

# NATIONAL LOW EMISSION FRAMEWORK – SUMMARY OF INTERIM NLEF STAGE 2 REPORT



**SYSTRA**

# ABERDEEN LOW EMISSION ZONE

## NATIONAL LOW EMISSION FRAMEWORK – SUMMARY OF INTERIM NLEF STAGE 2 REPORT

### IDENTIFICATION TABLE

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# 1. INTRODUCTION

## 1.1 Introduction

1.1.1 In September 2017, the Scottish Government, in their [Programme for Government](#), committed to the introduction of Low Emission Zones (LEZs) into Scotland's four biggest cities (Glasgow, Edinburgh, Dundee and Aberdeen) by 2020.

1.1.2 An LEZ is a scheme under which individuals are prohibited from driving vehicles which fail to meet specified emissions standards within a designated geographical area.

1.1.3 Low Emission Zones are included in the [Transport \(Scotland\) Act](#) which received Royal Assent in November 2019. The Act provides the legislative framework for Scottish local authorities to design, establish and operate nationally consistent LEZs. It allows the Scottish Government to set consistent national standards for a number of key aspects including emissions, penalties, exemptions and parameters for grace periods. Local authorities will then have the powers to create, enforce, operate or revoke an LEZ in their areas and to design the shape, size and vehicle scope of their low emission zone.

1.1.4 This document provides a summary of the assessment and appraisal process to inform the Aberdeen LEZ. The appraisal followed the Scottish Government's [National Low Emission Framework](#) (NLEF) guidance where NLEF is "*an air quality-focused, evidence-based appraisal process developed to help local authorities consider transport related actions to improve local air quality, where transport is identified as the key contributor to air quality problems*" (NLEF, 2019).

1.1.5 NLEF is a two stage process consisting of the following elements:

- Stage 1 – Screening
- Stage 2 – Assessment

1.1.6 The NLEF Stage 1 Screening is designed to review Aberdeen's Local Air Quality Management and build an evidence base to assist in the decision of whether a LEZ is appropriate for a particular Air Quality Management Areas (AQMA). It subsequently informs the appraisal and implementation of Aberdeen's LEZ through the Stage 2 Assessment process. Transport Scotland advised Aberdeen City Council (ACC) that the NLEF Stage 1 process was not formally required as Aberdeen are committed to delivering a LEZ for the city as a result of the Programme for Government commitment.

1.1.7 While no formal screening has taken place, the key stage of compiling the evidence base to support the LEZ option development and appraisal was undertaken. It was crucial to understand existing air quality in Aberdeen and to review all relevant regional and local plans, policies and strategies that may influence or be influenced by a LEZ in Aberdeen. This evidence base and policy review formed the first part of the NLEF appraisal, and is summarised in Chapter 2.

1.1.8 A Stage 2 Assessment, is described by the NLEF Guidance as comprising the following key steps:

1. Define the objectives for the potential LEZ
2. Assess the impact of potential LEZ options with regard to air quality using the National Modelling Framework Aberdeen City Model
3. Identify the preferred option, including consideration of geographical extent and scope of vehicles to be included
4. Stakeholder input and consultation
5. Consider the wider impacts of the preferred option (e.g. traffic and air quality modelling, Strategic Environmental Assessment, Equality Impact Assessment)
6. Support the identification of the costs associated with implementing the preferred option

1.1.9 An Interim NLEF Stage 2 Assessment was undertaken and reported on in *Aberdeen Low Emission Zone, National Low Emission Framework Interim Stage 2 Report (SYSTRA Ref. GB01T19I15/281119, April 2020)*. The Interim NLEF Stage 2 Report details the identification of the LEZ objectives and the preferred LEZ options (steps 1-3) to be presented for consultation (step 4) and detailed modelling (step 5). The tools to undertake the detailed testing through local traffic and air quality models and wider impact assessments of the preferred option are not yet available for use and the Interim Stage 2 Report therefore did not include results from the consultation period or the detailed testing, and nor did it identify the cost of the preferred option.

## 1.2 Purpose of this Report

1.2.1 This report summarises the key stages of Interim NLEF Stage 2 Assessment, providing detail on the objectives of Aberdeen's LEZ, the high level appraisal to identify emerging options and the detailed LEZ option appraisal, before summarising the identified LEZ options for consultation and model testing. The report consists of the following chapters:

- A summary of the evidence base to support the development of LEZ options for Aberdeen
- A review of the adopted objectives of Aberdeen's LEZ
- An outline of the LEZ option generation process
- A review of the outcomes from the detailed appraisal of LEZ options
- A summary of the recommended LEZ options for consultation and detailed testing
- An outline of the next steps in the assessment of a LEZ for Aberdeen

## 2. EVIDENCE BASE

### 2.1 Introduction

2.1.1 The first part of the Interim NLEF Stage 2 Report builds an evidence base to support the LEZ option development and appraisal process. Three main elements of evidence gathering were:

- A detailed policy review to understand all relevant regional and local plans, policies and strategies that may influence or be influenced by a LEZ in Aberdeen
- A review of the existing air quality in Aberdeen to identify the key problem locations and inform the LEZ area coverage
- High level air quality modelling to understand the network wide air quality under current (base) and possible LEZ scenarios

2.1.2 This chapter summarises the evidence base for Aberdeen’s LEZ, provided in detail in Chapters 2, 3 and 4 of the *Aberdeen Low Emission Zone, National Low Emission Framework Interim Stage 2 Report (SYSTRA Ref. GB01T19I15/281119, April 2020)*.

### 2.2 Policy Review

2.2.1 The policy review first set the context of the legislative framework for introducing a LEZ in Aberdeen, providing background on where LEZ fits in the legislative landscape. This was followed with a detailed review of National, Regional and Local plans, policies and strategies to ensure cognisance is taken of those that may help shape a LEZ in Aberdeen or in turn, be impacted by the introduction of a LEZ.

2.2.2 It was also important that any major committed infrastructure for Aberdeen City Centre was considered when developing options for Aberdeen’s LEZ and likewise, any existing studies in and around Aberdeen city centre that could to complement the development of a LEZ and vice versa.

- European Air Quality Legislation
  - The Ambient Air Quality and Cleaner Air for Europe (CAFE) Directive ([2008/50/EC](#))
  - 2013 Clean Air Programme for Europe ([COM\(2013\)918](#))
  - 2016 National Emissions Ceiling Directive ([2016/2284/EU](#))
- UK and Scottish Air Quality Legislation
  - [The Environment Act 1995: Part IV](#)
  - [The Air Quality Strategy for England, Scotland, Wales and Northern Ireland](#)
  - [Air Quality Standards \(Scotland\) Regulations 2010](#)
  - [Air Quality \(Scotland\) Regulations 2000](#)
  - [Air Quality \(Scotland\) Amendment Regulations 2002](#)
  - [Air Quality \(Scotland\) Amendment Regulations 2016](#)
  - [Cleaner Air for Scotland – The Road to a Healthier Future \(CAFS\)](#)
  - [National Low Emission Framework \(NLEF\)](#)
- National Plans, Policies and Strategies
  - [National Planning Framework 3 \(NPF3\)](#)
  - [National Transport Strategy 2 \(NTS2\)](#)
  - [Strategic Transport Projects Review \(STPR\)](#)
- Regional Plans, Policies and Strategies
  - [Aberdeen City and Shire Strategic Development Plan](#)

- [Aberdeen City Region Deal](#)
  - [Nestrans Regional Transport Strategy 2013–2035 Refresh](#)
  - Nestrans Freight Action Plan 2014 / [Freight Distribution Strategy](#) 2018
- Local Plans, Policies and Strategies
    - [Aberdeen Local Transport Strategy \(LTS\) 2016-2021](#)
    - [Aberdeen City Centre Masterplan \(CCMP\)](#)
    - [North East Scotland Roads Hierarchy Study](#)
    - [Aberdeen Sustainable Urban Mobility Plan \(SUMP\)](#)
    - Aberdeen City Centre Microsimulation Model (Paramics)
    - Aberdeen Sub Area Model (ASAM)
    - Aberdeen Air Quality Model (National Modelling Framework)
  - Committed infrastructure
    - [South College St Junction Improvements project](#) – Due to be in place by Autumn 2021
    - [Berryden Corridor Improvements](#) - Originally proposed for completion by 2020, now expected 2023
    - [Union Terrace Gardens](#) – Completion proposed by Summer 2021
  - Ongoing ACC Studies
    - Electric Vehicle (EV) Framework
    - Car Parking Framework
    - Multi-modal transport study on the Wellington Road Corridor

## 2.3 Analysis of 2018 Air Quality Monitoring Data

- 2.3.1 In 2018 ACC undertook automatic (continuous) monitoring at 6 sites and non-automatic (passive diffusion tube) monitoring at 70 sites during 2018 for Nitrogen Dioxide (NO<sub>2</sub>) and Particulate Matter (PM<sub>10</sub> and PM<sub>2.5</sub>).
- 2.3.2 In total, there were 9 monitoring locations where annual mean concentrations of NO<sub>2</sub> exceed the legal limit of 40 µg/m<sup>3</sup> (micrograms per cubic metre) and a further 10 monitoring sites where annual mean concentrations of NO<sub>2</sub> exceed 36 µg/m<sup>3</sup>. Data analysis showed that the total number of exceedance locations in the city has reduced each year from 2014 (16 locations) to 2018 (9 locations).
- 2.3.3 The primary exceedance locations of NO<sub>2</sub> are shown to be within the city centre as shown in Figure 2.1



