# Aberdeen Rapid Transit

## Detailed Options Appraisal

## Technical Note B – Initial Catchment Analysis

On behalf of:

nestrans

Project Ref: 330610570 | Rev: A | Date: February 2023

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# 1 Introduction

1.1.1 The form of the Aberdeen Rapid Transit (ART) network and routing of ART corridors (including the extents of the network, the services and their routeing) could take many forms. Ten infrastructure tests were identified to support high level exploration of how the ART network infrastructure could affect patronage.

1.1.2 Passenger demand estimates were derived based on an anticipated catchment area for the infrastructure defined under each test; estimates of the proportions of existing public transport (PT) and road based movements which would transfer to a relevant ART service; and the base demand matrices from the Aberdeen Sub Area Transport Model 2019 (ASAM19).

1.1.3 It should be noted that the base demand ASAM19 matrices available at the time were still going through a process of final refinement within the ASAM modelling. While no significant changes to the base matrices were anticipated it should however be noted that **the final ASAM19 base matrices are likely to be slightly different than those used in this analysis**.

# 2 Infrastructure Tests

2.1.1 As noted above, eleven infrastructure tests were undertaken based on the potential extents, routing and services for a potential ART network. These tests are described in the table below.

2.1.2 The core testing scenario is Test R2, as it aligns with the Nestrans Aberdeen Rapid Transit Vision Document. Where proposed corridors deviate from Test R2, these changes are highlighted in orange.

Table 2.1: ART network and routeing - Tests summary

| Test | Corridors | Purpose of Test |
|---|---|---|
| R1 | Kingswells P&R to **Union Street** via A944 | Test four sperate ART routes (one on each corridor) connecting in the city centre, on corridors highlighted in Vision Document. |
| | Bridge of Don P&R to **Union Street** via A956(N) | |
| | Craibstone P&R to **Union Street** via A96 | |
| | Portlethen P&R to **Union Street** via A956(S) | |
| R2 | Kingswells P&R to Bridge of Don P&R via A944 + A956(N) | Combination of corridors identified under Test R1 to create two separate ART routes, which cross in the city centre. |
| | Craibstone P&R to Portlethen P&R via A96 + A956(S) | |
| R3 | Kingswells P&R to Bridge of Don P&R via **A9119** + A956(N) | Variation on Test R2 to gauge comparative benefits of routeing western corridor along A9119. |
| | Craibstone P&R to Portlethen P&R via A96 + A956(S) | |
| R4a | Kingswells P&R to Bridge of Don P&R via A944 + A956(N) | Variation on Test R2 to gauge comparative benefits of routeing southern corridor along A92(S). |
| | Craibstone P&R to Portlethen P&R via A96 + **A92(S)** | |
| R4b | Kingswells P&R to Bridge of Don P&R via A944 + A956(N) | Variation on Test R4a to gauge comparative benefits of extending southern corridor (A92) to Portlethen town. |
| | Craibstone P&R to **Portlethen town** via A96 + **A92(S)** | |
| R5 | **Westhill** to Bridge of Don P&R via A944 + A956(N) | Variation on Test R2 to gauge comparative benefits of extending western corridor to Westhill. |
| | Craibstone P&R to Portlethen P&R via A96 + A956 | |
| R6 | Kingswells P&R to Bridge of Don P&R via A944 + A956(N) | Variation on Test R2 to gauge comparative benefits of extending southern corridor (A956) to Portlethen town. |
| | Craibstone P&R to **Portlethen town** via A96 + A956(S) | |
| R7 | Kingswells P&R to Bridge of Don P&R via A944 + A956(N) | Variation on Test R2 to gauge comparative benefits of routeing southern corridor along A9013 and terminating at RGU Garthdee. |
| | Craibstone P&R to **RGU Garthdee** via **A9013** | |
| R8 | **Kingswells P&R to Craibstone P&R via A944 + A96** | Alternative combination of corridors identified in Test R1. |
| | **Bridge of Don P&R to Portlethen P&R via A956(N) + A956(S)** | |
| R9 | **Kingswells P&R to Portlethen P&R via A944 + A956(S)** | Alternative combination of corridors identified in Test R1. |
| | **Craibstone P&R to Bridge of Don P&R via A96 + A956(N)** | |
| R10 | **Westhill** to Bridge of Don P&R via A944 + A956(N) | Combination of West to North route identified under Test R5 with North- |
| | Craibstone P&R to Portlethen P&R via A96 + **A92(S)** | |

| Test | Corridors | Purpose of Test |
|---|---|---|
| | | West to South route identified under Test R4a. |

2.1.3 Details of each test are set out below.

## 2.2 Test R1

2.2.1 Test R1 reflects the situation where there are four ART services operating from Kingswells, Bridge of Don, Craibstone and Portlethen (planned at Findon interchange) Park & Ride sites to Union Street in the city centre (i.e., no cross-city connectivity provided). These four 'corridors' encompass the main arterial routes into Aberdeen and provide access to the range of trip generators and attractors.

2.2.2 It is worth noting that during the initial analysis (undertaken at the Preliminary Options Appraisal Stage), some consideration was given to whether the A93 should be considered as a potential ART corridor. However, it is not as densely populated as other main arterial routes into the city centre, nor has the same number of trip generators and attractors along its length and is not served by an existing Park & Ride site. It was concluded that it would be least likely to provide a viable ART service and so was excluded from further consideration.

2.2.3 While these routes are easily understood and highly legible, the implementation of four separate shorter routes has disadvantages relative to the provision of two longer routes:

- Greater need for interchange between services, which adds inconvenience for travellers and increases end-to-end journey times for through traffic.
- Increased 'bus' congestion in the city centre caused by buses having to route between the last and first stop within the city centre
- Requirement to deliver bus stands and driver rest facilities within the city centre, where space is more constrained.
- Need for a greater number of vehicles to provide the same service frequency.

2.2.4 As a result, all other tests consider the situation where there are two ART services which intersect in the city centre.

2.2.5 Figure 2.1: Test R1 Network illustrates the wider proposed ART routes under Test R1, and Figure 2.2: Test R1 City Centre Routeing indicates routeing through the city centre.

