

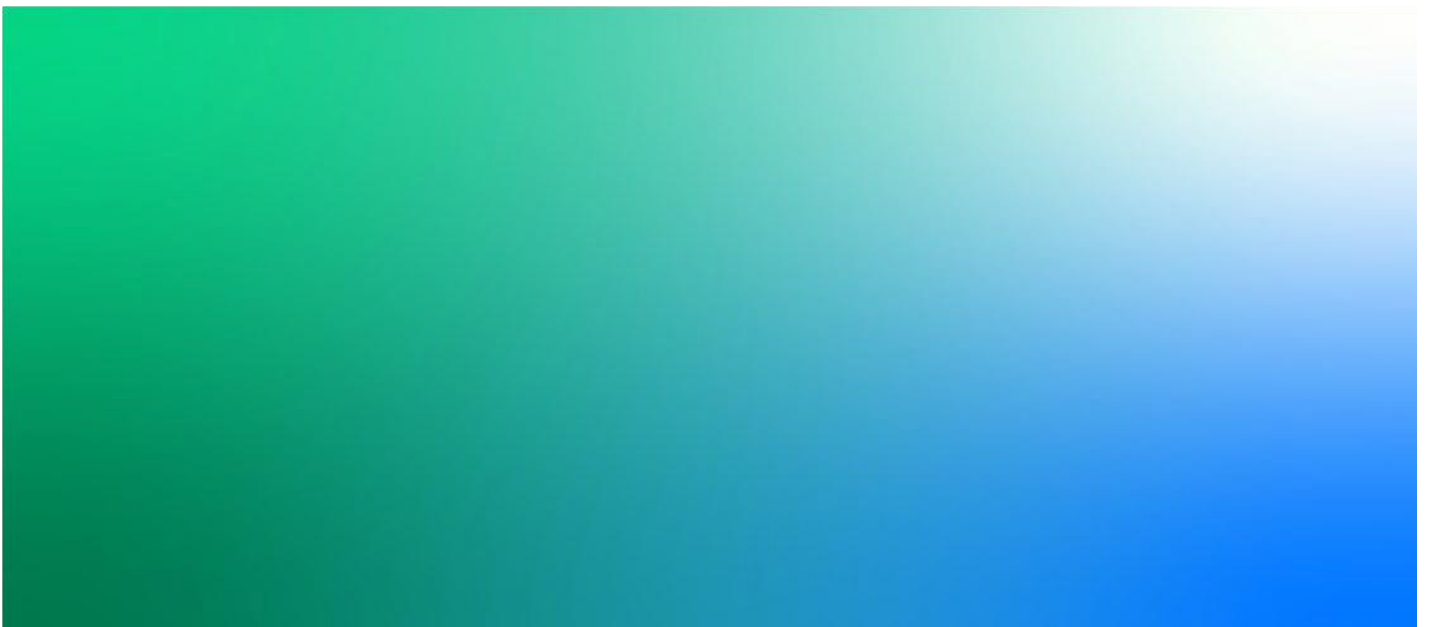


Bristol City Council Clean Air Plan - Full Business Case
Evaluation, Monitoring and Benefits Realisation Plan

FBC-38 | 5

June 2021

Bristol City Council



Bristol City Council Clean Air Plan Full Business Case

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Acronyms and Abbreviations

| | |
|-----------------|-----------------------------------------------------------------------|
| ANPR | Automatic Number Plate Recognition |
| AQO | Air Quality Objective |
| BCC | Bristol City Council |
| CAZ | Clean Air Zone |
| CSF | Critical Success Factor |
| Defra | Department for Environment, Food & Rural Affairs |
| DfT | Department for Transport |
| EU | European Union |
| EV | Electric Vehicle |
| FBC | Full Business Case |
| GDP | Gross Domestic Product |
| HGV | Heavy Goods Vehicle |
| ITS | Institute of Transport Studies |
| JAQU | Joint Air Quality Unit |
| JSA | Job Seekers Allowance |
| LEP | Local Enterprise Partnership |
| LAQM | Local Air Quality Management |
| LGV | Light Goods Vehicle |
| NO _x | Nitrogen Oxides |
| NO ₂ | Nitrogen Dioxide |
| OBC | Outline Business Case |
| ONS | Office for National Statistics |
| PCM | Pollution Climate Mapping |
| PHV | Private Hire Vehicle |
| PM | Particulate Matter |
| ROAMEF | Rationale, Objectives, Appraisal, Monitoring, Evaluation and Feedback |
| SME | Small to Medium Enterprise |
| SOC | Strategic Outline Case |
| VMS | Variable Message Sign |

1. Introduction

Poor air quality is the largest known environmental risk to public health in the UK¹. Investing in cleaner air and doing more to tackle air pollution are priorities for the EU and UK governments, as well as for Bristol City Council (BCC). The Mayor of Bristol has often cited Bristol's 'moral and legal duty' to improve air quality in the city and the administration recognises that achieving improved air quality is not solely a transport issue. Notwithstanding the Council's work on a Clean Air Zone, efforts have been made to make citizens more aware of – and take personal responsibility for – various sources of air pollution, from traffic fumes to solid fuel burning. The Mayor has articulated a 'call to action' for local people, businesses and organisations to consider how small changes can make a significant difference in cutting toxic fumes across the city. BCC has monitored and endeavoured to address air quality in Bristol for decades and declared its first Air Quality Management Area in 2001. Despite this, Bristol has ongoing exceedances of the legal limits for Nitrogen Dioxide (NO₂) and these are predicted to continue until around 2027 without intervention.

The added context is that of the COVID-19 pandemic. Recent research suggests that poor air quality may be correlated with higher death / infection rates from COVID-19. This is further compounded by growing evidence that suggests that those from black, Asian and minority ethnic communities are more at risk of catching and dying from the virus and the fact that individuals from these communities are more likely to live in areas where air quality is poor. The challenge of maintaining public health and supporting economic recovery while also achieving legal air quality levels after lockdown restrictions are lifted will remain live and intersecting issues for the foreseeable future.

The UK Government continue to transpose European Union law into its Environment Bill², to ensure that certain standards of air quality continue to be met, by setting air quality assessment levels (AQALs) on the concentrations of specific air pollutants. It's very unlikely that these AQALs will differ to EU Limit Values prescribed by the European Union's Air Quality Directive and transcribed in the UK's Air Quality Standards Regulation 2010. Therefore, these Limit Values will remain in enforcement post-Brexit. In common with many EU member states, the EU Limit Value for annual mean nitrogen dioxide (NO₂) is breached in the UK and there are on-going breaches of the NO₂ limit value in Bristol. The UK government is taking steps to remedy this breach in as short a time as possible, with the aim of reducing the harmful impacts on public health. Within this objective, the Government has published a UK Air Quality Plan and a Clean Air Zone Framework, both originally published in 2017 (noting there have been subsequent revisions). The latter document provides the expected approach for local authorities when implementing and operating a Clean Air Zone (CAZ). The following business cases have been submitted to JAQU for the Clean Air Plan; Strategic Outline Case (April 2018), and an Outline Business Case (November 2019 and updated between April and June 2020).

