



A944-A9119 Multi-modal Corridor Study

STAG-Based Detailed Appraisal

On behalf of



Aberdeenshire
COUNCIL



nestrans

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Executive Summary

Stantec was appointed in July 2021 by Aberdeen City Council to undertake a Scottish Transport Appraisal Guidance (STAG) based Detailed Options Appraisal of the A944 and A9119 corridors between Westhill and Aberdeen City Centre. This study builds on the findings of the Case for Change (Stantec, July 2020) and Preliminary Options Appraisal (Stantec, October 2020) STAG stages, which identified the need and options for delivering transformational change to sustainable transport provision on the western approaches to the city.

The publication of the Scottish Government's updated **Climate Change Plan** in 2020 set out revised climate change related targets including: reducing car kilometres by 20% and phasing out the need for petrol and diesel vehicles by 2030; and supporting transformational active travel projects. Furthermore, the **Reducing Car Use for a Healthier, Fairer and Greener Scotland** (2022) publication outlines the route map to achieving the 20% reduction in car kilometres by 2030 and describes the key sustainable travel behaviours which make up the framework, including investing in the public transport network.

Scotland's **National Transport Strategy 2** (NTS2), published in 2020 presents the 'Sustainable Travel Hierarchy' and 'Sustainable Investment Hierarchy', which together guide decision making by promoting walking, wheeling, cycling, public transport and shared transport options in preference to single occupancy private cars.

This strong underpinning policy context offers strengthened opportunities for successfully developing and implementing sustainable transport schemes and from the outset, the study aim has been to provide **transformational and more sustainable travel options** which can encourage modal shift towards walking, cycling and public transport.

This study, along with the similar multi-modal corridor studies for Aberdeen's other main arterial routes, is also feeding into the development of Aberdeen Rapid Transit (ART), where the ambition is to develop a **high quality, high frequency mass transit network across the city on key corridors and linking key destinations, anchored by P&R facilities** on each corridor. ART has national recognition within Transport Scotland's draft **Strategic Transport Projects Review 2** (STPR2) and in the Scottish Government's Draft **National Planning Framework 4** (NPF4). The work undertaken as part of this A944 / A9119 Multi-modal study has recognised throughout, the need to develop options which could facilitate the successful delivery of ART on the corridor.

Case for Change and Preliminary Options Appraisal

The initial stage of this study, the development of the Case for Change, considered the problems, opportunities, issues, and constraints for the study.

Recent changes across the policy landscape, most notably around climate change, present decision makers with a clear rationale and justification to implement the changes and behavioural change catalysts required in the transport system. As noted above, the publication of the Scottish Government's updated *Climate Change Plan* (2020), the *Reducing car use for a healthier, fairer and greener Scotland* (2022) publication, Transport Scotland's draft STPR2 and Scotland's NTS2 all provide clear opportunity for developing and implementing transformational sustainable transport schemes.

The completion of the Aberdeen Western Peripheral Route (AWPR) has enabled traffic to route around Aberdeen city. This has provided the opportunity to reassess the roads hierarchy within the city, prioritise sustainable transport infrastructure and facilities on routes into the centre and bring forward the City Centre Masterplan schemes. Furthermore, the **Transport (Scotland) Act 2019** provides local authorities with the powers to implement a workplace parking license scheme and Low Emission Zone (LEZ). Such complementary 'demand management' measures are likely to encourage the use of more sustainable modes and support the success of sustainable transport schemes.

The underutilised Park & Ride site at Kingswells offers a ready-made opportunity, if the appropriate level of services, competitiveness and journey quality could be achieved (as envisaged under the ART scheme). Bus operators are investing in new vehicles and fuelling infrastructure, utilising both electric and hydrogen-based technologies. Such vehicles offer environmental benefits and will help to improve perceptions of bus travel, and there is the opportunity to capitalise on these investments through complementary bus priority infrastructure.

A set of Transport Planning Objectives (TPOs) were developed, and multi-modal transport options developed which sought to improve sustainable transport connections between Westhill and Aberdeen City. The options were subsequently sifted to a small set for appraisal. These options were then packaged into four delivery packages (low, medium, high and gold), increasing in their ambition.

At the Preliminary Options Appraisal stage, the option packages were appraised, against the TPOs, the STAG appraisal criteria (Environment, Economy, Safety, Accessibility & Social Inclusion, and Integration, as they were at that time (now revised)), and against Implementability criteria (Feasibility, Affordability and Public Acceptability). Options were then rejected or selected for further development and more in-depth appraisal at the Detailed Options Appraisal stage.

Detailed Options Appraisal

Further Option Development

The development of active travel and public transport options has been based on developing **transformational schemes** that can deliver the TPOs for the study, and by doing so, address the issues identified along the corridor related to walking, cycling and bus use.

To develop truly transformational schemes and meet the ambitions of the study, and also recognising the needs of ART, an **end-to-end corridor-based approach** to further option development has been adopted, building on the schemes identified earlier in the study. The options have been developed by considering full corridor length schemes between Westhill and Aberdeen, and with each scheme incorporating various bus and active travel elements as previously developed within the four packages.

Key to this study is to develop options which align with national, regional and local policies, strategies and plans and work within Transport Scotland's Sustainable Travel Hierarchy, considering the needs of walking, cycling and wheeling modes first, before public transport and finally travel by private vehicle.

The corridors are constrained, especially close to Aberdeen city centre. This means that providing both dedicated cycle and bus priority provision along the full length of both corridors is challenging given the width of the existing roads and the buildings and park land along the routes. As such, the approach to option development has considered a range of different options which prioritise cycling and bus provision along the corridors, recognising that compromise is required between the two modes.

Note that under all options, in order to provide the cycle and bus priority infrastructure, there is a need to reallocate road space away from the private vehicle.

Four integrated bus and active travel option packages have been considered:

- **Option 1: Prioritise cycling on A944 and A9119.** Reflecting the Sustainable Travel Hierarchy, this option prioritises cycling infrastructure on A944 and A9119 (and thereafter provide the greatest additional bus priority infrastructure possible)
- **Option 2: Prioritise buses on A944 and A9119** (and thereafter provide the greatest additional cycle infrastructure possible). In this instance, 'off corridor' parallel cycle route provision has been considered to ensure both modes are sufficiently provided for.

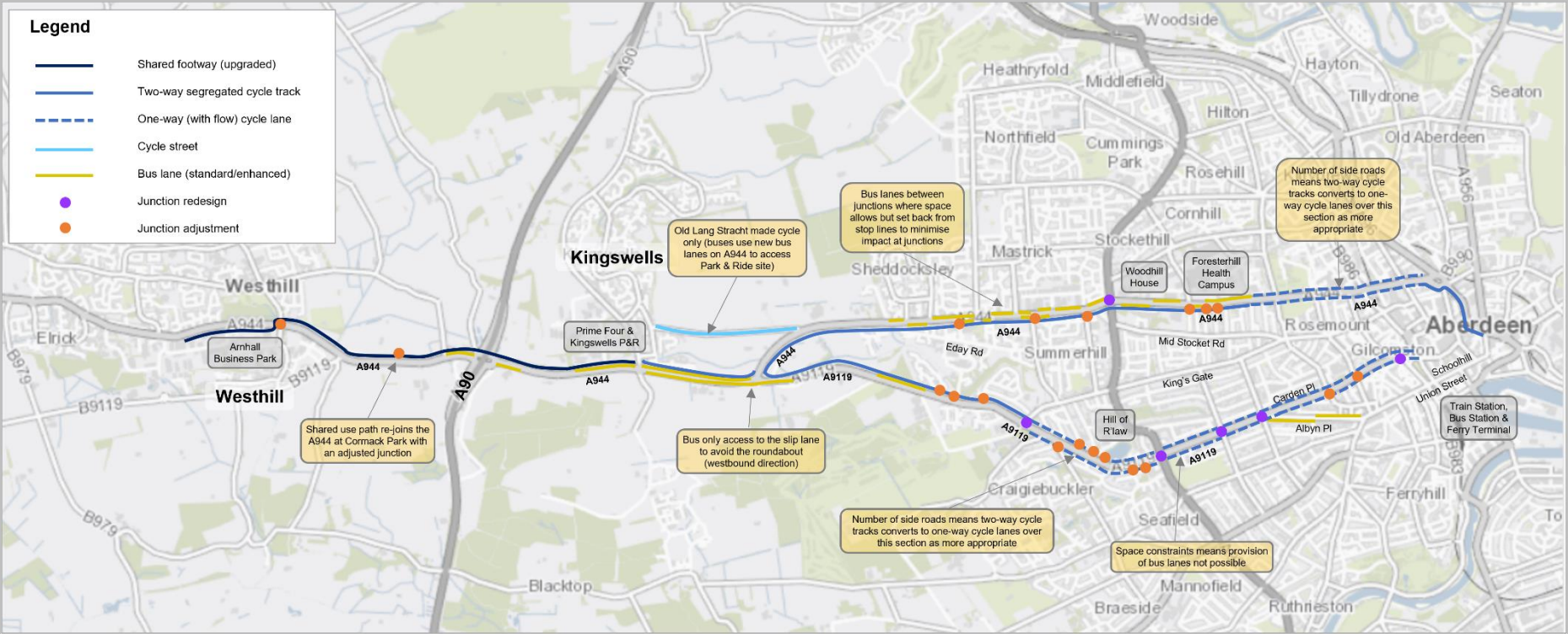
- **Option 3: Prioritise cycling on A944 and buses on A9119.** In this instance, the ‘off corridor’ parallel cycle route provision for the A9119 as provided under Option 2 is considered.
- **Option 4: Prioritise cycling on A9119 and buses on A944.** In this instance, the ‘off corridor’ parallel cycle route provision for the A944 as provided under Option 2 is considered. Under all options, improvements to walking and wheeling infrastructure is included.

The options are show in schematic form below. Greater detail around the options can be found in Section 4 and the supplementary *A944-A9119 Multi-modal Study Concept Design Report*. This includes greater detail around the option development process including the development of the parallel cycle routes noted for Options 2, 3 and 4.

Under Options 2 and 4, the routing of the bus priority measures from the A944 to enable access to Aberdeen city centre has been considered, and three variants developed, A, B and C (as shown in the diagrams below).

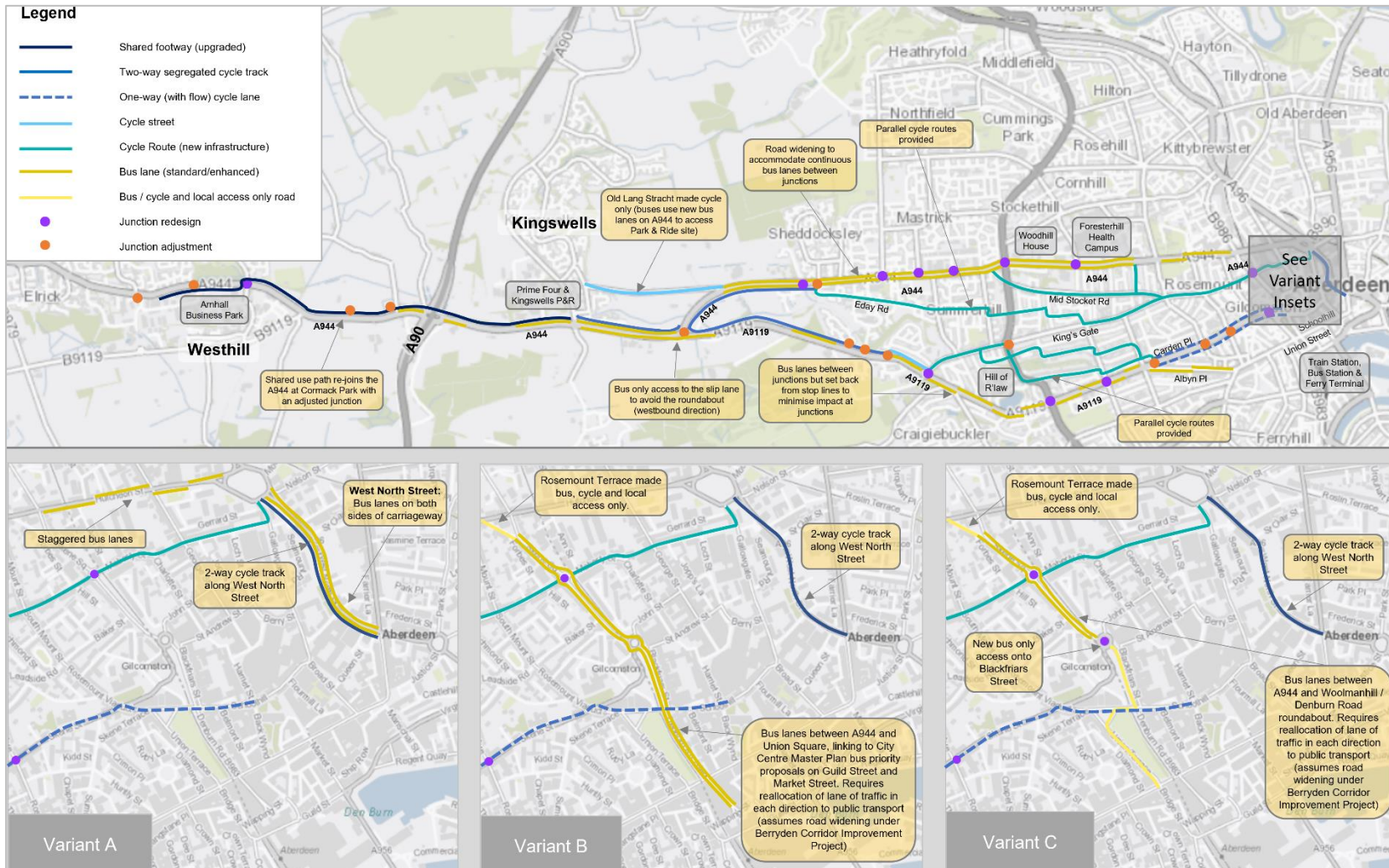
Variants B and C utilise the committed Berryden Corridor Improvement Project (BCIP) being progressed by Aberdeen City Council. This scheme will deliver a new / upgraded dual carriageway linking Skene Square to the A96 at Kittybrewster Roundabout and represents a substantial change to the road network. Reflecting the policy environment, it was assumed that the BCIP (and the additional road capacity it creates) should be considered as an opportunity for the study. Variants B and C which utilise the BCIP, assume the reallocation of road space in the Berryden corridor to enable bus priority from the A944 into the city centre.

Option 1: Prioritise cycling on A944 and A9119



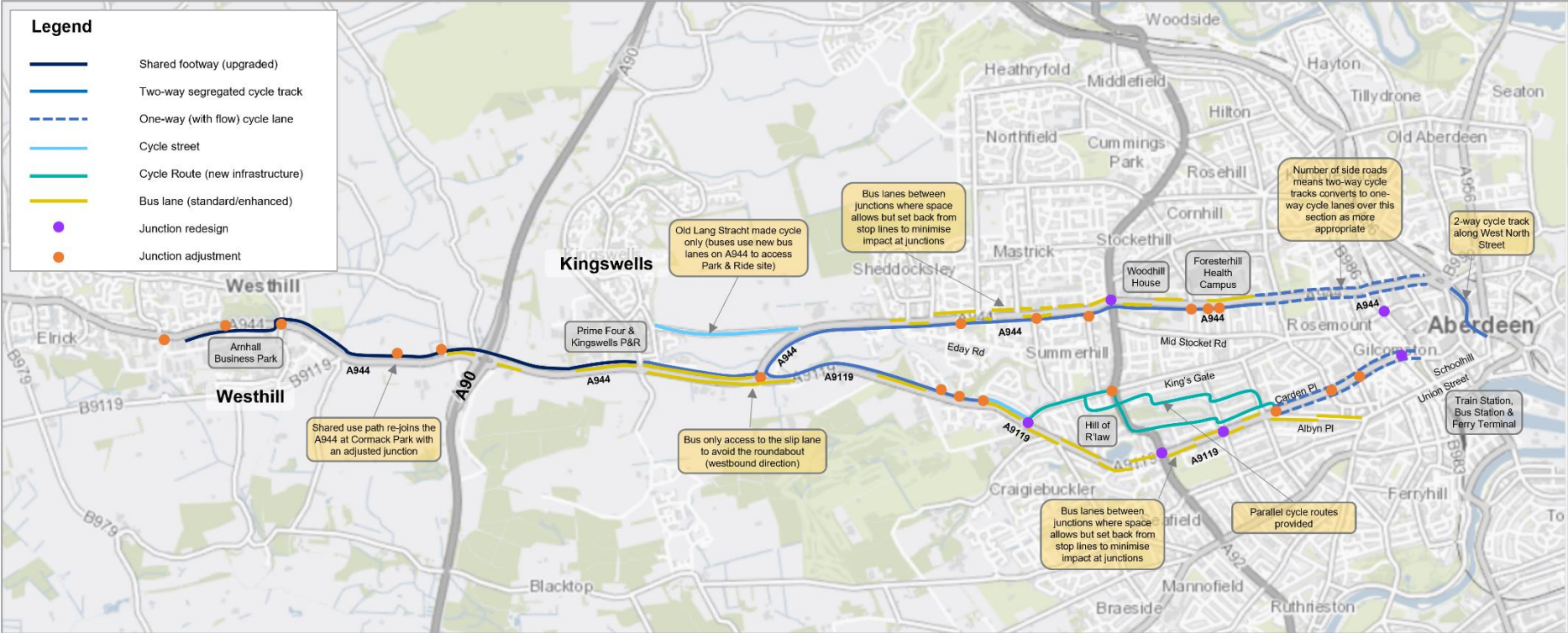
Option 1– Strategic Plan Overview

Option 2: Prioritise bus on A944 and A9119



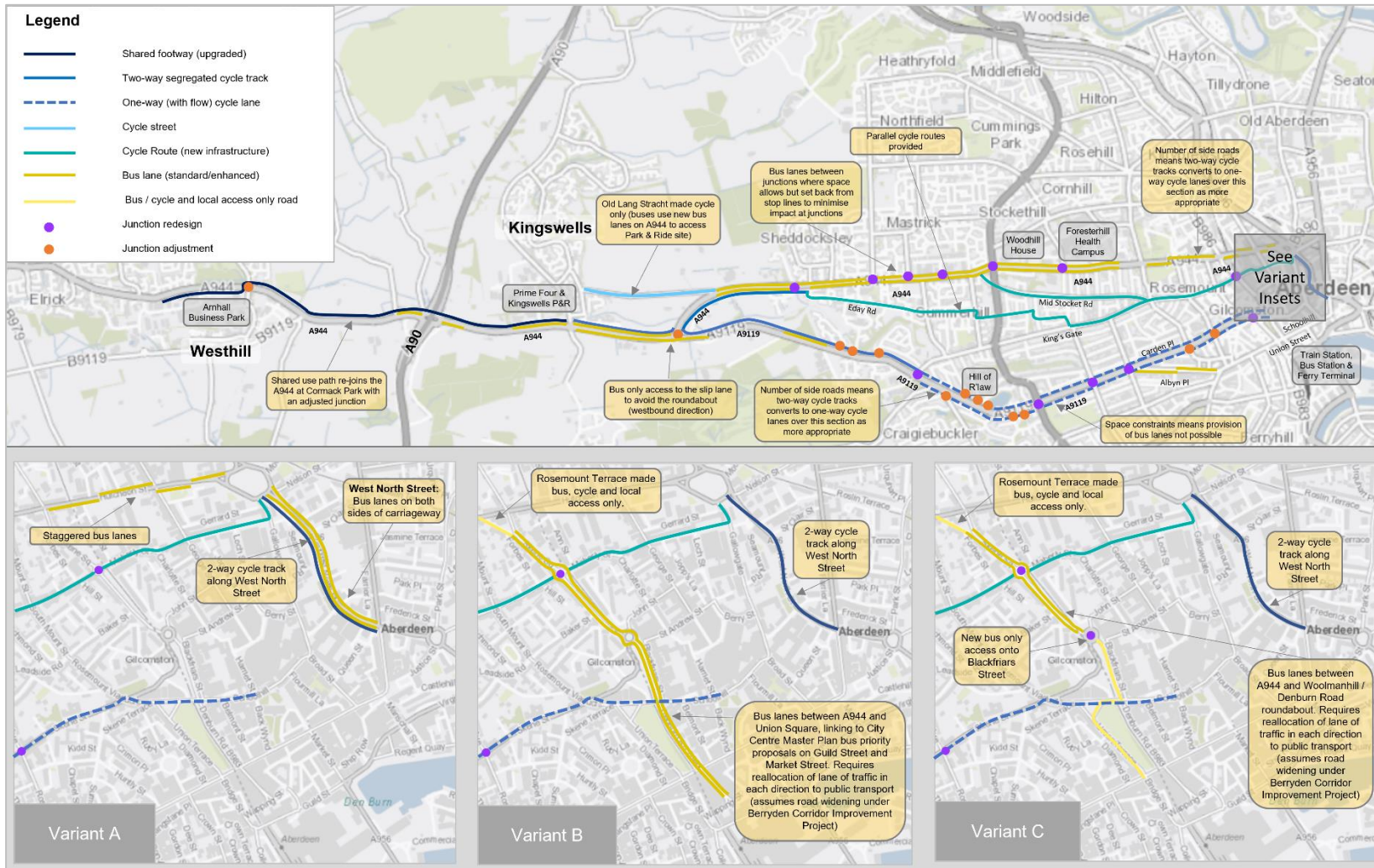
Option 2 – Strategic Plan Overview

Option 3: Prioritise cycling on A944 and bus on A9119



Option 3 – Strategic Plan Overview

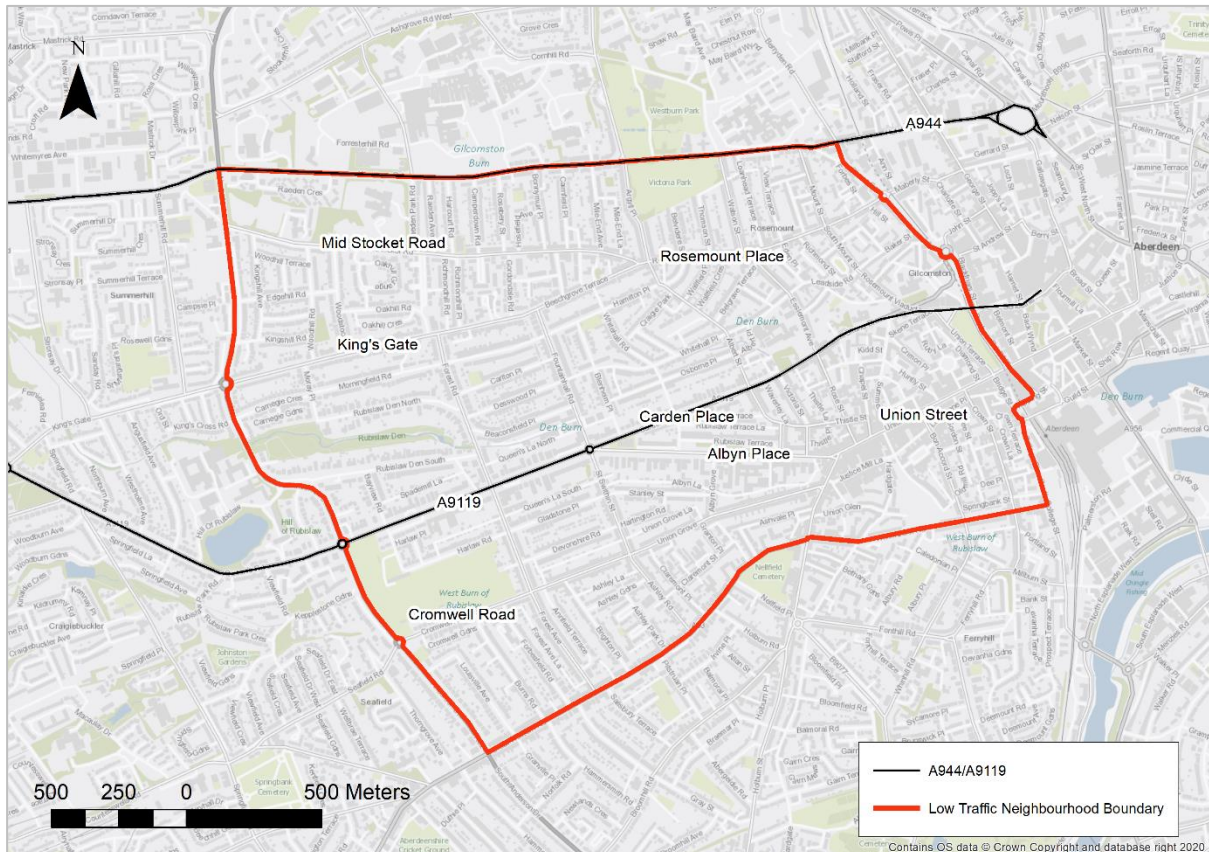
Option 4: Prioritise cycling on A9119 and bus on A944



Option 4 – Strategic Plan Overview

Low Traffic Neighbourhood

All the options presented above require the reallocation of road space away from private vehicles to accommodate greater priority for more sustainable modes. This may cause unwanted vehicle routing away from the main roads onto less suitable more residential streets. To reduce the potential impacts of this, part of the option development process has included the development of a Low Traffic Neighbourhood, which would encompass the streets between the A944 and A9119, and south of the A9119 as shown in the figure below.



Potential Low Traffic Neighbourhood Area

Low Traffic Neighbourhoods are places where motor traffic in residential streets is greatly reduced. This is done by minimising the amount of traffic that comes from vehicles using the streets within the neighbourhoods to get to another destination (this is often referred to as ‘through-traffic’ or ‘rat-running’). Private motorised vehicles still have easy access to all homes and businesses without driving directly through the neighbourhood. This opens up networks of streets so people can safely travel through the area on foot, bicycle, by wheeling or by bus. Emergency vehicles can also be prioritised to reach their destinations quicker.

Measures to facilitate the Low Traffic Neighbourhood could include:

- Possible road closures with access restricted to bus and cycle only, or cycle only
- Re-routing bus services to enable streets to provide safe on-road cycle routes

Options Appraisal

In line with STAG, the Detailed Options Appraisal has appraised each option against: Environment, Climate Change, Health, Safety and Wellbeing, Economy, Transport, Equality and Accessibility, Cost to Government and Risk and Uncertainty. In addition, an appraisal of the feasibility, affordability and acceptability of the options is also made. Note that since the Preliminary Options Appraisal was undertaken the STAG criteria has been revised.

The tables below summarise the main advantages and disadvantages in relation to the options.

Appraisal Summary – Key Advantages and Disadvantages – Options

Option	Advantages	Disadvantages
All Options	<ul style="list-style-type: none"> • Provide more sustainable travel options to support carbon reduction targets • Align with local, regional and national transport policy • Provide much improved pedestrian environment with pavement widening, segregation between pedestrians and cyclists, footway decluttering, improved crossing facilities and improved signage. This was welcomed by members of the public as noted in the public survey • Provide a step change in cycling provision between Westhill, Kingswells and Aberdeen city centre • Provides safe segregated cycling routes across significant sections of the corridor(s) likely to encourage new cyclists • Likely to reduce traffic accidents through modal shift from the car and the provision of segregated cycle routes 	<ul style="list-style-type: none"> • Likely to generate congestion (at least in the short term but this may help encourage modal shift to more sustainable modes) and potential unwanted re-routeing • Requires significant investment in infrastructure • Impacts on on-street parking • Requires bus service route adjustments (as discussed against the relevant option)
1 Prioritise cycling on A944 and A9119	<ul style="list-style-type: none"> • Step change improvement in cycle provision, offering continuous segregated provision along both corridors and direct active travel access to key employment and healthcare facilities located along the corridors • Best reflects the Sustainable Travel Hierarchy by catering for active travel first and then addressing provision for other modes along both corridors • Mode switch from car (and bus) to active travel would reduce traffic related carbon and other harmful emissions • Greater number of trips made by active travel modes would have a positive impact on health and well-being • Most preferred option by members of the public, with two-thirds of respondents who were supportive of the options citing Option 1 as their preferred option. This may in part be influenced by the strong opposition to the other options due to the parallel route proposals • Based on the responses to the public survey, expected to generate the greatest modal shift towards sustainable travel 	<ul style="list-style-type: none"> • Gradients between the Foresterhill Health Campus and the A92 (Anderson Drive) may deter use (as is highlighted in the Strava Metro analysis) • Does not provide continuous bus priority along either corridor alongside the cycle proposals due to lack of space, particularly on the A9119 where space is more challenging east of Anderson Drive • Likely to provide the lowest bus journey time benefits of all options and therefore likely to generate only minor modal shift to the bus • Would not support the implementation of ART on either of the corridors •
2 Prioritise buses on A944 and A9119	<ul style="list-style-type: none"> • Provides continuous fully segregated bus priority infrastructure on the A944 and maximises bus priority infrastructure (given the more constrained environment) on the A9119 • Would provide more consistent bus journey times across the day • Provides the greatest bus journey time benefits across both corridors 	<ul style="list-style-type: none"> • Likely to generate the most significant rerouting by general traffic given the road space reallocation which may negatively impact on secondary and local routes with increased noise and reduced air quality • Challenging to provide continuous fully segregated bus priority on the A9119 due to space constraints, reducing the extent of journey time reductions that could be achieved

Option	Advantages	Disadvantages
<p>2</p> <p>Prioritise buses on A944 and A9119</p>	<ul style="list-style-type: none"> • Would offer a more competitive bus journey time when compared with travel by car along both corridors, supporting modal shift to more sustainable travel modes: • For services between Kingswells P&R and Aberdeen bus station (Services 4, 5 and 6 routing via the A9119) - up to a 10 minute journey time saving • More limited journey time savings on Services 11, 14 and 23 which utilise only parts of the A944 • Potential journey time savings of around 5 minutes on the A944 with new services operating over the full length of the corridor between Kingswells P&R and the city centre (note that journey times from Kingswells P&R to the city centre would be shorter via the A944 than the A9119) • Would encourage use of the Kingswells P&R • Would enable ART vision to be realised through highly segregated public transport provision on the A944 corridor • Based on the responses to the public survey, expected to generate the greatest modal shift towards travel by bus • While parallel cycle routes would be required, the quieter cycle routes along more residential streets may be preferred by users (as opposed to cycling on the corridors themselves) and be perceived as safer encouraging use • The parallel cycle routes provide a good level of segregated provision • Variants B and C provide quick bus access from the A944 to Union Street (and to Union Square for interchange to the railway and bus stations under Variant B) 	<ul style="list-style-type: none"> • Segregated cycle routes along both corridors cannot be provided alongside bus priority requiring parallel cycle routes which would not route directly past key destinations such as the Foresterhill Health Campus or Woodhill House (although access to these destinations could be made on a number of suitable 'connector' roads) • Difficult to access the A9119 parallel cycle routes from south of the corridor and fewer suitable 'connector' cycle links from the parallel routes to the A9119 corridor itself • Variants B and C would impact on the Berryden Corridor Improvement Scheme objectives due to the changes proposed to the Skene Square junction with Rosemount Place / Maberly Street and the reallocation of a lane of traffic on Skene Square and Woolmanhill (Variants B and C) and on Denburn Road (Variant B) • Very strong opposition to the A944 parallel route proposals, particularly from both members of the public and local businesses with regards to the route along Rosemount Place and the subsequent need to reduce on-street parking and re-route the number 3 bus service from both Rosemount Place and Mid Stocket Road. The current bus operator also noted the number of elderly passengers who would be affected in terms of losing their direct bus access to the shops along Rosemount Place and overall were opposed to the suggested re-routing of the service • Second least preferred option by members of the public, with the disagreement with this option focussed on the A944 parallel route proposals • Design constraints make the A9119 parallel routes challenging to implement and access to the routes from the residential areas south of the A9119 would be difficult <p>To accommodate A944 parallel cycle routes:</p> <ul style="list-style-type: none"> • Car parking would need to be removed from Eday Road, Stronsay Place, Summerhill Terrace, Edgehill Road, Woodstock Road, Oakhill Road, King's Gate, Beechgrove Terrace and Mid Stocket Road onto side roads, which may make it more difficult for local residents to directly access their homes, especially for those with mobility issues, with young children etc. • Requires diversion of bus service 3 from Rosemount Place which may require some users to walk further to access the service, and there is very strong public opposition to this, and the bus operator has also noted concern

Option	Advantages	Disadvantages
		<ul style="list-style-type: none"> • Requires parking bays and loading provision changes along Rosemount Place which may impact on local businesses and there is very strong public opposition to this • Requires diversion of bus services 3, 14, 16 and 23 from Mid Stocket Road which may require some users to walk further to access the service. Again, and there is very strong public opposition to this <p>To accommodate A9119 parallel cycle routes:</p> <ul style="list-style-type: none"> • Requires road closures on King's Cross Terrace, King's Cross Road and partial closure of the A92 access to Carnegie Crescent which would impact on residents • Requires reallocation of parking from Carnegie Crescent, Forrest Road and Fountainhall Road into adjacent streets which may make it more difficult for local residents to directly access their homes, especially for those with mobility issues, with young children etc.
3	<p>Prioritise cycling on A944 and buses on A9119</p> <ul style="list-style-type: none"> • Step change improvement in cycle provision along the A944, offering continuous segregated provision along the corridor • Prioritising one corridor for public transport and the other for active travel provides a clear distinction between the corridor purposes and better use of the available space • Providing space for segregated cycling infrastructure along the main corridor sends a clear message about the priority and importance of active travel within the travel hierarchy and the city, and is likely to encourage use by raising the awareness of infrastructure and through seeing users on the route • Would provide direct and high quality cycle access to the Foresterhill Health Campus and the Aberdeenshire Council offices at Woodhill House • Would provide more consistent bus journey times across the day for bus travel on the A9119 • As with Option 2, would offer a more competitive bus journey time when compared with the car along the A9119, supporting modal shift to more sustainable travel modes with up to a 10 minute journey time saving for services between Kingswells P&R and Aberdeen bus station (Services 4, 5 and 6) • While A9119 parallel cycle routes would be required the quieter cycle routes along more residential streets may be preferred by users (as opposed to cycling on the corridors themselves) and be perceived as safer encouraging use 	<ul style="list-style-type: none"> • Gradients between the Foresterhill Health Campus and the A92 (Anderson Drive) may deter use of the cycle infrastructure (as is highlighted in the Strava Metro analysis) • Design constraints make the A9119 parallel routes challenging to implement and access to the routes from the residential areas south of the A9119 would be difficult • Second most preferred option by members of the public when overall ranking of options considered, although was only the first choice for 8% <p>To accommodate A9119 parallel cycle routes:</p> <ul style="list-style-type: none"> • Requires road closures on King's Cross Terrace, King's Cross Road and partial closure of the A92 access to Carnegie Crescent which would impact on residents • Requires dispersal of parking from Carnegie Crescent, Forrest Road and Fountainhall Road into adjacent streets which may make it more difficult for residents to directly access their homes, especially for those with mobility issues, with young children etc.

Option	Advantages	Disadvantages
<p>4</p> <p>Prioritise cycling on A9119 and buses on A944</p>	<ul style="list-style-type: none"> • Step change improvement in cycle provision, offering continuous segregated provision along the A9119. Responses to the public survey suggested that providing cycle infrastructure on the main corridors is significantly preferred over the parallel routes and also that cycling along the A9119 is preferred over the A944 • Prioritising one corridor for public transport and the other for active travel provides a clear distinction between the corridor purposes and better use of the available space • Providing clear space for segregated cycling infrastructure along the main corridor sends a clear message about the priority and importance of active travel within the travel hierarchy and the city and is likely to encourage use by raising the awareness of infrastructure and through seeing users on the route • The A9119 is a more residential route and can offer a more pleasant cycling experience for the user • Cycling infrastructure on the A9119 corridor itself can be more easily accessed by those south of the corridor • While A944 parallel cycle routes would be required, the quieter cycle routes along more residential streets may be preferred by users (as opposed to cycling on the corridors themselves) and be perceived as safer encouraging use • Would provide improved public transport access to the Foresterhill Health Campus and the Aberdeenshire Council offices at Woodhill House • Would provide more consistent bus journey times across the day for bus travel on the A944 • As with Option 2, could offer a more competitive bus journey time when compared with travel by car along the A944, supporting modal shift to more sustainable travel modes with up to a 5 minute journey time saving for services between Kingswells P&R and Aberdeen city centre (if new ART services were operating) • Would enable ART vision to be realised through highly segregated public transport provision 	<ul style="list-style-type: none"> • Variants B and C would impact on the Berryden Corridor Improvement Scheme objectives, in particular due to the changes proposed to the Skene Square junction with Rosemount Place / Maberly Street and the reallocation of a lane of traffic on Skene Square and Woolmanhill (Variants B and C) and on Denburn Road (Variant B) • Very strong opposition to the A944 parallel route proposals, particularly from both members of the public and local businesses with regards to the route along Rosemount Place and the subsequent need to reduce on-street parking and re-route the number 3 bus service from both Rosemount Place and Mid Stocket Road. The current bus operator also noted the number of elderly passengers who would be affected in terms of losing their direct bus access to the shops along Rosemount Place and overall were opposed to the suggested re-routing of the service. • Least preferred option by members of the public when overall ranking of options considered, although was only the first choice for 11%. Disagreement with this option focussed on the A944 parallel route proposals <p>To accommodate A944 parallel cycle routes:</p> <ul style="list-style-type: none"> • Car parking would need to be removed from Eday Road, Stronsay Place, Summerhill Terrace, Edgehill Road, Woodstock Road, Oakhill Road, King's Gate, Beechgrove Terrace and Mid Stocket Road onto side roads, which may make it more difficult for local residents to directly access their homes, especially for those with mobility issues, with young children etc. • Requires diversion of bus service 3 from Rosemount Place which may require some users to walk further to access the service, and there is very strong public opposition to this, and the bus operator has also noted concern • Requires parking bays and loading provision changes along Rosemount Place which may impact on local businesses and there is very strong public opposition to this • Requires diversion of bus services 3, 14, 16 and 23 from Mid Stocket Road which may require some users to walk further to access the service. Again, and there is very strong public opposition to this

Conclusions and Next Steps

In terms of the options:

- **Option 1: Prioritise cycling on both the A944 and A9119** - while providing much improved segregated cycling infrastructure along both corridors, this does not provide a significant step change in public transport provision, and this lack of more transformational bus priority measures along either corridor is likely to prohibit / undermine the implementation of ART between Westhill and the city centre. For that reason, it is not recommended that this option progress.
- **Option 2: Prioritise buses on both the A944 and A9119** - would provide significant benefits to bus users and is likely to attract new users. The proposals would also facilitate ART. While the proposed A944 parallel cycling routes are not directly along the A944, there are many suitable short linking 'connector' roads from the route to the A944 offering access to the main trip generators and attractors (e.g., Foresterhill Health Campus) and the routes offer quieter, less trafficked routes through residential areas and may be preferred by cyclists. It is however noted that to implement the parallel routes, there are a number of challenges including (i) the loss of on-street parking, (ii) bus service diversions, and (iii) parking bays and loading provision changes along Rosemount Place. As seen through the public survey, there is strong opposition from some to such changes, and should the A944 parallel routes progress, early design feasibility and engagement work (with both the local community, businesses and the bus operator) should be undertaken. This should include work to enable an understanding of the likely economic impacts of the proposed measures on local businesses. While recognising that the proposed A9119 parallel cycle routes offer a high level of segregation from general traffic and routes through quieter residential streets, there are a number of design constraints which make the routes challenging to implement - and access to the routes from the residential areas south of the A9119 would be difficult. For that reason, **the A9119 parallel routes are not recommended for further development** (in favour of cycling infrastructure on the A9119 itself, as per Option 4 (see below)). If the option was to progress without the A9119 parallel routes this option would not then provide any improved environment for cyclists either on or close to the A9119 corridor.
- **Option 3: Prioritise cycling on A944 and buses on A9119** - would provide significant benefits to bus users on the A9119 and is likely to attract new users. However, the constrained nature of the A9119 corridor means continuous bus priority cannot be provided which will limit the benefits that could be realised through ART. In addition, the constrained nature of the route may preclude certain elements of ART (e.g., new stop infrastructure to enable faster boarding and alighting times). For this reason, this option is **not recommended** for further consideration. In addition, the option was the first choice for only 8% of those who were supportive of an option (this was the lowest of all options).
- **Option 4: Prioritise cycling on A9119 and buses on A944** - would, as noted above for Option 2, enable ART to be facilitated on the A944 corridor where there is space for continuous bus lanes and the supporting stop infrastructure and there are numerous trip generators of both local and regional significance (such as Foresterhill Health Campus). Gradient issues heading westbound on the A944 are clearly unfavourable with cyclists, and cycle conditions on the A9119 appear preferable (as seen through the Strava data analysis). In addition, prioritising one corridor for public transport and the other for active travel provides a clear distinction between the corridor purposes, and better use of the available space with the A9119 corridor, which is a more residential route offering a more pleasant cycling experience for the user. The cycling infrastructure could also be more easily accessed by those south of the corridor (than the proposed parallel routes required if 'on corridor' infrastructure were not provided). As noted for Option 2 above, the outcomes of the public survey highlighted the opposition to the proposed A944 parallel cycling routes and therefore, early design feasibility and engagement work should be undertaken.

Given the above and particularly the ability to facilitate the implementation of ART, and the clear distinction between the corridor purposes the option would provide, **it is recommended that Option 4 be progressed**. However, given the opposition expressed within the study to the A944 parallel route proposals from Rosemount and Midstocket residents and local business, **early design feasibility and engagement work (with the local community, businesses and the bus operator) should be undertaken**. This should include work to enable an understanding of the **likely economic impacts** of the proposed parallel route proposals on local businesses.

Option 4 includes variants A, B and C at the eastern end of the A944 corridor, which consider bus priority infrastructure into the city centre from the corridor:

- **Variant A:** Routes via Mounthooly Roundabout and West North Street to Union Street. Such a route would not offer the most direct access to the city centre and is not heavily used for bus services at present.
- **Variant B:** Routes via Skene Square, Woolmanhill and Denburn Road to Union Square, and onwards to via Market Street to Union Street. The variant assumes the widening of Skene Square and Caroline Place as part of the committed Berryden Corridor Improvement Project (which will provide two traffic lanes in both directions throughout the length of the corridor, widening the existing road between Skene Square and Ashgrove Road and creating a new road between Ashgrove Road and Kittybrewster Roundabout). Additionally, over the southern part of the scheme, requires the reallocation of a lane of traffic in each direction to public transport on Skene Square, Woolmanhill and Denburn Road.
- **Variant C:** Routes via Skene Square and Woolmanhill, with a new bus only access to Blackfriars Street, Rosemount Viaduct, Union Terrace and onto Union Street, and similar to variant B, assumes the widening of Skene Square and Caroline Place as part of the committed Berryden Corridor Improvement Project. Additionally, over the southern part of the scheme, requires the reallocation of a lane of traffic in each direction to public transport on Skene Square, and Woolmanhill.

The most suitable variant for progression will be heavily dependent on the outcomes of the ART development work, and at this stage it is not recommended that any of the variants are discounted.

Next Steps: Risks and Issues for further consideration

At the next stage of the appraisal / business case, key issues and risks requiring more detailed consideration include:

- **Availability of third-party land for highway widening:** there is a need to understand the impact of the proposals on land outside the highway boundary and how this could be minimised. This is particularly relevant at junctions along Lang Stracht and Westburn Road where larger junctions are proposed to accommodate increased levels of bus priority and pedestrian / cycle facilities.
- **Impacts of road space reallocation** between Kingswells and Mounthooly roundabout, with the reallocation of a lane of the existing carriageway from general traffic to bus only over much of the corridor. The potential impacts on all road users needs consideration, especially the potential cumulative impacts of the proposals for the A944 and A9119 when considered with the proposals for the other corridor studies. Even with the corridors optimised to manage general traffic demand, it is likely some wider traffic reassignment will occur which potentially routes traffic along less suitable roads or onto those that delay other bus services. A strategic traffic modelling assessment is required to understand the extent of the reassignment and what mitigation is required.
- **Highway Corridor Performance:** The impact of proposals could create a corridor that is unable to efficiently manage the change to existing general traffic demands, resulting in exit blocked junctions and wider traffic disruption. Once the outline design is complete, the development of a micro-simulation traffic model should be considered to establish a suitable traffic management strategy for the corridors, one that ensures junctions have sufficient capacity and are co-ordinated.

- **Revenue Costs / Highway infrastructure maintenance liabilities:** There are several junctions¹ that require major road layout changes to provide suitable provision for cyclists and / or level of bus priority. Those on A944 Lang Stracht / Westburn Road require enlargement and full signal upgrades while those in A9119 Queens Road require either the removal of the roundabout and replacement with a signalised crossroads or conversion to a compact roundabout with circulatory cycle lanes. In addition to the substantial capital cost to deliver these signal upgrades or conversions, they will require an increase to highway maintenance budgets unless savings can be found elsewhere in the network.
- **Impact on the Berryden Corridor Improvement Project** and the scheme objectives from the proposed variants B and C
- **Loss of on-street parking:** the proposals require the removal of on-street waiting, loading and parking provision to accommodate the bus priority and cycle route infrastructure which will likely lead to local resident and trader opposition. There is a need to understand current parking behaviours and what opportunities there are to relocate this activity into adjacent side roads.
- If the A944 parallel cycle routes progress as part of this option:
 - **Loss of on-street parking:** to accommodate the A944 parallel cycle routes on Eday Road, Stronsay Place, Summerhill Terrace, Edgehill Road, Woodstock Road, Oakhill Road, King's Gate, Beechgrove Terrace and Mid Stocket Road
 - **Bus route diversions:** to accommodate the A944 parallel cycle routes because it is not possible to accommodate bus stops because of a constrained highway boundary. In these cases, bus services will need to be diverted onto other routes where potentially connectivity of local bus services is reduced. Bus stop connectivity analysis is required on the potentially affected routes (3, 14, 23 and 218 in the Rosemount area) and suitable mitigation developed
 - **Economic impacts to local businesses:** to accommodate the A944 parallel cycle routes
 - **Changes to parking bays and loading provision** changes along Rosemount Place

Furthermore, the following design and operations issues need to be considered:

- **Parking policy / supply:** the availability and cost of parking within the city centre and at key employment sites undermines proposals to encourage the use of bus services
- **Cycle infrastructure design:** The proposals use various types of cycle route infrastructure and while consistent with Cycle by Design, there is a need to ensure a consistent approach is taken across all corridors to ensure the cycle route network as it develops, remains coherent
- **Bus infrastructure design:** It is not possible to provide enhanced bus lanes at all junctions along Lang Stracht and Westburn Road due to the highway boundary and capacity constraints. These gaps could potentially become congested leading to bus delays. Similar issues occur along Skene Road and Queen's Road but where bus lanes need to be staggered due to highway boundary constraints. Outline design and traffic modelling assessment is required to establish an effective traffic management strategy for the A944 and A9119 corridors.
- **Foresterhill Health Campus / Aberdeen Royal Infirmary access:** The connectivity of the health campus to bus services operating along Lang Stracht and Westburn Road needs to be improved through the development of a new interchange and junction modifications

¹ A944 junctions include Lang Stracht junction with Summerhill Drive, Lang Stracht junction with A92 North Anderson Drive and Lang Stracht junction with Foresterhill Road. A9119 junctions include Queen's Road junction with A92 Anderson Drive, Queen's Road junction with Forest Road and Queen's Road junction with Fountainhall Road (Queen's Cross).

- **Complexity of junction layouts and the method of signal control:** The proposed infrastructure is likely to require a substantial upgrade to the Council's Urban Traffic Control system including new and upgraded hardware/ software
- **Extent of utility diversions and protection works**
- **Impact on street lighting**
- **Waiting and loading restrictions:** and how these will need to be changed to accommodate the proposals

There are also a number of opportunities that need to be considered as the study progresses:

- **Bus interchanges:** Within the study area there are options to improve bus interchanges at the Aberdeen Royal Infirmary, Provost Graham Avenue bus terminus and at Prime Four / Kingswells P&R
- **Compact roundabouts (with circulatory cycle lanes):** There are three locations within the study area where existing roundabouts could be converted to Dutch style 'Zwolle' roundabouts. While the single traffic lane approaches and circulatory lanes will reduce the capacity for general traffic, they offer a less expensive option to providing suitable cycle route infrastructure than signalisation
- **Public realm:** The proposals to improve conditions for pedestrians, cyclists and bus services have the potential to improve the public realm through the repair and widening of existing footways which offers greater opportunity for tree planting, seating areas, upgrade of materials and less crowded footways. This is particularly relevant at locations where cycle routes pass through or close to local and district centres
- **Low Traffic Neighbourhood:** To create a more comprehensive cycle route network to the west of the city and support safer local walking routes there is an opportunity to create a Low Traffic Neighbourhood bounded by Westburn Road (to the north), North Anderson Drive/ Anderson Drive (to the west) and Cromwell Road/ Union Grove (to the south). The LTN concept requires detailed development and engagement with the local communities it will impact
- **Cycle Parking:** To support the proposed cycle routes new secure cycle parking should be delivered at key locations on or close to the route. This should include locations close to local shops, at schools and workplaces and at public transport interchanges such as the Kingswells P&R

1 Introduction

1.1 Overview

- 1.1.1 Stantec was appointed in July 2021 by Aberdeen City Council to undertake a Scottish Transport Appraisal Guidance (STAG) based Detailed Options Appraisal of the A944 and A9119 (including Albyn Place) corridors between Westhill and Aberdeen City Centre. This study builds on the findings of the *Case for Change* (Stantec, July 2020) and *Preliminary Options Appraisal* (Stantec, October 2020) STAG stages, which identified the need and options for delivering transformational change to sustainable transport provision on the western approaches to the city.
- 1.1.2 This STAG-based Detailed Options Appraisal includes the development of detailed options and concept sketches and designs. While the study focuses on improving conditions for walking/wheeling, cycling and public transport (per the Sustainable Travel Hierarchy), consideration has been given to impacts upon all road users.
- 1.1.3 The A944-A9119 Multi-Modal Corridor Study is one of eight corridor studies being undertaken across Aberdeen. Work undertaken as part of this commission will feed into adjacent corridor studies as well as the Aberdeen Rapid Transit Options Appraisal Study.

1.2 Background

- 1.2.1 The initial stage of this study, the development of the *Case for Change*, considered the problems, opportunities, issues, and constraints for the study, set Transport Planning Objectives, and developed and sifted a list of multi-modal transport options which sought to improve sustainable transport connections between Westhill and Aberdeen City Centre. At the *Preliminary Options Appraisal* stage, these options were then qualitatively appraised, against the objectives, the STAG appraisal criteria (Environment, Economy, Safety, Accessibility & Social Inclusion, and Integration), and against Implementability criteria (Feasibility, Affordability and Public Acceptability). Options were then rejected or selected for further development and more in-depth appraisal at the Detailed Options Appraisal stage. A Baseline and Monitoring Technical Note was also produced to accompany the Preliminary Options Appraisal report, which sets out a framework for monitoring the success of the options.
- 1.2.2 A summary of the outcomes of the Case for Change and Preliminary Options Appraisal is provided within this report with full details of all the earlier stages of this study presented in the following reports:
- A944/A9119 Transport Corridor Study – STAG-Based Appraisal, Case for Change (*Stantec, July 2020*)
 - A944/A9119 Transport Corridor Study – STAG-Based Appraisal, Preliminary Appraisal, (*Stantec, October 2020*)
 - A944/A9119 Transport Corridor Study – STAG-Based Appraisal, Baseline and Monitoring Interventions Technical Note (*Stantec, October 2020*).

1.3 Study Area

The study area is indicated in orange in Figure 1:1. Note that Union Street and King Street formed part of the study area during the Case for Change and Preliminary Options Appraisal stages but are now excluded to prevent duplication of work, these streets being part of the City Centre Masterplan area.



Figure 1:1: Study area

- 1.3.1 Within the study area, car mode share is notably higher than that seen in other Scottish cities - this is particularly true towards the west of the corridor. Combined with decreasing bus patronage and relatively low levels of walking and cycling, the region's networks are dominated by car-based trips. However, there is still a substantial number of people who depend on the bus and active travel networks along these corridors.
- 1.3.2 Regional and national policy seek to arrest these trends and encourage more sustainable travel, to support population health, aid social inclusion and to assist the Scottish Government in its aim of reducing car kilometres by 20% by 2030.

1.4 Scope of Work

- 1.4.1 The purpose of the study is to build on previously identified and appraised options for improving transport connections between Westhill and Aberdeen City Centre. The study considers the corridors in a holistic manner, looking at both eastbound and westbound movements and recognising development aspirations and pressures in both Aberdeen and Aberdeenshire.
- 1.4.2 The key output of this study is a set of end-to-end costed, indicative dimensioned concept designs, which are feasible and deliverable, and have demonstrable benefits, to enable the local authorities and partners to further develop them for implementation.
- 1.4.3 While the focus of the study is on the development of sustainable transport interventions, due regard has been given to the likely impact that the proposed interventions will have on all modes, including general traffic and freight. Reflecting the status of A944 and A9119 as priority routes per the North East Scotland Roads Hierarchy, particular attention has been given to the development of options which improve the competitiveness of sustainable modes without rerouting traffic down less appropriate routes. The study has sought to identify and design interventions to support this environment and minimise / or mitigate unintended routing consequences.
- 1.4.4 The scope of work has therefore covered:
- Validation and development of previous work, including option refinement, and smartening of Transport Planning Objectives (TPOs)
 - Development of end-to-end corridor options, including clarification of the existing road envelope, the development of concept sketches and concept designs, focussing on transformational options with the potential to provide significant benefits for active travel and public transport users
 - Detailed Options Appraisal
 - Engagement with the public and stakeholders, to inform and gain feedback on proposals

- STAG reporting, with the identification of the best-performing design options to inform decision making on a preferred option for further development and implementation

1.4.5 The associated workflow is summarised in Figure 1:2 below.

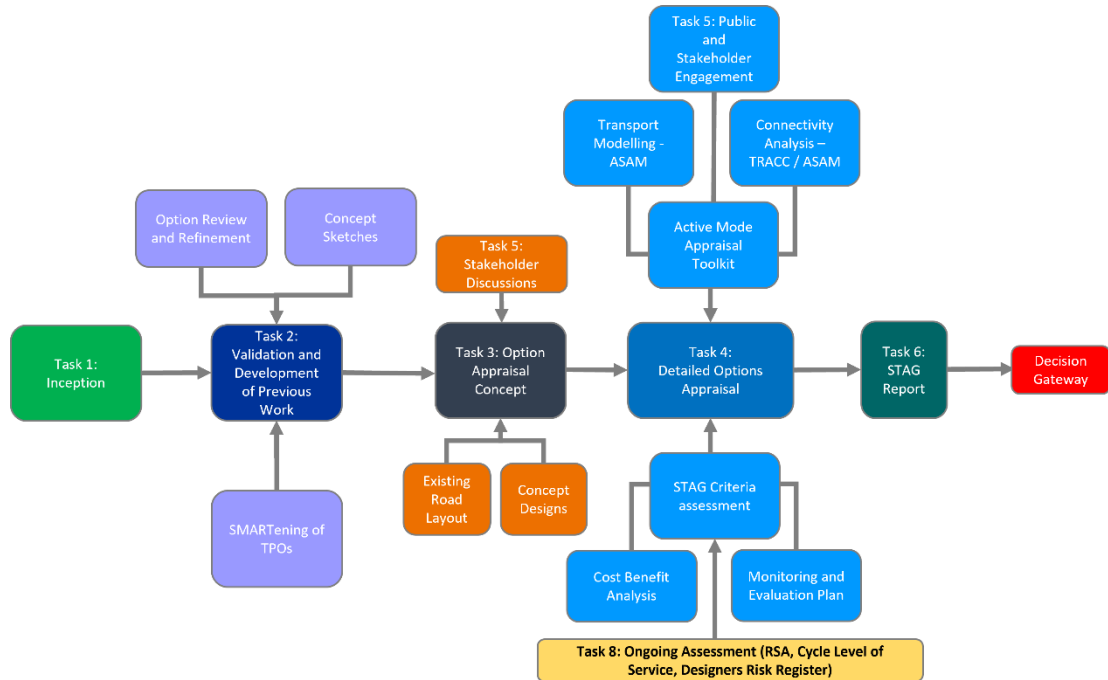


Figure 1:2: Task Workflow

1.4.6 Upon the study progressing through a Decision Gateway with Transport Scotland (Bus Partnership Fund team), the study will progress to the development of a robust business case including cost-benefit analysis for a preferred option (as selected by Aberdeen City Council).

2 Overview of Case for Change and Preliminary Options Appraisal

2.1 Introduction

2.1.1 This Chapter provides a summary of outcomes of the *Preliminary Options Appraisal*, which culminated in the recommendation of options for appraisal at this Detailed Options Appraisal stage. As noted in the section above, the full Preliminary Options Appraisal report (*A944/A9119 Transport Corridor Study – STAG-Based Appraisal, Preliminary Appraisal, Stantec, October 2020*) provides full details of the appraisal work.

2.2 Case for Change

Problems

2.2.1 The key problems identified at the Case for Change of the study included:

- Problem 1: Pedestrian infrastructure is inconsistent
- Problem 2: Cycle route infrastructure is disjointed
- Problem 3: Cycle infrastructure is inconsistent in form and quality
- Problem 4: Travel by public bus is not seen as an attractive option
- Problem 5: Bus priority infrastructure is sporadic, and buses are caught in traffic congestion
- Problem 6: Bus stop design and placement
- Problem 7: Kingswells Park & Ride infrastructure is underutilised
- Problem 8: Car travel is perceived as being cheaper than travel by public transport
- Problem 9: Bus network and service frequency are threatened by high car mode share
- Problem 10: Vehicular traffic dominates the city centre
- Problem 11: Poor driver behaviour and misuse of active/bus travel infrastructure
- Problem 12: Significant traffic delays are seen during peak periods
- Problem 13: Extensive development is planned to the western end of the corridor

Opportunities

2.2.2 A range of opportunities were identified including:

- Existing Active Travel Promotional Schemes
- Policy supports active travel improvements along the corridor
- Existing active Travel and bus priority infrastructure
- Existing smart ticketing system

- New / extended local authority powers under the Transport (Scotland) Act 2019
- Investment in line with NTS2 Sustainable Transport Hierarchy
- Availability of external funding sources
- Kingswells Park & Ride has significant spare capacity
- Business Improvement Districts Scheme
- Planned / Committed Improvements to Date
- Trip generators and attractors present along the corridors
- New developments lending support to the delivery of transport Improvements

2.2.3 Additionally, since the work was undertaken, changes across the policy landscape, most notably around climate change, now present decision makers with a clear rationale and justification to implement the changes and behavioural change catalysts required in the transport system. The publication of the Scottish Government's updated *Climate Change Plan* (2020), the *Reducing car use for a healthier, fairer and greener Scotland* (2022) publication, Transport Scotland's draft STPR2 and Scotland's NTS2 all provide clear opportunity for developing and implementing transformational sustainable transport schemes.

