Bath Clean Air Plan

Bath and North East Somerset Council

Clean Air Fund Report

674726.BR.042.FBC-46 | 3

January 2020

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Project No:	674726.BR.042
Document Title:	Clean Air Fund Report
Document No.:	674726.BR.042.FBC-46
Revision:	3
Date:	January 2020
Client Name:	Bath and North East Somerset Council
Project Manager:	RR
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Document history and status

Revision	Date	Description	By	Review	Approved
1	12.06.2019	FBC draft	CC	RR	BS
2	18.12.2019	Updated FBC Draft	RR/CC	RR/CC	DC
3	17.01.2020	Final FBC	RR/CC	RR/CC	DC

Contents

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 considering 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 Outline Business Case, 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.

The preferred option for the Bath Clean Air Plan is a Class C CAZ, with £100 charge for Heavy Goods Vehicles (HGVs), coaches, buses and £9 charge for Light Goods Vehicles and taxis/Private Hire Vehicles (PHVs), plus a traffic management scheme at Queen Square. Technical assessment found this scheme to achieve compliance in the shortest possible time, by 2021.

1.1 Purpose of This Report

This report has been written to support the FBC submitted to the Government by B&NES. It assesses a long list of potential mitigation options for the proposed charging measures, provides reasoning and details for the chosen mitigation measures and explains the amount of funding requested from the Clean Air Fund (CAF).

Section 2 describes the process to determine the mitigation measures, providing a summary of the social distribution impact assessment, and includes a comprehensive long list of options considered, comparing each to Critical Success Factors to determine the short list of measures which has been included in the CAF application.

Section 3 describes the approach to assessing the Value for Money (VfM) for each measure as well as the overall State aid assessment.

Sections 4 to 7 provide details of each mitigation measure including a description of the proposed measure, a delivery programme and proposal, quantification and costing of the funding request from the CAF and value for money assessment.

[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)

2. Process of Designing Mitigation Measures

In order to design mitigation measures that are important to the successful implementation of the CAZ, a process was followed that focuses on mitigation of groups negatively affected by the CAZ plans. The following process was followed:

1) Key conclusions were drawn from the FBC-19 'Distribution and Equalities Impact Analysis Report (DEIA)' Appendix G of this FBC, to identify the groups most negatively impacted by the CAZ and, therefore, most in need of support. The impact on those with protected characteristics, was also considered to ensure they were not disproportionately impacted.

2) From the DEIA conclusions, a longlist of mitigation measures was created. A deliberately wide range of measures were considered which could mitigate the negative impacts identified in the DEIA so they could be investigated and analysed further.

3) The longlist of measures were then assessed against the CSFs,as identified in the Strategic Outline Case (SOC). These are divided into:

- Primary CSF: Whether the measure delays reaching compliance in the shortest possible timeframe. This is a pass/fail criterion as it is crucial to the overall project success, if this was not achieved the measure was rejected.
- Secondary CSFs: These are required to undertake a comparative assessment of the best options relative to the project objectives, they have been grouped using the five-case model approach set out in the DfT's guidance on 'Transport Business Cases' (2013)[4] as a framework;

Strategic

> All trip purposes treated equitably

> Compliance with Defra Draft CAZ framework, including minimum requirements

Economic

> Mitigate financial impact on low income groups

> Maximise health improvements of low income groups

> Net economic benefit

> Improve general public health

Commercial

> Is the market able to supply in the time available?

Financial

> Likelihood of revenue equating to implementation/operational costs[5]

> Upfront capital required for scheme

> Risk of financial penalty to the Council/s

Management

> Public acceptability

> Local, regional and national political acceptability

[4] https://www.gov.uk/government/publications/transport-business-case

[5] Complying with the legal test which was set out by the High Court in November 2016 in R (ClientEarth) (NO_2) V Secretary of State for Environment Food and Rural Affairs [2016] EWHC 2740 (Admin), only shortlisted options which achieve compliance with the NO_2 Limit Value in the shortest possible time, are appraised across this criterion. The relevant analysis is presented in the Financial Case chapter.

4) Upon comparison of the measures with the CSFs, a qualitative decision was made whether to progress the measure to the short list. During this process the details of the measure were finalised.

5) The short list of measures was then analysed and quantified before a final decision was made on the items taken forward for the funding request to the CAF.

2.1 Summary of Distribution and Equalities Impact Analysis Report

The outputs from the DEIA were the primary consideration when identifying the groups negatively impacted by the CAZ and in need of support in the form of mitigation measures. The following sections are a summary of the impact of the CAZ Class C Scheme, on each of the socio-economic groups identified in JAQU's Options Appraisal Guidance (2017).

2.1.1 DEIA Report Conclusions

The conclusions from this report, shown in FBC-19 - Social Distributional Impacts Report in Appendix G of this FBC, were used to design a longlist of mitigation measures. The main findings from this report are summarised below, as well as the decision process of whether to include a mitigation measure targeted at the affected group in the longlist of measures.

Table 2-1: Summary of Distribution and Equalities Impact Analysis Report

Affected Group	Impact	Is a Mitigation Measure Required?
Children		No – but the traffic and air quality in the area at risk should be monitored closely to ensure it does not change excessively.
Elderly		No – but accessibility into Bath, particularly from areas with a high proportion of the elderly must be maintained.
Disabled		No – but accessibility into Bath, particularly from areas with a high proportion of the disabled must be maintained.
Women		No
Black and Ethnic Minority		No
Low-Income Households		Yes – in terms of affordability, low income households experience the most disbenefits. It is considered that supporting measures relating to public transport will help to mitigate these. In terms of air quality and accessibility, no negative impact is anticipated but area should be monitored closely to ensure traffic and air quality doesn't change excessively.
Businesses – SMEs		Yes
Businesses – LGVs/HGVs		Yes
Businesses – Local Bus Operators		Yes
Businesses – Taxis		Yes

2.1.2 Non-Affected Groups

Due to the adoption of a CAZ Class C Scheme, private cars will not be charged to enter the CAZ, and therefore a number of the groups identified in JAQU's Options Appraisal Guidance (2017), will be negligibly or non-affected. These groups are:

- Children;

- Elderly;
- Disabled;
- Women; and
- Black and ethnic minority.

The DEIA did identify some minor increases in NO_2 concentration in two Lower Super Output Areas, a geographic area with a population of roughly 1,552 people, with a large concentration of low-income households and children. This will need to be monitored to ensure it does not change excessively. It is also key to ensure that the low-income, elderly and disabled people, who use public transport to access places within the CAZ, are not cut-off, so these services will need to be maintained through CAZ operation.

Further, the DEIA noted overall disbenefits for those in LSOA which fall within the 0-20% most deprived. It is considered that supporting measures relating to public transport will assist in mitigating these impacts.

2.1.3 Businesses – SMEs

The DEIA report has identified Small and Medium Sized Enterprises (SMEs) who operate commercial vehicles in the Bath CAZ as being an area of concern. They are likely to be impacted in a number of different ways:

- Businesses owning non-compliant commercial vehicles may struggle to absorb the direct costs of CAZ implementation, i.e. the CAZ charge or upgrading to a compliant vehicle. This was corroborated by DEFRA's impact assessment study, which found that financial impacts of a CAZ would be significant for smaller HGV operations or small operators as measures requiring them to upgrade their vehicles will have a major impact on their costs.
- The CAZ could result in increased delivery costs to/from businesses located within the CAZ. The additional costs would either need to be absorbed by the business (affecting profitability) or passed on to customers (increasing prices and potentially deterring custom).
- Some businesses rely on commercial vehicles as part of their day-to-day operation (e.g. trades people).
- SMEs are also more likely to have smaller more specialist fleets and so will be less likely to be able to re-route compared to larger fleets.
- 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. This might be especially prevalent for self-employed businesses such as trade people.

Figure 2-1 below, extracted from the DEIA, presents the distribution of businesses across the immediate study area, indicating that there are Lower Super Output Areas (LSOAs) with a high concentration of businesses in close proximity to the CAZ boundary. This indicates that there are several businesses who will need to access the CAZ on a regular basis, especially those who's premises are in the centre, or use the primary routes through Bath that are within the CAZ to go about their daily business.

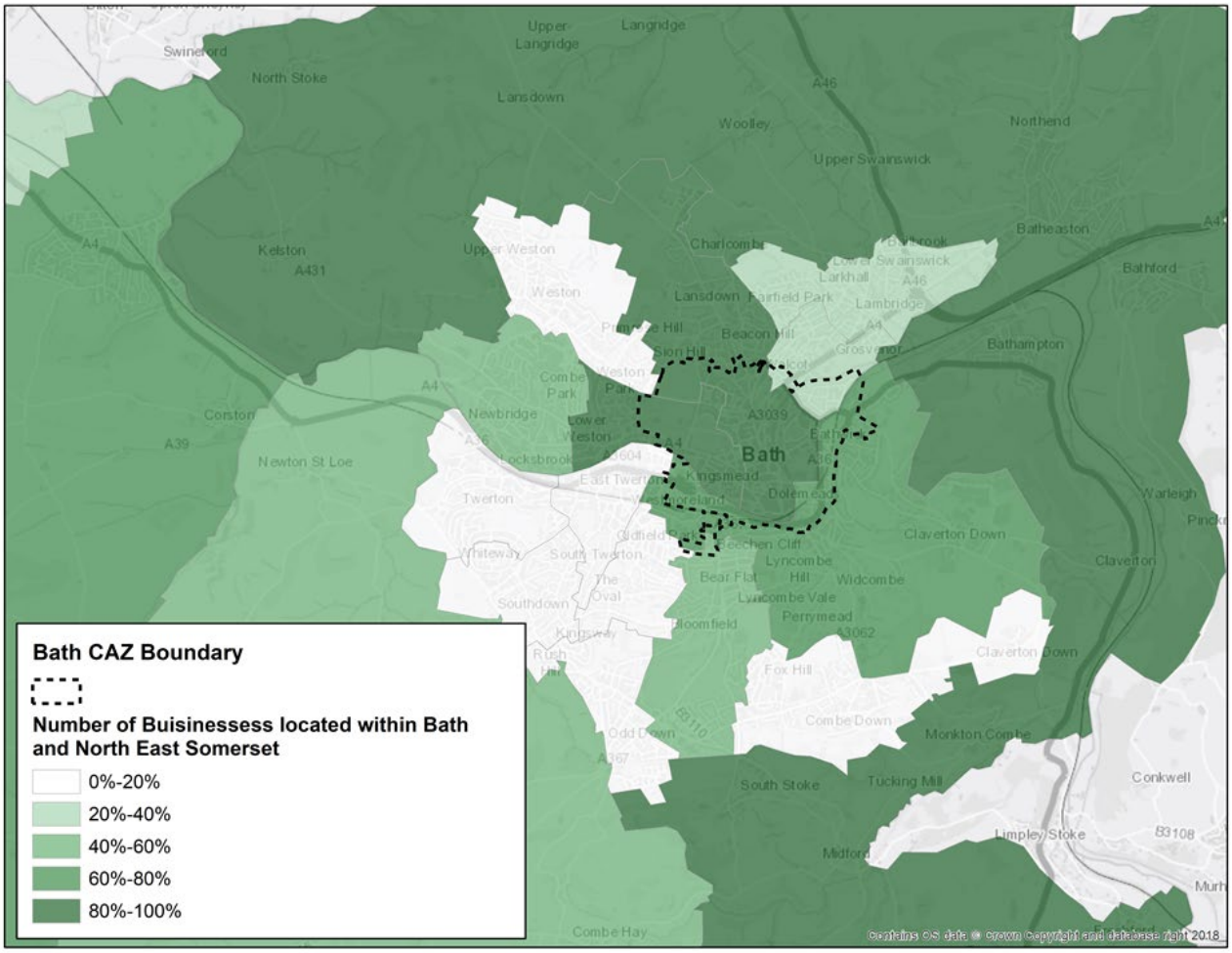


Figure 2-1: Concentration of Businesses in B&NES relative to National Benchmarks

The B&NES economy consists of approximately 8,200 businesses. The vast majority of these businesses are micro businesses (approximately 7,220) or SMEs (approximately 660). A sizeable proportion of the businesses (20% of micro businesses and 40% of SMEs) are located within LSOAs that are directly within the proposed CAZ boundary. Most businesses located within the CAZ and who travel into or through it regularly are likely to be reliant on LGVs and HGVs to supply/undertake deliveries.

Furthermore, some 90 SMEs within the CAZ 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.

With these businesses particularly, it is vital for them to be able to access the CAZ both to access jobs, which in these industries could be anywhere across the local area, but also to reach suppliers. If their access is restricted because of the CAZ, it could lead to unfair competition with competitors, who may have purchased a new LGV recently simply because of their previous vehicle life cycles. It would be unfair to force SMEs who were 'unlucky'

with the timings of upgrading their vehicles, into purchasing a new LGV when there is several years of serviceable use left on their current one.

Data gathered from the business questionnaire during the formal consultation on the draft OBC in October/November 2018, shown in Figure 2-2, summarises fleet compliance data given by respondents. As can be seen, of fleets that are five vehicles or smaller (therefore, likely to be SMEs and sole traders), 33% of businesses predict that they will have no compliant vehicles by the time the CAZ is implemented. 60% of these businesses with a fleet size up to 5 vehicles will have at least one non-compliant vehicle when the CAZ is implemented. Of larger vehicle fleets, 50% of those with 6-10 and 11-50 vehicles expect to have at least half of their fleet compliant by CAZ implementation, 30% of those with 50+ vehicles expect to have at least half their fleet compliant. This exhibits a disproportionate impact on those with smaller fleets, and the expected need for a financial assistance scheme to aid them in dealing with implementation of the CAZ.

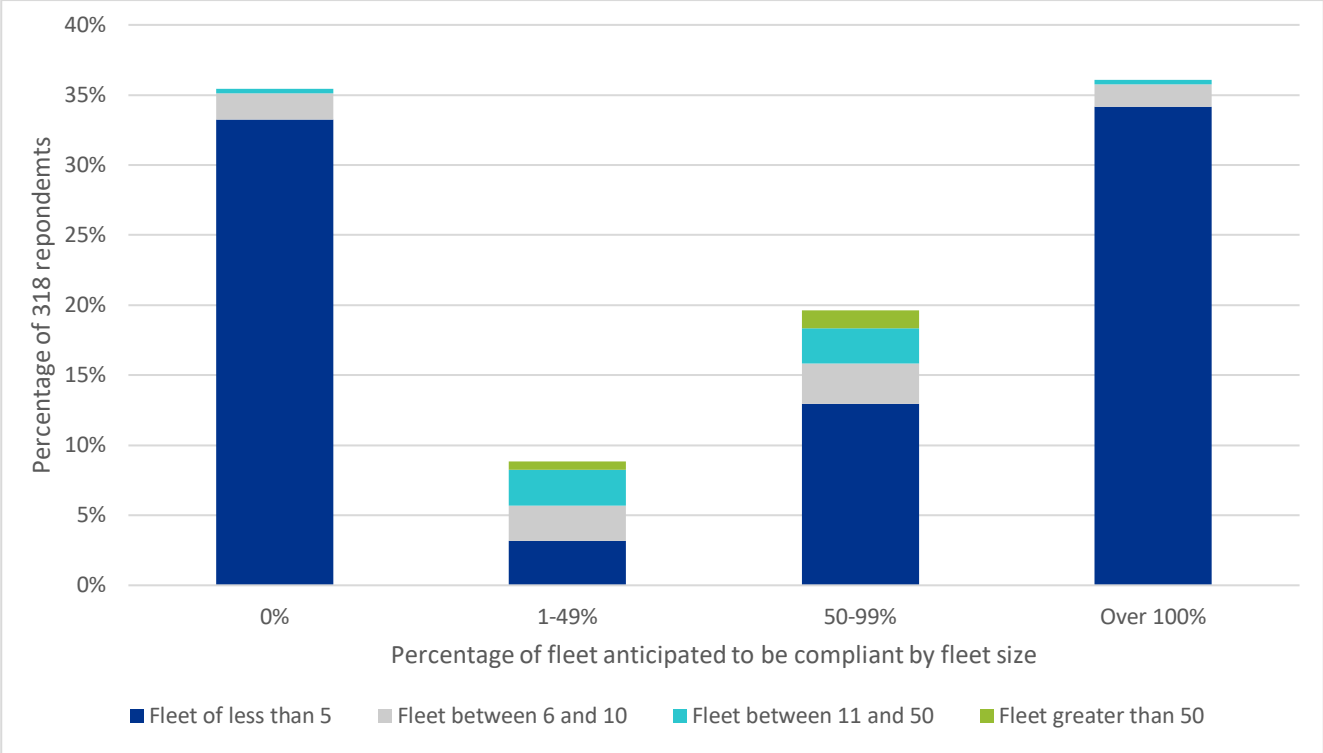


Figure 2-2: Percentage fleet anticipated to be compliant by percentage of respondents to the business questionnaire

2.1.4 Businesses - LGVs/HGVs

The benefits of the CAZ on local air quality are widely recognised, however, if implemented too quickly, this can impose significant costs on businesses and consumers, negatively impacting the local economy. According to a study published by the Road Haulage Association (RHA), the fleet of modern Euro 5 vehicles is forecast to be substantial until well after 2020. Replacing this fleet in a short time period will pose big financial risks to businesses. This is corroborated by Figure 2-2 above, where the majority of all fleets, 65%, predict they will have at least one non-compliant vehicle by implementation of the CAZ.

Businesses are heavily reliant on the use of LGVs and HGVs for their day-to-day operations. LGVs and HGVs represent a significant number of business trips. Due to their importance, the affordability impacts of the CAZ on LGVs and HGVs was assessed. Based on the outputs from TUBA models, journey time costs and vehicle operating costs will reduce following implementation of the scheme. However, the TUBA analysis did not take into account the significant cost in replacing or retro-fitting an LGV or HGV, which is likely to outweigh the benefits gained.

For SMEs operating on small margins or with low turnover, and for bigger firms with multiple non-compliant vehicles, vehicle replacement costs could make it difficult to adapt and bring compliant vehicles into their fleet in such a short timescale. 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.

This is especially true if their current business plan relies on purchasing older, second-hand vehicles as the supply of second-hand compliant commercial vehicles is limited. Information from elsewhere in the country has indicated a sharp increase in price of second-hand complaint HGVs upon CAZ announcements.

There are also a range of businesses located outside the CAZ that require routeing of LGVs/HGVs through the CAZ 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 the CAZ based on their geographical location within the CAZ, their business practices may mean regular entry to the CAZ, potentially resulting in charges being imposed.

This is particularly true of local coach operators, who may often have to route through the CAZ or be taking people to or from places within the CAZ. Smaller local coach fleets are also more likely to non-compliant vehicles within their fleets and so will be less likely to be able to re-allocate compliant vehicles to route through the zone compared to larger fleets.

Furthermore, journey times and operating costs for these vehicle types are not expected to decrease significantly due to there being no effects on smaller motor vehicle journeys. In one area, journey times for businesses will increase due to the traffic management scheme at Queens Square. This effect must be monitored to ensure that they do not increase significantly and disadvantage businesses operating in that area.

2.1.5 Businesses – Local Bus Operators

Local bus services are key for accessibility for some of the groups identified in the DEIA, namely low-income groups, elderly people and households without a car. It is vital that these services are at least maintained while when the CAZ is in place, and there is no negative effect to services.

These DEIA findings show that it is vital to maintain local public transport services, to provide support to groups that could be impacted by implementation of the CAZ. In the case of some it is important that CAZ charges do not get passed on to the customer, to maintain an affordable service. It will also provide further air quality improvements as diesel buses are some of the highest polluting vehicles. Upgrading all local services will enable bus operators to continue to maintain existing services.

The DEIA outlined some findings in relation to bus journeys, that are likely to concentrate benefits on existing bus users. These were general small-scale benefits to bus journey times in central Bath due to traffic flow changes caused by the charging zone. However, small scale disbenefits to bus journey times on some routes were recorded as a result of the traffic management scheme, which should be monitored to ensure they are not significant.

2.1.6 Businesses – Taxis and PHVs

Taxis may struggle to absorb the direct costs (i.e. CAZ charge) associated with implementing the scheme. Non-compliant taxis will be required to pay the CAZ charge, which will decrease affordability for these vehicles. Alternatively, the cost of replacing a taxi to one of compliant standard is also likely to add to affordability issues for taxi operators. Vehicle replacement costs may be prohibitive for taxi owners, leading to taxis either incurring the CAZ charge or avoiding the CAZ area altogether. These will cause disproportionate impact on those taxi drivers who drive non-compliant vehicles. If taxis stop entering the CAZ, this could lead to subsequent impacts for people that rely on taxi journeys to access key amenities and social infrastructure.

2.2 Clean Air Zone Consultation

In Autumn 2018 B&NES ran a public consultation on the proposal presented in the draft OBC to implement a Class D CAZ (charging higher emissions buses, coaches, taxis/PHVs, HGVs, LGVs and cars) in Bath. In Autumn

2019 B&NES subsequently ran a public consultation on the proposal presented in the final OBC to implement a Class C CAZ with traffic management at Queen Square. Key results and comments have been identified from the consultation feedback that could influence the design of mitigation measures to support the groups labelled as disproportionately negatively affected.

The feedback related to these groups has been separated by their specific comment on the CAZ proposals; in most cases in response to a question in the questionnaire about a certain aspect of the CAZ.

2.2.1 Boundary

The following comments are related to the proposed CAZ Boundary:

- In the first consultation 73% of business respondents to this question suggested they owned vehicles that travel into or through the zone.
    - 81% of these business respondents suggested their vehicles drive into the zone either 'several times a week' or 'daily'.
- Business respondents located within the zone raised concerns that they could be cut off from deliveries and suppliers (which was particularly prevalent for trade workers).
- Some business respondents thought that through routes, particularly arterial roads, should be excluded from the CAZ, to allow users who do not need to access Bath the opportunity to traverse it, noting there are very few alternative options for HGVs.

