



## **Bath Clean Air Plan**

Bath and North East Somerset Council

### **Explanatory Note on CAZ System Cost Estimates**

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## Bath Clean Air Plan

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**Appendix A. Breakdown of CAZ System Cost Estimates**

## Acronyms and Abbreviations

ANPR	Automatic Number Plate Recognition
ATC	Automatic Traffic Count (device)
B&NES	Bath and North East Somerset Council
BT	British Telecom
CAF	Clean Air Fund
CAP	Clean Air Plan
CAZ	Clean Air Zone
CCTV	Closed Circuit Television
DNO	Distribution Network Operator
Defra	Department for the Environment, Food, and Rural Affairs
DfT	Department for Transport
DVLA	Driver and Vehicle Licensing Agency
EIA	Equalities Impact Assessment
EV	Electric Vehicle
FBC	Full Business Case
FTE	Full Time Equivalent
HGV	Heavy Goods Vehicle
JAQU	Joint Air Quality Unit
LEP	Local Enterprise Partnership
MEV	Mobile Enforcement Vehicle
NPS	Notice Processing System
OBC	Outline Business Case
P & R	Park and Ride
PCN	Penalty Charge Notice
QRA	Quantitative Risk Assessment
RPZ	Residents Parking Zone
RRRAP	Road Restraints Risk Assessment Process
SAT	Site Acceptance Testing
SCOOT	Split Cycle and Offset Optimisation Technique
SDG	Steer Davies Gleave (Consultants)
SRN	Strategic Road Network
SOC	Strategic Outline Case
TPT	Traffic Penalty Tribunal
TRO	Traffic Regulation Order
UTMC	Urban Traffic Management and Control
VCA	Vehicle Certification Agency
VMS	Variable Message Sign

## 1. Introduction

Poor air quality is the largest known environmental risk to public health in the UK<sup>1</sup>. 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<sub>2</sub>) and these are predicted to continue until 2025 without intervention.

In 2017 the government published a UK Air Quality Plan for Nitrogen Dioxide<sup>2</sup> setting out how compliance with the EU Limit Value for annual mean NO<sub>2</sub> will be reached across the UK in the shortest possible time. Due to forecast air quality exceedances, B&NES, along with 27 other Local Authorities, was directed by Minister Therese Coffey (Defra) and Minister Jesse Norman (DfT) in 2017 to produce a Clean Air Plan (CAP). The Plan must set out how B&NES will achieve sufficient air quality improvements in the shortest possible time. In line with Government guidance B&NES is working towards implementation of a Clean Air Zone (CAZ), including both charging and non-charging measures, in order to achieve sufficient improvement in air quality and public health.

Jacobs has been commissioned by B&NES to produce an Outline Business Case (OBC) and Full Business Case (FBC) for the delivery of the CAP; a package of measures which will bring about compliance with the Limit Value for annual mean NO<sub>2</sub> in the shortest time possible in Bath. The OBC assessed the shortlist of options set out in the Strategic Outline Case<sup>3</sup> and proposed a preferred option including details of delivery. The FBC develops the preferred option set out in the OBC, detailing the commercial, financial and management requirements to implement and operate the scheme. The OBC and FBC form a bid to central government for funding to implement the CAP.

The preferred option described in this document is a Class C charging CAZ with traffic management at Queen Square. The Clean Air Fund (CAF) report sets out all required mitigation measures that will accompany the scheme. These have been recommended following a Distribution and Equalities Impact Assessment (EIA). These proposals are described in more in detail in Section 2 of FBC 46 'Clean Air Fund Report'.

This note provides reference information and explanatory detail on how the capital and revenue costs are derived for the proposed scheme. **All costs provided are 2019 prices taking no account of inflation.** Terms and abbreviations used are set out above.

A breakdown of the estimated costs for the scheme is provided in the tables in Appendix A of this document. This divides the various elements of the system into the following sections:

1) Capital costs for the enforcement system including:

- Supply, configuration and testing of the fixed Automatic Number Plate Recognition (ANPR) cameras and enforcement system;
- Provision of a mobile enforcement vehicle (MEV);
- Communications network switches;
- Back office processing and payments system;
- Provision of a data storage server;
- Provision of a control room;

Capital costs for core scheme design and management, including:

<sup>1</sup> 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>

<sup>2</sup> <https://www.gov.uk/government/publications/air-quality-plan-for-nitrogen-dioxide-no2-in-uk-2017>

<sup>3</sup> 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](http://www.bathnes.gov.uk/sites/default/files/siteimages/Environment/Pollution/strategic_outline_case_bath_28.03.2018_with_annexes.pdf)

- Detailed design of the core scheme works;
  - Delivery phase (B&NES) project management;
  - Staffing requirements during the project delivery phase (pre-implementation).
- 2) Capital costs for the enforcement scheme highway works including:
- Installation works (includes cabinets, camera posts (if needed), ducting, cabling and mounting at height);
  - Wireless communications;
  - Backhaul communications (BT);
  - Street Lighting columns and power supplies;
  - Signage (including posts);
  - SRN signage;
  - Residents Parking Zones (review and potential amendments);
  - Staff to manage on site / delivery of highway works (Infrastructure Lead and Site Co-ordinator)
- 3) Capital costs for the non-charging measures including:
- Queen Square traffic signals;
  - Variable Message Signs (VMS);
  - SCOOT review (Bath);
  - Queen Square (civil engineering works);
  - Queen Square public realm scheme;
  - Queen Square CCTV monitoring;
  - Queen Square (SCOOT/traffic signal controller configurations);
  - Queen Square (UTMC interfaces - connecting signals data with air quality monitor);
  - Permanent Automatic Traffic Counters (ATCs);
  - Queen Square (Gay St.) – permanent Air Quality Monitor;
  - ANPR monitoring sites (requested by Wiltshire County Council);
  - Pre-scheme baseline surveys;
  - Community Liaison events including scheme publicity and advertising.
- 4) Quantified risk during the delivery stage
- 5) Operational (revenue) costs for CAZ operations and maintenance, including:
- UTMC interfaces for the Queen Square traffic signal junctions;
  - Revenue payment (5%) to JAQU, which covers ongoing operation and development of the JAQU central payment portal;
  - Back office hardware and software maintenance (PCN system);
  - Back office hardware and software including annual hosting (ANPR system);
  - ANPR camera replacement;

- Roadside equipment maintenance;
  - Camera post/street lighting column maintenance;
  - Communications network maintenance (fibre);
  - Communications network maintenance (wireless);
  - Building maintenance and other related charges;
  - Replacement/repair of signage;
  - Maintenance of permanent ATCs;
  - Queen Square (Gay Street) pollution monitor maintenance and operation;
  - Queen Square CCTV maintenance;
  - Queen Square traffic signal annual maintenance.
- 6) Operations and Delivery Staff costs
- 7) Communications costs (licencing, support and data usage)
- 8) Power costs
- 9) Ongoing (revenue) costs for other activities, including:
- PCN generation and issue as well as related fees payable to the Traffic Penalty Tribunal;
  - Scheme monitoring including those for air quality, traffic counts, economic impact and active modes (e.g. cycling, walking);
  - A health and wellbeing study including subsequent assessments;
  - A re-draft of legal charging order, should changes to CAZ be required;
  - Decommissioning of the CAZ system;
  - Weight restriction enforcement (review and potential amendments).
- 10) B&NES overhead costs (30%) to cover involvement from other departments/externalities associated with the scheme. This covers the staff overhead costs for all B&NES staff directly involved with the scheme.

Each of the items above are described in more detail within this note in order to provide further explanation of the costs for each item and how these costs were derived. As stated previously, reference should also be made to document 674726.BR.042.FBC-46/1 'Clean Air Fund (CAF) Report' which outlines all mitigation measures proposed, including their costs which are in addition to those discussed within this document.

## 2. Assumptions and Exclusions

It is anticipated that B&NES will own and operate the hardware and software required to carry out all CAZ enforcement processes, except for those external databases such as the DVLA database and the national tax database, which will be the responsibility of others. The B&NES council CAZ system will connect with the central government payments system, which is currently being developed. This will ensure seamless use by the public when making a CAZ payment to any scheme across the country.

Procurement of each part of the CAZ system is outlined within the separate Procurement Strategy document FBC 20 'Procurement Strategy' in Appendix H of the FBC.