2.2.4 This strong underpinning policy context offers strengthened opportunities for successfully developing and implementing sustainable transport schemes and from the outset, the study aim has been to provide **transformational and more sustainable travel options** which can encourage modal shift towards walking, cycling and public transport.

Issues and Constraints

2.2.5 A range of **issues** were identified for the study including the impacts of the COVID-19 pandemic and the longer-term implications for public transport, the declining oil and gas industry in the region, commitment infrastructure to support residential and commercial developments along the corridors and the impacts of the Aberdeen CCMP on the road network. Identified **constraints** included significant road gradients (particularly for cyclists), limited road and junction widths at points along the corridors, and multiple agencies involvement in delivery.

2.2.6 A key design issue being addressed at this Detailed Options Appraisal stage, which was not present during the Case for Change and Preliminary Options Appraisal stages, is the need to ensure the infrastructure developed can facilitate the successful delivery of ART on the corridor(s).

Transport Planning Objectives

2.2.7 Eight TPOs for the study were developed at the Case for Change stage and were used to appraise the options at the Preliminary Options Appraisal stage. These have been smartened during the Detailed Options Appraisal, and further detail on these is provided in the next Chapter.

2.3 Preliminary Options Appraisal

Option Development

- 2.3.1 An initial long list of options was derived through: (i) options identified through previous and ongoing studies; (ii) options identified via the stakeholder consultation process; and (iii) those identified via internal team optioneering workshops.
- 2.3.2 An option sifting exercise was then undertaken to remove options that would not deliver against the TPOs and STAG criteria. Furthermore, options considered more appropriately implemented as part of a wider study, were routed away at this stage of the appraisal process.
- 2.3.3 Options were then packaged into four delivery packages, increasing in their ambition:
- **Low Delivery Package** – which requires the minimum level of works and investment and represents the minimum acceptable level of option delivery
 - **Medium Delivery Package** – which requires a higher level of works and investment and will provide more options beyond the minimum in line with existing levels of work
 - **High Delivery Package** – this involves a high level of infrastructure works alongside a significant investment in this infrastructure and other policy / regulatory changes to facilitate the delivery of these options
 - **Gold Delivery Package** – this package represents the highest level of infrastructure works in line with best practice guidance and will require substantial financial investment to support the delivery of this package of options.
- 2.3.4 As the packages are developed from the minimum package to the gold package, not all options will be considered within each package as some replace others and others are already accounted for within another option, so these packages are **additive not cumulative**, as you progress through the hierarchy.

Option Appraisal

- 2.3.5 The four option packages were appraised against the STAG criteria which were, at that time, Environment, Economy, Safety, Accessibility & Social Inclusion, and Integration, and against Implementability criteria considering each options Feasibility, Affordability and Public Acceptability. Note that STAG was revised in early 2022 and the Detailed Options Appraisal is being undertaken in line with the revised guidance.
- 2.3.6 Various options within each of the packages are being considered further as part of this Detailed Options Appraisal stage of the study and are discussed in greater detail in Chapter 4.

2.4 Engagement

- 2.4.1 Engagement with stakeholders and the public was undertaken during the Case for Change stage of the study (which at the time of reporting, also incorporated the development of options), and included:
- **Stakeholders** were issued with a briefing note to capture their views on travel along the corridor by mode and any other key comments related to the study corridors
 - Public Opinion:

- Initially sourced from (i) responses to consultations from other reports and studies interacting with the corridors and (ii) from responses to the Aberdeen City Commonplace page in support of COVID19 related Spaces for People response
- Online Public Engagement Exercise undertaken to gather public opinion on the options developed. An interactive and visual ArcGIS StoryMap was developed for the engagement, including a survey as part of the StoryMap to capture the feedback of the public on the outcomes of the study thus far and the options identified. The engagement was live for a period between 7th September 28th September 2020, with stakeholders previously consulted on the study receiving an invitation to complete the survey and public awareness attained through the social media channels of Aberdeen City and Shire councils and Nestrans, in addition to a wider press release by Aberdeen City Council.

3 Smartening the Transport Planning Objectives

3.1 Introduction

3.1.1 The STAG states that, at the start of any Detailed Options Appraisal, the Transport Planning Objectives (TPOs) for the study should be revisited and 'SMART-ened'.

3.1.2 This process was undertaken through two steps:

- **A rationalisation exercise** – where the TPOs were revisited to ensure they were still relevant to the study, and overall reduce the TPOs down from the eight developed at Case for Change stage
- A SMART-ening exercise, ensuring the TPOs were Specific, Measurable, Attainable, Relevant and Timed.

3.2 Rationalising the Objectives

3.2.1 Following a review of the eight TPOs developed at the Case for Change stage (and used to appraise the options at the Preliminary options Appraisal stage), three TPOs were discarded:

TPO3 - *Rebalance the city centre environment in favour of more sustainable modes* - the city centre has been removed from the study area at this stage of the appraisal as the Aberdeen City Centre Masterplan (CCMP) proposals aim to address identified problems. As a result, TPO3 is no longer needed within this study.

TPO6 - *Address the cost of public transport* - while recognising that addressing the cost of bus travel (or the perception) is an issue, especially in terms of ensuring equality of access, bus fares are set by commercial operators and Aberdeen City Council and Aberdeenshire Council do not have control over this. The options being developed and appraised as part of this study will not be able to address this TPO or provide any benefit or disbenefit with regards to this TPO, with no discernible difference in the appraisal between any of the options. While not directly addressing the cost of public transport itself, it is however recognised that the Councils can implement certain demand management measures in tandem with the options, which would increase the cost of using the car relative to public transport and active travel. Such measures could include increasing car parking charges, congestion zone charging and workplace parking licenses. The implementation of such options is likely to increase the overall success of sustainable transport option implementation.

TPO8 - *Increase the mode share for sustainable travel modes along the A944 and A9119 transport corridors* - Increased mode share is an *outcome* of TPOs 3, 4 and 5, and is not considered a TPO in its own right.

3.3 SMART-ening the Objectives

3.3.1 In accordance with STAG, TPOs should be SMART-ened, such that they are:

- Specific - it will say in precise terms what is sought
- Measurable - there will exist means to establish to stakeholders' satisfaction whether or not the objective has been achieved
- Attainable - there is general agreement that the objective can be achieved
- Relevant - the objective is a sensible indicator or proxy for the change which is sought

- Timed - the objective will be associated with an agreed future point by which it will have been met

3.3.2 The remaining TPOs have been assessed against SMART criteria and their wording SMART'-ened as shown in Table 3.1.

Table 3.1: SMART-ening the Transport Planning Objectives

Transport Planning Objective	Specific	Measurable	Attainable	Relevant	Timed
<i>TPO1: Improve the quality of the pedestrian experience for all, and address the barriers which affect some groups moving around as a pedestrian</i>	Objective is specific in that it seeks to address mode specific issues but should be updated to indicate location.	Walking counts, Travel Diary, Travel to Work 2022, local user surveys (e.g., Aberdeen Citizens Panel surveys), desired vs. actual route ratios at junctions, accident rates and vehicle speed surveys.	There is agreement among stakeholders that TPO can be attained within remit of the sponsoring bodies.	Addresses transport problem and root cause. Developed direct from identified transport problems via Case for Change.	Baseline established prior to opening. Initial monitoring 1 year after opening and then evaluation at 5 years.
<i>TPO2: Improve cycle routes to ensure they are sufficiently direct and connected, while improving journey quality, times, and safety for cyclists in the corridor</i>	Objective is specific in that it seeks to address mode specific issues on study corridors (inc. parallel routes).	Cycle counts, Travel Diary, Travel to Work 2022, local user surveys (e.g., Aberdeen Citizens Panel surveys), shortest route vs actual route ratios, accident rates and vehicle speed surveys.	There is agreement among stakeholders that TPO can be attained within remit of the sponsoring bodies.	Addresses transport problem and root cause. Developed direct from identified transport problems via Case for Change.	Baseline established prior to opening. Initial monitoring 1 year after opening and then evaluation at 5 years.
<i>TPO3: Reduce journey times by bus and improve service punctuality</i>	Objective is specific in that it seeks to address mode specific issues but should be updated to indicate location.	Bus journey time information can be obtained from Bus GPS/AVL data (e.g., Bus Open Data or from operators) and via TRACC analysis.	There is agreement among stakeholders that TPO can be attained within remit of the sponsoring bodies.	Addresses transport problem and root cause. Developed direct from identified transport problems via Case for Change.	Baseline established prior to opening. Initial monitoring 1 year after opening and then evaluation at 5 years.
<i>TPO4: Improve the quality of bus services and bus stop infrastructure in the corridor, enhancing the experience for current bus users and attracting new passengers</i>	Objective is specific in that it seeks to address mode specific issues along the study corridors.	Local user surveys (e.g., Aberdeen Citizens Panel surveys), bus patronage / km, inventory of facilities at bus stops, Kingswells P&R car park occupancy	There is agreement among stakeholders that TPO can be attained within remit of the sponsoring bodies.	Infrastructure improvements should enhance the experience of travelling by bus but resulting behaviour change is an outcome and should not form part of TPO.	Baseline established prior to opening. Initial monitoring 1 year after opening and then evaluation at 5 years.
<i>TPO5: Provide improved integration between sustainable travel modes</i>	Objective is specific in that it seeks to address mode specific issues but should be updated to indicate location.	Travel diary, local user surveys (e.g., Aberdeen Citizens Panel surveys), Kingswells P&R car park occupancy	There is agreement among stakeholders that TPO can be attained within remit of the sponsoring bodies.	Addresses transport problem and root cause. Developed direct from identified transport problems via Case for Change.	Baseline established prior to opening. Initial monitoring 1 year after opening and then evaluation at 5 years.

3.3.3 Table 3.2 presents the original set of objectives from the Case for Change, on the left alongside the corresponding revised objectives on the right.

Table 3.2: Revising the Transport Planning Objectives

Preliminary Appraisal		Detailed Appraisal	
Ref.	Original Objective	New Ref.	SMART Objective
TPO1	Improve the quality of the pedestrian experience for all, and address the barriers which affect some groups moving around as a pedestrian	TPO1	Improve the quality of the pedestrian experience and address barriers to walking / wheeling along the A944, A9119 and Albyn Place between Westhill and Aberdeen city centre.
TPO2	Improve cycle routes to ensure they are sufficiently direct and connected, while improving journey quality, times, and safety for cyclists in the corridor	TPO2	Ensure cycle routes are sufficiently direct and connected, while improving journey quality, times, and safety for cyclists along the study corridors.
TPO3	Rebalance the city centre environment in favour of more sustainable modes	-	No longer applicable as city centre has been removed from study area
TPO4	Reduce journey times by bus and improve service punctuality	TPO3	Reduce bus journey times and make journey times more consistent on the A944 and A9119 between Westhill and Aberdeen city centre.
TPO5	Improve the quality of bus services and bus stop infrastructure in the corridor, enhancing the experience for current bus users and attracting new passengers	TPO4	Improve the quality of bus stop infrastructure on the A9119 and A944, to enhance accessibility and provide a more comfortable waiting experience.
TPO6	Address the cost of public transport and reduce gaps in bus connectivity along the corridor	-	Not applicable. Ticket pricing and service routing are outside the control of the client group, but improvements to infrastructure can drive changes to routing and connectivity.
TPO7	Provide improved integration between sustainable travel modes	TPO5	Improve bus stop connectivity to ease interchange between active travel and public transport on the A944 and A9119 corridors.
TPO8	Increase the mode share for sustainable travel modes along the A944 and A9119 transport corridors	-	Increased mode share is likely to be an outcome of TPOs 3, 4 and 5, and so is not needed as a TPO.

3.3.4 These TPOs reflect the range of things which the study is setting out to achieve across all modes of travel.

3.3.5 Key Performance Indicators to gauge how successful selected options are in satisfying these TPOs are set out in the Monitoring and Evaluation section.

4 Option Development

4.1 Options recommended from the Preliminary Options Appraisal

- 4.1.1 At the end of the Preliminary Options Appraisal, a range of options within the four packages were recommended for further appraisal. These primarily concerned bus, cycle, and pedestrian infrastructure improvements. Several options identified at Preliminary Options Appraisal stage have since been progressed through other projects and/or are no longer relevant given the changes to the study area and policy.
- 4.1.2 Table 4.1 presents the options output from the Preliminary Options Appraisal and highlights which of these options have been carried through into the Detailed Options Appraisal and which have not. Where an option has not been carried through to Detailed Options Appraisal, an explanation is provided in the final column and the row in the table is coloured grey.

Table 4.1: Options recommended for consideration at Detailed Options Appraisal stage

Mode		Option Description	Package				Comment
			Low	Med	High	Gold	
Walking & Wheeling	ACTO1	Programme of pavement maintenance and decluttering.		✓	✓	✓	To be progressed to Detailed Options Appraisal
	ACTO2	Review pedestrian desire lines and install pedestrian crossing facilities to suit.	✓	✓	✓	✓	To be progressed to Detailed Options Appraisal
	ACTO3	Develop Green Corridors in city centre and between development sites	✓	✓	✓	✓	Falls under CCMP remit.
	ACTO4	Identify and formalise a city centre cycle network	✓	✓	✓	✓	Falls under CCMP and the associated Sustainable Urban Mobility Plan (SUMP) remit
Cycling	ACTO5a	Provision of segregated 2-way cycle lane from Prime Four to CC via A944.				✓	To be progressed to Detailed Options Appraisal
	ACTO5b	Provision of segregated 2-way cycle lane from Prime Four to ARI via A944.			✓		To be progressed to Detailed Options Appraisal
	ACTO6	Provision of segregated 2-way cycle lane from Prime Four to Union St/Holburn St junction via A9119.				✓	To be progressed to Detailed Options Appraisal
	ACTO7a	Replace & extend existing advisory cycle lanes to provide a connected network.	✓	✓			Not supported by Cycling by Design Update 2021.
	ACTO7 b/c	Replace and extend all existing advisory cycle routes with mandatory cycle lanes to provide a	✓	✓	✓	✓	Not supported by Cycling by Design Update 2021.

Mode	Option Description	Package				Comment
		Low	Med	High	Gold	
	connected network, with the option of including light segregation.					
	ACT08 Create a cycle route on Old Lang Stracht		✓	✓	✓	Option is proceeding to delivery.
	ACT09 Provide advance stop lines or cycle by-passes at all signalised junctions.				✓	To be progressed to Detailed Options Appraisal
Bus	PTO1 Reconfigure roundabout junctions to signalised junctions, complete with bus and cycle pre-signals.				✓	To be progressed to Detailed Options Appraisal
	PTO2 Bus Rapid Transit on the A944 Westhill – Aberdeen City Centre, via Kingswells Park & Ride			✓		This concept is being further developed by Nestrans as part of an Aberdeen Rapid Transit study.
	PTO3 Continuous Bus Lane from Westhill to Aberdeen via A944.			✓		To be progressed to Detailed Options Appraisal
	PTO4 Continuous Bus Lane from Westhill to Aberdeen City Centre via A9119.	✓	✓	✓	✓	To be progressed to Detailed Options Appraisal
	PTO5 Changes to bus lane operational hours and enforcement.		✓	✓	✓	Proceeding to Business Case development as part of a package of traffic management measures to improve bus efficiency on the corridor and within the city centre.
	PTO6 Bus stop upgrade programme and stop rationalisation.		✓	✓	✓	To be progressed to Detailed Options Appraisal. Also, to be considered in tandem with ART study.
	PTO7 Bus Prioritisation / Pre-Signals at all signalised junctions on the corridors.		✓	✓	✓	be progressed to Detailed Options Appraisal
	PTO8 Reallocate all lay-by bus stops to on-street bus stops.		✓			To be progressed to Detailed Options Appraisal. Also, to be considered in tandem with ART study.
	PTO9a Make Castle Street to Union terrace, bus, cycle and walk only.			✓	✓	These options are being considered as part of CCMP and Low Emission Zone proposals.
	PTO9b Make Castle Street to Holburn Street Junction, bus, cycle and walk only	✓	✓	✓	✓	
PTO10 Rebrand of Kingswells Park & Ride.	✓	✓	✓	✓	Work is ongoing to promote and encourage increased use of the	

Mode	Option Description	Package				Comment
		Low	Med	High	Gold	
						network of bus and rail Park and Ride sites around the city and to facilitate multimodal journeys to and from the sites.
	PTO11		✓	✓	✓	Submitted to Transport Scotland, as trunk roads authority, for consideration.
	PTO12		✓	✓	✓	Being progressed via the North East Bus Alliance.
	PTO13		✓	✓		Work is ongoing to promote and encourage increased use of the network of bus and rail Park and Ride sites around the city and to facilitate multimodal journeys to and from the sites.
	PTO14			✓	✓	Being considered as part of CCMP bus priority work.
General	GTO1	✓	✓	✓	✓	Taken forward as part of the ACC City Centre Masterplan, Sustainable Urban Mobility Plan and Active Travel Action Plan.
	GTO2		✓	✓	✓	The corridors are included within a wider active travel signage audit being progressed by ACC.

4.1.3 Remaining options from the Preliminary Options Appraisal have then been incorporated into the development of end-to-end concept corridor designs where careful consideration has been given to the options which could be implemented together and how to maximise benefits by mode.

4.2 Developing End-to-End Options

4.2.1 The supplementary *A944-A9119 Multi-modal Study Concept Design Report*, which should be viewed in tandem with this report, provides extensive detail on the option development process, the design principals adopted (taking cognisance of the available good practice guidance) and presents the Concept Sketches and Concept Designs for the options developed.

4.2.2 In terms of the design work:

- Concept Sketches:** Design development for each option starts with a concept sketch that sets out the strategy for the corridor or routes by indicating the type of highway infrastructure required. This infrastructure is developed with an understanding of known problems but also what is needed to achieve the TPOs. For example, if a cycle route is required along a busy main road, then the sketch would indicate a continuous and segregated cycle lane or track with major changes at signalised junctions to provide

protected crossings. Or, for a strategically important walking route into a city centre, wide footways and side road junction modifications would be shown to ensure good pedestrian comfort levels and priority over side roads. The concept sketch would also show the location of key transport interchanges (e.g., Park & Ride or large employment sites) and the connections to other important walking or cycling routes along the corridor.

- **Concept Designs:** Once the transport strategy for the corridor is established, the concept sketch is developed into a concept design that uses an Ordnance Survey map base with scaled objects to begin to understand the physical and engineering constraints of delivering the infrastructure. The concept design establishes any road space reallocation required, the likelihood of impacting land outside the highway boundary which can inform qualitative assessment of how link and junction capacity would change for general traffic.

4.2.3 For the purpose of this report, higher level strategic plans are provided to present the options (discussed in the following section).

Approach

4.2.4 End-to-end corridor options have been developed through the production of concept sketches and designs. This approach has allowed a set of options to be developed to ensure that there is an understanding of what could be accommodated within the existing highway envelope, where third party land take would be necessary, and what features would be affected. Recognising the constraints along each corridor and incorporating the options developed during the earlier stages of the study, four core 'end-to-end' corridor options were identified.

4.2.5 As there is insufficient space at numerous locations along each corridor to accommodate both bus lanes and segregated cycle lanes (those which can meet current design best practice standards), these end-to-end options were developed on the basis that the infrastructure required for one mode may therefore need to be prioritised over the other. Infrastructure requirements for the other, or secondary mode, would then be accommodated where possible and in the case of active travel, use alternative parallel routes to the A944 or A9119 (noting that providing priority bus infrastructure off the main corridors is clearly less practical).

4.2.6 In all cases, where bus priority or active travel provision is proposed, there will be a reallocation of road space away from general traffic.

4.2.7 The end-to-end corridor options are as follows:

- **Option 1: Prioritise cycling on A944 and A9119.** Reflecting the Sustainable Travel Hierarchy, this option prioritises cycling infrastructure on A944 and A9119 (and thereafter provide the greatest additional bus priority infrastructure possible)
- **Option 2: Prioritise bus on A944 and A9119** (and thereafter provide the greatest additional cycle infrastructure possible). In this instance, parallel cycle route provision has been considered to ensure both modes are sufficiently provided for.
- **Option 3: Prioritise cycling on A944 and bus on A9119.** In this instance, the parallel cycle route provision for the A9119 as provided under Option 2 is considered.
- **Option 4: Prioritise cycling A9119 and bus on A944.** In this instance, the parallel cycle route provision for the A944 as provided under Option 2 is considered.

4.2.8 The measures considered for each of the four options are illustrated and discussed in the sections below. More detail on the option development process and option concept sketches can be found in and the supplementary *A944-A9119 Multi-modal Study Concept Design Report* which show the approximate location of the bus, cycle and pedestrian infrastructure proposed.

4.2.9 Under all options, improvements to walking and wheeling provision is included and is discussed as part of the options below.

4.2.10 Across the options there are various sections over which the proposed infrastructure is the same. To aid in the presentation and understanding of the options, the corridors have been divided into three sections as shown in the figure below. These sections are shown in the table and figure below.

Table 4.2: Corridor Sections for Option Development

Section		Walking and Wheeling Proposals	Cycling Proposals	Public Transport Proposals
I	Westhill to Kingswells	Same across all options		
II	Kingswells to city centre via A944	Same across all options	Same across Options 1 and 3	Same across Options 2 and 4
III	Kingswells to city centre via A9119	Same across all options	Same across Options 1 and 4	Same across Options 2 and 3

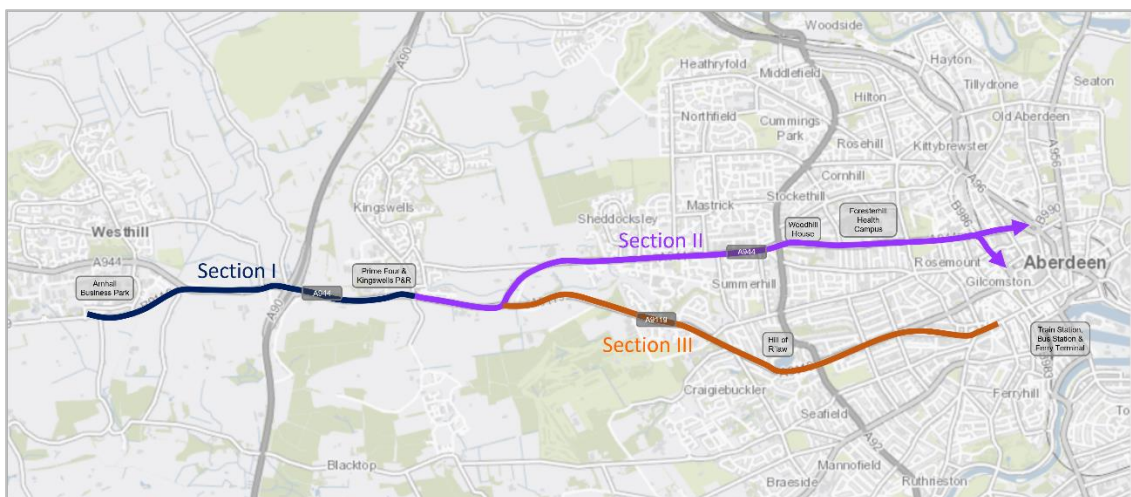


Figure 4.1: Corridor Sections for Option Development

4.2.11 Under all four options, improvements are assumed at bus stops, including:

- Bus Shelters and seating
- Footway Width
- Lighting (Internal)
- Lighting (Street Lighting)
- Information Board for Timetables
- Real Time Information
- Kassel Kerb (Equality compliant Kerb).

Option 1: Prioritise cycling on A944 and A9119

- 4.2.12 Option 1 seeks to prioritise the cycling infrastructure that can be provided along each of the two corridors. Thereafter, the greatest additional bus priority infrastructure possible is provided. The proposals are as shown in the table and figure below.
- 4.2.13 Note that in the figure, where:
- **Junction Adjustment** is noted this infers changes to side roads to make the walking and cycling experience safer and more comfortable. These changes establish the priority pedestrians and cyclists have over turning traffic at side roads as set out in the Highway Code, and using features such as tighter junction corners, entry treatments and continuous footways
 - **Junction Redesign** is noted this infers changes to the method of signal control (i.e., to accommodate new pedestrian / cycle crossing facilities) or major change to the layout (i.e., roundabout removal and replacement with signalised cross roads).
- 4.2.14 Where a **traffic gate** is noted in the table this refers to a measure to provide a level of bus priority where there is insufficient space for carriageway reallocation to bus lanes. A traffic gate is a technique used to control the inflow of vehicles into sensitive areas where it is particularly important to prevent serious congestion. One of its most important applications is to reduce bus delays by relocating congestion from narrow sections of the road network into an upstream section where bus lanes can be provided. Buses are then able to bypass the queued relocated traffic via the bus lane and enter the downstream section which is maintained as free flowing by the traffic gating signals. Journey times for general traffic remain approximately the same as they effectively queue on a different section of road and then benefit from the free-flowing conditions once past the gating point.

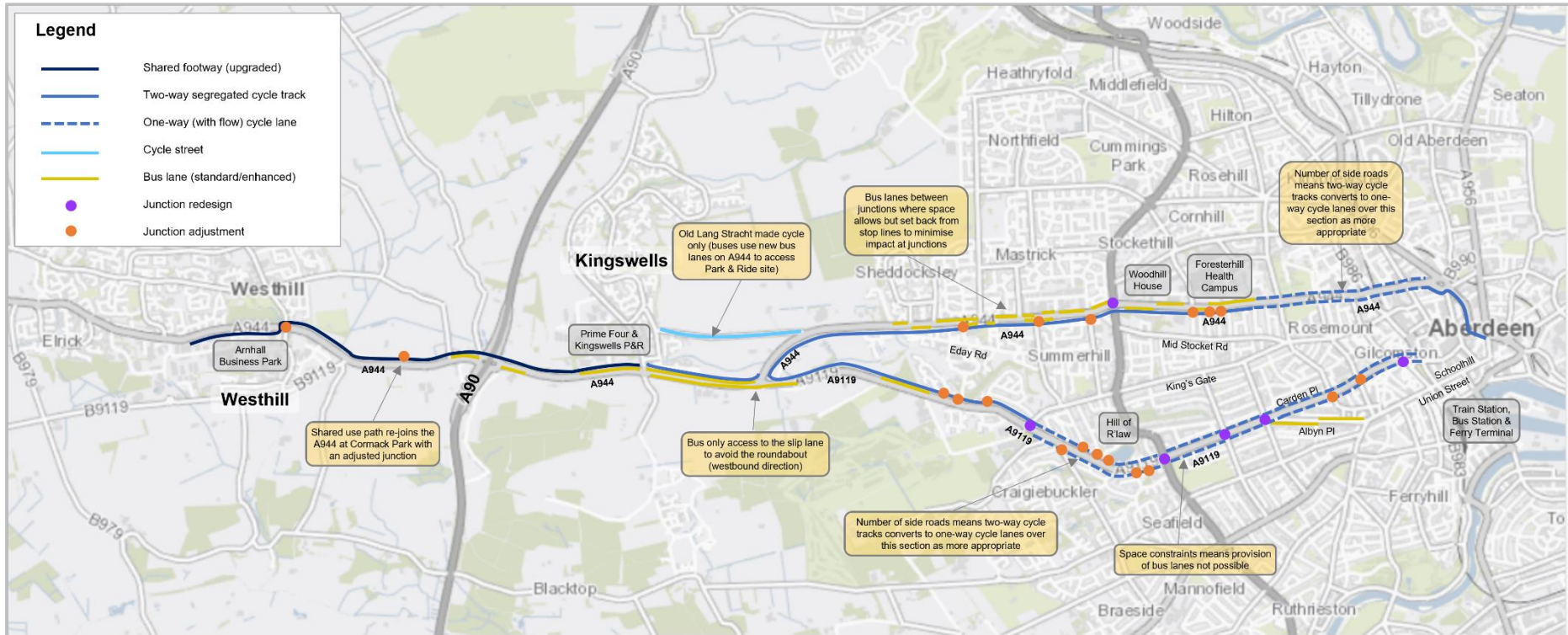


Figure 4:2: Option 1 – Strategic Plan

Table 4.3: Option 1 – Description

Section	Walking and Wheeling Proposals	Cycling Proposals	Public Transport Proposals
I Westhill to Kingswells	<p>Proposals to improve the provision for walking and cycling along Straik Road, the A944 and parts of Old Skene Road between Westhill and Kingswell include:</p> <ul style="list-style-type: none"> • Wider footpaths (shared with cyclists) along Straik Road (southern side) and A944 (northern side) • New and improved crossing facilities at the Westhill Drive roundabout, the Aberdeen Western Peripheral Road (AWPR - A90) junction, the Kingswells Causeway junction and Fairley Road roundabout • Side roads junctions are changed to make it easier to cross while walking or cycling • A new cycle track that bypasses Old Skene Road with an alignment along the northern side of the A944 		<p>Proposals to improve the provision for walking and cycling along Straik Road, the A944 and parts of Old Skene Road between Westhill and Kingswell include:</p> <ul style="list-style-type: none"> • Bus stop improvements including fully accessible stops with an improved waiting environment • A90 AWPR junction: Standard bus lanes on the eastbound and westbound approaches to the junction. These bus lanes will be set-back from the junctions to minimise impact on general traffic Kingswells Causeway junction: An eastbound bus lane on the approach to this junction with the bus lane set-back from the junction to ensure car drivers are not delayed accessing the Park & Ride site • Chapel of Stoneywood - Fairley Road roundabout: A westbound bus lane on the approach to this junction. A traffic signal and stop line will make it easier for buses to access the Park & Ride site. This bus lane will extend back through the roundabout with Lang Stracht using the existing bypass lane for general traffic • Lang Stracht and Skene Road roundabout: Westbound bus lane as mentioned above and an eastbound bus lane on the approach to the junction
II Kingswells to city centre via A944	<p>Proposals to improve the provision for walking along the A944 Lang Stracht, Westburn Road and Hutcheon Road include:</p> <ul style="list-style-type: none"> • Improved crossing facilities at signalised junctions, between paired bus stops and at mid-block locations (where required) to 	<p>To create a high quality cycle route along Lang Stracht, Westburn Road and Hutcheon Street the following infrastructure is proposed:</p> <ul style="list-style-type: none"> • Lang Stracht and Westburn Road (Skene Road to Cairnfield Road) - dual carriageway section: A two-way cycle track along the southern side of the road with signalised 	<p>Improvements to bus travel along Lang Stracht, Westburn Road and Hutcheon Street were developed ensuring there was no compromise to the walking, wheeling and cycling proposals:</p> <ul style="list-style-type: none"> • Existing bus lanes extended, and new bus lanes (set-back from junctions) introduced - between Stronsay Drive and Cairnfield Place

Section	Walking and Wheeling Proposals	Cycling Proposals	Public Transport Proposals
	<p>reduce the severance to pedestrians created by the road layout and traffic flows. Improvements include longer pedestrian green times, wider crossings and islands (suitable for shared-use) and removal of staggered crossings where feasible</p> <ul style="list-style-type: none"> • Side-road junctions will be upgraded to make pedestrian routes safer and more continuous. These measures will be focused to the east of Cairnfield Place where walking along the A944 becomes more attractive due to the width of the road and proximity of residential frontages and parkland • Footway surfacing will be replaced where necessary to ensure they are smooth and free from trip hazards • Footways widening where it can be justified, and appropriate kerb heights established to deter pavement parking • Bus shelters, lighting columns and other street furniture will be designed to maximise the effective width of the footways 	<p>crossings at all major junctions and priority over side roads</p> <ul style="list-style-type: none"> • Westburn Road and Hutcheon Street (Cairnfield Road to Mounthooly) – single carriageway section: Fully segregated provision for cyclists with signalised cycle priority at major junctions and a right of way over side roads • Side-road junctions along the corridor will be modified to give the cycle route priority but also create a safer environment for pedestrian to cross 	<p>which includes the A92 North Anderson Drive and Foresterhill Road junctions</p> <ul style="list-style-type: none"> • Traffic gate for eastbound traffic at the Cairnfield Place junction. This traffic gate aims to keep Cairnfield Place to Berryden Road free flowing, thereby allowing buses to move freely in a section where bus lanes cannot be introduced because of the road space taken up by the proposed cycle route infrastructure
<p>III Kingswells to city centre via A9119</p>	<p>Proposals to improve the provision for walking along Skene Road, Queen’s Road, Carden Place, Skene Street and Rosemount Viaduct are focused on sections where there is greatest potential to increase walking trips:</p> <ul style="list-style-type: none"> • Queen’s Road, Carden Place, Skene Street and Rosemount Viaduct (from the A92 Anderson Drive junction): wider and more continuous footways with a focus on establishing pedestrian right of way at side roads • A92 Anderson Drive junction: Major changes to reduce the severance the A92 causes to pedestrian and cycle movements. 	<p>To establish a high quality cycle route along Skene Road, Queen’s Road, Carden Place, Skene Street and Rosemount Viaduct the following infrastructure is proposed:</p> <ul style="list-style-type: none"> • Skene Road and Queen’s Road (to the King’s Gate roundabout): Fully segregated provision for cyclists on the northern side of the road requiring road widening and possible removal of existing bus lanes • Queen’s Road (King’s Gate to A92 Anderson Drive): Fully segregated provision for cyclists requiring the removal of on-street waiting, loading and bus lane provision 	<p>With the cycle route and pedestrian improvements in place the following changes to existing bus infrastructure need to be made along Skene Road and Queen’s Road:</p> <ul style="list-style-type: none"> • Existing bus lanes to be removed to accommodate the cycle route infrastructure described above • New bus lanes along Albyn Place requiring the removal of on-street parking bays (Residential Permit, Pay & Display, Car Club)

Section	Walking and Wheeling Proposals	Cycling Proposals	Public Transport Proposals
	<p>Proposals being developed in combination with work being undertaken as part of a separate A92 Multi-modal study</p> <ul style="list-style-type: none"> • Queen’s Road (King’s Gate to Anderson Drive): Side-road entry treatments and improved pedestrian crossing facilities to maintain the continuity of the walking route and connectivity to bus stops 	<p>A92 Anderson Drive junction: Major change required to create safe crossing routes for pedestrian and cyclists</p> <ul style="list-style-type: none"> • Queen’s Road, Carden Place, Skene Street and Rosemount Viaduct: Fully segregated provision for cyclists requiring the removal of on-street waiting, loading and parking bay provision • Forest Road and Queens Cross roundabouts: Major changes proposed to these roundabouts to create safe crossing routes for cyclists 	

Option 2: Prioritise Buses on A944 and A9119

4.2.15 Option 2 seeks to maximise the bus priority infrastructure that can be provided along each of the two corridors. In this instance, parallel cycle route provision is provided to ensure both modes of transport are sufficiently provided for.

A944 - East of Cairnfield Place

4.2.16 For the dual / wide-single carriageway sections of the A944, the bus lanes are continuous in that they are on both sides of the road. This will require some road widening outside the highway boundary. To extend these bus lanes to the stop line requires the footprint of the junction to be increased because there is a need for dedicated lanes for the left, ahead and right movements.

4.2.17 While this layout works for the A944 / A92 junction and other junctions with on the A944 at Mastrick Drive / Summerhill Road, Foresthill Road, and Maidencraig Drive, it is more difficult to implement at other locations because of the proximity to residential properties. At these locations there is a need to set the bus-lanes back from the junctions and design work has been undertaken to establish how many of these set-back gaps are needed along the corridor.

4.2.18 The sections of the A944 which narrow to a single lane carriageway (Cairnfield Place to Berryden Road and Berryden Road to Mounthooly) have the following constraints which makes road widening difficult to consider as feasible:

- **Cairnfield Place to Berryden Road:** This section is bounded by residential front gardens or historic parkland and within the Rosemount Conservation Area. There are also a number of listed buildings and structures that are located close to the highway boundary.
- **Berryden Road to Mounthooly:** This section would be slightly easier to dual, but the widening would impact on the Maberly Street Broadford Works site which is also listed. This section of the corridor also does not provide the most direct bus route into the city centre and is the reason why Variants B and C (see below) have been developed that use the southern section of the Berryden Corridor Improvement Project.

4.2.19 For these reasons, the provision of continuous bus lanes east of Cairnfield Place has not been included in the option.

Supporting Aberdeen Rapid Transit

4.2.20 It is recognised that there are no bus services operating the full length of the A944 between Westhill / Kingswells and the city centre, with services only using sections of the road as part of their routes. However, the infrastructure is being developed here to both assist these bus services and to enable the ART vision to be realised. The A944 corridor is the least constrained of the two corridors and has space to provide **continuous** bus priority over much of its length in both directions. The corridor could then be used as one of the ART corridors offering fast and frequent services operating between Kingswells P&R and the city centre. The analysis undertaken to support the options appraisal has considered the bus travel time saving that could be achieved if new P&R to city centre services were to operate along the A944 (as discussed in the appraisal table below).

4.2.21 For buses, the eastern section of the A944 (Hutcheon Street) routes into the city centre to the north of the city core, at Mounthooly roundabout. However, bus services may prefer a route which serves the city centre (Union Street) more directly and does not require routeing via Mounthooly roundabout. Three variants of Option 2 have therefore been developed at the eastern end of the A944. These variants are:

- **Variant 2A:** Route via Mounthooly Roundabout and West North Street to Union Street

- **Variants 2B:** Route via Skene Square, Woolmanhill and Denburn Road to Union Square, and onwards to via Market Street to Union Street
- **Variants 2C:** Route via Skene Square and Woolmanhill, with a new bus only access to Blackfriars Street, Rosemount Viaduct, Union Terrace and onto Union Street

4.2.22 Variants B and C assume the widening of Skene Square and Caroline Place as part of the committed Berryden Corridor Improvement Project (which will provide two traffic lanes in both directions throughout the length of the corridor, widening the existing road between Skene Square and Ashgrove Road and creating a new road between Ashgrove Road and Kittybrewster Roundabout) and requires, over the southern part of the scheme:

- **Under Variant B:** the reallocation of a lane of traffic in each direction to public transport on Skene Square, Woolmanhill and Denburn Road. Access from the A944 onto Skene Square would be via Rosemount Terrace which would be made bus, cycle and local access only
- **Under Variant C:** the reallocation of a lane of traffic in each direction to public transport on Skene Square, and Woolmanhill. Access from the A944 onto Skene Square would be via Rosemount Terrace which would be made bus, cycle and local access only

Parallel Cycling Routes

4.2.23 Under this option, parallel cycle routes have been developed to provide a high level of cycle provision. Two potential parallel cycle routes have been considered for each of the A944 and A9119, with all four parallel routes routeing on the streets between the corridors. Separate, more detailed diagrams are provided showing the parallel cycle route proposals below the main option plan and table which details the proposals. The parallel route proposals link into the city centre network of streets of recommended cycle routes and directly link into National Cycle Network Route 1.

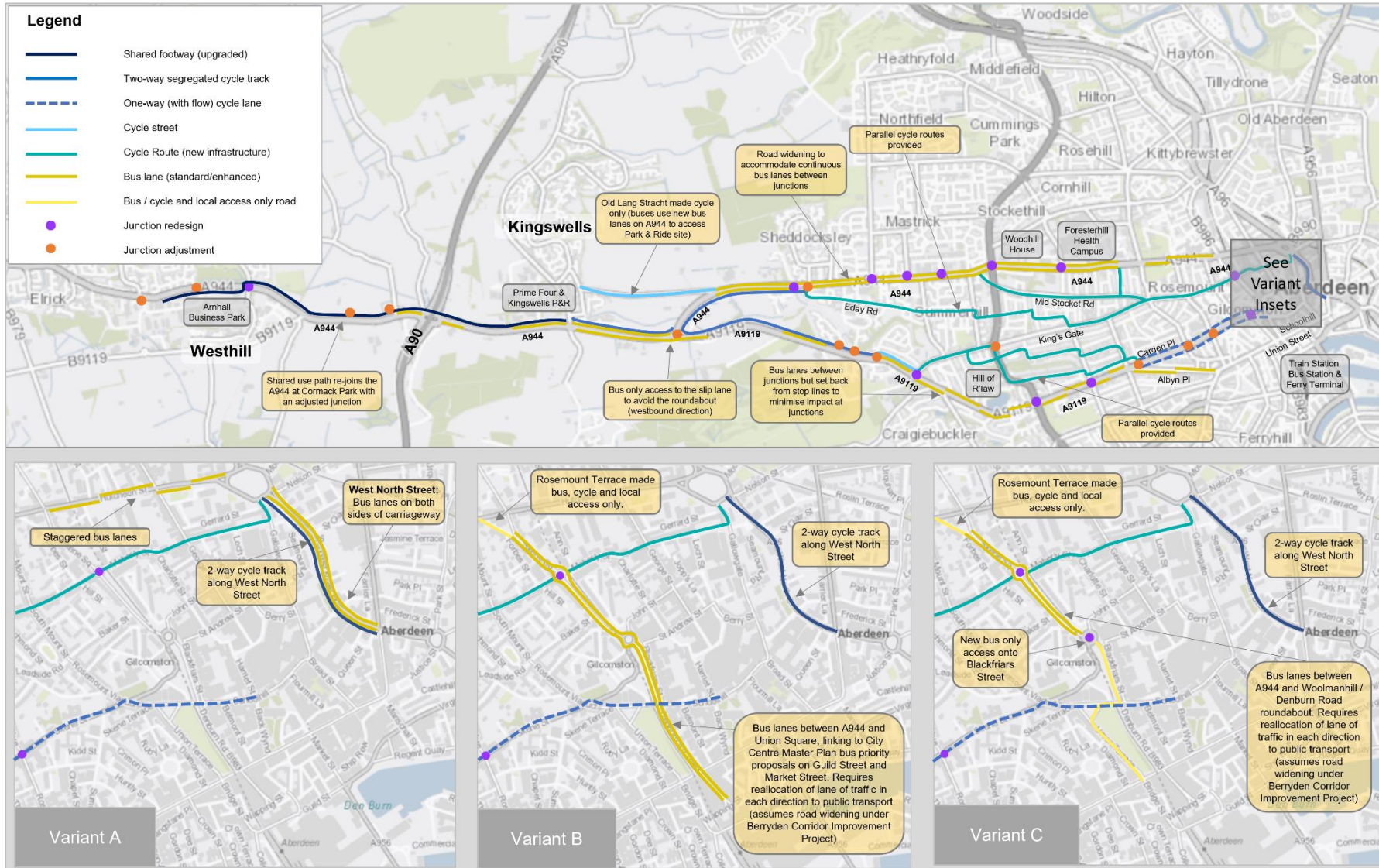


Figure 4:3: Option 2 – Strategic Plan

Table 4.4: Option 2– Description

Section		Walking and Wheeling Proposals	Cycling Proposals	Public Transport Proposals
I	Westhill to Kingswells	Same as Option 1		
II	Kingswells to city centre via A944	<p>Same as Option 1</p>	<p>A944 Parallel Route 1: Bressay Brae (at Sheddocksley) - Eday Road - Stronsay Place - Summerhill Terrace - Summerhill Road - Campsie Place - Edgehill Road - Woodstock Road - Oakhill Road - King's Gate - Beechgrove Terrace - Rosemount Place - Maberly Street - Spring Gardens - Gallowgate.</p> <p>Please refer to the A944 Parallel Route 1 diagram below</p> <p>A944 Parallel Route 2: Summerhill Drive and Mid Stocket Road</p> <p>Please refer to the A944 Parallel Route 2 diagram below</p>	<p>Proposals to improve bus journey times along Lang Stracht and Westburn Road (over which Options 2A, 2B and 2C are the same for public transport):</p> <ul style="list-style-type: none"> • Lang Stracht (Old Lang Stracht to North Anderson Drive): New bus lanes and extension to existing bus lanes requiring road widening and changes to signalised junctions. Possible third party land requirements and removal of right turns at priority junctions. Only one general traffic lane provided in each direction • Junction with North Anderson Drive: Major change to junction to accommodate bus lanes and pedestrian crossing facilities which is likely to result in a significant reduction in capacity for general traffic. Proposals being developed in combination with work being undertaken as part of a separate A92 Multi-modal study • Westburn Road (North Anderson Drive to Cairnfield Place): New bus lanes in both directions which reduces the road to a single carriageway in each direction for general traffic. In the eastbound direction the bus lane will end at a signalised traffic gate which will control traffic into the single carriageway section of Westburn Road and keep it free flowing. In the westbound direction the bus lane will extend up to the stop line of the North Anderson Drive junction • Westburn Road (Cairnfield Place to Berryden Road): Bus lanes will be staggered in each direction on the approaches to the Argyll Place / Argyll Crescent, Watson Street / Cornhill Road and Caroline Place / Berryden Road junctions. These bus lanes will be set back from the junctions (to maintain the same number of general traffic lanes on each approach arm) but will require the removal of all on-street parking and its relocation onto side roads. <p>East of Hutcheon Street, the variant infrastructure differs:</p> <ul style="list-style-type: none"> • Variant A - Hutcheon Street (Berryden Road to Mounthooly Roundabout and West North Street): Staggered bus lanes in each direction on the approach to the George Street junction and on the eastbound approach to Mounthooly roundabout and westbound approach to the Berryden Road junction. These bus lanes will require the removal of on-street parking bays including Residential and Pay & Display bays. Bus lanes in both directions on West North Street

Section	Walking and Wheeling Proposals	Cycling Proposals	Public Transport Proposals
			<ul style="list-style-type: none"> • Variant B - Skene Square, Woolmanhill and Denburn Road: Bus lanes in each direction between the A944 and Union Square, linking into the proposed Aberdeen City Centre Masterplan bus priority infrastructure on Guild Street and Market Street. Assumes the widening of Skene Square and Caroline Place as part of the committed Berryden Corridor Improvement Project and requires the reallocation of a lane of traffic in each direction to public transport on Skene Square, Woolmanhill and Denburn Road. Access from the A944 onto Skene Square would be via Rosemount Terrace which would be made bus, cycle and local access only • Variant C - Skene Square, Woolmanhill, and with a new bus only access to Blackfriars Street, Rosemount Viaduct, Union Terrace and onto Union Street: Bus lanes in each direction between the A944 and Woolmanhill / Denburn Road Roundabout. Assumes the widening of Skene Square and Caroline Place as part of the committed Berryden Corridor Improvement Project and requires the reallocation of a lane of traffic in each direction to public transport on Skene Square and Woolmanhill. New bus only access onto Blackfriars to provide access to Rosemount Viaduct, Union Terrace and onto Union Street. Access from the A944 onto Skene Square would be via Rosemount Terrace which would be made bus, cycle and local access only.
III	Kingswells to city centre via A9119	<p>Same as Option 1</p> <p>A9119 Parallel Route 1 This Parallel Route uses: King's Gate - King's Cross Terrace - Kings Cross Road - Carnegie Crescent - Moray Place - Rubislaw Den North - Forrest Road - Desswood Place ('lane' route) - Fountainhall Road - Albert Lane - Blenheim Place.</p> <p>Please refer to the A9119 Parallel Route 1 diagram below</p> <p>A9119 Parallel Route 2 This Parallel Route uses: A92 Anderson Drive (Carnegie Place to Rubislaw Den South) - Rubislaw Den South - Forest Road – Queens Lane North.</p>	<p>Proposals to improve bus journey times along Skene Road, Queen's Road and Albyn Place include:</p> <ul style="list-style-type: none"> • Skene Road: On the westbound approach to the Lang Stracht roundabout the bypass traffic lane is converted to a bus lane which extends back into Skene Road, requiring some road widening • Queen's Road (eastbound approach to Kings Gate): The eastbound bus lane is extended back to the junction with Woodend Crescent • Queen's Road (King's Gate to A92 Anderson Drive): Staggered bus lanes are proposed on both approaches to the Springfield Road junction and the westbound approach to the Hill of Rubislaw junction, requiring removal of on-street parking • Junction with North Anderson Drive: Major change to junction to prioritise bus movements along Queen's Road while also providing pedestrian and cycle crossing facilities to reduce severance issues along the A92. Proposals being developed in combination with work being undertaken as part of a separate A92 Multi-modal study • Queen's Road (Anderson Drive to Queen's Cross): Staggered eastbound bus lanes on the approaches to the Forrest Road and Queen's Cross roundabouts and

Section	Walking and Wheeling Proposals	Cycling Proposals	Public Transport Proposals
		<p>Please refer to the A9119 Parallel Route 2 diagram below</p>	<p>staggered westbound bus lanes on the approaches to the Forrest Road and Anderson Drive roundabout requiring removal of on-street parking</p> <ul style="list-style-type: none"> • Forrest Road roundabout: Options to signalise this junction being considered • Queens Cross roundabout: No change is currently proposed to this junction • Albyn Place: Staggered bus lane proposed on the eastbound approach to Union Street/ Holburn Street junction and the westbound approach to the Queen's Cross roundabout requiring the removal of on-street parking bays

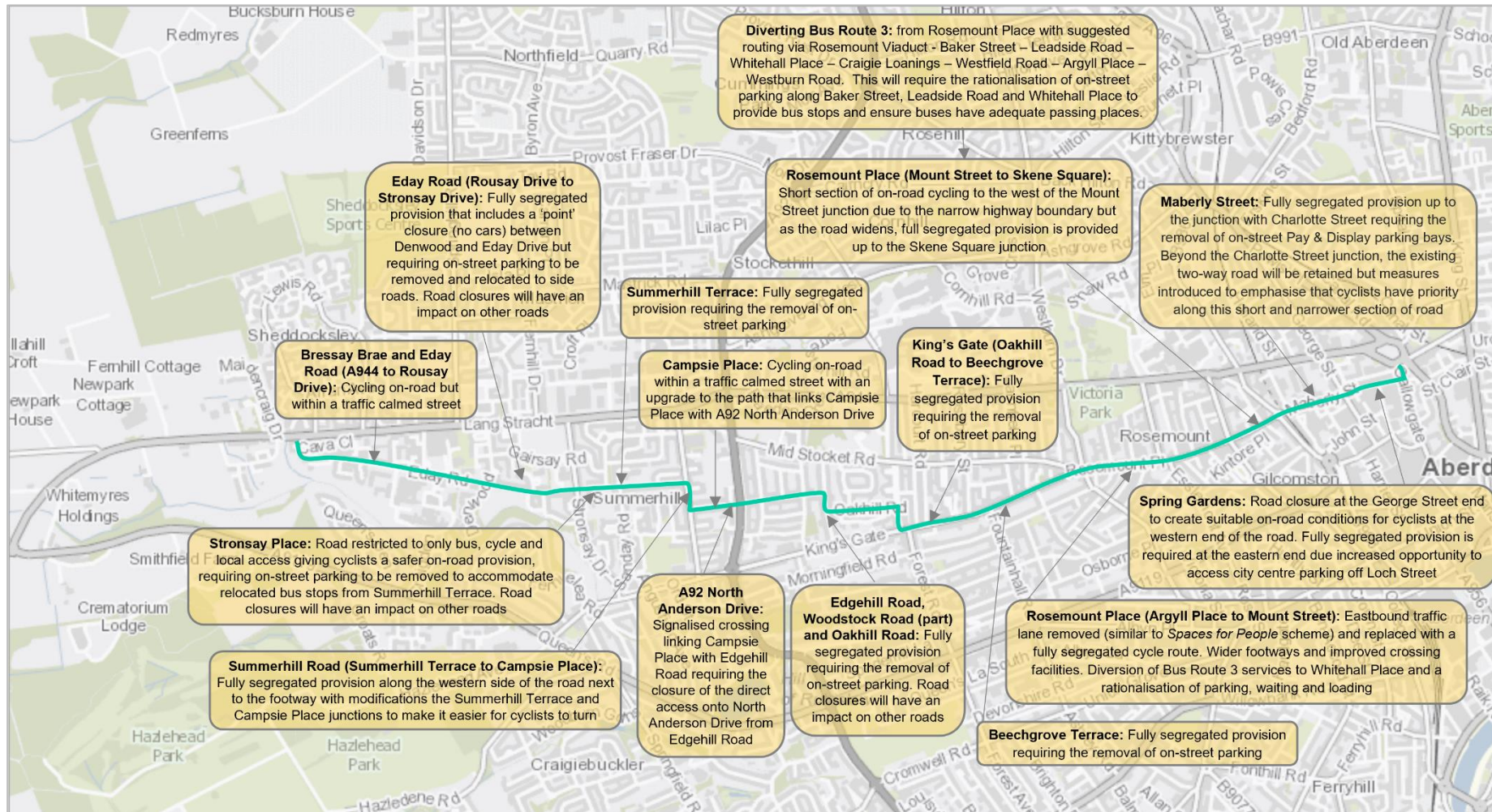


Figure 4.4: Option 2 – A944 Parallel Route 1

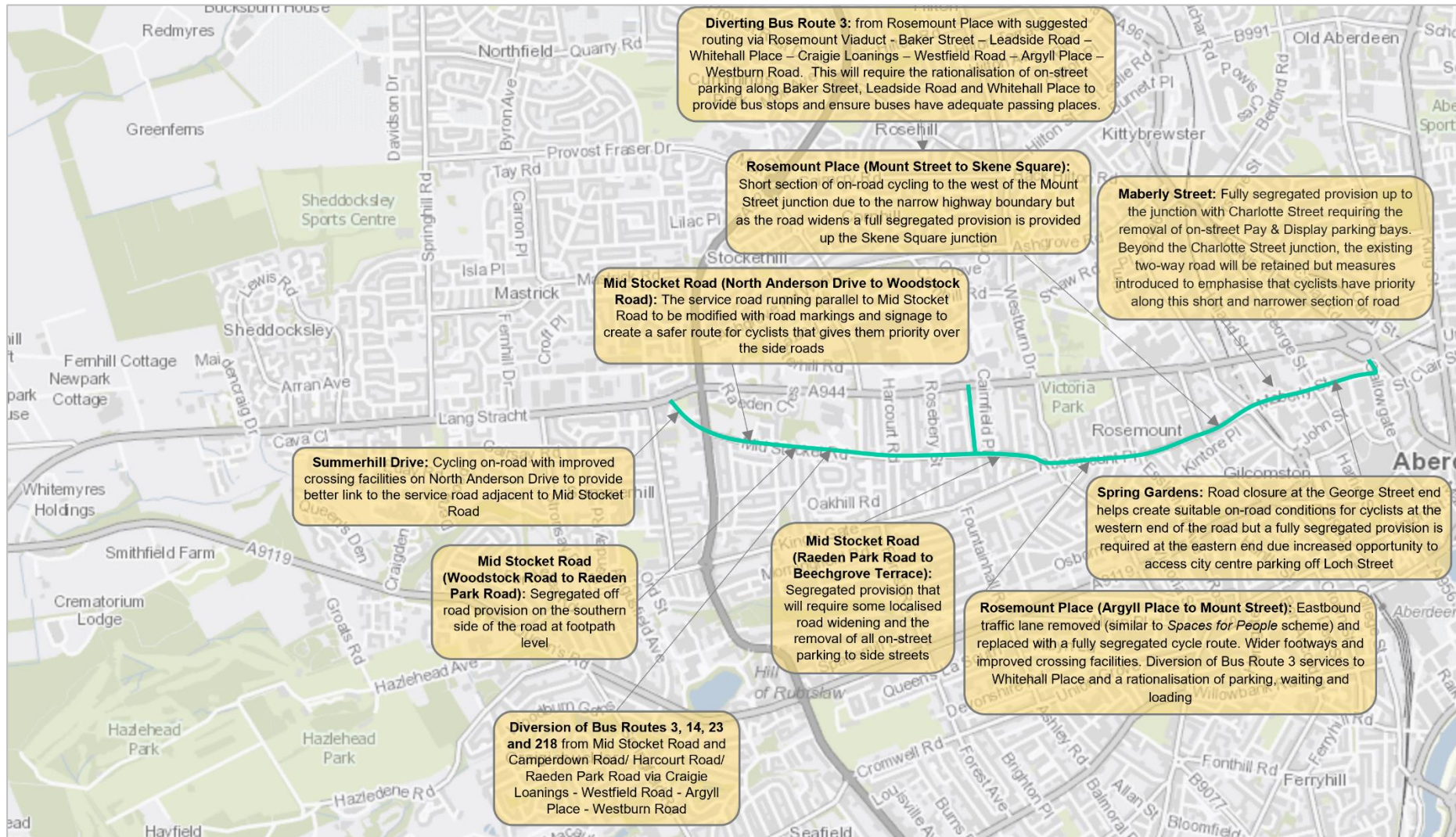


Figure 4:5: Option 2 – A944 Parallel Route 2

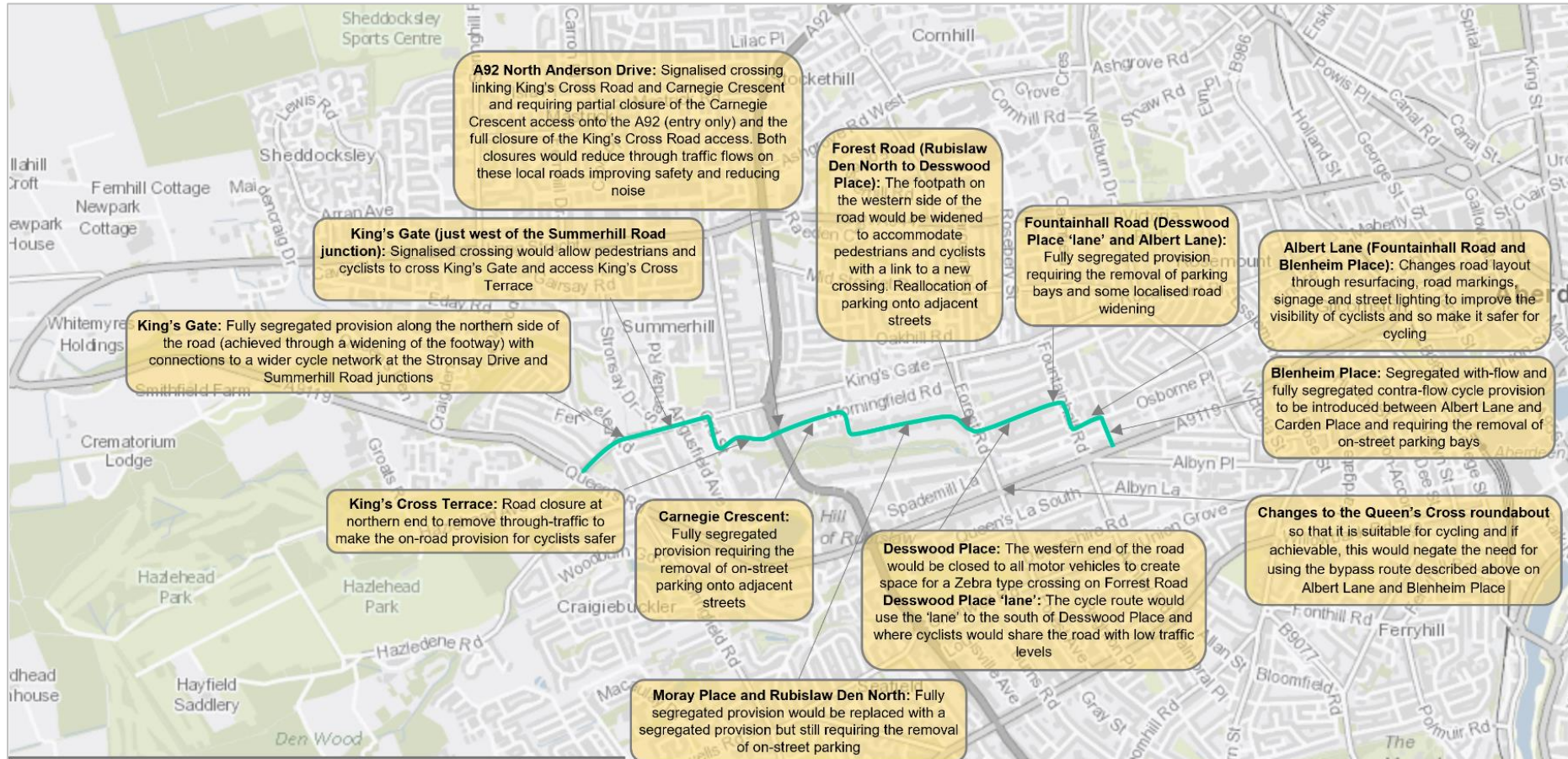


Figure 4:6: Option 2 – A9119 Parallel Route 1

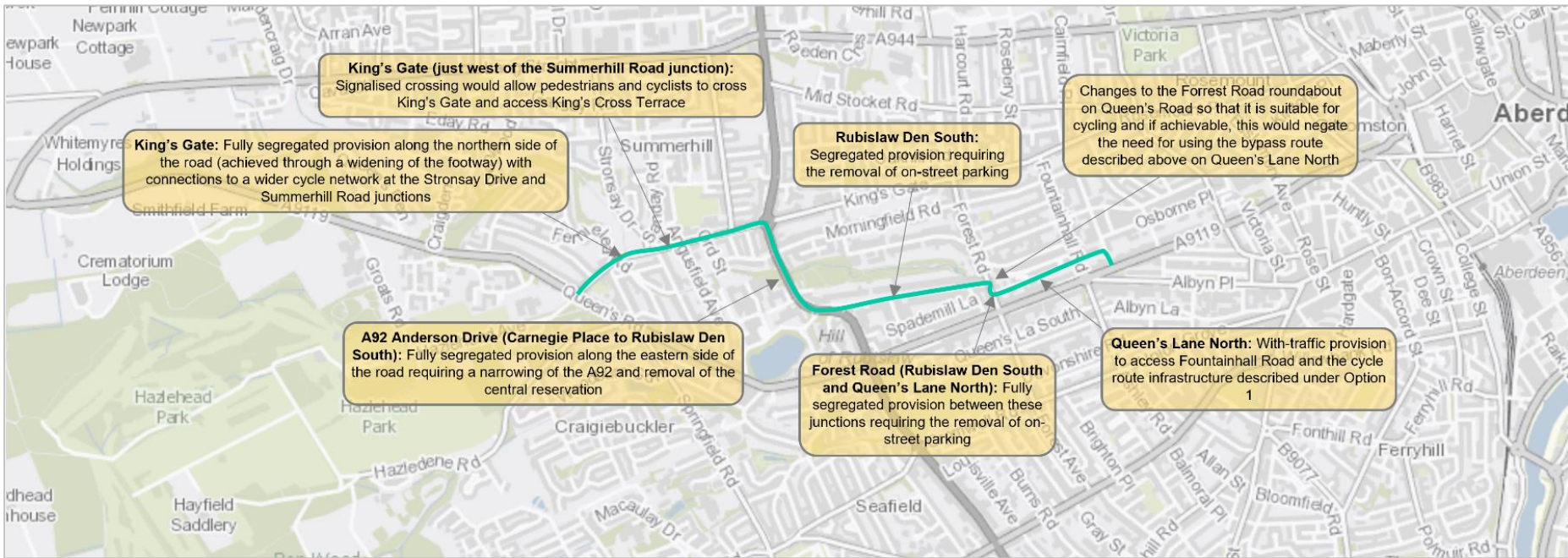


Figure 4:7: Option 2 – A9119 Parallel Route 2

Option 3: Prioritise Cycling on A944 and Buses on A9119

- 4.2.24 Option 3 seeks to maximise the cycling infrastructure that can be provided along the A944 corridor and the bus priority infrastructure that can be provided along the A9119 corridor. Under this option, the A944 would be the main cycle route between Westhill and the city centre, with the A9119 the main bus route.
- 4.2.25 With the A9119 prioritised for buses, as per Option 2, two parallel cycle routes have been considered to provide a high level of cycle provision close to the corridor:
- Over Section I (Westhill to Kingswells) and Section II (Kingswells to city centre via A944): Proposals are the same as Option 1 (see Figure 4:2 and Table 4.3)
 - Over Section III (Kingswells to city centre via A9119): Proposals are the same as Option 2 (see Figure 4:3 and Table 4.4).

