A956/BEACH BOULEVARD JUNCTION – OPTION APPRAISAL REPORT EXECUTIVE SUMMARY

SYSTRA

EXECUTIVE SUMMARY

Introduction

An objective-led appraisal of options for improving walking, wheeling, cycling and public transport connectivity between Aberdeen City Centre and the Beach Esplanade at the A956/Beach Boulevard roundabout has been undertaken and has identified a preferred option to be progressed to Outline Business Case (OBC).

The major city centre junction is the key connection point between Aberdeen's City Centre Masterplan (CCMP) and Beachfront Development Framework (BDF) and its future operation is critical to facilitating better connections between each masterplan area.

The appraisal was an objective-led study based on Scottish Transport Appraisal Guidance (STAG) principles. The appraisal was structured as follows:

- Review of Existing Conditions
- Objective Setting
- Option Generation
- Option Development
- Option Model Assessment
- DMRB Stage 2 Assessment
- Option Appraisal & Identification of Preferred Option

Throughout the commission, the SYSTRA project team were supported by an ACC study team of project officers.

Summary of Problems and Constraints

To inform the objective setting and option generation, the review of existing conditions highlighted the following key problems and constraints at the junction:

- A traffic-led junction with a large footprint
- Walking, wheeling and cycling connectivity is indirect and unattractive
- Formal crossing points are dislocated from desire lines
- Pedestrian environment is constrained and may feel intimidating or unsafe to some users
- There are no formal cycle facilities through or on any approaches to the junction
- The junction is a key freight route, it facilities access to and from Aberdeen Harbour and is the designated Abnormal Load Route

Objective Setting

Before beginning the option development process, it is crucial to set the study objectives to assist in the appraisal of options. STAG outlines that options should be appraised against Transport Planning Objectives (TPOs) and that these are typically identified at the start of the STAG process.

To inform the objective setting therefore, a review of the aims and objectives of the City Centre and Beach Masterplan was undertaken. Following this review and discussions with the ACC study team an agreed set of SMART Objective were identified. These are presented in Table 1 alongside the measurement of option performance and the proposed method of analysis during the option appraisal.

Table 1. A956/Beach Boulevard Study Objective

Objective		Measure		Method of Analysis
1	Improve pedestrian, wheeling and cycling connectivity	1A	Reduce walk distances through the junction	Total distance comparisons
		1B	Reduce walk time between City Centre and Beach through junction	Point to point journey time comparison
		1C	Optimise greentime/frequency of non-motorised movements through junction	Total cycle green time comparisons
		1D	Increase segregated cycle crossings	No. of arms connected by seg. cycle crossings
2	Improve access for all	2A	Reduce walk distances through the junction	Total distance comparisons
		2B	Reduce required level changes	Comparison against existing provision
		2C	Reduce the number of remote pedestrian crossings	Comparison against existing provision
3	Improve public transport connectivity	3A	Reduce bus journey times between Union Street (CCMP) and Beachfront	Existing vs Option (Paramics model analysis)
		3B	Improve journey time reliability between Union Street (CCMP) and Beachfront	
		3C	Accommodate future bus movement between Justice Street and Beach Boulevard	Suitability for potential bus routes through Justice Street
4	Optimise the traffic network performance	4A	Assessment of journey times on key routes through the junction	Existing vs Option (Paramics model analysis)
		4B	Assessment of any localised congestion on approaches to the junction	
		4C	Assessment of general network wide journey times and delay	
5	Optimise Network Resilience	5A	Public transport resilience (e.g. displacement of buses on to harbour route)	Informed by Paramics model analysis on network performance and wider considerations on Option Design
		5B	General traffic resilience (e.g. accommodate incident in traffic network)	
		5C	Provide emergency vehicle access in all directions	

