Bath Clean Air Plan

Bath & North East Somerset

Potential Eastern Extensions to CAZ Boundary

| 1

February 2019

Document history and status

Revision	Date	Description	By	Review	Approved
1	07/02/2019	DRAFT	JB & DL	RR	

Distribution of copies

Revision	Issue approved	Date issued	Issued to	Comments

Bath Clean Air Plan

Project No:	674726.BR.42
Document Title:	Potential Eastern Extensions to CAZ Boundary
Document No.:	
Revision:	1
Date:	February 2019
Client Name:	Bath & North East Somerset
Project Manager:	RR
Author:	JB & DL

Jacobs Consultancy Ltd.

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

Contents

1. Introduction

In 2017 the government published a UK Air Quality Plan for Nitrogen Dioxide (NO_2) setting out how compliance with the EU Limit Value for annual mean NO_2 will be reached across the UK in the shortest possible time. Due to forecast air quality exceedances, B&NES, along with 27 other Local Authorities, was directed by Minister Therese Coffey (Defra) and Minister Jesse Norman (DfT) in 2017 to produce a Clean Air Plan (CAP). The Plan must set out how B&NES will achieve sufficient air quality improvements in the shortest possible time. In line with Government guidance, B&NES is considering implementation of a Clean Air Zone (CAZ) including both charging and non-charging measures to achieve sufficient improvement in air quality and public health. **Figure 1.1** below shows the extent of the proposed CAZ in the Outline Business Case issued for formal public consultation in October 2018.