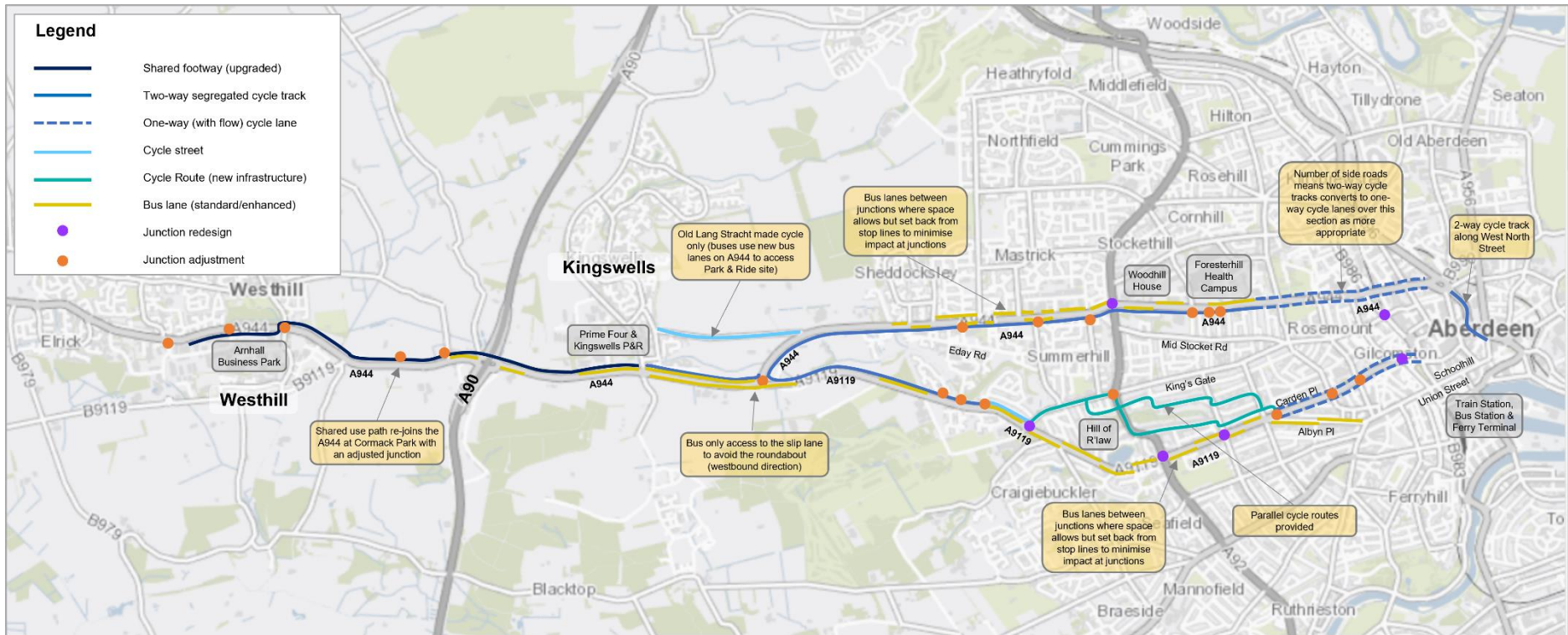


Figure 4:8: Option 3 – Strategic Plan

Option 4: Prioritise Cycling on A9119 and Buses on A944

- 4.2.26 Option 4 seeks to prioritise cycling infrastructure along the A9119 corridor and the bus priority infrastructure along the A944 corridor. Under this option, the A9119 would be the main cycle route between Westhill and the city centre, with the A944 the main bus route.
- 4.2.27 With the A944 prioritised for bus travel, as per Option 2, two parallel cycle routes have been considered to provide a high level of cycle provision close to the corridor:
- Over Section I (Westhill to Kingswells) and Section II (Kingswells to city centre via A944): Proposals are the same as Option 2 (see Figure 4:3 and Table 4.4)
 - Over Section III (Kingswells to city centre via A9119): Proposals are the same as Option 1 (see Figure 4:2 and Table 4.3)

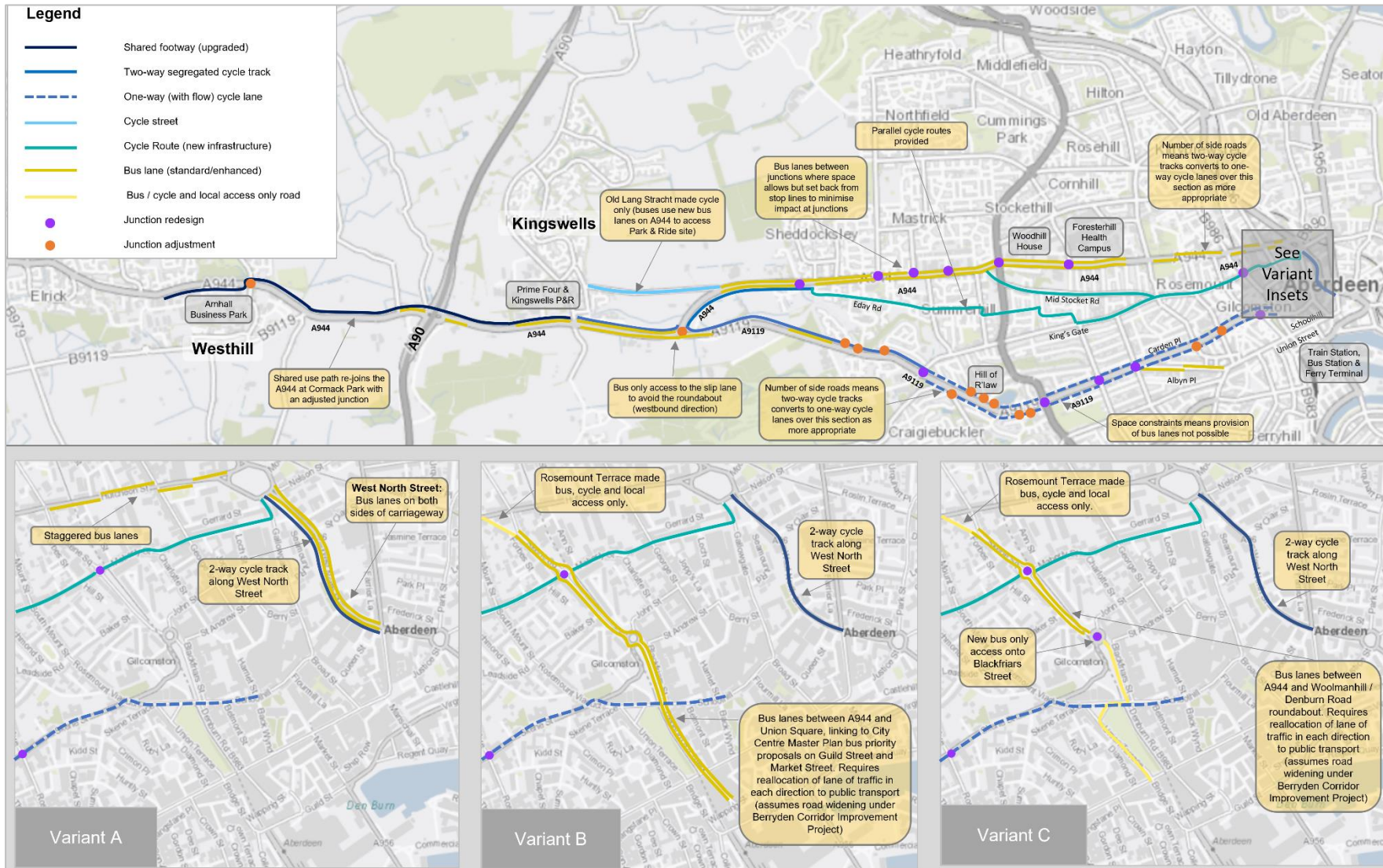


Figure 4:9: Option 4 – Strategic Plan

4.3 Low Traffic Neighbourhood

4.3.1 All the options presented above require the reallocation of road space away from general traffic to accommodate priority for more sustainable modes. This may cause unwanted vehicle routing away from the main roads onto less suitable residential streets. To reduce the potential impacts of this, part of the option development process has included the development of a *potential* Low Traffic Neighbourhood (LTN) which could be considered to mitigate the impacts. The LTN could encompass the streets between the A944 and A9119, and south of the A9119 as shown in the figure below. The LTN is not part of the options themselves but could be considered as an additional traffic management measure.

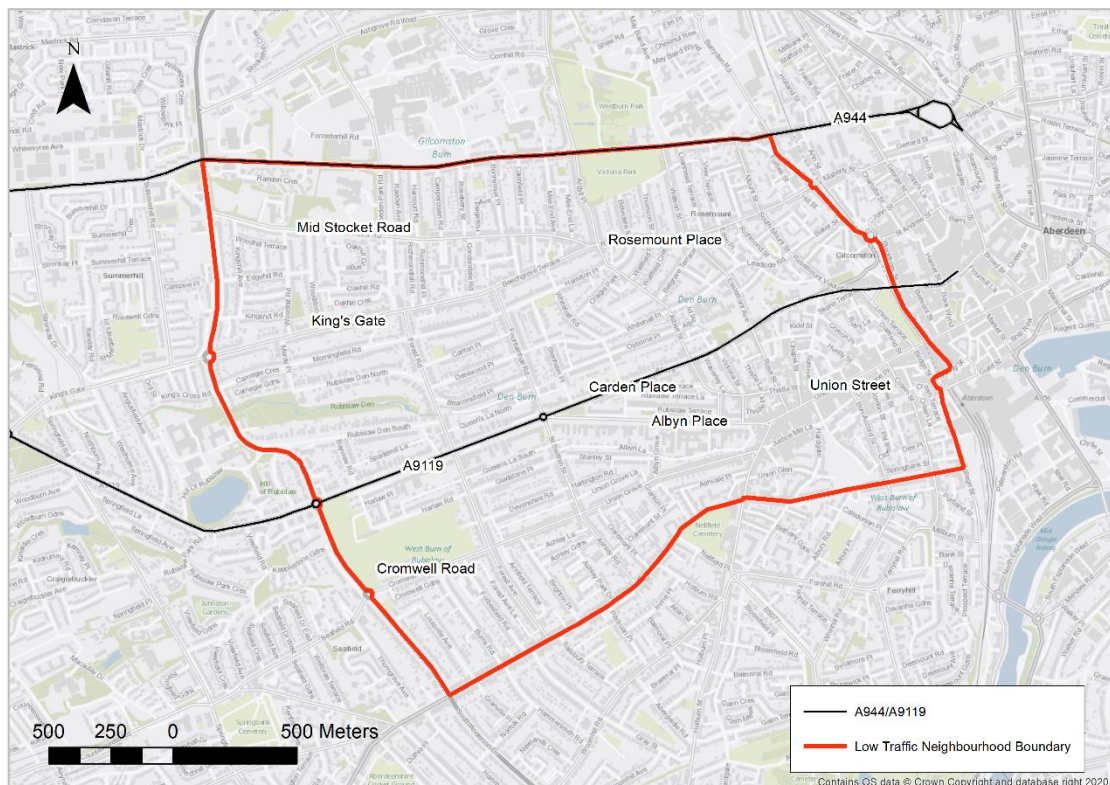


Figure 4:10: Potential Low Traffic Neighbourhood

4.3.2 LTNs are places where motor traffic in residential streets is greatly reduced. This is done by minimising the amount of traffic using the streets within the neighbourhoods to get to another destination (i.e., ‘through-traffic’ or ‘rat-running’ traffic). Private motorised vehicles still maintain access to all homes and businesses within the neighbourhood. This opens up networks of streets so people can more safely travel through the area on foot, bicycle, by wheeling or by bus. Emergency vehicles can also be prioritised to reach their destinations quicker.

4.3.3 Measures to facilitate the LTNs could include:

- Possible ‘point’ closures with access restricted to bus and cycle only, or cycle only
- Re-routing of bus services to provide safe cycle routes, requiring reduced segregation / road space given the lower traffic volumes in the neighbourhood

4.3.4 More detailed work will be required to establish the exact form of the LTN once a preferred option is determined and if the LTN is taken forward as part of the proposals.

4.4 Supporting Measures

4.4.1 The implementation of the options would provide significant benefits to pedestrians, cyclists and bus users with improved public transport journey times and service reliability, while, through road space allocation, likely dis-benefitting travel by car. These factors are likely to incentivise people to switch modes. However, there are further **supporting measures** which can drive behavioural change from private vehicle to more sustainable modes, which would significantly support the success of the options. Such measures can ensure the options realise the potential benefits, particularly the wider environmental and socio-economic benefits including helping work towards the national climate change targets, vehicle kilometre reduction targets and improved equality of access.

4.4.2 Such supporting measures could include:

- **Parking policy changes:** the management of parking can be used as part of a range of measures to discourage use of private cars and to increase the use of public transport and active travel. Measures might include changes to waiting restrictions, charges or a combination with charges set to dissuade longer stay parking (i.e., commuter parking) without significantly impacting on businesses or the vitality of town and city centres
- **Workplace Parking Licensing:** the Transport (Scotland) Act 2019 provides discretionary powers to Scottish local authorities to create a licensing scheme. The adopted Regional Transport Strategy (RTS:2040) contains an action to explore the introduction of a Workplace Parking Licensing scheme, alongside other charging regimes which could manage the demand for travel. However, in the run up to the May 2022 local elections, a cross party consensus was established against such measures, and post-election, the new Council's policy agreement '*Working in Partnership for Aberdeen*' states that a Workplace Parking Licensing scheme will not be progressed during the current Council term. However, **such policy levers would encourage modal shift to active travel and public transport and support bus patronage, and therefore the success of the options.** It is however recognised that Workplace Parking Licensing scheme would need strong political advocacy (especially in light of the recent policy agreement against such measures), may be perceived to impact business operations and constrain the labour market, and create inequality in access with the better off finding the charge easier to pay, especially in the likelihood that charges are passed to employees.
- **Reducing cross city-centre car movements:** changes to the road network to make it more difficult for city centre through traffic. In accordance with the CCMP, the Aberdeen Sustainable Urban Mobility Plan proposed removing a number of streets in the city centre. The Roads Hierarchy reclassification has been formalised and looks to discourage through traffic from the city centre and is being formalised through the ongoing delivery of the CCMP, in order to enable a more vibrant and people-focussed city centre. Such measures can support the use of active travel and public transport as the preferred mode through ensuring journey times by such modes between city segments are quicker than travel by private car.
- **Low Emission Zone:** A LEZ in Aberdeen has been progressed and following approval from Scottish Ministers (received on 19th May 2022), Aberdeen City Council introduced the LEZ in Aberdeen City Centre from 30th May 2022. The LEZ has a two year 'grace' period meaning that between 2022 and May 2024, drivers will not be fined for entering the LEZ with a non-compliant vehicle. The LEZ will then come into full effect in June 2024. The benefits of the LEZ include prioritising active travel and public transport.
- **Subsidising public transport:** All residents in Scotland under the age of 22 became eligible for free bus travel from January 2022. There is however the potential for expansion of the scheme, to cover other groups, and indeed there is an ever-growing list of cities around the world offer free or near-free public transport travel on some / all routes. Such measures would undoubtedly support modal shift to public transport and also offer financial equality of access to the public transport network across the

population. However, it is recognised that such a measure would require significant additional funding.

- **Congestion / road user zone charging:** In the UK road user charging has primarily been used to tackle congestion. Such measures could support the options through disincentivising travel by car. It is however recognised that such a measure would need strong political advocacy, may impact business operations and constrain the labour market, and create inequality in access with the better off finding the charge easier to pay.

5 Detailed Options Appraisal

5.1 Methodology

5.1.1 In line with the revised (February 2022) STAG, the Detailed Options Appraisal has encompassed appraising each of the options against:

- TPOs
- STAG Criteria:
 - Environment
 - Climate Change
 - Health, Safety and Wellbeing
 - Economy
 - Equality and Accessibility
 - Risk and Uncertainty
- Established Policy Directives
- Feasibility and Affordability
- Public Acceptability

5.1.2 All elements have been appraised against the STAG seven-point scale as shown in Table 5.1.

Table 5.1: STAG seven-point scale

Major Negative Impact	Moderate Negative Impact	Minor Negative Impacts	No Impact	Minor Positive Benefit	Moderate Positive Benefit	Major Positive Benefit
xxx	xx	x	-	✓	✓✓	✓✓✓

5.1.3 The information contained within the appraisal table (presented below) has been developed through consideration of:

- **Existing studies** – drawing on appraisals undertaken to date. In particular, quantitative analysis undertaken for the A96 Multi-modal Transport Study using the Aberdeen Sub Area Model (ASAM) has been drawn on to provide an indication of the similar impacts anticipated for this study.
- **Benchmarking & case studies** – this has been particularly appropriate e.g., for the active travel measures where step changes are made to the availability and quality of the active travel network.
- **Professional knowledge and consensus** – through various internal workshops, where the option impacts have been fully considered by the entire appraisal team
- **Stakeholder and Public Engagement** – through an online engagement exercise
- **Quantitative analysis** including the following elements:

- **Cycle Route Preferences:** Comparison of existing and direct routeing choices (Appendix B)
- **Public transport journey time analysis** (Appendix C)
- **Economic Impact Analysis:** including Transport Economic Efficiency and Active Mode Appraisal (Appendix D)
- **Option Costs:** development of high-level cost estimates for the options (with active travel and bus element of each option estimated separately) to inform the affordability appraisal criteria (Appendix A)
- **'Hansen' Accessibility Analysis** (Appendix E)

5.2 Options Appraisal

- 5.2.1 The appraisal of each option is shown in the Appraisal Table below supported by the information in the appendices (referenced within the table).
- 5.2.2 To recap, Options 1 and 2 focus on prioritising cycling and buses respectively along both corridors, while Options 3 and 4 comprise parts of the first two options, prioritising cycling on one corridor and buses on the other (and vice-versa). Comments which are relevant across more than one option and / or variant are noted once in a merged comments box or referred to earlier sections.
- 5.2.3 It is worth noting that this study was undertaken as the country transitioned out of the COVID-19 pandemic. Consideration has been given within the appraisal to both the potential positive and negative impacts of the pandemic on the viability of the options and their ability to support a 'green recovery' from the pandemic and 'lock-in' positive pandemic behaviours e.g., increased active travel or reduced trip making. Monitoring of travel behaviour and trends as the region transitions out of the pandemic will enable an understanding of the potential legacy impacts of the pandemic and enable a robust business case to be developed to allow for appropriate decision making.

Table 5.2: Appraisal Table - TPOs

Criteria	Option	Commentary	Score
<p>TPO1: Improve the quality of the pedestrian experience and address barriers to walking / wheeling along the A944, A9119 and Albyn Place between Westhill and Aberdeen city centre</p>	<p>ALL</p>	<p>Previous studies and the study site visits highlighted a range of issue including poor footway surface quality, poor maintenance, constrained footway widths, street clutter and footway parking, sub-standard pedestrian crossing facilities, non-Equalities Act compliant infrastructure, long distances between crossing locations on some sections, excessive wait times at crossings and pedestrian severance along the corridors. The site visit scoring along the route for walking and wheeling (see <i>A944-B9119 Multi-modal Study Preliminary Options Appraisal, Stantec, September 2020</i>) highlighted that walking and wheeling provision was below satisfactory on the A944 between the A944/AWPR junction to Kingswells and from Sheddocksley to Mounthooly, as well as on the A96 between Mounthooly and King Street and on Albyn Place.</p> <p>Measures are included within all options to improve the pedestrian environment, include fixing broken paving; introducing tactile paving/ dropped kerbs where missing; tackling footway parking; ensuring good and consistent lighting levels; decluttering footways; improving wayfinding through signage; and consistent use of materials.</p> <p>Under all options, the existing shared path between Westhill and Kingswells will be widened to 3m, and a buffer provided between pedestrians and the busy road carriageway. Path widening will make walking in this area a more comfortable experience and provide greater space to reduce conflicts between pedestrians and cyclists. Widening will include the construction of a shared use path across the frontage of Five-Mile Garage, where there are currently narrow footways, barriers, and large bell mouth access and egress points.</p> <p>Minor junctions which interact with the new shared path will be modified such that priority is given to users of the shared path, rather than vehicles crossing it, and junction geometries will be tightened to reduce pedestrian crossing distances. Additionally, new pedestrian crossings will be installed at key locations to reduce north-south severance and to better reflect pedestrian desire lines, specifically including new pedestrian crossings of the circulatory carriageway at the junction of the A944 with the AWPR.</p> <p>Under all options, signalised junctions would incorporate effective pedestrian crossing times within the overall signal cycle time, with maximum pedestrian waiting time at signals to be less than 90 seconds, minimising the number of pedestrians crossing without the green man and reducing the safety risk associated with this.</p> <p>Footway decluttering will be undertaken under all options to ensure that pedestrian space is maximised, and pedestrian movement is not unnecessarily impeded. This will include the removal of extraneous sections of pedestrian barriers, including those outside Foresterhill Health Campus and at Mounthooly roundabout.</p> <p>Signage will be introduced to indicate pedestrian routes to key destinations along both corridors.</p> <p>There is also potential to introduce a LTN covering the streets between the A944 and A9119, and streets south of the A9119, to mitigate traffic re-routing that may occur due to the reallocation of road space away from general traffic. Such a neighbourhood would open up the networks of streets so people can safely travel through the area on foot, bicycle, by wheeling or by bus. Clearly there would be pedestrian improvements with reduced general traffic in the streets creating quieter and safer walking routes and street crossings.</p>	<p>✓✓✓</p>

Criteria	Option	Commentary	Score
<p>TPO2: Ensure cycle routes are sufficiently direct and connected, while improving journey quality, times, and safety for cyclists along the study corridors</p>	<p>ALL</p>	<p>There is limited existing cycle provision along the A944 and A9119 which fulfils the requirements of Cycling by Design 2021 and multiple sections where cycle infrastructure is not present at all. Additionally, the existing cycle infrastructure features gaps and switches between sides of the road, making navigation more challenging, requiring users to cross the road at several locations - reducing the attractiveness of cycling as a mode of travel, particularly for less confident riders.</p> <p>Under all options, continuous coherent cycle routes are proposed between Westhill and Aberdeen city centre, supported by toucan crossings where the route crosses a carriageway and junction treatments to provide cycle route priority across side roads. Infrastructure on the A944 and A9119 will primarily take the form of either bidirectional 3m segregated cycle tracks or one-way with flow segregated cycle tracks in both directions (in more constrained urban settings).</p> <p>The new infrastructure will provide:</p> <ul style="list-style-type: none"> • A safe route which minimises the potential for accidents – a risk which is a key barrier to cycle use in Aberdeen. Consultation undertaken to support the Aberdeen Active Travel Action Plan found that the main barriers to cycling all centre on safety and protection from traffic. Similarly, research undertaken as part of the British Social Attitudes Survey in 2017 found that 62% of people agreed that <i>'It is too dangerous for me to cycle on the road'</i>. The proposed bidirectional cycle tracks and one-way with flow tracks are segregated from the main carriageway. This provides a consistent design to avoid ambiguity and is highly likely to address the key barrier of safety which often prevents people from cycling. The route provides improved cycle access to Harlaw Academy, St Joseph's RC School, Mile End School, St Margaret's School for Girls, and Albyn School which face directly onto the A944/A9119, as well as Hazelhead Academy, Holy Family RC School, Fernielea School, Muirfield School, Kingsford School and Hazelhead Primary School which are located nearby. It is anticipated that the provision of segregated cycle infrastructure in close proximity to the schools would encourage parents to allow their children to cycle to school and embed healthy travel choices from a young age. As well as new cycle tracks, safe junction crossings (with new toucan crossings and the conversion of existing crossing facilities to toucan control with dedicated cycle phases) would be provided which would further increase both real and perceived safety for cyclists along the route. • A coherent network which links the many residential urban communities including new developments at Maidencraigs and Countesswells with Aberdeen City Centre. This will include direct connections to health facilities, schools, parks and businesses, although the specific connections depend on the option. • Direct routes along the length of the corridor. Strava data highlights that at present, cyclists often take longer routes via the A9119 to access locations along the A944 (e.g., the most popular route between the Foresterhill Health Campus and Westhill utilises the A9119 and is approximately 1km longer than the most direct route which runs along the A944 – see Appendix B for further details). The main reason for these diversions is the significant westbound gradient on the A944, current lack of supporting cycle infrastructure and associated safety concerns. The provision of segregated cycle infrastructure will give cyclists the confidence to take the more direct route to their destination, by ensuring that cyclists do not have traffic queuing behind them/passing as they climb steeper sections. These changes would also reduce journey distances and travel time which can be a barrier to cycling. • Appropriate lighting, personal security, environmental quality, and a continuous level of infrastructure provision, likely to increase the attractiveness of the route and attract new users. • A smooth, uninterrupted, and well-maintained surface likely to attract 'non-sport' cyclists 	

Criteria	Option	Commentary	Score
<p>TPO2: Ensure cycle routes are sufficiently direct and connected, while improving journey quality, times, and safety for cyclists along the study corridors</p>		<ul style="list-style-type: none"> Integration with the public transport proposals - would involve additional infrastructure such as bus stop bypasses to ensure additional street furniture does not impact on the cycle route. 	
	Option 1	<p>Option 1 maximises provision for cyclists and best reflects the Scottish Government’s Travel Hierarchy by catering for active travel first and then addressing provision for other modes. Under Option 1 segregated cycle infrastructure will be provided to form two coherent cycle routes from Westhill to Aberdeen city centre, with enhanced segregation from traffic and supporting crossing infrastructure. Routes are direct and easy to follow. These improvements address all aspects of TPO1.</p> <p>On the A944, between Kingswells P&R and Westburn Drive / Argyll Place, and on the A9119 between the A944 and King’s Gate, a bidirectional segregated track is proposed. Such provision offers a step change in cycling provision and, of the two active travel options discussed, is also more closely aligned with good practice design on a priority road section like the A944 where traffic volumes and speeds are higher than a typical city environment. In terms of route maintenance, the two-way track also offers quicker, and likely cheaper maintenance given the ability to grit / de-ice / manage vegetation for both directions of the track at once. Additionally, a two-way track with cyclists travelling in opposite directions having visual contact can also help create a feeling of being part of a cycling community and increase the sense of security and safety felt using the route. However, a key disadvantage of the two-way track is the difficulty in connecting users with destinations on the opposite side of the carriageway. Appropriate integrated crossing facilities should enable such movements to be undertaken easily and safely.</p> <p>On the A944 east of Westburn Drive / Argyll Place and on the A9119 east of King’s Gate, there are many more side roads joining the main carriageway. Here, it is proposed that one-way with-flow cycle tracks are provided on both sides of the carriageway which would provide a step change in provision from that at present. One-way with flow cycle tracks enable easy connections with other cycle routes and make moving between the track and the road much easier than with a two-way track. However, there is the potential for cyclists to use the track in the wrong direction if it is easier than crossing a major road. This can lead to safety risks for cyclists using the track.</p> <p>Proposals cannot address the considerable gradient on the A944 in the vicinity of the Foresterhill Health Campus, but proposals should make the A944 a viable option for those cyclists who currently lack the confidence to traverse this section without physical infrastructure to protect them from general traffic. This should support cyclists in taking the most direct route to destinations along the A944 and accrue journey time savings as well as health benefits.</p> <p>In particular, the new continuous cycling connections provide direct cycling connections to a variety of large trip generators, business and community facilities, as illustrated in Appendix B . This specifically includes direct connections to:</p> <ul style="list-style-type: none"> On the A944 and A96 West North Street: <ul style="list-style-type: none"> A range of regional healthcare facilities at the Foresterhill Health Campus (which includes Royal Aberdeen Children’s Hospital, Aberdeen Royal Infirmary, and Aberdeen Maternity Hospital) and Cornhill Hospital (specialising in mental health problems) Employment at Prime Four, Woodhill House, Arnhall Business Park and well as significant planned employment development around Kingswells, both north and south of the A944 	<p>✓✓✓</p>

Criteria	Option	Commentary	Score
<p>TPO2: Ensure cycle routes are sufficiently direct and connected, while improving journey quality, times, and safety for cyclists along the study corridors</p>		<ul style="list-style-type: none"> ○ Retail premises at Whitemyres retail and business park, Tesco Mastrick Superstore, Lidl Mounthooly, Morrisons on West North Street and the George Street shopping area ○ Parkland at Westburn Park and Victoria Park ○ Onward cycle connections via National Cycle Network Route 1 at Mounthooly, and proposed new cycle infrastructure on A92, on A96 north of Mounthooly and on Berryden Corridor ● On the A9119: <ul style="list-style-type: none"> ○ Employment sites including Hill of Rubislaw Business Park and the West End Office Area; ○ Education facilities at Aberdeen Grammar School, Albyn School (private), Gilcomstoun School, Hazlehead Academy, Hazlehead Primary School and St. Joseph's RC School; ○ Parkland including Hazlehead Park and Den of Maidencraig; ○ Aberdeen City Centre Masterplan area which includes cultural sites such as Aberdeen Central Library, His Majesty's Theatre, Aberdeen Art Gallery and Union Terrace Gardens; and the Bon Accord and St Nicholas Shopping Centres. ○ Onward cycle connections via National Cycle Route 1 at Rosemount Viaduct. 	
	<p>Option 2 A/B/C</p>	<p>Under Option 2, bus infrastructure is prioritised in the first instance and despite the removal of one lane for general traffic there is insufficient space to accommodate continuous cycle infrastructure provision along the A9119 and A944. Proposals are as per Option 1 to the west of the junctions of the A944 with Bressay Brae and the A9119 with King's Gate, but to the east is provided via adjacent parallel routes through largely residential neighbourhoods.</p> <p>Two possible parallel cycle routes have been identified for the A944. Both deviate from the A944 and in so doing, provide a longer route to Mounthooly (+17%), but a more direct route to Aberdeen city centre. The parallel routes better serve the Rosemount Place shopping area but do not connect as closely with trip attractors on the A944 such as Foresterhill Health Campus, Woodhill House, and the Royal Cornhill Hospital.</p> <ul style="list-style-type: none"> ● A944 parallel route 1 extends from Bressay Brae to Mounthooly. Fully segregated cycle tracks will be provided along the majority of the route, except for short sections on Bressay Brae, Eday Road, Campsie Place and Rosemount Place where cycling will occur on-road but point closures and traffic calming will be implemented to reduce traffic volumes and speeds. ● A944 Parallel Route 2 extends from Summerhill Drive (immediately to the west of the A92 North Anderson Drive) to join A944 Parallel Route 1 on Rosemount Place. A944 Parallel Route 2 is shorter than A944 Parallel Route 1 and does not connect with the proposed infrastructure on the A944 to the west which terminates at Eday Road. However, it would allow those approaching the corridor from the north to join the cycle route network more quickly. As such, A944 Parallel Route 2 is likely to be delivered in addition to A944 Parallel Route 1, rather than alone. A944 Parallel Route 2 more constrained than Parallel Route 1, and a lower degree of segregation is possible; however, through point closures and supporting cycle infrastructure, it is considered that comfortable and safe cycling conditions can be achieved. <p>Similarly, two possible parallel cycle routes have been identified for the A9119 corridor. In this case, only one of the two routes will be delivered, as the routes are similar and provision of both would bring no additional benefit. Both of the A9119 parallel routes travel through the residential areas to the north of Queen's Road and re-join the A9119 at Queen's Cross Roundabout. These routes</p>	<p>✓✓</p>

Criteria	Option	Commentary	Score
<p>TPO2: Ensure cycle routes are sufficiently direct and connected, while improving journey quality, times, and safety for cyclists along the study corridors</p>	<p>Option 2 A/B/C</p>	<p>are less coherent than the parallel section of the A9119 and approximately 15% longer but allows cyclists to avoid what is a busy route for entering Aberdeen city centre. The corresponding section of the A9119 carries five bus routes with a combined frequency of approximately 20 buses per hour, and significant volumes of general traffic (approximately 13,500 vehicles per day in 2018).</p> <p>The new continuous cycling connections provide direct cycling connections to a variety of large trip generators, business and community facilities, as illustrated in Appendix B .</p> <p>The A944 and A944 parallel route 1 would provide direct cycling connectivity to:</p> <ul style="list-style-type: none"> • Employment at Prime Four, Arnhall Business Park and well as significant planned employment development around Kingswells, both north and south of the A944 • Healthcare facilities at Woodend Hospital • Education facilities at Fernielea School, Holy Family RC School and Skene Square Primary School • Rosemount Place shops and George Street shopping area • Proposed new cycle infrastructure on the A92 by junction with Edgehill Road an on the A96 north of Mounthooly <p>A944 parallel route 2 would provide additional direct cycling connectivity to:</p> <ul style="list-style-type: none"> • Mile End School; and • Rosemount Place shops and George Street shopping area. <p>The A9119 parallel routes 1 and 2 would provide direct cycling connectivity to:</p> <ul style="list-style-type: none"> • Employment at the West End Office Area • Education facilities at Aberdeen Grammar School, Countesswells School, Gilcomstoun School, Hazlehead Academy, Hazlehead Primary School and St. Joseph's RC School • Parkland including Den of Maidencraig, Fernielea Park and Hazlehead Park • Aberdeen City Centre Masterplan area including cultural sites such as Aberdeen Central Library, His Majesty's Theatre, Aberdeen Art Gallery and Union Terrace Gardens; and the Bon Accord and St Nicholas Shopping Centres • Onward cycle connections via National Cycle Route 1 at Rosemount Viaduct • Proposed new cycle infrastructure on the A92 by junction with Edgehill Road 	
	<p>Option 3</p>	<p>Cycling provision under Option 3 on the A944 corridor mimics that proposed under Option 1 and on the A9119 provision mimics that proposed under Option 2. Please refer to the corresponding rows immediately above.</p>	<p>✓✓</p>
	<p>Option 4 A/B/C</p>	<p>Cycling provision under Option 4 mimics that proposed under Option 2 for the parallel route provided for the A944, and on the A9119 provision mimics that proposed under Option 1. Please refer to the corresponding rows immediately above but note that through providing cycle infrastructure on the A9119 itself and A944 parallel routes, Option 4 maximises the number of schools served directly by cycle infrastructure (total of 10 schools served directly but additional schools located nearby will also benefit, e.g., Harlaw Academy and St. Margaret's School for Girls).</p>	<p>✓✓</p>

Criteria	Option	Commentary	Score
<p>TPO3: Reduce bus journey times and make journey times more consistent on the A944 and A9119 between Westhill and Aberdeen city centre</p>	ALL	<p>The main bus routes which travel along the A9119 and A944 corridors are the Stagecoach 4/5/6, Stagecoach 14, First 11 and First 23 services. It is important to note that no bus services use the A944 end-to-end from Westhill to Mounthooly. In fact, there is very little usage of the A944 corridor east of Foresterhill Health Campus.</p> <p>The 4, 5/6 and 11 services predominantly run along the A9119 and the 14 and 23 run along the A944. Analysis has been undertaken to estimate the impacts of each of the options on bus journey times, and is described in Appendix C. This analysis used existing bus timetables (as at Spring 2022) to assess the typical level of delay incurred by each bus service and output estimates of how delay could be reduced, dependent on the extent and quality of bus infrastructure proposed. This has assumed:</p> <ul style="list-style-type: none"> • Provision of continuous bus lanes on a section will allow buses to travel at free-flow/uncongested speeds and journey times will reflect the daily minimum on that section as per the existing timetable • Provision of staggered bus lanes on a section will reduce delay by half compared with the existing timetable (i.e., time saving = (timetabled section journey time – minimum daily journey time for that section) / 2) • Provision of a new junction between Blackfriars Street and Denburn Road (as per Option 2C) will remove the need for services to circulate around the square encapsulated by St Andrew Street, John Street and Charlotte Street, accruing a time saving of one minute <p>From the analysis undertaken (as presented in Appendix C), on the whole, there appears to be greater existing delay on the A9119 than A944, which likely reflects that there is greater bus priority infrastructure on the A944 at present.</p> <p>The analysis also considered the potential benefits that could be achieved if services used the full length of the proposed infrastructure on the A944, as per Options 2 and 4, (recognising that at present buses only utilise sections of the A944 corridor, but under the proposals for Aberdeen Rapid Transit, the full corridor may be part of an 'ART' network). As such, consideration has been given to three theoretical new 'dummy' ART services, with routeing as per the routes of the variant A, B and C infrastructure proposals.</p> <p>For the majority of its length, the A944 is wide and has good capacity to accommodate continuous bus priority. The A9119 is much more constrained and can accommodate staggered bus lanes at most.</p> <p>It is suggested that if new bus priority infrastructure was installed along the A944 east of Foresterhill Health Campus and along onward connections to Aberdeen city centre, bus journey times via the A944 may be substantially shorter than those along the A9119 and bus operators may be persuaded to operate new services or reroute existing services along the A944 to take full advantage of this. This could potentially take the form of a new ART service as proposed under the ART project. Detailed discussion is provided under Option 2 A/B/C and Option 4 A/B/C below.</p>	-
	Option 1	<p>Under Option 1, cycle infrastructure is prioritised first on the study corridors and only limited additional bus priority infrastructure can be accommodated.</p> <p>The table below indicates maximum bus journey time savings under Option 1 variants for the existing services which make greatest use of the study corridors. Full details of supporting calculations and outputs can be found in Appendix C .</p>	✓

Criteria	Option	Commentary	Score																								
<p>TPO3: Reduce bus journey times and make journey times more consistent on the A944 and A9119 between Westhill and Aberdeen city centre</p>		<table border="1"> <thead> <tr> <th>Service No.</th> <th>Route Section</th> <th>Study Corridor</th> <th>Change in Journey Time vs Do Nothing (Peak)</th> </tr> </thead> <tbody> <tr> <td>4</td> <td>Kingswells P&R – Bus Station</td> <td>A9119</td> <td>-8%</td> </tr> <tr> <td>5/6</td> <td>Kingswells P&R – Bus Station</td> <td>A9119</td> <td>-16%</td> </tr> <tr> <td>11</td> <td>Woodend - Union St</td> <td>A9119</td> <td>-5%</td> </tr> <tr> <td>14</td> <td>Kingswells - Bus Station</td> <td>A944</td> <td>-2%</td> </tr> <tr> <td>23</td> <td>Sheddocksley – Union St</td> <td>A944</td> <td>-7%</td> </tr> </tbody> </table> <p>The outputs from bus journey time analysis show:</p> <ul style="list-style-type: none"> Service 4 journey times reducing by up to 8% from the Do Minimum journey time, equating to 3 minutes of journey time saving. The greatest saving is made in the PM period in the eastbound direction (i.e., Kingswells - Aberdeen). Service 5/6 journey times reducing by up to 16% from the Do Minimum journey time, equating to 6 minutes of journey time saving. The greatest saving is made in the PM period in the eastbound direction (i.e., Kingswells - Aberdeen). Service 11, 14 and 23 journey times reducing by a negligible amount. <p>Note that the analysis relates to changes in the peak. Changes in journey time in the off-peak periods would be smaller.</p> <p>In short, Option 1 provides limited additional bus priority infrastructure and small journey time benefits. The majority of existing delay experienced on these services will not be alleviated by the extent of infrastructure proposed.</p>	Service No.	Route Section	Study Corridor	Change in Journey Time vs Do Nothing (Peak)	4	Kingswells P&R – Bus Station	A9119	-8%	5/6	Kingswells P&R – Bus Station	A9119	-16%	11	Woodend - Union St	A9119	-5%	14	Kingswells - Bus Station	A944	-2%	23	Sheddocksley – Union St	A944	-7%	
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<p>Option 2 A/B/C</p>	<p>Under Option 2 variants A, B and C, bus infrastructure is prioritised first on the study corridors and active travel provision is largely offline to maximise space for bus infrastructure. As such, continuous bus lanes are possible along the majority of the A944 corridor and staggered bus lanes along the majority of the A9119.</p> <p>Proposals under Option 2A/B/C are the same in terms of interaction with <i>existing</i> bus routes and so journey time benefits are also the same across the variants for the existing services. Options 2A/B/C provides the greatest journey times savings for existing services of all the options.</p> <p>As noted above, no services currently run along the full length of the A944 corridor and as such no existing services can take full advantage of the proposed new infrastructure under Options 2A/B/C. In order to assess the potential benefits of the full infrastructure, as noted above, consideration has been given to three theoretical new ‘dummy’ ART services, with routeing east of Berryden Road / Skene Square as per the routes of the variant A, B and C infrastructure, respectively.</p>	<p>✓✓✓</p>																									

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TPO3: Reduce bus journey times and make journey times more consistent on the A944 and A9119 between Westhill and Aberdeen city centre	Option 2 A/B/C	<p>The table below indicates maximum bus journey time savings under each of the Option 2 variants for existing services and the defined three theoretical new ART services which maximise use of proposed infrastructure. Full details of supporting calculations and outputs can be found in Appendix C .</p> <table border="1"> <thead> <tr> <th colspan="3"></th> <th colspan="3">Change in Journey Time vs Do Nothing (Peak)</th> </tr> <tr> <th>Service</th> <th>Route</th> <th>Corridor</th> <th>2A</th> <th>2B</th> <th>2C</th> </tr> </thead> <tbody> <tr> <td>4</td> <td>Kingswells P&R – Bus Station</td> <td>A9119</td> <td>-18%</td> <td>-18%</td> <td>-18%</td> </tr> <tr> <td>5/6</td> <td>Kingswells P&R – Bus Station</td> <td>A9119</td> <td>-24%</td> <td>-24%</td> <td>-24%</td> </tr> <tr> <td>11</td> <td>Woodend - Union Street</td> <td>A9119</td> <td>-13%</td> <td>-13%</td> <td>-13%</td> </tr> <tr> <td>14</td> <td>Kingswells - Bus Station</td> <td>A944</td> <td>-3%</td> <td>-3%</td> <td>-3%</td> </tr> <tr> <td>23</td> <td>Sheddocksley – Union Street</td> <td>A944</td> <td>-6%</td> <td>-6%</td> <td>-6%</td> </tr> <tr> <td>New A variant</td> <td>Kingswells P&R – Union Street</td> <td>A944</td> <td>-18%</td> <td>n/a</td> <td>n/a</td> </tr> <tr> <td>New B variant</td> <td>Kingswells P&R – Union Street</td> <td>A944</td> <td>n/a</td> <td>-16%</td> <td>n/a</td> </tr> <tr> <td>New C variant</td> <td>Kingswells P&R – Union Street</td> <td>A944</td> <td>n/a</td> <td>n/a</td> <td>-17%</td> </tr> </tbody> </table> <p>The outputs from bus journey time analysis show:</p> <ul style="list-style-type: none"> • Service 4 journey times reducing by up to 18%, equating to 7 minutes. The greatest saving is made in the PM period in the eastbound direction (i.e., Kingswells - Aberdeen). Results are the same under all Option 2 variants. • Service 5/6 journey times reducing by up to 24%, equating to 10 minutes. The greatest saving is made in the PM period in the eastbound direction (i.e., Kingswells - Aberdeen). Results are the same under all Option 2 variants. • Service 11 journey times reducing by up to 13%, equating to 3 minutes. The greatest saving is made in the PM period in the eastbound direction (i.e., Woodend - Aberdeen). Results are the same under all Option 2 variants. • Service 14 journey times reducing by a negligible amount. Service 14 only uses the A944 between Old Lang Stracht and Foresterhill Health Campus, and so only benefits from proposed new infrastructure towards the west of its route where congestion is not as severe. Under existing timetables, Service 14 shows only a small variation in journey times across the day between Kingswells and Union Square bus station, with 50% of this delay occurring outside of the study corridors, meaning that the potential time saving is very low. • Service 23 journey times reducing by up to 13%, equating to 4 minutes. The greatest savings are made in the PM period in the westbound direction (i.e., Aberdeen to Kingswells). Results are the same under all Option 2 variants. 				Change in Journey Time vs Do Nothing (Peak)			Service	Route	Corridor	2A	2B	2C	4	Kingswells P&R – Bus Station	A9119	-18%	-18%	-18%	5/6	Kingswells P&R – Bus Station	A9119	-24%	-24%	-24%	11	Woodend - Union Street	A9119	-13%	-13%	-13%	14	Kingswells - Bus Station	A944	-3%	-3%	-3%	23	Sheddocksley – Union Street	A944	-6%	-6%	-6%	New A variant	Kingswells P&R – Union Street	A944	-18%	n/a	n/a	New B variant	Kingswells P&R – Union Street	A944	n/a	-16%	n/a	New C variant	Kingswells P&R – Union Street	A944	n/a	n/a	-17%	
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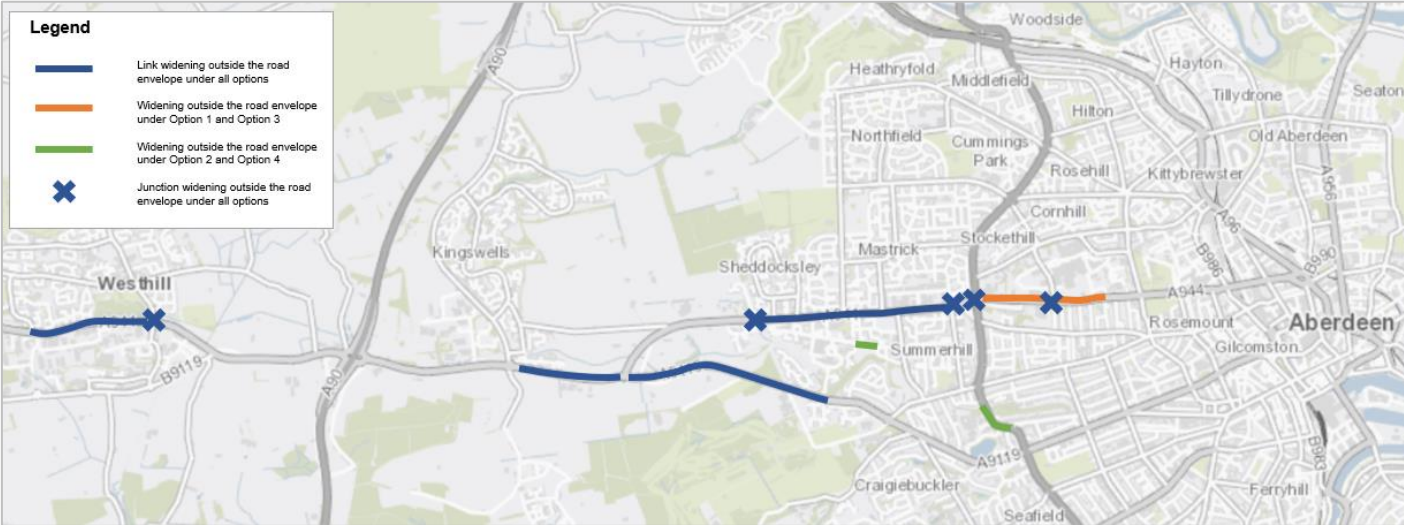
Criteria	Option	Commentary	Score
<p>TPO3: Reduce bus journey times and make journey times more consistent on the A944 and A9119 between Westhill and Aberdeen city centre</p>	<p>Option 2 A/B/C</p>	<ul style="list-style-type: none"> • New A service journey times reduce by up to 18% equating to 6 minutes. The greatest savings are made in the PM period in the westbound direction (i.e., Aberdeen to Kingswells) under Option 2A. • New B service journey times reduce by up to 16% equating to 5 minutes. The greatest savings are made in the AM period in the eastbound direction (i.e., Kingswells - Aberdeen) under Option 2B. • New C service journey times reduce by up to 17% equating to 5 minutes. The greatest savings are made in the AM period in the eastbound direction (i.e., Kingswells - Aberdeen) under Option 2C. <p>When reviewing the above, note that the A944 already features sections of bus lane in key areas (while the A9119 does not) and appears to suffer from a lower level of delay than the A9119. The 14 and 23 services also divert from the A944 by the Foresterhill Health Campus and so do not benefit from proposed bus priority improvements for a substantial portion of their routes.</p> <p>Under Option 2, Journey times become more consistent across the board with the difference between maximum and minimum journey times reducing by up to:</p> <ul style="list-style-type: none"> • 60% on Service 4 under all variants. • 55% on Service 5/6 under all variants. • 40% on Service 11 under all variants. • 20% on Service 14 under all variants. • 25% on Service 23 under all variants. • 66% on New A service under all variant 2A. • 90% on New B service under variants 2B. • 90% on New C service under variant 2C. <p>In the case of the theoretical new ART services, this means that new service journey times during morning and afternoon peaks under the Do Something scenario would be within one minute of minimum journey times under the Do Nothing scenario. It is worth noting that if the ART scheme were to be fully implemented, journey time savings are likely to be even greater as the scheme would likely utilise a reduced stopping pattern and well as reduced stop dwell times accomplished through seamless ticketing and improved stop infrastructure. Such measures are not reflected in the existing timetables used as the basis for the journey time estimates presented here.</p> <p>In short, all variants permit bus journey time savings of 5 minutes or more on the existing 4, 5 and 6 services, as well as on theoretical new services. Small journey time savings (< 5minutes) are also achievable on the 11, 14 and 23. On all routes, bus journey times will become more consistent, with the difference between maximum and minimum journey times reducing by 20-90%, resulting in a maximum anticipated difference of 5 minutes between peak and off peak journey times.</p>	
	<p>Option 3</p>	<p>Under Option 3, bus priority provision on the A944 corridor mimics that proposed under Option 1 and on the A9119 provision mimics that proposed under Option 2. Please refer to the corresponding rows immediately above.</p>	<p>✓✓</p>
	<p>Option 4 A/B/C</p>	<p>Under Option 4, bus priority provision on the A944 corridor mimics that proposed under Option 2 and on the A9119 provision mimics that proposed under Option 1. Please refer to the corresponding rows immediately above.</p>	<p>✓✓</p>

Criteria	Option	Commentary	Score
<p>TPO4: Improve the quality of bus stop infrastructure on the A9119 and A944, to enhance accessibility and provide a more comfortable waiting experience.</p>	<p>ALL</p>	<p>None of the options seek to improve the bus vehicle itself but all options would improve the attractiveness of the bus travel experience - key components of which are the waiting conditions at the stop and the ease of movement from the bus stop onto the bus, particularly for those with limited mobility or a pushchair/pram.</p> <p>The waiting environment should feel safe and comfortable whatever the time of day and provide good levels of protection from the weather, seating, and have easy to understand bus information. Getting on and off the bus should be achieved independently by wheelchair users requiring a step-free route between the footway and the bus floor, while those who are visually impaired should be able to locate the boarding zone without assistance.</p> <p>During the site visit, a review of bus stop infrastructure was undertaken, and the findings recorded as part of the site audit. The review concluded that although there were many examples of good bus stop infrastructure, there were several stops that lacked basic infrastructure including shelter, seats, Kassel kerbs, internal lighting and bus cages. Internal lighting is not available at many bus stops and real time information is only available via apps and QR code links, rather than via screens (meaning that this information may not be accessible to some travellers, particularly the elderly).</p> <p>Under all options, it is proposed that:</p> <ul style="list-style-type: none"> • Bus stop clearways are protected by a Traffic Regulation Order that is fully enforceable and keeps the bus stop clear of parked vehicles at times when buses operate (ideally this should cover a 24 hr period, 7 days a week to improve compliance) • Bus stop clearway lengths allow a bus to pull into the kerb and achieve a minimum horizontal gap between the bus floor and footway of 200mm • The boarding point should be located beyond the bus stop flag to support those who are visually impaired. • Bus stop kerb heights will allow level boarding. • Boarding and alighting zones (if buses have two sets of doors) are clear from street furniture or other obstacles and will be indicated using tactile paving as appropriate. • The bus stop clearway should be free from gully grates (which can also increase highway maintenance liabilities). • Bus shelters provide a good level of protection against the weather • Waiting passengers have clear visibility of oncoming traffic • Bus shelters are well lit and be exposed to high levels of natural surveillance • Easy to understand information about bus routes, destinations and service arrival times is provided • Real time passenger information is be provided at busy stops or where more than one route serves the stop • Bus stops are clean and well-maintained. • Seating/rest space is provided at larger stops. 	<p>✓✓✓</p>
<p>TPO5: Improve bus stop connectivity to ease interchange between active travel and public</p>	<p>ALL</p>	<p>Bus stop connectivity will be aided by the proposals to improve conditions for walking and cycling along the study corridors.</p> <p>Bus stops should be well connected to the key trip generators along the route. This generally means a walk distance of 400 metres or less with walking routes providing a high level of continuity, good sense of personal security and safe crossing routes particularly between paired bus stops. Under all options, it is proposed that:</p>	<p>✓✓✓</p>

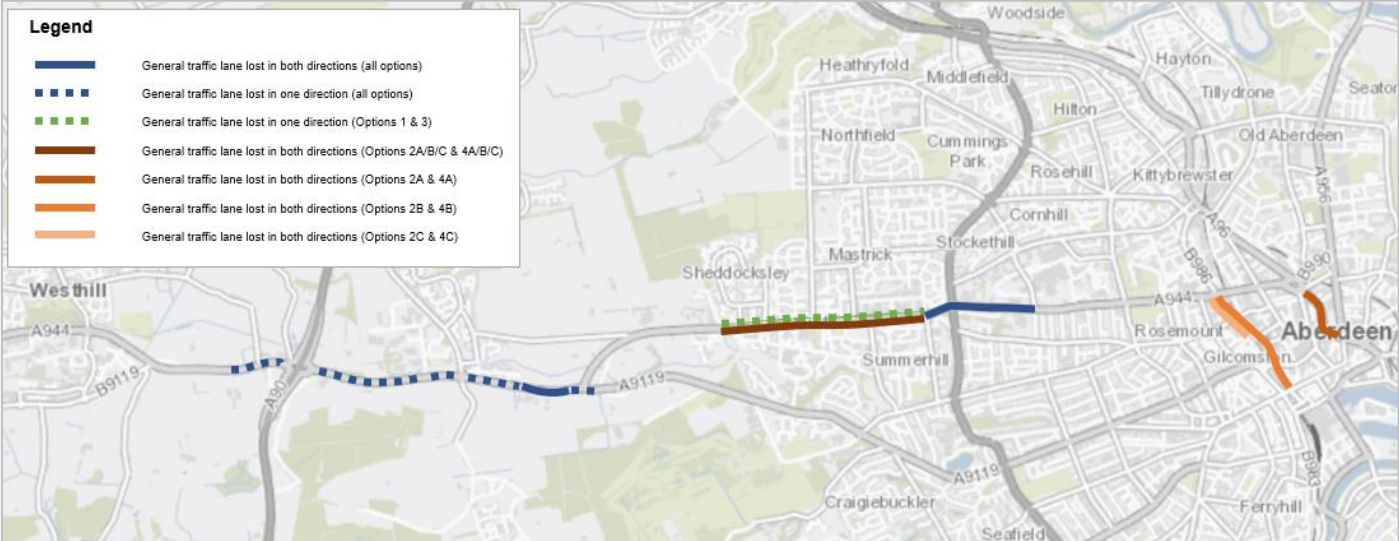
Criteria	Option	Commentary	Score
transport on the A944 and A9119 corridors.		<ul style="list-style-type: none"> • Bus stop positioning is reviewed and stops positioned close to side roads and pedestrian crossing facilities where possible. • Walking routes to bus stops are fully accessible, being step-free, sufficiently wide and with suitable gradients (if possible). • Walking routes feel safe and are well lit with good levels of forward visibility. • Walking routes are continuous and protected from traffic. • Walking routes are well maintained, have an even surface and are free from excessive litter. • Cycle parking is provided at busy bus stops and key interchange points. 	