Option Generation and Development

Option Generation & Initial Sifting

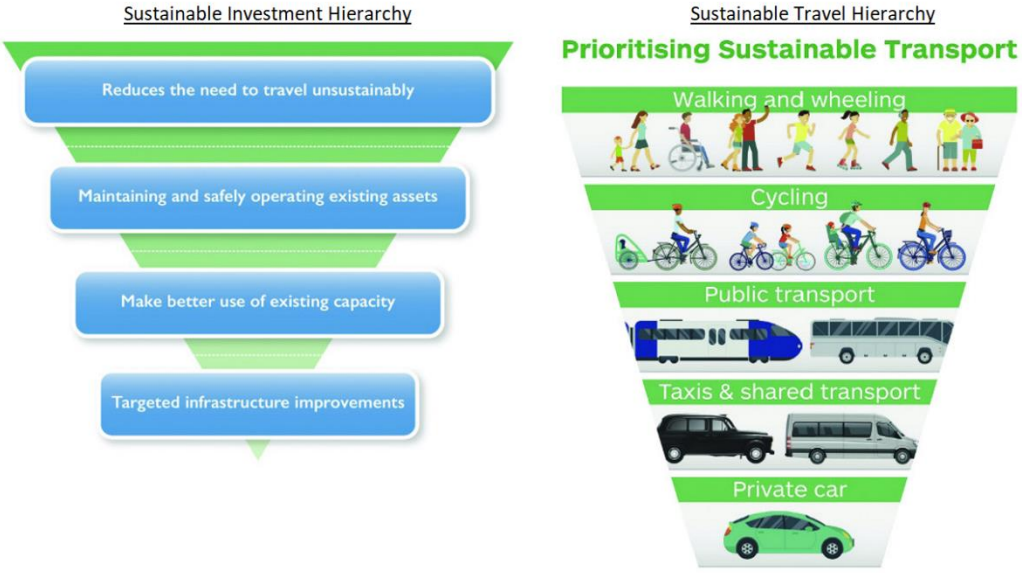
The first step in identifying a preferred option is to derive a 'Long List' of options that could satisfy the study's objectives, alleviate the identified problems and address the outlined opportunities.

In line with STAG, the options for this 'Long List' were generated through a number of methods, including:

- consideration of previous studies, in this case the wider CCMP and BDF
- consideration of other adopted ACC policies and strategies
- consideration of existing conditions (problems and opportunities)
- analysis of the existing transport network and committed measures
- current design standards and guidelines
- professional judgement flowing from a structured decision making process by the study team.

Option generation was also informed by both the Sustainable Investment Hierarchy and the Sustainable Travel Hierarchy (Figure 1). In doing so, as noted in the National Transport Strategy 2, transport options that focus on reducing inequalities and reducing the need to travel unsustainably will then be prioritised.

Figure 1. Sustainable Investment Hierarchy and the Sustainable Travel Hierarchy



This commission does not develop options to detailed design but importantly took cognisance of relevant design policy and guidance such as Designing Streets, Roads for All and Cycling by Design from the option generation stage right through to identification of the final preferred option.

Several concept options were identified through a high-level visioning as part of the BDF:

1. an at-grade option
2. a pedestrian and cycle overbridge option
3. a road tunnel option
4. an option that improves the existing pedestrian bridge connection between Virginia Court and Castlehill

Developing the options identified above and combining them with further options identified the methods outlined in STAG, resulted in 15 Options being considered for initial sifting. The options identified consisted of both at-grade and grade-separated solutions. For each option, an approximate sketch was made and key pedestrian, wheeling, cycling and vehicular movements identified. Each option was then scored against the identified study Objectives on a simple positive (+), neutral(/) and negative(-) scale.

Following discussion of the initial sifting results with the ACC Study Team, 11 of the 15 options progressed to the Option Development stage.

Option Development

Following the Option Generation and initial sifting exercise, eight at-grade solutions and three grade-separated solutions remained. The next step, in line with STAG, was to confirm that the options to be appraised were broadly feasible.

The feasibility assessment of the three grade-separated solutions (and a generic at-grade solution) were removed from this objective-led appraisal at this stage and examined in further engineering detail through a DMRB Stage 2 Engineering Assessment. This engineering-led assessment concluded that an at-grade solution is the most suitable proposal and therefore the focus on the appraisal from this stage is on identifying a suitable at-grade solution.

The eight at-grade options were first assessed for:

- Operational Capacity
- Design Feasibility

Following discussions with the ACC study team, the agreed outcome from this initial feasibility assessment was that two option concepts should be developed further before progressing to modelling and appraisal:

1. Retain the existing roundabout, in some form, and provide enhanced walking, wheeling and cycling connectivity.

2. Change the roundabout to a signalised junction and separate out key movements where possible and explore removing some movements completely to improve operational capacity and help facilitate active travel and public transport enhancements.