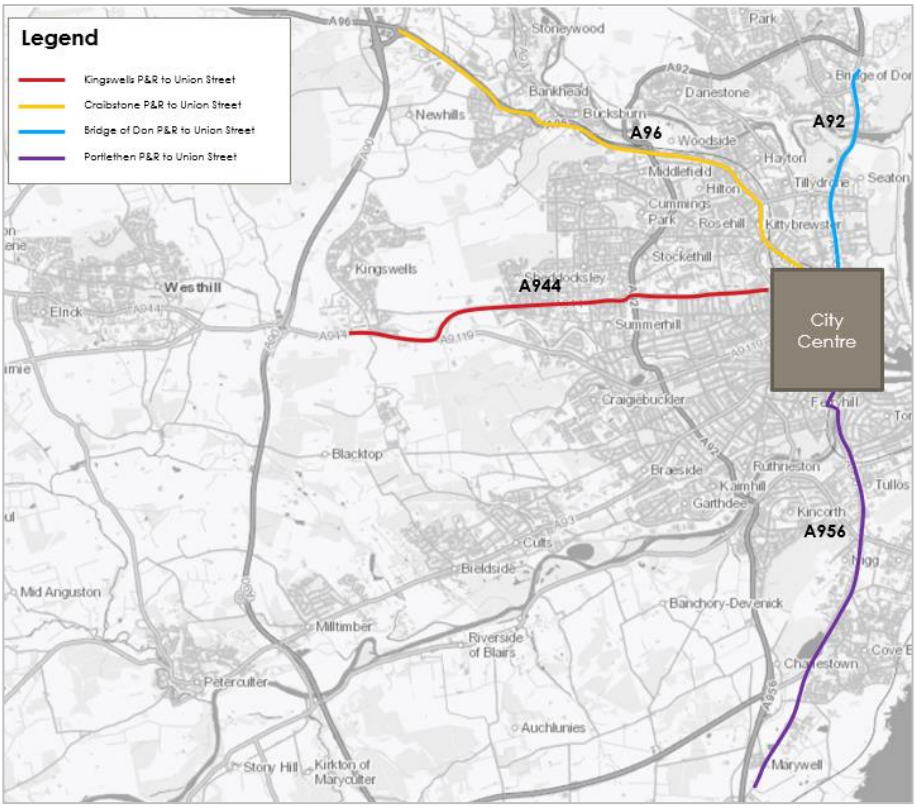


Figure 2.1: Test R1 Network

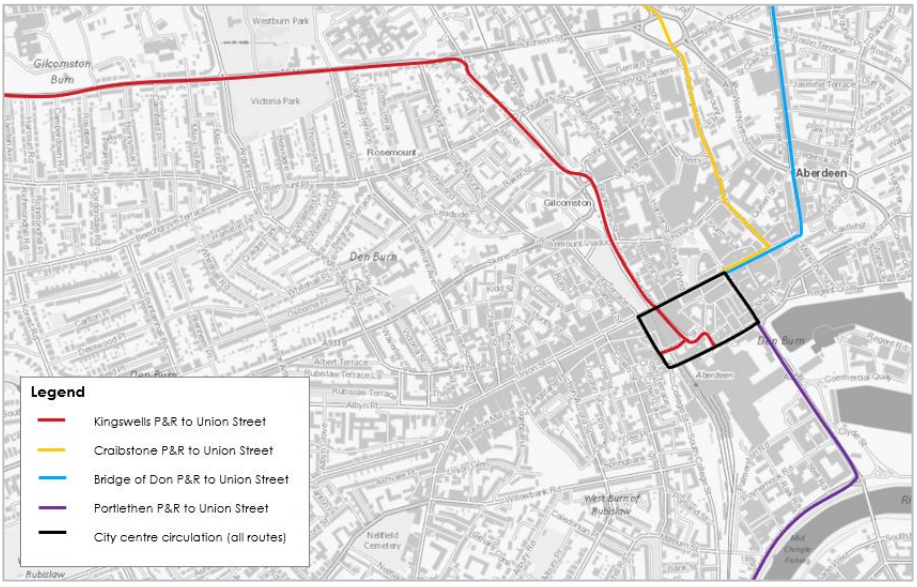


Figure 2.2: Test R1 City Centre Routeing

## 2.3 Test R2

2.3.1 Test R2 considers cross city services connecting Kingswells Park & Ride with Bridge of Don Park & Ride, and Craibstone Park & Ride with Portlethen Park & Ride broadly via the sections seen in Test R1. This combination of corridors could be considered to provide most logical ‘cross-city’ ART network (other options connect more parallel corridors).

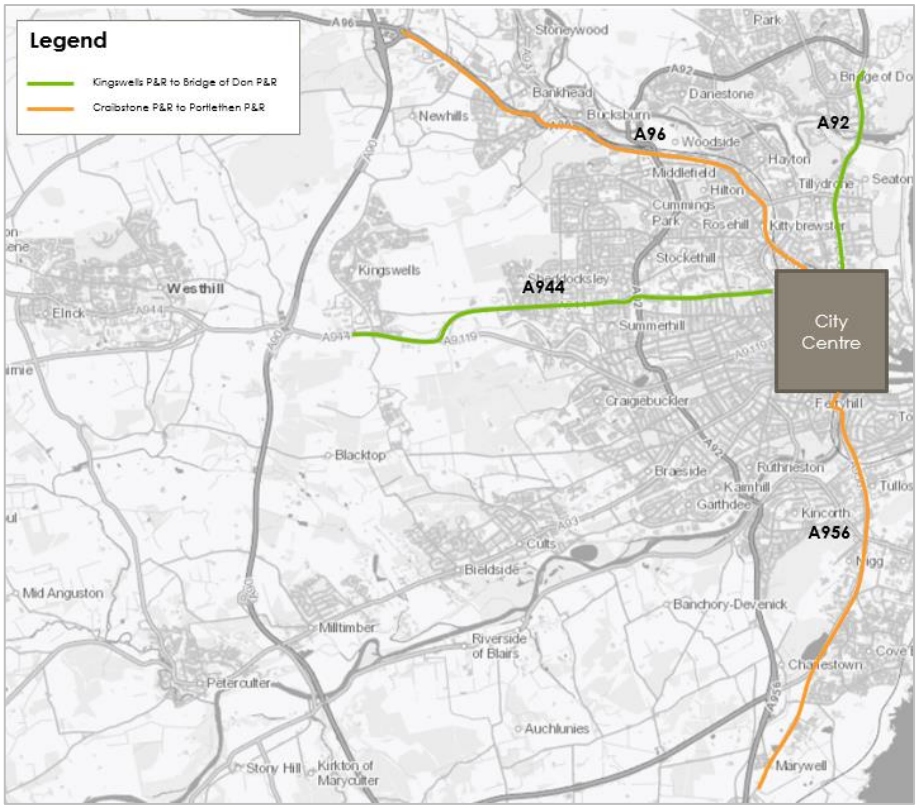


Figure 2.3: Test R2 Network

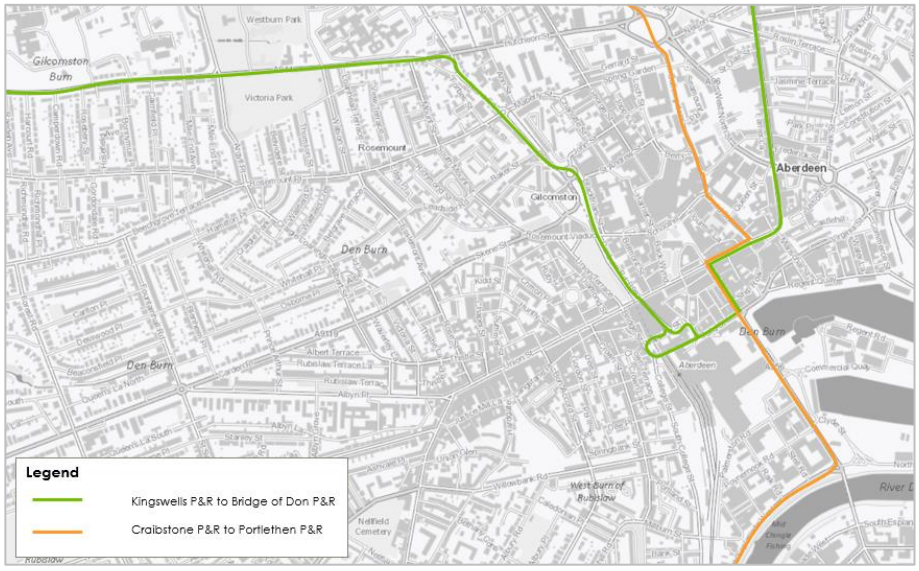


Figure 2.4: Test R2 City Centre Routeing

## 2.4 Test R3

2.4.1 Test R3 is as per Test R2, except that the western route from Kingswells Park & Ride runs via the A9119 rather than A944. Test R3 has the benefit of running ART services along the full length of Union Street and would provide a direct connection to Kingswells and Bridge of Don Park & Ride sites; however, it does not serve the key health regional facilities located at the Foresterhill Health Campus on Westburn Road.

