Aberdeen Rapid Transit

Detailed Options Appraisal

Technical Note F – Infrastructure Costing

On behalf of:

nestrans

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

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Document Control Sheet

Project Name: **Aberdeen Rapid Transit**

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Report Title: **Technical Note F – Infrastructure Costing**

Date: **February 2023**

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Revision	Date	Description	Prepared	Reviewed	Approved

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1 Infrastructure Costing

1.1 Introduction

1.1.1 This technical note outlines how infrastructure cost estimates were derived for each of the options under consideration.

1.1.2 Costing information for the ongoing A944 and A96 ART corridors was derived from the multi-modal corridor studies (A944-A9119 Detailed Appraisal and A96 Preliminary Appraisal). At the time of writing, a detailed appraisal of options for the A956 and A9013 corridors was on-going, but end-to-end designs and costing information was not yet available. As such, infrastructure costs for the remaining corridors were estimated based on the costings produced for the A96 (Option 2B) and A944 (Option 2). All costs below reflect 2021 prices.

1.2 Link Infrastructure

1.2.1 Costings developed for the A96 and A944 were reviewed and infrastructure proposals for each link were graded as being high/medium/low or none. Also, links were only graded as 'none' where no additional bus priority infrastructure was proposed; however, the majority of these links still required some associated improvement such as pedestrian crossing upgrade/renewal or side road entry treatments to improve conditions for those walking to/from ART stops.

1.2.2 An average cost per km (including preliminaries at 15% and optimism bias (OB) at 46%) was then calculated for each grade of infrastructure change:

- None: £230,000
- Low: £410,000
- Medium: £605,000
- High: £1,121,000

1.2.3 Links on the A956(N) and A92(S) corridors were then similarly graded. The figure below indicates link infrastructure grades assumed for all corridors.

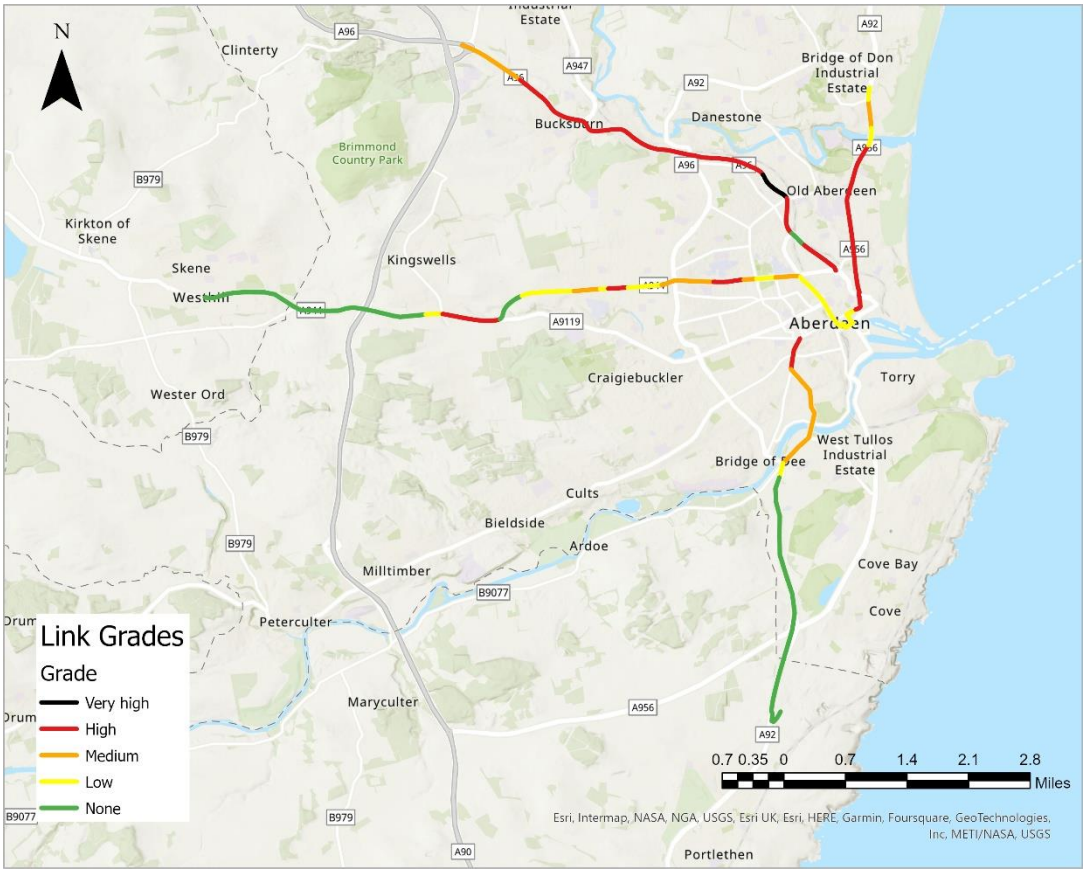

Figure 1.1: Link infrastructure grading

1.2.4 Based on the categorisation applied, an allowance was made for lighting:

- None: no lighting changes
- Low/Medium: Minor lighting modifications (£47,000/km including preliminaries and OB)
- High: Full lighting replacement (£470,000/km including preliminaries and OB)