In line with Government guidance BCC is considering implementation of the 'Small CAZ D Option' which includes a charging scheme for non-compliant buses, taxis, HGVs and LGVs and cars alongside a number of other measures.

A Full Business Case (FBC) was been produced for the delivery of the CAP; a package of measures which will bring about compliance with the Limit Value for annual mean NO₂ in the shortest time possible in Bristol. The FBC proposed a preferred option including details of delivery. The FBC formed a bid to central government for funding to implement the CAP.

This document is written to support the FBC and sets out how the benefits of the scheme will be monitored, evaluated and realised. It has been produced in line with the Inception, Evidence and Options Appraisal packages of Guidance issued by JAQU in 2017 (and updated in 2020), and the HM Treasury Green Book.

The objective of the scheme is to deliver an option including a package of measures which will be most likely to bring about compliance with the Limit Value for annual mean NO₂ in the shortest time possible in Bristol and reducing human exposure as quickly as possible. To understand whether the scheme meets this objective, it is

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 Environment Bill 2019-21 <https://services.parliament.uk/bills/2019-21/environment.html>

recommended that the “Standard Monitoring” approach set out in the Department for Transport’s (DfT) “Monitoring and Evaluation Framework for Local Authority Major Schemes” (September 2012) is followed.

This report sets out the evaluation strategy and benefits realisation plan for the BCC Clean Air Plan scheme, covering the monitoring of impacts and the approach to determining the projected benefits, impacts and objectives. In line with HM Treasury’s Magenta Book (2011) and DfT’s ‘Monitoring and Evaluation Strategy’ (2013), the plan also covers two stages of the ROAMEF concept (Rationale, Objectives, Appraisal, Monitoring, Evaluation and Feedback). This ensures that the Plan is aligned with the Government’s broad policy making and delivery cycle, depicted in Figure 1-1.

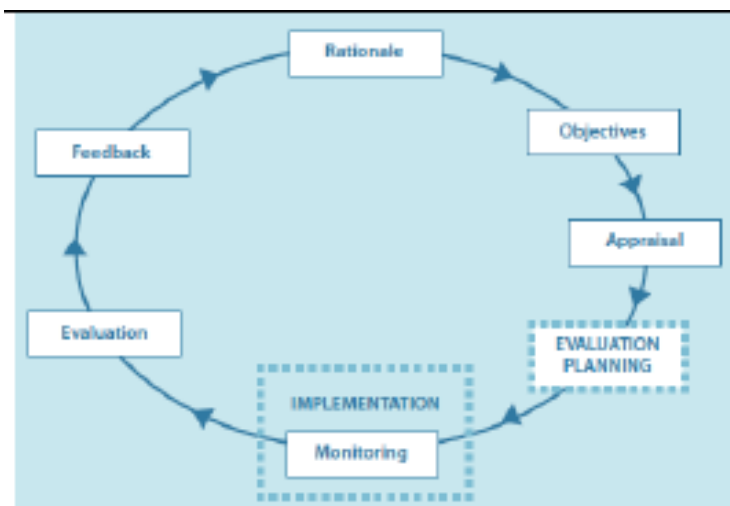


Figure 1-1: The ROAMEF cycle

In addition to local monitoring and evaluation of the BCC CAZ Scheme, JAQU are undertaking a central evaluation which will take place over two to three years by a separate organisation, with certain local authorities selected as a case study for a more detailed assessment. The central evaluation will provide BCC and other Local Authorities with learning that can be used to help delivery of Local Plans. This should include an understanding of what measures are working to reduce emissions in the shortest possible time and improve on the understanding of how Local Plan measures may affect local areas. The central evaluation will also provide Local Authorities with advice on approaches to gather robust data.

1.1 Summary of Evaluation Approach

The proposed approach is designed to assess whether the outputs and impacts of the scheme deliver the desired benefits and overarching objectives. The approach reflects the scale and type of scheme, plus the resources available to complete an evaluation providing a strong evidence base to feed into the benefits realisation assessment, inform stakeholders and where necessary, refine schemes.

The evaluation will include quantitative and qualitative measures, thereby covering a range of outcomes and impacts. Furthermore, the evaluation strategy will help influence similar schemes. It will comprise both ‘process evaluation’ and ‘impact evaluation’, with the former focusing on the processes by which the scheme was undertaken and the latter focusing on whether the desired impacts of the scheme were realised.

Based on DfT monitoring and evaluation guidance, and the requirement to undertake ‘standard evaluation’ for this scheme, the key types of questions to be addressed through this process are:

- How was the scheme delivered?
- What difference did the scheme make?
- Did the benefits justify the costs?

To enable evaluation to take place, a monitoring framework needs to be in place. The requirements of the "Standard Monitoring" outlined in the September 2012 DfT guidance have been used as a guide. The requirements are:

- Scheme Build
- Delivered scheme
- Costs
- Scheme objectives
- Travel demand, including behavioural change
- Travel times and reliability of travel times
- Out-turn value for money
- Impacts on the economy
- Carbon impacts.

The primary purpose of the scheme is to improve air quality within Bristol. Therefore, air quality will also be monitored, despite not being included within the 'standard monitoring' requirements.

The plan is defined in two parts, with the first part (process evaluation) covering the first three areas listed above (scheme build, delivery and costs) and the second area covering the scheme outputs, outcomes analysis and impacts to inform the benefits realisation. The second part will draw on the requirements in so far as they are applicable for this scheme.

Figure 1-2 illustrates the stages involved within the evaluation strategy and benefits realisation process. This process includes the following stages:

- Desired Impacts – These are based on the project's Critical Success Factors and reflect the intended effects of the scheme. These impacts are defined within Section 3.11 (listed as D1-D6).
- Monitoring Outputs – These include datasets that are likely to be impacted by the scheme. They are summarised within Section 3.2 (listed as M1-M8).
- Outcomes – These relate to the wider consequences of the scheme on society and the economy and are closely linked to the desired impacts. These outcomes are defined in Section 3.4 Outcome Analysis (listed as O1-O3).

