Bath Clean Air Plan

Bath and North East Somerset Council

Distribution and Equalities Impact Analysis

674726.BR.042.FBC-19 | 2

December 2019

Bath Clean Air Plan

Project No:	674726.BR.042
Document Title:	Distribution and Equalities Impact Analysis
Document No.:	674726.BR.042.FBC-19
Revision:	2
Date:	December 2019
Client Name:	Bath and North East Somerset Council
Project Manager:	RR
Author:	EA/GW

Jacobs Consultancy Ltd.

1 The Square, Temple Quay
2nd Floor
Bristol, BS1 6DG
United Kingdom
T +44 (0)117 910 2580
F +44 (0)117 910 2581
www.jacobs.com

Document history and status

Revision	Date	Description	By	Review	Approved
1	14.06.2019	FBC draft	EA	GW	RR
2	17.12.2019	Updated FBC draft	EA	GW	RR

Contents

1. Introduction 1
1.1 Purpose of the Report 1
1.2 Report Structure 4
2. Methodology 5
2.1 Approach 5
2.2 Identification of Study Area 5
2.3 Distributional Impact Assessment Criteria 5
2.4 Appraisal Methodology 7
3. Screening 8
3.1 Screening for Distributional Impacts 8
3.2 Relevant Grouping Variables 9
4. Socio-economic Context 10
4.1 Social Groups and Demographics 10
4.2 Economy 16
4.3 Key Facilities and Social Infrastructure 21
5. Distributional and Equalities Impact Analysis 22
5.1 Air Quality 22
5.2 Accessibility 25
5.3 Affordability 26
5.4 Other Impacts on Businesses 28
5.5 User Benefits 29
5.6 Other Impacts (Noise, Accidents, Severance) 30
6. Key Findings 31
7. Proposed Mitigation 32
7.1 Clean Air Fund 32
7.2 Proposed Exemptions and Concessions 33

1. Introduction

Poor air quality is the largest known environmental risk to public health in the UK[1]. Investing in cleaner air and doing more to tackle air pollution are priorities for the EU and UK governments, as well as for Bath and North East Somerset Council (B&NES). B&NES has monitored and endeavoured to address air quality in Bath, and wider B&NES, since 2002. Despite this, Bath has ongoing exceedances of the legal limits for Nitrogen Dioxide (NO_2) and these are predicted to continue until 2025 without intervention.

In 2017 the government published a UK Air Quality Plan for Nitrogen Dioxide[2] setting out how compliance with the EU Limit Value for annual mean NO_2 will be reached across the UK in the shortest possible time. Due to forecast air quality exceedances, B&NES, along with 27 other Local Authorities, was directed by Minister Therese Coffey (Defra) and Minister Jesse Norman (DfT) in 2017 to produce a Clean Air Plan (CAP). The Plan must set out how B&NES will achieve sufficient air quality improvements in the shortest possible time. In line with Government guidance B&NES is working towards implementation of a Clean Air Zone (CAZ), including both charging and non-charging measures, in order to achieve sufficient improvement in air quality and public health.

Jacobs has been commissioned by B&NES to produce an Outline Business Case (OBC) and Full Business Case (FBC) for the delivery of the CAP; a package of measures which will bring about compliance with the Limit Value for annual mean NO_2 in the shortest time possible in Bath. The OBC assessed the shortlist of options set out in the Strategic Outline Case[3], and proposed a preferred option including details of delivery. The FBC develops the preferred option set out in the OBC, detailing the commercial, financial and management requirements to implement and operate the scheme. The OBC and FBC form a bid to central government for funding to implement the CAP.

This Distributional and Equalities Impact Analysis Report is written to support the FBC. It outlines the overarching framework and detailed analysis that assesses the potential differential impacts of the Bath Clean Air Plan on relevant socio-economic groups. It presents the key assumptions, approach and structure of the impact analysis, leading to an identification of particular distributional and equality issues and concerns that are addressed in the Economic Case of the FBC.

Within this context, this report should be reviewed alongside the Economic Case presented in the FBC. The Economic Case itself outlines the key results of the economic appraisal and any requirements for mitigation, whilst this appendix focusses primarily on the methodology and background data underpinning the analysis.

1.1 Purpose of the Report

The UK Plan for Tackling Roadside Nitrogen Dioxide Concentrations (Defra/DfT July 2017) acknowledges that air quality issues, and NO_2 exceedances in particular, are highly localised. As such it is recommended that any interventions proposed to improve air quality should attempt to minimise their negative impact on local groups and businesses, especially vulnerable socio-economic groups. In line with the Joint Air Quality Unit's (JAQU) Options Appraisal Guidance (2017), the key local groups and businesses of interest are:

- Children and young people;
- Elderly residents;
- Residents suffering from illness and with disability;
- Female residents;
- Residents from ethnic minority groups;
- Low income households; and

[1] Public Health England (2014) Estimating local mortality burdens associated with particular air pollution. https://www.gov.uk/government/publications/estimating-local-mortality-burdens-associated-with-particulate-air-pollution
[2] https://www.gov.uk/government/publications/air-quality-plan-for-nitrogen-dioxide-no2-in-uk-2017
[3] Bath and North East Somerset Council Clean Air Plan: Strategic Outline Case, March 2018 (http://www.bathnes.gov.uk/sites/default/files/siteimages/Environment/Pollution/strategic_outline_case_bath_28.03.2018_with_annexes.pdf)

- Businesses, including small and medium enterprises (SMEs) and taxi/private hire firms.

The purpose of the report is to identify any positive or negative impacts of the proposed scheme on these interest groups. The social groups listed above (i.e. the first six groups listed) are included in the assessment to fulfil B&NES' statutory obligations under the Equality Act 2010. They include people with protected characteristics who may have less ability to adapt to the interventions proposed as part of the Bath CAP. Low income households have also been considered in-line with JAQU Option Appraisal Guidance. The businesses referred to in the list above are included in the assessment as the charging CAZ element of the Bath CAP will produce direct costs to businesses. It may not be possible for some SME's to absorb these additional costs, meaning specific consideration of distributional impacts on these business groups is also required.

Establishing the specific impacts of the scheme on the groups listed above will help determine whether the scheme unduly advantages or disadvantages a particular group. This will enable recommendations about requirements for mitigation to address certain impacts or for more fundamental amendments to the scheme.

This report assesses the preferred option formally accepted by B&NES. The preferred option is a Small Zone CAZ C (charging higher emission buses, coaches, taxis, HGVs and LGVs) plus complementary non-charging and traffic management measures in Queen Square. Figure 1.1 shows the proposed CAZ boundary in Bath. The boundary has been modified compared to that in the OBC, changes to this are detailed in FBC-04 'Clean Air Zone Boundary Updates' in Appendix A of the FBC. Full details of the mitigation packages for the preferred option are shown in Table 1.1.

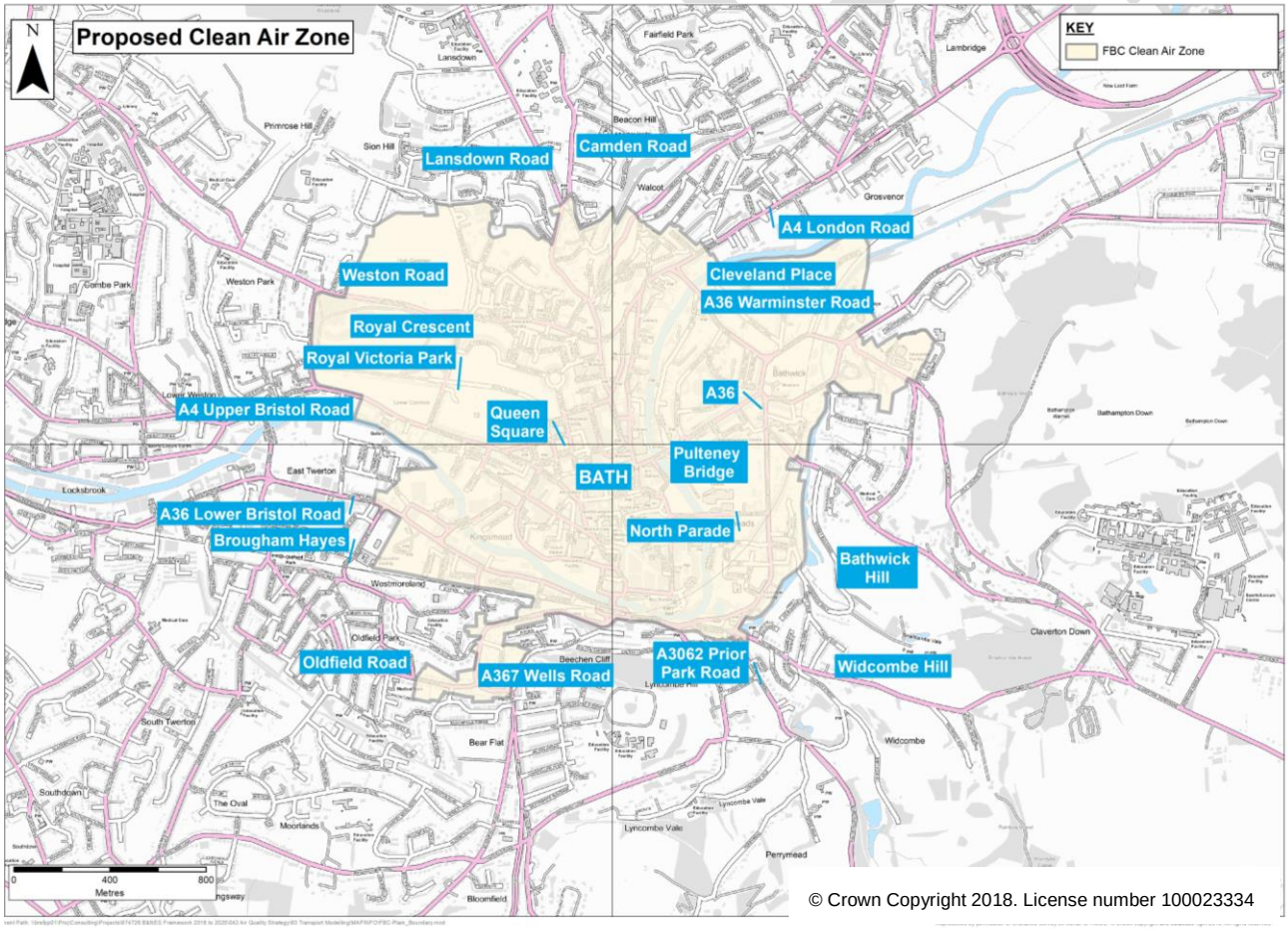

Figure 1.1. Clean Air Zone boundary

Table 1.1: Selected Mitigation Measures – CAZ C schemes

Measure	Group Impacted	Geographic Scope	Summary of Measure
Additional retrofit funding for registered, local Euro 3/4/5 buses	Local Bus Fleet	B&NES	This measure will be used to mitigate the air quality impact from the further use of Euro-5 and older diesel buses in B&NES. It will be in the form of a grant, provided through the CAF, which a local bus company can use to retrofit or repower on of its Euro-5, or older, buses.
Financial support for replacing pre-Euro 6 diesel and pre-Euro 4 petrol non-compliant vehicles with compliant ones	HGV/LGV Fleets Bus/Coach Fleets Hackney Carriages Private Hire Vehicles	B&NES and Surrounding Authorities	This measure aims to provide interest-free finance, to reduce the financial burden of the transition of LGV, HGV, coach, bus and taxi/PHV fleets to compliant vehicles. This funding is technology neutral and can be used towards the purchase or lease costs of a new or secondhand compliant vehicle. The is also expected to be sufficient to cover the cost of a retrofit installation, or the purchase of a low emission vehicle and supporting charging infrastructure. An alternative option is a grant towards replacement for a compliant vehicle. This is thought to be more useful for privately-owned LGVs, taxi/PHVs and some HGVs, for example those used by sole-traders, and those belonging to charitable organisations.
Provide support and facilities for alternative delivery and servicing options for businesses	Businesses within the CAZ	Bath City Centre	B&NES is proposing introducing a scheme where businesses within Bath City Centre are able to apply for a Delivery and Servicing Plan (DSP). A DSP is an appraisal tool which enables assessment of a businesses' environmental, economic and operational practices related to freight and servicing activities; and helps to identify opportunities available to achieve improvements. It has been proposed in the absence of infrastructure, such as consolidation services, which can help businesses to avoid the charges incurred by entering into a CAZ. In order to make this as successful as possible, procurement of delivery vehicles/bikes, facilities to support these and storage containers around the city are proposed to build on existing last mile delivery schemes within B&NES. The existing car/van club network would be extended to provide an access to electric vans as a further alternative for larger loads. Bath is also proposing to undertake a pilot for an updated approach to freight within their own local infrastructure strategy, to be delivered by the end of 2020.
Provide a sustainable travel and transport team to facilitate the use of the mitigation schemes by the impacted groups	All	B&NES and Surrounding Authorities	As part of this measure B&NES will engage with travel advisors to create a targeted promotional campaign to ensure that all people eligible for the scheme are notified. They will also be available to provide advice to those wishing to take up the scheme on the options available to them.

1.2 Report Structure

Within this context, the report is structured as follows:

- Chapter 2 presents the assessment methodology, drawing on JAQU's Options Appraisal Guidance, which in turn is informed by DfT's WebTAG unit A4-2 'Distributional Impact Appraisal'.
- Chapter 3 presents the screening stage of assessment, providing additional detail on the types of socio-economic groups and impact variables considered in the assessment.
- Chapter 4 outlines the socio-economic context in B&NES, which establishes the prevailing conditions within which socio-economic groupings and potential impacts can be assessed.
- Chapter 5 presents the distributional and equalities impact analysis
- Chapter 6 summarises the key findings of the assessment
- Chapter 7 summarises the proposed measures for mitigation.

2. Methodology

2.1 Approach

In accordance with JAQU's Options Appraisal Guidance and WebTAG unit A4-2, a three-step approach has been used for the distributional impact appraisal. These three steps involve:

- Step One – Screening: At this stage, the variety of impacts that the policy might have is considered and particular impacts are prioritised for further analysis so that only the most relevant indicators for the scheme are appraised to ensure proportionality.
- Step Two – Assessment: At this stage, information is collected on the geographical area likely to be affected by the policy and how different social and business groups are distributed within that geographical area.
- Step Three – Appraisal: At this stage, an assessment is made as to the extent of the impact of the policy on the social groups identified.

Many different methods including quantitative analysis of statistics and modelling outputs, spatial analysis of geographical datasets and qualitative appraisal drawing on available information and research is acceptable according to TAG guidance. JAQU guidance however, notes that 'light touch' appraisal is sufficient on some occasions, rather than the detailed guidance of TAG A4-2. This report will determine the impacts likely to be associated with the CAZ and what analysis would be best suited to investigating these impacts, depending on the data available and how sensitive the issue is to the CAZ project in Bath.

2.2 Identification of Study Area

A layered approach to identifying the study area for the assessment was adopted. This reflects the potential variation in spatial extent of any impacts that materialise. An immediate study area was defined as B&NES local authority area. A wider study area was also defined, covering B&NES and the other administrative areas forming the West of England sub-region (i.e. Bristol, South Gloucestershire and North Somerset). Further, Wiltshire was also included within the wider study area, due to its adjacent geographical position to B&NES and the high level of traffic flows between the two administrative areas[4]. The two study areas are outlined in Figure 2.1. The analysis presented in this report uses the appropriate study area definition based on the socio-economic group and impact variable being considered.