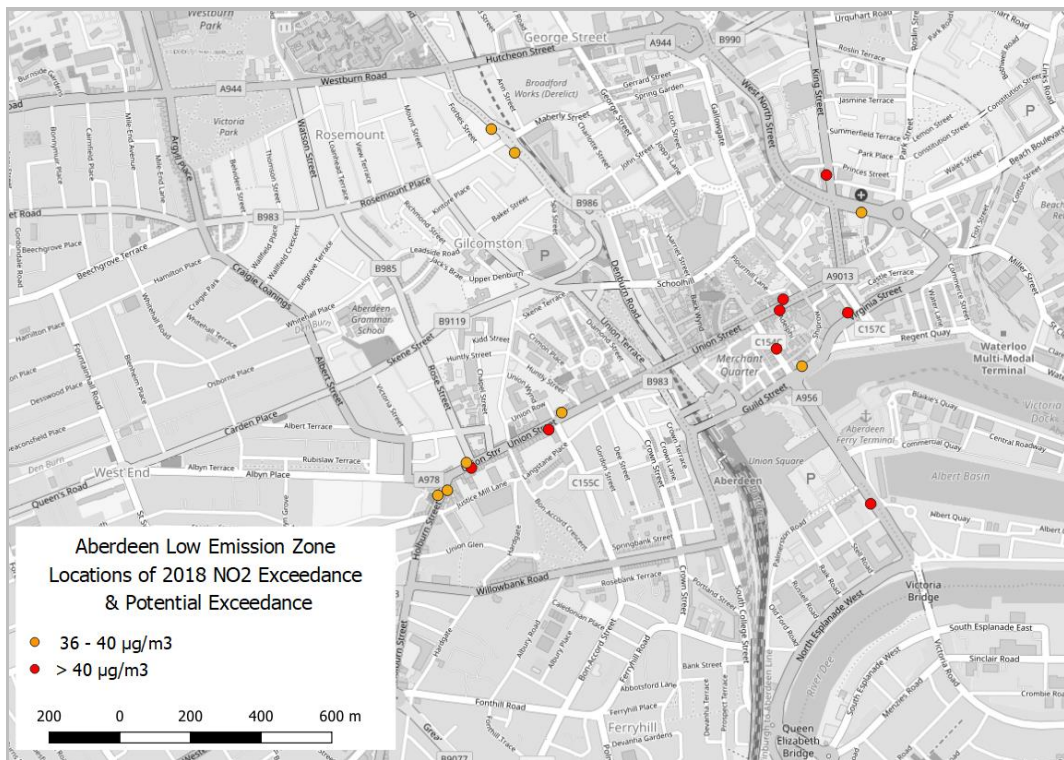


Figure 2.1 : 2018 Annual Mean Concentrations of NO<sub>2</sub> greater than 36 µg/m<sup>3</sup> (City Centre AQMA)

2.3.4 In 2018 there were no recorded exceedances of the PM<sub>10</sub> or PM<sub>2.5</sub> annual mean objective or the PM<sub>10</sub> 24 hour mean objective at any of the monitoring sites.

2.3.5 The observed air quality data shows that the City Centre AQMA currently experiences the highest number of exceedances and the highest level of exceedances for the NO<sub>2</sub> objective. The current observed air quality data suggests that a LEZ may be an appropriate tool to tackle the remaining air quality problems in the City Centre AQMA and this area therefore became the focus of the NLEF appraisal for Aberdeen’s LEZ.



Figure 2.2: Aberdeen City Centre AQMA for NO<sub>2</sub> and PM<sub>10</sub>

**2.4 LEZ Vehicle Compliance in Aberdeen**

2.4.1 Transport Scotland commissioned Automatic Number Plate Recognition (ANPR) surveys in May 2019 to inform the characteristics of the vehicle fleet in Aberdeen.

2.4.2 This information allowed detailed modelling of the existing vehicle fleet in the Aberdeen air quality model. The data also identified the proportion of vehicles considered compliant or non-compliant with the proposed LEZ regulations. This information is crucial in developing and appraising options for a LEZ as it informs the total number of vehicles likely to be required to find alternative routes to avoid the LEZ penalty, and can help identify whether a particular option is feasible or not.

2.4.3 In line with the Transport (Scotland) Act, the vehicle compliance for LEZ is:

- Euro 6 for diesel cars and light goods vehicles (LGVs)
- Euro VI for diesel buses and heavy goods vehicles (HGVs)
- Euro 4 for petrol vehicles

2.4.4 The proportion of non-compliant vehicles in Aberdeen, based on 2019 survey data is shown in Table 2.1.

**Table 2.1 : LEZ non-compliant vehicle proportions**

Fuel Type	Car	LGV	HGV
Non-compliant diesel	26.3%	59.7%	27.0%
Non-compliant petrol	3.9%	0.1%	0.0%
Total non-compliant	30.3%	59.8%	27.0%

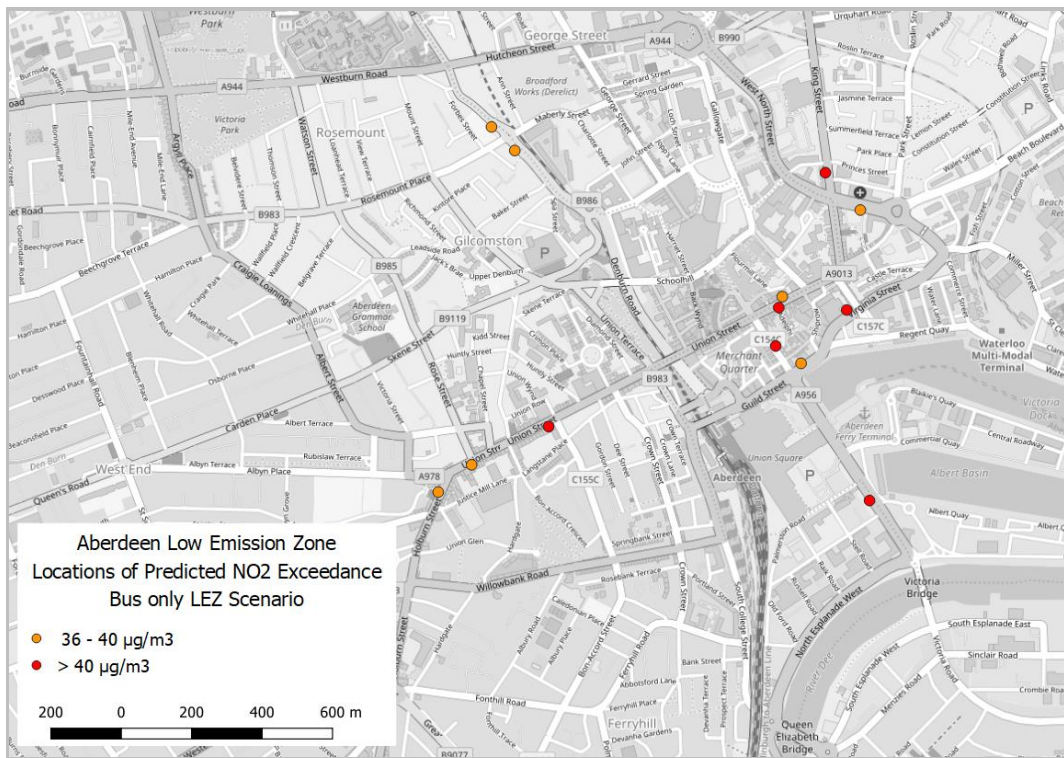
**2.5 The National Modelling Framework**

2.5.1 The National Modelling Framework (NMF) provides a standardised approach to modelling air quality to support the consideration of LEZs in Scotland. The NMF ensures that the analysis and generation of evidence to support decision-making in the LEZ development process is consistent across those local authorities undertaking a NLEF Stage 2 assessment.

2.5.2 The NMF air quality modelling is undertaken by SEPA and modelling results summarised here and presented in the *Aberdeen Low Emission Zone, National Low Emission Framework Interim Stage 2 Report (SYSTRA Ref. GB01T19I15/281119, April 2020)* have therefore been provided by SEPA.

2.5.3 The Aberdeen NMF Model was run for five high level LEZ scenarios to estimate likely changes to air quality to inform the option generation process. For each scenario the 2019 Base level fleet was adjusted for the specified vehicle type to bring it up to a 100% compliance with the LEZ standard with the Euro class mix for the other vehicle types remaining unchanged.

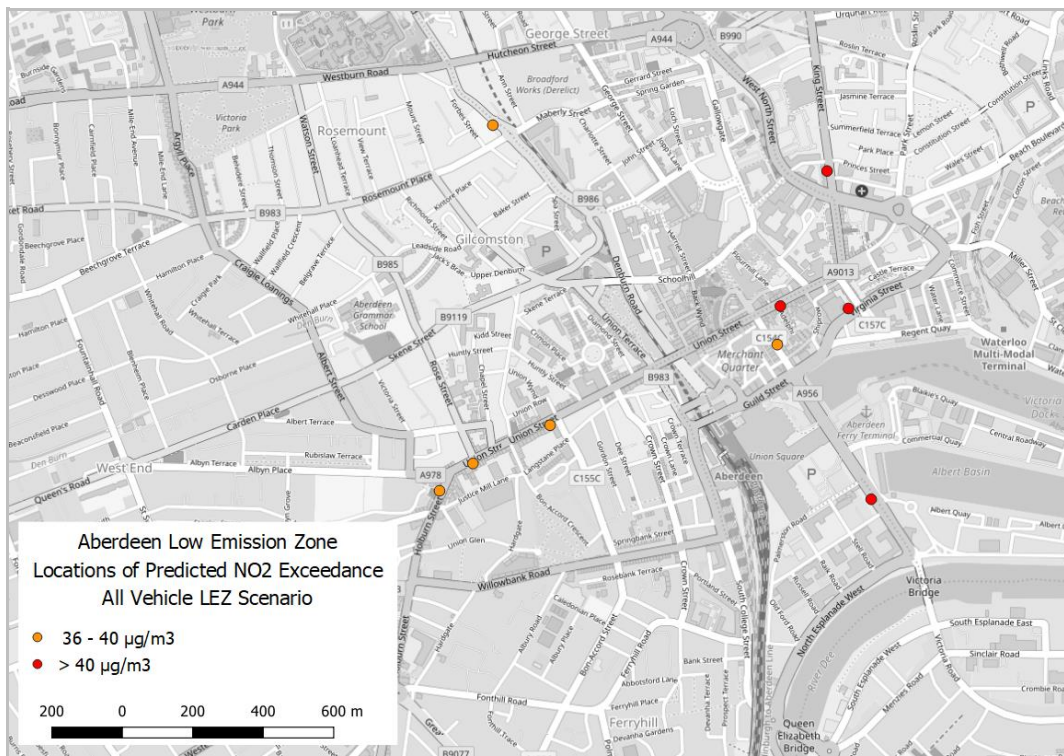
2.5.4 The high level analysis highlighted that improving the bus fleet to Euro VI standard buses in Aberdeen brings the largest reduction in network wide NO<sub>2</sub> from a single vehicle type, and that this reduction is significantly more than any other individual vehicle type. However, the modelling predicts that there would still remain locations of air quality exceedance under a bus only LEZ scenario, as highlighted in Figure 2.3.



