Clean Air Zone Analysis
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(You know how to find me.)

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1 Executive Summary

A Clean Air Zone neither solves all aspects of air pollution nor creates behaviour change to shift out of your car and walk, cycle, or use public transport. The city of Bath daily has 27,715 commuters drive cars into the city (Census 2011). Of those 8,279 are residents of Bath driving to work in Bath. Every September 23,000 students come to the city to study, many bring their own cars. If we truly want to tackle air pollution we need to not only implement the Clean Air Zone but also implement companion solutions:

1. Workplace Parking Levy
2. Citywide Parking Control
3. Low Traffic Neighbourhoods
4. Sustainable Transit Levy on all parking fees.
5. Subsidise All Buses

2 Clean Air Zone

A 100% compliant CAZ “C” scenario will achieve 28.08% drop in NOx whereas a CAZ “D” scenario achieves 43.87% drop in NOx. 94.32% drop in NOx can be achieved by ensuring all Buses and HGVs are Diesel CAT 6 and ALL diesel vans and cars are BANNED from the city.

Data from Bath ANPR Data Set

It is important to note that petrol cars have no noticeable impact on the NOx levels and if the scientific objective of to reduce NOx in an equitable way, then CAZ “D” should have not have charged older petrol cars.

In other words, a CAZ simply asks you to buy a new diesel or drive a 2006+ petrol car without actually tackling all forms of air pollution. A CAZ needs to be complimentary solutions as it does not facilitate modal shift away from car dependency.

Another issue with the Automatic Number Plate Recognition data set is that it excluded a significant amount of local traffic within the analysis do to the positioning of the cameras. There was no way to capture radial local journeys. Somebody could travel from Weston to the University of Bath without being detected.
3 Road Miles Generators

Emissions from different modes of transport
Emissions per passenger per km travelled

- CO2 emissions
- Secondary effects from high altitude, non-CO2 emissions

Domestic flight: 133g +121g
Long haul flight: 102g +93g
Car (1 passenger): 171g
Bus: 104g
Car (4 passengers): 43g
Domestic rail: 41g
Coach: 27g
Eurostar: 6g

Note: Car refers to average diesel car
Source: BEIS/Defra Greenhouse Gas Conversion Factors 2019

A primary objective of the Climate Emergency is to reduce road miles driven. Given that a CAZ does not change behaviour and simply has you buying a newer car, we need complementary solutions that create the necessary modal shift. We need to understand the reasons why people

3.1 Park and Ride Sites Behaviour

Park and Rides are problematic as these encourage car use and numerous studies have highlighted that they also weaken rural bus usage. They are a significant generator of road miles.


3.2 Car Park Usage

By 9am weekdays about 2100 car parking spaces are being used and overall we never reach
maximum capacity except during the Christmas markets. This lack of use is exasperated by the significant amount of readily available free on-street parking available in the city.

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<td><strong>2788</strong></td>
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Excludes Manvers Street (161 spaces)

3.3 Free Parking In Residential Areas

The city is simply too walkable and anybody happy to walk 15 to 20 minutes can park in the outskirts of a Resident Parking Zone and walk in. With the poor radial bus network in the city and there is a massive incentive to use your car significantly increasing road miles.

3.4 Bus Network and Pricing Failure

We need to recognise that the current bus services fail to get people to where they want to be and are significantly more expensive than using a car.

We should consider new radial routes and particularly new bus interchanges.
3.4.1 Keynsham Bypass Bus Stops

It was noted that a significant number of P&R users came from the Keynsham and Saltford area while rail access to Bath creates significant issues for people working in the Locksbrook Industrial Estate with the nearest train station being Oldfield Park. There would be significant value in building bus stops and connecting ramps/steps on the Keynsham Bypass to provide access to Keynsham High Street and Keynsham Train Station.
3.5 Failed Cycle Network

Bath is simply too hostile to cycling creating car dependency.

3.5.1 Topography

Bath ‘suffers’ through 7 hills but there are clear ‘corridors’. The river valley and the southern plateau are should be good cyclable environments but there is a distinct failure by the council to recognise the plateau in what has been delivered.

The PCT.BIKE DfT tool highlights these key potential routes.
3.5.2 Bath and North East Somerset Cycle Network Failure

Within a world where eBikes are normal, there are key routes in the city that need addressing as well as a number of key feeder routes that should be focused on. The BoA Towpath is a major school feeder route, while providing a good cycle route from Bath to Radstock via Peasedown St John would have a significant impact on modal shift from that area.

4 Commuter Analysis

Using Census 2011 data we can very quickly get a feel for the problem. Of the 27,715 people that drive to work in the city, 8,279 live in the city. This generates around 80 tons of CO2 per day.
4.1 Major Commuter/School Flows

Critically where people live and where they work or study in Bath indicate that bus services and cyclable routes are not available to support many of these journeys. The primary focus has been on getting people to the city centre without supporting these commute corridors

- Southdown to University of Bath
- Batheaston to Weston/Locksbrook
- Larkhall to University of Bath

4.2 Commuting by Car under 5km

Yet the analysis of Census 2011 indicates a significant number of people could easily shift to walking, and particularly, cycling (eBike).