2.3 Distributional Impact Assessment Criteria

In order to understand whether or not a particular group is being unduly disadvantaged by the proposed option, it is necessary to understand whether impacts are disproportionate. In order to investigate whether impacts are disproportionate, it is necessary to obtain an understanding of how impacts are occurring, whether they are acceptable or whether the option should be altered or mitigated. The following scale is used as a guide to determine the scale and extent of an impact.

Note that the assessment scoring outlined in Table 2.1 is undertaken relative to population sizes, comparing the proportion of net winners or losers in each socio-economic quintile to that socio-economic quintile's share of population in the study area. Therefore, a larger score (of "✓✓✓" or xxx") is indicative of impacts falling disproportionately on a particular quintile relative to that quintile's population share across the study area as a whole. So, if 20% of an impact falls on socio-economic quintile x, but socio-economic quintile x only form 10% of the study area population, a large assessment score will be recorded.

[4] Wiltshire represents the primary source of commuting inflows and the third most common destination of commuting outflows from B&NES, based on Census 2011 Journey to Work data

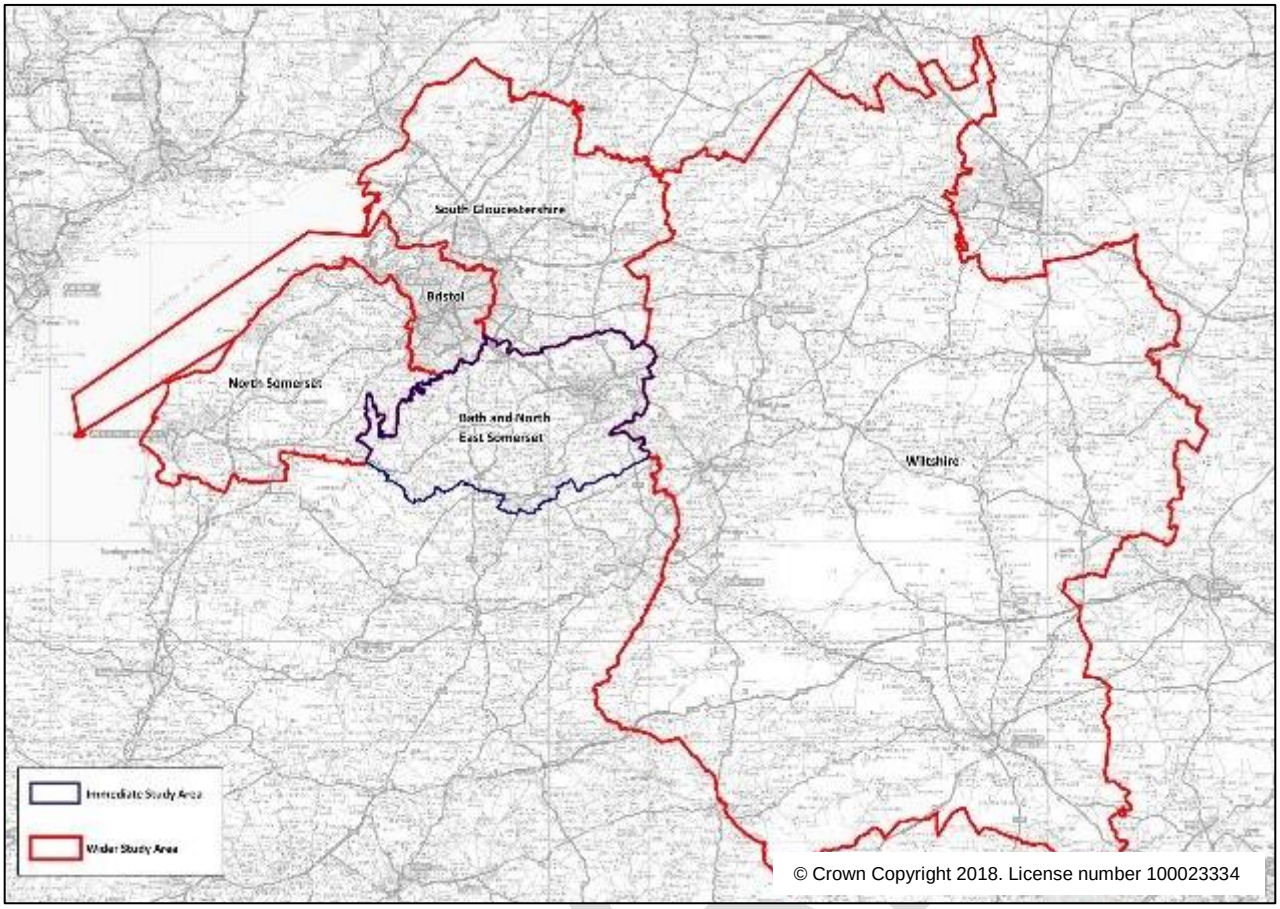

Figure 2.1. Study Area

Table 2.1 Distributional Impact Assessment Criteria

Assessment		Impact Description
✓✓✓	Large beneficial	Beneficial and the population impacted is significantly greater than the proportion of the group in the total population
✓✓	Moderate beneficial	Beneficial and the population impacted is broadly in line with the proportion of the group in the total population
✓	Slight beneficial	Beneficial and the population impacted is smaller than the proportion of the group in the total population
-	Neutral	There are no significant benefits or disbenefits experienced by the group for the specified impact
✘	Slight adverse	Adverse and the population impacted is smaller than the proportion of the population of the group in the total population
✘✘	Moderate adverse	Adverse and the population impacted is broadly in line with the proportion of the population of the group in the total population
✘✘✘	Large adverse	Adverse and the population impacted is significantly greater than the proportion of the group in the total population

2.4 Appraisal Methodology

In line with JAQU's Options Appraisal Guidance, three core distributional impact variables have been identified as most relevant to the Bath CAP proposals; these are:

- Air Quality: The primary objective and critical success factor of the scheme is to improve air quality by ensuring compliance with NO_2 limit values and objectives. Therefore, the differential impacts of changes in air quality spatially and across socio-economic groups is an essential element of analysis.
- Accessibility: The charging CAZ element of the scheme could induce changes in travel patterns and behaviours by imposing a charge on non-compliant vehicles. As such, it is necessary to establish whether changes in accessibility will disproportionately affect the socio-economic groups of interest.
- Affordability: The charging CAZ element of the scheme will impose direct costs on local people and businesses who use non-compliant vehicles. As such, it is necessary to establish whether changes in accessibility will disproportionately affect the socio-economic groups of interest.

In addition, User Benefits have been quantitatively assessed, and a light touch qualitative assessment of impacts including noise, accidents, and severance included.

2.4.1 Method of Assessing Air Quality

Within the FBC the economic analysis of air quality impacts has been undertaken following the Damage Cost Approach. This approach applies damage costs to changes in emissions data to monetise the impact of air quality improvements. For consistency, the distributional analysis pivots from the same approach, utilising changes in emissions data (as forecast at monitoring locations across the study area) to determine where air quality impacts would be most significant. This information was then overlaid on the spatial distribution of socio-economic groups to determine the variance in air quality impacts.

2.4.2 Method of Assessing Accessibility

JAQU's Options Appraisal Guidance states that accessibility Social and Distributional Impacts (SDI), in terms of public transport accessibility, must be assessed. However, the charging CAZ element of the preferred option is not envisaged to have a significant impact on public transport accessibility, as funding for retrofit of buses and other mitigation measures should mean existing bus services are unaffected.

There are, however, likely to be smaller scale impacts on public transport accessibility as a result of a reduction in traffic volumes within the CAZ area and impacts of the supporting abatement measures. As these impacts are relatively minor, it is not proportionate to undertake a full assessment. As such, a discussion is included of the potential social and distributional impacts in terms of public transport accessibility.

2.4.3 Method of Assessing Affordability and User Benefits

The detailed TUBA outputs relating to the journey time savings and vehicle operating costs, were distributed across LSOAs to identify the share of benefits across different income groups. The total benefits in this report differ to the total user benefits reported in the Outline Business Case because the Social and Distributional Impact analysis is based on a representative subset of time periods and trip purposes.

3. Screening

3.1 Screening for Distributional Impacts

JAQU's Options Appraisal Guidance (2017) states that as a minimum, the following impacts should be investigated:

- Air Quality: The primary objective and critical success factor of the scheme is to improve air quality by ensuring compliance with NO_2 limit values and objectives. Therefore, the differential impacts of changes in air quality spatially and across socio-economic groups is an essential element of analysis.
- Accessibility: The charging CAZ element of the scheme is not envisaged to have a significant impact on public transport accessibility, as funding for retrofit of buses and other measures should mean existing bus services are unaffected. However, a reduction in traffic volumes within the CAZ area and supporting non-charging measures such as bus priority measures which are likely to have public transport accessibility benefits.
- Affordability: The scheme options will impose direct costs on local people and businesses that use non-compliant vehicles. As such, it is necessary to establish whether changes in accessibility will disproportionately affect the socio-economic groups of interest.

In addition to the minimum impacts above, the following impacts have also been investigated:

- Other impacts on businesses: As well as the affordability impacts, businesses are affected in a number of other ways, including potential impacts on footfall in central Bath, increased charges for deliveries, and labour market impacts.
- User benefits: While not the primary purpose of the scheme options, the scheme options result in changes in journey times and associated vehicle operating costs in the area. An assessment of the distributional impacts of these impacts for different income groups is provided.
- Other impacts: The scheme options are also likely to result in noise, accident, and severance[5] impacts because of traffic flow changes.

The scheme options are not envisaged to have any significant impacts on security, such as pedestrian access, lighting, landscaping, formal or informal surveillance. As such, security is not included in the assessment.

[5] In WebTAG guidance, the word "severance" is used to describe when transport infrastructure or motorised traffic acts as a barrier to the movement of pedestrians.

3.2 Relevant Grouping Variables

The Guidance also sets out the interaction between impact variables and socio-economic groups in impact matrices. The matrices provide an indication of how the impact variables and socio-economic groups can be considered and outlines the basis for understanding which impacts should be appraised for each socio-economic group. An impacts matrix has been completed in Table 3.1.

Table 3.1: Impact categories in scope for each social or business group

Dataset / social group	Core Assessment			Additional Assessment				Justification for screening
	Air Quality	Accessibility	Affordability	User benefits	Noise	Accidents	Severance	
Income distribution	✓	Q	✓	✓	Q			The effects of diverted traffic and a higher concentration of higher polluting vehicles in low-income neighbourhoods may also impose localised air quality issues. Lower income groups may also be more impacted by the CAZ charges.
Children (aged <16)	✓	Q			Q	Q	Q	Children and young people may be more vulnerable to the health impacts of air pollution[6].
Older people (aged 70+)	✓	Q			Q	Q	Q	Further, there is evidence to suggest that the elderly are disproportionately affected by the public health impacts of air pollution[7].
Disabled		Q					Q	Disabled people are likely to have concerns over access to a range of key amenities (e.g. health facilities), so any change in accessibility could hinder their ability to reach such facilities.
Black and Minority Ethnic		Q						Ethnic minority groups may be less likely to have access to a car and are therefore more reliant on public transport. Any change in accessibility associated with the proposed scheme could further reduce their connectivity.
Businesses – SMEs			✓					SMEs may struggle to absorb the direct costs (e.g. CAZ charge) associated with implementing the scheme.
Businesses – LGVs/HGVs			✓					LGVs and HGVs represent a significant number of business trips. Owners of non-compliant LGVs and HGVs may struggle to absorb the direct costs (e.g. CAZ charge) associated with implementing the scheme.
Businesses – Taxis			✓					Taxis may struggle to absorb the direct costs (e.g. CAZ charge) associated with implementing the scheme.

Key: ✓ = Full quantitative assessment, Q = Light touch qualitative assessment only

[6] World Health Organization (2013) *Review of evidence on health aspects of air pollution – REVIHAAP Project: final technical report.* http://www.euro.who.int/en/health-topics/environment-and-health/air-quality/publications/2013/review-of-evidence-on-health-aspects-of-air-pollution-revihaap-project-final-technical-report

[7] Simoni et al., Adverse effects of outdoor pollution in the elderly, Journal of Thoracic Disease, January 2015 (URL:https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4311079/)

4. Socio-economic Context

4.1 Social Groups and Demographics

4.1.1 Population Size

The population of B&NES was estimated at 188,678 in 2017 (ONS Population Estimates), an increase of more than 9% since 2007. Population density in B&NES varies between the city centre core and the rural hinterland. The city centre core, which is the proposed location of the charging CAZ element of the CAP, is the most densely populated region within the local authority area. Based on 2011 Census data, the three most densely populated lower super output areas (LSOAs) in B&NES are located within the city centre core and will be directly affected by implementation of the CAZ.

4.1.2 Low Income Households

The distribution of low-income groups in B&NES was determined through analysis of the 2015 Indices of Multiple Deprivation's (IMD) 'Income Domain'. The IMD ranks LSOA areas in terms of levels of income, measured by the number of people that are out-of-work and those that are in work but who have low earnings. The income domain therefore acts as a suitable proxy for defining low-income groups.

Figures 4.1 and 4.2 map the distribution of low income LSOAs, and by proxy, low income households across B&NES. Figure 4.1 provides the distribution of income deprivation within the wider study area. Figure 4.2 provides a comparison of national levels of income deprivation. Both figures demonstrate that generally, B&NES is a relatively affluent location in the context of the wider study area and nationally.

However, the analysis also shows that some neighbourhoods around the Twerton area and in central Bath are amongst the most income deprived areas both regionally and nationally. At a national level, communities in Twerton on the western edge of Bath City are within the 0%-20% quintile for income deprivation, indicating that these communities are amongst the 20% most income deprived nationally. Similarly, some locations in the city centre core feature within the 20%-40% quintile for income deprivation at a national level.

