

Overview and Scrutiny Management Board Agenda



Date: Tuesday, 2 February 2021

Time: 4.30 pm

Venue: Virtual Meeting - Zoom Committee Meeting
with Public Access via YouTube

Distribution:

Councillors: Geoff Gollop (Chair), Celia Phipps (Vice-Chair), Mark Brain, Stephen Clarke, Claire Hiscott, Brenda Massey, Anthony Negus, Paula O'Rourke, Jo Sergeant and Lucy Whittle

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E-mail: democratic.services@bristol.gov.uk
Date: Monday, 25 January 2021



Agenda

1. Welcome, Introductions and Safety Information

(Pages 4 - 5)

2. Apologies for absence.

3. Declarations of Interest

To note any declarations of interest from the Councillors. They are asked to indicate the relevant agenda item, the nature of the interest and in particular whether it is a **disclosable pecuniary interest**.

Any declarations of interest made at the meeting which is not on the register of interests should be notified to the Monitoring Officer for inclusion.

4. Public Forum

Up to 30 minutes is allowed for this item

Any member of the public or Councillor may participate in Public Forum. The detailed arrangements for so doing are set out in the Public Information Sheet at the back of this agenda. Public Forum items should be emailed to democratic.services@bristol.gov.uk and please note that the following deadlines will apply in relation to this meeting:-

Questions - Written questions must be received 3 clear working days prior to the meeting. For this meeting, this means that your question(s) must be received in this office at the latest by **5pm on Wednesday 27th January**.

Petitions and Statements - Petitions and statements must be received on the working day prior to the meeting. For this meeting this means that your submission must be received in this office at the latest by **12 noon on Monday 1st February**.

Register to Speak – Intention to speak to your Public Forum submission must be received 2 clear working days prior to the meeting. For this meeting, this means that your intention to speak must be received in this office at the latest by **5pm on Thursday 28th January**.



5. Clean Air Zone Update

(Pages 6 - 77)



Public Information Sheet

Inspection of Papers - Local Government (Access to Information) Act 1985

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Councillors will take decisions remotely and the meetings will be broadcast live on YouTube.

Members of the public who wish to present their public forum in person during the video conference must register their interest by giving at least two clear working days' notice to Democratic Services of the request. To take part in the meeting, you will be required to register for a Zoom account, so that Democratic Services is able to match your named Zoom account to your public forum submission, and send you the password protected link and the instructions required to join the Zoom meeting to make your statement or ask your supplementary question(s).

As part of our security arrangements, please note that we will not permit access to the meeting if your Zoom credentials do not match your public forum submission credentials. This is in the interests of helping to ensure a safe meeting environment for all attending or observing proceedings via a live broadcast.

Please note: Members of the public will only be invited into the meeting for the duration of their submission and then be removed to permit the next public forum participant to speak.

Changes to Public Forum

Members of the public may make a written statement, ask a question or present a petition to most meetings. Your statement or question will be sent to the Committee Members and will be published on the Council's website before the meeting. Please send it to democratic.services@bristol.gov.uk. The following requirements apply:

- The statement is received no later than **12.00 noon on the working day before the meeting** and is about a matter which is the responsibility of the committee concerned.
- The question is received no later than **5pm three clear working days before the meeting**.
- Any statement submitted should be no longer than one side of A4 paper. For copyright reasons, we are unable to reproduce or publish newspaper or magazine articles that may be attached to statements.
- **Your intention to attend the meeting must be received no later than two clear working days in advance. The meeting agenda will clearly state the relevant public forum deadlines.**



By participating in public forum business, we will assume that you have consented to your name and the details of your submission being recorded and circulated to the Committee, published on the website and within the minutes. Your statement or question will also be made available to the public via publication on the Council's website and may be provided upon request in response to Freedom of Information Act requests in the future.

We will try to remove personal and identifiable information. However, because of time constraints we cannot guarantee this, and you may therefore wish to consider if your statement contains information that you would prefer not to be in the public domain. Other committee papers may be placed on the council's website and information within them may be searchable on the internet.

During the meeting:

- Public Forum is normally one of the first items on the agenda, although statements and petitions that relate to specific items on the agenda may be taken just before the item concerned.
- There will be no debate on statements or petitions.
- Public Forum will be circulated to the Committee members prior to the meeting and published on the website.
- If you have arranged with Democratic Services to attend the meeting to present your statement or ask a question(s), you should log into Zoom and use the meeting link provided which will admit you to the waiting room.
- The Chair will call each submission in turn and you will be invited into the meeting. When you are invited to speak, please make sure that your presentation focuses on the key issues that you would like Members to consider. This will have the greatest impact.
- Your time allocation may have to be strictly limited if there are a lot of submissions. **This may be as short as one minute, and you may need to be muted if you exceed your allotted time.**
- If there are a large number of submissions on one matter, a representative may be requested to speak on the group's behalf.
- If you do not attend the meeting at which your public forum submission is being taken your statement will be noted by Members.

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Overview & Scrutiny Management Board

2 February 2021



Report of: Chief Executive

Title: Clean Air Zone update

Purpose of the report

- This report provides a written update for Scrutiny that covers the background, current position and developments of Bristol's Clean Air Zone proposals through the provision of draft technical data/information to enable Scrutiny to assess the current draft data and provide input in to the final report which will be taken to Cabinet for decision on the 25th February
- The report shares two DRAFT reports with Scrutiny ahead of finalisation and approval, which have been shared with the Government's Joint Air Quality Unit (JAQU) for consideration and review. These documents remain as drafts and are shared with Scrutiny in advance of them being finalised and are subject to change. They are indicative and will only be finalised after a period of review and refinement with JAQU and the project team.
- A presentation will also be given to provide an update on the public Consultation that took place between the 8 October and 13 December 2020, prior to the final report being concluded for inclusion in the Full Business Case.



1. Background

After substantial discussions between Bristol City Council and the government's Joint Air Quality Unit (JAQU), and calls between the Mayor and the Minister, progress has been made towards a clean air plan for Bristol. This includes a new timetable, recognising the progress made towards alternative options for achieving cleaner air. Subsequently, on 20 August 2020, Government issued Bristol City Council with a new [Direction](#) regarding the implementation of a Local plan for a Clean Air Zone in Bristol.).

The Direction and associated letter of 13 March 2020 preceded the passing of the Coronavirus Act 2020, meaning that the implications of pandemic management policies had not been considered in setting the submission dates. Since then, Bristol City Council has been working closely with JAQU to understand the wider impacts of the global coronavirus pandemic on this programme of work.

In continuing discussions with JAQU throughout this period, Bristol City Council has continued to assess the situation and monitor the impacts of COVID-19. In April 2020 JAQU issued a statement from the Joint Heads of Department confirming that no Clean Air Zones would be implemented before January 2021. This was in recognition of the challenges and unknown entities that the situation presented.

Despite the challenges that the first lockdown (which commenced on the 23 March 2020) presented, council officers made significant progress in continuing with the additional required modelling and technical assessments as set out in the letter from Minister Pow on the 13th March 2020. These were all submitted in line with the requirements placed upon us.

Following the submission of the required information and subsequent discussions with JAQU officers, the Council was issued with a new [Direction](#) on 20 August 2020 which required the Council to:

'Implement the local plan for nitrogen dioxide (NO₂) compliance, specifying a Medium Charging Clean Air Zone Class C with small Charging Clean Air Zone Class D and additional measures, subject to provision of further evidence to be submitted to the Secretary of State in accordance with Article 5'.

'To be implemented as soon as possible and at least in time to bring forward compliance to 2023.'

This superseded the previous Direction of the 13 March 2020, which required the Council to submit a Full Business Case (FBC) by the 18 September 2020 and to provide all required modelling by 10 April 2020 (later extended to June to allow for further analysis to take place as requested by JAQU

This new Direction was as a direct result of intense engagement with JAQU which has continued in order to satisfy both parties that the Bristol Clean Air Zone is the right strategic fit for Bristol and that will meet the legal requirements.

COVID-19:

An Outline Business Case (OBC) that was submitted to JAQU in November 2019 included a set of proposals that offered the most appropriate measures for Bristol at that time and that were

aligned with the Mayor's strategic vision for the future development and direction of the city. However, the situation changed dramatically, without warning, due to the global pandemic caused by COVID-19.

The council has reviewed the impact of the pandemic and the inevitable change to the project baseline that this presents. The methodologies, modelling and assumptions that had been used up until the outbreak of COVID-19 became outdated. As such, consideration needed to be given to how we moved forward in a way that delivered cleaner air and improved health benefits to Bristol, recognising the unprecedented times we are in while also seeking to support economic recovery.

Officers have been in continual dialogue with JAQU to consider the most suitable manner in which Bristol can respond to the pandemic and take into account the new environment. In a short space of time and with the help of enabling legislation from Government, we were able to make some radical changes to some of the most polluting areas in Bristol. Baldwin Street and Bristol Bridge were closed to through traffic other than buses, motorbikes and taxis to help insulate and promote local bus services and encourage residents to adopt public transport and active modes of travel. This was particularly important during the pandemic to create extra capacity on buses and space for social distancing. Other measures included new segregated cycle routes on Park Row, Upper Maudlin St and Lewin's Mead. These routes improved cycle access to the central hospital and Bristol University and our plans for the autumn and winter will expand the area of focus to our local neighbourhoods, improving livability and air quality while protecting local businesses.

New proposals that will be put forward separate to the CAZ, will seek to build on these measures and develop further schemes to ensure we are successful in improving air quality on our most polluted corridors, making schemes permanent or extended as required.

The need to take account of the changes that have occurred inevitably means that the baseline data changed as a result of changed traffic patterns, and altered travel behaviours; these changes needed to be factored into the evidence base for future decision making. In order to do this a new three-staged modelling approach was agreed with JAQU to update the baseline and provide the most current evidence to make decisions.

A methodology was adopted that carried out modelling and sensitivity testing (reports that test the modelling results against different scenarios) as well as capturing real time information from existing air quality monitoring units and the automatic number plate recognition (ANPR) data.

The preferred outcome would be not to have a charging zone if the evidence supported this, and the Mayor gave a call to action to the city to encourage a continuation of the travel and traffic behaviors experienced during lockdown which led to less pollution and clean air.

There has been a great deal of behavioural, lifestyle and working changes, such as working from home and therefore not needing to travel into the city centre and organisations quickly adapting to new technology to allow people to work and operate in different ways. We are now in lockdown 3 which will have meant a further change again and we continue to monitor traffic levels. There may well be further periods of lockdown but the measures implemented must suit the average volumes i.e. out of a lockdown period. This must be considered alongside technical modelling data and consultation feedback to provide an overall picture of what is required to reach compliance in the shortest possible time.

This will be fully assessed by JAQU following receipt of the full business case on or before the 26 February 2021. The full business case will go to Cabinet for consideration on the 25 February 2021. Recommendations will be based on the finalised technical data following review by JAQU as well as consultation responses and EQUIA

Any income derived from a charging zone must be directed back into schemes to improve air quality in the City and mitigate any impacts of diversionary trips around the edge of the zone, this may include the roll out of liveable neighbourhoods.

Consultation:

Consultation began on the 8th of October and due to the implications of lockdown 2, it was extended to 13th December 2020. Two charging options were consulted on; a standalone small CAZ D and medium CAZ C with a small CAZ D in case either option are required. The consultation included all aspects of the possible schemes such as charge levels, timings, mitigations and exemptions.

Meanwhile, engagement has continued to take place with our key stakeholders including Business West and colleagues from the University Bristol NHS Trust.

2. Reports:

Two reports have been submitted for JAQU to review; a Draft Technical Note (TN) – Bristol Street Space Schemes (SSS) and Small CAZ D Report, and a Draft Traffic Volumes Report.

The Draft TN shows the impact of the recently implemented Street Space Schemes (SSS) on the original baseline for the project. It also includes a comparison with the previously proposed schemes, providing insight into the likely impact of the new SSS and Fast Track measures. This was to enable decisions to be made; whether two zones are still required, if a charging zone is required would the smaller zone alone be adequate in achieving the overall aim of the project; adherence with the legal direction to reach compliance in the shortest time possible, or whether no charging zone is now required to reach compliance.

The Draft TN touches on the impact of Covid-19 on traffic behavior and patterns, seeking to assess if this would be enough to warrant the implementation of non- charging measures. It also aligns with the Mayor's preferred approach to achieve compliance without imposing a vehicle charge if possible and ensures compliance with the legal direction. Provisional conclusions are drawn which indicate that, according to the data available at this time, a smaller zone may still be required to reach compliance in the shortest time. The Street Space Schemes have clearly made a positive impact on air quality in the central area and this is borne out by the modelling. However as the schemes do not specifically target more polluting vehicles, it would appear further measures may be required. While we have seen a demonstrable fall in traffic, particularly in the central area, we have not had a sufficiently long period of normal traffic flows to fully understand the long term benefits. This is particularly relevant when considering public transport where we still have significant capacity reductions. Final recommendations on this will be made once the technical teams at JAQU have reviewed all the evidence and are satisfied that that have all the information they need in order to make a decision.

A separate piece of work also took place to review traffic levels pre, during and post lockdowns which is also attached to this report, regarding traffic volumes. It covers the first two lockdown periods as this was applicable at the time that the data was submitted to JAQU. A team of experts reviewed the data available from ANPR cameras and air quality monitoring data to see what patterns occurred with traffic behavior and traffic levels throughout the pandemic and compared this to 2019 data. Conclusions were drawn as to what this data showed with the ultimate decision on the next steps again being made by JAQU. This report will be finalised once the review is completed and feedback is received from JAQU.

Both reports are in draft form as they are currently with JAQU for review and comments, therefore there may be changes or refinements made to the reports. When the review period is complete recommendations will be considered and included within the full business case.

3. Timeline:

We have completed the three stage modelling process and have submitted this draft information to JAQU for consideration. This is to be reviewed by 2 panels – the D-IRP (Delivery Independent Review Panel) and the T-IRP (Technical Independent Review Panel) and follow up refinements and qualifications will continue to be made to the reports until they satisfy the requirements of the Panels and JAQU.

In summary:

- The D-IRP (Delivery Independent Review Panel) took place on the 20th January 2021 and we await the outcome of that review. We are unable to state when this will be signed off as it depends on the questions and/or clarifications required
- The Draft TN and Draft Traffic Volumes report will be reviewed by T-IRP on the 26 January 2021. We are unable to state when this will be signed off as it depends on the questions and/or clarifications required
- Full Business Case to be submitted to Cabinet on 25 February 2021 prior to it being submitted to Government before 26 February 2021
- A CAZ to be in place by 29 October 2021 at the latest, assuming that evidence demonstrate that this is required
- The full business case will be brought to OSMB prior to consideration by Cabinet, following publication of documents

Appendices;

Appendix 1 Bristol SSS and Small CAZ D DRAFT Report Jan 21

Appendix 2 CAZ Programme Board Report - DRAFT Traffic Volume changes

Bristol City Council Clean Air Zone Business Case Street Space Baseline plus Fast Track Modelling and Small CAZ D Option

January 2021

Bristol City Council
DRAFT FOR DISCUSSION

Draft

Bristol City Council Clean Air Zone

Project No: 673846.CD.55.01
 Document Title: Street Space Baseline plus Fast Track Modelling and Small CAZ D Option
 Document No.: N/A
 Revision: 14
 Document Status: Draft
 Date: January 2021
 Client Name: Bristol City Council
 Project Manager: HO
 Author: KW/DW

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Document history and status

Revision	Date	Description	Author	Checked	Reviewed	Approved
1	22/10/2020	Draft 1	KW/DW	CB	HO	HO
2	29/10/2020	Draft 2	KW/DW	KW	HO	HO
3	3/11/2020	Draft 3	KW/DW	CB	HO	HO
4	4/11/2020	Draft 4	KW/DW	CB	HO	HO
5	9/11/2020	Draft 5	KW/DW	CB	HO	HO
6	12/11/2020	Draft 6	KW/DW	CB	HO	HO
7	12/11/2020	Draft 7	KW/DW	CB	HO	HO
8	13/11/2020	Draft 8	KW/DW	CB	HO	HO
9	16/11/2020	Draft 9	KW/DW	CB	HO	HO
10	27/11/2020	Draft 10	KW/DW	CB	HO	HO
11	30/11/2020	Draft 11	KW/DW	CB	HO	HO
12	30/11/2020	Draft 12	KW/DW	CB	HO	HO
13	4/12/2020	Draft 13	KW/DW	CB	HO	HO
14	6/1/2021	Draft 14	KW/DW	CB	HO	HO

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Executive Summary

This report provides details of air quality and transport modelling work for a revised baseline which includes the Street Space Schemes and Fast Track measures and a new Small CAZ D option (an agreed stage of the modelling process and part of the Legal Direction received on August 20th 2020).

The introduction of the Street Space Schemes has wider aims than just air quality, including enabling social distancing, allowing businesses to use outdoor space and encouraging people to travel by sustainable modes as part of an active lifestyle.

The Council's preferred outcome would be not to have a charging zone if the evidence supports this. This is led by a staged modelling process offering further evidence in support of the monitoring data. Whilst it is acknowledged that the current GBATS model is not fully reflective of the current position, and does not take into account recent significant changes due to COVID-19, the inclusion of the Street Space schemes provides an updated Baseline model against which the Clean Air Zone scheme requirements can be assessed. To understand the impacts of the Small CAZ D, the Fast Track Measures have also been included in the Baseline in this assessment. The preliminary modelling results for the revised Small CAZ D option (Small CAZ D RB4 & Street Space Schemes), show a compliance year of 2023. This test includes the following revisions:

- Changes to boundary at Cabot Circus so vehicles can enter / exit Cabot Circus car park via Houlton St access without going through the CAZ. This is Revised Boundary v4 / RB4.
- Application of speed / flow correction factors as per spring 2020 sensitivity test to the model outputs (post assignment adjustment).

The application of speed / flow correction factors is to provide an approximate correction for the difference between modelled and observed 2019 speeds and flows at critical locations.

For comparative purposes this report presents information about the Medium CAZ C + Small CAZ D, the Park and Ride decremental test, and the baseline used in these assessments. This shows that the compliance year for the options are as follows:

- Medium CAZ C/Small CAZ D was modelled as 2023
- Medium CAZ C/Small CAZ D Park and Ride decremental test was modelled as 2024

Given the Park and Ride is not deliverable within the CAZ scheme programme, the modelled compliance year for a Medium CAZ C / Small CAZ D should be viewed as 2024. With speed / flow correction factors applied to prior to running the air quality model, in order to improve the modelling accuracy in relation to observed 2019 speeds and flows, the expected compliance year would be 2023.

The assessments presented in the OBC did not include the Street Space schemes in the baseline models, so the results from the OBC modelling work and this latest modelling work are not directly comparable. However, based on the results presented in this Technical Note and the previous OBC work, it has been demonstrated that a Small CAZ D scheme is likely to perform at least as well as the Medium CAZ C + Small CAZ D scheme in air quality terms and hence it is recommended that the Medium CAZ C + Small CAZ D scheme does not need to be modelled further.

The Council has evidence that air quality improved during the first lockdown as people moved around the city less. People are now returning to work and school and the number of vehicles on the road has increased. During the COVID-19 pandemic, there have been many changes to when and how much people travel. The Council's preferred approach is to encourage citizens and businesses to sustain the recent, less polluting travel behaviour that has been seen during the ongoing COVID-19 pandemic, and the Council has supported this with improvements to roads around the city that make it easier to walk, cycle or use public transport. The Council is calling these the Street Space schemes (Government funded using Emergency Active Travel Fund budget) and 'Fast Track measures' (JAQU funded).

Further consideration needs to be given to how traffic volumes and travel patterns have responded recently to ensure accurate assessments are reflected. It needs to be noted however, the challenge of this is further impacted by the implementation of lockdown 2.0. Hence traffic volumes need to be further considered to understand if this is a sustained change or if, despite the Mayor's call to action to the City, traffic volumes have returned back to pre-COVID-19 levels or otherwise.

No adjustment for COVID-19 related traffic reductions are included in the modelling results presented in this report. This means that a more direct comparison can be made with these results against the OBC Medium CAZ C / Small CAZ D results. However, additional work will be undertaken to explore COVID-19 impacts further to verify whether a Small CAZ D is needed over and above the other measures in place or being implemented ahead of the CAZ scheme.

Draft

1. Introduction

1.1 Clean Air Zone context

Poor air quality is the largest known environmental risk to public health in the UK¹. Investing in cleaner air and doing more to tackle air pollution are priorities for the EU and UK governments, as well as for Bristol City Council (BCC). The Mayor of Bristol has often cited Bristol's 'moral and legal duty' to improve air quality in the city and the administration recognises that achieving improved air quality is not solely a transport issue. Notwithstanding the Council's work on a Clean Air Zone, efforts have been made to make citizens more aware of – and take personal responsibility for – various sources of air pollution, from traffic fumes to solid fuel burning. The Mayor has articulated a 'call to action' for local people, businesses and organisations to consider how small changes can make a significant difference in cutting toxic fumes across the city. BCC has monitored and endeavoured to address air quality in Bristol for decades and declared its first Air Quality Management Area in 2001. Despite this, Bristol has ongoing exceedances of the legal limits for Nitrogen Dioxide (NO₂) and these are predicted to continue until around 2029 without intervention.

The added context is that of the COVID-19 pandemic. Recent research that suggests poor air quality may be correlated with higher death / infection rates from COVID-19. The challenge of maintaining public health and supporting economic recovery while also achieving legal air quality levels after lockdown restrictions are lifted will remain live and intersecting issues for the foreseeable future.

The UK has in place legislation transposing requirements in European Union law, to ensure that certain standards of air quality are met, by setting Limit Values on the concentrations of specific air pollutants. In common with many EU member states, the EU limit value for annual mean nitrogen dioxide (NO₂) is breached in the UK and there are on-going breaches of the NO₂ limit value in Bristol. The UK government is taking steps to remedy this breach in as short a time as possible, with the aim of reducing the harmful impacts on public health. Within this objective, the government has published a UK Air Quality Plan and a Clean Air Zone Framework, both originally published in 2017 (noting there have been subsequent revisions). The latter document provides the expected approach for local authorities when implementing and operating a Clean Air Zone (CAZ). The following business cases have been submitted to JAQU for the Clean Air Plan; Strategic Outline Case (April 2018), and an Outline Business Case (November 2019 and updated between April and June 2020).

1.2 Purpose of this Report

This document provides information about the updated Bristol Clean Air Zone modelling, including the modelled impacts of the Bristol Street Space Schemes and Fast Track measures on the Bristol highway network, Small CAZ D and comparison to previous relevant tests undertaken.

The Street Space Schemes and Fast Track measures have been incorporated in an updated Baseline model which has helped refine the Bristol Clean Air Zone scheme presented in the Outline Business Case submission, prior to the Full Business Case submission.

Note in addition to the transport and air quality modelling presented in this Technical Note, there is further work being undertaken to consider the effects of COVID 19, further behaviour change, on ground traffic volumes and any additional schemes that could be viable in the required timescales.

¹ Public Health England (2014) Estimating local mortality burdens associated with particular air pollution.
<https://www.gov.uk/government/publications/estimating-local-mortality-burdens-associated-with-particulate-air-pollution>

2. Transport Modelling Scenarios

2.1 Street Space Schemes and Fast Track measures

The Street Space schemes and Fast Track measures have been/are being implemented to open up road space usually reserved for parking and movement of general traffic to cyclists and pedestrians to:

- Enable better social distancing, especially in local shopping areas;
- Encourage people to travel by bike or walk; and
- Reduce air pollution.

It must be noted that the Street Space and Fast Track are two different schemes, albeit modelled in combination in this assessment so that the Small CAZ D impacts can be identified.

BCC is monitoring the impacts of the changes and will liaise with local residents, businesses and ward councillors before making any changes permanent. However, the schemes are expected to be permanent, as BCC have advised:

“The administration is committed to the Street Space schemes some of which have been a part of the council’s transport strategy for a number of years and would likely have been implemented in the fullness of time without the pandemic having happened. Where problems have emerged changes have been made but the main elements of the schemes retained. We are confident that the schemes as a whole work for the City’s transport network and will be retained long term having captured the benefits. The council are fully committed to not only enable social distancing but also to make the city more accessible for all as part of our liveable neighbourhoods aspirations. There is more chance of the schemes being retained than there is of them being removed so they should be included in the modelling as part of the base line.”

Changes to the old city have been made sooner than planned because of coronavirus (COVID-19) in part to:

- Allow for social distancing
- Enable businesses to make use of the outdoor space

BCC provided Jacobs with details of the Bristol Street Space Schemes and Fast Track measures. The overview of the Street Space schemes is shown in Figures 2.1 and 2.2 below and a summary of the individual schemes included are shown in Table 2.1. More detailed general arrangement plans were provided to Jacobs for modelling purposes for the larger schemes highlighted.

The specific measures identified as Fast Track measures are as follows:

- Cumberland Rd closure inbound;
- Cycle scheme – Temple Way area to tie in with the Street Space schemes;
- Additional air quality monitors; and
- Signal management.

A further summary of the Fast Track Measures is provided in Table 2.2.

It should be noted that although the Fast Track measures are classified as CAZ measures, they have been incorporated into the Baseline to assess the impact of a charging zone. The Baseline will be updated to exclude the Fast Track measures and result submitted prior to the submission of the FBC. The inclusion of the Fast Track measures in the modelled Street Space baseline scenario does not affect the conclusions of this report.