**Figure 2.3 : Locations of predicted NO<sub>2</sub> greater than 36 µg/m<sup>3</sup> – Bus only**

2.5.5

All other individual vehicle type scenarios resulted in smaller reductions in NO<sub>2</sub> concentrations. The reductions from each individual scenario were combined to explore the additional reductions that could be achieved from a multi-vehicle LEZ. This analysis highlighted that while network-wide NO<sub>2</sub> levels and the number of NO<sub>2</sub> exceedance locations would further reduce, there would still be locations where NO<sub>2</sub> was higher than legal limits. The predicted remaining air quality exceedance locations under an all vehicle LEZ are shown in Figure 2.4.



**Figure 2.4 : Locations of predicted NO<sub>2</sub> greater than 36 µg/m<sup>3</sup> – All Vehicle**

## 2.6 Summary of Key findings from the Evidence Base

- 2.6.1 The NMF air quality modelling has shown that if all vehicles in Aberdeen (city wide and regardless of potential LEZ options area) were compliant with LEZ emission standards, this measure would not be enough to address all air quality exceedances, although it must be noted that those remaining exceedances are significantly reduced from current levels closer to legal limits.
- 2.6.2 In order to tackle all air quality exceedance locations, it is therefore anticipated that the LEZ should be delivered with additional complimentary traffic management interventions such as junction re-design, bus priority measures or road closures.
- 2.6.3 It is outside the scope of the current Interim NLEF Stage 2 Report to provide details or solutions of what these interventions could be due to the ongoing development of the modelling tools required to test such interventions. The Aberdeen City Centre Paramics model (developed as part of the wider LEZ assessment work) will be utilised to test the preferred LEZ option(s) and help identify what and where complimentary measures are required. It is anticipated that the Paramics model will be ready as an assessment tool by the end of May 2020. The results from the LEZ option testing using the Paramics model will be detailed in a final NLEF Stage 2 Report.
- 2.6.4 The Aberdeen LEZ and any complimentary traffic management measures should align with the existing transport policy landscape in Aberdeen. The key Aberdeen policies and strategies that may shape the final LEZ option(s) are:
- Aberdeen Local Transport Strategy (2016)
  - Aberdeen City Centre Masterplan (CCMP)
  - North East Scotland Roads Hierarchy Study
  - Aberdeen City Sustainable Urban Mobility Plan (SUMP)
- 2.6.5 Of particular relevance is the optimum delivery programme for the CCMP proposals identified through a detailed Paramics traffic model testing process in 2016. Although the delivery of the CCMP is subject to change and timescale uncertainties, any LEZ option should not contradict the proposals identified by previous studies without providing the rationale for doing so.

### 3. OBJECTIVES OF ABERDEEN LOW EMISSION ZONE

3.1.1 NLEF Guidance states that *“the starting point for the stage two assessment process will be to define the objectives for the potential LEZ, taking account of the pollutant(s) of concern and with regard to any available information on source apportionment that identifies particular vehicle types that are a significant contributor to any air quality exceedances”* (NLEF, 2019).

3.1.2 The Aberdeen Low Emission Zone Project Group meeting on 14<sup>th</sup> November 2019 agreed the following principles to help devise the objectives of Aberdeen’s Low Emission Zone:

- The principal aim of the LEZ is to improve air quality in Aberdeen and achieve air quality standards (as specified in the Transport (Scotland) Act)
- An individual health objective should not be set given the difficulty in obtaining baseline health information of the population and measuring any resultant health benefits directly as a result of the LEZ
- Protection of and improvements to health will be an outcome of improvements to air quality
- The introduction of a LEZ should not be to the detriment of the city’s economic or social inclusion objectives
- The LEZ should aim to positively impact on the city economy, access to active travel options and changes in mode-share, city placemaking, social equality, tourism, and sustainable development and the LEZ objectives should reflect this.

3.1.3 Objectives were developed by the Aberdeen LEZ Project Group, comprising representatives of ACC, Aberdeenshire Council, Nestrans, NHS Grampian, Transport Scotland, SEPA and SYSTRA. Two primary objectives were identified to reflect that the principal aim of a LEZ is to improve air quality and a requirement within the Transport (Scotland) Act that a LEZ should contribute towards the climate change targets (towards net zero by 2045) set out in the Climate Change (Scotland) Act 2009

3.1.4 The objectives for Aberdeen’s Low Emission Zone were accepted at the City Growth and Resources Committee meeting on 5<sup>th</sup> December 2019, in the light of the context set out above.

3.1.5 Aberdeen’s Low Emission Zone will:

**Improve air quality in Aberdeen by reducing harmful emissions from transport and delivering on the Scottish Government’s statutory air quality objectives.**

**Support climate change targets by reducing road transport’s contribution to emissions.**

3.1.6 It is recognised that a LEZ can help realise wider benefits beyond air quality improvement, but that these are influenced by many other factors and not solely or directly attributable to a LEZ. Therefore the following supplementary objectives for Aberdeen’s Low Emission Zone have been identified:

- Protect public health and wellbeing;
- Support local and regional transport strategies by contributing to the development of a vibrant, accessible, and safe city centre, where the volume of non-essential traffic is minimised and active and sustainable transport movements are prioritised; and
- Contribute to ongoing transformational change in Aberdeen, helping promote the city as a desirable place to live, visit and invest in.

## 4. LEZ OPTION GENERATION

### 4.1 Introduction

4.1.1 NLEF is objective-led and consistent with the principles of Scottish Transport Appraisal Guidance (STAG). The starting point for the NLEF Stage 2 assessment was to define the objectives (above) for the potential LEZ to inform the LEZ option generation, sifting and development. STAG states:

*“The purpose of Option Generation, Sifting and Development is to derive a range of options which should provide the solution/s to meet the Objectives and alleviate the problems identified. It is vital to derive options which fully reflect the range available and at this early phase in the process, this exercise should not be constrained.”*

4.1.2 Evidence gathering identified the existing air quality problems and issues in Aberdeen, and the LEZ objectives were been derived such that any options that satisfy these objectives will help address the current air quality issues in the city.

4.1.3 Following STAG principles, an unconstrained option generation exercise was first undertaken to allow all possible options to be considered and open to appraisal. This resulted in a large number of potential options that required sifting, refinement and high level appraisal to ensure they were suitable to be progressed to detailed appraisal and testing.

4.1.4 STAG emphasises that option generation, sifting and development should be carried out in a logical and transparent manner. As such, the steps undertaken for Aberdeen’s LEZ options development were as follows:

- **Option Generation**
  - Define suitable LEZ areas
  - Combine with possible LEZ vehicle restrictions to create long list of LEZ options
- **Option Sifting**
  - Screen against LEZ air quality objective
  - Screen for feasibility and logic
- **Option Development**
  - Undertake high level qualitative appraisal
  - Define emerging options for detailed appraisal

4.1.5 At suitable stages in the assessment process, options that failed the screening criteria were removed from the appraisal process. In line with STAG, options were rationalised at suitable points in the appraisal to give a more succinct set of options. The options remaining at the end of the high level appraisal process were taken forward for detailed appraisal.

4.1.6 STAG guidance suggests a high level assessment of all options against their feasibility, affordability and public acceptability is undertaken as an initial screening method. However, no assessment against public acceptability or affordability was made at this stage of the Interim NLEF Stage 2 Assessment due to the minimal option detail, lack of public consultation (as this stage) and unknown future funding and operating costs. The Interim NLEF Stage 2 Assessment concludes with a set of LEZ options for detailed model testing and public and stakeholder consultation, and thereafter an assessment against public acceptability and affordability can be undertaken.

4.1.7 In addition to feasibility, an assessment of the logic of each proposed LEZ option boundary is undertaken as a screening method. Each option is therefore broadly assessed against:

- Feasibility – a preliminary assessment of the feasibility of implementation and operation of an option as well as any cost, timescale or deliverability risks associated with the operation of the option.

- Logical Boundary – consideration of geographically distinct areas to influence the understanding of the LEZ boundary such as key roads and junction and allowance for logical alternative routes for non-compliant vehicles.

4.1.8 This chapter provides a summary of option generation process with full details and reasoning behind each option and its progression or rejection during the process documented in the *Aberdeen Low Emission Zone, National Low Emission Framework Interim Stage 2 Report (SYSTRA Ref. GB01T19I15/281119, April 2020)*.

## 4.2 Summary of Low Emission Zone Option Development

4.2.1 The NLEF guidance states that:

*“The indicative boundary of potential LEZ options for consideration should be defined at the outset, taking account of local circumstances. Potentially, more than one boundary may be considered. For example, the AQMA boundary or one which covers just a few streets with the highest concentrations of air pollutants.”*

4.2.2 In accordance with NLEF guidelines, the area for consideration was informed by:

1. the area of exceedance of air quality objectives and the main sources of pollutants
2. geographically discrete areas, such as a town centre and other areas which are well defined (e.g. within an inner ring road)
3. features that may influence enforcement (e.g. an outer ring-road with junctions leading into exceedance areas, key access points such as bridges)
4. mapped emissions by vehicle type in order to identify areas where options are likely to be most effective. Mapping bus routes, taxi ranks and/or residential and commercial land-uses will be useful.
5. air quality along any such alternative routes to determine if they could be at risk of new exceedances as a result of displaced traffic
6. the potential need to allow vehicles to divert onto alternative routes to avoid the area of the LEZ

4.2.3 The initial option generation exercise identified 16 high level scenarios, as detailed in Table 4.1, with diagrams provided in Appendix A of the *Aberdeen Low Emission Zone, National Low Emission Framework Interim Stage 2 Report (SYSTRA Ref. GB01T19I15/281119, April 2020)*. A high level assessment was made on each of these areas to assess whether they would likely be feasible and logical as LEZ options. Eight of the 16 scenarios were considered potentially suitable as LEZ options and progressed in the appraisal process, as indicated in Table 4.1.