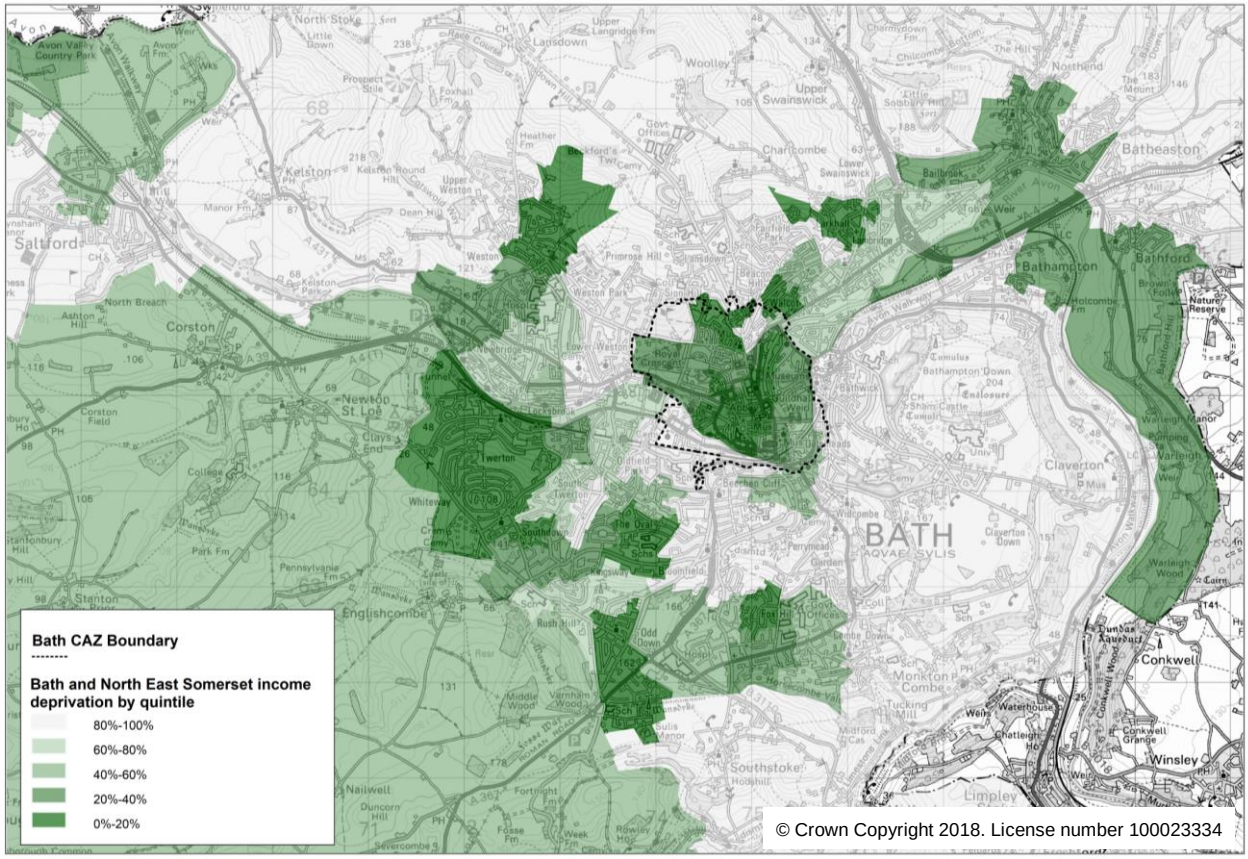

Figure 4.1: Concentration of Low-Income Households in B&NES Relative to Wider Study Area

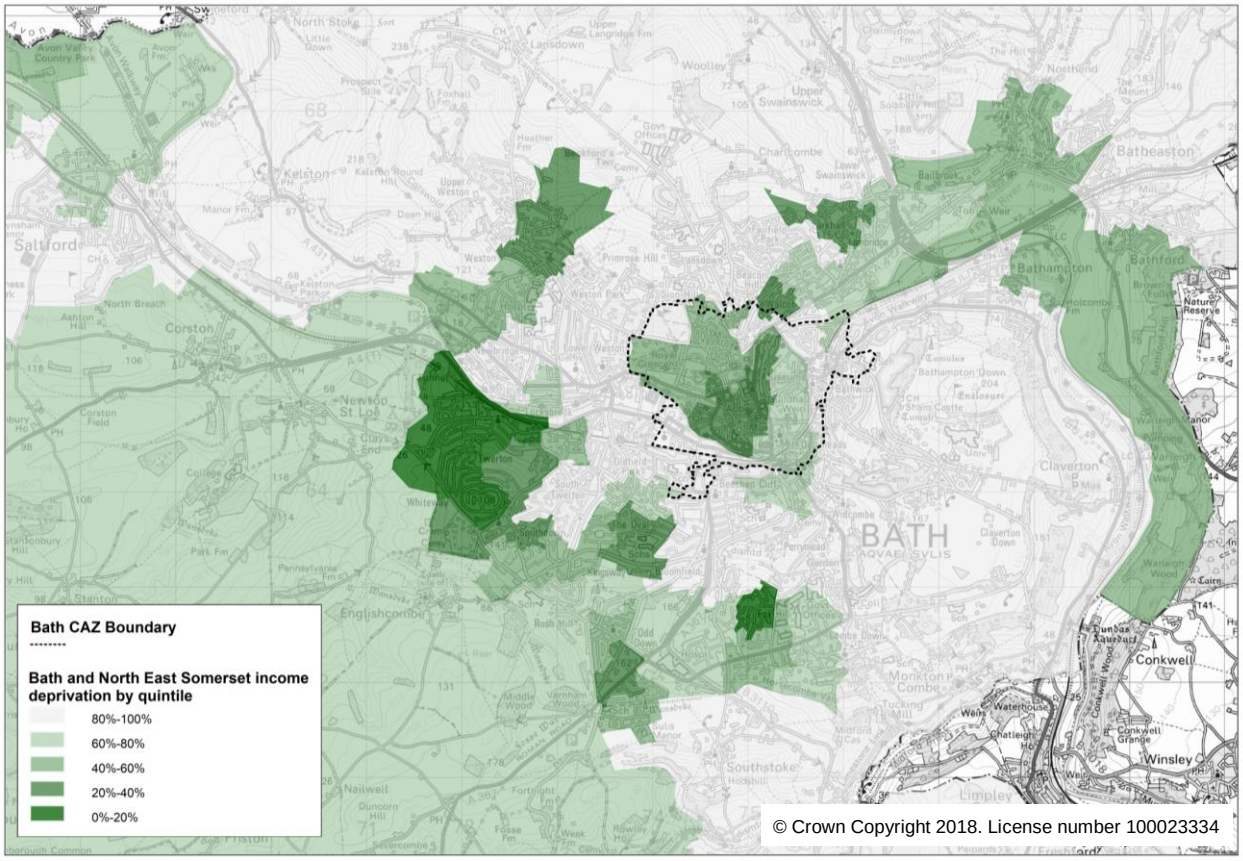

Figure 4.2: Concentration of Low-Income Households in B&NES Relative to National Benchmarks

4.1.3 Children

Figure 4.3 presents the distribution of children across B&NES and demonstrates that there are few areas with a high concentration of children in the immediate study area. Those that do exist are concentrated at the west and southern edges of Bath. The communities covered by the proposed CAZ itself have a low concentration of children. Nevertheless, some of the facilities used and relied on by children living on the outskirts of Bath City may be located in the city centre core or children may need to pass through the CAZ to access these facilities (locations of these facilities are considered later in this chapter).

4.1.4 Elderly People

Figure 4.4 presents the distribution of elderly people (aged over 65) across Bath and North East Somerset and shows that the immediate study area is home to a large elderly population. The elderly population is primarily concentrated on the peripheral areas of Bath City, outside of the proposed CAZ boundary. That said, there is a concentration of elderly people in a central LSOA that falls within the boundary. The elderly people living in these communities will be directly impacted by any change in air quality generated by the proposed scheme.

4.1.5 Disabled People

Figure 4.5 presents the distribution of disability deprivation across B&NES, measured using the 'illness and disability ratio' (IMD, 2015). This indicates the number of residents with work - limiting morbidity and disability, based on the number receiving benefits due to inability to work through ill health. The map indicates that communities with a high disability ratio are located throughout the immediate study area and are particularly concentrated in central Bath and on the western periphery.

4.1.6 Women

Figure 4.6 provides the distribution of females across B&NES and demonstrates that females are disproportionately located on the periphery of Bath City. Central areas are home to communities with a relatively low proportion of women. Females in the central and peripheral areas may be impacted by the scheme.

4.1.7 Ethnic Minorities

Figure 4.7 provides the distribution of ethnic minorities across B&NES and demonstrates that few people with ethnic minority backgrounds reside in the study area.

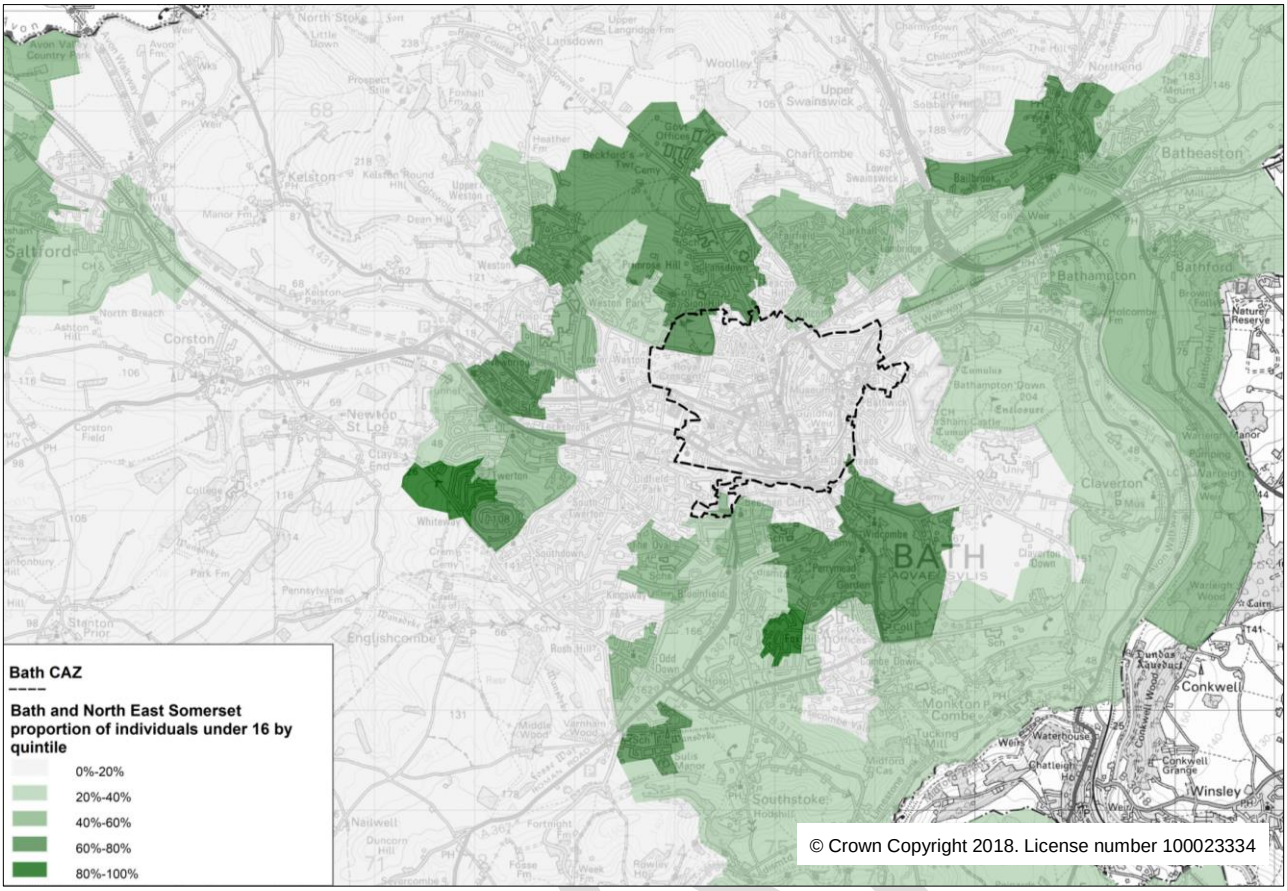

Figure 4.3: Concentration of Children in B&NES Relative to National Benchmarks

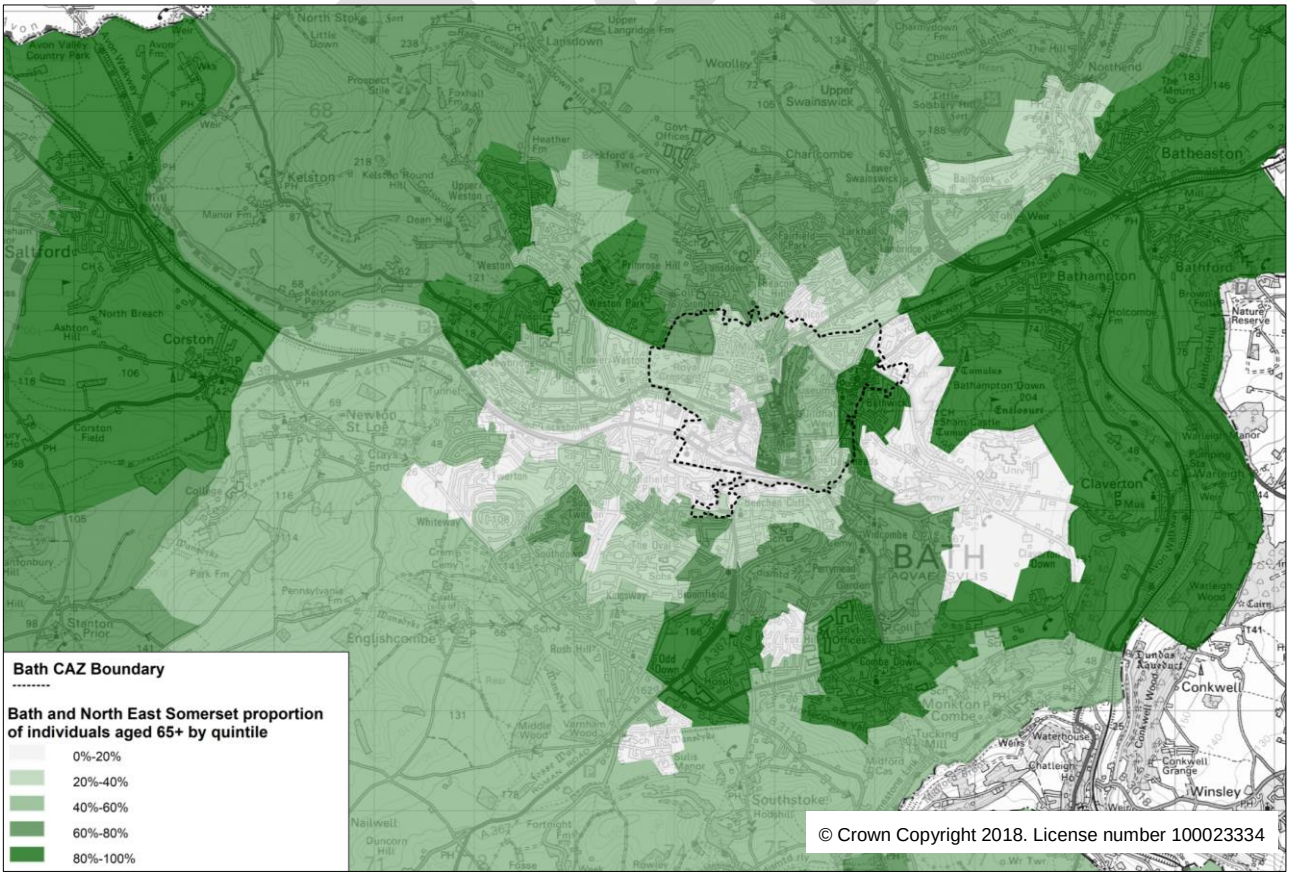

Figure 4.4: Concentration of Elderly People in B&NES Relative to National Benchmarks