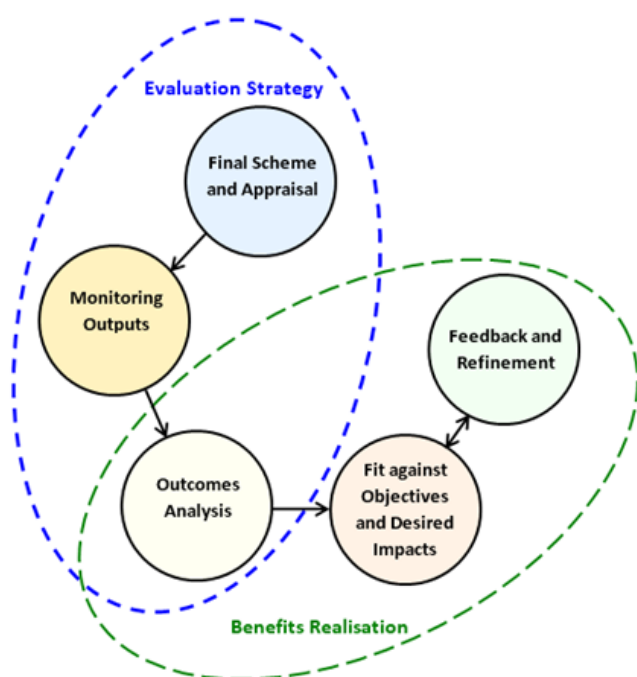


Figure 1-2: Flow diagram for Evaluation and Benefits Realisation Strategy

1.2 Scope of the scheme

The United Kingdom (UK) has in place air quality legislation, passed down from the European Union (EU), to ensure that certain standards of air quality are met. The legal limit for concentrations of NO₂ is 40 µg/m³ as an annual mean. This legal limit is breached across a number of cities in the UK, including at several locations in Bristol.

BCC, along with 27 other local authorities, has been directed to produce a Clean Air Plan (CAP) to achieve air quality improvements in Bristol in the shortest possible time.

After detailed analysis, the 'Small area CAZ D' was selected as the preferred scheme to comply with government guidance (see the FBC Options Assessment report for more detail on this process). This option is expected to achieve compliance by 2023. These measures aim to reduce NO₂ levels within Bristol to legal limits within the shortest possible timeframe.

- The Small CAZ D Option applicable to specific zones of operation shown in Figure 1-3 includes: Small Area Class D (charging non-compliant cars, buses, coaches, taxis, HGVs and LGVs);
- Fast Track Measures:
 - Closure of Cumberland Road inbound to general traffic
 - A detailed VMS (Variable Message Sign) Strategy which includes the use of existing transport infrastructure such as traffic signals and modelling

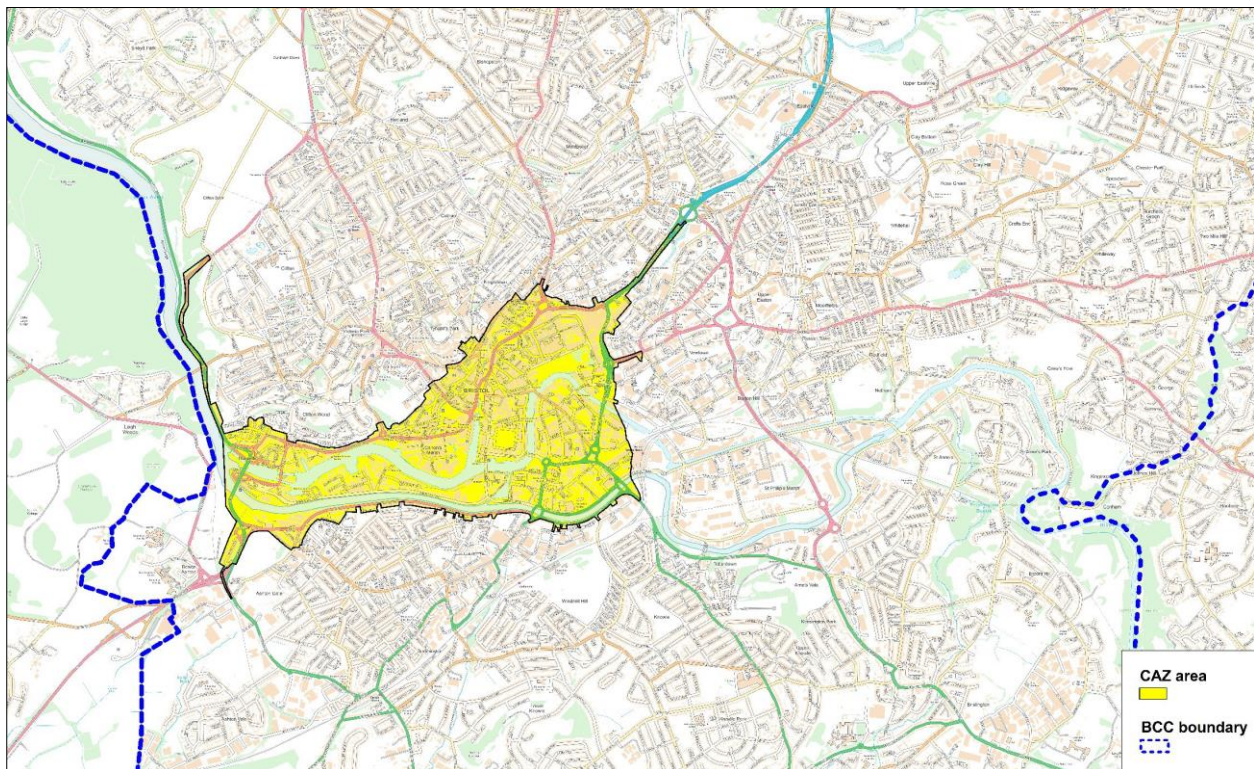


Figure 1-3: Bristol Small area CAZ D boundary

The Small CAZ D Option measures described above, would be delivered through funding from the Implementation Fund and Clean Air Fund, provided by central government. The Implementation Fund provides funding to deliver measures required to achieve compliance with air quality standards in the shortest possible time. The Clean Air Fund provides funding via a competitive bid process, to deliver measures that aim to mitigate and adverse impacts which are expected fall upon disadvantaged groups. Additional schemes and mitigation measures could potentially be funded by any net revenue produced from the charging zone, although this revenue is not guaranteed.

The ongoing base revenue cost for the CAZ to operate along with all other associated measures was estimated at £8.1 million over the three-year period in which the CAZ is expected to operate before compliance is achieved. The total base capital cost for the proposed CAZ was estimated at £46.6 million.

Timescales for delivery include:

- Scheme opening – 2022
- Modelled year of NO₂ compliance – 2023

2. Process Evaluation

Process evaluation seeks to answer the question 'How was the scheme delivered?'. This involves the assessment of whether a scheme is being implemented as intended, by monitoring the intervention's processes, timelines and budget throughout the implementation phase. This information will be used to inform the case for similar schemes across the UK.

The three areas of monitoring, evaluation and reporting will be:

- **Scheme build** – Covering procurement of the scheme, achievement of timescale and key milestones, risk outcomes and stakeholder feedback.
- **Delivered scheme** – Covering scheme refinements and success of the proposed design and materials used. This will include any measure taken to minimise any identified negative impacts during implementation.
- **Outturn costs** – These will be compared to forecasts covering capital and on-going operating and maintenance costs, ensuring the scheme financial performance is in line with the business case.

These three aspects of the scheme will be reported one year before scheme opening, as well as annually from 1 to 5 years after scheme opening.

3. Impact Evaluation

In line with the HM Treasury's 'Magenta Book' (2011), impacts evaluation attempts to provide an objective test of what changes have occurred, and the extent to which these can be attributed to the scheme.

