPO is consistent with the overall aim of the study. Problems and opportunities analysis found that the corridor is generally regarded as unfriendly for walking and cycling, with a lack of segregation between motorised and non-motorised users.	10-year period from year of opening
			Hands Up Survey			
			Employer Travel Plans			
			Pedestrian and Cycle Counts			
		Reduce the proportion of single occupancy vehicle trips in private cars	Census TTW Tables			
			Employer Travel Plans			
Increase the proportion of passenger bus journeys	Census TTW Tables					
	Scottish Household Survey					
TPO2: Facilitate efficient movement of freight on the corridor, promoting access to Aberdeen South Harbour and the proposed Energy Transition Zone	TPO identifies the need to enable efficient movement of freight on the Wellington Road corridor.	Peak and off-peak journey times for freight between Charleston Interchange and Aberdeen South Harbour/proposed Energy Transition Zone	Tom-Tom Data	Land required at former Craiginches Prison Site to enable schemes to be delivered.	Problems and opportunities analysis found that the route is an important freight corridor. Aberdeen South Harbour and the proposed Energy Transition Zone have strengthened the importance of the route for freight.	10-year period from year of opening
			Google Maps Traffic			
			Journey Time Surveys			
		Number of issues raised at Freight Forum meetings per annum	Direct engagement with Freight Forum			
TPO3: Reduce and manage traffic demands at key pinch points on the corridor, taking	TPO identifies the need to reduce traffic demands at key points along the	Peak and off-peak journey times for all traffic along Wellington Road between Charleston Interchange and Queen Elizabeth Bridge	Tom-Tom Data	Land required at former Craiginches Prison Site to enable schemes to be delivered.	Problems and opportunities analysis found that traffic congestion along the route impacts on journey time	10-year period from year of opening
			Google Maps Traffic			
			Journey Time Surveys			

TPO	Specific	Measurable (Outcomes)	Measurable (Indicators)	Attainable	Relevant	Timed
cognisance of the framework provided by the Roads Hierarchy	Wellington Road corridor.		Direct engagement with bus operators		reliability, particularly during peak times. Problems and opportunities analysis found lane access issues for buses due to traffic congestion and queued back traffic.	
TPO4: Improve accessibility to employment and education areas on the corridor	TPO identifies the need to improve accessibility to key destinations on the Wellington Road corridor.	Improve journey times and improve journey time reliability to key markets	TRACC – PT Journey Time	Delivery of TPO will require detailed design of option packages. Collaborative working may be required between ACC and bus operators. Land required at former Craiginches Prison Site to enable schemes to be delivered.	Problems and opportunities analysis found severance of communities and difficulties crossing Wellington Road for non-motorised users to be a problem. Problems and opportunities analysis found lack of public transport access into Altens Industrial Estate.	10-year period from year of opening
			TRACC – PT Catchment			
			TRACC – AT Journey Time			
			TRACC – AT Catchment			
			INRIX – Journey Time			
			INRIX – Journey Time Reliability			
		Increase the number of travel choices available for key journeys, with a key focus on making alternatives to private car more attractive	TRACC – PT Catchment			
			TRACC – No. of PT Services			
TRACC – AT Catchment						
TPO5: Promote a transport corridor which is safe for all users	TPO identifies the need to promote safety for all users on the Wellington Road corridor.	Reduce the number and severity of accidents	CrashMap	Land required at former Craiginches Prison Site to enable schemes to be delivered.	Problems and opportunities analysis noted concerns regarding the use of Wellington Road as a walking route to school for Lochside Academy.	10-year period from year of opening
		Improve perceptions of safety and security	Citizens Panel Surveys			
			Direct engagement with Community Councils			

TPO	Specific	Measurable (Outcomes)	Measurable (Indicators)	Attainable	Relevant	Timed
TPO6: Promote a transport corridor which supports air quality improvement strategies and improves public health	TPO identifies the need to promote air quality improvements along the Wellington Road corridor.	Reduce concentrations of NO ₂ and PM ₁₀	Annual Mean Monitoring Results	Land required at former Craiginches Prison Site to enable schemes to be delivered.	Air Quality Management Area designated between Queen Elizabeth Bridge and Balnagask Road.	10-year period from year of opening
		Improve public health in communities along the corridor	Scottish Public Health Observatory Online Profiles Tool			

4.4 Summary

This chapter has outlined the final TPOs for the study and has set out a SMART table to support ACC in the future monitoring and evaluation of the objectives. **Chapter 5** details the option packages that have been developed for the detailed appraisal.

5. Option Development & Packaging

5.1 Introduction

This chapter provides an overview of the development of the options brought forward from the Preliminary Appraisal and details the option packages that have been developed for the detailed appraisal.

5.2 Option Development

As outlined in **Chapter 2**, eight options from the Preliminary Appraisal stage were recommended to be taken forward for further consideration at the detailed appraisal stage. To better understand the potential ways in which the higher level Preliminary Appraisal options could enact change on the Wellington Road corridor, an initial task to inform the detailed appraisal was to test individual concepts building on the Preliminary Appraisal options to inform option packaging considerations. This was facilitated by the Wellington Road Corridor Microsimulation Model developed for this study, as discussed in **Chapter 7**.

Table 5.1 provides an overview of the model tests undertaken to support development of the Preliminary Appraisal options and inform option packaging at detailed appraisal.

Table 5.1: Development of Options from Preliminary Appraisal

Preliminary Appraisal Option	Model Tests Undertaken
Strategic Cycle Improvements	<ul style="list-style-type: none"> Two-way segregated cycleway¹⁸ With-flow segregated cycleway¹⁹
Shared Bus/HGV Priority Lane	<ul style="list-style-type: none"> Northbound shared HGV/bus lane Southbound shared HGV/bus lane Shared HGV/bus lane in both directions Existing northbound bus lane converted to shared HGV/bus lane
Souterhead Roundabout Improvements + More/Better Crossings at Souterhead Roundabout	<ul style="list-style-type: none"> Existing Souterhead Roundabout with new pedestrian crossings²⁰ Souterhead Junction improvement (based on a previous design promoted in the 2008 Access from the South²¹ Study)
Hareness Roundabout Improvements + More/Better Crossings at Hareness Roundabout	<ul style="list-style-type: none"> Hareness Junction improvement (based on a previous design promoted in the 2008 Access from the South Study)
Additional Capacity between Souterhead and Hareness Roundabouts	<ul style="list-style-type: none"> Additional lane between Charleston Road North and Hareness Roundabout (northbound)
Upgrade to Dual Carriageway at Former HM Craiginches Prison Site	<ul style="list-style-type: none"> Dualling between Grampian Place and Polwarth Road (southbound)
Wellington Road Bus Quality Package	<ul style="list-style-type: none"> Extension to existing northbound bus lane New southbound bus lane (Grampian Place to Kerloch Place)
Wellington Road Corridor Right-Turn/Traffic Signals Priorities Review Package	<ul style="list-style-type: none"> Right-turn ban (Wellington Road to Abbotswell Road) Right-turn ban (Wellington Road to Girdleness Road) Right-turn ban (Wellington Road to Abbotswell Road + Wellington Road to Girdleness Road)

Following the modelling tests undertaken, it was agreed in conjunction with the Client Group that the right-turn ban from Wellington Road to Girdleness Road and the combined right-turn ban from Wellington Road to Abbotswell Road + Wellington Road to Girdleness Road should not progress into the option packaging process based on their

¹⁸ Cycleway that travels in both directions on one side of the road and is separated from the carriageway by a buffer

¹⁹ Cycleway that travels with the flow of traffic and is separated from the carriageway by a buffer

²⁰ New pedestrian crossings at Souter Head Road, Langdykes Road and Wellington Circle

²¹ A study completed in May 2008 by SIAS Ltd on behalf of ACC, Aberdeenshire Council and Nestrans, developing options to improve traffic flows on the southern approaches to Aberdeen City and to identify an appropriate location for a park and ride site.

performance during initial model testing. Initial model testing indicated that the right-turn ban from Wellington Road onto Abbotswell Road would improve the southbound flow through the Abbotswell Road Junction as it would allow both southbound lanes to be available for the straight-ahead movement (whereas one lane is currently occupied by right-turning traffic). As a result of the improved southbound flow between Balnagask Road and Abbotswell Road, more gaps would be available for traffic turning right from Wellington Road into Girdleness Road. Furthermore, a right-turn ban onto Girdleness Road would result in traffic having to turn right at the Balnagask Road Junction to access Girdleness Road. This would cause additional delay for northbound traffic through Balnagask Junction, which already experiences queuing on this approach, especially on the right-turning lane into Balnagask Road. It was also agreed that whilst the additional capacity between Charleston Road North and Hareness Roundabout would not form part of the option packaging process, an additional sub-test in the model would be undertaken to demonstrate the impact of an additional lane in this location for buses and HGVs, should progression of this intervention be desired in the future (outwith the scope of the detailed appraisal).

5.3 Option Packaging

Given the competing demands on the corridor, it was agreed that a series of packages should be developed using a combination of options brought forward from the Preliminary Appraisal – and informed by the model tests undertaken as outlined in **Table 5.1**. To further facilitate the development of option packages, the Wellington Road corridor was split into seven sections as shown in the plan below.

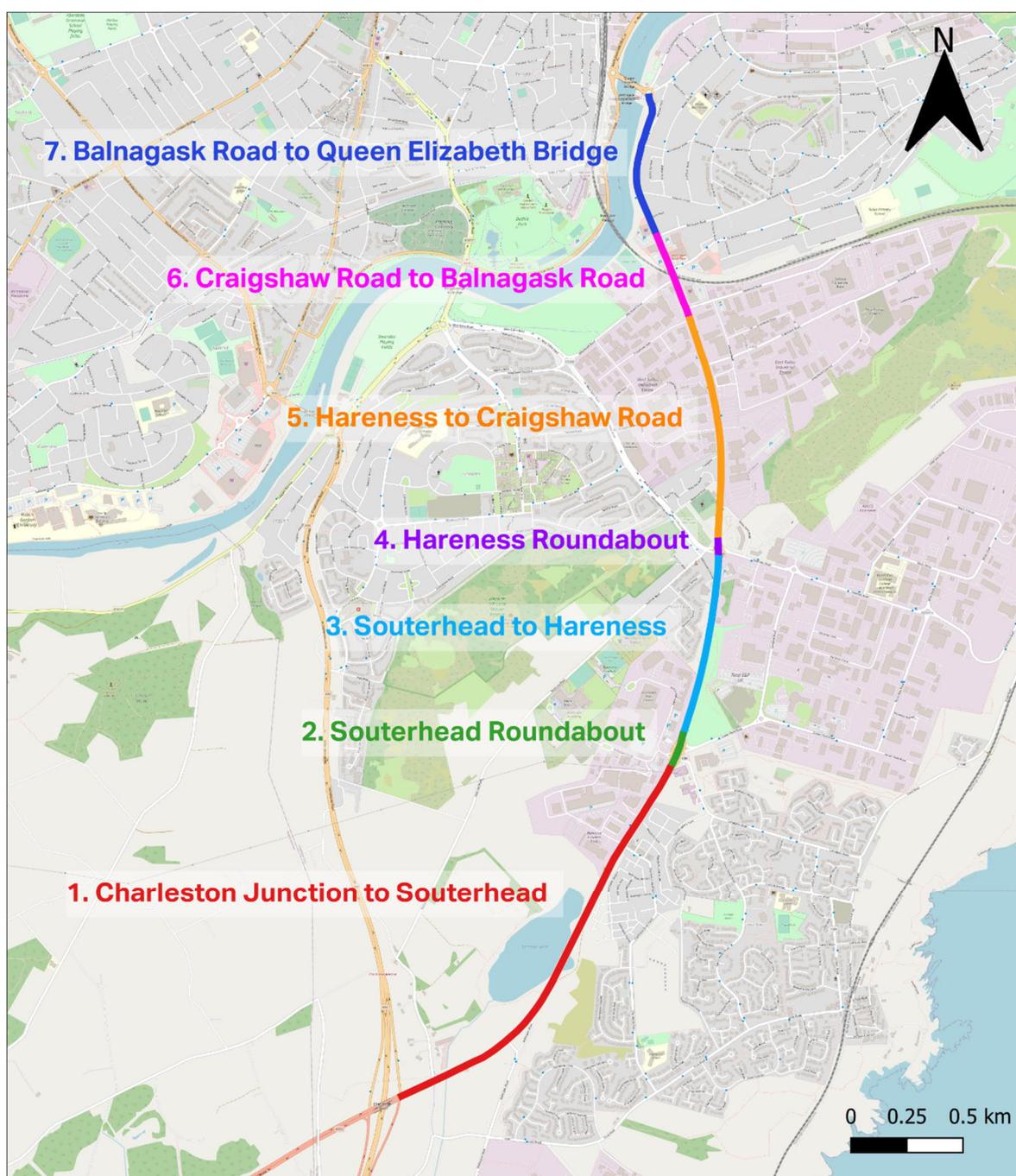


Figure 5.1: Study Corridor Sections

Initial high-level, conceptual feasibility work was undertaken using CAD to determine how various options could be accommodated along the corridor, with consideration subsequently given to identifying the most appropriate options to implement in combination, informed by the model tests initially carried out (**Table 5.1**).

This led to the development of three packages:

- **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.

The table below outlines the relationship between the initial model tests undertaken and the three packages subsequently developed.

Table 5.2: Detailed Appraisal Packages in Relation to Initial Model Tests Undertaken

Model Tests Undertaken	Detailed Appraisal Package		
	Active Travel	Public Transport	Multi-Modal
Two-way segregated cycleway	x	x	✓
With-flow segregated cycleway	✓	x	x
Northbound shared HGV/bus lane	x	Bus lane only	✓
Southbound shared HGV/bus lane	x	Bus lane only	✓
Shared HGV/bus lane in both directions	x	Bus lane only	✓
Existing northbound bus lane converted to shared HGV/bus lane	x	Bus lane only	✓
Existing Souterhead Roundabout with new pedestrian crossings	x	x	✓
Souterhead Junction improvement	✓	x	x
Hareness Junction improvement	✓	✓	✓
Additional lane between Charleston Road North and Hareness Roundabout (northbound)	x	x	Model sensitivity test
Dualling between Grampian Place and Polwarth Road	For with-flow cycleway	For bus lane	For two-way cycleway + shared bus/HGV lane
Extension to existing northbound bus lane	x	✓	Shared lane
New southbound bus lane (Grampian Place to Kerloch Place)	x	✓	Shared lane
Right-turn ban (Wellington Road to Abbotswell Road)	✓	✓	✓
Right-turn ban (Wellington Road to Girdleness Road)	x	x	x
Right-turn ban (Wellington Road to Abbotswell Road + Wellington Road to Girdleness Road)	x	x	x

Further detail on the elements included within the three packages along each section of the corridor is provided in the tables that follow and supported by the plans provided in **Appendix A***.

***NB: It should be noted that subsequent treatment of the packages in the detailed appraisal in the proceeding chapters has been informed by additional transport modelling undertaken during the second period of consultation in April 2021 – the relationship between the packages presented for consultation and the scope of the appraisal are set out in more detail as part of Chapter 7.**

The elements included within the Active Travel Package are outlined in **Table 5.3**.

Table 5.3: Active Travel Package

Intervention	Section (see Figure 5.1)						
	1	2	3	4	5	6	7
With-flow kerb segregated cycleway	✓		✓		✓	✓	✓
Cycle priority through junctions		✓		✓			
Junction reconfiguration		✓		✓			
Right-turn ban at Abbotswell Road						✓	

The elements included within the Public Transport Package are outlined in **Table 5.4**. It should be noted that this package assumes no public transport improvements to the south of the Souterhead Junction (Section 1).

Table 5.4: Public Transport Package

Intervention	Section (see Figure 5.1)						
	1	2	3	4	5	6	7
Northbound bus lane			✓		✓	✓	✓
Southbound bus lane			✓		✓	✓	✓
Bus priority through junctions		✓		✓	✓	✓	✓
Junction reconfiguration				✓			
Right-turn ban at Abbotswell Road						✓	

The elements included within the Multi-Modal Package are outlined in **Table 5.5**. It should be noted that this package assumes no public transport or freight improvements to the south of the Souterhead Junction (Section 1), however, this package does promote a two-way segregated cycleway from the southern extent of the corridor northwards.

Table 5.5: Multi-Modal Travel & Transport Package

Intervention	Section (see Figure 5.1)						
	1	2	3	4	5	6	7
Two-way kerb segregated cycleway ²²	✓		✓		✓	✓	✓
Northbound shared bus/HGV lane			✓		✓	✓	✓
Southbound shared bus/HGV lane			✓		✓	✓	✓
Improved crossings		✓		✓			
Junction reconfiguration				✓			
Right-turn ban at Abbotswell Road						✓	

5.4 Summary

This chapter has set out the process of how the options brought forward from the Preliminary Appraisal in 2018 have been developed to a level of detail appropriate to allow detailed appraisal in accordance with STAG. As alluded to above, the three packages were subject to additional transport modelling in April 2021; details of which are set out in **Chapter 7**. **Chapter 6** provides an overview of consultation and engagement undertaken to support the detailed appraisal.

²² The two-way cycleway has been designed at this stage on the assumption that it would be placed on the east side of the corridor, however, it could be interchangeable with the west side of the carriageway pending any detailed design of the scheme following the detailed appraisal study.

6. Consultation & Engagement

6.1 Part 1

An online consultation was hosted by ACC between November and December 2020 to provide the opportunity for members of the public and stakeholders to provide feedback on options developed as part of the ASH Study and initial feedback on the concepts being explored to support package development on the Wellington Road Multi-Modal Corridor Study. Launched on ACC's Citizen Space portal, the options for both studies were presented with a supplementary questionnaire providing means of feedback on the pros and cons of options under consideration. It should be noted that this was undertaken prior to the development of the Wellington Road Study option packages described in **Chapter 5** and therefore the feedback received was based on the 16 elements tested within the traffic model (set out in **Table 5.1**).

There were 141 responses to the questionnaire, including 126 from individuals and 15 responses from organisations. The key findings from the feedback received are summarised in the table below.

Table 6.1: Initial Consultation Feedback on Option Tests

Option Test	Feedback
Northbound shared HGV/bus lane	<ul style="list-style-type: none"> Some concerns that shared lanes may increase congestion on the corridor due to the reduced capacity for private vehicles.
Southbound shared HGV/bus lane	<ul style="list-style-type: none"> Support for bus priority measures due to alignment with the Regional Transport Strategy and the ongoing work of the North East Bus Alliance.
Shared HGV/bus lane in both directions	<ul style="list-style-type: none"> Some respondents indicating that shared lanes could provide benefits to the corridor.
Existing northbound bus lane converted to shared HGV/bus lane	<ul style="list-style-type: none"> Generally considered that this option could provide benefits, particularly during peak times.
Existing Souterhead Roundabout with new toucan crossings	<ul style="list-style-type: none"> Generally supported in order to enhance safety for pedestrians and cyclists navigating the junction.
Souterhead Junction Improvement	<ul style="list-style-type: none"> Some concerns about the loss of woodland area.
Hareness Junction Improvement	<ul style="list-style-type: none"> Generally supported in order to enhance safety for pedestrians and cyclists navigating the junction.
Additional lane between Charleston Road North and Hareness Roundabout (northbound)	<ul style="list-style-type: none"> Not generally considered to be necessary, and some concerns raised regarding the addition of infrastructure that would encourage the use of private vehicles (and subsequent pollution levels).
Dualling between Grampian Place and Polwarth Road (southbound)	<ul style="list-style-type: none"> Generally supported to enhance safety and improve traffic flow in this location.
Extension to existing northbound bus lane	<ul style="list-style-type: none"> Not generally considered to be necessary, and some concerns raised regarding the impact on traffic flow.
New southbound bus lane (Grampian Place to Kerloch Place)	<ul style="list-style-type: none"> Support for bus priority measures due to alignment with the Regional Transport Strategy and the ongoing work of the North East Bus Alliance.
Right-turn ban (Wellington Road to Abbotswell Road)	<ul style="list-style-type: none"> Some concerns regarding reduced accessibility for residents and businesses and concerns regarding displaced traffic onto other, less appropriate routes.
Right-turn ban (Wellington Road to Girdleness Road)	
Right-turn ban (Wellington Road to Abbotswell Road + Wellington Road to Girdleness Road)	
Two-way segregated cycleway	<ul style="list-style-type: none"> Some concerns that the low number of cyclists using the route does not justify significant investment, though others emphasised the importance of more and improved pedestrian and cycle paths.
With-flow cycleway	<ul style="list-style-type: none"> The with-flow option was broadly preferred over the two-way option as the two-way option would require users to cross the corridor more frequently to access their destination, which generates safety concerns.

6.2 Part 2

Following further development of options and the formulation of the option packages described in **Chapter 5**, members of the public and stakeholders were provided with another opportunity to feed back on proposals for the Wellington Road corridor (with the option package plans set out in **Appendix A** and a supporting public engagement pack providing the information necessary to inform a response). A further online consultation with these materials made available for download was hosted on ACC’s Citizen Space portal, available to complete from the 12th April 2021 until the 10th May 2021.

There were 130 responses during this round of consultation and this feedback has been used to inform the Public Acceptability element of the appraisal, which is detailed in **Section 11.4**. However, as alluded to in **Chapter 5**, the three detailed appraisal packages were subject to additional transport modelling in April 2021, in parallel to the ongoing online consultation. Due to the performance of the packages within the Wellington Road Corridor Microsimulation Model, a series of recommended revisions to the option packages were promoted to enable greater network efficiency and reduce the risk of traffic being displaced onto parallel and less appropriate routes in line with the revised roads hierarchy. This is explained further in **Chapter 7**.

The results of the second round of engagement 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.

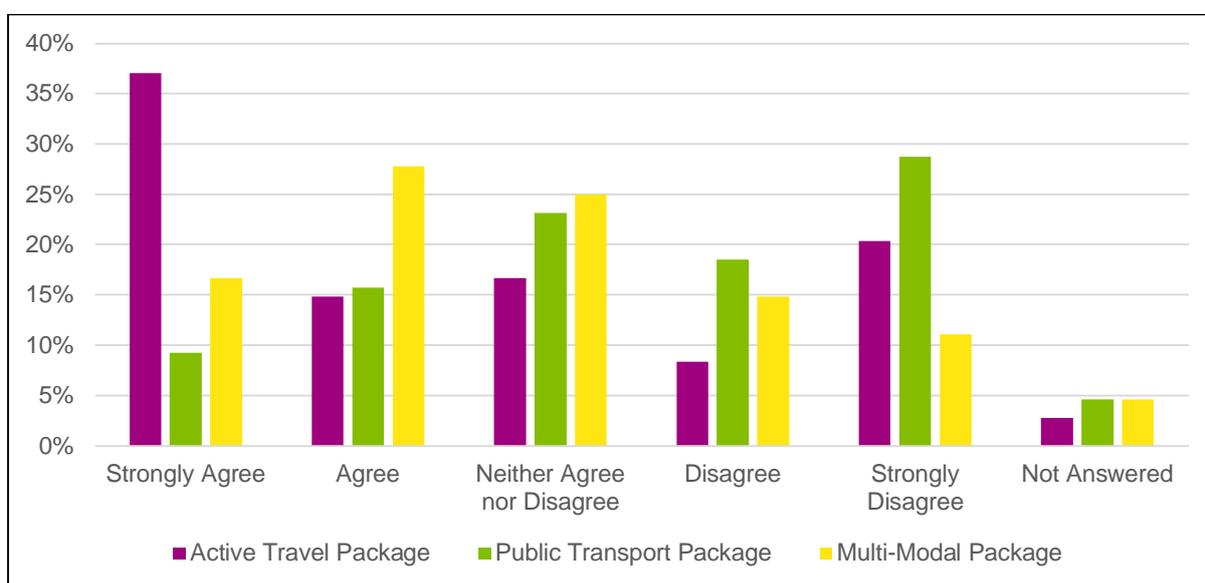


Figure 6.1: Level of Agreement with Packages

The table below provides an overview of the key types of comments made in support of and against the three packages. Further analysis is provided as part of the Public Acceptability appraisal in **Section 11.4** supported by a full review in **Appendix D**.

Table 6.2: Key Feedback on Option Packages

Option Test	Positive	Negative
Active Travel Package	<ul style="list-style-type: none"> Improved feelings of safety for active travel users Encourage increased walking and cycling 	<ul style="list-style-type: none"> Concerns about delays to general traffic, particularly freight vehicles Concerns about the topography of Wellington Road for cycling
Public Transport Package	<ul style="list-style-type: none"> Supporting modal shift (and reduced vehicle emissions) Improved opportunities for those without access to a car 	<ul style="list-style-type: none"> Relatively low number of bus services currently operating on the corridor Concerns about delays to general traffic
Multi-Modal Package	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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

6.2.1 Stakeholder Feedback

Responses to the online survey included feedback from key stakeholders, including Sustrans, Aberdeen Cycle Forum and Stagecoach. This section summarises the feedback from these organisations.

Sustrans

Sustrans noted that the Active Travel Package would improve usability for pedestrians and cyclists. They proposed a number of enhancements that could be made to the package to ensure alignment with the Sustainable Travel Hierarchy:

- Treatment of side road junctions and crossings to indicate pedestrian and cycle priority;
- Opt for single stage pedestrian (and cycle as appropriate) crossing points across Wellington Road and at large junctions;
- Ensure seamless link with planned provision on Craigshaw Drive;
- Facilitate independent travel for young people by ensuring direct, safe, and comfortable active travel infrastructure on routes to Lochside Academy;
- Improve the public realm, for example, by including resting places and enhancing green infrastructure, which reduces barriers caused by steep gradients and air pollution that currently characterise Wellington Road;
- Ensure design of floating bus stops requires cyclists to stop when pedestrians are alighting from buses to make sure users with protected characteristics feel safe; and
- Currently the with-flow cycleway starts and stops, while vehicles flow easily – this would need to change to reflect the Sustainable Travel Hierarchy.

Sustrans noted that the Public Transport Package could improve service time and increase patronage. They proposed a number of enhancements that could be made to the package to ensure alignment with the Sustainable Travel Hierarchy:

- Appropriate treatment at side roads, such as controlled crossing points and continuous footways to indicate pedestrian priority;
- The compatibility of active travel and public transport is understated – further indication is required of how pedestrians and cyclists coexist and complement public transport on this route;
- Improve safety and reduce wait times for pedestrians by installing controlled, single stage crossings at each arm of Souterhead Roundabout;
- Replace staggered crossings with single stage crossings or toucan crossings at Hareness and include a continuous footway over allotment entrance.

Sustrans additionally proposed the following recommendations that could be made to the Multi-Modal Package to ensure alignment with the Sustainable Travel Hierarchy:

- More should be done to capitalise on multi-modal journeys – active travel and public transport complement each other when integrated;
- Multi-modal journeys are supported by the careful placement of cycling facilities at key public transport interchanges;
- Weather protected seating and storage at key destinations may be sufficient, however, a clear and well-promoted system for carrying bikes on buses may be enough to encourage people to combine transport methods;
- Cycle service stations and bike hire schemes remove barriers to cycling;
- The two-way cycleway is not preferable to the with-flow cycleway option on such a busy arterial road as it requires vulnerable users to cross the carriageway; and
- The lack of controlled crossings would inhibit east-west movements, reducing permeability and becoming a barrier to active travel.

Aberdeen Cycle Forum

Aberdeen Cycle Forum indicated support for the Active Travel Package, particularly in terms of the cycleway maintaining priority over side streets and support for set-back crossing points not being promoted within the proposal. Aberdeen Cycle Forum additionally indicated support for the re-design of Hareness and Souterhead junctions, noting that proposals would make the junctions safer and more permeable for both pedestrians and cyclists. Despite support for this package, concerns were raised regarding the lack of detail regarding integration with the roundabout to the south of QEB, where there is currently no safe crossing points for pedestrians and cyclists in a north to south or east to west direction.

Aberdeen Cycle Forum raised concerns about the Public Transport Package, noting that it does not include sufficient provision to accommodate active travel facilities.

Aberdeen Cycle Forum indicated concerns with the Multi-Modal Package in relation to cycle provision only being provided on one side of the road, noting that this would reduce the appeal and convenience for some users, which may lead to reduced use compared to the with-flow cycleway option promoted as part of the Active Travel Package. Aberdeen Cycle Forum outlined a number of related issues regarding a two-way cycleway option, including:

- Proximity of cyclists travelling in opposite directions to each other, particularly where there is a significant gradient and therefore the potential for a large speed differential;
- Proximity of northbound cyclists to southbound vehicle traffic, again when cyclists are potentially travelling fast due to the gradient; and
- The inconvenience of crossing to make use of the segregated cycleway for northbound cyclists, which may mean that some choose to remain on the carriageway utilising the shared bus/HGV lane.

Stagecoach

Stagecoach indicated support for the Public Transport Package, noting that the commuter flows from communities to the south of the city is one of the strongest in the region, with frequent bus services from locations such as Portlethen and Stonehaven. Whilst services have generally been focussed on the A92 Stonehaven Road corridor, it is noted that, should the Public Transport Package be progressed, it is likely that services would increase along the Wellington Road corridor to support recent developments including Charleston, Lochside Academy and Marywell. The Public Transport Package would allow services to operate to Portlethen and beyond via Wellington Road, improving access for residents along the corridor to locations such as Badentoy Industrial Estate and Portlethen Retail Park and it would also provide another consistent, high quality corridor that may allow services to connect Aberdeenshire communities with key city destinations like Aberdeen Royal Infirmary.

In terms of the Multi-Modal Package, Stagecoach acknowledged that the provision of a two-way cycleway is less desirable than with-flow cycle lanes, however, indicated that this would provide ample capacity for current and future demand whilst allowing dedicated space for bus services along much of the route. Concerns were additionally raised regarding the breaks in the proposed bus lanes along the corridor.

6.3 Summary

This chapter has provided a summary of the findings from the consultation and engagement exercises that have been undertaken throughout the process of completing this detailed appraisal study. This has been used to inform the Public Acceptability appraisal in **Chapter 11**.

Chapter 7 provides an overview of the development of the Wellington Road Corridor Microsimulation Model, sets out the final option packages for appraisal and details the performance of option packages within this model.

7. Traffic Modelling

7.1 Introduction

This chapter presents the modelling results from the packages identified for detailed appraisal, namely the Active Travel, Public Transport and Multi-Modal Packages. It also contains the outcomes of an additional sub-test²³ undertaken in the context of the Multi-Modal package. It sets out the key performance indicators associated with the operation of each package, highlighting areas of the corridor that present delay or improvements to journey times. The analysis provides information on general traffic, HGVs, and buses, however due to the extent of the capabilities of the software used (Paramics Discovery), active travel modes have not been modelled, though the quantitative impacts of the cycleway schemes are set out in the Active Travel Economic Assessment (ATEA) in **Section 9.4**.

7.2 Background

It was agreed with the client group that a Wellington Road Corridor Microsimulation Model using Paramics Discovery software would be prepared to assist the detailed appraisal. In **Figure 7.1** the area of focus of the model is highlighted in orange 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. As noted in previous chapters, the detailed appraisal is focussing on options on the Wellington Road corridor itself, with a complementary appraisal of links for the ASH Study reported in February 2021. To future proof the model, the Coast Road was also modelled, with the model being additionally used to inform the ASH appraisal.



Figure 7.1: A956 Wellington Road Corridor – Modelled Area

A base model was developed in 2019 to assess the proposed options for the Wellington Road Corridor – the details of this model development are presented in the Model Development Report set out in **Appendix E**.

²³ Additional lane sub-test includes Multi-Modal Package, with 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.

7.3 Do Minimum Model (2026)

As noted, the base model created by AECOM for the detailed appraisal was adopted to aid the ASH Study. The model was extended to suit the study and future year models were prepared. The preferred network option for the ASH Study comprised a new bridge on Coast Road combined with widening of Coast Road. This 2026 model, named "Do Minimum" hereafter, has been used for the testing of the Wellington Road detailed appraisal packages.

The Do Minimum model comprises 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.

For the purpose of this modelling exercise, the 'Core growth' scenario was tested, with background traffic increased by approximately 2% in the AM peak and 3% in the PM peak between 2019 and 2026.

7.4 Final Package Components

The Active Travel, Public Transport and Multi-Modal Packages developed for detailed appraisal (as outlined in **Chapter 5**) were the focus of public and stakeholder consultation in April-May 2021.

Parallel to the consultation, the Wellington Road Corridor Microsimulation Model was run to capture data to assess the performance of the three packages. The results of the testing indicated that, as developed, the packages would be operationally constrained due to their wider impacts on the Wellington Road transport network. Therefore, to alleviate the extent of these impacts, adjustments were made to the models established for each of the packages. **Appendix F** sets out in detail the adjustments made to each package model to ensure that the network would run to an operationally viable level of service relative to the modelled future year Do Minimum.

Following the adjustments made, the final package components that formed the basis for appraisal are outlined in the proceeding sections.

7.4.1 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 7.1 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.²⁴ to 4no.

Table 7.1: 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 ²⁵	Footway = 650m With-flow cycleway = 650m
SB	Shared Use = 1635m Gap = 200m	Footway = 1460m With-flow cycleway = 1460m Shared Use = 375m	Shared Use = 850m	Footway = 850m With-flow cycleway = 850m	Footway = 1030m	Footway = 1030m With-flow cycleway = 1030m	Footway = 410m	Footway = 410m With-flow cycleway = 410m	Footway = 650m	Footway = 650m With-flow cycleway = 650m

²⁴ 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.

²⁵ Bus lane use by cyclists is permitted.

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 Southerhead (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, with the exception of the existing bus lane in Section 7, which cyclists are permitted to use. Where there is existing shared use infrastructure in the south of the corridor, some sections are relatively poor quality (e.g. between Southerhead and Hareness where the paths are generally less than 2m wide).