Table 5.3: Appraisal Table – STAG Criteria

Criteria	Option	Commentary	Score
Environment	ALL	<p><u>Active Travel:</u></p> <ul style="list-style-type: none"> • Mode switch from car to active travel would reduce traffic related carbon and other harmful emissions. This would support the Scottish Governments Climate Change Bill which sets a 2045 target for net zero emissions. • The provision of a continuous active travel route from Westhill to Aberdeen city centre is likely to provide a number of localised community improvements along its length and would help target shorter distance ‘everyday’ trips – these account for a large proportion of daily trips within Scotland. Transport and Travel in Scotland 2019 (based on Scottish Household Travel Diary 2019) states that 17% of journeys made are less than 1km, and a further 23% are under 3km. Therefore, 40% of journeys are less than 3km and could be made by active travel if suitable routes and facilities were available. Aberdeen is a compact city with high potential for increased walking and cycling. • The provision of connected active travel provision along the corridors would tie into Aberdeen’s strategic city-wide Green Space Network (GSN) connecting natural green and blue spaces and habitats to each other. There are substantial areas of the GSN which border the study corridors including: Hazlehead and Hazlehead Park, Westburn Park/Victoria Park, Kingswells South/Sheddocksley/Maidencraig and these areas provide onward connections to Brimmond Hill, West Hatton and Countesswells Woods. All options serve these green space areas equally well. <p><u>Bus:</u></p> <ul style="list-style-type: none"> • Increased bus priority along the corridor offering reliable services has the potential to radically alter perceptions of bus travel. This could significantly help towards achieving a 50:50 mode share target for sustainable transport, in turn reducing car kilometres and hence local and global emissions. This shift is likely to be greatest for Option 2 where bus priority infrastructure is provided along the length of both the A944 and A9119 study corridors. • The COVID-19 pandemic has severely impacted bus passenger numbers and the number of operating services. In Scotland, concessionary bus patronage fell to around 20% of 2019 levels during the initial stages of the pandemic, and in Autumn 2021, concessionary bus journeys were still down by 35% compared to pre-pandemic levels. Improving the bus network has the potential to help ‘build back greener’ as the region emerges from the pandemic. <p><u>All options:</u></p> <ul style="list-style-type: none"> • While new bus and cycle infrastructure is proposed along the length of the study corridors, additional cycle and bus infrastructure provision can typically be achieved within the existing road envelope through removal of parking and reallocation of road space. However, there are sections where land take and new ‘tarmac’ will be required (as illustrated in the figure below), although this will typically only be needed on one side of the road. This additional hard construction will impact on the environment at these locations with an increase in the embedded carbon of the scheme, although the extents of new tarmac will not vary substantially between options. • As the infrastructure being developed under all options primarily involves the reallocation of road space and localised widening of up to 3m, it is unlikely there will be any significant impacts on biodiversity and habitats, geology and soils, water, drainage and flooding, or landscape. 	

Criteria	Option	Commentary	Score
Environment	ALL	<ul style="list-style-type: none"> It is noted that the Albyn Place and Rubislaw Conservation Area covers much of the area between Queen's Road and King's Gate and that there are many listed buildings located immediately adjacent to these sections. None of the options propose changes outside of the existing road envelope and so there will be no physical impacts on conservation area or listed properties.  <p>In 2014, Aberdeen City Council identified 20 Candidate Noise Management Areas (CNMAs) where on-street noise levels are 55dB or greater. These include A9119 Queen's Road between Queen's Parade and Anderson Drive, the A92 by its junction with the A944 and Holburn Street by its junction with Albyn Place. These areas were considered to experience higher than desirable levels of noise, and an action plan was set-out to address these issues. However, CNMAs were identified prior to the opening of the AWPR, which dramatically altered traffic routing in and around Aberdeen. Transport Scotland reported that HGV traffic along the A92 through Aberdeen reduced by between 49 per cent and 61 per cent when comparing January to June 2019 data with comparable 2014 data². As such, the A92/A944 junction may no longer qualify as a CNMA and other CNMAs may have been similarly affected. Nevertheless, the CNMAs are likely to be more vulnerable to changes in traffic than other areas on the corridors.</p> <p>Cycle and bus infrastructure may encourage modal shift from the car, which in turn should reduce traffic related noise; however, the reallocation of road space from general traffic to active travel/bus lanes could potentially increase congestion unless sufficient modal</p>	

² <https://www.transport.gov.scot/news/awpr-first-anniversary/#:~:text=Depending%20on%20the%20location%2C%20HGV,data%20with%20comparable%202014%20data>

Criteria	Option	Commentary	Score
Environment	ALL	<p>shift occurs. This may increase noise levels at key junctions on the corridors, and/or increase noise levels on alternative routes as car drivers re-route.</p> <p>Changes to the transport infrastructure and associated modal shift may also impact air quality. Again, greater impacts would be felt in areas where there are existing air quality issues, such as the West North Street (King St to 100m north of junction with Littlejohn Street) and North Anderson Drive (Bridge of Dee to A96) Air Quality Management Areas (AQMAs). Both AQMAs overlap the study area and will be affected by the options. Any reduction in traffic would help improve air quality in these designated AQMAs, however, increased congestion on the corridors could also occur given that a lane of traffic will be removed on the sections shown in the figure below. This may increase emissions and pollutants on the corridors themselves and/or disperse the issue across a wider area as car drivers re-route. If re-routing/rat-running becomes an issue, a Low Traffic Neighbourhood (LTN) is proposed across the area shown in Figure 4:10 (bounded by the A92, A93, A944 and B896), which would reduce the potential for radial movements to reroute onto less suitable streets. For more information on LTNs, see Section 4.3.</p>  <p>There will be significant impacts during construction works, and these will be most pronounced under Options 2 and 4 where the maximum bus priority on the A944 is provided as well as parallel routes undergoing construction. During construction there is likely to be noise, vibration and air quality impacts through increased traffic congestion and the constructions works themselves.</p>	

Criteria	Option	Commentary	Score
Environment		<p>If significant modal shift to more sustainable modes can be achieved, and due to road space reallocation and reduced general traffic capacity along the corridors, there will be an overall reduction in noise and emissions along the corridors. However, noise and emission may increase on secondary and local roads due to traffic rerouting away from the corridors or may transfer to other primary routes in Aberdeen (such as the A93). Mitigation, such as the Low Traffic Neighbourhood discussed in Section 4.4 is required to minimise the potential impacts.</p>	
	Option 1	<p>Under Option 1, cycle infrastructure is routed directly along the A944 and A9119, and some additional bus lanes are provided where remaining road space allows.</p> <p>Option 1 is likely to deliver the most substantial modal shift from car to bicycle and the lowest modal shift from car to bus, given the relative extents of new infrastructure proposed. On balance, it is considered that the overall modal shift from car will be lowest under Option 1, as all options provide end-to-end cycle infrastructure, and all other options also provide more substantial bus infrastructure. There is expected to be a small to negligible decrease in traffic volumes as a result.</p> <p>Approximately 7km of general traffic lanes will be lost on the A944 to accommodate the proposed bus and cycle infrastructure. This is the lowest level of general traffic lane loss of all options but as it is not accompanied by a notable reduction in traffic volumes, overall car journey times and traffic congestion are likely to increase. This may increase noise levels at key junctions on the corridors, and/or increase noise levels on alternative routes as car drivers re-route.</p> <p>A general traffic lane will be lost in both directions on the section of the A944 near the intersection with the A92, which may increase noise levels at the A92/A944 CNMA compared to existing, but as traffic levels have dropped substantially on the A92 relative to the situation when CNMAs were declared, this is not expected to have a discernible impact. No traffic lane loss is proposed on the A9119 in the vicinity of the Queen's Road or Holburn Junction CNMAs.</p> <p>Option 1 is expected to have a small to negligible impact on air quality. No changes to infrastructure are proposed on West North Street and so the AQMA will be unaffected under Option 1. Similar to the above, there may be a small increase in congestion in the vicinity of the A92 AQMA as a result of traffic lane loss; however, this impact may be offset by the substantial reduction in traffic seen on the A92 since opening of the AWPR.</p> <p>Overall Option 1 is considered to have both small to negligible negative and positive environmental impacts within the study area.</p>	<p>x - ✓</p>
	Option 2A/B/C	<p>Under Option 2, cycle infrastructure is routed along the A944 and A9119 parallel routes, while bus priority infrastructure is provided on the A944 and A9119 corridors themselves.</p> <p>This is likely to deliver the most substantial modal shift overall through providing two end-to-end cycle routes from Westhill to Aberdeen as well as maximising bus priority infrastructure on both the A944 and A9119 corridors. As a result, a reduction in car traffic on these corridors should occur - however on the A944 this is unlikely to provide a reduction in car journey times given that 10-11km (dependent on the A, B or C variant) of general traffic lanes will be lost to accommodate bus and cycle infrastructure. This is the highest level of general traffic lane loss of all options but if it is not accompanied by a notable reduction in traffic volumes, car</p>	<p>xx - ✓✓</p>

Criteria	Option	Commentary	Score
Environment		<p>journey times and traffic congestion are likely to increase, with corresponding negative impacts on air quality and noise. This may increase noise levels at key junctions on the corridors, and/or increase noise levels on alternative routes as car drivers re-route.</p> <p>Substantial journey time savings should be possible for bus users, which in turn will support modal shift and reductions in car traffic volumes on the corridor. As such, an overall reduction in road noise is expected on the A9119, which will particularly benefit the Queen's Road CNMA. A reduction in traffic on the A9119 should also support improved air quality, but as there are no identified AQMAs on the A9119 corridor, no measurable benefit is assumed.</p> <p>The route of A944 Parallel Route 1 requires negotiating a number of trees on Summerhill Terrace, opposite Holy Trinity RC School, with the specific impacts to be clarified if the option progresses. Similarly, A944 Parallel Route 2 includes the provision of cycle infrastructure along Midstocket Road and in order to accommodate cycle infrastructure on the section to the immediate east of Oakhill Grange, some removal of trees and earthworks may be required. An area of semi-mature trees on the eastern side of the A92 may be similarly affected by proposals for A9119 Parallel Route 2; however, at this stage A9119 Parallel Route 1 appears to have greater potential and so A9119 Parallel Route 2 may not ultimately be pursued.</p> <p>Overall Option 2 is considered to have both small to moderate negative and positive environmental impacts within the study area.</p>	
	Option 3	Under Option 3, cycle infrastructure is routed along the A944 and A9119 parallel route, while bus priority infrastructure is provided on the A9119 itself. As such the environmental impacts of Option 3 which relate to the A944 are as per Option 1 and those associated with the A9119 are as discussed under Option 2.	x - ✓
	Option 4 A/B/C	Under Option 4, cycle infrastructure is routed along the A944 parallel routes and directly along A9119, while bus priority infrastructure is provided on the A944 corridor itself. As such the environmental impacts of Option 4 which relate to the A944 are as per Option 2 and those associated with the A9119 are as discussed under Option 1.	x - ✓
Climate Change	ALL	<p>The Climate Change Scotland Act (2019) includes a target date of 2045 for achieving net zero carbon as well as a target of 75% reduction against 1990 emissions levels by 2030.</p> <p>Improvements to cycle and bus infrastructure and the reallocation of road space should encourage modal shift from the car to more sustainable modes, which in turn should reduce traffic related levels of carbon emissions and contribute to the aspirations for net-zero carbon by 2045.</p> <p>The use of the A96 Multi-modal study traffic modelling outcomes as a case study for this study is discussed in detail against the Economy criteria below. The outcomes of that modelling work highlighted that traffic rerouting due to the reallocation of road space resulted in longer distance journeys which led to increased fuel consumption. The economic appraisal found greenhouse gas emissions impacts ranging from a £-4.7m disbenefit to a £-7.5m disbenefit for the options most similar to those proposed here. The ASAM14 modelling tool (the traffic model used in the assessment) is not particularly sensitive to modal choice, and large improvements in bus journey times do not necessarily translate to proportionate modal shift within the model. Given this, it is worth noting that the outcomes of the A96 modelling and the associated economic impacts represent a <i>worst-case</i> scenario in terms of journey times and economic impacts (in reality, it is likely that a greater number of car trips would switch to public transport). This</p>	-

Criteria	Option	Commentary	Score
Climate Change		also reflects the fact that alternative routes were available for cars. If all the major routes into Aberdeen were subject to similar measures, these alternative routes would be much less attractive, and a higher level of modal shift is more likely.	
	Option 1	Option 1 (and Option 3) requires significant reallocation of road space. This loss occurs predominantly on the A944 corridor. The general traffic lane loss is approximately: 7.2km. Given the lost general traffic capacity, if significant modal shift is not achieved, the option is likely to generate significant traffic rerouting and as discussed above, associated increases in greenhouse gas emissions similar to the disbenefits noted for the A96 study. If significant mode shift is achieved, and there is a net reduction in car-km then this would bring benefits.	x - ✓
	Option 2 A/B/C	Option 2 (and Option 4) requires the greatest reallocation of road space, greater than under Options 1 and 3. This loss occurs predominantly on the A944 corridor due to the implementation of continuous bus lanes. Across the variants, the general traffic lane loss is approximately: <ul style="list-style-type: none"> Option 2A: 10.2km Option 2B: 11.4km Option 2C: 11.1km Given the lost general traffic capacity, if significant modal shift is not achieved, the option is likely to generate significant traffic routing, greater than anticipated under Options 1 and 3, and as discussed above, associated increases in greenhouse gas emissions similar to the disbenefits noted for the A96 study. If significant mode shift is achieved, and there is a net reduction in car-km then this would bring benefits.	xx - ✓✓
	Option 3	As noted for Option 1 above.	x - ✓
	Option 4 A/B/C	As noted for Option 2 above.	xx - ✓✓
Health, Safety and Wellbeing	ALL	<p>Accidents</p> <p>Active Travel:</p> <ul style="list-style-type: none"> The provision of an end-to-end dedicated cycle infrastructure (with complete or near complete segregation) would generate a safer perception of cycling and is likely to encourage a greater number of people to travel actively. Consultation undertaken to support the Aberdeen Active Travel Action Plan found that the most commonly cited concern with regard to active travel in the city was safety. Similarly, research undertaken as part of the British Social Attitudes Survey in 2020 found that 66% of people agreed that <i>'It is too dangerous for me to cycle on the road'</i>. The proposed active travel routes offer much improved safety for cyclists and removing cyclists from the carriageway will reduce the likelihood of collisions involving cyclists with cars / HGVs. Casualty rates per million passenger miles by user type highlights that cyclists, and those on foot are far likelier to be a casualty or a fatality than those travelling by car or bus. In fact, cyclists are over 23 times more likely to be a casualty, and 16 times more likely to be a fatality on the road network than those travelling by car. However, these statistics should be viewed within the context that the statistics incorporate all cycle trips and those made on the road where no cycle provision is provided. In 	-

Criteria	Option	Commentary	Score
Health, Safety and Wellbeing	ALL	<p>addition, cycle trips tend to be shorter in distance than the car trips they replace. Given, under the option proposals, safe segregated provision is provided over significant parts of the corridors, modal shift from car to bicycle should occur under all options and so there is likely to be a small reduction in road accident rates.</p> <ul style="list-style-type: none"> • Cycle accident data (covering 2015-2019) analysed and presented in A944/A9119 Transport Corridor Study – STAG-Based Appraisal, Case for Change (Stantec, July 2020) shows 13 accidents involving cyclists occurred within the study area between 2014 and 2019 (zero fatal, six serious, and seven slight). Two serious and two slight collisions occurred at the Mounthooly Roundabout and involved conflict between cyclists and vehicles entering/exiting the roundabout. One serious and two slight collisions occurred at the Queen’s Cross Roundabout. At no other location was more than one cycle collision recorded. Segregated facilities at these roundabouts would reduce the likelihood of these accidents involving cyclists (for more detail see option specific discussion below). • Providing a segregated cycle track which is clearly delineated to keep cyclists and pedestrians separate would also reduce the risk of cyclist-pedestrian collisions and improve the safety and attractiveness of both modes of active travel • If segregated one-way with traffic flow tracks were implemented, cyclists may incorrectly use the tracks in the wrong direction if it is easier than crossing the A944/A9119 carriageway. This would lead to an increased safety risk • There may be some increased safety risk where the segregated two-way track is implemented given the need to move between the cycle track and the road, which would be more difficult for cyclists travelling against the flow of traffic • There is likely to be an increased feeling of safety and security where the segregated two-way track is implemented given the dedicated cycling ‘carriageway’ and the opportunity to interact with cyclists traveling in the opposite direction • There may be some increased safety risk where the segregated two-way track is implemented, and steep gradients are present and cyclists heading downhill may be travelling at speed on the track towards those cycling uphill • There may be some increased safety risk to cyclists on the segregated two-way track if they were dazzled by the headlights of on-coming motor vehicles on the road although this is less likely to be an issue in the urban lit areas • Safety, and the perceptions of safety surrounding active travel schemes is likely to improve as a critical mass of users is established and this travel behaviour is ‘normalised’ <p><u>Bus:</u></p> <ul style="list-style-type: none"> • A switch to bus travel from the car would reduce traffic on and around the corridor and the associated number of accidents. The scale of this change would depend on the extent of the modal shift from car achieved – likely to be greater for Option 2 where the journey time by bus will be shorter given the increased level of bus priority delivered. However, any increase in traffic onto other corridors into the city, or onto secondary and local roads, could see traffic levels increase alongside the associated number of accidents. Mitigation measures such as the Low Traffic Neighbourhood described in Section 4.3 would need consideration to minimise such impacts. • Travel by bus is also safer than travel by car, bicycle and indeed as a pedestrian. • Any reduction in accidents would provide savings to the public purse from the reduced social-economic costs including: <ul style="list-style-type: none"> ○ Loss of output due to injury ○ Human cost of casualties ○ Damage to vehicle and property ○ Police and insurance administration cost 	-

Criteria	Option	Commentary	Score
Health, Safety and Wellbeing	ALL	<ul style="list-style-type: none"> • Security: Several stops lack basic infrastructure, specifically including internal lighting. Under all options, bus stops on the corridor would be upgraded to ensure they are well lit and offer good levels of natural surveillance. At busy stops there will be CCTV monitoring and/or help points. <p>Health Outcomes: All public transport journeys involve an element of active travel and so under all options, there is likely to be an increase in the number of trips made by active modes. This will have a positive impact on public health outcomes, although the scale of this increase will vary across the options. Such benefits include reduced risk of premature death, absenteeism as well as journey ambience, noise, air quality and accidents (see Appendix D for greater detail). The table provided in the Economy appraisal below provides a summary of the outputs from the Department for Transport’s (DfT) Active Mode Appraisal Toolkit. In terms of the health benefits, assuming an appraisal period of 20 years, it is noted that:</p> <ul style="list-style-type: none"> • Given that all options offer end-to-end cycle infrastructure, all options accrue substantial benefits. Options 1 and 3 deliver approximately £7.8m of health benefits in relation to accidents, air quality, noise, reduced risk of premature death, absenteeism and journey quality, while Options 2 and 4 deliver approximately £7m of similar health related benefits³. The main difference between these options being that Options 1 and 3 offer a greater distance of off-road segregated tracks; however, AMAT appraisal does not account for the difference in the quality of junction infrastructure which is judged to be better on the A9119 corridor than the A944. • Aberdeen’s developing e-bike hire scheme⁴ could be integrated with proposed bus stop improvements to facilitate interchange between active modes and should also bolster use of the proposed new cycles routes – this is particularly relevant on the study corridors which features sections of notable gradients. • There would be disbenefits if current active travel users switch to using the bus (e.g., switching from a full 5km cycle (with the associated health benefits) to using the bus instead with only walking or cycling part of the trip to and from the bus stops and the origin/destination) but given the current low level of cycling within Aberdeen this impact will be marginal. <p>Access to Health and Wellbeing Infrastructure: A number of Aberdeen’s main healthcare facilities sit on or adjacent to the study corridors. These include the Foresthill Health Campus (including Aberdeen Royal Infirmary, Aberdeen Maternity Hospital, and Royal Aberdeen Children’s Hospital) and Royal Cornhill Hospital on the A944, in addition to Woodend Hospital and the Albyn Hospital on the A944. The Kingswells P&R would therefore provide direct connectivity to these facilities for those along the corridors. A number of parks and play areas are also located along the A944 including Countesswells Wood⁵, Hazlehead Park and Westburn Park/Victoria Park, all of which would become more accessible by bus/cycle. Bus stops would be reviewed and repositioned to ease access to these facilities.</p>	-

³ Additional benefits calculated through the AMAT toolkit relating to congestion and deferred infrastructure are noted in the Economy section and included in the overall Cost to Government Benefit to Cost ratio calculations

⁴ [Sharebike launches Aberdeen e-bike rental scheme | CiTTi Magazine](#)

⁵ Countesswells woods are currently closed to the public, but this is understood to be a result of recent storm damage, rather than a long-term situation.

Criteria	Option	Commentary	Score
Health, Safety and Wellbeing		<p>Through providing high-quality cycle infrastructure which connects directly with a number of schools, the project should support the development of healthy travel habits in local children. Segregated infrastructure and defined cycle routes may give the children more confidence and parents more reassurance that cycling in the city can be done safely:</p> <ul style="list-style-type: none"> • Aberdeen Grammar, Albyn School, Hazlehead Academy, Hazlehead Primary, Gilcomstoun School and St Joseph's R. C. School are located directly on the A9119 cycle corridor. • Fernielea School, Holy Family R. C. School and Skene Square Primary School are located on A944 Parallel Route 1. • Mile-End School sits on A944 Parallel Route 2. <p>Visual Amenity: The options proposed should facilitate some level of modal shift from car to bus and bicycle. This will reduce the intensity of traffic movements along the A944 and A9119 corridors, providing benefit to those living and working along the corridors. The reallocation of road space from general traffic would also further reduce the traffic volumes using the corridors. It is however noted that there may be disbenefits to other roads / routes if there is traffic re-routing, rat running due to the road space reallocation on the corridors. This would have negative impacts on those residing away from the corridors from whom traffic levels may increase, especially in neighbourhoods where the road network is not suitable for higher traffic volumes. In such instances, this should be mitigated against through the implementation of a LTN within the area enclosed by the A944, B896, A92 and A93. For further information see Section 4.3.</p>	
	Option 1	<p>While all options provide end-to-end cycle infrastructure with a good degree of segregation from traffic, Option 1 provides the highest quality cycle infrastructure, including the greatest length of off-road segregated cycle tracks. Option 1 also routes along the two key corridors for accessing the city from the west and so will be very prominent, meaning that more people are likely to be aware of the provision. As such, Option 1 is considered to have the greatest potential to prompt modal shift from car to cycle; and while cycle accident rates tend to be higher per km, this is not likely to be the case given the segregated nature of the proposed cycling infrastructure.</p> <p>The Active Mode Appraisal indicates that Option 1 will yield the greatest active travel health benefits of all options (£7.85m) with 66% of the benefits being derived from lower absenteeism and a reduced risk of premature death.</p> <p>Option 1 will provide only a small amount of additional bus lanes and is expected to only provide a small improvement in bus journey times. As a result, modal shift from car to bus is expected to be low and associated road safety improvements low also.</p> <p>Option 1 will notably improve access to healthcare facilities by bicycle and will provide more of a benefit to those working and visiting patients at the hospital.</p> <p>Removal of general traffic lanes and replacement with bicycle lanes should create a less intense and more visually pleasing streetscape on the corridors themselves. Some degree of traffic rerouting is to be expected, which may have negative visual impacts on other road sections. The degree of rerouting cannot be quantified at this stage as it crucially depends on initiatives taken forward in other corridors.</p>	✓✓
	Option 2 A/B/C	All Options provide end-to-end cycle infrastructure between Westhill and Aberdeen city centre and so deliver substantial active travel benefits. The differences between the options are whether they are on route or off-route, and whether they are segregated from	✓✓

Criteria	Option	Commentary	Score
Health, Safety and Wellbeing		<p>general traffic. Option 2 infrastructure is proposed on routes parallel to the main study routes to the east of Bressay Brae and King's Gate. These parallel routes carry lower levels of traffic but are more constrained and so cannot accommodate the same extent of segregated provision as the larger corridor. Under Option 2:</p> <ul style="list-style-type: none"> • a combination of on-road segregated, and on-road non-segregated cycling is provided along A944 Parallel Routes (whereas under Option 1 the corresponding section of the A944 provides off-road segregated and on-road segregated (through the use of orcas etc.) provision). • a combination of on-road segregated, and on-road non-segregated cycling is provided on A9119 Parallel Routes (whereas under Option 1 the corresponding section of the A9119 provides on-road segregated along its length). <p>Consequently, AMAT indicates Option 2 will yield the lowest active travel health benefits of all options (£7.05m – see Appendix D for more detail) with 68% of the benefits being derived from lower absenteeism and a reduced risk of premature death. While Option 2 (and Option 4) will yield lower active travel benefits than Option 1, it should be noted that this only relates to a difference of approximately £0.8million. Proposals for increased bus priority should encourage more bus users and every public transport journey has an element of active travel associated with it, and while these additional trips made by bus users could not be captured by the active mode appraisal, there is an inherent value to public health.</p> <p>By placing cycle infrastructure on parallel road sections, Option 2 is also able to deliver the greatest amount of bus priority of all the options and is consequently expected to generate the greatest modal shift from car to bus. The new cycle infrastructure is expected to generate some modal shift from car to bicycle and have a positive impact on accident rates. Additionally, efficient public transport services have further value in terms of the health and wellbeing as they can support older people to live independently for longer and reduce social exclusion by helping them to comfortably access amenities and services, and to visit friends and family.</p> <p>Option 2 will notably improve bus access to healthcare facilities including Foresterhill Health Campus, Royal Cornhill Hospital, Woodend Hospital and Albyn Hospital.</p>	
	Option 3	<p>Under Option 3, cycle infrastructure is of a similar quality to Option 1, with cycle infrastructure running along the A944 itself and along A9119 Parallel Route 1. Consequently, AMAT similarly indicates Option 3 will yield the second highest active travel benefits of all options (£7.84m – see Appendix D for more detail), with 66% of the benefits being derived from lower absenteeism and a reduced risk of premature death</p> <p>By placing A9119 cycle infrastructure on parallel road sections, Option 3 is also able to provide staggered bus lanes on the A9119, which is not possible under Options 1 and 4. The A9119 carries more east-west bus services than the A944 and appears to suffer from greater congestion. As such, Option 3 offers additional benefits compared to Option 1, specifically including improved access to Woodend Hospital and Albyn Hospital.</p> <p>Considering both the modal shift from car to bicycle and from car to bus, driven by Option 3 improvements, it is expected to have positive impact on accident rates and broader population health.</p>	✓✓
	Option 4 A/B/C	<p>Under Option 4 cycle infrastructure is of a similar quality to Option 2, with cycle infrastructure running along the A944 Parallel Routes and along A9119 itself. AMAT indicates Option 4 will yield the second lowest active travel health benefits of all options (£7.05m –</p>	✓✓

Criteria	Option	Commentary	Score
		<p>see Appendix D for more detail), with 68% of the benefits being derived from lower absenteeism and a reduced risk of premature death</p> <p>By placing A944 cycle infrastructure on parallel road sections, Option 4 is also able to provide continuous bus lanes on the A944 up to the east of Foresterhill Health Campus and staggered bus lanes on the A944 thereafter, which is not possible under Options 1 and 3. As such, Option 4 offers additional benefits compared to Option 1, specifically including improved public transport access to Foresterhill Health Campus and improved cycle access to Woodend Hospital.</p> <p>Considering both the modal shift from car to bicycle and from car to bus, driven by Option 4 improvements, it is expected to have positive impact on accident rates and broader population health.</p>	
Economy	ALL	<p>To provide quantitative analysis to the Economy criteria appraisal, (to provide an indication of the value for money of a scheme and the potential Costs to Government), at STAG Detailed Options Appraisal stage, the monetised economic impacts of options are normally estimated for road traffic, public transport, and active travel, through the use of available transport models and modelling tools.</p> <p>The following economic analysis has been undertaken:</p> <ul style="list-style-type: none"> • for road and public transport modes: using the A96 Multi-modal study⁶ economic outcomes as a case study (as discussed below) • for active travel modes: using the DfT's latest Active Mode Appraisal Toolkit (AMAT), which is a spreadsheet-based tool for evaluating the costs and benefits of walking and cycling interventions. <p><u>Road and Public Transport Modes</u></p> <p>Analysis for the recently completed A96 Multi-modal corridor study was undertaken using the Aberdeen Sub Area Model (ASAM14). ASAM is a multi-modal transport model and covers the main road and public transport network of Aberdeen City and Aberdeenshire. It was developed by Nestrans in partnership with Aberdeen City and Aberdeenshire Councils, the Strategic Development Planning Authority and Transport Scotland. The then-current version ASAM14 had a base year of 2014, and an update (ASMA19) is currently being finalised to reflect observed travel patterns following the opening of the AWPR with a new base year of 2019. Therefore, during the A96 study, the ASAM14 model was the most appropriate modelling tool to use and ASAM14 forecast years of 2027 and 2037 were considered. These forecast years include (amongst other committed schemes) the AWPR as a committed scheme.</p> <p>The outcomes of the ASAM A96 testing provided, amongst other outputs, quantitative analysis relating to:</p> <ul style="list-style-type: none"> • general traffic strategic re-routeing impacts – which was important given the scale of the schemes and road space reallocation 	-

⁶ A96 Multi-modal Corridor Study, Preliminary Options Appraisal, Stantec, April 2022

Criteria	Option	Commentary	Score
Economy	ALL	<ul style="list-style-type: none"> • general traffic and public transport inputs to the (DfT) TUBA (Transport User Benefit Appraisal) software to generate Travel Economic Efficiency (TEE) impacts and, when combined with scheme costs, to provide an indication of the benefit to cost ratio (BCR) for each option – as discussed in the Cost to Government section below. <p>The objectives of the A96 study are very similar to this A944 / A9119 study with a focus on improving travel in the corridor for more sustainable modes, and in terms of public transport specifically, improving the quality of bus travel in the corridor, reducing bus journey times, improving bus journey time reliability, and managing general traffic to minimise the impacts of traffic re-routing onto secondary and local routes (due to the reallocation of road space and reduced junction capacities).</p> <p>The infrastructure options developed for the A96 study, similar to those developed for this study, were developed to ensure the ART vision could be delivered. The level of bus priority along the corridors is therefore similar and includes the reallocation of road space, reducing the corridor capacity for general traffic in favour of more sustainable modes, as well as public transport and active travel priority at signals. Three levels of public transport intervention were considered, of which intervention levels 1 and 2 are very similar to the proposals for this study. Intervention level 1 was standard bus lanes (bus lanes between junctions but with the bus lane set back from the junction reducing the impact on junction capacity) with intervention level 2 being enhanced bus lanes, (bus lanes right up to junction stops lines, impacting more greatly on junction capacities).</p> <p>The outcomes of the ASAM A96 tests provided some clear indications as to the potential impacts of the schemes in terms of impacts on general traffic re-routing and public transport journey times. Given the similarity between the objectives of the two studies, and the similar types of intervention considered, rather than repeat the ASAM testing and analysis, in order to provide a proportionate approach to the appraisal, the outcomes of the A96 testing have been used as a well aligned case study to provide a robust indication of the likely impacts.</p> <p>Before discussing the A96 outcomes, it is important to note that the TEE analysis focusses mainly on travel time benefits so the reallocation of road space from general traffic to bus and active travel is likely to create significant disbenefits to general traffic. Given this, schemes which reallocate road space away from general traffic are highly likely to generate an overall disbenefit in terms of travel time savings. The scale of the disbenefit would depend on the level of modal shift achieved, the scale of any re-routing and how this was mitigated. The public transport journey time savings that could be achieved along the study corridors are discussed against TPO3 in the table above.</p> <p>Key outcomes of the A96 study model testing were:</p> <ul style="list-style-type: none"> • Significant traffic reductions along the corridor (up to 30% where enhanced bus lanes were introduced and road capacity for general traffic was halved as a result) • Traffic re-routing onto alternative primary routes into the city centre as well as secondary and local roads. This re-routing was prevalent along all other primary routes into the centre of Aberdeen (in this case the A92(N), A944, A9119, A92 (S) and A956) • Significant economic disbenefits to general traffic with vehicles travelling further to reach their destinations, increasing travel time, fuel costs, vehicle operating costs and greenhouse gas emissions, all contributing to total road disbenefits of over £200m for the enhanced bus lane options 	-

Criteria	Option	Commentary	Score
Economy	ALL	<ul style="list-style-type: none"> Significant public transport economic benefits of up to approximately £90m under the enhanced bus lane options Combined overall road and public transport disbenefits in excess of -£120m (in the 'best' performing option) under the enhanced bus lane options <p>Within the analysis, it was however noted that ASAM14 is not particularly sensitive to modal choice, and large improvements in bus journey times do not necessarily translate to proportionate modal shift within the model. The outcome of this is that the modelling results were considered to represent a worst-case scenario in terms of journey times and economic impacts, as in reality, it is likely that a greater number of car trips would convert to public transport.</p> <p>Given the above, it can be assumed that for the options being considered under this study:</p> <ul style="list-style-type: none"> There is likely to be a significant reduction in traffic on the A944 and A9119, particularly under Option 2 and 4 where the greatest level road space reallocation is required. Option 1 is likely to see the lowest impact given the scale of the proposals which are focused on active travel and require less significant road space reallocation. In addition, Option 3 requires similar road space reallocation to Option 1. Traffic is likely to re-route onto the other primary routes into Aberdeen with the largest increases likely to be seen on the A96, and A93 given their proximity to the A944/A9119 corridors. This assumes the A96 study outcomes are <i>not</i> in place. If similar road space reallocations were made on the other primary corridors into Aberdeen (as is likely to be required to implement ART) then secondary and more local roads are likely to experience a significant increase in traffic unless a substantial shift to public transport can be achieved. It is noted that the A93 lies in close proximity to the A944 / A9119 corridors and is not being considered as an ART corridor (although this is still to be confirmed). Given this, it may be that the A93 sees a significant increase in traffic. It is understood that Aberdeen City Council is in the process of developing a specification for a larger scale cumulative modelling exercise which will use ASAM19 to evaluate the combined impacts of all corridor studies and the ART scheme, as well as incorporating the proposals of the Aberdeen City Centre Masterplan. Understanding the combined impact of these A944/A9119 proposals alongside similar proposals on the other corridors is crucial to understanding the city-wide impacts In Options 3 and 4, where the A9119 and A944 respectively are prioritised for bus priority measures, it is likely that the opposing corridor in each case will suffer with increased traffic due to the road space reallocation. This is particularly unwanted given in these options the opposing corridor is being prioritised for cycling. <p>Active Travel:</p> <p>As noted above, the DfT's AMAT toolkit was used to estimate scheme benefits. The following benefits are anticipated, although the scale of benefits will vary across options:</p> <ul style="list-style-type: none"> Greater number of trips made by active travel modes would have a positive impact on health creating business savings from reduced absenteeism Modal shift from the car may result in deferred infrastructure provision (roads, junction upgrades etc.) with the associated cost saving 	-

Criteria	Option	Commentary	Score																																																											
Economy	ALL	<ul style="list-style-type: none"> A high quality segregated and attractive route may encourage and promote sustainable tourism – with links to Aberdeen Art Gallery, His Majesty’s Theatre, The Gordon Highlanders Museum, Marischal College and the Maritime Museum. <p>The AMAT analysis, detailed in Appendix D and summarised in the table below provides an indication of benefits related to active travel in terms of congestion, infrastructure, accidents, local air quality, noise, greenhouse gases, reduced risk of premature death, absenteeism, journey ambience and indirect taxation.</p> <table border="1"> <thead> <tr> <th rowspan="2">Impact</th> <th colspan="4">Active Travel Infrastructure Monetised Benefits (in £’000s)</th> </tr> <tr> <th>1</th> <th>2A/B/C</th> <th>3</th> <th>4A/B/C</th> </tr> </thead> <tbody> <tr> <td>Congestion benefit</td> <td>314</td> <td>291</td> <td>314</td> <td>291</td> </tr> <tr> <td>Infrastructure maintenance</td> <td>2</td> <td>2</td> <td>2</td> <td>2</td> </tr> <tr> <td>Accident</td> <td>53</td> <td>49</td> <td>53</td> <td>49</td> </tr> <tr> <td>Local air quality</td> <td>7</td> <td>6</td> <td>7</td> <td>6</td> </tr> <tr> <td>Noise</td> <td>4</td> <td>3</td> <td>4</td> <td>3</td> </tr> <tr> <td>Greenhouse gases</td> <td>21</td> <td>20</td> <td>21</td> <td>20</td> </tr> <tr> <td>Reduced risk of premature death</td> <td>4,613</td> <td>4,277</td> <td>4,613</td> <td>4,277</td> </tr> <tr> <td>Absenteeism</td> <td>568</td> <td>526</td> <td>568</td> <td>526</td> </tr> <tr> <td>Journey ambience</td> <td>2,290</td> <td>1,900</td> <td>2,288</td> <td>1,902</td> </tr> <tr> <td>Present Value of Benefits</td> <td>7,845</td> <td>7,050</td> <td>7,843</td> <td>7,053</td> </tr> </tbody> </table> <p>Although large-scale infrastructure schemes for other modes typically assume a 60-year appraisal period, this is generally not recommended for active mode interventions as they are more likely to have more finite project lifespans and increased uncertainty around the longevity of their impacts. Therefore, in line with most appraisals of cycling and walking infrastructure schemes, the above has assumed an appraisal period of 20 years.</p> <p>Analysis shows that Options 1 and 3 are anticipated to provide approximately £7.85m of active travel benefits and Option 2 and 4 are anticipated to provide approximately £7.05m of benefits (present value of benefits). <i>Note: AMAT calculates cycle benefits based on the quality of link infrastructure only, and it does not consider the cycle friendliness of junctions or assign any benefit to more cycle appropriate junction infrastructure. As such, this approach does not account for the additional benefits that cycle friendly junction upgrades will provide in terms of cycle travel times and cycle safety (actual and perceived). AMAT also does not take</i></p>	Impact	Active Travel Infrastructure Monetised Benefits (in £’000s)				1	2A/B/C	3	4A/B/C	Congestion benefit	314	291	314	291	Infrastructure maintenance	2	2	2	2	Accident	53	49	53	49	Local air quality	7	6	7	6	Noise	4	3	4	3	Greenhouse gases	21	20	21	20	Reduced risk of premature death	4,613	4,277	4,613	4,277	Absenteeism	568	526	568	526	Journey ambience	2,290	1,900	2,288	1,902	Present Value of Benefits	7,845	7,050	7,843	7,053	-
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Criteria	Option	Commentary	Score
Economy		<p><i>account of other factors which will affect demand for a route such as directness and visibility. As such, it is considered that the benefits for cycle infrastructure on the main corridors are likely to be underestimated.</i></p> <p>As outlined in Appendix D, the AMAT tool uses demand estimates for the study corridors to calculate benefits. Existing demand on the corridors was estimated based on Travel to Work data from the 2011 census, but demand was halved to reflect the fact that there are many route options within the city environment and so it is likely that some demand will use off-corridor routes. However, as the A9119 and A994 are the main traffic distributors in the area and provide the most direct routes, this may underestimate demand. As such, a sensitivity test was undertaken to identify the impact on active travel benefits and BCRs if 75% of those travelling between destinations within the study area actually used the study corridors themselves. This boosted benefits by 50%.</p> <p>Wider Economic Impacts</p> <p>There may be an impact on land-use through the improved public transport and cycle connectivity, and this may positively impact to encourage development. The effect is likely to be more pronounced where the new infrastructure can increase the commutable area through reducing travel times. This effect will largely be determined by changes to bus priority infrastructure and the balance of shorter bus journeys versus longer bus journeys. Bus journey time impacts are summarised under discussion on TPO3 and discussed in detail in Appendix C.</p> <ul style="list-style-type: none"> • Connectivity improvements could lead to more efficient labour markets, providing access to new or better jobs for people who could not previously access these jobs, especially through the improved access to Arnhall business park, Prime Four business park, the Aberdeenshire Council offices at Woodhill House, the range of healthcare facilities at the Foresterhill Health Campus, and the West End business district located along the A9119 corridor • Improvement may help catalyse and unlock development opportunities along and close to the corridors, as well as supporting existing employment and other economic generators located along the corridors (as listed above). • Better access to education and training leading to more skilled local labour markets 	
	Option 1 Active Travel	Will generate the greatest economic benefits through the provision of segregated safe infrastructure along both the A944 and A9119 corridors, enabling direct access to the key trip generators and attractors located immediately adjacent to both corridors.	✓✓✓
	Option 1 Public Transport	Will generate the lowest economic benefits as only minimal bus infrastructure is provided (on the A944) in addition to the active travel infrastructure.	✓
	Option 1 General Traffic	Likely to generate general traffic disbenefits given the road space reallocation, but likely to be less significant than the other options.	✗
	Option 2 A/B/C	Will generate significant economic benefits through the provision of segregated safe infrastructure on parallel routes to the main corridors. Connecting routes would be required to be utilised to enable access to the key trip generators and attractors located adjacent to both corridors.	✓✓

Criteria	Option	Commentary	Score
Economy	Active Travel		
	Option 2 A/B/C Public Transport	Likely to generate the greatest economic benefits as priority bus infrastructure is provided on the A944 and A9119 corridors	✓✓✓
	Option 2 A/B/C General Traffic	Likely to generate the greatest general traffic disbenefits given the road space reallocation	xxx
	Option 3 A/B/C Active Travel	Will generate economic benefits through the provision of segregated safe infrastructure on the A944 and on parallel routes to the A9119 corridor. It is noted that connecting routes would be required to be utilised to enable access to the key trip generators and attractors located adjacent to the A9119 corridor.	✓✓✓
	Option 3 A/B/C Public Transport	Likely to generate lower public transport economic benefits when compared to Option 2 as priority bus infrastructure is provided on the A9119 corridor only.	✓✓
	Option 3 A/B/C General Traffic	Likely to generate disbenefits given the road space reallocation. However, in Option 3 the A9119 is prioritised for bus travel which requires less road space reallocation than under Options 2 and 4 (where bus priority is provided on the A944, and the road space reallocation is greater).	xx
	Option 4 A/B/C Active Travel	Will generate economic benefits through the provision of segregated safe infrastructure on the A9119 and on parallel routes to the A944. Connecting routes would be required to be utilised to enable access to the key trip generators and attractors located adjacent to the A944 corridor.	✓✓
	Option 4 A/B/C Public Transport	Likely to generate public transport economic benefits than Option 2 but similar to Option 3, as priority bus infrastructure is provided on the A944 corridor only.	✓✓
	Option 4 A/B/C General Traffic	Likely to generate disbenefits given the road space reallocation, similar to Option 2 given the road space lost for general traffic.	xxx

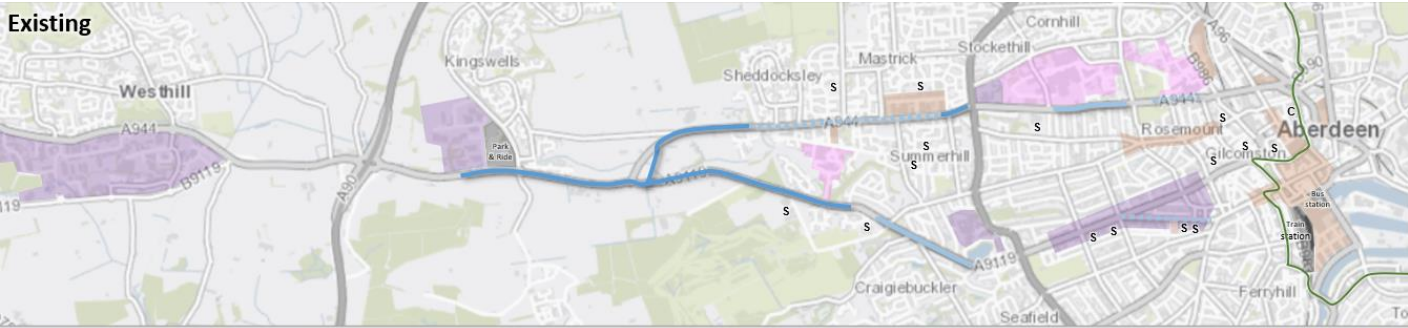
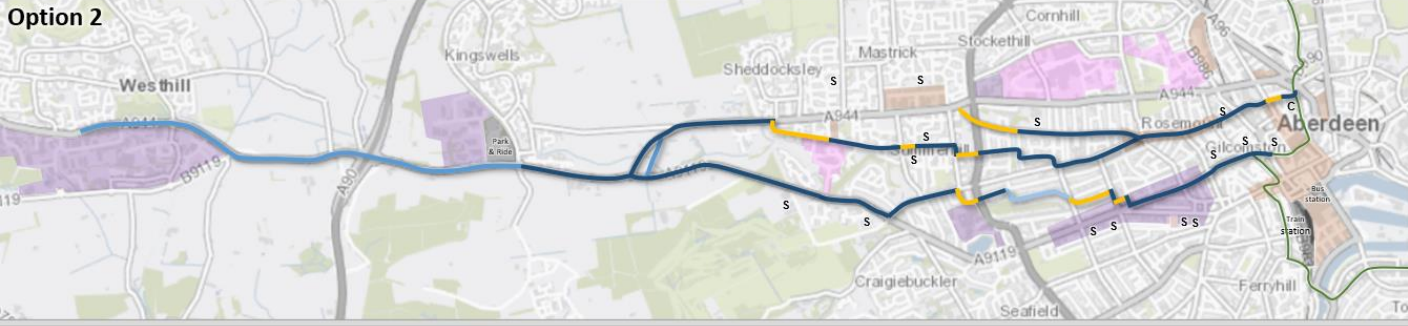
Criteria	Option	Commentary	Score
Equality and Accessibility	ALL	<p>The implementation of these options will not widen the existing bus network coverage as there are already public transport services operating along all the study corridors. Improved journey times for buses operating on the corridors, will however, improve the accessibility of jobs, education and social opportunities, which may now become 'time' accessible.</p> <p>Under all options, pedestrian infrastructure will be upgraded with footways widened, junction radii narrowed to ease pedestrian crossing, and junction entry treatments applied to emphasise the presence of, and need to, provide priority to pedestrians. Similarly, all bus stops will be upgraded to become fully Equality Act compliant (as discussed in relation to TPO4 above) and offer level platform boarding and alighting, improvements to comfort at bus stops, and may permit more of those with physical impairments to use the bus network (e.g., if you need shelter and a seat when waiting).</p>	-
	Option 1	<p>Active Travel:</p> <p>Under Option 1 substantial improvements are proposed to the active travel networks. The pedestrian environment will be similarly upgraded under all options, but Option 1 will provide the most extensive segregated cycling infrastructure of all the options. This will include continuous segregation along the A944 from Westhill to Mounthooly, along the A96 from Mounthooly to King Street, and along the A9119 from the A944 to Schoolhill in the city centre. Given that there is no segregated cycle infrastructure on the A944 and A9119 east of A92 North Anderson Drive and limited quality infrastructure to the west at present, this represents a huge change from existing. As such community and comparative accessibility benefits are expected.</p> <p>Community Accessibility:</p> <ul style="list-style-type: none"> • access to local services by walking and cycling would markedly improve. This would be true in both the peripheral and more densely urban community environments. • there would be improved active travel linkages to key trip attractors along the route including Arnhall industrial estate, Prime Four, Mastrick Whitemyres retail/business park, Woodhill House, Foresterhill Health Campus, Royal Cornhill Hospital, Hill of Rubislaw Business Park, West End Office Area, Tesco Mastrick, Lidl Hutcheon Street and Morrisons West North Street, and the city centre itself. • the provision of segregated cycle facilities will also improve safe routes to schools. These impacts will be particularly pronounced along the A9119 corridor which directly serves Albyn School, Hazlehead Academy, Hazlehead Primary and St Joseph's RC School and which is also used for access to Countesswells School, Harlaw Academy and St Margaret's School for Girls. • Improved and safer crossings for pedestrians (through reduced wait time at signals and the tightening up of junction geometries on side roads to reduce crossing lengths and slow down turning vehicles). <p>Comparative Accessibility:</p> <ul style="list-style-type: none"> • Safer, higher quality segregated active travel routes and facilities would remove barriers which prevent some groups in society using active travel. This is particularly likely to affect those with safety and intimidation concerns. The DfT's British Social 	✓


Criteria	Option	Commentary	Score
Equality and Accessibility	Option 1	<p>Attitudes Survey 2013⁷ found that women were 30% more likely than men to feel that cycling on road was too dangerous for them. Women also make more trips accompanied by children and so have an increased need for high quality routes that can be safely navigated by slower moving, less experienced, young cyclists.</p> <ul style="list-style-type: none"> • The DfT's British Social Attitudes Survey also found that the consideration that cycling was too dangerous increased with age: 47% of 18-24 year olds agreed with this statement compared with 61% of 45-54 year olds and 76% of those aged 65+. Therefore, if safety concerns can be addressed, many more women and older people could see cycling as a viable alternative for short trips. • Additional cycling infrastructure is less likely to have a material impact on access to jobs and the inequalities associated with deprivation, although cycling can provide a cost-effective alternative to the private car. However, in an area where cycle mode share is low, the majority of those within deprived communities will not own bicycles and may not be able to afford the up-front expense. This is where council bike-hire schemes, as proposed to be implemented in Aberdeen, can ensure that access to a bicycle is possible for those living in more deprived communities like Sheddocksley and Mastrick. 	