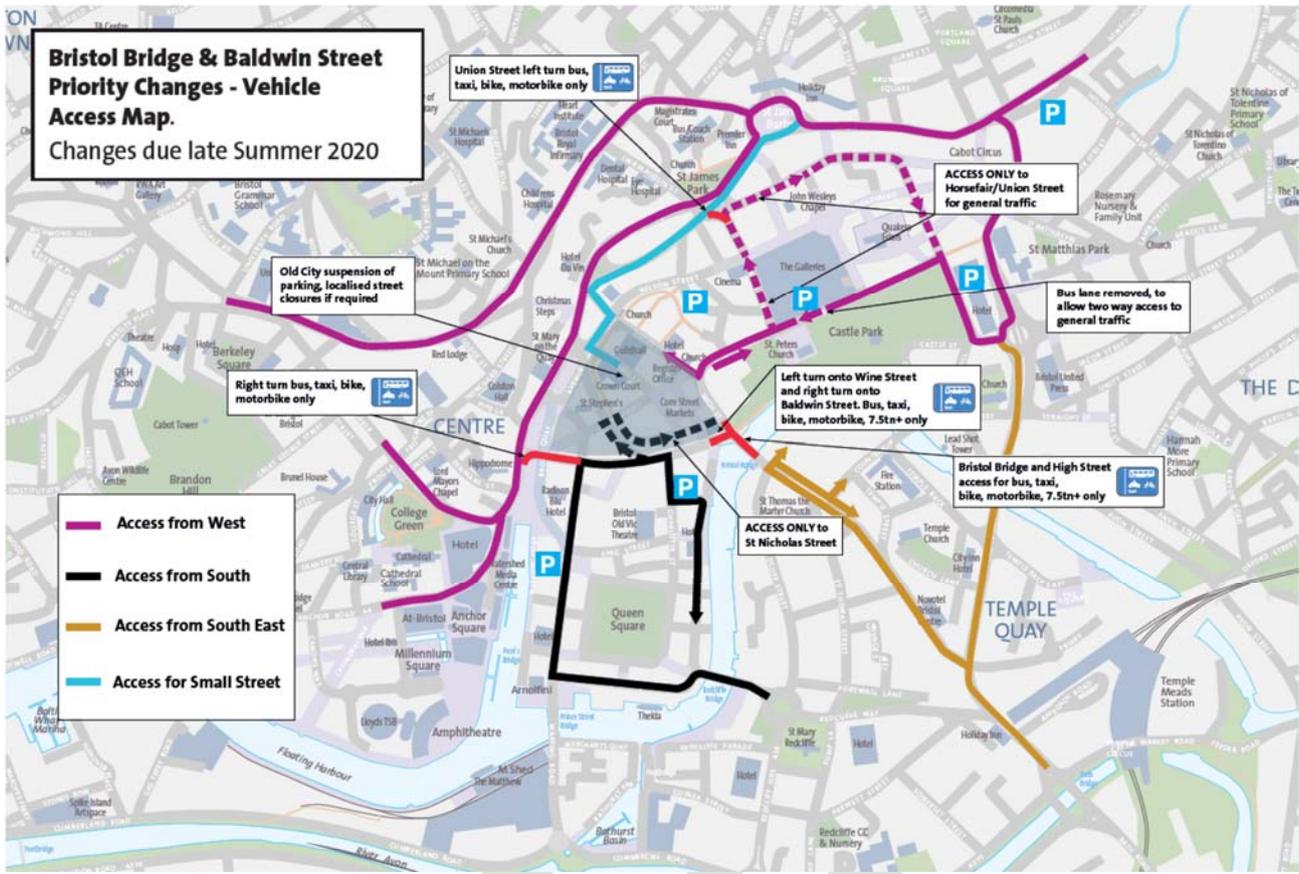


Figure 2.1 – Street Space Schemes – Map 1

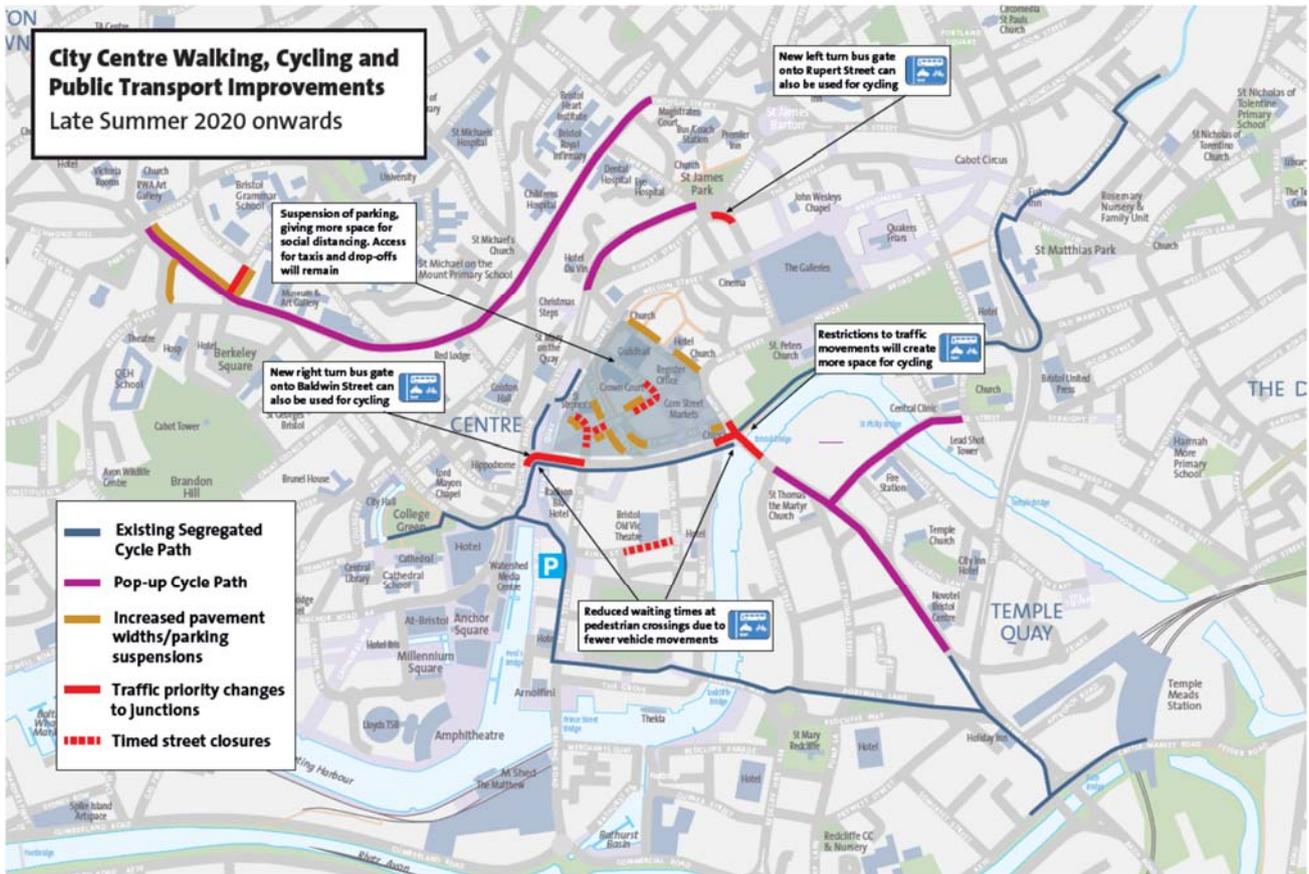


Figure 2.2 – Street Space Schemes – Map 2

Ref No.	Data Source	Description of Street Space Scheme	Location	Modelled
1	E20016-08 C101 Park Row-Upper Maudlin Street - DRAFT.pdf and E20016-08 C102 Park Row-Upper Maudlin Street - DRAFT.pdf	Park Row / Upper Maudlin Street / Marlborough Street cycle lanes. With-flow segregated cycle route, may be a TTRO	Park Row / Upper Maudlin Street / Marlborough Street	Yes
Baldwin Street priority changes and Bristol Bridge closure				
2	Road Closure Map 2 - August 2020 v6.pdf	Union Street left turn bus, taxi, motorbike only	Union Street turn onto Rupert Street	Yes
2.1	Road Closure Map 2 - August 2020 v6.pdf	Access only to Horsefair/Union Street for general traffic	Union Street / Horsefair	Yes
2.2	Road Closure Map 2 - August 2020 v6.pdf	Bus lane removed, to allow two-way access to general traffic	Newgate	Yes
2.3	Road Closure Map 2 - August 2020 v6.pdf	Left turn onto Wine Street and right on to Baldwin Street. Bus, taxi, bike and motorbike, 7.5tn+ only	Baldwin Street / Wine Street	Yes
2.4	Road Closure Map 3 - Transport Improvements v6	Restrictions to traffic movements will create space for cycling	Baldwin Street / High Street / Bristol Bridge	Yes
2.5	Road Closure Map 3 - Transport Improvements v6	New right turn bus gate onto Baldwin Street can also be used for cycling	Baldwin Street / St Augustine's Parade	Yes
2.6	Road Closure Map 2 - August 2020 v6.pdf	Bristol Bridge and High Street access for bus, taxi, bike and motorbike, 7.5tn+ only	Bristol Bridge and High Street	Yes
2.7	Road Closure Map 3 - Transport Improvements v6	Reduced waiting times at pedestrian crossings due to fewer vehicle movements	Baldwin Street / Wine Street / High Street and Baldwin Street / St Augustine's Parade	Yes

Ref No.	Data Source	Description of Street Space Scheme	Location	Modelled
2.8	Road Closure Map 2 - August 2020 v6.pdf	Right Turn bus, taxi, bike, motorbike only	Baldwin Street / St Augustine's Parade	Yes
City Centre Walking, Cycling and Public Transport Improvements				
3	Road Closure Map 3 - Transport Improvements v6	Suspension of parking, giving more space for social distancing. Access for taxis and drop offs remain	Old City area	No - Old city not in model
3.1	Road Closure Map 2 - August 2020 v6.pdf	Access only to St Nicolas Street	St Nicolas Street	No - Old city not in model
3.2	Road Closure Map 3 - Transport Improvements v6	New left turn bus gate into Rupert St can also be used for cycling	Horsefair into Rupert St	Yes
3.3	Road Closure Map 2 - August 2020 v6.pdf	Old City suspension of parking, localised street closures if required.	Old City area	No - Old city not in model
3.4	Road Closure Map 3 - Transport Improvements v6	Timed street closures in the old city area	Old City area	No - Old city not in model
3.5	Road Closure Map 3 - Transport Improvements v7	Increased pavements and suspension of parking in various locations	Old City area and the Triangle	No - Old city not in model
3.6	Road Closure Map 3 - Transport Improvements v6	Red line on University Road suggesting traffic priority changes	University Road	Yes
3.7	Road Closure Map 3 - Transport Improvements v6	Timed street closures on Kings Street	Kings Street	Yes
4	EATF Team	Bi-directional cycle lane on Victoria Street	Victoria Street Cycle Lane	No – too detailed for model
5	EATF Team	Bi-directional /uni-directional on Lewins Mead and uni-directional on Stokes Croft	Lewins Mead and Stokes Croft	No – incorporated in Ref No. 6
6	EATF Team	Removal of general traffic lane on Lewins Mead / Haymarket – from Christmas Street junction to St James Barton roundabout	Lewins Mead / Haymarket	Yes
7	EATF Team	Footway widening and uni directional cycle lane	Clifton Triangle	No – too detailed for model
8	EATF Team	Pavement widening at pinch points	Bedminster Parade	No – too small for model
9	EATF Team	Pavement widening at pinch points. Potential closure being progressed	St Marks Rd	No – too detailed for model
10	EATF Team	Cycle route (using space claimed by temporary barriers)	North St	No – too detailed for model
11	EATF Team	Closure north of York St roundabout; northern arm of York St / James St roundabout	Mina Rd	No – too uncertain
12	EATF Team	Pedestrian crossing	Merchants Bridge	No -- too small for model
13	EATF Team	Point closure - (road closure).	Grenville Rd / Upton Rd	No - too uncertain
14	EATF Team	Point closure - (road closure).	Rosemary lane in Easton	No - not in model
15	EATF Team	Point closure - (road closure).	Beaufort Rd / Victoria Ave-Beckswith and Avonvale	No - too uncertain
16	EATF Team	Point closure - (road closure).	Woodland Rd	Yes
17	EATF Team	Point closure - (road closure).	Dean Lane, Southville	Yes

Table 2.1 – Street Space Schemes Summary

Some of the schemes are not suitable for modelling as they are too detailed for inclusion in the SATURN model or deemed too small or uncertain. This has been indicated in the table above.

Some of the road closure schemes are not modelled because the Old City is not included in the model. Although some of these schemes include street closure and reduction in space the impact would be minimal as the Old City comprises minor roads mainly used for local access.

Description of Street Space Scheme	Location	Modelled
Cumberland Rd closure inbound	Cumberland Rd	Yes
Cycle scheme – Temple Way area to tie in with the Street Space schemes	Temple Way area	No – does not affect model coded networks
Additional air quality monitors	Various	No – does not affect transport network
Signal management to hold back traffic from entering the city centre	Key routes into the city centre	No – signal management has been reflected in conjunction with the CAZ scheme but not in the Street Space scheme / Fast Track measures Baseline scenario

Table 2.2 – Fast Track Measures Summary

It can be seen in Table 2.2 that the signal management component of the Fast Track measures has not been modelled in the Street Space scheme / Fast Track measures Baseline scenario. Rather, it has been modelled in the Small CAZ D scenario. This is because the intention of the signal management measure is to prevent background traffic levels filling up city centre network capacity when traffic levels are reduced by the CAZ scheme in conjunction with Fast Track measures.

2.2 Street Space and Fast Track Modelling

The Street Space and Fast Track schemes have been coded directly into the 2021 and 2025 Baseline SATURN Highway models for the AM, Inter-peak and PM and run with the variable demand model (VDM). Therefore, there will be some demand suppression as a result of the schemes and also the effects of re-routing through the Bristol network. It should be noted that the VDM does not apply to LGVs, HGVs and Coaches. The growth for each year is applied separately and is fixed. Due to the Street Space and Fast Track schemes significantly reducing the capacity within Bristol city centre, some signal optimisation has been required to reduce over capacity delays, particularly along Marlborough Street, Rupert Street and Lewins Mead. Network congestion has an adverse impact on air quality and therefore this optimisation was undertaken in order to improve the representation of the scheme in the modelling.

The inclusion of the Street Space and Fast Track schemes now provides an updated Baseline model against which the Clean Air Zone scheme requirements can be assessed. The Fast Track Measures have also been included in the Baseline in this assessment to identify the impacts of the Small CAZ D. No reduction of traffic levels has been modelled in this scenario to reflect COVID-19 impacts.

There is a limit to how much the detailed operational on-street measures can be reflected in a strategic transport model, hence it will be important to monitor the operation of the Street Space schemes on-street and potentially refine the modelling further based on recently observed conditions and traffic volumes. This will be presented in subsequent modelling work.

2.3 Small CAZ D Modelling

2.3.1 CAZ Boundary

Figure 2-3 shows the CAZ boundary options of the Small and Medium boundary used for the OBC submission. The small boundary has changed to exclude the Cabot Circus car park entry/exit via Houlton Street. This change has been made to address concerns raised about accessibility and the potential impact on citizens and businesses of

restricting access to the Cabot Circus car park. This boundary is shown in Figure 2-4, denoted as RB4, and has been used for the Small CAZ D option.

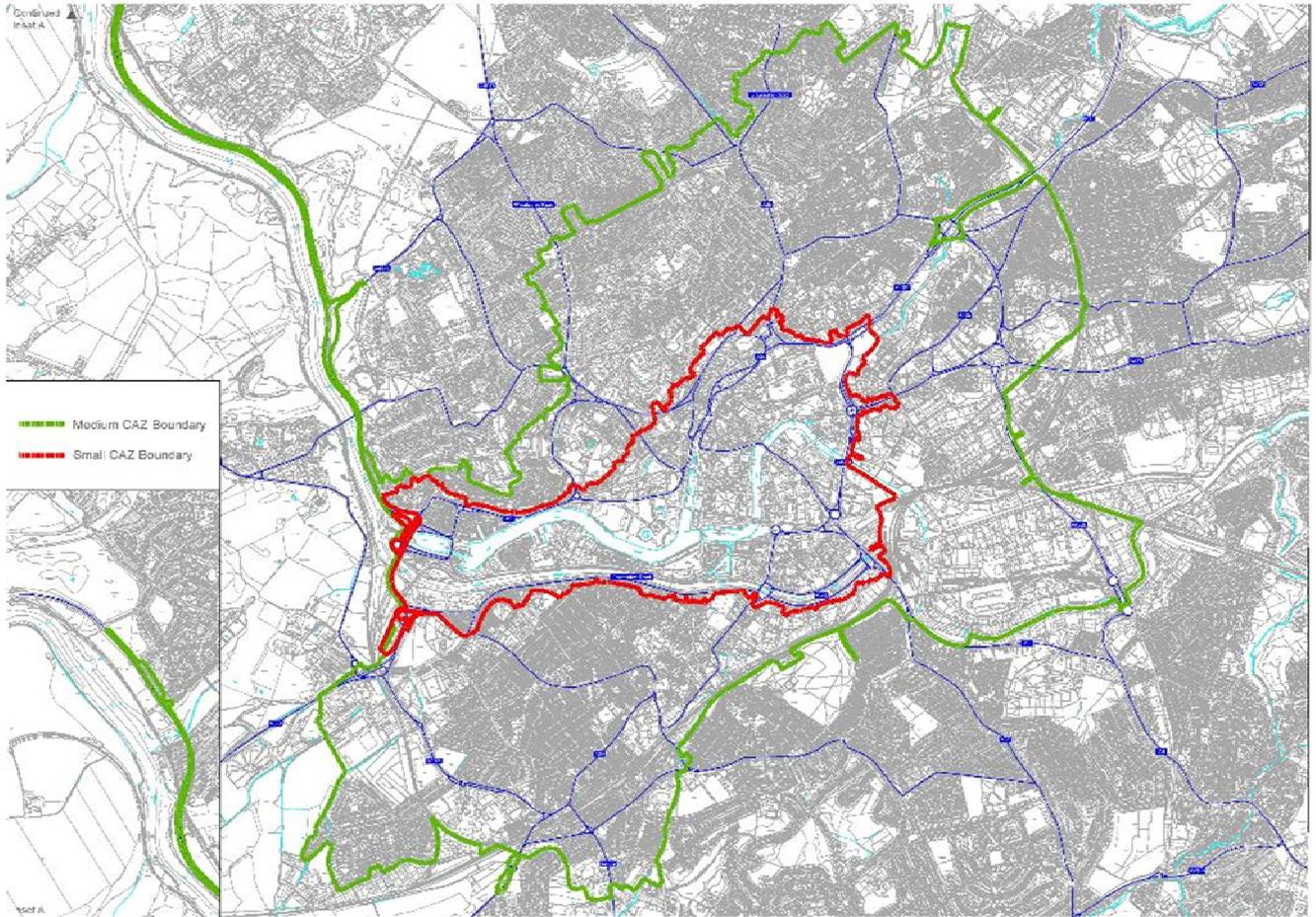


Figure 2-3: Bristol Small and Medium area CAZ OBC geographies

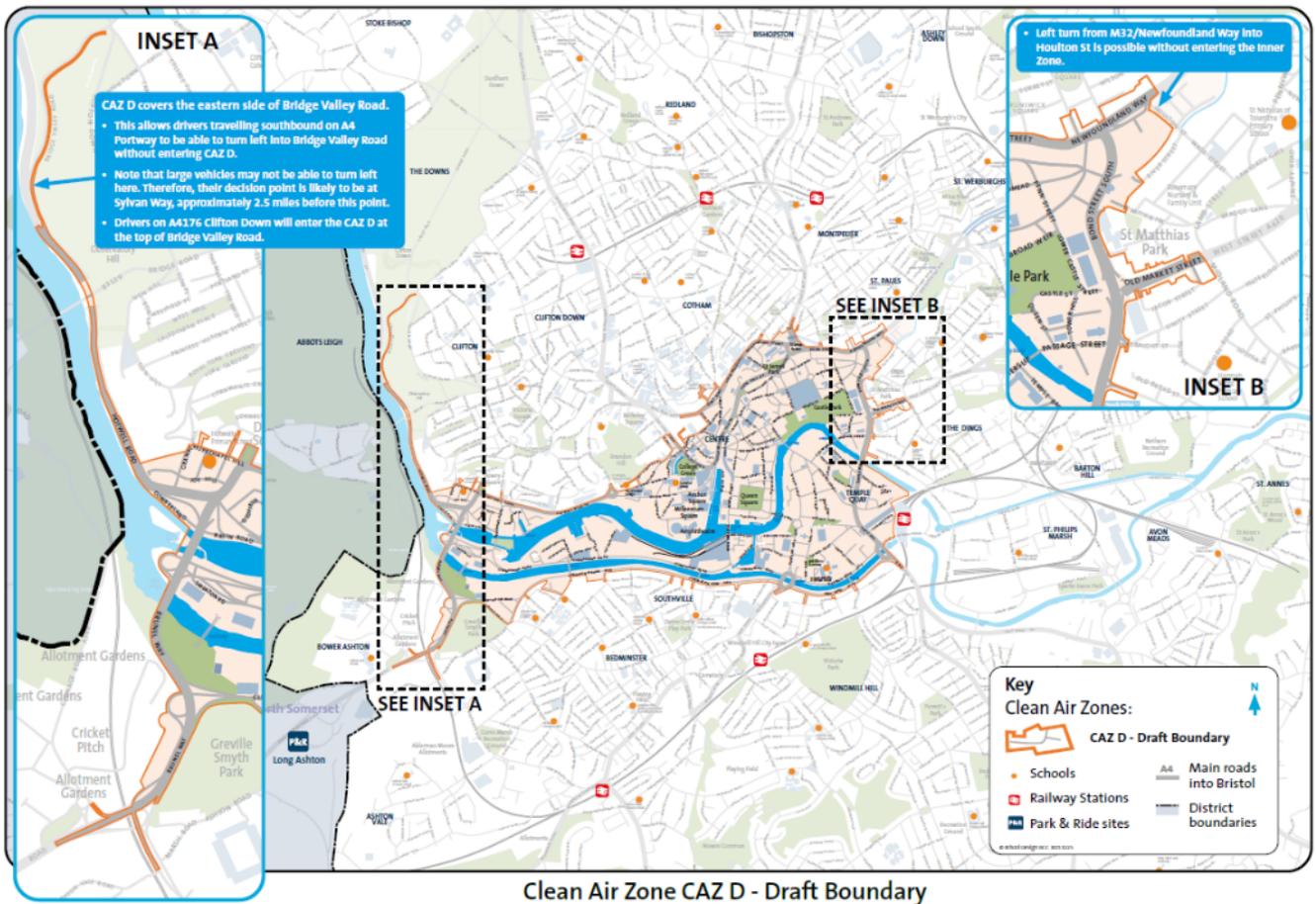


Figure 2-4: Bristol Small boundary excluding Houlton Street entry/exit (RB4)

Source: <https://www.cleanairforbristol.org/>

2.3.2 Small CAZ D Measures

The Small CAZ D option includes the following modelled measures:

- Small Area Class D – (charging non-compliant cars, buses, coaches, taxis, HGVs and LGVs);
- Holding back traffic to the city centre through the use of existing signals; and;
- Changes to the boundary at Cabot Circus so vehicles can enter / exit Cabot Circus car park via Houlton St access without going through the CAZ.

This scheme option also includes Fast Track measures, some of which have been included in the revised Baseline e.g closure of Cumberland Rd inbound and other measures such as additional cycle provision in the zone, additional air quality monitors etc. The M32 P&R and bus lane are not included as it cannot be delivered within the study programme, so do not form part of this option.

2.3.3 Primary Behavioural Responses

The primary charging CAZ responses have been modelled using the G-BATS4M highway model using the following methodology, as described in the Local Plan Transport Modelling Methodology Report (T3), Chapter 5:

- Pay Charge – no change to the model;
- Avoid Zone – a charge has been applied to each inbound link to replicate the expected percentage change from the baseline case of non-compliant cars, LGVs and HGV's within the CAZ;

- Cancel journey / change mode – this has been modelled by reducing the number of trips made by non-compliant vehicles to/from and within the CAZ area, to replicate the expected percentage change from the baseline case; and
- Replace Vehicle – an adjustment to the link flows by extracting select cordon link flows for the non-compliant trips and switching the required proportion of replace vehicles from the non-compliant link flows to the compliant link flows.

2.3.4 Secondary Behavioural Responses

In addition to the primary behavioural responses, JAQU have set out some further assumptions on secondary responses for a charging CAZ for cars in paragraph 3.3 of the Evidence Guidance, as described in the Local Plan Transport Modelling Methodology Report (T3), Chapter 5. These have been used due to lack of any available local data, which are as follows:

- The 'upgrade vehicle' response will result in 75% replacing their non-compliant vehicle to a second-hand compliant vehicle;
- 25% will scrap their vehicle and buy a new compliant one of the same fuel type; and
- For those replacing with a second-hand vehicle, 75% will switch from diesel and petrol while the remainder will keep the same fuel type.

These secondary responses have been applied during the calculation of the upgrade costs and post-processing of the extracted link-based flow data from the Transport Model for the 'replace vehicle' response.

2.3.5 Calculated Response Rates

The methodology for calculating the primary response rates for each Option is discussed fully in OBC-26 Bristol Clean Air Plan: Primary Behavioural Response Calculation Methodology and is summarised in the Local Plan Transport Modelling Methodology Report (T3).

Table 2-3 shows the final primary behavioural response rates by vehicle type for the Small CAZ D.

Response	Cars Low Income	Cars Medium Income	Cars High Income	Cars Employers Business	Taxis	LGVs	HGVs	Buses	Coaches
Pay Charge	4.3%	10.4%	5.4%	6.8%	4.1%	15.9%	8.8%	0.0%	17.8%
Avoid Zone	15.6%	19.0%	15.7%	7.7%	0.0%	19.2%	4.3%	0.0%	0.0%
Cancel Journey / Change Mode	39.8%	20.4%	14.2%	30.7%	0.0%	2.6%	4.3%	6.4%	11.4%
Replace Vehicle	40.4%	50.3%	64.6%	54.8%	95.9%	62.2%	82.6%	93.6%	70.8%

Table 2-3: Final Primary Behavioural Response Rates for Small CAZ D

2.3.6 Age of the Model

As reported in the Sensitivity Testing report, section 4.4, the age of the transport model was raised as a concern by the T-IRP. It was agreed with JAQU that as rebasing the base model would be a prohibitive task within the timescales available and therefore traffic data collected in October and November 2019 at locations of the network with critical compliance issues would be compared to the 2021 OBC Baseline transport model, which is appropriate since neither the original baseline nor 2019 traffic data include Street Space or Fast Track schemes so it is a 'like with like' comparison. Any notable differences were to be corrected with adjustment factors.

Traffic speeds along the 2021 OBC Baseline transport model links were checked against TrafficMaster data, extracted for October 2019, along links with critical compliance issues.

Automatic Traffic Count (ATC) Data was collected in November 2019, which was then adjusted as follows to be comparable to the 2021 OBC Baseline model.

- Normalised to October; and
- Adjusted to 2021 using TEMPRO V7.2.

Table 2-4 shows the adjustment factors for these critical links in terms of flows and speeds, which were then applied to the outturn AADT flows for the Small CAZ D option.

Critical Link	Traffic Flows		Speeds
	LV Factor	HGV Factor	Factor
Marlborough St (B4051) Northbound	0.56	4.50	0.60
Marlborough St (B4051) Southbound	0.88	2.92	1.19
Rupert St (A38) Westbound	0.77	0.78	0.57
Baldwin St (B4053) Eastbound	0.64	0.46	1.02
Baldwin St (B4053) Westbound	0.85	0.82	0.78

Table 2-4: Adjustment Factors

These factors have been applied to the outturn Small CAZ D results that get fed into the Air Quality modelling. The sensitivity test results shown in the Sensitivity Test report, section 4.4, showed that these adjustments improved the core scenario compliance by one year.

The validation of the model was undertaken in relation to pre-COVID-19 traffic levels and no adjustment for COVID-19 related traffic reductions are included in the modelling results presented for the Street Space Baseline plus Fast Track or Small CAZ D assessments. This means that a more direct comparison can be made with these results against the OBC Medium CAZ C / Small CAZ D results. However, sensitivity testing may be required to explore COVID-19 impacts further.

3. Street Space Baseline plus Fast Track Results

3.1 Introduction

The purpose of comparing the Street Space Baseline plus Fast Track results to the OBC Baseline is not to assess the operation of the Street Space and Fast Track schemes, but to allow a comparison of the Small CAZ D with the Medium CAZ C + Small CAZ D. This is because the Medium CAZ C + Small CAZ D was previously modelled without the inclusion of the Street Space Schemes, as the schemes are a recent addition to the Baseline.

3.2 Highway Network Statistics

The highway network statistics have been extracted for the 2021 and 2025 OBC Baseline and the Street Space Baseline plus Fast Track models. Tables 3.1 and 3.2 shows the statistics for 2021 and 2025 respectively.