### 3. Capital Costs

Capital costs are based wherever possible on proposed costs provided by suppliers and tendered schedules of rates for equipment and services and are thus considered reasonably robust. There are a small number of items which are currently estimated costs, with details to be finalised once B&NES are assured of funding and can proceed with detailed design work and specifications for the final items of required infrastructure. All costs quoted in the main body of this report exclude optimism bias. However, allowance has been made for optimism bias in the cost breakdown table in Appendix A. This table shows the base cost alongside the adjusted cost using nationally recognised guidelines (HM Treasury Green Book) applied for optimism bias. Optimism bias has been adjusted for the post-OBC figures now there is greater certainty around costs and delivery at this FBC stage.

#### 3.1 Enforcement System

CAZ system supply and installation costs at £2,405,019.37 form 24.7% of the total capital cost for the CAZ scheme. This includes supply of the on-street cameras but it excludes installation of these cameras and also excludes supply and installation of associated equipment housings (e.g. cabinets) and duct infrastructure, all of which are considered highway works and thus covered in section 3.2. An allowance has also been made for provision of a mobile enforcement vehicle.

All back office hardware, software, networking, cabling and connection is included in this total along with system integration by contractors and B&NES staff. This includes work to upgrade and interface the existing Chipside Notice Processing System (NPS) to the CAZ system. Costs for setting up of the control facility (i.e. the building in which CAZ operation will take place) are also included. Finally, resource costs have been included for design, project management and other related activities.

##### 3.1.1 Core System and On-Street Camera Equipment

From the above total for the enforcement system £1,326,001 is required by the selected provider for the central (back office) CAZ system. This includes supply, installation, configuration, testing and commissioning of this core system, including all work required by the supplier to interface the core system with the NPS and the central payment portal. It also includes supply-only of all camera hardware, i.e. camera and associated on-street processing hardware. This cost also includes configuration and testing of each camera by the system supplier. Camera installation is not included here as well as any required enhanced mounting and fixing hardware (i.e. bracketry), as it will be carried out by others as part of highway works (see section 3.2).

A total of 68 cameras at 35 locations will be required for enforcement of the CAZ. This number was derived from an initial desktop study of the proposed zone boundary and key routes within the CAZ. A combination of AutoCAD® drawings, Google Maps™ and Google Street View™ were used to identify where cameras were needed to identify all vehicles entering/exiting the zone at each possible cordon point. A number of site visits were subsequently undertaken with system suppliers to confirm the suitability of locations. The chosen methodology requires one camera per inbound lane at each entry point and one camera on each lane exiting the CAZ. There are also a limited number of cameras proposed for operation within the zone, which will be supplemented by the MEV. These will capture vehicles moving within the CAZ. The fixed cameras within the zone are located at major locations such as car parks and would be supplemented by the MEV, which would be utilised in a number of different locations throughout the zone.

A further five cameras are also proposed - one located at each end of Bathampton toll bridge and three at the main access points into Bathampton village from the A36. These will be located outside the CAZ and used for traffic monitoring purposes only, to ascertain baseline traffic levels as well as any changes in these levels. This is in response to concerns raised by Batheaston Parish Council regarding traffic demand at the toll bridge and regarding additional through traffic accessing the bridge. Whilst the bridge has tolls, which are collected manually, as well as vehicle detection equipment, data is not widely available as the historic structure is privately-managed and the operation of cameras here is only performed on an ad-hoc basis.

It is envisaged that these cameras, which will be mounted on existing street lights, will be removed and re-used within the CAZ at a later date for additional enforcement, where required.

Additionally, new cameras are also proposed to be installed at the entrances and exits to the Lansdown (2No. cameras), and Newbridge (4No. cameras) park and ride sites. Newbridge Park and Ride site has two entrances and exits hence the additional cameras required. Bath's other Park and Ride site located at Odd Down has recently had 2No. cameras installed and these would be re-used although they may require relocation due to changes planned to this Park and Ride site access. The cameras at the Park and Ride sites will also be located outside the CAZ and will be used for monitoring purposes to inform usage of the P&R service, especially to identify any potential increase in use from LGV/van and motorhome drivers. This will assist B&NES in targeting mitigation measures more directly, further improving air quality in the city centre.

A mobile enforcement vehicle is also included at a further cost of £83,950. This would be an electric vehicle (Renault Zoe) supplied and fitted with all associated enforcement equipment (cameras, mountings, recording equipment, user interface) and cabling. It will also be modified to include an auxiliary power supply (additional battery) for the enforcement equipment as well as suitable livery.

### **3.1.2 Interface to the Existing Notice Processing System**

In addition to the core CAZ system there is a requirement for work to be undertaken to upgrade and interface B&NES's existing NPS with the core system. The provider of the B&NES NPS has quoted a total of £220,000 for this work. This comprises a base cost of £75,000 for hardware and software plus 130 days of personnel time to develop the interface and reconfigure the NPS, including providing PCN whitelist management and integration with the central payment portal. This cost equates to a further £65,000. An additional requirement to ensure successful system operation includes £80,000 for system server upgrades to accommodate the anticipated significant increase in contravention data needing to be stored. Chipside Ltd are B&NES's existing parking and bus lane enforcement back office system provider and would effectively be expanding their existing system.

### **3.1.3 Network Switches**

A cost is also included for the supply and installation of networking equipment - primarily network switches - at £45,068 across all locations. These would be managed switches enabling remote diagnostics and management to be undertaken as required by B&NES staff. These would be housed within each street cabinet and facilitate connection between back office systems and the on-street equipment.

### **3.1.4 Fitting-Out of the Control Facility**

A nominal estimate of £100,000 is included for setting up the office accommodation from which the CAZ system will be operated. This assumes that office accommodation is already available at no additional cost to B&NES and that the costs to be covered are for fitting out and furnishing the facility including furniture, lighting, power and communications cabling, terminations and for any supporting services needed (e.g. administration and building security).

### **3.1.5 Project Management and Other Services**

The final element of capital cost for the CAZ system is that for scheme design and project management including other related activities. This covers Jacobs costs along with B&NES officers costs who have been involved in designing the scheme from inception through to detailed design. Design costs are £360,000.

External project management costs which also include B&NES financial, legal, procurement and HR support provision whilst developing and delivering the CAZ are also included. A sum of £15,000 per month is required for a period of 18 months, thus totalling £270,000. This is based on prior project expenditure and accounts for anticipated future requirements. This is in line with other similar parking/enforcement schemes.

## 3.2 Highway Works

Costs for highway works comprise 17.5% of the total capital cost for the CAZ scheme at a total of £1,702,469. This includes all required cabinets, mounting posts, ducting and cabling for the cameras as well as ducting, cabling and provision of the data communications network. Highway works capital costs also include replacement street lighting columns and provision of power supplies. Associated road signing is also included, as well as a required kerb build-out, traffic management, design reviews and site supervision. The highway works are directly attributable to the enforcement scheme only and do not include highway works associated with the non-charging measures. These are discussed in the following section (3.3).

### 3.2.1 Camera and Communications Network Infrastructure

The installation of cameras including mounting, housing and cabling will be provided along with significant infrastructure works such as the supply and installation of posts, cabinets and ducting will all be undertaken by the Council's existing provider. Preliminary site visits and surveys to ascertain ground conditions have been undertaken to reduce priced risks when quoting costs for significant lengths of footway excavation and required depths for planting new posts to host CAZ cameras. There is a requirement to install 18 new dedicated posts to host cameras where no suitable existing street light column exists.

A number of cabinets will be installed with each to host a mini server (providing on-site data storage) and network switch along with the required power and data communications cables to reach each item of infrastructure at each site. The project design team have attempted to reduce the required number of cabinets where possible with each able to support multiple cameras and items of infrastructure to reduce street clutter and scheme costs. All communications infrastructure installation would be covered, including the wireless equipment, network switches as well as the cameras themselves. This would be in addition to the previously discussed posts, cabinets and ducting. These items would be provided at a total cost of £556,265.

It has been calculated that 59 brand new replacement street lighting columns are required. These columns will upgrade the existing columns in situ. The introduction of 'long life' columns will ensure that the column is sufficiently robust to accommodate new cameras with bracketry, any wireless infrastructure such as access points and also boundary entry/exit signage for all speeds of road. Calculations have been undertaken following site visits and desktop analysis of scheme infrastructure.