**Table 4.1 : Aberdeen LEZ areas for consideration**

LEZ Area Option	Description and development narrative	Progress Option
<b>Option 1</b> Central Union Street	Central section of Union Street from Bridge Street to Market Street. The option cuts the centre of Union Street and although it covers a limited area, it may change through-routeing thereby addressing additional areas of air quality concern	NO
<b>Option 2</b> Union Street	Full length of Union Street. The option targets the key city centre route and the numerous air quality exceedances. It is a key bus corridor and any reduction in traffic resulting from a LEZ may improve air quality and facilitate improvements to bus provision and services.	NO

LEZ Area Option	Description and development narrative	Progress Option
<b>Option 3</b> Union Street, Market Street & King Street	Union Street from Bridge Street to King Street, south of East North Street. The option extends Option 1 to capture exceedance locations on Market Street and Union Street and may influence routeing around King Street and East & West North Street	YES
<b>Option 4</b> Holburn Street, Union Street and King Street	Holburn Street, north of A93 to King Street, south of East North Street. A combination of Option 2 and Option 3, this option targets a key strategic route and adjacent exceedance locations	NO
<b>Option 5</b> City Centre Core	Holburn Street, north of A93 to King Street, south of East North Street and Market Street, north of Guild Street. Similar to Option 4, the option extends to the south to capture potential exceedance locations on the north end of Holburn Street while potentially influencing the western strategic routeing in the city	NO
<b>Option 6</b> City Centre AQMA	The option area covers the entire city centre AQMA. The LEZ is focused in the AQMA area and it is considered intuitive for a LEZ to follow an established air quality intervention area	NO
<b>Option 7</b> City Centre Masterplan	The city centre masterplan is a key ACC policy and the LEZ should complement this. This option has therefore been devised to mirror the established city centre masterplan area	NO
<b>Option 8</b> City Centre Exceedances	Option 7 (CCMP) does not encompass all exceedance locations and therefore Option 8 is devised as the minimum area covering all exceedances of the NO <sub>2</sub> annual mean air quality objective	NO
<b>Option 9</b> Holburn Street to Mounthooly roundabout	The option is devised to closely follow the key strategic routes of Holburn St, Willowbank Rd, South College St, Guild St, Virginia St, West North St, Hutcheon St, Skene Sq and Skene St. This allows for viable alternative routes for non-complaint vehicle while covering key exceedance locations	YES
<b>Option 10</b> Union Street with extended boundary	The option is devised to cover the same exceedances as Union St option (Option 2) but is bound by clearly defined roads to provide viable alternative routes for non-compliant vehicles	YES
<b>Option 11</b> Westburn Road/Hutcheon St to Willowbank Road	Area bound by Westburn Rd/Hutcheon St, West North St, Virginia St, Guild St, Willowbank Rd, Holburn St, Albert St, Argyll PI, this option extends Option 10 to the west to include Gilcomston and Rosemount while still being bound by viable alternative routes	YES
<b>Option 12</b> Westburn Road/Hutcheon St to the River Dee	This option extends Option 11 to the south to capture a wider area including exceedance locations on Market Street	YES



LEZ Area Option	Description and development narrative	Progress Option
<b>Option 13</b> City Centre Exceedances with extended boundary	This option is devised to cover all the air quality exceedances as per Option 8 but is bound by clearly defined roads to provide viable alternative routes for non-compliant vehicles	YES
<b>Option 14</b> City Centre Exceedances with additional extended boundary	The option extends the Option 13 to include Argyle Pl and Albert St and further influence strategic routeing on the western side of the city centre	YES
<b>Option 15</b> City Centre Masterplan with extended boundary	The option was developed from Option 7 to cover the proposed city centre masterplan area but is bound by clearly defined roads to provide viable alternative routes for non-complaint vehicles	YES
<b>Option 16</b> City Cordon	Area bounded by the River Don, Anderson Drive and River Dee and devised to provide a wide area option encompassed by these key strategic routes.	NO

4.2.4 The eight remaining areas considered potentially suitable as LEZ options were combined with vehicle type restrictions and assessed against their likely impact on the LEZ air quality objective (objective 1): *To improve air quality in Aberdeen by reducing harmful emissions from transport and delivering on the Scottish Government's statutory air quality objectives*. This assessment was informed by the National Modelling Framework analysis summarised above, with five possible non-compliant vehicles were defined, in line with the high NMF results.

- Bus (Euro VI)
- Diesel Car (Euro 6)
- HGV (Euro VI)
- LGV (Euro VI)
- Petrol Car (Euro 4)

4.2.5 The NMF analysis concluded that improvements to the bus fleet brings the largest reduction in modelled NO<sub>2</sub> and therefore buses should be included in any LEZ option for Aberdeen. The combination of eight option areas and five vehicle type restrictions resulted in 40 LEZ options at the start of the appraisal process.

4.2.6 The options were assessed using the STAG seven-point assessment against their likely impact on the air quality objective, as shown in Table 4.2. This assessment and subsequent rationalisation resulted in 21 options progressing to the next stage of the high level appraisal process.

4.2.7 The appraisal identified that several options would not impact on a number of key exceedance locations, particularly with several options not capturing all city centre bus services. The appraisal also identified that a number of options return very similar scores, notably the bus plus HGVs, LGVs and petrol cars. At this stage in the appraisal process, such options were combined (with diesel cars) to create a set of all vehicle LEZ options with the remaining high level appraisal process considering the combined benefits and dis-benefits of such options.

**Table 4.2 : Appraisal of area and bus focussed vehicle restriction**

Ref No.	LEZ Area	LEZ Restriction	AQ Objective
1	Union Street, Market Street & King Street	Bus	+
2	Holburn Street to Mounthooly roundabout	Bus	++
3	Union Street with extended boundary	Bus	++
4	Westburn Road/Hutcheon St to Willowbank Road	Bus	++
5	Westburn Road/Hutcheon St to the River Dee	Bus	++
6	City Centre Exceedances	Bus	++
7	City Centre Exceedances with extended boundary	Bus	++
8	City Centre Masterplan with extended boundary	Bus	++
9	Union Street, Market Street & King Street	Bus & Diesel Car	+
10	Holburn Street to Mounthooly roundabout	Bus & Diesel Car	++
11	Union Street with extended boundary	Bus & Diesel Car	++
12	Westburn Road/Hutcheon St to Willowbank Road	Bus & Diesel Car	+++
13	Westburn Road/Hutcheon St to the River Dee	Bus & Diesel Car	+++
14	City Centre Exceedances	Bus & Diesel Car	+++
15	City Centre Exceedances with extended boundary	Bus & Diesel Car	+++
16	City Centre Masterplan with extended boundary	Bus & Diesel Car	+++
17	Union Street, Market Street & King Street	Bus & HGV	+
18	Holburn Street to Mounthooly roundabout	Bus & HGV	++
19	Union Street with extended boundary	Bus & HGV	++
20	Westburn Road/Hutcheon St to Willowbank Road	Bus & HGV	++
21	Westburn Road/Hutcheon St to the River Dee	Bus & HGV	++
22	City Centre Exceedances	Bus & HGV	++
23	City Centre Exceedances with extended boundary	Bus & HGV	++
24	City Centre Masterplan with extended boundary	Bus & HGV	++
25	Union Street, Market Street & King Street	Bus & LGV	+
26	Holburn Street to Mounthooly roundabout	Bus & LGV	++
27	Union Street with extended boundary	Bus & LGV	++
28	Westburn Road/Hutcheon St to Willowbank Road	Bus & LGV	++
29	Westburn Road/Hutcheon St to the River Dee	Bus & LGV	++
30	City Centre Exceedances	Bus & LGV	++
31	City Centre Exceedances with extended boundary	Bus & LGV	++
32	City Centre Masterplan with extended boundary	Bus & LGV	++
33	Union Street, Market Street & King Street	Bus & Petrol Car	+
34	Holburn Street to Mounthooly roundabout	Bus & Petrol Car	++
35	Union Street with extended boundary	Bus & Petrol Car	++
36	Westburn Road/Hutcheon St to Willowbank Road	Bus & Petrol Car	++
37	Westburn Road/Hutcheon St to the River Dee	Bus & Petrol Car	++
38	City Centre Exceedances	Bus & Petrol Car	++
39	City Centre Exceedances with extended boundary	Bus & Petrol Car	++
40	City Centre Masterplan with extended boundary	Bus & Petrol Car	++

### 4.3 Feasibility and Logic Assessment

4.3.1 A further high level assessment was made on each of the 21 remaining options to assess whether they would likely be feasible and logical if adopted as a LEZ, with the results shown in Table 4.3. Again, the assessment was made using the seven-point scale and if any one of these criteria scores zero or less the option was not considered suitable to progress in the appraisal process.

4.3.2 Table 4.3 shows the appraisal results of the 21 options against logic and feasibility.

**Table 4.3 : Appraisal against feasibility, affordability and public acceptability**

Ref No.	LEZ Area	LEZ Restriction	Feasible	Logical	Progress in appraisal
1	Holburn Street to Mounthooly roundabout	Bus	+++	++	Yes
2	Union Street with extended boundary	Bus	+++	+	Yes
3	Westburn Road/Hutcheon St to Willowbank Road	Bus	+++	0	No
4	Westburn Road/Hutcheon St to the River Dee	Bus	+++	0	No
5	City Centre Exceedances	Bus	+++	0	No
6	City Centre Exceedances with extended boundary	Bus	+++	0	No
7	City Centre Masterplan with extended boundary	Bus	+++	0	No
8	Holburn Street to Mounthooly roundabout	Bus & Diesel Car	++	++	Yes
9	Union Street with extended boundary	Bus & Diesel Car	++	++	Yes
10	Westburn Road/Hutcheon St to Willowbank Road	Bus & Diesel Car	+	-	No
11	Westburn Road/Hutcheon St to the River Dee	Bus & Diesel Car	+	-	No
12	City Centre Exceedances	Bus & Diesel Car	+	+	Yes
13	City Centre Exceedances with extended boundary	Bus & Diesel Car	+	-	No
14	City Centre Masterplan with extended boundary	Bus & Diesel Car	+	+	Yes
15	Holburn Street to Mounthooly roundabout	All Vehicle	++	++	Yes
16	Union Street with extended boundary	All Vehicle	++	++	Yes
17	Westburn Road/Hutcheon St to Willowbank Road	All Vehicle	+	-	No
18	Westburn Road/Hutcheon St to the River Dee	All Vehicle	+	-	No
19	City Centre Exceedances	All Vehicle	+	+	Yes
20	City Centre Exceedances with extended boundary	All Vehicle	+	-	No
21	City Centre Masterplan with extended boundary	All Vehicle	+	+	Yes

4.3.3 All bus only options were considered fully feasible as they can be enforced through a network of cameras located on fixed route bus routes. However, five options were not considered logical options as bus only LEZs due to their geographical extents with all five of these options including large areas where no bus services route. These options were removed from the appraisal process.

