ABERDEEN LOW EMISSION ZONE - INTEGRATED IMPACT ASSESSMENT

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EXECUTIVE SUMMARY

The Programme for Government (PfG) 2018 committed to the introduction of Low Emission Zones (LEZs) into Scotland's four biggest cities between 2018 and 2020 and into Air Quality Management Areas by 2023. This programme has been amended as a result of the COVID-19 pandemic, with the indicative timetable now aiming to introduce LEZs into the four cities between February to May 2022.

This Integrated Impact Assessment (IIA) forms part of the National Low Emission Framework (NLEF) appraisal to identify the preferred LEZ for Aberdeen.

How might Aberdeen be affected by a LEZ?
The LEZ has the potential to cause a range of positive and negative impacts, from improving the health of society to potentially reducing access to the city centre for those who rely on private vehicle transport. The most significant impact of the LEZ will be the improvement in air quality and the resulting health benefits, benefitting residents, visitors and workers. The LEZ also has a potential positive health impact through encouraging the use of active travel and public transport for certain trips and changing existing travel behaviours.

Given the focus of the IIA to look at how certain protected groups are potentially differentially affected, there are instances where the LEZ could disproportionately affect some groups in society. For example, those who have a diminished ability to upgrade to a compliant vehicle due to low income (including people on benefits, single parents, or disabled people). Those on lower incomes may experience reduced access to locations and in turn the goods, services, or employment opportunities available to them. Community transport providers that rely on cars and minibuses may be subject to LEZ restrictions, therefore the services they provide to a range of protected groups (such as youth groups and those receiving care) may be affected. Mitigation can reduce these potential impacts. For example, the LEZ Support Fund, retrofitting schemes, and exemptions outlined in the LEZ Regulations all look to reduce any negative impacts of the proposed LEZ scheme.

It is estimated that by 2024 there will be approximately 7,500 daily non-compliant vehicles in Aberdeen's city centre area, around 10% of the total. While it is possible to estimate the total costs associated with upgrading this number of vehicles to compliant vehicle types, the expected impact of the LEZ in Aberdeen means a much smaller number of drivers of non-compliant vehicles will choose to upgrade their vehicles. It is anticipated that drivers of non-compliant cars will generally adjust their journey rather than replace their vehicles for a compliant model and utilise alternative parking locations or potentially change mode. The financial cost therefore to comply with the LEZ for such drivers is considered relatively similar to the city network before a LEZ is introduced, though there will be a cost associated with any additional time taken to complete their journey. HGVs and taxis are expected to naturally upgrade by 2024 such that the impact is minimal. The bus fleet is upgrading a quicker pace in anticipation of forthcoming LEZ restrictions but this significant investment is offset to some degree with available funding. LGV drivers, particularly those driven by individuals or small businesses (rather than larger logistics companies) face the prospect of having to upgrade their vehicles to continue their business needs inside the LEZ and these drivers represent the group most at risk of incurring costs to comply with the LEZ. However, funding opportunities for micro-businesses can mitigate against much of the impact on this particular group. On the whole therefore, the total number of vehicles required to upgrade is anticipated to be small in comparison to the total number of trips entering the LEZ on a daily basis and with the provision of funding through the Low Emission Support Fund and the national exemptions

for certain vehicles and users, the cost of compliance in Aberdeen is likely to be relatively small against the benefits the LEZ will bring.

What insights were gained through the analysis?

The IIA shows that protected members of society can be impacted by the LEZ in subtle ways that, although small in magnitude relative to the overall air quality benefits of the LEZ, can be removed or mitigated through considerate decision making at a national and local level.

1. INTRODUCTION

1.1 Purpose of this report

1.1.1 This report will inform the final design of Aberdeen's Low Emission Zone (LEZ) by presenting potential impacts arising from its introduction. A LEZ in the city will restrict non-compliant vehicles from entering a defined area in the city centre and this report considers a range of consequential impacts including access, health, and financial. The analysis builds on the National Low Emission Framework (NLEF) appraisal, of which this Integrated Impact Assessment (IIA) is part and incorporates findings from public and stakeholder engagement undertaken by SYSTRA/Aberdeen City Council (ACC) and Transport Scotland.

1.1.2 Both quantitative and qualitative research approaches were adopted to identify the potential impacts of the scheme. A wide range of data sets have been analysed to inform the likely impacts including from Transport Scotland, Department for Transport, Aberdeen City Council and the Office for National Statistics. Where quantitative data was unavailable or limited, and to provide more detailed insights into specific issues, consultation with business owners, business and trade representative organisations, transport operators and community interest groups was undertaken as part of the NLEF process and used to inform the likely behavioural response to the LEZ introduction. The report also accessed a Scottish wide survey of businesses and people conducted by Transport Scotland to elicit their views on LEZs.

1.1.3 The report is structured as follows:

- Chapter 1 sets the context of this IIA.
- Chapter 2 provides detailed background on policy, Aberdeen's LEZ, and related projects.
- Chapter 3 presents the methodology of the IIA.
- Chapter 4 summaries the expected impact of the LEZ on IIA population groups
- Chapter 5 summarises the IIA findings against the IIA objectives.
- Chapter 6 details mitigation that may be used to reduce the potential negative impacts of the LEZ.

1.2 Health and air pollution

1.2.1 Pollutants caused by vehicle emissions are largely invisible, but these gases and particulates can be hazardous to human health. A recent review (2019) highlights a growing body of scientific evidence which links higher levels of air pollution with increased ill health. Particularly at risk are the very young, older people/pensioners and those with pre-existing health conditions and illnesses such as asthma. Aberdeen City Council produce annual Local Air Quality Management (LAQM) reports that track the progress of the Air Quality Action Plan (AQAP) in Aberdeen and its interventions to improve air quality over time. Despite improvements in air quality since the introduction of the AQAP, there remain several locations in the city centre Air Quality Management Area (AQMA) where exceedances of emissions exist and where the Air Quality Standards (AQS) are not being met.

1.2.2 A LEZ is therefore being introduced in the city to accelerate Aberdeen's required compliance with the AQS.

1.3 Low Emission Zones

1.3.1 LEZs are a Scottish Government policy response to aforementioned air pollution issues. They are areas where only vehicles of a certain emissions standard are allowed to enter/exit/operate within thereby reducing the use of more polluting vehicles. The potential benefit comes from the reduction in emissions associated with vehicles and resulting increase in health outcomes. LEZs may also encourage modal shift away from private cars to public transport and active travel with the potential for fewer vehicles overall to enter/exit/operate within the zone.

1.3.2 Low Emission Zones are included in the Transport (Scotland) Act 2019 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 now have the powers to create, enforce, operate or revoke a LEZ in their areas and to design the shape, size and vehicle scope of their low emission zone.

1.3.3 The accompanying LEZ Regulations were laid in Parliament in January 2021, thereby allowing Scottish Ministers to set nationally consistent standards (Regulations) on LEZ matters specified in the Act (e.g. emission standards, penalties and exemptions, statutory consultees). There are two sets of regulations for LEZs in Scotland. The Low Emission Zones (Emission Standards, Exemptions and Enforcement) (Scotland) Regulations 2021 cover the topics of emission standards, exemptions, penalty charge rates, and enforcement. The Low Emission Zones (Scotland) Regulations 2021 cover the topics of consultation, publication and representations, examinations, approved devices, accounts and amending or revoking LEZs.

1.4 National Low Emission Framework

1.4.1 An assessment and appraisal process to inform the size and scope of Aberdeen's LEZ follows the National Low Emission Framework (NLEF) guidance. The 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).

1.4.2 NLEF has allowed ACC to:

- build an evidence base to assist in the appraisal of Aberdeen's LEZ
- identify the objectives of the LEZ
- identify a range of LEZ options for stakeholder and public consultation
- develop a robust and detailed traffic and emissions model testing programme to assess the impacts of the LEZ options
- identify the preferred LEZ for Aberdeen

1.5 Integrated Impact Assessment

1.5.1 This report is an Integrated Impact Assessment (IIA) following NHS Lothian's guidance (in line with the IIAs undertaken for the LEZ proposals for Edinburgh, Dundee and Glasgow) to identify the potential differential effects on different groups as a result of the introduction of a LEZ in Aberdeen, as stipulated in the NLEF guidance.

1.5.2 The IIA method was chosen due to the overlapping nature of the assessment, where the IIA consists of a combined framework of the following assessments:

- Equality Impact Assessment (EqIA)
- Child Rights and Wellbeing Impact Assessment (CRWIA)
- The Fairer Scotland Duty (FSD)

1.5.3 Full detail on the IIA process and methodology can be found Chapter 3.

2. A LOW EMISSION ZONE FOR ABERDEEN

2.1 Background

2.1.1 The Environment Act 1995 requires all local authorities in the UK the statutory duty to undertake an air quality assessment within their area and determine whether they are likely to meet the air quality objectives for a number of pollutants. The process of review and assessment of air quality undertaken by local authorities is set out under the Local Air Quality Management (LAQM) regime.

2.1.2 Where the results of the review and assessment process highlight problems in meeting the objectives for air quality, the authority is required to declare an Air Quality Management Area (AQMA). Following the declaration of an AQMA, the local authority is then required to produce an Air Quality Action Plan (AQAP) which sets out measures that the local authority will implement to work towards to achieve air quality objectives.

2.1.3 In 2001 ACC first declared part of the City Centre (Union Street and Market Street) an Air Quality Management Area (AQMA) due to predicted exceedances of the annual mean national air quality objective for nitrogen dioxide (NO_2). The AQMA has been expanded several times since its declaration and two further AMQAs have since been declared in the city for the Anderson Drive/Haudagain roundabout/Auchmill Road corridor and the Wellington Road corridor (Queen Elizabeth Bridge/Balnagask Road).

2.1.4 The AQAP provide the mechanism by which local authorities, in collaboration with national agencies and others, will state their intentions for working towards the air quality objectives using the powers they have available. ACC's AQAP includes a series of measures that they will introduce in pursuit of the Air Quality Standards (AQS). The principal aim of the AQAP is to minimise the effects of air pollution on human health within the local authority area using all reasonable measures, within reasonable time frames, and by working towards achieving the AQS.

2.1.5 Despite improvements in air quality since the introduction of the AQAP, there remain several locations in the AQMA where exceedances of emissions exist and where the AQS are not being met. The number of exceedances of the NO_2 annual mean objective has decreased from 11 in 2018 to 8 in 2019. The 2020 Air Quality Annual Progress Report (APR) for Aberdeen City Council, contains the latest (2019) information on air quality in Aberdeen considered representative of annual trends in observed air quality. The 2021 APR provides the 2020 air quality dataset but this dataset contains observed data captured during the Coivd-19 pandemic and is not considered representative of the yearly trend in pollution levels up to and including 2019. The 2019 dataset has therefore been used in the NLEF appraisal and option development process.

2.1.6 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, Aberdeen and Dundee). At the time of writing each city is required to have declared their LEZ by February – May 2022. The LEZ is being introduced to accelerate the required compliance with the AQS.

2.1.7 A LEZ is a scheme under which individuals driving vehicles which fail to meet specified emission standards will be prohibited from driving those vehicles in contravention of the terms of the scheme as proposed by a local authority within a designated geographical area.

2.2 Legislative Framework and Operation of a LEZ

2.2.1 Low Emission Zones are included in the Transport (Scotland) Act 2019 which received Royal Assent in November 2019. Transport (Scotland) Act 2019 section 6(4)(a) provides the powers to specify LEZ emission standards for vehicles in the Regulations and allows all Scottish LEZs to operate to a consistent national level. A person may not drive a vehicle on a road within a LEZ unless that vehicle meets the specified emission standard. Vehicles that fail to comply with the LEZ emission standard will be subject to LEZ enforcement measures once any LEZ grace period has ended. The LEZ emission standards are:

- Euro VI emission standards for buses, coaches and heavy good vehicles with diesel engines, with retrofitted vehicles to this standard also being acceptable (Euro VI vehicle registrations from 2013)
- Minibuses, large vans, taxi's and cars are set at the Euro 6 for diesel and Euro 4 for petrol vehicles (Euro 6 diesel vehicle registrations in 2015, Euro 4 petrol vehicles in 2006).

2.2.2 Section 6(4)(a) of the Transport (Scotland) Act 2019 enables exemptions to be set consistently across Scotland. ACC will have no ability to vary or choose from the national LEZ exemptions listed in Regulation 3 of the LEZ Regulations and outlined in Table 2.1. ACC are therefore required to operate their LEZ in compliance with the exemption list, so that there is national consistency in its application.

Table 2.1 : National LEZ Exemptions

Vehicle type of classification	Description
Emergency Vehicles	For or in connection with the exercise of any function of:
	the Scottish Ambulance Service,
	the Scottish Fire and Rescue Service,
	Her Majesty's Coastguard, and
	the National Crime Agency.
Military Vehicles	Vehicles belonging to any of Her Majesty's forces; or used for the purposes of any of those forces
Vehicles of Historic Interest	Vehicles which are 30 years old or older, are no longer in production and historically preserved or maintained
Vehicles for Disabled Persons	Vehicles registered with a 'disabled' or 'disabled passenger vehicles' tax class
	Vehicles being used for the purposes of the 'Blue Badge Scheme'.
Showman Vehicles	Highly specialised vehicles used for the purposes of travelling showmen, where the vehicle is used during the performance, used for the purpose of providing the performance or used for carrying performance equipment.

2.2.3 The Transport (Scotland) Act 2019 requires a LEZ to specify a grace period before penalty enforcement of the scheme. Section 15 details the scope and time-limits of the grace period. The grace period applicable to non-residents must expire:

- not less than 1 year after it (LEZ declaration) begins, and
- not more than 4 years after it begins.

2.2.4 The grace period applicable to residents (whose registered address is inside the zone) must expire not more than 2 years after the expiry of the grace period applicable to non-residents.

2.2.5 Section 6(4)(a) of the Transport (Scotland) Act 2019 enables penalty charges to be set, based on the vehicle class, and sets out the circumstances in which penalty charges can be subject to a discount or surcharges or to escalate the penalties over time. The LEZ

Regulation 4 and Schedule 4 has set 'tiers' of penalties based on a pre-set number of Penalty Charge Notices (PCN's) being issued. The tier structure is outlined in Table 2.2

Table 2.2 : Proposed penalty charge structure for a non-compliant, non-exempt vehicles in a LEZ

Vehicle Category / Tier	Tier				
	1	2	3	4	5
Car, Taxi and Private Hire	£60	£120	£240	£480	£480
Minibus	£60	£120	£240	£480	£960
Light goods vehicles	£60	£120	£240	£480	£480
Bus or Coach	£60	£120	£240	£480	£960
Heavy goods vehicles	£60	£120	£240	£480	£960
Motorcycle or Mopeds	£60	£120	£240	£480	£480
Special purpose vehicles	£60	£120	£240	£480	£480

2.2.6 Section 8 of the Transport (Scotland) Act 2019 also enables the enforcement of LEZ schemes. The LEZ will be enforced through Automatic Number Plate Recognition (ANPR) cameras with the LEZ Regulations Schedule 6 detailing the approved devices.

2.3 Policy Context

2.3.1 A full policy review has been undertaken in the Interim NLEF Stage 2 Report (*Aberdeen Low Emission Zone, National Low Emission Framework Stage 2 Report, SYSTRA 2020)*. 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.

2.3.2 Activities relating to monitoring and management of air quality in Scotland are primarily driven by European (EU) legislation (at the time of writing) and implemented to UK and Scottish air quality policy. A summary of the legal air pollutant limits and guidelines in Scottish law is detailed in Table 2.3, with local authorities responsible for achieving these objectives.

Table 2.3 : Air Pollutant Limits and Guidelines

Pollutant	Air Quality Objective	
	Concentration	Measured as
Nitrogen Dioxide (NO2)	200 µg/m³ (not to be exceeded more than 10 times a year)	1-hour mean
	40 µg/m³	Annual mean
Coarse Particulate Matter (PM10)	50 µg/m³ (not to be exceeded more than 7 times a year)	24-hour mean
	18 µg/m³	Annual mean
Fine Particulate Matter (PM2.5)	10 µg/m³	Annual mean
Sulphur Dioxide (S02)	350 µg/m³ (not to be exceeded more than 24 times a year)	1-hour mean
	125 µg/m³ (not to be exceeded more than 3 times a year)	24-hour mean
	266 µg/m³ (not to be exceeded more than 35 times a year)	15 minute mean
Benzene	3.25 µg/m³	Running annual mean
1,3 Butadiene	2.25 µg/m³	Running annual mean
Carbon Monoxide (CO)	10.0 mg m³	Running 8-hour mean
Lead	0.25 µg/m³	Annual mean

2.3.3 There are also many related national, regional and local policies and strategies that can influence and be influenced by, the delivery of Aberdeen's Low Emission Zone. Many of these policies and strategies are focused on transportation issues, and may help contribute to overall improvements in air quality in the Aberdeen City AQMA. Similarly, it is crucial that local plans and policies (e.g. Development Plans, Economic Strategies) are informed by the LEZ to ensure they continue to drive improvements in air quality.