The predominant use of street lights rather than dedicated posts reduces costs and reduces street clutter satisfying some of B&NES Planning Department's concerns. Further benefits include the ease to replant a column in the ground avoiding the risk of below ground utility services impacting the installation process. Using lighting columns also provides straightforward power supply provision to infrastructure from a supply within the column rather than requiring a number of brand new power supplies, which would take more time and add cost to the project.

Each new lighting column will cost in the order of £1,500 and the existing lantern will be removed and replaced onto the new column along with each existing power supply. This supply will be utilised to power the CAZ infrastructure following the installation of a new double pole isolator in the base of each column enabling a supply to the existing lantern to be kept separate to that powering the CAZ equipment.

Additional costs will be incurred to provide new mains power supplies where current supplies provided on B&NES's existing private network are insufficient and need to be extended to carry additional electrical load. B&NES has evaluated these and priced the power supply disconnection/reconnections required along with any new Western Power Distribution provision. The total cost for provision and installation of new lighting columns and power supply works is £206,900.

Consideration was given to the cost of installing the digital communications network, which is proposed to be a combination of optical fibre and wireless networking. The optical fibre network will be an extension of the existing B&NES private network and the wireless network is proposed to be an extension of the PINACL network which is currently being rolled out across central Bath. The proposed use of fibre or wireless was considered on a site-by-site basis according to the location of the existing fibre network in relation to each

camera cabinet location. Of the proposed 35 camera locations required for the live enforcement system, 20 are proposed to be connected to fibre and 15 to wireless communications infrastructure. The capital cost of all works to enable the 20 fibre sites including cabling is included in the cost of installing the ducting, posts and cabinets.

The wireless network connections identified to transfer B&NES CAZ data from the cameras to the back-office system, matching B&NES's existing installations, will cost £39,068. This includes access points as well as intermediate repeater units to achieve connection to B&NES fibre network or new BT backhaul provision. This cost is for provision of the equipment only with its installation covered in the package of work mentioned above.

An additional communications network is also required for backhaul purposes. This is proposed to be provided by BT and will support the new wireless communications network getting data from on-street to the back-office system. The proposed capital cost for provision of this backhaul network is £26,107.

### 3.2.2 Road Signing, Marking and Minor Realignment

This section details the civil engineering works associated with the provision of road signing as well as minor realignment of kerb-lines. It is not proposed to introduce or amend any road markings due to the introduction of the CAZ. It is also anticipated that no major carriageway or footway re-alignment work will be needed for any part of the proposed CAZ boundary.

An analysis was undertaken of the signing requirement for each of the entry and exit points at the proposed CAZ boundary. From this, the following requirements were determined:

- 101 sign plates displaying CAZ entry/exit points, mounted on either 76mm diameter posts (i.e. two sign plates per post) or alternatively upon new camera posts or street lighting columns wherever possible.
- 54 advanced warning sign plates on B&NES roads, each on a 76mm diameter post advising road users of their approach to the CAZ.
- 15 camera warning signs, predominantly located on camera posts.
- NAL pole sockets at each sign location
- Traffic management (including street works notices).
- A build-out on Weston Road to accommodate the CAZ cameras.

The total cost has been calculated using the B&NES term maintenance contract tendered schedule of rates based upon requirements identified following site visits. Detailed calculations were made on a site by site basis. This has been undertaken in conjunction with the Highways term maintenance contractor who will undertake the works. The total cost to provide this package of works is expected to be £322,097.28.

Replacement weight restriction sign plates with new backing boards are also proposed at 20 locations outside the CAZ boundary. The purpose of this measure is to make these signs clearer to drivers to prevent larger vehicles using unsuitable routes in trying to avoid the CAZ. These would be erected onto existing signposts. In conjunction with this measure, B&NES will enforce weight limits on its roads more rigorously once the CAZ commences. The total cost for these replacement sign plates is accounted for within the total cost for signage outlined above.

A small kerb build-out is also required on Weston Road. This is proposed to host 2No. enforcement cameras at the entrance/exit to the CAZ on this road. The introduction of this build out will enable new enforcement cameras to have unimpeded visibility of approaching vehicles away from a number of large trees and parked vehicles. Again, this cost is included within the signage works identified above.

In addition to typical scheme signage, 4No. strategic locations have also been identified for advanced signage on the Highways England Strategic Road Network (SRN). These locations would require detailed RRRAP assessments. It is expected that HE contractors will undertake these works at an estimated cost of £28,000

per location. This includes a commuted sum of £2,000 to cover maintenance for the life of the sign. The total cost for these signs is therefore £112,000.

### 3.2.3 RPZ expansion

A review and update of B&NES RPZs is also included at a cost of £275,000. This includes all anticipated legal and physical on-site measures. This measure is required due to an anticipated change in the demand for some parking spaces once the CAZ is introduced. Parking habits are expected to change, especially near to and outside the proposed CAZ boundary. B&NES does not fully know what behavioural change will take place within each zone although liaison with other authorities and prior experience suggests that such a change is likely, and some zones will need to be amended accordingly.

### 3.2.4 Site Staff

There would be 2 new roles required to manage these packages of work. B&NES have identified a need for an infrastructure manager and a site co-ordinator for a temporary period of 18 months. An infrastructure manager is required to oversee and manage each workstream and ensure adequate communication and liaison with other teams in the organisation and senior managers. The site co-ordinator would actively be managing site works in various locations across the city ensuring relevant permissions are in place and liaison undertaken. This postholder would also check works from initial ground surveys to excavation and finally implementation of the required infrastructure across Bath on behalf of the Council. These roles are primarily in place to ensure contractors are delivering the works packages as required and internal stakeholders are suitably informed and engaged, ensuring project delivery. Given the limited timescales for delivery B&NES realise the importance placed upon these roles to ensure timescales as well as quality of work requirements are met. Both positions would be grade 10 positions, costing a combined total of £110,022 per year, £165,033 for the full 18-month period. It should be noted that all B&NES staff roles associated with the CAZ each include a 32% uplift on the standard graded roles. This is in place to cover annual pension and national insurance contributions made by the Council to each postholder.

## 3.3 Non-Charging Measures

The non-charging measures to support the CAZ, which are not part of the CAF bid will cost £2,933,251 and comprise 30.1% of the total capital costs for the CAZ scheme. Details of, and costs for, these measures are provided below.

### 3.3.1.1 Variable Message Signage

It is proposed to install four full-text VMS to replace existing car park VMS in Bath. The replacement signs will be made to fit existing posts, thus minimising design and installation costs. The signs will display car park status and occupancy levels as per the existing signs. However, they will also display notification messages about the CAZ as well as air quality information. B&NES has had discussions with another local authority that has installed these signs. B&NES shares the same VMS back office system as this authority and has installed similar signs previously. The total cost for the four VMS will be £160,000.

### 3.3.1.2 Queen Square Traffic Management Scheme

The Queen Square traffic management scheme is considered an essential element for satisfactory operation of the CAZ scheme. This measure comprises two parts. Firstly, it includes two new traffic signal junction installations on the north west and south west corners of the square at the junction of Queen Square with the A367 Chapel Row/ Princess Street, and the junction of Queen Square Place. The signal-controlled junctions will be capable of limiting the flow of traffic into those areas that otherwise would cause an exceedance of the legally permitted NO<sub>2</sub> threshold during busy times of day. This measure is expected to cost £653,421 for the civils works and a further £62,000 for supply and installation of all traffic signals equipment at the two junctions. An additional sum of £3,330 is included for validation and co-ordination of programming works of the installed traffic signals.

The scheme also proposes to provide enhanced public space and new signal crossings for people using the area as well as widened footways following the removal of parking and improved cycling facilities. These measures will enhance the Georgian square and promote active travel. However, B&NES is concerned that TROs and consultation will be required for delivery that could potentially incur delay if objections are received, which need to be managed and / or incorporated into the scheme. Therefore, these works have been separated from the signal works and are proposed to be delivered at a later date without prejudicing the core scheme. The cost of these public realm enhancements is estimated at £1,260,000.

A sum of £100,000 is also included to undertake traffic signal junction (SCOOT) optimisation across Bath to ensure that all signals operate optimally, in respect of the CAZ, in particular on diversionary routes close to Queen Square.

It is also proposed to install an additional AQMesh air quality monitor on Gay Street near to Queen Square in order to monitor the impact of the Queen Square scheme. This is expected to cost £10,100 for supply and installation of the air quality equipment.