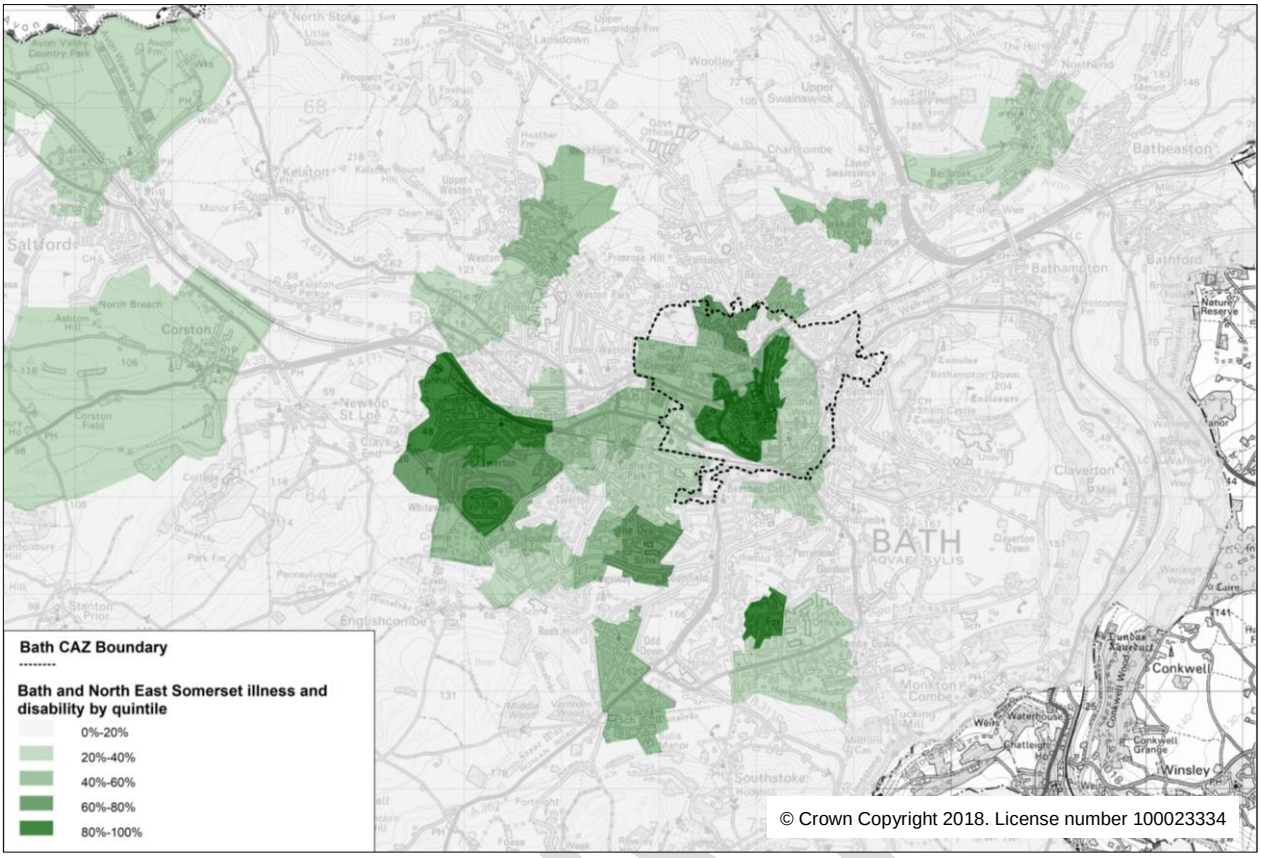

Figure 4.5: Concentration of Disabled People in B&NES Relative to National Benchmarks

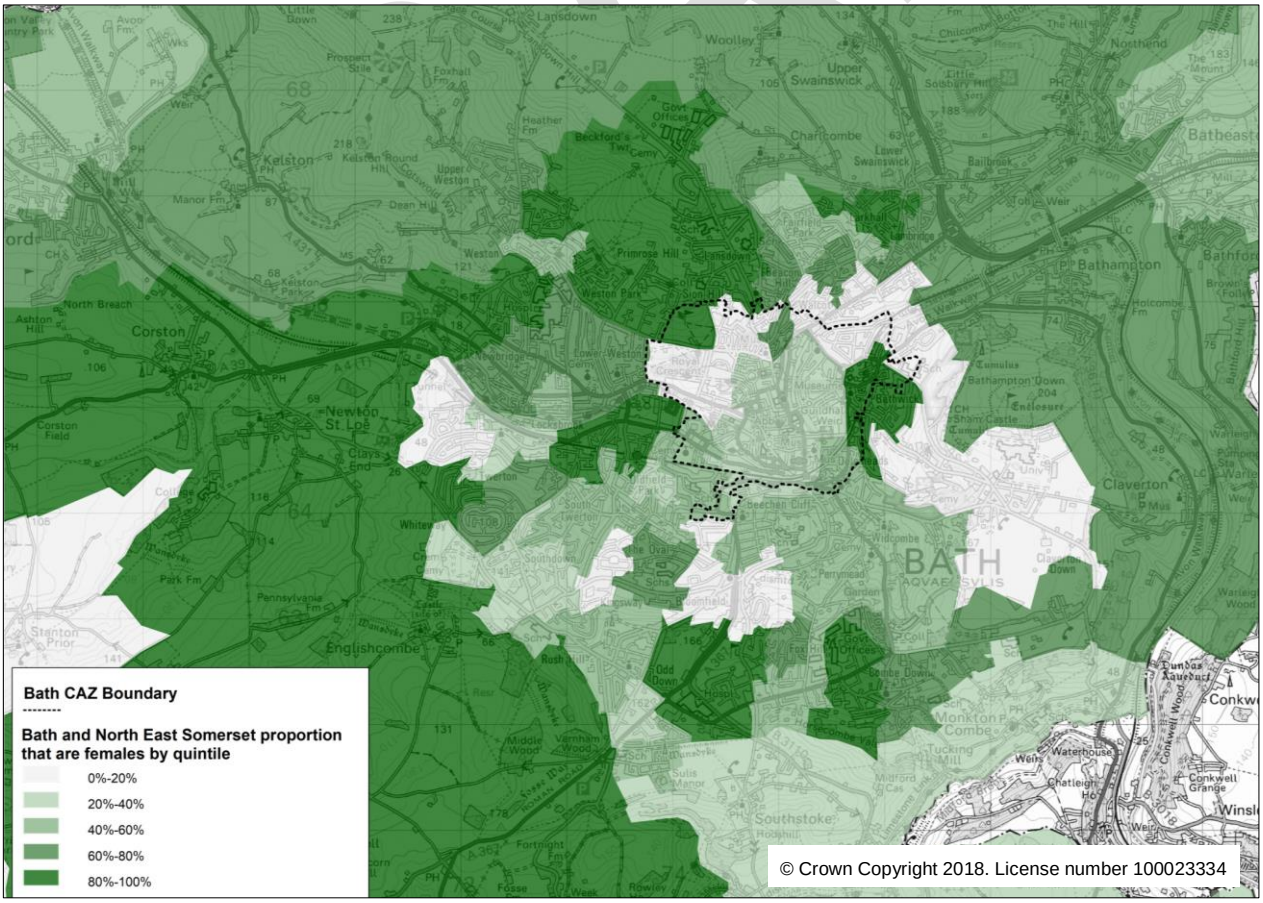

Figure 4.6: Concentration of Females in B&NES Relative to National Benchmarks

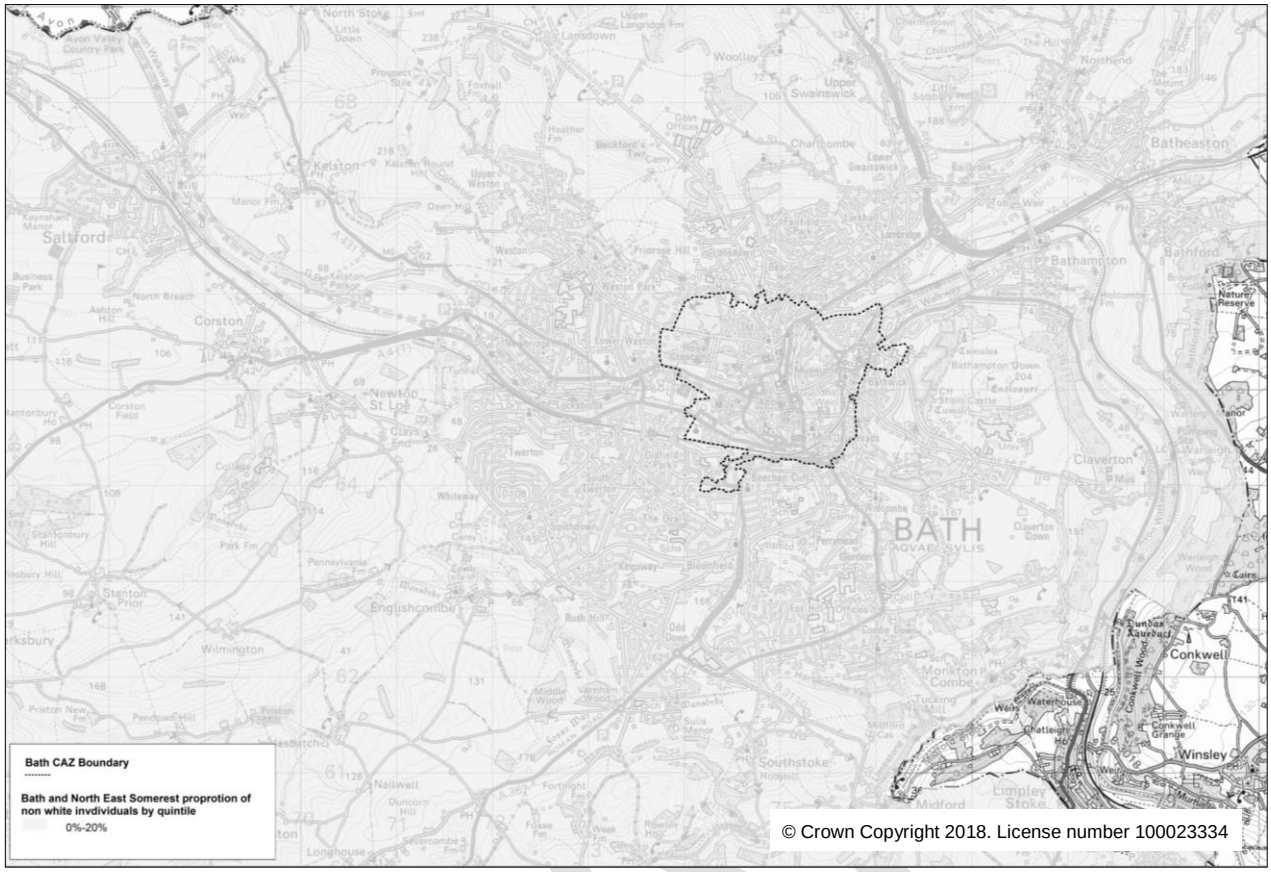

Figure 4.7: Concentration of Ethnic Minorities in B&NES Relative to National Benchmarks

4.2 Economy

4.2.1 Economic Output and Employment

Bath is a major economic hub within the West of England, acting as a key centre for employment and economic activity. The city contributed the majority of the economic output of £4.8 billion generated across the wider B&NES area in 2016. Further, B&NES was more productive than most benchmarks, achieving gross value added (GVA) per filled job of nearly £55,000, well above regional (<£51,000) and national (<£53,000) averages. B&NES also supports a buoyant tourist economy, driven by nearly 5 million day-trips and 1 million overnight trips by domestic and international visitors in 2014. In light of B&NES' strong economy, future economic growth and development in the region is earmarked for the city centre core as part of the Bath City Riverside Enterprise Area. This will further strengthen and build resilience in the B&NES economy.

The B&NES economy supported some 84,000 jobs in 2016. The sectoral split of employment in the area is presented in Table 4.1.

Table 4.1: Sectoral Profile of Employment (Business Register and Employment Survey [2016])

Employment Sectors	Employment Within CAZ	% of Employment within the CAZ	Employment within Bath (Excluding CAZ)	% of Employment within Bath (Excluding CAZ)
Financial and insurance activities	1,970	83%	405	17%
Human health and social work activities	2,355	16%	12,275	84%
Accommodation and food service activities	5,045	62%	3,155	38%
Wholesale and retail trade; repair of motor vehicles and motorcycles	5,820	44%	7,500	56%
Education	1,425	12%	10,920	88%
Public administration and defence; compulsory social security	670	34%	1,305	66%
Other service activities	1,105	55%	915	45%
Information and communication	2,865	69%	1,280	31%
Real estate activities	550	36%	970	64%
Professional, scientific and technical activities	3,115	48%	3,325	52%
Manufacturing	380	9%	3,950	91%
Construction	395	10%	3,590	90%
Transportation and storage	665	51%	640	49%
Arts, entertainment and recreation	970	54%	835	46%
Mining and quarrying	0	0%	30	100%
Electricity, gas, steam and air conditioning supply	0	0%	50	100%
Water supply; sewerage, waste management and remediation activities	30	2%	1,525	98%
Administrative and support service activities	1,135	30%	2,635	70%
Total	**28,495**	**34%**	**55,305**	**66%**

Table 4.1 demonstrates that around 35% of all employment in B&NES is concentrated within the city centre core that will be affected by implementation of the CAZ. The Preferred Option could affect business deliveries and everyday activities with commercial vehicles. High value service sector jobs such as those within finance and insurance and information and communication are predominantly located within the proposed CAZ boundary. Accommodation and food service activities account also account for a significant share of employment within the CAZ boundary.

4.2.2 Businesses

The B&NES economy consists of approximately 8,200 businesses. The vast majority of these businesses are micro businesses (approx. 7,220) or SMEs (approx. 7660). A sizeable proportion of the businesses (23% of micro businesses and 42% of SMEs) are located within MSOAs that are directly within the proposed CAZ boundary. Further, Figure 4.8 presents the distribution of SME and micro businesses across B&NES. The mapping demonstrates high concentrations of SME and micro businesses in central Bath, which will be directly affected by the introduction of the scheme.

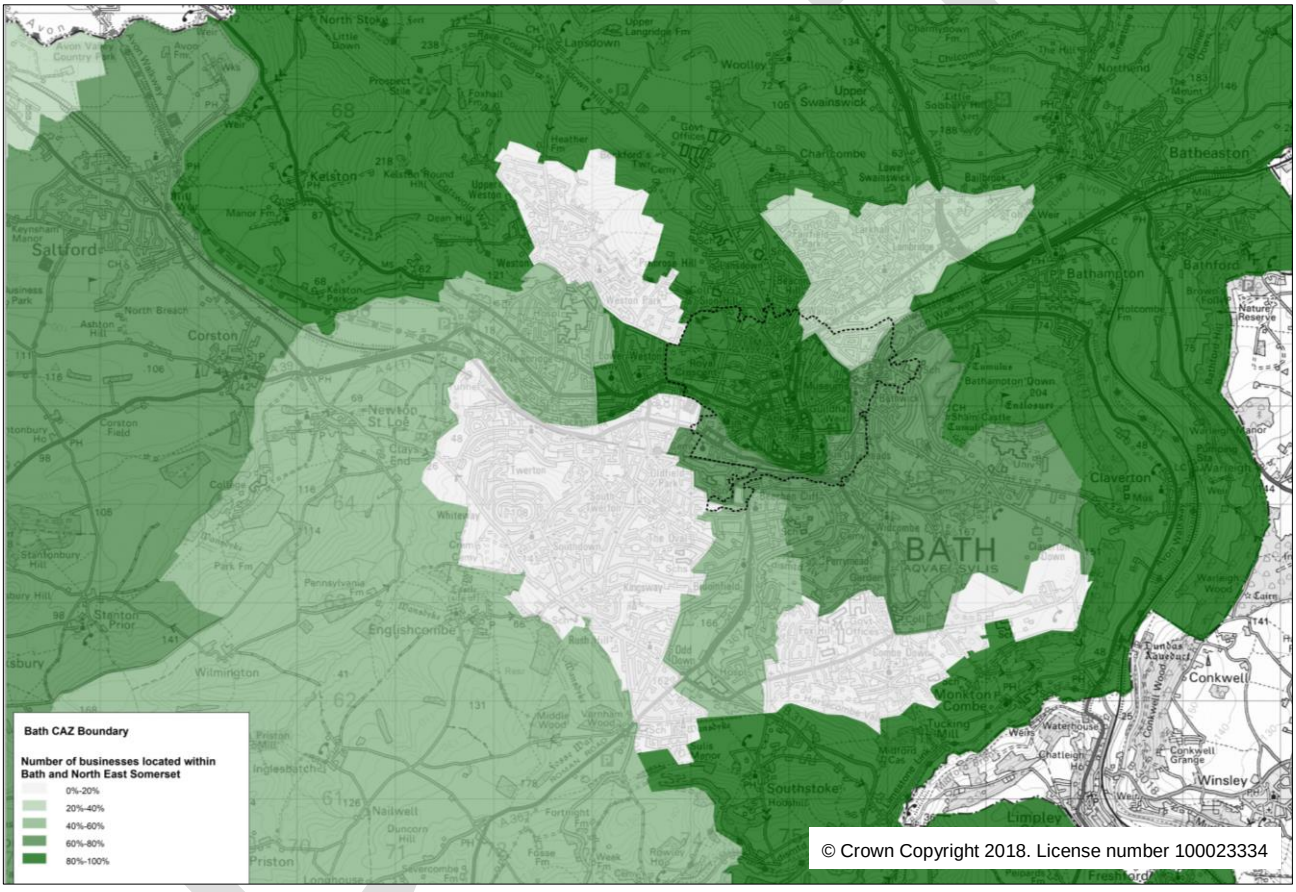

Figure 4.8: Concentration of Businesses in B&NES Relative to National Benchmarks

4.2.3 Transport

Based on Census 2011 data, the most common mode of travel to work in B&NES is via private car. More than 48,000 journeys to work are undertaken as car driver or passenger, equivalent to 57% of commuting journeys. For residents within the CAZ boundary itself, this proportion falls to 17%, reflecting around 2,600 commuting journeys. Further, 44% of all journeys to work in central Bath are undertaken by private car. It is also worth noting that the wider region provides significant numbers of employees that support the economy in Bath City Centre. In particular, Wiltshire (3,700 commuters), South Gloucestershire (1,400), Bristol (1,400), Mendip (1,000), North Somerset (275) and Swindon (120) all supply more than 100 employees to businesses in Central Bath each year. In most cases, and representing more than 5,000 commuting trips in total, car drivers represent the bulk of mode share for employees travelling into Central Bath from these neighbouring districts.