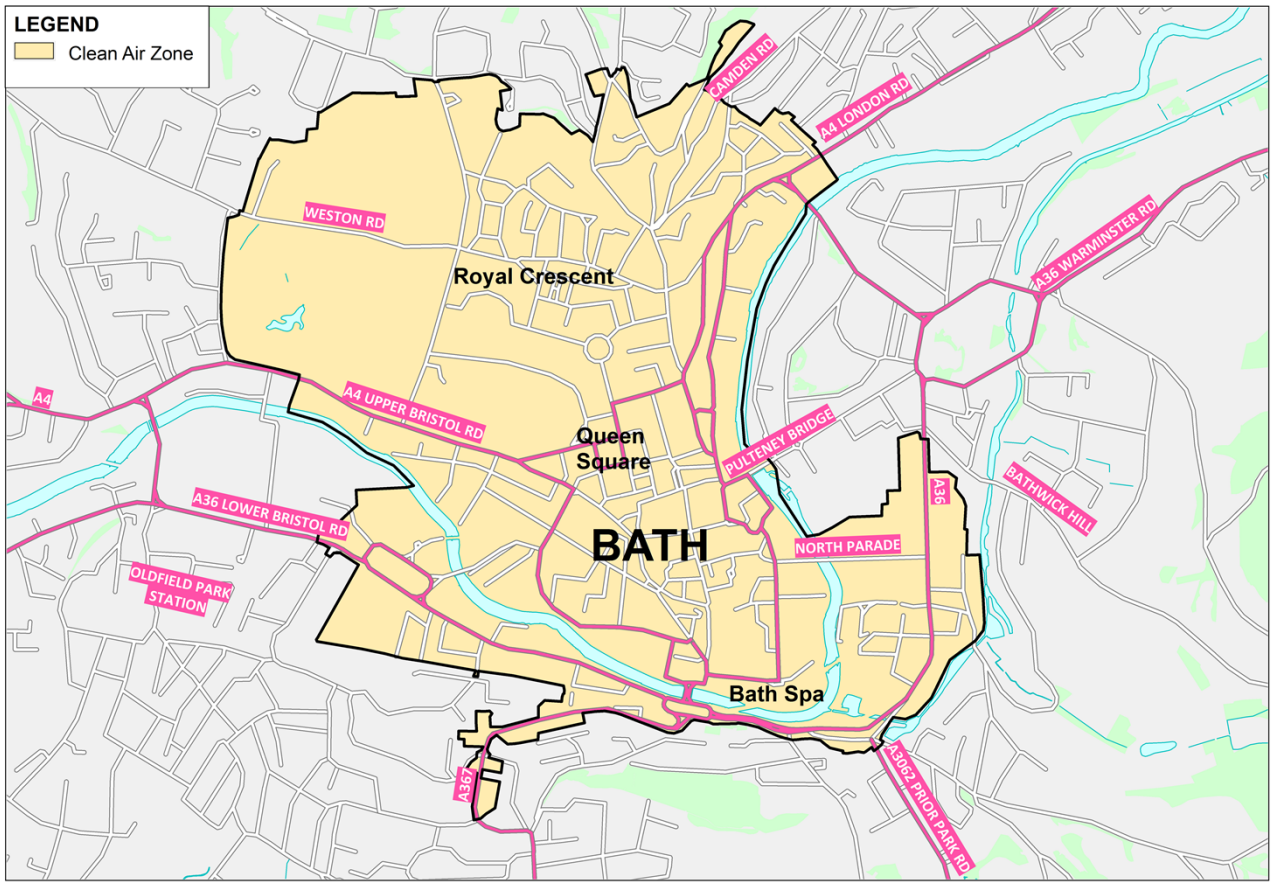

Figure 1.1 Proposed Clean Air Zone (CAZ) Extents - Outline Business Case

The public consultation on the scheme included in the Outline Business Case (OBC) has established that there is concern over the definition of the CAZ boundary on the eastern side of Bath. There are specific concerns from some residents in the Pulteney Estate area that the CAZ could exacerbate existing issues with tourist and rugby coaches idling in the area because it would be seen as an attractive location for non-compliant coaches seeking to avoid the charge while still getting close to the central area and the Recreation Ground. There are also concerns from both the Pulteney and Bathwick areas about drop-off and also parking of non-compliant vehicles.

Further to the east there are also concerns from residents in Bathampton about increased traffic use of Bathampton Lane/Mill Lane due to its use as an avoidance route by non-compliant light vehicle traffic. This includes concerns about increased delay on both approaches to the toll bridge and the risk of increased northbound queuing extending beyond the railway bridge into the northern part of Bathampton.

This Technical Report therefore covers three elements in response as follows:

- A summary of the technical work on the CAZ zone to date from the perspective of the eastern Bath area;
- An investigation of available data to assess the potential impact of the zone; and
- A consideration of the technical feasibility and implications of eastern zone extensions covering the Pulteney Estate, parts of Bathwick and Bathampton village.

2. Analysis of Potential Eastern Extensions

2.1 Air Quality in the East Bath Area and Expected Changes

2.1.1 Pulteney Estate and Bathwick

In the Baseline scenario (i.e. no Clean Air Plan and Zone) there are two exceedances expected in this area. These are both LAQM receptors on Bathwick Hill, one on the corner of Sydney Buildings (44µgm^{-3} annual mean NO_2) and one further up at house number 11 (41µgm^{-3}). Within the Pulteney Estate area the highest predicted NO_2 levels are 36µgm^{-3} on the PCM link representing the south side of Bathwick Street between Henrietta Rd and Daniel St. All other receptors show values of 30µgm^{-3} or less and the LAQM receptors at the north end of Great Pulteney Street show values between 21 and 22µgm^{-3}.

With the proposed Type D CAZ in place the above values are predicted to reduce, even though these areas are outside of the zone. This is because baseline traffic flows at these locations are affected by the zone, insofar as the boundary cuts the A36 route between Bathwick Roundabout and Brougham Hayes and the A46(T) to A36(T) route via Bathwick Street. The exceedances on Bathwick Hill are expected to see reductions of around 20µgm^{-3} to 24µgm^{-3} and 22µgm^{-3} respectively. Meanwhile, the already compliant areas of Pulteney and Bathwick are expected to see reductions of up to 10µgm^{-3}. Specifically, the highest PCM link on Bathwick Street is predicted to reduce to 27µgm^{-3}, whilst the LAQM receptors on Great Pulteney Street are forecast to fall to between 17 and 18µgm^{-3}. In keeping with the JAQU Framework that '*any charging zone should be as small as possible*', there is no immediate evidence or need from an air quality perspective to include these areas in the zone because of existing exceedances, or exceedances created by traffic changes resulting from the CAZ as proposed in the OBC. Indeed, as noted, base concentrations are expected to fall.

2.1.2 Bathampton

The Baseline air quality is predicted to be well within legal limits. The section of the A36(T) Warminster Road through Bathampton, which is the most heavily trafficked road, does not exceed 15µgm^{-3} in 2021.

With the proposed Type D CAZ in place the section of the A36(T) Warminster Rd past Bathampton is predicted to experience a 1-3µgm^{-3} reduction in NO_2. The reason for this is the same as that explained for the adjacent Bathwick area, in that a section of the A36 route to the south of the City Centre is within the CAZ, whilst the inclusion of the A4/Cleveland Place junction will also deter the use of the A36(T) to A4 London Road (and A46) route via Bathwick Street by non-compliant vehicles. The introduction of the CAZ is expected to result in a small daily increase in the use of the toll bridge route via Bathampton Lane and Mill Lane as explained later. However, this is not predicted to result in any local exceedances, notably on the approaches to the toll bridge where queuing in the weekday peak periods already occurs now.