⁷ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/326097/british-social-attitudes-survey-2013.pdf

Criteria	Option	Commentary	Score												
Equality and Accessibility	Option 1	<p>Existing</p>  <p>Option 1</p>  <p>Legend</p> <table border="0"> <tr> <td> Traffic calmed street</td> <td> Non-segregated cycle lanes</td> <td> Commercial area</td> </tr> <tr> <td> Shared use path</td> <td> Employment area</td> <td> Healthcare facilities</td> </tr> <tr> <td> Segregated cycle track/lanes</td> <td> Transport facilities</td> <td> School / college</td> </tr> <tr> <td> National Cycle Network</td> <td></td> <td></td> </tr> </table> <p>Bus Travel:</p> <p>In addition to the stop improvements proposed under all options (described above), Option 1 will also provide small extensions to existing bus priority on the corridors. Bus journey time analysis indicates that Option 1 will only provide small (<5min) improvements to bus journey times and so employment catchments are unlikely to be much affected.</p> <p>'Hansen' connectivity analysis has been undertaken to consider the improved level of accessibility to employment against a Do Minimum scenario. The analysis suggests that Option 1 would provide a 1% improvement in terms of access to employment (Appendix E presents the full analysis).</p>	Traffic calmed street	Non-segregated cycle lanes	Commercial area	Shared use path	Employment area	Healthcare facilities	Segregated cycle track/lanes	Transport facilities	School / college	National Cycle Network			
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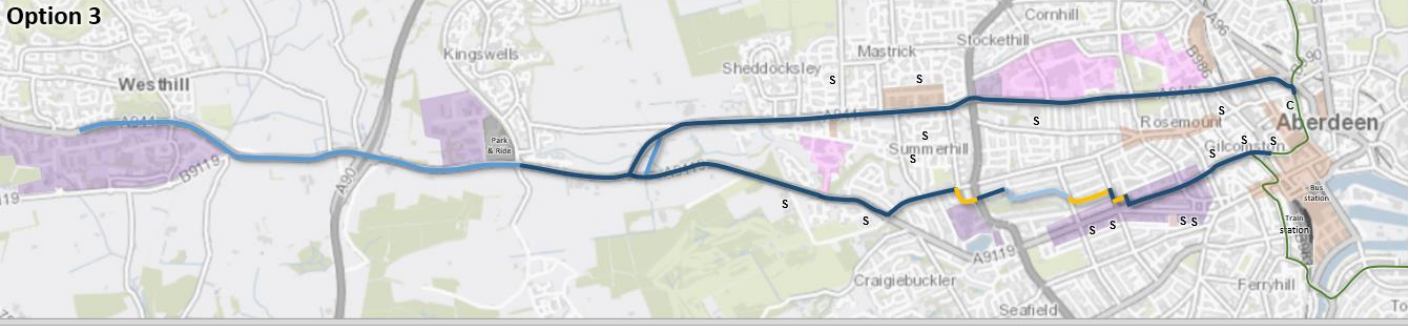
Criteria	Option	Commentary	Score
Equality and Accessibility	Option 2A/B/C	<p>Active Travel:</p> <p>Under Option 2 substantial improvements are proposed to the active travel network running parallel to the A944 and A9119 corridors.</p> <p>Community Accessibility:</p> <ul style="list-style-type: none"> • Access to local services by walking and cycling would markedly improve. This would be true in both the peripheral and more densely urban community environments. • There would be improved active travel linkages to a number of key trip attractors along the route including Arnhall industrial estate, Prime Four, Woodhill House, West End Office Area, and Morrisons West North Street, and the city centre itself. • The provision of segregated cycle facilities will also improve safe routes to schools. These impacts apply along the A9119 corridor and A9119 parallel routes which directly serve Aberdeen Grammar School, Countesswells School, Gilcomstoun School, Hazlehead Academy, Hazlehead Primary and which are also used for access to Albyn School, St Joseph’s RC School Harlaw Academy and St Margaret’s School for Girls. Similarly, A944 Parallel Routes 1 and 2 provide direct access to Fernielea School, Holy Family RC School, Mile End School and Skene Square Primary School. • Improved and safer crossings for pedestrians (through reduced wait time at signals and the tightening up of junction geometries on side roads to reduce crossing lengths and slow down turning vehicles). <p>Comparative Accessibility:</p> <ul style="list-style-type: none"> • Safer, higher quality segregated active travel routes and facilities would remove barriers which prevent some groups in society using active travel, as noted under Option 1 above • Many more women and older people could see cycling as a viable alternative for short trips, as noted under Option 1 above • Additional cycling infrastructure is less likely to have a material impact on access to jobs and the inequities associated with deprivation, although cycling can provide a cost-effective alternative to the private car. However, in an area where cycle mode share is low, the majority of those within deprived communities will not own bicycles and may not be able to afford the up-front expense. This is where council bike-hire schemes, as proposed to be implemented in Aberdeen, can ensure that access to a bicycle is possible for those living in more deprived communities like Sheddocksley and Mastrick. 	<p>✓✓✓</p>

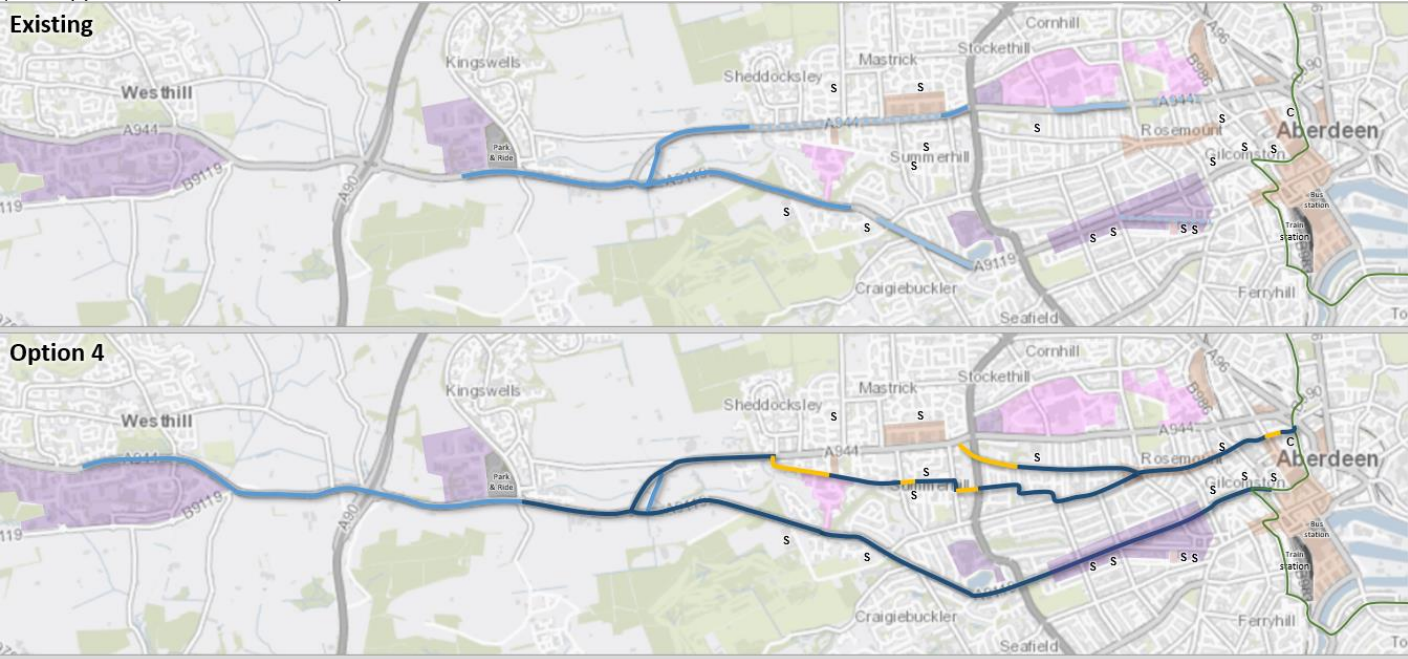
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Equality and Accessibility	Option 2A/B/C	<p>Existing</p>  <p>Option 2</p>  <p>Legend</p> <table border="0"> <tr> <td> Traffic calmed street</td> <td> Commercial area</td> </tr> <tr> <td> Non-segregated cycle lanes</td> <td> Employment area</td> </tr> <tr> <td> Shared use path</td> <td> Healthcare facilities</td> </tr> <tr> <td> Segregated cycle track/lanes</td> <td> Transport facilities</td> </tr> <tr> <td> National Cycle Network</td> <td> School / college</td> </tr> </table> <p>Bus Travel:</p> <p>Community Accessibility:</p> <ul style="list-style-type: none"> • Access to local services by bus would improve through reduced journey times. Option 2 variants provide the greatest journey time savings for existing services. Variant 2C provides the shortest journey times to Union Street and variant 2B provides the shortest journey times to Union Square Bus Station. • There would be improved access to a number of key trip attractors along the route including Arnhall industrial estate, Prime Four, Mastrick Whitemyres retail/business park, Woodhill House, Foresterhill Health Campus, Royal Cornhill Hospital, Hill of Rubislaw Business Park, West End Office Area, Tesco Mastrick, Lidl Hutcheon Street and Morrisons West North Street, and the city centre itself. 	Traffic calmed street	Commercial area	Non-segregated cycle lanes	Employment area	Shared use path	Healthcare facilities	Segregated cycle track/lanes	Transport facilities	National Cycle Network	School / college	
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Criteria	Option	Commentary	Score
Equality and Accessibility	Option 2A/B/C	<ul style="list-style-type: none"> Access by bus to Albyn School, Aberdeen Grammar School, Harlaw Academy, Hazlehead Academy, and St Margaret's School for Girls (all accessed from A9119 corridor) would be improved for those living further from the school campus. <p>Comparative Accessibility:</p> <ul style="list-style-type: none"> Reduced journey times by bus would support increased access to public services and opportunities for those without access to a car and may help reduce 'forced' car ownership. People from minority ethnic groups, young people not in education, employment or training, students, older people and women are considered to be at higher risk of transport poverty⁸, meaning that they typically have a greater dependence on the availability of low cost public transport in order to participate in society. These segments of society could particularly benefit from reductions in bus journey times and a corresponding increase in the facilities and opportunities accessible within a commutable distance. Improved bus stop infrastructure (i.e., appropriate bus shelters, accessible boarding and alighting etc.) would remove barriers which prevent some groups in society using the bus. Research suggests that women have greater concerns than men regarding their personal safety while travelling bus, and similarly disabled people have particular concerns regarding personal safety as well as concerns regarding physical access and facilities at points of departure⁹. <p>The 'Hansen' connectivity analysis undertaken suggests that Option 2 would provide a 4% improvement in terms of access to employment (Appendix E presents the full analysis). Option 2 performs most strongly of all options in terms of advancing public transport accessibility to employment.</p>	
	Option 3	<p>Under Option 3, bus infrastructure will be improved on the A9119 corridor and new cycle infrastructure installed on the A944. Supplementary cycle infrastructure will be installed on one of the two identified A9119 parallel routes.</p>	

⁸ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/953951/Transport_and_inequality_report_document.pdf

⁹ <https://dspace.stir.ac.uk/bitstream/1893/23004/1/Dobbie%20et%20al%20Understanding%20Why%20Some%20People%20do%20not%20use%20buses%202010.pdf>

Criteria	Option	Commentary	Score												
Equality and Accessibility	Option 3	<p>Existing</p>  <p>Option 3</p>  <p>Legend</p> <table border="0"> <tr> <td> Traffic calmed street</td> <td> Non-segregated cycle lanes</td> <td> Commercial area</td> </tr> <tr> <td> Shared use path</td> <td> Segregated cycle track/lanes</td> <td> Employment area</td> </tr> <tr> <td> National Cycle Network</td> <td> Healthcare facilities</td> <td> Transport facilities</td> </tr> <tr> <td></td> <td> School / college</td> <td></td> </tr> </table> <p>The 'Hansen' connectivity analysis undertaken suggests that Option 3 would provide a 2% improvement in terms of access to employment (Appendix E presents the full analysis). Option 3 performs more poorly than Options 2 and 4, but better than Option 1 in this regard.</p>	Traffic calmed street	Non-segregated cycle lanes	Commercial area	Shared use path	Segregated cycle track/lanes	Employment area	National Cycle Network	Healthcare facilities	Transport facilities		School / college		
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Criteria	Option	Commentary	Score
<p>Equality and Accessibility</p>	<p>Option 4A/B/C</p>	<p>Information from Strava indicates that cyclists prefer travel along the A9119 over the A944, even where this increases travel distance (see Appendix B for information).</p>  <p>The 'Hansen' connectivity analysis undertaken suggests that Option 4 would provide a 3% improvement in terms of access to employment (Appendix E presents the full analysis). Option 4 performs more poorly than Options 2, but better than Options 1 and 3 in this respect.</p>	<p>✓✓</p>
<p>Cost to Government</p>		<p><u>Investment Costs</u> The construction costs associated with each of the options is presented in Appendix A and in greater detail in the supplementary <i>A944-A9119 Multi-modal Study Concept Design Report</i>. A high-level summary of the option costs is presented in the table below. Note that the costs do not account for:</p> <ul style="list-style-type: none"> Land / property acquisition 	<p>-</p>

Criteria	Option	Commentary	Score																																																																																									
Cost to Government		<ul style="list-style-type: none"> Statutory approvals / consents Adjustments to existing public utility apparatus Surveys and investigation Design and works supervision fees Value Added Tax (VAT) and Inflation, as the date of construction is yet to be established 																																																																																										
		<table border="1"> <thead> <tr> <th rowspan="2">Option</th> <th colspan="4">Cost (£m, 2022 prices)</th> <th colspan="4">Cost (£m, 2022 prices) with 46%¹⁰ Optimism Bias</th> </tr> <tr> <th>Walking</th> <th>Cycling</th> <th>Bus</th> <th>Total</th> <th>Walking</th> <th>Cycling</th> <th>Bus</th> <th>Total</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>12.6</td> <td>23.7</td> <td>17.7</td> <td>54.0</td> <td>18.4</td> <td>34.6</td> <td>25.8</td> <td>78.8</td> </tr> <tr> <td>2A</td> <td>15.4</td> <td>16.6</td> <td>53.2</td> <td>85.2</td> <td>22.5</td> <td>24.2</td> <td>77.7</td> <td>124.4</td> </tr> <tr> <td>2B</td> <td>14.7</td> <td>16.6</td> <td>51.3</td> <td>82.6</td> <td>21.5</td> <td>24.2</td> <td>75.0</td> <td>120.7</td> </tr> <tr> <td>2C</td> <td>14.7</td> <td>16.6</td> <td>59.8</td> <td>91.1</td> <td>21.5</td> <td>24.2</td> <td>87.3</td> <td>133.0</td> </tr> <tr> <td>3</td> <td>8.3</td> <td>17.0</td> <td>26.9</td> <td>52.2</td> <td>12.2</td> <td>24.8</td> <td>39.3</td> <td>76.3</td> </tr> <tr> <td>4A</td> <td>19.7</td> <td>23.3</td> <td>43.9</td> <td>86.9</td> <td>28.8</td> <td>34.0</td> <td>64.1</td> <td>126.9</td> </tr> <tr> <td>4B</td> <td>19.0</td> <td>23.3</td> <td>42.1</td> <td>84.4</td> <td>27.7</td> <td>34.0</td> <td>61.4</td> <td>123.1</td> </tr> <tr> <td>4C</td> <td>19.0</td> <td>23.3</td> <td>50.5</td> <td>92.8</td> <td>27.7</td> <td>34.0</td> <td>73.8</td> <td>135.5</td> </tr> </tbody> </table>	Option	Cost (£m, 2022 prices)				Cost (£m, 2022 prices) with 46% ¹⁰ Optimism Bias				Walking	Cycling	Bus	Total	Walking	Cycling	Bus	Total	1	12.6	23.7	17.7	54.0	18.4	34.6	25.8	78.8	2A	15.4	16.6	53.2	85.2	22.5	24.2	77.7	124.4	2B	14.7	16.6	51.3	82.6	21.5	24.2	75.0	120.7	2C	14.7	16.6	59.8	91.1	21.5	24.2	87.3	133.0	3	8.3	17.0	26.9	52.2	12.2	24.8	39.3	76.3	4A	19.7	23.3	43.9	86.9	28.8	34.0	64.1	126.9	4B	19.0	23.3	42.1	84.4	27.7	34.0	61.4	123.1	4C	19.0	23.3	50.5	92.8	27.7	34.0	73.8	135.5	
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		<p><i>Note: Costs in the table above account for cycle infrastructure on both parallel routes for the A944 (as the routes are seen as complementary) but just for A9119 parallel route 1 (as only A9119 parallel route 1 or 2 would be implemented, and their costs are similar).</i></p> <p>Options 1 and 3 come with the lowest capital costs, and Options 2 and 4 have the highest capital costs. The difference in costs is primarily driven by two factors:</p> <ul style="list-style-type: none"> The much more comprehensive bus priority infrastructure that can be accommodated, and is proposed on the A944 than the A9119 (continuous bus lanes vs. staggered bus lanes) Two A944 parallel cycle routes are proposed and costed whereas only one A9119 parallel route would be implemented 																																																																																										

¹⁰ TAG UNIT A1.2 scheme costs (publishing.service.gov.uk)

Criteria	Option	Commentary	Score
Cost to Government		<p>Among the Option 2 and Option 4 route variants, Route Variant B has the lowest cost and Route Variant C the highest.</p> <p><u>Maintenance Costs</u></p> <p>The options would increase maintenance costs along the corridor due to new / altered signals at junctions (including at cycle and pedestrian crossings) often with more complex signal arrangements.</p> <p>Segregated active travel infrastructure would create additional maintenance costs due to the need to de-ice / grit and manage vegetation alongside the cycle tracks as well as keep them free of litter e.g., broken glass. This cost would be lower for the two-way segregated track sections given the ability to undertake maintenance over both directions of the track at the same time.</p> <p><u>Benefit to Cost Ratios (Road and Public Transport)</u></p> <p>As noted above for the Economy appraisal, analysis undertaken as part of the A96 study has been used to provide indicative outcomes for this study, given the similar nature of the proposals. Part of the A96 analysis generated benefit to cost ratio (BCR) for the schemes.</p> <p>Also as noted in the Economy appraisal above, it is important to note TEE analysis focusses mainly on travel time benefits and, as such, the reallocation of road space from general traffic to bus and active travel is likely to create significant disbenefits to general traffic. The resulting Benefit to Cost Ratios (BCR) can be negative, meaning the scheme creates a disbenefit (with disbenefits to general traffic outweighing benefits to bus and active travel users), which is counter-intuitive to a 'standard' desired outcomes. However, in this case, this may be a desired outcome, as time penalties are likely to encourage car drivers to switch to more sustainable modes, in line with policy and the TPOs. The scale of the disbenefit would depend on the level of modal shift achieved, the scale of any re-routeing and how this was mitigated. The smaller the differential between car and bus/cycle journey times, the higher (or less negative) the BCR will be. It is therefore important to recognise that the quantitative economic impacts discussed here only represent a part of the overall appraisal picture.</p> <p>The outcomes of the A96 study BCR analysis, for the options most similar to the proposal for this study, were:</p> <ul style="list-style-type: none"> the BCRs generated under the enhanced bus lane options (similar to the proposals for this study) ranged from approximately -2 to -6, meaning that the benefits to public transport users was not sufficient to offset the disbenefits to general traffic When a BCR was considered purely considering the benefits to public transport against the capital infrastructure costs, the BCR figures ranged from around 1.5 to 2.2. <p>Option BCRs for this study are likely to follow a similar pattern to those for the A96 study, with:</p> <ul style="list-style-type: none"> Overall BCR values likely to be negative, recognising that the benefits to public transport users is not sufficient to offset the disbenefits to general traffic 	-

Criteria	Option	Commentary	Score																								
Cost to Government		<ul style="list-style-type: none"> Public transport only BCRs considering the benefits to public transport against the capital infrastructure costs are likely to be greater than one, indicating an overall benefit <p>As noted against TPO3, if the ART scheme was to be fully implemented, journey time savings are likely to be greater than estimated for this study, particularly under Options 2 and 4, as the scheme would likely utilise a reduced stopping pattern and well as reduced stop dwell times through seamless ticketing and improved stop infrastructure. In this case, the benefits to users and hence the overall BCRs would increase.</p> <p><u>Benefit to Cost Ratios (Active Travel)</u></p> <p>The table below sets out the present values of the costs (derived from the costs in the above table) and benefits of cycle infrastructure proposed under each option, the methodology of which is presented in Appendix D in greater detail.</p> <table border="1"> <thead> <tr> <th rowspan="2"></th> <th colspan="4">Active Travel Costs and Benefits (PVC, £000s)</th> </tr> <tr> <th>Option 1</th> <th>Option 2A/B/C</th> <th>Option 3</th> <th>Option 4A/B/C</th> </tr> </thead> <tbody> <tr> <td>Present Value of Benefits</td> <td>7,845</td> <td>7,050</td> <td>7,843</td> <td>7,053</td> </tr> <tr> <td>Present Value of Costs</td> <td>16,405</td> <td>12,220</td> <td>12,888</td> <td>15,737</td> </tr> <tr> <td>BCR</td> <td>0.48</td> <td>0.58</td> <td>0.61</td> <td>0.45</td> </tr> </tbody> </table> <p><i>Note: Costs in the table above account for cycle infrastructure on both A944 Parallel Routes and A9119 Parallel Route 1.</i></p> <p>The present value of cycle infrastructure costs varies from £12.2m for Option 2 to £16.4m for Option 1. The main difference in costs arises from the scale of junction interventions needed on the main corridors compared with the parallel routes.</p> <p>Overall, Options 3 generates the highest BCR of 0.61, as it provides the 2nd highest benefits and 2nd lowest costs. Option 2 follows closely behind with a BCR of 0.58.</p> <p>However, it is important to note that costs include required junction upgrades, but the AMAT-derived benefits are based solely on link infrastructure and do not account for the additional benefits that cycle friendly junction upgrades will bring. AMAT also does not take account of other factors which will affect demand for a route such as directness and visibility. As such, it is considered that the BCRs for cycle infrastructure on the main corridors are likely to be underestimated.</p>		Active Travel Costs and Benefits (PVC, £000s)				Option 1	Option 2A/B/C	Option 3	Option 4A/B/C	Present Value of Benefits	7,845	7,050	7,843	7,053	Present Value of Costs	16,405	12,220	12,888	15,737	BCR	0.48	0.58	0.61	0.45	-
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Criteria	Option	Commentary	Score
Risk and Uncertainty	ALL	<p>There are a range of risks and uncertainties associated with the options relating to design, implementation, operation, impacts, and public and political appetite for the proposals.</p> <p><u>Highway Design and Infrastructure</u></p> <ul style="list-style-type: none"> • Highway widening, depending on land ownership, could require Compulsory Purchase Order powers and be met with resistance by those affected. Early discussions with those likely to be impacted can help mitigate the risks and costs associated with this. • Changes to waiting and loading restriction required to facilitate the infrastructure may impact on business and freight operations, and discussion would be required with affected business to ensure these are minimised • The complexity of junction layouts and the method of signal control will need further detailed consideration during the design stage • The extent of utility diversions and protection works will need further detailed consideration during the design stage • There may be impacts of street lighting with lighting relocation required • The ART Options Appraisal project is ongoing and will influence the options in terms of the ART network and service routing. This may require a focus on one of the corridors as the ART route and is likely to influence the decision on which option to take forward from this study and the level of bus priority required across each corridor. Ongoing dialogue between the two studies is critical to ensuring the proposals taken forward through this study do not impede the ART project. <p><u>Operational</u></p> <ul style="list-style-type: none"> • There are likely to be significant wider traffic impacts due to traffic reassignment, especially when combined with the proposals for the other primary arterial routes into the city centre. The programmed cumulative impact testing of the proposals will be critical to understanding the impacts of the proposals across all the corridors, combined with the emerging ART proposals. • Should variant B (under Options 2 and 4) be implemented, this would impact on the city Berryden Corridor Improvement Project committed scheme and is likely to impact on the objectives and operation of that scheme • The variant proposals all, to some extent, impact on the CCMP. Cognisance of the proposals as they progress will be important to ensuring the options for this study dovetail and support the masterplan. This is especially important with regards to the future plans for Union Street and whether bus access is permitted. <p><u>Political and Public Appetite</u></p> <ul style="list-style-type: none"> • Strong political backing will be required given the transformational changes proposed. Finding a key advocate within the Councils to champion the proposals, across all corridors, can help raise awareness of the schemes, clearly promote their benefits and help minimise any media negativity surrounding the schemes • There may be a lack of political will or appetite to implement supporting measures i.e., workplace parking licenses, review of parking charges / policy etc. and public opposition elements of the proposals (e.g., removal of parking, reduction in general traffic lanes etc). Again, a political champion for the schemes would be highly beneficial. Cross sector involvement, especially with those in the health sector, is likely to lend weight to the schemes if the health benefits can be promoted. This could be especially beneficial for this scheme given the wealth of healthcare facilities located along both the A944 and A9119 and NHS Grampian should be seen as a key stakeholder in the scheme promotion. 	-

Criteria	Option	Commentary	Score
Risk and Uncertainty		<ul style="list-style-type: none"> • There is likely to be some public opposition to the proposals, especially from drivers unlikely (or unable) to switch modes to public transport and business users / freight who will see their journey times increase • There is likely to be some public opposition to the loss of on-street parking both within residential areas and along the main corridors themselves. • There is likely to be some potential opposition from freight operators if the movement of freight within the city is significantly impacted. Early and on-going dialogue with freight operators is required especially around the cumulative impacts of the corridor studies to understand how freight movements may be affected. 	
Public Acceptability	ALL	<p>An online interactive Arc StoryMap was live on Aberdeen City Council's Citizens Space consultation page from 1st June 2022 to 1st July 2022 (this was also available in hard copy if requested). The survey was publicised through Aberdeen City Council's Citizen Space portal and the Council's media channels. In addition, leaflets were distributed to over 20,000 residential properties and businesses located close to the A944 and A9119 corridors to raise awareness of the engagement process. It was also shared through contact with local councillors, community councils and other local interest groups to further publicise the survey within the communities most likely to be affected by the proposals. Furthermore, a link to the survey was provided to a range of stakeholders, who were invited to complete the survey on behalf of their organisation or respond directly by email to the study team with comments.</p> <p>All options identified involve the reallocation of road space in favour of more sustainable modes at the expense of general traffic. The public survey (a full write up of which can be found in Appendix F) found that whilst there is an appreciation that society as a whole needs to travel more sustainably, there is a reluctance to make that change at a personal level and sacrifice some of the current convenience of car travel experienced by those living in the study area.</p> <p>Over 1,100 responses provided to the public survey from the general public and local businesses, in addition to eight responses from stakeholder organisations such as the NHS. The vast majority of responses came from people who live on the corridor and 93% of respondents say that they currently use the A944 and/or A9119.</p> <p>It is important to note that 40% of responses came from Rosemount and Midstocket which are situated off the main corridors but are affected by the parallel cycling routes proposed under Options 2 and 4. This is a much higher proportion than might be expected based on population, and this has skewed the results. Discussion is provided on the reasons for dissatisfaction expressed in these responses further below.</p> <p>The public survey found that 82% of respondents make car journeys along the A944/A9119, while 34% travel on foot, 22% travel by bus and 21% cycle. The proportion of respondents who drive is very high compared with bus for a city environment and the proportion cycling compared with walking is also high.</p> <p>Key findings:</p> <ul style="list-style-type: none"> • Overall, 29% of respondents felt that one or more of the options should be taken forward for further development, while 64% said none should be progressed and 7% said another option should be progressed. The most common suggestion for 'another option' was to improve conditions for sustainable modes without reducing on-street car parking. In contrast, half of the stakeholders surveyed were supportive of one or more of the options. The public opposition noted in respect of the A944 parallel routes in particular and their potential impact on Rosemount Place is likely to have influenced the survey outcomes and 	-

Criteria	Option	Commentary	Score
Public Acceptability	ALL	<p>the high number of respondents noting that none of the options should be progressed. Further analysis was therefore undertaken to establish the preferences of sub-sets of the respondents – namely those residing in Midstocket and Rosemount and those not residing in these areas. The analysis showed that support for the options goes from 24%, for those resident in Rosemount and Midstocket, to 33% among residents of other areas. . While a lower level of support for Options 2 and 4 was expected, it is perhaps surprising that Rosemount and Midstocket residents were much more likely to be unsupportive of all the options.</p> <ul style="list-style-type: none"> • Respondents who indicated their support for one or more of the options were then asked to rank the options. Option 1 was favoured by 66% with Options 2, 3 and 4 being the first choice for 14%, 8% and 11% of respondents respectively. A scoring was also undertaken to rank the options across their ranking preferences (i.e., 4 points for a 1st place ranking, decreasing to 1 point for a 4th place ranking). Under this ranking, Option 1 was still the most favoured, but that was followed by Option 3, then Option 2 and finally Option 4. • Based on the results of the public survey, of those who noted an option preference, it appears that Option 1 is most likely to generate modal shift towards more sustainable travel with 79% of respondents who favoured this option saying that they would change their travel habits. Option 4 follows close behind with 73% but Options 2 and 3 perform more poorly with 59% and 57% respectively saying that they would change their travel habits. • Respondents were asked whether they agree with the concept of a LTN. Some 56% of respondents selected 'No', while 30% selected 'Yes' and 14% either did not know or had no opinion. Within Rosemount and Midstocket, support for an LTN was 10% lower than elsewhere. <p>Respondents were also given the opportunity to provide any additional comments via an open question at the end of the survey or via email. The most common responses are outlined below.</p> <ul style="list-style-type: none"> • 335 respondents cited concerns relating to reductions in on-street parking, as this would increase walking distances between car and home and between car and shops which is inconvenient, would disadvantage those with mobility problems and may reduce customers at local businesses. 24 of these respondents also noted concerns that a reduction in on-street parking would reduce house values. Four stakeholders also noted that they were against the loss of on-street car-parking to accommodate options. • In a related point, 216 respondents were concerned that proposals would have an adverse effect on local businesses, particularly on Rosemount Place. It was felt that reduction in car-parking on Rosemount Place, combined with rerouting of the No.3 bus service onto Leadsid Road, would reduce customer footfall and reduce accessibility for the elderly and those with mobility problems. • The potential re-routing of bus services around Rosemount (Options 2 and 4) was highlighted by 93 respondents as being likely to have a detrimental impact on both residents and businesses in the area. Two stakeholders echoed this concern. • 90 respondents highlighted that they are supportive of proposals for new cycle infrastructure, while 82 felt that the routeing of cycle infrastructure is inappropriate (comments including: parallel routes not sufficiently direct, adverse gradients on the A944/A944 parallel routes and safety concerns about cycle traffic speeds on residential streets forming part of parallel routes) • 76 respondents considered that there was no need for additional cycle infrastructure as existing infrastructure is sufficient and very few people cycle 	

Criteria	Option	Commentary	Score
Public Acceptability		<ul style="list-style-type: none"> 57 respondents noted that they are concerned that reallocation of road space to more sustainable modes would increase congestion and 46 respondents felt that car users were being unfairly penalised to improve conditions for a minority of travellers who either travel by bus or cycle 36 respondents noted that they support the introduction of additional bus priority infrastructure, while 36 respondents stated that additional bus infrastructure was unnecessary as delays were not a problem and existing bus lanes underused The potential LTN outlined was objected to by 27 respondents who said that it would have a negative impact on those who work and live in the area. A further 9 respondents raised concerns that 'rat-running' would occur on streets to the north/south of the LTN and suggested that the surrounding roads could not support the increase in traffic flow. Overall, 28 members of the public indicated support for an LTN. <p>As noted above, there is strong opposition from some Rosemount and Midstocket residents to proposals for cycle infrastructure as proposed for the A944 parallel routes, given the need to reduce on-street car parking and adjust bus services, specifically including the number 3 service. The responses to the open questions reflect this, with a high number of comments made on issues which relate to the A944 parallel cycle routes proposed under Options 2 and 4. While this does skew the results, it also underlines the strength of feeling among some in the community.</p>	
	Option 1	<p>As noted above, 29% of respondents indicated their support for one or more of the options identified.</p> <p>Two-thirds of these 'supportive' respondents ranked Option 1 as their 1st choice and Option 1 was also the option which was found to be most likely to encourage modal shift. As such, on balance, it appears to be the most popular of the identified options.</p>	✓
	Option 2	<p>Option 2 was the first choice for 14% of 'supportive' respondents but even among those for whom it was their first choice, only just over half say that they would change their travel habits as a result of its implementation.</p> <p>The lack of support for Option 2 is likely to be influenced by proposals for cycle infrastructure along Mid Stocket Road and Rosemount Place, which requires a reduction in on-street car parking and the local rerouting of bus services. These proposals are highly unpopular with some local residents, as a result of concerns regarding the accessibility of local shops and homes, and possible knock-on effects on local businesses. First, the operator of the number 3 bus service, also noted that they are strongly against the rerouting of the service as they feel that bus users want direct access to the Rosemount Place shopping area and the additional 200m walk from Leaside Road may dissuade people from visiting.</p>	xxx
	Option 3	<p>Option 3 was the first choice for 8% of 'supportive' respondents but even among those for whom it was their first choice, only just over half say that they would change their travel habits as a result of its implementation.</p>	xx
	Option 4	<p>Option 4 was the first choice for 11% of 'supportive' respondents and it was found to perform well in terms of its ability to prompt modal shift with 73% of these respondents saying that they would travel more sustainably as a result. As is the case with Option 2, support for Option 4 is likely to be adversely impacted by the proposals for parallel cycle infrastructure along Mid Stocket Road and Rosemount Place.</p>	xxx

5.3 Appraisal Summary

- 5.3.1 Table 5.4 below presents a summary of all the scores from the appraisal. Thereafter, the main advantages and disadvantages in relation to the active travel proposals, and public transport proposals are shown in the tables that follow.

Table 5.4: - Appraisal Summary – Scores

Assessment Criteria		Option			
		1 Prioritise cycling on A944 & A9119	2 Prioritise buses on A944 & A9119	3 Prioritise cycling on A944 & buses on A9119	4 Prioritise cycling A9119 & buses on A944
TPO	TPO1: Improve the quality of the pedestrian experience and address barriers to walking / wheeling along the A944, A9119 and Albyn Place between Westhill and Aberdeen city centre	✓✓✓	✓✓✓	✓✓✓	✓✓✓
	TPO2: Ensure cycle routes are sufficiently direct and connected, while improving journey quality, times, and safety for cyclists along the study corridors	✓✓✓	✓✓	✓✓	✓✓
	TPO3: Reduce bus journey times and make journey times more consistent on the A944 and A9119 between Westhill and Aberdeen city centre.	✓	✓✓✓	✓✓	✓✓
	TPO4: Improve the quality of bus stop infrastructure on the A9119 and A944, to enhance accessibility and provide a more comfortable waiting experience	✓✓✓	✓✓✓	✓✓✓	✓✓✓
	TPO5: Improve integration between sustainable travel modes	✓✓✓	✓✓✓	✓✓✓	✓✓✓
STAG Criteria	Environment	x - ✓	xx - ✓✓	x - ✓	x - ✓
	Climate Change	x - ✓	xx - ✓✓	x - ✓	xx - ✓✓
	Health, Safety and Wellbeing	✓✓	✓✓	✓✓	✓✓
	Economy – Active Travel	✓✓✓	✓✓	✓✓✓	✓✓
	Economy – Public Transport	✓	✓✓✓	✓✓	✓✓
	Economy – General Traffic	x	xxx	xx	xxx
	Equality and Accessibility	✓	✓✓✓	✓✓	✓✓
	Risk and Uncertainty	Low	High	Medium	Medium
Public Acceptability	✓	xxx	xx	xxx	

Table 5.5: - Appraisal Summary – Option Advantages and Disadvantages

Option	Advantages	Disadvantages
All Options	<ul style="list-style-type: none"> • Provide more sustainable travel options to support carbon reduction targets • Align with local, regional and national transport policy • Provide much improved pedestrian environment with pavement widening, segregation between pedestrians and cyclists, footway decluttering, improved crossing facilities and improved signage. This was welcomed by members of the public as noted in the public survey • Provide a step change in cycling provision between Westhill, Kingswells and Aberdeen city centre • Provides safe segregated cycling routes across significant sections of the corridor(s) likely to encourage new cyclists • Likely to reduce traffic accidents through modal shift from the car and the provision of segregated cycle routes 	<ul style="list-style-type: none"> • Likely to generate congestion (at least in the short term but this may help encourage modal shift to more sustainable modes) and potential unwanted re-routing • Requires significant investment in infrastructure • Impacts on on-street parking • Requires bus service route adjustments (as discussed against the relevant option)
1 Prioritise cycling on A944 and A9119	<ul style="list-style-type: none"> • Step change improvement in cycle provision, offering continuous segregated provision along both corridors and direct active travel access to key employment and healthcare facilities located along the corridors • Best reflects the Sustainable Travel Hierarchy by catering for active travel first and then addressing provision for other modes along both corridors • Mode switch from car (and bus) to active travel would reduce traffic related carbon and other harmful emissions • Greater number of trips made by active travel modes would have a positive impact on health and well-being • Most preferred option by members of the public, with two-thirds of respondents who were supportive of the options citing Option 1 as their preferred option. This may in part be influenced by the strong opposition to the other options due to the parallel route proposals • Based on the responses to the public survey, expected to generate the greatest modal shift towards sustainable travel 	<ul style="list-style-type: none"> • Gradients between the Foresterhill Health Campus and the A92 (Anderson Drive) may deter use (as is highlighted in the Strava Metro analysis) • Does not provide continuous bus priority along either corridor alongside the cycle proposals due to lack of space, particularly on the A9119 where space is more challenging east of Anderson Drive • Likely to provide the lowest bus journey time benefits of all options and therefore likely to generate only minor modal shift to the bus • Would not support the implementation of ART on either of the corridors
2 Prioritise buses on A944 and A9119	<ul style="list-style-type: none"> • Provides continuous fully segregated bus priority infrastructure on the A944 and maximises bus priority infrastructure (given the more constrained environment) on the A9119 • Would provide more consistent bus journey times across the day • Provides the greatest bus journey time benefits across both corridors 	<ul style="list-style-type: none"> • Likely to generate the most significant rerouting by general traffic given the road space reallocation which may negatively impact on secondary and local routes with increased noise and reduced air quality • Challenging to provide continuous fully segregated bus priority on the A9119 due to space constraints, reducing the extent of journey time reductions that could be achieved

Option	Advantages	Disadvantages
<p>2</p> <p>Prioritise buses on A944 and A9119</p>	<ul style="list-style-type: none"> • Would offer a more competitive bus journey time when compared with travel by car along both corridors, supporting modal shift to more sustainable travel modes: • For services between Kingswells P&R and Aberdeen bus station (Services 4, 5 and 6 routeing via the A9119) - up to a 10 minute journey time saving • More limited journey time savings on Services 11, 14 and 23 which utilise only parts of the A944 • Potential journey time savings of around 5 minutes on the A944 with new services operating over the full length of the corridor between Kingswells P&R and the city centre (note that journey times from Kingswells P&R to the city centre would be shorter via the A944 than the A9119) • Would encourage use of the Kingswells P&R • Would enable ART vision to be realised through highly segregated public transport provision on the A944 corridor • Based on the responses to the public survey, expected to generate the greatest modal shift towards travel by bus • While parallel cycle routes would be required, the quieter cycle routes along more residential streets may be preferred by users (as opposed to cycling on the corridors themselves) and be perceived as safer encouraging use • The parallel cycle routes provide a good level of segregated provision • Variants B and C provide quick bus access from the A944 to Union Street (and to Union Square for interchange to the railway and bus stations under Variant B) 	<ul style="list-style-type: none"> • Segregated cycle routes along both corridors cannot be provided alongside bus priority requiring parallel cycle routes which would not route directly past key destinations such as the Foresterhill Health Campus or Woodhill House (although access to these destinations could be made on a number of suitable 'connector' roads) • Difficult to access the A9119 parallel cycle routes from south of the corridor and fewer suitable 'connector' cycle links from the parallel routes to the A9119 corridor itself • Variants B and C would impact on the Berryden Corridor Improvement Scheme objectives due to the changes proposed to the Skene Square junction with Rosemount Place / Maberly Street and the reallocation of a lane of traffic on Skene Square and Woolmanhill (Variants B and C) and on Denburn Road (Variant B) • Very strong opposition to the A944 parallel route proposals, particularly from both members of the public and local businesses with regards to the route along Rosemount Place and the subsequent need to reduce on-street parking and re-route the number 3 bus service from both Rosemount Place and Mid Stocket Road. The current bus operator also noted the number of elderly passengers who would be affected in terms of losing their direct bus access to the shops along Rosemount Place and overall were opposed to the suggested re-routeing of the service • Second least preferred option by members of the public, with the disagreement with this option focussed on the A944 parallel route proposals • Design constraints make the A9119 parallel routes challenging to implement and access to the routes from the residential areas south of the A9119 would be difficult <p>To accommodate A944 parallel cycle routes:</p> <ul style="list-style-type: none"> • Car parking would need to be removed from Eday Road, Stronsay Place, Summerhill Terrace, Edgehill Road, Woodstock Road, Oakhill Road, King's Gate, Beechgrove Terrace and Mid Stocket Road onto side roads, which may make it more difficult for local residents to directly access their homes, especially for those with mobility issues, with young children etc. • Requires diversion of bus service 3 from Rosemount Place which may require some users to walk further to access the service, and there is very strong public opposition to this, and the bus operator has also noted concern

Option	Advantages	Disadvantages
<p>2</p> <p>Prioritise buses on A944 and A9119</p>		<ul style="list-style-type: none"> • Requires parking bays and loading provision changes along Rosemount Place which may impact on local businesses and there is very strong public opposition to this • Requires diversion of bus services 3, 14, 16 and 23 from Mid Stocket Road which may require some users to walk further to access the service. Again, and there is very strong public opposition to this <p>To accommodate A9119 parallel cycle routes:</p> <ul style="list-style-type: none"> • Requires road closures on King’s Cross Terrace, King’s Cross Road and partial closure of the A92 access to Carnegie Crescent which would impact on residents • Requires reallocation of parking from Carnegie Crescent, Forrest Road and Fountainhall Road into adjacent streets which may make it more difficult for local residents to directly access their homes, especially for those with mobility issues, with young children etc.
<p>3</p> <p>Prioritise cycling on A944 and buses on A9119</p>	<ul style="list-style-type: none"> • Step change improvement in cycle provision along the A944, offering continuous segregated provision along the corridor • Prioritising one corridor for public transport and the other for active travel provides a clear distinction between the corridor purposes and better use of the available space • Providing space for segregated cycling infrastructure along the main corridor sends a clear message about the priority and importance of active travel within the travel hierarchy and the city, and is likely to encourage use by raising the awareness of infrastructure and through seeing users on the route • Would provide direct and high quality cycle access to the Foresterhill Health Campus and the Aberdeenshire Council offices at Woodhill House • Would provide more consistent bus journey times across the day for bus travel on the A9119 • As with Option 2, would offer a more competitive bus journey time when compared with the car along the A9119, supporting modal shift to more sustainable travel modes with up to a 10 minute journey time saving for services between Kingswells P&R and Aberdeen bus station (Services 4, 5 and 6) • While A9119 parallel cycle routes would be required the quieter cycle routes along more residential streets may be preferred by users (as opposed to cycling on the corridors themselves) and be perceived as safer encouraging use 	<ul style="list-style-type: none"> • Gradients between the Foresterhill Health Campus and the A92 (Anderson Drive) may deter use of the cycle infrastructure (as is highlighted in the Strava Metro analysis) • Design constraints make the A9119 parallel routes challenging to implement and access to the routes from the residential areas south of the A9119 would be difficult • Second most preferred option by members of the public when overall ranking of options considered, although was only the first choice for 8% <p>To accommodate A9119 parallel cycle routes:</p> <ul style="list-style-type: none"> • Requires road closures on King’s Cross Terrace, King’s Cross Road and partial closure of the A92 access to Carnegie Crescent which would impact on residents • Requires dispersal of parking from Carnegie Crescent, Forrest Road and Fountainhall Road into adjacent streets which may make it more difficult for residents to directly access their homes, especially for those with mobility issues, with young children etc.

Option	Advantages	Disadvantages
<p>4 Prioritise cycling on A9119 and buses on A944</p>	<ul style="list-style-type: none"> • Step change improvement in cycle provision, offering continuous segregated provision along the A9119. Responses to the public survey suggested that providing cycle infrastructure on the main corridors is significantly preferred over the parallel routes and also that cycling along the A9119 is preferred over the A944 • Prioritising one corridor for public transport and the other for active travel provides a clear distinction between the corridor purposes and better use of the available space • Providing clear space for segregated cycling infrastructure along the main corridor sends a clear message about the priority and importance of active travel within the travel hierarchy and the city and is likely to encourage use by raising the awareness of infrastructure and through seeing users on the route • The A9119 is a more residential route and can offer a more pleasant cycling experience for the user • Cycling infrastructure on the A9119 corridor itself can be more easily accessed by those south of the corridor • While A944 parallel cycle routes would be required, the quieter cycle routes along more residential streets may be preferred by users (as opposed to cycling on the corridors themselves) and be perceived as safer encouraging use • Would provide improved public transport access to the Foresterhill Health Campus and the Aberdeenshire Council offices at Woodhill House • Would provide more consistent bus journey times across the day for bus travel on the A944 • As with Option 2, could offer a more competitive bus journey time when compared with travel by car along the A944, supporting modal shift to more sustainable travel modes with up to a 5 minute journey time saving for services between Kingswells P&R and Aberdeen city centre (if new ART services were operating) • Would enable ART vision to be realised through highly segregated public transport provision 	<ul style="list-style-type: none"> • Variants B and C would impact on the Berryden Corridor Improvement Scheme objectives, in particular due to the changes proposed to the Skene Square junction with Rosemount Place / Maberly Street and the reallocation of a lane of traffic on Skene Square and Woolmanhill (Variants B and C) and on Denburn Road (Variant B) • Very strong opposition to the A944 parallel route proposals, particularly from both members of the public and local businesses with regards to the route along Rosemount Place and the subsequent need to reduce on-street parking and re-route the number 3 bus service from both Rosemount Place and Mid Stocket Road. The current bus operator also noted the number of elderly passengers who would be affected in terms of losing their direct bus access to the shops along Rosemount Place and overall were opposed to the suggested re-routeing of the service. • Least preferred option by members of the public when overall ranking of options considered, although was only the first choice for 11%. Disagreement with this option focussed on the A944 parallel route proposals <p>To accommodate A944 parallel cycle routes:</p> <ul style="list-style-type: none"> • Car parking would need to be removed from Eday Road, Stronsay Place, Summerhill Terrace, Edgehill Road, Woodstock Road, Oakhill Road, King's Gate, Beechgrove Terrace and Mid Stocket Road onto side roads, which may make it more difficult for local residents to directly access their homes, especially for those with mobility issues, with young children etc. • Requires diversion of bus service 3 from Rosemount Place which may require some users to walk further to access the service, and there is very strong public opposition to this, and the bus operator has also noted concern • Requires parking bays and loading provision changes along Rosemount Place which may impact on local businesses and there is very strong public opposition to this • Requires diversion of bus services 3, 14, 16 and 23 from Mid Stocket Road which may require some users to walk further to access the service. Again, and there is very strong public opposition to this

6 Monitoring and Evaluation

6.1 Introduction

6.1.1 The Monitoring Plan should focus on the supply side changes and the resulting changes in travel behaviour across the study area. The evaluation would then interpret this data and perhaps add primary research to assess the success of the option in terms of the TPOs and the STAG criteria. If implemented in isolation, these measures (particularly the reallocation of road space) would likely have a material impact on traffic levels on adjacent radial routes to which traffic would likely reroute. In this case though, the measures are likely to be implemented in combination with similar measures in other corridors, and indeed in combination with significant changes to bus journey times reflecting the ART vision. It is therefore recommended that a Monitoring Plan be developed to cover the totality of the project as it emerges rather than in relation to the incremental projects.

6.2 Monitoring and Evaluation Plan

6.2.1 Given that the corridor studies have in the main built from a pre COVID-19 position, a new common travel baseline should be established once the data indicates a stable post COVID19 position. Aberdeen City Council's ongoing monitoring of travel in the town should be used to make a judgement on when a new, settled position has been reached. At this point, for each corridor a baseline data collation should be undertake e.g., as follows:

- Quantitative 'audit' of walking / cycling / bus facilities (as per *Case for Change* audit)
- Description of bus services in corridor – to identify service changes which may / may not be due to the measures over time
- Analysis of bus travel times / compliance with timetable– using GPS/AVL data
- General traffic journey times – using e.g., INRIX data for selected point to point movements
- 'Screenline' counts by mode – three screenline could be determined e.g., between Kingswell P&R and A944/A9119 junction; between A944/A9119 junction and Anderson Drive; and east of Anderson Drive. These counts could be undertaken in a neutral week – recording pedestrians, cyclists, cars, vans, lorries etc. All significant streets crossing the screenline should be included – this will be required to assess the scale of re-routeing in the streets parallel to the A944 and A9119
- Bus passenger absolute and origin-destination data in equivalent weeks
- Bus passenger surveys / pedestrian & cyclist surveys – aimed primarily at 'scoring' satisfaction levels with different aspects of the service

6.2.2 This exercise could be repeated say one and five years after implementation. There may be value in undertaking a subset of this data collection annually (e.g., screenline counts).

6.2.3 If measures are implemented as part of an Aberdeen wide project, a control area or counterfactual should be identified. This should provide a 'no-intervention' scenario in terms of trip making and mode share. Given Scotland's other cities are likely to be implementing similar measures over the next decade, this could be problematic, and the control area(s) may have to be based on larger towns in Scotland where significant reallocation of road space is not planned. If the A944/A9119 measure are implemented in isolation, then control areas based on other (non-neighbouring) corridors in Aberdeen can be established.

- 6.2.4 The following table provides an indication of how the above data could be used to inform an evaluation of the A944/A9119 project against the TPOs and the STAG Criteria.
- 6.2.5 As noted above, unless the A944/A9119 infrastructure measures are implemented in isolation of similar measures in other corridors (and indeed ART) there should be a coordinated Monitoring Plan spanning all the ART and other corridors. This should be developed primarily under the ART banner.

Table 6.1: Monitoring and Evaluation Plan

Transport Planning Objective / STAG Criteria	Supply Side				Demand Side		Primary Research
	Corridor audit	Bus services	Bus travel times	General traffic travel time	Screenline counts	Bus patronage	Pedestrian, cyclist and bus passenger, surveys
TPO1: Improve the quality of the pedestrian experience and address barriers to walking / wheeling along the A944, A9119 and Albyn Place between Westhill and Aberdeen city centre	✓				✓		
TPO2: Ensure cycle routes are sufficiently direct and connected, while improving journey quality, times, and safety for cyclists along the study corridors	✓				✓		
TPO3: Reduce bus journey times and make journey times more consistent on the A944 and A9119 between Westhill and Aberdeen city centre		✓	✓		✓	✓	
TPO4: Improve the quality of bus stop infrastructure on the A9119 and A944, to enhance accessibility and provide a more comfortable waiting experience	✓				✓		✓
TPO5: Improve bus stop connectivity to ease interchange between active travel and public transport on the A944 and A9119 corridors	✓				✓		
Environment	✓				✓		
Climate Change					✓		
Health, Safety and Wellbeing	✓				✓	✓	✓
Economy			✓	✓	✓	✓	
Equality and Accessibility		✓	✓		✓	✓	

7 Summary and Conclusions

7.1 Summary

- 7.1.1 This report has presented the development and appraisal of **transformational sustainable travel options** on the A944 / A9119 corridors which can encourage modal shift towards walking, cycling and public transport. Along with the similar multi-modal corridor studies for Aberdeen's other main arterial routes, this study is also feeding into the development of ART, where the ambition is to develop a **high quality, high frequency mass transit network across the city on key corridors and linking key destinations, anchored by P&R facilities** on each corridor. ART has national recognition within Transport Scotland's draft *Strategic Transport Projects Review 2* (STPR2) and in the Scottish Government's Draft National Planning Framework 4 (NPF4). The work undertaken as part of this A944 / A9119 Multi-modal study has recognised throughout the need to develop options which could facilitate the successful delivery of ART on the corridor.
- 7.1.2 Through establishing the problems and opportunities for the corridor, a set of five Transport Planning Objectives were defined:
- **TPO 1** - Improve the quality of the pedestrian experience and address barriers to walking / wheeling along the A944, A9119 and Albyn Place between Westhill and Aberdeen city centre
 - **TPO 2** - Ensure cycle routes are sufficiently direct and connected, while improving journey quality, times, and safety for cyclists along the study corridors
 - **TPO 3** - Reduce bus journey times and make journey times more consistent on the A944 and A9119 between Westhill and Aberdeen city centre
 - **TPO 4** - Improve the quality of bus stop infrastructure on the A9119 and A944, to enhance accessibility and provide a more comfortable waiting experience
 - **TPO 5** - Improve bus stop connectivity to ease interchange between active travel and public transport on the A944 and A9119 corridors
- 7.1.3 These objectives were used, along with the STAG criteria, to appraise the range of options developed.

7.2 Conclusions and Next Steps

Conclusions

- 7.2.1 In terms of the options:
- **Option 1: Prioritise cycling on both the A944 and A9119** - while providing much improved segregated cycling infrastructure along both corridors, this does not provide a significant step change in public transport provision, and this lack of more transformational bus priority measures along either corridor is likely to prohibit / undermine the implementation of ART between Westhill and the city centre. For that reason, it is **not recommended** that this option progress.
 - **Option 2: Prioritise buses on both the A944 and A9119** - would provide significant benefits to bus users and is likely to attract new users. The proposals would also facilitate ART. While the proposed A944 parallel cycling routes are not directly along the A944, there are many suitable short linking 'connector' roads from the route to the A944 offering access to the main trip generators and attractors (e.g., Foresterhill Health Campus) and the routes offer quieter, less trafficked routes through residential areas and may be

preferred by cyclists. It is however noted that to implement the parallel routes, there are a number of challenges including (i) the loss of on-street parking, (ii) bus service diversions, and (iii) parking bays and loading provision changes along Rosemount Place. As seen through the public survey, there is strong opposition from some to such changes, and should the A944 parallel routes progress, early design feasibility and engagement work (with both the local community, businesses and the bus operator) should be undertaken. This should include work to enable an understanding of the likely economic impacts of the proposed measures on local businesses. While recognising that the proposed A9119 parallel cycle routes offer a high level of segregation from general traffic and routes through quieter residential streets, there are a number of design constraints which make the routes challenging to implement - and access to the routes from the residential areas south of the A9119 would be difficult. For that reason, **the A9119 parallel routes are not recommended for further development** (in favour of cycling infrastructure on the A9119 itself, as per Option 4 (see below)). If the option was to progress without the A9119 parallel routes this option would not then provide any improved environment for cyclists either on or close to the A9119 corridor.

- **Option 3: Prioritise cycling on A944 and buses on A9119** - would provide significant benefits to bus users on the A9119 and is likely to attract new users. However, the constrained nature of the A9119 corridor means continuous bus priority cannot be provided which will limit the benefits that could be realised through ART. In addition, the constrained nature of the route may preclude certain elements of ART (e.g., new stop infrastructure to enable faster boarding and alighting times). For this reason, this option is **not recommended** for further consideration. In addition, the option was the first choice for only 8% of those who were supportive of an option (this was the lowest of all options).
- **Option 4: Prioritise cycling on A9119 and buses on A944** - would, as noted above for Option 2, enable ART to be facilitated on the A944 corridor where there is space for continuous bus lanes and the supporting stop infrastructure and there are numerous trip generators of both local and regional significance (such as Foresterhill Health Campus). Gradient issues heading westbound on the A944 are clearly unfavourable with cyclists, and cycle conditions on the A9119 appear preferable (as seen through the Strava data analysis). In addition, prioritising one corridor for public transport and the other for active travel provides a clear distinction between the corridor purposes, and better use of the available space with the A9119 corridor, which is a more residential route offering a more pleasant cycling experience for the user. The cycling infrastructure could also be more easily accessed by those south of the corridor (than the proposed parallel routes required if 'on corridor' infrastructure were not provided). As noted for Option 2 above, the outcomes of the public survey highlighted the opposition to the proposed A944 parallel cycling routes and therefore, early design feasibility and engagement work should be undertaken.

7.2.2 Given the above and particularly the ability to facilitate the implementation of ART, and the clear distinction between the corridor purposes the option would provide, **it is recommended that Option 4 be progressed**. However, given the opposition expressed within the study to the A944 parallel route proposals from Rosemount and Midstocket residents and local business, **early design feasibility and engagement work (with the local community, businesses and the bus operator) should be undertaken**. This should include work to enable an understanding of the **likely economic impacts** of the proposed parallel route proposals on local businesses.

7.2.3 Option 4 includes variants A, B and C at the eastern end of the A944 corridor, which consider bus priority infrastructure into the city centre from the corridor:

- **Variant A:** Routes via Mounthooly Roundabout and West North Street to Union Street. Such a route would not offer the most direct access to the city centre and is not heavily used for bus services at present.

- **Variant B:** Routes via Skene Square, Woolmanhill and Denburn Road to Union Square, and onwards to via Market Street to Union Street. The variant assumes the widening of Skene Square and Caroline Place as part of the committed Berryden Corridor Improvement Project (which will provide two traffic lanes in both directions throughout the length of the corridor, widening the existing road between Skene Square and Ashgrove Road and creating a new road between Ashgrove Road and Kittybrewster Roundabout). Additionally, over the southern part of the scheme, requires the reallocation of a lane of traffic in each direction to public transport on Skene Square, Woolmanhill and Denburn Road.
- **Variant C:** Routes via Skene Square and Woolmanhill, with a new bus only access to Blackfriars Street, Rosemount Viaduct, Union Terrace and onto Union Street, and similar to variant B, assumes the widening of Skene Square and Caroline Place as part of the committed Berryden Corridor Improvement Project. Additionally, over the southern part of the scheme, requires the reallocation of a lane of traffic in each direction to public transport on Skene Square, and Woolmanhill.

7.2.4 The most suitable variant for progression will be heavily dependent on the outcomes of the ART development work, and at this stage it is not recommended that any of the variants are discounted.

Next Steps: Risks and Issues for further consideration

7.2.5 At the next stage of the appraisal / business case, key issues and risks requiring more detailed consideration include:

- **Availability of third-party land for highway widening:** there is a need to understand the impact of the proposals on land outside the highway boundary and how this could be minimised. This is particularly relevant at junctions along Lang Stracht and Westburn Road where larger junctions are proposed to accommodate increased levels of bus priority and pedestrian / cycle facilities.
- **Impacts of road space reallocation** between Kingswells and Mounthooly roundabout, with the reallocation of a lane of the existing carriageway from general traffic to bus only over much of the corridor. The potential impacts on all road users needs consideration, especially the potential cumulative impacts of the proposals for the A944 and A9119 when considered with the proposals for the other corridor studies. Even with the corridors optimised to manage general traffic demand, it is likely some wider traffic reassignment will occur which potentially routes traffic along less suitable roads or onto those that delay other bus services. A strategic traffic modelling assessment is required to understand the extent of the reassignment and what mitigation is required.
- **Highway Corridor Performance:** The impact of proposals could create a corridor that is unable to efficiently manage the change to existing general traffic demands, resulting in exit blocked junctions and wider traffic disruption. Once the outline design is complete, the development of a micro-simulation traffic model should be considered to establish a suitable traffic management strategy for the corridors, one that ensures junctions have sufficient capacity and are co-ordinated.
- **Revenue Costs / Highway infrastructure maintenance liabilities:** There are several junctions¹¹ that require major road layout changes to provide suitable provision for cyclists and / or level of bus priority. Those on A944 Lang Stracht / Westburn Road require enlargement and full signal upgrades while those in A9119 Queens Road require either the removal of the roundabout and replacement with a signalised crossroads or

¹¹ A944 junctions include Lang Stracht junction with Summerhill Drive, Lang Stracht junction with A92 North Anderson Drive and Lang Stracht junction with Foresterhill Road. A9119 junctions include Queen's Road junction with A92 Anderson Drive, Queen's Road junction with Forest Road and Queen's Road junction with Fountainhall Road (Queen's Cross).

conversion to a compact roundabout with circulatory cycle lanes. In addition to the substantial capital cost to deliver these signal upgrades or conversions, they will require an increase to highway maintenance budgets unless savings can be found elsewhere in the network.