Taking the two options concepts, an iterative exercise of option development and assessment was undertaken. This iterative exercise considered 20 permutations of the two option concepts and concluded there to be four viable options to be progressed to Option Appraisal and Modelling, as set out in Table 2.

For the signalised junction options, the operational capacity assessment gave a clear indication that to release junction capacity to improve connections for walking, wheeling, cycling and public transport, some vehicular movements currently available would have to be restricted or removed. Analysis of turning movement volumes and operational capacity signal timings highlighted:

- Only one movement can be separated from the junction using a slip lane, namely East North Street to Beach Boulevard
- The right turn from Commerce Street to Beach Boulevard (City South to Beachfront) is a key movement for junction capacity. Removing this frees significant capacity.
- The left turn from Beach Boulevard to Commerce Street can also be removed to free capacity but is not crucial to junction operational capacity

Table 2. At-grade junction options for modelling and appraisal

Option	Option Concept	Option Summary
Option 1	Retain a roundabout	-Reduce the size of the roundabout and shift footprint to the north west -This change facilitates improved pedestrian and cycling connections between Justice St & Beach Boulevard -Enhanced crossings can also be provided on all arms
Option 2	Signalised Junction	-Signalised junction with all existing movements maintained with the exception of Park St (NB only from East North St) -Enhanced pedestrian and cycling connections through the junction with segregated cycle lanes connecting Justice St & Beach Blvd, with possible provision to other arms
Option 3	Signalised Junction	-Signalised junction with banned right turn from Commerce St to Beach Blvd and Park St NB only (from East North St) -Vehicles from the south of the city travelling to the beach area signed to route via Hanover Street, with Hanover St changed to NB only -No access from Justice Street to Beach Blvd (achieved via Hanover St) -Enhanced pedestrian and cycling connections through the junction with segregated cycle lanes connecting Justice St & Beach Blvd, with possible provision to other arms
Option 4	Signalised Junction	-Signalised junction with banned right turn from Commerce St to Beach Blvd and Park St NB only (from East North St) -Vehicles from the south of the city travelling to the beach area only signed to route via Cotton St/Miller St -No access from Justice Street to Beach Blvd (achieved via Cotton St/Miller St) -Enhanced pedestrian and cycling connections through the junction with segregated cycle lanes connecting Justice St & Beach Blvd, with possible provision to other arms

Option Appraisal

The four options were then subject to detailed appraisal against:

- Study Objectives
- STAG criteria (Environment; Climate Change; Health, Safety & Wellbeing, Economy, Equality & Accessibility)
- Established Policy Directives
- Feasibility and Affordability

In line with STAG, the appraisal of options was undertaken using a seven-point assessment scale, as set out in Table 3, with the results appraisal outcomes presented in Table 4.

Table 3. STAG 7-Point Scale

STAG 7-Point Scale	
✓✓✓	Option has major positive impact
✓✓	Option has moderate positive impact
✓	Option has minor positive impact
-	Option has neutral or no impact
✖	Option has minor negative impact
✖✖	Option has moderate negative impact
✖✖✖	Option has major negative impact

Table 4. Options Appraisal Summary

Option Appraisal	Option 1	Option 2	Option 3	Option 4
Study Objectives				
Improve pedestrian, wheeling and cycling connectivity	✓✓✓	✓	✓✓✓	✓✓✓
Improve access for all	✓✓	✓✓	✓✓	✓✓
Improve public transport connectivity	✓✓	✖✖	✓✓	✓✓
Optimise traffic network performance	✓	✖	✓	✓
Optimise Network Resilience	✓✓	✖✖	✓✓	✓✓
STAG Criteria & Wider Considerations				
Environment	✓	✖	✓	✓
Climate Change	✓	✖	✓	✓
Health, Safety & Wellbeing	✓✓	✓✓	✖✖	✓✓
Economy	✓	-	✓	✓
Equality and Accessibility	✓	✓	✓	✓
Established Policy Objectives	✓✓	✓✓	✓✓	✓✓
Feasability	-	-	-	-
Affordability	-	-	-	-
Public Acceptability	-	-	-	-

Following the above Option Appraisal outcomes and discussion with the ACC study team, the following conclusions were reached:

There are significant concerns around the ability for the proposed Option 2 measures to operate without significant congestion and impact to journey times through the junction. **As such, Option 2 performs poorly against 3 of the study objectives and it is not recommended this option progresses in the appraisal process.**

Option 3 generally performs well against most criteria but there are significant concerns around the proposed use of Hanover Street as an alternative route for vehicles travelling to the beachfront from south of the city. Model analysis shows a significant increase in traffic flows outside the Hanover Street School, with Hanover Street currently a low volume access road. Such an increase is likely to risk health, from a potential increase in vehicle emissions, and safety, from a potential increase in the likelihood of accidents. Option 4, which proposes the same junction setup and provides the same overall benefits to walking, wheeling and cycling, provides an alternative routeing to the beachfront from the south away from the primary school and is therefore a preferable option to Option 3. **As such, Option 3 is not recommended to progress in the appraisal process.**

Option 1 and Option 4 receive similar scores against all appraisal criteria with both expected to deliver significant positive benefits against the study objectives. **It is recommended that both Option 1 and Option 4 are presented to ACC for further consideration and identification as a preferred option.**

Option 1 proposes a roundabout is retained at the junction but with a smaller overall footprint to allow improved walking, wheeling and cycle connections. Option 1 is shown in Figure 2 with a summary of key benefits and potential issues provided in Table 5.

Option 4 proposes changing the junction to a signalised junction with improved walking, wheeling and cycle connections between all arms. Option 4 is shown in Figure 3 with a summary of key benefits and potential issues provided in Table 6.