4.3.4 Three bus and diesel car options and three all vehicle options scored positively for feasibility but receive a negative score of for logic. All these options included substantial areas that are predominately residential, such as Rosemount and Ferryhill, where there are no existing exceedances of the air quality objectives. The areas were devised through the unconstrained option generation process but the addition of private vehicles (diesel and petrol cars) to the option would mean residents living in the LEZ area would be restricted from using their vehicles if they are non-compliant to tackle an issue that is not specific to their immediate localised area. For this reason, these options were not considered logical and not progressed in the option appraisal process.

## 4.4 LEZ Options for Detailed Appraisal

4.4.1 In line with STAG, options can be rationalised at suitable points in the appraisal to give a more succinct set of options and this was undertaken with options that returned positive scores in the above assessments and display similar characteristics, impacts and benefits.

4.4.2 The high level appraisal and subsequent rationalisation of the option list returned five emerging LEZ options to progress to detailed appraisal. At this stage, and as the number of options reduced from 40 to 5, the opportunity was taken to rename the option area to a more descriptive and succinct list.

4.4.3 *Option 1* was defined as the most suitable area to capture all bus services and, crucially, be directly expanded in its scope to include all vehicles without changing its boundary to create *Option 2*. *Option 3* extends the proposed LEZ area to the north to include the George Street area and encompass more of the CCMP and SUMP areas while still being defined by geographically visual key routes to give a logical LEZ with viable alternative routes. *Option 4* was defined to encompass all locations where annual mean NO<sub>2</sub> were greater than the legal limit (> 40 µg/m<sup>3</sup>). *Option 5* mirrors the existing CCMP and SUMP boundaries, with adjustments to allow suitable alternative routes, to provide a LEZ option that fully complements these existing key ACC strategies.

4.4.4 The five emerging options progressed to detailed appraisal are listed in Table 4.4.

**Table 4.4 : LEZ option list after feasibility and logic appraisal**

<b>Option No.</b>	<b>LEZ Option</b>	<b>LEZ Restriction</b>
1	Union Street Area	Bus
2	Union Street Area	All Vehicle
3	Union Street & George Street Area	All Vehicle
4	City Centre Air Quality Exceedance	All Vehicle
5	City Centre Masterplan	All Vehicle

## 5. DETAILED LEZ OPTION APPRAISAL

### 5.1 Introduction

5.1.1 The high level appraisal process identified five options that satisfied the LEZ Objectives and were considered feasible and logical. The next stage in the LEZ option development was to consider these in more detail and clearly define the boundary and predicted impacts of each emerging option in order to recommend LEZ Options for detailed testing and, in turn, stakeholder input and consultation. In defining the detail of each emerging option, a number of option variants were identified. The detailed option generation exercise assessed the following:

- Impact on air quality of each option
- Suitability of a bus only LEZ option
- Re-routeing of non-compliant vehicles
- Access to city centre car parks
- Access to resident and business parking

5.1.2 This chapter provides a summary of detailed option appraisal to identify the final LEZ options for testing and consultation. Full details can be found in the *Aberdeen Low Emission Zone, National Low Emission Framework Interim Stage 2 Report (SYSTRA Ref. GB01T19I15/281119, April 2020)*.

### 5.2 Impact on Air Quality

5.2.1 The Interim NLEF Stage 2 Report assessed the likely impact on air quality of each emerging LEZ option by utilising the high level scenario testing results from SEPA's air quality modelling.

5.2.2 The high level air quality modelling analysis concluded that none of the LEZ options delivered on their own were enough, in isolation, to tackle all locations of air quality exceedance. Therefore, to achieve compliance with air quality standards in Aberdeen, complimentary traffic management measures are likely to be required.

5.2.3 NLEF Guidance states that *"it may be more appropriate to address the issue (air quality exceedance) by identifying additional location specific measures to be implemented through the AQAP, potentially through consideration of local transport measures. In this situation, the additional measures should be identified...along with a description of the likely contribution to removing exceedances"*. (NLEF, 2019).

5.2.4 As the detailed traffic and air quality modelling testing results were not available at the time of the LEZ option appraisal, the *Interim* NLEF Stage 2 Report cannot provide details of or solutions to what these interventions should be. The final however NELF Stage 2 Report will provide the results of the traffic and air quality modelling and this will identify any complimentary measures required.

### 5.3 Summary of LEZ Options

5.3.1 The appraisal of the five LEZ options identified a number of possible variants and as the appraisal progressed, some of these variants were shown to be unsuitable while additional variants were identified in an iterative process. All LEZ option variants identified through the detailed analysis are shown in Table 5.1

**Table 5.1 : LEZ Option Variants**

Option	Option Description	Variant	Variant Description
Option 1A	Union Street Area (bus only)	Excludes bus station	Includes Guild Street and bus station exit to Guild Street
Option 1C		Includes bus station	Includes Guild Street, Market Street and bus station (including both accesses)
Option 2A	Union Street Area (all vehicle)	Includes Denburn Road	No access for non-compliant vehicles
Option 2B		Excludes Denburn Road	Full NB & SB access for non-compliant vehicles
Option 2C		Partially excludes Denburn Road	Full NB & partial SB access for non-compliant vehicles. Opportunity for junction re-design to allow full SB access
Option 2D		Excludes Denburn Road	Full NB & SB access for non-compliant vehicles, adjusted to complement CCMP interventions
Option 3A	Union Street & George Street Area (all vehicle)	Includes Denburn Road	No access for non-compliant vehicles
Option 3B		Excludes Denburn Road	Full NB & SB access for non-compliant vehicles
Option 3C		Partially excludes Denburn Road	Full NB & partial SB access for non-compliant vehicles. Opportunity for junction re-design to allow full SB access
Option 3D		Excludes Denburn Road	Full NB & SB access for non-compliant vehicles, adjusted to complement CCMP interventions
Option 4A	City Centre Air Quality Exceedance Area (all vehicle)	Includes Denburn Road	No access for non-compliant vehicles
Option 4B		Excludes Denburn Road	Full NB & SB access for non-compliant vehicles
Option 4C		Partially excludes Denburn Road	Full NB & partial SB access for non-compliant vehicles. Opportunity for junction re-design to allow full SB access
Option 4D		Excludes Denburn Road	Full NB & SB access for non-compliant vehicles, adjusted to complement CCMP interventions
Option 5A	City Centre Masterplan Area (all vehicle)	Includes Denburn Road	No access for non-compliant vehicles
Option 5B		Excludes Denburn Road	Full NB & SB access for non-compliant vehicles
Option 5C		Partially excludes Denburn Road	Full NB & partial SB access for non-compliant vehicles. Opportunity for junction re-design to allow full SB access
Option 5D		Excludes Denburn Road	Full NB & SB access for non-compliant vehicles, adjusted to complement CCMP interventions

5.3.2 Not all options listed progressed to the final appraisal stage against the LEZ objectives with variants B and C from the all vehicle options (2 – 5) not advancing in the process. The LEZ options that did progress through the detailed appraisal can be summarised as follows:

- Option 1 – two variants of a bus only option
  - Variant that excludes the bus station, but includes the exit to Guild Street
  - Variant that includes the entire bus station and both access on Guild Street and Market Street.
- Options 2 – 5 – two variants of the all vehicle options
  - Variant A includes Denburn Road and therefore does not allow access to Denburn Road for non-compliant vehicles
  - Variant D excludes Denburn Road and allows full access to Denburn Road for compliant and non-compliant vehicles

## 5.4 Appraisal Against Low Emission Zone Objectives

5.4.1 NLEF is objective-led and consistent with the principles of STAG and therefore a qualitative appraisal of the LEZ options against the key LEZ objectives was undertaken

using the seven-point assessment scale. If a LEZ option did not satisfy the LEZ objectives for Aberdeen’s LEZ they were removed from the appraisal process and not recommended for detailed testing and consultation.

5.4.2 The results of this assessment is shown in Table 5.2 with the justification detailed in the Interim NLEF Stage 2 Report. Table 5.2 shows all the all vehicle LEZ options (Option 2 to 5) score positively against the LEZ objectives. Option 1, the bus only option scores positively on the two key objectives (1 and 2) and objective 3, to protect public health and wellbeing. It is shown however, to score neither positively or negatively against objectives 4 and 5.

**Table 5.2 : Option appraisal against all LEZ objectives**

Option No.	LEZ Area	Aberdeen LEZ Objective				
		1	2	3	4	5
1A/B	Union Street Area (bus only)	++	+	+	0	0
2A/D	Union Street Area (all vehicles)	++	+	+	+	+
3A/D	Union Street & George Street Area	++	+	+	+	+
4A/D	City Centre Air Quality Exceedance Area	++	+	+	+	+
5A/D	City Centre Masterplan Area	++	+	+	+	+

## 5.5 Refinement of LEZ Options

5.5.1 Detailed appraisal informed the suitability of each of the five LEZ option that emerged from the high level option generation exercise. This led to a number of option variants being considered and a number of key observations could be made to refine the proposed option list before the final recommendations of the Interim NLEF Stage 2 Report were made.

5.5.2 Option 1, the bus only LEZ and Option 2, an all vehicle LEZ, cover approximately the same geographical area, with slight distinctions accounting for the identified option variants and after detailed appraisal, both are considered to be workable LEZ options. In the appraisal of these options against the LEZ objectives however, Option 1 is not considered to fully satisfy all objectives. As detailed in the Interim Stage 2 Report, any option that failed to fully satisfy all LEZ objectives was removed from further appraisal and detailed testing. Option 1, and its variants, were therefore removed from the appraisal process at this stage.

5.5.3 It is important to note that all remaining all vehicle options could, in theory, operate as a bus only LEZ if required, perhaps as part of a phased introduction of any LEZ. The removal of the single bus only option therefore does not necessarily preclude the possibility of Aberdeen introducing a bus only LEZ if desired. It is also possible that any option could be adjusted further to ensure the bus station is included or excluded from a final LEZ area, with all remaining options either bordering the bus station or encompassing it fully. Consultation with bus operators will be required to provide further information on any desire to include or exclude the bus station from the final LEZ option.