2.3.4 The detailed legislation, policies and plans reviewed in the NLEF Stage 2 Report are listed below. Firstly, the key policy and legislative drivers for Low Emission Zones are:

- Transport (Scotland) Act 2019;
- Cleaner Air for Scotland 2 – Towards a Better Place for Everyone (CAFS2)
- The Environment Act 1995: Part IV

2.3.5 The wider legislative and policy that influence or can be influenced by a LEZ in Aberdeen:

- EU, UK and Scottish 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)
  - 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 2 – Towards a Better Place for Everyone (CAFS2)

- 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 and Polices
  - Aberdeen City and Shire Strategic Development Plan
  - Aberdeen City Region Deal
  - Regional Transport Strategy
  - Nestrans Regional Transport Strategy 2013–2035 Refresh
  - North East Regional Economic Strategy to 2035

- Local Plans and Policies and Projects
  - Aberdeen Local Transport Strategy
  - Aberdeen Local Development Plan
  - Aberdeen City Centre Masterplan
  - North East Scotland Roads Hierarchy Study
  - Aberdeen Sustainable Urban Mobility Plan
  - Aberdeen Sub Area Model (ASAM)
  - Aberdeen City Centre Microsimulation Model

2.4 Objectives of Aberdeen's LEZ

2.4.1 The objectives for Aberdeen's Low Emission Zone were agreed at the City Growth and Resources Committee meeting on 5th December 2019.

2.4.2 They are that 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.

2.4.3 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.

2.5 Development of Aberdeen's LEZ

2.5.1 In line with the Transport Scotland Act and associated Regulations and Guidance, it is proposed that:

- low emission zone entry will be based on the Euro emission engine classification standards
- low emission zones operate continuously, 24 hours a day, seven days a week, all year-round. Enforcement will utilise Automatic Number Plate Recognition (ANPR) cameras, linked to a national vehicle licencing database, and will monitor vehicles entering a low emission zone to detect vehicles which do not comply with the minimum Euro emission standards
- low emission zones will be based on a penalty notice approach to discourage non-compliant vehicles from entering the zone
- the design, implementation and operation of low emission zones will involve grace periods to allow commercial fleet operators and private vehicle owners time to prepare
- exemptions will be specified in regulations such as the ability for a local authority to allow time limited local exemptions for up to 12 months
- local authorities publish a report annually on the effectiveness of low emission zones.

2.5.2 SYSTRA, on behalf of Aberdeen City Council, has followed the National Low Emission Framework (NLEF) guidance to build an evidence base to inform the development of the LEZ and to undertake a structured LEZ option appraisal process to identify LEZ options that best satisfy the LEZ objectives.

2.5.3 The NLEF guidance, published in January 2019, states that 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).

2.5.4 The NLEF appraisal process provides a consistent approach that can be applied across Scotland to inform decisions on transport-related actions to improve local air quality. It is designed to support local authorities in considering transport-related issues in the context of local air quality management and help develop evidence to support consideration of the introduction of an LEZ as an appropriate option to improve air quality.

2.5.5 A first Interim NLEF Stage 2 Assessment Report (*Aberdeen Low Emission Zone, National Low Emission Framework Interim Stage 2 Report, SYSTRA 2020)* was published in June 2020. The report provided an evidence base and policy review from which came the identification of the LEZ objectives and the LEZ options for stakeholder and public consultation and detailed testing through local traffic and air quality models.

2.5.6 The report summarised the high level scenario testing undertaken using SEPA's National Modelling Framework (NMF) Aberdeen City Air Quality Model to inform the LEZ option generation and development process. The NMF results showed that:

- Ensuring all buses meet Euro VI standard bring the largest reduction in modelled NO_2 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_2, this alone is not sufficient in addressing all exceedances in Aberdeen
- Whilst buses dominate emissions along the Union Street, Holburn Street and King Street corridor diesel cars are the primary contributors to annual average total NOx

elsewhere. LGVs are the third largest contributor with other Goods Vehicles adding smaller amounts

- Even with all vehicles compliant with LEZ standards, an all vehicle LEZ will not bring a sufficient enough reduction in NO_2 to allow a LEZ alone to tackle all air quality exceedances
- A LEZ for Aberdeen will therefore have to include all vehicle types and have to be delivered with traffic management measures if all exceedances of the air quality objectives are to be addressed.

2.5.7 The LEZ objectives and NMF results informed a LEZ option generation and development process. An unconstrained LEZ option generation exercise identified a large number of possible LEZ options of varying size and vehicle compliance.

2.5.8 Through high level sifting and option appraisal against the LEZ objectives and feasibility, affordability and public acceptability criteria, the NLEF Appraisal recommended that four main LEZ option be taken to wider consultation and detailed model testing undertaken using the NMF air quality model and the Paramics microsimulation traffic model. The analysis demonstrated that from the four options there were two possible variants to each option as follows:

- Option 1A – Union Street Area, including Denburn Road
- Option 1B – Union Street Area, excluding Denburn Road
- Option 2A – Union Street & George Street Area, including Denburn Road
- Option 2B – Union Street & George Street Area, excluding Denburn Road
- Option 3A – CCMP East including Denburn Road
- Option 3B – CCMP East excluding Denburn Road
- Option 4A – CCMP, including Denburn Road
- Option 4B – CCMP, excluding Denburn Road

2.5.9 Following publication of the first interim NLEF Stage 2 Report and on instruction from ACC's City Growth and Resources Committee, SYSTRA and ACC undertook a six-week public and stakeholder consultation exercise in Autumn 2020. The results from consultation informed the final LEZ option for Aberdeen along with detailed traffic microsimulation modelling and traffic emissions modelling.

2.5.10 A second Interim NLEF Stage 2 Report (*Aberdeen Low Emission Zone, National Low Emission Framework Interim Stage 2 Report, SYSTRA 2021)* was published in June 2021 and, through analysis of consultation findings and outcomes from the traffic and emissions modelling, it identified the final preferred LEZ for the city.

2.5.11 Upon identifying the final preferred LEZ option, and in line with The Transport (Scotland) Act 2019, a local authority must hold a consultation period on the final preferred LEZ option prior to submission of the scheme to Scottish Ministers. ACC therefore launched an eight-week consultation from 28 June 2021 to 22 August 2021 on its preferred LEZ scheme for the city, as agreed at the City Growth and Resources Committee on 24th June 2021.

2.5.12 The statutory consultation highlighted the need to examine boundary adjustments on the eastern side of the LEZ to address concerns around access to Aberdeen Harbour for non-compliant vehicles. To ensure the correct LEZ area was chosen that protects the city from harmful levels of air pollution while still providing suitable access to key areas in the city, further traffic and air quality model tests were undertaken.

2.5.13 The results from the additional boundary option tests are detailed in *Aberdeen LEZ Option Testing Report (SYSTRA, October 2021).* The modelling confirmed the final LEZ boundary

to be as proposed in the second Interim NLEF Stage 2 Report with the following adjustments:

- Wapping Street / Carmelite Street /Guild Street gyratory removed from the LEZ area
- East North Street and Commerce Street removed from the LEZ area

2.5.14 A final NLEF Stage 2 Report was complete in October 2021 and, through analysis of consultation findings and outcomes from the traffic and emissions modelling, the final LEZ for the city was proposed as outlined below.

2.6 Final LEZ for Aberdeen

2.6.1 A detailed drawing of the final Aberdeen LEZ is shown in Figure 4.8. A list of all roads which form part of the zone, as required by the Transport (Scotland) Act 2019 is included in Appendix C of the NLEF Stage 2 Report.

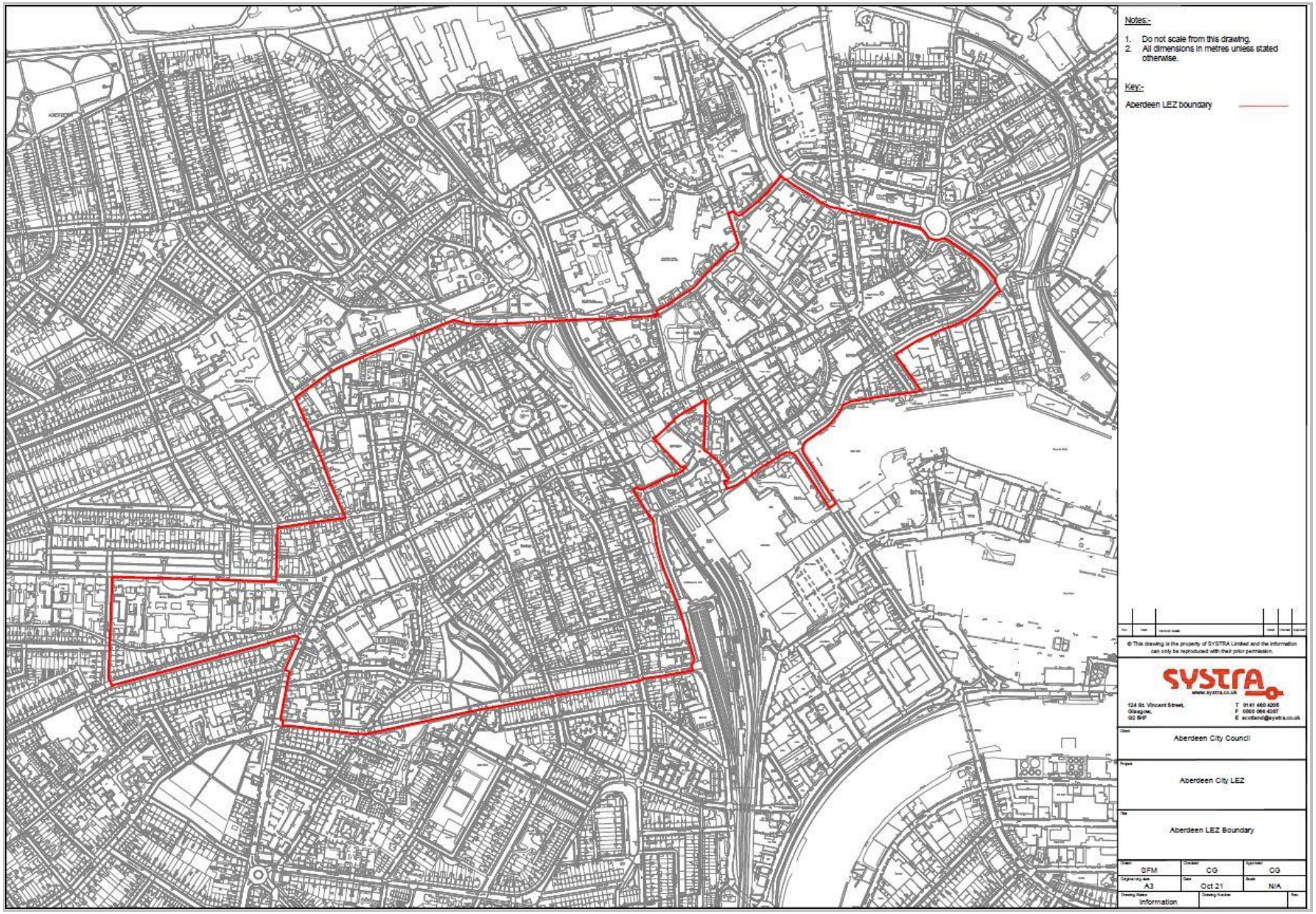


Figure 2.1 : Aberdeen LEZ Option Area

2.6.2 The Low Emission Zones (Emission Standards, Exemptions and Enforcement) (Scotland) Regulations 2021 sets the emission standards for entry to the LEZ without penalty and allows ACC to define which vehicle types are to be restricted from entering the LEZ area.

It is proposed that the final Aberdeen LEZ Option applies to all vehicles types as specified in Regulation 2 of the Low Emission Zones (Emission Standards, Exemptions and Enforcement) (Scotland) Regulations 2021.

2.6.3 The LEZ emission standards for Aberdeen LEZ are therefore:

- Euro VI emission standards for buses, coaches and heavy good vehicles with diesel engines, with retrofitted vehicles to this standard also being acceptable (Euro VI vehicle registrations from 2013)
- Minibuses, large vans, taxis and cars are set at the Euro 6 for diesel vehicles and Euro 4 for petrol vehicles (Euro 6 diesel vehicle registrations in 2015, Euro 4 petrol vehicles in 2006)
- Euro 3 for motorcycles and mopeds. It should be noted that motorcycles and mopeds have been scoped out of the LEZ and enforcement of these vehicle types will not occur

2.6.4 The Transport (Scotland) Act 2019 requires a LEZ to specify a grace period before penalty enforcement of the scheme.

It is proposed that the grace period for Aberdeen's LEZ expires in May 2024 for all vehicle types and for residents and non-residents of the zone.

2.6.5 Section 8 of the Transport (Scotland) Act 2019 enables the enforcement of LEZ schemes. The LEZ will be enforced through Automatic Number Plate Recognition (ANPR) cameras with the LEZ Regulations Schedule 6 detailing the approved devices.

2.6.6 ANPR camera enforcement is currently subject to funding decisions from Transport Scotland and procurement procedures with suppliers. The exact number and location of ANPR cameras is therefore not concluded and will be confirmed in the final NLEF Stage 2 Report and submission to Scottish Ministers.

2.6.7 In line with Section 18 of the Transport (Scotland) Act 2019, it is anticipated that the LEZ will be enforced at all times. Section 17 of the Act does allow for ACC to apply time-limited exemptions to enforcement should it be required, for example for road closures and diversion routes.

2.7 Consultation and Engagement on Aberdeen's LEZ

2.7.1 The development of Aberdeen's LEZ has been informed and shaped by public and stakeholder engagement from the outset. The consultation outcomes are used to inform the IIA, in particular the likely behavioural response from each IIA group identified in Chapter 3.

2.8 Statutory Consultation

2.8.1 Section 11 of the Transport (Scotland) Act 2019 states that before a local authority submits its final Low Emission Zone (LEZ) proposals to Scottish Ministers for approval, it must consult with:

- the Scottish Environment Protection Agency
- NatureScot
- Historic Environment Scotland,
- such persons as the authority considers represent the interests of
  i. the road haulage industry
  ii. the bus and coach industry
  iii. the taxi and private hire car industry
  iv. local businesses
  v. drivers likely to be affected by the proposal
- such persons as are specified by the Scottish Ministers in regulations
  i. neighbouring local authorities
  ii. the Regional Transport Partnership (Nestrans)
  iii. the local Health Board
- such other persons as the authority considers appropriate

2.8.2 In line with The Act 2019, Aberdeen City Council (ACC) launched an eight-week consultation from 28th June 2021 to 22th August 2021 on its proposed LEZ scheme for the city, as agreed at the City Growth and Resources Committee on 24th June 2021.

2.8.3 The statutory consultation period consisted of the following elements:

- Email correspondence to statutory consultees and organisations advising of LEZ proposals
- Stakeholder workshops
- Online survey seeking views on the proposed LEZ option
- Information flyer delivered to residents and businesses in proposed LEZ area

2.8.4 Table 2.4 shows stakeholders and organisations contacted directly by ACC that provided a written submission in response to the proposals for Aberdeen's LEZ.

Table 2.4 : Written submission received by ACC

Stakeholder Type	Organisation
Bus & Coach Operators	First Aberdeen
	Whyte's Coaches
	Stagecoach
Regional Partners	Aberdeenshire Council
	Nestrans
National Bodies	Nature Scot
	Historic Environment Scotland
Business Community	Aberdeen and Grampian Chamber of Commerce
	Federation of Small Businesses (FBS)
Community Councils	Rosemount and Mile End Community Council
	City Centre Community Council
	Culter Community Council
Harbour	Aberdeen Harbour Board
Education	Robert Gordon College
Shopping Centres and Car Park Operators	Q-Park
	Trinity Centre
	Union Square
Active Travel Groups	Aberdeen Cycle Forum
	Sustrans
	Paths for All
Environment and Interest Groups	Aberdeen Civic Society
	Aberdeen Friends of the Earth
Health Bodies	British Heart Association
	Asthma UK & British Lung Foundation Scotland
Motoring Groups	RAC Motoring Services
Delivery/Logistics	Royal Mail
	UPS
Freight and Hauliers	Road Haulage Association (RHA)
	Peterson SBS Ltd.
	Groundwater Lift Trucks Ltd.
	Shore Porters
	Dyce Carriers
	ARR Craib
	Canadian Natural Resources

2.8.5 In addition to the responses noted above, ACC also received written responses from the following organisations:

- Little Dreams Nursery
- Albyn Garage
- Bridge bar
- Kirkgate Bar
- Scullion, Bruce and Co.
- Unite the Union Scotland

2.8.6 SYSTRA organised five virtual stakeholder workshops in August 2021 during ACC's 8-week statutory consultation period on its LEZ proposals, held using Microsoft Teams. A summary of the workshop groups and number of attendees is provided in Table 2.5.

Table 2.5 : Aberdeen LEZ Stakeholder Workshops 2021

Workshop Group	Date	Number of Attendees
Community Councils	08/07/2021	8
Environmental, Health & Equalities Groups	26/07/2021	4
Freight & Aberdeen Harbour	27/07/2021	13
Business Community	28/07/2021	12
Bus & Coach Operators	28/07/2021	6
Total No. of Stakeholders Consulted:		**43**

2.8.7 Each workshop was scheduled for 1 hour 30 minutes. At all workshops, SYSTRA gave a 25-minute presentation on the proposals for the LEZ in Aberdeen, including details on planned operation and enforcement timeline for its introduction, followed by a question and answer session.