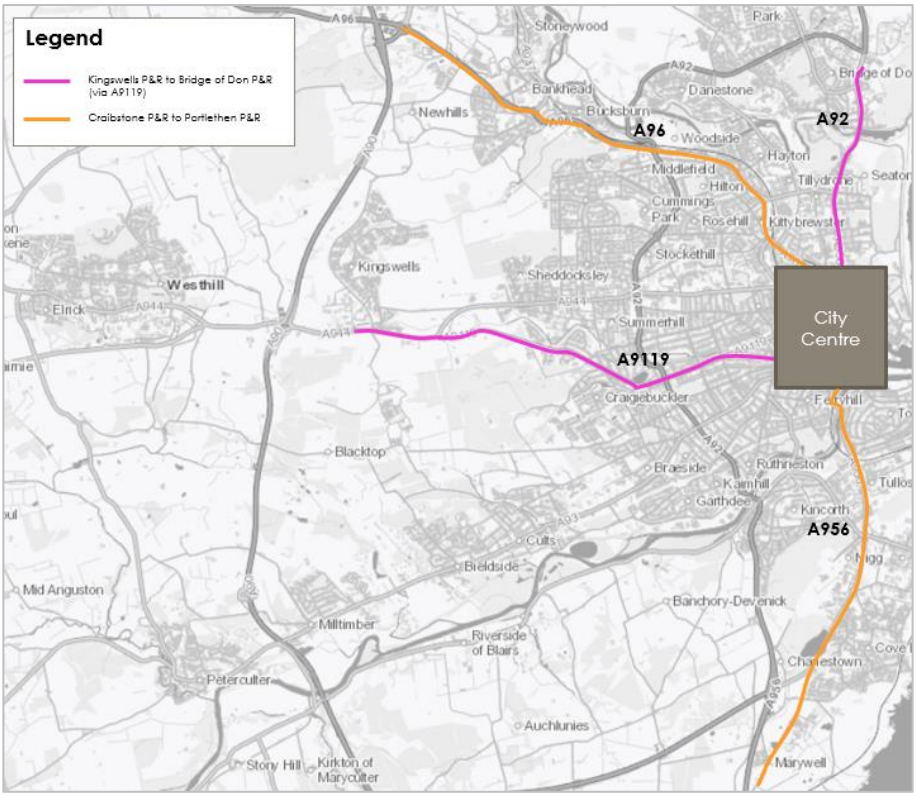


Figure 2.5: Test R3 Network

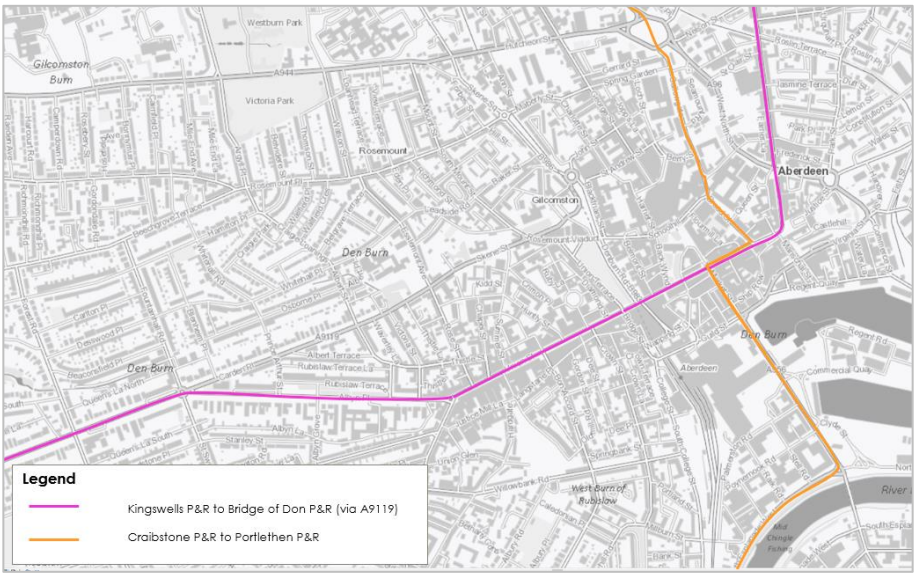


Figure 2.6: Test R3 City Centre Routeing

## 2.5 Test R4a

2.5.1 Test R4a is as per Test R2, except that the southern ART corridor runs from Union Street along the B9013 (Holburn Street) / B9077 (Great Southern Road) / A92(S) to the proposed Portlethen Park & Ride. While this does not serve the Altens and Tullos employment areas as effectively, it provides better connectivity to Kincorth and Ruthrieston and an ART service would run the full length of Union Street, providing a direct connection to Craibstone and Portlethen Park & Ride sites.

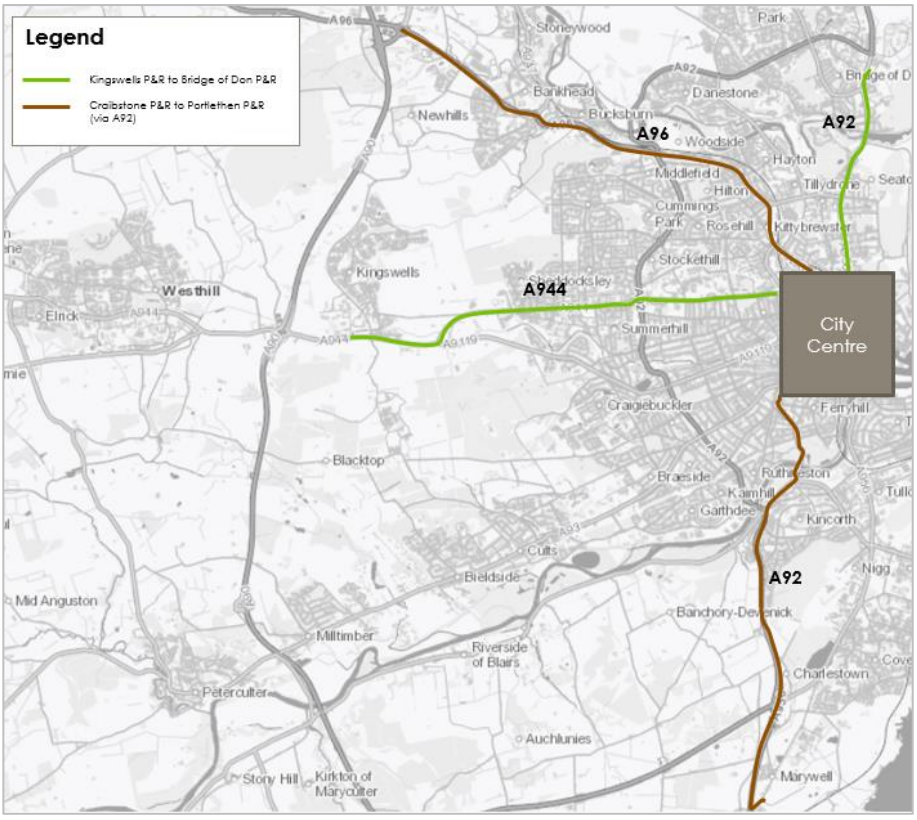


Figure 2.7: Test R4a Wider Ruthrieston

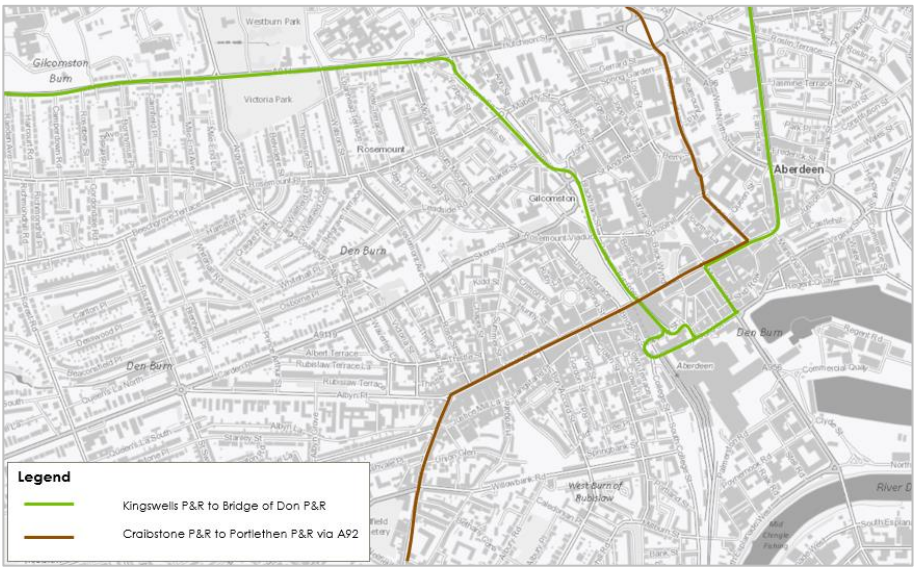


Figure 2.8: Test R4a City Centre Routeing

## 2.6 Test R4b

2.6.1 Test 4Rb is as per Test R4a, except the southern ART corridor continues south from Portlethen Park & Ride to Portlethen railway station. Routeing within the city centre is as per Test R4a.

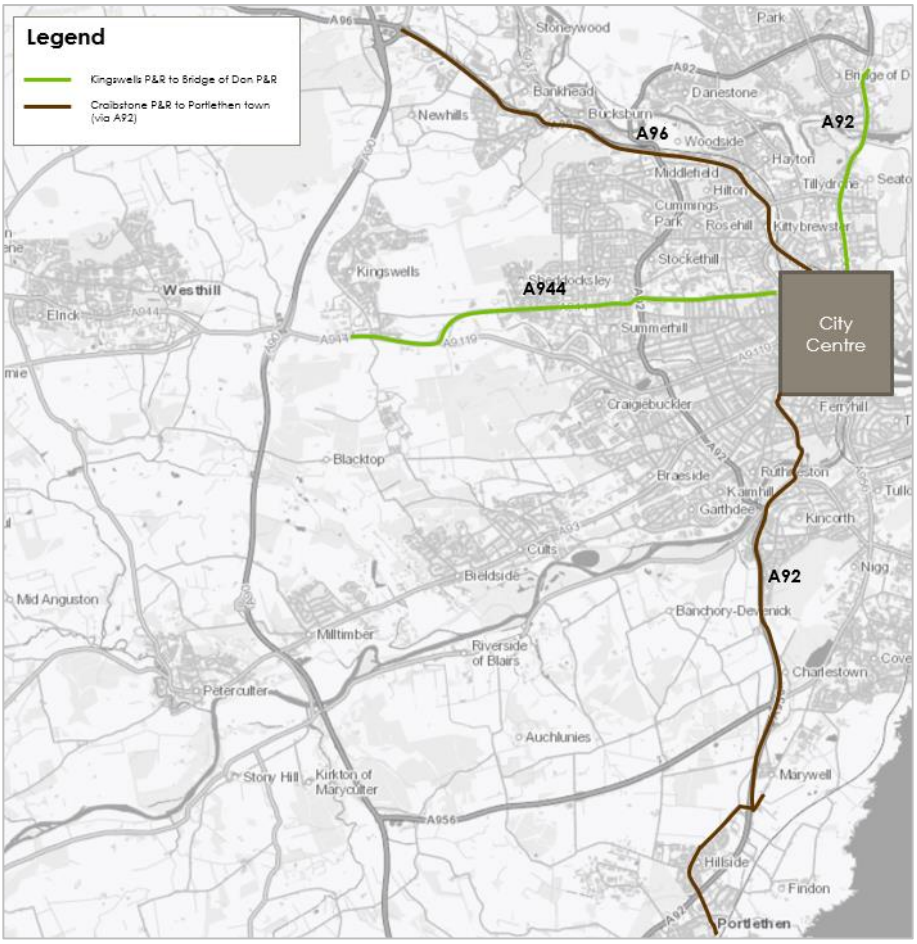


Figure 2.9: Test R4b Network

## 2.7 Test R5

2.7.1 Test R5 is as per Test R2, except the western corridor extends beyond Kingswells Park & Ride to Westhill itself. Routeing within the city centre is as per Test R2.