7.4.2 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 (see **Model Diagrams** section in **Appendix F**);
- Existing Southerhead 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 7.2 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 (Southerhead 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 7.2: Approximate Lengths of Bus Lane along Corridor

	Section 1: Charleston to Southerhead		Section 3: Southerhead 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

7.4.3 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 (see **Model Diagrams** section in **Appendix F**);
- Existing Southerhead Roundabout, with additional toucan crossings on Souther 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 7.3 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 (Southerhead 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, with the exception of the existing bus lane in Section 7, which cyclists are permitted to use. Where there is existing shared use infrastructure in the south of the corridor, some sections are relatively poor quality (e.g. between Southerhead 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 Southerhead (between Loirston Loch and Charleston Road North) and for 200m southbound in proximity to the Old Wellington Road Junction.

Table 7.3: Approximate Lengths of Intervention along Corridor

Intervention		Section 1: Charleston to Southerhead		Section 3: Southerhead 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 ²⁶	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

7.5 Performance Indicators

The following sections present the modelling results for each package. To aid the discussion and conclusions, three performance indicators were used to assess each package:

- Unreleased vehicles;
- Journey times; and
- Queue lengths.

Unreleased vehicles (or suppressed demand) highlight whether a model is unable to release vehicles onto the network. Areas of the network which highlight unreleased vehicles will also exhibit poor network performance.

Given that the Wellington Road corridor is being assessed using journey time analysis, it was deemed appropriate to also assess the side roads using queue length data for comparison. Changes in queue lengths on side roads is a good indication as to whether the options are impacting not only Wellington Road but also the roads joining the corridor.

These performance indicators have been used to provide evidence on the advantages and disadvantages of the proposed packages and to assist in identifying the merits of each package within the overall assessments comprising the detailed appraisal.

²⁶ Assumed to be on the east side for the purposes of the assessment.

7.6 Modelling Results

The following section presents a summary of the model output results for each package for general traffic, HGVs, and buses. **Table 7.4**, **Table 7.5** and **Table 7.6** present the general traffic, HGV and bus results respectively for the three detailed appraisal packages and the sub-test, and compares them against the Do Minimum model results for the AM peak (07:00-09:00) and PM peak (16:00-18:00). The tables present the following key performance indicators as described in **Section 7.5**.

- End to end journey times along Wellington Road corridor for all traffic in both directions;
- Average queue length on side arms of key junctions during the AM and PM peak hours;
 - North Esplanade West Roundabout;
 - Balnagask Road Junction;
 - Girdleness Road/Abbotswell Road Junction;
 - Greenwell Road/Craigshaw Drive Junction;
 - Hareness Roundabout; and
 - Souterhead Roundabout.
- Total number of unreleased vehicles onto the network at the end of the model period.

Given that the main purpose of the STAG assessment is to improve transport on the Wellington Road corridor, the end-to-end journey time results in both directions were the main performance indicator when assessing package performance in terms of the modelling outputs. However, queue length performance and suppressed demand were also considered to refine the assessment of each package.

7.6.1 Modelling Results Summary

As stated previously, the modelling tool used for this assessment does not have the functionality to assess active travel such as cycling, and is specifically focussed on motorised vehicles, including cars, HGVs, and buses. Therefore, it is important to consider the potential benefits of these active travel modes when considering each of the packages and the potential benefit they may receive from each package.

General Traffic

Table 7.4 outlines the anticipated journey time changes for all vehicles relative to the Do Minimum for each option package. Increases in journey time, average queue length and suppressed demand are shown in **red**, with decreases shown in **green**.

Table 7.4: All Vehicles Journey Time Change

		Do Minimum	Active Travel	Public Transport	Multi-Modal	Sub-test
AM (07:00-09:00)	JT Northbound	00:14:05	-00:06	+00:09	+01:03	-00:24
	JT Southbound	00:09:31	+02:07	+01:36	-00:05	-00:06
	Avg Queue (m)	67	+2	+2	-12	-12
	Suppressed Demand	28	+51	+65	+43	+40
PM (16:00-18:00)	JT Northbound	00:10:37	+01:47	+00:31	-00:19	-00:47
	JT Southbound	00:11:12	+00:31	+02:35	+03:06	+03:09
	Avg Queue (m)	56	+1	-2	-9	-8
	Suppressed Demand	64	+5	+163	+111	+107

The results above highlight that in the northbound direction, the Multi-Modal Package indicated the largest increase in journey time during the AM peak with an increase of approximately 1 minute, however the Multi-Modal sub-test presents a reduction of approximately 20 seconds. Both the Active Travel and Public Transport packages display similar journey times to that of the Do Minimum. In the southbound direction, the Active Travel and Public Transport Packages present approximately 2 minutes and 1.5 minute delay respectively when compared to the Do Minimum, whereas the Multi-Modal Package (and sub-test) display similar journey times to that of the Do Minimum.

During the PM peak, the largest delays are experienced in the southbound direction, with the Multi-Modal Package displaying delays over 3 minutes. In the northbound direction the most notable delays are observed in the Active Travel and Public Transport Packages with approximately 2 minutes and 30 seconds respectively. The Multi-Modal Package (and sub-test) experience a reduction in journey time with the Multi-Modal sub-test displaying the highest reduction in journey times of approximately 1 minute compared to the Do Minimum.

In terms of queueing, all packages display similar average queueing on the side roads analysed. However, there is potential suppressed demand (vehicles unable to access the network) in the Public Transport and Multi-Modal Packages during the PM peak. The Public Transport and Multi-Modal Packages highlight between 100 to 160 more vehicles being held off the network compared to the Active Travel Package, indicating that the Active Travel Package is processing more vehicles onto the network. The main location for this suppressed demand is on Craigshaw Drive, where queues extend off the network in both the Public Transport and Multi-Modal Packages.

HGVs

Table 7.5 outlines the anticipated journey time changes for HGVs relative to the Do Minimum for each option package. Increases in journey time are shown in red and decreases are shown in green.

Table 7.5: HGVs Journey Time Change

	Do Minimum	Active Travel	Public Transport	Multi-Modal	Sub-test
AM (07:00-09:00) JT NB	00:14:09	-00:22	+00:16	-00:01	-02:14
AM (07:00-09:00) JT SB	00:10:33	+02:02	+01:39	+00:21	+00:19
PM (16:00-18:00) JT NB	00:10:59	+02:16	+00:06	-01:27	-01:35
PM (16:00-18:00) JT SB	00:11:40	+01:35	+02:44	+01:40	+01:49

With regards to HGV journey times, as expected the Multi-Modal (sub-test) presents the shortest journey times in the northbound direction due to the additional lane between Charleston Road North and Hareness. The Multi-Modal Package also presents improvements in the northbound direction, however to a lesser extent with the AM peak northbound displaying similar journey times to that of the Do Minimum model. The Active Travel Package is the only other package which provides a reduced journey time when compared to the Do Minimum, with approximately 20 seconds saving in the AM peak northbound. In the southbound direction, all packages display increased journey times ranging between 20 seconds and approximately 3 minutes.

Buses

Table 7.6 outlines the anticipated journey time changes for buses relative to the Do Minimum for each option package. Increases in journey time are shown in red and decreases are shown in green.

Table 7.6: Buses Journey Time Change

	Do Minimum	Active Travel	Public Transport	Multi-Modal	Sub-test
AM (07:00-09:00) JT NB	00:10:17	+00:13	-00:06	+00:24	+00:18
AM (07:00-09:00) JT SB	00:09:02	+00:30	-00:04	+00:05	+00:10
PM (16:00-18:00) JT NB	00:11:24	+01:39	-01:07	-00:55	-01:08
PM (16:00-18:00) JT SB	00:10:44	+00:50	+01:17	+01:37	+01:40

As expected, the Public Transport Package provides buses with the shortest journey times, with marginal improvements being observed in the AM peak, and an improvement of approximately 1 minute in the PM peak northbound. However, in the southbound direction there is approximately a 1 minute and 20 second delay which has been attributed to queueing on approach to Hareness.

All other packages generally result in longer bus journey times, especially in the PM peak southbound with the Multi-Modal Package (and sub-test) presenting approximately a 1 minute and 40 seconds additional delay compared to the Do Minimum. The Multi-Modal Package (and sub-test) in the PM peak northbound highlights savings of around 1 minute compared to the Do Minimum.

Due to the low number of buses using Wellington Road to the south of Souterhead Roundabout (due to routing of bus services), it is expected that the Multi-Modal Package sub-test would provide similar benefits for buses on the northbound approach to Souterhead Junction as that presented by the HGV journey times. However, these benefits are likely to be negligible in the PM peak due to this section experiencing little delay during this period.

More detailed results are included within **Appendix F** where the all package journey times have been presented by section along the corridor.

7.7 Model Observations

The following section provides commentary on the operation of each package. To aid this commentary, journey time profile figures are presented to illustrate the sections where journey time savings or delays are experienced. **Figure 7.2** and **Figure 7.3** highlight the key locations along the corridor in the north and southbound directions respectively – these should be referred to while reviewing the journey time profile figures within the following section.

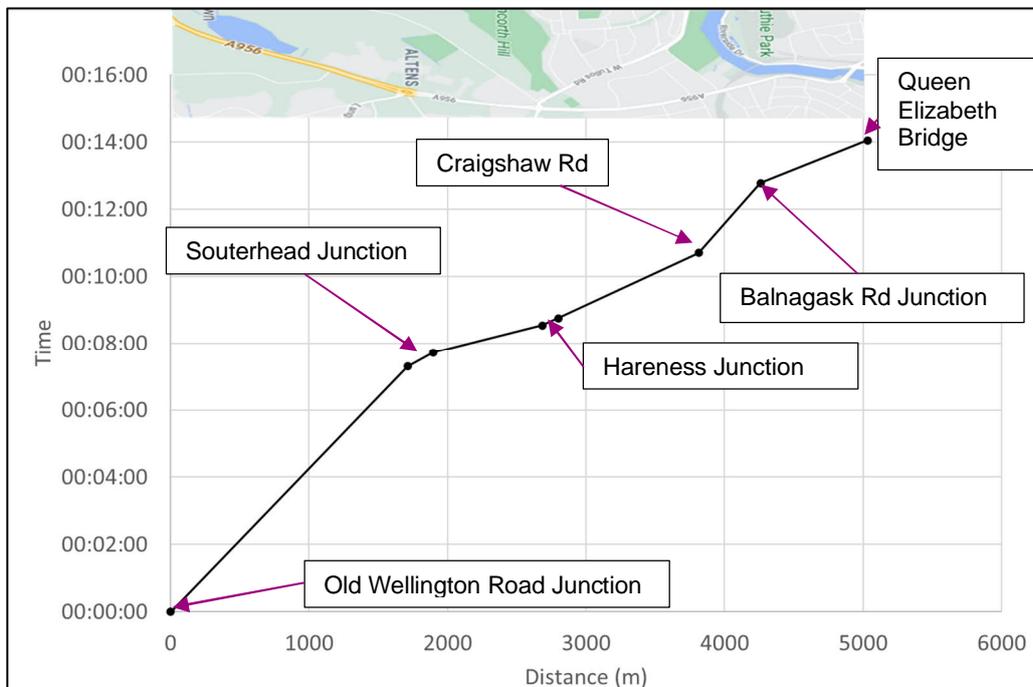


Figure 7.2: Northbound Journey Time Profiles – Key Locations



Figure 7.3: Southbound Journey Time Profiles – Key Locations

Note that the bus journey time profile figures stop at the Souterhead Junction and do not include the section between Souterhead Junction and Old Wellington Road Junction due to limited buses servicing this section of the corridor. This is reflected in the composition of the Public Transport and Multi-Modal Packages.

7.7.1 Active Travel Network Observations

AM Peak Period

Overview (End-to-End Journey Times)

In the AM peak period, the average northbound end-to-end journey time in both the Do Minimum and Active Travel Package were found to be very similar with a negligible disbenefit to general traffic of 6 seconds. In the southbound direction, the Active Travel Package was found to result in a more significant disbenefit to average end-to-end journey time for general traffic of approximately 2 minutes, as shown in **Figure 7.4**.

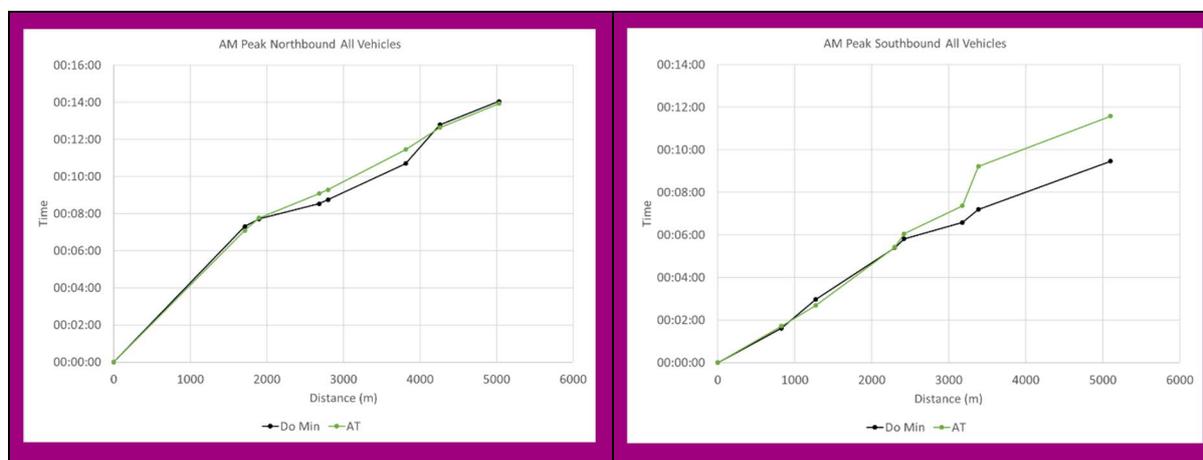


Figure 7.4: Active Travel AM Peak General Traffic Journey Time Profiles

General Traffic

The proposed Souterhead signalised junction prioritises Wellington Road movements, which transfers delays onto the side road approaches; specifically, on Langdykes Road. The delays experienced on the Langdykes Road approach to Souterhead results in some rerouting onto the Coast Road and through the Altens Industrial Estate.

Most sections south of Souterhead and north of Hareness show similar journey times to the Do Minimum, however the northbound approach to Hareness Junction experiences additional delay due to the proposed signalisation of the junction.

Journey time savings were experienced north of Balnagask Road in the northbound direction. This has been attributed to traffic being held back at Souterhead and Hareness junctions which has marginally reduced traffic volumes within this stretch of the corridor. Additionally, the changes to the staging at the Balnagask Road signalised junction allows right-turners from Wellington Road to stack within the junction and take gaps between the north and southbound traffic streams to access Tesco and Balnagask Road respectively.

In the southbound direction, an increase in journey time through the Souterhead and Hareness junctions was observed, with a journey time increase of approximately 2 minutes due to the proposed signals at the junctions.

HGVs

HGVs experience similar journey times as general traffic in both directions, given that there is no priority being provided for the HGVs within the Active Travel Package, therefore HGVs also experience delays on the approach to Souterhead Junction. It should be noted that existing crossing points at Hareness would be consolidated as part of the improvement (i.e. removal of the existing crossing point to the north of Hareness Roundabout), meaning that HGVs would only be required to stop once on this steep section on approach to Hareness (southbound) in order to navigate the junction.

Buses

As discussed previously, the bus journey time analysis does not consider the section between Souterhead Junction and Old Wellington Road, given that the majority of services access Wellington Road from Langdykes Road. Buses generally present the same journey time pattern to that of the Do Minimum (see **Figure 7.5**), however, similar to that of general traffic and HGVs, buses experience delays on the approach to Hareness Junction. It should also be highlighted that a number of bus services would be delayed on the northbound approach to Souterhead Junction due to the queueing on Langdykes Road.

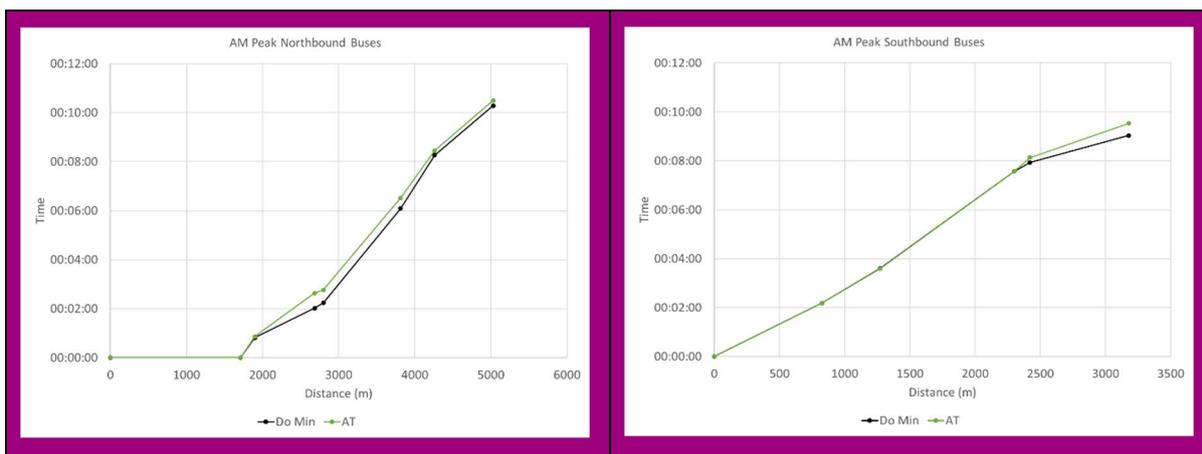


Figure 7.5: Active Travel AM Peak Bus Journey Time Profiles

PM Peak Period

Overview (End-to-End Journey Times)

During the PM period, the end-to-end journey time comparison highlights a delay of approximately 2 minutes in the northbound direction when compared to the Do Minimum, whereas in the southbound direction there is only approximately 30 seconds delay as shown in Figure 7.6 below.

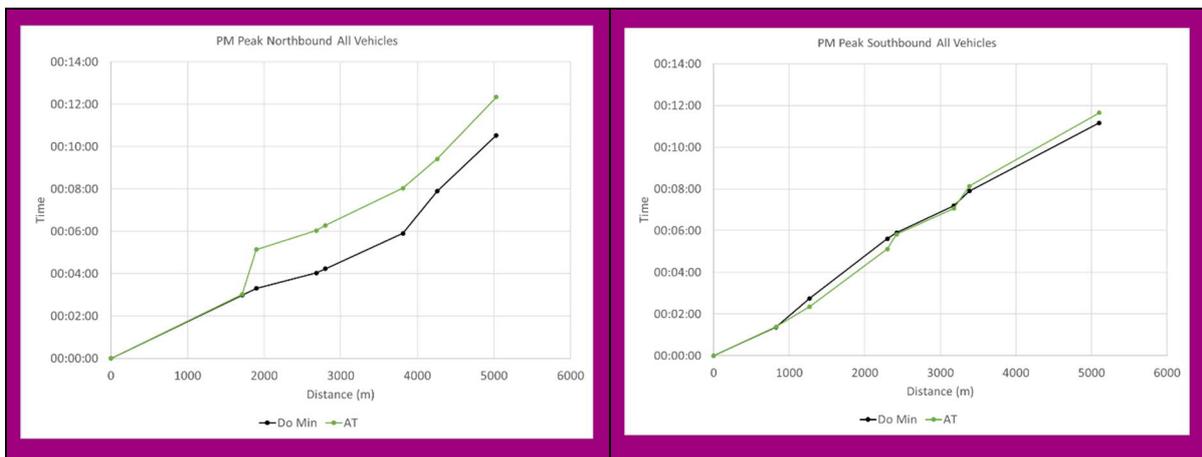


Figure 7.6: Active Travel PM Peak General Traffic Journey Time Profiles

General Traffic

The largest increase in journey times is observed in the northbound direction through Souterhead Junction, with an increase of approximately 2 minutes when compared to the Do Minimum. This is due to the proposed signalisation of Souterhead Junction and the requirement to provide sufficient green time for traffic leaving the Altens Industrial Estate via Souter Head Road, which limits the green time for the northbound traffic on Wellington Road. Improved journey times through the section between Craigshaw Road to Balnagask Road have been attributed to traffic being held back at Souterhead Junction and the signal optimisation change at the Balnagask Road Junction; the revised signal phasing change which allows right-turners to take gaps in the southbound traffic stream.

In the southbound direction the journey times remain similar between the Active Travel Package and the Do Minimum.

HGVs

As there is no priority being provided for HGVs within the Active Travel Package, the journey time profile for HGVs is similar to that of general traffic, although as shown in Table 7.7, HGVs are delayed to a greater extent than 'all vehicles' during the PM peak. It should be noted that existing crossing points at Hareness would be consolidated as part of the improvement (i.e. removal of the existing crossing point to the north of Hareness Roundabout), meaning that HGVs would only be required to stop once on this steep section on approach to Hareness (southbound) in order to navigate the junction.

Buses

Generally, buses present a similar journey time profile to that of the general traffic, with the majority of the delay being experienced at the Souterhead Junction. This is due to no infrastructure being provided for buses within the Active Travel Package, see Figure 7.7.

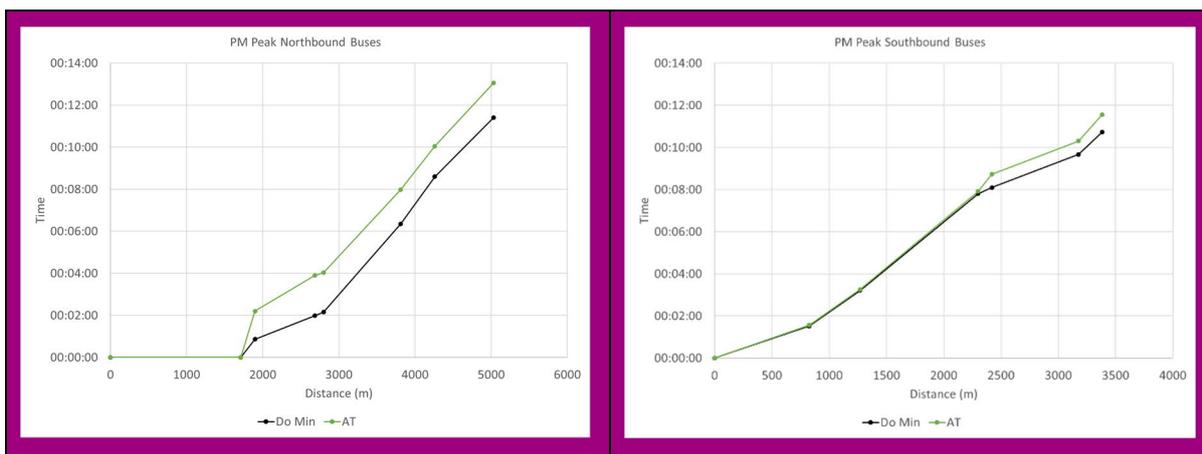


Figure 7.7: Active Travel PM Peak Bus Journey Time Profiles

7.7.2 Public Transport Network Observations

AM Peak Period

Overview (End-to-End Journey Times)

In the AM peak period, the average northbound end-to-end journey time in both the Do Minimum and Public Transport Package were found to be very similar with only a negligible disbenefit of 9 seconds. In the southbound direction, the Public Transport Package was found to result in a more significant disbenefit to average end-to-end journey time for general traffic, approximately 2 minutes as shown in **Figure 7.8**.

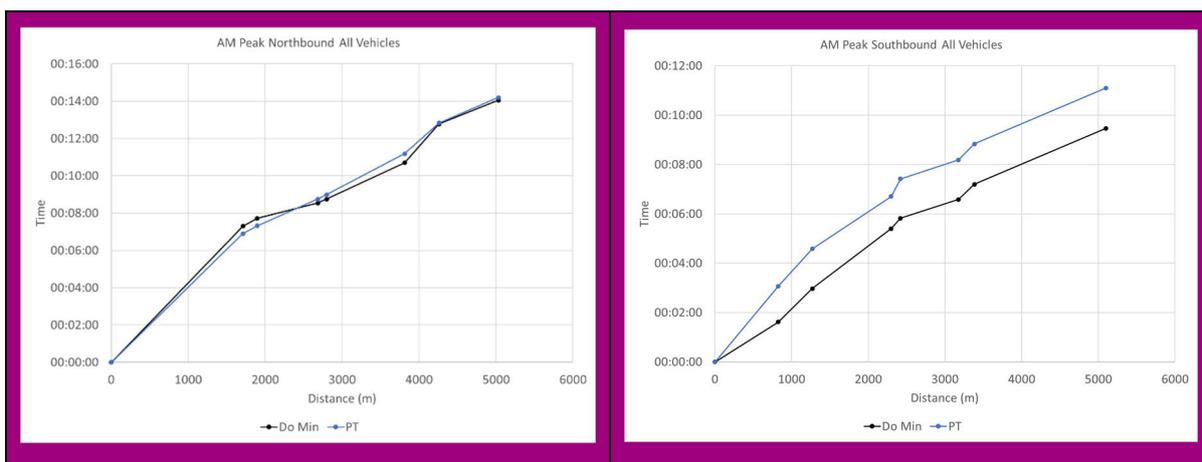


Figure 7.8: Public Transport AM Peak General Traffic Journey Time Profiles

General Traffic

The Public Transport Package was found to provide a slight improvement to average journey time on approach to the Souterhead Roundabout, however, due to an increase in queueing at the Hareness Junction, caused by the presence of traffic signals, the average journey time was found to increase in this section. The continuation of the bus lanes heading north resulted in additional delay to general traffic after the Craigshaw Road Junction, however, between the Balnagask Road Junction and QEB, the average journey times were very similar.

The average southbound end-to-end journey time was found to increase in the Public Transport Package compared to the Do Minimum. The largest increase was noticed between the QEB and the Balnagask Road Junction due to the presence of the bus lane restricting general traffic into one lane on the approach, albeit flaring to three lanes at the stop line, and therefore limiting the number of vehicles which travel through the junction in any one traffic signal cycle. The Public Transport Package and Do Minimum displayed similar journey time characteristics throughout the remainder of the southbound journey time route except for a slight increase in delay at the Hareness Junction caused by the traffic signals.

HGVs

As HGVs were restricted from entering the bus lanes in the Public Transport Package, the average end-to-end journey time profiles in both directions were found to be similar as what was observed for general traffic. It should be noted that existing crossing points at Hareness would be consolidated as part of the improvement (i.e. removal of the existing crossing point to the north of Hareness Roundabout), meaning that HGVs would only be required to stop once on this steep section on approach to Hareness (southbound) in order to navigate the junction.

Buses

Buses were found to experience additional delay heading northbound in the Public Transport Package between the Southerhead Roundabout and the Hareness Junction due to the increase in queuing caused by the traffic signals. However, due to the presence of bus lanes after the Hareness Junction, buses were found to experience less delay than in the Do Minimum which resulted in a very similar end-to-end journey time between the two models, see **Figure 7.9**.

In the southbound direction, buses were found to experience greater delay between the QEB and the Balnagask Road Junction than in the Do Minimum due to increased queuing caused by the merge from two lanes into one lane. This hindered access to the bus lane and resulted in a minor increase in average journey time in this section. However, due to the presence of the bus lane on approach to the Hareness Junction, buses were found to experience less delay on this section than in the Do Minimum. As a result, the overall end-to-end journey times in the Public Transport Package and Do Minimum were very similar.

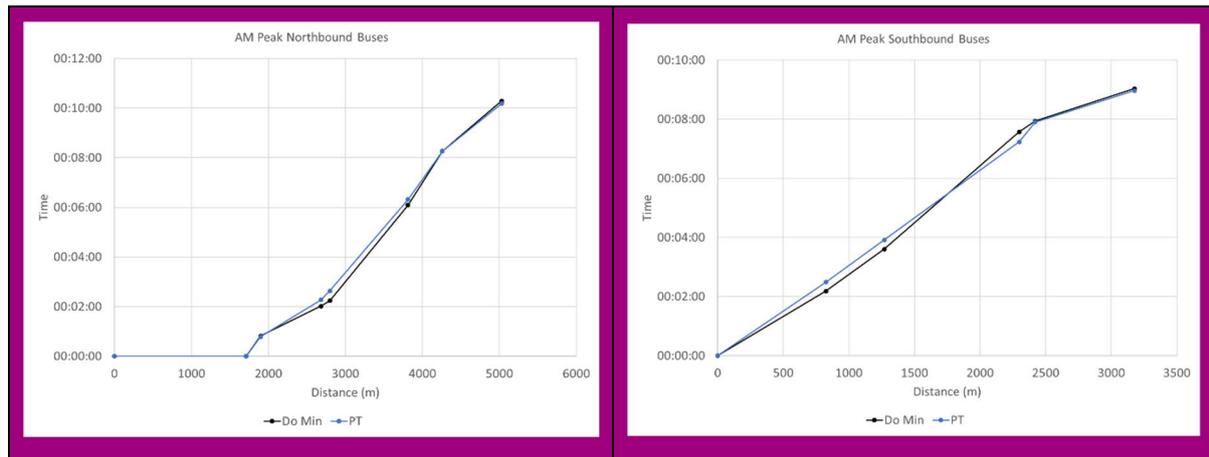


Figure 7.9: Public Transport AM Peak Bus Journey Time Profiles

PM Peak Period

Overview (End-to-End Journey Times)

In the PM peak period, the Public Transport Package was found to result in an increase in average northbound end-to-end journey time of approximately 30 seconds. With regards to the southbound average end-to-end journey time, the Public Transport Package displayed significantly greater delays which resulted in an increase of approximately 2.5 minutes, as shown in **Figure 7.10**.

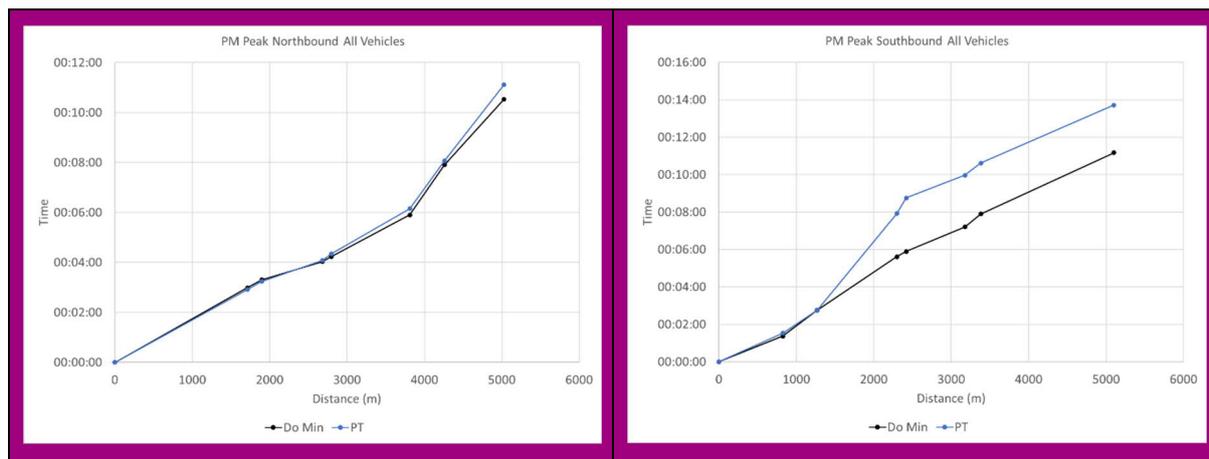


Figure 7.10: Public Transport PM Peak General Traffic Journey Time Profiles

General Traffic

In the northbound direction, general traffic within the Public Transport Package followed a similar journey time profile to that of the Do Minimum, however there was a slight increase in journey times from the Balnagask Road Junction to QEB.

In the southbound direction, a significant increase in journey time on the approach to Hareness Junction was experienced. This was caused by the bus lane north of the Hareness Junction limiting private vehicles into one lane. Furthermore, the presence of signals at the Hareness Junction also increased the delay experienced by vehicles when compared to the Do Minimum. The remaining sections presented similar journey times to that of the Do Minimum.

HGVs

The northbound and southbound average journey times for HGVs were found to be very similar to what was observed for general traffic in each direction. It should be noted that existing crossing points at Hareness would be consolidated as part of the improvement (i.e. removal of the existing crossing point to the north of Hareness Roundabout), meaning that HGVs would only be required to stop once on this steep section on approach to Hareness (southbound) in order to navigate the junction.

Buses

The northbound journey time for buses was found to be similar to what was observed in the Do Minimum except between the Balnagask Road Junction and QEB where the inclusion of the extended bus lane on approach to the roundabout resulted in a notable reduction in delay for buses, see **Figure 7.11**.

In the southbound direction greater delays were experienced on approach to the Hareness Junction due to the increased congestion caused by the traffic signals, which hindered the passage for buses. Elsewhere, the journey time profile was similar to what was observed in the Do Minimum.

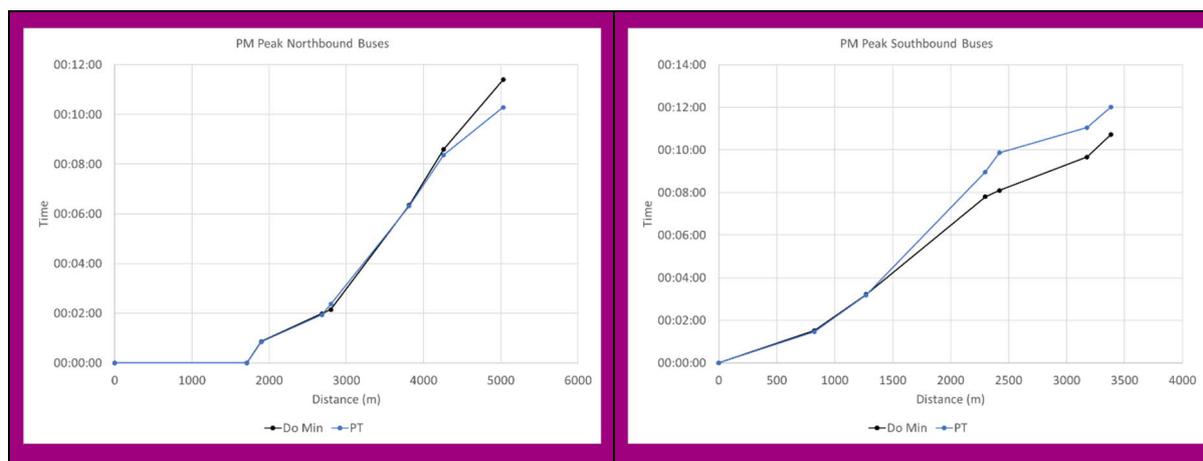


Figure 7.11: Public Transport PM Peak Buses Journey Time Profiles

7.7.3 Multi-Modal Network Observations

AM Peak Period

Overview (End-to-End Journey Times)

In the AM period in the northbound direction, the journey time for all vehicles along the Wellington Road corridor highlighted a delay of approximately 1 minute in comparison to the Do Minimum as illustrated in **Figure 7.12**. In the southbound direction the same comparison of journey times is very similar with a negligible improvement of 5 seconds.