- **Impact on the Berryden Corridor Improvement Project** and the scheme objectives from the proposed variants B and C
- **Loss of on-street parking:** the proposals require the removal of on-street waiting, loading and parking provision to accommodate the bus priority and cycle route infrastructure which will likely lead to local resident and trader opposition. There is a need to understand current parking behaviours and what opportunities there are to relocate this activity into adjacent side roads.
- If the A944 parallel cycle routes progress as part of this option:
 - **Loss of on-street parking:** to accommodate the A944 parallel cycle routes on Eday Road, Stronsay Place, Summerhill Terrace, Edgehill Road, Woodstock Road, Oakhill Road, King's Gate, Beechgrove Terrace and Mid Stocket Road
 - **Bus route diversions:** to accommodate the A944 parallel cycle routes because it is not possible to accommodate bus stops because of a constrained highway boundary. In these cases, bus services will need to be diverted onto other routes where potentially connectivity of local bus services is reduced. Bus stop connectivity analysis is required on the potentially affected routes (3, 14, 23 and 218 in the Rosemount area) and suitable mitigation developed
 - **Economic impacts to local businesses:** to accommodate the A944 parallel cycle routes
 - **Changes to parking bays and loading provision changes** along Rosemount Place

7.2.6 Furthermore, the following design and operations issues need to be considered:

- **Parking policy / supply:** the availability and cost of parking within the city centre and at key employment sites undermines proposals to encourage the use of bus services
- **Cycle infrastructure design:** The proposals use various types of cycle route infrastructure and while consistent with Cycle by Design, there is a need to ensure a consistent approach is taken across all corridors to ensure the cycle route network as it develops, remains coherent
- **Bus infrastructure design:** It is not possible to provide enhanced bus lanes at all junctions along Lang Stracht and Westburn Road due to the highway boundary and capacity constraints. These gaps could potentially become congested leading to bus delays. Similar issues occur along Skene Road and Queen's Road but where bus lanes need to be staggered due to highway boundary constraints. Outline design and traffic modelling assessment is required to establish an effective traffic management strategy for the A944 and A9119 corridors.
- **Foresterhill Health Campus / Aberdeen Royal Infirmary access:** The connectivity of the health campus to bus services operating along Lang Stracht and Westburn Road needs to be improved through the development of a new interchange and junction modifications
- **Complexity of junction layouts and the method of signal control:** The proposed infrastructure is likely to require a substantial upgrade to the Council's Urban Traffic Control system including new and upgraded hardware/ software

- **Extent of utility diversions and protection works**
- **Impact on street lighting**
- **Waiting and loading restrictions:** and how these will need to be changed to accommodate the proposals

7.2.7 There are also a number of opportunities that need to be considered as the study progresses:

- **Bus interchanges:** Within the study area there are options to improve bus interchanges at the Aberdeen Royal Infirmary, Provost Graham Avenue bus terminus and at Prime Four / Kingswells P&R
- **Compact roundabouts (with circulatory cycle lanes):** There are three locations within the study area where existing roundabouts could be converted to Dutch style 'Zwolle' roundabouts. While the single traffic lane approaches and circulatory lanes will reduce the capacity for general traffic, they offer a less expensive option to providing suitable cycle route infrastructure than signalisation
- **Public realm:** The proposals to improve conditions for pedestrians, cyclists and bus services have the potential to improve the public realm through the repair and widening of existing footways which offers greater opportunity for tree planting, seating areas, upgrade of materials and less crowded footways. This is particularly relevant at locations where cycle routes pass through or close to local and district centres
- **Low Traffic Neighbourhood:** To create a more comprehensive cycle route network to the west of the city and support safer local walking routes there is an opportunity to create a Low Traffic Neighbourhood bounded by Westburn Road (to the north), North Anderson Drive/ Anderson Drive (to the west) and Cromwell Road/ Union Grove (to the south). The LTN concept requires detailed development and engagement with the local communities it will impact
- **Cycle Parking:** To support the proposed cycle routes new secure cycle parking should be delivered at key locations on or close to the route. This should include locations close to local shops, at schools and workplaces and at public transport interchanges such as the Kingswells P&R

Appendix A Option Costs

A.1 Introduction

- A.1.1 This appendix describes the method used to prepare a cost plan for the options with a summary of the option costs. The information provided should be read in conjunction with the *A944-A9119 Multi-modal Transport Study – Concept Design Report, Stantec, July 2022*, which includes concept sketches and concept designs of all proposals summarised below (and as summarised in this report).
- A.1.2 The cost plan was derived from the concept designs developed for both corridors. These proposals were prepared using standard highway interventions which have been allocated either a unit cost (for signal controlled crossings, bus stops, etc.) or a rate cost (for bus lanes, cycle track, etc.). These costs have been estimated using the SPON'S Civil Engineering and Highways Works Price Book and supplemented with typical costs that Local Highway Authorities use to estimate costs for scheme funding. These costs are assumed to be set at 2022 prices on which actual inflationary uplifts could be added if they differ from assumed rates.
- A.1.3 Measurements taken from the concept designs were used to build up an itemised bill of quantities for each corridor option and by applying the unit or rate costs, a cost plan was generated.
- A.1.4 The following summarises the corridor options; describes the standard highway interventions used in the concept design with their estimated cost; sets out the assumptions made related to preliminaries and optimism bias (including contingencies); and explains how the costs were apportioned to support the Active Mode Appraisal Toolkit (AMAT) analysis. The final table provides the estimated costs for each corridor option.
- A.1.5 The cost plan spreadsheets for each option can be found in Appendix E of the *Concept Design Report*.

A.2 The Options

- A.2.1 Under all four options, the same improvements to the walking (and wheeling) environment and bus stop infrastructure are proposed.
- A.2.2 The corridors were divided into the following sections for concept design and costing purposes:
- Main Corridor I - A944 (Westhill to Kingswells) including Straik Road
 - Main Corridor II - A944 including Lang Stracht and Westburn Road
 - Main Corridor III - A9119 including Skene Road, Queen's Road, Carden Place and Skene Street
- A.2.3 When bus priority infrastructure is prioritised along the A944 (i.e., Options 2 and 4), it is assumed this corridor would become the main bus route for city centre services. At the point where the A944 intersects with Berryden Road (programmed to be upgraded to a dual carriageway) three potential routes buses could take to access the city centre have been considered. These routes variants are defined as A, B and C.
- A.2.4 The options requiring a cost plan are therefore 1, 2A, 2B, 2C, 3, 4A, 4B and 4C, with their costed components set out in the table below.

Table A.1: Options by costed component parts

Components	Option							
	1	2A	2B	2C	3	4A	4B	4C
Main Corridor I	✓	✓	✓	✓	✓	✓	✓	✓
Main Corridor II (A944)	✓	✓	✓	✓	✓	✓	✓	✓
Main Corridor III (A9119)	✓	✓	✓	✓	✓	✓	✓	✓
Parallel Route (A944) – primary & secondary	-	✓	✓	✓	-	✓	✓	✓
Parallel Route (A9119) – primary & secondary	-	✓	✓	✓	✓	-	-	-
MC II Route Variant A (via Mounthooly)	-	✓	-	-	-	✓	-	-
MC II Route Variant B (via Denburn Road)	-	-	✓	-	-	-	✓	-
MC II Route Variant C (via Union Terrace)	-	-	-	✓	-	-	-	✓

A.3 Standard Highway Infrastructure and Costs


A.3.1 The table below sets out estimated costs for each of the standard highway infrastructure items used in the concept designs. This provides a short description of each type of infrastructure and sets out the assumptions used to estimate the unit or rate cost.


A.3.2 Within the cost plan, the standard highway infrastructure items were grouped into categories that broadly reflected the mode of transport they support. These categories (used in the table below) are as follows:



- Main Junctions – ranging from kerb works to increase the number of approach arms to full conversions such as roundabouts to signalised cross-roads
- Bus Infrastructure – bus lanes, bus stops, bus priority at traffic signals
- Cycle Infrastructure – cycle lanes/ tracks, shared crossing facilities
- Pedestrian Infrastructure – wider footways, crossing facilities, side road entry treatments
- General Highway Works – road resurfacing, high friction surfacing
- Street Lighting – modified or new
- Miscellaneous Items



A.3.3 Miscellaneous items are bespoke interventions required to overcome specific issues along the corridor. For example, alterations to subway structures, significant earth works, retaining walls or bridge widening


Table A.2: Typical types of highway infrastructure and estimated unit and rate costs



Ref	Item	Unit	Rate	Description	Cost Assumption	
					Single Carriageway	Dual Carriageway
Main Junctions						
J1	Main road junction modification (low intervention)	no.	£750,000	1. Replacement of traffic signals (new MoC)	£750,000	£3,500,000
				2. Geometric and signal modification (2-arms)	£750,000	£3,500,000
J2	Main road junction modification (medium intervention)	no.	£3,500,000	3. Introduction of cycle track/ full ped facilities	£750,000	£3,500,000
				4. Geometric and signal modification (4-arms)	£3,500,000	£7,500,000
J3	Main road junction modification/ replacement (high intervention)	no.	£7,500,000	5. Signalisation of cross-road junction	£3,500,000	£7,500,000
				6. Roundabout replacement	£3,500,000	£7,500,000
Bus Infrastructure						
B1	Bus lane (standard) @ 3.25m wide	m	£145	A new 3.25 metres wide bus lane created within the nearside lane of an existing multi-lane road carriageway. The works would include resurfacing in red SMA, all signage and road markings for the bus lane and adjacent traffic lane.	1. Road resurfacing (base courses) = $£37/m^2 \times 3.25m = £122/m$ 2. Road markings and signage = $£20/m$	
						
B2	Bus lane (enhanced) @ 3.5m wide	m	£155	As above for the bus lane (standard) but at 3.5 metres wide to support higher bus speeds. Bus lanes extended up to junction stop lines. No cyclists.	1. Road resurfacing (base courses) = $£37/m^2 \times 3.5m = £130/m$ 2. Road markings and signage = $£25/m$	




Ref	Item	Unit	Rate	Description	Cost Assumption
B3	<p>Bus lane (busway) @ 7.0m wide</p> 	m	£500	<p>Busway on one side of a dual carriageway and conversion of the adjacent carriageway to two-way general traffic. The busway would be resurfaced in red SMA with appropriate busway signage and road markings. A new kerbed central reservation would be created, and all road markings replaced to create a two-way general traffic road on the other side of the road. Link costs only. Junctions costed separately.</p>	<ol style="list-style-type: none"> 1. Road resurfacing (base courses) = $£37/m^2 \times 7.3m = £260/m$ 2. Road markings and signage = $£20/m$ 3. New kerbs = $£50/m$ 4. Drainage = $£135/m$ * 5. Plus works to the other side of the road = $£35/m$ <p>* assumes every 100m there are 10 gullies at $£500$ each (including 2.5 metre drainage runs to reconnect) and 1 manhole cover at $£3,500$ each.</p>
B4	<p>Bus lane (existing) resurfacing @ 3.25m wide</p>	m	£120	<p>Road resurfacing in red SMA at 3.25 metres wide.</p>	<ol style="list-style-type: none"> 1. Road resurfacing (base courses) = $£37/m^2 \times 3.25m = £122/m$
B5	<p>Bus only road (road resurfacing, road markings and signage only)</p> 	m	£280 (reduced to £50 for this study)	<p>Conversion of an existing single carriageway road to bus and local access only requiring resurfacing (red SMA), road markings and signage. Does not include the bus gates at the access points (see B10).</p>	<ol style="list-style-type: none"> 1. Road resurfacing (base courses) = $£37/m^2 \times 7.3m = £260/m$ 2. Road markings and signage = $£20/m$


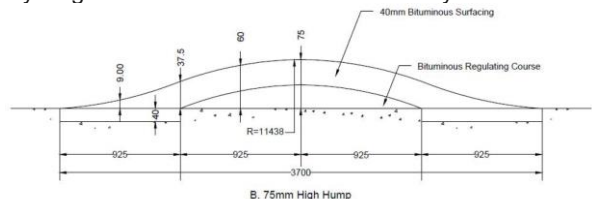

Ref	Item	Unit	Rate	Description	Cost Assumption
B6	<p>Bus stop & shelter - standard shelter with fully accessibility stop</p> 	no.	£10,000	<p>Fully accessible bus stop with compliant clearway, kerb height, road markings, good quality shelter and waiting area. Boarding and alighting zones clear of obstructions with sufficient drainage to eliminate standing surface water within the clearway and waiting area.</p>	<ol style="list-style-type: none"> 1. New shelter = £7,500 2. Kerb works, road markings and drainage (as required) = £2,500
B7	<p>Bus stop & shelter - 'enhanced' bus shelter with fully accessible stop</p> 	no.	£17,500	<p>As above for bus stop & shelter (standard) but with additional measures to ensure the bus does not need to pull into the bus stop i.e., introduction of a bus boarder. Higher quality bus shelter assumed.</p>	<ol style="list-style-type: none"> 1. New shelter = £12,500 2. Kerb works, road markings and drainage (as required) = £5,000


Ref	Item	Unit	Rate	Description	Cost Assumption
B8	<p>Bus stop & shelter - 'busway' type bus shelter with fully accessible stop</p> 	no.	£30,000	As above for bus stop & shelter (enhanced) but with additional measure to provide tram stop facilities including highway works to allow the stop to accommodate articulated vehicles or higher frequencies bus services.	<ol style="list-style-type: none"> 1. New shelter = £20,000 2. Kerb works, road markings and drainage (as required) = £10,000
B9	<p>Bus stop layby removal</p>  <p>(showing typical layby to be removed)</p>	no.	£10,000	The removal of a bus stop layby with new kerbs, pre-cast concrete (PCC) paving and drainage/ gully modifications. Excludes new shelter/ bus stop flag, street lighting.	<ol style="list-style-type: none"> 1. New footway paving (£37/m (l) x 3.5m (w) = 130m/2 @£40/m2 = £5,200 2. Road resurfacing (£37/mm (l) x 3.25m (w) = 120m/2 @£37/m2 = £4,440 3. Road markings (cage and clearway) = 50m @£15/m = £750
B10	Bus gate with CCTV enforcement	no.	£100,000	Traffic signal infrastructure, CCTV cameras for enforcement, signage and wider traffic management measures to create a bus only road (with local access)	



Ref	Item	Unit	Rate	Description	Cost Assumption
B11	Bus pre-signal (traffic gating)	no.	£100,000	A new traffic signal at the end of a bus lane to meter traffic into a downstream link. The traffic signal would be linked to queue detection loops located in the downstream link via a fixed link and operated under a UTC system. New traffic signal controller required.	
B12	Bus pre-signal (bus advance area)	no.	£100,000	A new traffic signal at the end of a bus lane in advance of a signalised junction creating. This traffic signal would have a fixed link to the traffic signal control of the main junction. New traffic signal controller required.	
Cycle Infrastructure					
C1	<p>Cycle track (2-way) @ 3.0m wide plus buffer > 1.5m wide</p> 	m	£425	A new asphalt surfaced 3.0 metre wide cycle track with kerbed edge on both sides. The cycle track would include gullies and connections to local drainage runs to remove surface water, all road marking and regulatory signage. The cycle track would be off-set from the road with a buffer of > 1.5 meters.	<ol style="list-style-type: none"> 1. Full depth footway construction with asphalt surfacing = $£90 \times m^2 \times 3/m = £270/m$ 2. New kerbs = $£50/m \times 2 = £100/m$ 3. Signage and road markings = $£10/m$ 4. Modified drainage = $£30/m$ 5. Buffer (unpaved) = $£15/m$



Ref	Item	Unit	Rate	Description	Cost Assumption
C2	<p>Cycle track (2-way) @ 3.0m wide plus buffer < 1.5m wide</p> 	m	£410	As above with narrower buffer.	As above minus buffer (unpaved)
C3a	<p>Crossing at side-road junction (1 or 2-way cycle track across junction)</p> 	no.	£7,500	One-way cycle track running straight across the mouth of the side junction requiring kerb line and road marking modifications.	

Ref	Item	Unit	Rate	Description	Cost Assumption
C3b	<p>Crossing at side-road junction (1 or 2-way cycle track off-set from junction)</p> 	no.	£12,500	One-way or two-way cycle track off-set from the main road with raised table and give-way road markings.	
C4	<p>Cycle track (1-way) or cycle lane (fully segregated) @ 2.0m</p> 	m	£160	A cycle lane/ track segregated from traffic by either a full height kerb or stepped track. Assumes changes to drainage are required.	<ol style="list-style-type: none"> 1. Road resurfacing (asphalt) = £45/m 2. New kerb (double - back to back) = £75/m 3. Road markings and signage = £10/m 4. Modified drainage = £30/m
C5	<p>Cycle lane @ 2.0m wide (light segregated)</p> 	m	£70	A cycle lane with light segregation (armadillo or orca separators plus wands). Would include all road markings (diag. 1057) and regulatory signage along the cycle lane. Assumes no change to the road surfacing, drainage or removal of existing road markings (covered under site clearance).	<ol style="list-style-type: none"> 1. Cycle lane separators = £50/m 2. Road markings and signage = £20/m


Ref	Item	Unit	Rate	Description	Cost Assumption
C6	<p>Cycle lane @ 2.0m wide (advisory or mandatory)</p> 	m	£20	A cycle lane marked out on an existing road carriageway. No road surfacing or drainage works changes. Assumes no removal of existing road markings (covered under site clearance).	1. Road markings and signage = £20/m
C7	<p>Cycling with traffic in a traffic-calmed or cycle street</p> 	m	£95	Road markings (including diag. 1057 cycle logos) and directional signage plus a sinusoidal speed hump every 100 metres. Assumes no road resurfacing and excludes a point closure to support reduced traffic flows (see C10).	<ol style="list-style-type: none"> Sinusoidal speed hump every 100 metres @£7,500 = £75/m Signage and road markings = £20/m
C8	<p>Shared use path @ 3.5m wide plus appropriate buffer (new)</p> 	m	£340	New shared use path at 3.5 metres wide with appropriate width buffer between the path and the road. The buffer would form a grass verge to the road.	<ol style="list-style-type: none"> Full construction inc. surfacing = £90/m² x 3.5m = 315/m Pin kerbs = £15/m x 2 = £15/m Signage = £5/m



Ref	Item	Unit	Rate	Description	Cost Assumption
C9	Share use path @ 3.5m wide plus appropriate buffer (upgrade)	m	£220	Widening of an existing asphalt surfaced path from 2.5 to 3.5 metres requiring 1 metre width of full depth path construction. There would also be a buffer of appropriate width (for the speed of the road) between the path and the road. The buffer area would form a grass verge to the road.	<ol style="list-style-type: none"> 1. Full construction inc. surfacing = £90/m² x 1m = 90/m 2. Partial construction inc. surfacing = £37/m² x 3.5m = 111/m 3. Pin kerbs = £15/m x 1 = £15/m 4. Signage = £5/m
C10	<p>Point closure (motorised traffic) - mid block as part of a Low Traffic Neighbourhood</p> 	no.	£7,500	Bollards or planters plus road markings and signage.	
C11	Crossing (signalised) - Cycle only	no.	£25,000	A signalised crossing of a single carriageway road for cyclists only including push-buttons, tactile paving and detection loops.	



Ref	Item	Unit	Rate	Description	Cost Assumption
C12	<p>Bus stop by-pass</p> 	no.	£25,000	<p>Cycle track bypass including all kerb works, surfacing, road markings, pedestrian crossing facilities. Includes all pavement works associated with creating an accessible bus stop but not the installation of the bus shelter and flag.</p>	
C13	<p>Advance Stop Lane (@ 5.0m)</p> 	no.	£500	<p>Road marking to create an Advance Stop Line on the approach to a signalised junction or crossing.</p>	

Ref	Item	Unit	Rate	Description	Cost Assumption
C14	<p>Cycle 'early-green'</p> 	no.	£25,000	New traffic signal aspects (high and low level) and controller to introduce an 'early green' for cyclists.	
C15	<p>Cycle pre-signal (cycle advance area)</p>	no.	£25,000	New traffic pre-signal, signal aspects (low level) and controller to introduce a cycle advance area for cyclists.	
C16	<p>Cycle route signage</p> 	m	£12	Comprehensive directional route signage for a main or parallel route.	Based on the CCAG costs of £12k/km

Ref	Item	Unit	Rate	Description	Cost Assumption
Pedestrian Infrastructure					
P1a	Footway surfacing (pavers - concrete) @ 3.0m wide	m	£120	Resurfacing of an existing footway with concrete pavers (ASP's). Assumes existing kerbs are retained with no replacement or repair required.	1. Resurfacing (sub-base + paving) = $£40/m^2 \times 3.0m = £120/m$
P1b	Footway surfacing (asphalt) @ 3.0m wide	m	£135	Resurfacing of an existing footway with asphalt. Assumes existing kerbs are retained with no replacement or repair required.	1. Resurfacing (sub-base + surfacing) = $£45/m^2 \times 3.0m = £135/m$
P1c	Footway surfacing (pavers – Granite) @ 3.0m wide	m	£280	Resurfacing of an existing footway with Granite pavers. Assumes existing kerbs are retained with no replacement or repair required.	
P2	Footway widening into road carriageway (kerbs and drainage only)	m	£80	Widening of a footway over existing road carriageway. Excludes resurfacing costs which are covered by P1.	1. New kerb @£50/m 2. Modified drainage @£30/m
P3	Footway (new) @ 3.0m wide - requiring full depth construction	m	£350	New footway requiring full depth construction (surface course, binder course and base course)	1. Full construction inc. surfacing = $£90/m^2 \times 3m = £270/m$ 2. New kerb @£50/m 3. Modify drainage @£30/m
P4	Crossing (uncontrolled) - dropped kerbs and tactile paving	no.	£2,500	New or upgraded uncontrolled crossing with dropped kerbs and tactile paving on each side of the road	

Ref	Item	Unit	Rate	Description	Cost Assumption
P5	<p>Crossing (priority) - Zebra or Parallel Zebra</p> 	no.	£30,000	Zebra crossing on a single carriageway road without island (belisha beacons, dropped kerbs, tactile paving, road markings, signage, street lighting)	
P6	Crossing (signalised) - upgrade to Toucan or Parallel	no.	£60,000	Conversion of signal crossing to a controlled shared-use crossing (Toucan or Parallel) on a single carriageway road. Assumes replacement/ upgrade of existing traffic signal infrastructure (including controller), dropped kerbs, tactile paving and road markings. For a dual carriageway road, the cost would be x2 to include widening of the crossing island.	

Ref	Item	Unit	Rate	Description	Cost Assumption
P7	Crossing (signalised) - PedEx, Toucan or Parallel 	no.	£75,000	New signal controlled crossing. For a dual carriageway road, the cost would be x2 to include widening of the crossing island	
P8	Side road junction modification (corner radii - give way markings - kerb adjustments)	no.	£5,000	Reduction to the corner radii of an existing junction between 1 to 3 metres depending on the width of the side road. No modification required to drainage.	
P9	Side road junction modification (entry treatment) 	no.	£12,500	A reduction to the corner radii of an existing junction (as above) plus a tabletop entry treatment. No modification required to drainage.	

Ref	Item	Unit	Rate	Description	Cost Assumption
P10	<p>Side road junction modification (continuous footway)</p> 	no.	£20,000	A reduction to the corner radii (as above) of an existing junction plus a continuous footway treatment. No modification required to drainage.	
P11	<p>Side road junction modification - point closure for motorised traffic as part of a Low Traffic Neighbourhood</p> 	no.	£12,500	The closure of a side road on a main road with the footway built across the junction by re-establishing the kerb and extending the footway surfacing	
General Highway Infrastructure					
G1	Road resurfacing @ 1.0m wide	m	£40	Replacement of surface course, binder course and base course	1. Resurfacing = £37/m
G2	Road construction (full depth) @ 1.0m wide	m	£290	As G1 plus sub-base	1. Construction (sub-base) = £200/m 2. Surfacing = £37/m 3. Modified drainage (road) = £50/m

Ref	Item	Unit	Rate	Description	Cost Assumption
G3	High friction surfacing (anti-skid) @ 3.25m wide	m	£65		1. Surface dressing = £20/m
Street Lighting					
L1	Street lighting minor modification	m	£14	Minor modification to street lighting on one side of the road	Assumes a lighting column (at £3500 each) is replaced every 250 metres along the corridor
L2	Street lighting 50% replacement	m	£70	Intermediate modification to street lighting on one side of the road	Assumes a lighting column (at £3500 each) is replaced every 50 metres along the corridor
L3	Street lighting full replacement	m	£140	Major modification to street lighting on one side of the road	Assumes a lighting column (at £3500 each) is replaced every 50 metres along the corridor

A.4 Preliminaries and Optimism Bias

- A.4.1 Given the level of detail that can be extracted from the concept designs and the extent to which on-site highway constraints can be established at this phase of scheme development, it has been necessary to apply a relatively high preliminary uplift of 15 percent.
- A.4.2 In addition, STAG requires an optimism bias to be added to the base cost plus preliminary total. This optimism bias (set out in Section 13, STAG Technical Database, May 2014) aims to address the tendency of project appraisers to be overly optimistic when estimating the base cost for schemes. STAG sets this optimism bias at 44 percent for Outline Business Case.
- A.4.3 The associated TAG Unit A1.2 guidance was updated in May 2022 and indicates that a revised optimism bias level of 46% should be used at Stage 1. For the purposes of a robust appraisal, 46 percent optimism bias was applied.

A.5 AMAT Analysis Assumptions

- A.5.1 To complete the AMAT analysis, only the costs associated with improving the cycle route infrastructure were required. The majority of this cost is captured in the Cycle Infrastructure category in the cost plan but for Main Junctions and Street Lighting, the costs needed to be split across multiple modes given that multiple modes would benefit. This is set out in the table below.

Table A.3: Costs apportioned by mode for main junctions and street lighting

Mode	Allocation of Costs to Mode	
	Main Junction	Street Lighting
Pedestrian	15%	5%
Cycle	15%	25%
Bus	70%	70%

A.6 Cost Summary

- A.6.1 Using a bill of quantities for the standard highway infrastructure indicated in the concept designs, the unit and rate costs in Table A.2 and the proposed split between bus, cycle and pedestrian modes in Table A.3, a cost plan was produced for each option. The table below provides a high level breakdown of these costs for each option, with further detail provided in Table A.5.

Table A.4: Option Capital Costs

Option	Infrastructure + Preliminaries (£m)				Plus 46% Optimism Bias (£m)			
	Walking	Cycling	Bus	Total	Walking	Cycling	Bus	Total
1	12.6	23.7	17.7	54.0	18.4	34.6	25.8	78.8
2A	15.4	16.6	53.2	85.2	22.4	24.2	77.7	124.3
2B	14.6	16.6	51.3	82.6	21.4	24.2	75.0	120.6
2C	14.6	16.6	59.8	91.1	21.4	24.2	87.3	132.9
3	8.3	17.0	26.9	52.3	12.2	24.8	39.3	76.3
4A	19.6	23.3	43.9	86.8	28.7	34.0	64.1	126.8
4B	18.9	23.3	42.1	84.3	27.6	34.0	61.4	123.0
4C	18.9	23.3	50.5	92.7	27.6	34.0	73.8	135.4

Table A.5: Breakdown of the Option costs

Option	Corridor/ Route	Infrastructure				TOTAL	Inf + Prelim	Inf + Prelim + OB	Total (inc. Variants)		
		Walking	Cycle	Bus	Variant A				Variant B	Variant C	
1	Main Corridor A944 I	£665,168	£2,138,040	£648,959	£3,452,167	£3,969,991	£5,796,188	£78.8M			
	Main Corridor A944 II	£1,607,328	£7,815,114	£11,476,461	£20,898,902	£24,033,737	£35,089,256				
	Main Corridor A9119 III	£8,702,713	£10,630,033	£3,233,702	£22,566,449	£25,951,416	£37,889,067				
2	Main Corridor A944 I	£665,168	£2,138,040	£648,959	£3,452,167	£3,969,991	£5,796,188	£124.7M	£120.9M	£132.9M	
	Main Corridor A944 II	£4,116,022	£1,316,086	£30,670,721	£36,102,829	£41,518,253	£60,616,650				
	Main Corridor A944 II - RV A	£629,412	£0	£2,626,647	£3,256,059	£3,744,468	£5,466,923				
	Main Corridor A944 II - RV B	£0	£0	£1,015,323	£1,015,323	£1,167,621	£1,704,727				
	Main Corridor A944 II - RV C	£0	£0	£8,382,487	£8,382,487	£9,639,860	£14,074,196				
	Main Corridor A9119 III	£4,284,976	£3,843,234	£11,306,656	£19,434,866	£22,350,096	£32,631,140				
	A944 Parallel Route 1	£1,785,628	£3,296,935	£1,009,074	£6,091,638	£7,005,383	£10,227,859				
	A944 Parallel Route 2	£1,187,938	£2,856,974	£0	£4,044,912	£4,651,648	£6,791,406				
	A9119 Parallel Route 1	£693,043	£975,259	£0	£1,668,301	£1,918,546	£2,801,078				
A9119 Parallel Route 2	£21,540	£173,760	£0	£195,300	£224,595	£327,908					
3	Main Corridor A944 I	£665,168	£2,138,040	£648,959	£3,452,167	£3,969,991	£5,796,188	£76.6M			
	Main Corridor A944 II	£1,607,328	£7,815,114	£11,476,461	£20,898,902	£24,033,737	£35,089,256				
	Main Corridor A9119 III	£4,284,976	£3,843,234	£11,306,656	£19,434,866	£22,350,096	£32,631,140				
	A9119 Parallel Route 1	£693,043	£975,259	£0	£1,668,301	£1,918,546	£2,801,078				
	A9119 Parallel Route 2	£21,540	£173,760	£0	£195,300	£224,595	£327,908				
4	Main Corridor A944 I	£665,168	£2,138,040	£648,959	£3,452,167	£3,969,991	£5,796,188	£126.8M	£123.0M	£135.4M	
	Main Corridor A944 II	£4,116,022	£1,316,086	£30,670,721	£36,102,829	£41,518,253	£60,616,650				
	Main Corridor A944 II - RV A	£629,412	£0	£2,626,647	£3,256,059	£3,744,468	£5,466,923				
	Main Corridor A944 II - RV B	£0	£0	£1,015,323	£1,015,323	£1,167,621	£1,704,727				
	Main Corridor A944 II - RV C	£0	£0	£8,382,487	£8,382,487	£9,639,860	£14,074,196				
	Main Corridor A9119 III	£8,702,713	£10,630,033	£3,233,702	£22,566,449	£25,951,416	£37,889,067				
	A944 Parallel Route 1	£1,785,628	£3,296,935	£1,009,074	£6,091,638	£7,005,383	£10,227,859				
	A944 Parallel Route 2	£1,187,938	£2,856,974	£0	£4,044,912	£4,651,648	£6,791,406				

Appendix B Cycle Route Preferences

B.1 Overview

- B.1.1 This appendix outlines a brief exercise undertaken to understand how cyclists currently travel to key destinations on the corridor, and how travel distances could be reduced if cyclists used the more direct routes if these were provided as proposed in the options.
- B.1.2 Through Aberdeen City Council, access has been made available to Strava Metro data.
- B.1.3 It is recognised that the Strava data is only representative of a subset of those who cycle, and particularly is likely to be skewed towards those more likely to be willing to cycle on road. However, it is none-the-less a very useful source of information regarding which routes / roads are more heavily used for cycling journeys, the times of day when cycle flows are highest, and the preferred routes people are taking – which do not always match the most direct route.
- B.1.4 **Note that all Strava Metro data within this report is aggregated and de-identified data from Strava Metro.**

B.2 Approach

- B.2.1 Strava Metro was used to identify how cyclists using the Strava app travel eastbound and westbound between:
- Westhill and Foresterhill Health Campus
 - Westhill and George Street (north of city centre)
 - Westhill and Union Street
- B.2.2 Strava Metro has been used to identify the **most popular** routes and **most direct** routes alongside the associated travel distance and elevation change data for both.
- B.2.3 Cycle journey times were estimated based on the assumption that a cyclist travels at an average speed of 15kph.

B.3 Route Comparison

Westhill to Foresterhill Health Campus

- B.3.1 Cyclists travelling from Westhill to the Foresterhill Health Campus (inc. Aberdeen Royal Infirmary) typically follow the A944 with some small deviations to use parallel shared path sections as shown in the figure below.

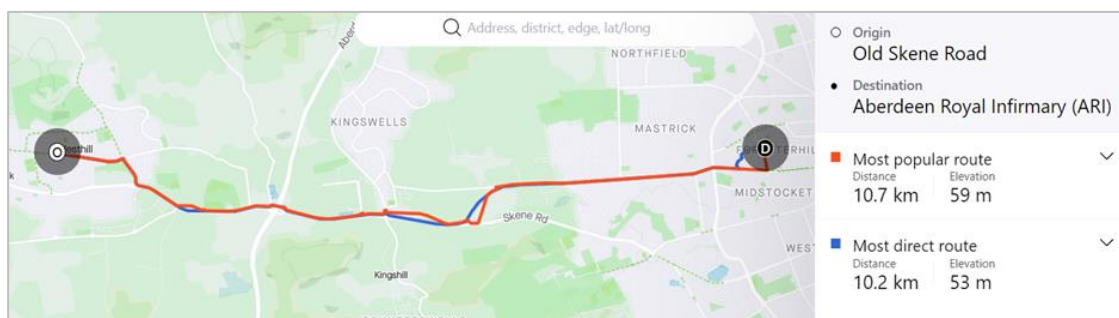


Figure B:1: Most direct and most popular cycle routes from Westhill to Foresterhill

Foresterhill Health Campus to Westhill

B.3.2 In the westbound direction, cyclists deviate from the A944, in preference of taking a longer route via the A9119 and King's Gate. This increases the cycle distance by 900m relative to the direct route via the A944.

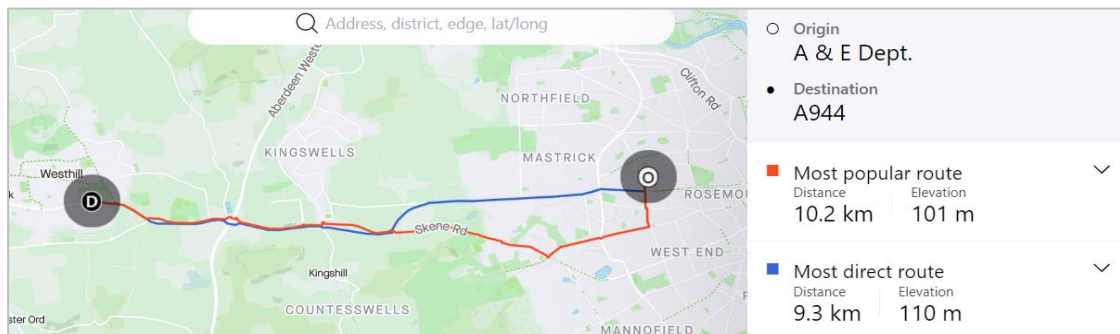


Figure B.2: Most direct and most popular cycle routes from Foresterhill to Westhill

B.3.3 Clearly the eastbound and westbound routes differ. This is likely to be influenced by the relatively steep gradient found on the A944 east of the A92.

B.3.4 Examination of Google Earth data shows that on the 1km section between Roseberry Street and the A92, the A944 shows a sustained 5% gradient and a maximum gradient of approximately 10%. It seems likely that cyclists are content to coast down this hill on their way to Foresterhill Health Campus but would prefer to avoid the westbound climb.

Westhill to George Street

B.3.5 The most popular route for cycle travel from Westhill to George Street, which sits to the north of the city centre, runs along the A9119 then routes north from Union Street. This route is 1.2km longer than the most direct route which runs eastbound along the A944 then south onto George Street.

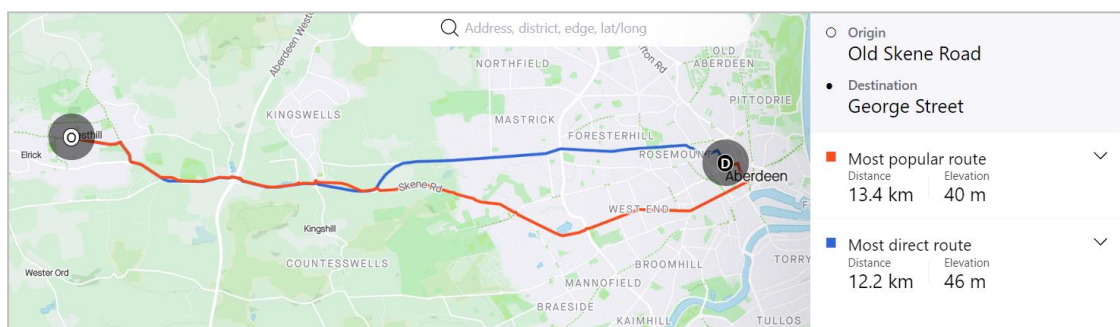


Figure B.3: Most direct and most popular routes between Westhill and George Street

B.3.6 Again, cyclists are choosing to take a longer route to avoid use of the A944. However, in this instance, cyclists would be travelling downhill and so the gradient is likely to be less of a factor. The quality of existing cycle infrastructure on both corridors is comparable, but other influencing factors may be:

- **Traffic volume:** Traffic volumes are approximately 20% higher on the A944 than the A9119.
 - Traffic count data from the DfT indicates that in 2019 average annual daily traffic on the A944 varied from 14,500 to 17,500 vehicles per day (based on counters 78516,

80028, 80029 and 80031), and on the A9119 traffic average annual daily traffic was recorded as approximately 13,500 vehicles per day (only one counter available).

- **Traffic speed:** traffic speed data from INRIX suggests that eastbound traffic speeds are comparable on the A944 and A9119 during the morning peak and slightly higher on the A9119 during the evening peak. Full details in Table B.6.
- **Perceived safety:** During the Stantec site visit in early 2020, the survey team cycled the A944 Westburn Road during the PM peak but noted that they felt unsafe due to heavy traffic flow, instances of speeding and parked cars obstructing their movement. As a result, the survey team chose to dismount and walk.

Table B.6: INRIX mean speed data (7th-10th October 2019)

Section	Mean Speed					
	Eastbound (kph)			Westbound (kph)		
	07:00	16:00	20:00	07:00	16:00	20:00
A944 - Westhill to AWPR	47	51	59	51	50	59
A944 - AWPR to Kingswells	41	42	53	16	15	36
A944 - Kingswells to A9119	28	28	41	56	49	64
A944 - A9119 to Sheddocksley	49	57	59	32	33	52
A944 - Sheddocksley to A92	26	26	37	31	30	40
A944 - A92 to Westburn Dr	26	26	37	36	33	41
A944 - Westburn Dr to Berryden Rd	14	19	32	24	27	33
A944 - Berryden Rd to Mounthooly	29	26	33	28	24	33
A96 (W N St)	23	19	31	26	26	33
Albyn Place	19	17	34	20	23	35
A9119 - Albyn Pl to Queen's Cross	20	33	41	25	20	36
A9119 - Queen's Cross to Hazlehead	28	33	46	22	22	37
A9119 - Hazlehead to A944	43	44	56	49	53	56

George Street to Westhill

- B.3.7 Similarly, the most popular route for cycle travel from George Street to Westhill routes south onto Union Street and then routes west along the A9119. This route is **1km longer than the most direct route** which runs westbound along the A944.

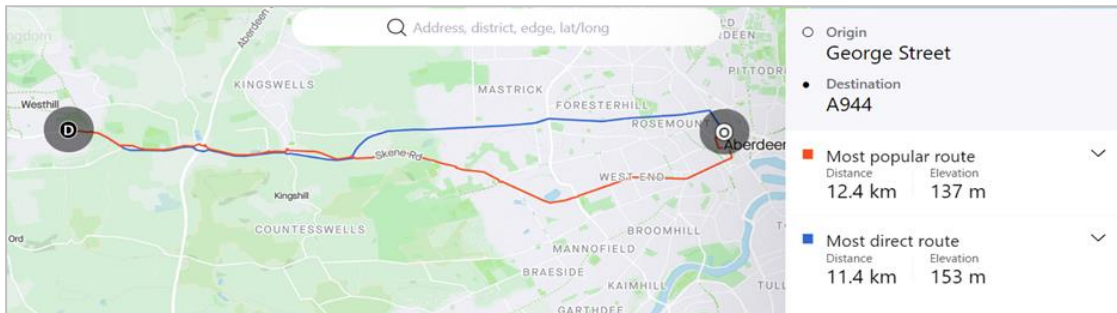


Figure B:4: Most direct and most popular routes between Westhill and George Street

B.3.8 As noted earlier, there is a steep gradient on the A944, east of the A92. This is an uphill gradient for those travelling westbound. While this gradient may dissuade some cyclists from the section, issues surrounding traffic volumes, traffic speeds and perceived safety may also be contributory factors.

Westhill to Union Street

B.3.9 The most direct and most popular routes from Westhill to Union Street essentially follow the same path along the A9119, with only small deviations to use parallel road sections on the western part of the route.

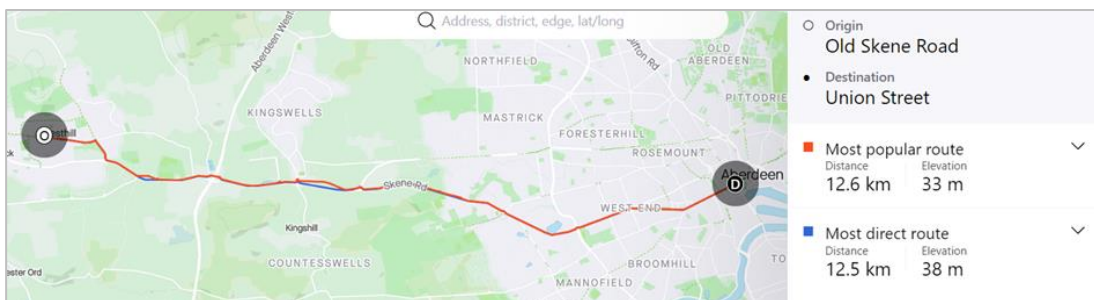


Figure B:5: Most direct and most popular routes between Westhill and Union Street

Union Street to Westhill

B.3.10 Similarly, the most direct and most popular routes from Union Street to Westhill essentially follow the same path along the A9119, as shown below.

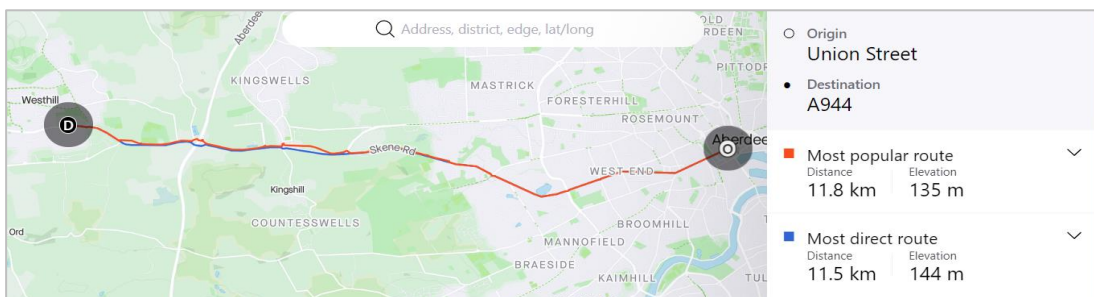


Figure B:6: Most direct and most popular routes between Union Street and Westhill

Appendix C Bus Journey Time Analysis

C.1 Introduction

C.1.1 Additional analysis has been undertaken to estimate the impacts of each of the options on bus journey times. This analysis has used existing bus timetables (as at Spring 2022) to assess the typical level of delay incurred by each bus service and output estimates of how delay could be reduced, dependent on the extent and quality of bus infrastructure proposed.

C.2 Bus Routes

Existing services

C.2.1 Review of existing bus route maps identified that the services which are likely to be most heavily impacted by the options are:

- Stagecoach 4/5/6 services which operate between Westhill/Countesswells and the city centre. These services converge at Kingswells Park & Ride site and follow the A9119 and Albyn Place to Holburn Junction where they access Union Street.
- First 11 service which operates between Woodend and Northfield, travelling along the A9119 and Albyn Place to Holburn Junction, where the service joins Union Street.
- Stagecoach 14 service which operates between Kingswells and the city centre, travelling via the A944 between the junction with Old Lang Stracht and the Foresterhill Health Campus. This service then travels via residential areas before accessing the west end of Union Street.
- First 23 service which operates between Sheddocksley and Heathryfold, travelling via the A944 between Sheddocksley and the Foresterhill Health Campus. This service then travels via residential areas before accessing the west end of Union Street. The 23 exits Union Street via King Street and joins the A96, travelling north to Mounthooly.

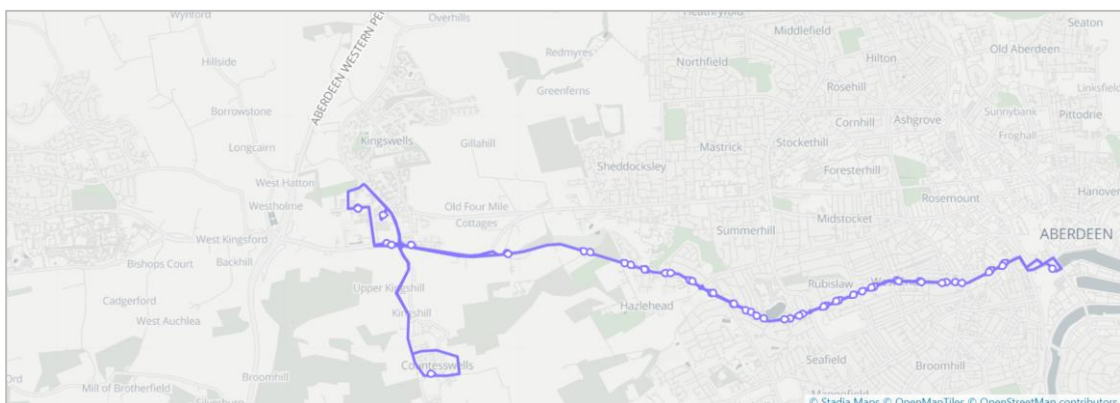


Figure C:1: Stagecoach 4 bus route (bustimes.org)

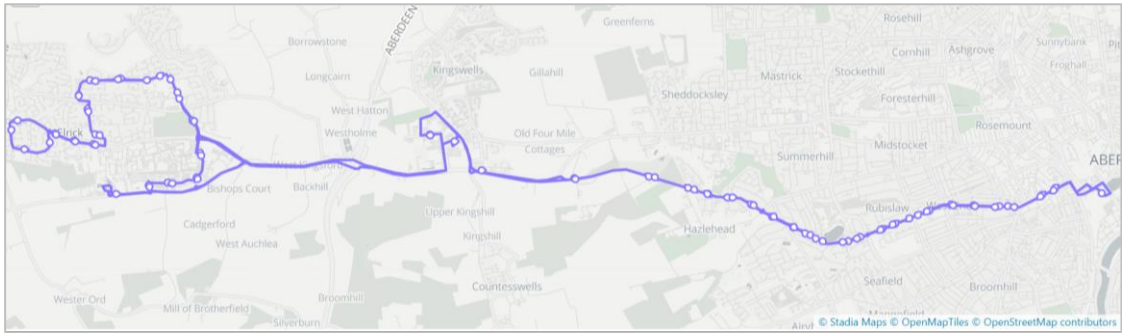


Figure C:2: Stagecoach 5 bus route (bustimes.org)

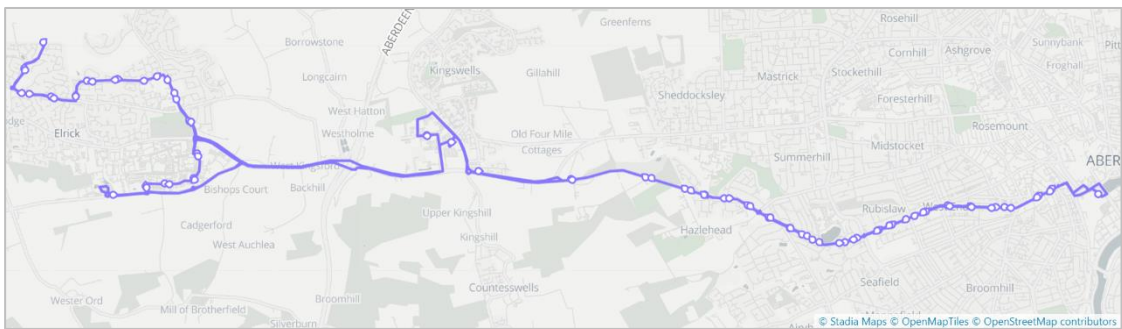


Figure C:3: Stagecoach 6 bus route (bustimes.org)

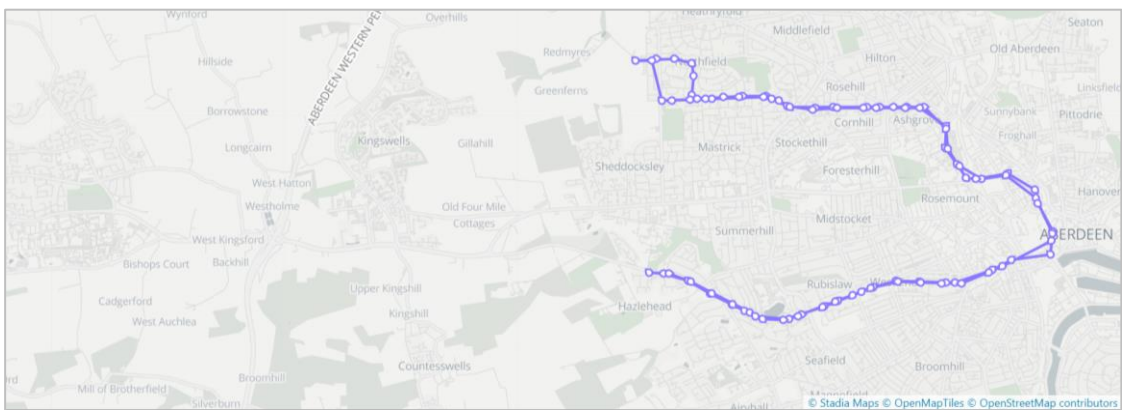


Figure C:4: First 11 bus route (bustimes.org)

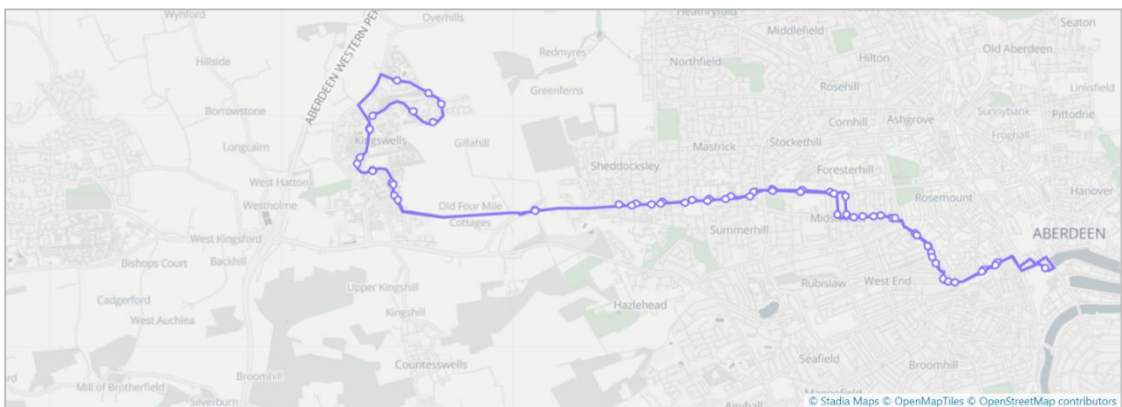


Figure C:5: Stagecoach 14 bus route (bustimes.org)

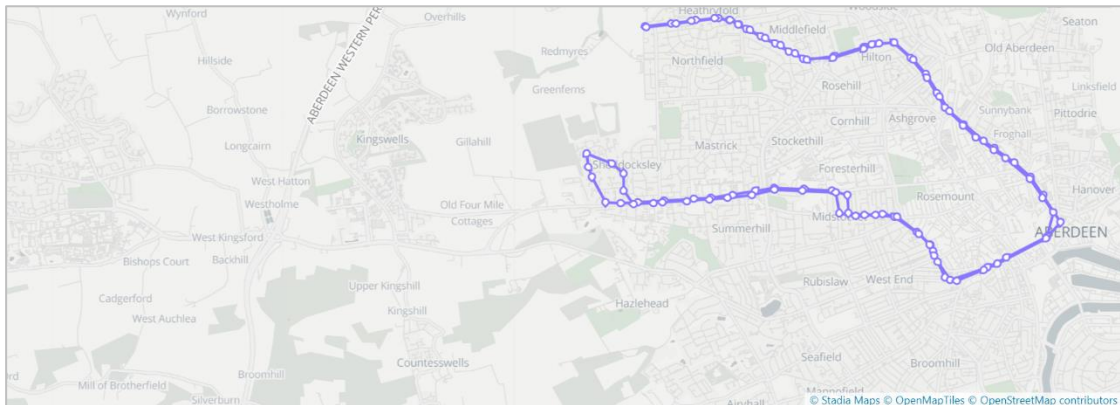


Figure C.6: First 23 bus route (bustimes.org)

Dummy ART services

- C.2.2 There are no existing bus services which route the full length of the A944 between Kingswells and Aberdeen city centre. Therefore, the benefits of the proposed bus priority along the A944 (as proposed under options 2 and 4) are not fully realised, particularly between Foresterhill Health Campus and Mounthooly roundabout.
- C.2.3 However, it is recognised that the Aberdeen Rapid Transit Options Appraisal study is ongoing, and as the ART network is not yet fully defined, it could include a rapid transit route between Kingswells Park & Ride and Aberdeen city centre along the A944. Indeed, the lesser constraints along the A944, and the key trip generators at Woodhill House and the Foresterhill Health Campus make it an attractive route for ART implementation. Given this, it has been important to assess the potential time savings could be accrued by such services if the proposed bus priority infrastructure along the A944 were implemented and ART services took full advantage of the infrastructure along the full length of the route.
- C.2.4 Three dummy 'ART' bus services have been developed and tested for this purpose, one for each of the Option 2 and 4 A, B and C variants. All services follow the A944 from Kingswells Park & Ride up to the junction with the B986/Berryden corridor and then diverge as below:
- Dummy A (assumed if variant A were in place) continues along the A944 to Mounthooly before travelling south on the A96 to Union Street via King Street
 - Dummy B (assumed if variant B were in place) turns south to follow the B986 (Skene Square, Denburn Road) as far as Guild Street, before heading north to Union Street via Market Street
 - Dummy C (assumed if variant C were in place) routes south to follow the B986 (Skene Square) as far as Woolmanhill Roundabout, before joining Blackfriars Street (via the proposed new access). The service then travels along Union Terrace for a short distance, before following Rosemount Viaduct and Union Terrace to Union Street
- C.2.5 **Note: these services do not form part of any of the options themselves and have only been considered to identify the journey time savings which could be accrued from the infrastructure.**
- C.2.6 Timetables have been developed for the dummy ART services based on existing timetables for the existing services noted above, as well as the First 20, Stagecoach 35, Stagecoach 37 and Stagecoach 59 bus services. It is assumed that boarding/alighting activity at a stop incurs a 20 second delay.

C.3 Study Area

C.3.1 While the study area for the appraisal excludes the city centre, bus journey time analysis has considered the full section between Kingswells and Union Street/Union Square Bus Station given the relevance of this analysis to the ART project.

C.3.2 The table below indicates which bus routes use each of the existing route sections.

Table C.1: Bus route usage by section

Road	Section	Bus Route use by Section						
		4/5/6	11	14	23	Dummy A	Dummy B	Dummy C
A944	Kingswells P&R to A9119	X				X	X	X
A944	A9119 to Old Lang Stracht					X	X	X
A944	Old Lang Stracht to Sheddocksley			X		X	X	X
A944	Sheddocksley to ARI			X	X	X	X	X
A944	ARI to Berryden Rd					X	X	X
A944	Berryden Rd to Mounthooly		X			X		
A96	Mounthooly to King St				X	X		
A9119	A944 to Woodend	X						
A9119	Woodend to King's Gate	X	X					
A9119	King's Gate to Queen's Cross	X	X					
Albyn Pl	Queen's X to Holburn Junction	X	X					
B896	A944 to Woolmanhill Roundabout						X	X
B896	Woolmanhill Roundabout to Guild St						X	
B'kfriars St	Link between St Andrews St & Rosemount Viaduct							X
Union St	Bridge St to Market St		X		X			X
Bridge St	Union St to Guild St	X		X				
Guild St	East of Carmelite St	X		X			X	
Market St	Guild St to Union St						X	

C.4 Quantifying Delay

C.4.1 In order to estimate existing delay, bus journey times for all services have been compared across the day, with the minimum journey time on each route section being assumed to reflect free flow/uncongested movement. The difference between timetabled journey times and the daily minimum is assumed to reflect congestion/delay on the route.

C.4.2 Limited delay is understood to apply on the corridor west of Kingswells (between Kingswells and Westhill) so minimal journey time savings are expected to apply on that section. Consequently, this analysis considers conditions from Kingswells Park & Ride eastwards.

Do Nothing Scenario

- C.4.3 As part of the Aberdeen City Centre Masterplan proposals, consideration is being given to additional traffic restrictions within the very heart of the city:
- Union Street is pedestrianised between Bridge St and Market St (cycles still permitted and time limited servicing), and use of Guild Street (east of Carmelite St), Bridge St, Market Street (north of Guild Street) is restricted to bus, taxi and cycle only
 - Union Street is made bus and cycle only between Bridge St and Market St (again limited time servicing permitted)
- C.4.4 However, modelling¹² found that even if Union Street remained open to buses, restrictions to general traffic would still be needed on Guild Street, Bridge Street and Market Street. Given that Aberdeen City Council has most recently decided to permit bus movement along Union Street, it has been assumed that in the Do Nothing scenario, Guild Street (east of Carmelite St), Bridge St, and Market Street (north of Guild Street) are restricted to bus, taxi and cycle only.
- C.4.5 Bus timetables for the services 4/5/6, 11, 14, 23 and the dummy ART services were adjusted to assume that minimum journey times applied throughout the day on sections where road traffic would be limited to buses, taxis and bicycles.
- C.4.6 The table below sets out key statistics on bus journey times and delay assumed to apply in the Do Nothing scenario. Journey times for all services except the 11 and 23 reflect travel between Kingswells and the city centre (Union Street /Union Square Bus Station). As such journey times for the 11 and 23 services cannot be directly compared with other services.

Table C.2: Do-Nothing Bus Journey Time Data (minutes)

No.	Direction	Section	Max. Journey Time	Mean Journey Time	Max. Delay	Mean Delay
4	Eastbound	Kingswells P&R – Bus Station	36	27	12	3
4	Westbound	Bus Station – Kingswells P&R	32	28	8	4
5/6	Eastbound	Kingswells P&R – Bus Station	39	27	22	11
5/6	Westbound	Bus Station – Kingswells P&R	35	26	16	7
11	Eastbound	Woodend - Union St (by Broad St)	20	19	6	5
11	Westbound	Union St (by Broad St) - Woodend	24	22	9	7
14	Eastbound	Kingswells (Kingswood Dr) - Bus Station	30	28	7	5
14	Westbound	Bus Station – Kingswells (Kingswood Dr)	24	23	4	3
23	Eastbound	Sheddocksley – Union St (by Broad St)	31	29	8	6
23	Westbound	Union St (by Broad St) to Sheddocksley	30	27	9	6
Dummy A	Eastbound	Kingswells P&R – Union St (by Broad St)	28	26	6	4
Dummy A	Westbound	Union St (by Broad St) – Kingswells P&R	30	27	8	5

¹² <https://committees.aberdeencity.gov.uk/documents/s126158/Appendix%20C.pdf>

No.	Direction	Section	Max. Journey Time	Mean Journey Time	Max. Delay	Mean Delay
Dummy B	Eastbound	Kingswells P&R – Union St (by Broad St)	29	26	5	2
Dummy B	Westbound	Union St (by Broad St) – Kingswells P&R	28	25	4	1
Dummy C	Eastbound	Kingswells P&R – Union St (by Broad St)	26	24	5	3
Dummy C	Westbound	Union St (by Broad St) – Kingswells P&R	28	26	4	2

C.4.7 Analysis of timetables identified some interesting points:

- The 4, 5 and 6 services are the most frequent existing services which serve Kingswells/Kingswells Park & Ride, although they show substantially longer journey times than the 14 at peak times
- Journey times on the 4/5/6 bus services reach a maximum of 39 minutes for travel between Kingswells and Union Square Bus station, compared with 30 minutes on the 14 service
- On the whole, services which run along the A9119 appear to suffer from more delay than those which run along the A944. This makes sense in that the A9119 corridor has negligible bus priority infrastructure at present whereas the A944 includes substantial lengths of bus lane between Sheddocksley and the Foresterhill Health Campus
- Consequently, there is greater variability in journey times on services which travel via the A9119. For example:
 - on the 5/6 service journey times from Kingswells Park & Ride to Union Square Bus Station vary from 17 to 39 minutes
 - on the 14 service journey times from Kingswells to Union Square Bus Station vary from 23 to 30 minutes
 - On the A9119, eastbound services incur more delay than westbound services
- New services along the A944, show journey times comparable to the existing Stagecoach 14 service under the Do Nothing scenario

Do Something Scenario

C.4.8 Consideration has been given to the potential impacts of new infrastructure proposed under the options.