2.8.8 ACC set out its proposals for the LEZ scheme on its LEZ website where those wishing to provide feedback could do so through an online survey. The online survey was available between 28th June and the 22nd August 2021 and hosted by ACC's preferred consultation platform Citizens Space. Consultation responses were also accepted via email to the Council's Transport Strategy address. In total, there were 1754 completed responses to the online survey and 45 responses via email. 97% of responses were individual responses and 3% of responses were from organisations or businesses. Submissions were received from a range of organisations such as small local businesses, national organisations, charities and national bodies. A number of statutory stakeholders provided their response to the LEZ proposals through the online portal and these were extracted and included in the stakeholder analysis. The following businesses (excluding statutory stakeholders) responded to the online survey:

- McDonalds
- William Black and Son Ltd.
- MS Services
- Aberdeen Mobile Machinery Services
- Destiny Partnership
- Quids In Theatre Company
- VSA
- Carmelite Hotel
- Somers Fishing Tackle
- Belmont Filmhouse
- Pure Beat Radio
- DaVinci Restaurant
- Lakeland
- Direct Waste Management
- Hunter Construction
- Silver City Wedding Cars
- Café Contour
- Caber Coffee
- MN Hamilton
- Bennett Security
- Gamola Golf
- Envirope
- Park Electrical Services
- R&Q

- Pattersons of Aberdeen Ltd.
- Colin Harkness Joinery
- Hebron Evangelical Church
- Enterprise Holdings
- The Scottish Motor Trade Association Ltd
- Workman FM
- Women's International Motorcycle Association (WIMA)
- Scottish Wholesale Association

2.8.9 Analysis of the written submissions, online survey results and workshop outcomes can be found in the *Aberdeen Low Emission Zone Statutory Consultation Summary (SYSTRA, September 2021).* The breadth of responses from individuals and businesses is used to inform the likely impacts and behavioural choices resulting from the introduction of the LEZ and the resulting outcomes of the IIA.

2.8.10 As noted above, the statutory consultation highlighted the need to examine boundary adjustments on the eastern side of the LEZ to address concerns around access to Aberdeen Harbour for non-compliant vehicles.

Previous Consultation Period

2.8.11 Prior to the statutory consultation in 2021, a six-week consultation period ran in 2020 seeking to discover the views of stakeholders and members of the public on LEZs in general and specifically the potential options for Aberdeen that emerged from the Interim NLEF Stage 2 Report, as noted above. The consultation took the form of an online public survey and virtual workshops with key (and statutory) stakeholders. The outcomes from the consultation period were reported to the City Growth and Resources Committee in June 2021 and is summarised here.

2.8.12 The online public survey ran for six weeks from 14th September 2020 to 25th October 2020 and was administered by ACC. The survey received 506 responses with a further 10 received by email. The survey included questions seeking to discover respondents' views on LEZs in general and:

- 48.4% of respondents supported the general principle of LEZs
- 40.9% were not in favour of LEZs
- 10.3% were unsure

2.8.13 Specifically asked about the introduction of a LEZ in Aberdeen to address air quality problems in the city, 43.9% of respondents were supportive of a LEZ and 42.6% were not supportive of a LEZ in the city.

2.8.14 Of the eight options presented for consultation in the Interim NLEF Stage 2 Report, Option 4A (22%) received the most preferred option votes overall, followed by Option 1A (19%). As outlined in the NLEF Report, the consultation outcomes and subsequent modelling and appraisal of the eight LEZ options, resulted in a hybrid of Option 1A and 4A (Option 5) being identified as the preferred option to be presented for Statutory Consultation.

2.8.15 A range of virtual workshops with key stakeholders were held concurrently with the live public survey dates during September and October 2020. Five workshops were held in total with the stakeholders represented as follows:

- Bus industry representatives:
  - Stagecoach East Scotland, First Bus, Bains Coaches and the Confederation of Passenger Transport (CPT)

- Local freight industry representatives
- Aberdeen Harbour
- Community Councils:
  - George Street, Rosemount and Mile End, Castlehill and Pittodrie
- Environmental/interest groups
  - Friends of the Earth, Aberdeen Cycle Forum, Asthma UK and British Lung Foundation Partnership, Aberdeen Environment Forum
- Taxi representatives

2.8.16 Further analysis of the results can be found in the second Interim NLEF Stage 2 Report. The consultation results show the level of support for the introduction of a LEZ in Aberdeen and crucially the information received helped shape and inform the final proposed LEZ area (as a hybrid of the two most preferred options) for final Statutory Consultation.

Focussed Covid-19 Consultation

2.8.17 In response to the Covid-19 pandemic the national LEZ Leadership Group announced in May 2020 a temporary pause in plans to implement LEZs across Scotland. Plans were formally resumed in August 2020 and a new indicative timescale for the introduction of LEZs was published, that aims to see their introduction between February and May 2022.

2.8.18 In light of the difficulties faced by many throughout 2020 and 2021, ACC were keen to understand the level of support for the introduction of a LEZ in the city post pandemic and gauge the impact the pandemic may have had on businesses and bus operators in preparing for its introduction.

2.8.19 ACC have consulted with bus operators in the city regularly throughout the LEZ process and have kept them up to date with ongoing proposals for the city's LEZ. Given the importance of bus compliance to the success of any LEZ, the operators (First Bus, Stagecoach and Bains Coaches) were approached in March 2021 and asked to complete a short questionnaire on the impact of Covid-19 on investment plans and likely future fleet compliance.

2.8.20 The business community has also been significantly impacted by the Covid-19 pandemic, with many shops and services required to close or provide reduced service due to Government restrictions. No business representatives attended the autumn 2020 workshops, and given the importance the business community to the implementation of any LEZ in the city, a further business workshop was organised for April 2021 where representatives from Union Square shopping centre and Aberdeen & Grampian Chamber of Commerce attended.

2.8.21 A key outcome from the focused consultation was to inform the length of the grace period. It was recognised that the Covid-19 pandemic has had an unprecedented impact on society, including on the wider environment and the economy. Cognisance of the difficulties faced by many throughout 2020 and 2021, particularly in the context of a Aberdeen city centre LEZ and its implications for city businesses and bus operators, suggested that a grace period greater than the required minimum one year was needed and a two year grace period was subsequently proposed.

Additional Consultation Resources

2.8.1 The IIA also utilises outcomes from two Transport Scotland facilitated public consultation exercises, *Building Scotland's Low Emission Zones* and Scotland Low Emission Zone Consultation on Regulations and Guidance 2019-2020.

3. METHODOLOGY AND APPROACH TO IIA

3.1 Overall approach

3.1.1 The objective of this report is to present potential impacts arising from the LEZ and use this analysis to support wider assessment of key LEZ decisions. The report uses the NHS Lothian Integrated Impact Assessment (IIA) approach because it is an effective mechanism for meeting requirements of the NLEF and the Equality Act 2010 (Specific Duties) (Scotland) 2014. This IIA approach is consistent with Transport Scotland's approach to the IIA for the LEZ Regulations. The approach has also been tailored to reflect relevant supporting guidance for Aberdeen's LEZ. The assessment was undertaken using datasets, including outputs from transport and air quality modelling, and employed a range of methodologies to conduct analysis to better understand the impacts from a LEZ and recommended mitigations.

3.2 Main guidance – NHS Lothian IIA

3.2.1 The NHS Lothian IIA guidance is used to structure the assessment of effects resulting from the implementation of a LEZ in Aberdeen, as required through the NLEF. The Equality Act 2010 (Specific Duties) (Scotland) 2014 requires public bodies to assess the impact of applying a proposed new or revised policy or practice to fulfil the requirements of the Public Sector Equality Duty (PSED) as set out in Section 149 of the Act. In addition, The Fairer Scotland Duty (FSD) places a legal responsibility on public bodies in Scotland to actively consider how they can reduce inequalities of outcome caused by socio-economic disadvantage, when making strategic decisions. As such, an IIA is an effective mechanism of meeting these legal requirements by considering the needs of different groups and to assess proposals for potential equality impacts to prevent unlawful discrimination.

3.2.2 The NHS Lothian IIA guidance informs that when undertaking an IIA, the likely impacts of the policy or proposal on the following groups are assessed:

- People with protected characteristics (e.g. age, gender, disability, ethnicity, religion);
- Those vulnerable to falling into poverty (e.g. unemployed, single parents, homeless people, carers and vulnerable families)
- Geographical communities (e.g. urban, rural, and business communities)
- Staff (where applicable)

3.2.3 In Chapter 4, the LEZ proposal is therefore assessed by identifying how it differentially impacts on these different population groups.

3.2.4 These impacts are organised by the following IIA objective themes:

- Equalities and Human Rights;
- Environmental
- Economic

3.2.5 Chapter 5 presents the impacts under defined IIA objectives associated with the aforementioned themes, as shown in Table 3.1. Note, not all IIA objectives listed in the NHS Lothian IIA guidance are relevant to the LEZ and are not included in Table 3.1 as agreed with ACC.

3.2.6 In line with the NHS Lothian IIA guidance, the likely impacts arising from the introduction of the LEZ has been discussed at the ACC LEZ Delivery Group (a monthly meeting), which consists of the following representatives:

- Aberdeen City Council (officers from different departments)
- Transport Scotland
- SEPA
- Aberdeenshire Council
- Nestrans (regional transport partner)
- NHS Grampian
- SYSTRA

3.2.7 In addition, the development of the LEZ proposals have been informed by these and other interest groups and stakeholders through ongoing consultation, as noted in Chapter 2.

Table 3.1 : IIA Objectives

IIA Topic Theme	IIA Objective
Equality and Human Rights	Eliminate discrimination and harassment
	Advance equality of opportunity e.g. improve access / quality of services
	Foster good relations within and between people with protected characteristics
	Enable people to have more control of their social/work environment
	Reduce differences in status between different groups of people
	Promote participation, inclusion, dignity and control over decisions
	Protect vulnerable children and Adults
Environment	Reduce greenhouse gas (GHG) emissions
	Plan for future climate change
	Pollution: air/water/soil/noise
	Protect coastal and inland waters
	Enhance biodiversity
	Encourage resource efficiency (energy, water, materials and minerals)
	Public Safety (e.g. minimise waste generation, infection control, accidental injury, fire risk)
	Reduce need to travel and promote sustainable forms of transport
	Improve the physical environment (e.g. housing quality, public space, access to and quality of green space)
Economy	Maximise income and/or reduce income inequality
	Help young people into positive destinations
	Support local business
	Help people to access jobs (both paid and unpaid)
	Improve literacy and numeracy
	Improve working conditions, including equal pay
	Improve local employment opportunities
	Improve quality of and access to services

4. IMPACT BY POPULATION GROUPS

4.1 Introduction

4.1.1 This chapter describes the different analysis undertaken in the IIA, for each of the identified IIA groups:

- People with protected characteristics (e.g. age, gender, disability, ethnicity, religion);
- Those vulnerable to falling into poverty (e.g. unemployed, single parents, homeless people, carers and vulnerable families)
- Geographical communities (e.g. urban, rural, and business communities)
- Staff (where applicable)

4.1.2 Several sources of information were utilised to provide a robust view of the likely impacts on different groups following the introduction of the LEZ. The following publicly available information sources were utilised in the IIA for Aberdeen's LEZ:

- Scotland's Census 2011
- National Records of Scotland Mid-2020 Small Area Population Estimates for 2011 Data Zones
- Scottish Index of Multiple Deprivation (SIMD) 2020
- Deprivation in Aberdeen City SIMD2016 Briefing Note
- National Atmospheric Emissions Inventory (NAEI) 2018
- Regional Economic Strategy
- Regional Economic Strategy 2018-2035 Action Plan
- Assessing the State of the Bus Network in Aberdeen and Aberdeenshire, North East Bus Alliance 2019
- Equality Evidence Finder
- Nomis Official Labour Market Statistics
- Sexual Orientation in Scotland 2017
- Transport Scotland Scottish Transport Statistics 2020
- Office for National Statistics (Economy)

4.1.3 In addition to the publicly available sources above, the IIA utilised information provided by ACC, SEPA and the National Modelling Framework, and traffic data and model outputs from the Paramics traffic modelling (undertaken by SYSTRA).

4.1.4 It should be noted that many of the available sources of information refer to the pre-Covid-19 and Brexit period (up to 2019).

4.1.5 Before specifically focussing on the impacts by each group (Section 4.6), the above data sources have first been used to undertake the following analysis:

- An overview of Aberdeen's population
- The likely number of vehicles impacted by the LEZ
- An overview of the city centre economy
- The predicted improvements to air quality and impact on health and inequalities

4.2 Overview of Aberdeen's Population Characteristics

4.2.1 Aberdeen is Scotland's third largest city and the most recent estimate of Aberdeen's population is 229,060 (National Records of Scotland (NRS) 2020 Mid-year population estimate), including approximately 7,600 residents in the LEZ area. Approximately 34,400

residents in Aberdeen City are aged 65 years and older (ca. 15% of total population), while in the LEZ area only approximately 650 people (9%) are aged 65 years and older. Aberdeen, in line with other large cities Glasgow and Edinburgh, has experienced slower population aging than wider Scottish trends in its data zones between mid-2009 and mid-2020 (NRS Mid-2020 Small Area Population Estimates).

4.2.2 58.7% of commuters in Aberdeen travel by car (including passenger car pools and taxis). Of the 4,900 economically active population in and around the LEZ area, 37% commute by foot, 18% by bus and 25% drive a car or van (Census 2011). This suggests that the majority of the working population in and around the LEZ area will not be adversely affected by LEZ enforcement when commuting, particularly under the assumption that all bus services will be compliant. That said it is residents of the LEZ area and regular commuters that will be some of the most impacted by the introduction of the LEZ, both positively and negatively. People visiting the city centre for shopping and other activities will also be impacted by the LEZ.

4.2.3 Whenever possible, the IIA has utilised local data specific for the LEZ area or the wider Aberdeen City area and different geographies have been considered, depending on the source available as detailed below, to inform of Aberdeen's population characteristics.

Scotland's Census 2011

4.2.4 The most recent Census data from 2011 was used to understand demographic characteristics of the resident population within the LEZ. Data was retrieved for the boundary shown in Figure 4.1, covering an area consistent with the future LEZ area.

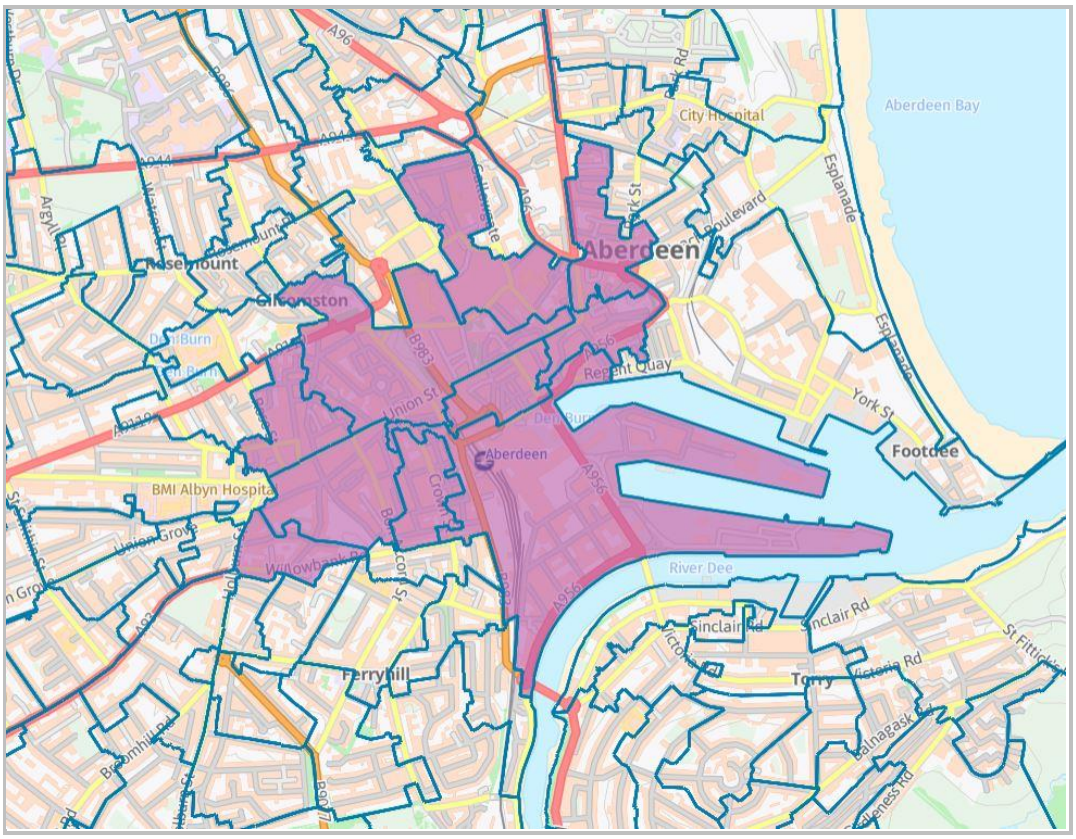


Figure 4.1 : Output Areas Census 2011 (Source: Census 2011)

SIMD 2020

4.2.5 The Scottish Index of Multiple Deprivation is a relative measure of deprivation across 6,976 small areas (called data zones). If an area is identified as 'deprived', this can relate to people having a low income but it can also mean fewer resources or opportunities. SIMD looks at the extent to which an area is deprived across seven domains: income, employment, education, health, access to services, crime and housing.