3.1 Scheme Critical Success Factors

A number of Critical Success Factors (CSF) have been developed for the scheme in order to assess each scheme option. The CSFs summarise the desired impacts of the intervention and it is necessary to understand these intended effects before assessing and evaluating the changes caused by the scheme. The following CSFs were used for the current scheme:

Primary Critical Success Factor

- Deliver compliance with NO₂ air quality Limit Values³ and Air Quality Objectives⁴ in the shortest possible timescales

Secondary Critical Success Factors

- **Strategic**
 - Provide equity across different vehicle type and trip purpose
 - Compliance with Defra Draft CAZ framework, including minimum requirements
- **Economic**
 - Mitigate financial impact on low income households
 - Improve health of low-income households
 - Maximise positive effects on the economy, whilst minimising any negative impacts
 - Improve public health across Bristol
- **Commercial**
 - Delivery timescale risks of procurement
- **Financial**
 - Likelihood of revenue equating to implementation/operational costs⁵
 - Upfront capital required for scheme
 - Risk of financial penalty to the Council/s
- **Management**
 - Public acceptability which could impact on the option's deliverability
 - Political acceptability which could impact on the option's deliverability

3.1.1 Desired Impacts to Monitor

A number of desired impacts have been identified based on the scheme CSFs. These impacts will be monitored and assessed in order to feed into the benefits realisation plan and are considered appropriate to evaluate the outcomes of the proposed scheme. These desired impacts include:

Implementation Fund Scheme:

- D1 – Deliver compliance with NO₂ air quality Limit Value in the shortest possible time
- D2 – Deliver compliance with NO₂ Air Quality Objective in the shortest possible time

³ (EU NO₂ concentration Limit Values)

⁴ (LAQM air quality Objectives for NO₂ as set out in the Air Quality (England) Regulations (SI2000/928 as amended))

⁵ Complying with the legal test which was set out by the High Court in November 2016 in R (ClientEarth) (NO₂) V Secretary of State for Environment Food and Rural Affairs [2016] EWHC 2740 (Admin), only shortlisted options which achieve compliance with the NO₂ Limit Value in the shortest possible time, are appraised across this criterion. The relevant analysis is presented in the Financial Case chapter of the Strategic Outline Case.

Clean Air Fund Scheme:

- D3 – Minimise the negative impacts and maximise the benefits of the scheme on local businesses
- D4 – Minimise adverse impacts on traffic
- D5 – Facilitate use of public transport and sustainable travel
- D6 – Minimise the impacts of the scheme on residents, particularly low-income households

One of the main aims of the scheme is to improve public health across the city, and to ensure that low income households also benefit from any health impacts. However, the public health benefits of improved air quality are long term (over lifetimes) and therefore would not be appropriate to include as a desired impact, as they could not be adequately assessed within a short period of scheme delivery. Improvements to air quality have been shown to produce beneficial impacts on public health ⁶, therefore the public health aims of this scheme should be achieved if the air quality objectives and EU NO₂ Limit Values are met.

3.2 Central evaluation

As well as the local scheme plan, information gathered will be provided to support the central evaluation of all the CAPs implemented in the UK. The following aspects are to be assessed centrally:

- What impact have Local Plans had on air quality, NO₂ emissions and health?
- How have Local Plans affected behaviours of car owners, public transport users, local businesses? Have behaviours changed in expected or unexpected ways?
- How has the impact of the Local Plans varied for different local groups, including more vulnerable residents or transport users?
- How have external factors influenced the effectiveness of the Local Plans?
- How does the approach to implementing Local Plans affect the scale and pace of impacts?

The central evaluation will be undertaken by a separate organisation, with certain local authorities selected as a case study for a more detailed assessment. BCC will submit quarterly reports to JAQU for central evaluation, covering air quality and traffic data.

3.3 Monitoring Plan

In order to assess whether the impacts of the scheme are as predicted, a monitoring plan has been produced, outlining the programme of data collection and information collation tasks for the scheme.

Key questions which the monitoring plan seeks to answer include:

- Was the scheme delivered to costs and timescale?
- Has the scheme delivered the desired impacts and benefits as forecast?
- Has the scheme shown out-turn value for money as predicted?
- What lessons can be learnt to help shape air quality strategies for Bristol?
- Has the scheme had any unpredicted impacts?

Where possible, methods of data collection have been selected which are completed as part of ongoing air quality and transport monitoring, in order to minimise additional costs whilst maximising the data available to identify scheme impacts.

The area to be monitored includes those parts of the city within the proposed charging zone, but also those areas neighbouring the zones and across the wider city, as appropriate.

⁶ 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>

Further details of the proposed ANPR camera locations, which will be used to monitor data as well as enforcing the charging zone, are available within the FBC.

Table 3-1 lists the data to be collected and collated as part of the monitoring plan, with information on the method and frequency of data collection and rationale for its inclusion.

The areas of data collection include:

- M1: Air quality data
- M2: Vehicular fleet information
- M3: Traffic flows
- M4: Jobs seekers allowance information
- M5: UK business count data
- M6: Retail/business/office space vacancy figures
- M7: Walking and cycling counts
- M8: Stakeholder feedback from council user group forums

Table 3-1 Data Collection and Collation

| Measure | Data to be used | Rationale for inclusion | Data collection methods | Frequency of data collection |
|----------------------------------------------------|-----------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|
| M1: Air quality data | NO ₂ concentrations data collected at existing monitoring locations within the BCC area. | To understand changes in air quality (particularly NO ₂ concentrations). | Diffusion tubes and real time monitoring | Baseline (pre-scheme) and then ongoing monitoring. |
| M2: Vehicular fleet information | Number of compliant/non-compliant vehicles driving within the BCC charging zone. | To understand how the type of vehicles travelling in Bristol changes over time | ANPR cordon, cross-referencing with DVLA vehicle database | Baseline (pre-scheme) and then continuously through permanent ATCs (analysed quarterly) |
| M3: Traffic flows | Traffic flows within the charging zone as well as across the wider city | To understand how the scheme impacts on traffic flows and speeds along key routes within the highway network | ANPR cordon Permanent Automatic Traffic Counts (ATCs) SCOOT Loop Data | At least 2 weeks during baseline monitoring (pre-scheme) and then continuously through permanent ATCs (analysed quarterly) |
| M4: Job seekers allowance (JSA) information | ONS data from NOMIS web, relating to JSA benefits claimants in BCC | To understand any changes in the number of individuals applying for JSA within BCC, in | Publicly available data. Will be compared against other similar cities to help isolate the | Baseline (pre-scheme) and then annually for five years |