2.2.2 Charges

The following comments are related to the proposed CAZ charges of £100 for HGVs, buses and coaches and £9 for LGVs/vans and taxis/PHVs:

- In the first consultation 63% of the business respondents that answered this question suggested that they 'disagreed' or 'strongly disagreed' the charge would be effective at changing behaviour.
- Business respondents were concerned they may not be able to afford the charge, which could disproportionately impact smaller businesses who could not absorb the costs. It was noted some may consider relocation in order to maintain the economic viability of continued operation.
- There was concern that businesses would not be able to afford to upgrade to compliant vehicles as timescales are too tight and much shorter than a standard vehicle upgrade cycle. It was highlighted that these timescales could lead to a significant loss of investment on a recently purchased vehicle. This was noted alongside a general lack of alternative vehicles for LGV drivers that are compliant and meet business needs. Some businesses suggested a desire to upgrade to electric vehicles but displayed caution due to a lack in the required infrastructure.
- Businesses were worried they would have to pass costs onto customers/consumers, and this could cause a disproportionate impact on the competitiveness of independent traders compared with larger firms who could afford to absorb the costs or upgrade vehicles.

2.2.3 Concessions and Exemptions

The following comments are in relation to concessions and exemptions suggested by businesses in order to mitigate against the impact of the CAZ Charge:

- In the first consultation 82% of business respondents that answered this question indicated that no proposed concessions or exemptions applied to them.
- The Freight Transport Association called for a concession for HGV operators with Euro 5 vehicles and this was supported by requests from other business respondents for diesel Euro 4/5 vehicles to have an exemption or longer phase in period to minimise financial impacts.
- Suggestions were made for a variety of commercial vehicles and businesses in and around Bath City Centre to be given permanent exemptions. There were also suggestions for exemptions outside of peak hours to enable deliveries and access suppliers.

2.2.4 Influence Travel Behaviour

The following comments address concerns and details on how businesses might expect to react to the implementation of the CAZ:

- Many businesses suggested they would avoid Bath or no longer do business in Bath due to the potential loss of customers due to the need to pass costs onto them. It was considered this could ultimately lead to businesses moving out of Bath, being forced to make redundancies or even ceasing operations entirely due to no longer being able to afford to operate.

2.2.5 Supporting Measures

The following comments are related to the supporting measures proposed to aid businesses with adapting to the implementation of the CAZ:

- Of the proposed supporting measures detailed in the first consultation, business respondents showed the most support for:
    - 'Financial support for local businesses to upgrade from non-compliant commercial vehicles' (52%)
    - 'Retrofitting high-emission buses with cleaner engines' (40%)
- A number of other supporting measures were suggested in the questionnaire including: a provision of funds available for businesses to purchase new vehicles, a sunset clause allowing more time for businesses to upgrade vehicles, funding to retrofit non-compliant vehicles and funding for electric vehicle charging points in Bath.

2.2.6 Impacted Groups

The following comments relate to which groups local businesses thought might be most impacted by the implementation of the CAZ:

- Bath Business Improvement District expressed concern about the impact on businesses in Bath generally. The Bath Chamber of Commerce identified specific concerns around higher charges for deliveries to businesses within the CAZ.
- Businesses or self-employed people relying on vans or delivering a trade/service in people's homes, at locations across Bath or travelling across the city and relying on clients/customers in Bath was a concern for business respondents.
- There were also concerns about any businesses with non-compliant vehicles, particular those with relatively new diesels. This was a particular concern for smaller businesses with multiple vehicles which would struggle to afford upgrade costs. It was thought this would be further exacerbated by a reduced market for non-compliant vehicles.
- There were also some comments that business with vehicles that drive through the zone would look to avoid it. It was thought that this would cause increased traffic on minor routes or result in drivers having to take large diversionary routes, increasing travel times.

2.3 Exemptions and Concessions

The results from the DEIA shown in Section 2.1 were used to identify groups who should be offered an exemption or concession from the CAZ charges. Exemptions are permanent exclusions from CAZ charges, whereas concessions are offered to allow disproportionately affected groups an extended period of time to adapt to the implementation of the CAZ and reduce negative impacts. It should be noted that exemptions and concessions can only be provided if they do not prevent compliance with the Limit Values in the shortest possible time. Table 2-2 shows a summary of the proposed exemptions and concessions. It does not include those already exempted within Defra's CAZ Framework or those not proposed as a result of the DEIA report.

Table 2-2: Exemptions/Concessions Offered

Exemption/ Concession	Description	DEIA	Length
Exemption	Vehicles used by a disabled person (disabled tax class)	Will allow disabled people who own and use LGVs as their regular transport to access the CAZ.	Permanent
Exemption	National Health Service Vehicles	Vehicles in the National Health Service vehicles tax class, to maintain access to the CAZ for vital health services.	Permanent
Exemption	Special Concessionary Vehicles	Agricultural machines, mowing machines, electric, gritter, snowplough and steam vehicles.	Permanent
Concession	Emergency service vehicles	Vehicles in the Emergency Vehicles tax class, to maintain vital access for emergency services.	To 01/01/2025
Concession	Vehicles supporting the emergency services	An emergency service support vehicle that is acting on behalf of a voluntary organisation to support an emergency service provider.	To 01/01/2025
Concession	Special Vehicles	Mobile crane, mobile pump, digging machine, works truck, road roller, showman's HGV and showman's haulage.	To 01/01/2025
Concession	Special Type Vehicles	Special Types General Order (STGO) or an individual order and are used to carry or haul exceptional loads.	To 01/01/2025
Concession	Recovery Vehicles	To allow access to recover broken down HGVs.	To 01/01/2025
Concession	General Haulage Vehicles	A vehicle constructed and used for hauling loads, where the vehicle itself does not carry the load or have the load superimposed on it.	To 01/01/2025
Concession	Euro 4/5 wheelchair accessible vehicles used as taxis	To maintain access opportunities for disabled persons.	To 01/01/2023
Concession	Euro 4/5 diesel vehicles used by 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.	To 01/01/2023
Concession	Euro 4/5 diesel vehicles used by registered education, health and social care providers	To maintain vital community education, health and social care services for those organisations with employees using Euro 4/5 diesel vehicles for work purposes, that are not subject to an exemption or concession elsewhere.	To 01/01/2023
Concession	Blue Badge Holders	Will allow blue badge holders who own and use LGVs as their regular transport to access the CAZ.	To 01/01/2023
Concession	Euro 4/5 diesel non-compliant vehicles subject to a failed financial assistance scheme application or with a compliant vehicle (or retrofit equipment to make the vehicle compliant) on order	To allow the business or individual unable to obtain finance further time to upgrade to a compliant vehicle before paying the charge.	To 01/01/2023

B&NES considers these exemptions and concessions as important measures to give specific vehicles and users, along with businesses unable to access financial support, an extended time frame to adapt to the CAZ. B&NES

will also keep the exemptions and concessions under review to ensure they are not impacting or hindering the delivering of compliance.

However, B&NES also recognise that the exemptions and concessions have restricted applicability, and do not help the majority of affected groups other than in some cases providing a longer period to adjust. In some cases, affected groups could be faced with the same issues following the concession period as they would have done in 2020 without a concession. To assist those groups affected by the CAZ, B&NES has devised a list of mitigation measures to be implemented alongside the exemptions and concessions.

2.4 Longlist of Mitigation Measures

After the target groups were identified through the DEIA, a long list of measures was created. Shown below in Table 2-3 are the measures designed to aid the disadvantaged user groups in adapting to the CAZ. Marking against the Primary and Secondary CSFs is rated Good, OK or Poor.

Table 2-3: Longlist of Mitigation Measures

Mitigation Measure	Primary CSF	Secondary CSF	Bring to Shortlist?
Extend the current business engagement scheme to encourage employers to promote sustainable transport through promotion of Employers Travel Forum and adoption of Travel Plans	**Poor** – No guarantee businesses and employees will utilise the scheme on a big enough scale to affect air quality.	**Good** – Good value for money, likely to be acceptable locally, compliant with CAZ framework, and would help impacted groups.	**No** – Significant engagement is currently taking place, so further promotion is unlikely to have a significant impact on air quality.
Encourage West of England Mayor to introduce advanced Bus Quality Partnerships and Direct Franchising	**Poor** – Unlikely to provide air quality benefits in the required timescale.	**Good** – Good value for money, likely to be acceptable locally.	**No** – Can't be implemented before a CAZ could achieve compliance. Not a mitigation measure. Continue to progress consideration of option through JLTP.
Encourage van hire operators to introduce electric vans	**Poor** – Unlikely to make an impact in the required timescale.	**Poor** – Too small scale to make a difference to air quality, economics or impacted groups, though likely to be publicly supported.	**No** – This is progressing in the market naturally and is also promoted through the Parking Strategy. Further incentivisation/investment is unlikely to produce a significant change within the required timescales.
Promote low emission vehicles for Hackney carriages/private hire through licensing	**OK** – Will help towards compliance, taking some of the highest polluting vehicles off the road, issues with time taken to implement.	**OK** – Requires large capital expenditure, unlikely to provide economic benefit, or help impacted groups but will likely be accepted by the public and will be CAZ compliant.	**No –** Although it would tackle emissions from taxis/private hire which undertake a large proportion of miles within the AQMA, it is not feasible in the short timescale. It is being progressed separately.
Targeted Hackney carriage/private hire investment incentive scheme	**OK** – Will help towards compliance, taking some of the highest polluting vehicles off the road, issues with time taken to implement.	**OK** – Requires large capital expenditure, unlikely to provide economic benefit, or help impacted groups but will likely be accepted by the public and will be CAZ compliant.	**No** – Would support and enable changes in response to license changes but difficult to offer meaningful incentives which comply with State Aid Regulations.

Mitigation Measure	Primary CSF	Secondary CSF	Bring to Shortlist?
Reduce traffic congestion by staggering business and school hours	**Poor** – Unlikely to provide air quality benefits in the required timescale.	**OK** – Good value for money. But will not aid impacted groups or provide health improvements.	**No** – Can't be implemented before a CAZ could achieve compliance. Cannot practically change business hours. Also, could lead to an increase in trips across the day, worsening air quality.
Deliver Bath air quality publicity campaign	**Poor** – Will not directly influence people to change their behaviour and improve air quality.	**OK** – Good value for money, and key to advertise the CAZ. But will not aid impacted groups or provide health improvements.	**No** – This should form part of the engagement package within the Feasibility Study, but would not deliver long-term air quality benefits.
A36/A46 Link Road	**Poor** – Will not be provided in the required timescale.	**Poor** – Requires a lot of capital expenditure, will not aid impacted groups or provide health improvements.	**No** – Cannot be delivered before a CAZ would achieve compliance or in time to be a mitigation measure. Continue to progress through GAB Transport Strategy.
Review existing delivery hours restrictions for businesses in Bath City Centre and amend where beneficial and viable	**Poor** – No guarantee you will find amendments large scale enough to affect air quality significantly.	**OK** – Is CAZ framework compliant, will be publicly acceptable and provide economic benefits, but requires lots of capital expenditure, doesn't help impacted groups and may be unacceptable to businesses.	**No** – There are existing delivery restrictions in the core of Bath, but this could be extended to increase the impact. Being progressed through Public Realm Movement Strategy and GAB Transport Strategy.
Provide a coach park outside the city centre	**Poor** – Will increase coach trips into the centre and so negligible impact on air quality.	**Poor** – Will not help impact groups or public health, will not provide economic benefits and is unlikely to be acceptable to public.	**No** – May increase coach trips between drop-off and parking locations, but could reduce circulating and/or idling coaches in AQMA. Overall impact on air quality likely to be negligible, or possibly detrimental, unless combined with P&R service to avoid need for coaches to travel in city centre. Being progressed as part of Coach Parking Strategy.
Promote use of low emission vehicles for freight, refuse, recycling and delivery services, where possible	**Poor** – Will not provide direct air quality improvement and may not be accepted by businesses.	**OK** – Likely to have large upfront cost for lower economic benefit, will be public acceptable but unlikely to aid impacted groups.	**Yes** – This is being progressed through the Go Ultra Low project and ongoing Council contract renewals.
Encourage operators to offer lower delivery charges if already visiting area	**Poor** – Unlikely to provide air quality benefits in the required timescale.	**OK -** Unlikely to aid impacted groups or public health or provide economic benefits, but would be publicly acceptable and be compliant with the CAZ framework.	**No** – Can't be implemented before a CAZ could achieve compliance or in time to be a mitigation measure. Continue to progress through Bath AQAP

Mitigation Measure	Primary CSF	Secondary CSF	Bring to Shortlist?
Introduce a revised TRC mandating that buses meet the Euro 6 emissions standard	**Good** – If implemented quickly it would lead to large improvements in air quality, however would be opposition from bus operators.	**OK** – Will be compliant with the CAZ framework and provide health improvements, but will require large capital and leave the council open to financial penalty	**No** – This will now be progressed by WECA and timescales are uncertain since WECA policy is only just emerging. Risk that if operators cannot replace their vehicles quickly in response to a TRC services could be discontinued, causing a knock-on increase in car traffic.
Increased utilisation of van club network in Bath	**Poor** – Unlikely to provide an air quality benefit, due to small scale.	**OK** – Unlikely to provide air quality or impacted group benefit but could see economic benefit and likely to be publicly supported.	**No** – Limited impact on air quality due to small % of trips, largely useful for less frequent trips (i.e. not commuting).
Supporting and enhancing the public transport network	**Poor** – Will take time to implement and no guarantee people will uptake once in place.	**Good** – Would aid impacted groups, provide good economic benefit, but acceptable locally and comply with the CAZ framework.	**No** – Corridor improvements and priority schemes identified but designs not sufficiently advanced for CAF. Consider for revenue as work progresses.
Sunset period to exempt Euro 5 diesel vehicles to enable longer for upgrades	**Poor** – Will likely hinder speed of compliance with air quality limits.	**OK** – Likely to be popular and some economic benefits along with aiding impacted groups, however, will not help to improve air quality and not compliant with the CAZ framework.	**No** – Being considered as part of the scheme design, with particular focus on impact on when compliance can be achieved.
Converting the experimental TRO for the bus lane on London Road at Lambridge to a permanent TRO	**Good** – Measure will further improve air quality along the London Road.	**Good** – Low upfront cost, already established scheme, will provide economic, air quality and impacted group benefits.	**No** – The measure is already being progressed elsewhere.
Bus priority measures at traffic signals.	**OK** – provides localised air quality improvements.	**OK** – Should provide mild benefits to impacted groups, air quality and economically.	**No** – Priority schemes identified but designs not sufficiently advanced for CAF. Consider for revenue as work progresses.
Rate relief/exemption for businesses within the zone	**Poor** – Does to target air quality improvements.	**Poor** – Not compliant with CAZ framework, will not provide direct air quality improvements and will not impact affected groups or economic benefits.	**No** – Impractical to target businesses most affected by CAZ and therefore could provide businesses not affected with a discount.
Visitors' CAZ permits providing an exemption for residents/businesses to use when employing local tradesmen, etc.	**Poor** – Will not help speed up air quality improvements.	**OK** – Will provide economic benefits locally, will help impacted groups and low capital cost, but will not improve air quality and is not compliant with the CAZ framework.	**No** – Being considered as part of the scheme design, with particular focus on impact on when compliance can be achieved.
Provide further security at all three P&R sites to encourage use by LGV users	**Poor** – Will not help speed up air quality improvements.	**OK** – High capital cost, but will aid impacted groups, provide economic, health and air quality benefits and be acceptable locally.	**No** – Uptake likely to be limited. Consider for revenue as scheme progresses.

Mitigation Measure	Primary CSF	Secondary CSF	Bring to Shortlist?
Park and Ride Concession for LGVs	**Poor -** Will not directly help speed up air quality improvements.	**OK** – High capital cost but could indirectly aid impacted groups to provide an alternative to paying the charge	**No** – Uptake likely to be limited. Consider for revenue as scheme progresses.
Provide EV charging points for LGVs	**Poor -** Will not directly help speed up air quality improvements.	**OK** – Would aid impacted groups and be acceptable locally and comply with the CAZ framework, however large capital expenditure required.	**No** – Provision of EV charging points is being considered elsewhere for all vehicle types.
Retrofit funding for registered, local Euro 3/4/5 buses.	**Good** – Will provide air quality improvements and speed up compliance with the CAZ.	**Good** – Provides air quality improvements and economic benefits, aids impacted groups and will be acceptable locally, however, will involve large upfront cost.	**Yes** – Provides additional air quality improvements and mitigation. Enables bus operators to continue to maintain existing services. Upgrading of registered, local buses from non-compliant to compliant is required to achieve compliance with the preferred option by 2021.
Retrofit funding for registered, local Euro 4/5 HGVs once the technology becomes available	**OK** – If expected uptake could see short team air quality improvements, though likely to be long term. Technology may not be available in timescale required.	**OK** – Large upfront cost, but will provide air quality and economic benefits when technology is available.	**Yes** – Provide option under financial support scheme for use should technology become available.
Financial support (grants) for replacing pre-Euro 6 diesel and pre-Euro 4 petrol vehicles compliant ones	**Good** – Can be implemented in the short term and should provide air quality improvements.	**Good** – High capital cost, but will aid impacted groups, provide economic, health and air quality benefits and be acceptable locally.	**Yes** - Would mitigate the impact of the scheme on affected groups, while speeding up the expected compliance rate, leading to an increase in air quality.
Financial support for electric charging points on private land for commercial vehicles	**OK** – If expected uptake could see short team air quality improvements, though likely to be long term.	**OK** – Likely to provide large economic benefit, air quality and public health, though large capital required.	**Yes** – Provide option under financial support scheme to support uptake of electric vehicles.
Financial support (interest free loans) for replacing pre-Euro 6 diesel and pre-Euro 4 petrol vehicles with compliant ones	**Good** – Can be implemented in the short term and should provide air quality improvements.	**Good** – High capital cost, but will aid impacted groups, provide economic, health and air quality benefits and be acceptable locally.	**Yes** – Would mitigate the impact of the scheme to local businesses, while speeding up the expected compliance rate, leading to an increase in air quality.
Provide travel advisors to facilitate the use of the mitigation schemes by the impacted groups	**Poor -** Will not directly help speed up air quality improvements.	**Good** – Low capital cost but will aid impacted groups and be locally acceptable.	**Yes** – This measure will support the implementation and uptake of the mitigation schemes, and may indirectly improve air quality.
Delivery and servicing plans for businesses	**OK** – If expected uptake could see short team air quality improvements, though likely to be long term.	**Good** – Low capital cost for long term economic, air quality and health benefits, will also help to aid impacted groups.	**Yes** – Personalised travel advice will help affected businesses establish alternative methods for their service and delivery needs. Potential for longer term beneficial changes in behaviour.

Mitigation Measure	Primary CSF	Secondary CSF	Bring to Shortlist?
Last mile delivery - Develop a Bath freight distribution centre, providing storage (for stock replenishment) and delivery depot for local businesses, supported by electric cargo bikes and Ultra-Low Emission Vehicles	**OK** – If expected uptake could see short team air quality improvements, though likely to be long term.	**OK** – Likely to have large upfront cost for lower economic benefit, will be public acceptable but unlikely to aid impacted groups.	**Yes** – This would expand upon and complement the Go Ultra Low pilot scheme and provide robust alternatives for businesses and vehicles affected by the CAZ.
Last mile delivery - Provide electric cargo bikes and Ultra-Low Emission Vehicles	**OK** – If expected uptake could see short team air quality improvements, though likely to be long term.	**Good** – Would aid impacted groups and be acceptable locally and comply with the CAZ framework.	**Yes** – This would expand upon and complement the Go Ultra Low initiative and provide robust alternatives for businesses and vehicles affected by the CAZ.

2.5 Measures to be supported through revenue

Several other measures were proposed to further help improve air quality in Bath, mitigate the impacts of the scheme and support local sustainable transport and travel initiatives. These measures will be funded through any revenue raised by the CAZ and are listed below:

- Enhancing the non-charging measures already being funded by the Government's Implementation Fund and Clean Air Fund;
- Enhancing the monitoring and evaluation of the Scheme (and implementing the contingency plans if required);
- Maintaining and enhancing the existing walking and cycling network and creating low traffic neighbourhoods;
- Supporting walking, scooting and cycling to school initiatives and creating school streets;
- Supporting and enhancing the public transport network, including home to school transport;
- Maintaining and enhancing the public electric vehicle charge point network;
- Supporting and enhancing sharing schemes such as the electric cycle hire scheme and car and van club network;
- Providing additional park and ride capacity and security at the existing park and ride sites and on existing bus routes;
- Providing schemes to reduce the impact of vehicles on the health and wellbeing of residents and visitors;
- Supporting the development of a mobility as a service (MaaS) platform; and
- Related research and policy development.

2.6 Shortlist of Mitigation Measures

As a result of the assessment, the following mitigation measures have been shortlisted for inclusion in the CAF request. It is recognised that some of these measures are complementary to one another and could be better combined to offer a package to affected groups; it is indicated below where this approach has been taken.

The shortlisted items included in the CAF submission are:

- Expanding the existing CBTF programme by providing additional funding for retrofitting registered, local Euro 3/4/5 buses
- Financial support for replacing pre-Euro 6 diesel and pre-Euro 4 petrol non-compliant vehicles with compliant ones. This combines:
    - Financial support (grants) for replacing pre-Euro 6 diesel and pre-Euro 4 petrol non-compliant vehicles and taxis/PHVs with compliant ones

  - Financial support (interest free loans) for replacing pre-Euro 6 diesel and pre-Euro 4 petrol non-compliant vehicles and taxis/PHVs with compliant ones
  - Complementary financial support for electric charging points on private land in order to encourage the uptake of electric vehicles
  - Complementary financial support for retrofitting in order to allow cheaper, non-compliant vehicles to be made compliant
- Provide support and facilities for alternative delivery and servicing options for businesses. This combines:
  - Delivery and servicing plans for businesses
  - Increased utilisation of the car/van club in Bath, with an emphasis on increasing the number of ULEVs available to businesses
  - Expanding the proposal (included in Go Ultra Low package) to introduce 'last mile' electric cargo bike hire to the city
- Provision for a sustainable travel and transport team to facilitate the use of the mitigation schemes by the impacted groups is also included.