Measure	2021 OBC Baseline			2021 Street Space Baseline plus Fast Track			% Difference from the OBC Baseline:		
	AM	IP	PM	AM	IP	PM	AM	IP	PM
Transient Queues	7824	4877	7653	7807	4952	7670	-0.2%	1.5%	0.2%
Over-Capacity Queues	1418	28	913	1592	71	1182	12.3%	156.3%	29.4%
Link Cruise Time	19519	15333	19723	19460	15356	19682	-0.3%	0.2%	-0.2%
(Free Flow	18908	14987	19127	18761	14967	19008	-0.8%	-0.1%	-0.6%
Delays	611	345	596	700	389	674	14.4%	12.5%	13.1%
Total Travel Time	28761	20238	28289	28859	20379	28534	0.3%	0.7%	0.9%
Travel Distance	1209008	976084	1239198	1207925	980976	1240814	-0.1%	0.5%	0.1%
Overall Average Speed	42.00	48.20	43.80	41.90	48.10	43.50	-0.2%	-0.2%	-0.7%
Total Trips Loaded	132040	113496	130923	131889	113562	130873	-0.1%	0.1%	0.0%

Table 3.1 – 2021 Highway Statistics

Measure	2025 OBC Baseline			2025 Street Space Baseline plus Fast Track			% Difference from the OBC Baseline:		
	AM	IP	PM	AM	IP	PM	AM	IP	PM
Transient Queues	8176	5199	8017	8169	5290	8064	-0.1%	1.7%	0.6%
Over-Capacity Queues	1611	58	1021	1779	110	1379	10.4%	91.1%	35.0%
Link Cruise Time	20189	16190	20463	20113	16214	20415	-0.4%	0.1%	-0.2%
(Free Flow	19485	15777	19768	19321	15751	19638	-0.8%	-0.2%	-0.7%
Delays	703	413	695	792	463	777	12.6%	12.1%	11.8%
Total Travel Time	29975	21447	29501	30060	21614	29858	0.3%	0.8%	1.2%
Travel Distance	1245521	1030643	1284097	1243452	1035549	1284969	-0.2%	0.5%	0.1%
Overall Average Speed	41.60	48.10	43.50	41.40	47.90	43.00	-0.5%	-0.4%	-1.1%
Total Trips Loaded	136747	118705	135646	136592	118765	135604	-0.1%	0.1%	0.0%

Table 3.2 – 2025 Highway Statistics

For both years, the results show that with the introduction of the Street Space and Fast Track Schemes, the average speed decreases, with significant increases in over capacity queues and a slight increase in transient queues and delays across the model area.

Air quality levels can be influenced by changes in traffic speeds and the network statistics show that the Street Space and Fast Track schemes reduce the average network speeds which is concentrated in the city centre.

3.3 Difference Plots

To show the impact of the Street Space and Fast Track schemes on traffic flows around the Bristol area, flow difference plots have been produced representing the AADT traffic flow change between the Scheme and Baseline, for 2021 and 2025. Figures 3.1 and 3.2 show these difference plots for the wider and central Bristol area respectively for 2021. Figures 3.3 and 3.4 show these difference plots for the wider and central Bristol area respectively for 2025. Green lines indicate increases in traffic flow associated with the Street Space and Fast Track schemes, and blue lines indicate reductions in traffic flow resulting from the Street Space and Fast Track schemes.

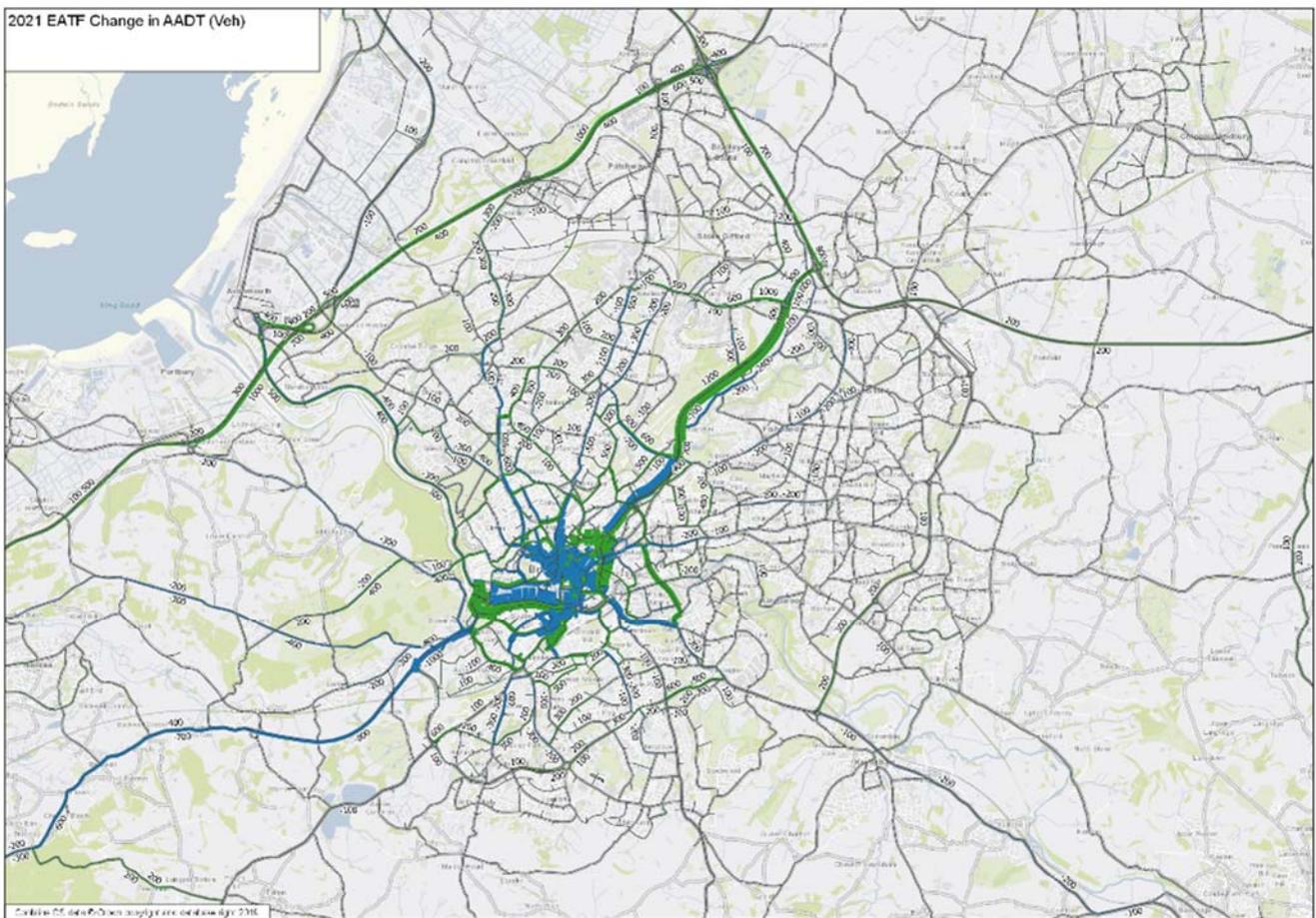


Figure 3.1 – 2021 Street Space Baseline plus Fast Track – OBC Baseline (wider Bristol area)

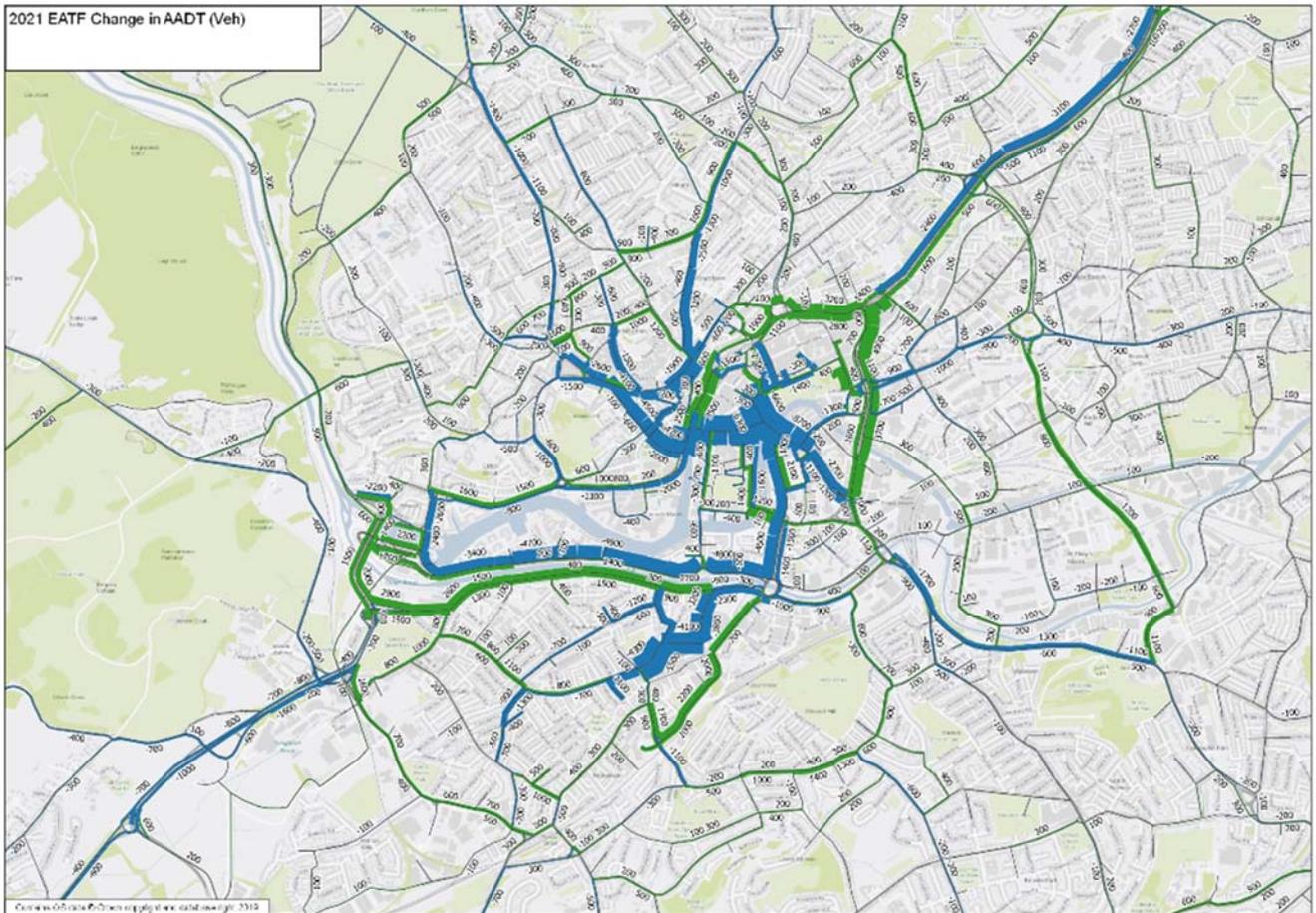


Figure 3.2 – 2021 Street Space Baseline plus Fast Track – OBC Baseline (central Bristol area)



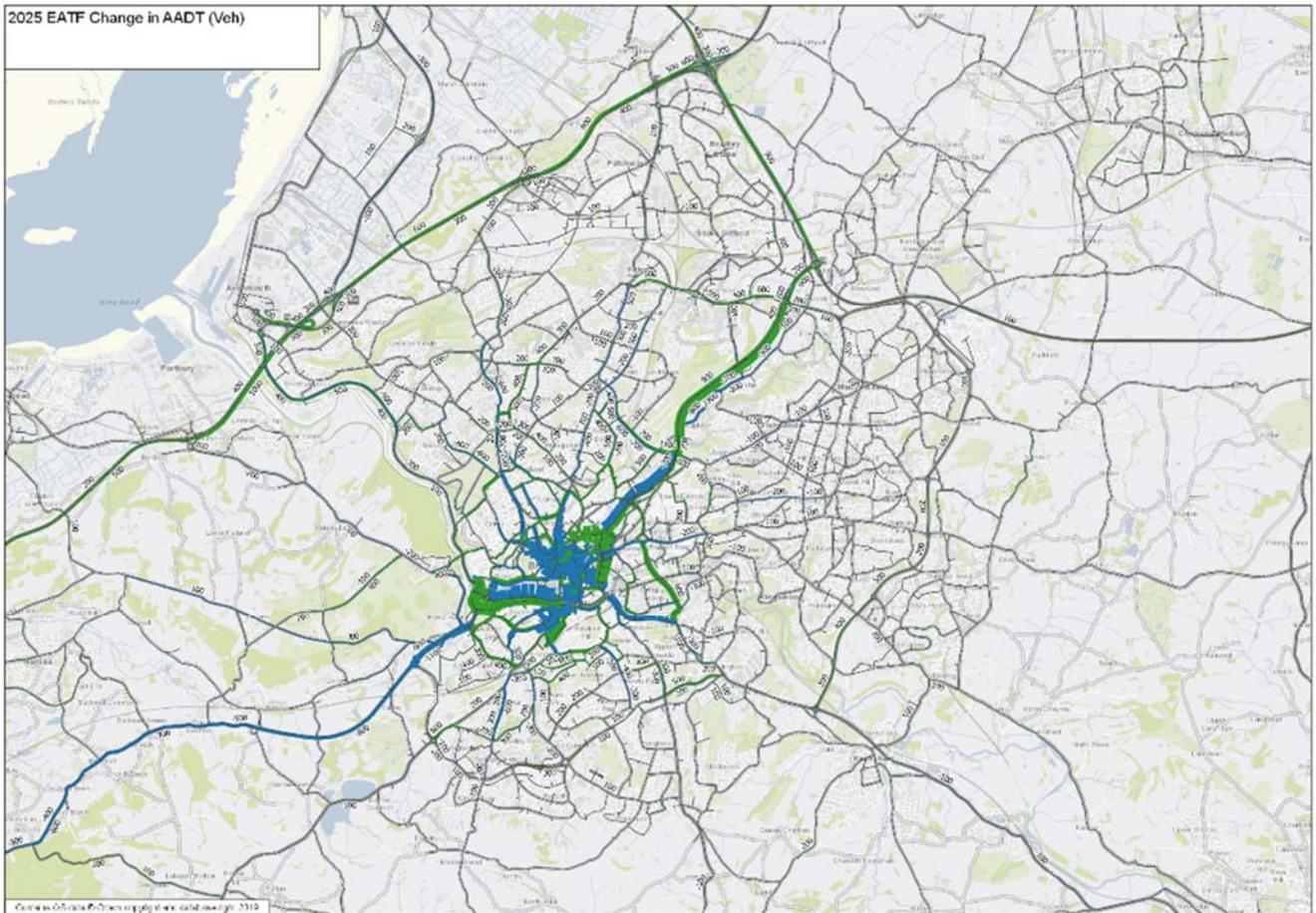


Figure 3.3 – 2025 Street Space Baseline plus Fast Track – OBC Baseline (wider Bristol area)

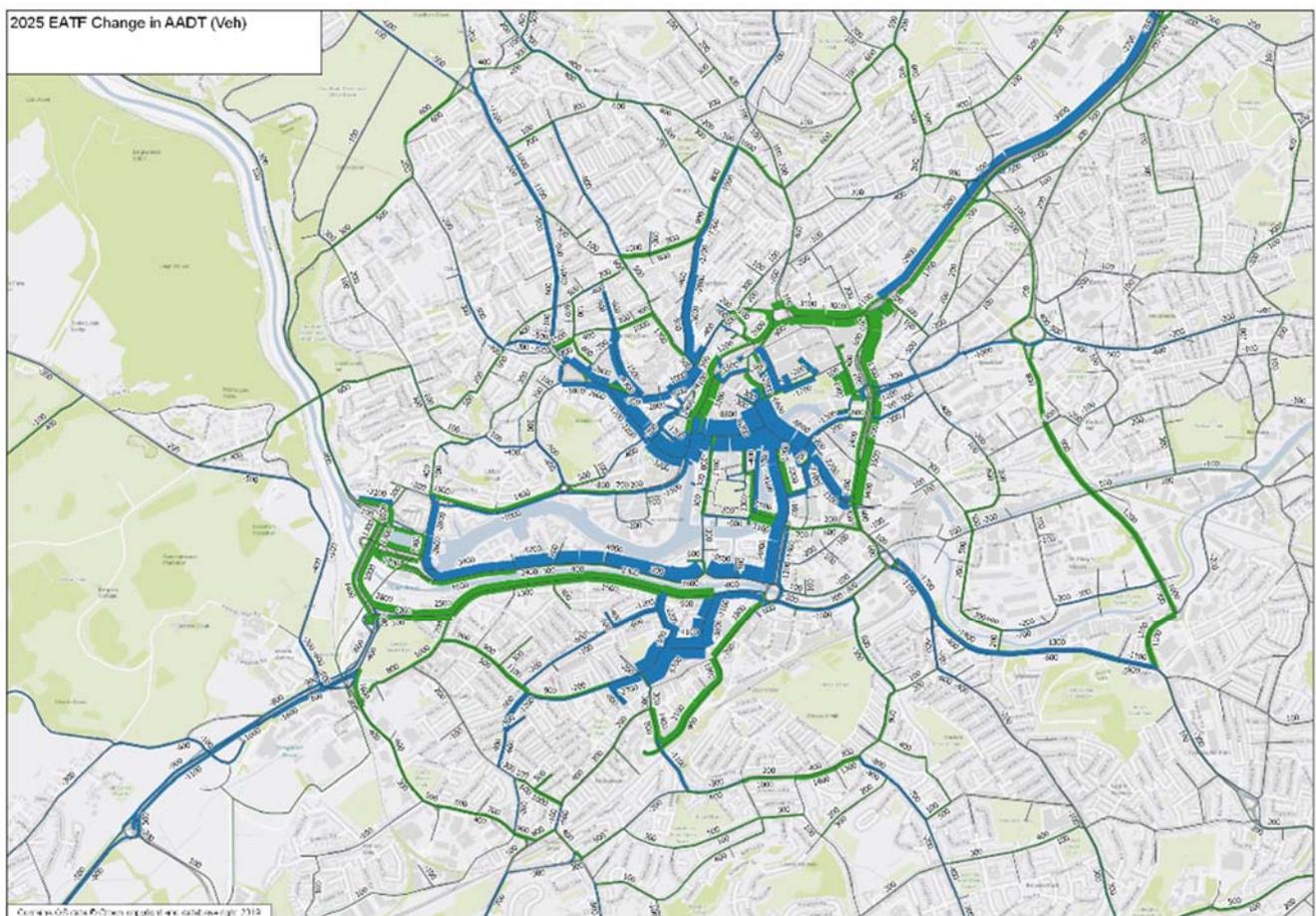


Figure 3.4 – 2025 Street Space Baseline plus Fast Track – OBC Baseline (central Bristol area)

These figures show a reduction in vehicle traffic in and around some of the Street Space and Fast Track schemes but increases along Marlborough Street and Rupert Street/Lewins Mead and the surrounding areas.

The increases in traffic flows on Marlborough Street and Rupert Street/Lewins Mead have occurred despite the reduced capacity along these routes due to the introduction of cycle lanes. This is because the closure of Baldwin Street and Cumberland Road eastbound causes re-routing onto alternative routes through and around the city and as Marlborough Street and Rupert Street/Lewins Mead are key routes through the city, traffic will divert to them as many other alternative routes are residential roads which are unsuitable for large volumes of traffic. Particularly LGVs, HGVs and Coaches which still have the same level of vehicles as the OBC Baseline as they are not subject to change within the VDM.

The modelling of the Street Space and Fast Track schemes indicated some potential modelling refinements that were incorporated into the Small CAZ D modelling, namely the adjustments of traffic flow and speeds in line with section 2.3.6 and the refinement of signal timings, at certain locations, such as Marlborough Street. These changes will also need to be incorporated into the baseline modelling presented in the FBC.

3.4 Small CAZ Area Flows

AADT cordoned flows for the new Small CAZ area, as shown in Figure 2.2, have been extracted for the OBC Baseline and the Street Space Baseline plus Fast Track, for 2021 and 2025. The flows include internal-internal, internal-external, external-internal and external-external trips for this area. Tables 3.3 and 3.4 show the AADT flows and the differences between the OBC Baseline and the Street Space Baseline plus Fast Track, for 2021 and 2025 respectively, for each movement, by user class and total.

Description	2021 OBC Baseline					2021 Street Space Baseline plus Fast Track					% Difference				
	Int-Int	Int-Ext	Ext-Int	Ext-Ext	Total	Int-Int	Int-Ext	Ext-Int	Ext-Ext	Total	Int-Int	Int-Ext	Ext-Int	Ext-Ext	Total
Cars Low Inc Comp	1842	9403	10048	17461	38766	1761	9223	9753	15812	36563	-4%	-2%	-3%	-9%	-6%
Cars Low Inc NonComp	676	3433	3649	6354	14138	645	3369	3544	5757	13341	-5%	-2%	-3%	-9%	-6%
Cars Med Inc Comp	2952	15057	14602	24425	57076	2839	14795	14150	22476	54299	-4%	-2%	-3%	-8%	-5%
Cars Med Inc NonComp	1083	5499	5302	8892	20829	1039	5405	5140	8185	19822	-4%	-2%	-3%	-8%	-5%
Cars High Inc Comp	2122	11021	9774	14660	37642	2031	10856	9478	13617	36049	-4%	-1%	-3%	-7%	-4%
Cars High Inc NonComp	778	4027	3546	5339	13769	743	3968	3441	4962	13193	-5%	-1%	-3%	-7%	-4%
Cars EMP Comp	962	4422	4294	6714	16483	899	4320	4178	6254	15743	-7%	-2%	-3%	-7%	-4%
Cars EMP NonComp	355	1626	1570	2463	6120	331	1589	1529	2295	5850	-7%	-2%	-3%	-7%	-4%
Taxis Comp	415	2053	1875	3030	7537	390	2024	1831	2897	7261	-6%	-1%	-2%	-4%	-4%
Taxis NonComp	214	1058	966	1561	3883	201	1041	942	1432	3748	-6%	-2%	-2%	-8%	-3%
LGV Comp	1359	6552	6227	11535	25818	1354	6554	6198	11274	25525	0%	0%	0%	-2%	-1%
LGV NonComp	843	4171	4006	7388	16566	845	4167	3979	7215	16364	0%	0%	-1%	-2%	-1%
HGV Comp	1298	3514	2295	7681	14959	778	4034	2809	7806	15598	-40%	15%	22%	2%	4%
HGV NonComp	421	1131	741	2484	4962	254	1299	907	2525	5169	-40%	15%	22%	2%	4%
Coach Comp	125	303	205	677	1508	84	345	246	688	1560	-33%	14%	20%	2%	3%
Coach NonComp	54	132	89	294	780	36	150	107	299	803	-33%	14%	20%	2%	3%
TOTAL	15498	73403	69188	120959	279048	14230	73140	68233	113495	269098	-8%	0%	-1%	-6%	-4%

Table 3.3 – 2021 AADT Small Cordon Flows

Description	2025 OBC Baseline					2025 Street Space Baseline plus Fast Track					% Difference				
	Int-Int	Int-Ext	Ext-Int	Ext-Ext	Total	Int-Int	Int-Ext	Ext-Int	Ext-Ext	Total	Int-Int	Int-Ext	Ext-Int	Ext-Ext	Total
Cars Low Inc Comp	2294	11140	11903	22316	47652	2189	10917	11538	20191	44835	-5%	-2%	-3%	-10%	-6%
Cars Low Inc NonComp	278	1344	1429	2688	5739	265	1318	1386	2433	5402	-5%	-2%	-3%	-9%	-6%
Cars Med Inc Comp	3649	17647	17192	31666	70154	3505	17323	16662	29085	66575	-4%	-2%	-3%	-8%	-5%
Cars Med Inc NonComp	443	2131	2063	3817	8453	424	2092	2000	3507	8023	-4%	-2%	-3%	-8%	-5%
Cars High Inc Comp	2578	12763	11492	19128	45961	2474	12549	11161	17877	44061	-4%	-2%	-3%	-7%	-4%
Cars High Inc NonComp	313	1541	1378	2307	5538	299	1516	1339	2156	5311	-4%	-2%	-3%	-7%	-4%
Cars EMP Comp	1169	5108	4982	8775	20033	1091	4985	4846	8184	19106	-7%	-2%	-3%	-7%	-5%
Cars EMP NonComp	143	621	602	1066	2432	133	606	586	994	2320	-7%	-2%	-3%	-7%	-5%
Taxis Comp	634	2976	2745	4808	11162	595	2928	2678	4528	10729	-6%	-2%	-2%	-6%	-4%
Taxis NonComp	0	0	0	0	0	0	0	0	0	0	0%	0%	0%	0%	0%
LGV Comp	2036	9428	8920	18689	39072	2011	9450	8891	18162	38515	-1%	0%	0%	-3%	-1%
LGV NonComp	338	1612	1541	3195	6686	336	1613	1533	3102	6584	0%	0%	-1%	-3%	-2%
HGV Comp	1631	4411	2879	9419	18340	978	5063	3522	9712	19276	-40%	15%	22%	3%	5%
HGV NonComp	129	346	227	744	1446	78	397	277	767	1519	-40%	15%	22%	3%	5%
Coach Comp	167	404	273	900	1743	112	459	327	923	1820	-33%	14%	20%	3%	4%
Coach NonComp	17	42	28	93	180	11	48	34	95	188	-33%	14%	20%	3%	4%
TOTAL	15815	71513	67653	129609	284591	14503	71265	66780	121717	274265	-8%	0%	-1%	-6%	-4%

Table 3.4 – 2025 AADT Small Cordon Flows

For both years, the results show that with the introduction of the Street Space and Fast Track Schemes, the internal-internal trips decrease by 8%, the internal-external trips there is no change, the external-internal trip decrease by 1% and the external-external trips decrease the most at 6%. On average the reduction is 4% in the

new Small CAZ area. The greater reduction in external-external trips is due to the option of re-routing around the zone for these trips, whereas the reductions in other trips rely on mode shift, trip suppression etc.

3.5 Traffic Flows at Key Locations

The AADT traffic flows at some of the locations with critical air quality issues (as defined in the Outline Business Case) as shown in Figure 3.5, have been extracted for the OBC Baseline and the Street Space Baseline plus Fast Track, for 2021 and 2025. Tables 3.5 and 3.6 show the AADT flows and the differences between the OBC and Street Space plus Fast Track models, for 2021 and 2025 respectively.