| Measure | Data to be used | Rationale for inclusion | Data collection methods | Frequency of data collection |
|----------------------------------------------------------------|---------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|
| | | order to assess impacts on the local labour market and economy. | impact of the scheme from other unconnected variables. | after scheme opening |
| M5: UK Business Count Data | ONS data from NOMIS web, relating to business demography | To understand changes in the number and type of businesses operating in Bristol in order to assess economic impacts. | Publicly available data. Will be compared against other similar cities to help isolate the impact of the scheme from other unconnected variables. | Baseline (pre-scheme) and then annually for five years after scheme opening |
| M6: Retail/business/office space vacancy figures | Vacancy statistics from internal council data. Market data from property consultants. | In order to understand economic impacts of the scheme in terms of changes to the number of businesses operating within Bristol. | Internal data collection as part of ongoing process. Regular property market reports published by property consultants in the public domain could also be used. | Baseline (pre-scheme) and then annually for five years after scheme opening |
| M7: Walking and cycling counts | Pedestrian and cycle counts on key routes within the city | To understand changes to the number of people walking and cycling along key routes within Bristol | Commissioning of new surveys Use of survey data from Street Space Scheme monitoring | Baseline (pre-scheme) and then annually for five years after scheme opening |
| M8: Stakeholder feedback from council user group forums | Stakeholder feedback covering relevant elected members, stakeholder groups, the LEP. | To understand the opinions of stakeholders on scheme delivery and impacts. To understand some of the less quantified impacts such as package effects. | Part of the on-going consultation process for transport strategies in the City. | 1, 3, 5 years after scheme opening |

Data that seeks to identify behavioural changes as a result of the CAZ will be collected within areas of Bristol beyond the CAZ boundary as well as for areas of the city within the boundary. This will help identify whether any

behavioural changes within the CAZ are due to the implementation of the scheme or because of other external factors taking place within the city and nationally.

3.3.1 Job seekers and business data

The number of individuals applying for Job seekers allowance will be collected across BCC (M4). This data will be used to assess the impacts of the CAZ on the local labour market and economy. In addition, UK Business Count data (M5) and Retail/business/office space vacancy figures (M6) will be collected to identify whether there are any changes to the type and number of businesses operating within BCC.

Data for these three measures will be compared for areas within and outside of the CAZ as well as against other comparator cities. This seeks to identify whether the CAZ has impacted on the unemployment rate and local economy within the city or whether any changes to the local economy are due to other local and national factors. This will be used to assess whether Outcome O3 (overall neutral or benefit to the local economy) has been achieved. This will have been considered to be achieved if patterns in the number of people applying for job seekers allowance and the number of businesses operating within Bristol (both within and outside of the CAZ) reflect similar trends to those seen within comparator cities.

3.3.2 Air Quality and Traffic Data Collection

Modelling indicates that the Small CAZ D Option will achieve compliance of the NO₂ Limit Value in 2023 compared to a modelled natural compliance year of 2027. Additional air quality monitoring will be focused on the effectiveness of the Small CAZ D Option.

Location and number of monitoring sites for air quality and traffic flows have been established based on the work completed within the OBC stage. Monitoring has begun at these sites and the data collected will provide information for the pre-scheme situation and the impacts of the scheme once measures are implemented.

In total, 95 additional diffusion tubes will be installed as part of the CAZ scheme. Additionally, a new continuous NO_x air quality monitoring site will be established on Marlborough Street, a key corridor where compliance is predicted to be late.

This data will be collected prior to implementation up until 2028 (i.e. one-year post 2027 the likely year of natural compliance). Existing BCC monitoring sites were used if they were suitable for air quality monitoring. This will provide data on measure M1 (air quality data).

ANPR surveys will be used to collect traffic data. These surveys will take place for one week prior to implementation, 2023, 2025 at 48 locations that have been identified as showing compliance issues in the OBC baseline 2024 model. This will provide data for monitoring of measures M2 and M3 (vehicular fleet information and traffic flows). A number of permanent traffic data collection sites will be established at points of interest within Bristol, this data will feed into JAQU's central evaluation process.

Maps and shapefiles of air quality and traffic monitoring sites are available at BCC's open data website⁷.

Baseline Data

Data has already been collected and is scheduled to be collected as part of the monitoring of other BCC transport schemes as well as to monitor the impacts of the COVID-19 pandemic on traffic and air quality. Data collected from these sources will be used to monitor the effects of the Small CAZ D Option, as well as the situation prior to implementation. Through the use of existing data sources, the need for new surveys and data collection will be minimised.

Traffic flow data has already been collected from February 2019 to November 2020 at key locations around the city. This data can be used to form a baseline of traffic for the CAZ scheme. Key traffic count locations, where monitoring took place, include the following:

⁷ Bristol City Council's open data website for air quality and traffic counts available through the following links:
<https://opendata.bristol.gov.uk/explore/dataset/air-quality-monitoring-sites/export/?disjunctive.pollutants&refine.current=True&location=12,51.46855,-2.60889&basemap=jawq.streets> and
<https://opendata.bristol.gov.uk/explore/dataset/dim-traffic-counters/export/?disjunctive.countdevicedescription&disjunctive.link>

- St Michaels Hill (Southbound)
- Lower Maudlin Street (Westbound at Lewins Mead)
- Marlborough Street (Westbound at Dighton Street)
- Newfoundland Street (Inbound)
- Newfoundland Street (Outbound)
- Perry Road (Eastbound)/ Colston Street

In addition, daily count data has been collected for working days from the 3rd February to the 4th December 2020 to assess the changes in traffic due to COVID-19.

As part of the monitoring of the Street Space Scheme measures, vehicle counts are also due to take place at the following locations in 2021:

- Park Row/Marlborough Street Junction
- Lewins Mead/Haymarket Junction
- St Michael's Hill Junction

Air quality data has already been collected from around the City during the period 25th March 2019-1st November 2019 and 24th March 2020-31st October 2020. This data will be used to create a baseline for the CAZ scheme.

These Monitoring sites were situated at the following locations:

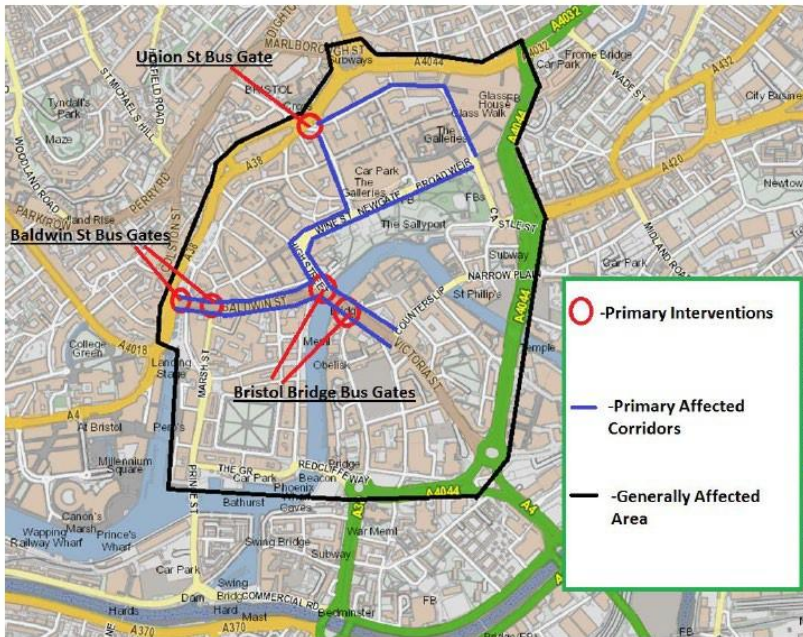
- Temple Way
- Colston Avenue

During the COVID-19 pandemic a number of Street Space Schemes were proposed within Bristol in order to free up road space, which would normally be used by traffic and parking, for the use of public transport, cyclists and pedestrians. One of these Street Space Schemes included measures surrounding Bristol Bridge. Monitoring is due to take place within the area shown in Figure 3-1 below, this includes the following:

- Vehicle counts and journey time information sourced from SCOOT loops and ANPR cameras
- Pedestrian and cycle counts sourced from manual counts and Vivacity Traffic Sensors
- Air quality levels sourced from diffusion tube data.