4.2.6 SIMD 2020 was used to identify potential impacts in relation to the level of deprivation of different areas in the LEZ and across Aberdeen city. Aberdeen has 283 data zones in total and specific analysis of data zones either fully or partially inside the LEZ area was undertaken to obtain an understanding of the levels of deprivation of the population living in an area representative of the LEZ. The SIMD 2020 data zones used in the IIA are shown by the green markers in Figure 4.2.

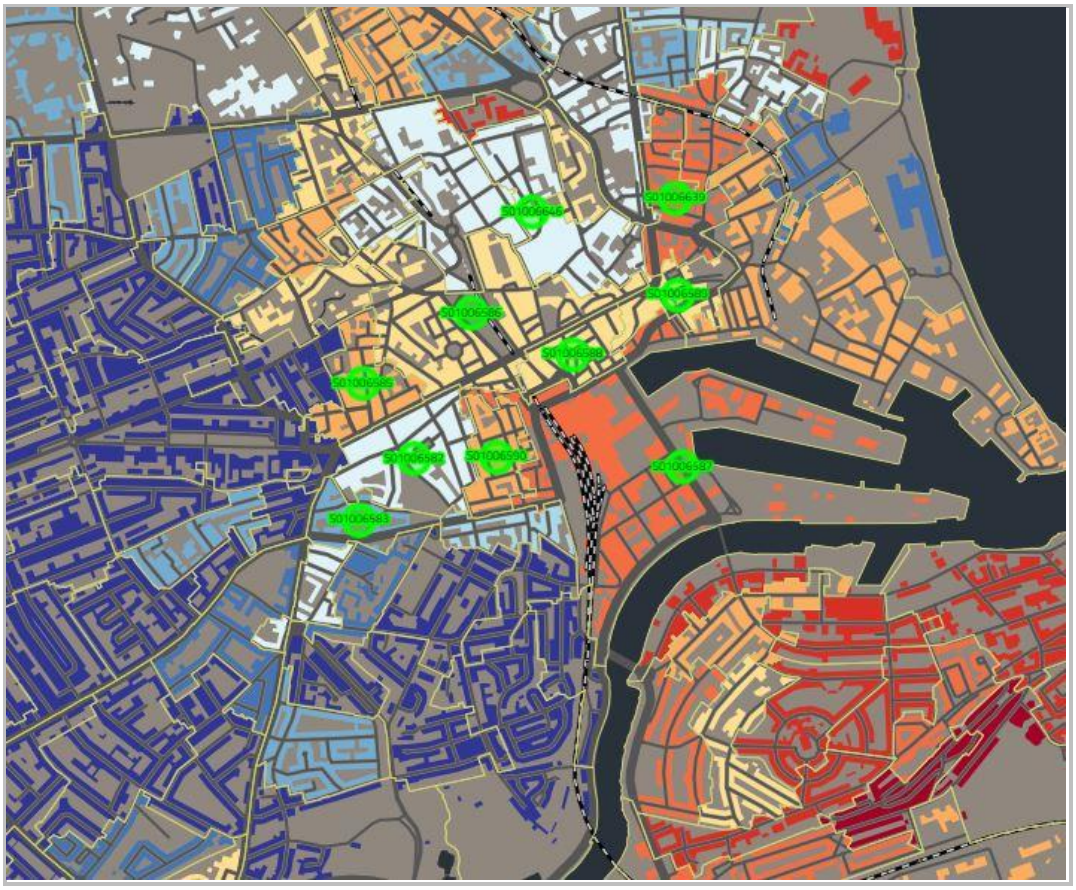


Figure 4.2 : SIMD 2020 Data Zones fully or partially inside Aberdeen's LEZ area

4.2.7 The Scottish Government uses 20% as a marker for the "Most Deprived" however they also state that those living in areas up to 40% most deprived may also experience difficulties.

4.2.8 The SIMD 2020 shows that 23,034 (10.1%) people in Aberdeen City live in a data zone within the 20% most deprived. This compares to 18,055 (7.9%) in SIMD 2016. The 20% most deprived zones in Aberdeen City are shown in red in Figure 4.3 below and Figure 4.4 then focuses on the city centre and the LEZ area, where again the green markers represent those zones used in the SIMD 2020 analysis. Both figures shows there are no areas within the 20% most deprived inside the LEZ area (marked red). Figure 4.4 does however highlight areas in Torry (to the south) and George Street (to the north), in close proximity to the city centre and proposed LEZ area.



Figure 4.3 : SIMD 2020 20% Most Deprived Areas in Aberdeen City



Figure 4.4 : SIMD 2020 20% Most Deprived Areas in Aberdeen City Centre

4.2.9 The employment domain in the Scottish Index of Multiple Deprivation examines unemployment claimant counts averaged over 12 months, the working age incapacity benefit or employment support allowance recipients and the working age severe disablement allowance recipients. The SIMD 2020 reported that 10,793 people (6.8% of the working age population) in Aberdeen City live in a data zone that is ranked in the 20% most deprived in the employment domain. The SIMD 2020 reported that 19,610 people or 8.6% of the population in Aberdeen City are classed as income deprived.

4.3 Number of Vehicles Affected by the LEZ

4.3.1 A LEZ will restrict vehicle access for non-compliant vehicles to the city centre of Aberdeen. To understand the impact of this restriction on the population, it is important to understand the total number of vehicles likely to be impacted. To ascertain a realistic estimate of the total non-compliant vehicles, data from traffic surveys and the Paramics traffic model was utilised.

4.3.2 An Automatic Number Plate Recognition (ANPR) traffic survey was undertaken over a 24-hour period in 2019 by Transport Scotland on key routes in Aberdeen. Data recorded in the survey included information on vehicle type, fuel and Euro standard passing through the survey locations and is considered representative of the local vehicle fleet composition in Aberdeen and therefore the types of vehicles likely to visit the LEZ in one day. The total number of non-compliant vehicles registered by ANPR cameras in Aberdeen, is shown by fuel type and Euro standard in Table 4.1. Table 4.2 shows the percentage of each vehicle type and Euro standard captured by the survey. Note, in both tables that compliant vehicles types (as specified in the LEZ Regulations) are represented by grey cells. The compliance proportions for buses is taken from SEPA's Spotfire tool and not available through the ANPR data with the number of buses therefore not presented.

Table 4.1 : Number of vehicles by fuel and Euro standard registered by ANPR cameras (2019)

Euro Standard	Car (Petrol)	Car (diesel)	LGV (Petrol)	LGV (diesel)	HGV	Bus
Euro 1	36	10	1	20	0	-
Euro 2	183	33	3	21	5	-
Euro 3	2044	894	8	376	40	-
Euro 4	5994	3978	3	1305	79	-
Euro 5	9917	10245	5	3670	347	-
Euro 6	13337	10855	15	3602	1274	-
Total non-compliant	2263	15160	12	5392	471	-
Total compliant	29248	10855	23	3602	1274	-

Table 4.2 : Percentage of vehicles by fuel and Euro standard registered by ANPR cameras (2019)

Euro Standard	Car (Petrol)	Car (diesel)	LGV (Petrol)	LGV (diesel)	HGV	Bus
Euro 1	0.1%	0.0%	2.7%	0.2%	0.0%	0.0%
Euro 2	0.6%	0.1%	8.1%	0.2%	0.3%	0.0%
Euro 3	6.5%	3.4%	21.6%	4.2%	2.3%	6.0%
Euro 4	19.0%	15.3%	8.1%	14.5%	4.5%	27.0%
Euro 5	31.5%	39.4%	13.5%	40.8%	19.9%	34.0%
Euro 6	42.3%	41.7%	40.5%	40.0%	73.0%	33.0%
Total non-compliant	**7.2%**	**58.3%**	**32.4%**	**60.0%**	**27.0%**	**67.0%**
Total compliant	**92.9%**	**41.7%**	**62.2%**	**40.0%**	**73.0%**	**33.0%**

4.3.3 The percentages of each vehicle type and Euro standard shown in Table 4.2 were utilised by SEPA for the air quality modelling and in the Paramics traffic modelling undertaken by

SYSTRA. Under the assumption that the ANPR survey results are representative of all traffic in Aberdeen, the ANPR proportions and the outputs from the Paramics traffic models can be used to infer the total number of non-compliant vehicles that enter the LEZ area each day. Using the Aberdeen City traffic model, the total number of vehicles entering and exiting the LEZ area over a 24-hour period was calculated. This was then multiplied by the non-compliant proportions in Table 4.2 to give the total number of non-compliant vehicles to be impacted by the LEZ over a 24-hour period (based on 2019 data), as shown in Table 4.3

4.3.4 It should be noted that the figures presented in Table 4.3 represent only one day and on another day a number of these vehicles will be the same while others will be different (i.e. a driver/vehicle that enters daily and a driver/vehicle that enters once a year). While the analysis does account for those vehicles that drive through the LEZ in one trip (i.e. without stopping), it is not possible (with the model data) to account for vehicles that enter the LEZ, park and then leave the LEZ at a later time (e.g. a driver visiting a shopping centre is captured twice entering and exiting the LEZ). The total number of non-compliant vehicles presented in Table 4.3 is therefore considered to be an over-estimation of the number of vehicles entering the LEZ on a daily basis.

4.3.5 Using the data available, an estimate of the total daily number is presented only, with no data available to allow a more statistically robust estimation of the number of vehicles impacted in total during the lifetime of the LEZ.

Table 4.3 : Number of non-compliant vehicles entering the LEZ area in 2019

Euro Standard	Car (Petrol)	Car (Diesel)	LGV (Petrol)	LGV (Diesel)	HGV	Bus
Euro 1	40	10	0	20	0	0
Euro 2	200	40	0	20	10	0
Euro 3	2250	980	10	350	70	120
Euro 4	-	4360	-	1200	130	550
Euro 5	-	11250	-	3400	570	700
Total non-compliant	**2490**	**16640**	**10**	**4990**	**780**	**1370**

4.3.6 The number of non-compliant vehicles entering the LEZ area in Table 4.3 above is derived based on 2019 traffic survey data. The LEZ in Aberdeen will be enforced in 2024 and to estimate the total number of non-compliant vehicles in 2024 from the 2019 survey data, vehicle fleet composition projections from the National Atmospheric Emissions Inventory (2018) (NAEI) were utilised. These forecasts could be seen as too optimistic in terms of natural turnover of vehicles and therefore are potentially underestimating the number of non-compliant vehicles on the network in 2024, although as noted above, the 2019 starting point is considered an over-estimate. The forecasts are UK-wide and perhaps not strictly representative of Aberdeen's vehicle fleet projections. They also do not take into account factors such as Brexit or the Covid-19 pandemic which potentially negatively impact incomes and therefore reduce the natural turnover of vehicles. However, the expected impact on non-compliant vehicles and drivers outlined below is considered the same in 2019 and 2024 and therefore the analysis is considered to hold true no matter the actual number of non-compliant vehicles in 2024 (i.e. somewhere between 2019 and 2024 figures).

4.3.7 The forecast number of vehicles impacted by the LEZ in 2024, based on NAEI forecasts, is shown in Table 4.4.

Table 4.4 : Projected number of non-compliant vehicles entering the LEZ area in 2024

Euro Standard	Car (Petrol)	Car (diesel)	LGV (Petrol)	LGV (diesel)	HGV	Bus
Euro 1	0	0	0	0	0	0
Euro 2	0	0	0	0	0	0
Euro 3	0	0	0	20	0	20
Euro 4	-	600	-	190	10	120
Euro 5	-	5000	-	1250	90	190
Total non-compliant	**0**	**5600**	**0**	**1460**	**100**	**330**

4.3.8 While a number of cities in England have introduced Clean Air Zones (CAZ), LEZs in Scotland have yet to be introduced for general traffic to date (Glasgow introduced a phased bus only LEZ in 2018). As such there is little evidence available to inform the likely behavioural response to the introduction of a LEZ in Aberdeen with its associated penalty charge enforcement, which differs from CAZ charge to enter. However, the extensive consultation exercises, as detailed in Chapter 2, alongside the existing Aberdeen road network and proposed LEZ area and associated signing strategy, do allow for a number of informed assumptions to be made as to the likely response to the introduction of the LEZ and the resultant impacts on drivers of non-compliant vehicles.

4.3.9 The NAEI forecasts there to be approximately 5600 non-compliant cars (approximately 10% of all trips) that would still be entering/exiting the LEZ area on a daily basis in 2024. With the LEZ in place, these vehicles can no longer enter without penalty. There are two main types of trips made by these cars. Firstly, non-compliant cars that will be impacted by the LEZ may be entering the city centre for a purpose (e.g. shopping, business, leisure or housing) and without a LEZ these trips would park at their chosen location in the city centre. With the exception of residents, it is assumed that all such trips by non-compliant vehicles would continue but instead of parking inside the LEZ, the drivers would choose to park at a car park outside the LEZ area. It is considered unlikely that the introduction of the LEZ will result in owners of non-compliant vehicles upgrading their vehicle (at significant cost) rather than switching to park at one of the car parks outside the LEZ (at the same cost as current parking). The LEZ has been developed to allow continued access for non-compliant vehicles to the majority of city centre car parks. The final proposed area excludes 9 of the 12 main city centre car parks, maintaining access to approximately 80% of available spaces in the city. Car park analysis in the NLEF Stage 2 Report showed there to be sufficient parking availability for non-compliant cars at the multi-story car parks excluded from the final LEZ area, with all car parks shown to be within a 10 minute walk to the centre of the city.

4.3.10 The second type of car trip will be those routeing through the city centre, looking to utilise routes such as Denburn Road or the eastern Corridor (Market Street, Virginia Street, Commerce Street, East North Street). With the LEZ in place, non-compliant vehicles will no longer be able to make such a trip. Again the LEZ has been developed to achieve this, with the aim to restrict non-compliant vehicles from routeing though the city centre area, but critically, as noted above, not restricting access to the city car parks. This approach aligns with existing ACC strategies, particularly the changes to the roads hierarchy. It is anticipated that such trips will adjust their journey route rather than upgrade to a compliant vehicle. While there may be a time and money cost associated with choosing an alternative route, this cost is considered lower than purchasing a compliant vehicle.

4.3.11 Detailed traffic modelling (LEZ Option Testing Report, SYSTRA June 2021) showed rerouting of non-compliant vehicles may result in increases in traffic flows on local routes on the periphery of the LEZ but that mitigation measures, identified through the traffic modelling, will allow ACC to mitigate against this. The majority of strategic through trips

by non-compliant vehicles move to the Anderson Drive corridor, in line with the roads hierarchy of Aberdeen. In addition, air quality modelling (*Cleaner Air for Scotland – National Modelling Framework – Low Emission Zone Aberdeen Evidence Report (SEPA, October 2021*)) has concluded that the rerouting of non-compliant vehicles does not result in increased air quality exceedances on the periphery of the LEZ.

4.3.12 The above assumption of non-compliant driver behaviour does not hold true for existing "pass-by" trips to city centre businesses. Of the 5600 non-compliant cars there is no data on the number of trips that enter the LEZ area for a short period to access a service (e.g. a shop or café). Such trips, by a non-compliant vehicle, would be expected to be lost if this was their only purpose in visiting the LEZ area, having a negative effect on the incomes of small business. However, it again must be noted that non-compliant cars are expected to make up approximately 10% of all daily trips in the city. A smaller proportion of these would be purely "pass-by" trips and therefore the overall impact is anticipated to be small, relative to the income of each business.

4.3.13 As noted in Chapter 2, vehicles for disabled drivers and passengers are exempt from enforcement in Aberdeen LEZ and therefore any non-compliant vehicles used by this group will be unaffected and can drive and park as they do now. This includes continued access to Union Square shopping centre and the shop mobility service located here.

4.3.14 Residents of an address registered in the LEZ area are assumed to require the same level of vehicles access to their properties as they do now. Resident parking permits are in operation in Aberdeen and five parking zones are either fully or partially inside the LEZ area, as analysed in the second Interim NLEF Stage 2 Report. At the time of writing, historic (2012) is the only parking permit dataset available to assess the number of parking permits inside the LEZ area. Analysis of historic data is considered relevant as the total number of resident spaces in the city centre is unlikely to have changed significantly in the city centre. The final LEZ captures approximately 900 registered parking permits (8% of all permits issued in 2012). Utilising the NAEI forecasts, in 2024 it is expected that approximately 80 permits issued will be to non-compliant cars. What is not known is the behavioural change from owners of non-compliant vehicles. Those that can afford to do so may choose to upgrade to a compliant vehicle. Those that cannot afford to do so may utilise their existing permit to park at locations outside the LEZ area (but inside the permit boundary) at no extra cost but with the inconvenience of not being able to access their vehicle directly from their property. As with all owners of non-compliant vehicles, there is the opportunity to utilise funding to assist with obtaining a compliant mode of transport, and this is discussed in Chapter 6.