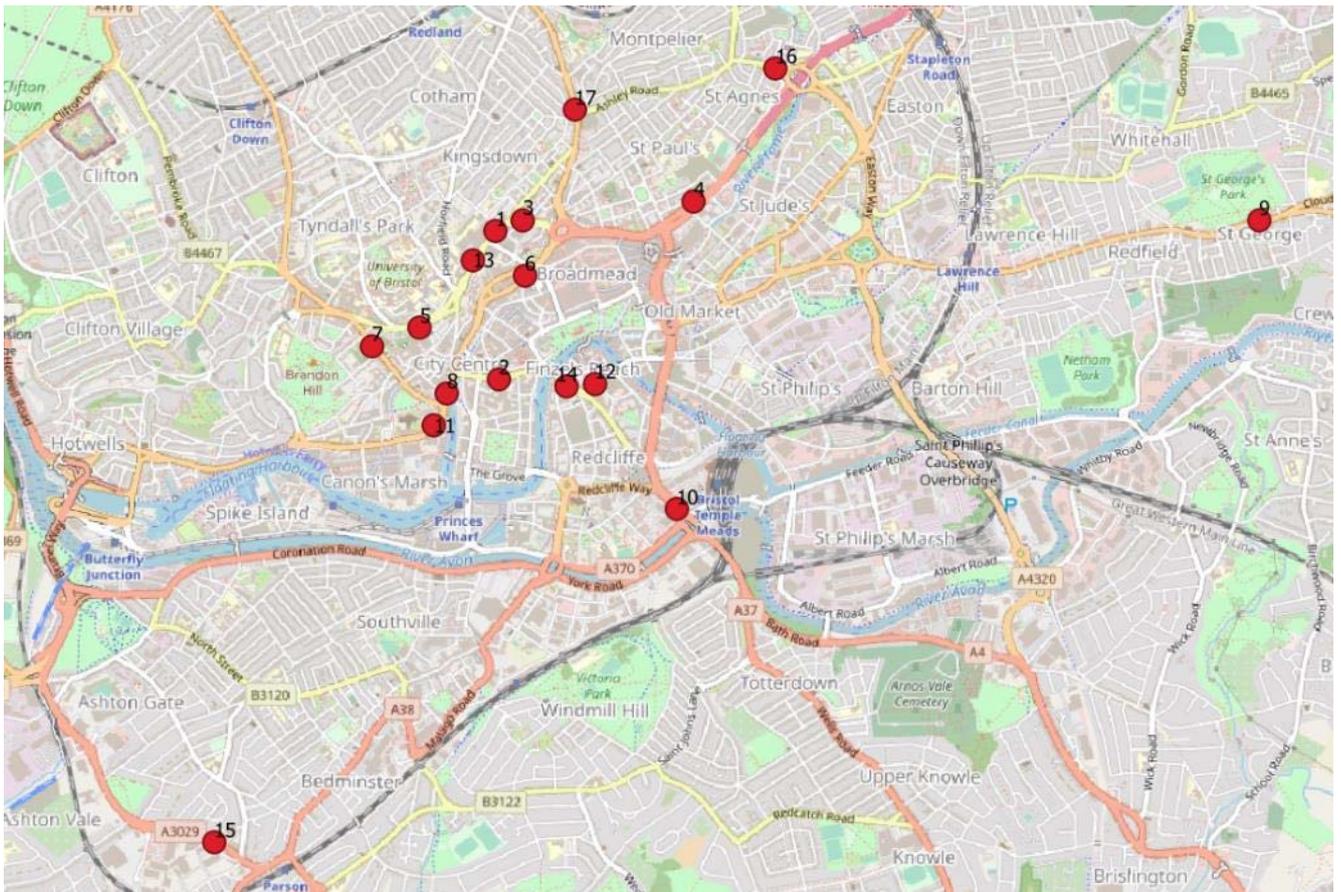


Figure 3.5 – Locations identified for comparison of traffic flow information

Ref No	Location	Dirn	2021 OBC Baseline			2021 Street Space Baseline plus Fast Track			Difference		
			Comp	Non-Comp	Total	Comp	Non-Comp	Total	Comp	Non-Comp	Total
1	Marlborough St (between Lower Maudlin St and Whitson St)	NEB	10828	4391	15219	10443	4294	14737	-385	-97	-482
		SWB	7595	3124	10719	7758	3231	10989	163	107	270
2	Baldwin St (between Marsh St and St Stephen's St)	EB	7667	2993	10660	1354	423	1777	-6313	-2570	-8883
		WB	5085	1998	7083	1237	412	1649	-3848	-1586	-5434
3	Marlborough St (between Whitson St and Charles St)	EWB	9494	3891	13385	10402	4288	14691	908	397	1306
		EB	10079	4126	14206	10021	4164	14185	-58	38	-21
4	A4032 Newfoundland Way (Between Houlton St and Wilson Place)	EB	28943	11692	40635	29926	12152	42079	983	460	1444
5	Park Row (between Woodland Rd and Lower Park Row)	EB	5188	2124	7313	5170	2126	7297	-18	2	-16
		WB	6898	2819	9717	4264	1778	6042	-2634	-1041	-3675
6	A38 (between Silver St and Bridewell St)	WB	10284	3391	13675	10176	3306	13482	-108	-85	-193
7	A4018 Park St (between Charlotte St and Great George St)	SEB	4672	1756	6428	1300	376	1677	-3372	-1380	-4751
		NWB	7155	2767	9922	5727	2180	7907	-1428	-587	-2015
8	A4018 College Green (between Mark Lane and Denmark St)	NEB	11389	4375	15764	7539	2813	10351	-3850	-1562	-5413
		SWB	4814	1802	6616	2788	978	3767	-2026	-824	-2849
9	A420 Church Road (between Northcote Rd and Beaconsfield Rd)	EB	7546	3091	10636	7500	3068	10568	-46	-23	-68
		WB	6276	2548	8823	6190	2509	8699	-86	-39	-124
10	A4 Temple Gate (between Station Approach and Cattle Market Rd)	SB	18414	7185	25599	18400	7215	25615	-14	30	16
		NB	12972	4919	17891	13617	5193	18810	645	274	919
11	A4 Anchor Rd (between College Green and Explorer Lane)	SWB	7137	2826	9962	5681	2245	7927	-1456	-581	-2035
12	Passage St (between Victoria St and Temple St)	NEB	3488	1368	4856	1708	681	2389	-1780	-687	-2467
		SWB	4545	1830	6375	4005	1629	5634	-540	-201	-741
13	Upper Maudlin St (between Lower Maudlin St and St Michael's Hill)	SWB	10236	4172	14408	9789	4046	13835	-447	-126	-573
		NEB	10828	4391	15219	10443	4294	14737	-385	-97	-482
14	Victoria St (between Bath St and St Thomas St)	SEB	6715	2494	9209	573	0	573	-6142	-2494	-8636
		NWB	5125	1947	7072	2646	889	3535	-2479	-1058	-3537
15	Winterstoke Rd (between Longmoor Rd and Uckweel Rd)	SEB	7516	3040	10555	7999	3254	11252	483	214	697
		NWB	10357	4175	14532	10690	4315	15005	333	140	473
16	Lower Ashley Rd (between M32 and Conduit Rd)	EB	7875	3272	11148	8184	3396	11579	309	124	431
		WB	10176	4189	14365	10350	4262	14612	174	73	247
17	Cheltenham Rd (between Ashley Rd and Arley Hill)	NB	2210	800	3010	2019	717	2736	-191	-83	-274
		SB	3233	1243	4476	3519	1359	4878	286	116	402
18	Rupert Street / Lewins Mead	SB	8936	2903	11838	10320	3490	13811	1384	587	1973
		NB	5821	2102	7922	7589	2817	10406	1768	715	2484

Table 3.5 – 2021 AADT Traffic Flows

Ref No	Location	Dirn	2025 OBC Baseline			2025 Street Space Baseline plus Fast Track			Difference		
			Comp	Non-Comp	Total	Comp	Non-Comp	Total	Comp	Non-Comp	Total
1	Marlborough St (between Lower Maudlin St and Whitson St)	NEB	13574	1652	15226	13194	1628	14822	-380	-24	-404
		SWB	9257	1136	10393	9672	1205	10877	415	69	484
2	Baldwin St (between Marsh St and St Stephen's St)	EB	9524	1115	10639	1643	163	1806	-7881	-952	-8833
		WB	6707	803	7509	1517	156	1672	-5190	-647	-5837
3	Marlborough St (between Whitson St and Charles St)	EWB	11774	1444	13218	13108	1617	14724	1333	173	1506
		EB	12674	1558	14231	12634	1576	14211	-39	19	-20
4	A4032 Newfoundland Way (Between Houlton St and Wilson Place)	EB	36721	4464	41185	37652	4593	42246	932	129	1061
5	Park Row (between Woodland Rd and Lower Park Row)	EB	6597	806	7403	6576	811	7386	-21	5	-16
		WB	7890	961	8851	5393	667	6060	-2497	-294	-2791
6	A38 (between Silver St and Bridewell St)	WB	12656	1312	13968	12328	1241	13570	-328	-71	-398
7	A4018 Park St (between Charlotte St and Great George St)	SEB	5905	681	6586	1551	144	1695	-4354	-537	-4891
		NWB	9980	1183	11163	7138	828	7966	-2843	-354	-3197
8	A4018 College Green (between Mark Lane and Denmark St)	NEB	14399	1676	16074	9364	1062	10426	-5034	-614	-5649
		SWB	6943	810	7753	3388	369	3757	-3555	-441	-3996
9	A420 Church Road (between Northcote Rd and Beaconsfield Rd)	EB	9535	1174	10708	9472	1165	10637	-62	-9	-71
		WB	8053	983	9035	7981	974	8955	-71	-8	-80
10	A4 Temple Gate (between Station Approach and Cattle Market Rd)	SB	23104	2721	25825	23039	2719	25758	-65	-3	-68
		NB	16395	1893	18288	16851	1948	18799	457	55	511
11	A4 Anchor Rd (between College Green and Explorer Lane)	SWB	8527	1016	9544	7157	856	8013	-1370	-160	-1531
12	Passage St (between Victoria St and Temple St)	NEB	4334	504	4838	2124	256	2381	-2210	-247	-2457
		SWB	5745	693	6438	5051	618	5670	-694	-75	-769
13	Upper Maudlin St (between Lower Maudlin St and St Michael's Hill)	SWB	12601	1538	14139	12333	1525	13858	-269	-13	-282
		NEB	13574	1652	15226	13194	1628	14822	-380	-24	-404
14	Victoria St (between Bath St and St Thomas St)	SEB	8393	945	9338	573	0	573	-7820	-945	-8765
		NWB	6392	732	7124	3217	341	3558	-3175	-391	-3566
15	Winterstoke Rd (between Longmoor Rd and Uckweel Rd)	SEB	9628	1168	10797	10216	1249	11465	587	80	668
		NWB	13938	1675	15613	14305	1723	16028	367	48	415
16	Lower Ashley Rd (between M32 and Conduit Rd)	EB	9989	1244	11233	10360	1294	11654	372	49	421
		WB	12850	1597	14447	13012	1620	14632	162	22	184
17	Cheltenham Rd (between Ashley Rd and Arley Hill)	NB	2667	297	2965	2511	274	2785	-156	-23	-180
		SB	4116	489	4604	4398	522	4920	282	34	316
18	Rupert Street / Lewins Mead	SB	11032	1126	12158	12558	1324	13882	1526	198	1724
		NB	7220	803	8023	9419	1063	10482	2199	260	2459

Table 3.6 – 2025 AADT Traffic Flows

The 2021 and 2025 AADT results show that the Street Space plus Fast Track schemes significantly reduce the traffic flows on Baldwin Street, Park Street, College Green, Anchor Road, Passage Street and Victoria Street. However, increases in traffic flows are occurring on Marlborough Street and Rupert Street/Lewins Mead, despite the reduced capacity along these routes due to the introduction of cycle lanes. This is due to the closure of Baldwin Street and Cumberland Road eastbound which causes re-routing onto alternative routes through and around the city. As Marlborough Street and Rupert Street/Lewins Mead are key routes through the city traffic will divert to them as many other alternative routes are residential roads, which are unsuitable for large volumes of traffic. In addition to the traffic volume changes, the traffic modelling of the Street Space Schemes indicates that the composition of the vehicle types changes. LGVs, HGVs and Coaches are less able to re-route therefore there is a higher proportion of traffic on the remaining main routes through the city centre, as residential routes are unsuitable. The impacts of the Street Space plus Fast Track schemes are being monitored, so forecast changes will be confirmed.

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4. Comparison with Outline Business Case scenarios

The purpose of this section is to provide a summary of previous model scenarios that will be compared with the latest Small CAZ D modelling work in Section 6 of the Technical Note. The Revised Outline Business Case documents submitted to JAQU between April and June 2020, provided information about the following options:

- The Revised Hybrid Scenario contained the following measures:
 - 8-hour Small Area diesel car exclusion (7am – 3pm);
 - Medium Area Class CAZ C (charging non-compliant buses, coaches, taxis, HGVs and LGVs);
 - Closure of Cumberland Road inbound to general traffic;
 - M32 Park and Ride (P&R) with bus lane inbound; and
 - Holding back traffic to the city centre through the use of existing signals.
- The Medium CAZ C + Small CAZ D scenario comprised the following proposed measures:
 - Small Area Class CAZ D – (charging non-compliant cars, buses, coaches, taxis, HGVs and LGVs));
 - Medium Area Class CAZ C (charging non-compliant buses, coaches, taxis, HGVs and LGVs);
 - Closure of Cumberland Road inbound to general traffic;
 - M32 Park and Ride (P&R) with bus lane inbound; and
 - Holding back traffic to the city centre through the use of existing signals.

The air quality modelling work showed that the Revised Hybrid and Medium CAZ C with Small CAZ D (including the M32 Park and Ride) would reach compliance in 2023. Compliance was achieved by the Medium CAZ C + Small CAZ D and Revised Hybrid by less than $1 \mu\text{g}/\text{m}^3$ in NO_2 concentration across the focus areas driving overall compliance. There was uncertainty surrounding these options, as documented in the Analytical Assurance Statement. The larger uncertainty in the assumptions for the Revised Hybrid case, coupled with this small ($< 1 \mu\text{g}/\text{m}^3$) margin of compliance, suggested that the compliance year for the Revised Hybrid may be subject to change. In addition, an examination of the changes in air quality occurring at reportable receptors showed the following; the Medium CAZ C + Small CAZ D indicated 998 improving, 392 staying the same and 9 worsening. This could be compared to the Revised Hybrid which showed 1104 improving, 295 staying the same and none worsening. Hence, from an exposure reduction viewpoint, the Revised Hybrid may outperform the Medium CAZ C + Small CAZ D.

The economic appraisal showed that the intervention options could generate an NPV of -£124m (Medium CAZ C + Small CAZ D) and -£251m (Revised Hybrid),

The transport modelling, air quality modelling, and associated sensitivity testing informed the Direction issued on 20th August 2020 to the Council to implement the Medium CAZ C/Small CAZ D, with the impact of achieving compliance by 2023.

The Park and Ride scheme considered in the OBC is no longer deliverable within the study programme. The sensitivity report included a P&R Decremental Test. The M32 P&R decremental test was undertaken on the original Medium CAZ C + Small CAZ D option. The test removed the M32 P&R but retained the bus lane.

The M32 Park and Ride Sensitivity Test Technical Note reports on the sensitivity test carried out in response to JAQU's T-IRP request to consider disaggregation of the policies proposed, to demonstrate the need for each component within the Medium CAZ + Small CAZ D. Due to timescales it was agreed that one decremental sensitivity test would be undertaken; without the M32 Park and Ride (P&R) scheme.

They show that the Medium CAZ D + Small CAZ D without the M32 P&R has an increase in trips compared with the M32 P&R option, as expected. This results in an increase in queues, delays and travel time and a decrease in the overall speed throughout the network.

It should be noted that the M32 P&R sensitivity test does not include the removal of the M32 bus lane. The bus lane results in some trip suppression along the M32 and therefore if the bus lane was not incorporated in this test the increase in trips within the city centre would be greater and therefore the impact on air quality would be greater.

The assessment work showed air quality would be adversely affected with the mean concentration increasing by $0.1 \mu\text{g}/\text{m}^3$ and the maximum by $0.4 \mu\text{g}/\text{m}^3$. In terms of the compliance year, the 'decremental' scenario (without P&R) would put compliance back to 2024 from the 2023 core estimate.

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5. Small CAZ D Results

5.1 Introduction

The purpose of this section is to present the results of the Small CAZ D modelling work. This section compares the performance of the option to the Street Space Baseline plus Fast Track schemes reported in Section 3. It should be noted that this modelling work does not reflect current traffic volumes as monitored 'on the ground' at this stage. The Council is undertaking work to collate recent traffic flow and speed data, which will be used to help verify whether a charging CAZ is needed. This will be reported and agreed prior to the FBC submission.

The modelling to date has been undertaken for 2021 and 2025,. It is acknowledged that a charging CAZ if implemented will not be operational for the whole of 2021. However, given this is before the expected compliance year (see Section 6) this won't affect the conclusions of this report in terms of relative modelled performance of schemes. 2023 modelling will be undertaken prior to the FBC submission.

5.2 Highway Network Statistics

The highway network statistics have been extracted for the 2021 and 2025 Street Space Baseline plus Fast Track and the Small CAZ D models. Tables 5.1 and 5.2 shows the statistics for 2021 and 2025 respectively.

Measure	2021 Street Space Baseline plus Fast Track			2021 Small CAZ D			% Difference from the SS Baseline:		
	AM	IP	PM	AM	IP	PM	AM	IP	PM
Transient Queues	7807	4952	7670	7554	4843	7436	-3.2%	-2.2%	-3.0%
Over-Capacity Queues	1592	71	1182	1327	52	902	-16.6%	-27.2%	-23.7%
Link Cruise Time	19460	15356	19682	19267	15231	19483	-1.0%	-0.8%	-1.0%
(Free Flow	18761	14967	19008	18579	14850	18830	-1.0%	-0.8%	-0.9%
Delays	700	389	674	689	381	653	-1.6%	-1.9%	-3.1%
Total Travel Time	28859	20379	28534	28148	20126	27821	-2.5%	-1.2%	-2.5%
Travel Distance	1207925	980976	1240814	1198212	974658	1230405	-0.8%	-0.6%	-0.8%
Overall Average Speed	41.90	48.10	43.50	42.60	48.40	44.20	1.7%	0.6%	1.6%
Total Trips Loaded	131889	113562	130873	130781	112593	129723	-0.8%	-0.9%	-0.9%

Table 5.1 – 2025 Highway Statistics

Measure	2025 Street Space Baseline plus Fast Track			2025 Small CAZ D			% Difference from the SS Baseline:		
	AM	IP	PM	AM	IP	PM	AM	IP	PM
Transient Queues	8169	5290	8064	8082	5241	7973	-1.1%	-0.9%	-1.1%
Over-Capacity Queues	1779	110	1379	1654	94	1234	-7.0%	-14.1%	-10.5%
Link Cruise Time	20113	16214	20415	20039	16162	20339	-0.4%	-0.3%	-0.4%
(Free Flow	19321	15751	19638	19252	15702	19571	-0.4%	-0.3%	-0.3%
Delays	792	463	777	787	459	768	-0.6%	-0.7%	-1.1%
Total Travel Time	30060	21614	29858	29775	21497	29546	-0.9%	-0.5%	-1.0%
Travel Distance	1243452	1035549	1284969	1239766	1032859	1281131	-0.3%	-0.3%	-0.3%
Overall Average Speed	41.40	47.90	43.00	41.60	48.00	43.40	0.5%	0.2%	0.9%
Total Trips Loaded	136592	118765	135604	136150	118371	135149	-0.3%	-0.3%	-0.3%

Table 5.2 – 2025 Highway Statistics

For both years, the results show that with the introduction of the Small CAZ D, the average speed increases, with decreases in over capacity queues and a slight decrease in transient queues and delays across the model area. This is due to the removal of some non-compliant trips in the Small area as a result of the 'cancel trip' and 'change mode' responses.

5.3 Difference Plots

To show the impact of the Small CAZ D on traffic flows around the Bristol area, flow difference plots have been produced representing the AADT traffic flow change between the Street Space Baseline plus Fast Track and the Small CAZ D, for 2021 and 2025. Figures 5.1 and 5.2 show these difference plots for the wider and central Bristol area respectively for 2021. Figures 5.3 and 5.4 show these difference plots for the wider and central Bristol area respectively for 2025. Green lines indicate increases in traffic flow associated with the Small CAZ D, and blue lines indicate reductions in traffic flow resulting from the Small CAZ D.

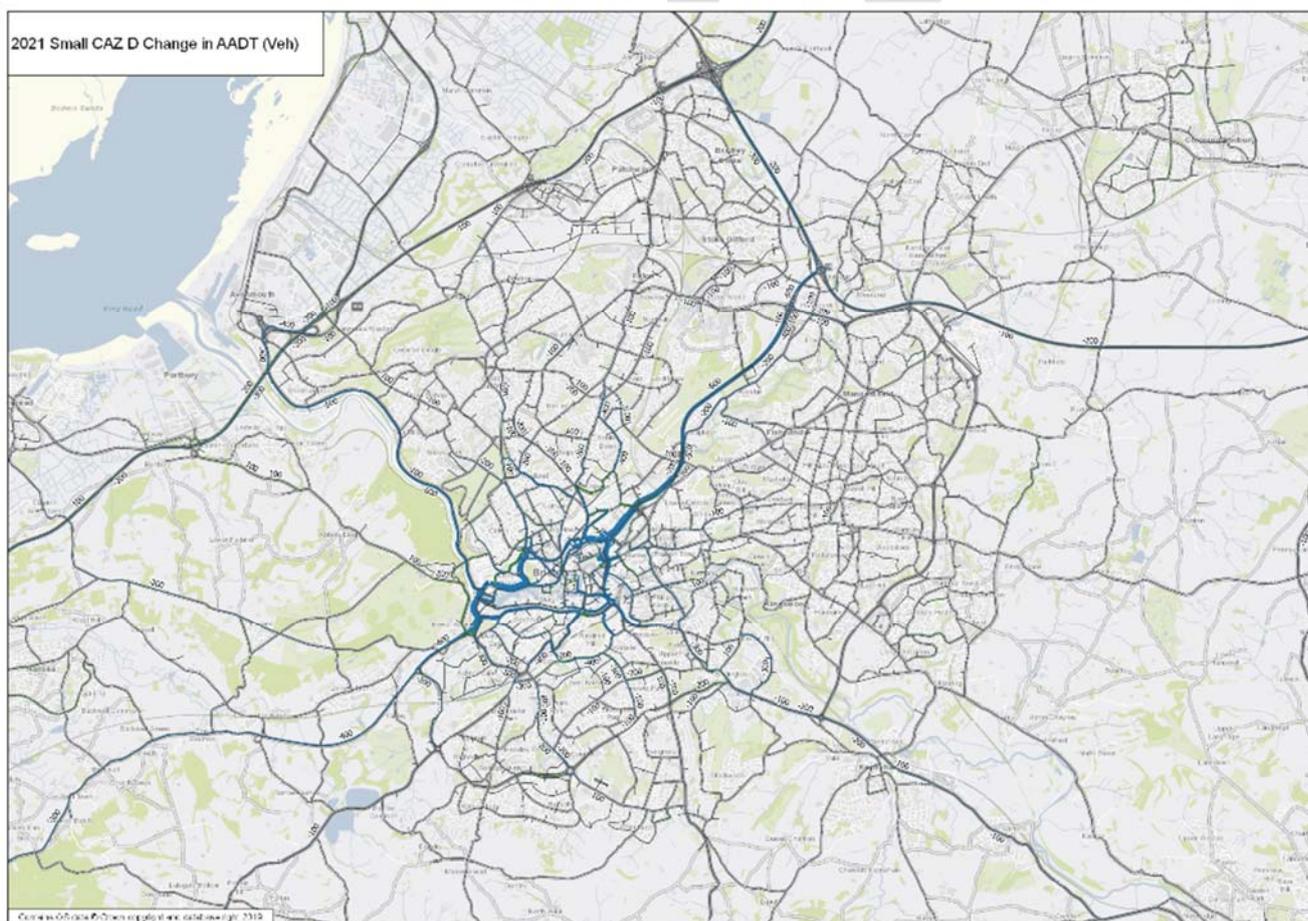


Figure 5.1 – 2021 Small CAZ D - Street Space Baseline plus Fast Track (wider Bristol area)

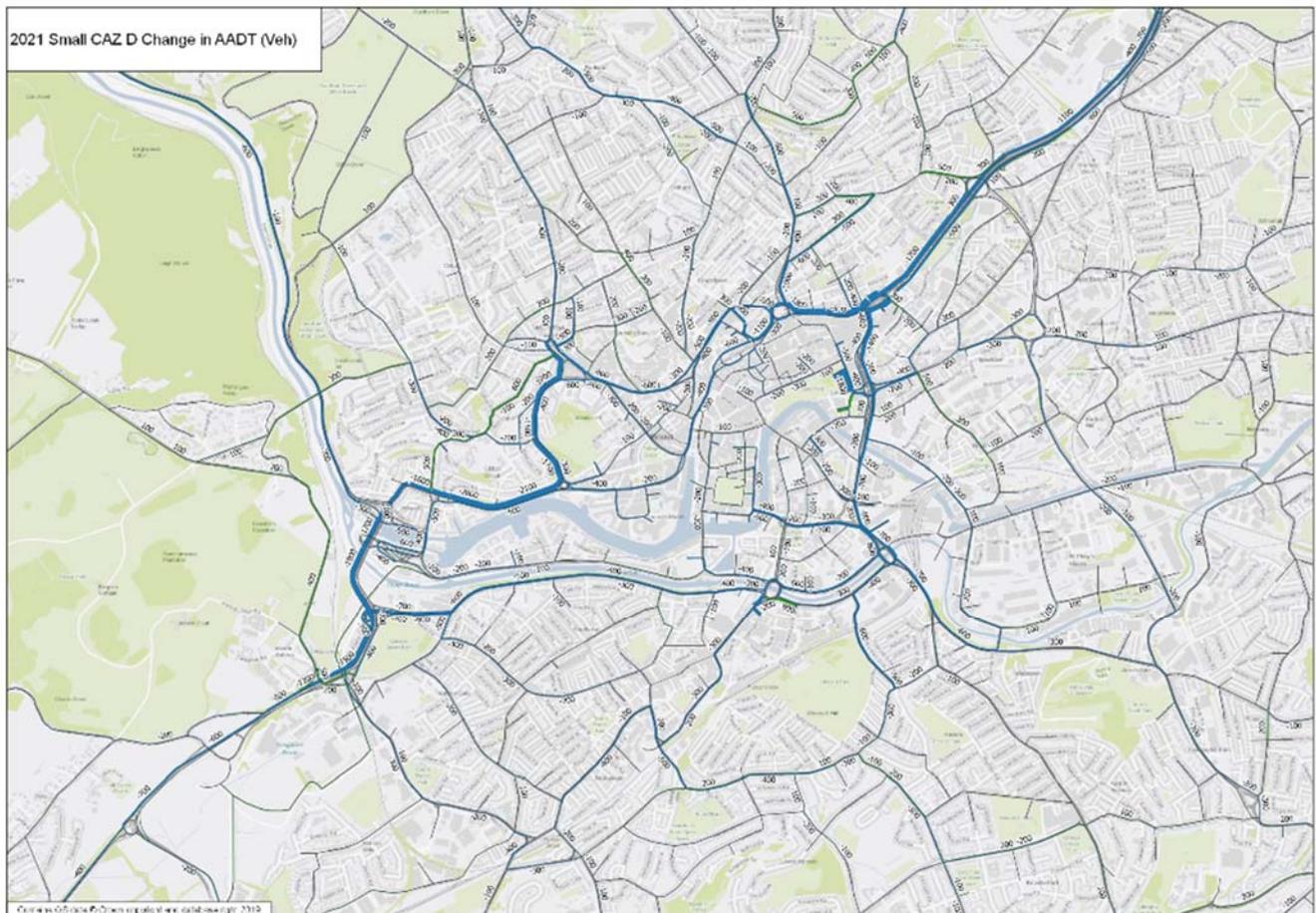


Figure 5.2 – 2021 Small CAZ D - Street Space Baseline plus Fast Track (central Bristol area)

The introduction of the charge fee over the Small CAZ area reduces vehicle traffic accessing the City Centre, as well as through traffic using roads in the CAZ, in 2021. However, it does result in some slight increases on roads mainly outside of the CAZ boundary, as non-compliant drivers attempt to avoid the charge by using routes around it. The scale of these potential impacts is considered to be modest, as almost all the changes on links showing increases can be considered as well within normal day-to-day variation in traffic volumes.