This data will be used to establish baseline data for the CAZ Scheme.

Figure 3-1: Areas to be monitored by Bristol Bridge scheme



3.4 Monitoring Outputs and Desired Impacts

Table 3-2 summarises the links between Monitoring Outputs and Desired Impacts.

Table 3-2: Monitoring Outputs for Assessing Desired Impacts (primary links only)

| Monitoring Outputs (M) by Desired Impacts (D) | D1: Deliver compliance with NO ₂ air quality Limit Values | D2: Deliver compliance with NO ₂ Air Quality Objectives | D3: Minimise the negative impacts and maximise the benefits of the scheme on local businesses | D4: Minimise adverse impacts on traffic | D5: Facilitate use of public transport and sustainable travel | D6: Minimise the impacts on residents, particularly low-income households |
|---------------------------------------------------------|----------------------------------------------------------------------|--------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|-----------------------------------------|---------------------------------------------------------------|---------------------------------------------------------------------------|
| M1: Air quality data | | | | | | |
| M2: Vehicular fleet information | | | | | | |
| M3: Traffic flows | | | | | | |
| M4: Job seekers allowance (JSA) information | | | | | | |
| M5: Changes in business numbers | | | | | | |
| M6: Retail/business/office space vacancy figures | | | | | | |
| M7: Walking and cycling counts | | | | | | |
| M8: Stakeholder feedback from council user group forums | | | | | | |

3.5 Outcome Analysis

Outcome analysis investigates the wider longer-term benefits of the scheme on the city and will be assessed based on data collected as part of the scheme monitoring outcomes (M1-M8). These outcomes are strongly linked to the desired impacts of the scheme (D1-D6) and are listed below:

- O1: Deliver compliance with NO₂ air quality Limit Values and Air Quality Objectives in Bristol
- O2: Minimise financial impacts of the scheme on low income households within Bristol
- O3: Overall neutral or benefit to the local economy

Figure 1-2 illustrates how monitoring outputs are used to feed into the outcome analysis and benefit realisation process. Table 3-3 maps how each monitoring output (M1-M8) will be used to evaluate the outcome analysis (O1-O3) and therefore contribute to the assessment of benefits realisation.

Table 3-3: Mapping of Monitoring Outputs and Outcomes Analysis (primary links only)

| Monitoring Outputs (M) by Outcome Analysis (O) | O1: Deliver compliance with NO ₂ air quality Limit Values and Air Quality Objectives in Bristol | O2: Minimise financial impacts of the scheme on low income households within Bristol | O3: Overall neutral or benefit to the local economy |
|----------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|-----------------------------------------------------|
| M1: Air quality data | | | |
| M2: Vehicular fleet information | | | |
| M3: Traffic flows | | | |
| M4: Job seekers allowance (JSA) information | | | |
| M5: Changes in business numbers | | | |
| M6: Retail/business/office space vacancy figures | | | |
| M7: Walking and cycling counts | | | |
| M8: Stakeholder feedback from council user group forums | | | |

3.6 Benefits Realisation

The data collected as part of this Monitoring and Evaluation Plan will be used to demonstrate the realisation of the scheme benefits and objectives.

Table 3-4 summarises the relationships between the desired impacts of the scheme (D1-D6) and the scheme outcomes (O1-O3). Alongside Table 3-2 and Table 3-3, this identifies the links between the data outputs collected as part of the monitoring process (M1-M8), the desired impacts (D1-D6) and outcomes (O1-O3) which form part of the benefits realisation. The process of monitoring and benefits realisation can be refined as necessary to allow optimisation of benefits and assessment of all objectives and desired impacts.

3.6.1 Benefits Profile

BCC was instructed to reduce NO₂ concentrations within the city to legal levels in the shortest time possible. Modelling of the preferred Small CAZ D Option indicate that this primary CSF should be achieved by 2023. Therefore, benefits to air quality produced by the Clean Air Plan are likely to be realised in a reasonably short timeframe from implementation. Monitoring of scheme outcomes and impacts will continue for five years after scheme opening, in order to assess the realisation of air quality benefits. This will take place alongside monitoring of impacts to the economy and transport within the city, in order to assess how these factors develop over the

course of the scheme. A monitoring period of five years is recommended within the guidance⁸ and this should provide an appropriate timescale to assess the wider impacts and benefits of the scheme.

Table 3-4: Mapping of Desired Impacts and Outcome Analysis (primary links only)

| Outcome Analysis (O) by Desired Impacts (D) | O1: Deliver compliance with NO₂ air quality Limit Values and Air Quality Objectives in Bristol | O2: Minimise financial impacts of the scheme on low income households within Bristol | O3: Overall neutral or benefit to the local economy |
|------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|------------------------------------------------------------|
| D1: Deliver compliance with NO₂ air quality Limit Values | | | |
| D2: Deliver compliance with NO₂ Air Quality Objectives | | | |
| D3: Minimise the negative impacts and maximise the benefits of the scheme on local businesses | | | |
| D4: Minimise adverse impacts on traffic | | | |
| D5: Facilitate use of public transport and sustainable travel | | | |
| D6: Minimise the impacts of the scheme on residents, particularly low-income households | | | |

⁸ DfT's 'Monitoring and Evaluation Framework for Local Authority Major Schemes' (September 2012)

4. Delivery of the Monitoring & Evaluation and Benefits Realisation Plan

4.1 Costs

The costs associated with the evaluation, monitoring and benefits realisation analyses are outlined within this section.

A total cost of £410,018 will be required for monitoring, evaluation and benefits realisation. This estimate is included within the project costs supporting the Financial Case of the FBC. The timing of expenditure on monitoring, evaluation and benefits realisation is assumed to be consistent across the assessment period, given the common frequency of data collection and assessment. Costs are as outlined in Table 4-1 to Table 4-3.

A sum has also been included within the scheme costs for the provision of BCC staff to undertake ongoing monitoring of the scheme during the period from scheme opening until 2028. An estimate of £20,000 was included for 1FTE staff member for this role. Air quality monitoring (installations) forms part of the scheme capital costs, and the air quality ongoing monitoring will be included within operational costs. Both air quality monitoring and traffic monitoring will be carried out during the period from one year prior to scheme opening until 2028.

CAPEX air quality monitoring costs were upfront scheme costs, before the FBC funding was awarded.