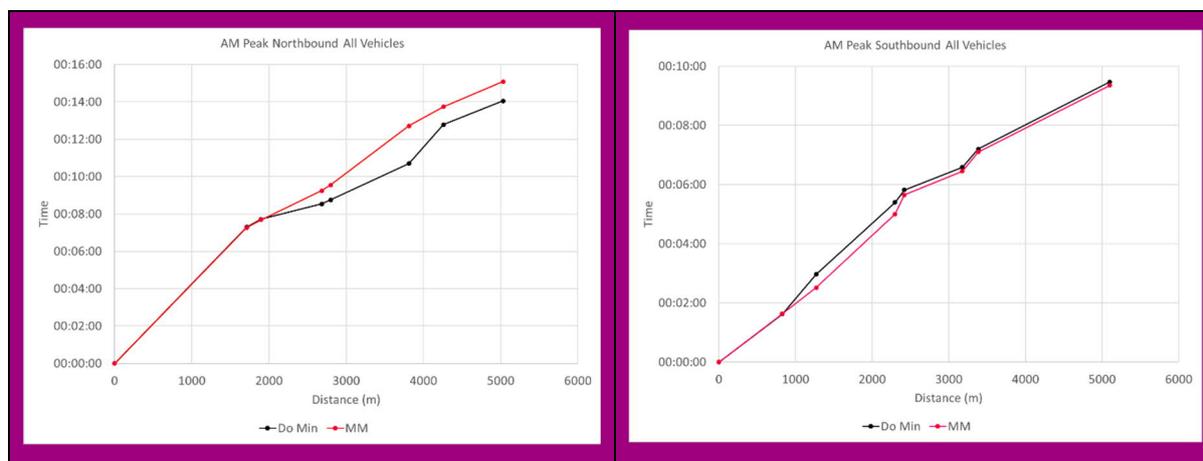


Figure 7.12: Multi-Modal AM Peak General Traffic Journey Time Profiles

General Traffic

The reconfiguration of Hareness Junction causes an increase in journey time of approximately 45 seconds between the Southerhead and Hareness junctions. Additional delay is also experienced between Hareness Junction and Craighshaw Road with the inclusion of the shared bus/HGV lane. However, journey times reduce between

Craigshaw Road and Balnagask Road which has been attributed to the changes to signal settings at the Balnagask Road Junction, where right-turners can take gaps in the southbound traffic to access Balnagask Road.

In the southbound direction a marginal reduction in journey time is observed which is achieved mainly between the Balnagask Road Junction and Craigshaw Road. Again, this is attributed to traffic being able to take gaps within the northbound traffic stream minimising the delays to the through traffic. Reduction in the number of lanes at the Greenbank Road and Craigshaw Drive junctions and introduction of shared bus/HGV lanes between Craigshaw Drive and Hareness Road does not have a significant impact on the southbound journey times due to lower traffic volumes in the southbound direction during the morning peak period.

HGVs

HGV end-to-end northbound journey times remain similar in the Multi-Modal Package to that of the Do Minimum, however this is due to the delays experienced travelling through Hareness Junction, which negates the benefits experienced between Craigshaw Road and the Balnagask Road Junction, as shown in **Figure 7.13**. Due to the lower levels of congestion in the southbound direction, the impact of the Hareness Junction is not mitigated by the bus/HGV lanes to the same extent as experienced in the northbound direction since the bus/HGV lanes are less effective with lower traffic volumes. It should be noted that existing crossing points at Hareness would be consolidated as part of the improvement (i.e. removal of the existing crossing point to the north of Hareness Roundabout), meaning that HGVs would only be required to stop once on this steep section on approach to Hareness (southbound) in order to navigate the junction.

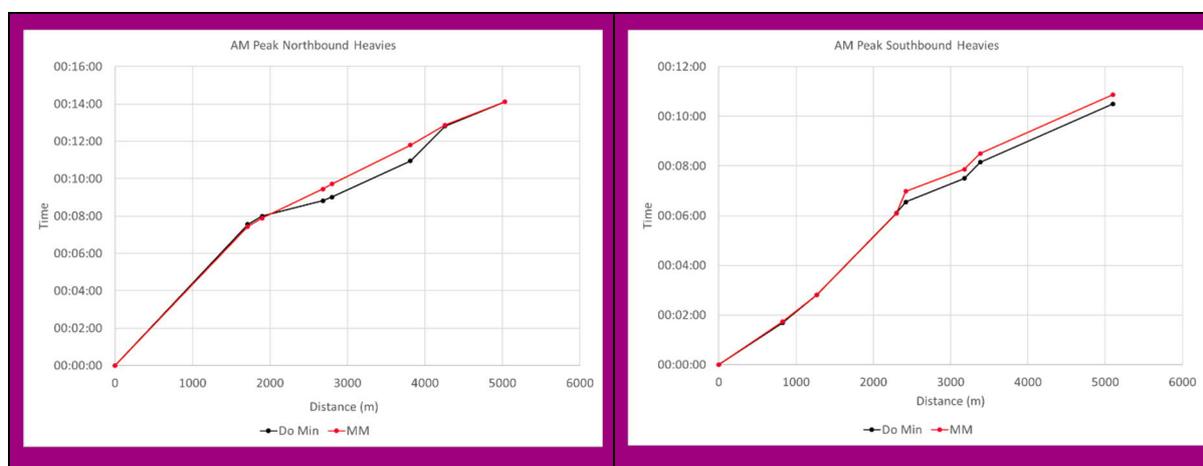


Figure 7.13: Multi-Modal AM Peak HGV Journey Time Profiles

Buses

Buses do not experience the same benefits as in the Public Transport Package, even though they remain segregated from the general traffic in the Multi-Modal Package. This is partly due to the presence of HGVs within this lane causing additional delay to buses while using the bus/HGV lanes. In the northbound direction, bus journey times increase on the approach to the Hareness Junction due to the signals, however in the southbound direction there is little impact observed due to the lower levels of congestion on the southbound approach to Hareness. **Figure 7.14** presents the bus journey time profiles for the AM Multi-Modal Package.

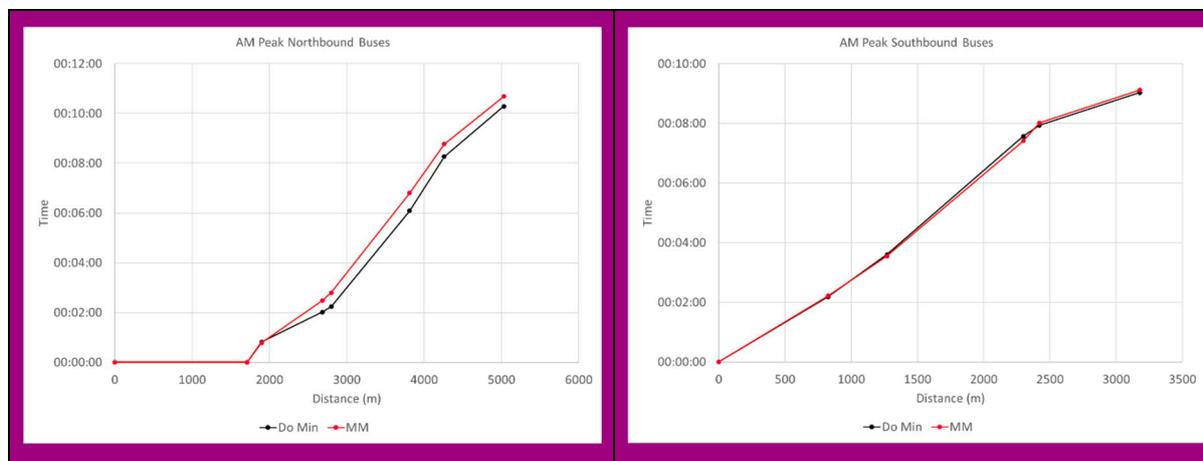


Figure 7.14: Multi-Modal AM Peak Bus Journey Time Profiles

PM Peak Period

Overview (End-to-End Journey Times)

During the PM peak northbound, journey times for general traffic show a slight improvement of approximately 20 seconds in comparison to the Do Minimum, however, there is a delay of approximately 3 minutes southbound.

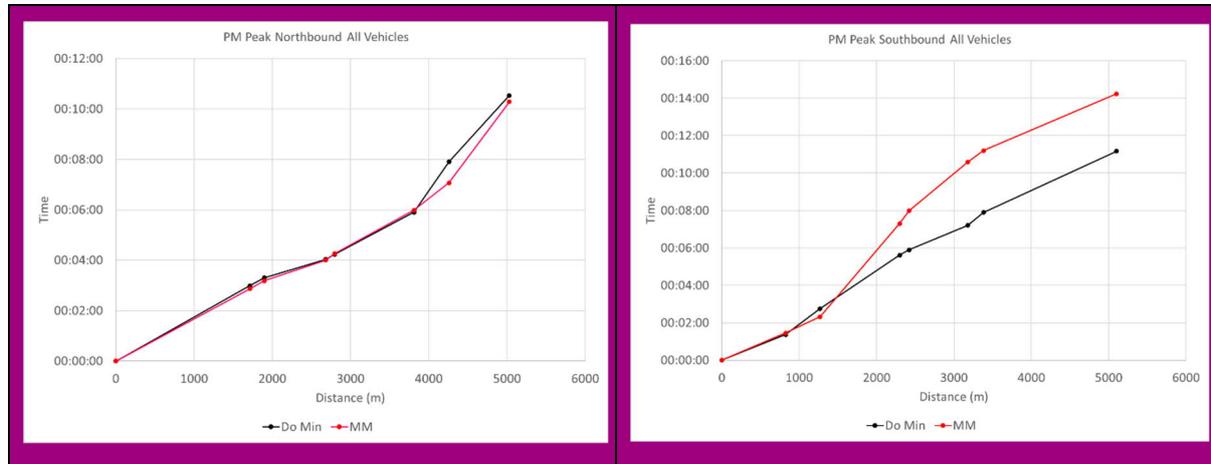


Figure 7.15: Multi-Modal PM Peak General Traffic Journey Time Profiles

General Traffic

Northbound journey times see an improvement between Craigshaw Road and Balnagask Road Junction of approximately 1 minute, however this narrows to approximately 15 seconds by the end of the journey time route. This has been attributed to queue relocation, with queuing being transferred on to the approach to QEB.

The southbound direction delays are mainly observed between Craigshaw Road and Souterhead, where the presence of bus/HGV lanes cause delays to general traffic. Furthermore, the removal of dedicated right-turning lanes at the Craigshaw Drive and Greenbank Road junctions to facilitate the two-way segregated cycleway causes additional delay. There is a journey time increase of approximately 2.5 minutes between Craigshaw Road and Hareness Junction.

HGVs

HGV journey times northbound present a similar journey time profile to that of general traffic, however greater journey time savings are observed between Balnagask Road Junction and QEB given the additional bus/HGV lane.

Similar to general traffic journey time profiles, the southbound HGV journey times see increased delays between Craigshaw Road and Hareness Junction, however, not to the same extent due to the bus/HGV lanes minimising the delays experienced within this section of the network. Between Hareness and Souterhead junctions, there is a marginal journey saving of approximately 20 seconds compared to the Do Minimum. This is due to a section of bus/HGV lane on approach to Souterhead Junction.

It should be noted that existing crossing points at Hareness would be consolidated as part of the improvement (i.e. removal of the existing crossing point to the north of Hareness Roundabout), meaning that HGVs would only be required to stop once on this steep section on approach to Hareness (southbound) in order to navigate the junction.

Figure 7.16 presents the Multi-Modal PM peak journey time profiles for HGVs.

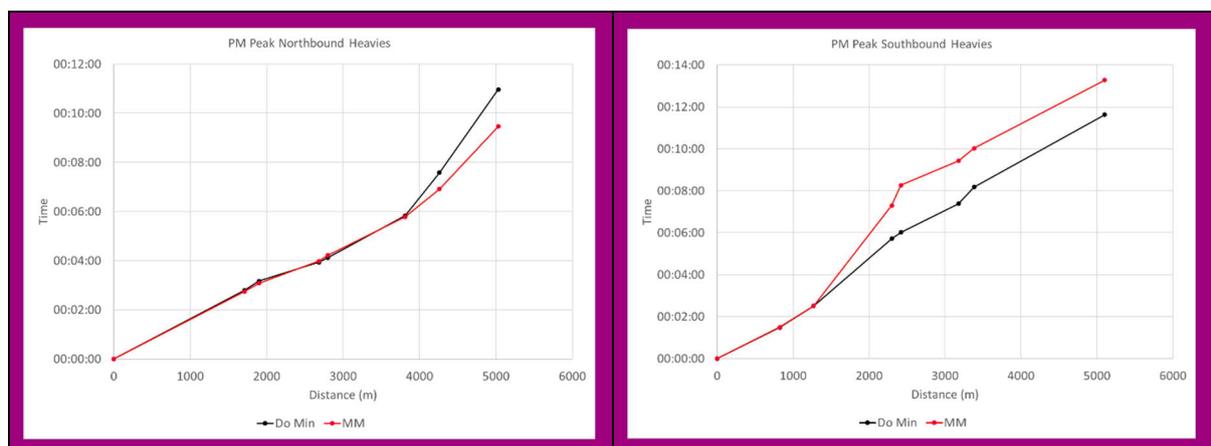


Figure 7.16: Multi-Modal PM Peak HGV Journey Time Profiles

Bus

In terms of bus journey times, the journey time profiles are similar to that of the HGV profiles due to the use of the bus/HGV lanes, as shown in **Figure 7.17**.

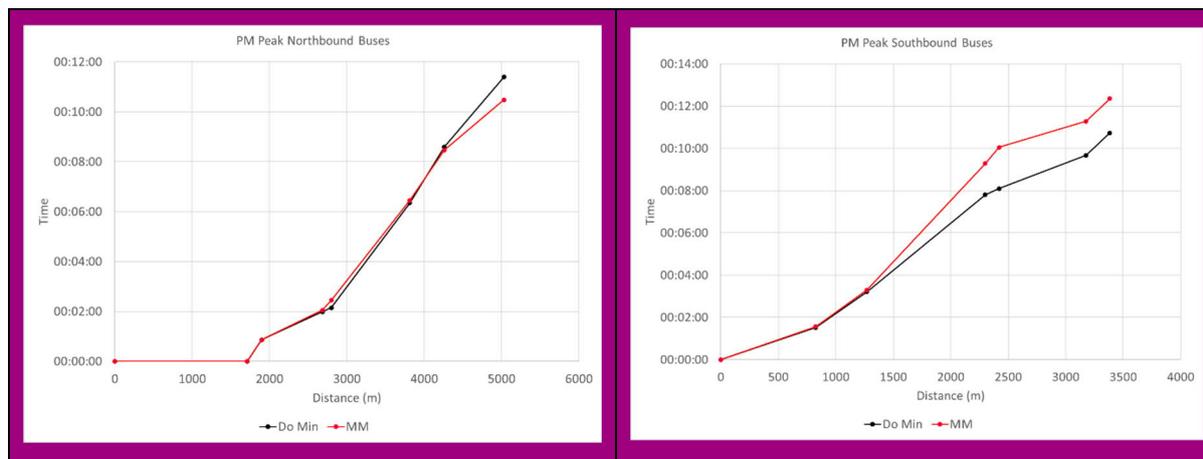


Figure 7.17: Multi-Modal PM Peak Bus Journey Time Profiles

7.7.4 Multi Modal (Sub-test) Observations

AM Peak Period

Overview (End-to-end Journey Times)

In the AM period in the northbound direction, the journey time for all vehicles along the Wellington Road corridor highlight a slight improvement of approximately 20 seconds in comparison to the Do Minimum, see **Figure 7.18**. Although there is an improvement due to the additional lane in the northbound direction between Charleston Road North and Hareness, this is evened out by delays at other parts of the network due to shared lanes in the north of the network. In the southbound direction, the same comparison of journey times is very similar with a negligible improvement of approximately 6 seconds.

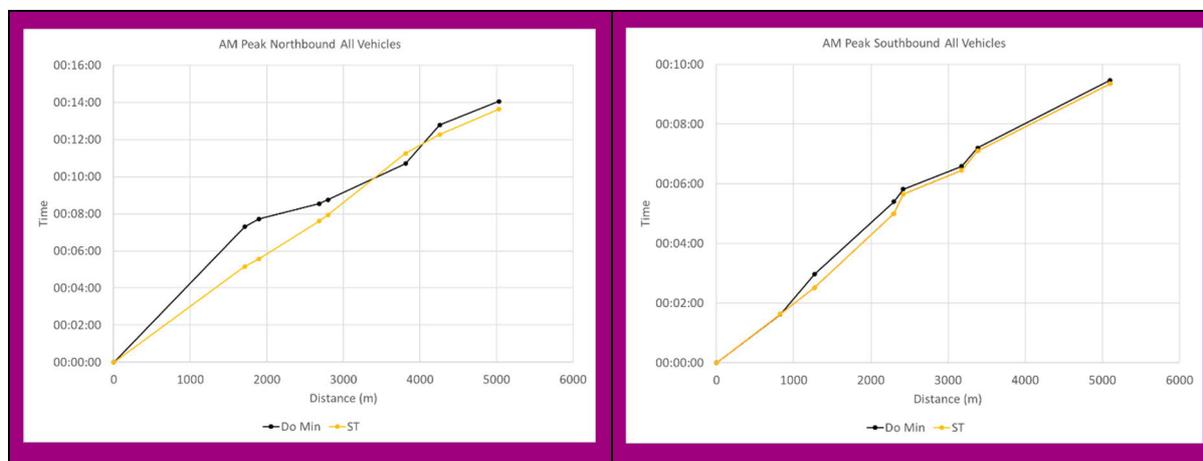


Figure 7.18: Multi Modal (Sub-test) AM Peak General Traffic Journey Time Profiles

General Traffic

The addition of a third lane on Wellington Road northbound between Charleston Road North and Hareness Junction reduces the journey time by just over 2 minutes. However, the reconfiguration of Hareness Junction causes an increase in journey time of approximately 1 minute between the Souterhead and Hareness junctions, and a further delay of approximately 1 minute 20 seconds is experienced between Hareness Junction and Craigshaw Road with the inclusion of the shared bus/HGV lane. These sections negate the benefits provided by the additional lane. Prior to QEB, a journey time saving between Craigshaw Road and Balnagask Road of just over 1 minute results in an end-to-end journey time which is marginally less than the Do Minimum.

In the southbound direction a marginal reduction in journey time is observed which is achieved mainly between the Balnagask Road Junction and Craigshaw Road. Again, this is attributed to right-turning traffic being able to take gaps within the northbound traffic stream minimising the delays to the through traffic. Reduction in the number of lanes at the Greenbank Road and Craigshaw Drive junctions and introduction of shared bus/HGV lanes between Craigshaw Drive and Hareness Road does not have a significant impact on the southbound journey times due to lower traffic volumes in the southbound direction during the morning peak period.

HGVs

HGV end-to-end northbound journey times see around a 2 minute saving due to the addition of the third lane at the most congested part of the network in the AM peak period. In the southbound direction, HGVs generally present similar journey times to that of the Do Minimum, with the exception of a marginal increase in journey time through Hareness Junction due to signalisation, see **Figure 7.19**.

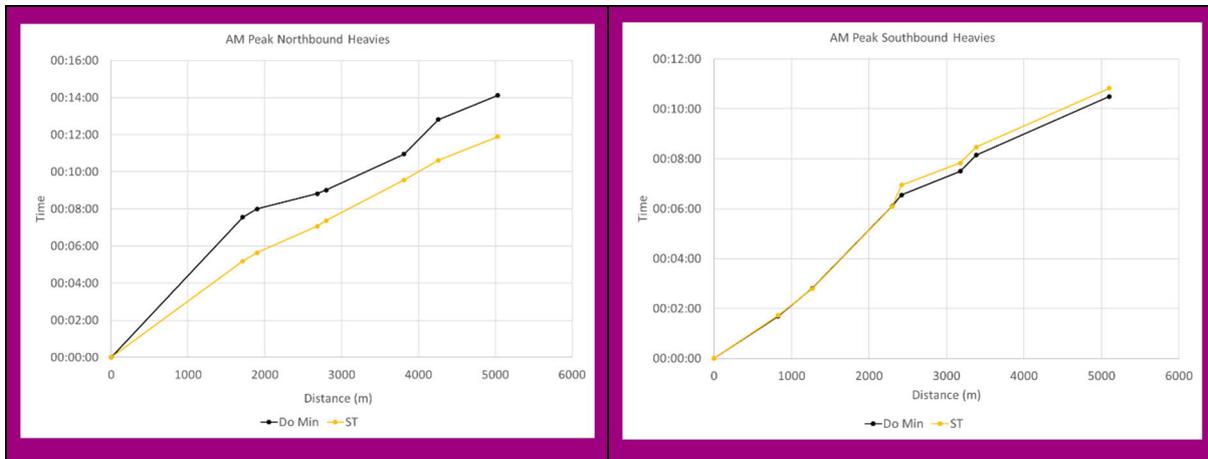


Figure 7.19: Multi Modal (Sub-test) AM Peak HGV Journey Time Profiles

Buses

Given that the bus journey time profile starts at Souterhead Junction, it is difficult to assess the benefits to buses, since the largest benefits are experienced on the Wellington Road northbound approach to Souterhead Junction, however it has been estimated that bus journey times along this section would experience similar benefits to that of the HGVs, approximately 2 minutes. With this in mind, the expected end-to-end benefits would be positive given that the journey time profile between Souterhead Junction and QEB is similar to the Do Minimum, see **Figure 7.20**. However, the southbound bus journey times would remain similar to that of the Do Minimum given there is no proposed infrastructure on Wellington Road being provided on the southbound carriageway south of Souterhead Junction.

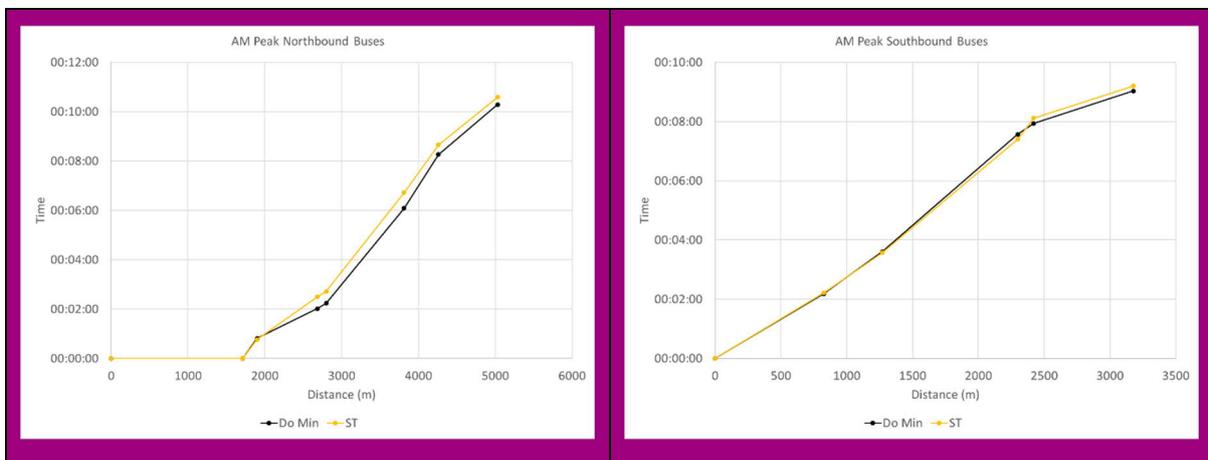


Figure 7.20: Multi Modal (Sub-test) AM Peak Bus Journey Time Profiles

PM Peak Period

Overview (End-to-end Journey Times)

During the PM period in the northbound direction, the journey time for general traffic along Wellington Road shows a slight improvement of approximately 50 seconds in comparison to the Do Minimum. However, in the southbound direction, there is a delay of just over 3 minutes, as shown in **Figure 7.21**. These results are similar to the Multi-Modal Package since the additional third lane mostly benefits the AM congested part of the network.

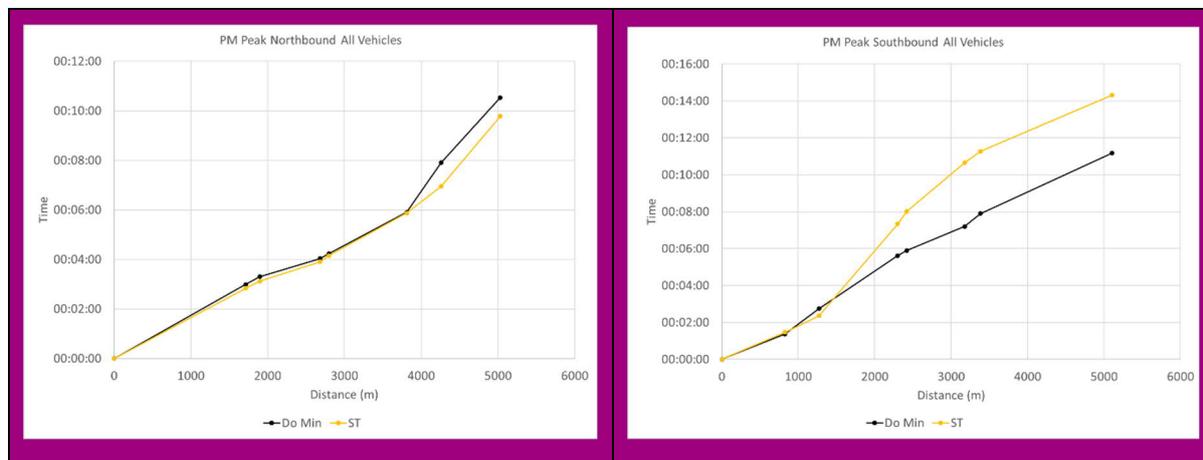


Figure 7.21: Multi-Modal (Sub-Test) PM Peak General Traffic Journey Time Profiles

General Traffic

In the northbound direction, journey times see an improvement between Craigshaw Road and the Balnagask Road Junction of just under 1 minute, due to the changes in signal staging and operation at the Balnagask Road Junction. In the southbound direction, delays are mainly observed between Craigshaw Road and Souterhead, where the presence of bus/HGV lanes and reconfiguration of Hareness Junction has caused delay to the general traffic by approximately 3 minutes.

HGVs

HGV journey times in the northbound direction see an improvement mostly observed between the Balnagask Road Junction and QEB due to the additional bus/HGV lane. Similar to the general traffic journey time profiles, the longest delays in the southbound HGV journey times are between Craigshaw Road and Hareness Junction, as shown in **Figure 7.22** below.

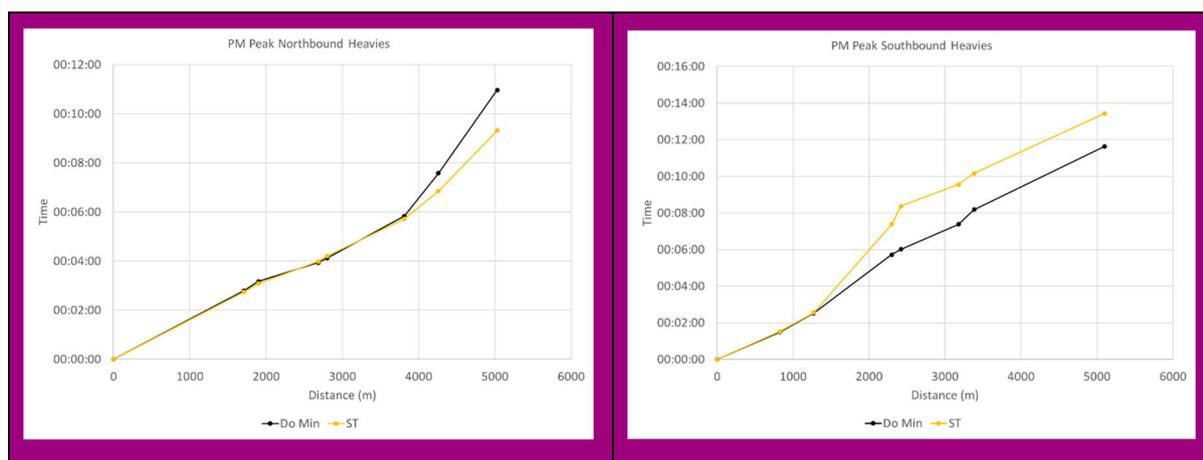


Figure 7.22: Multi Modal (Sub-test) PM Peak HGV Journey Time Profiles

Bus

In terms of bus journey times, the journey time profiles are similar to that of the HGV profiles due to the use of the bus/HGV lanes. As discussed previously, the journey times savings for buses on the Wellington Road approach to Souterhead Junction are expected to have similar benefits, however in the PM peak where congestion is very low on the northbound approach to Souterhead Junction, journey time benefits would be marginal, as shown in **Figure 7.23**.

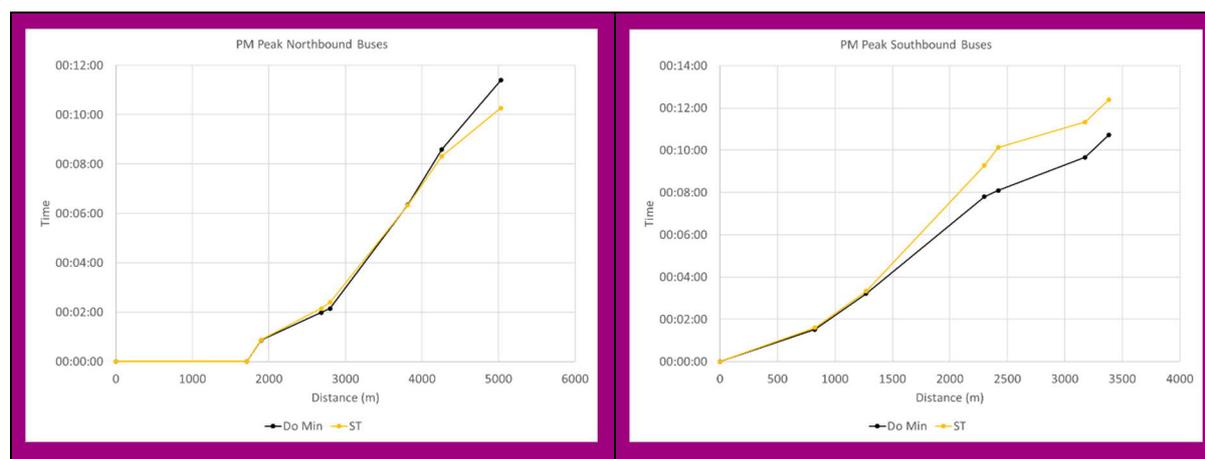


Figure 7.23: Multi-Modal (Sub-Test) PM Peak Bus Journey Time Profiles

7.8 Modelling Conclusions

The following table provides a general overview of each package based on the end-to-end journey times anticipated for each model, relative to the Do Minimum (see Section 7.7 for more detail on individual locations along the corridor).

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 7.7: 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.

When considering the results presented within this chapter, it should be borne in mind that the modelling undertaken has been based on peak periods only. The table and subsequent Figure 7.24 illustrate that whilst the peak periods are important for HGV movements (particularly the morning peak), HGV movements are relatively constant throughout the day on Wellington Road and the corridor, as a priority route, plays a key role in serving this freight

movement. The opening of Aberdeen South Harbour will further emphasise the importance of the route as a freight corridor and improvements therefore need to support continued HGV movements whilst allowing for the route to function for sustainable access to employment, education, and other services along the corridor for members of the community.