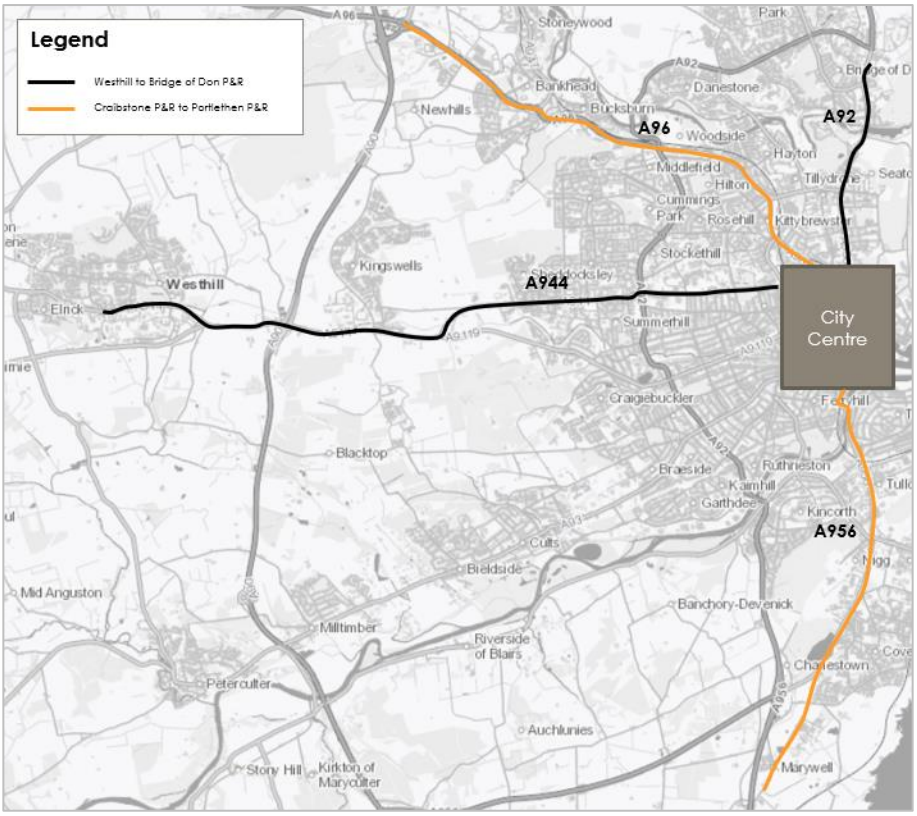


Figure 2.10: Test R5 Wider Routeing

## 2.8 Test R6

2.8.1 Test R6 is as per Test R2, except the southern route via the A956(S) extends beyond Portlethen Park & Ride to Portlethen railway station. Routeing within the city centre is as per Test R2.

Figure 2.11: Test R6 Network

## 2.9 Test R7

2.9.1 Test R7 is as per Test 2, except that the southern corridor travels south from Union Street to the Robert Gordon University Garthdee Campus via the A9013 (Holburn Street) / Garthdee Road. This is beneficial in that the university and adjacent large retail sites generate significant demand for travel, but on the other hand the southern corridor would not be anchored by a Park & Ride site. As a result, the potential modal shift from those residing south of the city is more limited. Routeing within the city centre is as per Test R2.

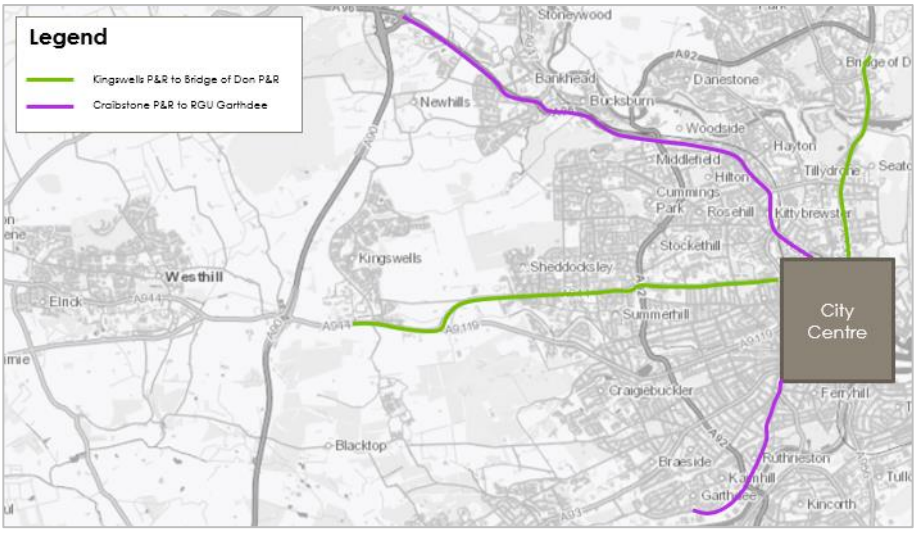


Figure 2.12: Test R7 Network

## 2.10 Test R8

2.10.1 Test R8 considers a direct north-south ART route from Bridge of Don Park & Ride to Portlethen Park & Ride, and then a West to North-West ART route from Kingswells Park & Ride to Craibstone Park & Ride. This routeing connects the substantial employment areas at Kingswells with those in Bankhead/Dyce.

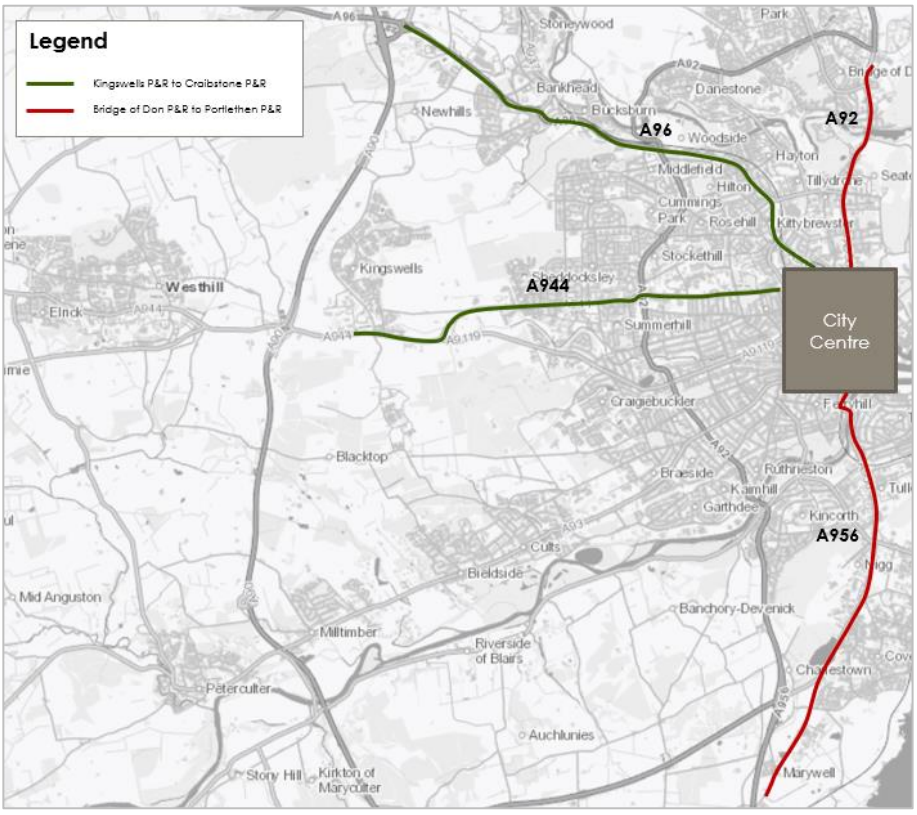


Figure 2.13: Test R8 Network

Figure 2.14: Test R8 City Centre Routing

## 2.11 Test R9

2.11.1 Test R9 reflects the remaining combination of ART corridors as set out in Test R1, linking Craibstone Park & Ride with Bridge of Don Park & Ride, and Kingswells Park & Ride with Portlethen Park & Ride. Under all other tests, it is assumed that interchange between ART services would occur on Union Street; however, under Test R9 it is assumed that passengers would interchange between ART services at Union Square Bus Station.