For each of these measures, the following sections provide a detailed description, including:

- A description of the measure;
- A delivery plan for the measure;
- Quantification of the scheme explaining the methodology used to calculate the number affected stakeholders and the funding required;
- Demonstration of how the measure represents value for money.

2.7 Impact on Compliance Data

The set of measures proposed will not delay the date of compliance, because:

- The measures are designed to aid businesses to upgrade to or retrofit to cleaner compliant vehicles or change to alternative modes earlier than they would otherwise, therefore, it is not expected that any measures would delay compliance. The upgrading of registered, local buses from non-compliant to compliant is required to achieve compliance with the preferred option by 2021.
- It is assumed that commercial fleets, as are being targeted with these measures, would switch their vehicle as a result of the CAZ over time, irrespective of the CAZ. Therefore, the measures proposed should not slow down the rate of compliance but instead make it easier for those who will be forced to upgrade or retrofit vehicles or review their delivery and servicing plans.

2.8 Basis of Costs

In order to determine the total funding request, the base costs were derived using supplier information and data in current prices (2019), however these are presented as nominal values (i.e. with inflation) when expenditure is forecast in future years. Rates of inflation are based on government forecasts from the Office for Budget Responsibility and are as follows:

- 3.5% for capital expenditure (CAPEX)
- 3% for staff operational expenditure (OPEX)
- 2.9% for maintenance operational expenditure (OPEX)

The cost build-ups for each measure show where inflation has been applied and at what rate.

2.9 Summary of Shortlisted Measures

Table 2-4: Summary of shortlisted measures

Measure	Group Impacted	Geographic Scope	Summary of Measure	DEIA	Cost
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.	Local bus operators who offer regular services into the CAZ may be disproportionally impacted, and may resort to passing charges onto customers. This will allow them to continue to maintain existing services in B&NES, without fare rises, without which car use would be expected to increase.	**£2,214,486**
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 grants and/or interest free loans, 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 second-hand compliant vehicle. This 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.	Businesses and charitable organisations operating coaches/HGVs/LGVs or relying on road transport and taxi drivers will be disproportionately impacted. Vehicle capital costs are high, and many fleets must enter CAZ as part of business operation. This helps fleets and privately-owned LGVs change to a compliant vehicle.	**£11,222,182**

Measure	Group Impacted	Geographic Scope	Summary of Measure	DEIA	Cost
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.	Businesses operating coaches/HGVs/LGVs or relying on road transport for day-to-day operation will be disproportionally impacted. This measure will help fleets to plan their activities efficiently and economically, reducing their environmental impact.	**£1,143,047**
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 implement a sustainable travel and transport team 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. A team is also proposed to lead the supporting measures.	Measure will support all affected groups to use the mitigation measures available to them and ensure smooth operation of the supporting measures.	**£1,607,444**
				Total (Assuming upper uptake for financial support scheme)	**£16,187,159**

3. Overall Approach to Value for Money and State Aid

3.1 Approach to Value for Money Assessment

The economic analysis underpinning the business case for Bath's Clean Air Plan is predicated on the following economic impacts accruing as a result of intervention:

- Air Quality – changes in emissions of NO_2 and PM10 resulting in improvements in public health;
- Active Mode – changes in number of walking and cycling journeys resulting in changes in public health;
- Traffic Flows – changes in number and flow of vehicles, resulting in changes in travel time and operating costs for vehicle users;
- Accidents – changes in number of road traffic incidents, resulting in changes to public health;
- Consumer Welfare – linked to loss of consumer surplus resulting from:
    - costs associated with upgrading to a compliant vehicle; and
    - changing travel behaviour in direct response to a CAZ (e.g. switching modes, cancelling journeys, avoiding zone);
- Vehicle Scrappage – changes in number of vehicles scrapped earlier than they otherwise would be, as vehicle users upgrade to new vehicles;
- Transactions – changes in time and extent of searching for new vehicles, as vehicle users upgrade to compliant vehicles; and
- Greenhouse Gas Emissions – changes in carbon emissions, resulting in improvements in public health.

Individuals and businesses experience these range of impacts to different extents and ascribe different values to each impact category. For example, the cost of upgrading (influencing the consumer welfare impacts) will vary for different commercial vehicle operators, including HGV, LGV and bus companies. Within this context, a range of Clean Air Fund mitigation measures have been identified as part of this document, designed to offset the differential economic impact of the Clean Air Plan on these different road users. The Value for Money for each mitigation measure can be assessed based on the extent to which any negative economic impacts are offset. The analysis in this document measures the extent of mitigation in two ways:

- Direct offset of costs that would otherwise be incurred by road users. The negative impact of the CAZ is removed by the provision of monetary compensation or alternative modes for affected groups, meaning that costs that would otherwise be incurred by road users are avoided.
- Allocated benefits from the economic model. Where mitigation measures were explicitly included within the core economic model, the outputs of that model can be ascribed to a particular intervention.

Table 3-1 summarises the approach to estimating the economic impacts of each proposed mitigation measure. The 'additional retrofit funding for registered, local Euro 3/4/5 buses' lends itself to the allocation of benefits from the economic model, as the measure was explicitly included within the core economic modelling. As a result, removing the retrofitting measure from the economic model provides a direct proxy for understanding the negative externalities on bus companies.

For the grant component of the 'financial support for non-compliant vehicles' mitigation measure, the grant will offset the cost of upgrading for eligible individuals and businesses. Hence, the benefit of the mitigation measure is the level of funding which offsets the cost of upgrading (plus interest), based on a 1:1 ratio.

For the finance component of the 'financial support for non-compliant vehicles' mitigation measure, a transfer payment will remove administration and interest costs for businesses who may otherwise upgrade via a commercial finance arrangement. Hence the benefit of the mitigation measure is level of funding which offsets the cost of interest (plus default costs and admin fees), based on a 1:1 ratio.

For the ‘delivery and servicing options for businesses’ mitigation measure, benefits were estimated based on the avoided cost of CAZ charges for non-compliant HGVs and LGVs owing to consolidated freight movements. It is assumed that non-compliant HGVs and LGVs would pass the cost of any CAZ charge on to the businesses they are delivering to, meaning the avoided cost represents a benefit to local businesses within the CAZ boundary.

For the final mitigation measure ‘provide a sustainable travel and transport team’, no direct monetisable benefits are assumed. Instead, this measure is considered to be critical to ensuring that the other mitigation measures work to their maximum capacity.

The Value for Money sections for each mitigation measure in Sections 4 to 6 will demonstrate that the measures generally represent low value for money individually and in aggregate. However, B&NES is of the view that low Value for Money from a traditional cost-benefit analysis perspective does not reflect the full scale of impacts that will result from the mitigation measures. For example, non-quantifiable benefits are not captured as part of the monetised analysis. As such, the Value for Money assessment for each mitigation measure includes a section on additional non-quantified benefits. Further, B&NES is committed to minimising the impact of the Clean Air Plan on individuals and businesses whilst ensuring compliance with air quality standards (i.e. by avoiding further exemptions or concessions). Hence, B&NES consider the proposed set of measures to be the best approach to achieving this commitment.

Note that the Value for Money analysis within this report does not apply optimism bias to the mitigation measure costs. Optimism bias is applied in Section 3.8 of the Economic Case of the main FBC document, which details the economic appraisal of the CAF mitigation measures.

Table 3-1: Economic impact of mitigation measures (Part 1)

Measure	Description	Air Quality	Active Modes	Traffic Flows	Accidents	Consumer Welfare	Vehicle Scrappage	Transactions	Greenhouse Gas Emissions
Additional retrofit funding for registered, local Euro 3/4/5 buses	In the absence of bus retrofits, most bus companies are induced to upgrade to new or used (compliant) vehicles. This leads to significant upgrade costs for commercial operators. Where new vehicles are purchased, some older (non-compliant) vehicles will be scrapped resulting in additional economic costs. Further, some bus services are likely to be cancelled or avoid the zone, further affecting consumer welfare. The resolution of the economic model does not allow independent modelling of other economic impacts as they are reliant on full transport and air quality runs which have not been undertaken for this exercise.	No	No	No	No	Yes	Yes	No	No
Financial support for replacing pre-Euro 6 diesel and pre-Euro 4 petrol non-compliant vehicles with compliant ones	The grant is to be provided to approx. 1,031 qualifying vehicles. Provision of a grant removes the upgrade cost attributable to approx. 1,031 businesses/individuals, as estimated in Table 5.12. The interest-free finance is to be provided to approx. 1,733 qualifying vehicles. The finance structure means that whilst recipients do not avoid the upgrade cost attributable to businesses/individuals within the core economic model, they can save on interest costs associated with purchase of compliant vehicles via a commercial finance agreement. The funding therefore directly offsets business expenditure at a 1 to 1 ratio.	No economic model output. Number of upgrading vehicles eligible to receive financial support (via grant or loan) is outlined in Table 5.12. Relationship between funding and avoided costs (either full cost of upgrading in for grant recipients or interest, default and administration costs for loan recipients) is assumed at 1: 1 ratio.							

Measure	Description	Air Quality	Active Modes	Traffic Flows	Accidents	Consumer Welfare	Vehicle Scrappage	Transactions	Greenhouse Gas Emissions
Provide support and facilities for alternative delivery and servicing options for businesses	This mitigation measure will reduce the need for non-compliant freight vehicles to enter the CAZ. Based on the assumption that non-compliant freight vehicles will pass on any CAZ charge to the businesses they serve, reducing the number of non-compliant freight vehicles will allow businesses to 'avoid' additional operating costs associated with the CAZ charge being passed on by freight companies. Further, the measure will support the other mitigation measures in delivering their stated objectives.	No economic model output. Number of non-compliant freight vehicles removed from network estimated based on: • Number of businesses receiving delivery and servicing plans (80 businesses, assumed to received 1 x non-compliant freight vehicle delivery 6 x days per week); • Number of electric vehicles supported by the electric the car/van club (16 vehicles, replacing 16 non-compliant freight vehicle entries per day); • Number of electric cargo bikes (12 bikes, replacing 12 non-compliant freight vehicle entries per day). Removal of non-compliant freight vehicles will lead to avoided costs for local businesses, as the CAZ charge incurred by freight companies will no longer be passed on to local businesses.							
Provide a sustainable travel and transport team to facilitate the use of the mitigation schemes by the impacted groups	This mitigation measure will support the other mitigation measures in delivering their stated objectives. No direct monetizable benefit assumed.	No direct monetisable benefit assumed.							

3.2 State Aid

Section 3.2 of this report has been prepared by BDB Pitmans[6] and outlines the general approach to State aid. More detailed considerations of State aid issues are, where relevant, set out at the end of this Section.

3.2.1 Definition of State Aid

State aid arises where aid derived from State resources (in whatever form) has the potential to distort competition and affect trade by conferring a benefit on certain undertakings, unless it is specifically allowed by the EU Treaty (**TFEU**) or exemptions made under it.

In brief the relevant tests are:-

- whether there is a transfer of State resources (which includes advantages such as tax breaks, grants, subsidies, sales at an undervalue);
- the aid provides a selective economic advantage to an undertaking carrying on an economic activity (i.e. offering goods/services to the market);
- the aid has the potential to distort competition; and
- the aid has the potential to affect trade between Member States (this being easily satisfied).

Addressing the above, the following tests must be applied to an exemption or relief from a burden otherwise imposed by the State. (This includes the provision of an interest free loan to aid transition and thereby mitigate the impact of the imposition of a CAZ):

1) Is the assistance granted by the state or through state resources?

- An exemption or relief from a tax or charge imposed by the State (e.g. B&NES) or the making available of interest-free finance with a view to mitigating its impact would constitute assistance granted by the State.

2) Does the assistance or relief give an advantage to one or more undertakings over others?

- An '**undertaking**' is an entity carrying out economic activity. Support to entities not partaking in economic activity is not classified as State aid. Accordingly mitigations and exemptions targeting individuals (but not individuals running a business) are not classified as State aid.
- If the exemption or mitigation is available to one business but not another in a similar market place it is likely to advantage one undertaking over another.

3) Does the assistance or mitigation distort or have the potential to distort competition?

- Any advantage given to one business over another (e.g. receipt of interest free finance from a public authority) has the potential to distort competition.
- Those undertakings benefitting will gain a commercial advantage over those that are not able to benefit.
- If the assistance or mitigation is available to all of a class in the market place i.e. no one class has an advantage over another but all are equally able to benefit, there is unlikely to be a distortion of competition or (if properly administered) a threat to the distorting of competition.

4) Does the relief affect trade between Member States?

- The test for this, although difficult to envisage in the context of the Bath CAZ because of the localisation of the measures and the unlikelihood of impacting upon the single market, is generally regarded as easily met. In other words an effect on trade between Member States is usually assumed.

It is to be noted that EU law also provides exemptions in circumstances where State aid is present. These generally reflect the Commission's experience as enforcers of the State aid rules that small measures of aid or aid directed at achieving certain social benefits such as cohesion and support for poorer regions does not have a distortive effect on the single market. An exemption authorising a limited amount of aid, known as the *de minimis*

[6] BDB Pitmans (June 2019) *Advice – State aid considerations re. proposed mitigation measures*

exemption, permits a business to enjoy aid of €200,000 across a rolling three year fiscal period. This is reduced to €100,000 in respect of HGV fleet operators, and cannot be used for the acquisition of road freight transport vehicles.

Applying these principles, it seems likely that a proportion of the proposed mitigation measures fulfil criteria 1-3, in particular the additional retrofit funding for local Euro 3/4/5 buses and the financial support for replacing pre-Euro 6 diesel/Euro 4 petrol vehicles, though none appear to fulfil criteria 4. It also seems that insofar as any advantage is derived by those businesses able to take advantage of the limited concessions available, where for example applications for funds are rejected or during an anticipated handover period, these are likely to be of only minimal benefit in the context of the overall scheme and likely to be covered in any event by the *de minimis* exemption.

It is also notable that one of the purposes of the scheme is to mitigate the impact of the CAZ charge on those least able to absorb its effects, for example SMEs. The relative benefit of the scheme would in any event only help to put those business back into the same or a similar position they were in before the scheme comes into play and it is considered that as a consequence the likelihood of a distortive effect resulting from the scheme is minimised.

Table 3-2: State aid considerations relating to retrofit funding for Euro 3/4/5 buses and financial support for replacing pre-Euro 6 diesel/Euro 4 petrol vehicles

Mitigation Measure	Summary description	Comments on state aid issues arising	Potential solution
Additional retrofit funding for registered, local Euro 3/4/5 buses	Financial assistance in the form of a grant, provided through the CAF, which a local bus company can use to retrofit or repower its Euro-5 or older buses. Beneficiaries are the local bus fleet.	The bus fleet companies are commercial operators. The financial assistance constitutes an aid. In state aid terms, the question is whether the aid (i.e. in the form of a grant) has the potential to distort competition or to affect trade between member states, and this is to be assumed if an operator's position has been strengthened against another's. **It would be difficult to argue that the market for local buses is distorted on the assumption that that the grants are available to all operating in that market.** Moreover the grant is to facilitate the operators absorb costs they would not ordinarily have incurred. There is the possibility of market distortion if adjacent area local bus operators are deprived of the advantage. However by definition the local market itself is unaffected. It can be assumed that adjacent area local bus operators are outside the relevant market. Having regard to the fact it is the local bus market under review it is difficult to see how trade between Member States can be affected by the aid.	If state aid is present, *de minimis* aid is available for each single recipient bus operator to the amount of 200,000 Euros over a three-year fiscal period. In any event it is proposed that Operators will be required to apply to the Council for funding through the a competitive process set out in Section 4.
Financial support for replacing pre-Euro 6 diesel and pre-Euro 4 petrol non-compliant vehicles with compliant ones. Available to those in surrounding authorities	Financial assistance in the form of grants and/or interest free finance to reduce the burden of transition of LGV, HGV, coach, bus and taxi/PHV fleets to compliant vehicles. Assistance can be used for the purchase or lease of new or second-hand compliant vehicles or cost of retrofit installation or purchase of low emission vehicles and charging infrastructure	Grants or interest free finance for the purposes of retrofit and purchase or lease of new or second-hand compliant vehicles or new low emission vehicles is financial assistance constituting an aid. **However, because the assistance is available to all B&NES businesses, including those located in neighbouring authorities which have premises in the CAZ or have vehicle movements in the CAZ there is very little prospect of real or potential distortion.** Because of the purpose of the aid which is to assist transition to compliant vehicles i.e. to mitigate for a burden which has been imposed, it is very difficult to see that the aid could have any impact on trade between Member States.	If State aid is present the *de minimis* exemption will still be available subject to various criteria. Coaches, private hire and hackney carriage and LGV operators, irrespective of whether the assistance is revenue or capital, under the *de minimis* rules, would be eligible for an exemption for each single undertaking up to 200,000 Euros over a three-year period for the cost of retrofit and purchase/lease. The maximum *de minimis* aid funding for an undertaking performing road freight transport for hire or reward is 100,000 Euros over a three-year fiscal period. This would be available for undertakings for the cost of retrofit. In any event it is proposed that vehicle owners and operators will be required to apply to the Council for funding through the process set out in Section 5

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

4.1 Description of Mitigation Measure

Upgrading of registered, local buses from non-compliant to compliant is required to achieve compliance with the preferred option. Retrofitting these vehicles, a process where emissions reduction technology is added to the vehicle's existing engine, allows for this to be achieved at both a lower cost and environmental impact than fully replacing buses. This is particularly relevant for newer buses which have a significant remaining useful life.

Detailed discussions have been held with local bus operators to understand the existing bus fleet and how many of those vehicles the operators could reasonably manage to upgrade themselves. Operators have confirmed willingness to participate in a retrofitting scheme, and a letter of support from each operator is included in Appendix A. This measure would provide the funds required for local bus operators to complete the balance of the required upgrades so that the entire fleet is compliant with the CAZ framework standards ahead of the zone coming into force.

It will be in the form of a grant, provided through the CAF and use the same terms and process as the existing Clean Bus Technology Fund (CBTF) bus retrofit programme, which a local bus company can use to retrofit or repower its Euro-5, or older, buses. The local companies who have been confirmed as running a local bus service are:

- **Arleen Coach Hire & Services**
  - Provides a local bus service between Peasedown St. John and Bath. It is important that this service is maintained for the residents of the local area, especially those who rely on the bus services to access Bath City Centre and services within Bath.
- **Bath Bus Company**
  - Provides tourist buses in and around Bath City Centre and operate the 'Air Decker' between Bath and Bristol.
  - The tour bus service is popular among tourists, having a large economic impact on Bath and it is important that the costs of the CAZ are not passed on to tourist – potentially jeopardising a key attraction in the City.
  - Bath Bus Company has made lowering emissions a prominent feature of their operation with the investment in three Euro VI buses (and scheduled purchase of four new Euro VI buses for the 'Air Decker' service - 2 in 2019 and 2 in 2020) and becoming the only provider of tour bus services in Bath since 2004 due to being the only company able to meet the minimum Euro III Traffic Regulation Conditions imposed in 2004. Bath Bus Company had a number of tour buses retrofitted by Green Urban Technologies under the CBTF2 scheme, but this was prior to the introduction of the Clean Vehicle Retrofit Accreditation Scheme and the retrofitted vehicles are not certified as Euro VI. As these buses are older (circa 2005), but with a lower mileage (tour buses usually travel a tenth of the mileage of a normal public service bus) and retrofitting of CVRAS approved technology is not thought to be viable for buses of this age and specification, it is proposed that these vehicles are repowered (i.e. a new engine is installed, either with or without retrofitting).
  - Due to the high frequency of both the tour and 'Air Decker' buses in Bath and their frequent stops, improving their emissions will have a significant impact on the air quality in Bath.
- **CT Coaches**
  - Provides local bus services to and from villages on the outskirts of Bath in addition to six services that provide crucial links between otherwise unserved suburban areas and it is important that these services are maintained especially for those who rely on the bus services to access Bath City Centre and services within Bath.
- **Faresaver**

- Provides a variety of regular local services to and from surrounding towns in Wiltshire and North Somerset including: Chippenham, Frome, Devizes, Melksham, Corsham and Colerne. These need to be maintained to allow commuters and visitors unable to, or who do not wish to drive, access to Bath City Centre and services in Bath.
- Provides a number of school and college services into Bath, which are vital for some teachers and students to access education, mitigating the impact of the CAZ implementation on children and young people.
- Faresaver until recently has focussed their business on buying and selling buses. This meant that their fleet maintenance was developed to a high standard in order to prepare vehicles for sale. Since the plans for the Bath Clean Air Zone were announced, they have begun to focus on holding onto their younger (Euro IV and V) vehicles more able to be retrofitted, in order to meet the CAZ framework standards.

- **First Bus**
  - Is the largest bus service provider in Bath, with numerous services in and around Bath, but also further afield to Frome, Shepton Mallet, Wells and Bristol City Centre. The outlying towns and villages rely on regular First bus services for commuting and accessing vital services.
  - Provides high frequency services to both of the Universities in Bath, which is the primary method of travelling to and from the city centre to these campuses.
  - Operates all three Park and Ride services in Bath.
- **Wiltshire**
  - There are a number of operators currently providing infrequent but vital supported services between outlying villages and central Bath. These are mostly run using minibuses and coaches and are subject to the DDA Compliance standards coming into force in December 2019. As such, it is not yet known what vehicles will be operating these services, but contingency is included in this document to ensure that these services can be retrofit or repowered and are not lost. The DDA compliance requirements may mean that the smaller operators who are more inclined to provide these services will need Clean Air Fund support to ensure viability and continuity of these services.

4.2 Delivery Plan

Figure 4-1 presents the key stages for delivery of this scheme, with further details in the section below.