Table 7.8: ATC Survey Results on Wellington Road to the South of Hareness Roundabout (June 2019)

TUESDAY 11/06/2019		Cars / Vans	HGVs	% HGV	Buses	% Bus	All Traffic
WELLINGTON ROAD SOUTH OF HARENESS ROUNDABOUT							
NB	AM Peak (07:00-09:00)	2362	382	14%	36	1%	2780
	PM Peak (16:00-18:00)	1610	252	13%	26	1%	1888
	Off-Peak	7365	1571	17%	173	2%	9109
	12 hr total (07:00-19:00)	9073	1862	17%	188	2%	11123
	24 hr total	11337	2205	16%	235	2%	13777
SB	AM Peak (07:00-09:00)	996	277	21%	41	3%	1314
	PM Peak (16:00-18:00)	2442	268	10%	20	1%	2730
	Off-Peak	7198	1383	16%	155	2%	8736
	12 hr total (07:00-19:00)	8470	1686	16%	186	2%	10342
	24 hr total	10636	1928	15%	216	2%	12780
Two-Way Total (24 hr)		21,973	4,133	16%	451	2%	26,557

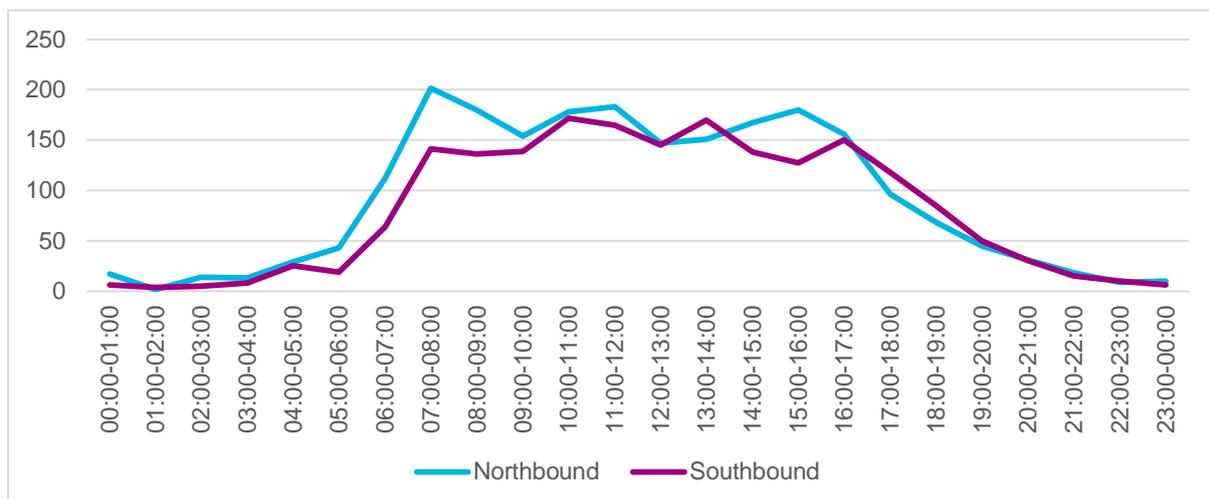


Figure 7.24: ATC Surveys - HGV Counts on Wellington Road to the South of Hareness Roundabout

7.9 Summary

This chapter has provided an overview of the modelling work that has been undertaken to support the detailed appraisal of options. The next chapter sets out the appraisal against TPOs.

8. TPO Appraisal

8.1 Introduction

This chapter provides an appraisal of the option packages against the TPOs developed for the study. As discussed in the previous chapter, this appraisal is based on the outputs of the model adjustments implemented in each package in April 2021.

8.2 Transport Planning Objectives

As noted in **Chapter 4**, the final TPOs for the study are:

- **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, promoting access to Aberdeen South Harbour and the proposed Energy Transition Zone;
- **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 corridor which is safe for all users; and
- **TPO6:** Promote a transport corridor which supports air quality improvement strategies and improves public health.

Options have been assessed according to the STAG seven-point scale shown below.

xxx	xx	x	-	✓	✓✓	✓✓✓
Major negative impact	Moderate negative impact	Minor negative impact	No benefit or impact	Minor beneficial impact	Moderate beneficial impact	Major beneficial impact

8.3 Do Minimum

For the purposes of the appraisal, the Do Minimum is scored as having **no benefit or impact** against the TPOs in order to provide the basis for comparison of other options.

8.4 Active Travel Package

This section provides an assessment of the Active Travel Package against the TPOs.

8.4.1 TPO1 – Greater Priority to Sustainable Modes

The Active Travel Package would introduce interventions that seek to provide greater priority to pedestrians and cyclists on the Wellington Road corridor.

The with-flow segregated cycleway would provide dedicated priority for cyclists on both sides of the road between the city centre and the communities located along Wellington Road, including Torry, Nigg, Altens and Cove. It should be noted that this element of the package would have implications for the priority afforded to other sustainable modes, with footway widths reduced between Polwarth Road and Girdleness Road, and removal of the existing bus lane to the north of Balnagask Road. However, overall, provision of dedicated cycling infrastructure along the corridor is considered to be beneficial to pedestrians as well as cyclists.

The reconfiguration of junctions at Souterhead and Hareness (conversion of the roundabouts to signalised junctions) would provide additional priority to pedestrians and cyclists, with dedicated crossing points through each junction. This would be a notable improvement from the Do Minimum scenario, whereby there are no signalised crossing points on the Wellington Circle, Langdykes Road and Souter Head Road arms of Souterhead Roundabout, or on any arms of the roundabout at Hareness. It should be noted that this element of the Active Travel Package has a negative impact on bus journey times due to the introduction of signal control.

The right-turn ban from Wellington Road onto Abbotswell Road would not be anticipated to generate significant impacts in terms of the priority given to sustainable modes on the corridor. Pedestrians would be unaffected by this change and there are currently no bus services in operation on the corridor that require to make this manoeuvre. It is anticipated that a right-turn ban could impact on a small number of cyclists still wishing to cycle on the road, however, there is a signalised crossing point at the Abbotswell Road Junction which is considered to provide a suitable alternative for accessing Abbotswell Road.

By encouraging increased travel by active modes on the corridor, there would be complementary support for the locking in of AWPR benefits. As noted above, the Active Travel Package would reduce the priority given to buses along the corridor relative to the Do Minimum scenario and therefore, it does not fully meet the TPO by providing greater priority to all modes of sustainable travel. Overall, the Active Travel Package has been assessed as providing a **moderate beneficial impact** against TPO1.

8.4.2 TPO2 – Freight Movement

The with-flow segregated cycleway would not be anticipated to have a significant impact on the movement of freight along the corridor. To incorporate the cycleway, right-turn filter lanes have been removed at Craigshaw Drive and Greenbank Road. Based on junction turning counts undertaken for the development of the Wellington Road Corridor Microsimulation Model, there are very few HGV movements from Wellington Road onto Craigshaw Drive (2 in both the AM and PM peaks) and from Wellington Road onto Greenbank Road (7 in the AM peak; 1 in the PM peak) and therefore, it is not anticipated that there would be a notable impact on the efficient movement of freight as a result of this intervention.

The reconfiguration of junctions at Southerhead and Hareness would result in delays for all vehicles, including HGVs. It is anticipated that this would have a negative impact on freight movements, including to Aberdeen South Harbour and the proposed Energy Transition Zone via Hareness Road. Overall, the Active Travel Package is estimated to result in longer journey times (~2 minutes longer) in the morning peak for southbound HGVs and in the evening peak for HGVs travelling in both directions (~2 minutes northbound and ~1.5 minutes southbound).

The right-turn ban from Wellington Road onto Abbotswell Road would not be anticipated to have a significant impact on the movement of freight along the corridor. Based on junction turning counts undertaken for the development of the base model, there are very few HGV movements from Wellington Road onto Abbotswell Road (10 in the AM peak; 4 in the PM peak).

Overall, the Active Travel Package has been assessed as providing a **moderate negative impact** against TPO2 due to the delays caused to freight vehicles as a result of reconfiguration at Southerhead and Hareness.

8.4.3 TPO3 – Traffic Management

For the purposes of the assessment against TPO3, the key pinch points on the Wellington Road corridor have been identified as junctions at Southerhead, Hareness and Balnagask Road.

In the AM peak northbound, end-to-end journey times are shown to be in line with the Do Minimum. It is anticipated that the proposed reconfiguration of Hareness Roundabout could result in some delays at this pinch-point, however, there are some anticipated savings to the north of Balnagask Road for northbound vehicles. This is attributed to delays further south on the network, which slightly reduces traffic volumes between Balnagask Road and QEB and additionally, the proposed changes in staging at the Balnagask Road Junction means that right-turners can take gaps in the opposing movement to turn into the side roads.

In the AM peak southbound, end-to-end journey times are shown to be approximately 2 minutes longer than the Do Minimum. This is attributed to increased journey times through the proposed signalised junctions at Southerhead and Hareness.

In the AM peak, delays are also anticipated on the side road approaches to Southerhead, which is shown to result in some rerouting onto the Coast Road and through Altens Industrial Estate. This would be contrary to the principles of the roads hierarchy, which looks to encourage use of the priority route (Wellington Road) for vehicles in order to protect less appropriate, parallel routes.

In the PM peak northbound, end-to-end journey times are shown to be approximately 2 minutes longer than the Do Minimum. This can mainly be attributed to a delay through Southerhead as a result of the proposed reconfiguration, where green time for northbound traffic on Wellington Road is limited as a result of the requirement to provide sufficient green time for vehicles exiting Altens Industrial Estate via Souther Head Road.

In the PM peak southbound, journey times remain similar to the Do Minimum throughout the length of the corridor.

Overall, the Active Travel Package has been assessed as providing a **moderate negative impact** against TPO3 as it would be anticipated to exacerbate the key pinch-points at Southerhead and Hareness, particularly in the AM peak southbound and the PM peak northbound. There is also some evidence of rerouting onto less appropriate, parallel routes as a result of the interventions, which is counter to the principles of the road hierarchy.

8.4.4 TPO4 – Accessibility to Employment and Education

The with-flow segregated cycleway would enhance accessibility to employment and education areas on the corridor for cyclists through the provision of dedicated cycle priority along the length of the corridor. The cycleway would not be anticipated to improve the ability for pedestrians, bus users and car drivers to access employment and education areas on the corridor.

The reconfiguration of junctions at Southerhead and Hareness (conversion of the roundabouts to signalised junctions) would improve accessibility to employment and education areas on the corridor for pedestrians and

cyclists, particularly in terms of facilitating access to Lochside Academy for school pupils crossing from the east side of Wellington Road. Modelling results indicate that reconfiguration of the junctions would cause delay to all vehicles, and therefore, this intervention would have negative impacts on accessibility by bus and by car.

The right-turn ban from Wellington Road onto Abbotswell Road would not be anticipated to generate significant impacts on the ability for pedestrians, cyclists, and bus users to access employment and education areas on the corridor. However, it would be anticipated to slightly reduce the accessibility by car of employment locations that are accessed from Abbotswell Road and the wider network via West Tullos Road.

Overall, the Active Travel Package would be anticipated to improve accessibility to employment and education areas for pedestrians and cyclists whilst reducing accessibility to these locations for bus and car users. Whilst there is a reduction in accessibility for bus and car users associated with increased journey times (for some journeys), employment and education areas would continue to be accessible via these modes. Overall, therefore, it has been assessed as providing a **minor beneficial impact** against TPO4.

8.4.5 TPO5 – Safety for Users

The with-flow segregated cycleway would be anticipated to enhance safety and perceptions of safety as it would segregate cyclists from the main vehicular carriageway and therefore reduce interactions and conflicts between motorised vehicle users and cyclists along the corridor. It would also introduce full segregation between pedestrians and cyclists, which would also be anticipated to generate safety improvements and contribute to improved feelings of safety, particularly for pedestrians.

It should be noted that engagement with ACC officers indicated that historically, road traffic collisions on the corridor have involved pedestrians in collision with vehicles outwith controlled crossing points along the corridor. To incorporate the cycleway, the central reservation would require removal between Hareness Roundabout and Polwarth Road, which would reduce the availability of safe spaces for crossing (primarily for pedestrians) outwith the dedicated crossing points along the corridor, with potential detrimental impacts on safety. It should be noted that removal of the central reservation was proposed based on the desire to use existing road space and to limit impacts on biodiversity in the existing verges of the corridor where possible. In the interests of pedestrian safety, during future preliminary and detailed design stages, the potential to provide either a reduced central reservation or additional crossing points could be investigated to ensure existing pedestrian desire lines are accommodated, whilst still taking into consideration biodiversity and land take on the corridor. A detailed survey of pedestrian movements would be recommended to support these decisions.

In terms of active travel provision, a with-flow cycleway (as proposed in this package) provides safety benefits relative to a two-way cycleway (as proposed in the Multi-Modal Package) due to the reduced requirement to cross the road in order to reach the destination and due to the with-flow nature of the lanes on each side of the road meaning that cyclists travelling in opposite directions do not have to pass close to each other along particularly steep sections of the corridor where it is likely that those travelling northbound would be doing so at much higher speeds.

The Active Travel Package is modelled to result in an increase in the number of accidents and the severity of accidents as a result of reconfiguration at Souterhead and Hareness. It should be emphasised, however, that this is only based on general traffic accidents and there are limitations with the modelling software that should be borne in mind (as outlined in **Section 9.3.2**).

Whilst roundabouts are the safest form of at-grade junction for general traffic, around 10% of all reported accidents involving cyclists occur at roundabouts. Of these, 11% are likely to be either serious or fatal, and more than 50% involve a motorist entering a roundabout and colliding with a cyclist using the circulatory carriageway (TAL 9/97). Cyclist accident rates at roundabouts are four times that for motor vehicle drivers, with the most hazardous types of roundabout for cyclists those that are large, unsignalised and with multiple circulation lanes. In terms of the two junctions under consideration at Souterhead and Hareness, analysis of CrashMap indicates that there has been one personal injury accident in the last five years and this involved a pedal cyclist at Hareness Roundabout.

It is therefore considered that reconfiguration of the junctions, and especially Hareness Junction due to the currently uncontrolled nature of the roundabout, would generate significant safety improvements for active travel users. As demonstrated in **Section 9.4** as part of the appraisal against the STAG Economy Criteria, the Active Travel Package is anticipated to generate an increase in active travel use and it is therefore important to consider the potential safety implications of improving the wider network infrastructure without providing improved facilities through these key junctions.

The right-turn ban from Wellington Road onto Abbotswell Road would not be anticipated to generate significant impacts in terms of safety.

Overall, the Active Travel Package is considered to provide **no benefit or impact** against TPO5. This reflects the balance between safety improvements (associated with the with-flow segregated cycleway and the reconfiguration of Hareness and Souterhead for active travel users) 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 in order to accommodate the cycleway).

8.4.6 TPO6 – Air Quality and Health

The with-flow cycleway provides a consistent and coherent option for cycle trips along the Wellington Road corridor, which would be considered to provide a viable alternative to vehicle trips for some users of the corridor, both for commuting and leisure purposes and could facilitate a degree of modal shift. This could result in minor air quality benefits associated with reduced private vehicle trips, with subsequent benefits to public health associated with reduced exposure to air pollution and increased exercise.

The reconfiguration of junctions at Hareness and Southerhead would provide safety and accessibility improvements for active travel users, which would be anticipated to increase the levels of walking and cycling and accordingly, support improvements to public health. It is possible that the junction improvements could encourage more people to walk and cycle for short trips as opposed to driving, which could additionally have minor benefits on local air quality due to reduced vehicle emissions. However, the proposed junction changes are anticipated to result in delays to all vehicles, which could have detrimental impacts on air quality.

The right-turn ban from Wellington Road onto Abbotswell Road would not be anticipated to generate significant improvements in terms of air quality or public health.

Modelling results indicate that the Active Travel Package could result in increased congestion and queueing along some sections of the corridor and therefore increased air quality emissions could arise, including from rerouting in order to avoid congestion. This could have subsequent negative impacts on public health associated with increased exposure to air pollution.

Overall, at this stage, the Active Travel Package is considered to provide **no benefit or impact** against TPO6. This reflects the potential for positive impacts relating to modal shift balanced against the adverse impacts that would be caused by congestion on the road network.

It should be noted that air quality impacts would be dependent on the fleet composition and negative impacts would be anticipated to reduce over time with increased uptake of alternative fuel vehicles and sales of new petrol and diesel cars and vans to be banned from 2030.

8.5 Public Transport Package

This section provides an assessment of the Public Transport Package against the TPOs.

8.5.1 TPO1 – Greater Priority to Sustainable Modes

The Public Transport Package would introduce interventions that seek to provide greater priority to bus users on the Wellington Road corridor, however, it is considered that there could also be minor beneficial impacts for other sustainable modes.

The introduction of additional sections of bus lane along the corridor (relative to the Do Minimum) would enhance priority for bus users between Southerhead and QEB. The loss of space for general traffic along sections of the corridor is considered to place more emphasis on providing enhanced priority to shared travel modes over private car travel and this is likely to be similarly perceived by both bus operators and the wider public – reflecting that there is a move on the corridor to lock in the benefits of the AWPR. Whilst the introduction of bus lanes would not enhance priority for pedestrians, it may provide slight benefits to cyclists by reducing the number of locations along the corridor that cyclists are required to share space with general traffic (assuming cyclists are permitted to use the bus lanes implemented as part of this package).

The introduction of bus priority signals at Southerhead Roundabout would also enhance priority for bus users on southbound services towards Cove and the A92 corridor.

The reconfiguration of Hareness Roundabout (conversion of the roundabout to a signalised junction) would provide additional priority to pedestrians and cyclists, with dedicated crossing points through each junction. This would be a notable improvement from the Do Minimum scenario, whereby there are no signalised crossing points on any arm of the roundabout. It should be noted that this element of the Public Transport Package has a negative impact on bus journey times for southbound movements (in the PM peak) due to the introduction of signal control.

The right-turn ban from Wellington Road onto Abbotswell Road would not be anticipated to generate significant impacts in terms of the priority given to sustainable modes on the corridor, as outlined in the analysis of the Active Travel Package.

Overall, the Public Transport Package is considered to provide a **minor beneficial impact** against TPO1.

8.5.2 TPO2 – Freight Movement

The introduction of additional sections of bus lane along the corridor (relative to the Do Minimum) reduces capacity for general traffic between Southerhead Roundabout and QEB, which leads to longer journey times for HGVs sharing the road capacity with all other vehicles.

The introduction of bus priority signals would not be anticipated to have a significant impact on the movement of freight along the corridor.

The reconfiguration of the junction at Hareness would result in delays for all vehicles, including HGVs (particularly for southbound HGVs in the PM peak). It is anticipated that this would have a negative impact on freight movements, including to Aberdeen South Harbour and the proposed Energy Transition Zone via Hareness Road.

The right-turn ban from Wellington Road onto Abbotswell Road would not be anticipated to have a significant impact on the movement of freight along the corridor. Based on junction turning counts undertaken for the development of the base model, there are very few HGV movements from Wellington Road onto Abbotswell Road (10 in the AM peak; 4 in the PM peak).

Overall, the Public Transport Package has been assessed as providing a **moderate negative impact** against TPO2.

8.5.3 TPO3 – Traffic Management

In the AM peak northbound, end-to-end journey times are shown to be in line with the Do Minimum. Whilst the Public Transport Package is shown to provide a slight improvement to journey times on approach to Souterhead Roundabout, increased queueing is anticipated at Hareness as a result of the proposed reconfiguration, which means there is an overall journey time increase in this southern section. The continuation of additional sections of bus lane between Hareness and Balnagask Road would also be anticipated to result in additional delay to general traffic between Craigshaw Road and Balnagask Road.

In the AM peak southbound, end-to-end journey times are shown to be approximately 2 minutes longer than the Do Minimum. The biggest delay for general traffic is anticipated between QEB and the junction at Balnagask Road due to the addition of a bus lane restricting general traffic into one lane on approach to the junction. A slight delay was also evidenced on approach to Hareness Junction as a result of the proposed reconfiguration.

In the PM peak northbound, end-to-end journey times are shown to be slightly longer (approximately 30 seconds) than the Do Minimum. Whilst the journey time profile would generally be anticipated to be similar to the Do Minimum, slight increases were shown for general traffic between Balnagask Road and QEB.

In the PM peak southbound, end-to-end journey times are shown to be over 2 minutes longer than the Do Minimum. The biggest delay for general traffic would be anticipated on approach to Hareness due to a section of bus lane to the north of Hareness reducing the capacity for general traffic and due to the proposed reconfiguration of Hareness Junction itself.

Overall, the Public Transport Package has been assessed as providing a **moderate negative impact** against TPO3 as it would be anticipated to exacerbate the key pinch-points at Hareness and Balnagask Road for southbound movements in both the AM and PM peaks. The proposed introduction of sections of northbound bus lane, however, does not appear to cause significant detrimental impacts for general traffic.

8.5.4 TPO4 – Accessibility to Employment and Education

The introduction of sections of bus lane along the corridor would enhance accessibility to employment and education areas by bus. The bus lane would not be anticipated to improve the ability for pedestrians, cyclists, or car drivers to access employment and education areas on the corridor, although there may be minor benefits for cyclists using the bus lane (assuming cyclists are permitted to use the bus lanes implemented as part of this package).

The reconfiguration of Hareness Roundabout (conversion to a signalised junction) would improve accessibility to employment and education areas on the corridor for pedestrians and cyclists, however, modelling results indicate that it would cause delay to all vehicles, and therefore, this intervention would have negative impacts on accessibility by bus and by car.

The introduction of bus priority signals at Souterhead would not be anticipated to have an impact on accessibility to employment and education areas and it should be noted that there are no accessibility benefits at Souterhead for pedestrians and cyclists relative to the Do Minimum that would facilitate access to Lochside Academy for school pupils or to employment areas located in the Wellington Circle area.

The right-turn ban from Wellington Road onto Abbotswell Road would not be anticipated to generate significant impacts on the ability for pedestrians, cyclists, and bus users to access employment and education areas on the corridor. However, it would be anticipated to slightly reduce the accessibility by car of employment locations that are accessed from Abbotswell Road and the wider network via West Tullos Road.

Overall, the Public Transport Package would be anticipated to provide minor accessibility improvements to employment and education areas for pedestrians, cyclists (although not to the same extent as the Active Travel Package), and bus users whilst reducing accessibility to these locations for car users. Overall, therefore, it has been assessed as providing **no benefit or impact** against TPO4.

8.5.5 TPO5 – Safety for Users

The introduction of sections of bus lane along the corridor, the introduction of bus priority signals at Southerhead and the introduction of a right-turn ban from Wellington Road onto Abbotswell Road would not be anticipated to generate significant impacts in terms of safety.

The Public Transport Package is modelled to result in an increase in the number of accidents and severity of accidents as a result of the junction reconfiguration at Hareness. In line with the analysis for the Active Travel Package, however, it should be emphasised that this is only based on general traffic accidents and there would be anticipated safety improvements for active travel users through the introduction of signal control at this location. Reconfiguration of Hareness may also improve feelings of safety amongst motorists, including HGV drivers, through the introduction of controlled crossing points for active travel users.

Overall, the Public Transport Package is considered to provide **no benefit or impact** against TPO5. This reflects the balance between negative safety implications for general traffic that would be anticipated through the conversion of the existing roundabout to signals and the safety improvements that would be anticipated for active travel users through the introduction of signal control at the junction.

8.5.6 TPO6 – Air Quality and Health

The introduction of additional sections of bus lane along the corridor (relative to the Do Minimum) and the introduction of bus priority signals would not be anticipated to generate significant impacts in terms of public health. The bus lanes are anticipated to generate a slight benefit for bus users (travelling northbound in the PM peak), which could facilitate modal shift towards bus, however, it is not considered that the savings overall are significant enough to generate a substantial shift away from private vehicle travel. The bus lanes would reduce capacity for general traffic for significant sections of the corridor between Southerhead Roundabout and QEB, which would be anticipated to result in delays, with subsequent detrimental impacts on air quality (and subsequent knock-on impacts for public health).

The reconfiguration of Hareness Roundabout would provide safety and accessibility improvements, which would be anticipated to increase levels of walking and cycling and accordingly, support improvements to public health. It is possible that changes to the junction at Hareness could encourage more people to walk and cycle for short journeys as opposed to driving, which could additionally have minor benefits on local air quality due to reduced vehicle emissions. However, reconfiguration of the junction is anticipated to result in delays to all vehicles, which is likely to result in detrimental impacts in terms of air quality.

The right-turn ban from Wellington Road onto Abbotswell Road would not be anticipated to generate significant improvements in terms of air quality or public health.

Overall, the Public Transport Package is not anticipated to result in significant increases in walking and cycling due to the more limited interventions for active travel in this package. It is also not considered that the benefits created by the introduction of additional lengths of bus lane along the corridor would be significant enough to generate a substantial mode shift from private cars to public transport and therefore it is considered that there could be negative overall impacts in terms of air quality and public health associated with increased delays on the road network. Overall, the Public Transport Package has been assessed as providing a **minor negative impact** against TPO6.

It should be noted that air quality impacts would be dependent on the fleet composition and negative impacts would be anticipated to reduce over time with increased uptake of alternative fuel vehicles and sales of new petrol and diesel cars and vans to be banned from 2030.

8.6 Multi-Modal Travel & Transport Package

This section provides an assessment of the Multi-Modal Package against the TPOs.

8.6.1 TPO1 – Greater Priority to Sustainable Modes

The Multi-Modal Package would introduce interventions that seek to provide greater priority to pedestrians, cyclists, and bus users on the Wellington Road corridor.

The two-way segregated cycleway would provide dedicated priority for cyclists on one side of the road (assumed on the east side) between the city centre and the communities located along Wellington Road, including Torry, Nigg, Altens and Cove. Whilst this is an improvement from the Do Minimum scenario, the two-way cycleway would introduce difficulties for users accessing the infrastructure from the west of Wellington Road and side roads. The two-way cycleway requires cyclists to cross lanes of traffic to access the infrastructure (from the west), which could limit use of the route. The two-way segregated cycleway would be anticipated to generate minor benefits for pedestrians by introducing greater segregation between modes.

The reconfiguration of Hareness Roundabout (conversion of the roundabout to a signalised junction) would provide additional priority to pedestrians and cyclists, with dedicated crossing points through each junction. This would be a notable improvement from the Do Minimum scenario, whereby there are no signalised crossing points on any

arm of the roundabout. It should be noted that this element of the Multi-Modal Package has a negative impact on bus journey times for northbound movements in the AM peak and for southbound movements in the PM peak due to the introduction of signal control.

The introduction of toucan crossing points at Souterhead would provide additional priority to pedestrians and cyclists at this junction. This would be a notable improvement from the Do Minimum scenario, whereby there are no signalised crossing points on the Wellington Circle, Langdykes Road, and Souter Head Road arms of the roundabout.

The introduction of sections of shared bus/HGV lane along the corridor would enhance priority for bus users between Souterhead and QEB. In line with the Public Transport Package, the loss of space for general traffic along sections of the corridor is considered to place more emphasis on providing enhanced priority to shared travel modes over private car travel, which is in line with national, regional, and local policy objectives.

The right-turn ban from Wellington Road onto Abbotswell Road would not be anticipated to generate significant impacts in terms of the priority given to sustainable modes on the corridor, as outlined in the analysis of the Active Travel Package.

Overall, the Multi-Modal Package is considered to provide a **moderate beneficial impact** against TPO1.

8.6.2 TPO2 – Freight Movement

The Multi-Modal Package is the only package that introduces dedicated priority for HGVs along the Wellington Road corridor.

The two-way segregated cycleway, the introduction of toucan crossing points at Souterhead and the introduction of a right-turn ban from Wellington Road to Abbotswell Road would not be anticipated to have a significant impact on the movement of freight along the corridor. To incorporate the cycleway, right-turn filter lanes have been removed at Craigshaw Drive and Greenbank Road. Based on junction turning counts undertaken for the development of the Wellington Road Corridor Microsimulation Model, there are very few HGV movements from Wellington Road onto Craigshaw Drive (2 in both the AM and PM peaks) and from Wellington Road onto Greenbank Road (7 in the AM peak; 1 in the PM peak) and therefore, it is not anticipated that there would be a notable impact on the efficient movement of freight as a result of this intervention.

The reconfiguration of the junction at Hareness would result in delays for HGVs (particularly for southbound vehicles during the PM peak), which would have a negative impact on freight movements, including to/from Aberdeen South Harbour and the proposed Energy Transition Zone via Hareness Road.

The introduction of sections of shared bus/HGV lane along the corridor would provide journey time benefits for HGVs northbound during the PM peak, which would facilitate movement to Aberdeen South Harbour and the proposed Energy Transition Zone. It should be noted that the preferred route to Aberdeen South Harbour is via Hareness Road, which would require HGVs to leave the shared bus/HGV lane and use the lane shared with general traffic in order to turn right at the junction onto Hareness Road.

Overall, the Multi-Modal Package has been assessed as providing a **minor beneficial impact** against TPO2.

8.6.3 TPO3 – Traffic Management

In the AM peak northbound, end-to-end journey times are shown to be approximately 1 minute longer than the Do Minimum. The proposed reconfiguration of Hareness Roundabout and the inclusion of a shared bus/HGV lane between Hareness and Craigshaw Road results in slightly longer journey times between Souterhead and Craigshaw Road. However, it is anticipated that there are journey time savings for general traffic between Craigshaw Road and Balnagask Road as a result of changes to the signal settings at the Balnagask Road Junction, which allows right-turners to take gaps in the southbound traffic in order to access Balnagask Road.

In the AM peak southbound, end-to-end journey times are shown to be in line with the Do Minimum. A marginal reduction in journey time would be anticipated between Balnagask Road and Craigshaw Road, again attributed to the revised signal settings at the Balnagask Road Junction. In addition, the introduction of shared bus/HGV lanes between Craigshaw Road and Hareness would not be anticipated to have a significant impact on journey times for general traffic due to the lower traffic volumes in the southbound direction during the morning peak period.

In the PM peak northbound, end-to-end journey times are shown to be in line with the Do Minimum. There is a journey time improvement between Craigshaw Road and the junction at Balnagask Road of approximately 1 minute, however, it is anticipated that there would be a relocation of the queue evidenced in the Do Minimum model from the Balnagask Road Junction to the approach to QEB.

In the PM peak southbound, end-to-end journey times are shown to be approximately 3 minutes longer than the Do Minimum. The biggest delay for general traffic would be anticipated between Craigshaw Road and Souterhead, where the presence of shared bus/HGV lanes are shown to cause delays to general traffic. In addition, the removal of dedicated right-turning lanes at the Craigshaw Drive and Greenbank Road junctions in order to accommodate the two-way segregated cycleway causes additional delay.

Overall, the Multi-Modal Package has been assessed as providing a **moderate negative impact** against TPO3 as it would be anticipated to exacerbate key pinch-points, particularly for southbound vehicles in the PM peak.

8.6.4 TPO4 – Accessibility to Employment and Education

The two-way segregated cycleway would enhance accessibility to employment and education areas on the corridor for cyclists through the provision of dedicated cycle priority along the length of the corridor, although to a notably lesser extent compared to the with-flow cycleway option in the Active Travel Package due to the requirement to cross Wellington Road to access locations in West Tullos Industrial Estate or employment and education areas in the Wellington Circle area, including Lochside Academy.

The reconfiguration of Hareness Roundabout would improve accessibility to employment and education areas on the corridor for pedestrians and cyclists, however, modelling results indicate that it would cause delay to all vehicles, and therefore, this intervention would have negative impacts on accessibility by bus and by car.

The introduction of toucan crossing points at Souterhead would enhance accessibility to employment and education areas on the corridor, particularly for pedestrian and cycle movements from residential areas on the east side of Wellington Road to the Wellington Circle area, including to Lochside Academy.

The introduction of sections of shared bus/HGV lane along the corridor would provide some minor accessibility improvements for bus users based on reduced journey times for northbound movements in the PM peak, however, overall benefits to bus users are considered to be limited. The shared lane would not be anticipated to improve the ability for pedestrians, cyclists, or car drivers to access employment and education areas on the corridor.

The right-turn ban from Wellington Road onto Abbotswell Road would not be anticipated to generate significant impacts on the ability for pedestrians, cyclists, and bus users to access employment and education areas on the corridor. However, it would be anticipated to reduce the accessibility by car of employment locations that are accessed from Abbotswell Road and the wider network via West Tullos Road.

Overall, the Multi-Modal Package would be anticipated to improve accessibility to employment and education areas for pedestrians, cyclists and, to a lesser extent, bus users, whilst reducing the accessibility to these locations by car. Overall, therefore, it has been assessed as providing a **minor beneficial impact** against TPO4.

8.6.5 TPO5 – Safety for Users

The two-way segregated cycleway would provide segregated cycling infrastructure along the Wellington Road corridor, which would be anticipated to enhance safety as it would remove cyclists from the main carriageway and therefore reduce interactions between motorised vehicle users and cyclists along the corridor. As noted under the appraisal of the Active Travel Package, there are some safety concerns associated with the two-way cycleway relating to the requirement to cross the road more frequently in order to reach the destination and due to cyclists travelling in opposite directions having to pass close to each other, particularly along steep sections of the corridor where it is likely that those travelling northbound would be doing so at much higher speeds. Further, the two-way cycleway would require removal of the central reservation between Greenbank Road and Polwarth Road, which would reduce the availability of safe spaces for crossing outwith the dedicated crossing points along the corridor. In line with the Active Travel Package, should this intervention progress, it would be recommended that future preliminary and detailed design stages consider the potential for either a reduced central reservation or additional crossing points along the corridor to mitigate negative impacts on pedestrian safety.

The Multi-Modal Package is modelled to result in increased accidents for general traffic as a result of signalisation at Hareness. In line with the analysis for the Active Travel Package, however, it should be emphasised that this is only based on general traffic accidents and there would be anticipated safety improvements for active travel users through the introduction of signal control at this location. Reconfiguration of Hareness may also improve feelings of safety amongst motorists, including HGV drivers, through the introduction of controlled crossing points for active travel users. As demonstrated in **Section 9.4** as part of the appraisal against the STAG Economy Criteria, the Multi-Modal Package is anticipated to generate an increase in active travel use and it is therefore important to consider the potential safety implications of improving the wider network infrastructure without providing improved facilities through these key junctions.

At Souterhead Roundabout, the introduction of toucan crossings would be anticipated to provide safety improvements for pedestrians and cyclists.

The introduction of sections of shared bus/HGV lanes along the corridor and the introduction of a right-turn ban from Wellington Road onto Abbotswell Road would not be anticipated to generate significant impacts in terms of safety.

Overall, the Multi-Modal Package is considered to provide a **minor beneficial impact** against TPO5. This reflects the balance between the anticipated safety improvements generated by the two-way segregated cycleway, the introduction of additional toucan crossing points at Souterhead and the reconfiguration of Hareness (for active travel users) and the negative safety implications for general traffic that would be anticipated through the conversion of the existing roundabout at Hareness to signals.

8.6.6 TPO6 – Air Quality and Health

The two-way segregated cycleway provides a consistent and coherent option for cycle trips along the Wellington Road corridor, which could facilitate a degree of modal shift to cycling, with resultant beneficial impacts in terms of public health and air quality. However, it is considered that the two-way cycleway option would be less likely to generate significant modal shift relative to the with-flow cycleway option, due to the more limited accessibility provided by this option because of the need to cross the road more frequently for accessing destinations on the west side of the corridor.