Given the CAZ Class C does not include charging cars, it is not anticipated that high proportions will be negatively impacted. However, the traffic management at Queen Square will increase journey times and therefore there is the potential for accessibility and affordability to be compromised by the implementation for both local residents and employees in the wider region that fall within Bath's labour supply catchment.

Businesses are heavily reliant on use of LGVs and HGVs for their day-to-day operations. However, a significant portion of the fleet for these vehicle classes is non-compliant and may face access and affordability issues following implementation of a CAZ C. Vehicle registration data for B&NES suggests more than 90% of the LGV fleet is non-compliant. Within the proposed CAZ boundary, this proportion is even higher at 93%. The analysis suggests that the majority of LGV drivers within the CAZ will be directly impacted. Moreover, the projected compliance in 2021 for LGVs entering the CAZ cordon is approximately 92% in the intervention case, based on outputs from the transport model. Figure 4.9 presents the distribution of LGVs across the immediate study area, indicating that there are LSOAs with a high concentration of LGVs in close proximity to the CAZ boundary.

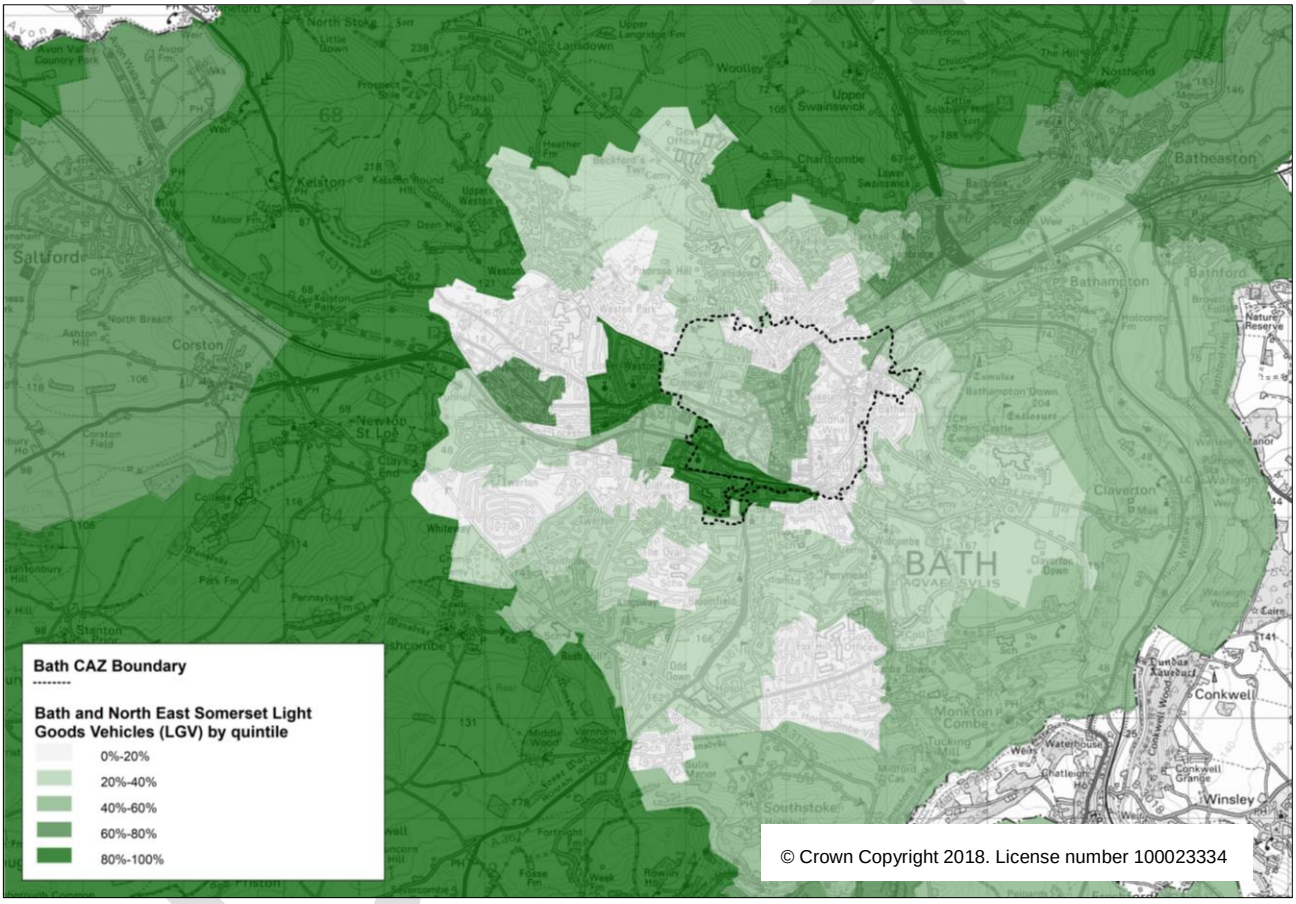

Figure 4.9: Concentration of LGVs in B&NES Relative to National Benchmarks

4.2.4 Traffic movements

Figures 4.10 and 4.11 show the total number and proportion of good vehicle (LGV and HGV) traffic within the study area. The figures are shown in terms of Annual Average Daily Traffic (AADT), which represents the number of vehicles on an average day. This highlights the significant goods vehicle flows on the A4, A36, and A367, with large numbers of good vehicles travelling through the east and south of CAZ charge boundary area.

Figures 4.12 and 4.13 show the forecast traffic flow changes as a result of the preferred scheme in the AM and PM respectively. The figures show a mix of traffic flow increases and decreases as a result of the CAZ charges and traffic management scheme at Queen Square.

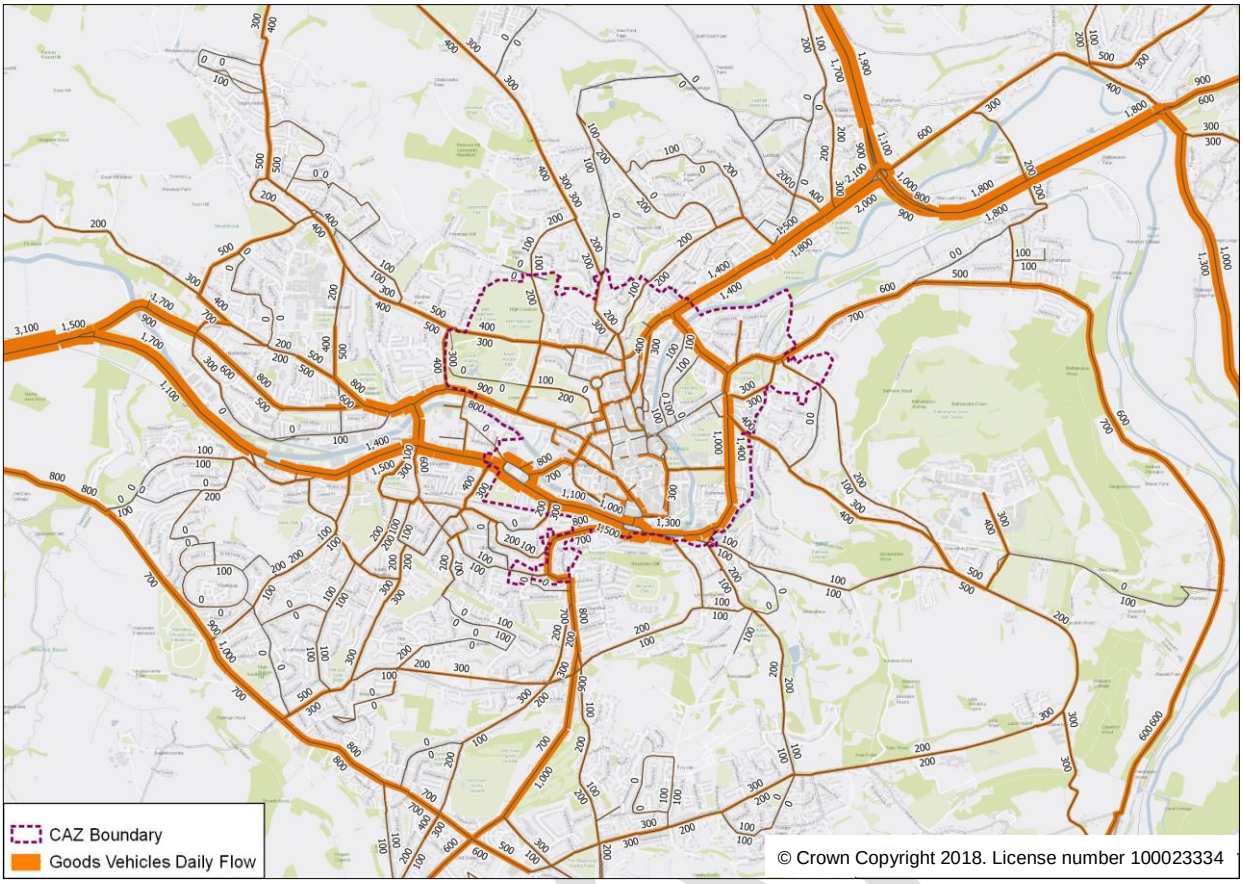

Figure 4.10: Traffic composition - LGV/HGV flows (AADT)

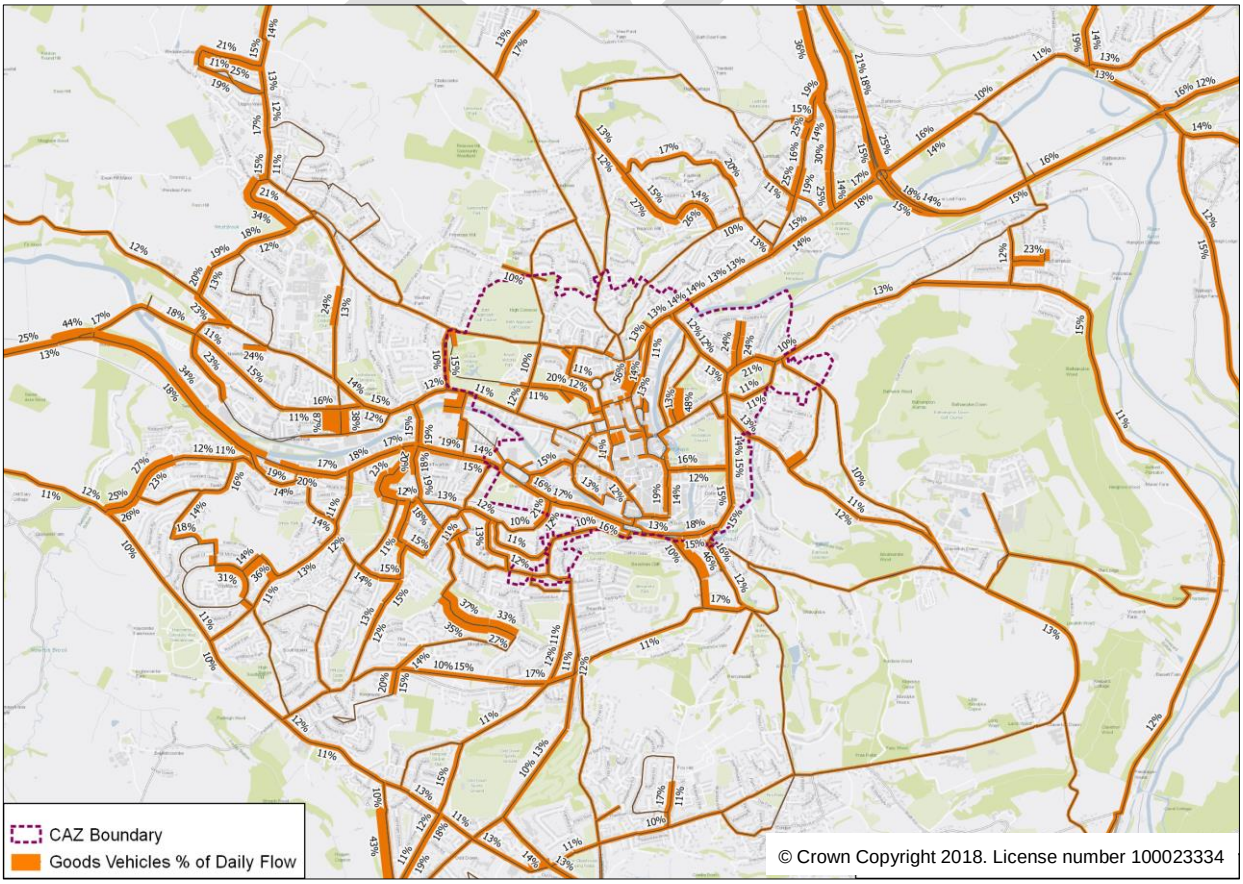

Figure 4.11: Traffic composition - LGV/HGV flows as a proportion of total motor traffic flows (AADT)