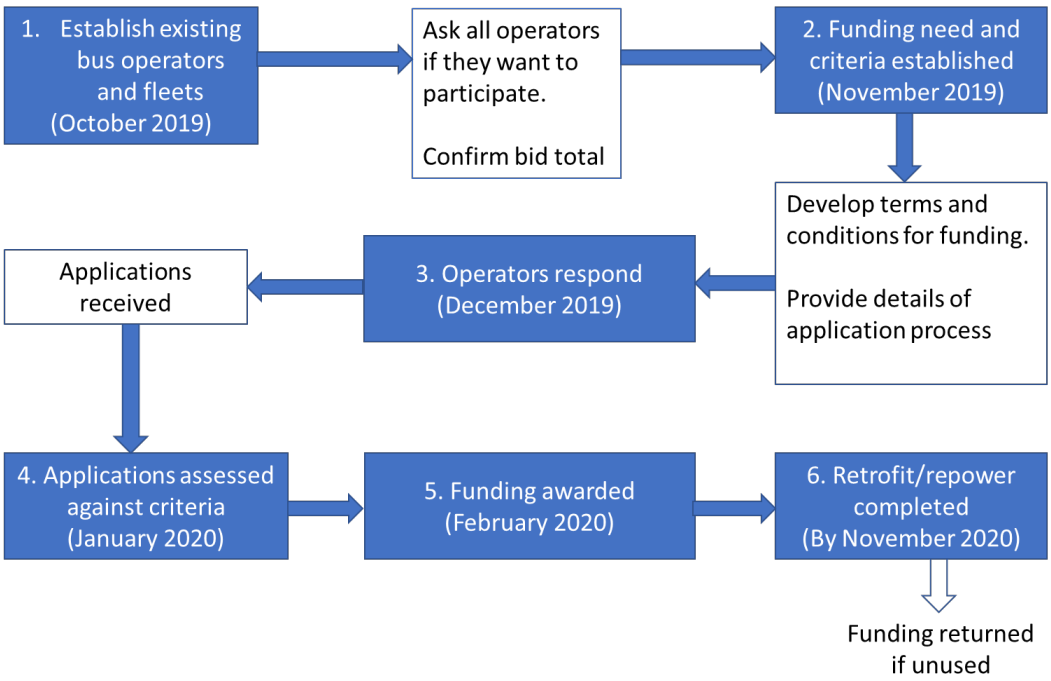


Figure 4-1: Delivery plan for the retrofit funding for local Euro 3/4/5 buses

1) Establish existing operators and fleets

A series of regular meetings have been undertaken with local bus operators. In the first instance operators have been asked to confirm their position in upgrading their fleets for compliance. As well as First Bus, the largest operator in the area, there are a number of smaller operators, some of which run services to more rural areas, which need support to upgrade their fleets in time for the commencement of the CAZ.

Details on the existing fleets, including any plans or intentions to update these fleets, have been obtained through ongoing liaison with the operators. Details of the fleets for each operator are presented in Section 4.1. This information has been used to confirm the bid total in Section 4.3.

2) Funding need and criteria established

It is anticipated that all operators will require partial or full funding for retrofitting or repowering to be able to achieve compliance in the required timescales. The preference is therefore to provide the required support to all operators.

However, if insufficient CAF is awarded to support all operators funding need an allocation will be assessed based on the following hierarchy:

1. Is alternative funding available, either through CBTF or self-funding, to undertake the modification (to ensure that funding is targeted at those businesses with the greatest need).

2. How frequently will the vehicle enter the CAZ, or how many hours per day on average does the vehicle spend in the CAZ (to ensure that funds are targeted at those services with the greatest impact on air quality).

3. Does the vehicle service a key route for which alternative public transport options do not exist (to maintain existing services linking neighbouring areas or rural communities).

4. Does the vehicle operate a school service (which if lost could result in additional car journeys being undertaken within the CAZ).

A draft set of terms and conditions has been developed for the grant funding and is presented in Appendix B. The terms and process have been largely aligned to that of the existing CBTF. This will be supplied to applicants to inform the process.

3) Operators respond

Once the application information is finalised, it will be distributed to the operators. A deadline will be set for the receipt of applications in order that they can be assessed in parallel.

Applicants will be required to provide the following information:

- Number of vehicles to be modified, including makes and models
- Numbers of single-deckers and double-deckers
- Age and Euro-class of vehicles
- Name of engine manufacturer(s)
- Estimated annual mileage
- Details of the routes/services it operates
- Expected change in annual mileage as a result of modification
- Will the modification extend the lifespan of the vehicle, and if so for how long
- Estimated cost of purchasing and fitting the technology per vehicle
- Estimated annual operating costs/savings (including fuel) per vehicle over 5 years
- Estimated additional maintenance costs/savings per vehicle over 5 years
- Total cost of warranty for one year (if not included in cost of technology)
- Funding sought per vehicle (including one-year warranty but excluding other contributions and operational costs).
- Evidence that alternative funding options have been explored, for example from CBTF funding or self-funding

Applicants will also need to provide a schedule for delivery, including their proposed retrofit/repower solution and how this will be provided, and by whom. Operators will be asked to revisit their proposals if the date for final delivery of the retrofit/repower scheme is later than the commencement date of the CAZ.

4) Applications assessed against criteria

Applications will be assessed based on the criteria set out in the terms and conditions and other guidance issued to applicants. This is likely to take approximately 1 month. It is proposed that the specialist officer responsible for managing this scheme will also manage this process, supported by the existing CBTF funding team to ensure continuity and synergy, and draw upon existing experience.

To avoid an unfair / unequal level of support, if full funding is not awarded from the CAF, funding to each operator will be reduced by the same proportion.

5) Funding awarded

Payment will be released to the Recipient following the submission of the fully-completed, compliant application, a signed grant agreement and evidence that the equipment supplier has been commissioned to install the technology. At this point the operator will become bound by the terms and conditions of the grant funding.

6) Retrofit/repower completed

The following conditions will apply:

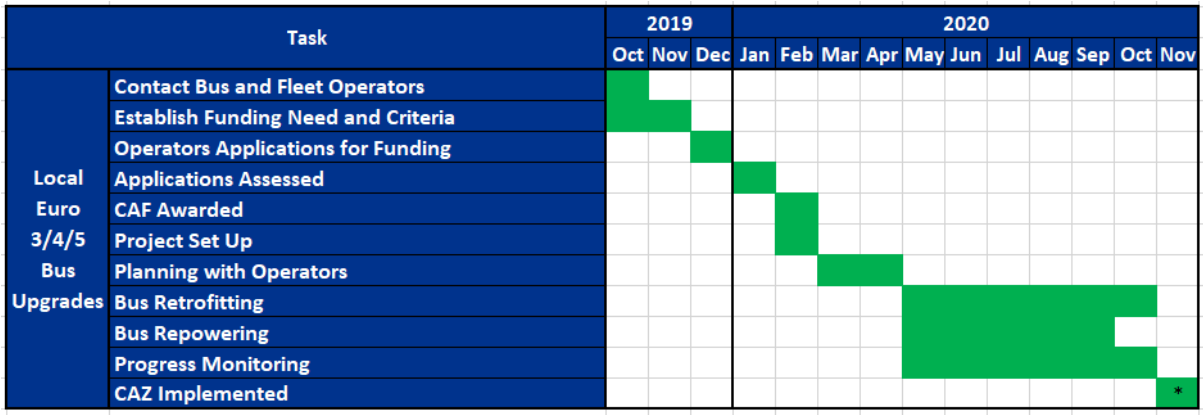
- Modified buses must remain operational and be used within Bath and North Somerset for at least five years following completion of the modification

- Retrofit equipment can be moved to a different vehicle, if required, to ensure continued operation of modified buses; and
- Modified buses must continue to operate predominantly on routes that include roads that are designated as having poor quality

Any unused funding will be required to be returned, as the recipient must not use the grant funding for purposes other than eligible expenditure.

Table 4-1 below presents on overview of the delivery schedule for this measure.

Table 4-1: Bus upgrade delivery schedule



4.3 Quantification of Package

In order to calculate the amount of funding requested from the CAF each company's buses and local services were evaluated. Depending on the age and engine type of the bus it was decided whether the bus could or could not be retrofitted, and if not, could it be repowered or were no upgrades possible. Listed below are the upgrades to be undertaken by the bus companies, with Table 4-2 below showing a summary:

- Arleen:
  - One Euro III Cummins bus to be retrofitted.
- Bath Bus Company:
  - One Euro III Volvo B9TL buses to be retrofitted
  - Two Euro IV Volvo B9TL buses to be retrofitted
  - Four Euro IV Volvo B7TL buses to be retrofitted
  - Five Euro V Volvo B9TL buses to be retrofitted; and
  - Seven Euro V Volvo B7L buses to be repowered with Euro VI engines (already retrofitted).
- CT Coaches:
  - One Euro V Mercedes Optare Solo to be retrofitted
  - One Euro IV Mercedes Optare Solo to be retrofitted; and
  - One Mercedes Sprinter to be retrofitted.
  - Older buses, 15 years +, to be reallocated outside of B&NES contracts.
- Faresaver:
  - Six Euro III Volvo B7TL double-deck buses to be retrofitted
  - Two Euro V Volvo B9TL double-deck buses to be retrofitted

- Six Euro IV ADL Enviro 200 Cummins single deck buses to be retrofitted
- Three Euro V ADL Enviro 200 Cummins single deck buses to be retrofitted
- Three Euro V Optare Solo Cummins single deck buses to be retrofitted
- Eight Euro V ADL Enviro 200 Cummins single deck buses to be retrofitted
- Nine Euro IV Optare Solo Cummins single deck buses to be retrofitted
- Three Euro V ADL Enviro 200 Cummins single deck buses to be retrofitted; and
- Five Euro IV ADL Enviro 200 Cummins single deck buses to be retrofitted.

- First Bus:
  - Six Euro IV B9TLs to be retrofitted
  - Eight Euro III B7RLEs to be retrofitted; and
  - Eight Euro III B7LAs buses to be retrofitted.
  - First Bus has committed to achieving compliance with the rest of their fleet utilising CBTF and self-funding.
- Wiltshire:
  - Funding for six future retrofits to be provided given the uncertainties over future operators and vehicles due to forthcoming December 2019 DDA requirements for coaches.

The proposed list of vehicles to be retrofitted includes those for which a CVRAS accredited solution already exists or those for which one will become available shortly. Retrofit equipment can be moved to a different vehicle, if required, to ensure continued operation of modified buses.

It is relevant to note that First Bus has committed £12,650,000 of match funding to upgrading their local fleet for compliance (including c. £650,000 of Clean Bus Technology Fund support); the vehicles affected and thus costs are not included within the totals set out within this funding proposal. First Bus is also having vehicles retrofitted under the existing CBTF programme, where possible, in order to reduce the burden on the Clean Air Fund.

The cost for each retrofit and repower are from feedback provided by operators who have had recent experience of this activity. They are assumed to apply in 2020 only as retrofits and repowers are to be completed before the CAZ start date in November 2020 (inflation for future years does not apply).

The cost of £20,100 for a retrofit comprises £15,000 for exhaust retrofit, £3,000 for an e-fan with 5-year warranty and £1,500 for a spare filter.

Seven buses will be repowered. Preliminary investigations into the feasibility of repowering these specific Euro 3 vehicles identifies that the most cost effective and workable option is to install Euro 4 or 5 engines and subsequently retrofit them to Euro 6. The £50,100 cost per vehicle is composed of £30,000 engine replacement cost (engine and staff time) plus £20,100 for the subsequent retrofitting.

Table 4-2: A Summary of Bus Retrofits and Repowers Under the Scheme

Bus Operator	No. Vehicles Retrofitted	Cost of Retrofit	No. Vehicles Repowered	Cost of Repower	Total
CAPEX					
Arleen	1	£20,100			£20,100
Bath Bus Company	12	£20,100	7	£50,100	£591,900
CT Coaches	3	£20,100			£60,300
Faresaver	45	£20,100			£904,500

Bus Operator	No. Vehicles Retrofitted	Cost of Retrofit	No. Vehicles Repowered	Cost of Repower	Total
CAPEX					
First Bus	22	£20,100			£442,200
Wiltshire Services	6	£20,100			£120,600
Total	**89**		**7**		£2,313,900
				TOTAL CAPEX (including 3.5% inflation for 2020)	**£2,214,486**

4.4 Value for money assessment

4.4.1 Quantifiable Impacts

By making non-compliant vehicles compliant, the retrofitting measure allows bus companies to avoid upgrading their fleet or cancelling services, which may occur in the absence of the measure. However, as the bus retrofitting mitigation measure was incorporated into the core economic model, these economic costs are avoided within the model. As such, it is possible to derive a proxy for the economic benefit of the measure by adjusting key inputs to the core model, to mimic a scenario where bus retrofitting does not take place and bus companies are forced to either upgrade or change their travel behaviours. Within this context, the negative economic impact of cancelling the bus retrofitting measure can be retrospectively added to the model, to understand the avoided cost of:

- Bus companies upgrading their fleet in response to the CAZ;
- Bus companies cancelling journeys or avoiding the zone as a result of the CAZ.

In order to model this scenario, the core economic model was adjusted to include assumptions around the scale and timing of bus upgrading and cancelled/foregone bus journeys in the absence of the bus retrofitting measure. The retrofit and repower measure will support some 96 non-compliant buses, as outlined in Section 4.3. In the absence of the retrofitting measure, these non-compliant buses will be expected to upgrade (at the expense of bus companies) or have their journeys cancelled. Based on the behavioural responses adopted in the model, some 94% of non-compliant bus trips (representing 75% of all bus vehicles) will be upgraded to compliant vehicles. Further, some 6% of bus trips will be cancelled and no longer travel into the zone.

With respect to the 96 non-compliant buses expected to benefit from retrofitting, these behavioural responses translate to some 72 vehicles incurring upgrade costs to bus companies in the absence of retrofitting (i.e. 75% of all non-compliant buses proposed for retrofitting). Further, some 1,500 unique non-compliant bus journeys will be cancelled in 2021 relative to the baseline, reflecting additional disbenefit to bus companies. The number of cancelled journeys relative to the baseline will fall over time, to 150 by 2030. These values are equivalent to 6% of all annual trips by non-compliant buses that will benefit from the retrofitting mitigation measure.

These behavioural responses will result in economic costs to the bus companies, as the cost of upgrading and cost of cancelling journeys increases. In terms of upgrading in the absence of bus retrofitting, the economic cost to bus companies can be summarised as follows (and is explained in more detail in Section 5.3.1 of FBC-18 ‘E1: Economic Appraisal Methodology Report)’:

- Vehicle age estimates were combined with the estimated vehicle values by age (based on depreciation rates) to estimate the residual value of vehicles by Euro Standard (a proxy for age), across vehicle types and across years;
- The cost differential between upgrading in 2021 and all other years in the appraisal period was calculated based on residual value of vehicles in each year;
- The differential proportion of vehicles upgrading in each year by baseline/intervention scenario was applied to the cost differential for upgrading in each year, to arrive at a weighted cost differential;

- The weighted cost differentials for upgrading was summed across all years to arrive at an aggregate cost differential;
- The proportion of vehicles upgrading (split by age, as indicated by Euro Standard) was applied to the aggregate cost differential for upgrading, to arrive at a blended average upgrade cost differential between the baseline and intervention.

Following this approach, a cost to upgrade was estimated at £43,500 per vehicle for switching to new vehicles. The equivalent upgrade cost for switching to second-hand vehicles was estimated at £9,400 per vehicle. As a result, the cost of upgrading will vary depending on any assumption regarding a switch to new or used buses. Adopting an assumption that all upgrading buses switch to a new vehicle, the economic cost of upgrading 77 non-compliant buses in the absence of the retrofitting measure is £3.2m (2019 prices). Assuming that all upgrading buses switch to a second-hand compliant vehicle, the economic cost of upgrading reduces to £0.7 million. However, given that the market for second-hand compliant bus vehicles is understood to be relatively small, it is likely that the choice to upgrade would require a switch to a new vehicle.

The economic cost of cancelling journeys is calculated as half of the value of the CAZ charge multiplied by the number of foregone trips per annum, undertaken by unique buses on a daily basis. This reflects the fact that the economic value of a cancelled journeys must be lower than the CAZ charge to induce cancellation of trip, otherwise the journey would continue to take place. However, as the economic value of the journey is not known, the mid-point between zero and the CAZ charge (i.e. half the CAZ charge) is applied as a proxy economic cost of cancellation. Based on this approach (see Section 5.3.2 of FBC 18 'E1: Economic Appraisal Methodology Report' for more details), a CAZ charge of £100 per daily bus entry translates to an economic loss of £50 per bus entry. Multiplied across a profile of annual journeys starting at 1,500 in 2021 and falling to around 150 in 2030, the economic cost of non-compliant journey cancellation can be estimated at around £399,000 (2018 prices).

Further, the assumption that 72 non-compliant vehicles will need to be upgraded to new vehicles in the absence of the retrofitting measure results in potential for additional economic costs to bus companies relating to vehicle scrappage. Vehicle scrappage occurs because the overall fleet size is assumed to stay the same. Hence, an influx of new vehicles to the bus fleet will result in the scrappage of older non-compliant vehicles. Vehicle scrappage costs arise because the intervention case is assumed to bring forward the upgrading (and therefore scrappage) of vehicles. This means vehicles are scrapped earlier and with higher residual values than they would have been under the baseline scenario. As a result, the intervention case leads to a greater loss of residual asset value.

The differential in residual asset value between the baseline and intervention options can be summarised as follows (and is explained in more detail in Section 5.4 of FBC 18 'E1: Economic Appraisal Methodology Report):

- Established the asset value of vehicles to be scrapped based on age and depreciation rates;
- Subtracted the asset value of vehicles to be scrapped in each year of the appraisal period from the 2021 value to establish an asset value differential per vehicle scrapped earlier than intended, across all years
- Used the interpolation rates to determine the proportion of vehicles scrapped each year in the intervention case, and applied the proportion to the asset value differential per vehicle identified above
- Summed the asset value differential across all years and Euro Standards to arrive at a weighted average asset value differential to act as a proxy for scrappage cost change between the baseline and intervention cases.

Adopting this approach, the residual value of scrapped vehicles was around £6,000 per unit for buses. Multiplying this value by the 72 buses that would be scrapped to cater for replacement new buses, the aggregate economic cost of vehicle scrappage is estimated at £437,000 (2018 prices).

Table 4-3 demonstrates that combined, the economic cost of upgrading or cancelling bus journeys and scrapping vehicles earlier than would otherwise occur in the absence of the Bath Clean Air Plan amounts to £4.0 million. This economic cost would be incurred in the absence of the bus retrofitting measure. The proposed retrofitting measure allows these costs to be avoided. As a result, the avoided cost of £4.0 million can be considered an economic benefit of the proposed retrofitting measure.

Table 4-3: Aggregate Value for Money Assessment

Economic Impact Category	Value (2018 Prices, Undiscounted)
Avoided Upgrade Cost Associated with Replacing Vehicle	3,180,442
Avoided Welfare Loss from Cancelled Bus Services	399,026
Avoided Residual Value Loss for Scrapped Vehicles	437,493
Total Benefits	4,016,961
Total Costs	2,313,900
Benefit Cost Ratio	1.74

Set against a bus retrofitting cost of £2.3 million, the economic benefits identified above could generate an indicative BCR of 1.74 in response to implementing the retrofitting measure.

As outlined in Section 3.1, the resolution of the economic model does not allow bespoke calculation of a range of potential economic impacts without the provision of more detailed air quality and traffic modelling inputs. As no additional air quality or traffic modelling was undertaken for this exercise, impacts relating to air quality, traffic flows, accidents and greenhouse gas emissions were not estimated for introducing this measure. That said, it should be noted that the impact of not implementing the retrofitting mitigation measure is expected to be negligible across these economic drivers. Further, active mode analysis was not undertaken as the proposed retrofitting measure is not expected to significantly change the number of people choosing to walk or cycle. Transaction cost impacts were not estimated because no transaction cost was identified for purchasing replacement bus vehicles; hence no avoided cost would be achieved by implementing the retrofitting measure.

4.4.2 Additional Non-Quantifiable Impacts

In addition to the quantified and monetised benefits described above, the mitigation measure is expected to have the following wider, non-quantifiable benefits:

- Reduced severance for some rural communities that may lose access to Bath City Centre. As bus companies are expected to cancel some services in response to the CAZ (in the absence of bus retrofitting), the mitigation measure will ensure that services are retained.
- Given the rural nature of Bath and North East Somerset, the bus network is characterised by multiple operators including a number of small, locally focussed operators. The mitigation measure will ensure that the cost of upgrading to compliant vehicles does not fall on small operators, thus challenging their long-term viability.
- By ensuring bus services are retained, the mitigation measure will avoid any negative publicity associated with reducing key public services.
- By ensuring bus services are retained, the mitigation measure will support wider efforts to achieve mode shift from private car use to public transport. Attempts to promote use of public transport could appear illogical if the bus network contracted in response to the CAZ.
- Retention of bus services will support the ongoing vitality and viability of Bath city centre, by ensuring that consumers can continue to access the central area and maintain current levels of retail expenditure. Should bus services be cancelled, expenditure in the city centre could fall as consumers that rely on bus services to access the centre are forced to use alternative retail areas or modes.
- Similarly, retention of bus services will also ensure that residents that rely on bus travel can continue to access civic functions and social activities located in Bath city centre. This will safeguard social inclusion and cohesion.

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

5.1 Description of Mitigation Measure

To protect businesses, as well as the jobs they provide and their contribution to the local economy, B&NES is requesting money from the Clean Air Fund (CAF) to support the transition of LGV, HGV, bus/coach, and taxi/PHV fleets to compliant vehicles, with local bus fleets being upgraded through a separate mitigation measure, see Section 4. Two schemes will be available to provide mitigation for those affected by charges:

- Financial Support (Grant Scheme) to replace pre-Euro 6 diesel and pre-Euro 4 petrol non-compliant vehicles with compliant ones.
- Financial Support (Interest-Free Finance Scheme) to replace pre-Euro 6 diesel and pre-Euro 4 petrol non-compliant vehicles with compliant ones.

These schemes will also include:

- Complementary financial support for electric charging points on private land in order to encourage the uptake of electric vehicles.
- Complementary financial support for retrofitting in order to allow cheaper, non-compliant vehicles to be made compliant.

The Scheme does not apply to buses operating scheduled services (buses providing local bus services as defined under Section 2 of the Transport Act 1985).