With reduced traffic flows in the City Centre, traffic congestion in this central area could be reduced, leading to improvements not only for cars, but also quicker journey times and greater journey time reliability for public transport. This could allow greater punctuality of public transport and increase its attractiveness as an alternative to the car. This is also reflected in the highway statistics, where the Small CAZ D reduces queues and the average speed increases.

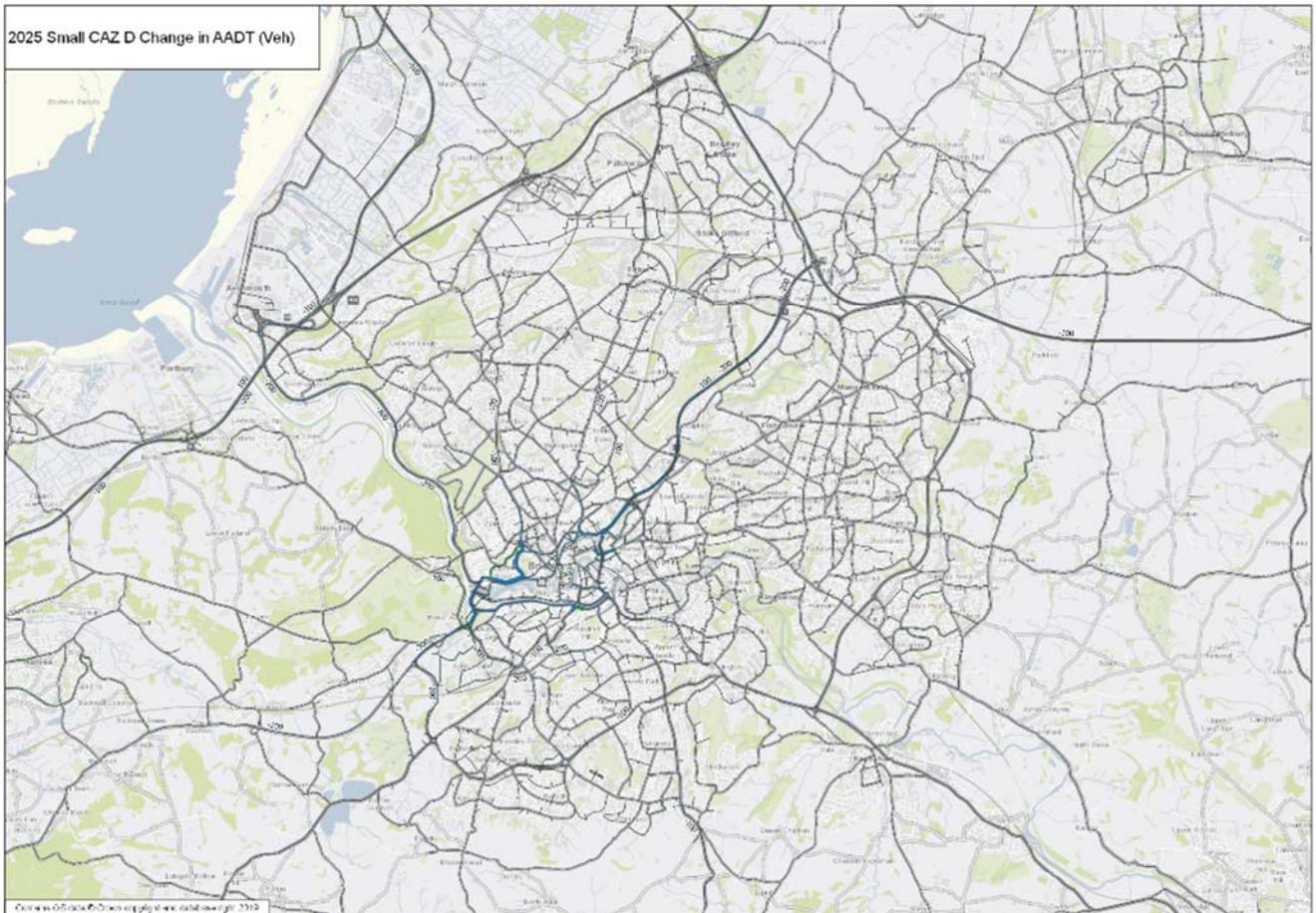


Figure 5.3 – 2025 Small CAZ D - Street Space Baseline plus Fast Track (wider Bristol area)



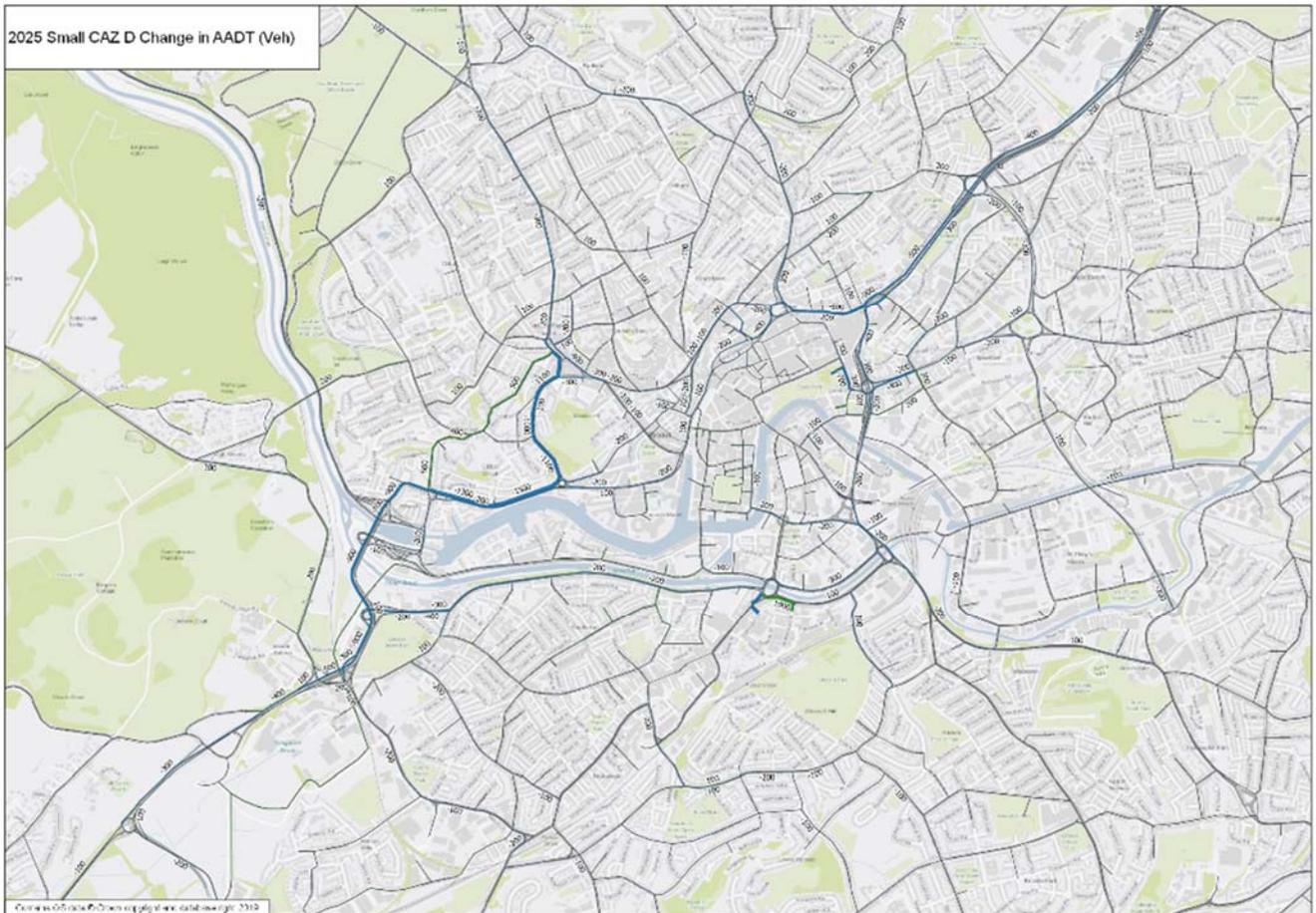


Figure 5.4 – 2025 Small CAZ D - Street Space Baseline plus Fast Track (central Bristol area)

The impact of the charge fee over the Small CAZ area in 2025 is less than in 2021 due to the decrease in non-compliant vehicles over time as vehicles are replaced organically.

5.4 Small CAZ Area Flows

AADT cordoned flows for the new Small CAZ area, as shown in Figure 2.2, have been extracted for the Street Space Baseline plus Fast Track and the Small CAZ D, for 2021 and 2025. The flows include internal-internal, internal-external, external-internal and external-external trips for this area. Tables 5.3 and 5.4 show the AADT flows and the differences between the Street Space Baseline plus Fast Track and the Small CAZ D for 2021 and 2025 respectively, for each movement, by user class and total.

Description	2021 Street Space Baseline plus Fast Track					2021 Small CAZ D					% Difference				
	Int-Int	Int-Ext	Ext-Int	Ext-Ext	Total	Int-Int	Int-Ext	Ext-Int	Ext-Ext	Total	Int-Int	Int-Ext	Ext-Int	Ext-Ext	Total
Cars Low Inc Comp	1761	9223	9753	15812	36563	1740	8873	9413	17979	38017	-1%	-4%	-3%	14%	4%
Cars Low Inc NonComp	645	3369	3544	5757	13341	266	1292	1351	3537	6473	-59%	-62%	-62%	-39%	-51%
Cars Med Inc Comp	2839	14795	14150	22476	54299	2810	14204	13662	25593	56308	-1%	-4%	-3%	14%	4%
Cars Med Inc NonComp	1039	5405	5140	8185	19822	745	3596	3420	4727	12541	-28%	-33%	-33%	-42%	-37%
Cars High Inc Comp	2031	10856	9478	13617	36049	2006	10383	9168	15855	37479	-1%	-4%	-3%	16%	4%
Cars High Inc NonComp	743	3968	3441	4962	13193	610	3008	2626	3117	9441	-18%	-24%	-24%	-37%	-28%
Cars EMP Comp	899	4320	4178	6254	15743	885	4102	4004	7306	16389	-2%	-5%	-4%	17%	4%
Cars EMP NonComp	331	1589	1529	2295	5850	187	829	803	1845	3769	-44%	-48%	-48%	-20%	-36%
Taxis Comp	390	2024	1831	2897	7261	384	1930	1755	3253	7440	-2%	-5%	-4%	12%	2%
Taxis NonComp	201	1041	942	1432	3748	198	994	904	1676	3903	-1%	-5%	-4%	17%	4%
LGV Comp	1354	6554	6198	11274	25525	1315	6225	5871	12964	26520	-3%	-5%	-5%	15%	4%
LGV NonComp	845	4167	3979	7215	16364	825	3791	3587	4638	12999	-2%	-9%	-10%	-36%	-21%
HGV Comp	778	4034	2809	7806	15598	779	4034	2815	8123	15922	0%	0%	0%	4%	2%
HGV NonComp	254	1299	907	2525	5169	236	1204	843	2336	4804	-7%	-7%	-7%	-7%	-7%
Coach Comp	84	345	246	688	1560	84	344	246	718	1590	0%	0%	0%	4%	2%
Coach NonComp	36	150	107	299	803	29	121	86	302	749	-19%	-19%	-19%	1%	-7%
TOTAL	14230	73140	68233	113495	269098	13099	64932	60555	113969	252556	-8%	-11%	-11%	0%	-6%

Table 5.3 – 2021 AADT Small Cordon Flows

Description	2025 Street Space Baseline plus Fast Track					2025 Small CAZ D					% Difference				
	Int-Int	Int-Ext	Ext-Int	Ext-Ext	Total	Int-Int	Int-Ext	Ext-Int	Ext-Ext	Total	Int-Int	Int-Ext	Ext-Int	Ext-Ext	Total
Cars Low Inc Comp	2189	10917	11538	20191	44835	2191	10915	11566	20884	45557	0%	0%	0%	3%	2%
Cars Low Inc NonComp	265	1318	1386	2433	5402	112	530	554	1403	2598	-58%	-60%	-60%	-42%	-52%
Cars Med Inc Comp	3505	17323	16662	29085	66575	3504	17325	16686	29927	67442	0%	0%	0%	3%	1%
Cars Med Inc NonComp	424	2092	2000	3507	8023	307	1450	1382	1855	4994	-28%	-31%	-31%	-47%	-38%
Cars High Inc Comp	2474	12549	11161	17877	44061	2473	12551	11175	18628	44827	0%	0%	0%	4%	2%
Cars High Inc NonComp	299	1516	1339	2156	5311	248	1201	1058	1263	3770	-17%	-21%	-21%	-41%	-29%
Cars EMP Comp	1091	4985	4846	8184	19106	1090	4986	4852	8514	19442	0%	0%	0%	4%	2%
Cars EMP NonComp	133	606	586	994	2320	76	332	321	687	1416	-43%	-45%	-45%	-31%	-39%
Taxis Comp	595	2928	2678	4528	10729	595	2928	2681	4725	10930	0%	0%	0%	4%	2%
Taxis NonComp	0	0	0	0	0	0	0	0	0	0	0%	0%	0%	0%	0%
LGV Comp	2011	9450	8891	18162	38515	2000	9462	8909	18776	39147	-1%	0%	0%	3%	2%
LGV NonComp	336	1613	1533	3102	6584	337	1542	1458	1855	5191	0%	-4%	-5%	-40%	-21%
HGV Comp	978	5063	3522	9712	19276	978	5063	3525	9833	19400	0%	0%	0%	1%	1%
HGV NonComp	78	397	277	767	1519	72	368	257	659	1357	-7%	-7%	-7%	-14%	-11%
Coach Comp	112	459	327	923	1820	112	459	327	934	1831	0%	0%	0%	1%	1%
Coach NonComp	11	48	34	95	188	9	38	27	93	168	-19%	-19%	-19%	-2%	-11%
TOTAL	14503	71265	66780	121717	274265	14104	69150	64779	120036	268070	-3%	-3%	-3%	-1%	-2%

Table 5.4 – 2025 AADT Small Cordon Flows

In 2021 the results show that with the introduction of the Small CAZ D, the internal-internal trips decrease by 8%, the internal-external trips decrease by 11%, the external-internal trip decrease by 11% and the external-external trips do not change. On average the reduction is 6% in the Small CAZ area.

In 2025 the results show that with the introduction of the Small CAZ D, the internal-internal trips decrease by 3%, the internal-external trips decrease by 3%, the external-internal trip decrease by 3% and the external-external trips decrease by 1%. On average the reduction is 2% in the Small CAZ area.

In both years, the non-compliant trips decrease due to the charging CAZ targeting these vehicles. Compliant vehicles increase slightly due to some infilling as congestion decreases - some non-compliant vehicles either avoid the Small CAZ D charge by rerouting, cancel their trip or change mode. This is less pronounced in 2025 as the non-complaint vehicles in the network decrease organically over time.

5.5 Traffic Flows at Key Locations

The AADT traffic flows at some of the locations with critical air quality issues (as defined in the Outline Business Case) as shown in Figure 3.5, have been extracted for the Street Space Baseline plus fast Track and the Small CAZ D, for 2021 and 2025. Tables 5.5 and 5.6 show the AADT flows and the differences between them, for 2021 and 2025 respectively.

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Ref No.	Location	Direction	2021 Street Space Baseline plus Fast Track			2021 Small CAZ D			Difference		
			Comp	Non-Comp	Total	Comp	Non-Comp	Total	Comp	Non-Comp	Total
1	Marlborough St (between Lower Maudlin St and Whitson St)	NEB	10443	4294	14737	13650	334	13984	3207	-3960	-753
		SWB	7758	3231	10989	10540	277	10817	2782	-2954	-172
2	Baldwin St (between Marsh St and St Stephen's St)	EB	1354	423	1777	1617	40	1657	263	-383	-120
		WB	1237	412	1649	1627	45	1672	390	-367	23
3	Marlborough St (between Whitson St and Charles St)	EWB	10402	4288	14691	13453	361	13814	3051	-3927	-877
		EB	10021	4164	14185	13737	333	14070	3716	-3831	-115
4	A4032 Newfoundland Way (Between Houlton St and Wilson Place)	EB	29926	12152	42079	38197	989	39186	8271	-	-2893
5	Park Row (between Woodland Rd and Lower Park Row)	EB	5170	2126	7297	6487	178	6664	1317	-1948	-633
		WB	4264	1778	6042	5650	168	5818	1386	-1610	-224
6	A38 (between Silver St and Bridewell St)	WB	10176	3306	13482	12653	359	13011	2477	-2947	-471
7	A4018 Park St (between Charlotte St and Great George St)	SEB	1300	376	1677	1521	38	1559	221	-338	-118
		NWB	5727	2180	7907	7428	268	7696	1701	-1912	-211
8	A4018 College Green (between Mark Lane and Denmark St)	NEB	7539	2813	10351	9635	310	9945	2096	-2503	-406
		SWB	2788	978	3767	3507	113	3619	719	-865	-148
9	A420 Church Road (between Northcote Rd and Beaconsfield Rd)	EB	7500	3068	10568	8044	2472	10516	544	-596	-52
		WB	6190	2509	8699	6702	1940	8642	512	-569	-57
10	A4 Temple Gate (between Station Approach and Cattle Market Rd)	SB	18400	7215	25615	23989	628	24617	5589	-6587	-998
		NB	13617	5193	18810	17336	514	17850	3719	-4679	-960
11	A4 Anchor Rd (between College Green and Explorer Lane)	SWB	5681	2245	7927	7479	255	7734	1798	-1990	-193
12	Passage St (between Victoria St and Temple St)	NEB	1708	681	2389	2397	76	2473	689	-605	84
		SWB	4005	1629	5634	5369	170	5539	1364	-1459	-95
13	Upper Maudlin St (between Lower Maudlin St and St Michael's Hill)	SWB	9789	4046	13835	12994	360	13354	3205	-3686	-481
		NEB	10443	4294	14737	13650	334	13984	3207	-3960	-753
14	Victoria St (between Bath St and St Thomas St)	SEB	573	0	573	574	0	574	1	0	1
		NWB	2646	889	3535	3489	90	3579	843	-799	44
15	Winterstoke Rd (between Longmoor Rd and Uckweel Rd)	SEB	7999	3254	11252	9302	1938	11240	1303	-1316	-12
		NWB	10690	4315	15005	12057	2710	14766	1367	-1605	-239
16	Lower Ashley Rd (between M32 and Conduit Rd)	EB	8184	3396	11579	7287	4802	12089	-897	1406	510
		WB	10350	4262	14612	9917	4894	14811	-433	632	199
17	Cheltenham Rd (between Ashley Rd and Arley Hill)	NB	2019	717	2736	2597	63	2659	578	-654	-77
		SB	3519	1359	4878	4370	78	4448	851	-1281	-430
18	Rupert Street / Lewins Mead	SB	10320	3490	13811	13096	415	13511	2776	-3075	-300
		NB	7589	2817	10406	9679	310	9988	2090	-2507	-418

Table 5.5 – 2021 AADT Traffic Flows

Ref No.	Location	Direction	2025 Street Space Baseline plus Fast Track			2025 Small CAZ D			Difference		
			Comp	Non-Comp	Total	Comp	Non-Comp	Total	Comp	Non-Comp	Total
1	Marlborough St (between Lower Maudlin St and Whitson St)	NEB	13194	1628	14822	14400	126	14526	1206	-1503	-296
		SWB	9672	1205	10877	10783	104	10886	1111	-1102	9
2	Baldwin St (between Marsh St and St Stephen's St)	EB	1643	163	1806	1741	16	1758	98	-147	-48
		WB	1517	156	1672	1667	16	1683	150	-140	11
3	Marlborough St (between Whitson St and Charles St)	EWB	13108	1617	14724	14361	139	14500	1253	-1478	-224
		EB	12634	1576	14211	14065	122	14187	1431	-1454	-24
4	A4032 Newfoundland Way (Between Houlton St and Wilson Place)	EB	37652	4593	42246	41008	384	41392	3355	-4209	-853
5	Park Row (between Woodland Rd and Lower Park Row)	EB	6576	811	7386	7149	67	7216	573	-743	-170
		WB	5393	667	6060	5928	63	5991	535	-603	-69
6	A38 (between Silver St and Bridewell St)	WB	12328	1241	13570	13285	138	13423	957	-1103	-146
7	A4018 Park St (between Charlotte St and Great George St)	SEB	1551	144	1695	1612	15	1626	61	-129	-68
		NWB	7138	828	7966	7762	105	7867	624	-723	-98
8	A4018 College Green (between Mark Lane and Denmark St)	NEB	9364	1062	10426	10162	120	10281	797	-942	-145
		SWB	3388	369	3757	3702	44	3747	315	-325	-10
9	A420 Church Road (between Northcote Rd and Beaconsfield Rd)	EB	9472	1165	10637	9685	943	10628	213	-221	-8
		WB	7981	974	8955	8155	756	8912	174	-218	-44
10	A4 Temple Gate (between Station Approach and Cattle Market Rd)	SB	23039	2719	25758	25202	239	25440	2162	-2480	-317
		NB	16851	1948	18799	18363	200	18563	1511	-1748	-236
11	A4 Anchor Rd (between College Green and Explorer Lane)	SWB	7157	856	8013	7817	98	7915	660	-758	-98
12	Passage St (between Victoria St and Temple St)	NEB	2124	256	2381	2357	27	2384	232	-229	3
		SWB	5051	618	5670	5526	64	5589	474	-555	-80
13	Upper Maudlin St (between Lower Maudlin St and St Michael's Hill)	SWB	12333	1525	13858	13605	138	13742	1272	-1387	-116
		NEB	13194	1628	14822	14400	126	14526	1206	-1503	-296
14	Victoria St (between Bath St and St Thomas St)	SEB	573	0	573	573	0	573	0	0	0
		NWB	3217	341	3558	3521	34	3555	304	-307	-2
15	Winterstoke Rd (between Longmoor Rd and Uckweel Rd)	SEB	10216	1249	11465	10697	770	11467	481	-479	3
		NWB	14305	1723	16028	14809	1030	15839	503	-693	-189
16	Lower Ashley Rd (between M32 and Conduit Rd)	EB	10360	1294	11654	9880	1926	11806	-480	633	153
		WB	13012	1620	14632	12817	1846	14664	-195	227	32
17	Cheltenham Rd (between Ashley Rd and Arley Hill)	NB	2511	274	2785	2716	25	2741	205	-250	-44
		SB	4398	522	4920	4746	31	4776	348	-492	-144
18	Rupert Street / Lewins Mead	SB	12558	1324	13882	13625	160	13785	1067	-1164	-97
		NB	9419	1063	10482	10221	120	10341	802	-943	-141

Table 5.6 – 2025 AADT Traffic Flows

The 2021 and 2025 AADT results show that the Small CAZ D significantly reduces the non-compliant traffic flows on most of the air quality critical links. It also increases the compliant traffic flows due to the replace vehicle response. The total flow decreases slightly as a result of the avoid zone, cancel trip and change model responses. The only link that has an increase in flows is Lower Ashley Road, which is outside the small CAZ boundary and can be used as an alternative route for non-compliant vehicles to avoid the charging zone.

5.6 Traffic Flow and Speed Adjustments

The flow and speed results from the 2021 and 2025 Small CAZ D models have been adjusted with the factors shown in Table 2-2, due to concerns over the age of the transport model. Tables 5-7 and 5-8 show the results of these adjustments to 2021 and 2025 respectively.

Location	Small CAZ D		Small CAZ D Adjusted	
	Flow	Speed	Flow	Speed
Marlborough St (B4051) Northbound	13984	27	8617	17
Marlborough St (B4051) Southbound	10817	13	10188	15
Rupert St (A38) Westbound	14404	39	11566	22
Baldwin St (B4053) Eastbound	1657	27	1161	27
Baldwin St (B4053) Westbound	1672	20	1454	16

Table 5.7 – 2021 AADT Traffic Flows and Speeds at adjusted locations

Location	Small CAZ D		Small CAZ D Adjusted	
	Flow	Speed	Flow	Speed
Marlborough St (B4051) Northbound	14526	20	8914	12
Marlborough St (B4051) Southbound	10886	13	10268	15
Rupert St (A38) Westbound	14811	39	11880	22
Baldwin St (B4053) Eastbound	1758	27	1225	27
Baldwin St (B4053) Westbound	1683	20	1464	16

Table 5.8– 2025 AADT Traffic Flows and Speeds at adjusted locations

These flow adjustments have been carried through to the Air Quality modelling of the Small CAZ D.

6. Air Quality Modelling

6.1 Scheme Modelling

Traffic data described in Section 5 was provided as input to the air quality impact assessment. A full description of the methodology used to assess the quantity of vehicle emissions and the subsequent impact emissions have on air quality at roadside receptors was provided in AQ2 methodology Report on the 6th April 2020.

The new results reported here are for the following scenarios modelled for projection years 2021 and 2025:

- Street Space Scheme Baseline (including Fast Track Measures); and
- Small CAZ D & Street Space plus Fast Track Schemes as described in Section 2.3.2.

Note that, prior to the submission of the FBC, the Street Space Scheme Baseline will be refined to include the application of speed / flow correction factors as per spring 2020 sensitivity test to the model outputs (post assignment adjustment) and to consider the signal timing changes in critical areas of the network.

The base year information, and therefore all previous verification methodology outlined in AQ2 and AQ3 remain the same as reported at OBC. This verification is still within the valid timeframe.

6.2 Results

The results for the above scenarios and other relevant tests for comparison are shown in Table 6.1. The following observations are drawn with respect to the eleven critical locations driving compliance of the Air Quality Directive EU Limit Value of $40\mu\text{g}/\text{m}^3$. It is also evident however that air quality is dramatically improved across the central area where through traffic has been removed through the Street Space schemes although not all of these areas are covered by the eleven critical locations. It is worth noting that in all cases reportable receptors or qualifying receptors are placed 4m from the roadside. The results for the Small CAZ D plus Street Space / Fast Track Schemes are compared against a benchmark scenario of a Medium CAZ C with a Small CAZ D (referred to as the 'benchmark'). For reference, the benchmark scenario without the Park and Ride scheme has also been included, as this scheme component cannot be delivered with the CAZ programme due to the scheme being delivered by others. The following is a list of the key observations:

- The Street Space Schemes baseline plus Fast Track compliance year was estimated to be beyond 2025 (possibly 2027/8) which is a minimum 2 years later than the Medium CAZ C/Small CAZ D benchmark. The Street Space/ Fast Track Schemes alone do bring similar benefits to the benchmark in the city centre where the measures included in the Street Space / Fast Track Schemes are directly implemented including Baldwin Street, Park Street and Queens Road. When compared to the OBC Baseline compliance years, the following is noted for the Street Space / Fast Track Schemes:
 - The compliance years are brought forwards substantially at Baldwin Street (5 years) and Park Street (3 years). Smaller (1 year) improvements in the compliance year were also modelled at Queens Road, Park Row and Victoria Street;
 - Compliance years are pushed back slightly (1-2 years) on Upper Maudlin Street, Marlborough Street (after the Royal Infirmary), Rupert Street and St Augustine's Parade, amongst others. The modelling indicates this is attributable to vehicles rerouting as a result of the Street Space/Fast Track schemes. However, these locations are compliant in or before 2025, with the exception of Marlborough Street. The age and detail of the model does not necessarily reflect some of the changes made very well and further work is required to assess the actual impacts;
 - The modelling work does not include any reduction in traffic flows or representation of current flow levels. Further sensitivity tests are required to assess the impacts of potential future reductions in traffic flows when the network returns to normal and public transport capacity returns alongside long term changes in behaviour around home working; and
 - Of the 1,399 reportable receptors, only the five receptors on Marlborough Street outside the Bristol Royal Infirmary do not achieve compliance by 2025, whereas for the OBC baseline it was

both Marlborough Street and Baldwin Street holding back compliance. The main reason for Marlborough Street and less so perhaps Rupert Street being adversely affected is due to the limited route choices of non-discretionary trips.