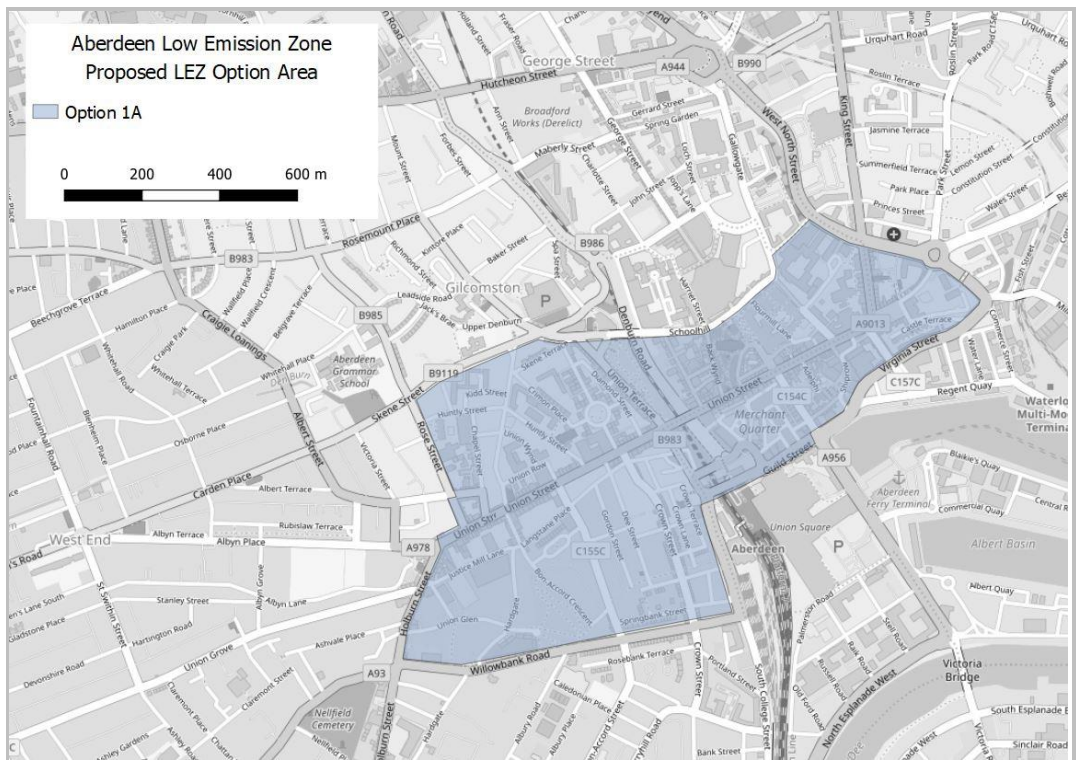
5.5.4 In defining the boundary of the all vehicle LEZ options, analysis of existing traffic data showed there to be a significant number of non-compliant vehicles that would be impacted by each option. Key to the total number likely to of non-compliant vehicles that may be impacted by each options was the inclusion or exclusion of Denburn Road. Through analysis of existing traffic data, it was concluded that if Denburn Road is included in the LEZ, the majority of remaining non-compliant strategic trips would likely reroute via East & West North Street/Commerce Street/Virginia Street (Eastern Route), with some likely to route to the west via Holburn Street.

- 5.5.5 In Option 2 and Option 3, the Eastern Route is not included inside the option boundary and it remains a feasible alternative route for any non-compliant vehicle and therefore both option variants for Options 2 and 3 are considered viable.
- 5.5.6 Option 4 and Option 5 encompass the Eastern Route and therefore non-compliant vehicles from Denburn Road would also not be permitted to route via this route. Conversely, non-compliant vehicles on the Eastern Route would have to find alternative routes and these vehicles could reroute via Denburn Road, if available, or to alternative routes further west. The detailed analysis considered the likely impacts of both Option 4 and Option 5 including Denburn Road (variants A) and excluding Denburn Road (variants B) and concluded that although there may be unintended consequences to traffic volumes and air quality, both options and their variants should be tested in the traffic and air quality models to fully understand and quantify the impacts.
- 5.5.7 However, the option appraisal concluded that Option 4 and Option 5 are likely to have similar impacts on the local road network and air quality. As noted, Option 4 and Option 5 include the key Eastern Route, however this means that there was no option that captures the air quality exceedances on the Eastern Route while providing full access to Aberdeen Harbour (from Market Street) and Union Square, two key land uses in the city centre area. Given the similar impacts and coverage of Option 5, it was proposed that the southern boundary of Option 4 was altered such that it extended only to the junction of Market Street/Commercial Quay/Union Square. This significantly differentiated Option 4 from Option 5 and offered an option that provided access for non-compliant vehicles to Aberdeen Harbour and Union Square.
- 5.5.8 With the updated boundaries for Option 4 and Option 5 (both variants) it can be summarised that Option 4 provides access for non-compliant vehicles to Aberdeen Harbour while Option 5 does not. Both options do not of course impact the accessibility of compliant vehicles to Aberdeen Harbour.
- 5.5.9 The updated combined option, together with all other remaining options after the above refinement considerations are presented in below.

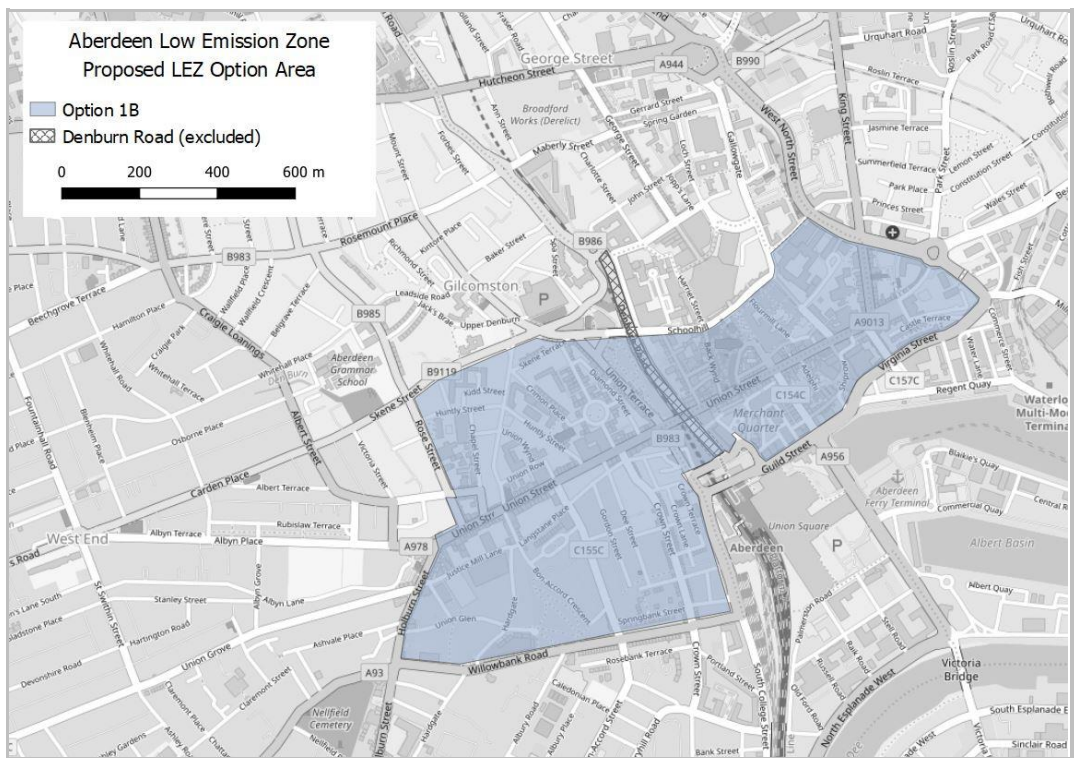
## **5.6 LEZ Options for Consultation and Detailed Testing**

- 5.6.1 The NLEF Appraisal recommends that detailed model testing of four main LEZ options is undertaken using the NMF air quality model and the Paramics microsimulation traffic model.
- 5.6.2 The analysis demonstrated that from these four options there are two possible variants to each option. To provide a concise and understandable list for detailed testing and subsequent consultation, the LEZ option numbering is reset and are as follows:
- Option 1A – Union Street Area, including Denburn Rd (Figure 5.1)
  - Option 1B – Union Street Area, excluding Denburn Rd (Figure 5.2)
  - Option 2A – Union Street & George Street Area, including Denburn Rd (Figure 5.3)
  - Option 2B – Union Street & George Street Area, excluding Denburn Rd (Figure 5.4)
  - Option 3A – CCMP East including Denburn Rd (Figure 5.5)
  - Option 3B – CCMP East excluding Denburn Road (Figure 5.6)
  - Option 4A – CCMP, including Denburn Rd (Figure 5.7)
  - Option 4B – CCMP, excluding Denburn Rd (Figure 5.8)