The reconfiguration of Hareness Roundabout would provide safety and accessibility improvements, which would be anticipated to increase levels of walking and cycling and accordingly, support improvements to public health. It is possible that changes to the junction at Hareness could encourage more people to walk and cycle for short journeys as opposed to driving, which could additionally have minor benefits on local air quality due to reduced vehicle emissions. However, signalisation of the junction is anticipated to result in delays to all vehicles, which is likely to result in detrimental impacts in terms of air quality. At Souterhead, the introduction of toucan crossing points would also be anticipated to increase levels of walking and cycling between residential areas to the east of Wellington Road and the Wellington Circle area, supporting improvements to public health.

The introduction of sections of shared bus/HGV lanes along the corridor would not be anticipated to generate significant impacts in terms of public health. The shared lanes are anticipated to generate a slight benefit for bus users (travelling northbound in the PM peak), which could encourage modal shift towards bus, however, it is not considered that the savings overall are significant enough to generate a substantial shift away from private vehicle travel. The shared lanes would reduce capacity for general traffic for significant sections of the corridor between Souterhead Roundabout and QEB, which would be anticipated to result in delays, with subsequent detrimental impacts on air quality (and subsequent knock-on impacts for public health).

The right-turn ban from Wellington Road onto Abbotswell Road would not be anticipated to generate significant improvements in terms of air quality or public health.

Modelling results indicate that the Multi-Modal Package could result in increased congestion and queueing along some sections of the corridor and therefore increased air quality emissions could arise, including from rerouting in order to avoid congestion. This could have subsequent negative impacts on public health associated with increased exposure to air pollution.

Overall, at this stage, the Multi-Modal Package is considered to provide **no benefit or impact** against TPO6. This reflects the potential for positive impacts relating to modal shift balanced against the adverse impacts that would be caused by congestion on the road network.

It should be noted that air quality impacts would be dependent on the fleet composition and negative impacts would be anticipated to reduce over time with increased uptake of alternative fuel vehicles and sales of new petrol and diesel cars and vans to be banned from 2030.

8.7 Additional Lane Sub-Test

This section provides a high-level overview of the performance of the additional lane sub-test against the TPOs. As described in **Section 7.1**, the sub-test undertaken was based on the components of the Multi-Modal Package, with the inclusion of an additional lane northbound between Charleston Road North and Hareness for use by buses and HGVs.

Against TPO1, the sub-test would provide additional priority for buses (and HGVs), however, priority for pedestrians and cyclists would be reduced relative to the Multi-Modal Package. Whilst the Multi-Modal Package provides a two-way segregated cycleway along the length of the corridor, in order to accommodate this in combination with the additional lane for buses and HGVs in the sub-test, it is anticipated that the central reservation would have to be removed or land would have to be acquired on the west side of Wellington Road. Overall, therefore, it has been assessed as providing a **minor beneficial impact** against TPO1.

Against TPO2, the sub-test would provide northbound journey time savings for HGVs of around 2 minutes in the AM peak and a similar saving in the PM peak. Whilst there remains some delay to southbound HGVs during the PM peak, overall, it is considered that the sub-test would facilitate freight movements along the corridor and for access to Aberdeen South Harbour and the proposed Energy Transition Zone. Therefore, it has been assessed as providing a **minor beneficial impact** against TPO2.

Against TPO3, the sub-test provides similar end-to-end journey times to the Do Minimum in the AM peak. Whilst journey time savings are evident through pinch-points at Souterhead and Hareness for northbound vehicles, this is off-set by delays further north due to the addition of shared lanes along sections to the north of Hareness. In the PM peak, the sub-test provides similar journey times to the Do-Minimum for northbound movements, however, delays of approximately 3 minutes are anticipated for southbound movements. Overall, it has been assessed as providing a **moderate negative impact** against TPO3 as pinch-points at Hareness and Souterhead could be exacerbated for southbound movements.

Against TPO4, the sub-test would be anticipated to provide the same benefits to accessibility that have been outlined for the Multi-Modal Package in terms of the reconfiguration of Hareness Roundabout, the introduction of

additional toucan crossing points at Southerhead and the introduction of segregated infrastructure for cyclists (north of Hareness). To the south of Hareness, the additional lane present in the sub-test may result in detrimental impacts in access to education and employment areas for pedestrians and cyclists whilst improving accessibility to these areas for buses and HGVs. Overall, it has been assessed as providing a **minor beneficial impact** against TPO4.

Against TPO5, the sub-test would be anticipated to provide the same safety benefits as the Multi-Modal Package in terms of the two-way segregated cycleway (providing increased segregation between all users to the north of Hareness), the introduction of additional toucan crossing points at Southerhead and the reconfiguration of Hareness (for active travel users). In line with the Multi-Modal Package, the sub-test would also be anticipated to generate safety disbenefits for general traffic as a result of the reconfiguration at Hareness. In the sub-test, the introduction of the additional lane between Charleston Road North and Hareness means that additional land may require to be purchased or the central reservation removed in order to accommodate the two-way segregated cycling infrastructure along this section. Without the implementation of the two-way segregated cycleway, it is considered that there could be detrimental impacts to safety and perceptions of safety relative to the Do Minimum due to the requirement to cross an additional lane of traffic for east-west movements. Overall, due to the safety benefits that would be anticipated along other sections of the route, on balance it has been assessed as providing **no benefit or impact** against TPO5.

Against TPO6, the additional lane for buses and HGVs that is introduced as part of the sub-test could have detrimental impacts on air quality and public health by providing more road capacity to motor vehicles, which could subsequently act as a deterrent to completing trips by walking or cycling. It is anticipated that the additional lane could not be introduced in combination with the two-way segregated cycleway without removal of the central reservation or the acquisition of land on the west side of the road, which could have further detrimental impacts against this objective. Whilst the additional lane is anticipated to result in fewer delays through the key junctions at Southerhead and Hareness, modelling results indicate that delays would move further north on the corridor and therefore, it is not expected to result in air quality benefits overall. Overall, therefore, the sub-test has been assessed as providing a **minor negative impact** against TPO6.

8.8 Summary of TPO Appraisal

A summary of the assessment against the TPOs for the study is shown in the table below.

Table 8.1: Summary of TPO Appraisal

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	✓✓	xx	xx	✓	-	-
Public Transport	✓	xx	xx	-	-	x
Multi-Modal	✓✓	✓	xx	✓	✓	-
Sub-Test	✓	✓	xx	✓	-	x

The high level review of the additional lane sub-test against the TPOs indicated that it does not perform as strongly as the Multi-Modal Package. Therefore, only the Multi-Modal Package has been considered as part of the assessment against the remainder of the appraisal criteria, given that the Multi-Modal Package contains the same component parts as the additional sub-test, with the exception of the additional lane northbound between Southerhead and Hareness for buses and HGVs and as a result, no segregated active travel provision along this section.

It should be noted that **Chapter 12** outlines potential mitigation measures that could be implemented to reduce some of the negative impacts shown, particularly with regards TPO2 and TPO3.

The next chapter outlines the appraisal of each of the identified packages against the five STAG Criteria; Environment, Safety, Economy, Integration and Accessibility & Social Inclusion.

9. STAG Criteria Appraisal

9.1 Introduction

This chapter outlines the appraisal of each of the identified packages against the five STAG Criteria covering the Environment, Safety, Economy, Integration and Accessibility & Social Inclusion, and their related sub-criteria as detailed in the following sections. In line with the assessment against TPOs, the appraisal against STAG Criteria is based on the outputs of the model adjustments implemented in each package in April 2021 (as outlined in **Section 7.4**).

In line with STAG, a seven-point assessment scale has been undertaken for each option against the STAG Criteria as shown in **Table 9.1**.

Table 9.1: STAG Seven-Point Scale

Impact	Description
Major beneficial impact (✓✓✓)	These are benefits or positive impacts which, depending on the scale of benefit, should be a principal consideration when assessing an option.
Moderate beneficial impact (✓✓)	The option is anticipated to have a moderate benefit or positive impact which, when taken in isolation, may not determine the appraisal of an option but would form a key consideration when considered alongside other factors.
Minor beneficial impact (✓)	The option is anticipated to have a small benefit or positive impact. Small benefits or impacts are those which are worth noting but are not likely to contribute materially to determining whether an option is taken forward.
No benefit or impact (-)	The option is anticipated to have no or negligible benefit or impact.
Minor negative impact (✗)	The option is anticipated to have a small negative impact. Small impacts are those which are worth noting but are not likely to contribute materially to determining whether an option is taken forward.
Moderate negative impact (✗✗)	The option is anticipated to have a moderate negative impact which, when taken in isolation may not determine the appraisal of an option but would form a key consideration when considered alongside other factors.
Major negative impact (✗✗✗)	There are negative impacts which, depending on the severity of impact, should be a principal consideration when assessing an option.

9.2 Environment

The environmental appraisal at the detailed appraisal stage includes consideration of the following criteria:

- Noise and vibration;
- Global and local air quality;
- Water quality, drainage, and flood defence;
- Biodiversity and habitats;
- Landscape and visual amenity;
- Cultural heritage; and
- Physical fitness.

It should be noted that it is considered appropriate to scope out the following environmental sub-criteria:

- Geology – the corridor does not sit within any sites designated for their geological interests; and
- Agriculture and soils – there is limited land take required for the option packages proposed; none of which is proposed to encroach onto agricultural fields.

The appraisal involved the following key steps:

- Analysis of the site and context, definition of the extent of the study, and identification and description of the receptors that have the potential to be affected by the option packages under consideration;

- Appreciation of the nature of the proposed option packages;
- Appraisal of the potential changes and implications to the existing environmental receptors; and
- Development of next steps and opportunities to consider in the design evolution in parallel with an environmental assessment process.

The sections that follow provide the key points from the appraisal of options, with **Appendix G** providing the full detail and recommendations for further work.

9.2.1 Do Minimum

For the purposes of the appraisal, the Do Minimum is scored as having **no benefit or impact** against the environment criteria in order to provide the basis for comparison of other options.

9.2.2 Active Travel Package

Noise and Vibration

The construction phase of the Active Travel Package has the potential to emit noise which could impact upon nearby noise sensitive receptors (NSRs). These impacts, whilst adverse, would be temporary and of short duration, as such they are unlikely to result in significant effects.

The operation of the Active Travel Package would potentially affect traffic noise levels as experienced by occupiers of NSRs, in the vicinity of the proposed package, and along other existing affected roads on the local road network. The potential change in noise levels at NSRs would be due to changes in road traffic flow, speeds, and percentage of HGVs, and due to the changes in road alignment or changes at junctions.

The with-flow segregated cycleway is not generally anticipated to significantly alter the alignment of the vehicles on Wellington Road, and therefore it would not significantly change noise levels at NSRs. The exceptions to this are the conversion of one northbound bus lane to an all vehicle lane to the north of Balnagask Road, the removal of the central reservation between Hareness Roundabout and Polwarth Road and the land acquisition at the former HM Craiginches Prison Site. Between Hareness Roundabout and Polwarth Road, the intervention would increase the distance between the nearby NSRs and the nearside carriageway edge by around 3m. Disregarding any change in traffic flows, vertical alignment or additional screening, this change would reduce the traffic noise levels at these properties. At the former HM Craiginches Prison site, the distance from the nearby NSRs (which are on the site of the former prison) to the nearside carriageway edge would be reduced by around 4m; thereby potentially increasing road traffic noise levels. The bus lane conversion to the north of Balnagask Road will move some traffic further from the nearest NSRs, with the potential of decreasing road traffic noise levels. Where NSRs are affected by noise from more than one intervention, it is not possible to identify the combined impact accurately.

The reconfiguration of Souterhead Roundabout would involve the realignment of Souter Head Road, which would move the nearside carriageway edge approximately 30m further away from the closest residential NSRs located on the north side of Craigmaraonn Gardens. These properties are already around 140m away from this road, an additional 30m (in the horizontal alignment only) is not anticipated to significantly change traffic noise levels. The closest NSRs to this junction (on the west side of Craigmaraonn Gardens) are over 120m away and screened by other buildings. Therefore, no significant effects are anticipated due to this intervention.

The reconfiguration of Hareness Roundabout would increase the distance to the nearest NSR (Kirkton Cottage) and the traffic noise source by a maximum of around 7m; therefore, there is the potential for a traffic noise level reduction at this receptor. However, this intervention is also likely to introduce additional stopping and starting of vehicles at the traffic lights when compared to the existing roundabout junction. This would be likely to alter the character of the traffic noise in the vicinity, which would include more sound of vehicles braking, engines running whilst stationary and then accelerating.

The right-turn ban from Wellington Road onto Abbotswell Road would not be anticipated to generate any significant noise level changes as there are no anticipated changes in road alignment.

In addition, an initial assessment of the short-term road traffic noise level change has been undertaken in accordance with the Design Manual for Roads and Bridges (DMRB) LA 111 version 2 (Ref 1) methodology for the assessment of affected routes. This considers the impacts due solely to the anticipated changes in traffic flows; changes in traffic alignment are considered qualitatively above.

DMRB provides two classifications for the magnitude of the traffic noise impact of a proposed road scheme, as shown in **Table 9.2**. These relate to both short-term changes and long-term changes in traffic noise levels. The short-term classification detailed in **Table 9.2** is the main driver of the initial identification of significant effects.

Table 9.2: Magnitude Criteria for Traffic Noise Impacts

Short-Term Change		Long-Term Change	
Noise Level Change (rounded to 0.1dB) LA _{10,18hr} dB	Magnitude of Impact	Noise Level Change (rounded to 0.1dB) LA _{10,18hr} dB	Magnitude of Impact
<1.0	Negligible	<3.0	Negligible
1.0 – 2.9	Minor	3.0 – 4.9	Minor
3.0 – 4.9	Moderate	5.0 – 9.9	Moderate
≥5	Major	≥10.0	Major

According to the DMRB, negligible changes at NSRs are unlikely to give rise to significant effects and major road traffic noise level changes in the short-term are likely to be significant. Minor and moderate changes may result in either not significant or significant noise effects, depending upon consideration of other circumstances. Impacts can either be adverse (increases in noise level) or beneficial (decreases in noise level).

Based on the traffic data supplied with and without the scheme, the change in the 18 hour Calculation of Road Traffic Noise (CRTN) Basic Noise Level (BNL) i.e. the traffic noise level at 10m from the kerb, taking into account the flow, %HGV and speed has been calculated. The roads for which the BNL is anticipated to change by at least 1 dB in the short-term (and therefore significant effects may occur) are presented in **Table 9.3**. In some instances, the supplied traffic data includes multiple links for one road, therefore a range of noise level changes are calculated.

Table 9.3: Short-Term Traffic Noise Impacts, Active Travel Package

Link	Short-term BNL Change LA _{10,18hr} dB	Worst-Case Magnitude of Impact
Coast Road	1.4 to 2.0	Minor negative
Langdykes Road	1.3 to 3.7	Moderate negative
Wellington Road (Craigshaw Rd to Greenwell Rd)	1.1	Minor negative
Wellington Road (north of Souterhead Rbt)	-1.0	Minor beneficial

Overall, the worst-case impacts of the Active Travel Package have been assessed as having a **moderate negative impact** against the noise and vibration criterion.

Global Air Quality – CO₂

The Active Travel Package increases average trip lengths, with an increase in vehicle/km travelled of 1.8% in the AM peak and 0.2% in the PM peak demonstrated in the Wellington Road Corridor Microsimulation Model, due to rerouting from congestion at Souterhead and Hareness junctions. Of all the package options, the Active Travel Package has the highest overall vehicle kilometres travelled in the Do Minimum. The economic analysis undertaken demonstrated an overall increase in terms of greenhouse gas emissions, with a monetised estimation of -£888,000.

It should be emphasised that air quality impacts would be dependent on the fleet composition and negative impacts would be anticipated to reduce over time with increased uptake of alternative fuel vehicles and sales of new petrol and diesel cars and vans to be banned from 2030.

Overall, the Active Travel Package has been assessed as having a **minor negative impact** against the global air quality criterion.

Local Air Quality – PM₁₀ and NO₂

The Active Travel Package could lead to increased levels of cycling, which would provide minor beneficial impacts on local air quality. However, it could also lead to increased vehicle congestion and therefore increased air quality emissions could arise, including from rerouting in order to avoid congestion. The Active Travel Package is anticipated to result in an increase in overall vehicle kilometres travelled (as demonstrated in the Wellington Road Corridor Microsimulation Model), which could also increase overall air quality emissions, although this would depend on future fleet compositions. Further assessment to include dispersion modelling would be required should this package proceed to examine in detail the effects the proposed changes to traffic flows, fleet composition, speed and associated developments will have on air quality, particularly with regards the Wellington Road AQMA.

Impacts on AQMA

In terms of the Wellington Road AQMA (QEB to Balnagask Road), modelling results indicate that northbound congestion will increase for all vehicles within the AQMA in the PM peak period compared to the Do Minimum, which could cause moderate negative air quality impacts. The with-flow cycleway will likely move traffic further away from sensitive receptors along this section, potentially reducing the contribution of vehicle emissions on pollutant concentrations at these locations, however, this may not offset the impact of increased emissions due to congestion. The Active Travel Package therefore has the potential to impact negatively on the AQMA due to the proposed interventions.

Impacts on Wider Corridor

The junction reconfigurations at Souterhead and Hareness could increase queueing in these locations. Souterhead does not have existing receptors that would be sensitive to this change, however, the residential receptors at Hareness could be adversely impacted. Modelling results indicate that congestion is predicted to increase slightly in the AM and PM peak periods in both directions for all vehicles between Souterhead Roundabout and Craigshaw Road in comparison to the Do Minimum, but ease between Craigshaw Road and Balnagask Road northbound in the AM peak. Reduced congestion could be due to less queueing resulting from the right-turn ban from Wellington Road onto Abbotswell Road, which could improve air quality at this location, although there are no sensitive receptors nearby in this area. The right-turn ban could, however, also result in rerouted traffic and longer trip lengths which could impact on air quality elsewhere on the network.

It should be emphasised that air quality impacts would be dependent on the fleet composition and negative impacts would be anticipated to reduce over time with increased uptake of alternative fuel vehicles and sales of new petrol and diesel cars and vans to be banned from 2030.

Overall, the Active Travel Package has been assessed as having a **moderate negative impact** against the local air quality criterion.

Water Quality, Drainage and Flood Defence

The with-flow segregated cycleway would require additional land take from current areas of urban amenity grassland and scattered trees, with existing hard standing areas being remodelled. Increased areas of impermeable hardstanding and alterations in existing hard standing areas can alter surface water run-off flows, and therefore the location, risk, and significance of surface water flooding. Further flood risk modelling and detailed drainage design would be required to ensure no significant adverse increases or alterations to surface water flows. The with-flow segregated cycleway also generates a risk of pollution to Loirston Loch. The carriageway across the loch currently comprises two northbound lanes, two southbound lanes and one southbound narrow footway. It is proposed that the central reservation would be reduced and the carriageways realigned. Works within this area have the potential for pollution risk to the loch and further studies should be carried out if this intervention was to proceed to establish how construction pollution could be effectively controlled. Furthermore, works in the vicinity of the River Dee will need to be undertaken with robust pollution prevention measures to ensure no pollution of the river during construction.

The reconfiguration of Souterhead Roundabout involves new development through existing woodland north-east of the roundabout, which would result in the introduction of an increased surface area of hardstanding and reduction in permeable ground. The new junction arrangement is within close proximity to areas of 'high likelihood' of surface water flooding, as set out on the SEPA flood maps, and therefore, further studies should be carried out if this intervention was to proceed to inform detailed design and the control of surface water run-off.

The reconfiguration of Hareness Roundabout would not require any additional land take, with existing areas of hardstanding being remodelled. Therefore, no significant changes in surface water run-off are anticipated post-detailed drainage design.

The right-turn ban from Wellington Road onto Abbotswell Road is not anticipated to generate any impacts in terms of water quality, drainage, and flood defence.

Overall, to minimise the potential for adverse impacts on water quality, all construction works, including enabling works, would be required to be undertaken in accordance with relevant and up to date best practice guidance, including SEPA Pollution Prevention Guidelines/Guidance for Pollution Prevention (PPGs/GPPs). In addition, a detailed review of any culverted watercourses would require to be undertaken to ensure no adverse effects on the structure integrity or pollution risk during construction. At this time, the Active Travel Package has been assessed as having a **moderate negative impact** against the water quality, drainage, and flood defence criterion.

Biodiversity and Habitats

The with-flow segregated cycleway would require pockets and strips of additional land take from current areas of urban amenity grassland and scattered trees, with potential indirect impacts on larger woodland areas such as Pot Heugh. There is the potential for impacts to breeding birds and roosting bats from noise, vibration, lighting, and tree and scrub removal. To mitigate these impacts, removal of any tree or scrub vegetation should be minimal with detailed design on any additional lighting to avoid illuminating wooded areas. Removal of greenspace, scattered trees, scrub, and tree lines, particularly within an urban environment, can also lead to increased fragmentation of habitats and restricted movement of species. There are a number of important wildlife habitats within the study area, such as Kincorth Hill, Loirston Country Park, Loirston Loch and Pot Heugh, and such linkages can be important to a number of species. Should this intervention proceed, a review of vegetation removal should be undertaken and advice sought from an ecologist.

Loirston Loch is considered to be a key area of risk. It is an important habitat for both otter and wintering bird species. In the Active Travel Package, it is proposed that the central reservation is reduced to allow realignment of the carriageway and incorporation of the proposed with-flow segregated cycleway, rather than widening of the carriageway. Notwithstanding, the loch is present on both sides of the existing road and there remains the potential for significant adverse effects on water quality, which in turn can impact on species. Noise disturbance is also a

significant risk to wintering birds. Further studies would be necessary should the with-flow segregated cycleway element of the Active Travel Package proceed.

The reconfiguration of Souterhead Roundabout involves new development through existing woodland north east of the roundabout, which would have similar impacts on woodlands discussed as part of the with-flow segregated cycleway element above. An ecological survey would be required to establish the quality of the woodland habitat and the species it supports.

The reconfiguration of Hareness Roundabout is not anticipated to generate any significant impacts, provided there is no vegetation removal and no new lighting proposed as part of the intervention.

The right-turn ban from Wellington Road onto Abbotswell Road is not anticipated to generate any impacts in terms of biodiversity and habitats.

Overall, at this time, the Active Travel Package has been assessed as having a **moderate negative impact** against the biodiversity and habitats criterion.

Landscape and Visual Amenity

The introduction of the Active Travel Package would result in limited change to the overall landscape and urban character of the site and extent of the study area. It would require some land acquisition and therefore expand part of the existing transport corridor, which would generate a very slight change to the physical fabric of the landscape and urban character. Potential construction impacts would be temporary and localised to the construction working corridor. Provided that there is very limited physical alteration to Loirston Loch, there is unlikely to be a substantial loss of valued landscape elements such as veteran trees or established boundaries. It is considered that the introduction of a comprehensive active travel solution would slightly enhance the overall streetscape and accessibility of this part of the urban environment.

Potential visual effects would be limited to pedestrian users of the existing transport corridor and residential receptors at the recently developed Charleston residential estate where several properties overlook part of the study area, and the residential properties between Balnagask Road and QEB. Construction activities would temporarily diminish the existing levels of visual amenity, whilst the completed and operational active travel solution would result in slight but perceptible change to views. However, the overall composition and focus of views would largely be unaltered and the realignment of the corridor would result in very limited change for pedestrians. The greater physical separation between the footway and carriageway may improve the overall visual experience.

The incorporation of a comprehensive integrated landscape scheme would further enhance the quality and impression of the Active Travel Package and the overall transport corridor. It would also improve the experience of pedestrians and cyclists, and better integrate with the new and planned residential developments along the corridor.

Overall, the Active Travel Package has been assessed as having a **minor beneficial impact** against the landscape and visual amenity criterion.

Cultural Heritage

It is not anticipated that the Active Travel Package would generate any direct significant impacts on heritage assets along the corridor, provided that works do not encroach on the Category A listed Wellington Suspension Bridge over the River Dee. The design of all interventions would be required to be in-keeping with and sympathetic to the surrounding environment to avoid significant adverse impacts on the setting of listed structures within the study area. Consultation with archaeologists within ACC should be undertaken if this package is to proceed to liaise on the design and to ascertain if any locally important heritage and archaeological assets are present within the study area.

Whilst there always remains the potential for previously unrecorded archaeological assets to be present within the study area, at this time, the Active Travel Package has been assessed as having **no benefit or impact** against the cultural heritage criterion.

Physical Fitness

The Active Travel Package introduces interventions that aim to prioritise walking and cycling through dedicated cycling infrastructure and improvements at key junctions. The introduction of signalised crossings introduces considerable safety and accessibility improvements for pedestrians and cyclists. These interventions are considered likely to increase the levels of walking and cycling and generate an increase in physical fitness from the current baseline. Overall, the Active Travel Package has been assessed as having a **major beneficial impact** against the physical fitness criterion.

9.2.3 Public Transport Package

Noise and Vibration

As with the Active Travel Package, the construction phase of the proposed Public Transport Package has the potential to emit noise which could impact upon nearby NSRs. These impacts, whilst adverse, would be temporary and of short duration, as such they are unlikely to result in significant effects.

The proposed option package operation would potentially affect traffic noise levels as experienced by occupiers of residential properties, in the vicinity of the proposed scheme, and along other existing affected roads on the local road network. The potential change in noise levels at NSRs would be due to changes in road traffic flow, speeds, and percentage of HGVs, and due to the changes in road alignment or changes at junctions.

The sections of bus lane in both directions would generally not change the carriageway alignment. Where a bus lane is introduced, it would move all the traffic except buses towards the centre of the road, away from nearby residential properties. Hence, it is likely that noise levels at residential properties near these locations would reduce due to the redistribution of traffic flow. At the former HM Craiginches Prison Site, the nearside carriageway edge would move approximately 3.5m closer to the nearby properties to accommodate the new bus lane. As the additional lane would only be used by buses, the remainder of the traffic would be the same distance from the properties as the current situation. Therefore, traffic noise level increases at the properties would be expected to be lower than with the Active Travel Package.

The introduction of bus priority signals at Souterhead Roundabout would not change the carriageway realignment and therefore, no significant noise level changes would be anticipated.

The reconfiguration of Hareness Roundabout would increase the distance to the nearest NSR (Kirkton Cottage) and the traffic noise source by a maximum of around 7m; therefore, there is the potential for a traffic noise level reduction at this receptor. However, this intervention is also likely to introduce additional stopping and starting of vehicles at the traffic lights when compared to the existing roundabout junction. This would be likely to alter the character of the traffic noise in the vicinity, which would include more sound of vehicles braking, engines running whilst stationary and then accelerating.

The right-turn ban from Wellington Road onto Abbotswell Road would not be anticipated to generate any significant noise level changes as there are no anticipated changes in road alignment.

Additionally, noise level impacts due solely to the anticipated changes in traffic flows as a result of the scheme have been calculated. Based on the traffic data supplied with and without the scheme, the change in the 18 hour CRTN BNL has been calculated. The roads for which the BNL is anticipated to change by at least 1 dB in the short-term (and therefore significant effects may occur) are presented in **Table 9.4**.

Table 9.4: Short-Term Traffic Noise Impacts, Public Transport Package

Link	Short-term BNL Change LA _{10,18hr} dB	Worst-Case Magnitude of Impact
Crawpeel Road	1.1 to 1.3	Minor negative
Wellington Road (Greenbank Rd to Craigshaw Rd)	-2.2	Minor beneficial
Wellington Road (Hareness to Nigg Kirk Rd)	-1.3	Minor beneficial
Wellington Road (Craigshaw Rd to Greenwell Rd)	-1.7	Minor beneficial

Overall, the worst-case impacts of the Public Transport Package have been assessed as having a **minor negative impact** against the noise and vibration criterion.

Global Air Quality – CO₂

The Public Transport Package slightly reduces average trip lengths, with a decrease in vehicle/km travelled of 0.2% in the AM peak and 1.1% in the PM peak demonstrated in the Wellington Road Corridor Microsimulation Model. Of all the package options, the Public Transport Package has the lowest overall vehicle kilometres travelled within the Wellington Road Corridor Microsimulation Model in 2026. Despite this, the economic analysis undertaken shows an overall increase in terms of greenhouse gas emissions, with a monetised estimation of -£465,000.

It should be emphasised that air quality impacts would be dependent on the fleet composition and negative impacts would be anticipated to reduce over time with increased uptake of alternative fuel vehicles and sales of new petrol and diesel cars and vans to be banned from 2030.

Overall, the Public Transport Package has been assessed as having a **minor negative impact** against the global air quality criterion.

Local Air Quality – PM₁₀ and NO₂

The implementation of additional bus priority measures could have a positive impact on air quality if this intervention was to encourage a modal shift from private transport to public transport, by reducing the number of low occupancy vehicles on the road. However, overall, significant modal shift is not anticipated due to the limited benefits that the

Public Transport Package provides to bus users. The Public Transport Package also requires a reduction in capacity for general traffic where a bus lane is proposed that is not currently provided, and this would likely increase localised areas of congestion that could worsen air quality. A decrease in the overall vehicle kilometres travelled in comparison to the Do Minimum would not necessarily generate decreased emissions, noting that carbon emissions increase with this package (as outlined under the analysis against Global Air Quality).

Impact on AQMA

In terms of the Wellington Road AQMA (between QEB and Balnagask Road), extension of the existing bus lane would require other road vehicles to vacate the lane earlier than the current arrangement. This could 'push back' queueing during peak periods, therefore causing negative air quality impacts and potentially adversely impacting on the Wellington Road AQMA (although this would be dependent on future fleet compositions).

Provision of a new southbound bus lane could potentially deliver some localised benefit to air quality in the immediate vicinity of the AQMA by allowing a more efficient flow of vehicle movements in the general traffic lane. Modelling results indicate that southbound (and northbound to a lesser extent) congestion of all vehicles increases within the AQMA in the AM peak period when compared to the Do Minimum. Congestion is also anticipated to increase within the AQMA in the PM peak period for general traffic northbound (although congestion of buses and HGVs is anticipated to reduce slightly).

Impact on Wider Corridor

The introduction of sections of bus lane in both directions along the corridor has the potential to deliver air quality benefits, should modal shift away from low occupancy vehicles be encouraged, however, as noted above, the potential for modal shift is considered to be relatively limited as a result of the proposed interventions. The proposed sections of bus lane would reduce capacity for general traffic, which could result in an increase in congestion and subsequently adverse air quality impacts. Should the separation distance be reduced between road edge (point of emissions) and sensitive receptors, this may also lead to adverse air quality impacts at sensitive receptors along the main road network outside of the AQMA.

The introduction of bus priority signals at Souterhead Roundabout would be anticipated to reduce queueing buses, with subsequent beneficial impacts for air quality. It should be noted, however, that emissions from other vehicles may increase due to increased queueing, although there are no nearby sensitive receptors at Souterhead for these changes to have an impact.

The reconfiguration of the junction at Hareness is anticipated to result in increased emissions due to increased congestion in the AM peak southbound direction, which could negatively impact on the nearby residential receptors at Hareness.

The right-turn ban from Wellington Road onto Abbotswell Road could result in less queueing at this location, which could have beneficial air quality impacts, although this could be offset by rerouted traffic and longer trip lengths, with potentially negative impacts on air quality elsewhere on the network.

Modelling results indicate a slight congestion increase between Souterhead Roundabout and Craigshaw Road for all vehicles northbound during the AM peak and for all vehicles southbound during the PM peak between Craigshaw Road and Hareness Junction. It would be anticipated that air quality would be adversely impacted at existing sensitive receptors along these sections of the route. There are predicted decreases in congestion in the AM peak for all northbound vehicles between Old Wellington Road and Souterhead Roundabout and between Craigshaw Road and Balnagask Road, and for southbound buses and HGVs between Craigshaw Road and Hareness Junction.

It should be emphasised that air quality impacts would be dependent on the fleet composition and negative impacts would be anticipated to reduce over time with increased uptake of alternative fuel vehicles and sales of new petrol and diesel cars and vans to be banned from 2030.

Overall, the Public Transport Package has been assessed as having a **minor negative impact** against the local air quality criterion (with potentially moderate negative impacts within the Wellington Road AQMA). This is due to anticipated increased emissions overall and therefore worsened air quality would be anticipated at any sensitive receptors located closest to the road along the sections outside of the AQMA.

Water Quality, Drainage and Flood Defence

The Public Transport Package is anticipated to generate similar impacts to the Active Travel Package in terms of water quality, drainage, and flood defence. The proposed sections of bus lane do not extend to the south of Souterhead Roundabout, and therefore the potential risks relating to Loirston Loch are not applicable in this case. In addition, the introduction of bus priority signals at Souterhead Roundabout is not anticipated to generate any impacts.

As with the Active Travel Package, to minimise the potential for adverse impacts on water quality, all construction works, including enabling works, would be required to be undertaken in accordance with relevant and up to date best practice guidance, including SEPA PPGs/GPPs. In addition, a detailed review of any culverted watercourses would require to be undertaken to ensure no adverse effects on the structure integrity or pollution risk during

construction. At this time, the Public Transport Package has been assessed as having a **minor negative impact** against the water quality, drainage, and flood defence criterion.

Biodiversity and Habitats

The Public Transport Package is anticipated to generate similar impacts to the Active Travel Package in terms of biodiversity and habitats.

The proposed sections of bus lane would require pockets and strips of additional land take from current areas of urban amenity grassland and scattered trees, with potential indirect impacts on larger woodland areas such as Pot Heugh and the woodland wedge north-east of Souterhead Roundabout. There is the potential for impacts to breeding birds and roosting bats from noise, vibration, lighting, and tree and scrub removal. Removal of any tree or scrub vegetation should be minimal with detailed design on any additional lighting to avoid illuminating wooded areas. Removal of greenspace, scattered trees, scrub, and tree lines, particularly within an urban environment, can create increased fragmentation of habitats and restricted movement of species. There are a number of important wildlife habitats within the study area such as Kincorth Hill, Loirston Country Park, Loirston Loch, and Pot Heugh, and such linkages can be important to a number of species. Should this intervention proceed, a review of vegetation removal should be undertaken and advice sought from an ecologist.