4.3.15 The NAEI forecasts approximately 100 non-compliant heavy goods vehicles (HGVs) would enter the city centre area daily in 2024, compared to approximately 780 non-compliant HGVs in 2019. Information obtained from the stakeholder engagement with freight operators noted that with the proposed enforcement date of 30th May 2024, Euro VI (compliant) vehicles will naturally make up most of the HGV fleet through current replacement cycles and will have become "standard" fleet for many operators in and around Aberdeen. The economic "life" for a HGV is approximately 7 or 8 years, after which they become too expensive to maintain and operate. In 2024, a Euro VI vehicle will have been the emission standard for 11 years meaning the majority of HGVs will be of this standard or above and therefore the impact on HGV operators is considered minimal. During the statutory consultation, it was noted that the option for consultation did not allow suitable alternative access for non-compliant vehicles to access the north areas of Aberdeen Harbour. As noted in Chapter 2, this information resulted in the final LEZ boundary being adjusted to exclude East North Street and Commerce Street. As noted however, it is anticipated the majority of HGVs requiring access to the harbour will be

compliant by 2024 and the largest impact from this adjustment will be to light goods vehicles (LGVs), as discussed further below.

4.3.16 The NAEI forecasts there to be approximately 330 non-compliant buses operating in the city in 2024. However, the forecasts do of course not account for the introduction of the LEZ and the two main operators in Aberdeen, First Bus and Stagecoach are aware of the requirement to meet the LEZ emission standards by the end of the grace period. Both operators have made significant investment in recent years to upgrade their fleets and the introduction of the LEZ will require further significant investment to ensure their fleets are fully compliant. Both operators have indicated the difficulties in meeting full compliance by 2024 but that they expect to meet the required standards for their respective fleets entering the LEZ by 2024, with any remaining non-compliant vehicles reassigned to routes not impacted by the LEZ. There is some indication from operators that some routes may see a reduction in frequency or adjustment or routes in order to ensure only compliant vehicles enter the LEZ and that this may result in a reduction in access for those that rely on buses to travel around the city. The impact to different population groups of any alterations to services is discussed in Section 4.6. Clearly the ongoing investment has been influenced by the LEZ proposals (that have been discussed in detail with them for a number of years). The financial outlay from the operators is offset somewhat by the Bus Emissions Abatement Retrofit (BEAR) programme, discussed in detail in Chapter 6.

4.3.17 The NAEI forecasts there to be approximately 1450 non-compliant LGVs entering the LEZ each day by 2024. LGVs generally provide a service (e.g. goods delivery to small businesses, delivery service to business and residents) and there will remain demand for this service provision. Larger logistics and courier providers (e.g. UPS who provided response to the consultation) are likely to have the ability to adjust services such that their compliant fleet operates in the LEZ with non-compliant vehicles deployed in areas with no LEZ. LEZ enforcement is more likely to impact smaller businesses who operate a small number of LGVs and don't have the option or ability to switch to a non-compliant vehicle. Through the statutory consultation process, it was identified that a large number of LGVs serve the Aberdeen Harbour area and play a crucial part in the supply chain. The proposed LEZ option for consultation did not provide a suitable route for non-compliant LGVs to access the north harbour area, and the adjustment to the eastern boundary as noted above provides this. There will still be LGV drivers impacted by the LEZ, creating a financial impact and may result in additional business costs or loss of income. The LEZ Retrofit Fund provides micro-businesses with funding to replace their LGVs with a LEZ compliant mode of transport and will help lessen the financial burden on LGV drivers.

4.3.18 The taxi fleet operating in Aberdeen is predominately made up of cars, with no black cab or London Hackney type vehicles in operation, which can be eligible for retrofitting to the minimum LEZ emission standards. Taxis (cars) are likely to enter the LEZ area regularly, multiple times a day and like all vehicles will have to be compliant to avoid penalty. There were 1,012 registered taxi vehicles in Aberdeen in 2020 (Transport Scotland). As advised by ACC the maximum age limit of a vehicle used as a taxi in Aberdeen is ten years. The Euro 4 standard for petrol cars ensures any petrol fuelled taxi will be compliant by 2024. The Euro 6 standard for diesel cars was is generally applicable to vehicles registered from 2015 onwards (some manufactures vary). This would mean by 2025 all taxis will be of Euro 6 standard (ten years from 2015) meaning there may be some in the fleet in 2024, the date of enforcement. Those operators and drivers of non-compliant vehicles can possibly make use of the micro-business funding, as detailed in Chapter 6.

4.3.19 Utilising NAEI projections, the total number of non-compliant vehicles that may enter the city centre area on a daily basis can be estimated. With the LEZ in place, drivers of these

vehicles will have to adjust their trips, stop making their journey or upgrade their vehicles. As explained above, it is anticipated that non-compliant cars visiting the city for a particular purpose will generally adjust their journey end point (car park) and the cost to comply with the LEZ will be relatively similar to a city without a LEZ. The majority of HGVs and taxis are expected to naturally upgrade by 2024 such that the impact is minimal. Bus operators are currently upgrading their fleets in anticipation of the LEZ being introduced in 2024 but it has been indicated there may be some impact to services. The significant investment by operators would occur naturally in time but is progressing at a quicker pace with the LEZ time-limited requirements for compliance. The investment by bus operators is offset to some degree with retrofit funding available. LGV users, particularly those driven by individuals or small businesses (rather than larger logistics companies) face the prospect of having to upgrade their vehicles to continue their business needs inside the LEZ. On the whole therefore, the total number of vehicles required to upgrade is anticipated to be small in comparisons to the total number of trips entering the LEZ on a daily basis and the impact of the LEZ on particular groups is discussed in Section 4.6.

4.4 Aberdeen city centre businesses and economy

4.4.1 To understand the potential impact on the economy and businesses in Aberdeen from the introduction of the LEZ, it is important to establish the existing economic picture in the city.

4.4.2 The most recent statistics available from the Aberdeen City area on the local economy refer to the pre-Covid-19 period (up to 2019). Both Brexit and Covid-19 will have had impacts on Aberdeen's economy, but at this stage it is not possible to measure the level of impacts from these events. It should be noted the statistics on jobs and employee numbers are not granular enough to provide detailed information on the LEZ area alone and are for the full Aberdeen City area.

4.4.3 The total Gross Value Added (GVA) produced in the Aberdeen City and Aberdeenshire Region in 2018 was £16.9 billion, an increase of 8.5% in 10 years (ONS).

4.4.4 It is estimated that there are approximately 172,000 employee jobs in Aberdeen City, down from 182,000 in 2015 (Nomis 2019). The number of people on unemployment-related benefits across the north-east has risen over recent years with the alternative claimant count for Aberdeen City increasing by 5,000 to 9,394 (114% increase) between 2020 and 2021 (DWP). The unemployment rate in Aberdeen City was 4.7% in the period April 2020 to March 2021, compared to 4.6% Scotland wide. While there is no data available specifically for the number of jobs in the LEZ area itself, the 2011 Census shows that approximately 87% or 4,900 people of those aged over 16 living in a census zone inside or partially inside the LEZ area are economically active (including students).

4.4.5 The Aberdeen City and Aberdeenshire region has established itself as a key world location for the oil, gas and renewable energy sectors . Oil and Gas UK (OGUK) estimated the oil and gas industry is worth £18 billion to the north-east economy and provides approximately 64,000 jobs to people in the region. Despite the downturn in the oil and gas industry since 2014, the North East of Scotland remains one of the most active economies in the UK. GVA per head in Aberdeen City and Aberdeenshire was 44% higher than the Scottish national average in 2016. The oil market has seen unprecedented volatility throughout 2020, the direct result of a collapse in demand due to the restrictions put in place to manage the spread of Covid-19. This has led industry leaders to suggest that the pandemic-related restrictions, combined with the wider adoption of net zero objectives, will mean that 2019 represents the peak level of oil demand at global level. This is likely to have a significant impact on the Aberdeen City economy and levels of

employment. Many current jobs in oil and gas are transitioning to renewable sectors and this may continue and increase, providing an opportunity to retain the skilled workforce in the region.

4.4.6 The Aberdeen City region has approximately 8,700 enterprises located within its boundary, with 87% of them having fewer than 10 employees (Nomis), with the number of enterprises by size in Aberdeen shown in Table 4.5.

Table 4.5 : Number of enterprises by size in Aberdeen

Size	Micro (0 to 9)	Small (10 to 49)	Medium (50 to 249)	Large (250+)	Total
Number of Companies	7,255	860	210	60	8,385

4.4.7 The sectors with the highest employee jobs are :

- Human health and social work (28,000 employees)
- Professional, scientific and technical activities (27,000)
- Mining and quarrying (19,000)
- Wholesale and retail (18,000 employees)
- Administrative and support service activities (15,000)
- Accommodation and food services activities (14,000)

4.4.8 The introduction of an LEZ will create an additional cost to businesses that do not use compliant vehicles. Sectors that are most dependent on LGVs (such as the construction, wholesale and retail trade, accommodation and food service activities, and transportation and storage) may be impacted by the requirement to comply with LEZ regulations. There are around 2,090 business in Aberdeen that fall within these sectors. Figure 4.5 shows the employment size band of Aberdeen City industries in 2021. It is apparent that most of the enterprises have 0 to 49 employees and it is possible this smaller size of company will have the most difficulty in upgrading their vehicles to become LEZ compliant.

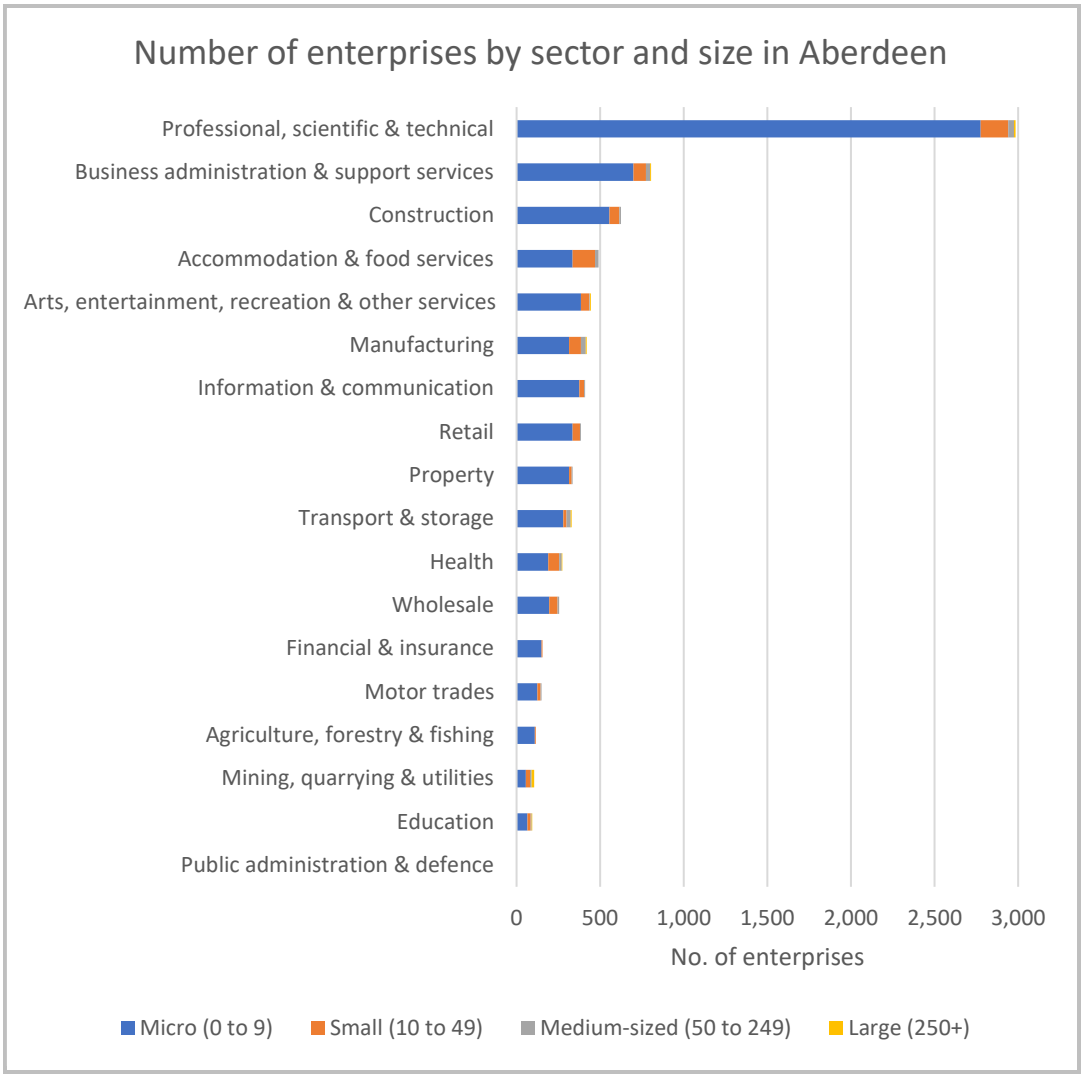


Figure 4.5 : Number of Enterprises by sector and size in Aberdeen (2021 Nomis)

Business and Regulatory Impact Assessment

4.4.9 In line with the LEZ Guidance, the proposed LEZ scheme can be subject to a Business and Regulatory Impact Assessment (BRIA), if required. A BRIA is used to assess the cost and benefits to businesses and the third sector of any proposed legislation or regulation, with the goal of using evidence to identify the proposal that best achieves policy objectives while minimising costs and burdens as much as possible.

4.4.10 The content and detail in a BRIA is predominately encompassed by this IIA and therefore a BRIA is not undertaken, in line with the approach taken by the other cities introducing a LEZ.

4.5 Anticipated Improvements to Air Quality and the impact on Health

4.5.1 According to Public Health England, poor air quality is the largest environmental risk to public health in the UK, as long-term exposure to air pollution can cause chronic conditions such as cardiovascular and respiratory diseases as well as lung cancer, leading to reduced life expectancy.

4.5.2 Although long term exposure to air pollution can affect all members of society, some groups are more vulnerable to the effects of air pollution because of their age (children

and older people are at increased risk), existing medical conditions and/or health determining behaviours. Areas of high deprivation are also associated with poorer air quality and the health impacts of poor air quality compound pre-existing health inequalities.

4.5.3 Recent studies (Lee et al. (2019), Willocks et al. (2012)) estimating the health impact of air pollution in Scotland, and the resulting benefits of reducing concentrations in city centres have highlighted the difficulty in measuring the health impacts of improved air quality interventions, such as a LEZ. Lee et al. (2019) found that focusing an air pollution reduction intervention, such as an LEZ, on a city centre where concentrations are highest is likely to have a relatively small positive health impact at the national level, because these areas are largely commercial and hence have small resident populations. Even though these areas will routinely see large numbers of people visiting for both shopping and working, their time spent in the area, especially outdoors, will likely be relatively short.

4.5.4 However, the Committee on the Medical Effects of Air Pollutants (COMEAP) has established that short-term exposure to NO_2, and PM_{10}, particularly at high concentrations, is a respiratory irritant that can cause inflammation of the airways leading to, for example, cough, production of mucus and shortness of breath. Public Health England detail epidemiological studies that have also shown associations of outdoor NO_2 with adverse effects on health, including reduced life expectancy.

4.5.5 A primary objective therefore of the LEZ is to improve air quality by reducing concentrations of pollutants in the city. To understand the benefits of the LEZ to the local population, existing air quality levels and predicted air quality improvements have been assessed throughout the NLEF process, utilising SEPA's National Modelling Framework (NMF) Aberdeen City Air Quality Model.

Existing Air Quality in Aberdeen

4.5.6 In 2001, ACC first declared part of the City Centre an AQMA due to predicted exceedances of the annual mean national air quality objective for NO_2. The AQMA has been expanded several times since its declaration and two further AQMAs have since been declared in the city for the Anderson Drive/Haudagain roundabout/Auchmill Road corridor and the Wellington Road corridor. The NLEF appraisal established the focus of Aberdeen's LEZ should be the Aberdeen City Centre AQMA.

4.5.7 Air quality is generally good in Aberdeen and despite improvements in air quality since the introduction of the AQAP, there remain several locations in the AQMAs where exceedances of emissions exist and where the AQS are not being met. The number of exceedances of the NO_2 annual mean objective has decreased from 11 in 2018 to 8 in 2019. The introduction of the LEZ will aim to accelerate the continued improvements to air quality in the city.

4.5.8 ACC are required to report on observed air quality in the city on an annual basis and the 2020 Air Quality Annual Progress Report (APR) for Aberdeen City Council contains the latest pre-Covid-19 (2019) information on air quality in Aberdeen. Detailed analysis of air quality in Aberdeen in relation the LEZ development is reported in the Interim NLEF Stage 2 Report (*Aberdeen Low Emission Zone, National Low Emission Framework Interim Stage 2 Report, SYSTRA 2021*). In total, there were 8 locations where annual mean concentrations of NO_2 exceed the AQO of 40 µg/m^3 (maximum legal limit) and a further 7 sites where annual mean concentrations of NO_2 exceed 36 µg/m^3 (within 10% of

maximum legal limit). Figure 4.6 shows the locations where annual mean concentrations of NO_2 were recorded as greater than 36 µg/m³ in 2019.