2.2 Traffic Impact of the Proposed CAZ in the East Bath Area

2.2.1 Pulteney Estate and Bathwick

Although the traffic model handles the main responses that are expected in response to the Type D CAZ, it is not sophisticated enough to handle detailed concerns raised by residents in this area about increased coach access, or indeed any potential for increased use of this part of the city as a drop-off/pick-up zone for non-compliant car drivers. However, it has been possible to extract data from the two-week ANPR surveys which were undertaken to obtain an estimate of the magnitude of any possible impact associated with coaches. Increased drop-off/pick-up by non-compliant cars will also depend on how easy it is to route around the zone from other areas of the city or radial routes to/from the Pulteney Estate area. In other words, the convoluted and lengthy diversion route is unlikely to make this attractive.

To understand the potential coach access implications the ANPR data was processed into trip chains, allowing classifications, time periods and other data to be extracted. For coaches, two specific time periods were investigated as follows:

- An average weekend day which was comprised of the observed Saturdays and Sundays (4th, 5th, 11th and 12th of November 2017); and
- A Bath rugby match on Friday evening on the 10th November 2017.

For the weekend period, the daily average number of observed origins of coaches between 09:00 and 21:00 is shown in **Table 2 1.** These numbers only include coaches that 'stopped' in the city. This is because the data included coaches on some inbound routes (External Cordon) which were seen to depart the city in a short period of time at another site on the External Cordon (outbound). It was therefore assumed that these were not tourist coaches but 'through' movements. For coaches that did stop in the city, it was not possible to infer much about their internal route and where they did stop, as the bulk of the tourist attractions lay within the inner cordon of ANPR sites.

Table 2 1: Average Weekend Daily Coach Origins (09:00-21:00)

Origin	Compliant	Non-Compliant	Diversion Cost
A46(T) North	4.25	4.75	High
A4 East	1.75	5.75	Moderate
A36(T) South	3.25	2.75	None
A3062 South	0.25	1	Low
A367 South	2.75	2.5	Low
A4 & A36 West	3	3.5	Moderate to High
Lansdown Rd	2	1.75	High

For each origin route a relative 'cost' of diversion is assumed in the rightmost column. This is based on the difficulty and convenience in altering or adapting the approach route to arrive on the A36(T). At the low end, coaches from the A36(T) are already arriving in Bathwick, so there is little diversion cost should these choose to stop short and drop-off/pick-up in Great Pulteney Street, as opposed to continuing into the City Centre. At the high end are coaches approaching from the opposite side of Bath. For these, the diversion required is substantial to get around the zone to the A36(T), particularly coaches from the north and northwest. These coaches would have to add as many as 20-30 miles to their journey length and over half an hour of time (each way) to adapt the final part of their route to arrive/depart via the A36(T). Given this fact, it is considered that diversion from these inbound routes is highly unlikely, as it would not be cost effective to do so. Coaches typically have fuel consumption figures around 5mpg, meaning that the total 40-60 mile diversion for the round trip would cost £40-60. Half the savings made by not paying the charge would thus be spent avoiding it in fuel alone and, in addition, coach operators will consider non-fuel costs of additional mileage and driver time.

It is accepted that diversion and/or stopping short is more likely from the south eastern direction (A36(T)), but even here it should be noted that tourists may not wish to be stopped short. Also, for a coach of 50 visitors, the £100 CAZ charge amounts to only £2 extra per passenger. It is also expected that the number of compliant coaches will increase as fleets are replaced. The background turnover rates set out in the EFT spreadsheet from JAQU indicate around half of non-compliant coaches will have been replaced by 2021. It is therefore concluded that the presence of the CAZ as presently proposed is unlikely to significantly exacerbate any existing problem of idling tourist coaches in the Pulteney Estate area on a typical weekend when tourist coach demand is highest.

The ANPR survey data also captured one home rugby match, the second round Anglo-Welsh Cup match against Leicester Tigers with a near sell-out attendance of 14,354. Match kick-off was at 19:45. Inbound coach observations and paths were therefore extracted for this day, which were seen between 16:00 and 20:00 and are shown in **Table 2.2** below.

Table 2 2: Friday Rugby Match Coach Origins (16:00-20:00)

Origin	Compliant	Non-Compliant
A46(T) North	1	0
A4 East	6	2
A36(T) South	2	2
A3062 South	1	1
A367 South	4	0
A4 & A36 West	1	0
Lansdown Rd	3	0

It is noted that the observed rate of compliance is higher, with only a minority of coaches, 5 of the 18, being non-compliant. When considered against the background fleet turnover, plus the more significant diversion that the two coaches from the A4 East would have to make, it suggests that the exclusion of the Pulteney Estate area from the CAZ is unlikely to make a significant difference. However, it also shows that including the Pulteney Estate area within the CAZ would not unduly affect coaches associated with Bath home rugby matches, accepting this was only a 'snap-shot' of one game.