The introduction of bus priority signals through Souterhead Junction would not be anticipated to generate any impacts.

Overall, the Public Transport Package has been assessed as having a **minor negative impact** against the biodiversity and habitats criterion.

Landscape and Visual Amenity

The Public Transport Package is anticipated to generate similar impacts to the Active Travel Package in terms of landscape and visual amenity. The extent of change would be very limited to the more regular appearance of taller buses in outer bus lanes at the edge of footways. Overall, long-term changes to current levels of visual amenity would be barely perceptible. However, a comprehensive landscape scheme would help to better integrate the Public Transport Package and overall transport corridor into views and the wider landscape and urban context. Overall, the Public Transport Package has been assessed as having **no benefit or impact** against the landscape and visual amenity criterion.

Cultural Heritage

The Public Transport Package is anticipated to generate similar impacts to the Active Travel Package in terms of cultural heritage. Overall, it has been assessed as having **no benefit or impact** against the cultural heritage criterion.

Physical Fitness

The reconfiguration of Hareness Roundabout provides a positive effect for pedestrians and cyclists through increased safety and improved accessibility. However, the Public Transport Package does not provide interventions that improve safety and accessibility for active travel users along the corridor and therefore, the positive impact on physical fitness is considered to be less significant relative to the other packages. Overall, the Public Transport Package has been assessed as having a **minor beneficial impact** against the physical fitness criterion.

9.2.4 Multi-Modal Travel & Transport Package

Noise and Vibration

As with the other packages, the proposed Multi-Modal Package has the potential to emit noise which could impact upon nearby NSRs. These impacts, whilst adverse, would be temporary and of short duration, as such they are unlikely to result in significant effects.

The proposed option package operation would potentially affect traffic noise levels as experienced by occupiers of residential properties, in the vicinity of the proposed scheme, and along other existing affected roads on the local road network. The potential change in noise levels at NSRs would be due to changes in road traffic flow, speeds, and percentage of HGVs, and due to the changes in road alignment or changes at junctions.

The two-way segregated cycleway would not be anticipated to significantly alter the alignment of the vehicles on Wellington Road, and therefore it would not significantly change noise levels at NSRs. The exceptions to this are the removal of the central reservation between Greenbank Road and Polwarth Road and the land acquisition at the former HM Craiginches Prison Site. Between Greenbank Road and Polwarth Road, the intervention would increase the distance between the nearby NSRs and the nearside carriageway edge by a maximum of around 3m. Disregarding any change in traffic flows, vertical alignment or additional screening, this change would reduce the traffic noise levels at these properties. At the former HM Craiginches Prison site, the distance from the nearby NSRs (which are on the site of the former prison) to the nearside carriageway edge would be reduced by around 4m; thereby increasing road traffic noise levels. Where properties are affected by noise from more than one intervention, it is not possible to identify the combined impact accurately.

Implementation of additional toucan crossing points at Southerhead would not be expected to significantly change the road alignment and therefore, no significant noise level changes are anticipated.

The sections of shared bus/HGV lane would require similar lane realignment to the bus lane addition intervention discussed in the Public Transport Package. Where a new shared bus/HGV lane is being introduced, this would move all the traffic except buses and HGVs towards the centre of the road, away from nearby residential properties. Hence it is likely that noise levels at residential properties near these locations would reduce due to redistribution of traffic within the existing carriageway alignment, although the reduction would be smaller than would be expected for the proposed bus lane. The additional lane at the former HM Craiginches Prison site would be used by buses and HGVs, the remainder of the traffic would be the same distance from the properties as the current situation. Therefore, traffic noise level increases at the properties would be expected to be lower than with the Active Travel Package but greater than the Public Transport Package.

The reconfiguration of Hareness Roundabout would increase the distance to the nearest NSR (Kirkton Cottage) and the traffic noise source by a maximum of around 7m; therefore, there is the potential for a traffic noise level reduction at this receptor. However, this intervention is also likely to introduce additional stopping and starting of vehicles at the traffic lights when compared to the existing roundabout junction. This would be likely to alter the character of the traffic noise in the vicinity, which would include more sound of vehicles braking, engines running whilst stationary and then accelerating.

The right-turn ban from Wellington Road onto Abbotswell Road would not be anticipated to generate any significant noise level changes as there are no anticipated changes in road alignment.

Additionally, noise level impacts due solely to the anticipated changes in traffic flows as a result of the scheme have been calculated. Based on the traffic data supplied with and without the scheme, the change in the 18 hour CRTN BNL has been calculated. The roads for which the BNL is anticipated to change by at least 1 dB in the short-term (and therefore significant effects may occur) are presented in **Table 9.5**.

Table 9.5: Short-Term Traffic Noise Impacts, Multi-Modal Package

Link	Short-term BNL Change LA _{10,18hr} dB	Worst-Case Magnitude of Impact
Crawpeel Road	1.5 to 1.7	Minor negative
Wellington Road (Greenbank Rd to Craigshaw Rd)	-1.2	Minor beneficial
Wellington Road (Hareness to Nigg Kirk Rd)	-1.0	Minor beneficial
Wellington Road (Craigshaw Rd to Greenwell Rd)	-1.7	Minor beneficial

Overall, the worst-case impacts of the Multi-Modal Package have been assessed as having a **minor negative impact** against the noise and vibration criterion.

Global Air Quality – CO₂

The Multi-Modal Package increases average trip lengths, with an increase in vehicle/km travelled of <0.1% in the AM peak and an increase of 0.6% in the PM peak demonstrated in the Wellington Road Corridor Microsimulation Model. The economic analysis undertaken demonstrated an overall increase in terms of greenhouse gas emissions, with a monetised estimation of -£736,000.

It should be emphasised that air quality impacts would be dependent on the fleet composition and negative impacts would be anticipated to reduce over time with increased uptake of alternative fuel vehicles and sales of new petrol and diesel cars and vans to be banned from 2030.

Overall, the Multi-Modal Package has been assessed as having a **minor negative impact** against the global air quality criterion.

Local Air Quality – PM₁₀ and NO₂

The Multi-Modal Package could lead to increased levels of cycling, which would provide minor beneficial impacts on local air quality. However, it could also lead to increased vehicle congestion and therefore increased air quality emissions could arise, including from rerouting in order to avoid congestion. The Multi-Modal Package is anticipated to result in an increase in overall vehicle kilometres travelled (as demonstrated in the Wellington Road Corridor Microsimulation Model), which could also increase overall air quality emissions. Further assessment to include dispersion modelling would be required should this package proceed to examine in detail the effects the proposed changes to traffic flows, fleet composition, speed and associated developments will have on air quality, particularly with regards the Wellington Road AQMA.

Impact on AQMA

In terms of the Wellington Road AQMA (QEB to Balnagask Road), the potential realignment of traffic flow to be further west to create space for the two-way segregated cycleway would benefit sensitive receptors along the east of Wellington Road by increasing the separation distance between residential facades and vehicle emissions. It should be noted that there does not appear to be any sensitive receptors located along the west of Wellington Road within the AQMA to be negatively impacted by this change. However, should the purchase of land for the

shared bus/HGV lane and/or the two-way segregated cycleway involve shifting of road centre lines towards the sensitive receptors along the east of Wellington Road, there would be a negative impact on air quality within the AQMA. Modelling results indicated that there will be increased northbound congestion for all vehicles within the AQMA during the PM peak, with the exception of congestion from buses and HGVs, which is predicted to decrease. Reduced congestion from buses and HGVs could result in a higher reduction in emissions than the increase in emissions resulting from congestion of cars and LGVs, or there could be a neutral impact overall.

Impact on Wider Corridor

Along the remainder of the route, the two-way segregated cycleway would be anticipated to result in road centre lines being located further west, with traffic flow realigned. This would be anticipated to benefit sensitive receptors along the east of the main road network by increasing the separation distance between any residential facades and vehicle emissions. This could have beneficial impacts for receptors located to the south of Souterhead Roundabout on the eastern side of Wellington Road, whilst adverse impacts would be anticipated on receptors to the north and south of Hareness, on the western side of Wellington Road.

The introduction of additional pedestrian and cycle crossings would be anticipated to increase idling traffic and queueing, and therefore emissions to air. The modelling results indicate increases in congestion between Souterhead Roundabout and Craigshaw Road northbound in the AM peak for all vehicles except buses and HGVs. This would be anticipated to have a minor adverse impact on local air quality at receptors nearby (Hareness Junction and Souterhead Roundabout). It would be anticipated that adverse impacts would be greater at Hareness due to the presence of local sensitive receptors (residential properties) to the south-west of the junction.

The reconfiguration of the junction at Hareness is anticipated to result in increased emissions due to increased congestion in the AM peak southbound direction, which could negatively impact on the nearby residential receptors at Hareness.

Modelling results indicate a large increase in congestion southbound in the PM peak between Craigshaw Road and Souterhead Roundabout and southbound at Hareness Junction in the AM peak. There are predicted decreases in congestion in the AM peak in both directions between Craigshaw Road and Balnagask Road and northbound in the PM peak. Reduced congestion could be due to less queueing resulting from the right-turn ban from Wellington Road onto Abbotswell Road, which could improve air quality at this location, although there are no sensitive receptors nearby in this area. The right-turn ban could, however, also result in rerouted traffic and longer trip lengths which could impact on air quality elsewhere on the network.

It should be emphasised that air quality impacts would be dependent on the fleet composition and negative impacts would be anticipated to reduce over time with increased uptake of alternative fuel vehicles and sales of new petrol and diesel cars and vans to be banned from 2030.

Overall, the Multi-Modal Package has been assessed as having **no benefit or impact** against the local air quality criterion.

Water Quality, Drainage and Flood Defence

The Multi-Modal Package is anticipated to generate similar impacts to the respective elements of the Active Travel Package and the Public Transport Package. As per the other packages, the right-turn ban from Wellington Road onto Abbotswell Road is not anticipated to generate any impacts in terms water quality, drainage, and flood defence, nor is the signalisation of Hareness Roundabout, provided there is no vegetation removal and no new lighting proposed as part of the intervention. The implementation of additional toucan crossing points at Souterhead Roundabout is also not anticipated to generate any significant impacts in terms of surface water run-off post detailed drainage design.

The two-way segregated cycleway is anticipated to generate the same impacts as the with-flow cycleway in the Active Travel Package, with the potential for impacts on the location, risk and significance of surface water flooding associated with increased areas of hardstanding, and the potential for pollution of Loirston Loch. As with the Active Travel Package, further studies should be carried out if this package was to proceed to establish how construction pollution could be effectively controlled and works within the vicinity of the River Dee would need to be undertaken with robust pollution prevention measures to ensure no pollution of the river during construction.

The shared bus/HGV lane is anticipated to generate the same impacts as the bus lane in the Public Transport Package, with the potential for impacts on the location, risk and significance of surface water flooding associated with increased areas of hardstanding due to the additional land take from current areas of urban amenity grassland and scattered trees. Further flood risk modelling and detailed drainage design would be required to ensure no significant adverse increases or alteration to surface water flows and works in the vicinity of the River Dee would need to consider management of construction run-off to ensure pollution of the river during construction is effectively mitigated.

Overall, the Multi-Modal Package has been assessed as having a **minor negative impact** against the water quality, drainage, and flood defence criterion.

Biodiversity and Habitats

The Multi-Modal Package is anticipated to generate similar impacts to the respective elements of the Active Travel Package and the Public Transport Package. As per the other packages, the right-turn ban from Wellington Road onto Abbotswell Road is not anticipated to generate any impacts in terms of biodiversity and habitats, nor is the signalisation of Hareness Roundabout, provided there is no vegetation removal and no new lighting proposed as part of the intervention. The implementation of additional toucan crossing points at Southerhead Roundabout is also not anticipated to generate any significant impacts in terms of biodiversity and habitats.

The two-way segregated cycleway is anticipated to generate the same impacts as the with-flow cycleway in the Active Travel Package, with the potential for impacts to breeding birds and roosting bats from noise, vibration, lighting, and tree and scrub removal. Loirston Loch is also considered to be a key area of risk in this package, which is an important habitat for both otter and wintering bird species.

The shared bus/HGV lane is anticipated to generate the same impacts as the bus lane in the Public Transport Package, with the additional land take from current areas of urban amenity grassland and scattered trees generating the potential for indirect impacts on larger woodland areas such as the woodland wedge north-east of Southerhead Roundabout and Pot Heugh. There is also the potential for impacts to breeding birds and roosting bats, increased fragmentation of habitats and restricted movement of species. If the shared/bus HGV lane is to proceed, a review of vegetation removal should be undertaken and advice sought from an ecologist.

Overall, the Multi-Modal Package has been assessed as having a **minor negative impact** against the biodiversity and habitats criterion.

Landscape and Visual Amenity

The Multi-Modal Package is anticipated to generate similar landscape and visual changes and opportunities as those described for the Active Travel Package and, to a lesser extent, the Public Transport Package. Any changes to the landscape and urban character of the site would be localised where land acquisition is required and little change is anticipated to the overall impression of character. In line with the appraisal for the Active Travel Package, it is considered that the implementation of the two-way segregated cycleway, and greater physical separation between the footway and carriageway, may improve the overall visual experience. As with the other packages, the incorporation of a comprehensive landscape scheme would enhance the quality and impression of the active travel elements of the package and the overall transport corridor. Overall, the Multi-Modal Package has been assessed as having a **minor beneficial impact** against the landscape and visual amenity criteria.

Cultural Heritage

The Multi-Modal Package is anticipated to generate similar impacts to the Active Travel Package in terms of cultural heritage. Overall, it has been assessed as having **no benefit or impact** against the cultural heritage criterion.

Physical Fitness

The Multi-Modal Package provides several interventions that could provide positive effects on physical fitness: two-way segregated cycleway along the length of Wellington Road, additional toucan crossing points at Southerhead Roundabout and signalisation of Hareness Roundabout. It is possible that the two-way segregated cycleway may have less appeal relative to the with-flow cycleway, which could limit its use by some users, however, overall, it is considered likely to increase active travel use from the current baseline and therefore support an increase in physical fitness from the current baseline. Overall, the Multi-Modal Package has been assessed as having a **moderate beneficial impact** against the physical fitness criterion.

9.2.6 Summary of Environmental Appraisal

The outcomes of the environmental appraisal are summarised in the table below.

Table 9.6: Environment Criteria Appraisal Summary

Package	Environment Criteria							
	Noise & Vibration	Global Air Quality	Local Air Quality	Water Quality, Drainage & Flood Defence	Biodiversity & Habitats	Landscape & Visual Amenity	Cultural Heritage	Physical Fitness
Do Minimum	-	-	-	-	-	-	-	-
Active Travel	xx	x	xx	xx	xx	✓	-	✓✓✓
Public Transport	x	x	x	x	x	-	-	✓
Multi-Modal	x	x	-	x	x	✓	-	✓✓

9.3 Safety

The safety appraisal at the detailed appraisal stage includes consideration of the following criteria:

- Reducing accidents; and
- Improving security.

Accidents

COBALT (**CO**st and **B**enefit to **A**ccidents – **L**ight **T**ouch) is an accident analysis tool developed by the Department for Transport (DfT). To inform the accident appraisal, COBALT was used to compare accidents by severity in 'Without-Scheme' and 'With-Scheme' forecasts and their associated costs. For each assessment, link and junction characteristics, relevant accident rates as well as forecast traffic volumes were collected and used to calculate the associated costs of each scheme. The resulting costs associated with each scheme are calculated over a 60-year assessment period with costs and benefits discounted to 2010.

When interpreting the results generated by the COBALT analysis in the proceeding sections, the following considerations should be borne in mind:

- No local observed accident rates were collected as part of the assessment and therefore COBALT uses national accident rates. In a local context, analysis of CrashMap (2016-2020) indicates that there has been one personal injury accident at Hareness Roundabout in the last five years, which involved a pedal cyclist and no accidents were recorded at Southerhead Roundabout. A number of pedestrian accidents were recorded to the north of Hareness Roundabout, including two pedestrian fatalities.
- COBALT provides an estimate of increases in accidents and accident severity for general traffic only; it does not provide a mechanism to estimate the impact of schemes on pedestrian and cycle safety.

In the absence of a tool to assess the safety implications for pedestrians and cyclists quantitatively, a qualitative assessment has been provided for each package. It should be noted that whilst roundabouts are the safest form of at-grade junction for general traffic, around 10% of all reported accidents involving cyclists occur at roundabouts. Of these, 11% are likely to be either serious or fatal, and more than 50% involve a motorist entering a roundabout and colliding with a cyclist using the circulatory carriageway (TAL 9/97). Cyclist accident rates at roundabouts are four times that for motor vehicle drivers, with the most hazardous types of roundabout for cyclists those that are large, unsignalised and with multiple circulation lanes.²⁷

Furthermore, the Scottish Government has recently provided support for either segregation of road users or speed reduction as part of a safe systems approach to roads design. In general terms on Wellington Road, segregation is considered to be the most appropriate way of increasing safety for vulnerable road users, given that speed

²⁷ <https://www.transport.gov.scot/media/48026/cycling-by-design-july-2020.pdf>

reduction measures are more unlikely on this priority route into the city centre. Therefore, in the proceeding analysis, where segregation of active travel facilities is being proposed, a positive benefit should be seen for vulnerable road users.

The Road Safety Framework²⁸ notes: *"In a Safe System, roads are designed to reduce the risk of collisions, and to mitigate the severity of injury should a collision occur. A combination of design and maintenance of roads and roadsides supported by the implementation of a range of strategies to ensure that roads and roadsides can be as safe as possible can reduce casualties on our roads. One way in which this can be achieved is to segregate different kinds of road users and to segregate traffic moving in different directions or at different speeds. If this is not possible, a speed limit to protect the most vulnerable road users can be implemented."*

Security

The security criterion is used to assess and reflect changes in real and perceived security of travellers arising from particular transport options and the likely number of users affected, with consideration given to security indicators such as site perimeters; entrances and exits; surveillance; landscaping; lighting and visibility; and emergency call facilities. In line with guidance, particular consideration has been given to the security of vulnerable sections of the community such as children, the elderly and women travelling alone. The security appraisal has been undertaken qualitatively for all option packages.

9.3.1 Do Minimum

For the purposes of the appraisal, the Do Minimum is scored as having **no benefit or impact** against the safety criteria in order to provide the basis for comparison of other options.

9.3.2 Active Travel Package

Accidents

In terms of the accident assessment for general traffic, the table below shows the projected summary for the Active Travel Package on links, at junctions and in total, which has been calculated through the COBALT tool.

Table 9.7: Active Travel Package COBALT Summary

Links/Junctions	Total Benefit (£)
Links	- £313,100
Junctions	- £15,114,400
Total	- £15,427,500

A disbenefit of -£313,100 was calculated on links for this scheme which was largely due to the rerouting of traffic from Wellington Road (primarily a dual carriageway) on to single carriageway links such as Crawpeel Road, Coast Road and Hareness Road as well as the shortening of sections on Wellington Road to accommodate the proposed junction improvements at Souterhead.

A disbenefit of -£15,114,400 was calculated at junctions of which approximately £14,000,000 was associated with the changes to the Hareness and Souterhead roundabouts due to the increase in accident rates for general traffic at signalised junctions compared to roundabouts. The remainder of the calculated disbenefit was found to occur at junctions which experienced an increase in traffic due to rerouting.

In total, a disbenefit of -£15,427,500 was calculated for this scheme.

As noted in **Section 9.3**, whilst there is not a tool to determine the quantitative impacts on active travel users, a qualitative assessment can be undertaken.

The with-flow segregated cycleway would be anticipated to generate safety improvements and improved feelings of safety, particularly for cyclists but for other road users also due to the increased segregation between modes. It is anticipated that the with-flow cycleway (as promoted in this package) would provide greater safety benefits than the two-way cycleway (as promoted in the Multi-Modal Package) due to the reduced requirement to cross the road with a with-flow cycleway and because the with-flow option would not involve cyclists passing close to other cyclists in opposite directions along particularly steep sections of the corridor.

It should be noted that the with-flow segregated cycleway would require removal of the central reservation between Hareness Roundabout and Polwarth Road, which could have negative safety implications. Engagement with ACC officers has indicated that, historically, road traffic collisions on the corridor have commonly involved pedestrians colliding with buses and HGVs outwith controlled crossing points along the route. Whilst the with-flow cycleway may reduce the need for people to cross, removal of the central reservation would reduce the availability of safe

²⁸ <https://www.transport.gov.scot/publication/scotland-s-road-safety-framework-to-2030/>

crossing points outwith the dedicated crossing points on the route. As noted in **Section 8.4.5**, proposed removal of the central reservation was based on the desire to maintain existing road space and limit impacts on biodiversity in the existing verges of the corridor where possible. Future design stages would provide the opportunity to consider a reduced central reservation or additional crossing points along the corridor.

The reconfiguration of Hareness Roundabout would be anticipated to generate significant safety improvements for pedestrians and cyclists at the junction relative to the Do Minimum scenario. The only existing controlled crossing points at Hareness are remote from the roundabout itself and traffic is free-flowing, which as outlined in **Section 9.3**, presents particularly hazardous situations for cyclists. The introduction of signal control at this junction would additionally provide improvements in terms of feelings of safety amongst vulnerable road users.

The reconfiguration of Souterhead Roundabout would also be anticipated to generate safety improvements for pedestrians and cyclists, although it is considered that the Do Minimum scenario at this junction is slightly better for pedestrian and cyclist manoeuvrability than at Hareness as there is existing signal control and a toucan crossing point to the north and south of the roundabout.

Overall, on balance, the Active Travel Package is considered to have **no benefit or impact** against the accidents criterion. This reflects the disbenefits in terms of an anticipated increase in accidents for general traffic associated with the junction reconfigurations at Souterhead and Hareness and the potentially negative safety implications of removing the central reservation to accommodate the with-flow cycleway and the anticipated safety benefits associated with the full segregation of users and the enhanced safety for active travel users through the reconfiguration of junctions at Souterhead and Hareness.

Security

The Active Travel Package is not anticipated to have any impacts in terms of security relative to the existing situation. The proposed with-flow cycleway on both sides of Wellington Road allows for informal surveillance from the road and from the frontages along the corridor, including residential and retail buildings. There is lighting along the corridor, which would alleviate security concerns (or perceived security concerns), particularly for vulnerable people in the community such as elderly people or women travelling alone. It should additionally be ensured that there is adequate signage along the corridor to aid active travel users. Overall, the Active Travel Package is considered to have **no benefit or impact** against the security criterion.

9.3.3 Public Transport Package

Accidents

In terms of the accident assessment for general traffic, the table below shows the projected summary for the Public Transport Package on links, at junctions and in total, which has been calculated through the COBALT tool.

Table 9.8: Public Transport Package COBALT Summary

Links/Junctions	Total Benefit (£)
Links	+ £8,200
Junctions	- £4,712,900
Total	- £4,704,700

A minor benefit of +£8,200 was calculated on links for this scheme due to minor changes in routeing.

A disbenefit of -£4,712,900 was calculated at junctions of which approximately £4,600,000 was associated with the changes to Hareness Roundabout due to the increase in accident rates for general traffic at signalised junctions compared to roundabouts. The remainder of the calculated disbenefit was found to occur at junctions which experienced an increase in traffic due to rerouting.

In total, a disbenefit of -£4,704,700 was calculated for this scheme.

As noted for the assessment against the Active Travel Package, the reconfiguration of Hareness Roundabout would be anticipated to generate significant safety improvements for pedestrians and cyclists at the junction relative to the Do Minimum.

Overall, the Public Transport Package is considered to have **no benefit or impact** against the accidents criterion. This reflects the balance between negative safety implications for general traffic that would be anticipated through the conversion of the existing roundabout to signals and the safety improvements that would be anticipated for active travel users through the introduction of signal control at the junction.

Security

The Public Transport Package is not anticipated to have any impacts in terms of security relative to the existing situation as no changes are proposed outwith the existing road space that would have an impact on the security of users. With the small potential for modal shift to public transport, there could be a slight improvement in feelings of security amongst bus users, particularly at night, as informal surveillance would be enhanced if there were more people on bus services and at bus stops. Overall, however, the Public Transport Package is considered to have **no benefit or impact** against the security criterion.

9.3.4 Multi-Modal Travel & Transport Package

Accidents

In terms of the accident summary for general traffic, the table below shows the project summary for the Multi-Modal Package on links, at junctions and in total, which has been calculated through the COBALT tool.

Table 9.9: Multi-Modal Travel & Transport Package COBALT Summary

Links/Junctions	Total Benefit (£)
Links	- £83,400
Junctions	- £5,119,300
Total	- £5,202,700

A disbenefit of -£83,400 was calculated on links for this scheme which was due to the rerouting of traffic from the section of Wellington Road between the Hareness and Souterhead junctions on to Crawpeel Road, Souter Head Road and Coast Road.

A disbenefit of -£5,119,300 was calculated at junctions of which over £4,600,000 was associated with the changes to Hareness Roundabout due to the increase in accident rates for general traffic at signalised junctions compared to roundabouts. The remainder of the calculated disbenefit was found to occur at junctions which experienced an increase in traffic due to rerouting; most notably the Hareness Road/Crawpeel Road Roundabout which saw a disbenefit of -£211,000.

In total, a disbenefit of -£5,202,700 was calculated for this scheme.

The two-way cycleway would generate safety improvements for cyclists, albeit not to the same extent as a with-flow cycleway would (in the Active Travel Package), with some concerns relating to the requirement to cross the road more frequently with a two-way cycleway and with cyclists travelling in opposite directions having to pass close to each other, particularly along steep sections of the corridor where it is likely that those travelling northbound would be doing so at much higher speeds.

It should be noted that the two-way cycleway would require removal of the central reservation between Greenbank Road and Polwarth Road, which could have negative impacts on feelings of safety for active travel users, particularly due to the reduced availability of safe crossing spaces outwith dedicated crossing points along the corridor.

As noted for the assessment against the Active Travel and Public Transport Packages, the reconfiguration of Hareness Roundabout would be anticipated to generate significant safety improvements for pedestrians and cyclists at the junction relative to the Do Minimum.

The introduction of toucan crossings on the remaining arms of the roundabout at Souterhead (Langdykes Road, Souter Head Road and Wellington Circle) would also be anticipated to generate safety improvements for pedestrians and cyclists.

Overall, on balance, the Multi-Modal Package is considered to have a **minor beneficial impact** against the accidents criterion. This reflects the anticipated benefits of the two-way cycleway and the interventions proposed at Hareness and Souterhead for active travel users and the disbenefits for general traffic associated with the reconfiguration of Hareness Junction.

Security

The Multi-Modal Package is not anticipated to have any impacts in terms of security relative to the existing situation. The proposed cycleway on one side of Wellington Road allows for informal surveillance from the road and from the frontages along the corridor, including residential and retail buildings. There is lighting along the corridor, which would alleviate security concerns (or perceived security concerns), particularly for vulnerable people in the community such as elderly people or women travelling alone. It should additionally be ensured that there is adequate signage along the corridor to aid active travel users. The shared bus/HGV lanes do not involve changes outwith the existing road space that would have an impact on the security of users, though there is the potential for

slight improvements in feelings of security amongst bus users if interventions did generate modal shift towards public transport, particularly for vulnerable members of the community at night. Overall, however, the Multi-Modal Package is considered to have **no benefit or impact** against the security criterion.

9.3.5 Summary of Safety Appraisal

The findings of the safety appraisal are summarised in the table below.

Table 9.10: Safety Criteria Appraisal Summary

Package	Safety Criteria	
	Accidents	Security
Do Minimum	-	-
Active Travel	-	-
Public Transport	-	-
Multi-Modal	✓	-

9.4 Economy

The Economy Criterion has two sub-criteria that should be considered as part of the detailed appraisal:

- Transport Economic Efficiency (TEE) – the transport impacts of an option, ordinarily captured by standard cost-benefit analysis; and
- Wider Economic Impacts (WEI) – impacts in non-transport markets that are either of importance from a policy or distributional perspective, or which affect the net value that society attributes to the outcomes of a transport intervention.

To assess the TEE for each package, the DfT TUBA (Transport User Benefit Appraisal) software was used. Time, distance, and volume outputs from the microsimulation modelling were annualised using Automatic Traffic Count (ATC) data from a neutral month which was used in the matrix development process given the absence of any long-term ATCs which could allow for Average Annual Daily Traffic (AADT) to be calculated.

No information on the duration of construction works or the associated spend profile for each package has been determined, therefore it has been assumed that each scheme would take two years to construct (2024 and 2025) with construction and supervision costs split evenly over the two years. However, all costs associated with preparation have been assigned to 2024. The resulting costs associated with each scheme are calculated over a 60-year assessment period with costs and benefits discounted to 2010.

The microsimulation models have considered an opening year for each package of 2026 with a 15-year forecast to 2041 for the AM and PM periods. No inter-peak, off-peak or weekend assessment has been undertaken and consequently it is assumed that they will have no economic impact. No 'High Growth' or other sensitivity assessments have been undertaken and an assessment period of 60 years has been used to calculate the benefits of each package.

It should be noted that TEE is based on a standard format for highway assessment, with set quantitative criteria that do not take into account the benefits of active travel. Therefore, additional analysis utilising the DfT Active Travel Mode Appraisal Toolkit (AMAT)²⁹ has also been undertaken to set out the economic case supporting the development of active travel infrastructure improvements associated with the Active Travel and Multi-Modal Packages subject to appraisal in this study (i.e. the with-flow and two-way segregated cycleways only). This analysis is set out within the proceeding sections, with a detailed overview of the Active Travel Economic Assessment (ATEA) provided in **Appendix H**.

9.4.1 Do Minimum

For the purposes of the appraisal, the Do Minimum is scored as having **no benefit or impact** against the economy criteria in order to provide the basis for comparison of other options.

²⁹ <https://www.gov.uk/government/publications/tag-social-and-distributional-impacts-worksheets>

9.4.2 Active Travel Package

Transport Economic Efficiency

The table below shows a summary of the results from the TUBA assessment for the Active Travel Package.

Table 9.11: Active Travel Package TUBA Summary

	Total Benefits by Time Saving					
Time Banding	<-5 mins	-5 to -2 mins	-2 to 0 mins	0 to 2 mins	2 to 5 mins	>5 mins
Benefit (£000s)	-49,157	-34,249	-39,702	+13,325	+13,065	+23,141
	Total Benefits					
Travel Time Benefits (£000s)	-68,135					
Vehicle Operating Costs (£000s)	-5,442					
Indirect Taxes (£000s)	+1,767					
Total (£000s)	-71,810					
	Monetised Costs, Benefits & Overall Impact					
Greenhouse Gases (£000s)	-888					
Present Value of Benefits (PVB) (£000s)	-72,699					
Present Value of Costs (PVC) (£000s)	10,798					
Net Present Value (NPV) (£000s)	-83,497					
Benefit Cost Ratio (BCR)	-6.733					
TEE	-73,577					

As shown, the Active Travel Package was found to have an overall disbenefit to users over the 60-year assessment period. With regards to time savings, the greatest amount of disbenefits to users was found to occur in the '<-5 mins' range with -£49,157,000 worth of disbenefit to users followed by the '-2 to 0 mins' range with -£39,702,000 worth of disbenefit and the '-5 to -2 mins' range with -£34,249,000 worth of disbenefit. Time saving benefits were also found to occur, however these were not as significant as the disbenefits. Overall, the Active Travel Package was found to have a PVC of £10,798,000 and a NPV of -£83,497,000 which resulted in a Benefit Cost Ratio (BCR) of -6.733.

Overall, the Active Travel Package has been assessed as providing a **moderate negative impact** in terms of Transport Economic Efficiency.

Wider Economic Impacts

The Active Travel Package is considered to improve accessibility to employment areas along the corridor and to the city centre of Aberdeen, which could generate minor labour market benefits, providing businesses with access to a wider pool of labour.

The Active Travel Package additionally facilitates access between the city centre and Aberdeen South Harbour for pedestrians and cyclists, connecting with the active travel options at Balnagask Road and Hareness Road that were recommended for progression from the ASH Study. This may provide minor benefits to the wider economy in terms of facilitating access to businesses for cruise passengers from the new harbour.

Overall, the Active Travel Package has been assessed as providing a **minor beneficial impact** in terms of wider economic impacts.

Active Travel Economic Assessment

The Active Travel Package would be expected to generate a **'poor to low'** Value for Money, with BCRs ranging between **0.68:1** and **1.22:1** over the 20-year appraisal period, based on the low growth (+150% increase or 151

new cycle trips) and high growth (+301% increase or 243 new cycle trips) scenarios of cycle uptake developed for this study.

Analysis of the appraisal results using the latest AMAT toolkit, indicates that a significant element of the overall benefit is provided by the journey quality improvements (37-45% approx.) and physical fitness improvements (52-60% approx.), which are delivered by the proposed scheme. The new users benefitting from this scheme would also provide additional benefits through the reduction in road congestion due to modal shift (3-3.4% approx.), also resulting in environmental and accident benefits.

The Active Travel Package is deemed to potentially generate the same level of cycle demand and associated benefits as the Multi-Modal Package. However, a large proportion of the benefits generated by the scheme are offset by the higher costs associated with the cycle infrastructure of this package. Therefore, for the purposes of the appraisal, the cycle element associated with the Active Travel Package is scored as providing **no benefit or impact** in terms of Value for Money.

9.4.3 Public Transport Package

Transport Economic Efficiency

The table below shows a summary of the results from the TUBA assessment for the Public Transport Package.