- The Street Space Schemes in combination with a Small CAZ D (including Fast Track Measures) had a large beneficial impact on the critical locations driving compliance, particularly Marlborough Street and Newfoundland Way. This scenario was estimated to achieve compliance in 2023.

The compliance year for Marlborough Street cannot be reported without modelling a future year post 2025, which has not yet been done to date for the Street Space Baseline plus Fast Track. Annual mean concentrations compared to the OBC Baseline would suggest 2027 or 2028. It is also noted that the Council are undertaking further work collating recent traffic count information, which could indicate that the Street Space Scheme performance is better than has been modelled to date.

For comparative purposes the compliance year for the schemes are:

- Medium CAZ C/Small CAZ D was modelled as 2023 (this included the M32 Park and Ride which is no longer able to be delivered in the CAZ programme)
- Medium CAZ C/Small CAZ D without Park and Ride decremental test was modelled as 2024

The results for the 'without Park and Ride' decremental tests are presented since the Park and Ride is not deliverable within the CAZ scheme programme.

The Street Space Baseline plus Fast Track modelling results for 2021 are shown in Figure 6.1. Non-compliance is shown in the City Centre, on feeder roads and beyond. In Figure 6.2, the same spatial aspect for year 2025 shows most of non-compliance disappear apart from receptors on Marlborough Street shown in greater detail in Figure 6.3.

The Small CAZ D plus Street Space Scheme results for 2021 and 2025 are shown in Figures 6.4 and 6.5 respectively. Figure 6.6 shows 2025 results in more detail for the City Centre.

Figure 6.7 shows the differences due to the Small CAZ D calculated for each reportable receptor. Green shading indicates where the scheme provides a benefit and orange a disbenefit. This illustrates the beneficial impact on the critical locations driving compliance.

Table 6.1. 2021-2025 Street Space Baseline plus Fast Track and Small CAZ D results

	Rupert Street (nr Bridewell St)	Marlborough Street	Upper Maudlin Street	Park Row	Park Street	Queen's Road	College Green	Cheltenham Road	Newfoundland Way	Church Road	Baldwin Street
Receptor ID (Baseline Max)	15160	12649	12636	12014	6925	7098	11949	12708	13742	24587	11589
2021 Results (ug/m3)											
OBC Baseline	49.5	58.7	46.4	49.9	49.2	41.6	48.9	40.1	50.0	43.8	54.7
Medium CAZ C / Small CAZ D	39.9	43.9	36.2	36.9	37.2	33.2	37.7	36.8	38.8	40.4	43.2
Hybrid (Small CAZ D) RB2 No PR	40.6	44.1	36.4	36.9	37.1	33.3	37.8	37.2	39.1	40.3	43.0
Street Space Baseline plus Fast Track	50.9	61.1	48.5	46.1	37.4	34.7	40.6	41.6	49.7	43.5	27.4
Small CAZ D RB4 & Street Space + Fast Track Scheme RB4	43.1	42.8	37.4	35.3	29.3	28.5	32.8	38.9	39.8	41.6	24.5
2025 Results (ug/m3)											
OBC Baseline	38.6	43.7	34.7	36.4	34.3	30.7	36.2	31.2	38.3	33.0	41.6
Medium CAZ C / Small CAZ D	33.8	36.0	29.6	30.4	30.0	27.4	31.0	28.8	32.9	31.4	34.9
Hybrid (Small CAZ D) RB2 No PR	34.1	37.2	30.1	30.5	29.6	27.2	31.3	30.8	33.0	31.7	36.2
Street Space Baseline plus Fast Track	39.7	45.4	36.3	34.7	27.7	26.7	30.6	32.6	38.0	32.9	22.2
Small CAZ D RB4 & Street Space + Fast Track Scheme RB4	36.4	36.7	31.3	30.0	24.4	24.0	27.1	31.5	33.2	31.9	20.6
Compliance Year - Non-Linear Interpolation											
OBC Baseline	2025	2027	2023	2024	2024	2022	2024	2022	2025	2023	2026
Medium CAZ C / Small CAZ D	2021	2023	2021	2021	2021	2021	2021	2021	2021	2022	2023
Hybrid (Small CAZ D) RB2 No PR	2022	2024	2021	2021	2021	2021	2021	2021	2021	2022	2023
Street Space Baseline plus Fast Track	2025	After 2025	2024	2023	2021	2021	2022	2022	2025	2023	2021
Small CAZ D RB4 & Street Space + Fast Track Scheme RB4	2023	2023	2021	2021	2021	2021	2021	2021	2021	2022	2021

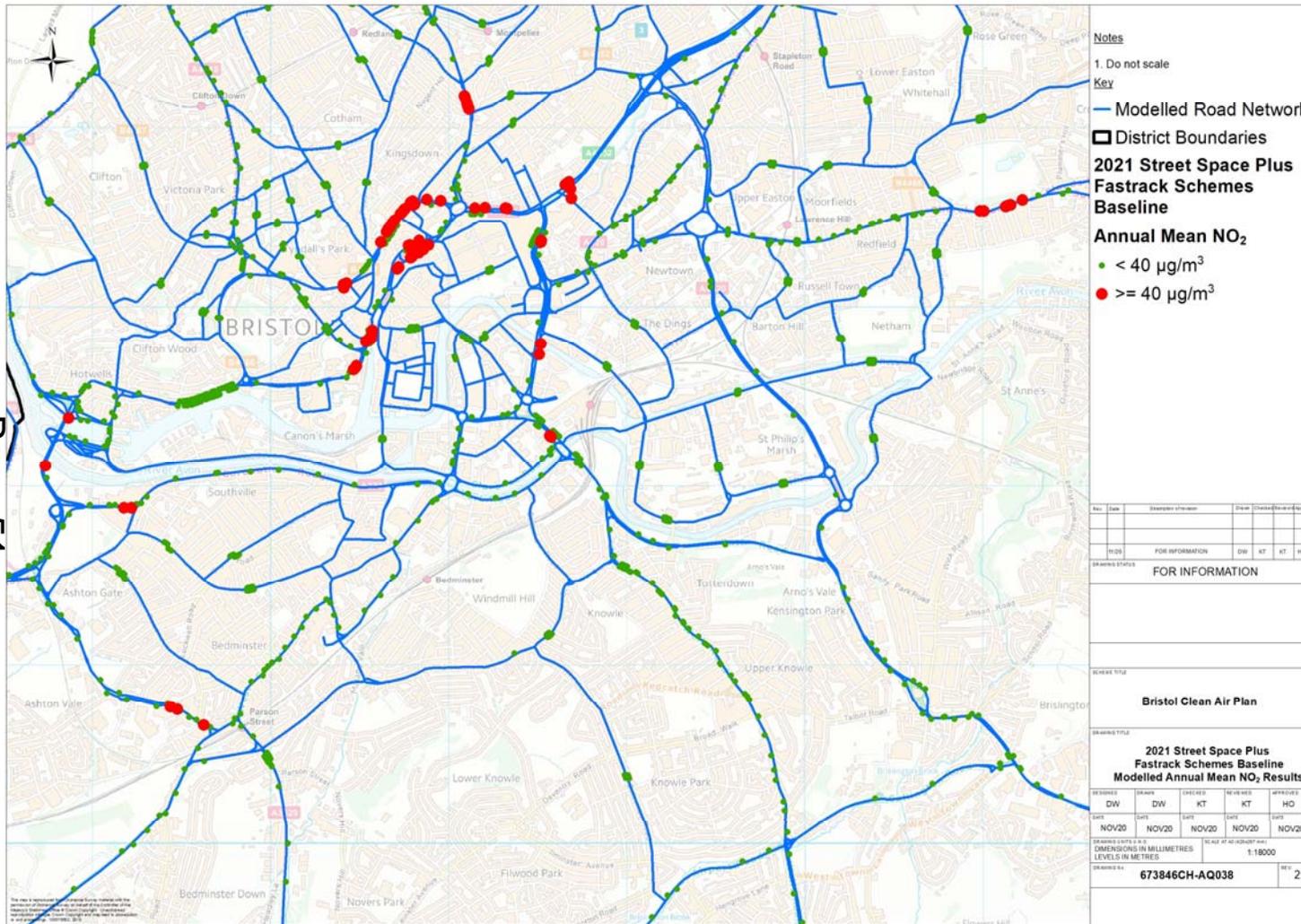


Figure 6.1. NO₂ Annual Mean 2021 Street Space Baseline plus Fast Track Schemes

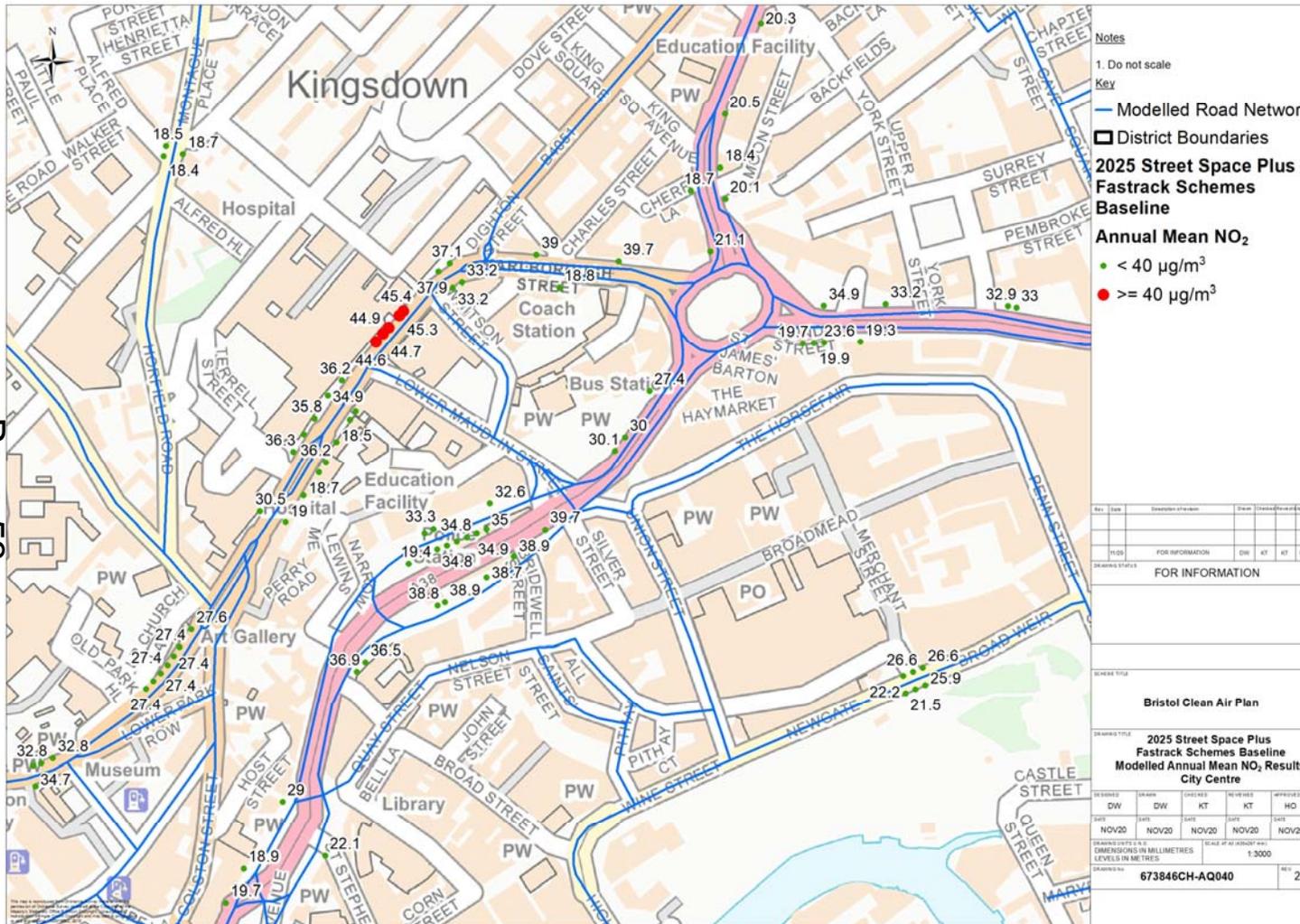


Figure 6.3. NO2 Annual Mean 2025 Street Space Baseline plus Fast Track schemes focused on Marlborough Street

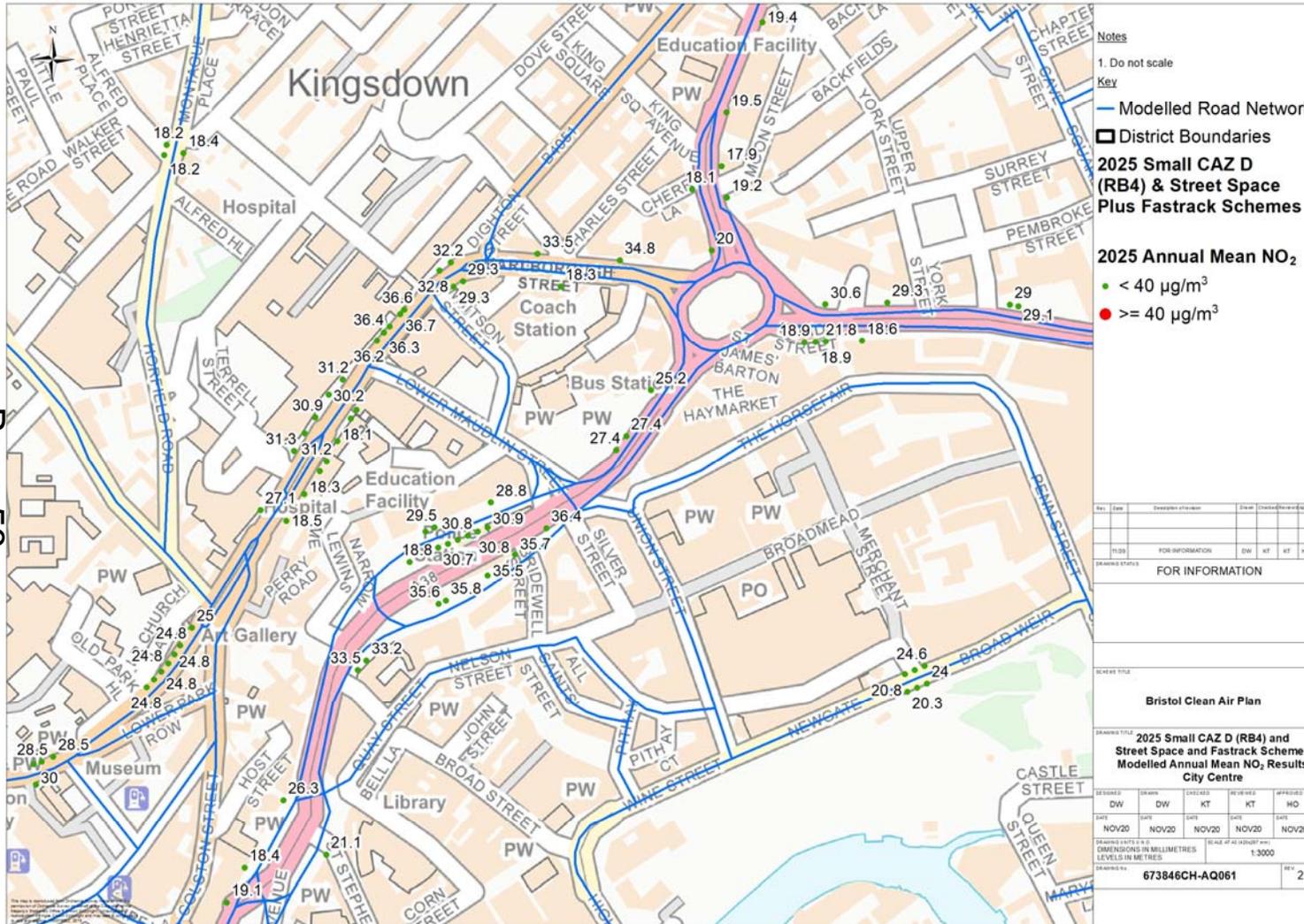


Figure 6.6. NO₂ Annual Mean 2025 Small CAZ D RB4 with Street Space plus Fast Track Schemes (City Centre)

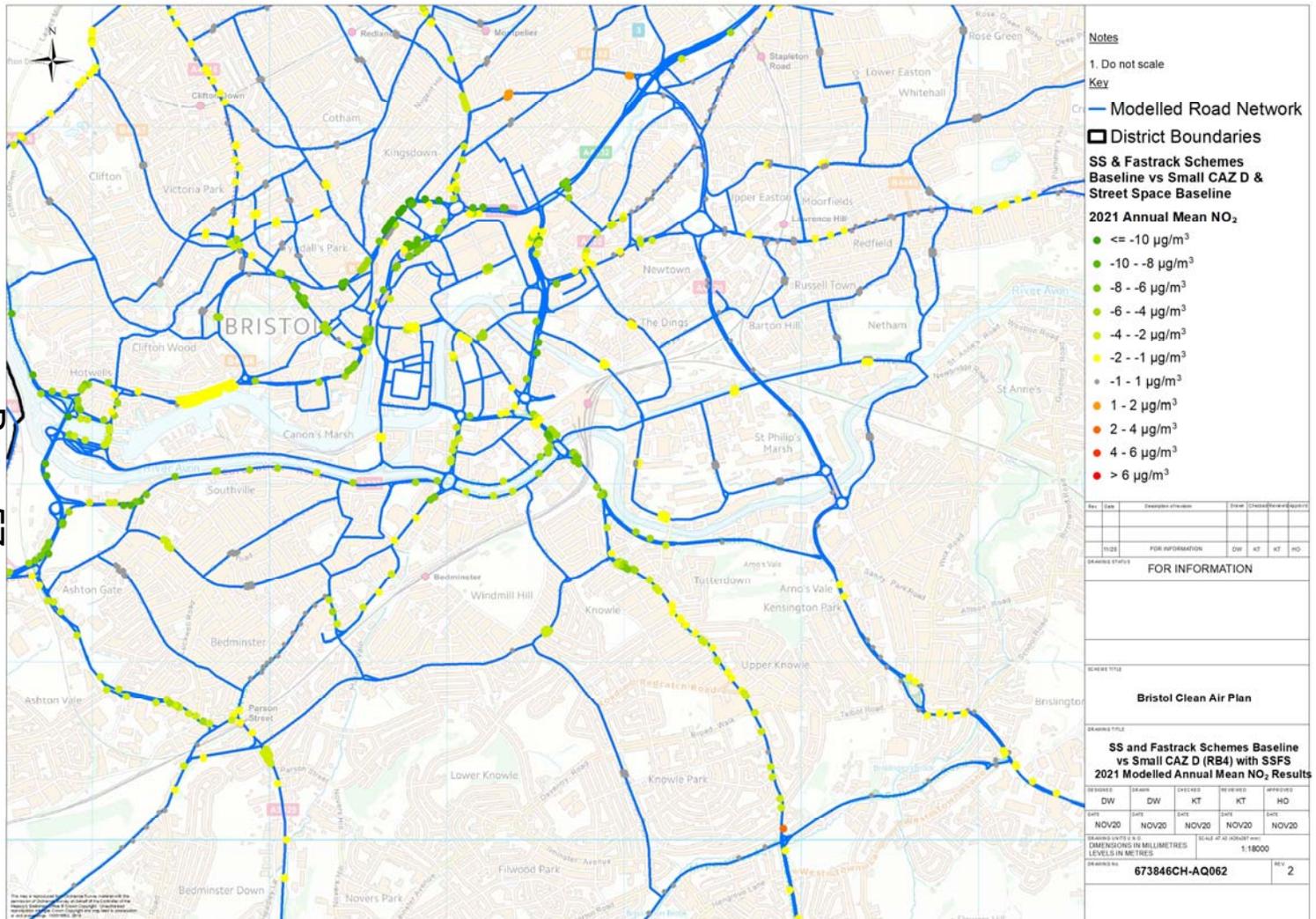


Figure 6.7. Changes in annual mean NO₂ between Street Space Baseline plus Fast Track and Small CAZ D RB4 with Street Space plus Fast Track Schemes 2021

6.3 Conclusions

The inclusion of the Street Space schemes provides an updated Baseline model against which the Clean Air Zone scheme requirements can be assessed. For the purposes of this assessment, this also includes the Fast Track measures. The inclusion of the Fast Track measures in the modelled Street Space baseline scenario does not affect the conclusions of this report. It should be noted that not all of the Fast Track Measures have been modelled, as stated in section 2.1, and hence not all the benefits of the Fast Track measures are reflected in this assessment.

The Council's preferred outcome would be not to have a charging zone if the evidence supports this. This is led by a staged modelling process offering further evidence in support of the monitoring data. Whilst it is acknowledged that the current GBATS model is not fully reflective of the current position and does not take into account recent significant changes due to COVID-19, the inclusion of the Street Space schemes provides an updated Baseline model against which the Clean Air Zone scheme requirements can be assessed. To understand the impacts of the Small CAZ D, the Fast Track Measures have also been included in the Baseline in this assessment. The preliminary modelling results for the revised Small CAZ D option (Small CAZ D RB4 & Street Space plus Fast Track Schemes), show a compliance year of 2023. This test includes the following revisions:

- Changes to boundary at Cabot Circus so vehicles can enter / exit Cabot Circus car park via Houlton St access without going through the CAZ. This is Revised Boundary v4 / RB4.
- Application of speed / flow correction factors as per spring 2020 sensitivity test to the model outputs (post assignment adjustment).

The application of speed / flow correction factors is to provide an approximate correction for the difference between modelled and observed 2019 speeds and flows at critical locations. No reduction of traffic levels has been modelled in this scenario to reflect COVID-19 impacts which enables comparison against the Medium CAZ C / Small CAZ D assessment undertaken for the OBC.

For comparative purposes this report presents information about the Medium CAZ C + Small CAZ D, the Park and Ride decremental test, and the baseline used in these assessments. This shows that the compliance year for the options are follows:

- Medium CAZ C/Small CAZ D was modelled as 2023
- Medium CAZ C/Small CAZ D without Park and Ride decremental test was modelled as 2024

Given the Park and Ride is not deliverable within the CAZ scheme programme, the modelled compliance year for a Medium CAZ C / Small CAZ D should be viewed as 2024. With speed / flow correction factors applied prior to running the air quality model, in order to improve the modelling accuracy in relation to observed 2019 speeds and flows, the expected compliance year would be 2023.

The assessments presented in the OBC did not include the Street Space schemes in the baseline models, so the results from the OBC modelling work and this latest modelling work are not directly comparable. However, based on the results presented in this Technical Note and the previous OBC work, it has been demonstrated that a Small CAZ D scheme is likely to perform at least as well as the Medium CAZ C + Small CAZ D scheme in air quality terms and hence it is recommended that the Medium CAZ C + Small CAZ D scheme does not need to be modelled further.

The Council has evidence that air quality improved during the first lockdown as people moved around the city less. People are now returning to work and school and the number of vehicles on the road has increased. During the COVID-19 pandemic, there have been many changes to when and how much people travel. The Council's preferred approach is to encourage citizens and businesses to sustain the recent, less polluting travel behaviour that has been seen during the ongoing COVID-19 pandemic, and the Council has supported this with improvements to roads around the city that make it easier to walk, cycle or use public transport. The Council is calling these the Street Space schemes (Government funded using Emergency Active Travel Fund budget) and 'Fast Track measures' (JAQU funded). Further modelling work associated with the Fast Track measures, will be presented in the FBC as a stand-alone scenario.

Further consideration needs to be given to how traffic volumes and travel patterns have responded recently to ensure accurate assessments are reflected. It needs to be noted however, the challenge of this is further impacted by the implementation of lockdown 2.0. Hence traffic volumes need to be further considered to understand if this is a sustained change or if, despite the Mayor's call to action to the City, traffic volumes have returned back to pre-COVID-19 levels or otherwise.

No adjustment for COVID-19 related traffic reductions are included in the modelling results presented in this report. This means that a more direct comparison can be made with these results against the OBC Medium CAZ C / Small CAZ D results. However, additional work will be undertaken to explore COVID-19 impacts further to verify whether a Small CAZ D is needed over and above the other measures in place or being implemented ahead of the CAZ scheme.

The ongoing technical work developing the FBC includes:

- Modelling of the Street Space Scheme Baseline to reflect Street Space schemes without the Fast Track measures;
- Refinement of the Street Space Scheme Baseline to include the application of speed / flow correction factors as per spring 2020 sensitivity test to the model outputs (post assignment adjustment) and to consider the signal timing changes in critical areas of the network;
- Update supporting reports relating to behavioural response to reflect a CAZ D only package (OBC-26 and T3) and modelling results (T4);
- Reviewing the post-COVID-19 traffic flow and speed data and sensitivity testing to verify whether a charging CAZ is required, which will be reported and agreed prior to the FBC submission; and
- The compliance year is expected to be 2023, so a 2023 forecast model will be developed prior to the FBC.

Following JAQU's acceptance that the Medium CAZ C/Small CAZ D option is not to be pursued, the scope of the proposed technical work is to be agreed with JAQU.



Report Purpose: To explain traffic flow changes as a result of the pandemic

Meeting: CAZ Board Meeting

DATE: 07 January 2021

TITLE:	Traffic behaviour 2019 - 2020	
Authors: Abigail Smith Technical input and analysis: Aaron Clarke / Maimoonah Khaliq / Chris Bushell / Steve Crawshaw	Job title/Roles: Abigail Smith - CAZ Programme Manager Aaron Clarke -Traffic Control Engineer Maimoonah Khaliq – Senior UTMC Engineer Chris Bushell – Jacobs Transport Modelling SW Lead Steve Crawshaw – Programme coordinator – City Innovation & Sustainability (AQ)	
Decision/s Required: Accept the evidence presented and agree to use the technical data as an appendices to the Technical Note (agreed by CAZ Board on 02/12/2020 and revisions to be further considered by CAZ Board on 7/1/21)		
Timescales: <ul style="list-style-type: none"> It is intended to review the information within this report and for the technical data to form an appendix to the technical note (agreed by CAZ Board on 02/12/2020 and revisions to be further considered by CAZ Board on 7/1/21). It will then be reviewed alongside the consultation output (in Jan 2021) to enable Board to make an appropriate recommendation to Cabinet in February 2021 (date to be agreed). Full Business Case is to be submitted to JAQU on or before 26 February 2021. 		
Purpose of Report: <ol style="list-style-type: none"> To explain how the traffic flows have changed as a result of the pandemic, before, during and in-between the two periods of national lockdown due to the Covid-19 pandemic To provide Board members with enough information so all can understand and see clearly the changes that have occurred To ensure Board members feel there is adequate technical evidence for submission to JAQU, as an appendices to the updated Technical Note (agreed to be submitted to JAQU, for consideration and further review, by Board on 7 January 2021). 		
Introduction <p>This report is an appendix to the technical note; it was approved for submission by the CAZ Board on 7th January 2021 (subject to further refinement once reviewed by JAQU) and should be read in conjunction with the technical note. It provides Board with an overview of traffic volumes and air quality before, during and after lockdown periods.</p> <p>As stated in the technical note, the Council’s preferred outcome would be to not introduce a charging zone if the evidence supports this. The inclusion of the Street Space schemes provides an updated Baseline model against which the Clean Air Zone scheme requirements can be assessed. The introduction of the Street Space Schemes has wider aims than just air quality including; enabling social distancing, allowing businesses to use outdoor space and encouraging people to travel by sustainable modes as part of an active lifestyle.</p> <p>To understand the potential impacts of the Small CAZ D, the Fast Track Measures have also been included in the Baseline in the assessment. The preliminary modelling results for the revised Small CAZ D option show a compliance year of 2023, this is covered in more detail in the technical note.</p>		
Evidence Base <p>The global pandemic: Covid-19 began to take hold in March 2020. This led to a nationwide lockdown in the UK. From</p>		

that moment, the traffic behaviour changed and with that, air quality improved across Bristol. Naturally, this led to calls for the CAZ to be reviewed in light of the improvements being seen which were largely as a result of the closure of schools, building sites, bars, restaurants and non-essential shops. While the improvement in air quality during this time was a welcome effect of the lockdown, in order to define an area as being *compliant* (within the legal limits set), the air quality is measured using an annual measurement: annual mean. Therefore it is not possible to officially state that Bristol had become air quality compliant at that time.