5.1.1 Financial Support (Grant Scheme) to replace pre-Euro 6 diesel and pre-Euro 4 petrol non-compliant vehicles with compliant ones

To protect owners of non-compliant vehicles (LGVs, HGVs, buses/coaches and taxis/PHVs), as well as the jobs they provide and their contribution to the local economy, B&NES is requesting money from the CAF to provide grants, to subsidise the transition of vehicles from non-compliant to compliant. This funding is technology neutral and can be used towards the purchase or lease costs of a new or second-hand compliant vehicle. By making the funding technology neutral, it allows owners to judge for themselves the most appropriate route to compliance.

The outline proposal is as follows:

1) It will run during 2019/20 and 2020/21, prior to the CAZ coming into force.
2) It will be managed by a panel of specialist vehicle asset finance companies.
3) The administration costs will be covered by a grant from central government. The capital for the scheme will be covered by a grant from central government.
4) It will provide financial assistance in the form of a grant plus an administration fee. The grant offered will be dictated by the value of vehicle being traded away, any other grant funding that may be available (e.g. workplace charging scheme, plug in grant, other CAZ etc) and will be net of VAT, but should make a significant contribution to the upgrade to a compliant vehicle of the same make and model.
5) It will be open to limited companies, partnerships, sole traders, charities and individuals located in B&NES and neighbouring authorities with premises in the CAZ or delivering into the CAZ.
6) Applications will be scored, and the following categories given a higher priority:

- Applications from SMEs, sole traders and individuals.
- Upgrade of vehicles that frequently enter the CAZ;
- Upgrade of the most polluting vehicles; and
- Requests to upgrade to electric vehicles not eligible for the OLEV funding available.

The size of the organisation's fleet, its ability to absorb the cost of transferring to a compliant vehicle and its ability to reroute/redistribute its fleet to avoid the CAZ will also be considered in the scoring.

7) The cost of any associated charging infrastructure, required as part of an upgrade to an electric vehicle, may also be included in the grant request.

8) Applications will be subject to a credit check and the details of all other vehicles in the business must be supplied. This information may be used to prioritise applications.

9) The cost of retrofitting or repowering the replacement vehicle may be included in the grant request. In exceptional circumstances grants may be provided to retrofit or re-power existing vehicles.

10) It will have key terms as follows:

- The existing vehicle is a chargeable vehicle as defined within the CAZ scheme, that does not benefit from an exemption to the CAZ charge.
- The existing vehicle has been owned by the applicant for at least six months at their current address i.e. the address on the vehicle's V5C and the owner's address need to match.
- A telematics use assessment report is provided as evidence of use of the existing vehicle within the CAZ.
- The existing vehicle is roadworthy, has a valid MOT certificate and is either:

  (a) part exchanged for a replacement vehicle via a dealer registered with the Retail Motor Industry Federation or other reputable trade association; or

  (b) evidence is supplied to demonstrate that the existing vehicle has been sold and the funds from the disposal received; or

  (c) evidence is supplied to demonstrate that the existing vehicle has been returned to the current funder.
- The existing vehicle must be part exchanged or sold at market value, with the replacement vehicle purchase occurring at the same time as the part exchange, sale or return of the existing vehicle.
- All proceeds from the disposal of the existing vehicle must be applied to the purchase of the replacement vehicle so as to reduce the financed amount of the replacement vehicle.
- The replacement vehicle must be of comparable type and specification to the vehicle being replaced. In exceptional circumstances applications to upgrade or change the vehicle type will be considered where doing so will deliver an air quality benefit or protect vital services.
- The replacement vehicle is being registered to the applicant at their current address i.e. the address on the vehicle's V5C and the owner's address need to match.
- The replacement vehicle also does not benefit from an exemption to the CAZ charge.
- The replacement vehicle must remain in the same ownership and in its current use for at least 24 months.
- Any other financial support on the replacement vehicle received or applied for must be declared during the application process.
- The funds are transferred direct to the seller on handover.

11) Any grant offered will be dictated by the type of vehicle being part exchanged or sold up to a maximum value as set out in the table below.

Vehicle Type	Maximum Grant
Taxi/PHV	Up to £4,500 or 50% of upgrade cost
LGV	Up to £4,500 or 50% of upgrade cost
HGV	Up to £20,000 or 50% of upgrade cost
Bus/coach	Up to £35,000 or 50% of upgrade cost

12) In the event that an applicant applies for finance and the application is rejected then provided that the existing vehicle is a Euro 4 or 5 diesel vehicle it will be provided with a limited concession to 1/1/2023. There will be no concession for pre-Euro 4 vehicles.

13) In the event that an applicant applies for finance and the application is accepted then the existing vehicle will be provided with a limited concession to the expected handover date or 1/1/2023, whichever is the sooner. This will apply irrespective of the Euro class of the existing vehicle.

5.1.2 Financial Support (Interest-Free Finance Scheme) to replace pre-Euro 6 diesel and pre-Euro 4 petrol non-compliant commercial vehicles with compliant ones

This funding is intended to assist owners of non-compliant vehicles (LGVs, HGVs, buses/coaches and taxis/PHVs) with premises within B&NES and neighbouring authorities that regularly enter the CAZ. It will provide interest-free finance to subsidies the upgrade of non-compliant vehicles to compliant vehicles.

The funding will be technology neutral and can be used towards the purchase or finance costs of a new or second-hand compliant vehicle. By making the funding technology neutral it allows owners to judge for themselves the most appropriate route to compliance. The funding amount used in this report is also expected to be sufficient to cover the cost of a retrofit installation, or the purchase of an electric vehicle and supporting charging infrastructure.

In exceptional circumstances finance may be provided to retrofit or re-power existing vehicles. This would assist specialised vehicles where it may be difficult or prohibitively expensive to upgrade e.g. refuse lorries. It should be noted that retrofits would be required to be CVRAS accredited. This is due to feedback from elsewhere in the UK from fleets citing serious issues concerning current retrofit technology for HGVs. These included:

- The technology is untried and untested.
- Vehicles will be off the road for the time it takes to retrofit the vehicle.
- The technology providers specify the servicing requirements are undertaken regular and exclusively through themselves. Fleets are concerned that these will be excessively expensive.
- The cost of the retrofit is very high in comparison to the cost of the vehicle.

It should be noted that initial modelling has shown that a large portion of the regular traffic driving through Bath makes at least one stop in the city centre before continuing. Therefore, it is anticipated that there will only be a small percentage of vehicles that will not be eligible for the scheme and these will be assessed on a case-by-case basis.

The outline proposal is as follows:

1) It will run during 2019/20 and 2020/21, prior to the CAZ coming into force.

2) It will be managed by a panel of specialist vehicle asset finance companies.

3) The administration, interest and default costs will be covered by a grant from central government. The capital for the scheme will be provided by the vehicle asset finance companies.

4) It will provide financial assistance in the form of an interest free loan, contract hire, contract purchase, finance lease or lease purchase agreement to suit the needs of the business or individual. The finance offered will be dictated by the value of the vehicle being traded away, any other grant funding that may be available (e.g. workplace charging scheme, plug in grant, other CAZ, etc.) and will be net of VAT. The maximum repayment period will be 60 months, extended to 84 months for some specialist vehicles including buses and coaches.

5) It will be open to limited companies, partnerships, sole traders, charities and individuals located in B&NES and neighbouring authorities with premises in the CAZ or delivering into the CAZ.

6) Applications will be scored, and the following categories prioritised:

- Applications from SMEs, sole traders and individuals.
- Upgrade of vehicles that frequently enter the CAZ;
- Upgrade of the most polluting vehicles; and

- Requests to upgrade to electric vehicles not eligible for the OLEV funding available.

  The size of the organisation's fleet, its ability to absorb the cost of transferring to a compliant vehicle and its ability to reroute/redistribute its fleet to avoid the CAZ will also be considered in the scoring.

7) The cost of any associated charging infrastructure, required as part of an upgrade to an electric vehicle, may also be included in the finance request.

8) Applications will be subject to a credit check and the details of all other vehicles in the business must be supplied. This information may be used to prioritise applications.

9) The cost of retrofitting or re-powering the replacement vehicle may be included in the finance request. In exceptional circumstances finance may also be provided to retrofit or re-power existing vehicles.

10) It will have key terms as follows:

- The existing vehicle is a chargeable vehicle as defined within the CAZ scheme, and does not benefit from an exemption to the CAZ charge.
- The existing vehicle has been owned by the applicant for at least six months at their current business address.
- A telematics use assessment report is provided as evidence of use of the existing vehicle within the CAZ.
- The replacement vehicle is being registered to the applicant at their current address i.e. the address on the vehicle's V5C and the owner's address need to match.
- There is no other finance to be secured on the replacement vehicle.
- The existing vehicle is roadworthy, has a valid MOT certificate and is either:
- (a) part exchanged for a replacement vehicle via a dealer registered with the Retail Motor Industry Federation or other reputable trade association; or
- (b) evidence is supplied to demonstrate that the existing vehicle has been sold and the funds from the disposal received; or
- (c) evidence is supplied to demonstrate that the existing vehicle has been returned to the current funder.
- Any other financial support on the vehicle received or applied for must be declared during the application process.
- The existing vehicle must be part exchanged or sold at market value, with the replacement vehicle purchase occurring at the same time as the part exchange, sale or return of the existing vehicle.
- All proceeds from the disposal of the existing vehicle must be applied to the purchase of the replacement vehicle so as to reduce the financed amount of the replacement vehicle.
- The replacement vehicle must be of comparable type and specification to the vehicle being replaced. In exceptional circumstances applications to upgrade or change the vehicle type will be considered where doing so will deliver an air quality benefit or protect vital services.
- The replacement vehicle is being registered to the applicant at their current address i.e. the address on the vehicle's V5C and the owner's address need to match.
- The replacement vehicle also does not benefit from an exemption to the CAZ charge.
- Any other financial support on the replacement vehicle received or applied for must be declared during the application process.
- The funds are transferred direct to the seller on handover.
- There will be the option for a repayment holiday.
- There will be the option for early settlement.
- The replacement vehicle must remain in the same ownership or remain financed under the associated finance agreement and in its current use during the finance term.

11) In the event that an applicant applies for finance and the application is rejected then provided that the existing vehicle is a Euro 4 or 5 diesel vehicle it will be provided with a limited concession to 1/1/2023. There will be no concession for pre-Euro 4 vehicles.

12) In the event that an applicant applies for finance and the application is accepted then the existing vehicle will be provided with a limited concession to the expected handover date or 1/1/2023, whichever is the sooner. This will apply irrespective of the Euro class of the existing vehicle.

Further to the above, the businesses applying for finance will have to provide:

- Proof of need. This will consider the size of business, the size of its fleet, its ability to absorb the cost of transferring to a compliant vehicle and its ability to reroute/redistribute its fleet to avoid the CAZ (vehicle type and duty cycle, vehicle routes etc.).
- Proof of financial stability. It is vital that any financial support goes towards businesses which will continue to operate in B&NES for the foreseeable future, and as a result the council will require proof of financial stability.
- Proof of operations within the CAZ. This will require the business to provide evidence that the vehicle in question is operating or based within the CAZ. The number plate of the vehicle may also be monitored for its activity in the CAZ.

5.1.3 Approvals

Approval for the scheme has been obtained from the Council's s151 Officer.

5.2 Delivery Plan

Figure 5-1 presents the key stages for delivery of this scheme, with further details in the section below.

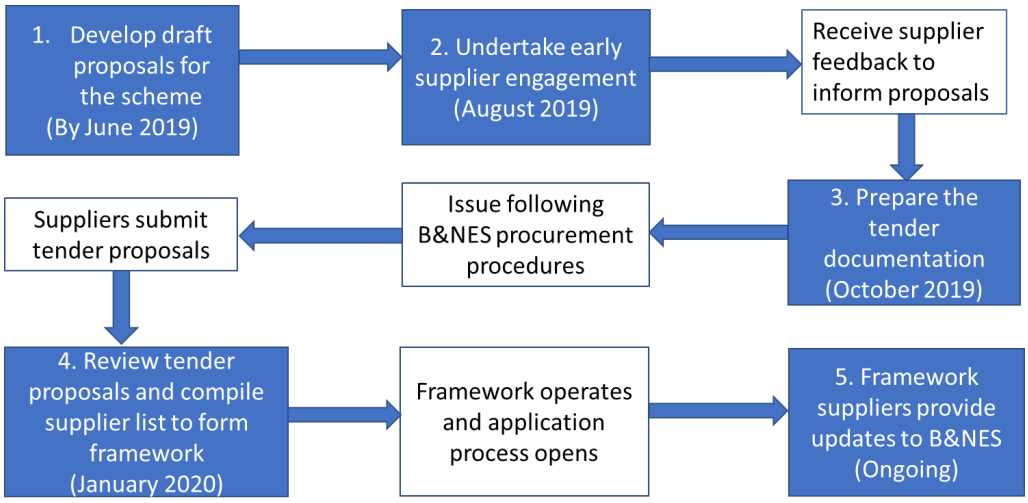


Figure 5-1: Flowchart for the financial assistance scheme framework procurement

1) Develop draft proposals for the scheme

When preparing the OBC and draft FBC, the proposals for these schemes were developed taking into account the affected groups, the numbers of eligible vehicles and costs of upgrading those vehicles.

This phase was completed in June 2019.

2) Undertake early supplier engagement

In order to inform the development of the scheme, the draft proposals were discussed in a series of meetings with prospective vehicle asset finance providers and industry experts, in order to understand interest to administer the scheme, ensure feasibility and workability of the proposals, and confirm that the funding request for the scheme was realistic.

This phase was completed in August 2019.

3) Prepare the tender documentation

In order to deliver this scheme, a separate procurement exercise is required to compile a panel of vehicle asset finance companies to administer the scheme and provide the loan capital. Appendix B presents the Invitation to Tender (ITT) documentation developed for the proposed financial support schemes and includes:

- ITT:

  Includes an introduction to the project and role of bidder
- Eligibility Criteria:

  Details the eligibility criteria for financial support applicants.
- Scheme Detail Questions:

  A series of questions bidders should respond to when applying to administer the scheme, based on the scheme details.
- Process Flow Chart

  Details the customer experience process for applicants to the financial support scheme.
- Pricing Schedule

These documents will be issued in January 2020 in accordance with B&NES open-tender procurement processes.

4) Review tender proposals and compile supplier list to form

Applicant(s) are required to submit their proposals to the Council within the specified tender period.

The applications will be evaluated based on the criteria set out in the ITT documents, and successful tenderers will be invited to form a framework of suppliers capable of delivering scheme. With the varied nature of the vehicle types and credit status of applicants that are expected to be accommodated within the scheme, not all applicants may have the expertise to participate across this range.

5) Framework suppliers provide updates to B&NES

There will be quarterly meetings between B&NES and the successful suppliers to update on progress during the time that the scheme is active.

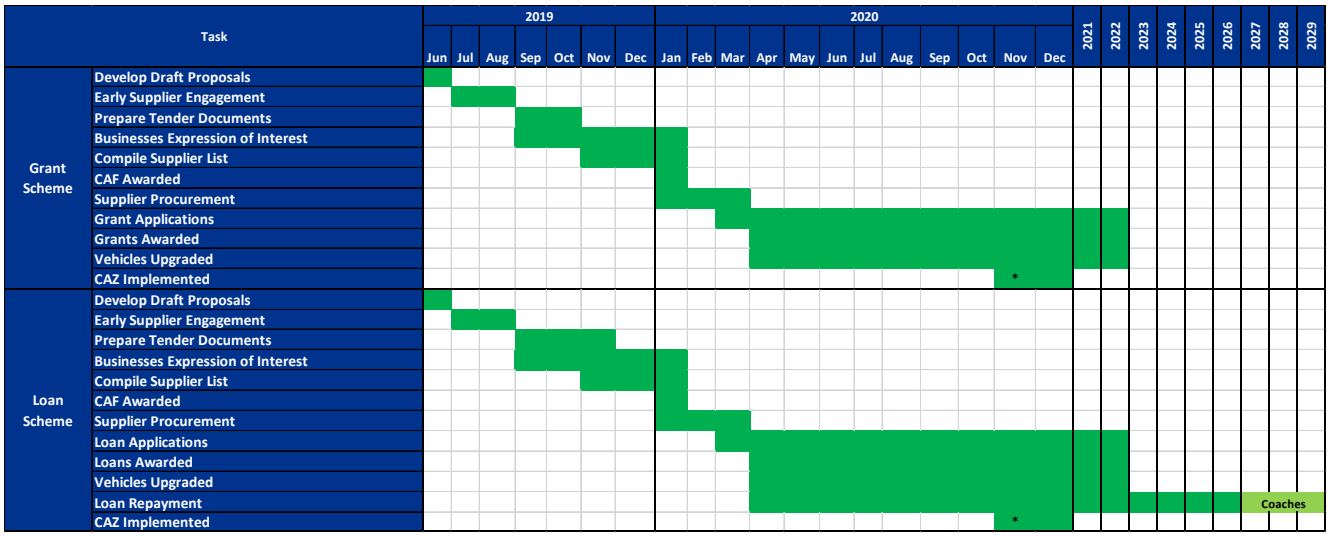
B&NES will be required to make the following payments to suppliers:

- Grant funding
- Administrative costs for grants and interest-free finance
- Interest payments and default costs for the interest-free finance.

Whilst consistency is sought, it is anticipated that there may be variation on the payment processes and timescales depending on individual agreements with the suppliers. This could be linked to numbers of applications processed and approved, quantities of funding and types of vehicle funded, which will vary between suppliers.

The following delivery plan in Table 5-1 presents a programme for implementing and operating the financial support schemes.

Table 5-1: Delivery plan for financial support schemes



5.3 Quantification of Package

To calculate the amount of funding required for the grant and interest-free finance scheme both the cost of upgrading different non-compliant vehicles and the expected uptake need to be estimated.

5.3.1 Vehicle Upgrade Costs

This section uses an evidence base to estimate the upgrade cost of the different vehicle types eligible for the grant and interest-free finance scheme. These calculations will enable B&NES to offer grant and interest-free finance values that will cover a fair amount of the cost of upgrading to a compliant vehicle, while also being able to offer assistance to as many businesses as possible.

5.3.1.1 LGVs

Firstly, the value of a range of LGVs available on the market was calculated using Parkers.co.uk in April 2019. To get as accurate data as possible average prices were calculated for small, medium and large non-compliant Euro 3, 4 or 5 LGVs, as can be seen in Table 5-2 below. The same exercise was then performed for second-hand compliant diesel Euro 6 LGVs, to the centre of the table. Table 5-2 then goes on to calculate the average upgrade cost from each of the non-compliant LGV types to an equivalent second-hand Euro 6 diesel LGV.

Table 5-2: Averages costs for pre-Euro 6 diesel and 2nd Hand Euro 6 diesel LGV

Average Current Vehicle Value		Average New Vehicle Value		Average Upgrade Cost
LGV Type	Value	LGV Type	Value	
Euro 3 Diesel Small	£1,300	2nd Hand Euro 6 Diesel Small	£10,500	**£9,200**
Euro 3 Diesel Medium	£3,250	2nd Hand Euro 6 Diesel Medium	£13,500	**£10,250**
Euro 3 Diesel Large	£4,000	2nd Hand Euro 6 Diesel Large	£16,250	**£12,250**
Euro 4 Diesel Small	£2,900	2nd Hand Euro 6 Diesel Small	£10,500	**£7,600**

Average Current Vehicle Value		Average New Vehicle Value		Average Upgrade Cost
LGV Type	Value	LGV Type	Value	
Euro 4 Diesel Medium	£5,500	2nd Hand Euro 6 Diesel Medium	£13,500	**£8,000**
Euro 4 Diesel Large	£4,750	2nd Hand Euro 6 Diesel Large	£16,250	**£11,500**
Euro 5 Diesel Small	£6,400	2nd Hand Euro 6 Diesel Small	£10,500	**£4,100**
Euro 5 Diesel Medium	£9,250	2nd Hand Euro 6 Diesel Medium	£13,500	**£4,250**
Euro 5 Diesel Large	£9,250	2nd Hand Euro To 6 Diesel Large	£16,250	**£7,000**

*Source Parkers.co.uk (accessed April 2019)

Table 5-3 below, shows the average cost of upgrading a Euro-3, 4 or 5 LGV, regardless of the size, to a second-hand Euro 6 LGV, before calculating an average cost across all Euro classes.

Table 5-3: Average cost of upgrading to a complaint LGV by Euro class of existing LGV

Current LGV Type	Cost of Upgrade to Compliant Vehicle by Type
Euro 3 Diesel	£10,567
Euro 4 Diesel	£9,033
Euro 5 Diesel	£5,117
Average	**£8,239**

As a result of this average cost, B&NES will offer businesses wishing to upgrade LGVs a maximum grant of £4,500, enough to cover 50% of the average upgrade cost. For the interest-free finance, the total value will be calculated on a case by case basis. The typical cost coverage by the interest-free finance scheme per LGV, for administration, interest and default costs, is anticipated to be approximately 20% of the total cost of the finance provided to the individual or business.

5.3.1.2 HGVs

The average cost to upgrade from a non-compliant HGV to a compliant HGV has been extracted from 'The Economics Appraisal Modelling Report' Appendix F of the FBC. Table 5-4 shows that the average cost to upgrade to a compliant HGVs is £24,600. It should be noted that these figures do not account for where a low emission vehicle is purchased, or an older vehicle is purchased and retrofitted or repowered. It only accounts for the average cost to upgrade to a compliant second-hand HGV for the same make and model.

Table 5-4: Average cost to upgrade from a non-compliant to a compliant HGV

Vehicle Type	Average Cost to Upgrade to a Euro 6 Diesel
Artic HGV	£24,751
Rigid HGV	£24,432
Average	**£24,592**

Using the value shown in the table above, B&NES will offer businesses wishing to upgrade HGVs a maximum grant of £13,000, enough to cover 50% of the average upgrade cost. For the interest-free finance, the total value will be calculated on a case by case basis. The typical cost coverage by the interest-free finance scheme per HGV, for administration, interest and default costs, is anticipated to be approximately 15% of the total cost of the finance provided to the individual or business.