C.4.9 The table below sets out the infrastructure assumed on each road section under each corridor option.

Table C.3: Do Something proposals by option and road section

Road	Section	Infrastructure by Option							
		Option 1	Option 2A	Option 2B	Option 2C	Option 3	Option 4A	Option 4B	Option 3C
A944	Kingswells P&R to A944 / A9119 roundabout	Continuous bus lanes	Continuous bus lanes	Continuous bus lanes	Continuous bus lanes	Continuous bus lanes	Continuous bus lanes	Continuous bus lanes	Continuous bus lanes
A944	A944/A9119 roundabout to Old Lang Stracht	No change	No change	No change	No change	No change	No change	No change	No change
A944	Old Lang Stracht to Sheddocksley	No change	Continuous bus lanes	Continuous bus lanes	Continuous bus lanes	No change	Continuous bus lanes	Continuous bus lanes	Continuous bus lanes
A944	Sheddocksley to ARI (Raeden Av approx.)	Staggered bus lanes	Continuous bus lanes	Continuous bus lanes	Continuous bus lanes	Staggered bus lanes	Continuous bus lanes	Continuous bus lanes	Continuous bus lanes
A944	ARI to Berryden Rd junction	No change	Staggered bus lanes	Staggered bus lanes	Staggered bus lanes	No change	Staggered bus lanes	Staggered bus lanes	Staggered bus lanes
A944	Berryden Rd junction to Mounthooly	No change	Staggered bus lanes	No change	No change	No change	Staggered bus lanes	No change	No change
A96	Mounthooly to King St junction	No change	Continuous bus lanes	No change	No change	No change	Continuous bus lanes	No change	No change
A9119	A944/A9119 roundabout to Woodend	No change	Staggered bus lanes	Staggered bus lanes	Staggered bus lanes	Staggered bus lanes	No change	No change	No change
A9119	Woodend to King's Gate	No change	Staggered bus lanes	Staggered bus lanes	Staggered bus lanes	Staggered bus lanes	No change	No change	No change
A9119	King's Gate to Queen's Cross Roundabout	No change	Staggered bus lanes	Staggered bus lanes	Staggered bus lanes	Staggered bus lanes	No change	No change	No change
Albyn Place	Queen's Cross Roundabout to Holburn Junction	Staggered bus lanes	Staggered bus lanes	Staggered bus lanes	Staggered bus lanes	Staggered bus lanes	Staggered bus lanes	Staggered bus lanes	Staggered bus lanes
B896	A944 junction to Woolmanhill Roundabout	No change	No change	Continuous bus lanes	Continuous bus lanes	No change	No change	Continuous bus lanes	Continuous bus lanes
B896	Woolmanhill Roundabout to Guild St junction	No change	No change	Continuous bus lanes	No change	No change	No change	Continuous bus lanes	No change
B'friars St	Link between St Andrew's Street & Rosemount Viaduct	No change	No change	No change	New junction with Denburn Rd	No change	No change	No change	New junction with Denburn Rd
Union Street	Bridge St junction to Market Street junction	No change	No change	No change	No change	No change	No change	No change	No change
Bridge St	Union St junction to Guild St junction	No change	No change	No change	No change	No change	No change	No change	No change
Guild St	East of Carmelite St	No change	No change	No change	No change	No change	No change	No change	No change
Market St	Guild St junction to Union St	No change	No change	No change	No change	No change	No change	No change	No change

C.4.10 It has been assumed that:

- Provision of continuous bus lanes on a section will allow buses to travel at free-flow/uncongested speeds and journey times will reflect the daily minimum on that section as per the existing timetable.
- Provision of staggered bus lanes on a section will reduce delay by half compared with the existing timetable (i.e., time saving = (timetabled section journey time – minimum daily journey time for that section) / 2).
- Provision of a new junction between Blackfriars Street and Denburn Road will remove the need for services to circulate around the square encapsulated by St Andrew Street, John Street and Charlotte Street, accruing a time saving of one minute.

C.4.11 Based on the above assumptions, revised journey times were calculated for each bus service under each option. Key statistics are set out in the tables below.

Table C.4: Do Something Journey Times (minutes)

Service	Section	Max. Journey Time (min) by Option								Mean Journey Time (min) by Option							
		Option 1	Option 2A	Option 2B	Option 2C	Option 3	Option 4A	Option 4B	Option 4C	Option 1	Option 2A	Option 2B	Option 2C	Option 3	Option 4A	Option 4B	Option 4C
4	Kingswells P&R – Bus Station	33	30	30	30	30	33	33	33	26	25	25	25	25	26	26	26
4	Bus Station – Kingswells P&R	31	29	29	29	29	31	31	31	26	25	25	25	25	26	26	26
5/6	Kingswells P&R – Bus Station	35	30	30	30	30	35	35	35	25	23	23	23	23	25	25	25
5/6	Bus Station – Kingswells P&R	30	27	27	27	27	30	30	30	23	22	22	22	22	23	23	23
11	Woodend - Union St	19	18	18	18	18	18	19	19	18	17	17	17	17	17	18	18
11	Union St - Woodend	23	21	21	21	21	21	23	23	21	20	20	20	20	20	21	21
14	Kingswells - Bus Station	30	29	29	29	30	29	29	29	28	27	27	27	28	27	27	27
14	Bus Station – Kingswells	24	24	24	24	24	24	24	24	23	23	23	23	23	23	23	23
23	Sheddocksley – Union St	30	29	29	29	30	29	29	29	28	28	28	28	28	28	28	28
23	Union St - Sheddocksley	28	26	26	26	28	26	26	26	26	25	25	25	26	25	25	25
Dummy A	Kingswells P&R – Union St		23				23				22				23		
Dummy A	Union St – Kingswells P&R		25				25				23				25		
Dummy B	Kingswells P&R – Union St			25				25				24				24	

Service	Section	Max. Journey Time (min) by Option								Mean Journey Time (min) by Option							
		Option 1	Option 2A	Option 2B	Option 2C	Option 3	Option 4A	Option 4B	Option 4C	Option 1	Option 2A	Option 2B	Option 2C	Option 3	Option 4A	Option 4B	Option 4C
Dummy B	Union St – Kingswells P&R			25				25				24				24	
Dummy C	Kingswells P&R – Union St				22				22				21				21
Dummy C	Union St – Kingswells P&R				25				25				24				24

Table C.5: Do Something Time Savings (minutes per service)

Service	Section	Max. Time Saving (min)								Mean Time Saving (min)							
		Option 1	Option 2A	Option 2B	Option 2C	Option 3	Option 4A	Option 4B	Option 4C	Option 1	Option 2A	Option 2B	Option 2C	Option 3	Option 4A	Option 4B	Option 4C
4	Kingswells P&R – Bus Station	3	7	7	7	7	3	3	3	1	2	2	2	2	1	1	1
4	Bus Station – Kingswells P&R	2	4	4	4	4	2	2	2	2	3	3	3	3	2	2	2
5/6	Kingswells P&R – Bus Station	4	10	10	10	10	4	4	4	2	4	4	4	4	2	2	2
5/6	Bus Station – Kingswells P&R	6	9	9	9	9	6	6	6	3	4	4	4	4	3	3	3
11	Woodend - Union St	1	3	3	3	3	3	1	1	1	2	2	2	2	2	1	1
11	Union St - Woodend	1	3	3	3	3	3	1	1	1	2	2	2	2	2	1	1
14	Kingswells - Bus Station	1	3	3	3	1	3	3	3	0	1	1	1	0	1	1	1
14	Bus Station – Kingswells	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
23	Sheddocksley – Union St	2	3	3	3	2	3	3	3	1	2	2	2	1	2	2	2
23	Union St - Sheddocksley	2	4	4	4	2	4	4	4	1	2	2	2	1	2	2	2
Dummy A	Kingswells P&R – Union St		5				5				4				4		
Dummy A	Union St – Kingswells P&R		6				6				3				3		
Dummy B	Kingswells P&R – Union St			5				5				2				2	
Dummy B	Union St – Kingswells P&R			3				3				1				1	

Service	Section	Max. Time Saving (min)								Mean Time Saving (min)							
		Option 1	Option 2A	Option 2B	Option 2C	Option 3	Option 4A	Option 4B	Option 4C	Option 1	Option 2A	Option 2B	Option 2C	Option 3	Option 4A	Option 4B	Option 4C
Dummy C	Kingswells P&R – Union St				5				5				3				3
Dummy C	Union St – Kingswells P&R				3				3				2				2

Table C.6: Do Something Time Savings (%)

No.	Section	Maximum Journey Time Reduction								Mean Journey Time Reduction							
		Option 1	Option 2A	Option 2B	Option 2C	Option 3	Option 4A	Option 4B	Option 4C	Option 1	Option 2A	Option 2B	Option 2C	Option 3	Option 4A	Option 4B	Option 4C
4	Kingswells P&R – Bus Station	-8%	-18%	-18%	-18%	-18%	-8%	-8%	-8%	-2%	-6%	-6%	-6%	-6%	-2%	-2%	-2%
4	Bus Station – Kingswells P&R	-5%	-11%	-11%	-11%	-11%	-5%	-5%	-5%	-7%	-9%	-9%	-9%	-9%	-7%	-7%	-7%
5/6	Kingswells P&R – Bus Station	-10%	-24%	-24%	-24%	-24%	-10%	-10%	-10%	-6%	-16%	-16%	-16%	-16%	-6%	-6%	-6%
5/6	Bus Station – Kingswells P&R	-16%	-24%	-24%	-24%	-24%	-16%	-16%	-16%	-10%	-15%	-15%	-15%	-15%	-10%	-10%	-10%
11	Woodend - Union St	-5%	-13%	-13%	-13%	-13%	-13%	-5%	-5%	-5%	-10%	-10%	-10%	-10%	-10%	-5%	-5%
11	Union St - Woodend	-4%	-13%	-13%	-13%	-13%	-13%	-4%	-4%	-4%	-11%	-11%	-11%	-11%	-11%	-4%	-4%
14	Kingswells - Bus Station	-2%	-3%	-3%	-3%	-2%	-3%	-3%	-3%	-1%	-3%	-3%	-3%	-1%	-3%	-3%	-3%
14	Bus Station – Kingswells	0%	0%	0%	0%	0%	0%	0%	0%	-1%	-1%	-1%	-1%	-1%	-1%	-1%	-1%
23	Sheddocksley – Union St	-3%	-6%	-6%	-6%	-3%	-6%	-6%	-6%	-3%	-6%	-6%	-6%	-3%	-6%	-6%	-6%
23	Union St - Sheddocksley	-7%	-13%	-13%	-13%	-7%	-13%	-13%	-13%	-4%	-8%	-8%	-8%	-4%	-8%	-8%	-8%
Dummy A	Kingswells P&R – Union St		-18%				-18%				-14%				-14%		
Dummy A	Union St – Kingswells P&R		-18%				-18%				-13%				-13%		
Dummy B	Kingswells P&R – Union St			-16%				-16%				-8%				-8%	

No.	Section	Maximum Journey Time Reduction								Mean Journey Time Reduction							
		Option 1	Option 2A	Option 2B	Option 2C	Option 3	Option 4A	Option 4B	Option 4C	Option 1	Option 2A	Option 2B	Option 2C	Option 3	Option 4A	Option 4B	Option 4C
Dummy B	Union St – Kingswells P&R			-11%					-11%				-4%				-4%
Dummy C	Kingswells P&R – Union St				-17%				-17%				-11%				-11%
Dummy C	Union St – Kingswells P&R				-11%				-11%				-6%				-6%

C.4.12 Analysis shows that:

- Option 1 infrastructure provides limited journey time savings – a maximum of 6 minutes on the 5/6 service eastbound and on average of about one minute
- Option 2A/B/C provides the greatest journey times savings for existing services with Options 3 and 4 providing comparable time savings for services, which run along the A9119 and A944, respectively
- Under Option 2, journey times on the:
 - 4 service reduce by up to 7 minutes eastbound and 4 minutes westbound, resulting in a maximum journey time of 29 minutes and a mean journey time of 25 minutes eastbound, and a maximum journey time of 28 minutes and a mean journey time of 25 minutes westbound
 - 5/6 service reduce by up to 10 minutes eastbound and 9 minutes westbound, resulting in a maximum journey time of 29 minutes and a mean journey time of 22 minutes eastbound, and a maximum journey time of 26 minutes and a mean journey time of 22 minutes westbound
 - 14 service reduce by up to 3 minutes eastbound and 1 minute westbound, resulting in a maximum journey time of 29 minutes and a mean journey time of 27 minutes eastbound, and a maximum journey time of 24 minutes and a mean journey time of 22 minutes westbound
- It makes sense that time savings are higher on the 4/5/6 than the 14 as the sections of the A944 used by the 14 already feature substantial stretches of bus lane and there is less existing delay to address
- The new services which could potentially run along the A944, accrue greater journey time savings than the existing 14 and 23 services which also use the A944. The reason for this is that the new services benefit from improved bus priority along a much greater proportion of their routes
- Under Option 2A/4A, the Dummy A service achieves a maximum journey time of 23 min and a mean journey time of 22 minutes eastbound, and a maximum journey time of 25 min and a mean journey time of 23 minutes westbound
- Under Option 2B/4B, the Dummy B service achieves a maximum journey time of 25 minutes and a mean journey time of 24 minutes in both directions.
- Under Option 2C/4C, the Dummy C service achieves a maximum journey time of 22 min and a mean journey time of 21 minutes eastbound, and a maximum journey time of 25 min and a mean journey time of 24 minutes westbound.
- In each of the above three variant cases, this means that dummy service journey times during morning and afternoon peaks under the Do Something scenario will be within one minute of minimum journey times under the Do Nothing scenario. If an ART Rapid Transit service were introduced on these routes, time savings are likely to be even greater as a reduced stopping frequency would be implemented, which is not reflected in the existing timetables which were used as a basis for journey time estimates.

Appendix D Active Travel Economic Impacts

D.1 Introduction

- D.1.1 To provide quantitative analysis to the economy criteria appraisal, the monetised economic impacts of the active travel (cycling) elements of the options have been estimated using the DfT's latest Active Mode Appraisal Toolkit (AMAT), which is a spreadsheet-based tool for estimating the costs and benefits of walking and cycling interventions.
- D.1.2 It is important to recognise that the quantitative economic impacts presented in this appendix only represent a part of the overall appraisal picture and overly focusing on the BCRs generated by the options as a means of assessing the value of each option is not advised. The schemes to be implemented all consider significant reallocation of road space away from the private vehicle and as such will have a similarly significant journey time disbenefit and associated economic impact on traffic.

D.2 Monetised Benefits - Cycling

Overview

- D.2.1 In order to provide an indication of the potential economic benefit of the proposed active travel interventions proposed under each of the options, an appraisal of the benefits based on the Department for Transport latest (May 2022) Active Mode Appraisal Toolkit (AMAT) has been undertaken. This analysis covers benefits relating to Congestion, infrastructure, accidents, local air quality, noise, greenhouse gases, reduced risk of premature death, absenteeism, journey ambience, indirect taxation, and government costs.
- D.2.2 Although large-scale infrastructure schemes for other modes typically assume a 60-year appraisal period, this is generally not recommended for active modes interventions as they are more likely to have more finite project lives and increased uncertainty around the longevity of their impacts. Therefore, most appraisals of cycling and walking infrastructure schemes assume an appraisal period of 20 years and this approach has been adopted for this appraisal.
- D.2.3 Analysis first requires an estimation of cycling demand, and the approach taken to estimating demand is set out below.

Active Travel Demand

- D.2.4 All approaches to active mode appraisal require estimation of Do Nothing and Do Something active travel demand and this section describes the method used for the this study. These demand forecasts are used in the appraisal of benefits of the identified options.
- D.2.5 Active travel counters in Aberdeen City and Shire are focussed in areas where active travel infrastructure already exists and there is insufficient data available to estimate demand within the study area. In such a situation TAG Unit A.5.1 suggests that cycle demand can be estimated using Travel to Work Data (TTW) from the 2011 Census. This approach was adopted and is described below.

Study Area

- D.2.6 The study area was defined as those intermediate zones which have population weighted centroids within 1km of the core study corridors (i.e., A944 between Westhill and Mounthooly, A9119 between A944 and Albyn Place and Albyn Place itself. The Kingswells and Countesswells intermediate zones were also added to the study area given the substantial

development which has been ongoing in these areas since 2011. As such, the Study Area was identified as those intermediate zones shown in pink in the figure below.

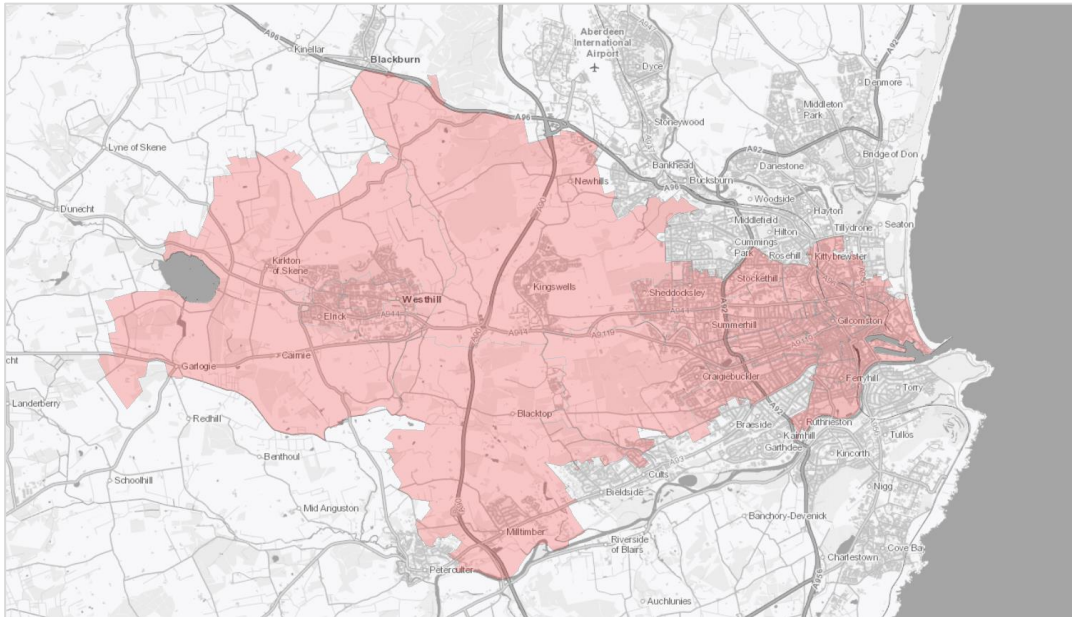


Figure D:1: Active Mode Appraisal Study Area

D.2.7 The study corridors were broken up into sections according to where different standards of infrastructure are proposed under the various options, and zones at the Intermediate Zone level were allocated to the sections based on which section was nearest to the population weighted centroid.

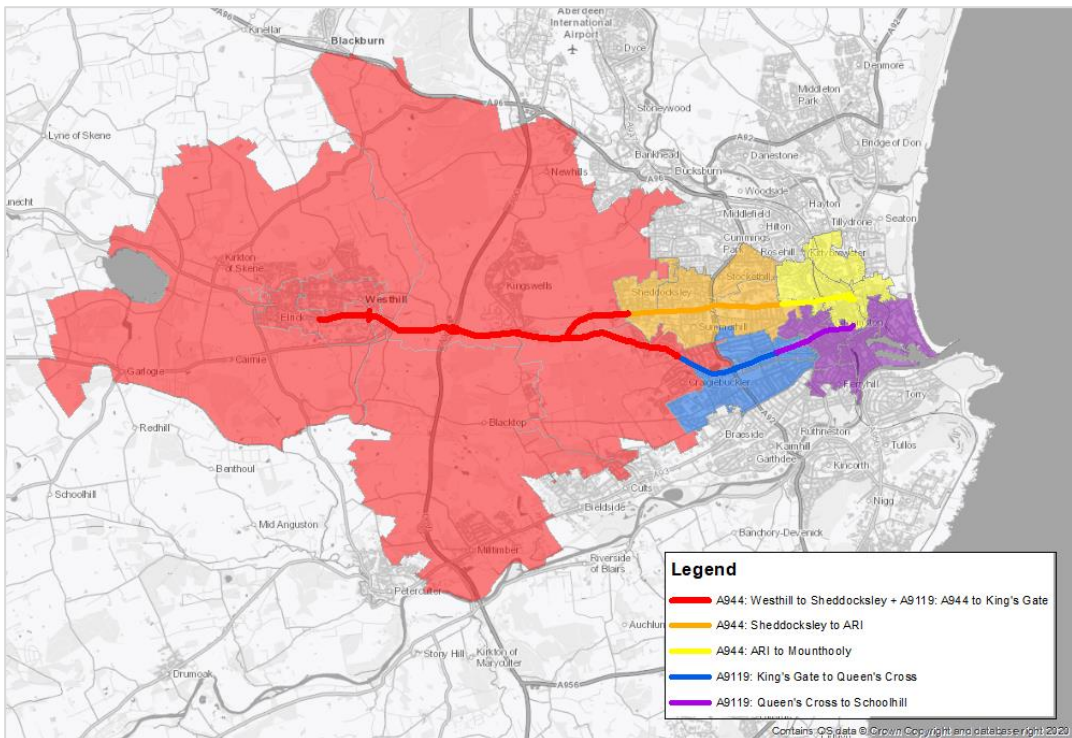


Figure D:2: Active Mode Appraisal Study Area split by section

Baseline Data

D.2.8 As part of the census, participants are asked where they live, where they work and the main mode of travel they use to travel to work. This dataset is available with origins and destinations described at Intermediate Zone (IZ) level or higher geographies. TTW data was collated for journeys where:

- the main mode of travel was bicycle;
- the residence and workplace fell within the study area;
- the residence and workplace fell within different intermediate zones; and
- from high level review of mapping, it appeared that travel between home and workplace could use the identified study corridors.

D.2.9 This process output estimates of the number of people who cycled to work through the study area in 2011.

Baseline Demand for Active Travel

D.2.10 TTW data provides an indication of how many people travel to work between given intermediate zones by bike. However, this is not equivalent to cycle demand on an average weekday as return trips involve two movements, those surveyed will work differing numbers of hours per week and differing days and may not attend work due to sickness or annual leave. As such, we used this data as the basis for estimating underlying cycle commuter demand and then growthed commuting demand up to total cycle demand using factors obtained from the Scottish Household Survey. Specific steps are described below.

D.2.11 WebTAG Unit A5-1 requires that active travel demand be expressed in terms of the average number of cycling trips per day. As such, it was necessary to generate an estimate of the proportion of commuters who would be travelling on an average weekday. We estimated that 72% of employees would be working on a given weekday based on the following approach:

- Identify the proportion of people in employment who work <6 hours, 6-15 hours, 15-30 hours, 31-45 hours, and more than 45 hours per week (Annual Population Survey / Labour Force Survey 2019) and estimate average number of days worked per year for each band.
- Estimate the average number of Saturdays and Sundays worked in each band, based on outputs from the Labour Force Survey 2013 (could not find equivalent data from 2019, but assume proportions have not changed significantly).
- Estimate the number of days' holiday taken each year for each band, on basis of a full-time employee taking 28 days per year (pro-rated).
- Estimate the number of sick leave taken each year for each band, on basis the average worker taking 4.2 days per year (Labour Force Survey 2019).
- Deduct the above from the average number of weekdays worked per year for each band to estimate the likelihood of an employee working on a given weekday.

D.2.12 We assumed that 72% of employees who commute to work would be working on an average weekday and also that 90% of trips would be a return (per TAG Unite A.5-1), allowing us to generate an estimate of the average number of weekday commuting trips undertaken by bicycle in 2011.

D.2.13 The next step was to consider how cycle travel demand had evolved between 2011 and 2022. There are two key aspects to consider:

- Population change: Data from the Sub-Area population estimates from the National Records of Scotland show that the population of the study area grew by 4.4% between 2011 and 2020.
- Change in propensity to travel by bike: Scottish Transport Statistics 2020 shows that cycle mode share for commuting trips increased by 14% between 2011 and 2019. Given that 2020 was an anomalous year as a result of pandemic impacts upon cycling, it was simply assumed that there was no change in terms of propensity to cycle between 2019 and 2020.

D.2.14 Each of these uplifts was applied to daily 2011 commuter cycle demand estimates to generate the equivalent for 2020. Given the continuing impacts of COVID on travel trends, it was simply assumed that population in 2022 is as per 2020- and propensity to cycle remains as per 2019.

D.2.15 The next consideration was the proportion of trips that travel between ODs which actually use the study corridors. A first high-level pass was under taken to remove trips between ODs which would not use the study infrastructure (e.g., travel from Mounthooly to Union Street), and secondly a factor of 50% was applied to reflect that there are many routing options within a city environment and many cyclists will use routes parallel to the study corridors, rather than the study corridors themselves.

D.2.16 A factor was then applied to expand the estimate from average weekday commuter cycle trips to all cycle trips. Data from the National Travel Survey (DfT, 2016) indicates that in England 33% of cycling trips are undertaken for commuting purposes (Note: corresponding statistics were sought for Scotland from the Scottish Household Survey but could not be found). Commuter cycle trip numbers were divided by this proportion to estimate total cycle trips in 2022.

D.2.17 The above generated an estimate of total cycle demand on the study corridors. This demand was then allocated to corridor sections, based on the origin destination sections and the intervening sections which cyclists would pass through, e.g.: A trip beginning in Section 1 and ending in Section 3, would add demand to Sections 1, 2 and 3.

Origin Section	Destination Section	Sections Used				
		1	2	3	4	5
1	1	✓				
1	2	✓	✓			
1	3	✓	✓	✓		
1	4	✓			✓	
1	5	✓			✓	✓
2	2		✓			
2	3		✓	✓		
2	4		✓		✓	
2	5		✓		✓	✓
3	3			✓		
3	4			✓	✓	
3	5			✓		✓
4	4				✓	

Origin Section	Destination Section	Sections Used				
		1	2	3	4	5
4	5				✓	✓
5	5					✓

D.2.18 After existing cycle demand estimates were developed for each of the main corridor sections, additional calculations were completed to estimate demand for the A944 Parallel Route 1 and A9119 Parallel Route 1 (as described in Section 4.2). A944 Parallel Route provides an alternative to routing along the main corridor Sections 2 and 3, and A9119 Parallel Route 1 provides an alternative to travelling along main corridor Section 5. On this basis, demand for these routes was assumed to equivalent to the number of unique trips on the respective sections (i.e., a trip which added demand to Sections 2 and 3 is assumed to add only one trip to A944 Parallel Route 1).

Forecasting Future Demand: The Do-Nothing Case

- D.2.19 After estimating demand in 2020, the next step was to consider how demand for cycle infrastructure may evolve in the absence of the proposed scheme. Opening year is assumed to be 2027 and benefits are assumed to be accrued over a 20-year period up to 2047.
- D.2.20 TEMPRO was used to generate trip-end growth factors for cycling in Aberdeen City for the average weekday. These factors showed that cycle demand is likely to grow by 1% between 2027 and 2047. Growth of 1% over 20 years is very low (equivalent to 0.05% growth p.a.) and so it was assumed that cycle demand would remain flat across the whole appraisal period.

Forecasting Future Demand: The Do-Something Case

- D.2.21 TAG Unit A5.1 presents three approaches to estimating the demand impact of a new active travel scheme. The decision was taken to use a comparator approach, whereby a similar active travel scheme is identified and observed growth in cycle trips is applied to Do Nothing demand within the study area.
- D.2.22 A number of monitoring reports were reviewed for various cycle schemes; however, the Greater Bristol Cycling City scheme was selected due to fact that it involved a programme of infrastructure improvements which focussed on radial and arterial routes into Bristol.
- D.2.23 Cycle volumes within the Greater Bristol Cycling City study area grew by 40% following implementation of the scheme. The table below compares Do Nothing and Do Something cycle demand if a similar level of cycle growth was seen in Aberdeen.

Table D.7: Future Cycle Demand

Section	Do Nothing	Do Something
A944: Westhill to Sheddocksley & A9119: A944 to King's Gate	341	477
A944: Sheddocksley to Foresterhill Health Campus	511	715
A944: Foresterhill Health Campus to Mounthooly	448	627
A9119: King's Gate to Queen's Cross	513	719
A9119: Queen's Cross to Schoolhill	426	596
A944 Parallel Route 1	759	1,063
A9119 Parallel Route 1	513	719

D.2.24 It is recognised that while the nature of cycle infrastructure improvements proposed in Bristol is similar to that proposed in Aberdeen, the Bristol scheme benefitted from a supporting travel planning scheme. However, demand estimates for the study corridors are considered to be conservative, given that demand estimates have already been halved to account for the range of route options available. As such, it is considered that there is more demand within the broader study area which can reroute on to the study corridor once conditions improve, in addition to the new trips which can be generated, and therefore 40% is an appropriate demand uplift estimate.

Summary

D.2.25 Do Nothing active travel demand was calculated from first principles using TTW outputs from the 2011 census and then multiplying these volumes up to total cycle trips using assumptions primarily based on NTS, NRS and SHS data. Observed growth from comparator schemes was then applied to Do Nothing demand forecasts to generate an estimate of how trip making activity may change if proposed options are implemented (i.e., the Do Something case).

D.2.26 These demand forecasts form the basis of the active mode appraisal.

Active Mode Appraisal Toolkit Analysis

D.2.27 In May 2020, the Department for Transport (DfT) published the latest Active Mode Appraisal Toolkit (AMAT), which is a spreadsheet-based tool for estimating the costs and benefits of walking and cycling interventions. This tool was used to calculate and monetise the key costs and benefits of the active travel infrastructure proposed under this study.

D.2.28 The AMAT spreadsheet quantifies a range of potential benefits including health improvements from increased physical activity, improvements to journey quality and impacts associated with modal shift.

Existing Conditions

D.2.29 There is very limited existing cycle infrastructure between Westhill and Aberdeen along the A944 and A9119 corridors. Where infrastructure does exist, it falls below current standards for appropriate cycle infrastructure, and so it has been assumed that there is no existing compliant cycle infrastructure within the study corridors.

Proposed Options

D.2.30 All options provide continuous cycle infrastructure between Westhill and Aberdeen city centre via the A944, A9119 and identified Parallel Routes. The table below summarises assumed infrastructure provision under each option. While two potential parallel routes have been

identified for each of the A944 and A9119 corridors, only one parallel route has been assessed for each corridor. The longer of the routes have been chosen for robustness.

D.2.31 Note: As the majority of the route has existing pedestrian connections where needed, the Active Mode Appraisal focusses on cycling benefits only, although the costs associated with pedestrian improvements have been included.

Table D.8: Proposed infrastructure by option

Section	Assumed Infrastructure			
	Option 1	Option 2	Option 3	Option 4
A944: Westhill to Sheddocksley & A9119: A944 to King's Gate	Off-road segregated cycle track	Off-road segregated cycle track	Off-road segregated cycle track	Off-road segregated cycle track
A944: Sheddocksley to Foresterhill Health Campus	Off-road segregated cycle track	No provision	Off-road segregated cycle track	No provision
A944: Foresterhill Health Campus to Mounthooly	On-road segregated cycle lane	No provision	On-road segregated cycle lane	No provision
A9119: King's Gate to Queen's Cross	On-road segregated cycle lane	No provision	No provision	On-road segregated cycle lane
A9119: Queen's Cross to Schoolhill	On-road segregated cycle lane	On-road segregated cycle lane	On-road segregated cycle lane	On-road segregated cycle lane
A944 Parallel Route 1	No provision	On-road segregated cycle lane	No provision	On-road segregated cycle lane
A9119 Parallel Route 1	No provision	On road non-segregated cycle lane	On road non-segregated cycle lane	No provision

D.2.32 The AMAT spreadsheet requires the user to input key pieces of data concerning the proposals and also allows the user to refine underlying assumptions where more locally specific data is available. The table below indicates the assumptions made and how key variables were defined.

Table D.9: AMAT Inputs

AMAT Section	Variable Description	Input	Comment
Intervention Details	Appraisal year	2022	
	Intervention Opening year	2027	
	Last year of funding	2027	
	Appraisal period	20 years	
	Local area type	Other Urban	The majority of NTEM zones within the study area fall into the Other Urban category.
Mode information - cycling	No. trips without proposed intervention	Varies by option. See Table D.7	
	No. trips with proposed intervention		

AMAT Section	Variable Description	Input	Comment
	How much of an average cycling trip will use the intervention?	Varies by section. See Table D.10 below.	
	Current cycling infrastructure	No provision	Existing provision is limited and where it does exist, it does not meet current standards
	Proposed cycling infrastructure	Varies by option and by section. See Table D.8	
	Are any additional shower facilities being added?	No	
	Are any additional secure storage facilities being added?	No	
Assumptions (Where changed from default)	Average length of trip	4.8 km	Transport and Travel in Scotland 2019 (SHS Travel Diary TD5)
	Proportion otherwise using a car	14.9%	Values from TAG Databook Table A5.4.7 normalised per AMAT Guidance (as no light rail or rail on study corridor)
	Proportion otherwise using a taxi	10.9%	
	Background growth rate in trips	0.0%	TEMPO Cycle Growth Factors

D.2.33 As noted above, the AMAT spreadsheets also require the proportion of an average cycling trip which will use the study infrastructure. This will obviously vary across each of the road sections as they vary in length, but the average cycling trip length is fixed. These values were estimated based on the following assumptions:

- Where a trip starts and ends within the same section study area, it will use 25% of the section infrastructure.
- Where a trip starts in one section study area, but ends in another, it will use 50% of the infrastructure in the origin and destination areas, as well as 100% of the infrastructure within the intermediary areas.
- An average cycling trip measures 4.8km as above.

Table D.10: Proportion of section infrastructure used by an average cycle trip

Section	% of section infrastructure used by average cycle trip
A944: Westhill to Sheddocksley & A9119: A944 to King's Gate	62%
A944: Sheddocksley to Foresterhill Health Campus	29%
A944: Foresterhill Health Campus to Mounthooly	14%
A9119: King's Gate to Queen's Cross	33%
A9119: Queen's Cross to Schoolhill	17%
A944 Parallel Route 1	27%
A9119 Parallel Route 1	33%

Option Costs

D.2.34 Costs have been developed for the delivery of all options. The table below sets out the costs in 2022 prices, including optimism bias at 46%¹³, and assumes that only one parallel route will be delivered for each corridor under Options 2 and 4.

Descriptions	Option 1	Option 2	Option 3	Option 4
A944: Westhill to Sheddocksley & A9119: A944 to King's Gate	£5,405,330	£5,405,330	£5,405,330	£5,405,330
A944: Sheddocksley to Foresterhill Health Campus	£5,239,794	-	£5,239,794	-
A944: Foresterhill Health Campus to Mounthooly	£2,832,397	-	£2,832,397	-
A9119: King's Gate to Queen's Cross	£6,283,886	-	-	£6,283,886
A9119: Queen's Cross to Schoolhill	£3,909,257	£3,909,257	£3,909,257	£3,909,257
A944 Parallel Routes 1 & 2	-	£7,076,996	-	£7,076,996
A9119 Parallel Route 1	-	£1,121,547	£1,121,547	-
Full Route	£23,670,664	£17,513,130	£18,508,326	£22,675,468

D.2.35 The costs of delivering Options 1 and 4, are the highest and the costs of delivering Options 2 and 3 are the lowest. The difference is primarily driven by the difference in costs of providing cycle infrastructure (links and junctions) suitable for a high flow busy arterial route like the A944 and A9119, versus provision of cycle infrastructure on a quieter parallel route. Additionally, cycle route infrastructure is costed for two parallel routes for the A944 but only one parallel route for the A9119.

D.2.36 Costs were also generated for the maintenance of active travel infrastructure. It was assumed that maintenance would cost £3,000 per km of cycle infrastructure per annum. This is roughly equivalent to the cost of cycle track replacement every 30 years.

AMAT Results

D.2.37 The AMAT spreadsheets for the respective sections output individual estimates of option benefits for the corresponding section, and these outputs were summed to generate total benefits for each option for the whole study area.

D.2.38 The results for the active mode appraisal are provided in Table D.11.

Table D.11: AMAT Results Summary

Impact	Active Travel Infrastructure Monetised Costs and Benefits (in £'000s)			
	Option 1	Option 2A/B/C	Option 3	Option 4A/B/C
Congestion benefit	314	291	314	291
Infrastructure maintenance	2	2	2	2
Accident	53	49	53	49

¹³ An optimism bias of 46% was applied to all costs, given the phase of scheme development. However, given the highly detailed costing exercise undertaken, a 23% optimism bias may be more appropriate.

Impact	Active Travel Infrastructure Monetised Costs and Benefits (in £'000s)			
	Option 1	Option 2A/B/C	Option 3	Option 4A/B/C
Local air quality	7	6	7	6
Noise	4	3	4	3
Greenhouse gases	21	20	21	20
Reduced risk of premature death	4,613	4,277	4,613	4,277
Absenteeism	568	526	568	526
Journey ambience	2,290	1,900	2,288	1,902
Indirect taxation	-24	-22	-24	-22
Government costs	16,164	11,959	12,639	15,484
Private contribution	243	262	251	254
PVB	7,845	7,050	7,843	7,053
PVC	16,405	12,220	12,888	15,737
BCR	0.48	0.58	0.61	0.45

- D.2.39 While all options provide end-to-end cycle infrastructure with a good degree of segregation from traffic, Option 1 is considered to provide the highest quality cycle infrastructure, including the greatest distance of off-road segregated cycle tracks. Option 1 cycle infrastructure also routes along the two key corridors for accessing the city from the west and so will be very prominent, meaning that more people are likely to be aware of the provision. The Active Mode Appraisal indicates that Option 1 will yield the greatest active travel benefits of all options (£7.845m PVB), with 66% of the benefits being derived from lower absenteeism and a reduced risk of premature death.
- D.2.40 Option 2 similarly provides end-to-end cycle infrastructure and also accrues substantial active travel benefits. However, Option 2 infrastructure is proposed on routes parallel to the main study corridors to the east of Bressay Brae and King's Gate. These parallel routes carry lower levels of traffic but are more constrained and so cannot accommodate the same extent of off-road and segregated provision as the larger corridor. Consequently, the Active Mode Appraisal indicates Option 2 will yield the lowest active travel benefits of all options (£7.050m PVB). While Option 2 (and Option 4) will yield lower active travel benefits than Option 1, it should be noted that this only relates to a difference of £0.8million. Option 2 proposals for increased bus priority should increase demand for bus travel and every public transport journey has an element of active travel associated with it, and while these additional trips made by bus users could not be captured by the active mode appraisal, there is an additional uncaptured value to public health.
- D.2.41 Option 3 provides a very similar standard of link infrastructure to Option 1 and Option 4 provides a similar standard of cycle link to Option 2. However, the provision of cycle infrastructure on the main study corridors, which are arterial routes into the city is a lot more costly in terms of junction upgrades, given the volumes of traffic and scale of the junctions involved. As such, costs are highest for Option 1 which focuses cycle infrastructure on both the A944 and A9119 and costs are lowest for Option 2 which focuses cycle infrastructure on quieter parallel routes. Also, Option 3 provides cycle infrastructure on one main corridor and one parallel route, while Option 4 provides cycle infrastructure on one main corridor and two parallel routes which is notably more costly.
- D.2.42 In short, Options 2 and 3 generate the highest BCRs and Options 1 and 4 the lowest BCRs.
- D.2.43 If Options 2 and 4 were only to provide cycle infrastructure on one parallel route for the A944, as is the case for the A9119, then Option 2 would provide the highest BCR (0.71) and Option 1 the lowest (0.48).

D.3 Sensitivity Testing

- D.3.1 As discussed above, cycle demand forecasts were halved for the core AMAT calculations to reflect the fact that not all cycle demand travelling through the study area will use the specific study corridors. A sensitivity test has been undertaken to explore how active travel benefits and BCRs would be affected if it were assumed that 75% of cycle trips within the study area used the study corridors themselves. As the study corridors reflect the main traffic corridors and most direct cycle routes, this may be a reasonable assumption.
- D.3.2 The results for the active mode appraisal sensitivity test are provided in Table D.7

Table D.12: Sensitivity Tests Defined

Impact	Cycle Infrastructure Monetised Costs and Benefits (in £'000s)			
	Option 1	Option 2A/B/C	Option 3	Option 4A/B/C
Congestion benefit	469	435	469	435
Infrastructure maintenance	3	2	3	2
Accident	79	73	79	73
Local air quality	10	10	10	10
Noise	5	5	5	5
Greenhouse gases	32	30	32	30
Reduced risk of premature death	6,892	6,391	6,892	6,391
Absenteeism	848	786	848	786
Journey ambience	3,435	2,849	3,431	2,852
Indirect taxation	-36	-33	-36	-33
Investment costs	16,164	11,959	12,639	15,484
Operating & maintenance costs	243	262	251	254
PVB	11,733	10,545	11,730	10,548
PVC	16,404	12,219	12,887	15,736
BCR	0.72	0.86	0.91	0.67

- D.3.3 Benefits increase by 50%, compared with the core scenario and BCRs are improved accordingly but all BCRs remain below 1.

D.4 Summary

- D.4.1 All options provide end-to-end cycle infrastructure between Westhill and the Aberdeen city centre area. The differentiator between options is the degree of segregation which can be provided and whether this infrastructure runs entirely along the main A944 and A9119 study corridors or uses parallel routes on local roads to the east of Sheddocksley/King's Gate Roundabout.
- D.4.2 Benefits are highest for Options 1 and 3 which provide the greatest lengths of off-road segregated cycle tracks (approx. £7.8m PVB), but this is only £0.8m higher than the benefits expected to be derived from Options 1 and 4.
- D.4.3 Costs were developed for the delivery and maintenance of all options and are estimated to vary from £12.2 to £16.4m (PVC). Costs are highest for Option 1 and lowest for Option 2; a result of the much more substantial works required on junctions on the busy A944/A9119 routes than the parallel off-corridor cycle routes.

- D.4.4 The highest BCR is obtained for Option 3 which generates benefits similar to Option 1 but has costs similar to Option 2. However, BCRs are below 1 for all options.

Appendix E Hansen Analysis

E.1 Introduction

- E.1.1 Hansen indicators provide a measure of accessibility from a specific origin to all destinations in a study area, weighted by chosen criteria. High scores indicate good accessibility, and low scores suggest there is poor accessibility according to the chosen criteria.
- E.1.2 The key accessibility indicator which has been considered to provide an indication of the accessibility change with the options in place, compared to the reference case situation is the Hansen Indicator for *Change in Accessibility to Employment* by public transport. The change represents how accessible the area is in terms of accessing employment between the reference case and each option scenario.
- E.1.3 In this instance the change in public transport journey time between each pair of origins/destinations is weighted by the number of jobs at the destination zones as the 'criteria'. The results of each origin – destination (O-D) pair are then summed over all origin zones and the global change in employment accessibility (as a percentage) between the reference case and the option can then be calculated.

E.2 Hansen Indicator Calculation – Methodology

- E.2.1 Travel times were generated for each origin and destination pair using TRACC. TRACC is a multi-modal transport accessibility analysis tool which generates travel times for end-to-end bus-based journeys, including walking time to and from bus stops. TRACC requires a number of inputs from the user, and for this project the inputs are listed below:
- Transport network and public transport timetables: The public transport network imported into TRACC was obtained from Datacutter and reflects conditions and timetables from the first quarter of 2022
 - The TRACC runs were undertaken for the AM Peak 08:00 – 10:00 with all data zones (population weighted centroids) in Aberdeen City and Aberdeenshire being used as origins and destinations. TRACC provided a journey time for each origin – destination combination.
 - Two Do Nothing scenarios were tested, the first was based on existing timetables with a one minute time-saving applied to allow for proposed new traffic restrictions within the city centre under the council's City Centre Masterplan. The second was as per the first with the addition of a dummy service running from Kingswells to Union Street via the A944 and Denburn corridor, with a 15-minute frequency in each direction. Dummy service B (as per Appendix C) was chosen to be modelled
 - Additionally, a series of Do Something scenarios were tested to reflect the impact of proposed infrastructure improvements under each of the defined corridor options
 - Data zones were then grouped into common sectors, and sector to sector journey time savings estimated by pro-rating full route bus journey time savings set out in Appendix C. As part of this process, it was necessary to make an assumption as to which bus service would be used
 - It was assumed that the following bus services would benefit from journey time savings as a result of the proposed options: Stagecoach 4/5/6, First 11, Stagecoach 14/218, First 11 and dummy ART Service B. The existing service used was identified by entering origins and destinations into Traveline Scotland and selecting the fastest option. Note: it was assumed that journey time savings accrued by the Stagecoach 218 would be the same as the Stagecoach 14. Consideration was finally given to whether the ART Service B could

be used as a substitute to the existing service and was assumed to be used where the journey times were shorter.

E.2.2 Although TRACC was used to output journey times for bus-based trips between all data zones in Aberdeen City and Aberdeenshire, only those journeys where the origin is located within 1km of the study corridors were used for the purposes of the Hansen analysis (see figure below). It is assumed that bus travellers will not walk more than 1km to access a bus stop.

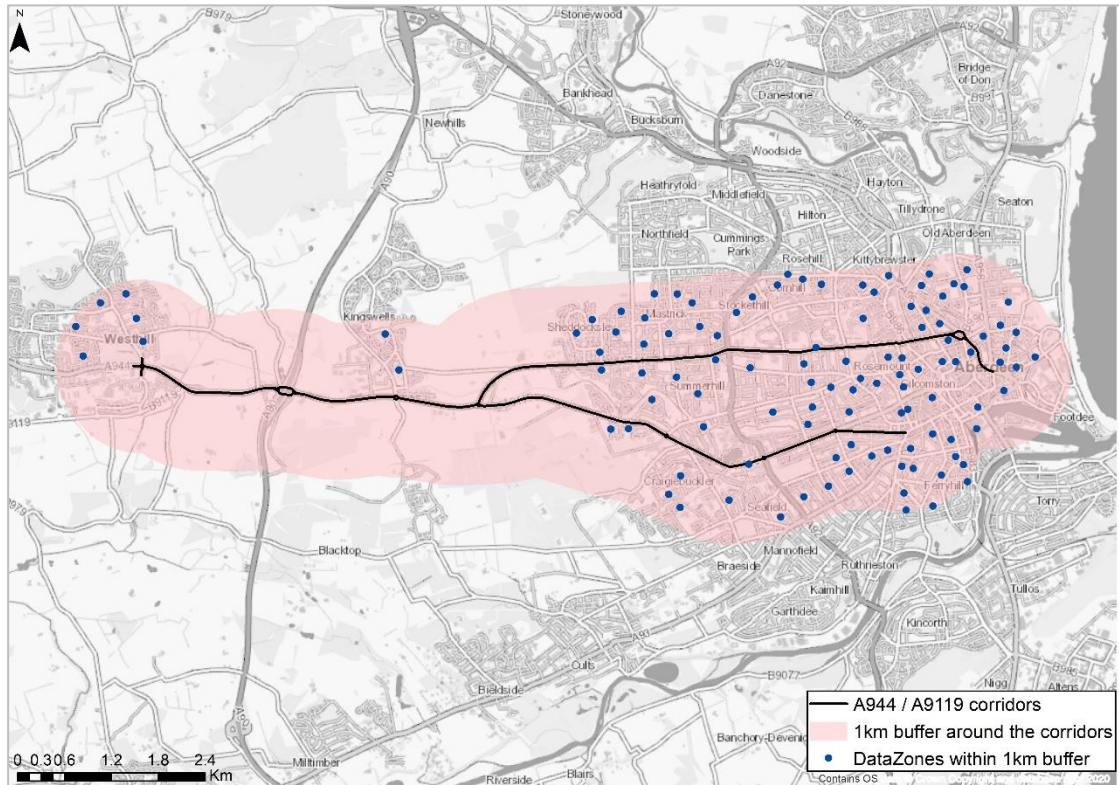


Figure E:1: Data zone population weighted centroids within 1km of study corridors

E.2.3 The Hansen calculation, as described above for the change in accessibility to employment, requires the number of jobs within each Data Zone. Jobs data was acquired from the Business Register and Employment Survey (BRES) 2020.

E.2.4 The Hansen calculation considers the ‘deterrent’ effect of travel time by means of a negative exponential function which is hypothesised to describe the relationship between travel duration and the likelihood of travel.

E.2.5 The Hansen value for each origin-destination pair has been calculated using the following formula:

$$Hansen_{ij} = E_j * e^{-\lambda t_{ij}}$$

Where:

- E is the number of jobs (employment) at the destination zone j
- t is the journey time (public transport) in minutes between the origin (i) and destination (j)

- λ is the deterrent coefficient factor. For this analysis λ has been set as 0.044 for public transport¹⁴ commuting.

E.2.6 The Hansen values are calculated for each origin-destination pair, before being summed across all origin-destination pairs.

E.2.7 Finally, the change in accessibility is calculated as:

$$\text{Change in Accessibility}_s = \frac{\sum \text{Hansen}^s_{ij}}{\sum \text{Hansen}^r_{ij}}$$

Where:

- s is scenario (Do Something)
- r is the reference case (Do Nothing)

E.3 Hansen Accessibility Analysis Results

E.3.1 The outcome of the Hansen analysis for the AM Peak (08:00-10:00) is shown in the table below.

Table E.1: Hansen Analysis (08:00 – 10:00)

Option	% change in public transport accessibility (full study area)	Range (% change in public transport accessibility DZ)
1	+1.1%	0% to +7%
2B	+3.6%	0% to +14%
3	+2.0%	0% to +13%
4B	+3.0%	0% to +13%

E.3.2 The table shows:

- Public transport accessibility to jobs is improved by all options
- Option 2B shows the greatest increase in public transport accessibility, which is to be expected given that bus priority infrastructure is maximised on both the A944 and A9119 corridors
- Options 3 and 4B prioritise bus infrastructure on the A9119 and A944, respectively. 4B performs better – this is likely to be a result of the proposed continuous bus lanes which can be accommodated on the A944 (whereas space constraints only permit staggered bus lanes on the A9119)

¹⁴ Source:

<https://webarchive.nationalarchives.gov.uk/ukgwa/+http://www.dft.gov.uk/pgr/regional/ltp/accessibility/guidance/gap/technicalappendix6informatio3639>

Appendix F Stakeholder and Public Engagement

F.1 Introduction

- F.1.1 In order to inform the appraisal of the options, and in particular feed into the STAG public acceptability criteria, a stakeholder and public engagement exercise was undertaken towards the end of the Detailed Options Appraisal.
- F.1.2 An online interactive Arc StoryMap was live on Aberdeen City Council's Citizens Space consultation page for just over four weeks from 1st June 2022 to 1st July 2022 (this was also available in hard copy if requested). The StoryMap provided background on the study, presented the options developed and each option's advantages and disadvantages, and then presented a set of embedded questions for feedback on the options.
- F.1.3 The opportunity to respond to the survey was publicised through Aberdeen City Council's Citizen Space portal and the Council's media channels. In addition, leaflets were distributed to over 20,000 residential properties and businesses located close to the A944 and A9119 corridors to raise awareness of the opportunity. It was also shared through direct contact with local councillors, community councils and other local interest groups to further publicise the survey within the communities most likely to be impacted by / benefit from the proposals. Furthermore, a link to the survey was provided to a range of stakeholders, who were invited to complete the survey on behalf of their organisation or respond directly by email to the study team with comments. Details of the stakeholders contacted can be found in the Stakeholder Engagement section below.

F.2 Stakeholder Engagement

- F.2.1 Table F:1 lists the stakeholders contacted to inform them about the opportunity to respond to the survey.

Table F:1: Stakeholders Contacted

Group	Stakeholder
Active Travel	Aberdeen Outdoor Access Forum
	Aberdeen Cycle Forum
	Grampian Cycling Partnership
	Grampian Cyclists Touring Club
	CTC Grampian
	Cycling Scotland
Accessibility / Equality	Aberdeen Disability Equity Partnership
	Aberdeen Action on Disability
	Aberdeenshire Disability Equity Partnership
	Paths for All
	Co-Wheels
	Aberdeen City Youth Council
	North East Sensory Services
	Bon Accord Access Panel
Bus Operators	Stagecoach
	First

Group	Stakeholder
	Bains Coaches
Public Transport	Aberdeen Taxi Consultation Group
	Bus Users UK
	Confederation of Passenger Transport
	Community Transport Association (Scotland)
	Transport Scotland
Health	NHS Grampian
	Health & Transport Action Plan Working Group
Freight	Road Haulage Association
	Logistics UK
Education	Robert Gordon University
	Harlaw Academy
	Hazlehead Academy
	Holy Family RC Primary School
	St Joseph's RC School
	Fernielea School
	Muirfield School
	Kingsford School
	Mile End School
	Hazlehead Primary School
	St Margaret's School for Girls
	Albyn School
	Aberdeen Grammar
	Gilcomstoun School
Skene Square Primary School	
Emergency Services	Police Scotland
	Scottish Ambulance Service
	Scottish Fire and Rescue Service
Business	Aberdeen and Grampian Chamber of Commerce
	Federation of Small Businesses
	Opportunity North East
	Scottish Enterprise Grampian
	Federation of Small Businesses
	Aberdeen Inspired Business Improvement District
	Prime Four Management Ltd
	Aberdeen Football Club
	Aberdeen Council of Voluntary Organisations
Environment	SEPA
	Aberdeen Climate Action

Group	Stakeholder
	Aberdeen Friends of the Earth
	Aberdeen City Heritage Trust
	Historic Scotland
	NatureScot (Scottish Natural Heritage)
Elected Members	Aberdeenshire Council - Councillors
	Aberdeenshire Council - MSPs
	Aberdeenshire Council - MPs
	Aberdeen City Council - Councillors
	Aberdeen City Council - MSPs
	Aberdeen City Council - MPs
Community Councils	Kingswells Community Council
	City Centre Community Council
	Westhill and Elrick Community Council
	Mastrick, Sheddocksley & Summerhill Community Council
	Craigiebuckler & Seafield Community Council
	Cults, Bieldside & Milltimber Community Council
	Queen's Cross & Harlaw Community Council
	Rosemount & Mile End Community Council
	George Street Community Council

F.2.2 Stakeholder feedback was received via requested meetings, email and survey responses.

Stakeholder Discussions

F.2.3 Individual discussions were held, at request, with a number of groups / organisations and a summary of the key points from these discussions is noted below.

First Bus

F.2.4 A meeting was held with First bus operator on 14th July 2022. Key points noted were:

- First strongly oppose moving the Number 3 from Rosemount Place. First had lots of problems and objections from the public when COVID restrictions meant Spaces for People measures altered Rosemount Place with a one way system in place for buses. Travellers want the bus to serve the Rosemount Place shopping area directly and the elderly do not want to walk up the hill to get to Rosemount Place. First anticipate losing customers if the No. 3 is diverted
- First foresee problems if Service 23 is rerouted. Residents on Mid Stocket Road want their buses on the road and easy to access. If diverted, there is likely to be a reduction in bus connectivity for those living south of Mid Stocket Road
- Biggest issue in terms of congestion on A944 is with traffic at junction of North Anderson Drive (A92) and Lang Stracht
- No traffic flow issues experienced by First at A92 / A9119 Queens Road junction, but care will need to be taken to ensure proposals between this study and A92 study dovetail

- Similarly, the traffic typically flows well at the A9119 / Queens Cross Roundabout but First noted that this is a difficult junction to manoeuvre through and it's certainly an issue for cyclists
- First highlighted that consideration needs to be given to parking charges to support modal shift from car to bus
- First noted that the proposals seem more geared towards benefitting longer distance out of town bus services and not the local bus network

Stagecoach

F.2.5 A meeting was held with Stagecoach bus operator on 28th June 2022. Key points noted were:

- There is a more dense demand for Stagecoach services on A9119 than A944 but recognised that A944 serves substantial trip generators and has greater space to accommodate new infrastructure. However, Stagecoach note that it is important not to "leave behind" the A9119 corridor, as it will be impractical for most bus users on the A9119 corridor to transfer to the A944 corridor. Population density is also arguably higher on the A9119 corridor. From a Stagecoach point of view, it is important that even if A944 is selected as the "ART" corridor, that services that continue to use the A9119 can access any ART facilities between Westhill and the A944/A9119 junction. There are also some interventions that could still proceed even if A944 is selected for prioritisation of bus infrastructure, e.g., the westbound bus-only bypass lane at the A944/A9119 junction
- Key areas of delay to Stagecoach services on these corridors include A9119 between Springfield Road and A92, and on Albyn Place (Albyn PI issues caused by car parking impacts on bus stops)
- Local diversions to Stagecoach services on Midsocket and Craigiellanings proposed under Options 2 and 4 would not pose a commercial problem to Stagecoach (14 service is tendered by ACC, limited bus priority possible on these sections and limited demand) but may present a social issue through increasing walking distances in an area where many older people reside
- Stagecoach queried whether options which prioritise active travel on the A9119, could include additional improvements for buses and Stantec confirmed that it may be possible to switch out proposed Dutch roundabouts for signals which would aid bus movement through junctions
- Route variant C (under Options 2 and 4) would also benefit Stagecoach 59 and First 12 services
- Restrictions to car parking will be needed in addition to bus infrastructure improvements, if any of the options are to generate substantial modal shift

George Street Community Council

F.2.6 A meeting was held with George Street Community Council on 14th June 2022, which was attended by the Aberdeen City Council Project Manager for the study. Key points noted were:

- Concern that the eastbound only restriction on Maberly Street during Spaces for People caused quite a bit of congestion, with traffic backing up onto Hutcheon Street. The Council queried whether a westbound only restriction would work instead – apparently at some point in the past during emergency works an eastbound only restriction has been in place and, following some opposition, this was reverted to a westbound only restriction which they felt worked much better

- Suggestion that the Maberly Street route was heavily used by Fire service vehicles which may be an issue if made one-way

Rosemount and Mile End Community Council

F.2.7 A meeting was held with Rosemount and Mile End Community Council on 29th June 2022. Key points noted were mainly in relation to Option 2 and the proposed A944 parallel cycle routes forming part of the option. In particular, RMCC noted:

- Very strong opposition to the re-routeing of the Number 3 bus service from Rosemount Place and Mid Stocket. It was noted that there are many older people in the area who rely on the service and walking further to access the service would present difficulties. The potential negative impact on local businesses due to the proposed change to the bus route was also noted
- Very strong opposition to the loss of any parking spaces from Rosemount Place and the potential negative impacts on businesses and local residents
- The topography of the cycle routes was noted and RMCC felt that the gradients meant the routes were likely to be avoided by cyclists
- The need for a specific quantitative economic impacts assessment to fully understand the impacts to Rosemount businesses should the undertaken if the A944 parallel cycle routes are being progressed

Stakeholder Engagement

F.2.8 In total, eight stakeholders responded to the online survey and three stakeholders provided email responses. The stakeholders that responded were:

- Aberdeen Football Club
- Bus Users UK
- Duncan Massey, Councillor for Lower Deeside
- Federation of Small Businesses
- Light Rail UK
- NHS Grampian
- North East Sensory Services
- Rosemount and Mile End Community Council
- Scottish Ambulance Service
- Westhill and Elrick Council

F.2.9 The section below summarises stakeholder consultation responses received via both the survey and email.