Figure 4.6: 2019 Annual Mean Concentrations of NO_2 greater than 36 µg/m³ (City Wide)

4.5.9 The 2021 Air Quality Annual Progress Report provides the full ratified and adjusted 2020 air quality dataset. This dataset contains observed data captured during the Coivd-19 pandemic and is not considered representative of the yearly trend in pollution levels up to and including 2019. The 2019 dataset has therefore been used in the NLEF appraisal and option development process.

Air Quality Modelling

4.5.10 Air quality modelling has been undertaken by SEPA through the National Modelling Framework (NMF) in support of the Scottish Government's Cleaner Air for Scotland Strategy (CAFS). CAFS set a commitment to develop a NMF to provide 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 all local authorities. Output from the NMF Aberdeen City Air Quality Model (SEPA) has informed the LEZ option development and appraisal process and ensured the LEZ delivers the expected improvements to air quality.

4.5.11 Chapter 5 of the second Interim NLEF Stage 2 Report details how the NMF was utilised in the option development process, informing the size and vehicle scope of the LEZ. The conclusions from this initial NMF assessment helped identify the LEZ options for the first round of public and stakeholder consultation and detailed traffic model testing, as outlined in Chapter 2 above.

4.5.12 Upon identification of the final preferred LEZ scheme for Aberdeen, the NMF assessed the preferred scheme to identify the impact of the LEZ on air quality, with full outcomes provided in SEPA's *Cleaner Air for Scotland – National Modelling Framework – Low*

Emission Zone Aberdeen Evidence Report (SEPA, October 2021). The key outcomes from the air quality modelling of Aberdeen's proposed LEZ are:

- Air quality model results are based on traffic flow and fleet composition data collected in May 2019 and so incorporate any changes following the completion of the Aberdeen Western Peripheral Route in February 2019.
- Earlier modelling identified that the highest annual-average concentrations of NO_2 occurred in the City Centre where vehicle emissions were dominated by buses, whilst diesel car emissions dominated other key routes around the city.
- SEPA's emissions report identified that key bus routes within the LEZ boundary will experience the largest reductions in NO_x emissions. On the sections of Union Street where only buses and taxis are permitted as part of the CCMP Union Street Scheme there is an average reduction of 87% in NO_x emissions. Along the remaining sections of Union Street there is a reduction in NO_x emission rates of 57% on average (ranging between 34% and 72%).
- Air quality modelling results indicate that the majority of current NO_2 exceedances inside the LEZ will be removed.
- Localised exceedances may remain on Market Street south of Guild Street, and at the Westburn Road/Berryden Road/Hutcheson Street/Caroline Place and Skene Street/Rosemount Viaduct junctions despite small decreases in NO_2 concentrations due to the LEZ.
- The LEZ is also expected to lead to substantial reductions in tailpipe emissions of PM_{10}, most notably on bus routes inside the LEZ.

4.5.13 The NMF confirms there is a reduction in emissions and roadside concentration of NO_2 inside the LEZ area, where modelled levels drop below the legal requirement of 40 µg/m³ at most locations. The predicted changes to NO_2 concentrations in Aberdeen city centre are shown in Figure 4.7 and Figure 4.8 by comparing modelled concentrations with and without a LEZ.

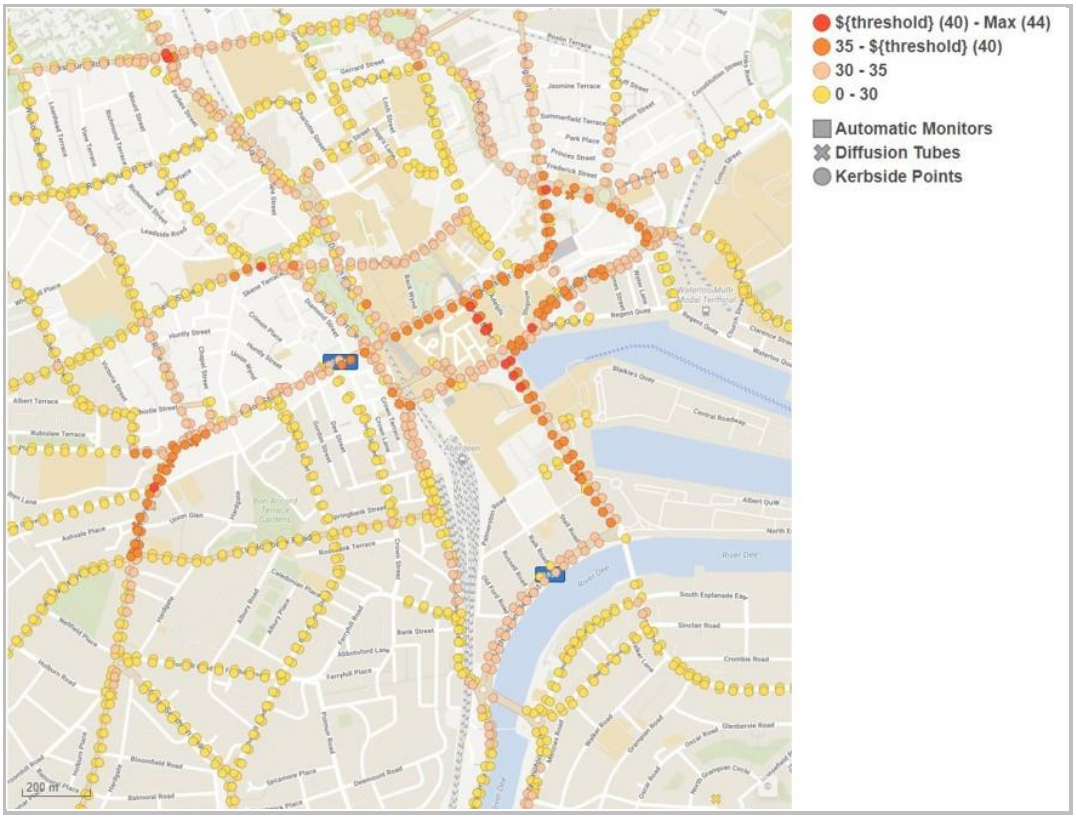


Figure 4.7 : NO2 Concentrations in Aberdeen City Centre without LEZ (2024 Reference Case Model)

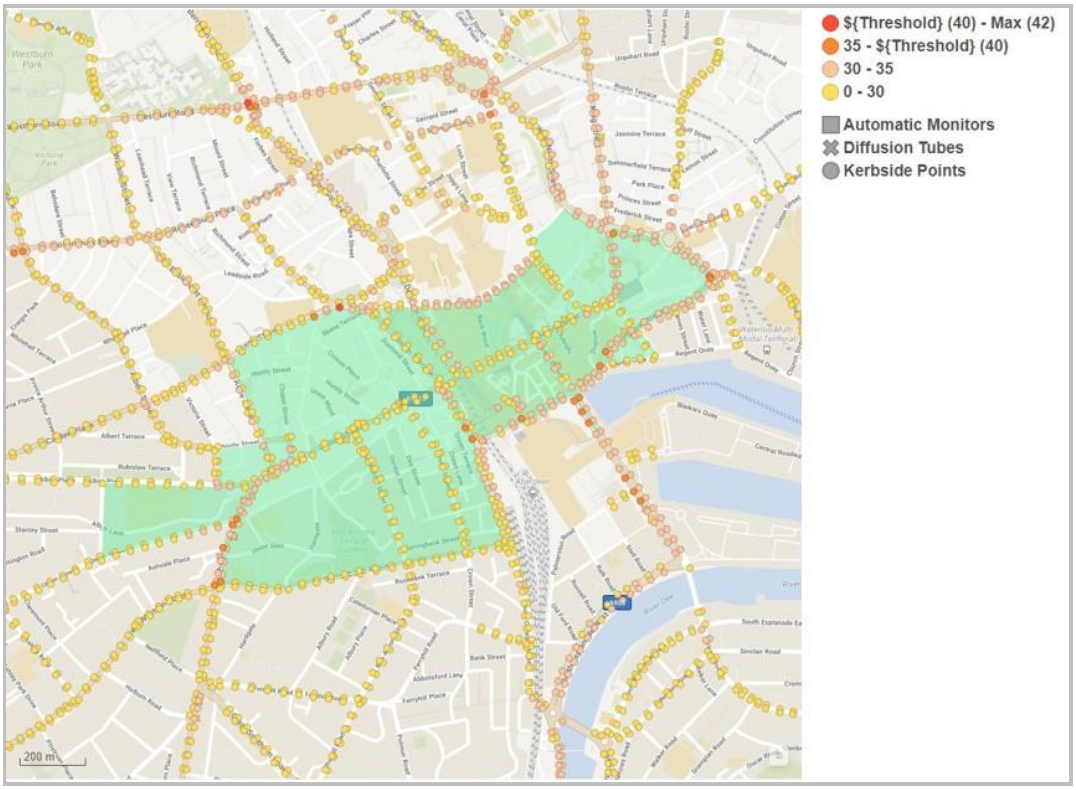


Figure 4.8 : NO2 Concentrations in Aberdeen City Centre with LEZ (2024 LEZ Option Model)

4.5.14 The LEZ stops the most polluting vehicles from operating within the city centre of Aberdeen with the NMF concluding that overall this will reduce emissions and improve air quality though some exceedances may remain at a small number of location. These improvements to air quality will in turn have a positive effect on health of those who visit the city and in particular those most at risk of respiratory illness including older people/pensioners and children (including unborn children). This improvement to air quality is the most significant positive impact of the LEZ and will have health and wellbeing benefits for residents, workers, and visitors to the city.

4.5.15 The NMF also examined the predicted changes to PM_{10} emissions resulting from the introduction of the LEZ. Particulate matter (PM) is a generic term used to describe a complex mixture of solid and liquid particles of varying size, shape, and composition. According to Public Health England, there is an extensive body of evidence that long-term exposure to PM increases mortality and morbidity from cardiovascular and respiratory diseases. Outdoor air pollution, particularly PM, has also been classified by the International Agency for Research on Cancer (IARC) as carcinogenic to humans (a Group 1 carcinogen) and a cause of lung cancer. The NMF concludes there are large reductions in PM_{10} tailpipe emissions as a result of implementing the LEZ with the largest reductions occurring inside the LEZ. While the NMF has not predicted the resulting reductions in concentrations of PM_{10}, it is clear that any reduction in PM_{10} will bring health improvements to those regularly exposed and again in particular those vulnerable to the effects of poor air quality.

4.6 Differential Impacts by Population Groups

4.6.1 Using the sources of information and the analysis of the available data identified above, the impact of the proposed LEZ on the different IIA affected groups outlined in the IIA Guidance is undertaken below in Table 4.6.

Table 4.6 : Impacts by Population Group

Population Group	Differential Impacts (how each group may be affected in different ways)
People with protected characteristics	
Older people and people in their middle years	Aberdeen's population is generally comparable to the rest of Scotland. In Aberdeen City, 15% of people is aged 65 years or older, compared to 19% for the whole country. However, by 2028, the 65-74 population is expected to grow by 14.4% and the over 75s by 16.1% (NRS Scotland) Older people (residents and visitors) and people in their middle years will benefit from the reduction in emissions and the improved air quality in the city centre following the introduction of the LEZ, particularly those suffering with respiratory illnesses.
Young people and children	15% of the population of Aberdeen City are aged below 16 years old. Young people and children are one of the categories that will benefit from the air quality improvement that the LEZ will bring, particularly those with respiratory illnesses. This benefit will be perceived not only by residents of the area, but also by young people and children visiting the city centre. While there are no schools inside the LEZ, there are several on the periphery where it is possible non-compliant vehicles may reroute. While modelling suggests rerouting can be mitigated against, there may be unintended consequences to be addressed in the short term following LEZ enforcement.
Men (including trans men), Women (including trans women) and Non-binary people (Include issues relating to pregnancy and maternity including same sex parents)	Benefits related to improved air quality are applicable to all people living, working, or visiting the LEZ particularly those who suffer from respiratory illnesses.

Minority ethnic people (includes Gypsy/Travellers, migrant workers, non-English speakers)	According to Census 2011 data, within the LEZ, 16% of people identify as non-white, with the largest communities identifying as Asian, Asian Scottish, or Asian British. Some minority ethnic people, particularly non-English speakers, may struggle to be aware of the introduction of the LEZ. If they travel within the city centre with a non-compliant vehicle, they may incur fines and subsequently face financial issues. Awareness campaigns with ethnic groups should form part of the mitigation, discussed in later chapters. The equality evidence finder provides data at national level and suggests the minority ethnic groups are more likely to be in poverty compared to white-British. For example, 31% of 'Asian or Asian British' ethnic groups were in relative poverty before housing costs compared to 16% of 'White - British' people. This may limit their ability to comply with the LEZ requirements.
Disabled people (includes physical disability, learning disability, sensory impairment, long-term medical conditions, mental health problems)	According to Census 2011 data, 18% of households in the LEZ area (either with partial or full census area inside the LEZ) had at least one resident with a disability limiting their day-to-day activities. In line with the LEZ Regulations, there is expected to be a limited direct impact from the introduction of the LEZ on blue badge holders or owners of vehicles for disable people, as these user categories will be exempt from the LEZ requirements. Disabled people are also entitled to free bus travel in Scotland. Impacts experienced by those providing care support for vulnerable people may adversely affect those receiving care, for example, if the cost of care is increased. Carers who own a non-compliant vehicle and cannot afford to upgrade it may have to increase the cost or reduce the quantity of the care they provide, to offset the charge, where this is not paid by their employer. According to Census 2011 data, 6% of households in the LEZ area have at least one unpaid carer in the household
Refugees and asylum seekers	The Scottish Refugee Council is supported by Aberdeen for A Fairer World charity, which is located outside the LEZ boundary. Refugees and asylum seekers are likely to have very low income levels and will be negatively impacted if any vehicles that they have access to are non-compliant. Private vehicle ownership of this specific population group is likely to be significantly lower than for the population as a whole and this will reduce the impact on this group.

People with different religions or beliefs (includes people with no religion or belief)	There are several locations for religious congregation and places of worship in the city centre. These include: St Mary of the Assumption Cathedral, Gilcomston Church, Crown Terrace Mosque, Syed Shah Mustafa Jame' Masjid & Islamic Centre, Aberdeen Methodist Church, St John's Episcopal Church, Kirk of St Nicholas, Aberdeen Synagogue, Crown Street Hindu Temple People relying on non-compliant cars and that are not able to change their vehicle may find it more difficult to access these locations, with the potential for negative impacts on their wellbeing. It is noted however that these vehicles would pay for parking before the LEZ and will still have the opportunity to park on the periphery of the LEZ area.
Lesbian, gay, bisexual, and heterosexual people	Local data on sexual orientation are not available, but at national level, 2% of adults identified as Lesbian, Gay, and Bi-sexual and Other, 3% do not know or refused to answer. It is unknown if people of non-heterosexual orientation are potentially more likely to use their own cars to go to the city centre due to concerns over their personal security using public transport. Of these, some may be using a non-compliant vehicle. This issue may be relevant particularly for trips done at night-time.
People who are unmarried, married or in a civil partnership	No readily identified impacts.
Those vulnerable to falling into poverty	
Unemployed	Due to lower income, these groups are less able to upgrade a non-compliant vehicle. They may experience a potentially negative impact on their ability to take up a job inside the LEZ if they do not have access to affordable public transport or active travel alternatives. Unemployed and people on benefits are less likely to have access to a car, due to low income. While car ownership levels in the north east are high compared to the rest of Scotland, 27% of households in Aberdeen city do not have access to a car or van. *Reducing the barriers to bus use report (ACGG, First Group Nestrans, 2015*) noted 24% of bus users believe the fare to be too high with affordability being a barrier to using public transport. Many of the factors affecting access to services or employment were barriers prior to the LEZ with the LEZ not necessarily increasing these barriers. It is noted in the mitigation chapter the availability of funding for those on low income and benefits living within a 20km radius of the Aberdeen LEZ.
People on benefits	

Single parents	Due to a potential lower income, single parents who own a non-compliant vehicle may have difficulties in upgrading it and as a result potentially have reduced access to formal and informal childcare within the LEZ.
Vulnerable families e.g. young mothers, people experiencing domestic abuse, children at risk	Potentially lower access to nurseries and support groups within the LEZ if they do not have access to a compliant vehicle, public transport, or active travel alternative. However it is noted that there a few nurseries in the LEZ (Little Dreams is inside) and support services such as Grampian Woman's Aid is located in the north of the city, outside the LEZ area and the imapct is likely to be minimal.
Pensioners	The share of older people within the LEZ is lower compared to Aberdeen City and the Scottish average. Pensioners who own a non-compliant vehicle, may face financial constraints upgrading it. Nevertheless, people over 60 are eligible to receive free bus passes and may have a higher propensity to modal shift, with the proportion of concessionary passengers increase yearly from 2015/16 (35%) to 2017/18 (38%). Older people are also less likely to drive every day and less likely to hold a driving license than average (Equality Evidence Finder).
Looked after children and young people	Non-profit support services such as The Fostering Network and Action for Children are located outside the LEZ area and ACC provide extensive on-site fostering services. There is a potential risk of lower access to any smaller but crucial services inside the LEZ (not identified) for visitors and staff if they do not have access to a compliant vehicle, public transport, or active travel alternatives.
Those leaving care settings (including children and young people and those with illness)	Care leavers have a higher risk of lower incomes which could hinder them from travelling within the LEZ if they do not have access to public transport or active travel alternatives and are currently using a non-compliant vehicle to access the city centre.
Homeless People	ACCs Homelessness Unit is based on the periphery of the LEZ area. Several non-profit organisations providing support to homeless people, such a Shelter's Aberdeen Community Hub, are located in the LEZ area and homeless people may be indirectly impacted if volunteers do not have access to a compliant vehicle, public transport, or active travel alternatives
Carers (including young carers and carers with protected characteristics)	Carers who own a non-compliant vehicle and cannot afford to upgrade it may have to reduce the quantity or increase the cost of the care they provide to those inside the LEZ