5.3.1.3 Buses/Coaches

Using the data obtained from the ANPR survey and Carweb, it was possible to identify the most common coach makes and models that travelled into the inner cordon and, therefore, the CAZ. These were identified as the Mercedes Tourismo, Volvo B Series, Irizar I Series and Scania K Series. It should be noted these makes and models are fairly broad to capture as many coaches in the estimate as possible to improve its accuracy.

To calculate the average cost of upgrading from a non-compliant to a compliant second-hand coach of these makes and models, research was undertaken into the cost of coaches of different Euro Classes. To obtain the data a combination of the following sites was used: Plaxton Coach Sales, Odyssey Coach Sales and John Hill Coach Sales. It should be noted that used vehicle sales sites have been used to calculate the cost as it prices an upgrade to a compliant 2nd hand vehicle, the minimum that is required, maximising the number of vehicles that can be supported.

Table 5-5 below, shows the average cost of used coaches, of each of the makes and models listed above of each of the Euro-classes 3, 4, 5 and 6. Table 5-6 then calculates the average cost of upgrading each coach make and model or each non-compliant Euro-class, to a compliant coach of the same make and model. As shown, this leaves and average upgrade cost of £70,341, which was used to estimate the cost required in this calculation.

Table 5-5: Average cost of used coach models frequently detected entering Bath City Centre

		Coach Model			
Euro-Class		Mercedes Tourismo	Volvo B Series	Irizar I Series	Scania K Series
Non-Compliant	Euro 3 Diesel	N/A	£33,088	N/A	£37,678
	Euro 4 Diesel	N/A	£80,244	N/A	£57,171
	Euro 5 Diesel	£90,088	£131,696	£126,116	£95,145
Compliant	Euro 6 Diesel	£153,461	£176,680	£162,960	£149,475

Table 5-6: Average cost of upgrading to a compliant used coach of the same make and model

	Coach Model				Upgrade Cost
Euro-Class	Mercedes Tourismo	Volvo B Series	Irizar I Series	Scania K Series	Average
Euro 3 Diesel	N/A	£143,593	N/A	£111,797	**£127,695**
Euro 4 Diesel	N/A	£96,436	N/A	£92,304	**£94,370**
Euro 5 Diesel	£63,374	£44,984	£36,844	£54,330	**£49,883**
Average	**£63,374**	**£95,004**	**£36,844**	**£86,144**	**£70,341**

Using the value shown in the table above, B&NES will offer businesses wishing to upgrade non-scheduled coaches a maximum grant of £35,000, enough to cover 50% of the average upgrade cost. For interest-free finance, the value will be calculated on a case by case basis. The typical cost coverage by the interest-free finance scheme per coach, for administration, interest and default costs, is anticipated to be approximately 15% of the total cost of the finance provided to the individual or business.

5.3.1.4 Taxis/PHVs

Using the data obtained from the ANPR survey and Carweb, it was possible to identify the most common vehicle types registered as Taxis that travelled into the inner cordon and, therefore, the CAZ. These were identified as the Seat Toledo, Skoda Octavia, Mercedes E-Class and Ford Galaxy and show a good overview of the types of Taxi found in B&NES.

Parkers.co.uk was then used to look up the average prices of both compliant and non-compliant models of the vehicle. This data was then in turn used to calculate an average upgrade cost as well as an overall average for Taxis of £9,000, as shown in Table 5-7. It should be noted that Parkers.co.uk is used to calculate the cost to upgrade to a compliant second-hand vehicle, the least that is required, maximizing the number of vehicles that could be supported through this scheme.

Table 5-7: Average upgrade cost for taxis.

Vehicle	Average Cost of Non-Compliant Vehicle	Average Cost of Compliant Vehicle	Upgrade Cost
Seat Toledo	£7,500	£13,000	£5,500
Skoda Octavia	£9,750	£17,250	£7,500
Mercedes E-Class	£12,750	£26,000	£13,250
Ford Galaxy	£11,750	£21,500	£9,750
Average			**£9,000**

As a result of this average cost, B&NES will offer businesses wishing to upgrade taxis and PHVs a maximum grant of £4,500, enough to cover 50% of the average upgrade cost. For the interest-free finance, the value will be calculated on a case by case basis. The typical cost coverage by the interest-free finance scheme per taxi, for administration, interest and default costs, is anticipated to be approximately 20% of the total cost of the finance provided to the individual or business.

5.3.1.5 Summary

As a result of the research conducted above the maximum grant values and expected loan values of the grants and loans for each vehicle type are as shown in Table 5-8 below.

Table 5-8: Maximum grant and interest-free finance available for each vehicle type

Vehicle Type	Maximum Grant Available	Finance Value used in Calculation
LGV	£4,500	£8,239
HGV	£13,000	£25,000
Coach	£35,000	£70,341
Taxi/PHV	£4,500	£9,000

B&NES feels that using the estimated maximum grant values above achieves a good balance by covering the majority of the upfront costs of the vehicle upgrade from a non-compliant pre-Euro 6 diesel or pre-Euro 4 petrol to a compliant, second hand Euro 6 diesel, assisting companies who wish to upgrade their vehicles. By striking this balance the total scheme cost will be kept to a minimum and allow more individuals to be supported financially and thus be able to support the desired removal of non-compliant vehicles from the local fleet.

5.3.2 Frequency Analysis

In order to quantify the number of vehicles that may be eligible for the grant and loan scheme a calculation was undertaken using the most relevant available data, the process of which is described below and in Appendix C.

This vehicle data was then used to provide a best estimate of the cost of the schemes overall, and therefore, the funds requested from the CAF.

Automatic Number Plate Recognition (ANPR) has been used to inform the scheme estimates for all vehicle types. It should be noted that there is no data currently available that identifies which goods vehicles form part of a 'local'

fleet, hence non-compliant trip frequencies have been used as a proxy to identify the number of such vehicles that regularly drive within the central part of Bath.

ANPR data was obtained at a number of locations across Bath for 14 consecutive days in October / November 2017. The camera locations are shown in Figure 5-1 and Table 5-9 below.

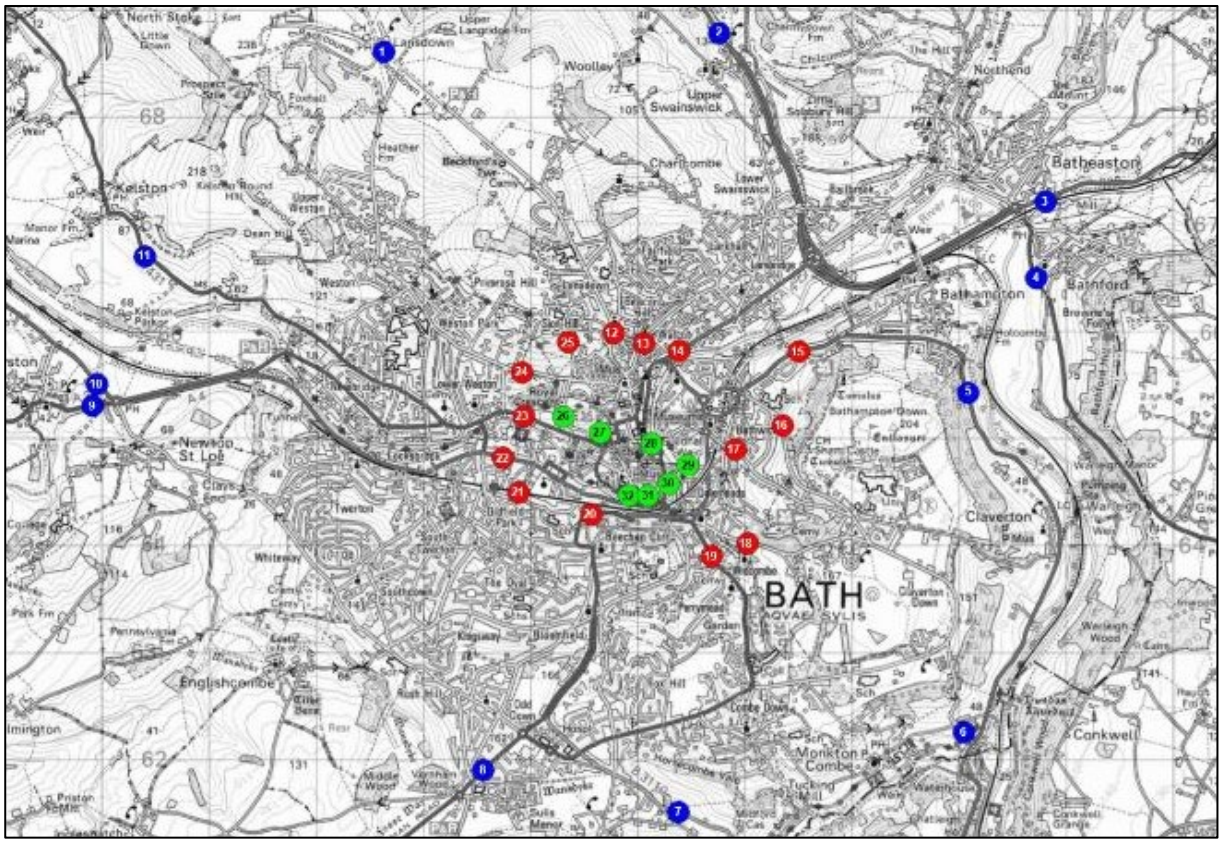


Figure 5-1: ANPR survey locations

Table 5-9: ANPR Camera Locations

Outer Cordon (blue labels)

1) Lansdown Road, north of Lansdown Lane
2) A46, north of Upper Swainswick
3) A4, east of A363 Bradford Road
4) A363 Bradford Road
5) A36 Warminster Road, east of Bathampton
6) Brassknocker Hill
7) B3110 Midford Road
8) A367, north of Odd Down P&R and south of Old Fosse Road
9) A39 Wells Road, west of junction with Bristol Road
10) A4 Bath Road, west of junction with Bristol Road
11) A431 Kelston Road

Inner Cordon (red labels)

12) Lansdown Road, north of Lansdown Grove
13) Camden Road
14) A4 London Road
15) A36 Warminster Road
16) North Road
17) Bathwick Hill
18) Widcombe Hill
19) Prior Park Road
20) A367 Wells Road, north of Oldfield Road
21) Brougham Hayes
22) A36 Lower Bristol Road, east of Windsor Bridge Road
23) Upper Bristol Road, east of Windsor Bridge Road
24) Weston Road, east of Park Lane
25) Cavendish Road

City Centre Car Parks (green labels)

26) Charlotte Street Car Park, entrance 1
27) Charlotte Street Car Park, entrance 2
28) The Podium Car Park - to include the entrance ramp and the 2-way entry/exit road to the rear
29) Leisure Centre Car Park
30) Manvers Street Car Park
31) Southgate Car Park
32) Avon Street Car Park

The cordons are not entirely watertight as some small routes were not included in the surveys. However, based on local knowledge of the network the key routes into/through the city have been selected to capture the majority of traffic.

The ANPR data captured vehicle registration numbers (VRNs) that were then cross referenced against vehicle details data purchased from Carweb that enabled identification of vehicle type, fuel type and Euro class for each vehicle. From this pre-Euro 6 LGVs, HGVs, Buses, Coaches and Taxis could be identified.

For the purposes of this analysis just the ANPR data captured at the Inner Cordon locations was used since this best represents the area covered by the proposed CAZ.

Through number plate matching across the 14-day period, frequency analysis was undertaken to identify the number of days each pre-Euro 6 diesel and pre-Euro 4 petrol vehicle was recorded in the ANPR data for Inner Cordon sites.

It may be noted that ANPR cameras do not achieve full capture of all vehicles. However, analysis has shown that if a vehicle enters Bath on a given day then on average it will pass three ANPR locations across the day. Hence the likelihood of it not being captured by any of the ANPR cameras is very low, around 1%, hence any adjustment for this would not make a material difference to the frequency analysis. However, the estimated number of 'through' trips (i.e. those not stopping in Bath) have been subtracted in order to estimate the number of relevant vehicles stopping within the central Bath area.

The dataset available relates to October / November 2017, therefore. the Emissions Factor Toolkit projected changes in fleet Euro class composition have been used to estimate 2019 values. Table 5-10 below, presents trip frequency analysis for 2019 based on the projected change in Euro class composition.

Table 5-10: Predicted composition of the non-compliant B&NES vehicles fleet in 2019

Vehicle Type	Number of Days Travelling in the CAZ in 14 Days														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Total
LGV	5209	1604	727	522	340	292	230	219	224	217	150	101	40	32	**9907**
HGV	1066	273	107	69	36	22	20	11	14	14	7	1	2	4	**1647**
Coach	72	13	4	6	3	4	3	1	1	1	0	1	0	0	**110**
Taxi	11	11	7	6	4	4	6	9	8	17	20	22	32	50	**205**

ANPR analysis over 14 days adjusted to 2019 levels indicates a total of around 11,900 pre-Euro 6 diesel vehicles, potentially eligible for these schemes, maybe be driving in Bath, this consists of roughly; 9900 LGVs, 1650 HGVs, 110 Coaches and 205 Taxis. These figures do not give a direct estimate of the relevant number of commercial vehicles that would be eligible for the scheme as this analysis will exclude vehicles that did not travel into Bath during the days covered by the data and may include other vehicles that drive into Bath very infrequently.

However, this data can be used to calculate an approximation of the number of vehicles that may be eligible to apply for the grant and interest-free finance scheme. The duty cycle of the vehicles, especially the frequency of entry, is expected be an important marking criterion in the application for the schemes, as this directly relates to the financial impacts of the CAZ on the company. For these reasons it is initially assumed that only vehicles entering the CAZ at least twice a week will apply, due to the relative lower expense of paying the charge. Whilst this may not make pure economic sense, the value of a newer vehicle would present other benefits in terms of reduced operational maintenance costs and fuel efficiency.

Using this assumption, Table 5-11 shows the predicted number of non-compliant vehicles, split by vehicle type, that will drive into the CAZ at least twice a week (i.e. at least four times over a 14-day period), and therefore, likely to result in an application for finance from the business or a grant from a private vehicle owner.

Table 5-11. A table showing predicted trip frequency for 2019 of non-compliant LGVs and HGVs into the B&NES CAZ over a 14-day period.

	Number of Days											
Vehicle Type	4	5	6	7	8	9	10	11	12	13	14	Total
LGV (pre-Euro 6)	522	340	292	230	219	224	217	150	101	40	32	**2366**
HGV (pre-Euro 6)	69	36	22	20	11	14	14	7	1	2	4	**201**
Coaches (pre-Euro 6)	6	3	4	3	1	1	1	0	1	0	0	**20**
Taxis (non-compliant)	6	4	4	6	9	8	17	20	22	32	50	**176**
Total												**2763**

The next step is to estimate the number of these vehicles that are privately owned, to decipher which will be eligible to apply for the interest-free finance scheme and which for the grant scheme. To do this an estimation of the percentage of these vehicles that are privately owned is made.

For LGVs this has been obtained using data from the DfTs Baseline Survey of Van Activity for England[7] which surveyed 6,565 registered van owner addresses and identified that 35% of these are privately-owned.

For the other vehicle types and the purposes of these calculations, it is assumed that 20% of HGVs, 10% of Coaches and 90% of Taxis are privately owned.

[7] Van Activity Baseline Survey 2008: Provisional Result, Department for Transport, https://webarchive.nationalarchives.gov.uk/20091003144254/http://www.dft.gov.uk/pgr/statistics/datatablespublications/freight/vanactivitybaseline08/vabs08.pdf

5.3.3 Overall Cost of Scheme

Using a combination of the data presented in Sections 5.3.1 and 5.3.2 above a calculation can be made to estimate the total cost of the scheme and the funding requested from the Government required to implement it.

To calculate the overall value of the financial support scheme, the number of vehicles calculated in Table 5-11 has been used to form the upper uptake estimate. For a lower uptake estimate of the financial support scheme, it has been assumed that any vehicle that is owned by a business will apply for the interest-free finance and any privately-owned vehicles will apply for a grant. The number of vehicles for these uptake assumptions, as well as a medium uptake (the average number of vehicles between the upper and lower uptakes) can be seen in Table 5-12 below.

Table 5-12 also contains the average interest-free finance and grant amount calculated for each vehicle type and then estimates the cost for the interest free finance and grant funding required for all uptake assumptions. This gives a total interest-free value for the finance. On top of this there will be interest, administration fee and default costs. B&NES is requesting the funds to cover the interest, administration and default costs from JAQU as part of the package of non-charging measures. The interest on the capital borrowing has been assumed to be 3% per annum, the administration costs have been assumed to be £850 per loan application (assuming processing, paper work and monitoring throughout the up-to five-year repayment period) and the default rate is assumed to be 3.5%. Capital repayment rates have been assumed as 16% per annum for LGVs, HGVs and taxis, and 11% per annum for coaches. The administration fee for the grant scheme is estimated to be 3% of the cost of the grant.

In order to assess eligibility owners will be required to provide a telematics assessment report to provide evidence of the use of the non-compliant vehicle within the CAZ. To facilitate this a plug and play tracking device will be provided. The device will allow the vehicles, to be replaced or upgrade, to be tracked. A geofence will be created mimicking the CAZ area to establish how often the vehicle enters, exits or moves around within the zone. Up to 3,000 vehicles are expected to apply for the financial assistance scheme, and three months of telematics data will be required for each vehicle. Due to the length of the scheme up to March 2021, it is estimated that 500 devices will be rented for 24 months at a cost of £15.45 per month per device, these will be rotated around the vehicles. Funding for these devices has been included in Table 5-13.

As part of the scheme, and to further drive air quality improvements, B&NES is aiming to encourage a greater uptake of those electric vehicles (EVs) not currently eligible for the OLEV funding available such as electric buses and coaches, Funds are also being requested as part of the scheme for businesses to be able to install the necessary infrastructure to support the purchase of an EV, net of any OLEV funding available. This has been calculated by assuming an EV charging point will cost £3,000 to install and that over the duration of the scheme 5% of the vehicles upgrading will be electric, and so will apply for this infrastructure. On top of this, it has been assumed both First Bus and the Bath Bus Company will apply for £250,000 for grid infrastructure for EV bus charging points. This value can be seen in Table 5-13 and where it is added onto the base loan values as calculated in Table 5-12.

Table 5-13 below calculates the overall value of the funding request for the financial support schemes. For the upper uptake assumption, the amount of funding requested for the interest-free finance scheme is £5,157,345 and for the grant scheme it is £5,499,943. The overall funding amount requested from JAQU for this measure is **£11,222,182** for both schemes, including 3.5% inflation for 2020.

Table 5-12: Lower, medium and upper uptake assumption values of total scheme cost

	Vehicle Type	Grant Amount per Vehicle	Finance Amount per Vehicle	Number Expected to Upgrade	Number of Grant Applicants	Total Value of Grant	Number of Finance Applicants	Total Value of Finance
Lower Uptake	LGV	£4,500	£8,239	323	113	£510,300	210	£1,730,437
	HGV	£20,000	£25,000	14	3	£60,000	11	£283,028
	Coach	£35,000	£70,341	1	0	£7,000	1	£72,227
	Taxi	£4,500	£9,000	123	111	£500,850	12	£108,670
	Total			**462**	**228**	**£1,078,150**	**234**	**£2,194,361**
Medium Uptake	LGV	£4,500	£8,239	1345	471	£2,119,725	874	£7,199,153
	HGV	£20,000	£25,000	108	22	£436,000	86	£2,145,322
	Coach	£35,000	£70,341	11	1	£45,500	9	£656,446
	Taxi	£4,500	£9,000	150	135	£607,725	15	£131,433
	Total			**1613**	**629**	**£3,208,950**	**984**	**£10,132,354**
Upper Uptake	LGV	£4,500	£8,239	2366	829	£3,729,150	1538	£12,667,868
	HGV	£20,000	£25,000	201	41	£812,000	160	£4,007,616
	Coach	£35,000	£70,341	20	2	£84,000	18	£1,240,664
	Taxi	£4,500	£9,000	176	159	£714,600	17	£154,197
	Total			**2763**	**1031**	**£5,339,750**	**1733**	**£18,070,347**

Table 5-13: Calculation of the overall funding request

	Total Loan Value	Electric Charging Points	Total Loan Capital	Loan Interest (3% per annum)	Loan Default Costs (3.5%)	Loan Admin Fee	Total Loan CAF	Loan CAF + Capital	Total Grant + Admin CAF Request	Telematic Devices	Total funding request	Total CAPEX inc. 3.5% inflation for 2020
Lower Uptake	£2,194,361	£604,029	£2,798,391	£224,345	£97,944	£199,284	**£1,125,602**	**£3,923,993**	**£1,110,495**	**£185,400**	**£2,421,497**	**£2,506,249**
Middle Uptake	£10,132,354	£862,866	£10,995,220	£1,038,227	£384,833	£836,008	**£3,121,933**	**£14,117,153**	**£3,305,219**	**£185,400**	**£6,612,552**	**£6,843,991**
Upper Uptake	£18,070,347	£1,121,703	£19,192,050	£1,891,189	£671,722	£1,472,731	**£5,157,345**	**£24,349,395**	**£5,499,943**	**£185,400**	**£10,842,687**	**£11,222,182**

5.4 Value for Money Assessment

5.4.1 Quantifiable Impacts

The grant component of the financial support mitigation measure will provide funding towards the replacement of 1,031 non-compliant vehicles owned by businesses or private individuals. Section 5.3.3 demonstrates that the aggregate cost of providing grant funding towards the replacement of 1,031 non-compliant vehicles is £5.5 million (including administration fee for each grant). Recipients of this grant funding avoid upgrade costs amounting to £5.5 million. This avoided cost represents an economic benefit to upgraders. Hence, the grant funding therefore directly offsets expenditure by businesses and individuals at a 1:1 ratio.

The interest-free finance component of the financial support mitigation measure is to be provided to 1,733 qualifying non-compliant vehicles. The finance structure means that whilst recipients do not avoid the upgrade cost attributable to businesses/individuals, they can save on interest costs (plus default costs and administration fees) associated with purchase of compliant vehicles via a commercial finance arrangement. The finance therefore directly offsets expenditure by businesses and individuals at a 1:1 ratio.