Figure 2. Option 1

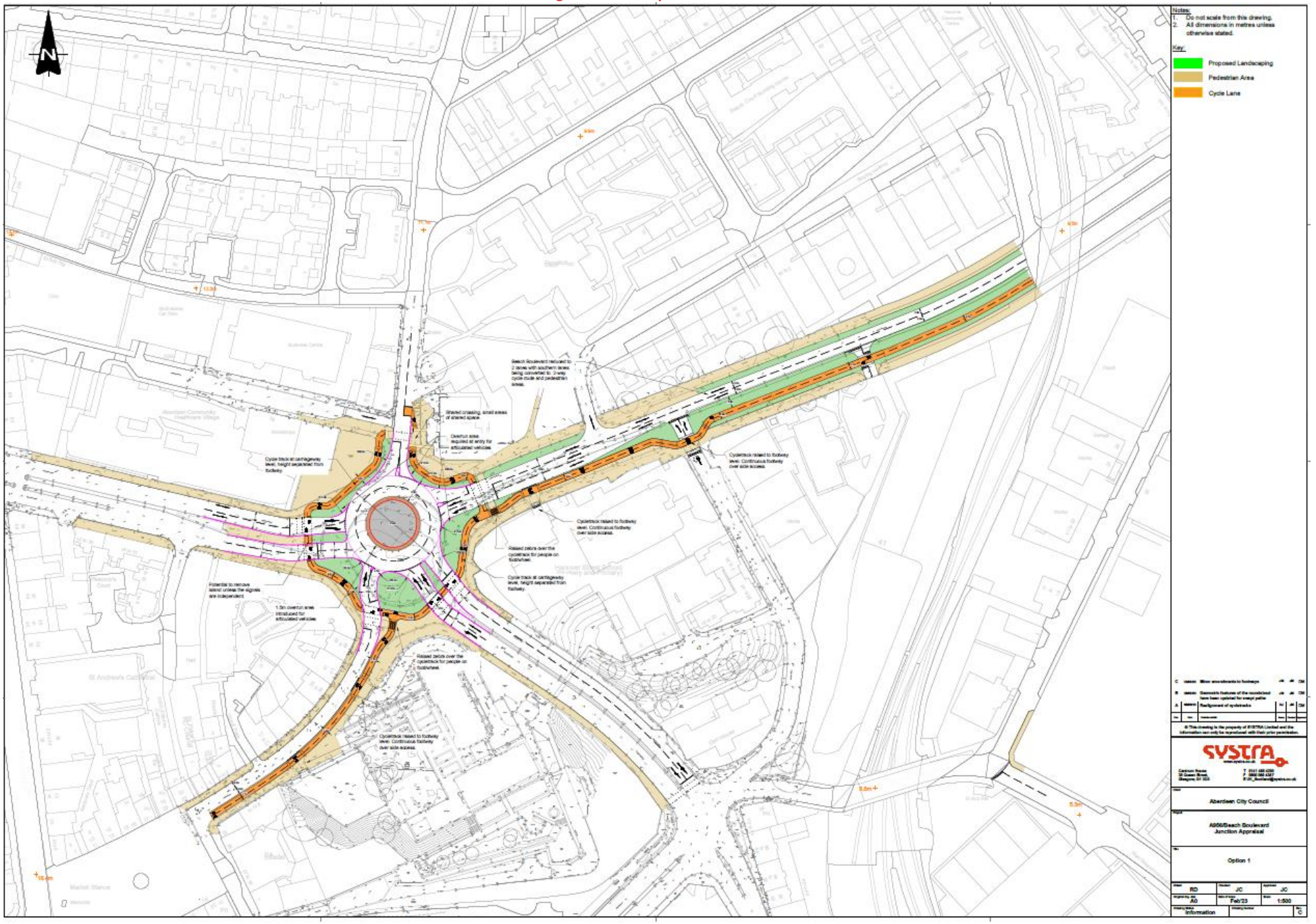


Table 5. Option 1 Summary

Option 1: Roundabout	
Benefits	Potential Risks
Provides improved walking and wheeling connections on all arms, with reduced walk distances and times	Departure from design standards expected, particularly on entry/exit radii. Potential detailed design risk if required departures impact on the safety of users.
Remote crossings (closer to desire lines than existing situation) are activated by the user giving short wait times and improving user experience	Detailed design may highlight issues for current Abnormal Load route
Pedestrian crossing dwell areas are larger than existing provision to provide safer, more comfortable space to wait (and cater for high volume pedestrian events)	Access to and from Justice Street for some larger vehicles may be restricted
Crossing points on Commerce St and East North St are traversed in one single movement - no need for pedestrians or cyclists to wait in a central reserve.	Does not enhance control of the junction to provide additional network resilience (e.g. traffic incident, high volume pedestrian event)
New segregated cycle connections provided between all arms. New cycle infrastructure connects CCMP and BDF segregated cycle lanes through the junction.	Does not provide the ability to prioritise bus movements through the junction (e.g. bus transponders at signalised junction)
Likely to lower speeds of vehicular traffic and improve overall safety experience for non-motorised users.	
Performs well against the policy objectives to prioritise active travel over vehicular movements	
Bus journey times and journey time reliability maintained. Accommodates future bus route improvements (e.g. through Justice Street/Castlegate)	
Little impact on general traffic queueing or journey times (retains optimum capacity of a roundabout)	
Maintains access to/from all arms for general traffic	
Maintains access to/from Aberdeen Harbour	
Capital and Revenue Costs limited to junction area i.e. no wider network implications	