A sum of £56,125 is included for B&NES's current UTMC system supplier to link the Queen Square traffic signals and AQMesh air quality monitor to the Bath UTMC system to provide improved control and daily management. This cost also includes provision of a VMS adapter for the connection and use of VMS signs to display information, including air quality levels.

It is also proposed that CCTV cameras are installed at Queen Square to allow B&NES to monitor the operation of the new scheme and act upon any issue which may occur such as illegal parking or vehicle breakdown. Total cost for supply and installation of these 3 cameras is £6,384.

### **3.3.1.3 Automatic Traffic Counters**

A study was undertaken to identify requirements for continuous monitoring of traffic levels during CAZ operation in order to determine the overall impact of the CAZ. This is in accordance with JAQU requirements for central monitoring and evaluation. This identified a need for 23 new permanent ATC units and the replacement of six of B&NES's existing permanent ATCs. This will cost an average of £3,823.75 for each of the 29 sites, giving a total cost of £110,889.

### **3.3.1.4 ANPR Cameras in Wiltshire**

The neighbouring county of Wiltshire shares a considerable length of its border with the county of Bath & North East Somerset just to the east of the city of Bath, within close proximity to the CAZ boundary. Wiltshire Council has requested that B&NES establishes a network of ANPR cameras within Wiltshire to monitor traffic movement in the vicinity of this shared border. This will require the supply and installation of six ANPR cameras linked to the Wiltshire system (subject to a data sharing agreement with B&NES). A cost of £25,700 has been determined for each camera, including connections to nearby mains power supplies which would require civil engineering works. It is anticipated to cost a further £72,700 for 2No. cameras where mains power supplies do not appear to be readily available. Works to install maintenance engineer parking and erect the cameras on high speed roads increases costs. Therefore, to install the 6No. cameras gives an estimated total cost of £248,200.

### **3.3.1.5 Baseline Surveys**

It is proposed to establish pre-scheme baseline temporary surveys of traffic volumes and air quality in and around the CAZ. Again, this is in line with JAQU central monitoring and evaluation requirements. These will be carried out over a two-year period (2019 and 2020) prior to CAZ operation. These surveys have been costed at £14,458 per year for the traffic surveys and £17,500 per year for the air quality monitoring surveys (including monitoring equipment and staffing costs). An additional £50,000 is required for active modes and economic indicator surveys, which are only required in 2020. The total cost for these surveys over the two-year period is therefore £113,916.

### 3.3.1.6 Communications & Community Liaison

It is proposed to hold a series of community-based events prior to and during initial operation of the scheme. Alongside this, it is proposed to carry out various publicity and advertising activities to increase awareness and understanding of the scheme. The costs for these activities assume a significant amount of initial publicity that will reduce once the scheme is underway and has become more familiar with the public. This also includes an element of cost to cover the promotion of an anti-idling initiative in the CAZ as well as community liaison drop-in events and provision of other information. All of these activities are expected to cost a total of £65,920 over a 2 year period.

A community liaison lead would be employed to manage and undertake much of the work required to educate / inform the public on the implications and benefits of the charging CAZ scheme. This role would be required for an 18-month period costing a further £55,011 per year.

## 3.4 Quantified Risk Assessment

Risk has been calculated at 27.7% of the total cost for the CAZ scheme. It has been derived using Monte Carlo software with risks established for the implementation stage of the project. The following unit costs of delay (£ per month) have been considered for the various risks during the implementation stage that could cause delay to the project:

- £10,000/month – for risks during the FBC stage that do not affect the critical path of project. This allows for project management costs and the potential for a limited amount of re-work;
- £75,000/month – for risks during the FBC stage that affect the critical path of project. This is based on the average spend per month of the project to date;
- £110,000/month – for risks during the FBC that affect the critical path of project and include legal staff costs. This is based on the average spend per month of the project to date plus an allowance for a limited amount of legal assistance within a month;
- £167,000/month – for risks that occur during delivery/operation of the scheme. This is based on the approximate monthly cost of staff required to enforce the scheme.

The QRA figure in line with WebTag guidance (P(Mean)) is £2,703,000 during the project implementation stage. Full details of the QRA are provided in FBC-23 'Quantified Risk Assessment' within Appendix M of the FBC.

## 4. Revenue Costs

CAZ operation accounts for £1,968,878 of total annual revenue cost for the CAZ type C scheme. The largest cost relates to the provision of the required staff resources to operate the scheme. Other significant costs are the anticipated 5% annual revenue payment to JAQU for use of the central payment portal and the cost for maintenance and support for the Videalert enforcement system.

### 4.1 Enforcement System Operations

System operation costs are £403,451 per year. This represents 20.5% of the total annual revenue cost for the CAZ C type scheme. This cost comprises several technical system elements.

B&NES Urban Traffic Management and Control (UTMC) database which is required to manage and connect the VMS signs, Gay Street pollution monitor and any encrypted ANPR data provided (for journey time analysis/display) needs the installed software interfaces updated and fixed throughout the year should any system connections be lost or changed. The cost to maintain these required system interfaces and cover ongoing licenses, provide support and any required data management is £7,600 per year.

An annual payment of 5% of anticipated CAZ revenue would be paid to JAQU for ongoing maintenance, operation and development of the central payment portal. The anticipated first year cost for this provision is £217,101. It is expected that this revenue cost will reduce as scheme compliance increases.

An additional cost will be incurred for maintenance and support of the expanded NPS. The cost provided by the contractor to undertake this function is £5,000 per year.

The cost of back office system hosting and maintenance, to cover all infrastructure (including servers), all software licenses (including security, remote management, reporting and interfaces), evidence pack review (client application) and any other enforcement system support required by B&NES has been quoted by the system supplier at £148,750 per year, assuming a minimum of four years' service.

A nominal building maintenance cost of £25,000 per annum is also included.

### 4.2 On Street Equipment Maintenance and Support Costs

Annual maintenance and support of on-street assets provided by the CAZ accounts for only 5.6% of the total revenue cost. This equates to a total of £109,896.

Costs for maintenance and support of on-street equipment were calculated as follows:

- ANPR Camera Replacement – £2,200 per annum for replacement of one camera per year (including recording capability) due to damage or malfunction;
- Roadside equipment, including Vehicle Certification Agency (VCA) compliance check – £500 per camera i.e. £42,500 per annum for all 85 cameras;
- CCTV post / street lighting maintenance column assumed at £100 per location, equating to £8,500 per annum;
- Optical fibre data communications network – £500 per location, i.e. £10,500 per annum in total for the 21 cabinet locations where a fibre connection is proposed (includes Newbridge Park and Ride site);
- Wireless data communications network - £500 per location, i.e. £8,000 per annum in total for the 16 cabinet locations where a wireless connection is proposed;

Estimates were also derived for replacement of any CAZ signage that may be damaged. It has been estimated that 10 signs per year will need to be replaced at £1,850 per sign, thus giving a total annual cost of £18,500.

A sum of £11,486 is also included to cover ongoing maintenance and data storage, SIM cards and battery replacement of the permanent ATC units per year.

The new pollution monitor located on Gay Street will require annual maintenance including gas sensor and particle engine replacement. The cost for this provision is £2,010 per annum.

New CCTV cameras installed to provide operators with visibility over Queen Square, and the controlled approaches to it, require annual maintenance at a total cost of £1,200 per year. This is £400 per camera per year.

The signs on the highways England SRN have a maintenance contribution (commuted sum) included within the CAPEX cost equating to £2,000 for each sign. This will cover the limited period for which they will be in place. If maintenance is required, provision will be made under the maintenance regime of the Highways England Area 2 Term Maintenance Contractor.

A cost of £5,000 is included to cover ongoing maintenance of the traffic management measures within Queen Square. This cost will cover annual maintenance, power, safety checks and ongoing operations of the two traffic signal junctions.

### 4.3 CAZ Project Delivery and Ongoing Operational Management Team

B&NES Council will be required to manage the implementation and future ownership and transfer of assets following scheme implementation. There are a number of essential staff required to deliver a successful CAZ scheme in Bath. These staff roles comprise 41.1% of total operational expenditure costing £810,114 per year. The following roles will be required for a 3 year period, including the implementation period. These roles are as follows:

- CAZ Manager

This postholder would have ultimate responsibility for the ongoing management and operation of the CAZ project until such time as this responsibility passes to the Operations Team Manager. This management post would be required to be funded for 3 years from January 2020 until December 2022. The post would be required at grade 13 and cost £77,614.68 per year.