5.4.2 Additional Non-Quantifiable Impacts

In addition to the quantified and monetised benefits described above, the mitigation measure is expected to have the following wider, non-quantifiable benefits:

- Prevent job losses amongst trades people in Bath, as the availability of financial support allows vehicular upgrade.
- Maintains Bath as a location that is attractive to local trades people, ensuring that consumers continue to have choice.
- Supports dependent businesses such as retail. The mitigation measure safeguards the delivery of stock on a reliable basis. This will help prevent job losses and help maintain the vitality and viability of Bath City Centre.
- Supports the leisure and tourism industry in the city by providing opportunities for eligible coach companies to access financial support.
- Most businesses across all sectors are reliant to some extent on freight or delivery services. If non-compliant vehicles continued to enter the CAZ, any associated charge would likely be passed on to end consumers. Provision of financial support for eligible freight vehicles reduces the amount of non-compliant freight vehicles entering the CAZ zone and therefore helps to minimise pass-through of CAZ costs.
- Protects local freight businesses and traders by reducing the capital cost burden of upgrading to compliant vehicles. This is particularly important for SMEs and sole traders, who may be more vulnerable to a significant financial shock such as upgrading to a compliant vehicle.
- Provides a monetary stimulus for the local economy as new vehicles may be purchased from local dealerships.
- Prevents negative publicity. In the event that SMEs or trades people went out of business as a consequence of the CAZ, both B&NES and central government may be perceived to lack support for vulnerable business groups.

Through its support and prioritisation of financial support for applications to upgrade to electric vehicles, the measure also has the potential to support the emerging electric vehicle industry. Further, by encouraging the use of electric vehicles, the mitigation measure will increase awareness within the nascent market. Electric vehicles will also contribute to lower operating costs and noise pollution.

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

6.1 Summary of Package

This measure is formed from a package of options identified within the long list:

1) Delivery and servicing plans for businesses
2) Increased utilisation of the electric car/van club in Bath, with an emphasis on increasing the number of electric LGVs/vans available to businesses
3) Expanding the proposal (included in the Go Ultra Low package) to introduce 'last mile' electric cargo bike hire to the city

The schemes aim to provide a full package of options for local businesses to adapt to the CAZ. It is proposed that these measures will be available alongside the financial support options.

6.2 Delivery and servicing plans

6.2.1 Description

6.2.1.1 Introduction

B&NES is proposing to introduce a scheme where businesses within Bath City Centre are able to apply for specialist advice in preparing a Delivery and Servicing Plan (DSP). This is currently being trialled with a group of businesses in the city, and Clean Air Funding would allow this to be rolled out on a wider scale with a view to reducing the burden on businesses affected by the Clean Air Zone.

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.

A DSP comprises two key surveys: an internal audit of a businesses' internal procurement and inventory management activities and strategies, and a survey of the resultant freight and servicing vehicle activity at its premises. Following these assessments, the information collected is analysed to create a comprehensive overview of the businesses' delivery and servicing activities, and formulate a set of recommendations designed to improve the management of inventory within a business. The DSP will aim to:

- Identify the areas of a business which generate significant amounts of delivery and servicing activities to a businesses' premises;
- Assess the environmental and economic efficiency of the inventory management processes (including procurement) and the related freight and servicing activities and evaluate how to reduce/consolidate orders that generate freight movements;
- Quantify the number of delivery and servicing vehicles visiting their premises by activity type and time of day and night;
- Manage deliveries and servicing activities to reduce and re-time trips, also helping to cut congestion in the local area and reduce environmental impacts of the organisation; and
- Improve safety and reliability.

The proposed DSP process will be undertaken as below:

1) Internal Audit

The internal audit will act as a fact-finding tool to help interrogate the current practices and processes related to deliveries and collections at the organisation, enabling the assessor to:

- Examine the proposed inventory and storage options and processes on-site/off-site.
- Assess the proposed procurement strategies regarding suppliers for products and services.
- Identify core goods and servicing activities that will be responsible for generating traffic.
- Identify any suggested areas for improvement related to goods and servicing activities.

2) External Audit

The external audit will aim to record all the delivery and servicing vehicle movements to and from the observation site making notes of the following elements:

- Number and size of vehicles loading and unloading within the observation period.
- Type of products delivered/collected.
- Method and duration of loading/unloading activity.
- Single or multiple delivery/collection points.
- Issues related to legal loading/unloading practices; PCNs being issued; and road/pedestrian/driver/vehicle safety.
- Details of notable frequent receivers, suppliers or couriers of goods.

3) Road Mapping

A DSP roadmap will then be provided, these will be a detailed framework to help guide to successfully implement the DSP. Key objectives will be defined so that performance against them can be readily monitored. By using this method, the organisation will be able to evaluate the success of the DSP.

4) On-going Monitoring

A periodic review of performance will be conducted against the roadmap to monitor progress against strategic objectives and key actions. Both the internal and external audit will be reviewed after one year with the roadmap being updated to reflect actions that have been achieved/new actions that have been identified.

6.2.2 DSP Pilot

A pilot DSP is underway with a number of businesses in the Kingsmead Square area; a prominent local centre within Bath which is a main pedestrian thoroughfare. Local services here include the bus terminus location for the Newbridge park and ride and other services linking with Bristol, various food and drink establishments and a theatre and casino, with lots of cycle parking already in place. Additionally, there is a separate initiative in this area being led by the Business Improvement Districts (BID) team, which identifies areas requiring pedestrian improvements. A pedestrianisation scheme at Kingsmead Square has recently been consulted on and is planned for implementation. It is therefore also recognised that a delivery and servicing plan pilot in this location would complement the new pedestrian measures, making this an ideal location to undertake a pilot scheme.

The businesses (mostly independent shops) currently receive deliveries from numerous companies at unspecified times during throughout the day. The road space for delivery vehicles is limited and their presence and manoeuvring is to the detriment of the customer environment. The businesses have suggested that it would be preferable to be able to choose what time they receive or collect their goods. It has been suggested that one option would be for a local distribution hub to be used by the delivery companies and the businesses then travel by shared electric van, shared electric cargo bike or on foot to collect the goods. This would have the potential of improving the shopping environment, reducing emissions in the vicinity and enabling an efficient use of staff resource.

Six traders have been identified, with a view to using five for the pilot scheme to share delivery services. A specialist supplier will be used to support delivery of this pilot, and a report will be prepared within the next 1-2 months on short-term, medium-term and long-term options for improvement of delivery and servicing in the area. The local businesses are already looking to combine food waste collections by using shared bins, in order to improve efficiency of this service.

6.2.3 Full Scheme Proposal

Once the pilot is complete, it is proposed to use funding from the CAF to roll this out to groups of other traders where the same approach is possible. The following additional locations have been identified around the city:

- Kingsmead Square
- Southgate
- Milsom Street
- Bartlett Street
- Moorland Road (Oldfield Park)
- Walcot Street
- Brock Street (Margaret's Buildings)
- Widcombe
- Weston
- Chelsea Road (Lower Weston)
- Larkhall (including Fairfield Park/Camden)
- Odd Down
- Combe Down
- Twerton
- Batheaston and;
- Bathampton

6.2.4 Delivery plan

To achieve the successful delivery of a DSP scheme within Bath, B&NES would begin by targeting independent businesses in established local centres with the support of the BID team and the Council's business engagement team. This approach will aid in the identification of those traders already having sustainable procurement and supply chain practices and who are likely to be receptive to initiatives such as joint procurement which can deliver greater benefits to businesses participating in DSPs. In addition to this B&NES will aim to engage with any larger public or private sector organisations in these local centres which can be significant freight and servicing generators within city centres and are often easy to engage with.

The proposed strategy for the implementation of the Bath DSP scheme is divided into 5 Work Packages. Whilst numbered, some work packages will be undertaken concurrently with the others.

Work Package 1: Identification of Target Area/Population

Using the list in Section 6.2.3 as a basis, the first step will be to identify the geographical areas or zones within the B&NES CAZ in which to target businesses/organisations for DSPs. It is anticipated the Bath Improvement District (BID) will be a likely focus for the roll out of DSPs within the CAZ. Involvement and endorsement of DSPs through organisations such as the BID and the Council's business engagement team will aid in recruitment of DSP participant businesses and organisations.

It is estimated that undertaking DSPs for 80 organisations in up to sixteen locations is an achievable target for this scheme, based on the rate of participation and time effort required to undertake a DSP.

Work Package 2: Create a Hierarchy of Businesses and Premises

Following the identification of the target areas within Bath City, a hierarchy of the businesses and premises within each target area will be created. This will be based on the sector and size of the business or organisations. This

will allow for businesses which are typically large generators of freight and servicing activities to be identified. Those businesses at the top of the hierarchy will be selected for DSP services first to deliver the greatest impact possible at the earliest opportunity.

In addition, the categorisation of businesses by sector and size will ensure that a representative sample of businesses across Bath City have been selected to increase the relevance and transferability of the lessons learned and recommendations of each DSP to other similar businesses, thereby delivery greater impact to addressing the source of city-wide emissions.

Work Package 3: Bath DSP Network

As part of this scheme a Bath DSP network will be set up, as a means to enable the sharing of lessons learned, and local collaboration between businesses to drive sustainable freight and servicing solutions such as joint procurement. This will be predominantly undertaken in the form of regular emails providing updates on the DSP Scheme, on-going advice, and opportunities for to exploit sustainable operating outcomes such as joint procurement. This engagement will also be accompanied by an annual workshop to enable further ideas sharing and promote the benefits of DSPs.

Work Package 4: End of Year and Final Reports/Case Studies

At the end of each year of the Bath City DSP scheme B&NES will produce a report outlining the total number of DSPs undertaken, the headline findings for each DSP, and the key recommendations / lessons learned that have emerged. This document will be shared with local businesses as a way to disseminate the findings of the DSPs to date, and promote the scheme.

Work Package 5: Additional Support for DSP Implementation

In many cases the benefits of such support and recommendations may only be partially-achieved or fail to be achieved due to a lack of staff capacity / technical ability to implement findings. To resolve this, B&NES will provide additional support to businesses who have undertaken DSPs to provide advice and guidance to help businesses implement the recommendations emerging from their respective DSPs.

It is hoped that this will help to provide tangible evidence to other businesses, B&NES and central government to support the participation and deployment of the Bath DSP scheme.

The indicative schedule for this work is outlined in Table 6-1.

Table 6-1: Indicative DSP programme

Task		Year One												Year Two											
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
Year One	Project Set Up																								
	DSP Recruitment																								
	DSP Delivery																								
	DSP Assessment																								
	End of Year Reporting																								
	Workshop																								
Year Two	DSP Recruitment																								
	DSP Delivery																								
	DSP Assessment																								
	End of Year Reporting																								
	Workshop																								

6.2.5 Quantification of scheme

The cost of provision of a Bath Delivery and Service Plan Pilot scheme is £15,000 which is being funded from the feasibility study funding provided. In order to roll this out across a further 80 businesses/organisations in up to sixteen locations, the total funding request is **£248,400**, as shown in Table 6-2, assuming a cost of £3,000 per business and inflation of 3.5%. This is in accordance with the cost per business currently allocated for the pilot scheme.

Table 6-2: Summary of mitigation measure costs

Item	No.	Rate	Total
CAPEX			
Delivery and servicing plan	80	£3,000	£240,000
		CAPEX Sub-Total	£240,000
		Total CAPEX including 3.5% inflation for 2020	**£248,400**

6.3 Electric car/van club

6.3.1 Description

It was identified by the DEIA that 90 SMEs within the CAZ operate in sectors that are expected to be particularly reliant on LGVs, and it is recognised that it will not be possible to use cargo bikes for delivery in all circumstances.

It is therefore proposed to bring forward the car/van club re-procurement in recognition of increasing the number of electric vans available. This would provide a suitable alternative where delivery using cargo bikes is not feasible. In order to facilitate this, a tender specification and a review of existing allocations is required, collecting data from current usage patterns, linking into new policy development areas. Review and scoring of submissions and a report outlining the conclusions will be required. Allocated car/van club bays will also be implemented in the zone to facilitate parking, which will require Traffic Regulation Orders and associated signing and lining. It is assumed that up to 16 bays will be allocated for car/van club vehicles, based on the proposed areas for DSPs.

6.3.2 Delivery plan

Table 6-3 presents an indicative programme to show how the measure would be developed and implemented.

Table 6-3: Indicative electric car/van hire club

Task		2019				2020										
		Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
Car/van hire club	Detail Work Needed															
	Procurement															
	Contract Award															
	CAZ Implemented															*

6.3.3 Quantification of scheme

Table 6-4 presents a summary of the proposed costs for this measure. In 2019 prices, a total of £6,000 is requested for the review and re-procurement of car/van club scheme, based on the cost of similar exercises undertaken by B&NES. Each parking bay is priced at £5,000, for provision of a Traffic Regulation Order (TRO) and the associated signing and lining, again based on the costs of similar schemes.

Table 6-4: Summary of mitigation measure costs

Item	No.	Rate	Total
CAPEX			
Facilitate use of car/van club for electric van hire – procurement	1	£6,000	£6,000
Facilitate use of car/van club for electric van hire – parking bays	16	£5,000	£80,000
		CAPEX Sub-Total	£86,000
		Total CAPEX including 3.5% inflation for 2020	**£89,010**

6.4 Last mile delivery

6.4.1 Description

This measure is aimed at further building on an existing Last Mile Delivery service scheme currently operating in B&NES, in recognition that the addition of a CAZ would increase the demand for these services.

Under current funding from the Office of Low Emission Vehicles (OLEV), B&NES has established a Last Mile Delivery service. B&NES has procured WeGo to provide an electric cargo bike delivery service to support city centre businesses move items in and out of the city for prompt and reliable deliveries without resorting to LGVs and HGVs, reducing costs to business owners, reducing congestion in Bath and improving the air quality in the City. The current contract provides for around £100,000 of support for a pilot of this service up to the end of March 2021. Currently this provides for the use of two cargo bikes available to service the whole of the CAZ area, to whichever businesses sign up to the scheme.

The council has previously piloted a larger scale freight consolidation centre in collaboration with Bristol City Council, utilising a large out of town storage facility at Avonmouth for consolidating deliveries to reduce goods vehicles journeys into the City, and electric HGVs to further avoid adding to the air quality issues in Bath. Whilst this pilot delivered excellent outcomes in terms of reduced vehicle movements (a 78% reduction in journey movements for participating businesses), the high overheads meant the service charges were a barrier to attracting enough local businesses to make the operation sustainable. A Last Mile Delivery service focuses on using shared electric cargo bikes or tricycles with electric pedal assist to keep overheads low and maximise the range. Subsequently the current scheme is using a small local depot on London Road, which improves on the previous Avonmouth based depot, which offered no benefit to logistics companies operating to the East of the city.

Additional funding from the Clean Air Zone mitigation package would allow the council to expand the scheme, providing more bikes, larger storage containers, and bikes with greater storage capacity, to increase the potential to replace goods vehicles entering the city and offer a sustainable alternative for businesses otherwise impacted by the CAZ. The current scheme is proposed for non-perishable items. Additional funding would enable the council to also introduce insulated containers and expand the scheme to allow the transport of perishable goods including food and medical items.

The proposal would expand the existing depot on London Road to the east of Bath and then establish depots in three other locations including:

- West of Bath – off A36 (Lower Bristol Road)
- West of Bath – off A4 (Upper Bristol Road)
- South of Bath – off A367 in Bear Flat area

Twelve additional cargo bikes are proposed to provide the additional last mile delivery services.

Further, Bath has been identified as part of a report published by the National Infrastructure Commission[8] as a pilot city to set out their updated approach to freight within their own local infrastructure strategy by the end of 2020. B&NES will be working with freight providers to develop innovative ways of altering the model of last mile delivery, addressing delivery timings and reviewing late night movements to reduce emissions through peak times in line with existing and developing local transport strategic policies and aims. Funding is requested through the CAF to facilitate this pilot, which complements the last mile delivery services being proposed.

[8] National Infrastructure Commission (April 2019) *Better Delivery: The Challenge for Freight. Freight Study Final Report*

6.4.2 Delivery plan

Procurement limits for the existing contract requires a new competitive tender process for the proposed expansion of the existing scheme however this will be expedited by basing it on the tender recently completed, which has been successfully delivered.

Table 6-5 presents an indicative programme to show how the measure would be developed and implemented.

Table 6-5: Indicative last mile delivery programme

Task		2019				2020											
		Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
Last- mile delivery services	Detail Work Needed																
	Procurement/contract extension																
	Award																
	Infrastructure implementation																
	Scheme Begins																
	CAZ Implemented																*

6.4.3 Quantification of scheme

Costs for this mitigation measure are as those for the existing contract. Table 6-6 presents a summary of the proposed costs for this measure.

12 additional vehicles for £15,000 each would be purchased at a total cost of £180,000. B&NES anticipates small depots or containers would be located on each strategic axis to the city to maximise ease of use for customers, their logistics providers as well as the operator. Each storage unit or expansion is expected to cost an upfront total of £20,000, so a further £80,000 in capital cost. Other capital costs would be an office and communications infrastructure (expanding upon the existing system), including software development to improve the user experience and operational efficiency. This essential capital infrastructure is estimated to cost in the order of £100,000. Operational costs include staff costs, vehicle maintenance, upkeep of software and rental of server farm space to host the system. This is expected to cost £120,000 per year (£10,000 per cargo bike) for the first three years, with revenue derived from the operation covering ongoing costs after that.

The city freight pilot is estimated to cost a total of £50,000, in accordance with similar schemes.

Table 6-6: Summary of mitigation measure costs

Item	No.	Base Rate	Total
CAPEX			
Cargo bikes	12	£15,000	£180,000
Storage units	4	£20,000	£80,000
Supporting infrastructure	1	£100,000	£100,000
City freight pilot	1	£50,000	£50,000
		CAPEX Sub-total	**£410,000**
OPEX			
Maintenance	3 years	£120,000	£360,000
		OPEX Sub-total	**£360,000**
		Total (including 3.5% CAPEX* and 2.9% OPEX inflation)**	**£805,637**

* Uplifted for inflation in 2020. **Uplifted for inflation in 2020, 2021 and 2022.

6.5 Value for money assessment

6.5.1 Quantifiable Impacts

The delivery and servicing plans have the potential to remove non-compliant freight traffic associated with eighty businesses in Bath City Centre from the highway network. Assuming an equal proportion of non-compliant LGV and HGV freight traffic currently service these businesses on a daily basis, the delivery and servicing plans could remove 40 LGV trips and 40 HGV trips from the CAZ each day. Whilst the air quality and transport benefits of removing non-compliant LGVs and HGVs from the network are likely to be positive, they cannot be assessed in the absence of formal modelling.

However, it is possible to monetise the impact of removing non-compliant freight traffic on business operational costs. It is assumed that non-compliant freight traffic will pass on the cost of entering the CAZ to the businesses they are delivering to. Hence, it is possible to estimate the reduction in costs incurred by those businesses who may avoid the pass-through cost of entering the CAZ for non-compliant freight traffic. Assuming 40 non-compliant LGV trips (at a £9 CAZ charge per day) and 40 non-compliant HGV trips (at a £100 CAZ charge per day) no longer take place each day, businesses could avoid pass-through CAZ charges of around £4,360 per day. On the basis that deliveries occur six days a week, the daily figure can be annualised to £1.4 million of avoided costs in response to delivery and servicing plans.

The electric car/van club will provide spaces for sixteen electric commercial vehicles that will not be required to pay the CAZ charge. These sixteen vehicles will replace trips into the CAZ area by non-compliant freight vehicles, who would incur CAZ charges of £9 per LGV and £100 per HGV. These CAZ charges would otherwise be passed onto individual businesses. Assuming that the non-compliant freight trips will be split evenly between LGVs and HGVs, cancellation of these non-compliant trips within the CAZ area could result in avoided costs of nearly £900 per day for local businesses. On the basis that non-compliant deliveries would otherwise occur six days a week, the daily figure can be annualised to £272,064 of avoided costs in response to the electric car/van club.

The last mile delivery scheme component will provide twelve cargo bikes that will allow businesses to collect delivery goods from storage depots, alleviating the need for non-compliant freight vehicles to enter the CAZ and risk passing any CAZ charge incurred onto the businesses they are servicing. The last mile delivery scheme will reduce the number of trips into the CAZ area by non-compliant freight vehicles, who would incur CAZ charges of £9 per LGV and £100 per HGV. These CAZ charges would otherwise be passed onto individual businesses. Assuming that the non-compliant freight trips will be split evenly between LGVs and HGVs, cancellation of these non-compliant trips within the CAZ area could result in avoided costs of £654 per day for local businesses. On the basis that non-compliant deliveries would otherwise occur six days a week, the daily figure can be annualised to £204,048 of avoided costs in response to the electric car/van club.

Table 6-7 demonstrates that combined, the economic benefit of reducing non-compliant freight trips amounts to £1.8 million. This represents the potential avoided cost to businesses of incurring pass through costs arising from the imposition of the CAZ charge on freight companies. The proposed measures allow these costs to be avoided. As a result, the avoided cost of £1.8 million can be considered an economic benefit to local businesses.

Table 6-7: Aggregate Value for Money Assessment

Economic Impact Category	Value (2019 Prices, Undiscounted)
Delivery and Servicing Plan – Benefits	£1,360,320
Electric Car/Van Club – Benefits	£272,064
Last Mile Delivery - Benefits	£204,048
Total Benefits	£1,836,432
Delivery and Servicing Plan – Costs	£240,000
Electric Car/Van Club – Costs	£86,000
Last Mile Delivery - Costs	£770,000
Total Costs	£1,096,000
Benefit Cost Ratio	1.68

Set against a scheme cost of £1.1 million, the economic benefits identified above could generate an indicative BCR of 1.68. Note that the benefits alluded to above are based on one year of impacts. If impacts are extrapolated across the ten year appraisal period, the scale of benefits is likely to increase. Also note that it has not been possible to estimate the additional economic benefits that might arise due to reduced traffic and improved air quality as a result of fewer non-compliant freight trips.