While it is acknowledged that coach idling in this area is a current concern, it is considered that it is not likely to be significantly exacerbated by the introduction of a CAZ with the Pulteney Estate area excluded. This is due to the limited numbers of non-compliant coaches by 2021, with diversion for most rather than just paying the charge, a non-efficient cost option. Extending the CAZ would not address this problem during Bath Rugby home matches either, as available ANPR data indicates that most supporter coaches are likely to be compliant anyway, which will increase over time. It should also be noted that part of the complementary measures to be included with the Charging Zone is dedicated funding for anti-idling enforcement officers. It is anticipated that this will be a far more effective way to address issues of idling coaches, as they will be able to target vehicles regardless of compliance.

As noted earlier, increased drop-off/pick-up by non-compliant cars will also depend on how easy it is to route around the zone from other areas of the city or radial routes to/from the Pulteney Estate area. An examination of the proposed boundary in Figure 1.1 shows that accessing the Pulteney Estate area from large parts of Bath would involve a very circuitous route to avoid the proposed CAZ. This is particularly the case for all areas north of the river, but also the southwest part of the city. It is accepted that non-compliant drivers with easy access to the A36(T) or North Road and Bathwick Hill (Combe Down) might choose to use Great Pulteney Street/Laura Place as a preferred location of drop-off/pick-up. However, it is not inconceivable that drivers from the southeast part of the city wouldn't be doing this now. With respect to an increase in on-street parking risk, it is noted that the whole of the Pulteney Estate is covered by Residents Parking Zone (RPZ) 1, whilst parts of Bathwick are included in RPZ Zones 8 and 10. As such, the parking supply is already actively managed for the most part, and zone extensions could be considered in line with the B&NES RPZ guidelines to address any additional nuisance parking created in Bathwick by non-compliant vehicle owners. In other words, it does not require the extension of the CAZ boundary to cover the whole of Bathwick to achieve this.

2.2.2 Bathampton

As with other areas outside of the CAZ, the traffic diversionary impacts have been assessed using the GBATH SATURN model. This was developed to a calibrated/validated base of 2014 by Mott MacDonald in 2015 following extensive Roadside Interview Surveys (RSI), traffic counts (both MCC and ATC) and journey time surveys done at this time. The highway models were developed in SATURN to represent the AM peak hour (08:00 - 09:00), an average hour in the inter-peak (10:00 - 16:00) and the PM peak hour (17:00 - 18:00) for an average Monday to Friday weekday in October 2014. With respect to Bathampton it is important to note that the Mill Lane toll bridge was expressly calibrated and checked for 'goodness of fit' given its importance to any consideration of transport measures in the 'East of Bath' area; which was the driver at the time for the model update. The results in the Local Model Validation Report (LMVR), dated June 2015, showed the following:

- AM Peak Hour: Counted NB and SB flows of 167 and 327 vehicles were satisfactorily replicated by modelled flows of 173 and 352 vehicles;
- IP 'Average' Hour: Counted NB and SB flows of 123 and 140 vehicles were satisfactorily replicated by modelled flows of 118 and 137 vehicles; and
- PM Peak Hour: Counted NB and SB flows of 280 and 172 vehicles were satisfactorily replicated by modelled flows of 289 and 167 vehicles.

Whilst it is accepted that all 'wide area' models can incorporate some inaccuracy, this is not the case with GBATH at Mill Lane. The 'fit' and flow 'tidality' in the two weekday peak hours is accurately represented. The effect of the long one-way 'shuttle' section on the bridge, and the toll operation, serves to constrain the maximum two-way flow capacity which can be achieved along this route, with queuing on both approaches in the peak hours a regular occurrence now. It is notable that the two-way flows in both peak hours are circa 450-500 vehicles, which is the proxy for its ultimate throughput. Based on this, the potential for diversionary growth in traffic usage with the CAZ in place will be confined to the inter-peak period, when capacity to accommodate it exists.