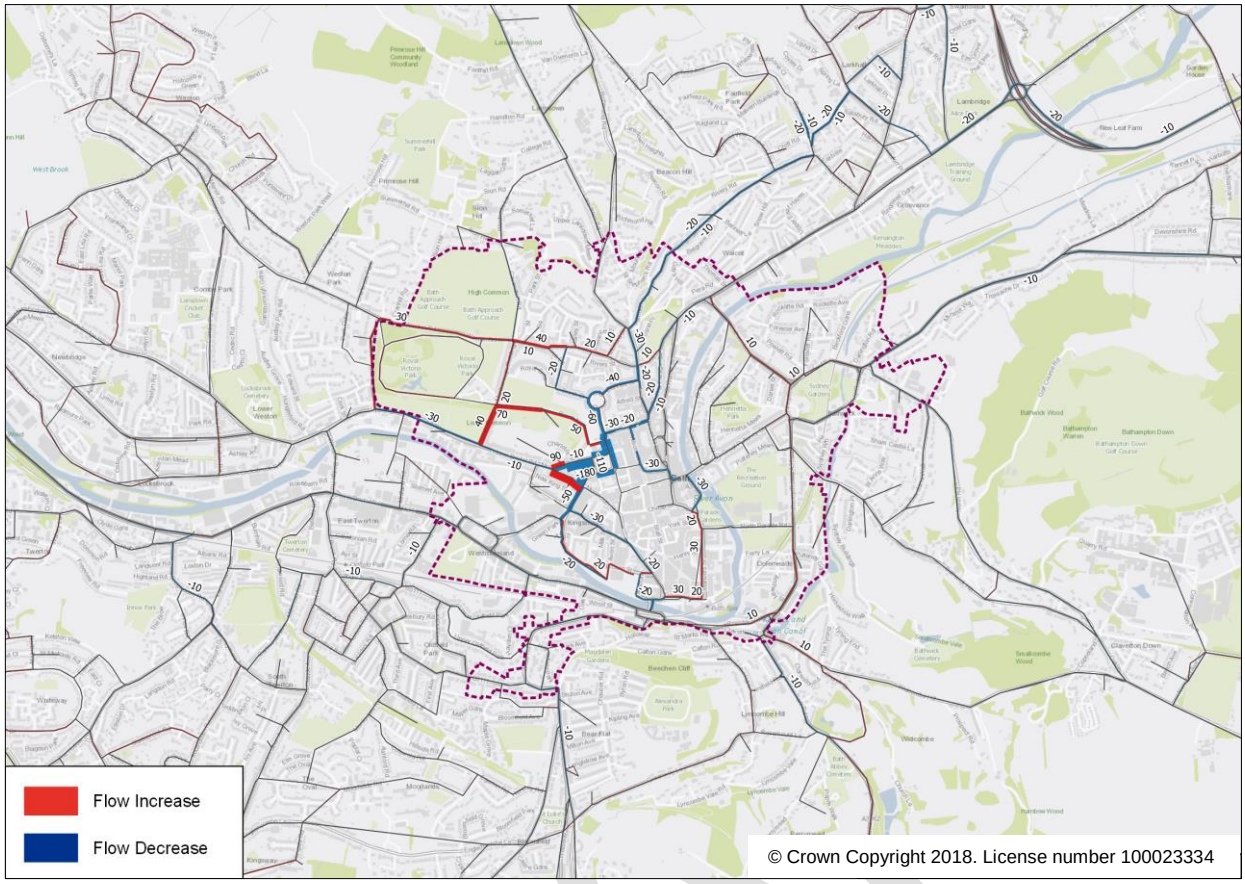

Figure 4.12: CAZ C difference in traffic flow (2021 AM)

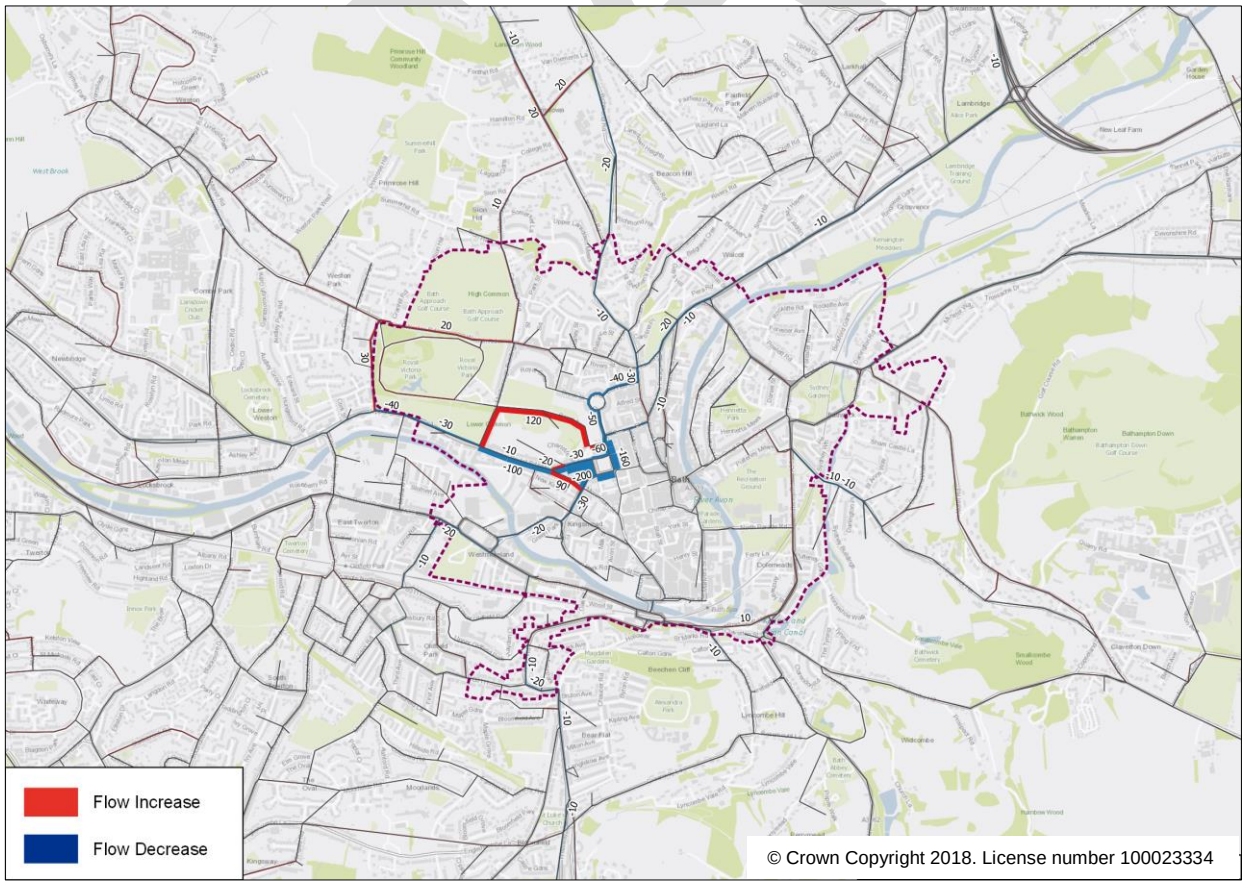

Figure 4.13: Difference in traffic flow (2021 PM)

4.3 Key Facilities and Social Infrastructure

Figure 4.14 highlights the distribution of amenities and social infrastructure within the immediate study area. The mapping demonstrates that there are schools, community centres, care homes and green space all located within the proposed CAZ boundary. Further, the retail and employment core is located within the proposed CAZ boundary. As such, all trips made using non-compliant vehicles to these facilities and amenities are likely to be marginally affected by imposition of the CAZ.

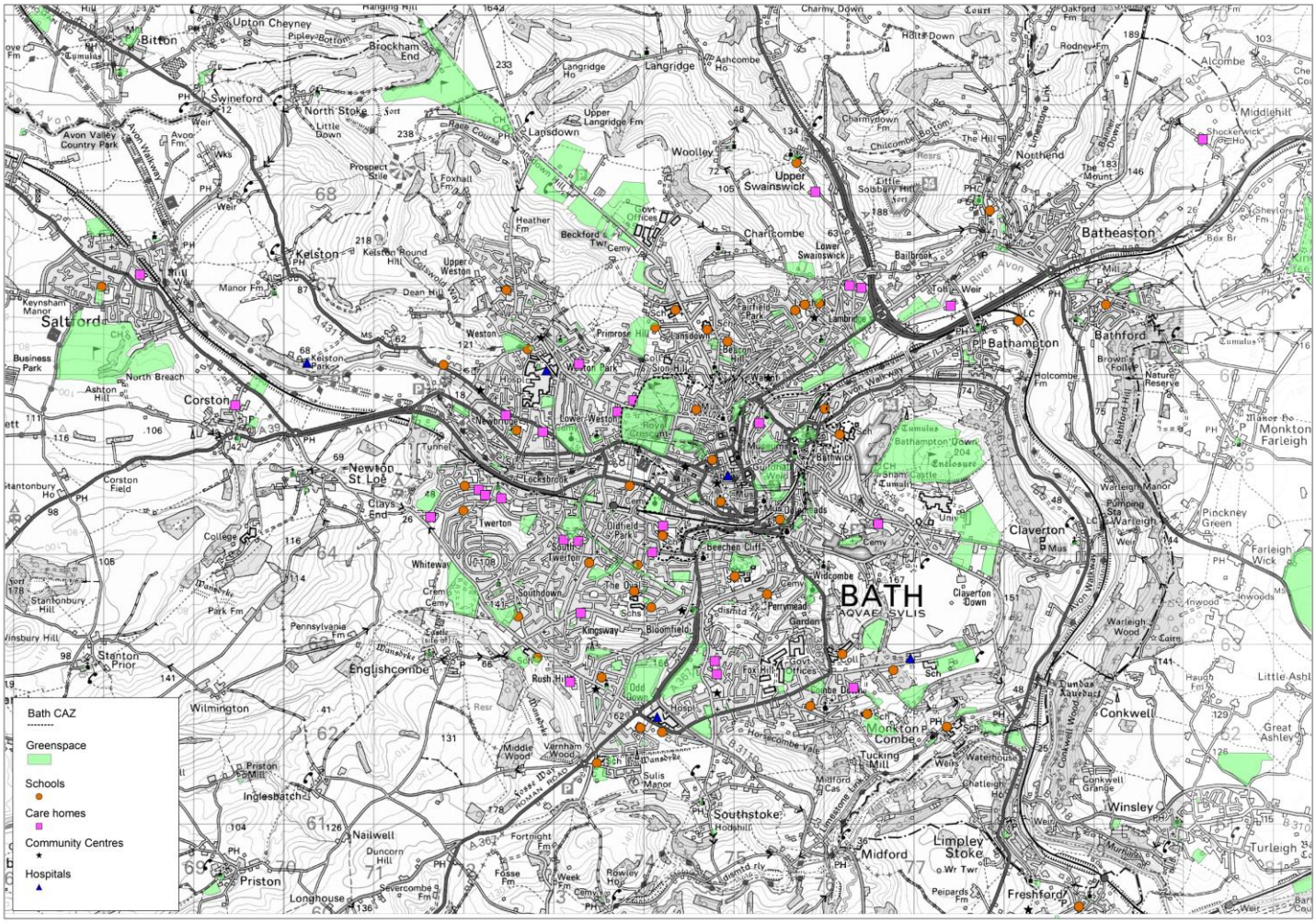

Figure 4.14: Key Social Infrastructure Within B&NES

5. Distributional and Equalities Impact Analysis

5.1 Air Quality

Figure 5.1 to 5.2 present the change in NO_2 concentrations forecast in 2021 at relevant receptors, following implementation of the Bath CAP options.

The figures indicate that NO_2 concentrations are predicted to remain unchanged or fall in response to the CAP, with the exception of Whiteway Road and Rush Hill where NO_2 concentrations marginally increase. Compliance is achieved in all locations, with further details available in FBC-11 'AQ3 Air Quality Modelling Report' within Appendix D of the FBC. The largest reduction in NO_2 concentration is forecast along the key arterial routes into Central Bath (i.e. A367, Wells Road, Bathwick Hill and Upper Bristol Road) and within the central area itself (specifically the Paragon). Hence, the CAP is forecast to contribute to positive impacts within Bath from an air quality perspective, and these are likely to be felt most strongly in those communities that lie alongside the key arterial routes and within central Bath

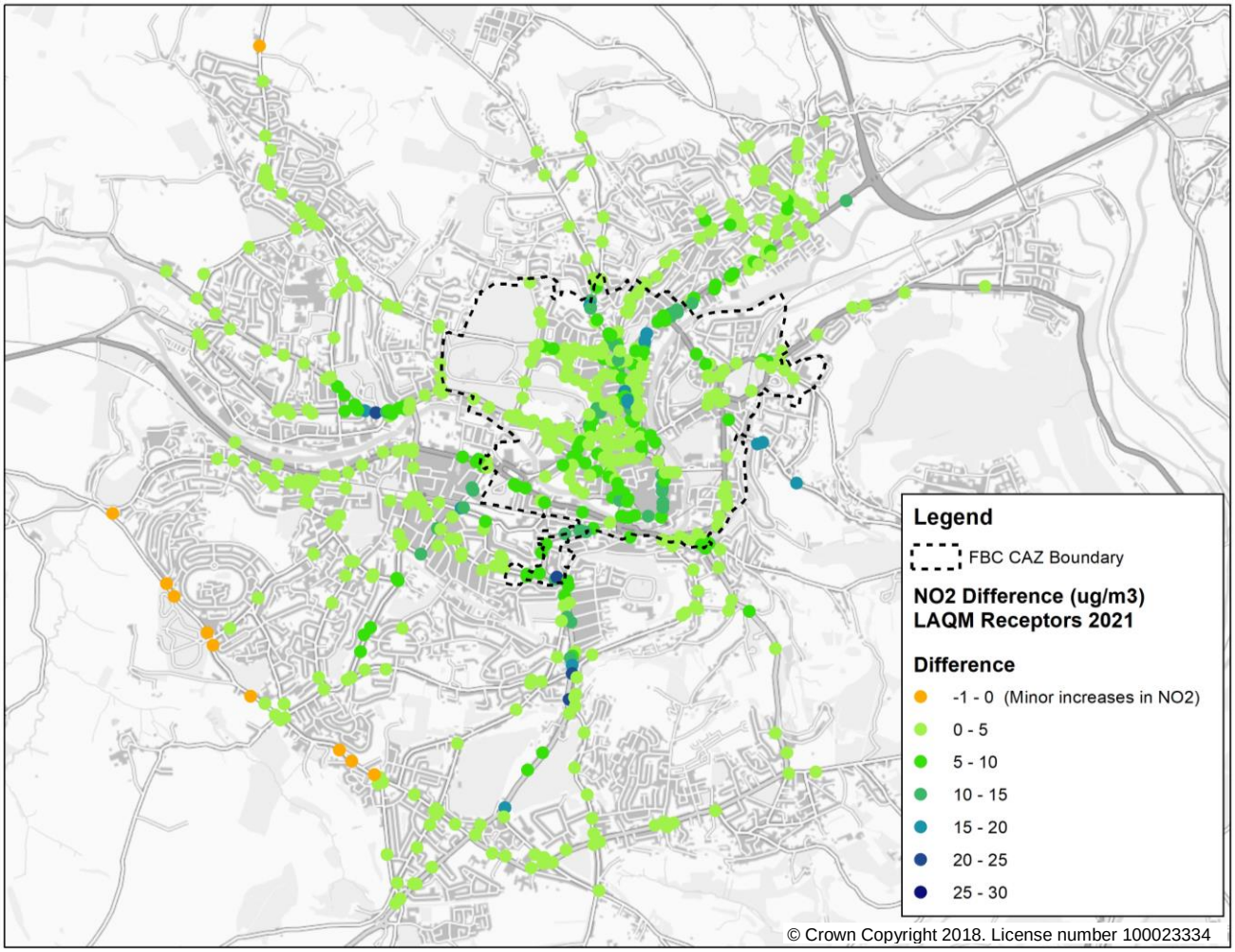

Figure 5.1: Reduction in NO_2 Concentrations based on LAQM Receptors (2021)