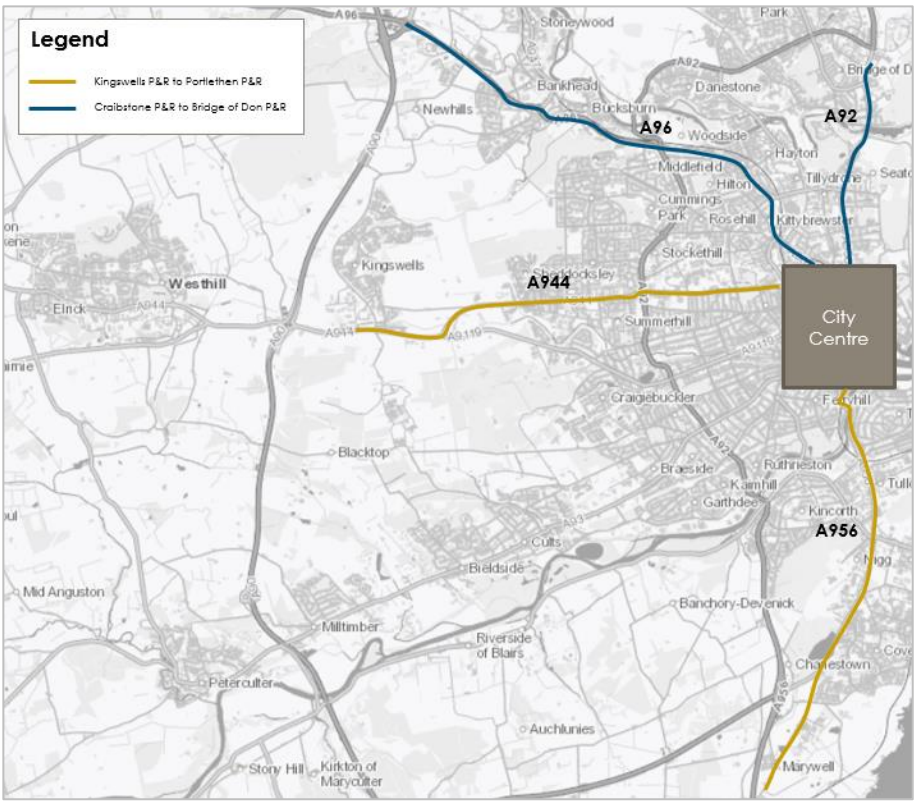


Figure 2.15: Test R9 Network

Figure 2.16: Test R9 City Centre Routeing

## 2.12 Test R10

2.12.1 Test R10 reflects a combination of the Craibstone Park & Ride to Portlethen Park & Ride via A92(S) route from Test R4a with the Westhill to Bridge of Don Park & Ride route from Test R5. City centre routeing is as per Test R4a. This has the benefit of serving the town of Westhill and associated employment areas, as well as the denser demand along the B9013 (Holburn Street) / A92(S) corridor. However, it will not provide access to the Altens & Tullos areas as effectively as Test 5.

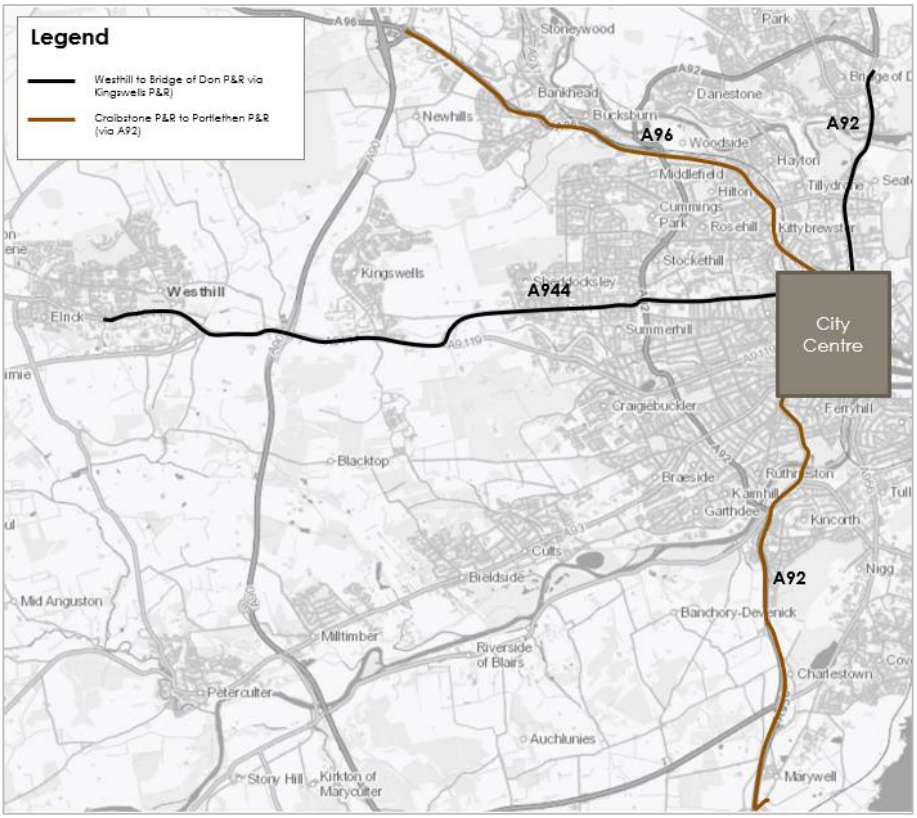


Figure 2.17: Test R10 Network

# 3 City Centre Masterplan and Pedestrianisation of Union Street Central

3.1.1 At the time of writing, Union Street Central (the section between Bridge Street and Market Street) is open to bus traffic; however, there remains some uncertainty around whether this will continue in the longer term.

3.1.2 At present, the City Centre Masterplan (including the Union Street transformation) and Beach Masterplanning work continues. The outcomes of Phase 1 of the Traffic Management Plan in respect of Union Street Central (Bridge Street to Market Street) were presented and agreed at the Aberdeen City Council City Growth and Resources Committee in November 2021. The agreed Phase 1 Plan saw Union Street Central fully pedestrianised with access for cycles and time limited servicing only. In order to implement this, bus, taxi (and private hire) and cycle priority is required on Bridge Street, Market Street and Guild Street, as well as increased bus stop provision. Schoolhill / Upperkirkgate is required to be pedestrianised between Harriet Street and Flourmill Lane, and right turns prohibited except for buses, taxis (and private hire) and cycles from Union Terrace into Rosemount Viaduct.

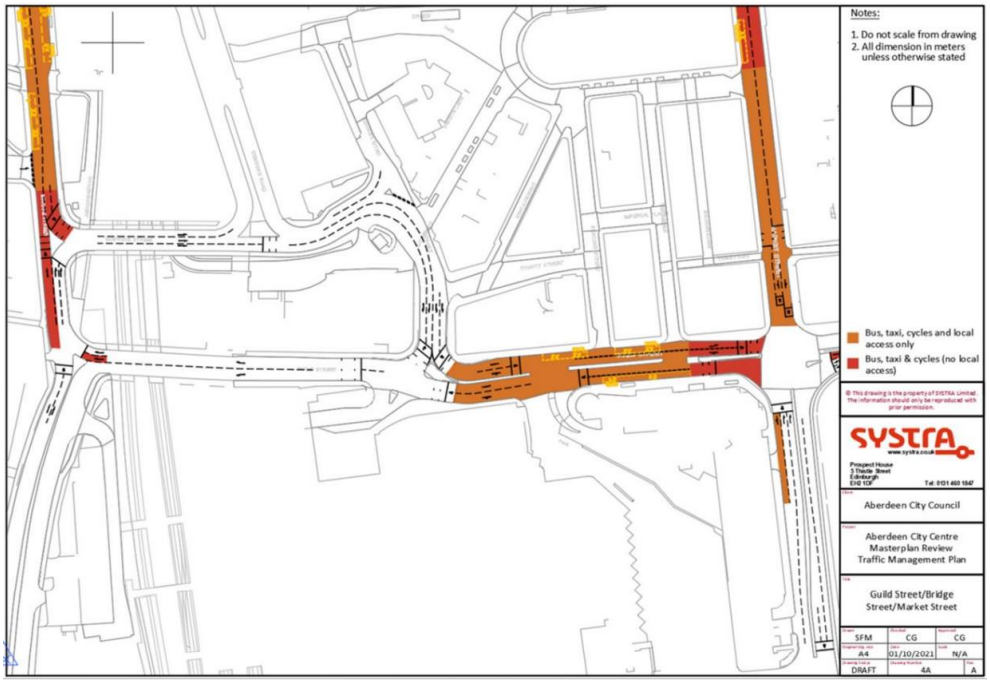


Figure 3.1: CCMP Traffic Management Plan Proposal for Bridge St/Guild St/Market Street (Systra, 2021)

3.1.3 During the COVID-19 pandemic, Union Street was closed to all traffic with bus services routeing via Bridge Street, Market Street and Guild Street. However, in February 2022, a motion to reinstate public transport on Union Street Central was backed, and Union Street Central was officially reopened to local buses and taxis in June 2022.