This view is supported by ATC data collected on Toll Bridge Road in November-2018. This is very consistent with the 2014 counts used for the GBATH calibration/validation. Looking at the two-way flows, these 'peak' at about 440-460vph in the two weekday peak hours, so not much different to the situation with 2014 data as reported above. The average two-way flow in the weekday inter-peak (10 am-4 pm) has risen to 305 vph in this data, so is clearly the period in which growth over the 2014-2018 has occurred. With Enterprise Area (EA) development related growth in the City Centre expected to add traffic pressure to the road network on the eastern side of Bath by 2021, increased use of the Mill Lane/Bathampton Lane route in the inter-peak period is highly likely to occur irrespective of the CAZ.

For the purposes of the current CAZ work a 2-week ANPR survey was used to obtain information to split the 2014 matrices into finer detail on vehicle types, as required for the traffic and air quality modelling. This included the fuel and euro class splits to determine compliance and emissions of vehicles, as well as splitting out classes such as coaches and taxis. Traffic demand in the model was then increased according to DfT forecasts to 2021. The change in compliance of vehicles between the observed 2017 data and 2021 was obtained using the Defra Emissions Factors Toolkit (EFT). Note that the traffic origin-destination patterns implicit in the calibrated 2014 matrices were not changed.

When factoring flows to 12-hour and then AADT, the 9-10 am and 4-5 pm hours were accounted for in the factoring of the 8-9 am and 5-6 pm 'peak' hour flows (GBATH) to the 7-10 am and 4-7 pm 'peak' periods. Local area ATC data has been used to establish these factors. In short:

- A global factor was derived from local ATC data to convert AM peak hour flows (8:00-9:00) to AM peak period flows (7:00-10:00);
- A global factor was derived from local ATC data to convert the average inter peak hour flow to the total inter peak period flow (10:00-16:00);
- A global factor was derived from local ATC data to convert PM peak hour flows (17:00-18:00) to PM peak period flows (16:00-19:00);
- A global factor was derived from local ATC data to convert the 12-hour flows calculated above to 24-hour Annual Average Weekday Traffic (AAWT) flows; and
- A global factor was derived from local ATC data to convert the 24-hour flows calculated above to 24-hour Annual Average Daily Traffic (AADT), which includes weekend trips and is adjusted for seasonality. This process was necessary as AADT forecasts are the ones necessary for air quality emission modelling.

Based on the above, the modelling with a Class D CAZ shows a small increase in the daily (AADT) flow on Mill Lane of around 100 vehicles/day, which compares with a projected 2021 baseline daily flow of ~6500 vehicles/day. This equates to diversion induced growth of +1.5% which, as noted above, is likely to occur in the inter-peak period when the capacity at the toll bridge allows. So, whilst it is accepted that increased traffic use of Bathampton Lane/Mill Lane will occur with the Class D CAZ as proposed, the expected level of increase is considered modest and within acceptable limits when considering normal daily variation in traffic. It should be noted that a Stated Preference Survey (SPS) was undertaken to understand the likely behavioural change to a

CAZ, with this applied to the local model to replicate responses by owners of non-compliant vehicles. The survey was undertaken through an independent market research panel and issued to a representative sample of people in Bath and the surrounding area. For non-compliant car owners, the proportion advising they would re-route to avoid the zone was only 19.6%. This compares with 57.2% stating that they would upgrade/replace the vehicle and 18.3% advising they would change mode or cancel the journey. So, the potential for traffic change in Mill Lane also needs to be considered in the light of these SPS findings, which is reflected in the GBATH modelling as noted.

Based on the 2021 modelling results, and the quality of the 2014 base model 'fit' at Mill Lane, it is considered there is no justification to extend the CAZ to include Bathampton village and the toll bridge as part of the initial CAZ scheme. Including the Bathampton toll bridge would also mean there would be no available crossing point over the River Avon on the east side of the city for non-compliant car drivers to use, with the alternative option well south of Bath at Winsley (B3108).

3. Technical Considerations

3.1 Pulteney Estate and Bathwick

Comments received from the Pulteney Estate Residents Association stated that "*PERA believes that the CAZ should extend to include the city sections of the A36 from Beckford Road/Sydney Road to Pulteney Road. This would extend the CAZ to encompass many important parts of the heritage centre of Bath such as Great Pulteney Street, Sydney Place and Sydney Gardens*". By implication this would include the whole of the Pulteney Estate, Bathwick Street and Sydney Gardens. It would also by necessity include the part of Bathwick to the north of Sydney Gardens, which has sole access to the A36 Beckford Road via Forrester Road and Beckford Gardens. South of Sydney Road, the eastern boundary would then logically follow the line of the Avon and Kennet Canal to 'tie-in' with the existing proposed boundary to the south of Bathwick Hill. An extension of this size would, however, have implications in providing suitable opportunity for 'turn-back' or re-routing of non-compliant vehicles, particularly HGVs entering the city on the A36(T). These are as follows:

- Non-compliant vehicles entering Bath on the A36(T) would be forced to turn left into North Road to avoid entry into the CAZ via either Beckford Road or Sydney Road. This is unsuitable for HGV's, so an 'entrapment' issue would be created as vehicles would be forced to enter the CAZ. Therefore, the only suitable 'turn-back' opportunities for these large vehicles via the Sydney Gardens 'loop' (Beckford Road/Sydney Place/Sydney Road) or a 'U' turn at Bathwick Roundabout would be lost; and
- 'Turn-back' for non-compliant light vehicles would, as stated above, increase traffic in North Road and so past the front of King Edwards School. These drivers would have to continue along North Road to Claverton Down Road, or expedite a turn using residential roads to the south of North Road (Cleveland Walk-Sham Castle Lane) to return to the A36 via North Road. Roads in the new Holburne Park development (former MOD site) might also be used for turning to avoid zone entry, or Minster Way. The existing A36 Beckford Road/Sydney Road junction is signal controlled with the junction layout having quite a large 'foot-print'. Whilst converting this junction to a small roundabout might be possible to allow a 'U' turning avoidance manoeuvre for non-compliant vehicles, it is important to note that the current signal layout includes controlled crossings over both Beckford Road and Sydney Road to assist pedestrian/cyclist movements in this location, which is on the 'key' route to/from King Edwards School. This could not be conveniently replicated with a roundabout design, whilst even a small island design would represent a tight 'U' turn for HGV's.

For the reasons stated above a zone extension to the extent advocated by PERA is not recommended, because it is not needed to achieve compliance. However, a smaller extension covering the Pulteney Estate could be considered, provided it does not interfere with the turning opportunities via Sydney Gardens or Bathwick Roundabout. Under this extension scenario four new cordon entry/exit points would be created as follows:

- Bathwick Street: At the junction with Beckford Road and Sydney Place;
- Sutton Street: At the junction with the A36;
- Great Pulteney Street: At the junction with the A36; and
- Vane Street: At Bathwick Roundabout.

This extension would result in the currently proposed cordon entry/exit points on Bathwick Street (at Cleveland Bridge) and Pulteney Bridge being removed. The 'net' change would be two additional cordon points requiring signing and ANPR camera enforcement. However, it is important to note that, whilst technically feasible without traffic management implications, it will offer little or no additional air quality benefit albeit having a direct impact on more residents through inclusion within the zone. As such, it will impact negatively on an Outline Business Case (OBC) which is already negative. It also assumes that all the residents of the Pulteney Estate would support inclusion as advocated by PERA.

Further extension to cover a wider area of Bathwick might be considered at some point in the future if CAZ implementation is shown to introduce undesirable parking or rat-running effects which are not addressable with normal parking or traffic management controls. If so, the A36/North Road junction and the section of North Road as far as Cleveland Walk may need to be included as an addition to the area suggested by PERA to prevent an undesirable increase in 'avoidance' traffic past King Edward's School. As noted however, this will create an entrapment issue for non-compliant HGV's, as any proceeding northbound beyond the A36(T)/B3108 Lower

Stoke junction at Winsley will have no suitable opportunity to avoid zone entry. In contrast, non-compliant HGVs entering Bath on the A46(T) will have signed turn-back opportunities much closer to the CAZ entry point on the A4 London Road at either Lambridge Interchange or the Gloucester Road junction.

3.2 Bathampton

The inclusion of Bathampton village would create a need for an 'outlier' CAZ unless it could be linked with a feasible extension of the main zone through the Pulteney Estate and Bathwick. It would also be highly desirable to avoid any inclusion of the A36(T) within the CAZ, which is separately managed by Highways England. To facilitate possible 'link-up' as a single zone the Pulteney Estate area described earlier would have to be included in addition to:

- The area of Bathwick to the north of the A36 Beckford Road served off the accesses with Forrester Road and Beckford Gardens;
- Darlington Road, including Bathwick St Mary C of E Primary School; and
- The new Holburne Park development off the A36 access junction with Inglis Court.

However, between Holburne Park and Bathampton Lane there are several large properties with direct frontage access to the A36 Warminster Road. Noting the need to avoid any direct inclusion of the A36(T), it would not be possible or viable to include these properties within the CAZ. As such, any proposal to include Bathampton will in effect create the need for a remote sub-zone covering the whole of its extent to the north of the A36(T), and south of the A4 Batheaston Bypass (Mill Lane Bridge).