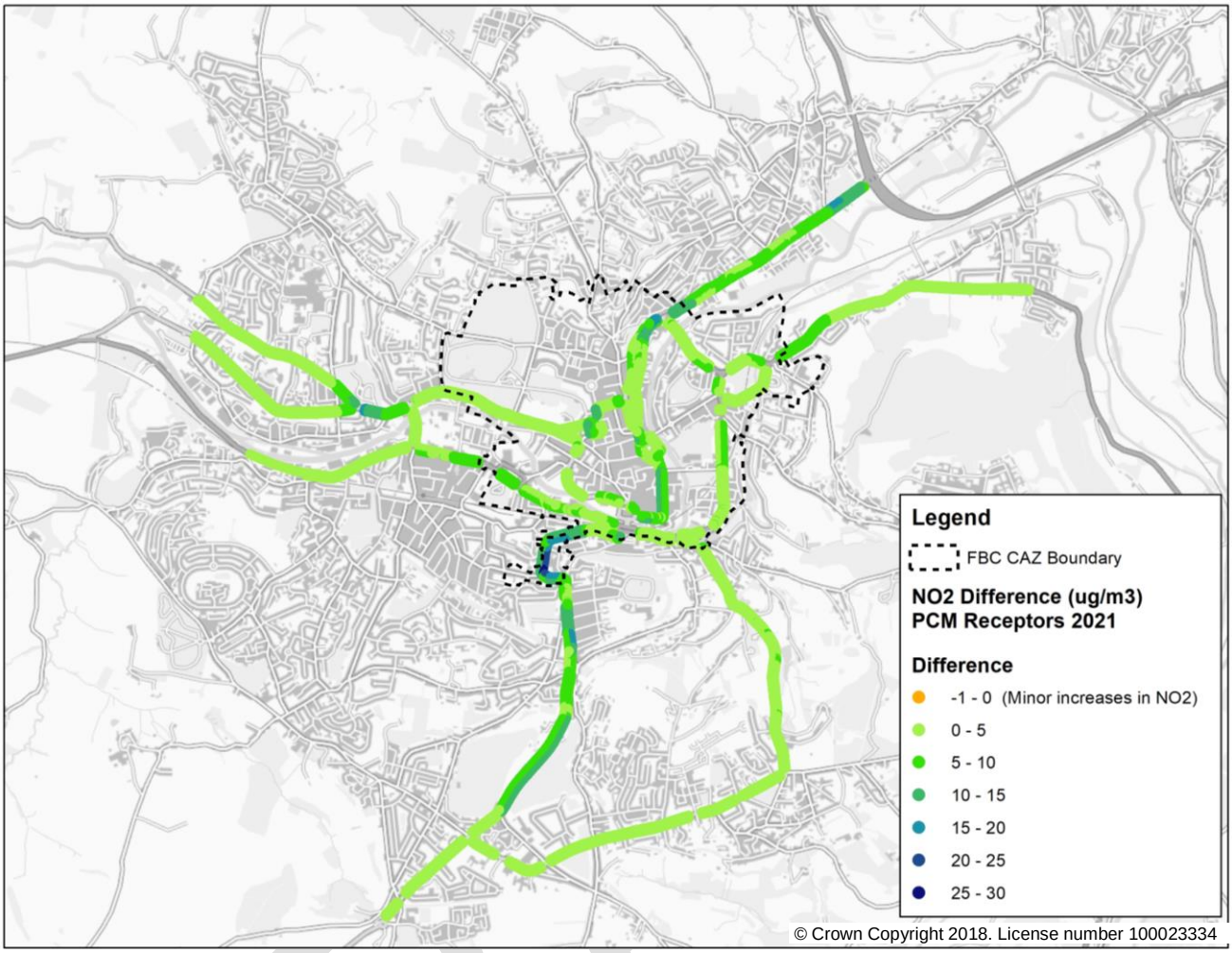

Figure 5.2: Reduction in NO2 Concentrations based on PCM Receptors (2021)

Figures 4.1 and 4.2 indicate that the most acute concentrations of low-income households are located in Twerton on the western outskirts of the city. Figure 5.1 demonstrate that the receptors in these communities report a mixed results in NO_2 concentrations. To the north and east of these communities, receptors report a reduction in NO_2 concentrations between 0 and 5 micrograms. Small increases in traffic flow on Whiteway Road, due to the additional traffic management measures in Queen Square causing diversions to other routes, results in a small net increase in NO_2 concentrations for one LSOAs in vicinity of Twerton. A further one LSOA to the north west of Bath, along Lansdown Road, results in a small net increase in NO_2 concentrations.

Pockets of income deprivation were identified from Figures 4.1 and 4.2 in central Bath too (albeit less severe than on the western periphery). Figures 5.1 and 5.2 demonstrate a more significant reduction in NO_2 concentrations in these low-income communities, contributing to a notable beneficial air quality impact in these communities.

In light of this appraisal, Table 5.1 presents the appraisal matrix for the combination of low-income household grouping and air quality impact variable. It demonstrates that beneficial impacts accrue across low-income groups, with greater proportions of low-income households (i.e. those in areas that are most income deprived) benefitting relative to this group's share of the overall population in B&NES.

Table 5.1: Air Quality Impacts on Low Income Households

		Income Deprivation Quintiles					Total
		0-20% (most deprived)	20-40%	40-60%	60-80%	80-100% (least deprived)	
A	No. of people with improved air quality	6,101	14,422	14,095	20,038	33,899	88,555
B	No. of people with reduced air quality	1,552	0	0	0	1,330	2,882
C	No. of net winners [A - B]	4,549	14,422	14,095	20,038	32,569	85,673
D	Total no. of winners across all groups [Sum of C]						87,003
E	Net winners in each areas as % of total [C/D]	5%	16%	16%	23%	37%	100%
F	Share of population in B&NES	4%	13%	21%	25%	37%	100%
G	Assessment for B&NES	✓✓	✓✓	✓	✓✓	✓✓	

5.1.1 Children

Figure 4.3 demonstrates that the distribution of children and young people in B&NES is similar to the distribution of low-income households, with specific concentrations on the western and southern periphery of the built-up area. As a result, cross-referencing this distribution with the change in air quality reveals similar distributional impacts as reported for low-income households, i.e. overall air quality is expected to improve for children in the immediate study area, with more significant improvements recorded in central areas. For the preferred option, the small increases in traffic flow on Whiteway Road, due to the additional traffic management measures in Queen Square causing traffic to divert to alternative routes, results in a small net increase in NO_2 concentrations for one LSOA with a high concentration of children and one LSOA with a low concentration of children.

Table 5.2 presents the appraisal matrix for the children grouping and air quality impact variable combination. It demonstrates that beneficial impacts accrue for all children in built-up Bath, with a significantly greater proportion of children benefitting in areas where LSOAs contain fewest children.

Table 5.2: Air Quality Impacts on Children

		Children Quintiles					Total
		0-20% (fewest children)	20-40%	40-60%	60-80%	80-100% (most children)	
A	No. of children with improved air quality	4,339	2,883	2,695	1,932	1,689	12,208
B	No. of children with reduced air quality	193	0	0	0	410	1,710
C	No. of net winners [A - B]	1,709	2,883	2,695	1,932	1,279	10,498
D	Total no. of winners across all groups [Sum of C]						10,498
E	Net winners in each areas as % of total [C/D]	32%	22%	21%	15%	10%	100%
F	Share of population in B&NES	19%	20%	26%	15%	19%	100%
G	Assessment for B&NES	✓✓✓	✓✓	✓	✓✓	✓	

5.1.2 Elderly Residents

Figure 4.4 demonstrates that the distribution of elderly residents in B&NES differs from the distribution of low-income households and children, with a concentration of communities with a high proportion of elderly residents on the northern boundary of the urban area plus some pockets in central Bath, within the proposed CAZ boundary.

Those communities with a high proportion of elderly residents in central Bath will benefit from the most significant improvements in air quality, as air quality is expected to improve to the greatest extent in the city centre core.

Table 5.3 presents the appraisal matrix for the elderly resident grouping and air quality impact variable combination. It demonstrates that beneficial impacts accrue for all elderly residents in built-up Bath, with significantly greater proportion of elderly residents benefitting in areas where there is a smaller proportion of elderly residents.

Table 5.3: Air Quality Impacts on the Elderly

		Elderly Resident Quintiles					
		0-20% (fewest elderly residents)	20-40%	40-60%	60-80%	80-100% (most elderly residents)	Total
A	No. of elderly people with improved air quality	1,342	3,608	4,154	2,487	2,327	13,918
B	No. of elderly people with reduced air quality	147	0	0	291	0	438
C	No. of net winners [A - B]	1,195	3,608	4,154	2,196	2,327	13,480
D	Total no. of winners across all groups [Sum of C]						13,480
E	Net winners in each areas as % of total [C/D]	9%	27%	31%	16%	17%	100%
F	Share of population in B&NES	7%	15%	23%	28%	26%	100%
G	Assessment for B&NES	✓✓	✓✓✓	✓✓✓	✓	✓	

5.2 Accessibility

5.2.1 Introduction

JAQU's Options Appraisal Guidance states that accessibility distributional impacts, in terms of public transport accessibility, should be assessed. However, the charging CAZ element of the scheme options are not envisaged to have a significant impact on public transport accessibility, as funding for retrofit of buses and other measures should mean existing bus services are unaffected.

There are, however, likely to be smaller scale impacts on public transport accessibility as a result of a reduction in traffic volumes within the CAZ area and impacts of the supporting abatement measures. As these impacts are relatively minor, it is not proportionate to undertake a full assessment. As such, the following section includes a discussion of the potential social and distributional impacts in terms of public transport accessibility.

5.2.2 Discussion of impacts

There will likely be small scale benefits to bus journey times in central Bath due to traffic flow changes caused by the charging zone and traffic management scheme. There may also be small scale disbenefits to bus journey times on some routes as a result of the traffic management scheme.

These benefits in bus journey times are likely to be concentrated on existing bus users, who are typically more likely to be from lower income groups, older people, and households without a car than the background population.

5.3 Affordability

5.3.1 Introduction

The charging CAZ element of the scheme will impose direct costs on local people and businesses that use non-compliant LGVs and HGVs. As such, it is necessary to establish whether changes in affordability will disproportionately affect the socio-economic groups of interest. In addition, the journey time savings will result in reductions in fuel costs and other vehicle operating costs for people in the area, and the distribution of impacts across income groups has been assessed.

5.3.2 Low Income Households

Based on outputs from TUBA Model runs, Table 5.4 outlines the proportional share of cost savings associated with vehicle operating cost change for the income deprivation quintiles. The 0-20% income quintile group (i.e. the most deprived) sees overall net user disbenefits, as a result of journeys being impacted by the scheme. The quantum of disbenefits accruing to these groups is in line with the proportion people in the most deprived (0-20%) quintile. Conversely, other income quintiles see net benefits, with variable differences between the proportions of benefits and proportions of people in the groups. Overall, the distributional impact of vehicle operating cost impacts is uneven. Supporting measures such as the public transport measures are likely to mitigate this impact. It should be noted that the scale of user benefits are relatively small, particularly when distributed across the modelled area, and as such small changes in benefits/disbenefits impact the overall assessment scores.

Table 5.4: Affordability Impacts on Low Income Households as a result of vehicle operating cost changes (CAZ C)

	Income Deprivation Quintiles					
	0-20% (most deprived)	20-40%	40-60%	60-80%	80-100% (least deprived)	Total
VOC benefits 2021-2031 (£)		£15,068	£93,701	£26,946	£70,442	£206,157
VOC disbenefits 2021-2031 (£)	-£1,579					-£1,579
Share of VOC benefits		7%	45%	13%	34%	100%
Share of VOC disbenefits	100%					100%
Share of population in B&NES	4%	13%	21%	25%	37%	100%
Assessment for B&NES	×××	✓	✓✓✓	✓	✓✓	

*Benefits calculated using the following assumptions:

AM Peak: Origin LSOA assigned 100% of commute benefits/disbenefits, 50% of other benefits/disbenefits. Destination LSOA assigned 50% of other benefits/disbenefits

Inter Peak: Origin LSOA assigned 50% of commute benefits/disbenefits, 50% of other benefits/disbenefits. Destination LSOA assigned 50% of commute benefits/disbenefits and 50% other benefits/disbenefits

PM Peak: Destination LSOA assigned 100% of commute benefits/disbenefits, 50% of other benefits/disbenefits. Origin LSOA assigned 50% of other benefits/disbenefits

All benefits/disbenefits in £'000s

Note that the assessment scoring is relative, comparing the proportion of net winners or losers in each quintile to that quintile's share of population in the study area. Therefore, a larger score is indicative of impacts falling disproportionately on a particular quintile relative to that quintile's population share across the study area.

5.3.3 Businesses

Some businesses rely on LGVs and HGVs as part of their day-to-day operations (e.g. trades people). In light of the importance of LGVs and HGVs to business operation, the affordability impacts of the CAZ on use of LGVs and HGVs were assessed. For the preferred scheme, the journey time and operating costs for these vehicle types will increase due to the traffic management scheme, with corresponding increases for businesses.

The TUBA analysis does not take into account the significant cost of replacing LGVs and HGVs which is likely to outweigh the transport user impacts described above. The average cost of vehicle replacement is estimated to be around £5,900 for LGVs and in the range £18,000 to £24,500 for HGVs (see FBC-16 'Primary Behavioural Response Calculation Methodology' within Appendix E of the FBC for details of this calculation). For small firms operating on small margins or with low turnover and for bigger firms with multiple non-compliant vehicles, these vehicle replacement costs could deter the purchase of compliant vehicles. This could result in such firms incurring the CAZ charge as their vehicles enter central Bath, or firms avoiding central Bath altogether. This could impact on business profitability and consumer choice.

To mitigate against these impacts, an interest-free finance or grant scheme has been proposed to help businesses in upgrading their non-compliant commercial vehicle to a compliant one, or retrofitting the vehicle to make it compliant.

5.3.4 Taxis

Compliant taxis are likely to benefit from improved journey times and reduced vehicle operating costs due to reductions in traffic flow within the CAZ area.

The Taxi Licensing Policy has been reviewed to require that all taxis (Hackney Carriage and Private Hire Vehicles) must be compliant with the terms of the CAZ. The cost of replacing a taxi to one of compliant standard is likely to give rise to affordability issues for taxi operators. Vehicle replacement costs may be prohibitive to taxi owners, leading to taxis either incurring the CAZ charge or avoiding the CAZ area altogether. If taxis stop entering the CAZ area, this could lead to subsequent impacts for people that rely on taxi journeys to access key amenities and social infrastructure.

To mitigate against these impacts, an interest-free finance or grant scheme has been proposed to help taxi owners in upgrading their non-compliant vehicle to a compliant one.