3.1.4 While councillors have permitted bus movement on Union Street Central, council co-leader Alex Nicoll clarified, in June 2022, that this decision does not preclude the council from pedestrianising Union Street at a later date, provided that "suitable 24-hour access arrangements to central Union Street are in place for people with disabilities and limited mobility and that suitable alternative bus and public transport arrangements are available which ensure easy bus passenger access to central Union Street."[1]

[1] https://news.stv.tv/north/aberdeen-city-councillors-vote-to-allow-buses-and-taxis-on-partly-pedestrianised-union-street

3.1.5 Given the above, consideration has been given to how ART routes could intersect in the city centre and where interchange could most effectively occur, assuming interchange could be facilitated on Union Street or at Union Square. A third possibility is that ART services route along Union Street but that it remains closed to all other bus services. This would set ART apart from regular bus services, facilitate faster public transport journey times through the city centre core, reduce overall bus congestion on Union Street, and potentially encourage use of the ART services. This would still permit substantial reallocation of road space to walkers, wheelers and cyclists.

3.1.6 ART Network Tests R2, R5, R6 and R8 do not use Union Street Central for the routing of ART services and so these tests are unaffected by the potential future pedestrianisation of Union Street; however, Tests R1, R3, R4a, R4b, R7, R9 and R10 would require re-routing of ART services in the event of buses not being permitted to use Union Street Central.

## 3.2 Test R1 Routing Alternative

3.2.1 Under Test R1, all routes must terminate and interchange in the city centre and so consideration also needs to be given to how vehicles will turn around before returning north/south/west/north-west. If all four ART services must meet for interchange, then there are two broad options: on Broad Street and at Union Square Bus Station. These options are illustrated in the figures below.

3.2.2 The route via Broad Street has the advantage of bringing all four ART services closer to the Bon Accord and St Nicholas Shopping Centres, as well as Marischal College. There are existing bus gates on Broad Street, but this routeing is likely to necessitate some additional changes to bus priority infrastructure and traffic signals at the junctions of Union Street with Broad Street, Littlejohn Street and King Street with West North Street to ease bus movement.

Figure 3.2: Test R1 Routing Alternative - Broad Street Terminus

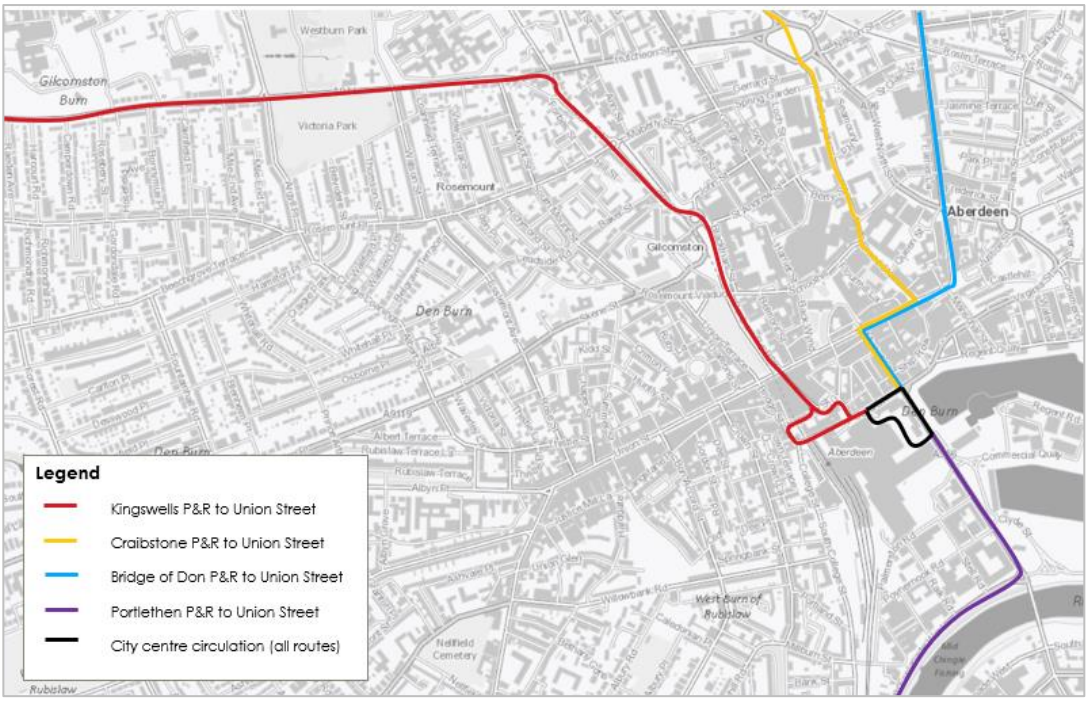


Figure 3.3: Test R1 Routing Alternative - Union Square Bus Station Terminus

## 3.3 Test R3 Routing Alternative

3.3.1 Routeing around Union Street Central for Test R3 is straight-forward, with the Kingswells Park & Ride to Bridge of Don Park & Ride service diverting via Market Street, Guild Street and Bridge Street to resume travel along Union Street. While Guild Street/Market Street and Market Street/Union Street junctions are heavily trafficked at present, CCMP proposals suggest that general car traffic will no longer be able to use Market Street which should improve conditions.

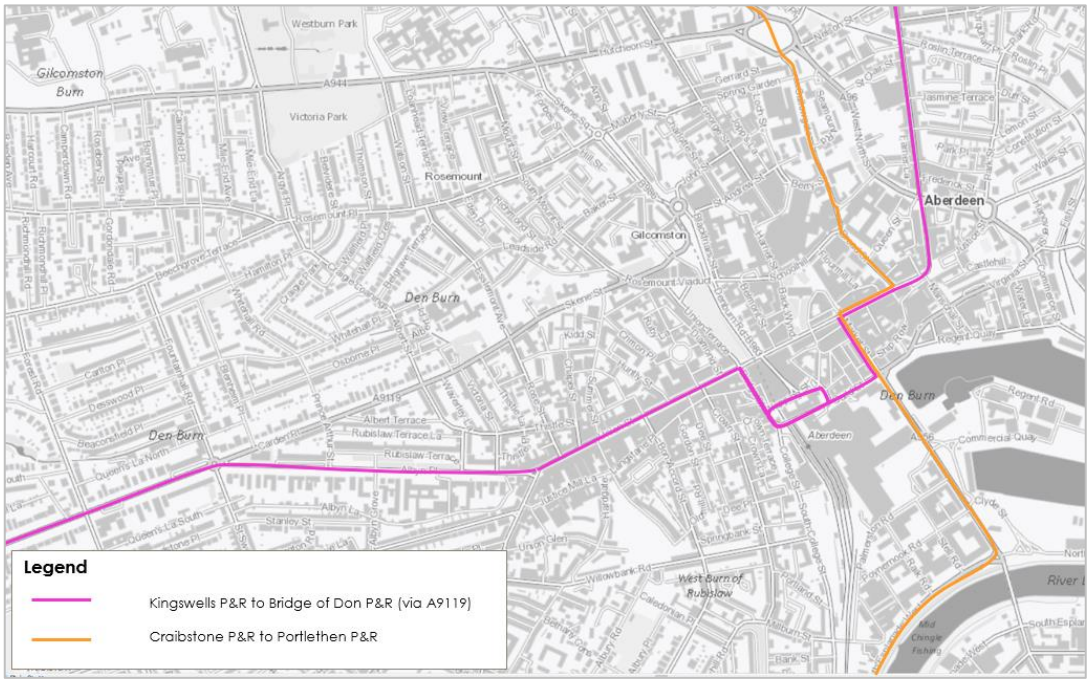


Figure 3.4: Test R3 Routing Alternative

## 3.4 Test R4a / R4b / R7 / R10 Routing Alternative

3.4.1 Tests R4a, R4b, R7 and R10 have the same routeing within the city centre, and so the same re-routeing is required if there is a requirement to avoid Union Street Central.