The position of the sub-zone entry/exit point on Mill Lane would, however, need careful consideration to ensure there is an adequate 'turn-back' opportunity for southbound non-compliant vehicles reaching and crossing the toll bridge. Locating the zone entry/exit point at the London Road West/Toll Bridge Road junction could be considered, but this would then incorporate within the zone all properties served off Toll Bridge Road and Mill Lane. This would then additionally impact on several businesses including The Old Mill and Bathampton Mill, as well as residential properties served off The Willowfalls. Avoiding this would be highly desirable, so a suitable turning point for light vehicles would ideally need to be established between Bathampton Mill and Mill Lane Bridge, which could be difficult to achieve due to limited available highway width. In the absence of this it is probable that the existing access junctions to Bathampton Mill or New Leaf Farm will be used by southbound non-compliant drivers to make 'U' turns to avoid zone entry, which is less than ideal. Advance signing at the London Road West/Toll Bridge Road could, however, be installed to reduce or mitigate this risk.

In summary the inclusion of Bathampton will create a need for an 'outlier' zone with four entry/exit points as follows:

- Bathampton Lane: at the junction with the A36(T);
- Devonshire Road: at the junction with the A36(T);
- Down Lane: at the junction with the A36(T); and
- Mill Lane, or alternatively Toll Bridge Road.

The creation of an 'outlier' CAZ (in addition to the main zone covering the central area) is considered to create a precedent for inclusion of other sub-zones. As noted earlier, there is no case for its inclusion to achieve air quality compliance by 2021. Furthermore, whilst some increased traffic use of Bathampton Lane and Mill Lane is predicted, the level of this expected increase is not excessive. The ability for 'growth' to be accommodated in the weekday peak hours is also already heavily constrained by the capacity available at the toll bridge, a fact that will be well known to local drivers.

4. Conclusions

4.1 General

This Technical Report is a response to concerns over the definition of the CAZ boundary on the eastern side of Bath. There are specific concerns from some residents in the Pulteney Estate area that the CAZ could exacerbate existing issues with tourist and rugby coaches idling in the area. There are also concerns from both the Pulteney and Bathwick areas about drop-off and parking of non-compliant vehicles. To the east there are also concerns from residents in Bathampton about increased traffic use of Bathampton Lane/Mill Lane due to its use as an avoidance route by non-compliant light vehicle traffic. This includes concern about increased delay on both approaches to the toll bridge and the risk of increased northbound queuing extending beyond the railway bridge into the northern part of Bathampton.

4.2 Pulteney Estate and Bathwick

The traffic and air quality modelling undertaken to date shows that the inclusion of the Pulteney Estate/Bathwick area advocated by PERA, and/or further inclusion of Bathampton, is not necessary to achieve air quality compliance by 2021. Furthermore, substantively increasing the overall CAZ extents to include these areas will increase the overall direct impact on residents, so would serve to erode an economic case which is already shown to be negative with the zone as proposed (OBC).

With respect to the Pulteney Estate/Bathwick area there are potential traffic management issues with including the whole of the area proposed by PERA. These are related to maintaining satisfactory 'turn-back' provision for non-compliant drivers reaching Bathwick on the A36(T). Specific issues would include:

- Non-compliant vehicles entering Bath on the A36(T) being forced to turn left into North Road to avoid entry into the CAZ via either Beckford Road or Sydney Road. This is unsuitable for HGV's, so an 'entrapment' issue would be created as these would be forced to enter the CAZ. In short, the only suitable 'turn-back' opportunities for these large vehicles via the Sydney Gardens 'loop' (Beckford Road/ Sydney Place/Sydney Road) or a 'U' turn at Bathwick Roundabout would be lost; and
- 'Turn-back' for non-compliant light vehicles would, as stated above, increase traffic in North Road and so past the front of King Edwards School. These drivers would have to continue along North Road to Claverton Down Road, or expedite a turn using residential roads to the south of North Road (Cleveland Walk-Sham Castle Lane) to return to the A36 via North Road. Roads in the new Holburne Park development (former MOD site) might also be used for turning to avoid zone entry, or Minster Way.

An identified 'fall back' position would be to include the Pulteney Estate only, so with a revised boundary incorporating four new cordon points as follows:

- Bathwick Street: At the junction with Beckford Road and Sydney Place;
- Sutton Street: At the junction with the A36;
- Great Pulteney Street: At the junction with the A36; and
- Vane Street: At Bathwick Roundabout.

This would remove the need for the currently proposed cordon points on Bathwick Street at Cleveland Bridge, and on Pulteney Bridge. It should be re-iterated, however, that this partial change is not needed for compliance. As such, it can be expected to worsen the economic case, although this is not expected to be to a significant degree.