The centre circle is the number of people in that area that drive to work in that area per day. The segments indicate the number of commuters driving into that area from that direction.
4.3 Leisure and Commuter Movement Patterns are similar

It is very clear from the work done in the Atkins Trams report that humans are creatures of habit.

2.5 Journey purpose – work journeys

This map shows the origins and routes of traffic crossing a cordon around the city centre, for commuting and business journey purposes.

The map re-emphasises that the A367 to the south of Bath is a key corridor for people who travel to Bath for work. The map also shows high use of the B3110 from the south east, the A4 from both east and west directions, and Lansdown Road from the north.

There does not appear to be high usage of the A36 and A4 for trips into Bath. This is likely to be due to these being more long distance routes, and journeys with local origins are less likely to use these routes for short journeys.

30 October 2017

2.6 Journey purpose – leisure journeys

This map shows the origins and routes of traffic crossing a cordon around the city centre, for leisure and personal journey purposes.

The map shows that the optimal corridors used by people travelling into Bath for leisure purposes are similar to those used for work.

Most significantly, the southern A367 corridor is heavily used, more than any other corridor, and many of the origins of these trips appear to be in or near Midsummer Norton and Radstock. To the west and north, the A4 and Lansdown Road are also key routes. The three Park & Ride sites for Bath are located on these three corridors.
5 Through Traffic Analysis

In October 2017 the city set up a large set of Automatic Number Plate Recognition Cameras. Two weeks of data was anonymised and released to Bath Hacked to allow the public to play with the data.

5.1 Issues with the data set

The Automatic Number Plate Recognition data set excluded a significant amount of local traffic due to the positioning of the cameras. There was no way to capture radial local journeys. Somebody could travel from Weston to the University of Bath without being detected however some roads could be easily analysed.

5.2 London Road Through Traffic Analysis
It is important to note that around 47% of all HGVs on London Road drive through the city within 1 hour.

A420 Digital Bypass
The implications of this through traffic analysis is that the council could remove traffic from our roads simply through charging drivers to use the city for specific journeys when reasonable alternatives are available using simple ANPR cameras with the effectiveness of building the A46-A36 Link Road.
Further reductions to cross city traffic could be achieved by placing the ANPR camera at London Road/Cleveland Place junction to ‘force’ Bristol traffic out along the A46 and A420.
6 Comparing Bath To Her Peers

6.1 Bath

6.1.1 Commuter Profile

When looking at the propensity to travel by car, it is the steep incline between 1-3km that indicates there is a high potential to shift to other more sustainable modes.
6.2 Cambridge

6.2.1 Commuter Profile

Cambridge clearly demonstrates that there is still some work to shift people out of the car, but it is almost a straight line unlike Bath. It also demonstrates that cycling is dominant within the city but with little traction outside the city boundaries. Bus use seems to be focused more on the peri-urban/rural services.

6.2.2 Commuter Propensity
6.3 Oxford

6.3.1 Commuter Profile

Oxford still relies heavily within the city on buses and but has tackled car use significantly better than Cambridge. (See how much fun this is!)

6.3.2 Commuter Propensity

Oxford still relies heavily within the city on buses and but has tackled car use significantly better than Cambridge. (See how much fun this is!)

6.4 Conclusions

If Bath was like Oxford 1906 fewer car commutes per day
If Bath was like Cambridge there would be 1406 fewer car commutes per day.

Simply put Bath has a higher than expected level of driving within very short distances. It’s urban/peri-urban/rural employment base, a mixture of topography, poor cycling infrastructure, rampant free parking, coupled with inadequate, expensive bus & train services have resulted in a city with a significant car dependency.

7 Complementary Solutions

What I hope I have shown is that Bath has a problems created by free residential parking where it is simply much cheaper and easier to not use public transport. It is too uncomfortable and difficult to consider cycling longer distances which are impracticable for walking. Combined with the principles that Park and Rides are good, we have a perfect situation that enforces car dependency while discouraging modal shift resulting in significant road miles

An example Bath should follow is Vancouver. The city wants two-thirds of all trips to be by walking, biking or transit by 2030 as part of a declared Climate Emergency. This target is something Bath should aim for.

Within the context of Air Pollution, we need to recognise that any diesel car or van is problematic the council should be doing its utmost to discourage use/ownership through pricing.
7.1 Workplace Parking Levy

Nottingham has been able to maintain congestion at 2012 levels while significantly investing in public transport. The WPL has been hailed as a huge success. Given the business mix of Bath, the revenue from this would not be big, but the impact would be significant and could see a 20% drop in commuter traffic, particularly to the RUH/Locksbrook/University of Bath areas. There would be a 50% surcharge on diesel vehicles.