1.2.5 Link infrastructure costs for each corridor were then calculated by multiplying link length by the appropriate average cost per km derived for high/medium/low/none infrastructure changes[1]. Consideration was also given to the fact that under Options 2, 3 and 3A, ART services would only use a portion of ART corridors and costs were adjusted accordingly. Note it was assumed that link upgrades will not be required on Broad Street and Union Street which fall within the CCMP area, and also on Airport Road, Argyll Road and Brent Road between the A96 and the Airport.

[1] Costs for the A96 Link 16 were left as per the original study, given that this link includes substantial road widening as part of the Berryden Road Corridor project Phase 2, and is not reflective of typical corridor conditions.

Table 1.1: Link Upgrade Costs

Corridor	Link Upgrade Costs (£m)	
	Option 2, 3 and 3A	Options 5A, 5 and 5P
Westhill to Guild Street via A944	2.1	6.0
Craibstone Park & Ride to Gallowgate via A96	24.1	25.1
Bridge of Don Park & Ride to Broad St/Union St junction via A956(N)	5.1	5.1
Portlethen Park & Ride (Findon Junction) to Union St/Holburn St junction via A92(S)	3.3	3.3
Total	**34.5**	**39.5**

1.2.6 These costs include an allowance for preliminaries at 15% and optimism bias at 46%.

1.3 Junction Upgrades

1.3.1 As part of the A944 and A96 costings an exercise was undertaken to categorise required junction upgrades as either high, medium or low cost. Average junction upgrade costs (including preliminaries and optimism bias) were calculated for high/medium/low grades of intervention, as below:

- High: £12.1m
- Medium: £5.6m
- Low: £1.2m

1.3.2 A high level review of junctions on the A956(N) and A92(S) corridors was undertaken to allow categorisation as high/medium/low intervention for the purposes of this cost estimate[2]. When further information becomes available from the remaining corridor studies, these estimates will be revised.

1.3.3 The figure below illustrates which junctions have been included in this calculation and the grade of junction improvements assumed:

[2] Note: following comparison of A96 and A944 junction categorisation, it was decided that some minor changes should be made to junctions