6.5.2 Additional Non-Quantifiable Impacts

Through its ability to unlock the following wider, non-quantifiable benefits, the mitigation measure is considered critical to unlocking and maximising the full potential of the other mitigation measures proposed as part of this CAF bid. The measure will also support the following wider impacts:

- Promotes more active and healthier lifestyles through support for active mode alternatives via the electric bike infrastructure.
- Supports dependent businesses such as retail. The mitigation measure safeguards the delivery of stock on a reliable basis. This will help prevent job losses and help maintain the vitality and viability of Bath City Centre.
- Most businesses across all sectors are reliant to some extent on freight or delivery services. If non-compliant vehicles continued to enter the CAZ, any associated charge would likely be passed on to end consumers. Provision of delivery and servicing plans as well as alternatives to LGV access to the city centre could reduce the amount of non-compliant freight vehicles entering the CAZ zone and therefore helps to minimise pass-through of CAZ costs to end consumers.
- Protects local freight businesses and traders by providing support for alternatives to non-compliant LGV use. This is particularly important for SMEs and sole traders, who may struggle to identify these opportunities alone.
- The facilitation of an electric car/van club could have a positive impact on the emerging electric vehicle market. The measure could convince more people to switch to electric vehicles. Further, by encouraging the use of electric vehicles, the mitigation measure will increase awareness of a nascent market. Electric vehicles will also contribute to lower operating costs and noise pollution.

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

7.1 Description of Measure

7.1.1 Sustainable travel and transport team

Whilst not a direct mitigation measure, B&NES proposes to employ a team to promote and facilitate uptake and usage of the mitigation measures. They will also provide a general advice service to those affected by the Clean Air Zone.

The sustainable travel and transport team would be employed to work proactively and reactively with local businesses to:

1) Ensure that businesses are aware that the CAZ is being implemented.
2) Explore the implications of the implementation on individual businesses and employees.
3) Provide advice and support to facilitate:
    i. The uptake of mitigation resources where appropriate.
    ii. Behaviour change for employees where this will have a positive impact on air quality and individuals' health and wellbeing.

In addition, the team will also actively seek to engage with residents/community groups to positively promote the CAZ and mitigation measures or other services that are available outside of the CAF which will support modal shift towards more sustainable modes of transport. The travel advisors will play an important role in providing support to local businesses and residents (and those in neighbouring authorities impacted by the CAZ) and will encourage these stakeholders to take responsibility for their contribution to air quality and therefore celebrate in the positive outcomes.

Through this work, the team will aim to collect information on our local businesses and individuals that engage with the team. Such information will allow for:

1) Impact assessment of marketing of the CAZ
2) Identification and quantification of the impact of the CAZ.
3) Uptake of mitigation resources.
4) Uptake of other resources.
5) Measure of change in mileage, "dirty to clean" and therefore reduction in NO_2 (motor vehicles).
6) Measure of change in mileage, "dirty to clean" and therefore reduction in NO_2 (active transport).
7) Identification of impacts not predicted.
8) Monitoring of changes in health of those accessing individual support.
9) Circulation of positive impacts of change to those who have contributed.

The sustainable travel and transport team will be made up of twelve staff, with roles as follows:

- One sustainable travel and transport team lead, who will manage the travel advisor team.
- Three technical administration officers
- Four business engagement officers; and
- Four travel advisors.

7.1.2 Supporting measures staff

In addition to the sustainable travel and transport team, delivery leads for the supporting measures on behalf of are also proposed including a:

- Supporting measures team manager -

  Manages the sustainable travel and transport team and supporting measures scheme leads

- Bus retrofit scheme lead -

  A full-time, 18-month officer resource to support the CBFT Project Manager based in Bristol and manage the local administration of funding, installation by retrofit companies and help co-ordinate the works around the fleets to ensure continuity of service and full compliance before the commencement of the CAZ.

- Financial assistance scheme lead –

  A full-time 24-month officer resource to lead the delivery of the asset finance specialist contract on behalf of B&NES.

7.2 Delivery Plan

It is proposed to employ a mix of specialist consultancy staff and directly employed staff via the usual framework contracts or recruitment processes. It is proposed to have these staff in place by January 2020 in order to provide this service well in advance of the CAZ becoming operational.

The organisational structure for the Supporting Measures team is presented in Figure 7.1.

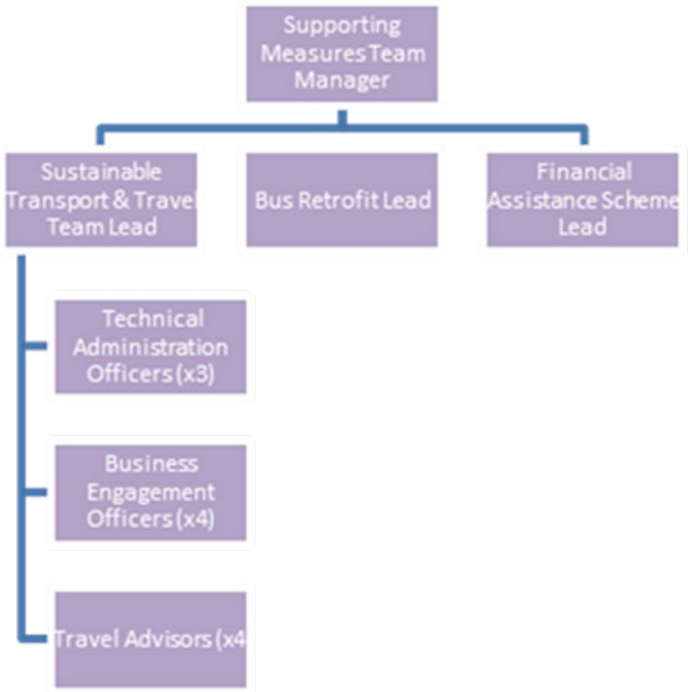


Figure 7-1: Supporting measures team

7.3 Quantification of Scheme

Each team member is budgeted for an initial two-year period, with the exception of the bus retrofit lead who will be in post for a period of 18 months. After the initial period, scheme revenue is assumed to cover ongoing staff costs. The total funding request for this measure is **£1,607,444** for two years.

The base cost per person is determined using the current salary for the grade indicated, plus a 32% uplift for pension and national insurance contributions. Inflation is applied at a rate of 3% on these costs to account for roles being held in 2020 and 2021. A further overall mark-up of 30% is applied to the total of the staff costs, to account for B&NES Council overheads including office space, IT equipment and support, and human resources.

Table 7-1: Supporting measures staff costs

Role	No.	B&NES Grade	Funding period	Base cost per person	Total Cost
OPEX					
Supporting measures team manager	1	Grade 10	2 years	£55,011	£110,022
Sustainable travel and transport team lead	1	Grade 8	2 years	£43,399	£86,798
Technical administration officers	3	Grade 6	2 years	£34,738	£208,428
Business engagement officers	4	Grade 7	2 years	£39,120	£312,960
Travel advisors	4	Grade 7	2 years	£39,120	£312,960
Bus retrofit lead	1	Grade 8	1.5 years	£43,399	£65,099
Financial assistance scheme lead	1	Grade 8	2 years	£43,399	£86,798
				Sub-total	£1,183,065
				Sub-total including 3% inflation for 2020 and 2021	£1,236,495
				Overhead on base costs (30%)	£370,949
				TOTAL OPEX	£1,607,444

7.4 Value for Money Assessment

The mitigation measure does not generate any direct, monetisable benefits. However, through its ability to unlock the following wider, non-quantifiable benefits, the mitigation measure is considered critical to unlocking and maximising the full potential of the other mitigation measures proposed as part of this CAF bid:

- As a result, could prevent job losses amongst people in Bath and its neighbouring authorities, by for example ensuring awareness of the availability of financial support for vehicles to be upgraded. It will also maintain Bath as a location that is attractive to local businesses, ensuring that consumers continue to have choice.
- Could lead to the promotion of more active and healthier lifestyles through support for active mode alternatives including walking and cycling.
- Allows independent businesses (e.g. retail) to be more proactive in their response to the Clean Air Plan. This could help safeguard the delivery of stock on a reliable basis. This will help prevent job losses and help maintain the vitality and viability of Bath City Centre.
- Most businesses across all sectors are reliant to some extent on freight or delivery services or trades people. Any CAZ charge would likely be passed on to end consumers. By raising awareness and encouraging travel planning, the amount of non-compliant vehicles entering the CAZ zone could be reduced, thereby minimising pass-through of CAZ costs to end consumers.
- Will ensure the leisure and tourism industry is aware of opportunities to access support in dealing with the transition to the Clean Air Plan.

Appendix A. Bus Operator Letters

Appendix B. Financial Support Scheme Invitation to Tender Documents

Appendix C. Financial Support Schemes Vehicle Estimates

JACOBS

DRAFT Memorandum

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Subject	**Vehicle Estimates for Household and Business Assistance Schemes**
Project Name	Bath Clean Air Plan
From	Jacobs
Date	December 21, 2018

1. Introduction

1.1 Purpose of Memo

As part of the Bath Clean Air Plan project the purpose of this Memo is to provide estimates of the numbers of vehicles that may be eligible for the following schemes:

- Pre-Euro 4 Household Assistance Scheme
- Pre-Euro 6 Business Assistance Scheme.

It should be noted that not all relevant information is available to provide direct estimates of the above, hence the most relevant available data has been analysed and is presented accordingly in this note.

To inform the above, three primary datasets were used as described below.

1.2 Scheme Summaries

The schemes are summarised below.

Key features of the Household Assistance Scheme are:

- To be run during 2019/20
- Grant available to upgrade pre-Euro 4 petrol or diesel cars
- Open to Bath residents who live in the CAZ area and B&NES / neighboring authority residents who work in the CAZ area

Key features of the Business Assistance Scheme are:

- To be run during 2019/20
- Interest free loan available to upgrade pre-Euro 6 commercial vehicles

- Open to B&NES / neighboring authority businesses with premises in the CAZ or delivering into the CAZ

2. Vehicle Registration Data and Census Journey to Work Data

2.1 Data sources

Lower Super Output Area vehicle registration data provided by DEFRA has been used to estimate the proportions of cars that are non-compliant with CAZ standards.

Specifically, the data has been used to identify:

- diesel cars first registered before September 2014 (broadly pre-E6)
- petrol cars first registered before January 2005 (broadly pre-E4)

The data refers to registrations as of March 2017.

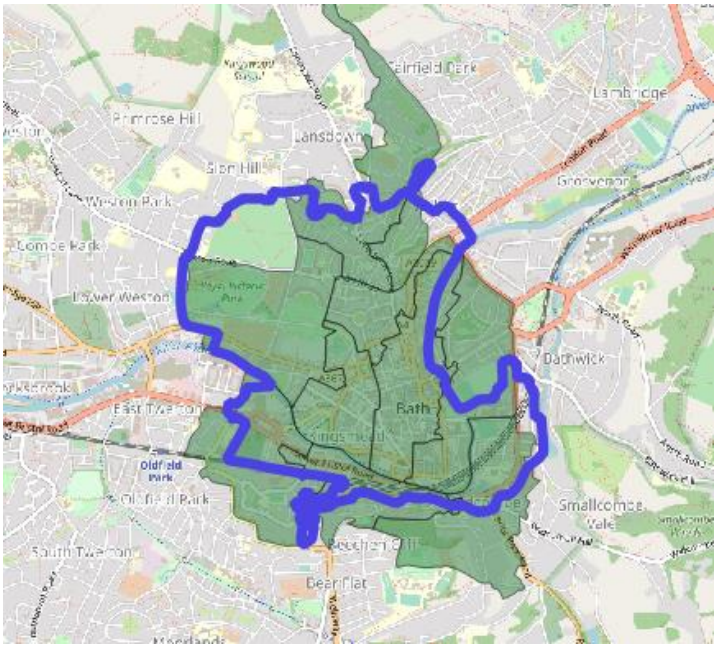
The use of approval cut-off dates as a proxy for Euro standards is imperfect, however it provides the most reliable approximation currently available.

Census Journey to Work data has been used to identify the number of cars used to travel to work within the Bath CAZ area. This data is available at a geographical division of Middle Super Output Area (MSOA), which are comprised of groups of LSOAs.

2.2 Geographical Boundaries

The vehicle registration data is provided at a geographical division of Lower Super Output Area (LSOA) level.

The LSOA is a geographical area that is used in census statistics and each encompasses around 1,500 residents. The most recent LSOA boundaries are from the 2011 census and each of these has a unique code that identifies it. The LSOAs included within the Bath CAZ for this analysis are highlighted with green on the map below.



The definition of Bath and which LSOAs that are included in Bath has been approximated by the areas identified in the *Major Town and City boundaries* dataset by Office for National Statistics[1], valid for December 2015.

2.3 Analysis

The analysis approach is as follows:

- Use the LSOA vehicle registration data to identify the pre-Euro 4 petrol and pre-Euro 6 diesel cars registered within the CAZ area
- Use Census Journey to Work data to identify the MSOAs that comprise the catchment area for 90% of car work trips into the Bath CAZ[2], covering B&NES and parts of Bristol, North Somerset, South Gloucestershire, Somerset and Wiltshire
- Use Census Journey to Work data to identify the numbers of people who commute by car into the CAZ area from the above MSOAs, excluding those who live in the CAZ (since captured in step 1 above)
- Use the LSOA vehicle registration data to identify the proportions of pre-Euro 4 petrol and pre-Euro 6 diesel cars within each of the above MSOAs
- From the above, estimate the number of non-compliant cars being used to commute into the CAZ, factoring up the result by 1/0.9 since only 90% catchment area identified
- Apply Euro class splits for diesel cars (identified from ANPR and vehicle number plate lookup data) to estimate the number of pre-Euro 4 diesel cars
- Apply 10% uplift since the Journey to Work data is 2011 trip levels
- Apply Emissions Factor Toolkit (EFT) projected changes in fleet Euro class composition from 2017 to 2019 to estimate 2019 values

The Table below presents the estimated number of pre-Euro 4 cars owned by people who either live or work in the Bath CAZ area.

2019 Values	Diesel pre-E4	Petrol pre-E4	Total
Registered in Bath CAZ	102	493	595
Working in Bath CAZ	401	1877	2279
Total	503	2370	2874

3. Automatic Number Plate Recognition Data

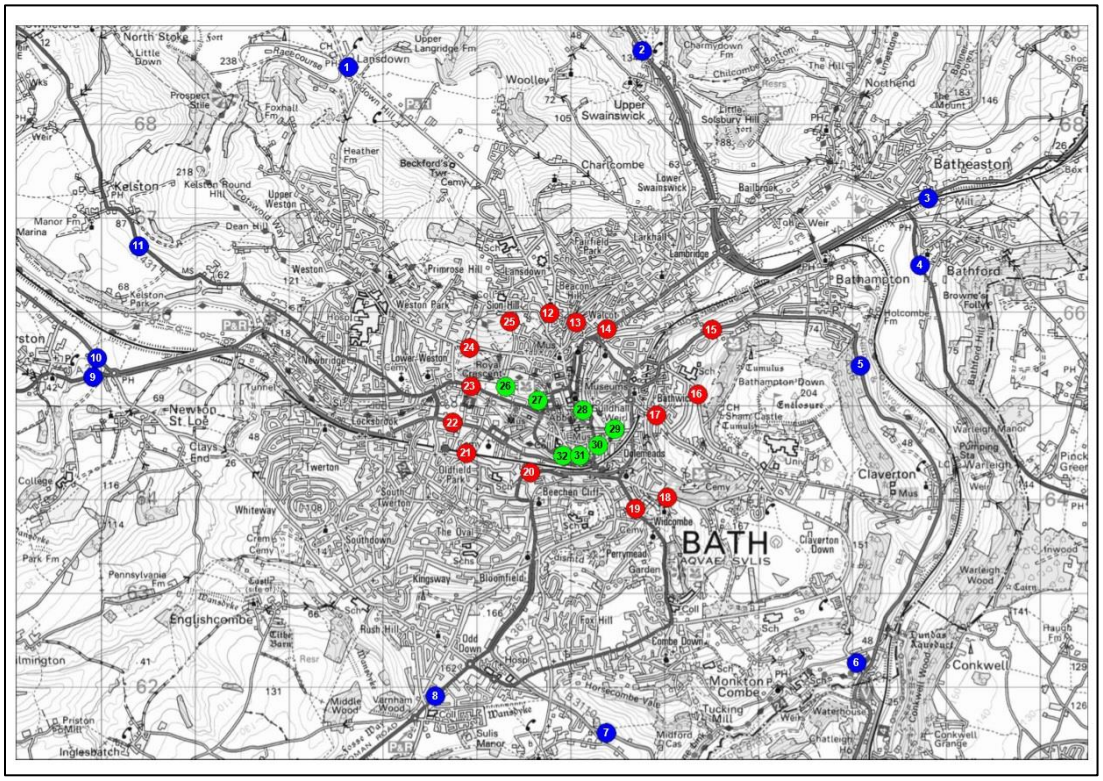
3.1 Data source

Automatic Number Plate Recognition (ANPR) has been used to inform the Business Assistance scheme estimates for LGVs and HGVs. It should be noted that there is no data currently available that identifies which goods vehicles form part of a 'local' fleet, hence non-compliant trip frequencies have been used as a proxy to identify the number of such vehicles that regularly drive within the central part of Bath.

ANPR was obtained at a number of locations across Bath for 14 consecutive days in October / November 2017. The camera locations are shown in the Figure below.

[1] https://data.gov.uk/dataset/5c962ca3-9834-4aca-a6c8-11d224438166/major-towns-and-cities-december-2015-boundaries

[2] The remaining 10% are spread across a large number of MSOAs with a small sample size for each.



The cameras were positioned at the following sites:

Outer Cordon (blue labels)

1) Lansdown Road, north of Lansdown Lane
2) A46, north of Upper Swainswick
3) A4, east of A363 Bradford Road
4) A363 Bradford Road
5) A36 Warminster Road, east of Bathampton
6) Brassknocker Hill
7) B3110 Midford Road
8) A367, north of Odd Down P&R and south of Old Fosse Road
9) A39 Wells Road, west of junction with Bristol Road
10) A4 Bath Road, west of junction with Bristol Road
11) A431 Kelston Road

Inner Cordon (red labels)

12) Lansdown Road, north of Lansdown Grove
13) Camden Road
14) A4 London Road
15) A36 Warminster Road
16) North Road

17) Bathwick Hill
18) Widcombe Hill
19) Prior Park Road
20) A367 Wells Road, north of Oldfield Road
21) Broughman Hayes
22) A36 Lower Bristol Road, east of Windsor Bridge Road
23) Upper Bristol Road, east of Windsor Bridge Road
24) Weston Road, east of Park Lane
25) Cavendish Road

City Centre Car Parks (green labels)

26) Charlotte Street Car Park, entrance 1
27) Charlotte Street Car Park, entrance 2
28) The Podium Car Park - to include the entrance ramp and the 2-way entry/exit road to the rear
29) Leisure Centre Car Park
30) Manvers Street Car Park
31) Southgate Car Park
32) Avon Street Car Park

The cordons are not entirely watertight as some small routes were not included in the surveys. However, based on local knowledge of the network the key routes into/through the city have been selected to capture the majority of traffic.

The ANPR data captured vehicle registration numbers (VRNs) that were then cross referenced against vehicle details data purchased from Carweb that enabled identification of vehicle type, fuel type and Euro class for each vehicle. From this pre-Euro 6 LGVs and HGVs could be identified.

For the purposes of this analysis just the ANPR data captured at the Inner Cordon locations were used since this best represents the area covered by the proposed CAZ.

3.2 Frequency analysis

Through number plate matching across the 14-day period, frequency analysis was undertaken to identify the number of days each pre-E6 LGV/HGV was recorded in the ANPR data for Inner Cordon sites.

It may be noted that ANPR cameras do not achieve full capture of all vehicles. However, analysis has shown that if a vehicle enters Bath on a given day then on average it will pass three ANPR locations across the day. Hence the likelihood of not being captured by any of the ANPR cameras is very low (around 1%) hence any adjustment for this would not make a material difference to the frequency analysis. However, the estimated number of 'through' trips (i.e. those not stopping in Bath) have been subtracted in order to estimate the number of relevant vehicles stopping within the central Bath area.

The dataset available relates to October / November 2017. Again, EFT projected changes in fleet Euro class composition have been used to estimate 2019 values.

The Table below presents trip frequency analysis for 2019 based on the projected change in Euro class composition.

2019	Number of days														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Total
LGV (pre-Euro 6)	5209	1604	727	522	340	292	230	219	224	217	150	101	40	32	9907
HGV (pre-Euro 6)	1066	273	107	69	36	22	20	11	14	14	7	1	2	4	1647

From the above table it can be seen, for example, that 5209 pre-E6 LGVs were observed on one day out of 14 whilst 32 were observed on all 14 days. The corresponding values for HGVs are 1066 and 4.

4. Summary

Available[3] data sources have been reviewed to obtain approximate indications of the number of vehicles whose owners may be eligible for schemes as follows in relation to the implementation of a charging CAZ for Bath:

- Pre-Euro 4 car Household Assistance Scheme
- Pre-Euro 6 LGV and HGV Business Assistance Scheme.

Census Journey to Work and LSOA registration data indicates approximately 600 cars within the Bath CAZ area and a further 2300 owned by people working in the CAZ area predicted to be pre-Euro 4 in 2019 giving a total of just under 3000 cars eligible for the Household Assistance Scheme.

ANPR analysis over 14 days adjusted to 2019 levels indicates a total of around 9900 pre-Euro 6 LGVs and 1650 pre-Euro 6 HGVs driving into central Bath. These figures do not give a direct estimate of the relevant number of commercial vehicles that would be eligible for the scheme as this analysis will exclude vehicles that did not travel into Bath during the days covered by the data and may include other vehicles that drive into Bath very infrequently. However these figures are provided as a very approximate indication of the possible number of goods vehicles that may be eligible for a Business Assistance Scheme.

Note, the Business Assistance Scheme is also proposed to apply to buses and taxis. These vehicles have not been considered in this analysis as it is understood B&NES have further information for these categories of vehicles.

[3] Based on information held by Jacobs at the time of writing