- CAZ Project Lead

The project lead would effectively supervise each of the different teams involved with the project in addition to supervising the delivery phase of the CAZ project. This post would require funding for a 3-year period. It would be graded at level 10 and cost £55,011 per year.

- RPZ Enforcement Officer (0.5FTE)

This postholder would undertake a formal review of the existing RPZs and identify any impacts upon them following the introduction of the CAZ. Dependent upon the results from the review, amendments would be made to existing RPZs, which may be affected. This role has been identified at grade 6 (0.5 FTE) which would cost £17,369 per year.

The following required roles would be in place for a 5 year duration:

- Monitoring and Evaluation Lead

The monitoring and evaluation lead will ultimately be responsible for the satisfactory production of both quarterly and annual reports focused upon a number of areas impacted by the CAZ. Data produced by this team will include air quality and also traffic levels, economic indicators and active modes (walking and cycling) during the specified timeframes. This data will be assessed by B&NES as well as by national government who will be monitoring CAZ projects nationally. This role is grade 8. It is required until December 2025 and costs £43,398.96 per year.

- Monitoring Officer (x2)

Monitoring officers will be employed to undertake analysis of data pertaining to CAZ introduction and operation. The officers will present the data in graphical form and produce regular reports to highlight the benefits (and any detrimental impacts) to residents and businesses including any trends from introducing and operating the CAZ. This data will be vital to demonstrate the performance of the CAZ in the area directly impacted i.e. the zone as well as other significant areas across the city. Both roles would be graded at level 6 costing £34,738.44 each per year.

- Anti-idling Enforcement Officer (x2)

Two anti-idling enforcement officers will be required until 2025 to help enforce the anti-idling measures put into place. Prior research suggests that the introduction of signage only is not a sufficient deterrent for motorists to adhere to this initiative. These staff will be directly appointed by the Council and deployed in various locations to make clear to motorists that engines must be switched off when stationary, especially in areas suffering higher concentrations of air pollutants. It is anticipated that schools in particular will be targeted. The annual cost is £69,477 for two members of staff at grade 6.

The following roles are required to be in place for the full 10 year duration of the scheme:

- Financial Controller

A financial controller post is required to oversee all major financial transactions relating to the introduction and ongoing operation of the CAZ scheme. The CAZ may potentially generate significant sums in terms of paid charges as well as PCNs issued for non-payment of the charge. The financial controller will assess decisions and risks during both the implementation of the scheme and during its operation when revenue is likely to reduce over time. This post will be required for the ten-year anticipated duration of the scheme at grade 12, which will cost £69,132.36 per year.

- Operations Team Manager

This role will involve ongoing management of the CAZ charging infrastructure, including maintenance regimes. The CAZ enforcement team leader post will report to this postholder. This post will be at grade 11, which will cost £61,593.84 per year for the ten-year term.

- ICT Lead

An ICT lead is required due to the scheme providing a significant increase in IT equipment and the critical importance of performance of that equipment along with the supporting IT network. This postholder will also be required to manage the contractor's performance when providing equipment and access to the Council's IT network. This role will be at grade 9 and will cost £49,960.68 per year.

- Customer Services Officer

The Customer Services Officer will be the public facing member of the CAZ team who will be expected to deal with queries raised regarding the CAZ and any complaints or PR requirements in the first instance. This postholder will work closely with the business support officers, in particular. The role will be at grade 8 and cost £43,398.96 per year.

- Enforcement Team Leader

The enforcement team leader will have responsibility for CAZ enforcement, RPZ enforcement, anti-idling enforcement and weight restriction enforcement, all directly affected by the introduction of a charging CAZ. The post will be at grade 8, i.e. £43,398.96 per year, for the ten-year period.

- Enforcement/Business Support Officers (x4)

Four enforcement / business support officers are required, and these will be directly appointed by B&NES. These staff will process PCNs where required following the undertaking of manual assessments of contraventions produced by the enforcement system. One of these staff is required to drive the MEV on a daily basis. The cost for providing these four support officers at grade 4 is £105,309.60 per annum.

- Weight Limit Enforcement Officer

The role of weight limit enforcement officer is required due to the likelihood of weight limit breach contraventions increasing, once the scheme is in place. It is anticipated that once the scheme is introduced HGV and delivery drivers could try and avoid crossing the CAZ boundary due to the payments and fines which apply to these vehicle types. B&NES are concerned that vehicles could try and use wholly unsuitable roads which could lead to an increased risk of accidents and disturbance to residents as well as inflicting structural damage to roads and bridges within the city. Therefore, the inclusion of this member of the team will help to deter this behaviour as they would analyse existing weight limits, ensure accurate signage is in place, thereby enabling justified and legal enforcement to take place. This officer will be in post until 2030 employed at grade 9, costing £49,960.68 per year.

The following role is required for 2 years:

- Communications Manager

This grade 10 role will be in place for 2 years starting in January 2020 and will be working within B&NES Communications and Marketing department at a cost of £55,011 per year. This includes supporting the production of promotional materials and hosted events.

#### 4.4 Power and Data Communications Networks

Assuming the adoption of B-Net optical fibre and PINACL wireless data communications, the annual costs for data communications and power provision are expected to be a negligible 1.4% of total annual revenue costs combined. The cost for power and data provision is £27,152 per year. This assumes that B-Net has no ongoing costs beyond the maintenance costs identified in section 4.2 above.

Licencing associated with the PINACL wireless network will cost £4,290 per year.

A survey has been undertaken and costs are currently estimated by the provider to operate the required backhaul services at £3,262 per year. This cost will cover maintenance and B&NES required enhanced response times to any service 'drop-outs' or issues. The backhaul provision is required to support the wireless communications network north and south of the city centre.

In addition to the B-Net and wireless comms services it is proposed to install a backup comms network connection to each camera using the 4G mobile network service. This will be supplied by the core system provider and fitted into each site prior to installation by the highway works provider. There is no initial cost for provision of the 4G SIMs but there is an annual charge of £300 for the data service. Thus for 37 sites with single or multiple cameras, the total annual cost will be £11,100. This includes the re-deployable cameras located at Bathampton and Lansdown, Newbridge and Odd Down P&R sites. It is anticipated that data will be stored on site and transmitted once a day to the back office from these cameras.

In terms of mains power supplies, a cost assumption has been made of £100 per year for each of the 85 cameras, processors and direct site communications connections installed. This assumes that each camera and associated equipment has a combined power consumption of 100 Watts and that the price of electricity is 11 pence per kilowatt hour. This gives a total annual running cost of £8,500.

#### 4.5 Other Activities and Services

These costs comprise 18.5% of the total CAZ scheme annual operating costs at £365,048. Traffic Penalty Tribunal (TPT) charges are included as each PCN issued contributes a nominal 35 pence towards the operation of this independent panel. It is estimated that 17,057 PCNs will be generated in year 1 (based on an assumed 8% non-payment rate of CAZ charges) which will cost £5,970 in TPT charges. However, this cost is anticipated to reduce during the life of the CAZ as compliance with the scheme increases.

Printing each of the 17,057 PCNs for issue, including associated materials, is calculated to cost 48 pence. The CAZ scheme will therefore incur printing costs of £8,187. Sending postage by first class mail currently costs 70 pence per stamp. Therefore, postage costs for all PCNs will cost £11,940 in the first year. As mentioned above, this will reduce as the scheme is established and the extent of non-compliance reduces.

A cost of £7,700 per year is included for more frequent monitoring of air quality levels using existing B&NES air pollution monitoring equipment across a larger number of locations. This meets the requirements from JAQU relating to central monitoring and evaluation. A cost of £14,458 per year is also included for monitoring traffic flows. This survey cost was provided by B&NES preferred provider again using existing B&NES permanently installed traffic count detection equipment supplemented with annual temporary surveys. This will apply from 2021 onwards (traffic monitoring prior to 2021 is costed earlier in this report under CAPEX costs).

Economic indicators will also be monitored throughout the scheme, which will cost £25,000 per year. Active mode use (walking and cycling) will also be monitored for the same ongoing annual cost. Costs to carry out surveys providing data for both of these monitoring tasks is therefore anticipated to cost £50,000 per year.