5.4 Other Impacts on Businesses

Given than cars are not included in the charge, it is not anticipated that the CAZ will have a significant impact on footfall in central Bath. However, it could result in increased charges for deliveries to/from businesses located in the central area, providing additional costs that would either need to be absorbed by the business (affecting profitability) or passed on to consumers (increasing prices and potentially deterring custom). Most businesses located within the CAZ boundary are likely to be reliant on LGVs and HGVs to supply/undertake deliveries. A sizeable proportion of the businesses (23% of micro businesses and 42% of SMEs) are located within MSOAs that are directly within the proposed CAZ boundary. Furthermore, over 90 SMEs within the CAZ area operate in sectors that are expected to be particularly reliant on LGVs as part of their core operations, including businesses working in:

- Repair/maintenance
- Utilities
- Construction
- Skilled trades (e.g. Plumbing, electricians)
- Post/couriers
- Handyman/caretaker activities

There are a range of businesses located outside the CAZ boundary that require routeing of LGVs/HGVs through the CAZ area as part of their day-to-day activities (e.g. for trades people or for suppliers/deliveries). Almost 900 businesses within B&NES operate in the sectors outlined above and are likely to be reliant on LGV use. Although these businesses are not directly affected by implementation of a CAZ, based on their geographical location within the CAZ boundary, their business practices may mean regular entry to the CAZ area, potentially resulting in charges being imposed.

Many businesses rely on employment sourced from a wide geographic labour market; imposing a charge on non-compliant vehicles could cause a contraction of this market as labour located in the wider geographic area choose to work in other locations that are unaffected by a CAZ. Within the CAZ itself there are over 400 employees working in the LGV-reliant trades as outlined above. This increases to more than 6,600 across B&NES and nearly 42,000 across WECA alone. Employees using non-compliant LGVs throughout the region could be deterred from undertaking work requiring entry to the CAZ boundary. Further, nearly 40% of labour demand in central Bath is supplied from outside B&NES. Significant labour supply is sourced from Wiltshire, the other West of England authorities, Mendip and Swindon. Around 44% of all labour sourced from outside of B&NES travels into central Bath via private car. As such, nearly half of all labour supply to central Bath could be directly affected by the CAZ intervention. This could make central Bath a less attractive place to work (and consequently to set up business). Employees with non-compliant vehicles that currently drive into central Bath could be incentivised to look elsewhere for employment opportunities, contributing to a labour supply deficit in the short term in central Bath.

5.5 User Benefits

5.5.1 Introduction

While not the primary purpose, the scheme options result in changes in journey times and associated vehicle operating costs in the area. An assessment of the distributional impacts of these impacts for different income groups is provided below. User benefits as a result of changes in traffic flow due to the scheme are only one factor affecting wider user benefits. They only capture benefits to those who continue to make highway trips following the implementation of the CAP. Some people may cancel journeys or make journeys to alternative locations as a behavioural response to the charging CAZ component of the CAP. Journey time changes do not capture the user benefits on those individuals that respond in this manner. However, responses such as cancelling journeys or making journeys to alternative locations could lead to adverse journey time impacts for all households, irrespective of their relative level of income deprivation. Underlying journey time issues could be compounded for low-income groups.

5.5.2 Low Income Households

Based on outputs from TUBA Model runs, Table 5.5 outline the proportional share of user benefits for the income deprivation quintiles. For the preferred scheme there are a mixture of total benefits and disbenefits across the different income groups. Both the 0-20% and 20-40% income quintile groups (i.e. the two most deprived) see overall net user disbenefits, as a result of their journeys being impacted by the scheme. The quantum of disbenefits accruing to these groups is in line with the proportion people in the most deprived (0-20%) quintile, but significantly above the proportion in the 20-40% quintile. Conversely, other (central and least deprived) income quintiles see net benefits. On this basis, the distributional impact of user benefits is uneven. However, it is important to note that the disbenefits are based on journey and mitigation through supporting public transport scheme are likely to mitigate these impacts. It should be noted that the scale of user benefits are relatively small, particularly when distributed across the modelled area, and as such small changes in benefits/disbenefits impact the overall assessment scores.

Table 5.5: User Benefits for Low Income Households (CAZ C)

	Income Deprivation Quintiles					Total
	0-20% (most deprived)	20-40%	40-60%	60-80%	80-100% (least deprived)	
User benefits 2021-2031 (£)*			£78,983	£2,152	£71,155	£152,290
User disbenefits 2021-2031 (£)	-£4,479	-£89,394				-£93,873
Share of user benefits			52%	1%	47%	100%
Share of user dis-benefits	5%	95%				100%
Share of population in B&NES	4%	13%	21%	25%	37%	100%
Assessment for B&NES	××	×××	✓✓✓	✓	✓✓✓	

*Benefits calculated using the following assumptions:

AM Peak: Origin LSOA assigned 100% of commute benefits/disbenefits, 50% of other benefits/disbenefits. Destination LSOA assigned 50% of other benefits/disbenefits

Inter Peak: Origin LSOA assigned 50% of commute benefits/disbenefits, 50% of other benefits/disbenefits. Destination LSOA assigned 50% of commute benefits/disbenefits and 50% other benefits/disbenefits

PM Peak: Destination LSOA assigned 100% of commute benefits/disbenefits, 50% of other benefits/disbenefits. Origin LSOA assigned 50% of other benefits/disbenefits

All benefits/disbenefits in £'000s

5.6 Other Impacts (Noise, Accidents, Severance)

The scheme options are also likely to result in small scale noise, accident, and severance impacts because of traffic flow changes. Due to the small scale of these impacts and light touch approach to distributional appraisal, a full assessment of these impacts is not proportionate. As such, the following section includes a discussion of the potential social and distributional impacts in terms of noise, accidents, and severance.

The preferred option results in both motor traffic flow increases and decreases in central Bath due to the CAZ charge and traffic management scheme on Queen Square (see Figure 4.11). The larger increases in motor traffic flow are forecast on Royal Avenue, Marlborough Buildings, Monmouth Place, Park Lane and Weston Road. The larger decreases in motor traffic flow are forecast on Queen Square, Gay Street, George Street, Bennet Street, and Landsdown Road.

The changes in motor traffic flow occur primarily in:

- Lower income areas, that will be most impacted by both benefits and disbenefits in terms of noise;
- Areas with fewer children living, that will be most impacted by both benefits and disbenefits in terms of noise, accidents, and severance; and
- Areas with fewer females and fewer ethnic minorities.

Larger increases in motor traffic flows occur in areas where fewer elderly people reside. In contrast, larger decreases in motor traffic flows occur in areas with more elderly people, meaning that elderly people will see a greater share of the benefits in terms of noise, accidents, and severance.

The larger increases in motor traffic flows will occur in areas with higher than average concentrations of disabled people, and the larger decreases in motor traffic will occur in areas with the highest average concentrations of disabled people. As such, disabled people will see the greatest share of both the benefits and disbenefits in terms of severance.

Reported road traffic accidents over five years (2013-2017) were analysed on the roads that see the largest increases and decreases in motor traffic volumes. The greatest concentration of pedestrian casualties was reported on routes that will see a decrease in traffic compared to those that will see an increase in traffic. The results for pedal cycles show dispersed pedal cycle accidents south of Queen Square and along Lansdown Road that will see a decrease in traffic. There have been four collisions involving pedal cycles at the Marlborough Ln junction with Weston Road. However, whilst this junction will see an increase in motor traffic volumes, the environmental and public realm improvement scheme implemented at the junction in 2018 is anticipated to have improved safety through widening the pavement and narrowing the carriageway to reduce the crossing distance. Motorcycle riders are likely to see a mix of benefits and disbenefits with casualties reported on Monmouth Place, Upper Bristol Road, and George Street.

6. Key Findings

Tables 6.1 and 6.2 present a summary of the key findings of the distributional and equalities analysis. The analysis conducted relates to the locations where the benefits/disbenefits accrue and it has been mapped to the individuals that live in those areas.

Table 6.1: Air Quality Impacts on Relevant Socio-Economic/Business Groups

Socio-Economic/Business Group	Quintiles					Are Impacts Distributed Evenly?
	0-20% (most deprived)	20-40%	40-60%	60-80%	80-100% (least deprived)	
Low-Income Households (Income Deprivation)	✓✓	✓✓	✓	✓✓	✓✓	Yes
Children	✓✓✓	✓✓	✓	✓✓	✓	No
Elderly Residents	✓✓	✓✓✓	✓✓✓	✓	✓	No

Table 6.2: Affordability and User Benefit Impacts by Income Deprivation

Measure	Quintiles					Are Impacts Distributed Evenly?
	0-20% (most deprived)	20-40%	40-60%	60-80%	80-100% (least deprived)	
Affordability impacts due to vehicle operating cost changes	××	✓	✓✓✓	✓	✓✓	No
User Benefits	××	×××	✓✓✓	✓	✓✓✓	No

The analysis represents the relative distribution of impacts on socio-economic quintiles compared to the quintiles' population share across B&NES. The key conclusions are:

- Air quality benefits are felt across the majority of Bath, with a minor decrease in air quality reported in two LSOAs in low income areas. Beneficial impacts accrue across low-income groups, with greater proportions of low-income households (i.e. those in areas that are most income deprived) benefitting relative to this group's share of the overall population in B&NES.
- There are likely to be small scale public transport accessibility benefits due to a reduction in traffic volumes within the CAZ area and impacts of the supporting abatement measures. These benefits are likely to be concentrated on existing bus users who are typically more likely to be from lower income groups, older people, and households without a car than the background population.
- Whilst car drivers will not be subject to CAZ charges, there are negative affordability and user benefits for residents in B&NES due to the traffic management scheme, with those in the 0-20% and 20-40% income groups seeing the largest share of the disbenefits.
- It should be noted that the scale of vehicle operating cost and user benefit impacts are relatively small, particularly when distributed across the modelled area, and as such small changes in benefits/disbenefits could impact the overall assessment scores.
- The scheme is also likely to result in a mix of small scale positive and negative noise, accident, and severance impacts because of traffic flow changes. These impacts are concentrated within the CAZ charging zone with impacts on lower income areas, areas with few children, areas with a higher proportion of disabled people. There is an overall benefit for pedestrians, however, impacts for people cycling and motorcycling are more mixed.

7. Proposed Mitigation

7.1 Clean Air Fund

In order to mitigate with the key issues identified through the distributional and equalities impact analysis, JAQU have established the Clean Air Fund (CAF). The CAF aims to provide funding to deliver mitigation measures designed to alleviate any adverse distributional and equalities impacts identified above. Based on the range of adverse impacts, the following mitigation measures are proposed to support the transition towards the CAP for vulnerable and protected socio-economic groups:

- Additional retrofit funding for registered, local Euro 3/4/5 buses;
- Financial support for replacing pre-Euro 6 diesel and pre-Euro 4 petrol non-compliant commercial vehicles with compliant ones;
- Provide support and facilities for alternative delivery and servicing options for businesses;
- Provide a sustainable travel and transport team to facilitate the use of the mitigation schemes by the impacted groups.

7.1.1 Additional retrofit funding for registered, local Euro 3/4/5 buses

As referenced, the additional retrofit funding for registered, local Euro 3/4/5 buses will ensure that preferred option will not have a significant impact on public transport accessibility.

7.1.2 Financial support for replacing pre-Euro 6 diesel and pre-Euro 4 petrol non-compliant commercial vehicles with compliant ones

Financial support is proposed to support socio-economic groups and businesses suffering from adverse affordability impacts associated with the cost of upgrading to compliant vehicles. Support will be provided to businesses, with a focus on taxi/private hire firms and businesses with a reliance on HGVs and LGVs. The measures intended to make replacing vehicles with a compliant one more affordable are detailed below.

Financial support will be provided in the form of a grant or an interest free loan, contract hire, contract purchase, finance lease or lease purchase agreement to suit the needs of the business. The scheme will be open to B&NES businesses and those located in local authorities to upgrade their non-compliant commercial vehicle to a new or secondhand compliant vehicle.

Support is also proposed to mitigate against the cost of replacing vehicles with electric ones. Support will be provided to businesses to allow for the installation of electric charging points on private land. This will reduce the financial cost facing businesses who wish to purchase an electric vehicle, thereby making the option more affordable.

7.1.3 Provide support and facilities for alternative delivery and servicing options for businesses.

Increasing the uptake of delivery and servicing plans, providing electric cargo bike hire and facilities and providing the option of electric van hire for businesses will help local businesses proactively respond to the Clean Air Zone charges and manage its impacts on servicing and deliveries.

7.1.4 Provide a sustainable travel and transport team to facilitate the use of the mitigation schemes by the impacted groups

B&NES proposes to employ a sustainable travel and transport team to promote and facilitate uptake and usage of the mitigation measures. Travel advisors will work with local businesses affected, ensuring that businesses are aware of mitigation measures. Additionally, the team will engage with residents/community groups to positively promote the CAP and mitigation measures or other services that are available outside of the CAF which will support modal shift towards more sustainable modes of transport.

7.2 Proposed Exemptions and Concessions

Additional mitigation is proposed in the form of exemptions and concessions for certain groups. A summary of the proposed exemptions and concessions is provided below. Full details, and discussion around the selection of these, is provided in FBC-05 'Proposed System Design Features and Payment Exemptions' within Appendix A of the FBC.

The following vehicles are exempted within Defra's CAZ framework and therefore, exempt within the Bath CAZ scheme:

- Euro 4+ petrol vehicles
- Euro 6+ diesel vehicles
- Historic vehicles in the Exempt Vehicles tax class
- Disabled passenger vehicles (in the Exempt Vehicles tax class)
- Military vehicles by virtue of Section 349 of the Armed Forces Act 2006
- Ultra-Low Emission Vehicles (fully electric and hydrogen fuel cell)

The following vehicles will be granted a local exemption providing they are registered under the relevant tax class on the day they enter the CAZ area:

- Gas (LPG/CNG) or hybrid electric vehicles in the Alternative Fuel Car Vehicle tax class
- Vehicles in the Special Concessionary tax class not already exempt under the CAZ Framework including:
    - Vehicles used between different parts of land;
    - Tractors and certain agricultural vehicles;
    - Agricultural machines;
    - Mowing machines;
    - Steam powered vehicles;
    - Snowploughs; and
    - Gritters.
- Vehicles in the Motorcycle tax class not already exempt under the CAZ Framework.
- Other vehicles in the Exempt Vehicles tax class not already exempt under the CAZ Framework including:
    - 'limited use' vehicles;
    - vehicles used by a disabled person (disabled tax class); and
    - National Health Service vehicles.

In addition to the exemptions listed above, under Defra's CAZ framework and therefore, exempt within the CAZ C scheme, are all cars (except taxis/PHVs).

7.2.1 Local concessions

Concessions are under consideration for the following vehicle types until 01/01/2025:

- Recovery Vehicles:
  - A recovery vehicle or breakdown truck with a revenue weight exceeding 3,500kg; and
  - Doesn't include breakdown vans (e.g. AA, RAC).
- Emergency Vehicles:
  - Police vehicles;
  - Ambulances and health service vehicles;
  - Fire engines etc;
  - Mine rescue vehicles; and
  - Lifeboat vehicles.
- Special Vehicles tax class which includes mobile crane, mobile pump, digging machine, works truck, road roller, showman's HGV and showman's haulage.
- Special Types tax class vehicles which have been issued with a Special Types General Order (STGO) or an individual order and are used to carry or haul exceptional loads.
- General Haulage Vehicle tax class, where the vehicles are constructed and used solely for haulage.
- Vehicles supporting the emergency services

Concessions are under consideration for the following vehicle types until 01/01/2023:

- Euro 4/5 wheelchair accessible vehicles used as taxis – to maintain access opportunities for disabled persons.
- Euro 4/5 diesel registered community transport providers - to maintain access for communities, schools and religious establishments. This will potentially benefit several of the key local groups identified in the distributional impact assessment.
- Euro 4/5 diesel vehicles granted a concession under the financial assistance scheme.
- Blue badge holders who own and use LGVs as their regular transport to access the CAZ – to maintain access opportunities for disabled persons.
- Education, health and social care providers – to ensure continuity of service in the community.