Perth uses a more extreme version with all parking having a levy. The impact of this has been phenomenal and has provided free public transport within the area it operates within.

7.2 Citywide Parking Control

The city should be covered in new ‘outer’ controlled parking zones with the current established zones being defined as ‘inner’ zones. Resident permits would be restricted to council tax paying residents, that is no students, with certain exceptions. Commercial/commuter permits would be provided through the council working in partnership with local businesses.

We simply need to prevent significant ingress of cars into the city.

7.2.1 Residential Parking Permits

Resident Parking Permit for a Zone must be based on CO2g/km \* length of car with a diesel surcharge of 50%. This should encourage the ownership of small petrol/electric cars within the city. Diesel cars are particularly polluting while the engine is warming.
Example pricing model based on Bristol pricing model.

### 7.2.2 Commercial/Commuter Parking Permits

Given the size of Bath, around 25,000 commuters park their cars in Bath for free either in employer car parks (targeted by the Workplace Parking Levy) or on residential streets. Bath cannot simply ban all commuter parking within the city as this would impact the economic viability of the city and the Urban/Peri-Urban/Rural mix of its workforce. Permit would be priced at the same price as the WPL, again with a 50% diesel surcharge.

### 7.3 Low Traffic Neighbourhoods

Low Traffic Neighbourhoods are these magical beasts that remove all through traffic, get more people walking and cycling, tackle air pollution (20-30% reduction), make communities stronger, grow your local economy, and reduce overall traffic levels in the city, simply by placing a few bollards and bus/resident gates in a residential area and making it less convenient to travel around the city by car.
Critical to their success is recognition from Highways department that permeability of the residential road network is a bad thing.

7.3.1 Tools used inside LTNs

In order of effectiveness:

- Bollards/Gates/Planters:- Permanent prevent use by private vehicles.
- Bus Gates:- Allow direct routes for public transit
- School Streets:- by default all Schools should be required to have them with special case opt outs. These significantly tackles the school run.
- Time-limited/Signage Enforcement:- People simply ignore.
- Width Restrictions:- Keeping out HGVs while allowing in smaller vehicles is poor.

7.3.2 Tools used on the edges of LTNs

No particular order

- Parklets
- Parallel Crossings
- Main Road Cycle Tracks
- Continuous Footways/Blended Crossings
7.3.3 LTN Crib Sheet (http://bit.ly/ltncribsheet)

<table>
<thead>
<tr>
<th>Topic</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Traffic (Active/Lived/Healthy/Livable) Neighbourhoods Crib Sheet</td>
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</tbody>
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7.3.4 Use LTNS to reduce complexity and cost of the Clean Air Zone

The proposed CAZ is exceptionally complicated but can be simplified through the use of LTNs to remove the ability to circumvent the Clean Air Zone.

E.g. There is no need for a Camden Road camera IF a North East Low Traffic Neighbourhood can be established to remove all rat running.
The Living Heart is probably the most complex set of Low Traffic Neighbourhood Cells I have designed in consultation with 100s of people over many years.
7.4 Sustainable Transit Levy

Simply put, all parking fees taken in the city should have a 10% (minimum £1) levy placed on them that funds sustainable transport modes in the city.

7.5 Subsidise All Buses

If we want people to get out of cars, there must be attractive, viable, and cheap transport choices available to facilitate that shift. Within the Census 2011 data 19,436 people living outside the city say they park their cars in the city every day. 8,279 Bath residents say are driving to work in the city. The revenue generated from the Workplace Parking Levy, Parking Permits, and Sustainable Transit must be used to so that travelling to the city by bus is cheaper than coming by train and that the bus network provides direct routes via key bus interchanges around the city.

8 Conclusion

A Clean Air Zone neither tackles all forms of air pollution or tries to create an environment where behaviour change is possible and people can ditch the car. It is critical that the council implement:

1. Low Traffic Neighbourhoods to compliment the CAZ and prevent rat running to circumvent the CAZ. School streets should be the default with schools having to opt out under exceptional circumstances.
2. Workplace Parking levy to discourage car commuters and fund investment in a good public bus network integrated with walking and cycling.
3. Citywide Parking control to discourage excessive car ownership, student car ownership, and commuter car ingress into the city.
4. Sustainable Transport Tax on all parking fees to fund good public transport services.
5. Subsidised/Free Public Buses with better integrated services, creating bus hubs at key locations (P&R sites & London Road) to allow easy radial travel to centres of employment.

At the end of the day Bath is a beautiful city that has an enormous and unnecessary car dependency. The Council’s Highways Department must be taken to task with its policy of maximising vehicular flow and ensuring residential streets, where children play, are permeable and useable as rat runs. This has to stop. We need to maximise the movement of people. We need to
prioritize walking and cycling over driving, but not make driving impossible. We need to tackle car dependency head on. We've declared a Climate Emergency. We need Climate Action.

These FIVE policies are climate action.