A Health and Wellbeing Study will be established between B&NES and the University of the West of England to assess the health and wellbeing of residents located within, and outside of, the CAZ area. This study will be conducted both pre- and post-scheme to ascertain whether any changes in health and wellbeing that could be attributable to the CAZ take place. The anticipated set up cost for this study is £47,159. The study will involve production of an initial report and three further annual assessments. These will be produced as annual formal reports with the ongoing costs calculated to be £48,488 in year 2, £49,862 in year 3 and £51,284 in year 4. The total cost to complete this work over the four-year period incorporating an initial pre-scheme report and three subsequent reports is expected to cost £196,793.

A cost has been included to cover the drafting and any subsequent changes required to the Legal Charging Order. Some consultation on this may also be required should the boundary or scheme require change. This is anticipated to be £20,000.

B&NES also proposes more rigorous enforcement of existing weight restrictions, especially near to the perimeter of the CAZ. Signage will be improved to make it clearer to drivers where weight restrictions are in place. This has been identified as a serious concern by residents throughout the scheme consultation process and Bath has several very steep roads that may become dangerous if used by larger vehicles.

A number of these vehicle weight limits are likely to require either adjustment or introduction in the vicinity of the CAZ boundary. These changes will enable B&NES to carry out an improved regime of active and successful enforcement should drivers use routes which are unsuitable for larger or heavier vehicles. The cost to write, advertise and sign various weight limits across the city is anticipated to be £50,000.

## **4.6 Decommissioning Cost**

An estimate was made for decommissioning the CAZ once air quality compliance levels have been achieved. This will require the removal of all on-street camera and communications equipment including cabinets. It also includes removal of the mounting posts for the cameras and signage. An estimate of £5,000 was made for this activity at each of the 35 camera locations, i.e. £175,000 in total, and £1,000 for removal of signage at each location, which equates to £100,000.

Thus, in total it is estimated that decommissioning the system will cost £275,000.

## **4.7 B&NES Overhead Costs**

These overhead costs comprise 12.9% of the total CAZ scheme operating costs. A factor of 30% is included to cover B&NES overhead costs for those directly-employed staff working on the CAZ scheme. This cost covers recruitment, Human Resources, IT and training as well as other associated costs. The total ongoing cost will be £253,217 per annum.

## 5. Optimism Bias Estimates

It should be noted that all figures quoted in the preceding sections of this document exclude optimism bias. The cost breakdown table in Appendix A of this document provides the base costs along with a column to show optimism bias. Various rates of optimism bias were used ranging from zero to 10% according to the specific item. These rates were selected based on DfT's WebTAG guidance and Her Majesty's (HM) Treasury Green Book.

Optimism bias was not applied to either risk or staff overhead costs. All other costs were subject to optimism bias as described above and as shown in Appendix A.

It should be noted that all capital and revenue price estimates provided in this document are assumed to be firm and fixed for the duration of CAZ installation and operation. No allowance has been made for index-linked or any other such potential variations in prices over time.

With optimism bias applied to the CAZ scheme, CAPEX costs are adjusted from £9,743,739 to £10,088,136. Correspondingly, OPEX is adjusted from £1,968,878 to £2,026,230 with optimism bias applied.

## 6. Summary of Capital and Revenue Costs

As can be seen in Appendix A of this document, allowing for the costs previously described - including risk but excluding uplift for optimism bias - the total base capital cost for the proposed CAZ scheme is anticipated at **£9,743,739**.

Of this total, **£2,405,019** is for the supply and installation of the enforcement system (cameras, enforcement vehicle, network switches, control room setup and back office hardware and software) and supporting project management. A further **£1,702,469** is for highway works activities including supply and installation of cabinets, mounting posts, street lighting columns, ducting, cabling and signing as well as any minor kerb realignment. Again, this includes costs for project management and site supervision.

The total capital cost for non-charging measures is expected at **£2,933,251**. Of this value, the largest capital cost for non-charging measures is that for the Queen Square traffic management scheme, which is considered essential to allow the proposed CAZ scheme to operate successfully, and which is estimated to cost approximately £2 million. The second largest cost is estimated at almost £250,000 and covers provision of ANPR cameras within Wiltshire. The third largest cost covers the provision of four VMS at a total cost of £160,000.

Risk is also incorporated into the capital costs at an estimated value of **£2,703,000**.

The ongoing base revenue cost for the CAZ to operate along with all other associated measures is expected to cost **£1,968,878** for the CAZ scheme in year one, reducing over subsequent years as compliance increases and enforcement costs reduce. Of this, **£403,451** is required for operation of the CAZ system with a further **£109,896** per year required for on-street maintenance. A further **£27,152** would be needed for power and communications provision. CAZ project delivery and ongoing operational staff direct costs are expected at **£810,114** per annum. Other annual operational

expenditure totals **£365,048** excluding scheme decommissioning at an estimated **£275,000**. B&NES staff overhead costs are estimated at **£253,217**.

The most significant single operational expenditure is for system decommissioning at £275,000. Otherwise the costliest annual expenditures are on B&NES staff overheads, costing £253,217 followed by the anticipated revenue payment (5%) to JAQU towards the operation of the central payment portal costing £217,101.

The summary table below provides an overview of these capital and revenue costs.

**Table 1 Summary of CAZ scheme costs**

<b>Infrastructure Required</b>	<b>Estimated Cost</b>
<b>CAPEX Requirements</b>	
Enforcement System	£2,405,019
Highway works	£1,702,469
Non-charge measures Implementation Fund	£2,933,251
Risk*	£2,703,000
<b>TOTAL BASE CAPEX COST (EXCL. OPTIMISM BIAS)</b>	<b>£9,743,739</b>
<b>OPEX Requirements</b>	
Enforcement System Operations	£403,451
On street maintenance	£109,896
Communications	£18,652
Power (on-street)	£8,500
CAZ Project Delivery & Ongoing Operational Management Team (staff)	£810,114
Other Costs (exc. decommissioning)	£365,048
B&NES overhead costs (30%)*	£253,217
<b>TOTAL BASE OPEX COST (EXCL. OPTIMISM BIAS)</b>	<b>£1,968,878</b>

The decommissioning cost of the CAZ Scheme is expected to be **£275,000**. This cost should be deducted from the OPEX figures above, if first year only costs are required.

Note: No optimism bias was applied to either risk or overhead costs.