Those involved in the criminal justice system	Aberdeen Sheriff Court is located within the LEZ boundary. There is a potential risk of lower access for visitors and staff if they do not have access to a compliant vehicle, public transport or active travel alternatives. It is noted however that there are several parking options outside the LEZ located close to the court. In addition, there may be a possible issue in relation to the transport of prisoners but no data is available for this.
Those living in the most deprived communities	People living in more deprived communities may be more affected by the introduction of the LEZ as they are likely to have a larger financial challenge in upgrading any non-compliant vehicles that they use. 10 SIMD zones have been identified within the LEZ border (either fully or partially). According to the latest available data (SIMD 2020), no SIMD areas inside the LEZ are considered the most deprived but there are several zones close to the LEZ that may experience direct impacts form the LEZ measures. The SIMD 2020 reported that 23,034 (10.1%) people in Aberdeen City live in a data zone ranked within the 20% most deprived and that 29 of Aberdeen City's 283 data zones were ranked in the 20% most deprived in Scotland. People living in the most deprived areas are more likely to have a non-compliant vehicle and to have difficulties in upgrading it. However as noted, those that do currently use a non-compliant vehicle to enter the city centre will be able to park on the periphery of the LEZ area and/or may be eligable for funfing through the Low Emission Support Fund, as outlined in Chapter 6.
People with low literacy/ numeracy	Non-English speakers or people with low literacy/numeracy, may not be aware of the introduction of the LEZ. If they travel within the city centre with a non-compliant vehicle, they may incur in fines and financial issues.
People misusing substances	Potentially lower access to support groups within the LEZ if they do not have access to a compliant vehicle, public transport, or active travel alternative.
Others e.g. veterans and students	University of Aberdeen and Robert Gordon University are outside the LEZ area. Students may see a reduction in access, particularly to city centre services or amenities, if they rely on a non-compliant vehicle and are unable to transfer to active or public transport modes however students are less likely to own a car compared to other population groups. Veteran support services provided by ACC are not dependent on location and access to support will be maintained

Geographical Communities	
• Rural/ semi-rural communities • Urban communities • Coastal communities • Business community	Aberdeen is a local economic hub for neighbouring populations from for the North East of Scotland. Those from surrounding rural/semi-rural communities may regularly visit the city for leisure, work or study. These communities may be adversely affected by the LEZ due to being forced to upgrade due to lack of viable alternative modes of transport caused by their location. As noted however, it is anticipated that the availability of parking will be sufficient for non-compliant cars to allow continued access to Aberdeen. The current provision of bus services may be impacted as a result of the LEZ introduction, as indicated by the main bus operators and this may result in a reduction in access to the city of Aberdeen
Employees	
• Full-time • Part-time • Shift workers	Shift workers with a non-compliant vehicle will have less public transport alternatives, particularly at night, to commute to/from the LEZ. This will result in potential issues in keeping or finding a job in the city centre for specific employee categories (e.g. people working in nightclubs and bars, receptionists, people working in emergency services, cleaners etc). The provision of parking on the periphery of the LEZ area may not be perceived as suitable or as safe as parking closer to their place of work

5. IMPACT BY IIA OBJECTIVES

5.1.1 This section presents impacts arising from the introduction and operation of the preferred LEZ in Aberdeen. Table 5.1 details the positive and negative impacts resulting from the introduction of the LEZ on the three IIA objectives of Economy, Environment and Equality and Human Rights. These impacts represent disproportionate effects on various population groups which were identified through direct engagement, examination of survey results, research and analysis of existing datasets (see Chapter 4 for more detail).

Table 5.1 : Summary of IIA Impacts

#	Impact/Objective	Description	Differentially affected populations*	Boundary Impact differentiators / Geographical implications
IIA Objective - Equality and human rights				
1	Positive health impact	The LEZ will discourage the most polluting vehicles from operating within the city centre of Aberdeen, including the strategic through-routeing of non-compliant vehicles. This has been shown to reduce emissions and improve air quality and in turn have a positive effect on health of those most at risk of respiratory illness including older people/pensioners and children (including unborn children). Modelling has also shown that some benefits will be felt city-wide as cleaner vehicles travel to/from the LEZ area, particularly on key bus routes This is the most significant positive impact of the LEZ and will have health and wellbeing benefits for residents, workers, and visitors to the city	Children, pregnant women, disabled people and older people/pensioners.	The city centre has some of the highest air pollution concentrations and is the focussed area of the LEZ therefore most benefit will be observed in this area. City wide air pollution concentrations will improve due to the required compliance of the city bus fleets serving the entire city, not just the LEZ area. Positive health impacts will be felt by residents, workers and visitors. SEPA's NMF modelling concludes that all air quality exceedances will fall within legal limits inside the LEZ area.
*affected populations: population groups mentioned in methodology section				
2	Positive health impact	The LEZ (and complimentary traffic management measures in Aberdeen city centre) may encourage some modal shift from cars to public transport and active travel which will have a positive impact on health. Any reduction in private car trips will result in further improvements to air quality.	Children, pregnant women, disabled people and older people/pensioners.	It is anticipated that any shift to sustainable modes of transport is likely to be city wide, particularly on key corridors with improved bus fleets and/or improved active travel links. Active travel uptake may also increase both city wide and inside the LEZ as a result of improved air quality.

3	Reduction in access	Bus operators may increase the price of fares as a result of the increased costs to their operations arising from the need to replace or upgrade buses, to ensure compliance with the LEZ regulation. For some bus passengers the increase in price may make the journey unaffordable and result in them foregoing their journey. This may affect people's ability to engage in activities or will struggle to reallocate their required services which in turn will affect their wellbeing/social activity. ***Mitigation:*** *Funding is available to support costs to bus operators associated with LEZ compliance (see Section 6.3 for full details) such as The BEAR Programme which provides funding to support costs associated with retrofitting and low/no emission vehicles funds such as SULEBS and JIVE.* *The effect on the most vulnerable groups may be mitigated as any fare increase will not be applicable to holders of free travel passes including older people/pensioners, disabled and subsidised travel* .	Unemployed, people on benefits, single parents, homeless people, carers, part-time workers, students, staff vulnerable to falling into poverty	The effect of bus fare increase would be felt city-wide. NLEF appraisal notes that all bus services that operate in the city, enter the LEZ area for part of their routes, therefore all city bus services must be compliant to continue operating in the city. It is the nature of the operators in the city that fare increase would be across all services, not targeted on services that enter the LEZ (as noted, this is all services)
4	Reduction in access	Bus operators may remove or adjust non-profitable routes in response to LEZ related costs to upgrade fleet. Communication with bus operators suggest this may be a consequence of the LEZ, resulting in lower accessibility for some groups. ***Mitigation:*** *As above, funding is available for bus operators to assist with the cost of compliance to help mitigate against this possibility. In addition SEPA's bus operator route model can be used to ensure that as compliant buses enter the fleet these are implemented in the correct manner to tackle poor air quality and reduce the impact on bus users.*	Unemployed, older people/pensioners, disabled people, carers, pregnant women, rural/semi-rural communities	Any service reduction has the potential to impact all areas of the city and the wider Aberdeenshire area, depending on the particular routes or areas targeted.

5	Reduction in access and quality of care reduction	The LEZ Regulations indicate that disabled tax class and Blue Badge holders are exempt from penalty enforcements of the LEZ and this will lessen the impact on non-compliant vehicles used by this population group. People with a disability who do not use public transport who own a non-compliant vehicle and cannot afford to upgrade, may choose to forego their journey into the city centre if they do not meet the exemption requirements, adversely affecting their opportunity to access services and having a negative impact on their social activity. The LEZ will also impact non-compliant minibuses providing community transport services (care providers, youth groups, school groups, elderly care providers) which may not meet exemption criteria. Any impacts experienced by those providing care support for vulnerable people may also adversely affect those receiving care, for example, if the cost of care is increased. Carers who own a non-compliant vehicle and cannot afford to upgrade may have to reduce the quality and /or quantity of the care they provide. There is a particularly disproportionate impact on unpaid carers of family members, who not only experience a reduction in the care they can offer to others but may also suffer reductions in access for themselves and family members ***Mitigation:*** *Impacts can be mitigated via the granting of exemptions with further mitigation offered by the availability of the Low Emission Support Fund (see Section 6.3) to help more individuals and organisations prepare for the introduction of the LEZ.*	Disabled people and carers.	This will primarily impact those services and/or care provided in the city centre (LEZ) area. Services and care provided outside the LEZ will operate as they do now.

6	Negative financial impact	Impacts on non-English speaking residents or visitors of the city, potentially due to low awareness of LEZ being in place. Possibly non-English speaking populations from low income households with a non-compliant vehicle may enter LEZ by mistake and enter into financial difficulty due to the fine incurred and an inability to pay. ***Mitigation** : Impact could be mitigated by providing clear communications around the LEZ implementation across different media and in a range of language* s used by communities in Aberdeen	Low income householders, minority ethnic people (including non-English speakers).	This impact may be felt city-wide as people travel to the city centre
7	Reduction in access	People who use their own cars that are fitted with adaptive features (such as swivel chairs) to access community and leisure facilities within the City Centre may not be able to afford the cost of transferring the adaptive features onto LEZ compliant cars. This in turn potentially can adversely affect their social activity/ day to day activity. ***Mitigation** : disabled tax class and blue badge holders exempt from enforcement and this should minimise such an impact*	Disabled people and carers.	This will only impact those services and care provided/accessed in the city centre (LEZ) area. Services and care provided outside the LEZ will operate as they do now.

8	Reduction in provision of services	Community Transport Providers, usually LGV (minibuses), with non-compliant vehicles may shift services to areas outside LEZ. This has the potential to effect older people/pensioners, disabled people and children who are dependent on their service to undertake social activities related travel. However, the funding options available to upgrade their non-compliant fleet and proposed grace periods will mean vehicles 9 years old or newer are likely to be compliant and not face restriction from entering the LEZ. ***Mitigation** : Any identified source of funding(Section 6.3) for vehicle upgrades or retrofitting should be clearly communicated to Community Transport Providers: such as the BEAR Programme and Electric Vehicle Loans. ACC should also engage with Community Transport Providers to effectively communicate LEZ proposals and on potential impact to help them prepare better for the change.*	Older people/pensioners, children and disabled people.	This will only impact those services and care provided/accessed in the city centre (LEZ) area. Services and care provided outside the LEZ will operate as they do now.
9	Reduction in access	Community groups that engage with children, may use LGVs (such as minibuses) to transport children for various activities in city centre and or to access facilities in the City Centre. Given the city centre area covered by the LEZ, it is anticipated that such facilities are small in number. However, there is a potential that activities provided to these groups are restricted or increase in cost until vehicle is changed. However, as noted above, minimum grace periods will mean vehicles 9 years old or newer are likely to be compliant and not face restriction from entering the LEZ ***Mitigation:** as above*	Young people and children	This will only impact those services and care provided/accessed in the city centre (LEZ) area. Services and care provided outside the LEZ will operate as they do now.

10	Reduction in access to services and employment opportunities	There is a potential for people who currently use their own vehicles to access the city centre for employment or recreation to be negatively affected if they can no longer use their private vehicle for access. While switching to public transport or active travel may be viable for some it will not be for everyone. Some groups may perceive there to be personal security concerns with public transport. As a result, passengers may forego their journey into the City Centre, particularly at night time. ***Mitigation*** *: The LEZ makes available a number of parking locations on the periphery of the zone and make a viable alternative for many, though not all. Impacts can be mitigated via the granting of exemptions with further mitigation offered by the availability of the Low Emission Support Fund (see Section 6.3) to help more individuals and organisations prepare for the introduction of the LEZ.*	Minority ethnic people, disabled people, Non-binary, Transgender, women, those involved in the criminal justice system, older people.	City-wide impact on those accessing the city centre
11	Reduction in access to services	There are several locations for religious congregation and places of worship that are located within the LEZ area. If most of the users live outside of the City Centre and are reliant on cars, their activity may be adversely affected if they have to forego their journey. As noted above however, the availability of parking on the periphery of the zone mitigates this impact somewhat.	People of different religious belief/ faith	Only those services located in the LEZ area will be affected

12	Lack of access to affordable finance leading to disproportionate negative quality of life impact and reduction in access	Cost of replacing a vehicle with a compliant mode of transport will impose a greater burden on older people/pensioner, low income individuals and families for whom a vehicle is necessary due to the disproportionately large amount of income for an unexpected replacement. For example, a single parent may have a decreased earning potential compared to a two parent family. As noted in the IIA analysis, the number of private vehicle owners that will be required to upgrade is considered minimal. ***Mitigation*** *: Impact may be mitigated through the Funding opportunities for those on means tested benefits.*	Single parents, people on benefits, vulnerable families, older people/pensioners, carers, and students	Mainly impacts those who reside in the city centre LEZ area and cannot afford to replace their vehicle. Those who reside outside the LEZ will have restricted access but unlikely to change vehicle on accessibility grounds only with access to several car parks maintained.
IIA Objective - Environment and sustainability				
13	Positive effect on air quality	Implementing a LEZ is shown to bring air quality improvements and health & wellbeing improvements particularly to those population groups which are most sensitive to poor air quality, notably those suffering from chronic respiratory illness, and young children.	Children, disabled people and pregnant women	Greatest impact inside the LEZ boundary but impacts also felt city-wide as improved bus fleet service full city area.
14	Positive effect on air quality and climatic factors	Air quality modelling has shown the LEZ will reduce pollution in Aberdeen and is also likely to generate a positive effect on reducing factors contributing to climate change through reduced greenhouse gas emissions	Individuals	As above

15	Positive effect on population and human health	The LEZ may promote sustainable forms of transport via modal shift from cars to buses, shared cars, bicycles or walking, which in turn will have positive impact on air quality. This shift may be increased with the complementary CCMP measures delivered alongside the LEZ. Dependent on what modes people shift to there may be positive effects on the health and well-being of people due to physical activity (cycling/ walking) and exposure to outdoor spaces.	Individuals	It is anticipated that any shift to sustainable modes of transport is likely to be city wide, particularly on key corridors with improved bus fleets and/or improved active travel links. Active travel uptake is also likely to increase both city wide and inside the LEZ as a result of improved air quality
16	Environment	Improvements to air quality could directly lead to improvements to physical environment although as noted in the Strategic Environmental Screening, the impact is not likely to be significant.	Children, disabled people and pregnant women	Greatest impact inside the LEZ boundary but impacts also felt city-wide as improved bus fleet service full city area, improving air quality along key bus routes
17	Water pollution	The introduction of a LEZ is not likely to significantly affect water.	-	-
18	Soil pollution	The introduction of a LEZ is not likely to significantly affect soil.	-	-
19	Noise Pollution	Reduced traffic flows directly from LEZ restrictions inside the LEZ and possibly also caused by modal shift towards public transport and active travel, are likely to lead to a reduction in city centre background noise. Lower noise pollution is anticipated to have health and productivity benefits. Possible increases on the periphery may require mitigation measures to ensure that any impact is minimised and ACC to continually monitor post LEZ implementation.	Urban communities, veterans, children and young people (including students)	Impact likely to be felt both inside the LEZ and throughout the city bus networks Possible impacts on the periphery of the LEZ if non-compliant vehicles choose local routes to avoid the LEZ area.