Following lockdown 1 when schools and businesses reopened, a gradual increase in traffic volumes was observed although these were not to levels experienced in previous years. Questions were raised as to the viability of the existing baseline and direction of the project, given the possibility that people may maintain the positive travel behaviours experienced during lockdown and potentially continue to work at home. Further encouraged as new technologies had been rapidly adopted by businesses and organisations during the lockdown, resulting in less commuting traffic (and therefore less pollution) and in recognition that lifestyles had changed. It was subsequently agreed with JAQU to begin a staged modelling process, which would explore new opportunities, capture the changes and highlight which measures would be most appropriate to reach legal compliance.

During lockdown 1, the Government released emergency funding for local authorities to facilitate social distancing measures: Emergency Active Travel Funding (EATF). In Bristol, this saw some road space removed and other key changes on some of the main CAZ corridors which were experiencing the worst air pollution. This further supported the need to urgently review the baseline (these are detailed in table 2.2 of the main Technical Note; Bristol SSS and Small CAZ D Report).

Data collection on traffic flows and air quality levels continue to be captured and analysed throughout the pandemic, to explore whether a charging CAZ would be required, given all the changes that had occurred as a direct result of the two national lockdowns and subsequent tier system. There is evidence that air quality improved during the first lockdown as movement around the city reduced and travel behaviour changed. The Council's preferred approach is to build on these behaviour changes and to encourage citizens and businesses to sustain the recent, less polluting travel behaviour that had been seen during the pandemic, without needing to implement a charging CAZ. The Council has supported this with improvements to roads around the city that make it easier to walk, cycle or use public transport. The Council is calling these the Street Space schemes (Government funded, using Emergency Active Travel Fund budget) and Fast Track measures (JAQU funded). On September 1st 2020, the Mayor issued a call to action during a Council Cabinet Meeting, stressing that in order for there to be a reasonable chance of avoiding a charging zone, people would need to modify their travel behaviour. He said:

We need to use this opportunity for people to transition onto public transport. We can have conversations with our bus providers to facilitate that and make sure people can do it in a safe way. But, that transition also helps us build the longer-term case for the mass transit system that we're also bringing through. This really is a call to action. This is not something that the council can deliver alone; this is about us as a city collectively engaging in behaviour change in the way we move around. If we collectively engage in that behaviour change, we can get ourselves to compliance in the shortest possible time in a way that does not further compound the economic woes faced by households and businesses in Bristol.

To achieve this, a clear understanding of traffic flows was required, to assess whether traffic volumes might not return to pre-lockdown levels. The Traffic Control Team were able to utilise data captured using SCOOT reporting, from the PowerBi system, to see patterns of behaviour and thus make some informed and experienced observations and recommendations about how traffic volumes may change going forward.

Data Analysis

The traffic data that is now becoming available does seem to be indicating that between lockdown 1 and lockdown 2 – the latter of which started on the 5 November 2020 and ended on 2 Dec 2020 – traffic levels rose but that they fell short of rising to pre-Covid levels by 18%. This could be, in part, attributed to the introduction of the Street Space Schemes and the different working behaviours that people adopted during lockdown 1 that may they have maintained. For example, when comparing October 2019 traffic volumes to October 2020, we can see that by October 2020 weekday traffic levels had risen to 82% of October 2019 levels, as demonstrated below, but not

returned to pre-Covid levels:

Location	Oct-19	Oct-20	% of 2019 flows
Newfoundland St Inbound	145,268	121,960	84%
Newfoundland St Outbound	178,968	146,040	82%
Marlborough St WB	66,200	54,888	83%
Perry Rd EB	42,324	31,368	74%
Total	432,760	354,256	82%

The above traffic data focusses on some of the key CAZ count locations, 'key' because they are within the potential clean air zone boundary; traffic levels in turn affect air pollution levels and ultimately compliance dates.

The key CAZ traffic count locations are:

St Michaels Hill SB - D07115

Lower Maudlin St Westbound @ Lewins Mead – D01361

Marlborough St Westbound @ Dighton St - D07163

Newfoundland St Inbound - D02171

Newfoundland St Outbound - D02174

Perry Rd Eastbound/ Colston St - D07112

Please note that the St Michaels Hill Street Space junction changes took place on 27th September 2020. This involved a no left turn into St Michaels Hill and no right turn out of St Michaels Hill; a significant change to the road layout.

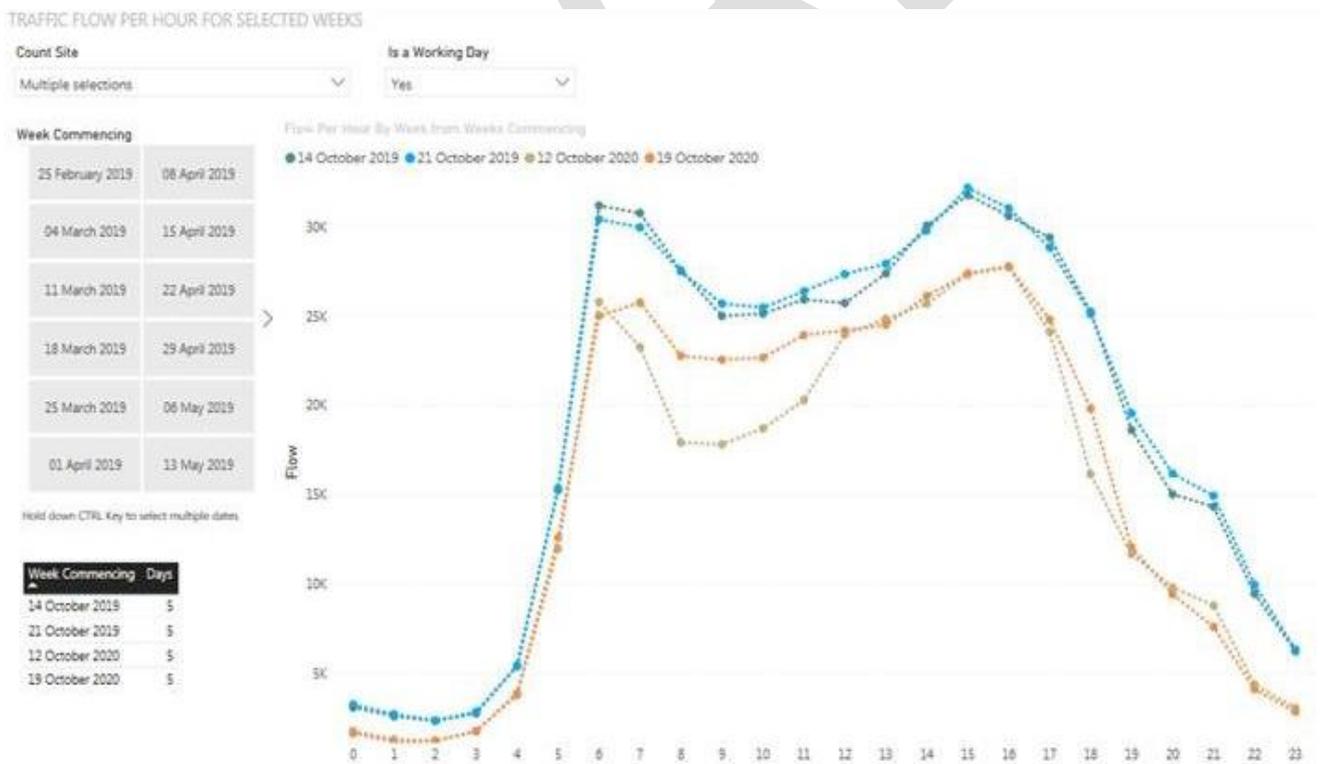
The following data / graphs show and compare traffic levels during and in-between the two periods of lockdown, to make some assumptions about what is likely to be the pattern post pandemic. It begins with a look back in comparison to levels pre, during and post the two initial lockdowns. This will be followed with some analysis of air quality over the same period of time. Ultimately, the decision about what this data indicates lies with JAQU as they consider what measures Bristol will be directed to implement by October 2021.

Pre, during and post lockdown data

Graph 1: Feb 2019 – Nov 2020; Traffic flows by year and month



Graph 2: A comparison of traffic flows in October 2019 and October 2020

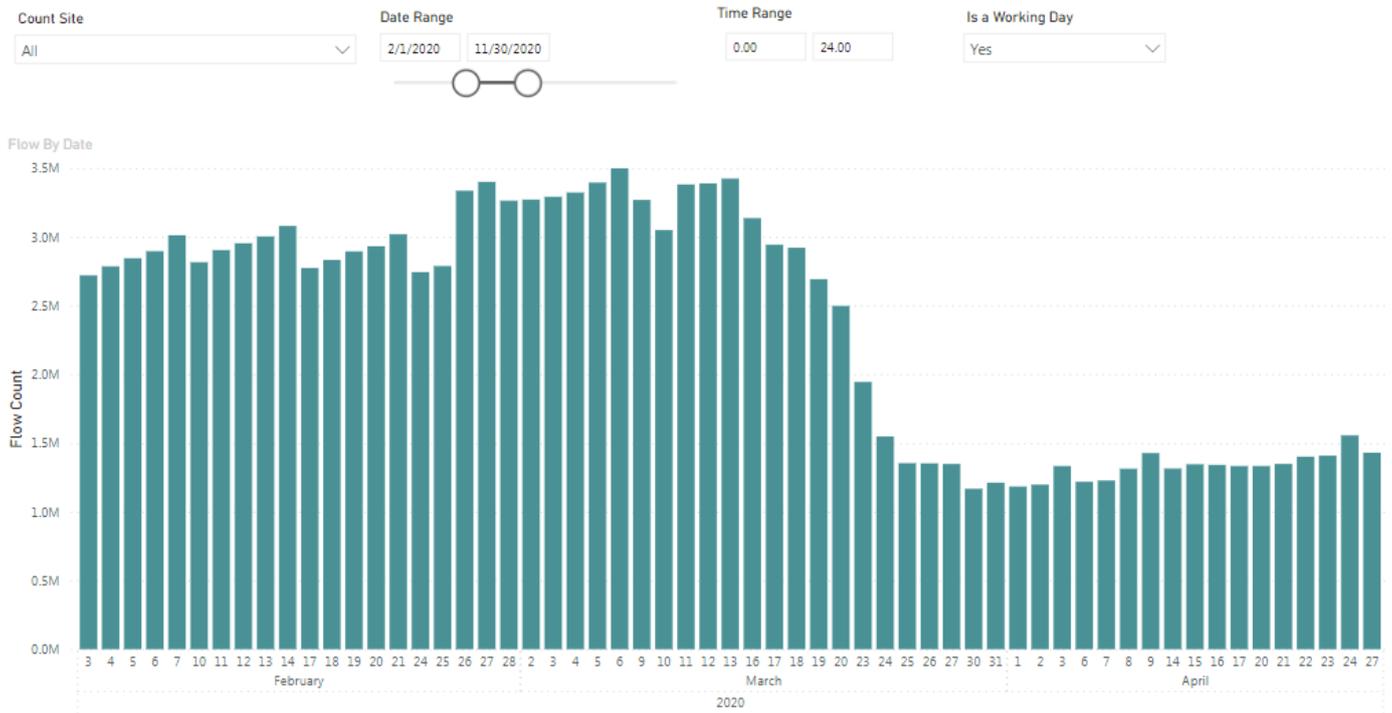


Graphs 3 – 6: Daily traffic counts pre, during and post lockdown in 2020

The following 4 graphs show the daily counts for Working Days (excluding bank holiday) from the 3rd February to the 4th December 2020

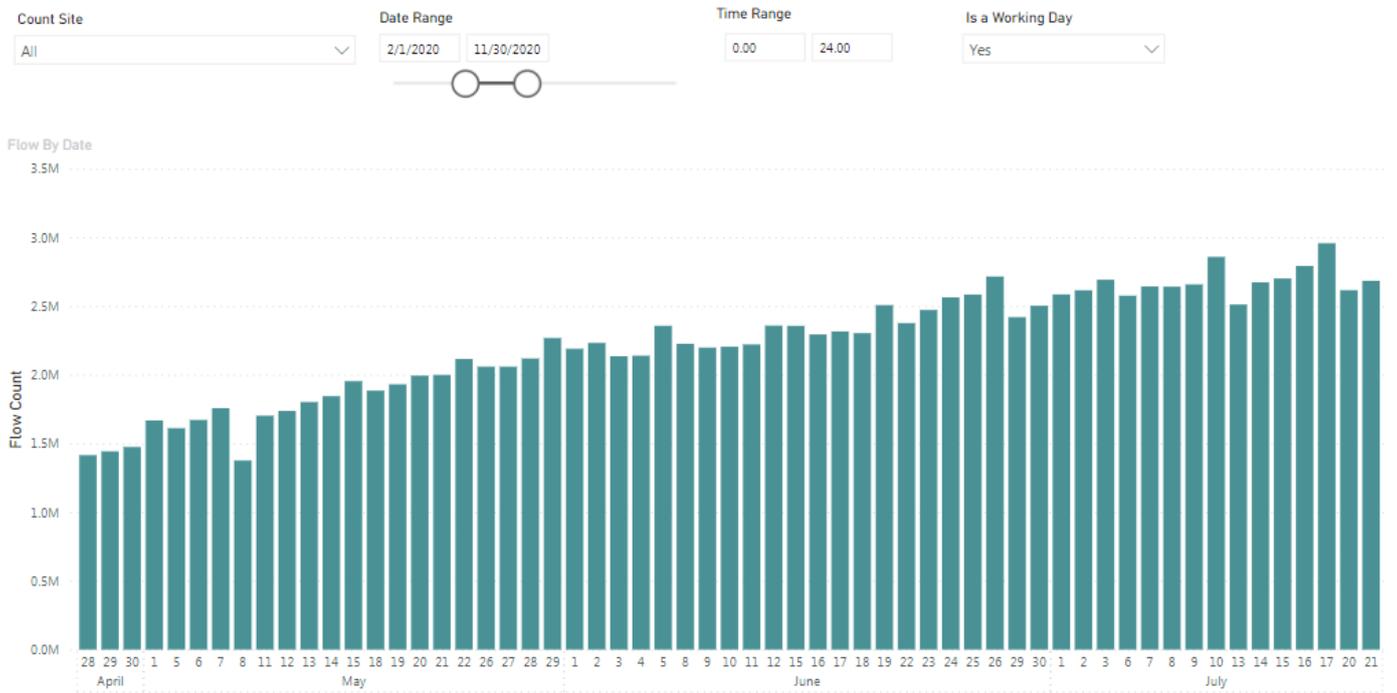
Graph 3: Feb 2020 – Apr 2020

TRAFFIC FLOW BY DAY FOR SELECTED DATES



Graph 4: Apr 2020 – July 2020

TRAFFIC FLOW BY DAY FOR SELECTED DATES

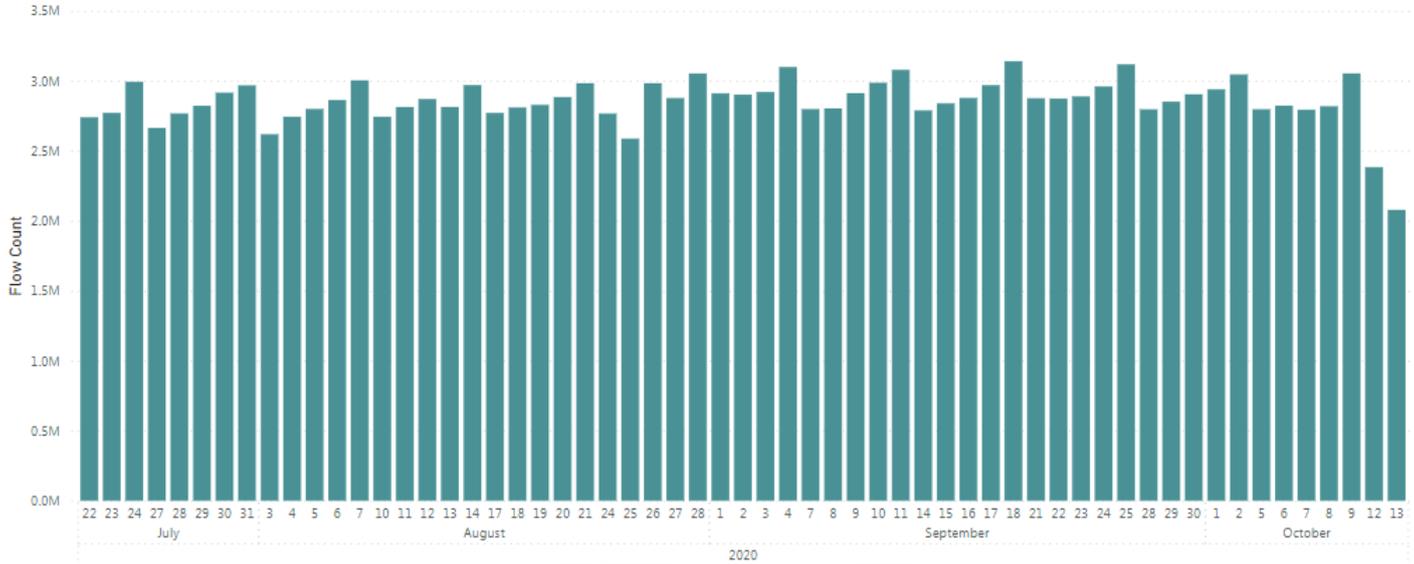


Graph 5: Jul 2020 – Oct 2020

TRAFFIC FLOW BY DAY FOR SELECTED DATES

Count Site: Date Range: Time Range: Is a Working Day:

Flow By Date

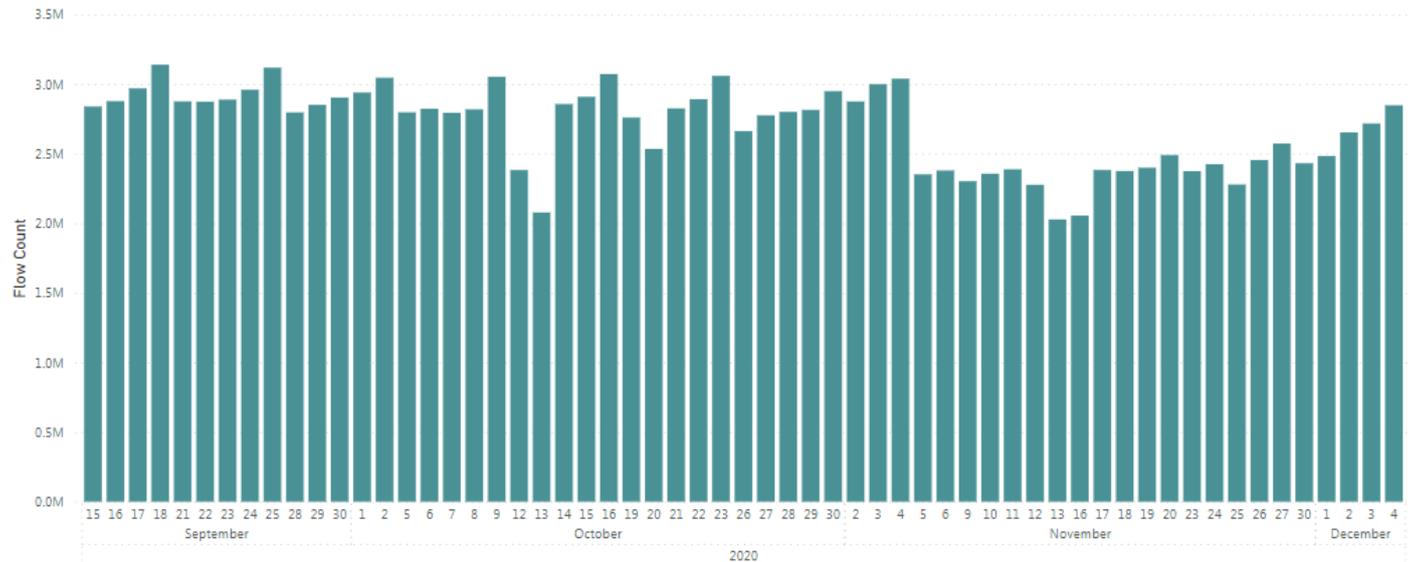


Graph 6: Sept 2020 – Dec 2020

TRAFFIC FLOW BY DAY FOR SELECTED DATES

Count Site: Date Range: Time Range: Is a Working Day:

Flow By Date

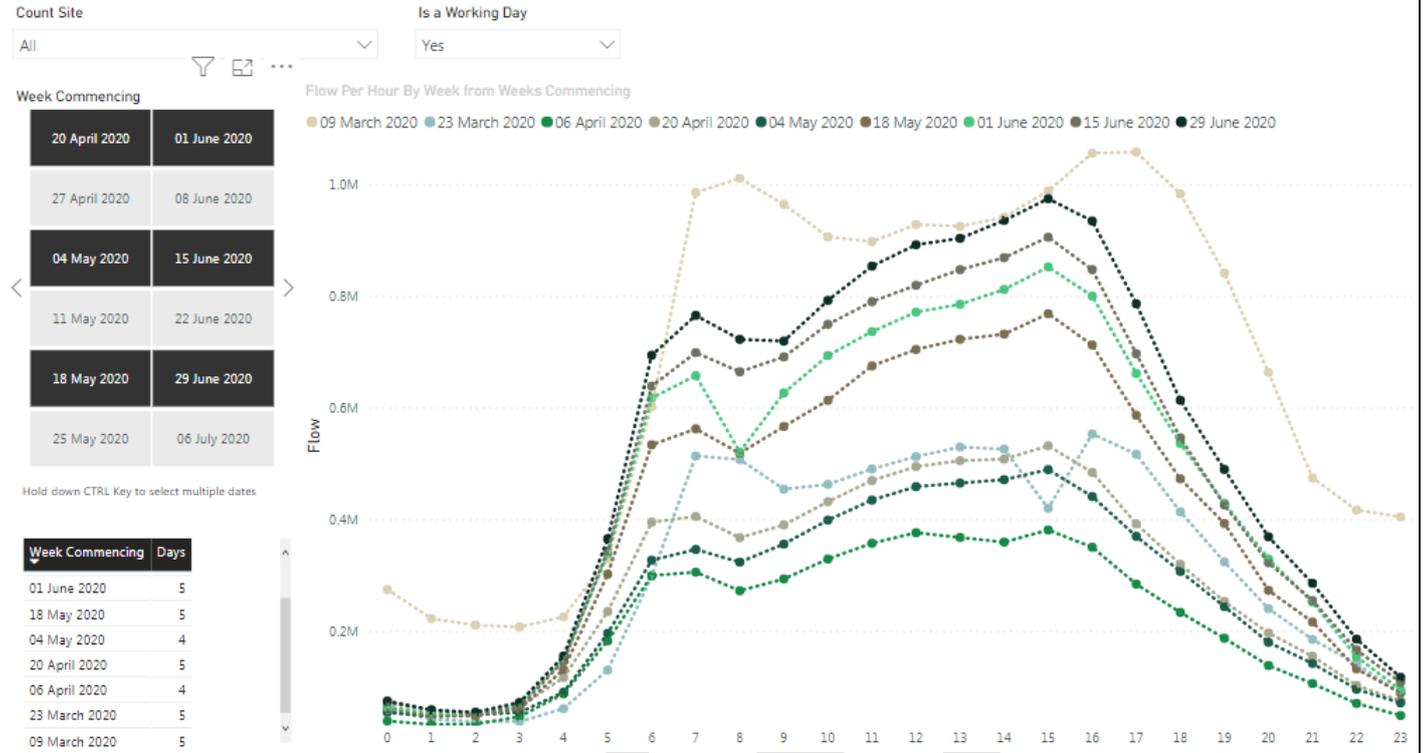


The above 4 graphs show the daily counts for Working Days (excluding bank holiday) from the 3rd February 2020 to the 4th December 2020 (axis names on the left; the Flow Count and along the bottom its year, month and date).

The following graphs summarise the traffic increases in two parts; Mar – June 2020 and Jul – Nov 2020.

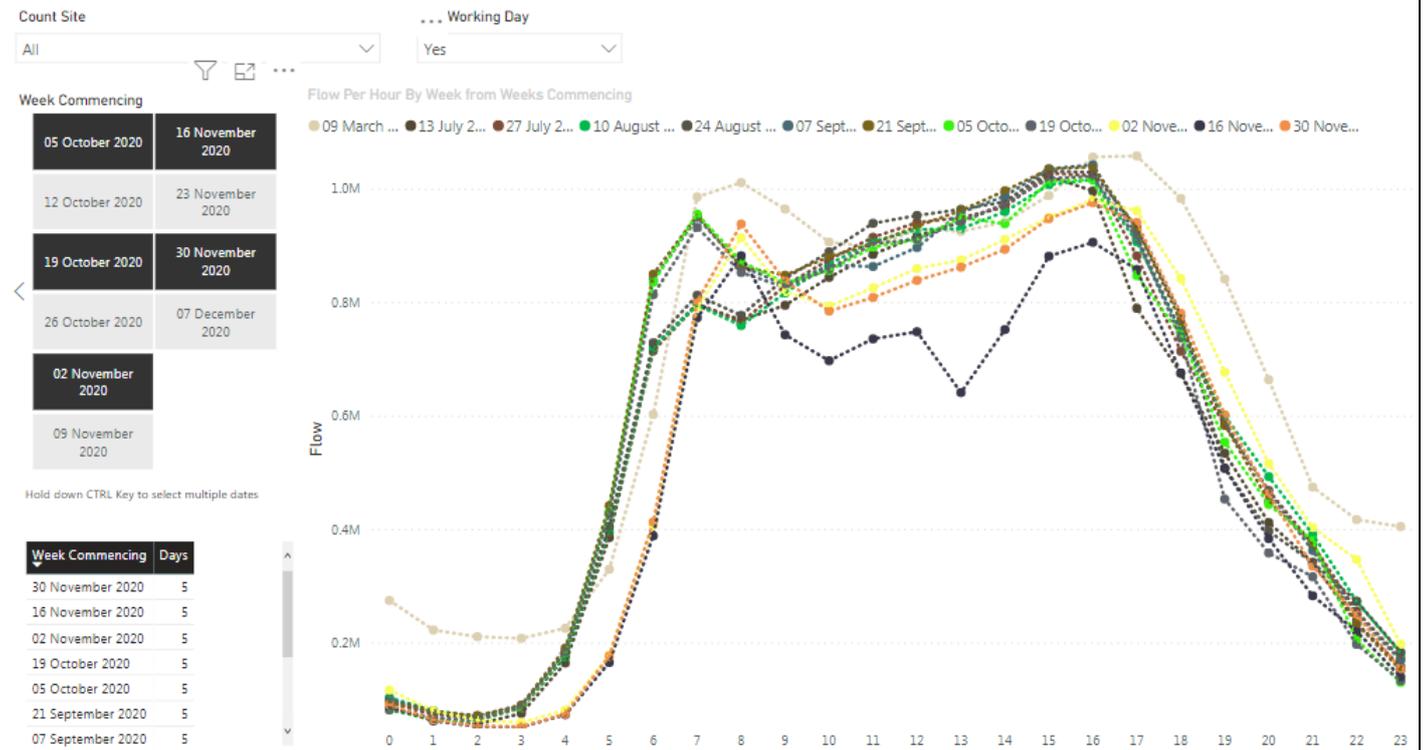
Graph 7: Traffic flows Mar 2020 – Jun 2020

TRAFFIC FLOW PER HOUR FOR SELECTED WEEKS



Graph 8: Traffic flows July 2020 – Nov 2020

TRAFFIC FLOW PER HOUR FOR SELECTED WEEKS



The two graphs above show how the traffic has increased from pre-lockdown to November 2020. Data from every other week has been used to try and keep the graph readable.