3.4.2 Under CCMP proposals, Market Street, Bridge Street and Guild Street would be closed to cars and additional bus stop infrastructure installed. On this basis, there are three broad options for an interchange location: Union Street between Market Street and Broad Street, Guild Street east of Carmelite Street or Union Square Bus Station. While routeing ART services via the bus station would make interchange with other local bus services and rail services easier, it will add greater delay than the on-street options.

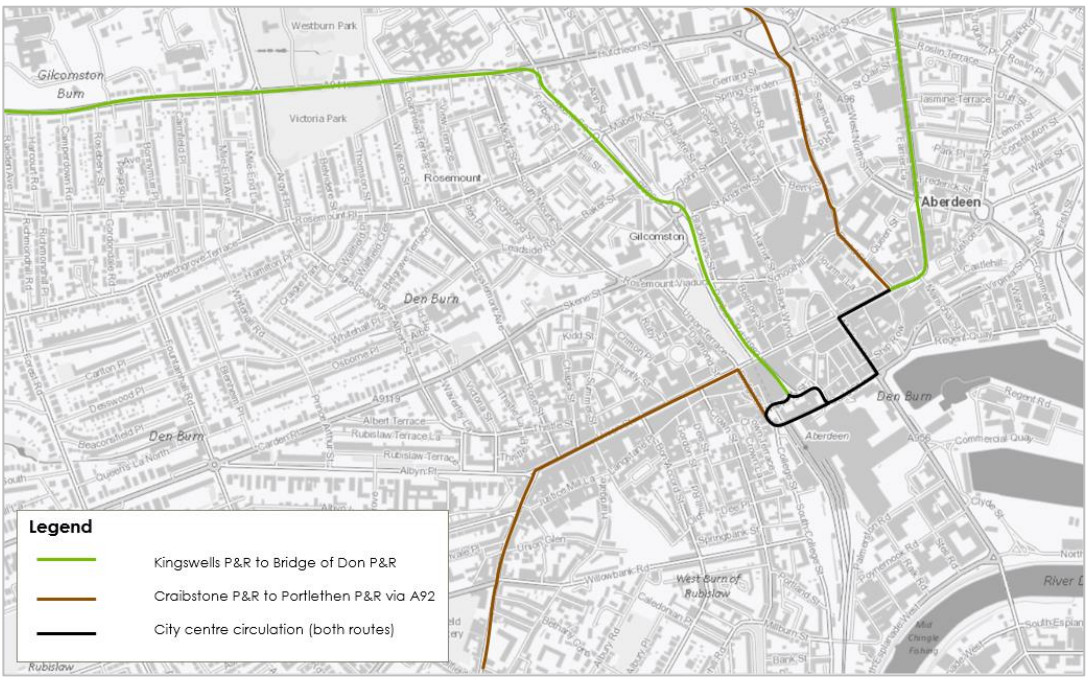


Figure 3.5: Test R4a Routing Alternative

## 3.5 Test R9 Routing Alternative

3.5.1 The two ART routes under Test R9 do not naturally cross the city centre nor intersect. In order to achieve this the Craibstone Park & Ride to Bridge of Don Park & Ride route must extend south to Guild Street, then 'double back' on itself.

3.5.2 It is anticipated that interchange could either occur on Guild Street or at Union Square Bus Station. A more time-efficient alternative would be to do without direct interchange, and for bus users to walk 500m from Guild Street to Broad Street to switch between services.

Figure 3.6: Test R9 Routing Alternative

# 4 Defining the catchments

## 4.1 Introduction

4.1.1 GIS software has been used to plot the proposed ART corridors under each of the network tests, and to identify the potential catchment area for the associated ART services.

4.1.2 Analysis of National Travel Survey data completed by White Young Green in 2015[2] identified the mean and 85th percentile walking distances between origin and bus stops/train stations where bus/train was the main mode of travel. These findings are summarised in the table below.

Table 4.1: Typical walking distances to public transport stops

| | Weighted Sample Size | Mean | 85th Percentile |
|---|---|---|---|
| Walk to bus stop | | | |
| Scotland | 871 | 510m | 800m |
| UK (excl. London) | 5075 | 580m | 800m |
| Walk to train station | | | |
| Scotland | 365 | 980m | 1610m |
| UK (excl. London) | 2676 | 1010m | 1610m |

4.1.3 500m is a typical walking distance to access a bus service in Scotland, with an approximate distance of 1km for a rail service. Therefore, 600m walking distance to access a bus rapid transit service with frequent, express style services was considered appropriate.

4.1.4 Zone shapefiles were updated for each test to indicate the proximity of each zone to the corridors defined (50m bandings from 50-600m). For each zone:

- Where the ASAM zones was located within 600m of the proposed ART network, the zone was allocated to the nearest ART corridor.
- Where the ASAM zone fell beyond the extents of the ART network and outside of the city (i.e., further north / south / east / west of proposed ART corridors), it was considered that those travelling from these zones may be candidates for use of the ART network in conjunction with a Park & Ride site. Such zones were allocated to the nearest Park & Ride facility.

4.1.5 Zones which did not fall into either of the categories noted above were assumed to be outside the catchment of an ART service.

## 4.2 Sectoring and Categorisation

4.2.1 The ASAM zones associated with each of the Park & Ride sites and ART corridors were then defined as a sector, and sector based origin-destination pairs classified as falling into one of six categories:

- **ext_ext**: origin and destination fall within Park & Ride site catchment
- **pnr:** origin or destination in Park & Ride site catchment and opposite end of the trip in corresponding ART corridor catchment (i.e., no interchange needed between ART services)
- **pnr_interchange**: origin or destination within Park & Ride site catchment and opposite end of the trip within different ART corridor catchment (i.e., user interchanges between ART services in the city centre)

[2] https://rapleys.com/wp-content/uploads/2020/10/CD3.38-WYG_how-far-do-people-walk.pdf

- **corridor**: origin and destination both within same ART corridor catchment
- **interchange**: origin within one ART corridor catchment and destination another ART corridor (i.e., interchange needed between ART services in the city centre)
- **out of scope**: origin or destination falls outside of both an ART corridor and Park and Ride site catchment

4.2.2 'Out of scope' origin-destination pairs were excluded from consideration given that an ART corridor does not effectively serve one end of the journey. It was also decided to exclude those origin-destination pairs where both the origin and destination fall within the catchment of a Park and Ride site, as it was considered that travellers making trips like this were unlikely to use an ART service (i.e., 'ext_ext') given that the journey would involve at least two interchanges between modes.

4.2.3 Finally, origin-destination pairs were excluded where the travel distance between zones was less than 1km because it was assumed that an ART service would not be used given the short trip length.

## 4.3 Aberdeen Sub-Area Transport Model 2019 (ASAM19)

4.3.1 Baseline 2019 matrix 'skims' were obtained from ASAM19 which indicated the number of movements between each zone pair during the AM peak hour, average Interpeak hour and PM peak hour for both road traffic and public transport. Sectoring was applied as described above for each of the network tests.

4.3.2 ASAM demand data is expressed in terms of the number of person trips for public transport journeys and in terms of vehicle trips for car-based journeys. Data was obtained from the National Travel Survey 2019 on average car/van occupancy by travel purpose (NTS0905, National Travel Survey 2019), in addition to data on the travel purpose split of Bridge of Don Park & Ride users (Table 5.3, The Effects of Park & Ride Supply and Pricing on Public Transport Demand, Transport Scotland, 2012). Average car/van occupancies were weighted by the Park & Ride journey purpose split proportions to estimate the average car occupancy of Park & Ride users (1.4 persons per car/van). ASAM car-based demand outputs were then factored accordingly to estimate the demand in terms of person trips.

4.3.3 As a straight-line distance was used to identify the ASAM zones which fall within a potential catchment area of the ART corridors, it was necessary to apply an additional factor to reflect the fact that straight-line walking routes are generally not possible within an urban environment and so the actual walking distance is equal to or longer than the straight-line distance. As such, a factor of 0.8 was applied to identified catchment demand to reflect this.

4.3.4 Finally, factoring was applied to convert AM peak hour, average Interpeak hour and PM peak hour to full AM (07:00-10:00), Interpeak (10:00-16:00) and PM (16:00-19:00) periods. These ASAM19 factors were provided by Systra and are those factors as applied within the ASAM19 model.