## Appendix A. Breakdown of CAZ System Cost Estimates

Item	Cost Type	Unit Type	Est. Unit Cost (£)	Qty	Total Cost	Total Cost inc. Optimism Bias (as per Green Book)	Cost Category	Comments
<b>CORE SCHEME</b>								
Videalert - Enforcement cameras and system	CAPEX	Camera	£1,326,001.00	1	£1,326,001.00	£1,458,602	System	Cost provided by Videalert to cover required on street as well as back office infrastructure and software required by enforcement system for complete operation
Videalert - Mobile Enforcement Vehicle (MEV)	CAPEX	Camera	£83,950.00	1	£83,950.00	£92,345	System	Cost provided by Videalert to cover Renault Zoe electric car fitted out with enforcement cameras and associated equipment
Dynniq - Queen Square traffic signals	CAPEX	Other	£61,999.61	1	£61,999.61	£63,860	Non Charge	Cost covers all traffic signals equipment including installation for 2No. new traffic signal junctions
Dynniq - Sub contractor works	CAPEX	Other	£556,265.33	1	£556,265.33	£572,954	Works	Cost covers installation of cabinets/posts/ducting, installation of network switches/wireless infrastructure plus cameras along with all required fibre/cats5 comms cabling
Dynniq - VMS signs	CAPEX	Other	£40,000.00	4	£160,000.00	£164,800	Non Charge	Supply and installation including connection of 4No. replacement VMS signs with multi-use functionality
Dynniq - SCOOT review	CAPEX	Other	£100,000.00	1	£100,000.00	£110,000	Non Charge	For junction optimisation exercise throughout Bath to ensure signals operate optimally, especially on diversion routes near to Queen Square
Pinnacle - Wireless Communications	CAPEX	Other	£39,066.19	1	£39,066.19	£42,973	Works	Cost covers provision of wi-fi access points and repeaters/bridges at a number of ANPR locations
Maintel - B&NES network switches	CAPEX	Other	£45,068.37	1	£45,068.37	£49,576	System	Cost covers the provision of ethernet network switches required to support the ANPR cameras and communications network
BT	CAPEX	Other	£26,107.00	1	£26,107.00	£28,718	Works	** BT to provide formal documentation ** Cost covers backhaul communications for wireless locations
B&NES Street Lighting	CAPEX	Location	£206,900.00	1	£206,900.00	£213,107	Works	Cost covers provision of mains power supplies and replacement of street lighting columns which will host ANPR cameras
Volker - Signage	CAPEX	Location	£322,097.28	1	£322,097.28	£331,761	Works	Cost covers 170 sign plates and 100 individual poles. This cost is primarily for CAZ boundary & advanced signage but also covers a small number of camera warning signs. Includes an additional sum for temporary sign covers.
Volker - Queen Square (civil engineering works only)	CAPEX	Location	£653,420.97	1	£653,420.97	£673,024	Non Charge	Cost covers the civil engineering works associated with the installation of 2No. Traffic signal junctions at Queen Square
Volker - Public Realm Scheme (civil engineering works only)	CAPEX	Location	£1,260,000.00	1	£1,260,000.00	£1,297,800	Non Charge	Estimated cost based on known rates for installation of public realm scheme at Queen Square
Avon alarms - CCTV cameras Queen Square	CAPEX	Camera	£2,278.00	3	£6,834.00	£7,518	Non Charge	Quote provided based upon recent identical quote for same CCTV requirement at nearby location. Price confirmed as accurate.
JSTSM - SCOOT validation of Queen Square traffic signal junctions	CAPEX	Other	£3,330.00	1	£3,330.00	£3,663	Non Charge	Cost for programming and co-ordinating traffic signal junctions around Queen Square and at nearby Charles Street
IDOX - UTM interfaces for Queen Square traffic signal junctions	CAPEX	Other	£56,125.00	1	£56,125.00	£61,738	Non Charge	Cost for connecting Queen Square Air Quality monitor and new traffic signal junctions to UTM database, facilitating improved control and daily management. Cost also covers VMS adapter for connection and use by VMS signs
Chipside - Back office PCN system (software)	CAPEX	Other	£140,000.00	1	£140,000.00	£154,000	System	Base quotation of £75k, plus further 130 days development time required @ £250 per technical specialist per day (2 No. persons). System to undertake PCN Whitelist management integration with government systems & offer helpdesk function
Chipside - Server (hardware)	CAPEX	Other	£80,000.00	1	£80,000.00	£88,000	System	Quotation provided by Chipside for server storage including set up and integration
B&NES Property Services - Control room and fitting out	CAPEX	Other	£100,000.00	1	£100,000.00	£102,000	System	Cost to provide and fit out office space for new CAZ enforcement and operations team
New and changed signing (supply and install) on SRN	CAPEX	Sign	£28,000.00	4	£112,000.00	£115,360	Works	Supply and install of signage at 4 locations on the SRN network. Includes proposed verge and layby locations and RRRAP assessments. Also includes £2,000 for future maintenance - HE to undertake works
Permanent ATC Infrastructure	CAPEX	ATC	£3,823.75	29	£110,888.75	£121,978	Non Charge	Installation of 23 new permanent Automatic Traffic Count (ATC) sites as well as replacement of 6 existing permanent ATCs
ET - AQ MESH for Queen Square	CAPEX	Other	£10,100.00	1	£10,100.00	£11,110	Non Charge	*No formal quotation only e-mail correspondence for supply of unit* Cost provided by B&NES air quality team to supply only an ET AQ MESH Air Quality monitor for installation on Gay Street. Installation of new post undertaken by Select Electrics
ANPR cameras requested by Wiltshire - power supply available	CAPEX	Camera	£25,700.00	4	£102,800.00	£113,080	Non Charge	*No quotation* Cost estimated based upon desktop survey and build up from known rates
ANPR cameras requested by Wiltshire - new power supply required	CAPEX	Camera	£72,700.00	2	£145,400.00	£159,940	Non Charge	*No quotation* Cost estimated based upon desktop survey and build up from known rates
Pre-scheme baseline surveys	CAPEX	Other	£113,916.00	1	£113,916.00	£113,916.00	Non Charge	Includes baseline pre-scheme temporary ATC traffic survey (1 per annum @£14,458) & AQ monitoring (£17,500 per annum inc. equipment/staff cost) in 2019 and 2020. £50,000 for active modes and economic indicator surveys in 2020 only
Review and update of residents parking zone (RPZ)	CAPEX	Sign/Line	£275,000.00	1	£275,000.00	£283,250	Works	Review and update zones / signage of RPZs in relation to CAZ boundary. Cost covers anticipated changes to Bath RPZs in order to align and facilitate changes in parking behaviour following implementation of the CAZ
Community liaison events, scheme publicity and advertising (including anti-idling)	CAPEX	Other	£65,920.00	1	£65,920.00	£72,512.00	Non Charge	Covers publicity associated with CAZ. Initial publicity will reduce once the scheme is embedded. Cost also includes a portion to cover promotion of B&NES CAZ anti-idling initiative. Also includes community liaison drop-in events & other information provision
					<b>£6,163,189.50</b>	<b>£6,507,585.00</b>		
<b>CORE SCHEME DESIGN AND MANAGEMENT</b>								
Detailed design of core scheme	CAPEX	Other	£30,000.00	12	£360,000.00	£360,000.00	System	Cost per month for 12 months commencing April 2019. Based on actuals and ongoing forecasts for B&NES in-house design team and external consultancy support
Delivery phase B&NES project management	CAPEX	Other	£15,000.00	18	£270,000.00	£270,000.00	System	Proposed 18 month period commencing September 2019 including B&NES Finance, Legal, Procurement, HR staffing and external consultancy requirements
Infrastructure Lead (Grade 10)	CAPEX	Person	£55,011.00	1.5	£82,516.50	£82,517.00	Works	18 months from Sept 2019
Community Liaison Lead (Grade 10)	CAPEX	Person	£55,011.00	1.5	£82,516.50	£82,517.00	Non Charge	18 months from Sept 2019
Site Coordinator (Grade 10)	CAPEX	Person	£55,011.00	1.5	£82,516.50	£82,517.00	Works	18 months from Sept 2019
					<b>£877,549.50</b>	<b>£877,551.00</b>		
<b>OPERATIONS AND MAINTENANCE</b>								
IDOX - UTM interfaces for Queen Square traffic signal junctions	OPEX	Other	£7,600.00	1	£7,600.00	£8,360.00	Operation	Cost covers annual maintenance and licencing
Revenue payment (5%) to support ongoing operation of JAQU central payment system	OPEX	Other	£217,101.00	1	£217,101.00	£238,812.00	Operation	Revenue generation figure taken from economics model and payable to JAQU for ongoing central payment portal development & operation
Chipside - Back office hardware and software maintenance/housekeeping	OPEX	Other	£5,000.00	1	£5,000.00	£5,500.00	Operation	Chipside support cost per annum