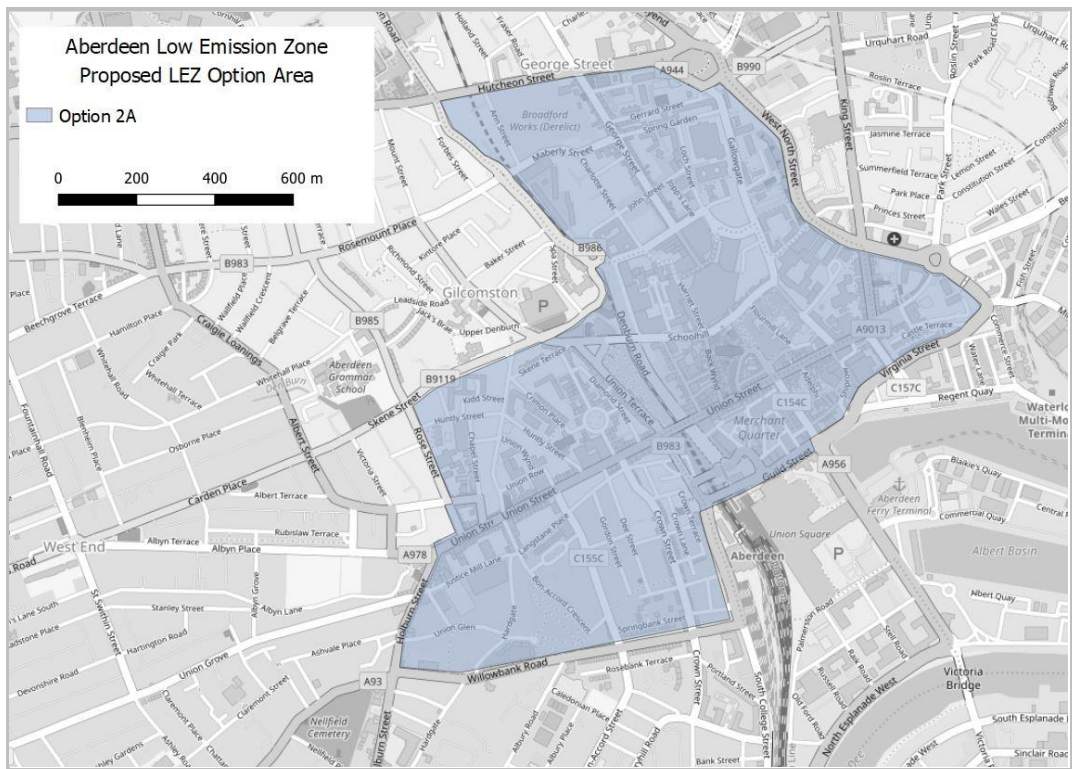




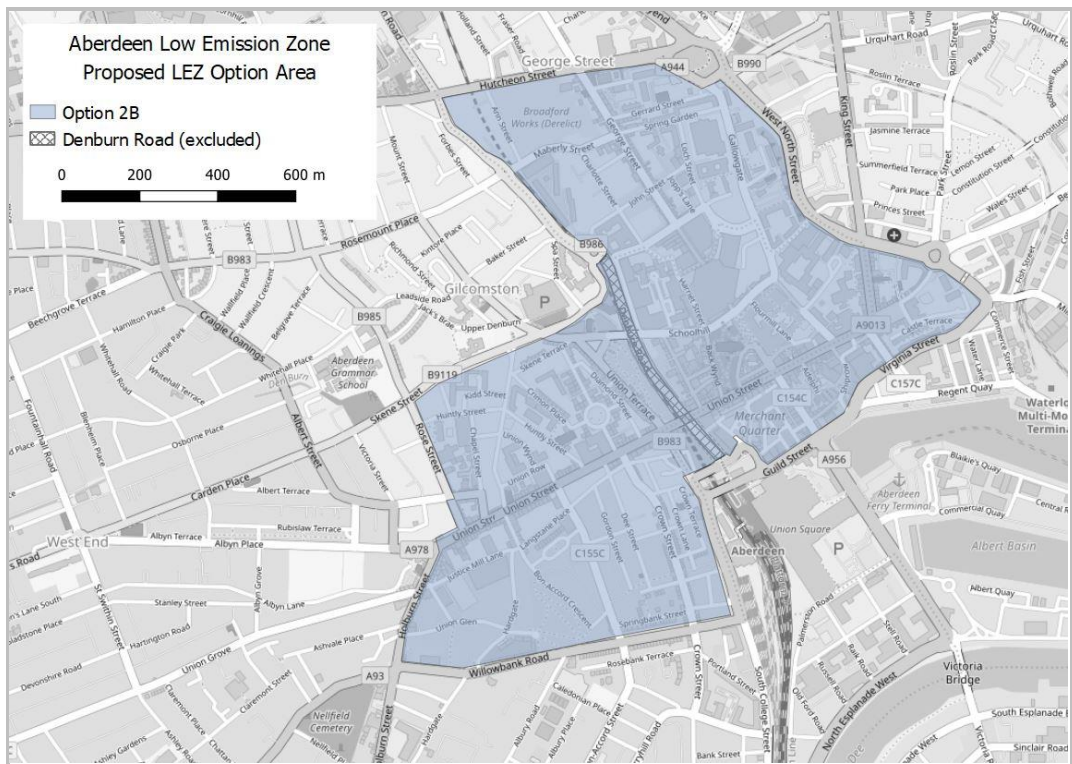
**Figure 5.1 : Option 1A – Union Street Area, including Denburn Road**



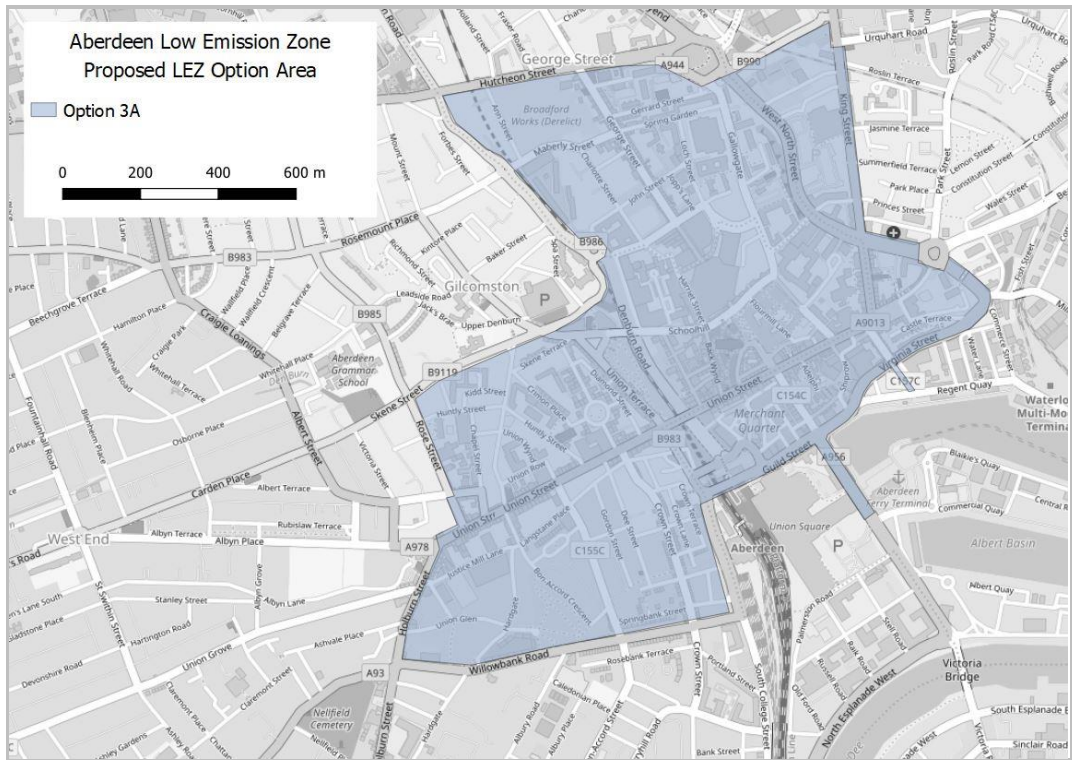
**Figure 5.2 : Option 1B – Union Street Area, excluding Denburn Road**



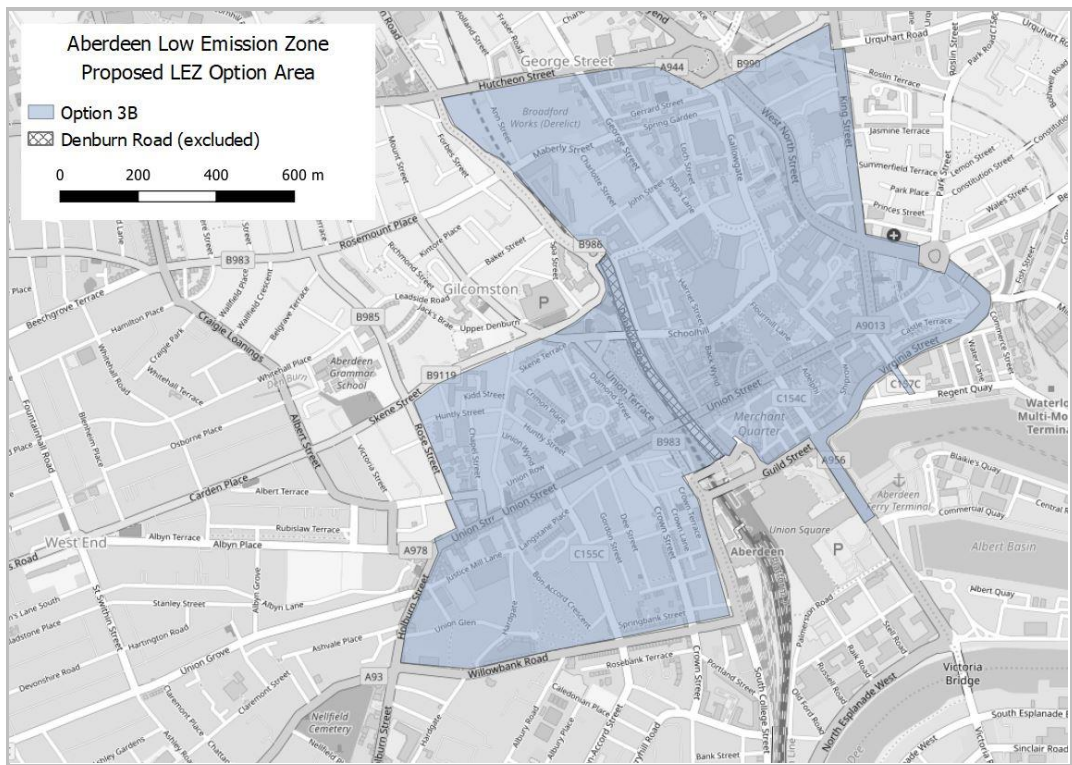
**Figure 5.3 : Option 2A – Union Street and George Street Area, including Denburn Road**