**4.3.5 The result was a set of sector-based origin-destination pairs for each test which represents the total demand for travel between 07:00 and 19:00, which could theoretically be partially or fully served by an ART service.**

# 5 Estimating Demand for ART

## 5.1 Overview

5.1.1 The next step was to consider how much of the theoretical demand would actually transfer to an ART service. The likelihood of transfer was assumed to depend on the original mode of travel, the requirement for interchange and whether ART could be accessed within walking distance.

5.1.2 This analysis was undertaken under the assumption that ART would take a form similar to that proposed under Option 5 (i.e. new services which operate new bespoke 'tram-like' vehicles, with a six to ten minute headway).

## 5.2 Assumptions

5.2.1 The below table was generated of the transfer probabilities for current public transport and car users, based on the described rationale. These probabilities reflect those used in the similar analysis in the Preliminary Options Appraisal report.

Table 5.1: Assumptions underlying catchment demand estimation

| Current Mode of Travel | Means of accessing ART | Interchange between ART services to reach destination? | Rationale for assumption | Assumed % of 'in catchment' trips which would transfer to ART |
|---|---|---|---|---|
| Current Public Transport Users | Walk to ART corridor | No | Already using public transport and transferring to use ART service will provide journey time benefit and provides direct connection to destination so a large proportion will transfer to ART services. This recognises that not everyone will transfer to ART as the existing service may be preferred. | 70% |
| | | Yes | Already using public transport and transferring to use ART service is likely to provide journey time benefit. Recognising that interchange would be required between services (and assuming current bus travel is direct) and introducing an interchange may deter use, a lower assumed percentage of switchers is assumed (slightly less than half of the users as noted in the cell above). The percentage is still significant, recognising the assumed ease and high-quality interchange environment on ART. | 30% |
| | Bus to P&R to join ART service | No | Already using public transport but swapping to join ART at a Park & Ride site would add an interchange into the trip to join the ART network. People may be less inclined to do so and prefer to remain on an existing direct service where interchange is not required (even if the overall journey time is longer). It is also noted that both the A96 and A92(S) corridors are served by rail which may mean trips from further afield are more likely to be captive to rail as opposed to Park & Ride on these corridors. | 10% |
| | | Yes | Already using public transport but swapping to join ART at a Park & Ride site would add an interchange into the trip to join the ART network. There would then be an additional interchange between ART services to reach the final destination. The assumed percentage of people transferring to ART recognises that two interchanges is unlikely to be welcomed and a low percentage in this segment will transfer to ART. As noted above, both the A96 and A92(S) corridors are served by rail which may mean trips from further afield are more likely to be captive to rail as opposed to Park & Ride on these corridors. | 5% |
| Current Drivers | Within walking distance of ART service | No | The rationale for the percentage to apply to these four segments is similar to that as noted above against the similar segments. However, the percentages are much lower, reflecting the fact that these four segments represent current car drivers and using ART would require modal shift to public transport. In addition, the low percentages also reflect the high potential 'in catchment' demand i.e., when applied to the 'in catchment' demand they do not generate an unattainably high number of switchers. | 10% |
| | | Yes | | 2% |
| | Drive to P&R to join ART service | No | | 3% |
| | | Yes | | 0.1% |

5.2.2 These assumptions were then applied to the total 'in-catchment' demand for travel to estimate the likely demand for ART services on each ART corridor, for each of the infrastructure tests on an average weekday between 07:00 and 19:00.

5.2.3 Additional assumptions on ART operation were applied to allow estimation of hourly demand and demand per departure for the average weekday. These assumptions are as below:

- **Operating hours:** ART services operate at a consistent frequency 18 hours a day from 06:00-00:00, with no services operating from 00:00-06:00.
- **Service frequency:** 10 ART services operate in each direction per hour on each corridor (i.e., 6-minute frequency) as the core scenario.

## 5.3 Demand Forecasts

5.3.1 The following table presents the resulting potential annual in-catchment demand under each of the ART network tests.

Table 5.2: Initial Passenger Demand Estimates by Test and Corridor

| Test | Corridor | Annual Demand | |
|---|---|---|---|
| R1 | Kingswells P&R to Union Street via A944 | 1.6m | **4.5m** |
| | Bridge of Don P&R to Union Street via A956(N) | 0.7m | |
| | Craibstone P&R to Union Street via A96 | 1.3m | |
| | Portlethen P&R to Union Street via A956(S) | 0.8m | |
| R2 | Kingswells P&R to Bridge of Don P&R via A944 + A956(N) | 3.0m | **5.7m** |
| | Craibstone P&R to Portlethen P&R via A96 + A956(S) | 2.7m | |
| R3 | Kingswells P&R to Bridge of Don P&R via A9119 + A956(N) | 2.3m | **5.0m** |
| | Craibstone P&R to Portlethen P&R via A96 + A956(S) | 2.7m | |
| R4a | Kingswells P&R to Bridge of Don P&R via A944 + A956(N) | 2.7m | **5.7m** |
| | Craibstone P&R to Portlethen P&R via A96 + A92(S) | 3.0m | |
| R4b | Kingswells P&R to Bridge of Don P&R via A944 + A956(N) | 2.8m | **5.9m** |
| | Craibstone P&R to Portlethen town via A96 + A92(S) | 3.2m | |
| R5 | Westhill to Bridge of Don P&R via A944 + A956(N) | 3.3m | **5.9m** |
| | Craibstone P&R to Portlethen P&R via A96 + A956(S) | 2.7m | |
| R6 | Kingswells P&R to Bridge of Don P&R via A944 + A956(N) | 3.0m | **5.9m** |
| | Craibstone P&R to Portlethen town via A96 + A956(S) | 2.9m | |
| R7 | Kingswells P&R to Bridge of Don P&R via A944 + A956(N) | 2.8m | **5.8m** |
| | Craibstone P&R to RGU Garthdee via A9013 | 3.0m | |
| R8 | Kingswells P&R to Craibstone P&R via A944 + A96 | 4.0m | **5.9m** |
| | Bridge of Don P&R to Portlethen P&R via A956(N) + A956(S) | 1.9m | |
| R9 | Kingswells P&R to Portlethen P&R via A944 + A956(S) | 3.0m | **5.7m** |
| | Craibstone P&R to Bridge of Don P&R via A96 + A956(N) | 2.7m | |
| R10 | Westhill to Bridge of Don P&R via A944 + A956(N) | 3.3m | **6.2m** |
| | Craibstone P&R to Portlethen P&R via A96 + A92(S) | 2.9m | |

5.3.2 The top three corridors in terms of demand served are therefore:

- Kingswells Park & Ride to Craibstone Park & Ride via A944 + A96 (Test R8) – 4.0m passengers per annum.

- Westhill to Bridge of Don Park & Ride via A944 + A956(N) (Tests R5 & R10) – 3.3m passengers per annum.
- Craibstone Park & Ride to Portlethen town via A96 + A92(S) (Test R4b) – 3.2m passengers per annum.

5.3.3 The top three tests in terms of total demand served are:

- Test R10 (6.2m passengers per annum)
- Test 4Rb (5.9m passengers per annum)
- Test R5 (5.9m passengers per annum)

5.3.4 Another point of note is that the Craibstone to RGU Garthdee corridor (Test R7) is expected to carry approximately 3m passengers per annum, which is similar to much longer routes from Craibstone to Portlethen. The routes which extend as far as Portlethen are approximately 4km longer than the equivalent to RGU Garthdee, necessitating a greater extent of infrastructure works, in addition to a new Park and Ride site at Findon Junction.

# 6 Summary

6.1.1 Prior to the full Detailed Options Appraisal modelling, analysis was undertaken to explore potential route structures for Aberdeen Rapid Transit. From this, passenger demand estimates were derived for each of the ten network tests identified and discussed above. These estimates were developed based on (unaudited at the time) ASAM19 base matrices available in Summer 2022.

6.1.2 Overall, it was identified that network Test R10 would generate highest levels of patronage at approximately 6.2m passengers per year. Test R10 comprised two routes:

- Westhill to Bridge of Don P&R via A944 + A956(N)
- Craibstone P&R to Portlethen P&R via A96 + A92(S)

6.1.3 Test R10 also closely matches the Nestrans Vision for ART and was brought forward for the full modelling and detailed appraisal purposes. **Note however that this is not to say that this network is the preferred ART network, just that it is considered at this stage the most appropriate network on which to undertake robust testing.**

6.1.4 However, it should be noted, an alternative route from Craibstone to Robert Gordon University Garthdee campus also performed well in terms of estimated patronage. With this route being substantially shorter and remaining within the Aberdeen urban area, there would not be a requirement for a new Park & Ride site north of Portlethen at Findon Junction, and therefore both infrastructure and operational costs are likely to be lower. This could potentially to boost the chances of a commercially viable service.