Videalert - Back office system annual hosting and software maintenance costs	OPEX	Other	£148,750.00	1	£148,750.00	£163,625.00	Operation	Proposed support cost per annum. Videalert quotation assumes 4 years support required
ANPR camera replacement	OPEX	Camera	£2,200.00	1	£2,200.00	£2,420.00	Maintenance	Assumes one camera requires replacement each year due to vandalism/breakdown. Considers issues not covered by provided maintenance arrangement
Roadside equipment maintenance per camera	OPEX	Camera	£500.00	85	£42,500.00	£46,750.00	Maintenance	Cost based on number of cameras to maintain and certify, using known rate for similar systems
CCTV post/street lighting column maintenance	OPEX	Location	£100.00	85	£8,500.00	£8,755.00	Maintenance	Cost based on number of posts to maintain
Communications network maintenance - B-Net fibre	OPEX	Location	£500.00	21	£10,500.00	£11,550.00	Maintenance	Cost based on number of locations of B&NES B-Net private fibre
Communications network maintenance - B&NES PINACL wi-fi system	OPEX	Location	£500.00	16	£8,000.00	£8,800.00	Maintenance	Cost based on number of locations of B&NES PINACL wi-fi system
Building maintenance and other related charges	OPEX	Other	£25,000.00	1	£25,000.00	£25,500.00	Maintenance	Cost based on known rates.
Replacement/repair of signage - CAZ boundary / advanced signage	OPEX	Sign/Line	£1,850.00	10	£18,500.00	£19,055.00	Maintenance	Assumes replacement / repair of 10 signs per year, at an average cost per sign determined from B&NES Schedule of Rates. Cost includes an average site traffic management cost
Maintenance of permanent ATCs	OPEX	ATC	£11,486.00	1	£11,486.00	£12,635.00	Maintenance	Data storage, SIM and battery replacement
Queen Square (Gay Street) pollution monitor	OPEX	Location	£2,010.00	1	£2,010.00	£2,210.00	Maintenance	Cost covers maintenance/support including gas sensor and particle engine replacement
Queen Square - CCTV maintenance	OPEX	Location	£400.00	3	£1,200.00	£1,320.00	Maintenance	Cost covers maintenance/support of required CCTV cameras at Queen Square
Dynniq - Queen Square traffic signals annual maintenance	OPEX	Location	£2,500.00	2	£5,000.00	£5,500.00	Maintenance	Cost provided by B&NES Traffic Signals team. Supplied to developers for maintenance, safety and operational checks of signal junctions per annum
					<b>£513,347.00</b>	<b>£560,793.00</b>		
<b>OPERATIONS AND DELIVERY STAFF</b>								
CAZ Manager (Grade 13)	OPEX	Person	£77,614.68	1	£77,614.68	£77,615.00	Management	
CAZ Project Lead (Grade 10)	OPEX	Person	£55,011.00	1	£55,011.00	£55,011.00	Management	
Financial Controller (Grade 12)	OPEX	Person	£69,132.36	1	£69,132.36	£69,133.00	Management	
Communications Manager (Grade 10)	OPEX	Person	£55,011.00	1	£55,011.00	£55,011.00	Management	
Monitoring and Evaluation Lead (Grade 8)	OPEX	Person	£43,398.96	1	£43,398.96	£43,399.00	Management	
Monitoring Officer x 2 (Grade 6)	OPEX	Person	£34,738.44	2	£69,476.88	£69,477.00	Management	
Operations Team Manager (Grade 11)	OPEX	Person	£61,593.84	1	£61,593.84	£61,594.00	Management	
ICT Lead (Grade 9)	OPEX	Person	£49,960.68	1	£49,960.68	£49,961.00	Management	
Customer Services Officer (Grade 8)	OPEX	Person	£43,398.96	1	£43,398.96	£43,399.00	Management	
Enforcement Team Leader (Grade 8)	OPEX	Person	£43,398.96	1	£43,398.96	£43,399.00	Management	
Enforcement/Business Support Officers x 4 (Grade 4)	OPEX	Person	£26,327.40	4	£105,309.60	£105,310.00	Management	One enforcement officer would drive the MEV on a daily basis
Weight Limit Enforcement Officer (Grade 9)	OPEX	Person	£49,960.68	1	£49,960.68	£49,961.00	Management	
Anti-idling Enforcement Officer (Grade 6)	OPEX	Person	£34,738.44	2	£69,476.88	£69,477.00	Management	
Staff to deal with revised / extended RPZs - staff (0.5FTE) (Grade 6)	OPEX	Person	£34,738.44	0.5	£17,369.22	£17,370.00	Management	
					<b>£810,113.70</b>	<b>£810,117.00</b>		
<b>COMMUNICATIONS</b>								
B-Net optical fibre network use including backhaul	OPEX	Location	£0.00	1	£0.00	£0.00	Power+Comms	Assumes B-Net has no ongoing cost other than maintenance (see above).
PINACL Wi-Fi system licence costs	OPEX	Location	£4,290.00	1	£4,290.00	£4,719.00	Power+Comms	Cost covers wireless units annual licence and maintenance support costs
BT / other landline (e.g. DSL)	OPEX	Other	£3,262.00	1	£3,262.00	£3,589.00	Power+Comms	Maintenance would be covered within B&NES enlarged existing SLA contract
4G comms (Videalert)	OPEX	Other	£300.00	37	£11,100.00	£12,210.00	Power+Comms	Cost to provide 4G communications to each site comprising Videalert RDS ruggedised PC
					<b>£18,652.00</b>	<b>£20,518.00</b>		
<b>POWER (ON STREET)</b>								
Annual operating costs	OPEX	Camera	£100.00	85	£8,500.00	£8,500.00	Power+Comms	Assumes each camera, processor and direct site comms connection(s) combined consumes 100W and electricity price is 11p/kWh. Estimate based upon known Elexon codes
<b>OTHER</b>								
TPT charges	OPEX	Other	£0.35	17,057	£5,969.95	£5,970.00	Other	Expected number of PCNs to be issued and B&NES-supplied cost per PCN based on existing enforcement activities; however, no. of PCNs should reduce year on year (cost assumes 5% non payment rate).
Stationery and supplies	OPEX	Other	£0.48	17,057	£8,187.36	£9,007.00	Other	Expected number of PCNs to be issued and B&NES-supplied cost per PCN based on existing enforcement activities; however, no. of PCNs should reduce year on year (cost assumes 5% non payment rate).
PCN postage	OPEX	Other	£0.70	17,057	£11,939.90	£11,940.00	Other	First class postage only can be used per PCN. Current postage stamp cost is 70p (cost assumes 5% non payment rate).
Ongoing monitoring - Air Quality	OPEX	Other	£7,700.00	1	£7,700.00	£8,470.00	Other	Estimated monitoring cost per annum (utilising existing air quality sites).
Ongoing monitoring - Traffic	OPEX	Other	£14,458.00	1	£14,458.00	£15,904.00	Other	Based on TRACSIS quotation for monitoring. Applies from 2021 onwards
Ongoing monitoring - Economic Indicators	OPEX	Other	£25,000.00	1	£25,000.00	£27,500.00	Other	Monitoring cost per annum.
Ongoing monitoring - Active Modes (cycling / walking)	OPEX	Other	£25,000.00	1	£25,000.00	£27,500.00	Other	Monitoring cost per annum (surveys).
Health and wellbeing study set-up (year 1)	OPEX	Other	£47,159.00	1	£47,159.00	£47,159.00	Other	Set up of study assessing health & wellbeing of residents in & out of Clean Air Zone pre CAZ implementation
Health and wellbeing study operation (year 2)	OPEX	Other	£48,488.00	1	£48,488.00	£48,488.00	Other	Study assessing health & wellbeing of residents in & out of Clean Air Zone pre & post implementation. Cost covers year 2 annual assessment & write up
Health and wellbeing study operation (year 3)	OPEX	Other	£49,862.00	1	£49,862.00	£49,862.00	Other	Study assessing health & wellbeing of residents in & out of Clean Air Zone pre & post implementation. Cost covers year 3 annual assessment & write up
Health and wellbeing study operation (year 4)	OPEX	Other	£51,284.00	1	£51,284.00	£51,284.00	Other	Study assessing health & wellbeing of residents in & out of Clean Air Zone pre & post implementation. Cost covers year 4 annual assessment & write up
Re-draft of Legal Charging Order	OPEX	Other	£20,000.00	1	£20,000.00	£20,000.00	Other	B&NES must undertake this to operate a CAZ. Any further changes would require an amendment to be made.
Scheme Replacement / Decommissioning [-only applies in final year of scheme-]	OPEX	Other	£5000 or £1000	35 + 100	£275,000.00	£283,250.00	Decommissioning	Removal of all signage and posts (assumes £1k per site) = £100k + 5k per camera site for 35 sites = £175k. (Ignores Bathampton monitoring sites)
Weight limit enforcement - TROs	OPEX	Other	£50,000.00	1	£50,000.00	£50,000.00	Other	Allows for improvements to signage and necessary consultation and legal TRO making process to take place where required
					<b>£640,048.21</b>	<b>£656,334.00</b>		
<b>Risk</b>								
ORA Risk P(Mean) All stages (Financial + Delay) *	RISK (ALL)	Other	£2,703,000.00	1	£2,703,000.00	£2,703,000.00		ORA Risk in line with WebTag Guidance - mean used between P50 and P80 range
<b>B&amp;NES Overhead Costs</b>								
B&NES Council Overhead Costs *	OPEX	Other	£844,056.84	30%	£253,217.05	£253,218.00	Overhead	This cost is a 30% factor applied to all B&NES direct staff costs. This covers HR, legal, IT and other service departments costs
					<b>£9,743,739.00</b>	<b>£10,088,136.00</b>		
<b>TOTAL CAPEX</b>					<b>£9,743,739.00</b>	<b>£10,088,136.00</b>		
<b>TOTAL OPEX per year (EXCLUDING Scheme Decommissioning)</b>					<b>£1,968,877.96</b>	<b>£2,026,230.00</b>		