20	Protection of Landscape/ Townscape	The introduction of the LEZ is not likely to significantly affect landscape. However, there may be minor improvement to townscape due to reduction in vehicles on the street. Where signage is required this needs to be sensitively located to avoid negative impact on key views and listed building setting. Complementary measures from the CCMP are aimed and improving the city landscape.	Urban communities, children and students	Predominately inside the LEZ area
21	Protection of Cultural Heritage	Vehicle emissions contain various pollutants that can damage buildings including carbon dioxide (CO2) and sulphur and nitrogen oxides. The reduction of vehicle traffic in the city centre may help alleviate this problem.	Urban communities	Predominately inside the LEZ area
22	Nature Conservation	The introduction of the LEZ is not likely to significantly affect biodiversity, however there are potential benefits from a reduction in air pollution deposition on habitats through reduced traffic.	Urban communities	Predominately inside the LEZ area
23	Waste creation	A shift towards compliant vehicles may lead to redundant non-compliant vehicles being removed from the fleet. The scrappage of these surplus vehicles may cause environmental harm if not disposed of correctly (e.g. battery disposal).	Children, older people/pensioners and pregnant women	City-wide

24	Transmission of infectious disease	The potential modal shift from private vehicles to public transport could potentially increase disease transmission, particularly with uncertainty around the longevity of the COVID-19 impact. Increased public transport usage could increase the likelihood of transmission, potentially leading to an increase in contagion and a negative effect on city-wide health.	Older people and people in their middle years, those living in the most deprived communities, carers, disabled people, urban communities, minority ethnic people.	City-wide
IIA Objective - Economy				
25	Consumer welfare loss and asset value loss	A proportion of non-compliant vehicle owners may upgrade their vehicle although this is expected to be a small number in Aberdeen as detailed in the analysis. Similarly, there may be some non-compliant vehicles that may be scrapped that otherwise would not have. These activities represent a form of consumer welfare loss or asset value loss. In Aberdeen, as noted in the IIA analysis the total number of non-compliant vehicles affected is anticipated to be small, relative to those vehicles whose owners change trip journey/destination.	Individuals and local economy	Any welfare or asset loss is likely to be city-wide.
26	Potential economic activity increase	Increased economic activity for a number of sectors may occur but again in Aberdeen this impact may be minimal. Examples include Second hand car traders, vehicle scrappage, vehicle leasing operators, active-travel distributors/repairers, and public transport operators through increased patronage.	Business community	City-wide

27	Increased capital and operational expenditure, impacting upon services provided and scale of operation.	Some vehicle (especially bus, LGV and HGV) have relatively long turnover periods. The LEZ may require users to change their vehicles earlier than anticipated. The need to purchase compliant vehicles and sell/scrap their non-compliant vehicle means that the users will incur additional financial cost. Given the potential number of vehicles required to upgrade or alter behaviours, it is conceivable that some businesses may be forced to alter operations in order to comply. This could entail reducing services, cutting staff, or reducing training. As noted in the IIA analysis this impact differs depending on the size of business with smaller businesses less likely to be able to replace/redeploy non-compliant vehicles. ***Mitigation:*** *Micro-businesses can apply for funding through the LEZ Support Fund to assist with the costs of replacing non-compliant vehicles, lessening the financial burden on smaller businesses.*	Lower income community Groups Business communities Business communities' staff Urban communities Low income groups, Part-time workers	City-wide, though as noted in IIA analysis the total number of vehicles being replaced is anticipated to be relatively low
28	Potential economic activity increase	Decreased traffic and cleaner atmosphere may lead to higher quality of public spaces in the city centre. This could lead to more opportunities for business and tourism to Aberdeen city centre as more people are attracted to a cleaner, more attractive city space.	Business community. People that work and visit areas within the LEZ boundaries, urban communities	Predominately inside the LEZ area

29	Re-distribution of business footfall	The cost incurred from entering or operating within the LEZ may cause changes in consumer travel patterns. Penalties implemented as part of the LEZ may deter those outside of the LEZ from entering the city centre, particularly for "pass-by" trips, potentially changing previously established shopping patterns. Consumers may choose to visit a store outside of the LEZ, rather than the store they previously visited inside the LEZ. This will have a negative impact on the footfall of businesses located within the LEZ, potentially causing the relocation of 'footloose' businesses to outside of the LEZ. ***Mitigation:*** *The final LEZ proposals allow for continued access to the majority of city centre car parks and shopping centres, within short walking distance to core city centre businesses thereby limiting the impact of changes to existing shopping patterns.*	Business community staff, staff vulnerable to falling into poverty, urban communities, rural/semi-rural communities	Both city centre and city-wide
30	Decreased labour market pool	Decreased access to the city centre due to the LEZ restricting entry to non-compliant cars may cause certain members of society (lower income households) to be dissuaded from applying for a job in the city. This may have a negative effect on the size and diversity of the potential workforce in Aberdeen. ***Mitigation:*** *As noted, the final LEZ proposals allow for access to the majority of car parks and shopping centre, within short walking distance to core city centre businesses thereby limiting the impact of access to employment. Without a LEZ, the same parking changes would apply .*	Business community and local economy	Both city centre and city-wide

31	Increased income inequality	People from low income households who use cars to visit the city centre for work on a regular basis may face financial difficulty to upgrade their vehicle, if they choose to do so. Income inequality may increase as those on low incomes may take on credit to pay for vehicle changes that they would not otherwise have purchased. Again, it is noted in the analysis it is likely individuals will adjust their trip patterns rather than purchase new vehicles and in Aberdeen this impact will likely be low. ***Mitigation** : Any impacts may be mitigated through LEZ Support Fund to help households with low income to afford an upgrade to a compliant vehicle or travel pass. Again, the availability of car parking on the periphery will mitigate against the need for many to upgrade their vehicles.*	Lower income households, staff vulnerable of falling into poverty, business community staff	Both city centre and city-wide
32	Increased employment opportunities	The development of the retrofitting and Low Emission Vehicle (LEV) industries as a result of the LEZ may create employment opportunities throughout the supply chain. Jobs involving the manufacture, maintenance, and sales/operation of lease or rental vehicles could be created.	Unemployed, young people, students, shift workers, staff vulnerable to falling into poverty, business community staff	Both city centre and city-wide

33	Travel efficiency	A reduction in general traffic inside the LEZ, as shown in the traffic modelling, could impact the efficiency of the public transport network, lessen delays, lower the time taken for buses to complete their routes, and improving the efficiency of travel for both commuters and leisure seekers. Complimentary CCMP measures and parallel ACC projects seek to improve journey time reliability on key routes in the city. This impact is related to other impacts where users experience an changes in travel times due to different modes of travel or origin/destination of their journey. This is particularly true of drivers of non-compliant vehicles subject to diversions or alternative choice of parking locations.	Business community staff, urban communities	Both city centre and city-wide

6. MITIGATION

6.1 Introduction

6.1.1 Mitigation forms a key part of the overall impact assessment. Properly targeted mitigation measures, such as funding and exemptions can reduce many negative impacts associated with the LEZ introduction and in turn maximise positive impacts. There are many forms of mitigation through both the LEZ implementation and support offered by local councils and Transport Scotland and this is constantly evolving. It therefore should be noted that the mitigation within this section is not exhaustive and may change in the future.

6.2 Exemptions

6.2.1 Exemptions for some vehicle categories from the LEZ emission standards are stated in Chapter 2 and set out in the Low Emission Zones (Emission Standards, Exemptions and Enforcement) (Scotland) Regulations 2021. These exemptions are a form of mitigation as they decrease the negative impacts of Aberdeen's LEZ on groups such as emergency services, disabled individuals and the showman community.

6.2.2 The most significant exemption for Aberdeen's population is for holders of blue badges or disabled tax class vehicles who will be able to travel into the LEZ area without penalty, no matter their vehicle type standard. The exemption of blue badge holders and those with disabled tax classed vehicles significantly mitigates any potential negative impact the LEZ could have had on this group of the population.

6.3 Funding

6.3.1 Through its 2018 Programme for Government, the Scottish Government committed to help those who will have most difficulty preparing for the introduction of Low Emission Zones in Scotland, including Aberdeen. Funding is available for qualifying individuals and organisations who may struggle with the introduction of Aberdeen's LEZ for the financial year 2021/2022. Although it is not certain to what extent funding will continue to be provided and therefore negative effects minimised and positive effects maximised, it is anticipated that some level of funding will be made available until the introduction of the LEZ enforcement in 2024. Funding specifically mitigates the negative impacts caused by issues with upgrade costs and mode shift.

LEZ Support Fund: Households and Businesses

6.3.2 £3 million new funding has been made available in 2021/22 through the Low Emission Zone Support Fund to help more individuals and organisations prepare for the introduction of Low Emission Zones in Scotland.

6.3.3 From previous rounds of funding, Aberdeen has been awarded grants worth £14,000 towards households and grants worth £3,000 towards businesses.

6.3.4 The Low Emission Zone Support Fund, funded by Transport Scotland and administered by Energy Saving Trust, offers an incentive for low-income households to take older, more polluting vehicles off the road.

6.3.5 Grants of up to £3,000 are available to incentivise the disposal of non-compliant vehicles:

- £2,000 is available to eligible households who dispose of their non-compliant vehicle with a Scottish authorised treatment facility. The applicant must live close to a proposed Scottish low emission zone and be in receipt of specific means-tested benefits.
- Travel Better incentives of up to £500 will also be made available for each adult in the household. A maximum of £1,000 per household applies.

6.3.6 The Travel Better fund, of which £9,000 has been awarded in Aberdeen, gives funding towards purchasing a new or second hand bike, cargo bike or e-bike, cycle equipment, membership and driving credits for car clubs and cycle hire schemes or multi-trip public transport tickets. Together with the Disposal Grant of £2,500 the funding for households tries to incentivise switching to a more sustainable and active travel mode, where possible. There is no obligation to use the Disposal Grant for a specific purpose and it can be used to fund the purchase of a compliant vehicle.

6.3.7 For businesses, the Low Emission Support Fund offers micro businesses and sole traders, with an operating site within 20km of the low emission zones, a £2,500 grant towards the safe disposal of non-compliant vehicles.

6.3.8 The LEZ Support Fund, and the grants issued as part of it, incentivises both households and businesses to take older vehicles off the road which do not comply with the LEZ emission standards. Due to its qualifying criteria, it specifically targets those identified in this IIA, households on low incomes and small/medium enterprises, as being disproportionately affected by the LEZ due to decreased ability to meet the LEZ standards.

The Low Emission Zone Retrofit Fund

6.3.9 The LEZ Retrofit Fund will provide micro-businesses in Aberdeen with support to retrofit their existing non-compliant vehicle with Clean Vehicle Retrofit Accreditation Scheme approved solutions, making sure the vehicles meet the minimum proposed emission standards. Grants are available to cover up to 80% of the cost of a retrofit solution, subject to the following terms and conditions:

- Up to £5,000 per light commercial vehicle and wheelchair accessible taxi installing retrofit exhaust after-treatment systems.
- Up to £10,000 per wheelchair accessible taxi installing re-powering technology.
- Up to £16,000 per heavy goods vehicle or refuse collection vehicle.

6.3.10 It is anticipated that the update of the Retrofit Fund will be limited in Aberdeen due to the existing taxi fleet (non-hackney type) and the feedback from HGV drivers that the services is not suitable for their needs. This is confirmed with the latest uptake figures where no grants have been awarded in Aberdeen.

Bus Emissions Abatement Retrofit (BEAR) programme

6.3.11 This fund aims to fit buses and coaches with Clean Vehicle Retrofit Accreditation Scheme (CVRAS) accredited retrofit technology solutions to support the delivery of LEZ by increasing the number of compliant buses.

6.3.12 The Bus Emissions Abatement Retrofit Programme (BEAR) Phases 1, 2 & 3 provided £12.2M funding to support the costs of retrofitting of 762 buses and coaches to Euro VI standard in Scottish Air Quality Management Areas from 2018 to 2021 (Transport Scotland).

BEAR Phase 4 funding of up to £5.7 million is available in the 2021/22 financial year to licensed bus and coach operators, local authorities and community transport operators located in, or operating eligible vehicles based on routes within one of the LEZs in Scotland (and/or one of Scotland's AQMAs). Through consultation with the bus operators it is anticipated that applications for support from the BEAR Phase 4 funding will be submitted to assist each operator to meet its requirements for the LEZ in Aberdeen.

Scottish Ultra-Low Emission Bus Scheme (SULEBS)

6.3.13 The Scottish Ultra-Low Emission Bus Scheme (SULEBS) was an evolution of the Scottish Green Bus Fund held each year between 2011 and 2018. SULEBS supported the Scottish Government's net zero targets, its commitment to delivering Low Emission Zones and Scotland's ambitions for transport decarbonisation.

6.3.14 It provided support for the purchase of new ultra-low emission buses up to a maximum 75% of the differential costs against diesel buses, depending on their zero emission running capability. Support was also available for the infrastructure for this technology of up to a maximum 75% of the capital cost.

6.3.15 The first round of SULEBS ran in August 2020. Over £10.1 million of funding supported four completed bids, for the introduction of 57 ultra-low emission buses, and supporting infrastructure. The second round of SULEBS ran in January/February 2021. Over £40.5 million of funding will support six completed bids, introducing a further 215 ultra-low emission buses, and supporting infrastructure across Scotland. Stagecoach East were awarded £2,181,663 towards nine single deck hydrogen buses, but with routes serving a wide geographical area in eastern and central Scotland, it is not known if these will be deployed in Aberdeen.

Further support for transition to zero emission buses has been offered under the Scottish Zero Emission Bus Challenge Fund (ScotZEB) which opened for bids on 4 August 2021.

The Joint Initiative for hydrogen Vehicles across Europe (JIVE)

6.3.16 The JIVE project seeks to deploy 139 new zero emission fuel cell buses and associated refuelling infrastructure across five countries. JIVE will run for six years from January 2017 and is co-funded by a 32 million euro grant from the FCH JU (Fuel Cells and Hydrogen Joint Undertaking) under the European Union Horizon 2020 framework programme for research and innovation.

6.3.17 The world's first fleet of double decker hydrogen buses has officially launched into service in Aberdeen. The vehicles will be operated mainly on the First Bus Service 19 (Peterculter to Tillydrone) along with other services and is part funded by the JIVE project. Cities that will follow Aberdeen's footsteps include London and Birmingham, with Dundee and Brighton and Hove being lead partners in JIVE2. The new £8.3 million project has been funded by ACC, the Scottish Government, and the European Union (FCH JU), with an investment of about £500,000 per vehicle.

6.3.18 The UK's first hydrogen production and bus refuelling station was opened in Aberdeen in 2015 as part of a £19million green transport demonstration project. The Aberdeen City Council-led project tested the economic and environmental benefits of hydrogen transport technologies and aims to drive the development of hydrogen technologies.

7. SUMMARY AND CONCLUSIONS

7.1 Summary of Impacts

7.1.1 This report presents a range of impacts resulting from the proposed implementation of a LEZ and includes direct and indirect impacts affecting individuals and businesses. The magnitude of impact varies according to likelihood of occurrence and the considered mitigations. The following impacts are considered to be of high priority:

- Health benefits
  - A direct impact of the LEZ will be to reduce emissions concentrations through restricting access to the city centre from the most polluting vehicles. A secondary impact may be felt through improved vehicle turnover as a behavioural change to the LEZ, though this is anticipated to be limited in Aberdeen. Indirect impacts of the LEZ may be the resulting health benefits from a mode shift from private vehicle travel to active travel or public transport modes.
- Potential economic costs replacing vehicles
  - LGV and bus will be most significantly affected due the requirements of their trips inside the LEZ area
  - Private car owners will likely be affected to a lesser degree, primarily due to the area covered by the LEZ. It is anticipated that few private car owners that currently access the city centre would consider replacing a non-compliant vehicle over adjusting their parking/trip habits to utilise a car park located outside the zone. This however may result in changes to access, as noted below.
- Reduction in the access and provision of goods/services/care
  - Businesses are likely to be impacted as they will face restrictions in how they can operate in a the city centre should they currently utilise a non-compliant vehicle
  - Individuals are given fewer options as they face restrictions to access the good/service/care or the good/service/care is no longer being offered. This will especially affect who are reliant on private vehicle transport but do not have access to finance to achieve compliance or those that use community transport not considered exempt from LEZ enforcement.
- Potential economic activity changes
  - Through the changing atmosphere of the city centre, some people and businesses may be more attracted to the area, generating more economic activity. This benefit is heightened where the LEZ is delivered with the CCMP placemaking proposals
  - The push to compliant vehicles provides new opportunities for retrofitting, vehicle sales/maintenance, vehicle lease operations and car clubs potentially generating economic and employment growth
  - Some sectors and industries that are reliant on vehicles and have a fleet of non-compliant vehicles may be adversely affected by the LEZ and may be forced to reduce or amend operations at a cost impact

7.2 Conclusions

7.2.1 The LEZ has the potential to cause a range of positive and negative impacts, from improving health of society to potentially reducing access to the city centre for those who rely on private vehicle transport. The most significant impact of the LEZ will be the improvement in air quality and the resulting health benefits, benefitting residents, visitors and workers. The LEZ also has a potential positive health impact through encouraging the use of active travel and public transport for certain trips and changing existing travel behaviours.

7.2.2 Given the focus of the IIA to look at how certain protected groups are potentially differentially affected, there are instances where the LEZ could disproportionately affect some groups in society. For example, those who have a diminished ability to upgrade to a compliant vehicle due to low income (including people on benefits, single parents, or disabled people). Those on lower incomes may experience reduced access to locations and in turn the goods, services, or employment opportunities available to them. Community transport providers rely on cars and minibuses that may be subject to a LEZ, therefore the services they provide to a range of protected groups (such as youth groups and those receiving care) may be affected.

7.2.3 Mitigation can reduce these potential impacts. For example, the recently announced LEZ Mobility Fund, retrofitting schemes, and exemptions outlined in the LEZ regulations all look to reduce any negative impacts of the proposed LEZ scheme. The IIA shows that protected members of society can be impacted by the LEZ in subtle ways that, although small in magnitude relative to the overall health benefits of the LEZ, can be removed or mitigated through considerate decision making at a national and local level.