Table 9.12: Public Transport Package TUBA Summary

Time Banding	Total Benefits by Time Saving					
	<-5 mins	-5 to -2 mins	-2 to 0 mins	0 to 2 mins	2 to 5 mins	>5 mins
Benefit (£000s)	-74,246	-29,267	-30,310	+16,604	+12,760	+17,879
	Total Benefits					
Travel Time Benefits (£000s)	-83,337					
Vehicle Operating Costs (£000s)	-3,245					
Indirect Taxes (£000s)	+928					
Total (£000s)	-85,655					
	Monetised Costs, Benefits & Overall Impact					
Greenhouse Gases (£000s)	-465					
Present Value of Benefits (PVB) (£000s)	-86,120					
Present Value of Costs (PVC) (£000s)	1,269					
Net Present Value (NPV) (£000s)	-87,388					
Benefit Cost Ratio (BCR)	-67.864					
TEE	-86,582					

As shown, the Public Transport Package was found to have an overall disbenefit to users over the 60-year assessment period. With regards to time savings, the greatest amount of disbenefits to users was found to occur in the '<-5 mins' range with -£74,246,000 worth of disbenefit to users followed by the '-2 to 0 mins' range with a disbenefit of -£30,310,000 and the '-5 to -2 mins' range with -£29,267,000 worth of disbenefit. Time saving benefits were also found to occur, however these were not as significant as the disbenefits. Overall, the Active Travel Package was found to have a PVC of £1,269,000 and a NPV of -£87,388,000 which resulted in a BCR of -67.864.

Overall, the Public Transport Package has been assessed as providing a **major negative impact** in terms of Transport Economic Efficiency.

Wider Economic Impacts

The Public Transport Package is considered to provide some accessibility benefits for pedestrians, cyclists, and bus users to employment areas along the corridor and to the city centre of Aberdeen. This could generate some minor labour market benefits, providing businesses with access to a wider pool of labour.

The Public Transport Package would additionally support one of the public transport options recommended for progression from the ASH Study, providing benefits for the proposed extension of Service 20 and the reintroduction of Service 3B to facilitate access to the new harbour and proposed Energy Transition Zone. This may provide benefits to the wider economy in terms of facilitating access to businesses for cruise passengers from the new harbour.

Overall, the Public Transport Package has been assessed as providing a **minor beneficial impact** in terms of wider economic impacts.

Active Travel Economic Assessment

Given the absence of active travel interventions as part of the Public Transport Package, there would be no active travel-related economic benefits and therefore, it has been assessed as providing **no benefit or impact** against this criterion.

9.4.4 Multi-Modal Travel & Transport Package

Transport Economic Efficiency

The table below shows a summary of the results from the TUBA assessment for the Multi-Modal Package.

Table 9.13: Multi-Modal Travel & Transport Package TUBA Summary

Time Banding	Total Benefits by Time Saving					
	<-5 mins	-5 to -2 mins	-2 to 0 mins	0 to 2 mins	2 to 5 mins	>5 mins
Benefit (£000s)	-49,032	-47,701	-29,624	+9,934	+14,522	+22,442
	Total Benefits					
Travel Time Benefits (£000s)	-75,174					
Vehicle Operating Costs (£000s)	-4,282					
Indirect Taxes (£000s)	+1,433					
Total (£000s)	-78,023					
	Monetised Costs, Benefits & Overall Impact					
Greenhouse Gases (£000s)	-736					
Present Value of Benefits (PVB) (£000s)	-78,758					
Present Value of Costs (PVC) (£000s)	6,542					
Net Present Value (NPV) (£000s)	-85,300					
Benefit Cost Ratio (BCR)	-12.039					
TEE	-79,456					

As shown, the Multi-Modal Package was found to have an overall disbenefit to users over the 60-year assessment period. With regards to time savings, the greatest amount of disbenefits to users was found to occur in the '<-5 mins' range with -£49,032,000 worth of disbenefit to users followed by the '-5 to -2 mins' range with -£47,701,000 worth of disbenefit and the '-2 to 0 mins' range with -£29,624,000 worth of disbenefit. Time saving benefits were also found to occur, however these were not as significant as the disbenefits. Overall, the Multi-Modal Package was found to have a PVC of £6,542,000 and a NPV of -£85,300,000 which resulted in a BCR of -12.039.

Overall, the Multi-Modal Package has been assessed as providing a **moderate negative impact** in terms of Transport Economic Efficiency.

Wider Economic Impacts

The Multi-Modal Package is considered to provide some accessibility benefits for pedestrians, cyclists, and bus users to employment areas along the corridor and to the city centre of Aberdeen. This could generate some minor labour market benefits, providing businesses with access to a wider pool of labour.

The Multi-Modal Package additionally facilitates access between the city centre and Aberdeen South Harbour for pedestrians and cyclists, connecting with the active travel options at Balnagask Road and Hareness Road that were recommended for progression from the ASH Study. This may provide minor benefits to the wider economy in terms of facilitating access to businesses for cruise passengers from the new harbour.

The Multi-Modal Package would additionally support one of the public transport options recommended for progression from the ASH Study, providing some benefits for the proposed extension of Service 20 and the reintroduction of Service 3B to facilitate access to the new harbour and proposed Energy Transition Zone. This may provide benefits to the wider economy in terms of facilitating access to businesses for cruise passengers from the new harbour.

Overall, the Multi-Modal Package has been assessed as providing a **minor beneficial impact** in terms of wider economic impacts.

Active Travel Economic Assessment

The Multi-Modal Package would be expected to generate a **'low to medium'** Value for Money, with BCRs ranging between **1.14:1** and **2.04:1** over the 20-year appraisal period, based on the low growth (+150% increase or 151 new cycle trips) and high growth (+301% increase or 243 new cycle trips) scenarios of cycle uptake developed for this study.

Analysis of the appraisal results using the latest AMAT toolkit, indicates that a significant element of the overall benefit is provided by the journey quality improvements (37-45% approx.) and physical fitness improvements (52-60% approx.), which are delivered by the proposed scheme. The new users benefitting from this scheme would also provide additional benefits through the reduction in road congestion due to modal shift (3-3.4% approx.), also resulting in environmental and accident benefits.

The Multi-Modal Package is deemed to potentially generate the same level of cycle demand and associated benefits as the Active Travel Package, with the overall costs associated with the cycle infrastructure of this package comparing lower than the other package. Therefore, for the purposes of the appraisal, the cycle element associated with the Multi-Modal Package is scored as providing a **minor beneficial impact** in terms of Value for Money.

9.4.5 Summary of Economy Appraisal

The outcomes of the economy appraisal are summarised in the table below.

Table 9.14: Economy Criteria Appraisal Summary

Package	Economy Criteria		
	TEE	WEI	ATEA
Do Minimum	-	-	-
Active Travel	xx	✓	-
Public Transport	xxx	✓	-
Multi-Modal	xx	✓	✓

It should be highlighted that the negative scores for the TEE analysis are a result of the delays to general traffic in the models tested based on the appraisal packages developed for this study. However, further to detailed review of the results, there are potential mitigation measures that could be implemented to minimise impacts to general traffic in all packages, to a greater or lesser extent. **Chapter 12** sets out full details of risks and potential mitigation measures.

9.5 Integration

The following sections discuss the impacts of the packages on the integration sub-criteria relating to:

- Transport integration;
- Transport and land use integration; and
- Policy integration.

Transport integration is the degree to which an option fits with other transport infrastructure and services. It requires consideration of services and ticketing, and infrastructure and information.

Transport and land use integration relates to the fit between the option and established land use plans and land use/transport planning guidance. Developments in UK and Scottish Government policy have provided a clear framework for the integration of land use and transport planning with a general requirement to promote sustainability and reduce the need to travel to relevant existing or future developments. The land use integration criterion should consider whether:

- Any land required for the proposal is preserved for uses which are incompatible with transport;
- The proposal fits with the general policies of all authorities at all levels concerning transport and land use; or
- The proposal conflicts with any other existing or planned development.

The policy integration sub-criterion considers the appropriateness of the option in light of wider policies, including those at national, regional (including the Nestrans RTS2040) and local levels. It requires consideration of any genuinely additional benefits in the context of Scottish policy on disability, health, and rural matters, together with further social inclusion impacts. This includes consideration of the contribution of options to meeting the Government's purpose and national transport targets.

Policy Assessment Framework (PAF) diagrams have been completed to outline the performance of the option packages against objectives from national policy documents. An adapted version of the PAF has been used for the purposes of this assessment, as the existing PAF in the STAG guidance refers to documents that are now outdated (i.e. the previous NTS and STPR). The adapted version developed for the purpose of this detailed appraisal assesses the performance of options against the new NTS2 objectives and the objectives of STPR2, which is currently ongoing.

The PAF outputs are presented in the diagrams below.

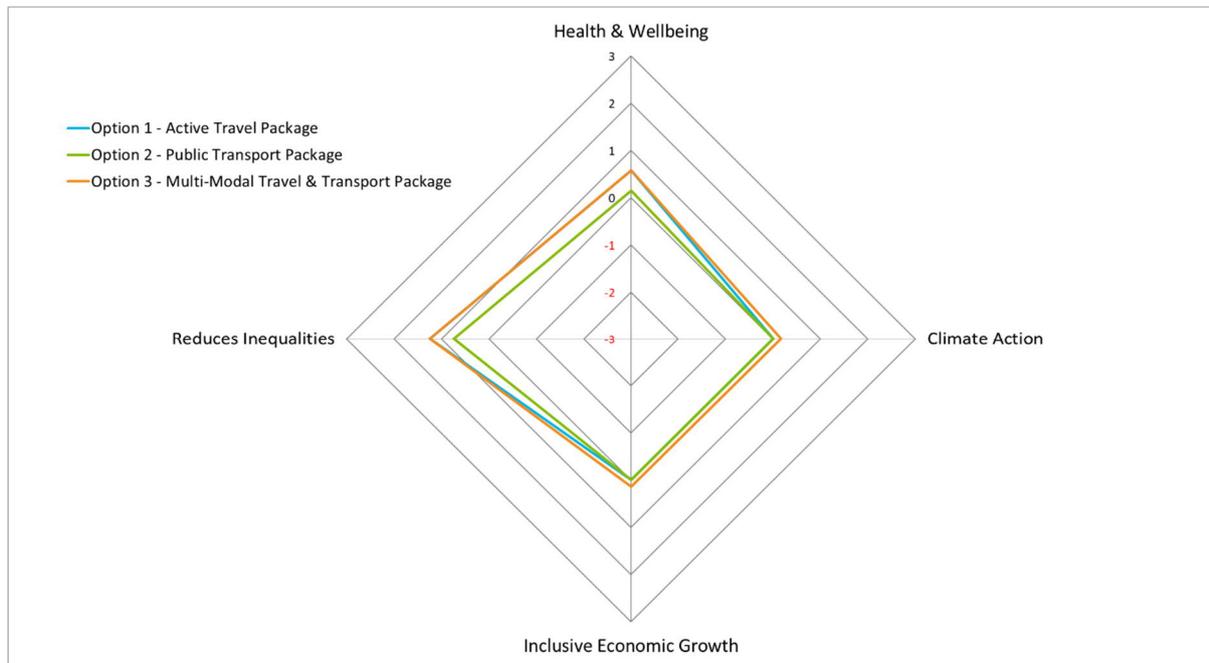


Figure 9.1: PAF Output 1



Figure 9.2: PAF Output 2

The performance of the option packages against the objectives are discussed under ‘Policy Integration’ in the sections that follow. It should be noted that the option packages under consideration as part of this study are not anticipated to generate any impacts in terms of rural affairs and it is not anticipated that any of the options would have additional social inclusion impacts that have not been captured under the assessment of Accessibility and Social Inclusion.

9.5.1 Do Minimum

For the purposes of the appraisal, the Do Minimum is scored as having **no benefit or impact** against the integration criteria in order to provide the basis for comparison of other options.

9.5.2 Active Travel Package

Transport Integration

The with-flow cycleway element of the Active Travel Package would support integration with the wider active travel network, including the National Cycle Network at Wellington Suspension Bridge, which would subsequently provide a connection with cycle improvements on South College Street. It would also support integration with the active travel options being promoted for access to Aberdeen South Harbour and the proposed Energy Transition Zone.

Overall, the Active Travel Package has been assessed as providing a **minor beneficial impact** against the transport integration criterion.

Transport and Land Use Integration

The Active Travel Package would not generate any spatial conflicts and there are negligible impacts in terms of existing and planned land use developments. The Active Travel Package is not considered to conflict with planning policy at a national, regional, or local level. Overall, it has been assessed as providing **no benefit or impact** against the transport and land use integration criterion.

Policy Integration

As illustrated in the PAF outputs, the Active Travel Package performs well against the NTS2 priorities of ‘Reduces Inequalities’ and ‘Health & Wellbeing’, particularly due to the improved accessibility to services for those without access to a car, the health and wellbeing benefits of active travel and the potential for modal shift. It should be noted that the Active Travel Package has been assessed as performing poorly in relation to supporting improvements to air quality. It is considered that this would be dependent on the extent of modal shift achieved through the proposed interventions and additionally, air quality impacts are likely to be reduced as the fleet is ‘greened’. The Active Travel Package additionally supports key priorities listed in the RTS2040, particularly in terms of providing a step-change in active travel.

In terms of wider Government policy, it is not anticipated that the Active Travel Package would have noteworthy impacts in terms of overcoming barriers for people with disabilities, however, there could be notable benefits in terms of health by providing infrastructure that could encourage increased exercise in the local community. A modal shift towards walking and cycling would additionally support national transport targets to reduce car kilometres by 20% by 2030.

Overall, it is considered that the Active Travel Package would have a **moderate beneficial impact** against the policy integration sub-criterion.

9.5.3 Public Transport Package

Transport Integration

It is considered that the Public Transport Package would generally have **no benefit or impact** against the transport integration criterion.

Transport and Land Use Integration

The Public Transport Package would not generate any spatial conflicts and there are negligible impacts in terms of existing and planned land use developments. The Public Transport Package is not considered to conflict with planning policy at a national, regional, or local level. Overall, it has been assessed as providing **no benefit or impact** against the transport and land use integration criterion.

Policy Integration

As illustrated in the PAF outputs, the Public Transport Package generally has a negligible impact against the NTS2 priorities, with some minor benefits in terms of accessibility to services and the potential for modal shift (although as has been illustrated elsewhere, it is considered that there is not significant potential for modal shift due to the limited benefits provided to bus users). In line with the assessment for the Active Travel Package, the Public Transport Package has been assessed as performing poorly in relation to supporting improvements to air quality but it is anticipated that negative impacts would reduce over time.

The Public Transport Package generally has a negligible impact against the key priorities listed in the RTS2040. The RTS2040 outlines aspirations for a rapid transit system linking Craibstone, the Airport and TECA (The Event Complex Aberdeen) to Altens, providing support in policy terms for dedicated bus priority along Wellington Road.

In terms of wider Government policy, it is not anticipated that the Public Transport Package would have noteworthy impacts in terms of overcoming barriers for people with disabilities or in terms of improving health.

Overall, it is considered that the Public Transport Package would have **no benefit or impact** against the policy integration criterion.

9.5.4 Multi-Modal Travel & Transport Package

Transport Integration

The two-way segregated cycleway element of the Multi-Modal Package would support integration with the wider active travel network, albeit not to the same extent as the with-flow cycleway promoted in the Active Travel Package. As the working assumption is for the cycleway to be provided on the east side, the two-way cycleway would support integration with the active travel options being promoted for access to Aberdeen South Harbour and the proposed Energy Transition Zone. It would also connect with the National Cycle Network in the north of the corridor, albeit cyclists would require to cross Wellington Road to continue on the wider network via Wellington Suspension Bridge and South College Street.

Overall, the Multi-Modal Package has been assessed as providing a **minor beneficial impact** against the transport integration criterion.

Transport and Land Use Integration

The Multi-Modal Package would not generate any spatial conflicts and it is not considered to conflict with planning policy at a national, regional, or local level. The introduction of sections of shared bus/HGV lane along the corridor would be anticipated to provide minor benefits to operations at Aberdeen South Harbour due to the enhanced priority for freight vehicles in this package. Overall, it has been assessed as providing a **minor beneficial impact** against the transport and land use integration criterion.

Policy Integration

As illustrated in the PAF outputs, the Multi-Modal Package performs well against the NTS2 priorities of 'Reduces Inequalities' and 'Health & Wellbeing', particularly due to the improved accessibility to services for those without access to a car, the health and wellbeing benefits of active travel and the potential for modal shift. In line with the assessment for the Active Travel Package, the Multi-Modal Package has been assessed as performing poorly in relation to supporting improvements to air quality but it is anticipated that negative impacts would reduce over time.

The Multi-Modal Package additionally supports key priorities listed in the RTS2040, particularly in terms of providing a step-change in active travel. Furthermore, the RTS2040 outlines aspirations for a rapid transit system linking Craibstone, the Airport and TECA to Altens, providing further support in policy terms for dedicated bus priority along Wellington Road, although not to the same extent as the Public Transport Package due to the proposed sharing of priority with HGVs in this package.

In terms of wider Government policy, it is not anticipated that the Multi-Modal Package would have noteworthy impacts in terms of overcoming barriers for people with disabilities, however, there could be some benefits in terms of health by encouraging increased exercise for people walking and cycling (through the introduction of safety improvements at key junctions and the increased segregation of all modes along the corridor through the proposed dedicated cycling infrastructure and associated improvements for pedestrians). A modal shift to active travel and public transport would additionally support national transport targets to reduce car kilometres by 20% by 2030.

Overall, it is considered that the Multi-Modal Package would have a **moderate beneficial impact** against the policy integration criterion.

9.5.5 Summary of Integration Appraisal

The outcomes of the integration appraisal are summarised in the table below.

Table 9.15: Integration Appraisal Summary

Package	Integration Criteria		
	Transport	Transport and Land Use	Policy
Do Minimum	-	-	-
Active Travel	✓	-	✓✓
Public Transport	-	-	-
Multi-Modal	✓	✓	✓✓

9.6 Accessibility and Social Inclusion

Accessibility is a broad concept that defines the ability of people and businesses to access goods, services, people, and opportunities. STAG highlights four aspects of accessibility that require consideration in relation to transport schemes, grouped under the headings of Community Accessibility and Comparative Accessibility.

Community Accessibility comprises of:

- Public Transport Network Coverage – a consideration of the impacts of an option on each group in society for a range of trip purposes; and
- Access to Local Services – the measurement of opportunities to walk or cycle to services and facilities is required, including severance arising from proposed changes.

Comparative Accessibility comprises of:

- People Group – particular attention is paid to the needs of socially excluded groups with age, gender, mobility impairment, income group and car ownership factors of relevance; and
- Geographic Location – locations relevant to local TPOs considered, for example community regeneration areas, areas of disadvantage and deprivation and rural areas. The appraisal should describe where impacts are occurring and compare the impacts within these locations with other areas.

9.6.1 Do Minimum

For the purposes of the appraisal, the Do Minimum is scored as having **no benefit or impact** against the TPOs in order to provide the basis for comparison of other options.

9.6.2 Active Travel Package

Public Transport Network Coverage

It is not anticipated that the Active Travel Package would result in any changes in accessibility provided by the public transport system and therefore, it has been assessed as having **no benefit or impact** against this criterion.

Local Accessibility

The Active Travel Package would introduce interventions that improve accessibility to the city centre and other services along Wellington Road by walking and cycling through dedicated cycling infrastructure and improved active travel facilities at major junctions. The active travel interventions that would be introduced as part of this package would also improve walking and cycling access to public transport, both in terms of access to local bus stops and in terms of access to regional public transport services from the bus and rail stations in the south of the city centre. Overall, it has been assessed as having a **moderate beneficial impact** against this criterion.

Distribution of Impacts by People Group

It is considered that the Active Travel Package would provide benefits to those in lower income groups and those without access to a car as it could increase access to employment opportunities, for example in the city centre, by offering dedicated active travel infrastructure that is direct, coherent and that provides a safe and free to use connection between the city centre and communities along Wellington Road. On the other hand, the Active Travel Package may have negative impacts on older people, those with mobility impairments and other groups who may not be able to take advantage of the infrastructure, particularly if the changes implemented lead to delays and therefore reduced accessibility by car. The modelling results suggest that, in the AM peak, delays would be experienced on the northbound approach to Hareness Junction and an increase in journey times would be anticipated in the southbound direction through the Souterhead and Hareness junctions due to the proposed signalisation. During the PM peak, delays of approximately 2 minutes would be anticipated northbound through Souterhead Junction due to the proposed signalisation.

Whilst the Active Travel Package could have benefits and disbenefits across different groups, interventions proposed as part of this package would not remove accessibility by car, and therefore, there is considered to be an overall benefit. It has therefore been assessed as having a **minor beneficial impact** against this criterion.

Distribution of Impacts by Geographical Area

It is not anticipated that the Active Travel Package would have any notable impacts by geographical area and it has therefore been assessed as having **no benefit or impact** against this criterion.

9.6.3 Public Transport Package

Public Transport Network Coverage

Whilst the Public Transport Package introduces interventions to promote bus priority, the overall impact on bus journey times is varied. Modelling results indicate that in the AM peak, end-to-end bus journey times are generally in line with the Do Minimum in both directions. In the PM peak, there is an approximate 67 second (or 10%) journey time saving for northbound bus movements, whilst in the southbound direction, greater delays are experienced on approach to Hareness Junction for buses due to increased congestion caused by the traffic signals. Due to the minor anticipated impact overall for bus journey times, it is expected that opportunities to implement knock-on bus service improvements would be limited. Overall, therefore, the Public Transport Package has been assessed as having **no benefit or impact** against this criterion.

Local Accessibility

It is not anticipated that the Public Transport Package would result in any changes in accessibility by walking and cycling to local services and therefore, it has been assessed as having **no benefit or impact** against this criterion.

Distribution of Impacts by People Group

It is considered that the Public Transport Package could provide benefits to those in lower income groups and those without access to a car through reduced bus journey times, albeit potentially not for the main commuting journeys along the corridor (northbound in the AM peak and southbound in the PM peak), with the principal benefits experienced for northbound journeys during the PM peak. On the other hand, the Public Transport Package may have negative impacts on groups that require use of a car to travel, particularly given the modelling results indicate that this package results in longer journey times for general traffic in both directions during both the AM and PM peaks. Therefore, given the anticipated benefits and disbenefits for different groups, the Public Transport Package has been assessed as having **no benefit or impact** against this criterion.

Distribution of Impacts by Geographical Area

It is not anticipated that the Public Transport Package would have any notable impacts by geographical area and it has therefore been assessed as having **no benefit or impact** against this criterion.

9.6.4 Multi-Modal Travel & Transport Package

Public Transport Network Coverage

Whilst the Multi-Modal Package introduces interventions to promote bus priority, the overall impact on bus journey times is varied. Modelling results indicate that in the AM peak, end-to-end bus journey times are generally in line with the Do Minimum in both directions. In the PM peak, there is an approximate 55 second (or 8%) journey time saving for northbound bus movements, whilst in the southbound direction, greater delays are experienced on approach to Hareness Junction for buses due to increased congestion caused by the traffic signals. Due to the minor anticipated impact overall for bus journey times, it is expected that opportunities to implement knock-on bus service improvements would be limited. Overall, therefore, the Multi-Modal Package has been assessed as having **no benefit or impact** against this criterion.

Local Accessibility

The Multi-Modal Package would introduce interventions that improve accessibility to the city centre and other services along Wellington Road by walking and cycling through dedicated cycling infrastructure and improved active travel facilities at major junctions. The active travel interventions that would be introduced as part of this package would also improve walking and cycling access to public transport, both in terms of access to local bus stops and in terms of access to regional public transport services from the bus and rail stations in the south of the city centre. Overall, it has been assessed as having a **moderate beneficial impact** against this criterion.

Distribution of Impacts by People Group

It is considered that the Multi-Modal Package would provide benefits to those in lower income groups and those without access to a car as it could increase access to employment opportunities and other services. On the other hand, the Multi-Modal Package may have negative impacts on groups that require use of a car to travel, particularly if the changes implemented lead to congestion and therefore reduced accessibility by this mode. The modelling results suggest that, in the AM peak, journey times for general traffic would increase between Southerhead and Hareness and additional delay would be experienced between Hareness and Craigshaw Road. This is off-set to an extent by savings between Craigshaw Road and Balnagask Road, however, the Multi-Modal Package would still result in longer end-to-end journey times northbound overall relative to the Do Minimum. During the PM peak, journey times are anticipated to be approximately 3 minutes longer relative to the Do Minimum. This is mainly caused by the presence of bus/HGV lanes between Craigshaw Road and Southerhead which cause delays to general traffic.

Whilst the Multi-Modal Package could have benefits and disbenefits across different groups, interventions proposed as part of this package would not remove accessibility by car, and therefore, there is considered to be an overall benefit. The Multi-Modal Package has therefore been assessed as having a **minor beneficial impact** against this criterion.

Distribution of Impacts by Geographical Area

It is not anticipated that the Multi-Modal Package would have any notable impacts by geographical area and it has therefore been assessed as having **no benefit or impact** against this criterion.

9.6.5 Summary of Accessibility and Social Inclusion Appraisal

The outcomes of the accessibility and social inclusion appraisal are summarised in the table below.

Table 9.16: Accessibility & Social Inclusion Appraisal Summary

Package	Community Accessibility		Comparative Accessibility	
	Public Transport Network Coverage	Local Accessibility	Impacts by People Group	Impacts by Geographical Location
Do Minimum	-	-	-	-
Active Travel	-	✓✓	✓	-
Public Transport	-	-	-	-
Multi-Modal	-	✓✓	✓	-

9.7 Summary of STAG Criteria Appraisal

This chapter has provided an assessment of the three option packages against the five STAG Criteria (and associated sub-criteria) of Environment, Safety, Economy, Integration, and Accessibility and Social Inclusion. **Table 9.17** provides an overall summary of this assessment.

The next chapter provides high-level cost estimates for the three packages under consideration.

Table 9.17: 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	xx	x	xx	xx	xx	✓	-	✓✓✓	-	-	xx	✓	-	✓	-	✓✓	-	✓✓	✓	-	-
Public Transport	x	x	x	x	x	-	-	✓	-	-	xxx	✓	-	-	-	-	-	-	-	-	-
Multi-Modal	x	x	-	x	x	✓	-	✓✓	✓	-	xx	✓	✓	✓	✓	✓✓	-	✓✓	✓	-	-

10. Cost to Government

10.1 Introduction

STAG requires that the net cost of an option is assessed from a public spending perspective, which is then compared with the total benefits of the option in terms of the STAG criteria, allowing an overall value for money assessment to be made.

Cost to Government refers to all costs incurred by the public sector as a whole net of any revenues. The total net cost consists of:

- Investment (capital) costs – include all infrastructure and other capital costs incurred by public sector operators which are additional to those incurred in the Do Minimum scenario;
- Operating and maintenance costs – include the annual recurring costs incurred by the public sector in running and maintaining the option considered;
- Grant/subsidy payment – should private sector operators not cover the investment and operating costs, some form of grant or subsidy may be required for the delivery of an option by private sector operators;
- Revenues – user charges, which represent monetary transfers from the users to the Government; and
- Taxation impacts – options which substantially promote public transport can lead to reductions in indirect tax receipts by shifting expenditure from cars and car fuel, which are heavily taxed, to public transport services on which the indirect tax rate is relatively low.

This chapter outlines high-level cost estimates for the three packages, based on the outputs of the model adjustments implemented in each package in April 2021 (as outlined in **Section 7.4**).

10.2 Capital Costs

This section sets out high-level cost estimates for the implementation of the three packages. 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. **Appendix I** provides a detailed cost breakdown for each package, which should be consulted to understand the composite elements comprising the overall package cost.

The table below provides the key assumptions applied in the costing of each package.

Table 10.1: Package Costing Assumptions

Package	Costing Assumptions
Active Travel	<ul style="list-style-type: none"> • Assumption made at this stage that 20% of carriageway area would be resurfaced • Assume central reservation hard standings priced as footway construction • Where precast concrete road kerbs are required as a result of the cycle track being constructed within existing carriageway, these totals and associated carriageway reinstatement have been attributed to the cycle track • Where the central reservation width has been altered or realigned, the kerbing and road construction required has not been attributed to the cycle track
Public Transport	<ul style="list-style-type: none"> • Costs per km based on rates taken from SPONS and similar local authority frameworks • New Hareness Junction costs based on Multi-Modal Package option, excluding cycle track
Multi-Modal	<ul style="list-style-type: none"> • Assumption made at this stage that 20% of carriageway area would be resurfaced • Assumption made at this stage that western footway is only being resurfaced/reconstructed at locations of widening into existing carriageway • Assume central reservation hard standings priced as footway construction

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.

Table 10.2: Estimated Scheme Costs

Cost Element	Active Travel Package	Public Transport Package	Multi-Modal Package
<i>Charleston Junction to Charleston Road North</i>	£1,344,900		£1,186,000
<i>Charleston Road North to Souterhead Roundabout</i>	£339,500		£191,700
<i>Souterhead Junction</i>	£3,288,800		£270,800
<i>Souterhead to Hareness</i>	£652,700		£732,400
<i>Hareness Junction</i>	£1,173,300		£1,166,500
<i>Hareness to Greenbank Road</i>	£1,281,600		£1,148,700
<i>Greenbank Road to Balnagask Road</i>	£812,700		£679,400
<i>Balnagask Road to QEB</i>	£702,300		£444,200
Construction Sub-Total	£9,595,600	£1,223,200	£5,819,800
Optimism Bias (44%)	£4,222,100	£538,200	£2,560,700
Construction Sub-Total (Inclusive of Optimism Bias)	£13,817,700	£1,761,400	£8,380,500
Design	£1,381,800	£176,100	£838,000
Placemaking and Landscaping	£690,900	N/A	£419,000
Site Supervision and Project Management	£690,900	£88,000	£419,000
Traffic Management	£690,900	£88,000	£419,000
Monitoring and Evaluation	£690,900	N/A	£419,000
TOTAL PACKAGE COST	£17,963,000	£2,113,700³⁰	£10,894,600

10.3 Operating and Maintenance Costs

It is anticipated that maintenance costs would be incurred with each of the packages. These would generally be expected to be associated with the requirement to maintain signing/lining associated with, for example, the with-flow or two-way segregated cycleways and bus (or bus/HGV) lane markings etc. Cycleways would also require winter maintenance, which is assumed would be undertaken when completing winter maintenance of existing footways and cycleway schemes in the city.

The implementation of additional signalisation at Souterhead (in the Active Travel Package), at Hareness (in all packages) and via toucan crossings at Souter Head Road, Langdykes Road and Wellington Circle (in the Multi-Modal Package) would introduce an additional maintenance burden on ACC associated with operation and management of additional traffic signal systems.

ACC would require to identify the maintenance requirements associated with any packages or elements of packages progressing to business case stage – and thereafter, implementation.

³⁰ Refer to **Appendix I** for full composition of package cost.

10.4 Other Costs

The option packages under consideration do not incorporate user charging, and therefore no revenues would be anticipated in terms of monetary transfers from the users to the Government.

It is also not anticipated that the option packages under consideration would generate any notable impacts in terms of taxation relating to the promotion of public transport.

10.5 Summary

This chapter has provided a high-level overview of estimated costs associated with the three option packages, including capital costs, operating and maintenance costs, and consideration of any other costs. The next chapter of this report sets out the implementability appraisal of the three detailed appraisal packages.

11. Implementability

11.1 Introduction

Implementability, or deliverability, has been a key consideration through the development and assessment of option packages through this study. To fulfil the requirements of the detailed appraisal, the option packages must also be assessed in terms of their Feasibility, Affordability, and Public Acceptability. The proceeding sections provide commentary against these elements.

11.2 Feasibility

This section provides an overview of the feasibility of each option package, based on the outputs of the model adjustments implemented in each package in April 2021 (as outlined in **Section 7.4**).

11.2.1 Active Travel Package

With-Flow Kerb Segregated Cycleway

To determine feasibility of the with-flow cycleway along the Wellington Road corridor, AutoCAD software was utilised to sketch up proposals on the OS mapping base and assess implications on the existing road layout. Design options were developed utilising Cycling by Design, the Traffic Signs Manual and Design Manual for Roads and Bridges (DMRB) guidance.

The technical feasibility assessment determined that the delivery of the with-flow cycleway element of the Active Travel Package would require the following:

- Land at the former HM Craiginches Prison Site;
- Loss of one lane on approach to Balnagask Road for general traffic (reduced to two lanes in both directions);
- Loss of the right-turn filter lane at Craigshaw Drive for general traffic (in both directions);
- Loss of the right-turn filter lane at Greenbank Road for general traffic (in both directions);
- Loss of the central reservation between Hareness Roundabout and Polwarth Road; and
- Reduced footway width and reduced buffer width between Polwarth Road and Girdleness Road.

Removal of Souterhead Roundabout

In terms of constructability considerations for the proposed Souterhead Junction improvement, forward visibility appears to be reasonable on approaches to the proposed signalised junction but would be required to be checked at the design stages.

To convert this location to a signalised junction would require the construction of a temporary road through the centre of the existing roundabout, adjacent to one half of the current route around the roundabout, and through parts of the existing central reservation. The other half of the roundabout would then be temporarily closed to traffic, including access from the side roads, so that the new road alignment could be constructed. This would also require temporary traffic signal control, as the location would no longer function as a roundabout during this construction period. Once this half of the junction was completed, the traffic would be moved onto this section, so that the other half of the roundabout could be constructed.

There are alternative traffic routes by which the surrounding area to the east could be accessed while side road access to the junction was closed. However, there is currently no alternative access to the west of the existing junction, which includes premises within Wellington Circle and Lochside Academy. A temporary access may need to be constructed. The requirements for temporary use of third party land to enable this would need to be understood.

Early contractor engagement would provide an opportunity to consider construction phasing in more depth, which may be particularly beneficial in this location. An experienced contractor may be able to offer alternative solutions for phasing these works, and for minimising any closure of side roads. This would aid consultation with companies located to the west of this junction. Obtaining early contractor input could also offer some design and construction cost efficiencies.

Removal of Hareness Roundabout

In terms of constructability considerations for the proposed Hareness Junction improvement, at the design stages, forward visibility should be reviewed on approaches to the proposed signalised junction, particularly on the Wellington Road southbound approach, and on West Tullos Road. The existing vertical alignment changes on these approaches and the removal of the deflection leading to the existing roundabout, replaced by a more direct horizontal alignment for a signalised junction option, may require some vertical realignment of the road.