Table 4-1: Scheme costs over monitoring and evaluation period

| Activity | Cost per unit | No. required | Duration (years) | Total Cost |
|--------------------------------------------------------------------------------------------------------------------------------------|---------------|--------------|------------------|-----------------|
| CAPEX | | | | |
| Air Quality Monitoring (Installations) (Including Infrastructure at Marlborough Street, staff costs and site decommission) | £20,149 | 1 | 1 | £20,149 |
| OPEX | | | | |
| Air Quality Monitoring (ongoing monitoring)⁹ (Including costs for Marlborough Street site) | £33,734 | 1 | 8 | £269,869 |
| Traffic Levels Monitoring (ongoing monitoring) | £50,000 | 1 | 1 | £50,000 |
| Economic Indicators (ongoing monitoring) | £25,000 | 1 | 1 | £25,000 |
| Active Modes (ongoing monitoring) | £25,000 | 1 | 1 | £25,000 |
| Staff (ongoing monitoring) | £54,587 | 0.37 | 1 | £20,000 |
| Sub-total monitoring and evaluation OPEX (for monitoring period) | | | | £389,869 |

⁹ These costs include air quality monitoring up to and including one full year post the date of natural compliance.

Table 4-2: Air Quality Monitoring Revenue Costs

| Year | Revenue cost |
|------|--------------|
| 2021 | £30,348.52 |
| 2022 | £31,258.97 |
| 2023 | £32,196.74 |
| 2024 | £33,162.64 |
| 2025 | £34,157.52 |
| 2026 | £35,182.25 |
| 2027 | £36,237.71 |
| 2028 | £37,324.85 |

Table 4-3: Air quality monitoring costs (capital and revenue)

| Item | Number | Cost Capital | Cost Revenue (pcm) |
|-------------------------------------------------|--------|--------------|--------------------|
| Marlborough Street continuous monitor and works | 1 | £14,027.00 | |
| Replacement aircon at 4 years | 1 | £2,350.88 | |
| Establish diffusion tubes | 1 | £1,885.63 | |
| Decommission diffusion tubes | 1 | £1,885.63 | |
| Change tubes and calibrate monitor | 93 | | £942.82 |
| Tube analysis | 93 | | £306.90 |
| Continuous analyser service contract | 1 | | £250.00 |
| Reporting and analysis | 1 | | £935.67 |
| Calibration gas | 1 | | £20.00 |
| Totals | | £20,149.14 | £2,455.38 |
| Total to 2028 | | £20,149.14 | £269,869.20 |

4.2 Timescales

A summary of data collection timescales is presented below:

- Stage 1 – Before opening– surveys pre-implementation
- Stage 2 – 1 year after full opening of the scheme – surveys in 2023
- Stage 3 – Ongoing monitoring until a year after natural compliance 2028

Air quality data and traffic flow, composition and speed data will be collected quarterly during stages 2 and 3.

4.3 Reporting

The evaluation and benefits realisation strategy and reporting will be managed by the BCC Project Manager, with support from relevant officers. They will ensure the plan is successfully completed in accordance with the quality assurance defined by BCC.

Central evaluation has been set up by JAQU in order to gain a better understanding of which schemes and policies work best in reducing nitrogen dioxide (NO₂) within England in the shortest possible time. JAQU has commissioned Ispos MORI, the Institute of Transport Studies (ITS), Enviro Technology Services and Air Quality Data Management in order to undertake the central evaluation.

Air quality data and traffic flow, composition and speed data will be shared with JAQU on a quarterly basis (at the end of March, June, September and December). Air Quality data will include information from real time monitoring and diffusion tubes, which will be provided to the central evaluation team. If available, historical data ATC and speed data (from 2015 or earlier) will also be submitted to the ITS within the first submission. This will include any historical air quality, ATC or traffic speed data. Air quality data will be submitted to JAQU in the format of the 'Air Quality Monitoring reporting template' provided within the guidance. ANPR data, alongside other traffic data including vehicular fleet information and walking and cycling counts, will be provided to the ITS.

Data and reports submitted to the central evaluation and ITS will be used by JAQU and BCC to adapt and improve their approach to the scheme and also will be used to assess how effectively Local Plans have been in meeting their aims. The findings of the central evaluation will be reported back to BCC through a quarterly newsletter to all Local Authorities, annual reports and individual reports from deep-dive and rapid-assessment case studies to Local Authorities. These reports are intended for internal use only. Learning from the central evaluation will be shared with other Local Authorities by JAQU.

BCC will also submit a report to JAQU outlining programme management factors including information on activity undertaken, financial spend, review of programme risks and performance against key indicators. These reports will be submitted quarterly.

BCC monitoring reports will be made available to stakeholders via the CleanAirforBristol.org website.

4.4 Governance

The evaluation and benefits realisation strategy and reporting will be managed in accordance with the management strategy and quality assurance defined by BCC within the FBC Management Case.

4.5 Risks and Mitigations

There are a number of risks associated with the completion of the monitoring and benefits realisation plan. These risks include:

- It is assumed that data from third parties will be available for use by BCC. For example, information from private companies (e.g. First data on bus patronage) and from other local authorities may not be made available by these organisations.
- Some publicly available data is only available with a minimum one-year lag. This could lead to some delay in the assessment when using data available in the public domain.

- Many of the variables being monitored within this plan are impacted by a large number of external factors. This is particularly true of economic factors such as retail footfall, which are likely to be affected by wider national and international policies and economic performance. To try to isolate and measure the explicit impact of the CAP, a benchmarking exercise will be undertaken to compare economic performance in Bristol against other comparable cities such as Cardiff and Manchester.
- It is assumed that the current BCC programme of air quality monitoring will be continued for the evaluation and benefits realisation period.
- Diffusion tubes are used by BCC to monitor air quality data; however, this method generally produces lower quality measurements than automatic monitors. This could reduce the accuracy of the air quality data collected

4.6 New Data Collection

This plan has been developed in a way that minimises additional data collection. Where possible, data has been sourced from data sets which are already collected as part of BCC and third-party organisation’s ongoing operations. Efforts have been made to use monitoring outputs which can be used to assess multiple impacts and outcomes. Information on how data will be provided for each monitoring output (M1-M8) and whether new data surveys are required, is summarised in Table 4-4.