Figure 3. Option 4

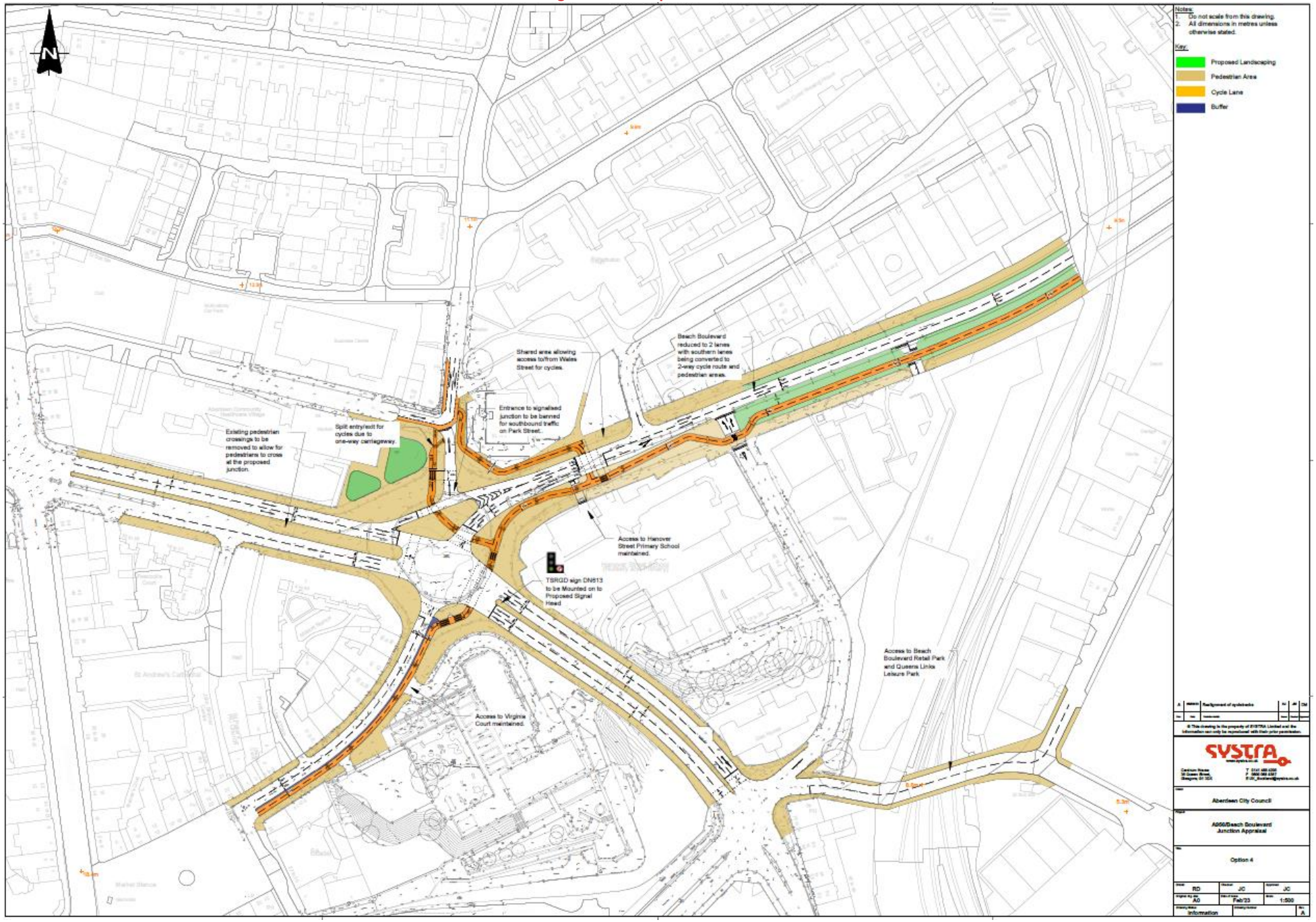


Table 6. Option 1 Summary

Option 4: Signalised Junction	
Benefits	Potential Risks
Provides improved walking and wheeling connections on all arms, with reduced walk distances and times	Removes a key movement from the junction (Commerce St to Beach Blvd). Vehicles from the South signed to the Beach area via Cotton St/Miller St.
4 stage signalised junction with all round pedestrian stage with a significant % of proposed 96s cycle time attributed to pedestrian stage. All crossing contained within junction	Wider deliverability risks and considerations: E.g. Virginia St/Castle St junction, Cotton St/Links Rd junction, use of wider network a requirement to deliver option and knock-on effects
New segregated cycle connections provided between all arms. New cycle infrastructure connects CCMP and BDF segregated cycle lanes through the junction.	Capital and Revenue costs wider than junction itself e.g. Cotton St/Links Rd if signalised, maintenance of road surfaces/lighting/parking enforcement if traffic volumes increase
Performs well against the policy objectives to prioritise active travel over vehicular movements	Signing private cars from the south to arrive at the Beachfront at Cotton St/Links Rd may impact wider planned BDF proposals
Bus journey times and journey time reliability maintained	Justice St to Beach Blvd movement also removed (low volume movement) with route also via Cotton St/Miller St.
Accommodates future bus route improvements for westbound bus movements on Justice Street/Castlegate.	Access to Park St from the junction restricted. Only accessible via East North St. This restricts direct access from south to the Healthcare Village on Frederick St (other routing available).
Little impact on general traffic queueing or journey times (minimal impact of signalising junction)	
Enhances control of the junction to provide additional network resilience (e.g. traffic incident, high volume pedestrian event)	
Maintains access to/from Aberdeen Harbour	
Maintains Abnormal Load route	

IDENTIFICATION TABLE

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