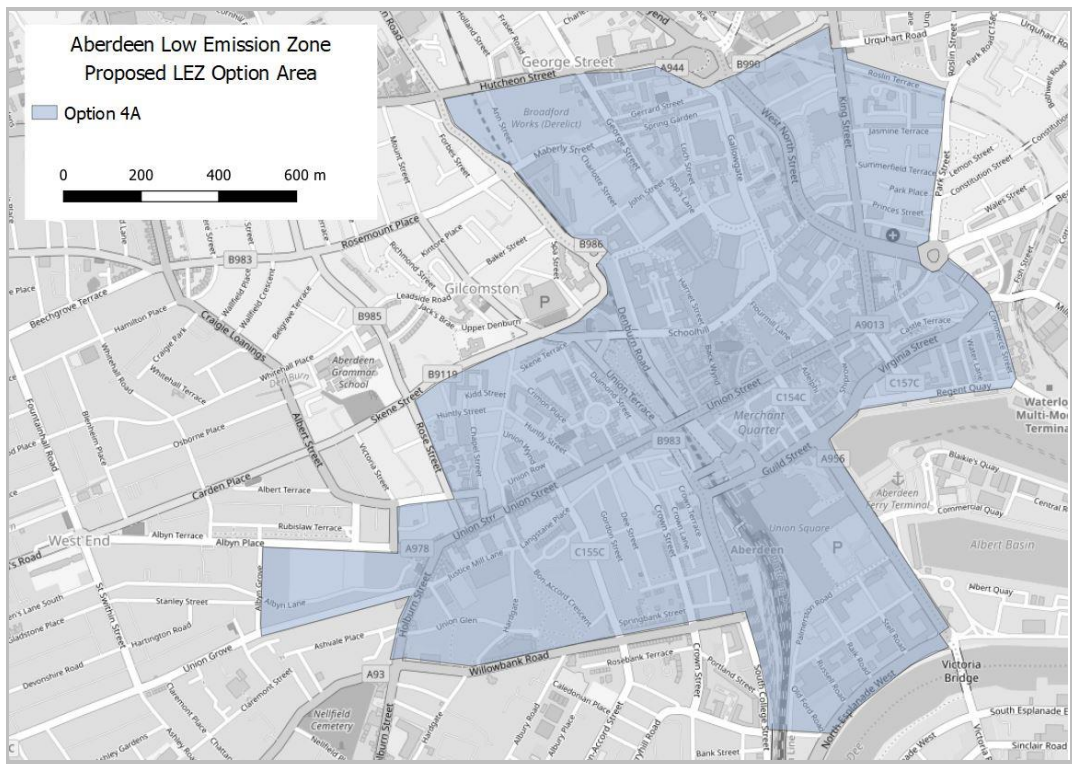
**Figure 5.4 : Option 2B – Union Street and George Street Area, excluding Denburn Road**



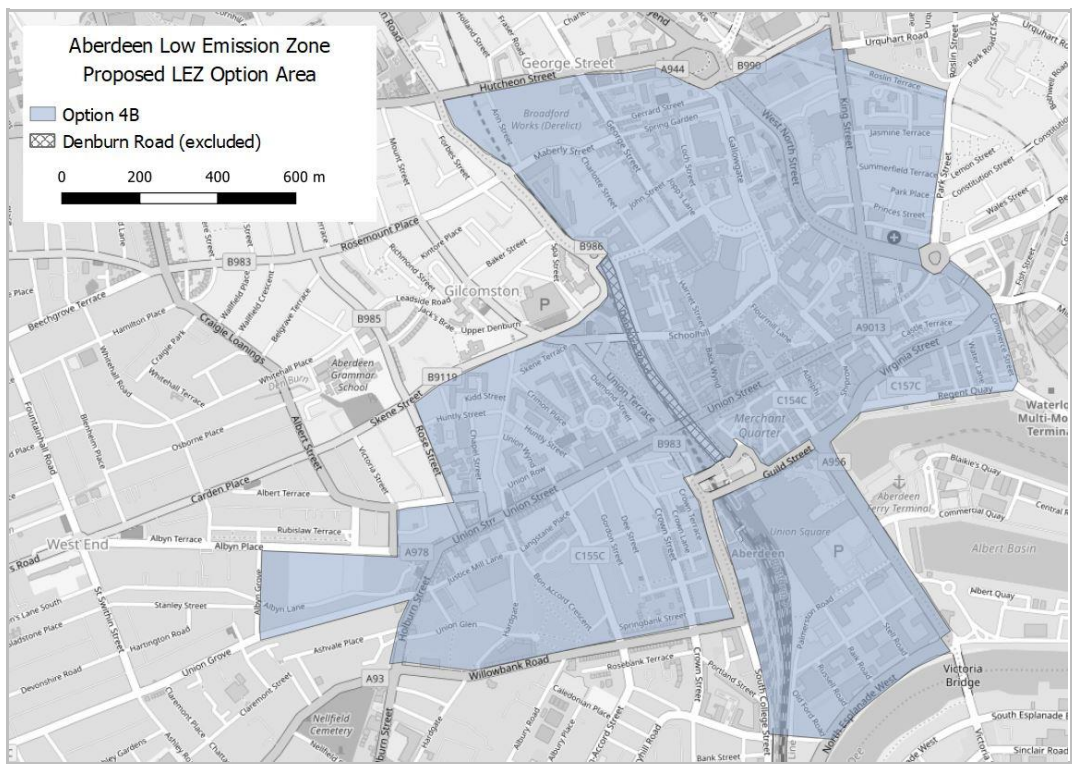
**Figure 5.5 : Option 3A – City Centre Masterplan East, including Denburn Road**



**Figure 5.6 : Option 3B – City Centre Masterplan East, excluding Denburn Road**



**Figure 5.7 : Option 4A – City Centre Masterplan, including Denburn Road**



**Figure 5.8 : Option 4B – City Centre Masterplan, excluding Denburn Road**

## 6. SUMMARY AND NEXT STEPS

### 6.1 Summary of Interim NLEF Stage 2 Assessment

6.1.1 In line with NLEF Guidance, the Interim NLEF Stage 2 Assessment Report:

- Defined the objectives for the potential LEZ
- Assessed the impact of potential LEZ options with regard to air quality using the National Modelling Framework (NMF) Aberdeen City Model
- Identified the preferred LEZ option(s), including consideration of geographical extent and scope of vehicles to be included, to be recommended to be progressed to Consultation and detailed testing.

6.1.2 The objectives for Aberdeen's Low Emission Zone were accepted at the City Growth and Resources Committee meeting on 5<sup>th</sup> December 2019. Aberdeen's Low Emission Zone will:

1. Improve air quality in Aberdeen by reducing harmful emissions from transport and delivering on the Scottish Government's statutory air quality objectives.
2. Support climate change targets by reducing road transport's contribution to emissions.

6.1.3 It was recognised that a LEZ can help realise wider benefits beyond air quality improvement, but that these are influenced by many other factors and not solely or directly attributable to a LEZ. Therefore the following supplementary objectives for Aberdeen's Low Emission Zone were also identified:

- Protect public health and wellbeing;
- Support local and regional transport strategies by contributing to the development of a vibrant, accessible, and safe city centre, where the volume of non-essential traffic is minimised and active and sustainable transport movements are prioritised; and
- Contribute to ongoing transformational change in Aberdeen, helping promote the city as a desirable place to live, visit and invest in.

6.1.4 High level scenario testing using the NMF Aberdeen City Model was undertaken to inform the LEZ option generation and development process. The NMF results showed that:

- Ensuring all buses meet Euro VI standard brings the largest reduction in modelled NO<sub>2</sub> of any change to a single type of vehicle and should be included in any LEZ option for Aberdeen
- While a Euro VI bus fleet would bring the largest reduction in NO<sub>2</sub>, this alone is not sufficient in addressing all exceedances in Aberdeen.
- Including all vehicles in a LEZ does not bring a sufficient enough reduction in NO<sub>2</sub> to allow a LEZ alone to tackle all air quality exceedances.

6.1.5 The NMF results concluded that a LEZ for Aberdeen should include all vehicle types and should be delivered with complimentary traffic management measures if all exceedances of the air quality objectives are to be addressed.

6.1.6 The LEZ Objectives and NMF results informed the LEZ option generation and development process. An unconstrained LEZ option generation exercise identified 40 possible LEZ options of varying size and vehicle compliance. High level sifting and option appraisal against the LEZ objectives and feasibility and logic criteria concluded there to be five emerging LEZ Options.

6.1.7 Detailed analysis of these emerging LEZ options was undertaken and concluded that four options and their identified variants should be recommended for wider stakeholder consultation. The LEZ Options for Consultation are:

- Option 1A – Union Street Area, including Denburn Rd (Figure 5.1)
- Option 1B – Union Street Area, excluding Denburn Rd (Figure 5.2)
- Option 2A – Union Street & George Street Area, including Denburn Rd (Figure 5.3)
- Option 2B – Union Street & George Street Area, excluding Denburn Rd (Figure 5.4)
- Option 3A – CCMP East including Denburn Rd (Figure 5.5)
- Option 3B – CCMP East excluding Denburn Road (Figure 5.6)
- Option 4A – CCMP, including Denburn Rd (Figure 5.7)
- Option 4B – CCMP, excluding Denburn Rd (Figure 5.8)

## **6.2 Next Steps for the NELF Stage 2 Assessment**

- 6.2.1 The Interim NLEF Stage 2 Report concluded with a set of LEZ options to be progressed to detailed testing using the NMF air quality model and the Paramics microsimulation traffic model, and subsequent public and stakeholder consultation. It therefore does not include results from the testing or consultation period.
- 6.2.2 The Interim NLEF Stage 2 Report concluded that the LEZ options should be delivered along with targeted transport interventions to address predicted remaining exceedance locations in the city. A detailed Paramics traffic microsimulation of Aberdeen City Centre is currently in development and it will be used to test the impact of any transport measures to be delivered alongside the LEZ for Aberdeen. Outputs from the traffic modelling testing will be input to the NMF Aberdeen City Model to assess their impacts on removing exceedance locations.
- 6.2.3 The report identified that any transport interventions should complement existing ACC transport policy, particularly the Aberdeen City Centre Masterplan (CCMP), Sustainable Urban Mobility Plan (SUMP) and the Roads Hierarchy Study. It is concluded that both the CCMP/SUMP interventions and each LEZ option will result in significant changes to vehicle routing in the city centre.
- 6.2.4 Through analysis of the likely impacts of the LEZ and existing ACC transport policy, it is clear that many factors must be considered when detailed modelling of the LEZ options is undertaken and it is crucial that a structured modelling programme is developed and agreed between SYSTRA, ACC and SEPA at the outset of the modelling.
- 6.2.5 Outcomes from the full stakeholder consultation and detailed traffic and air quality modelling are to be included in a Final NLEF Stage 2 Assessment Report.