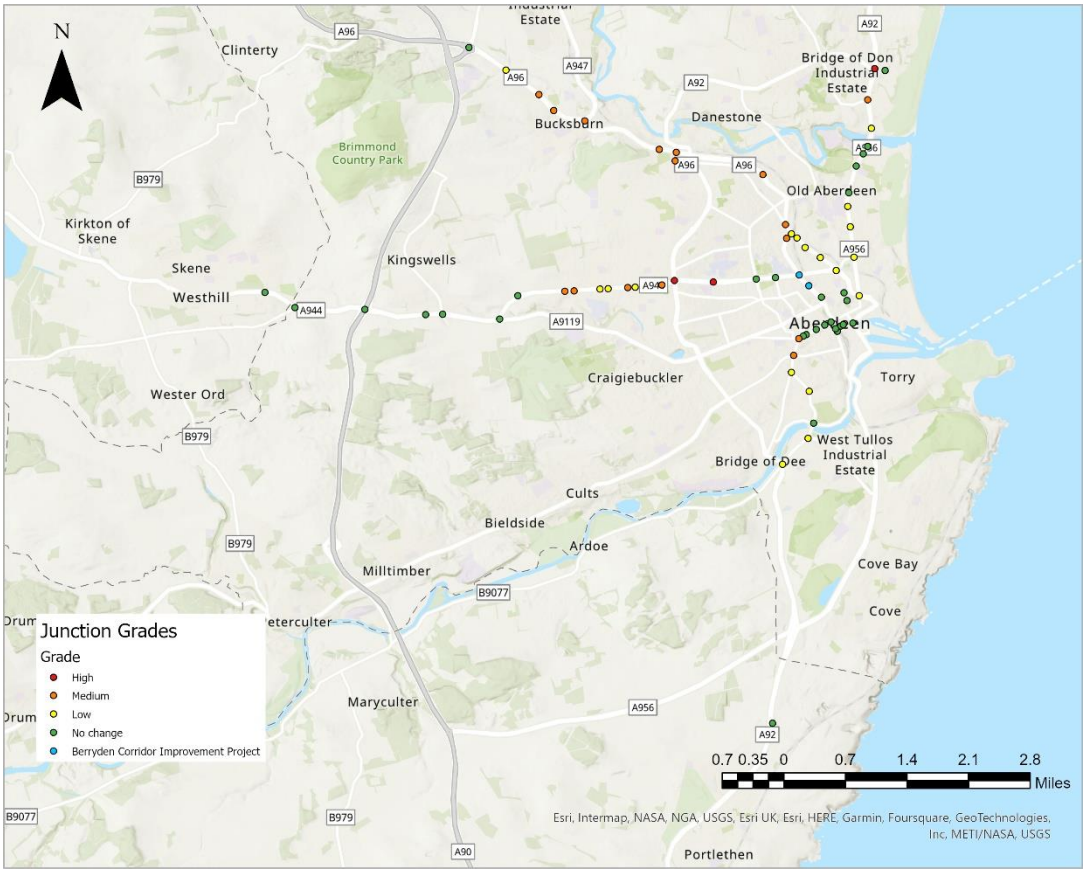

Figure 1.2: Junction infrastructure grading

1.3.4 Total junction improvement costs for each of the corridors are noted below (including preliminaries and optimism bias). Consideration was again given to the fact that under Options 2, 3 and 3A, ART services would only use a portion of ART corridors and costs were adjusted accordingly.

Table 1.2: Junction Upgrade Costs

Corridor	Junction Upgrade Costs (£m)	
	Option 2, 3 and 3A	Options 5A, 5 and 5P
Westhill to Guild Street via A944	50.3	52.7
Craibstone Park & Ride to Gallowgate via A96	53.3	60.4
Bridge of Don Park & Ride to Broad St/Union St junction via A956(N)	24.8	24.8
Portlethen Park & Ride (Findon Junction) to Union St/Holburn St junction via A92(S)	16.8	16.8
Total	**145.2**	**154.7**

1.4 Bus stop infrastructure

Options 2 and 3

1.4.1 Under Options 2 and 3, it is assumed that all existing bus stops on the study corridors would be upgraded to include a modern shelter, rest-space and timetable information as required. For the purposes of this cost estimate, it has been assumed that this will cost approximately £25,000 per stop including preliminaries and optimism bias.

1.4.2 It was also assumed that bus laybys would be removed, as it can be difficult for buses to re-enter the flow of traffic after stopping in a lay-by. This has been estimated to cost approximately £13,000 per layby.

1.4.3 No changes to existing bus stops have been assumed within the city centre under Options 2 and 3, given that existing bus stops appear to be well provisioned and in good condition, and this area is covered by the CCMP.

1.4.4 Overall upgrades to bus stops and removal of bus laybys on ART corridors under Options 2 and 3 are expected to cost approximately (including preliminaries and optimism bias):

- Westhill to Guild Street via A944: **£1.3m**
- Craibstone Park & Ride to Gallowgate via A96: **£1.5m**
- Bridge of Don Park & Ride to Broad St/Union St junction via A956(N): **£0.9m**
- Portlethen Park & Ride (Findon Junction) to Union St/Holburn St junction via A92(S): **£0.8m**

Options 3A, 5A, 5 and 5P

1.4.5 Under Options 3A, 5A, 5 and 5P it is assumed that new ART stops provided at approximately 800m intervals. To reduce congestion on ART corridors for all services and improve journey times, existing bus stops will also be removed on ART corridors outside of the city centre.

1.4.6 Stops will not be located with a strict 800m spacing but instead have been assumed to approximately align with key trip generators such as shopping areas, medical facilities and business parks. It is estimated that construction of a new high specification ART stop would cost approximately £84,000 (including preliminaries and optimism bias).

1.4.7 Similar to the above, it has been assumed that bus laybys would be removed on ART corridors at a cost of approximately £13,000 per layby.

1.4.8 Within the city centre, it has been assumed that an ART interchange would be located east of the junction with Market Street, where both ART routes would meet. This Interchange would site two ART stops on each side of the road with a pedestrian crossing in between, as has been costed as being equivalent to four ART stops. Further ART stops would be provided on Union Street by the Music Hall, on Guild Street opposite the Bus Station and on Gallowgate opposite North East Scotland College.

1.4.9 The figure below provides an indication of all potential ART stop locations, as used for the purposes of estimating bus stop infrastructure costs.