The part of Bathwick to the north of Beckford Road, so the part accessed off Forrester Road and Beckford Gardens, could be included as part of the extension noted above. However, this is not considered necessary as on-street parking in this area is already wholly controlled by RPZ 10. However, further extension including this and to cover a much wider area of Bathwick might be considered at some point in the future if subsequent CAZ implementation is shown to introduce undesirable parking or rat-running effects which are not addressable with normal parking or traffic management controls. If so, the A36/North Road junction and the section of North Road as far as Cleveland Walk may need to be included as an addition to the area suggested by PERA to prevent an undesirable increase in 'avoidance' traffic past King Edward's School. As noted however, this will create an

entrapment issue for non-compliant HGV's, as any proceeding northbound beyond the A36(T)/B3108 Lower Stoke junction at Winsley will have no suitable opportunity to avoid zone entry. In contrast, non-compliant HGVs entering Bath on the A46(T) will have signed turn-back opportunities much closer to the CAZ entry point on the A4 London Road at either Lambridge Interchange or the Gloucester Road junction.

4.3 Bathampton

Including Bathampton would create the need for an 'outlier' sub-zone. This is because there is no logical way of 'linking' this 'outlier' through Bathwick to form an extension of the main zone. The creation of an 'outlier' CAZ in addition to the main zone covering the central area is considered to create a possible precedent for inclusion of other 'requested' sub-zones in Bath. As noted earlier, there is no case for the inclusion of Bathampton to achieve air quality compliance by 2021. Furthermore, whilst some increased traffic use of Bathampton Lane and Mill Lane is predicted, the level of this expected increase is not excessive.

The ability for 'growth' to be accommodated in the weekday peak hours is already heavily constrained by the capacity available at the toll bridge, a fact that will be well known to local drivers. As such, the potential for diversionary growth in traffic usage with the CAZ in place will be confined to the inter-peak period, when capacity to accommodate it exists. This view is supported by ATC data collected on Toll Bridge Road in November-2018. This is very consistent with the 2014 counts used for the GBATH calibration/validation. Looking at the two-way flows, these 'peak' at about 440-460vph in the two weekday peak hours, so not much different to the situation with 2014 data. However, the average two-way flow in the weekday inter-peak (10 am-4 pm) has risen to 305 vph in this data, so is clearly the period in which growth over the 2014-2018 has occurred. With Enterprise Area (EA) development related growth in the City Centre expected to add traffic pressure to the road network on the eastern side of Bath by 2021, increased use of the Mill Lane/Bathampton Lane route in the inter-peak period is highly likely to occur irrespective of the CAZ. This will need to be taken on board in any post-CAZ monitoring of this route, insofar as an increase in inter-peak traffic usage over time will not necessarily be the sole result of the CAZ, but equally likely to be a 'growth' impact resulting in diversionary re-routing away from already congested highway operating conditions at the A4/Cleveland Place junction and Bathwick Street (NB) throughout the working day.

Another concern in including Bathampton is that encompassing the toll bridge would leave no available crossing point over the River Avon on the east side of the city for non-compliant car drivers to use, with the alternative option well south of Bath at Winsley (B3108). It is accepted that a higher proportion of non-compliant traffic using Bathampton Lane and Mill Lane as an avoidance route is undesirable, but the effect of this and the net increase in traffic predicted is not shown to result in any air quality exceedances in Bathampton with a Class D CAZ as proposed in place. In view of all these considerations, it is considered there is no case for including Bathampton in the CAZ at outset, which as stated would need to be treated as a sub-zone.

Notwithstanding the above there will be a need for a programme of regular monitoring to establish changing traffic flows and potentially journey times on the Bathampton Lane/Mill Lane/Toll Bridge Road route in the pre-CAZ and post-CAZ scenarios. Pre-monitoring will be needed to establish the natural growth trend up to the CAZ launch. Comparison of 2014 and 2018 flows set out in this Note has shown no appreciable change in two-way 'peak' weekday flows at the Toll Bridge, but a perceivable growth change in the average inter-peak hour flow over the period 2014-2018. Further data collection up to CAZ implementation will enable what appears to be an underlying growth trend to be established. In the post-CAZ scenario, this can then be accounted for in establishing any true 'extra-over' effects of the CAZ. If the outcome from future comparison analyses does reveal a net impact of significance, then a decision could be taken then to introduce an 'outlier' CAZ if required, subject of course to a full public consultation. As the route is already subject to a 4-ton weight restriction and has traffic calming and a 20mph speed restriction in parts, it is considered that little could be achieved using further formal traffic management measures to deter vehicle usage. Increasing charges on the Toll Bridge is also outside of the control of B&NES.