Options

F.2.10 Four of the eight stakeholders indicated support for the options, and three stakeholders said that none of the options should be taken forward. One stakeholder stated that additional investment on bus and cycle infrastructure is unnecessary as the road network in this area

currently functions well for both modes. Another suggested an alternative option, discussed below.

F.2.11 Some of the key comments made around the options are noted below.

Low Traffic Neighbourhoods

F.2.12 Five stakeholder respondents said that they agree with the concept of an LTN. One stakeholder indicated that they have no opinion, and three others said that they were not supportive. Key concerns related to the LTN were that it would create additional congestion and reduce the volume of passing traffic, to the detriment of local businesses.

Parking

F.2.13 Four stakeholders noted they were against the loss of car parking to accommodate bus/cycle infrastructure as this would increase walking distances for those accessing residences and businesses on the indicated routes. It was noted that this would be a particular issue for the elderly and those with mobility problems and may reduce custom at local businesses which typically attract shoppers from further afield.

Rerouting of No. 3 Bus Service

F.2.14 Two respondents specifically noted their opposition to the rerouting of the First No.3 bus service from Rosemount Place to Leadside Road. Concerns related to reduced custom for the Rosemount Place businesses, as longer walking distances between the bus route and the shops may dissuade/prevent some from accessing the shops.

Pedestrian Access

F.2.15 Three respondents also highlighted the importance of high quality pedestrian infrastructure. One respondent highlighted that not all residents are able to cycle and use public transport as a way to access essential goods and services, and two stakeholders also noted that those with visual impairments or mobility problems would benefit from segregation between cyclists and pedestrians.

Other Options

F.2.16 One stakeholder suggested that a further alternative to prioritising bus along the study corridors would be to implement a tram link from Kirkton of Skene to Aberdeen city centre via the A944 and the B986. They noted that a tram route would bring greater environmental and economic benefits than a bus rapid transit service on the same routing.

F.2.17 One stakeholder suggested another option to retain use of Old Lang Stracht for emergency vehicles should be considered. It should be noted that this would be accommodated within the defined options as any Traffic Road Order to limit vehicular use of Old Lang Stracht would have provisions to ensure continued access by emergency vehicles.

F.3 Public Engagement

F.3.1 In total, **1,106** responses were received to the online survey from members of the public (n=1095) and local businesses (n=11). The results of the public responses (including those from local businesses not captured as 'stakeholders') are summarised here.

Which area best describes where you live or where your business is based?

- F.3.2 Survey respondents were asked to select which area best describes their home or business location. Figure F:2 presents the results. The most commonly stated home/business origins were Rosemount (21%), West End (20%), Midstocket (19%) and city centre (13%), covering 73% of all responses.
- F.3.3 With 40% of all survey responses coming from Rosemount and Midstocket, the response rate from these areas is substantially higher than might be expected based on population and as such the survey results are likely to be skewed towards the opinions of those residing in these areas as a result. Seven of the 11 responses received from local businesses also came from businesses located on Rosemount Place itself.

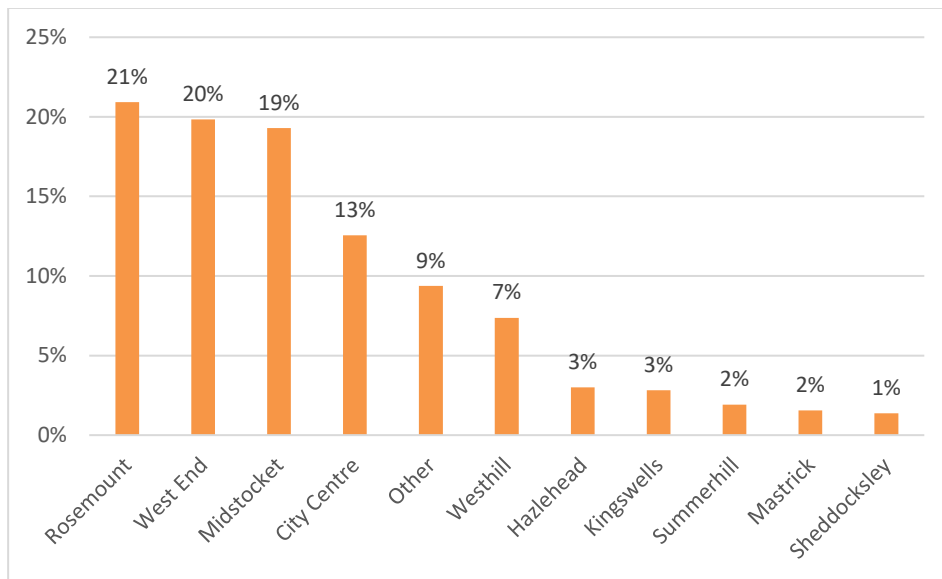


Figure F:2: Location of home/business

- F.3.4 Respondents were also asked to provide their four character home/business postcode sector (e.g., AB10). Figure F:3 displays the home postcode sectors of the respondents.

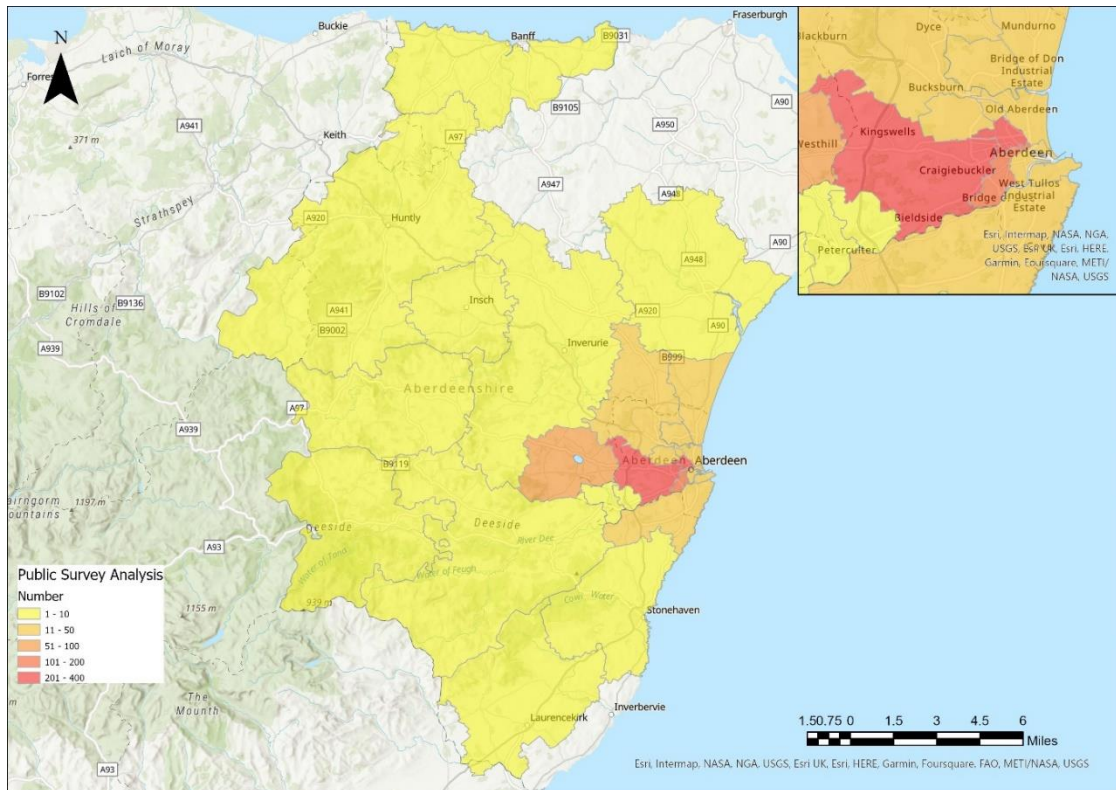


Figure F.3: Home postcode sector

F.3.5 The AB15 postcode sector (covering Kingswells, Countesswells, Hazlehead, Rubislaw and Midstocket) received the largest number of public survey responses, with 389 responses recorded. This was followed by AB25 (n = 204), AB10 (n = 108) and AB32 (n = 38). A number of responses were recorded from individuals living a significant distance from the study area, including respondents from Banff, Edinburgh and Huntly.

Do you currently use the A944/A9119?

F.3.6 All the respondents were then asked if they currently use the A944 or A9119 between Westhill and Aberdeen City Centre. 93% of respondents use these routes, while 7% of respondents do not.

How do you make these journeys?

F.3.7 The survey respondents were then asked to select which modes of transport they use to make their journeys along the A944 or A9119. To note, this was a 'select all that apply' question so some individuals may have selected more than one mode of transport.

F.3.8 Figure F.4 displays the results. The majority (82%) of respondents noted that they travel the corridors by car, while 34% travel on foot, 22% travel by bus, and 21% cycle.

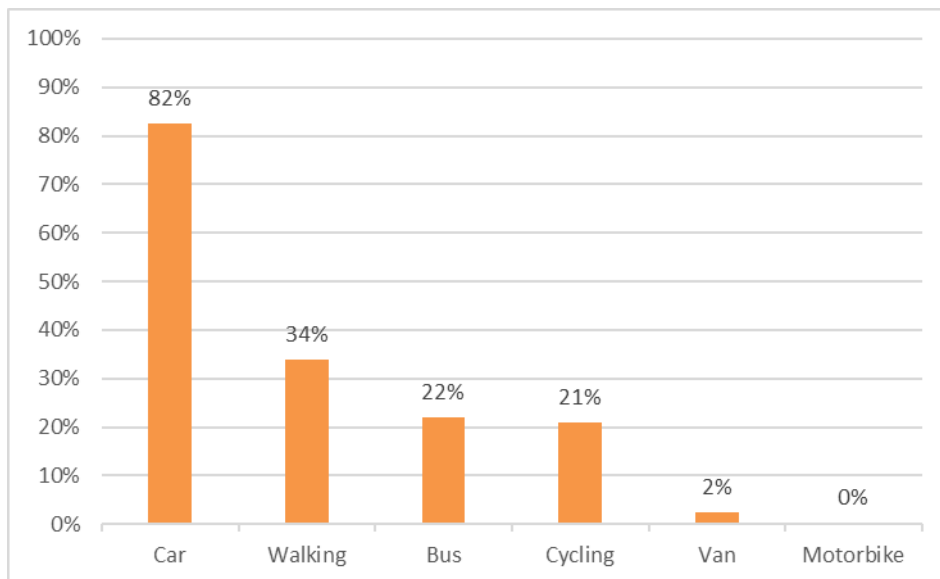


Figure F.4: Mode of travel along A944/A9119

Do you think any of the proposed options should be taken forward for further development?

F.3.9 Respondents were asked to select whether they think any of the proposed options should be taken forward for further development. Overall, 64% of respondents selected 'No', while 29% selected 'Yes' and 7% selected 'Another option'.

F.3.10 However, when the results are considered alongside location, a notable difference is seen in support between those living in Rosemount and Midstocket and elsewhere. Support for the options goes from 24%, for those resident in Rosemount and Midstocket, to 33% among residents of other areas.

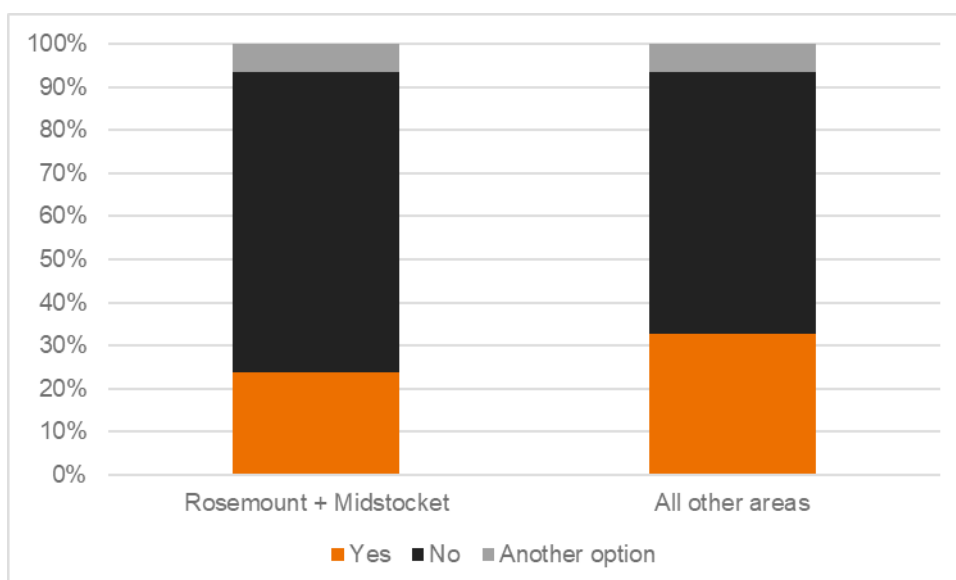


Figure F.5: Support for options

F.3.11 Respondents who selected 'another option' to the preceding question were then asked to describe the alternative option they would prefer. While 72 respondents suggested that they would prefer another option, only 43 respondents made alternative suggestion(s) which fell within the study scope. Suggestions which related to other locations (e.g., A96 or A92) or

activities which could not be influenced by the study (e.g., horticulture) were excluded as a result.

F.3.12 Responses were categorised into themes and are summarised below:

- 19 respondents commented on the retention of on-street car parking. Two respondents suggested the creation of additional car parking facilities off main street corridors, and a further two respondents suggested that parking laybys are formed on cycle route sections
- Four respondents noted that they would like to retain use of the westbound slip road at the A944-A9119 roundabout for all vehicles, as opposed to it becoming bus-only
- Four respondents suggested means of reducing car journey times, including removing traffic lights at the A944/AWPR junction, increasing the speed limit on dual carriageway sections of the A944, providing greater priority to traffic on the A944 at the junction with the A92 and controlling right turns at the junction of Spring Garden with George Street
- Three respondents suggested that some streets could be made one-way to reduce vehicular traffic volumes and/or increase space for other modes. Two of these respondents also suggested action should be taken to reduce traffic speeds in the area through reduction in the speed limit or traffic calming
- Three respondents suggested that there should be a more frequent bus service from Kingswells village into the city centre (most importantly at the weekend, when the 14 service does not currently run). Note: bus service routing and frequency are controlled by the bus operators themselves, but improvements to infrastructure can support shorter journey times and more efficient running of services, which may in turn make higher frequencies viable
- Three respondents suggested an express bus service between Westhill and the city centre, and one further respondent suggested that a tram could operate between Westhill and the Beach/Esplanade via the city centre. One respondent also suggested that a personal rapid transit system could be implemented in Aberdeen.
- Two respondents provided suggestions they felt could improve A944 Parallel Route 1 for cyclists. The first suggested widening Eday Road between Denwood and Stronsay Drive and the second suggested an alternative cycle route via Midstocket, Gordondale Road, King's Gate and Fountainhall Road to reach the A9119
- Two respondents suggested that cyclist/pedestrian safety could be improved through providing greater separation from vehicular traffic via underpass/bridges at busy junctions or installation of additional guard rails
- Two respondents suggested that car trip making could be reduced through wider adoption of 'work from home' practices or through making car travel more expensive
- One respondent suggested that Old Lang Stracht should remain open for bus traffic to ensure the Stagecoach 14 service remains as efficient as possible. A second respondent was concerned that Old Lang Stracht may become inaccessible to emergency service vehicles under proposals, but it should be noted that any new traffic regulation order would permit continued use of Old Lang Stracht by emergency services
- One respondent noted that they wish to maintain the current routing of the First No. 3 bus service along Rosemount Place.
- One respondent suggested that a Park & Ride site should be built in Westhill.

- One respondent suggested that consideration should be given to means of easing access to the city centre for those driving electric vehicles as they are already travelling more sustainably

How would you rank the four options?

F.3.13 Respondents were asked to rank the four options (in order of preference) for development of the A944 and A9119 corridors. The options presented were as follows:

- Option 1: Prioritise cycle infrastructure over bus priority on both corridors.
- Option 2: Prioritise bus priority infrastructure over cycle infrastructure on both corridors.
- Option 3: Prioritise cycle infrastructure on A944 and bus priority infrastructure on A9119.
- Option 4: Prioritise cycle infrastructure on A9119 and bus priority infrastructure on A944.

F.3.14 Figure F:6 indicates the proportion of respondents who ranked each option 1st/2nd/3rd/4th.

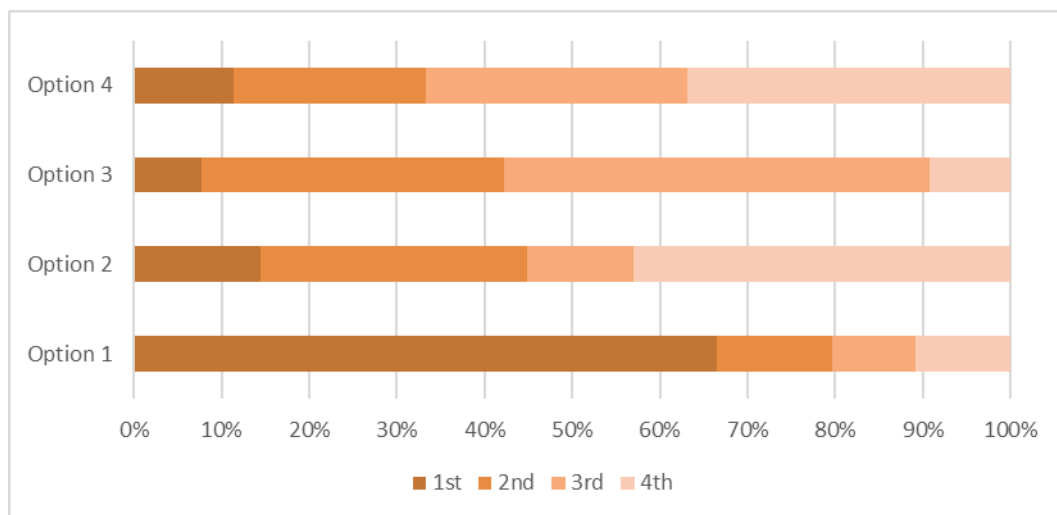


Figure F:6: Option ranking (all respondents)

F.3.15 Option 1 was the first choice for 66% of respondents, while Option 2 was the first choice for 14%, Option 4 for 11% and Option 3 for 8%.

F.3.16 Based on the ranking by each respondent, the options were then allocated a score between 1 and 4 points based on its ranking (i.e., 4 points for a 1st place ranking, decreasing to 1 point for a 4th place ranking). The scores awarded by all responses were then total to provide an overall option score. The results were as follows:

- Option 1 score: 1090
- Option 3 score: 782
- Option 2 score: 703
- Option 4 score: 675

F.3.17 The lowest scoring options (Options 2 and 4) both prioritise bus travel on the A944 and with the proposed A944 parallel cycle routes via Rosemount Place. The low scoring for these two options likely reflects the strong public opposition voiced through the survey with regards to the A944 parallel cycle routes proposed.

F.3.18 An exercise was undertaken to see if Rosemount and Midstocket residents ranked options similarly to those living elsewhere along the corridor. Figure F:7 contrasts option ranking results by home location.

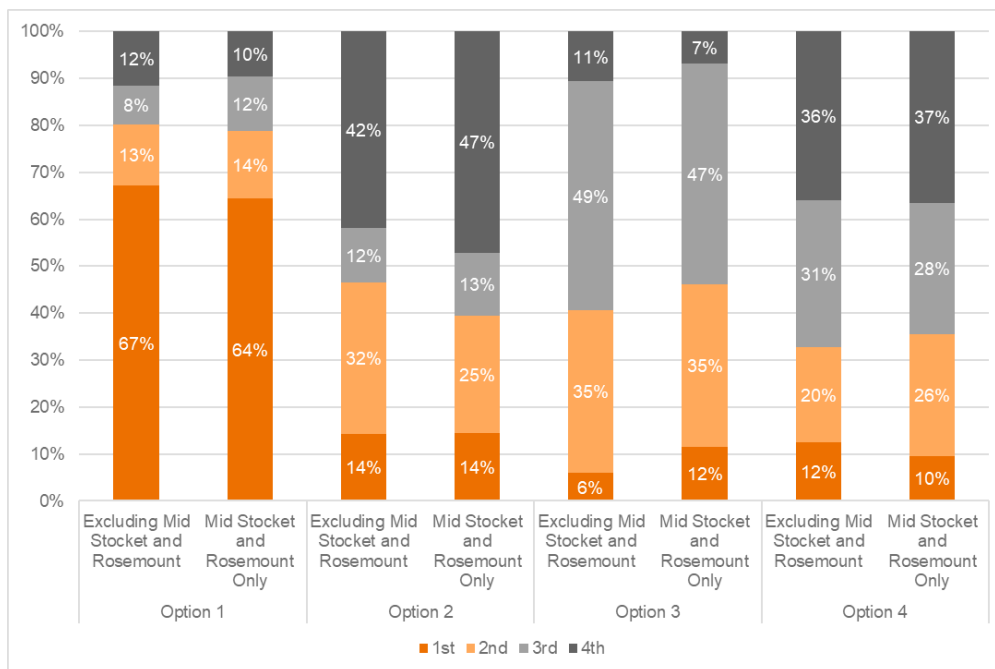


Figure F:7: Option ranking (by location)

7.2.8 There is not a substantial difference in option ranking between those living in Rosemount / Midstocket, and the rest of the respondents, although this ranking exercise was only undertaken by those respondents who noted support for the options.

How would you change the way you travel if your preferred option were implemented?

F.3.19 The second part of this question prompted respondents to answer whether they would change their travel behaviour if their preferred option (i.e., first choice) were to be implemented. Respondents were able to select 1 of 10 responses:

- I would not change the way I travel.
- I would change from travelling by car to walking.
- I would change from travelling by car to cycling.
- I would change from travelling by car to travelling by bus.
- I would change from travelling by bus to walking.
- I would change from travelling by bus to cycling.
- I would still cycle but would now use a different route.
- I would change from cycling to walking.
- I would change from cycling to travelling by bus.
- Other.

F.3.20 Respondents who selected ‘Other’ were able to describe how their travel habits would change. A reasonable proportion of respondents provided answers indicating that they would partially change their travel habits in favour of sustainable modes and so a corresponding category was added.

Option 1

F.3.21 Figure F:8 presents the results where Option 1 is the preferred option. 46% of respondents (n=97) said that they would change from travelling by car to bicycle if Option 1 was implemented. 21% of respondents (n=45) said that they would not change the way they travel and 14% said that they would still cycle, but now use a different route. 17 individuals also said that they would change from travelling by car to bus, but the reasoning for this is unclear as no improvement to bus infrastructure is proposed under Option 1.

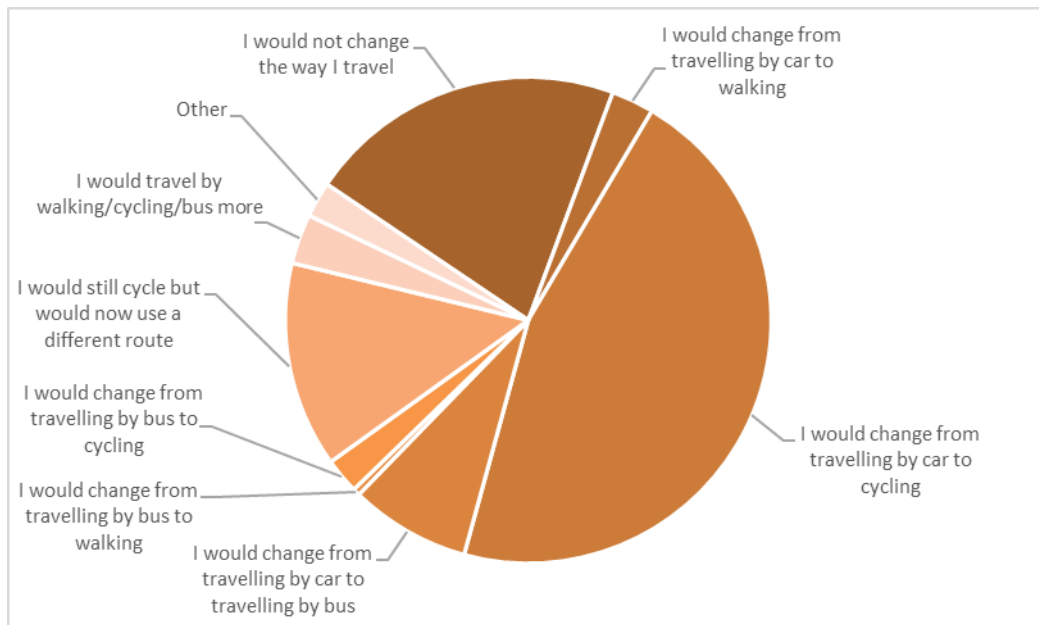


Figure F:8: Option 1 expected behaviour change

Option 2

F.3.22 Figure F:9 similarly presents the results for Option 2. 41% of respondents said that they would change from travelling by car to bus if Option 2 were implemented, while a further 41% of respondents said that they would not change the way they travel and 14% said that they would change from travelling by car to cycling.

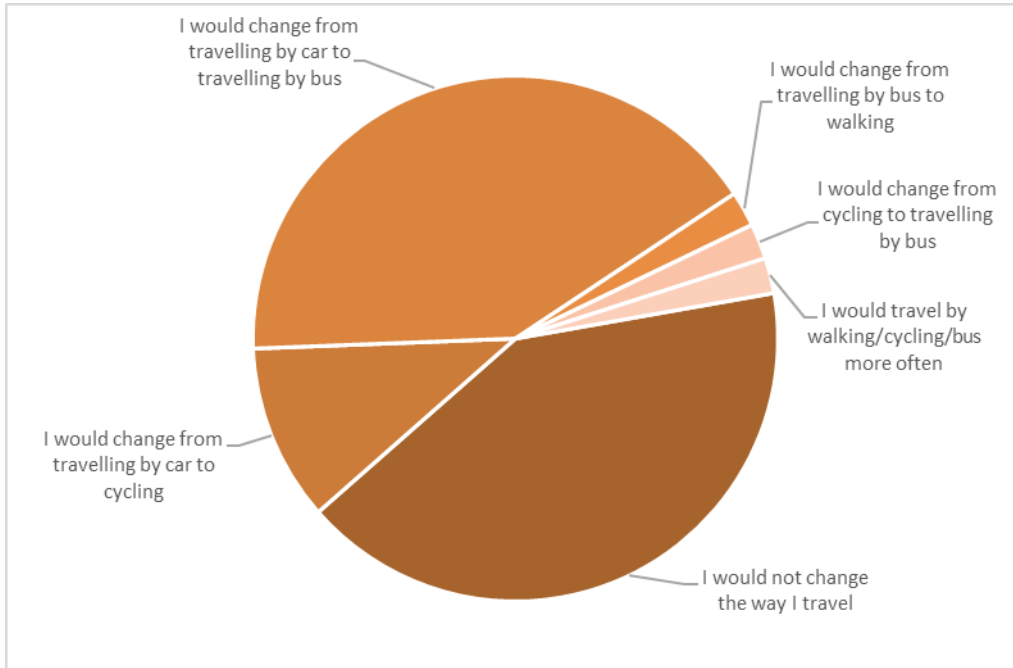


Figure F:9: Option 2 expected behaviour change

Option 3

F.3.23 Figure F:10 similarly presents the results for Option 3. 44% of respondents said that they would not change the way they travel, 28% said that they would change from travelling by car to bicycle and 12% who would change from car to bus.

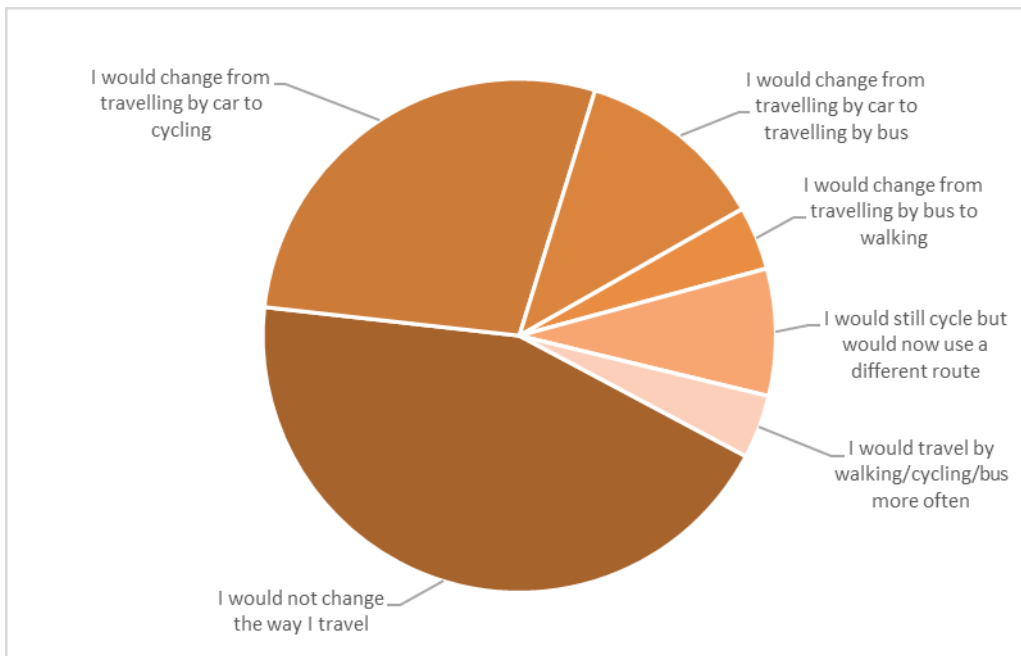


Figure F:10: Option 3 expected behaviour change

Option 4

F.3.24 Finally, Figure F:11 presents mode shift results for Option 4. 43% of respondents said that they change from other modes to cycling, followed by 27% who said they would not change the way they travel, and 14% who said they would change from car to bus.

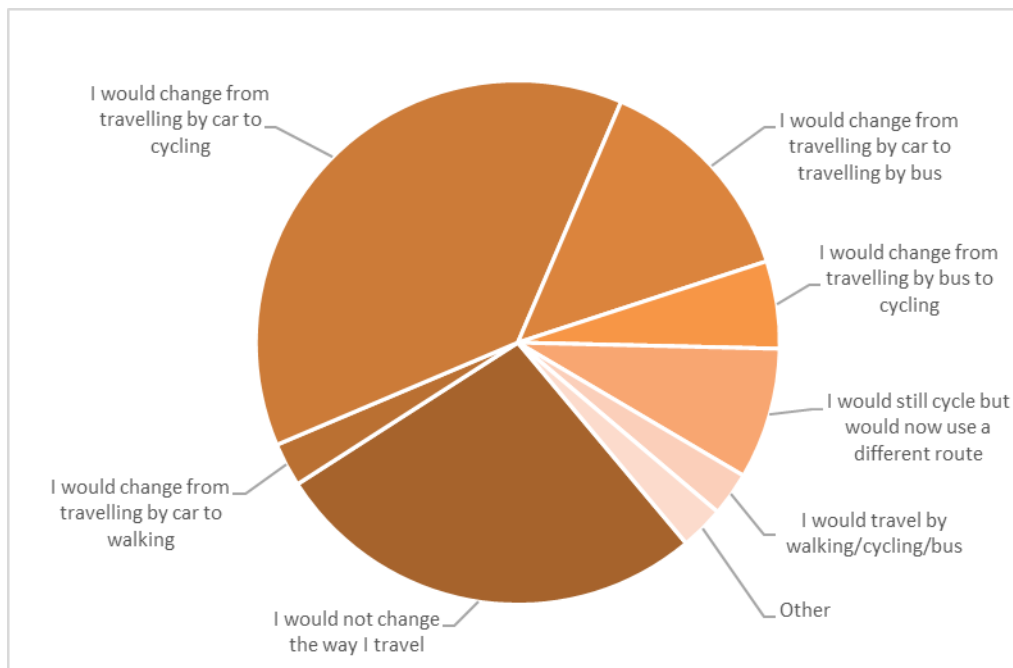


Figure F:11: Option 4 expected behaviour change

Summary

- F.3.25 Overall, Option 1 is expected to generate the greatest modal shift towards sustainable travel with only 21% of respondents saying that they would not change their travel habits. Option 4 follows close behind with only 27% saying that they would not change their travel habits. Options 2 and 4 perform more poorly with 41% and 43% respectively saying that they would not change their travel habits.
- F.3.26 As would be expected, Option 1 is expected to provide the most significant modal shift from car to cycling, although Option 4 also performs well with 43% saying that they would shift mode to cycling. Options 2 and 3 perform much more poorly in terms of modal shift to cycling with only 28% and 11% saying they would switch to cycling respectively. This suggests that providing cycle infrastructure on the main corridors is significantly preferred over the parallel routes and also that cycling along the A9119 is preferred over the A944.
- F.3.27 Again, it is unsurprising that Option 2 is expected to generate the greatest modal shift from other modes to bus (43%), while the results for all other options are significantly poorer (8%, 12% and 15% modal shift under options 1, 3 and 4 respectively).

Do you agree with the concept of a proposed Low Traffic Neighbourhood?

- F.3.28 Respondents were asked if they agree with the concept of a Low Traffic Neighbourhood. 56% of respondents selected 'No', while 30% selected 'yes' and 14% either did not know or had no opinion. Figure F:12 presents the results.

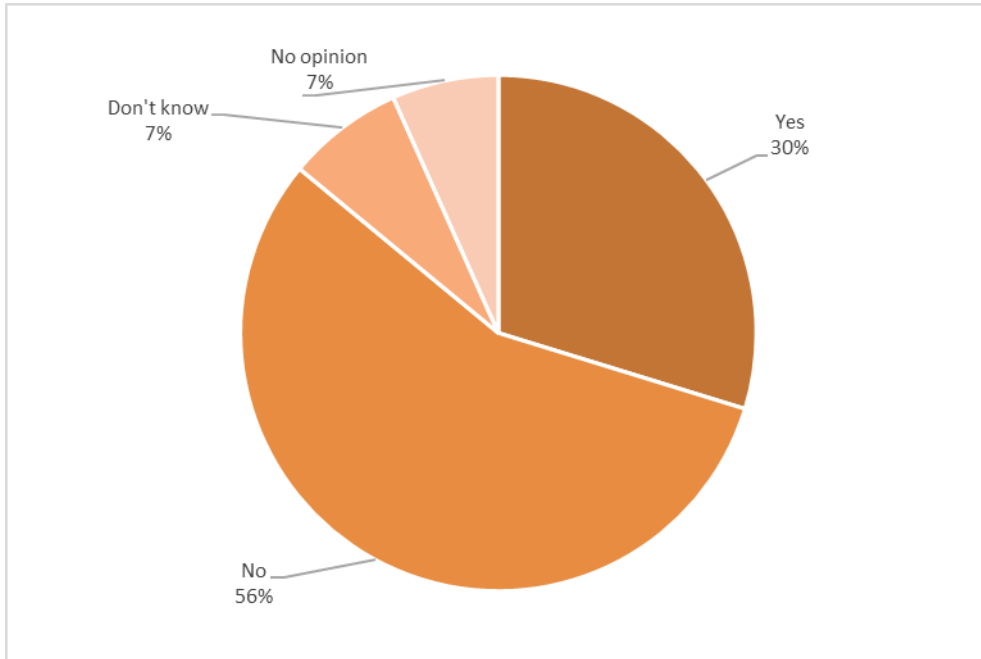


Figure F.12: Support for Low Traffic Neighbourhood (all respondents)

F.3.29 Again, further analysis was undertaken to identify whether there was a difference in support for a Low Traffic Neighbourhood based on location.

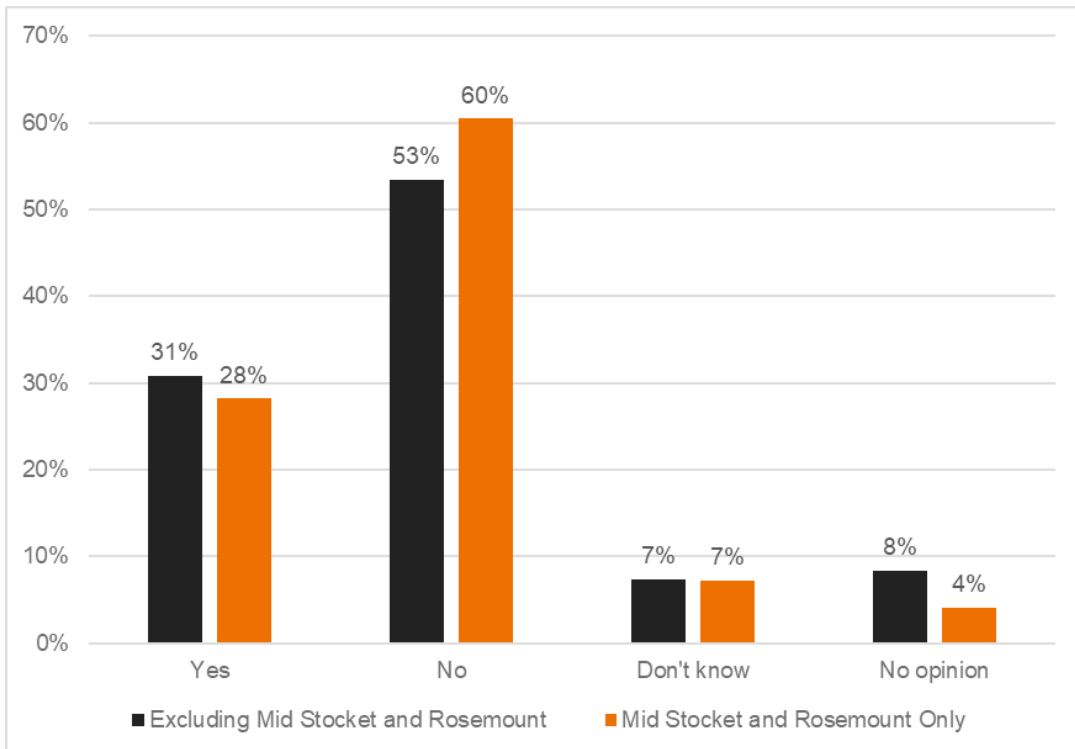


Figure F.13: Support for Low Traffic Neighbourhood (by location)

F.3.30 Support for an LTN is approximately 10% higher outside of Rosemount and Midstocket.

Do you have any comments on any of the proposed options?

- F.3.31 Those who responded to the survey were provided an opportunity to comment further on the outlined proposals. In total 815 members of the public and local businesses provided a response. An additional 10 members of the public provided email responses which are also summarised here.
- F.3.32 All the comments have been categorised and summarised in key points as discussed below. The strong opposition to the proposed parallel cycle routes, particularly the A944 parallel routes was evident in the responses in relation to the loss of on-street parking, bus service re-routing and subsequent business impacts.

Active Travel

- F.3.33 90 respondents highlighted that they are supportive of the proposed cycle routes and agreed with the location of these routes as they will benefit cyclists.
- F.3.34 In contrast, 82 respondents felt that the routing of cycle infrastructure is inappropriate. Concerns focussed on the indirect nature of the parallel routes, the gradients on A944 and A9119 parallel routes and safety implications of routing cycles along residential streets.
- F.3.35 76 respondents suggested that there is no need for more cycle infrastructure as the existing infrastructure is currently under used and cyclists choose to travel with traffic. Additionally, the residential streets which are being proposed for the parallel routes are adequate for cyclists without the introduction of new infrastructure.
- F.3.36 A further 15 respondents mentioned that the improvements to footways and crossing facilities would be beneficial to pedestrians.

Public Transport

- F.3.37 The potential re-routing of bus services from Rosemount Place (Options 2 and 4) was highlighted by 93 respondents as being likely to have a detrimental impact on both residents and businesses in the area.
- F.3.38 59 respondents suggested that the existing bus services are unreliable and infrequent, and explained this was a factor as to why they choose to travel by car. The high cost of bus services was also highlighted by 27 of the respondents as one of the main reasons why they do not currently travel by bus.
- F.3.39 36 members of the public and local businesses felt that additional bus lanes are unnecessary as those which already exist are not well used. 15 respondents specifically noted an objection to the proposed bus only slip road from the A9119 westbound at the Kingswells roundabout as it was felt this will lead to increased congestion for general traffic.
- F.3.40 Additionally, a total of 36 respondents noted that they support the introduction of bus priority infrastructure to aide in the improvement of journey times and reliability.

Car Use

- F.3.41 The removal of on-street parking to accommodate new bus and/or cycle infrastructure was highlighted by 335 people as being a problem as this would increase walking distances between parking and residences/businesses. Key concerns were a reduction in accessibility for those with disabilities/mobility problems and reduction in customers at local businesses.
- F.3.42 46 respondents mentioned that car users are being unfairly penalised through the reallocation of road space to sustainable modes and the potential for the introduction of a Low Traffic Neighbourhood (LTN).

Residents Quality of Life

- F.3.43 A total of 113 respondents suggested that proposals could adversely affect travel opportunities and quality of life for those who are elderly, disabled or have mobility issues, as they rely on travelling by car, being able to park outside their homes and/or short walking distances to bus stops.
- F.3.44 Concerns around negative impact the proposals will have on house prices in the area affected by the parallel cycle routes was raised by 24 respondents.

Low Traffic Neighbourhood

- F.3.45 The potential Low Traffic Neighbourhood (LTN) outlined was objected to by 27 of the respondents who expected that it would have a negative impact on those who work and live in the area. A further 9 respondents raised concerns around the consequential 'rat-running' which would occur on streets to the north/south of the LTN and suggested that the surrounding roads could not support the increase in traffic flow.
- F.3.46 Overall, 28 members of the public indicated support for an LTN.

Congestion

- F.3.47 57 respondents felt that the reallocation of road space from general traffic to sustainable modes would increase traffic congestion, with some of suggesting that proposals would have an adverse environmental impact through increasing carbon emissions.

Businesses

- F.3.48 The negative impact on proposals upon businesses was cited by 216 respondents. It was felt that the installation of cycle infrastructure, rerouting of the No. 3 bus service and loss of car parking would adversely affect the footfall in the Rosemount Place area and could lead to more shops closing as a result.

Electric Vehicles

- F.3.49 It was raised by 11 respondents that there is a lack of focus on electric vehicles and the associated infrastructure needed to charge them.

Infrastructure

- F.3.50 61 respondents indicated that they agree with the proposed improvements to infrastructure as the benefits will outweigh the disbenefits to make Aberdeen a more accessible city.
- F.3.51 49 members of the public indicated an overall disagreement with the proposed options but did not specifically comment on particular aspects of the schemes.

Demographics

- F.3.52 Respondents were asked a series of questions relating to the individual's sex, age, employment, illness/health condition (which impacts personal mobility) and pay.

Gender identity

- F.3.53 Respondents were asked which gender they identify with. Figure F:14 displays the results. 50% of respondents identified as female, 43% as male, and 7% preferred not to say. Note that 3 respondents identified as non-binary, although due to the volume of respondents, this represents close to 0%.

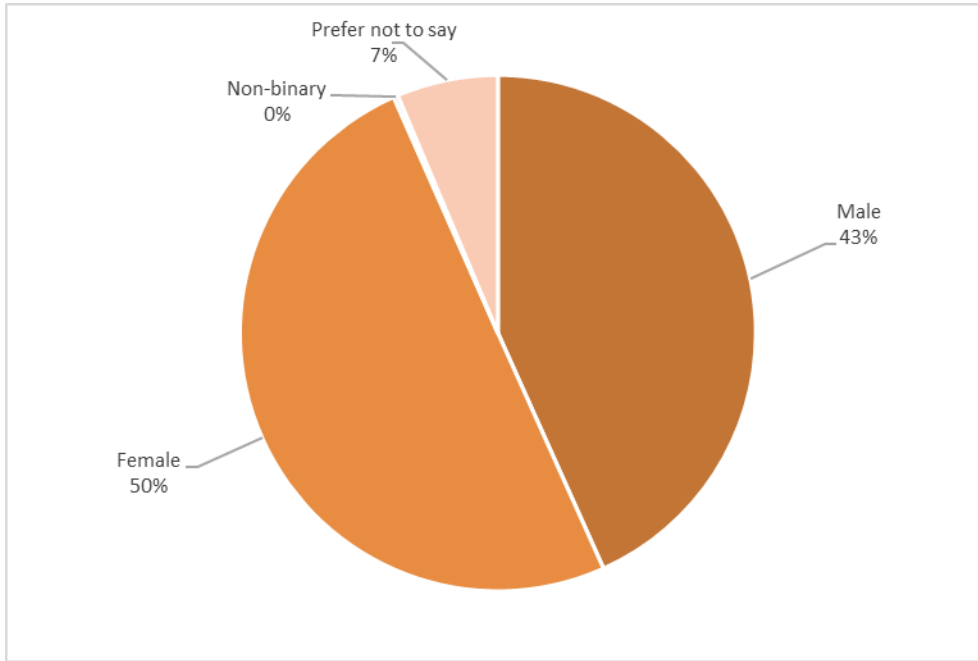


Figure F:14: Gender identity

Age

F.3.54 Figure F:15 presents the age group of respondents. The largest number of responses were received from those in the 35-44 age group (21%), followed by 45-54 (20%) and 55-64 (18%).

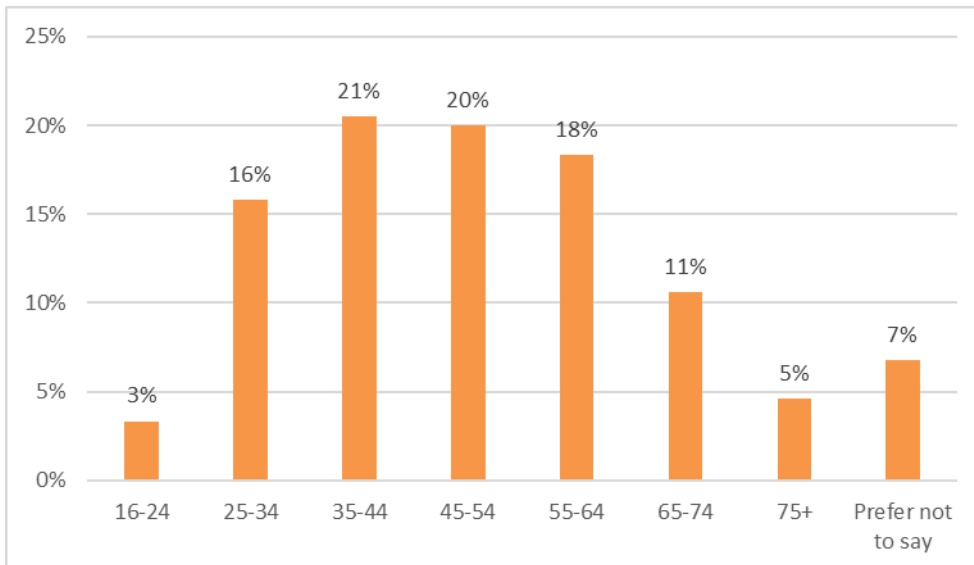


Figure F:15: Age

F.3.55 Population data for Aberdeen City indicates that in 2018 81% of the adult population was aged 16-64, which falls very closely in line with the above (83%) and indicates a good age representation within the survey sample.

Employment status

F.3.56 Figure F:16 presents the status of employment of respondents. 58% of respondents are employed or self-employed full time, 18% are retired, and 13% are employed/self-employed part-time. Note that 5% of respondents preferred not to say. Data from the Scottish

Government indicates that in Autumn 2021, 69% of those aged 16+ were economically active¹⁵, compared with approximately 75% of survey respondents.

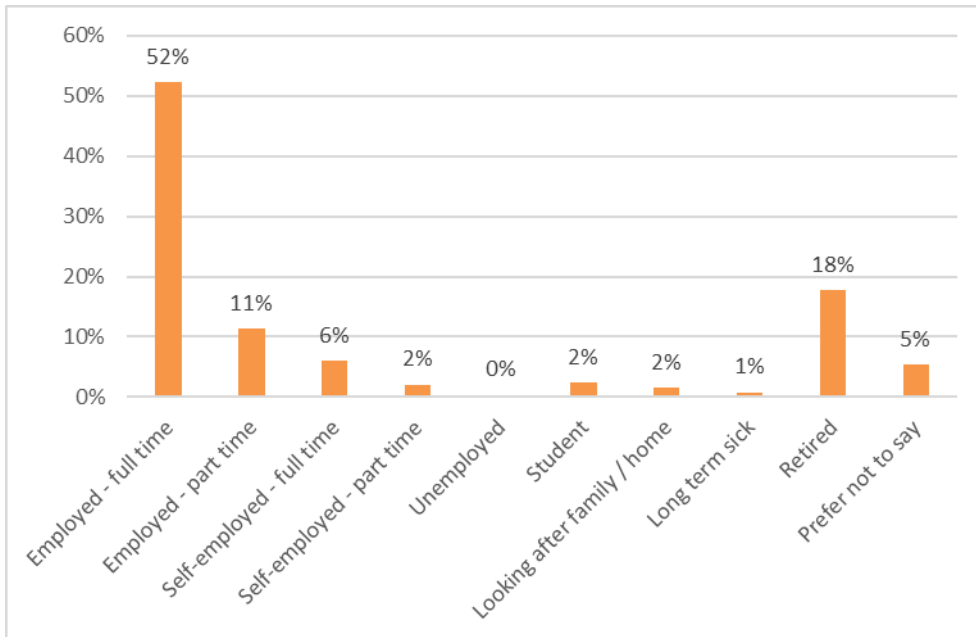


Figure F:16: Employment status

Health

F.3.57 Figure F:17 presents the proportion of respondents who have a health condition which affects their personal mobility. 80% selected 'No', 14% selected 'Yes, a little' and 6% selected 'Yes, a lot'.

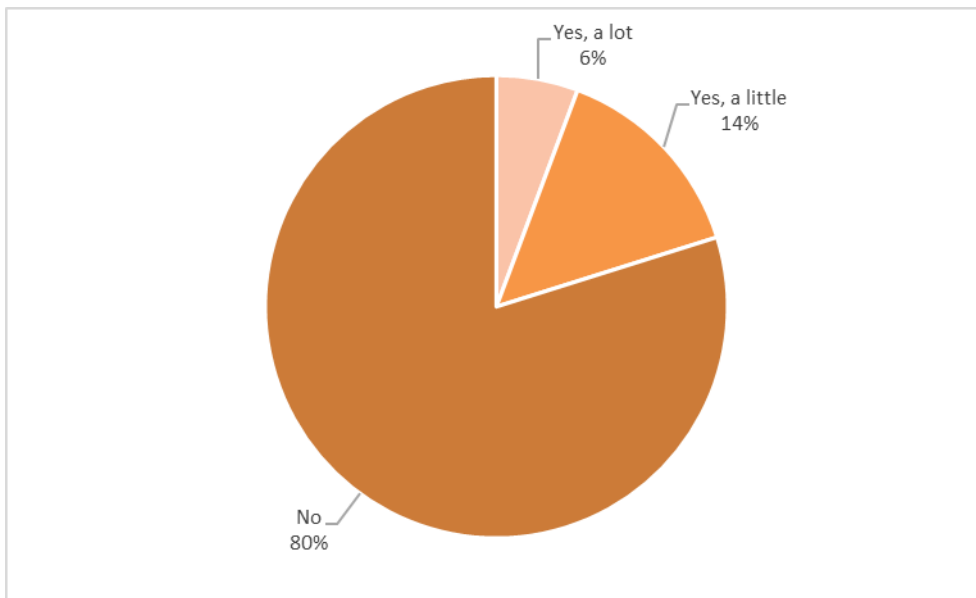


Figure F:17: Health condition which affects mobility

F.3.58 Respondents who selected 'Yes' to the previous question were then asked if their condition or illness affects their ability to use public transport. The results are presented in Figure F:18.

¹⁵ <https://statistics.gov.scot/resource?uri=http%3A%2F%2Fstatistics.gov.scot%2Fdata%2Feconomic-activity>

20% of respondents selected 'Yes, a lot' and 33% selected 'Yes, a little'. 47% of respondents selected 'No'.

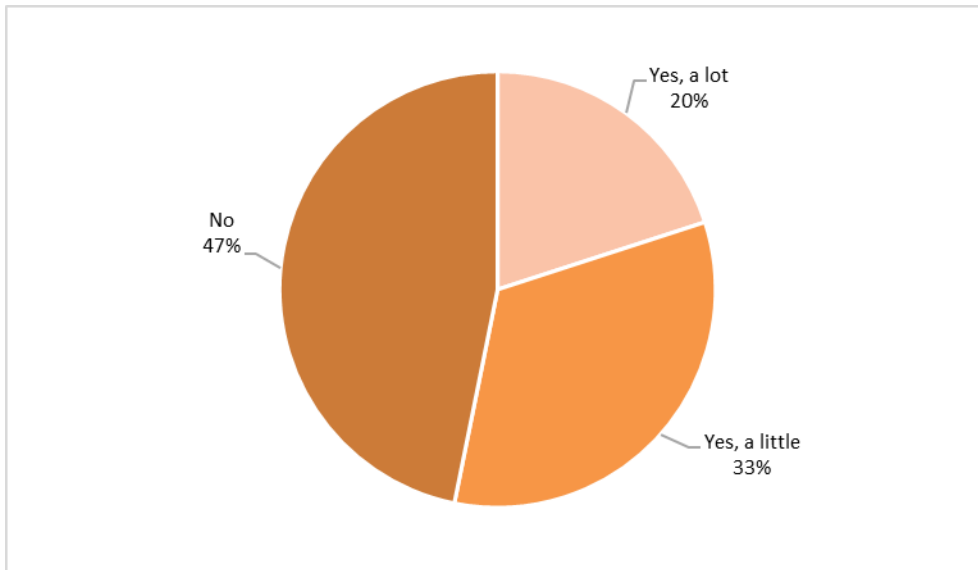


Figure F:18: Health condition which affects ability to use public transport

Household income

F.3.59 Figure F:19 displays the distribution of respondents' reported household annual incomes (before tax). Data from Aberdeenshire Council shows that in 2020 the average household income in Aberdeenshire was £38,000 per year, and £31,000 across Scotland. In comparison, 75% of survey respondents come from households earning more than £30,000 and 60% come from households earning more than £40,000. This suggests that those responding to the survey are likely to be better off than the general population, and more likely to have access to a car.

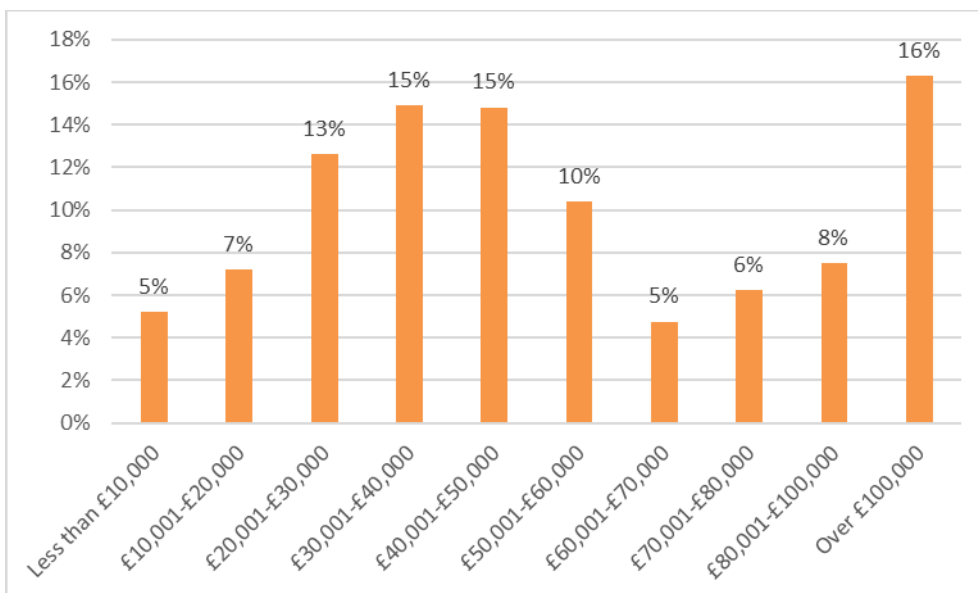


Figure F:19: Household income