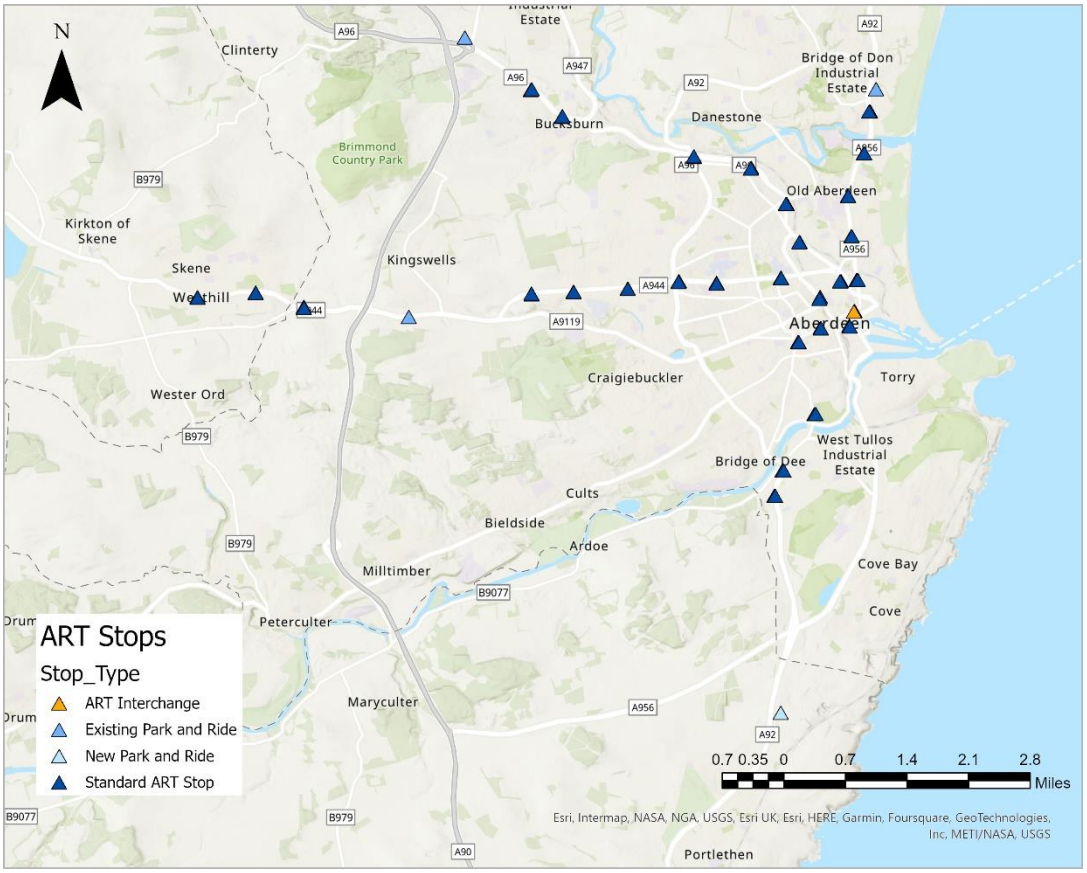

Figure 1.3: ART Stop Types and Locations

1.4.10 Overall, the provision of new ART stops, removal of existing stops and bus laybys on ART corridors under Options 3A, 5A, 5 and 5P is expected to cost approximately (including preliminaries and optimism bias):

- Westhill to Guild Street via A944: **£1.6m**
- Craibstone Park & Ride to Gallowgate via A96: **£1.3m**
- Bridge of Don Park & Ride to Broad St/Union St junction via A956(N): **£0.9m**
- Portlethen Park & Ride (Findon Junction) to Union St/Holburn St junction via A92(S): **£0.8m**
- City centre: **£0.8m**

1.5 Park and Ride Upgrades and Construction

1.5.1 This analysis has assumed that ART services would visit existing Park and Ride facilities at Craibstone, Kingswells and Bridge of Don, as well as the proposed Portlethen Park and Ride, located off the A92(S) at Findon junction. A ballpark estimate of **£13.4m** (including preliminaries and optimism bias) has been assumed for the construction of a new Park and Ride facility by Findon junction under all options. Although, existing Park and Ride sites could benefit from upgrade/modernisation, this has not been costed for as part of ART.

1.6 Summary

1.6.1 The table below summarises total infrastructure costs for ART for each option and includes an allowance for construction of a new Park and Ride facility by Findon Junction under all Options.

Table 1.3: Infrastructure costing summary

Option	Cost Estimate (£m)
Option 2	198
Option 3	
Option 3A	199
Option 5A	213
Option 5	
Option 5P	