To convert this location to a signalised junction would require the construction of a temporary road through the centre of the existing roundabout, adjacent to one half of the current route around the roundabout, and through parts of the existing central reservation. The other half of the roundabout would then be temporarily closed to traffic, including access from the side roads, so that the new road alignment could be constructed. This would also require temporary traffic signal control, as the location would no longer function as a roundabout during this construction period. Once this half of the junction was completed, the traffic would be moved onto this section, so that the other half of the roundabout could be constructed.

There are alternative traffic routes by which the surrounding areas could be accessed while side road access to the junction was closed. Alternative access to the area off Hareness Road to the east of this junction would be taken via Souterhead Junction, and so construction phasing of the main road works should be carefully considered in order to maintain access to this area.

Early contractor engagement would provide an opportunity to consider construction phasing in more depth, which can aid public communication of the roadworks. Obtaining early contractor input could also offer some design and construction cost efficiencies.

Right-Turn Ban from Wellington Road onto Abbotswell Road

The right-turn ban from Wellington Road onto Abbotswell Road would require a Traffic Regulation Order (TRO) for the prohibition of this specified turn. It would also require new white line markings and associated signage alerting drivers to the change in carriageway conditions. It would not be possible to physically enforce the right-turn ban as the junction would be required to remain open to allow for vehicles turning left into Abbotswell Road from Wellington Road and for those exiting Abbotswell Road onto Wellington Road. The intervention would therefore be reliant on drivers obeying the associated signage.

Summary

In addition to the above, the Active Travel Package would require a variety of other road orders, such as Side Road Orders, Stopping Up Orders and Redetermination Orders (RSOs) may also be required. For example, an RSO would be required in order to redetermine those sections of existing footway and carriageway that are proposed as segregated cycleways within this package.

Overall, the feasibility considerations outlined above are anticipated to provide a **minor risk** to the deliverability of the Active Travel Package as currently presented, primarily in relation to the requirement for land purchase in the northern section of the corridor at the former HM Craiginches Prison Site.

11.2.2 Public Transport Package

Bus Lanes

The delivery of the bus lanes element of the Public Transport Package would require the following:

- Land at the former HM Craiginches Prison Site; and
- Loss of one lane for general traffic wherever a bus lane is provided that is not provided currently.

A TRO would also be required in order to enforce the sections of bus lane. This TRO would be required to set out which vehicles are entitled to use the bus lane, or specific sections of it, and the days and hours of operation for bus lanes, likely in line with other bus lanes in operation throughout the city. The TRO would additionally be required to specify any authorised use of the bus lane by taxis and cycles.

Souterhead Bus Priority Signals

To facilitate implementation of bus priority signals in advance of Souterhead Roundabout, it would need to be confirmed that the signals form part of the SCOOT network. These may need to be upgraded with a new controller box. Communications would also need to be present in terms of a fibre or mesh network as mobile dialling would add delay to the communication between bus-server-signals. Ideally, a one second delay or less should be targeted for this communication. There may also be a requirement to assess whether the existing bus stop prior to the proposed signal arrangement would affect the operation of the equipment. Subsequent consideration of this intervention at business case stage would require consultation with ACC's Traffic Signals team.

Removal of Hareness Roundabout

The feasibility considerations regarding the removal of Hareness Roundabout are as per those outlined for the Active Travel Package.

Right-Turn Ban from Wellington Road onto Abbotswell Road

The feasibility considerations regarding the right-turn ban from Wellington Road onto Abbotswell Road are as per those outlined for the Active Travel Package.

Summary

Overall, the feasibility considerations outlined above are anticipated to provide a **minor risk** to the deliverability of the Public Transport Package as currently presented, primarily in relation to the requirement for land purchase in the northern section of the corridor.

11.2.3 Multi-Modal Travel & Transport Package

Two-way Kerb Segregated Cycleway

To determine feasibility of the two-way cycleway along the Wellington Road corridor, AutoCAD software was utilised to sketch up proposals on the OS mapping base and assess implications on the existing road layout. Design options were developed utilising Cycling by Design, the Traffic Signs Manual and DMRB guidance.

The technical feasibility assessment determined that the delivery of the two-flow cycleway element of the Multi-Modal Package would require the following:

- Land at the former HM Craiginches Prison Site;
- Loss of one lane on approach to Balnagask Road for general traffic (reduced to two lanes in both directions);
- Loss of the central reservation between Greenbank Road and Polwarth Road;
- Loss of the right-turn filter lane at Craigshaw Drive for general traffic (in both directions);
- Loss of the right-turn filter lane at Greenbank Road for general traffic (in both directions); and
- Reduced footway width and reduced buffer width between Polwarth Road and Girdleness Road.

Shared bus/HGV lane

The delivery of the shared bus/HGV lane element of the Multi-Modal Package would require the following:

- Land at the former HM Craiginches Prison Site;
- Loss of one lane for general traffic wherever a bus/HGV lane is provided that is not currently a bus lane.

It should be noted that the technical feasibility assessment determined that there would be implementability issues associated with delivering a shared bus/HGV lane southbound in combination with the two-way cycleway to the north of Grampian Place due to width and elevation constraints.

Additional Toucan Crossings at Souterhead Roundabout

Single stage crossings have been identified in the Multi-Modal Package rather than staggered crossings onto island locations. Design criteria indicates that the crossings should be a minimum of 15 metres from the roundabout. It would be advised that a Road Safety Audit (RSA) be undertaken for the additional crossings, as vehicles stopping when the toucan crossings were activated would instantly cause blocking back towards the circulating carriageway of Souterhead Roundabout. Single stage crossings require longer green times for pedestrians, stopping traffic for a longer duration, which could result in a degree of driver distraction and frustration.

Removal of Hareness Roundabout

The feasibility considerations regarding the removal of Hareness Roundabout are as per those outlined for the Active Travel Package.

Right-Turn Ban from Wellington Road onto Abbotswell Road

The feasibility considerations regarding the right-turn ban from Wellington Road onto Abbotswell Road are as per those outlined for the Active Travel Package.

Summary

In addition to the above, the Multi-Modal Package would require a variety of road orders. In line with the Public Transport Package, a TRO would be required where any shared bus/HGV lanes are proposed to determine the authorised usage of these. Other road orders, such as Side Road Orders, Stopping Up Orders and Redetermination Orders (RSOs) may also be required. For example, an RSO would be required in order to redetermine those sections of existing footway and carriageway that are proposed as segregated cycleways within this package.

Overall, the feasibility considerations outlined above are anticipated to provide a **moderate risk** to the deliverability of the Multi-Modal Package as currently presented due to 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, and, on this basis, this package carries a higher deliverability risk than the Active Travel Package or the Public Transport Package. Potential mitigation measures are set out in **Section 12.3**.

11.3 Affordability

This section provides an overview of the affordability of each option package, based on the outputs of the model adjustments implemented in each package in April 2021 (as outlined in **Section 7.4**).

11.3.1 Active Travel Package

The Active Travel Package would be anticipated to constitute a **very high cost** in terms of capital construction costs. Interventions included within the package would also require ongoing maintenance, including winter maintenance of the with-flow cycleways, signing and lining for the cycleways as required and operation and management of additional traffic signal systems (at Souterhead and Hareness).

11.3.2 Public Transport Package

The Public Transport Package would be anticipated to constitute a **low cost** in terms of capital construction costs. Ongoing maintenance costs would additionally be required, associated with the management of additional traffic signal systems (at Souterhead and Hareness junctions).

11.3.3 Multi-Modal Travel & Transport Package

The Multi-Modal Package would be anticipated to constitute a **high cost** in terms of capital construction costs. Interventions included within the package would also require ongoing maintenance, including winter maintenance of the two-way cycleway, signing and lining for the cycleway as required and operation and management of additional traffic signal systems (at Hareness and Souterhead).

11.4 Public Acceptability

This section provides an overview of the Public Acceptability of each option package. It should be noted that the package designs presented in **Appendix A**, which were developed in conjunction with the composition of the packages set out in **Chapter 5**, formed the basis for gauging the public and stakeholder acceptability of the packages under consideration. Thus, it should be highlighted that residual changes to the package components in April 2021 (as outlined in **Section 7.4**) have not been subject to consultation. However, with the exception of the CYCLOPS junction at Hareness in the Active Travel Package, the assessment of Public Acceptability should still be regarded as a strong indication of the likely support (or otherwise) of the packages and their components, as the adjustments to the models have generally been promoted on the basis of ensuring a more deliverable level of network service, and, for the most part, do not take away from the overall message or objective of any of the packages.

As set out further in **Chapter 14**, there would be a need for ACC to initiate changes to the existing designs to reflect the changes in the package models made to facilitate the detailed appraisal (and, by consequence, communicate these changes in any additional public or stakeholder engagement necessary to accompany individual scheme or package implementation).

11.4.1 Active Travel Package

Based on responses to the online survey throughout April and May 2021, it is anticipated that the Active Travel Package would have a reasonable level of public support, with 53% of respondents indicating that they are in favour of the implementation of this package, including 40% strongly in favour.

Respondents noted support of this package based on the ability to improve cycle safety through segregated infrastructure and based on improved active travel access through large junctions along the route. A number of respondents also indicated that implementation of the Active Travel Package would encourage them to cycle more often, both for commuting purposes and for leisure, with some respondents noting that the Active Travel Package would provide a direct and safe route that they would feel safe using alone or with their family.

In terms of the individual elements included within the Active Travel Package, reconfiguration of the junction at Souterhead generated the most support (91 like; 30 dislike), closely followed by signalisation of the junction at Hareness (87 like; 33 dislike) and the with-flow cycleway along the length of the corridor (84 like; 40 dislike). The right-turn ban from Wellington Road onto Abbotswell Road generated the least support of the package elements, though more were still in favour of this than against (70 like; 45 dislike). This is shown in **Figure 11.1**.

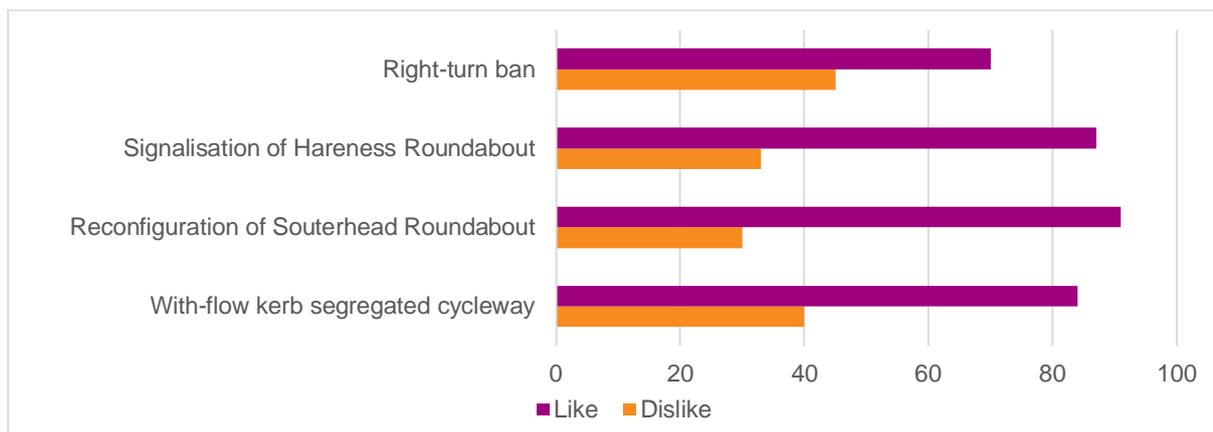


Figure 11.1: Opinion of Active Travel Package Components

Conversely, a number of concerns were raised about the Active Travel Package, with approximately 17% of respondents indicating that they are strongly opposed to implementation of this package. Concerns raised were primarily in relation to the delays to movement along the corridor by vehicles that could be caused. Respondents emphasised the importance of the corridor as a primary freight route and noted that any impact on the movement of freight as a result of road space being reallocated could have significant economic impacts. A number of respondents additionally raised concerns about the suitability of Wellington Road as an active travel corridor due to the topography, noting that the proposed interventions could cause inconvenience to the majority for a perceived relatively small number of cyclists.

Overall, the Active Travel Package has been assessed as providing a **minor beneficial impact** against the Public Acceptability criterion.

11.4.2 Public Transport Package

Based on responses to the online survey throughout April and May 2021, it is anticipated that there would be a limited level of public support for the Public Transport Package, although less support would be anticipated relative to the other packages under consideration. Overall, 25% of respondents indicated support for the implementation of this package, whilst 45% were against the implementation of this package.

Of those respondents indicating support for the Public Transport Package, the most common reasons were in terms of the benefits that modal shift to public transport could have on reducing vehicle emissions and improving the flow of traffic on Wellington Road. Those in favour of this package additionally made reference to the opportunities that improved public transport services could provide for people who do not have access to a car.

Those against the Public Transport Package argued that the relatively low number of bus services that currently operate on the corridor does not justify a dedicated bus lane along the length of Wellington Road. Concerns were also raised in relation to congestion that could be generated due to the reduction in road space for general traffic.

In terms of the individual elements within the Public Transport Package, the bus lane element of the proposal generated the most opposition (75 dislike; 40 like), closely followed by signalisation of Hareness Roundabout, with bus priority through the junction (71 dislike; 44 like). The right-turn ban from Wellington Road onto Abbotswell Road in the Public Transport Package was the only element of the Public Transport Package to generate more support than opposition (61 like; 53 dislike). This is shown in the diagram below.

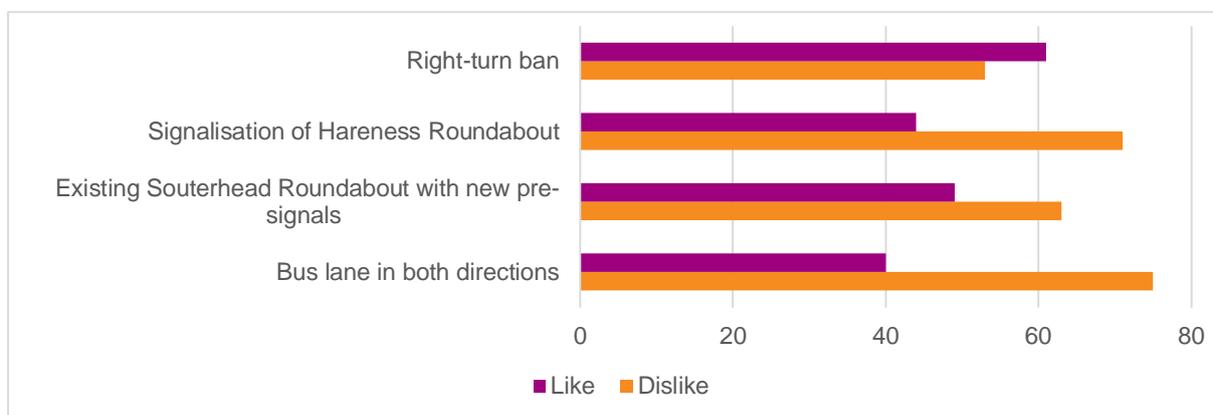


Figure 11.2: Opinion of Public Transport Package Components

Overall, the Public Transport Package has been assessed as providing a **moderate negative impact** against the Public Acceptability criteria.

11.4.3 Multi-Modal Travel & Transport Package

Based on responses to the online survey throughout April and May 2021, it is anticipated that the Multi-Modal Package would have a reasonable level of public support, with 49% of respondents indicating that they are in favour of the implementation of this package with only 25% opposed (the lowest of the three packages).

Respondents expressed support for this package based on the equal share of road space provided across modes and the improved safety for active travel users relative to the existing arrangement. In terms of the individual elements included within the Multi-Modal Package, implementation of toucan crossing points at Souterhead Roundabout generated the most support (77 like; 38 dislike). The two-way cycleway and the signalisation of Hareness Roundabout generated a similar level of support (73 like; 47 dislike and 74 like; 42 dislike respectively). The shared bus/HGV lane was the only element of the package that generated more opposition than support (65 dislike; 45 like). Whilst some respondents were in agreement with the idea of a Multi-Modal Package, there were those who indicated that they would prefer elements within this package to be altered e.g. with inclusion of the with-flow cycleway instead of the two-way cycleway.

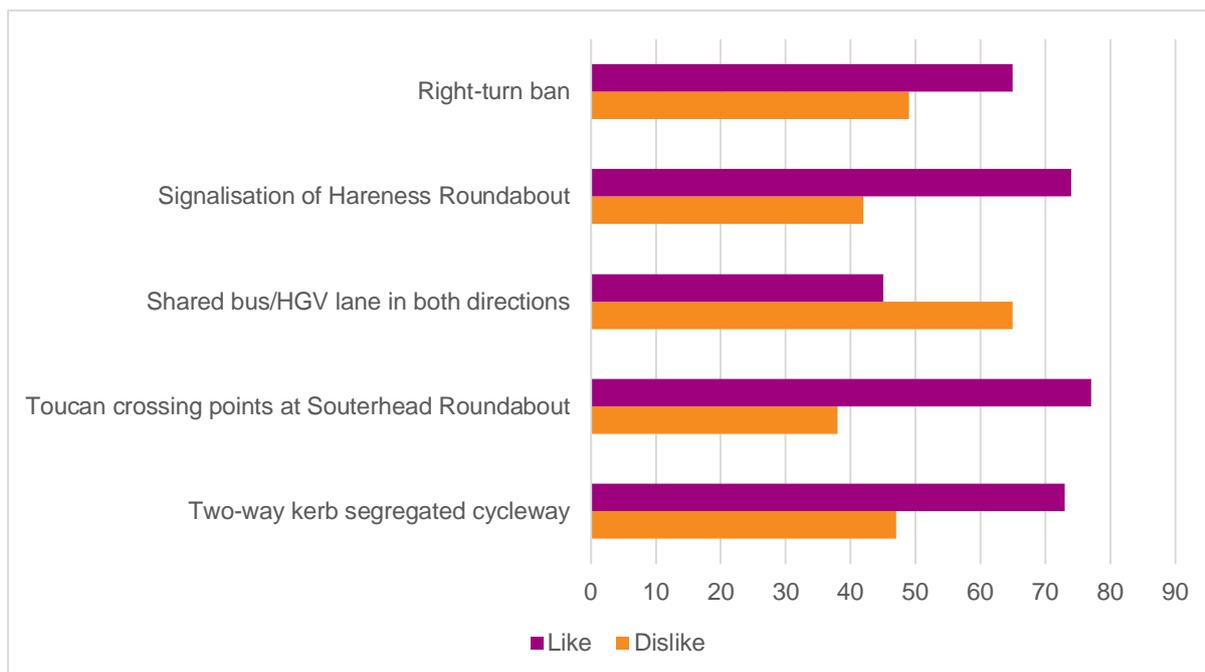


Figure 11.3: Opinion of Multi-Modal Package Components

For those opposed to the implementation of this package, concerns were raised regarding the safety of the two-way cycleway in comparison to the with-flow option and the importance of providing crossing points at key points along the route was emphasised. Safety concerns were also raised regarding the removal of the central reservation along some sections of the corridor. Other concerns raised about the Multi-Modal Package included the potential for congestion that could be generated due to the reduction in road space for general traffic and the difficulties that would likely be caused by any HGVs requiring to turn right from Wellington Road (particularly at Hareness Road to access Aberdeen South Harbour). Furthermore, some indicated concerns about HGVs becoming delayed by buses along the corridor and the associated economic impacts of this.

Overall, the Multi-Modal Package has been assessed as providing a **minor beneficial impact** against the Public Acceptability criteria.

Appendix D provides further detail of the outcomes from the online survey.

11.5 Summary of Implementability Appraisal

The outcomes of the implementability appraisal are summarised in the table below.

Table 11.1: Accessibility & Social Inclusion Appraisal Summary

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

The next chapter provides an overview of the key risks and uncertainties that should be borne in mind as progress is made with delivery of any of the interventions under consideration to business case stage.

12. Risk & Uncertainty

12.1 Introduction

This chapter considers risk and uncertainties that should be borne in mind through the progression of any options to business case stage and identifies a series of measures that could be put in place to reduce the risks identified.

12.2 Risk Management

Risk management is a structured approach to identifying, assessing, and controlling risks that emerge during the course of the option lifecycle. This supports better decision making by developing a more thorough understanding of the risks inherent within an option and their likely impact. Risk management involves:

- Identifying possible risks in advance and putting mechanisms in place to minimise the likelihood of their materialising with adverse effects;
- Having processes in place to monitor risks, and access to reliable, up-to-date information about risks;
- The right balance of control in place to mitigate the adverse consequences of the risks, if they should materialise; and
- Decision making processes supported by a framework of risk analysis and evaluation.

12.3 Risk and Uncertainties

This section outlines key risks and uncertainties associated with the progression of option packages identified as part of this study. The table below presents the main types of project risk identified by STAG alongside a commentary of its anticipated significance in the context of this study and any potential mitigation measures that have been identified.

Table 12.1: Project Risks and Potential Mitigation Measures

Type of Risk		Anticipated Significance for Wellington Road Study	Potential Mitigation Measures
Policy risk	Legislative risk	Low risk – there is a minor risk that legislative changes affecting transport could have implications for the Wellington Road corridor and its operation. For example, the Scottish Government has an objective to promote the use of ultra-low emission vehicles (ULEVs) and phase out the need for new petrol and diesel cars and vans by 2032 (ahead of the UK Government's 2040 target) ³¹ . However, as cars/vans (or general traffic as a whole) are not prioritised in the Wellington Road Study, it is considered that any such legislative changes affecting transport in the future are unlikely to affect the implementation of any sustainable interventions from the detailed appraisal packages.	No mitigation measures considered necessary.
	Policy risk	Low risk – as the detailed appraisal has demonstrated, there is a generally strong fit in terms of policy integration between the packages and the wider	No mitigation measures considered necessary.

³¹ <https://www.gov.scot/policies/renewable-and-low-carbon-energy/low-carbon-transport/>

Type of Risk		Anticipated Significance for Wellington Road Study	Potential Mitigation Measures
		<p>suite of national, regional, and local policies. In particular, the Wellington Road Study identifies improvements which provide synergy with both the RTS2040 and the wider local objectives of ACC, which have long-term plans for the development of the city. On this basis, it is not considered that there is a major risk of a disconnect between the areas for improvement identified in the appraisal and the future direction of transport planning in Aberdeen.</p>	
Risk on delivering the asset	Construction risk	<p>Medium risk – as noted in Chapter 11, 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.</p>	<p>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.</p> <p>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.</p>
	Planning risk	<p>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.</p> <p>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.</p>	<p>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.</p> <p>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.</p>
	Residual value risk	<p>Low risk – residual values can be estimated for projects with finite lives and should be included in the appraisal of projects. Residual values should not however, be included in the appraisal of projects with indefinite lives where the appraisal period should end 60 years after the scheme opening year. In the context of the Wellington Road Study, this is not applicable as a 60 year assessment has been undertaken.</p>	<p>No mitigation measures considered necessary.</p>
Risk on operating the asset	Operational risk	<p>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).</p> <p>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.</p>	<p>Active Travel Package: exclusion of the Souterhead Junction improvement would be anticipated to minimise delays for general traffic along the corridor.</p> <p>Public Transport Package: exclusion of the southbound bus lanes would be anticipated to minimise delays for all vehicles along the corridor.</p>

Type of Risk		Anticipated Significance for Wellington Road Study	Potential Mitigation Measures
		<p>The addition of southbound bus lanes risks delays (approx. 1-3 minutes) to all vehicles, including buses, particularly during the PM peak.</p> <p>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 is a sensitive section of northbound shared bus/HGV lane between Craigshaw Road and Balnagask Road.</p> <p>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.</p> <p>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.</p>	<p>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.</p> <p>Right-turn ban risks could be mitigated through communications with the public.</p> <p>Risks associated with signalisation at Hareness and minor additional delay could be mitigated by communications with the public regarding implementation of signals to improve the safety and directness of walking and cycling crossing points.</p>
	Inflation risk	<p>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.</p>	<p>Construction costs should be kept under review as interventions are developed further.</p>
	Maintenance risk	<p>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.</p>	<p>ACC should mitigate costs of maintenance in line with existing practices.</p>
Risks on demand and revenue	Demand risk	<p>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.</p>	<p>Further future scenario testing.</p>
	Design risk	<p>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</p>	<p>Mitigation measures will be identified and assessed as part of the detailed design process.</p> <p>The lengthening of bus lanes on approach to QEB would require a detailed safety design check in the north of the corridor.</p>

Type of Risk		Anticipated Significance for Wellington Road Study	Potential Mitigation Measures
		<p>design stage, there would be a requirement to develop the designs during Developed Design as part of the normal design process.</p> <p>Medium risk – the Public Transport Package and Multi-Modal Package propose lengthening bus lanes on approach to QEB, which could introduce safety implications.</p> <p>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).</p> <p>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.</p>	<p>Additional environmental survey work, including flood risk modelling and Phase 1 habitat surveys will be required to support and inform technical design work.</p> <p>Consistency risks can be mitigated by implementing as much of a modal type along the route as is possible using the Sustainable Travel Hierarchy 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).</p>
	Availability risk	<p>Low risk – Bus services on the corridor are privately operated, limiting ACC's influence over any future service changes. Given that no service improvements are proposed as part of the option packages, this is considered to be a minor risk.</p>	<p>No mitigation measures considered necessary.</p>
	Volume risk	<p>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.</p>	<p>Further future scenario testing.</p>
	Technology risk	<p>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.</p>	<p>ACC should ensure that optimal technology is adopted at the time of implementation of any interventions on the Wellington Road corridor.</p>

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).

There is also a need to consider risks associated with tie-in to existing active travel infrastructure as follows:

- In the Active Travel Package, the cycle provision tie-in to the existing layout at QEB in the north of the corridor has not been fully developed. This is considered to be a low risk as there are a number of options that could be investigated to provide suitable connections and crossing points for pedestrians and cyclists. In the south of the corridor, there are existing shared use path facilities and therefore low risks are anticipated in terms of designing connections to these facilities, and to onward routes from those connections.
- The Public Transport Package does not require consideration of the tie-in with existing active travel infrastructure and as such, is determined to be low risk in this regard.
- In the Multi-Modal Package, the need to tie-in active travel provision to the existing layout is considered to be low risk, as there are a number of options that could be investigated at the northern end of the study corridor, including some existing provision to connect to. In terms of tie-in, for example, a toucan crossing on Wellington Road at the location of the dropped kerbs on approach to the Craig Place/South Esplanade West Roundabout may be possible, which would provide an improved connection to NCN1 at the Wellington Suspension Bridge. Alternatively, the existing crossing point to the north of Grampian Place could be upgraded to a toucan crossing, with the two-way cycleway relocated to the west side of Wellington Road for a short section. Both options would require an engineering design review of safety and operation. As outlined for the Active Travel Package, there are existing shared use path facilities in the south of the corridor and therefore, tie-in to existing facilities is considered to be low risk in this location.
- In terms of other onward cycle provision connections at the north end of the study area, there is a moderate risk that provision will not be satisfactory until further improvements are undertaken. It is noted that onward connections of NCN1 crossing the QEB to the one-way South Esplanade West and from Craig Place/one-way Menzies Road require further consideration of improvements for active travel, outwith the scope of this study. Their improvement would connect Wellington Road to Victoria Road and onward to other parts of Torry and the continuation of NCN1 to the Coast Road.

12.4 Summary

This chapter has provided consideration of risk and uncertainties that should be borne in mind through the progression of any options to business case stage and potential mitigation measures that could be put in place to reduce the risks identified.

Chapter 13 identifies a series of indicators that could be used to monitor the performance of interventions.

13. Monitoring & Evaluation

13.1 Introduction

The Scottish Government requires monitoring and evaluation to be undertaken and documented for any proposal for which it provides funding or approval. STAG requires that a new project or strategy be subject to planned evaluation and monitoring, in addition to regular revalidation throughout its development.

Monitoring is an ongoing process of watching over the performance of a project, identifying problems as they arise and taking appropriate action, whilst evaluation is used for specific, post-implementation events, designed to assess the project performance against established objectives and to provide in-depth diagnosis of successes as well as deficiencies. Therefore, by gathering and interpreting information, monitoring and evaluation will demonstrate how the project or strategy performs against its objectives, identify any deficiencies, and allow adjustments to be made.

Soon after implementation, the performance of the scheme should be assessed against the specified objectives, requiring the data capture associated with scheme delivery. Recognising that certain projects require time before the full benefits can be realised, a further evaluation is required at an appropriate time after implementation.

In addition, regular monitoring of the scheme is essential against specified Key Performance Indicators (KPIs) to assess the ongoing effectiveness of the overall strategy and individual schemes.

A series of indicators have been identified to monitor the performance of the detailed appraisal packages on the TPOs.

Table 13.1: Potential Performance Indicators for Monitoring and Evaluation

Indicators
Census Travel to Work tables
Scottish Household Survey
Hands Up Survey
Pedestrian and Cycle Counts
Tom-Tom Data
Google Maps Traffic
Journey Time Surveys
TRACC – AT Journey Time
TRACC – AT Catchment
TRACC – PT Journey Time
TRACC – PT Catchment
TRACC – No. of PT Services
INRIX – Journey Time
INRIX – Journey Time Reliability
Annual Mean Air Quality Monitoring Results
CrashMap
Employer Travel Plans
Citizens Panel Surveys
Direct engagement with Community Councils
Direct engagement with Freight Forum
Direct engagement with bus operators
Scottish Public Health Observatory Online Profiles Tool

Going forward, these will be essential monitoring tools to gauge how any interventions subsequently implemented are performing. There will be a requirement for ACC to establish an evaluation regime for any schemes which progress through business case stage to construction.

A detailed Monitoring and Evaluation Plan should be prepared as schemes move forward.

13.2 Summary

This chapter has identified a series of indicators that could be used to monitor the performance of interventions proposed as part of this study.

Chapter 14 provides a summary of the key findings from the detailed appraisal of option packages.

14. Summary & Conclusions

14.1 Introduction

This chapter provides a summary of the findings from the detailed appraisal of options to improve strategic transport connections and active travel along the Wellington Road corridor.

14.2 Appraisal Outcomes

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

The scoring for each element of the appraisal is summarised in the tables that follow.

Table 14.1: 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	✓✓	xx	xx	✓	-	-
Public Transport	✓	xx	xx	-	-	x
Multi-Modal	✓✓	✓	xx	✓	✓	-

As shown above, all packages potentially provide minor to moderate beneficial impacts across several of the TPOs, with negative impacts anticipated for the movement of freight and the management of key pinch-points on the network, particularly for the Active Travel and Multi-Modal Packages. This is associated with delay to general traffic as a result of the interventions proposed as part of the option packages. As has been discussed, there are potential mitigation measures that could be implemented to minimise these impacts.

Table 14.2: Summary of Appraisal against Implementability Criteria

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

As shown above, there are minor to moderate impacts on implementability regarding the feasibility of delivering the option packages. The Public Transport Package is anticipated to be low cost, with the other two packages incurring greater capital costs. The online survey that was undertaken indicated a level of support for the Active Travel and Multi-Modal Packages, however, the Public Transport Package generated a significant level of opposition.

Table 14.3: 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	xx	x	xx	xx	xx	✓	-	✓✓✓	-	-	xx	✓	-	✓	-	✓✓	-	✓✓	✓	-
Public Transport	x	x	x	x	x	-	-	✓	-	-	xxx	✓	-	-	-	-	-	-	-	-
Multi-Modal	x	x	-	x	x	✓	-	✓✓	✓	-	xx	✓	✓	✓	✓	✓✓	-	✓✓	✓	-

The appraisal of options against the STAG Criteria indicated limited impacts against some of the Integration and Accessibility and Social Inclusion sub-criteria, although there were benefits against policy integration and local accessibility, particularly for the Active Travel and Multi-Modal Packages. There are some environmental concerns relating to noise and vibration, air quality, water quality, drainage and flood defence, and biodiversity and habitats, although there are potential measures that could be implemented to mitigate these impacts. 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. Whilst the modelling results in COBALT indicated increases in accidents associated with the reconfiguration of Hareness Junction (and Southerhead Junction in the Active Travel Package), the appraisal has taken account of the anticipated safety benefits that would be generated for active travel users.

14.3 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.

As discussed throughout this report, 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 presented earlier in this report, 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 14.6**.

Table 14.4: 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.	<ul style="list-style-type: none"> • 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.	<ul style="list-style-type: none"> • Toucan crossing infrastructure provides safety and accessibility improvements for pedestrians and cyclists whilst maintaining efficient vehicle flows through the junction.

Intervention	Description	Rationale
Hareness Junction	Conversion of the roundabout to a signalised junction, with integrated pedestrian and cycle crossing facilities.	<ul style="list-style-type: none"> The existing roundabout is uncontrolled, with two crossing points provided which are remote from the roundabout. 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.	<ul style="list-style-type: none"> 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 14.5: 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.

Intervention	Rationale
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 14.6 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 14.6: 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.	<ul style="list-style-type: none"> • 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.	<ul style="list-style-type: none"> • 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.	<ul style="list-style-type: none"> • 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.	<ul style="list-style-type: none"> • 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.

Corridor Section	Potential Interventions Proposed	Further Considerations
Section 5: Hareness to Craigshaw Road	Cycleway between Hareness and Craigshaw Road.	<ul style="list-style-type: none"> 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.
	Northbound bus lane between Craigshaw Drive and Abbotswell Road, avoiding the approach to and the junctions at Craigshaw Drive, Greenbank Road and Abbotswell Road.	<ul style="list-style-type: none"> 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.	<ul style="list-style-type: none"> 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.	<ul style="list-style-type: none"> 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.

Corridor Section	Potential Interventions Proposed	Further Considerations
	Northbound bus lane (small extension to existing bus lane towards QEB)	<ul style="list-style-type: none"> • 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 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 report 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. As has been detailed throughout this report and in the table above, 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 proposed 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.