Table 4-4: Summary of new and existing data sets required for monitoring

| Monitoring Outputs (M) | Stage 1 – before opening | Stage 2 – 1 year after opening | Stage 3 – 2-5 years after opening |
|--------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| M1 (Air Quality Data) | This data will be collected by BCC through a network of automatic and passive (diffusion tube) monitoring locations. | This data will be collected by BCC through a network of automatic and passive (diffusion tube) monitoring locations. | This data will be collected by BCC through a network of automatic and passive (diffusion tube) monitoring locations. |
| M2: Vehicular fleet information | Data available from ANPR survey undertaken as part of business case preparation | ANPR cameras installed to enforce the diesel ban and charging zones will provide this information | ANPR cameras installed to enforce the diesel ban and charging zones will provide this information |
| M3: Traffic flows | New traffic surveys will be required Data available through monitoring of Street Space Scheme Measures and existing traffic counts (see Section 3.3.1) | Data on traffic flows will be available from ANPR cameras installed to enforce the diesel ban and charging zones, alongside new traffic surveys in areas outside of these zones. | Data on traffic flows will be available from ANPR cameras installed to enforce the diesel ban and charging zones, alongside new traffic surveys in areas outside of these zones. |
| M4: Job seekers allowance information | Publicly available Job Seekers Allowance data will be available from NOMIS (ONS) | Publicly available Job Seekers Allowance data will be available from NOMIS (ONS) | Publicly available Job Seekers Allowance data will be available from NOMIS (ONS) |
| M5: UK business council data about changes in business | Publicly available business demography data from ONS | Publicly available business demography data from ONS | Publicly available business demography data from ONS |

| Monitoring Outputs (M) | Stage 1 – before opening | Stage 2 – 1 year after opening | Stage 3 – 2-5 years after opening |
|---------------------------------------------------------|----------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|-------------------------------------------------------------------------------|
| M6: Retail/business/office space vacancy figures | Data collected by BCC and property consultants as part of on-going processes. | Data collected by BCC and property consultants as part of on-going processes. | Data collected by BCC and property consultants as part of on-going processes. |
| M7: Walking and cycling counts | New surveys required Data collected as part of monitoring of Bristol Bridge Scheme will be used | New surveys required | New surveys required |
| M8: Stakeholder feedback from Council user group forums | Collected as part of BCC existing on-going consultation process | Collected as part of BCC existing on-going consultation process | Collected as part of BCC existing on-going consultation process |

As summarised above, new data collection will only be required for monitoring outputs M1, M2, M3 and M7. Further details of transport and air quality data collection is set out below.

It is proposed that the following Air Quality data is collected:

- Air quality monitoring at 95 additional diffusion tube sites. Data will be collected pre implementation up until 2028.
- Establishment of a new continuous NOx air quality monitoring site on Marlborough Street, a key corridor where compliance is predicted to be late.
- Use of some existing BCC sites if locations are suitable

It is proposed that the following Traffic Data is collected:

- Repeat ANPR surveys for one-week pre-implementation, 2023, 2025.
- Additional ANPR surveys at 48 locations (those showing compliance issues in the OBC baseline in 2024) for one-week pre-implementation, 2023, 2025.

4.7 Benefits Register

A copy of the benefits register for the project can be found in Appendix A to this report.

Appendix A. Benefits Register

| Name of scheme: | | Bristol Clean Air Plan | Description of scheme: | Scheme to deliver compliance with NO2 air quality Limit Values within Bristol | | | Date Produced: | 30/06/2021 | | Contact: | Name: Abigail Smith | | Role: BCC Project Manager | | | |
|-----------------|-------------------------------------------------------------------------------------------|------------------------|------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|-----------------------------------------------------------------------------|------------------------------------------------------------|--------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|-----------------|---------------------------|---------------------------|-------------------------|------------------------------|
| Benefit ID | Benefit Title and Description | Requestor | State | Link to Objectives (Project, Business, Strategic) | Benefit Owner | Planned Outcome | Stakeholders and Beneficiaries | Program/Project ID and/or Name | Measure Description & Expected Result | Baseline Measure | Measure Frequency | Actual Measures | Status | Expected Realisation Date | Actual Realisation Date | Benefit Action (if required) |
| D1 | Deliver compliance with NO2 air quality Limit Values | BCC/JAQU | Active | Contributes to O1: Deliver compliance with NO2 air quality Limit Values and Air Quality Objectives in Bristol | SRO - Nicki Beardmore | NO2 will become compliant with legal limits within BCC | Individuals living or working within Bristol CAZ | Bristol Clean Air Plan | Measurement: M1 air quality data; M2 Vehicular fleet information; M3 traffic flows Expected result: NO2 value lower than 40µm/m3 within Bristol | Baseline measurement before scheme implemented | Baseline (pre-scheme) and then ongoing monitoring. | Pre-scheme | On Track | 2023 | | |
| D2 | Deliver compliance with NO2 Air Quality Objectives | BCC/JAQU | Active | Contributes to O1: Deliver compliance with NO2 air quality Limit Values and Air Quality Objectives in Bristol | SRO - Nicki Beardmore | NO2 will become compliant with legal limits within BCC | Individuals living or working within Bristol CAZ | Bristol Clean Air Plan | Measurement: M1 air quality data; M2 Vehicular fleet information; M3 traffic flows Expected result: NO2 value lower than 40µm/m3 within Bristol | Baseline measurement before scheme implemented | Baseline (pre-scheme) and then ongoing monitoring. | Pre-scheme | On Track | 2023 | | |
| D3 | Minimise the negative impacts and maximise the benefits of the scheme on local businesses | BCC/JAQU | Active | Contributes to O3: Overall neutral or benefit to the local economy | SRO - Nicki Beardmore | The local economy will perform as well as or better than comparator cities | Local businesses operating within Bristol | Bristol Clean Air Plan | Measurement: M4 job seekers allowance; M5 changes in business numbers; Retail/business/office space vacancy figures; M8 stakeholder feedback from council user group forums Expected result: measurements for Bristol follow similar trends as comparator cities | Baseline measurement before scheme implemented | Baseline (pre-scheme) and then annually for five years after scheme opening | Pre-scheme | On Track | 2023 | | |
| D4 | Minimise adverse impacts on traffic | BCC/JAQU | Active | Contributes to O1: Deliver compliance with NO2 air quality Limit Values and Air Quality Objectives in Bristol and O3: Overall neutral or benefit to the local economy | SRO - Nicki Beardmore | There will be minimal adverse impacts on traffic flows and congestion | Highway users within Bristol | Bristol Clean Air Plan | Measurement: M3 traffic flows; M8 stakeholder feedback from council user group forums Expected result: Traffic flows and congestion does not become significantly worse in certain locations compared to the expected situation without the CAZ | Baseline measurement before scheme implemented | At least 2 weeks during baseline monitoring (pre-scheme) and then continuously through permanent ATCs (analysed quarterly) | Pre-scheme | On Track | 2023 | | |
| D5 | Facilitate use of public transport and sustainable travel | BCC/JAQU | Active | Contributes to O1: Deliver compliance with NO2 air quality Limit Values and Air Quality Objectives in Bristol; O2: Minimise financial impacts of the scheme on low income households within Bristol; and O3: Overall neutral or benefit to the local economy | SRO - Nicki Beardmore | There will be increases in the number of individuals using public transport | Active transport and public transport users within Bristol | Bristol Clean Air Plan | Measurement: M7 walking and cycling counts; M8 stakeholder feedback from council user group forums Expected result: increases in the number of individuals using public/sustainable transport across the city | Baseline measurement before scheme implemented | Baseline (pre-scheme) and then annually for five years after scheme opening | Pre-scheme | On Track | 2023 | | |