Analysis of data: Lockdown 1 compared to lockdown 2

There is some debate as to when lockdown 1 actually started. The date varies between the 16th March 2020 when it was discussed in the House of Commons, the 23rd of March when the Prime Minister announced the restrictions to the country or the 26th March when the Health Protection Act became enforceable. For this report, the 9th March is being used as a pre-Covid-19 data set. This is to capture the full effect of the gradual move into lockdown and to ensure all relevant data is captured.

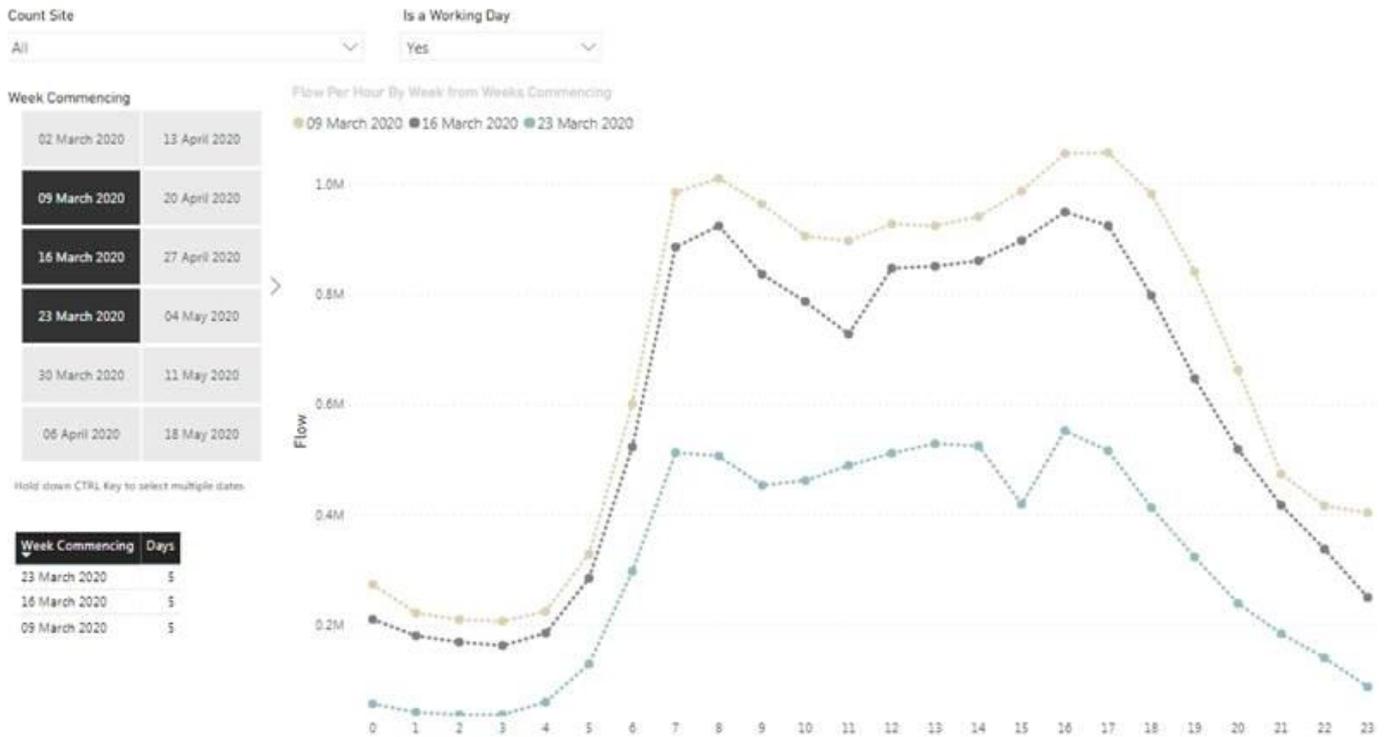
The start of lockdown 2 began on the 5th November. As this was towards the end of the week, it's best to use one full week of lockdown 2 so we are therefore counting the week beginning the 9th November.

Our latest data, as at 23/12/2020, shows that traffic is returning to the city, although not at pre-Covid levels. The week beginning 7th December shows higher traffic flows compared to all the previous four weeks. The week commencing 2nd November is a special case as only part of that week was in lockdown 2, as noted above. Prior to that, w/c 26th October was half term week, which is why it doesn't have an AM peak. The week beginning the 14th December saw a drop in traffic on both the AM and PM peaks. The previous week of the 7th December saw an increase in traffic compared to the weeks of the 23rd November and 30th November, so traffic was rising. The main difference between 2019 and 2020 traffic data is that the weeks with higher traffic flow have swapped; week 50 (9th December 2019 & 7th December 2020) and week 51 (16th December 2019 & 14th December 2020). The higher traffic in 2019 was week 51 but in 2020 it is week 50. This may be due to the way people are reacting to Covid-19 and the lockdown rules.

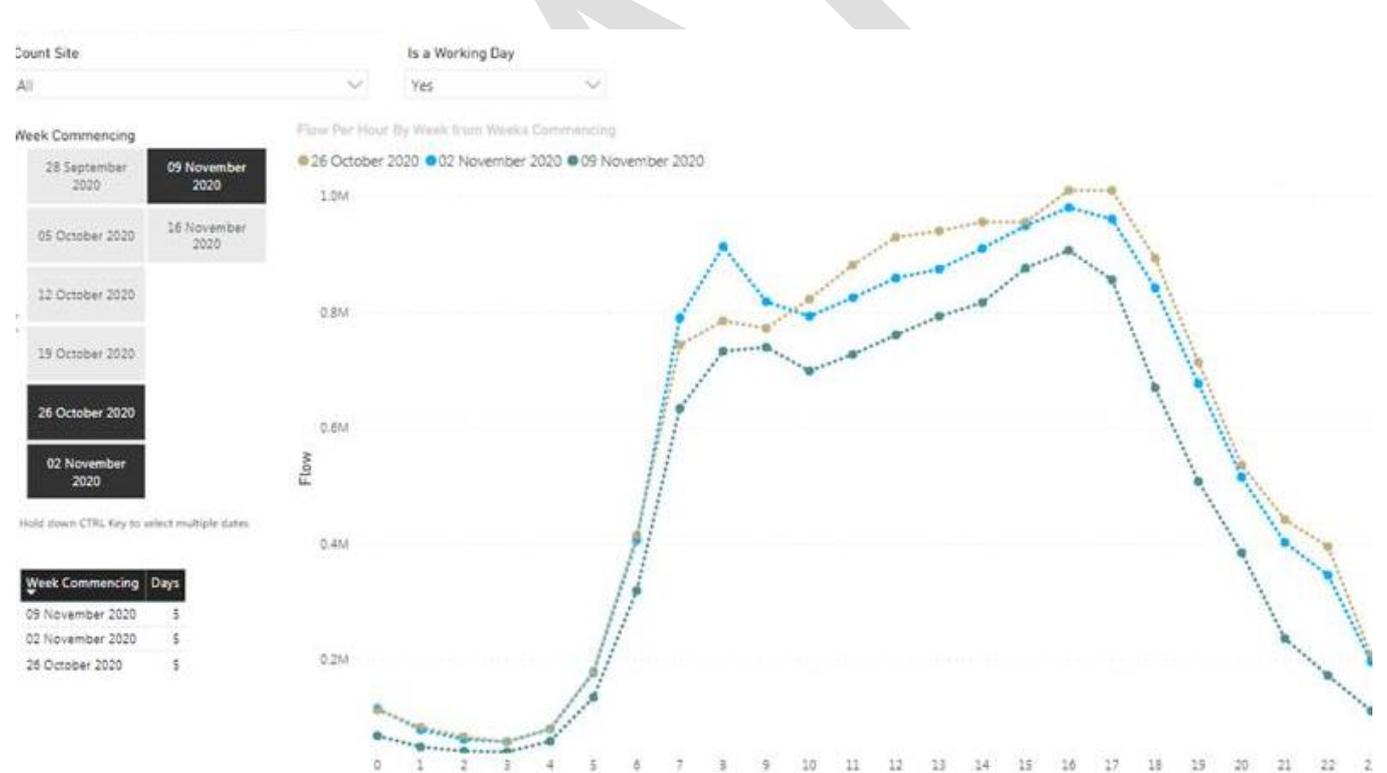
Looking ahead, if the week commencing the 21st December 2020 follows the same pattern as 23rd December 2019 then the traffic volumes will drop this week. Some of this is due to the number of working days within the week of 23rd December 2019 which had Christmas Day and Boxing Day in the working week, so there was only three days of work in the normal five day week; more people would be on leave from work during this week. Given the impacts of Covid-19 the number of people attending offices has dropped generally, so this week may not see that much of a traffic drop compared to the week commencing 14th December.

The graphs below aim to show how lockdown 1 differed to lockdown 2. The key observation being that the drop in traffic levels was less in lockdown 2 than lockdown 1.

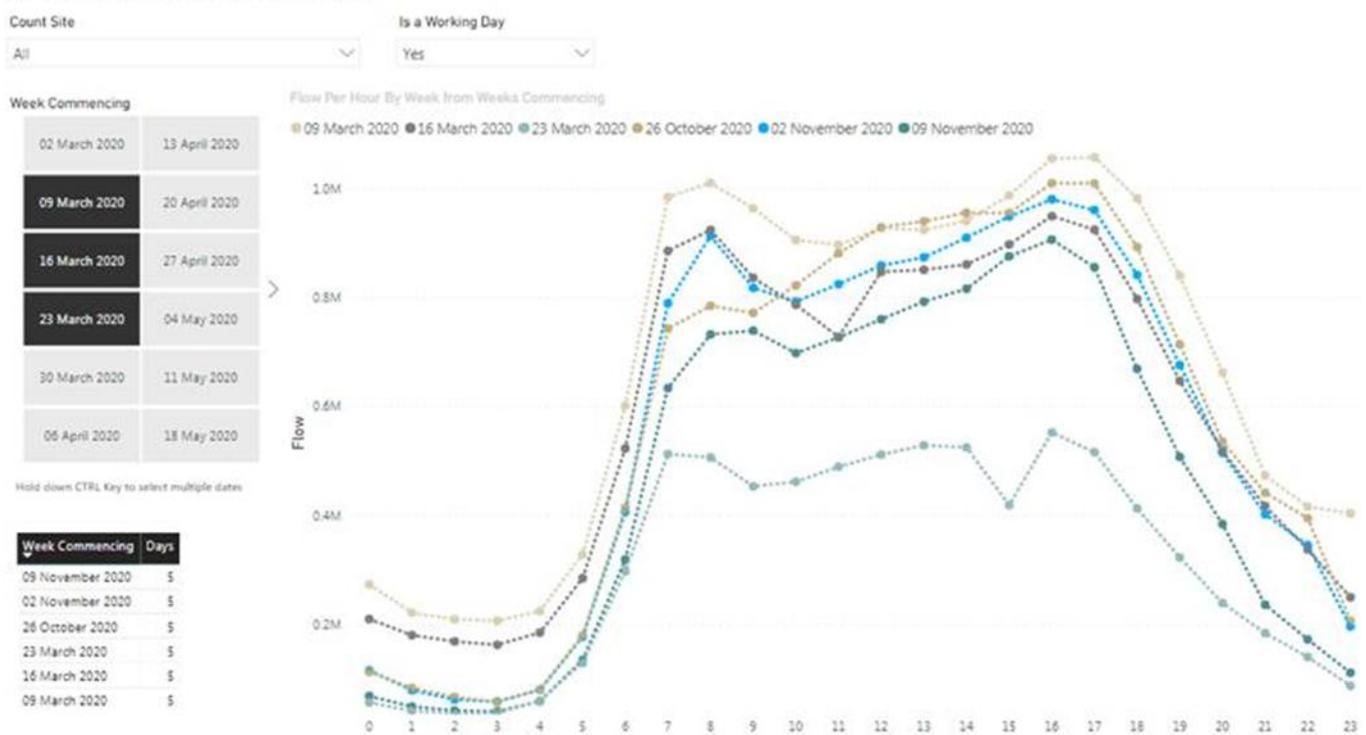
Graph A: Beginning of Lockdown 1



Graph B: Beginning of Lockdown 2



Graph C: Lockdown 1 and 2 compared



The data above shows that traffic volumes dramatically dropped during the first lockdown. Numbers then began to steadily rise following the end of lockdown 1, but not yet reaching pre-lockdown levels. Lockdown 2 resulted in another reduction, this time 18% in comparison to an approximate 50% reduction during the first lockdown, again as noted at the beginning of this report.

It is reasonable to assume that traffic volumes will rise once more when tiered restrictions are lifted, but there are still many unknown factors which could affect this, including further lockdowns or tiered restrictions. Our latest data supports the assumption of a rise in traffic volumes as it already shows traffic levels beginning to rise at the end of lockdown 2, as well as acknowledging that levels did not dip as low as evidenced in the first lockdown.

Traffic flows at some sites may well have changed since the pandemic first took hold. These sites may never return to the pre Covid-19 levels particularly as there has been such a shift towards home working. The pattern of traffic flows at the present time is now more focussed on the outlying areas rather than the centre itself. However, whilst traffic levels in the central area appear to be lower than pre Covid-19, it is also the case that the traffic behaviour is now appearing more dispersed over the whole city rather than just in the central area. This could be because people are not travelling in to work within the central area as they were previously and are now spending more time in their local areas for shopping etc. They are still therefore making a similar amount of journeys but just not as part of a commute. This is why the monitoring data provided in this report is required; to best understand traffic volumes and to ensure we implement the necessary measures required, achieving compliance in the shortest possible time.

Air Quality data

This project must adhere to the legal definition of compliance. In line with the Air Quality Directive, everywhere within the city where there is public access should experience annual mean NO₂ below the EU Limit, i.e. 40µgm⁻³. The project team agreed with JAQU, when initially legally directed in 2017, that this definition would include Bristol's LAQM (Local Air Quality Management) monitoring sites as well. 2020 clearly cannot be considered a typical year, not least due to the ongoing uncertainties, so seeking to represent compliance in 2020 as being representative is likely to be an unsuccessful strategy. It is likely that there will be at least some locations in 2020 that will exceed compliance, though it is obviously still too early to say for certain at this stage as we have to wait for the national monitoring data to be ratified; usually in June. This is because we use the national data to correct the diffusion tube data. Bristol City Council continued to monitor air quality throughout lockdown as this work was classed by the government as an essential activity.

Traffic levels declined rapidly from immediately before lockdown leading to a clear reduction in emissions of key pollutants. This is apparent for roadside and background sites.

Air quality changed during the lockdown period, but the changes in air quality characterised by comparisons of raw data between two periods cannot be solely attributed to the lockdown measures, because weather and other variables strongly influence ambient air quality. In order to account for the influence of weather and other covariates, a statistical modelling approach has been adopted which can remove the effect of the weather and identify the changes in concentrations which would arise if meteorological conditions and temporal effects are held constant.

This approach can be used to ascribe the changes in air quality to lockdown measures with more certainty than simply by comparing raw data between two periods.

Summary of changes

The comparison of raw data between 2019 and 2020 was for the period 25th March 2019 to 01st November 2019 and 24th March 2020 to 31st October 2020.

Analysis of air quality data from Bristol City Council's continuous air monitoring network comparing the lockdown period in 2020 to the same period in 2019 shows a significant change in nitrogen dioxide (NO₂), a traffic pollutant, of a maximum -76% as a weekly average. Reductions in NO_x (oxides of nitrogen), which can be considered a surrogate for direct exhaust emissions, fell even further with a maximum mean weekly change of -86%. These changes cannot be attributed solely to the lockdown measures because of the effect of weather and the small effect of changes in the vehicle fleet between the two comparison periods however accounts for a large proportion of it.

Measures of particulate matter (PM) - PM₁₀ and PM_{2.5} also fell but the reduction was less. This is because the local contribution to ambient PM is a small part of the total. There are significant regional and background components present which are unaffected by the lockdown measures. For PM₁₀ the roadside increment in 2019 was 27% when comparing a background and roadside site in the central city.

Ozone (O₃) rose in the first lockdown when compared to the baseline period. This is expected because as NO_x declines, less ozone is chemically reduced in the photochemical reaction between these two species (ozone is chemically reduced - loses an atom of oxygen in the photochemical reaction) and hence concentrations of ozone may rise. Unusually sunny weather also contributed to the higher than usual levels of ozone.

Data from the [NO₂ diffusion tube network](#), which gives greater spatial coverage than the continuous network has been analysed. The changes in measured nitrogen dioxide for each month where we have data are shown. There is typically around a 6 week delay between the end of the month where tubes have been exposed, to receiving the results.

All of Bristol's air quality data is available through our [open data portal](#).

Summary of changes by pollutant

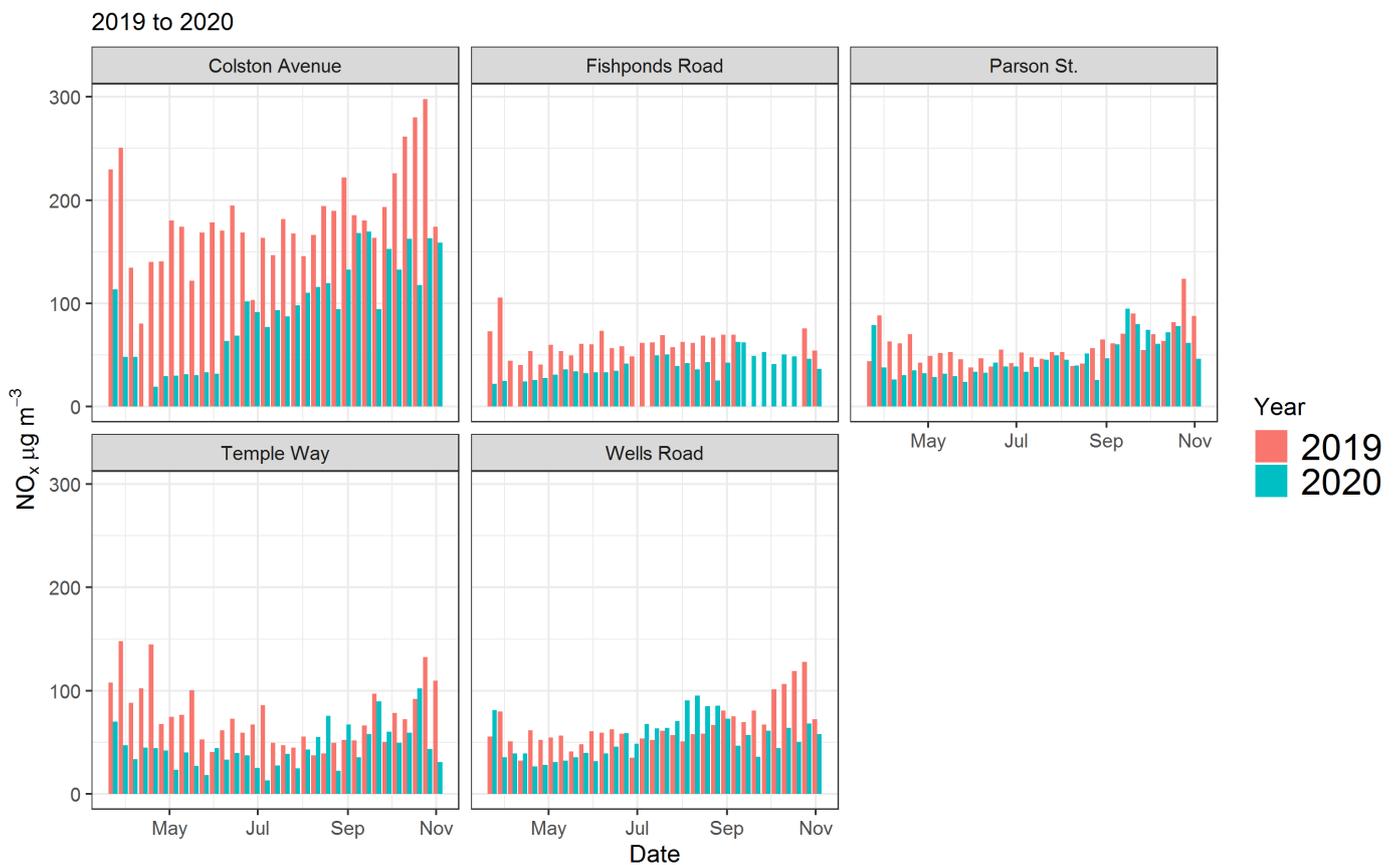
The table below shows the maximum percentage changes of weekly mean concentrations aggregated by site and pollutant. The dates are the week beginning of when the maximum change in each pollutant, at each site, was realised. Hence they are not regularly spaced. Roadside sites have been selected as these are the most affected and these will not necessarily match the key CAZ count sites noted in the traffic section of the report, as this is considering air quality rather than traffic data. The analysis compares weekly averages to the same week in the preceding year, i.e. 2019. While this does not take into account the effects of the weather on concentrations, it provides an indication of the extent of change and by using weekly means, noise* that would be apparent when using a daily mean value is reduced (*noise is used as in signal; meaning short term fluctuations due to weather that provide a misleading impression of the longer term trends). Bristol City Council's data are ratified according to processes detailed with our [annual status reports](#). Data from the national network sites (Bristol St. Pauls and Bristol Temple Way) are not fully ratified at the time of writing.

Site ID	Location	Pollutant	Week Beginning	Percentage change
215	Parson St.	NO ₂	24/08/2020	-55%
215	Parson St.	NO _x	06/04/2020	-59%
270	Wells Road	NO ₂	20/04/2020	-51%

270	Wells Road	NOX	19/10/2020	-58%
463	Fishponds Road	NO2	23/03/2020	-75%
463	Fishponds Road	NOX	30/03/2020	-77%
500	Temple Way	NO2	06/07/2020	-76%
500	Temple Way	NOX	06/07/2020	-85%
501	Colston Avenue	NO2	20/04/2020	-76%
501	Colston Avenue	NOX	20/04/2020	-86%

The chart below shows the weekly mean concentrations of NOx at sites in 2019 and 2020. Not all sites measure all pollutants. NOx is selected as this pollutant is most closely associated with traffic emissions.

Change in weekly NOx concentrations



Changes in air quality at Bristol's continuous monitoring sites

Bristol's city centre site at [Colston Avenue](#) is the most polluted roadside site on the network and so is an interesting example of the reductions during the lockdown. The chart below shows weekly mean concentrations of NOx, NO2 and PM10 for the baseline and lockdown period. Operational issues between 9th April and 15th April mean that data is incomplete for this period.

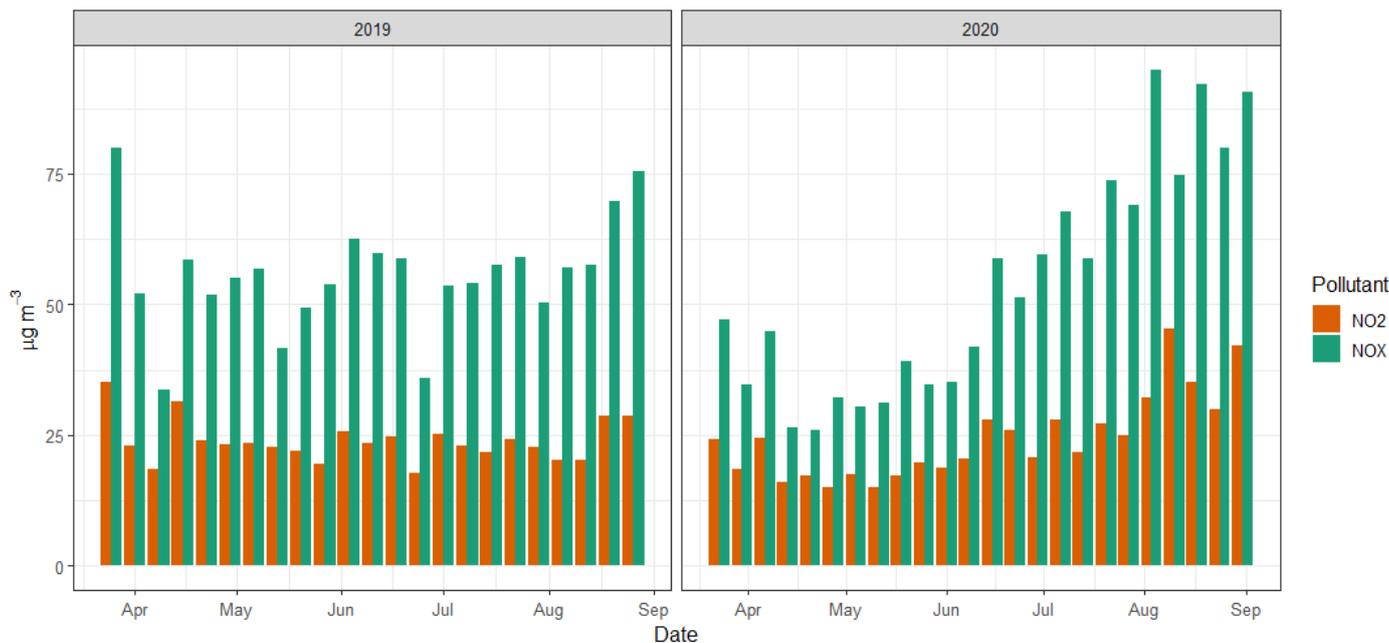
Changes in weekly mean concentrations by year in lockdown periods: Colston Avenue



Operational issues 9th April to 16th April 2020

Other sites on the network show similar patterns. For the [Wells Road](#) site, the difference in concentrations between the two periods was not as pronounced as for Colston Avenue.

Changes in weekly mean concentrations in lockdown periods: Wells Road



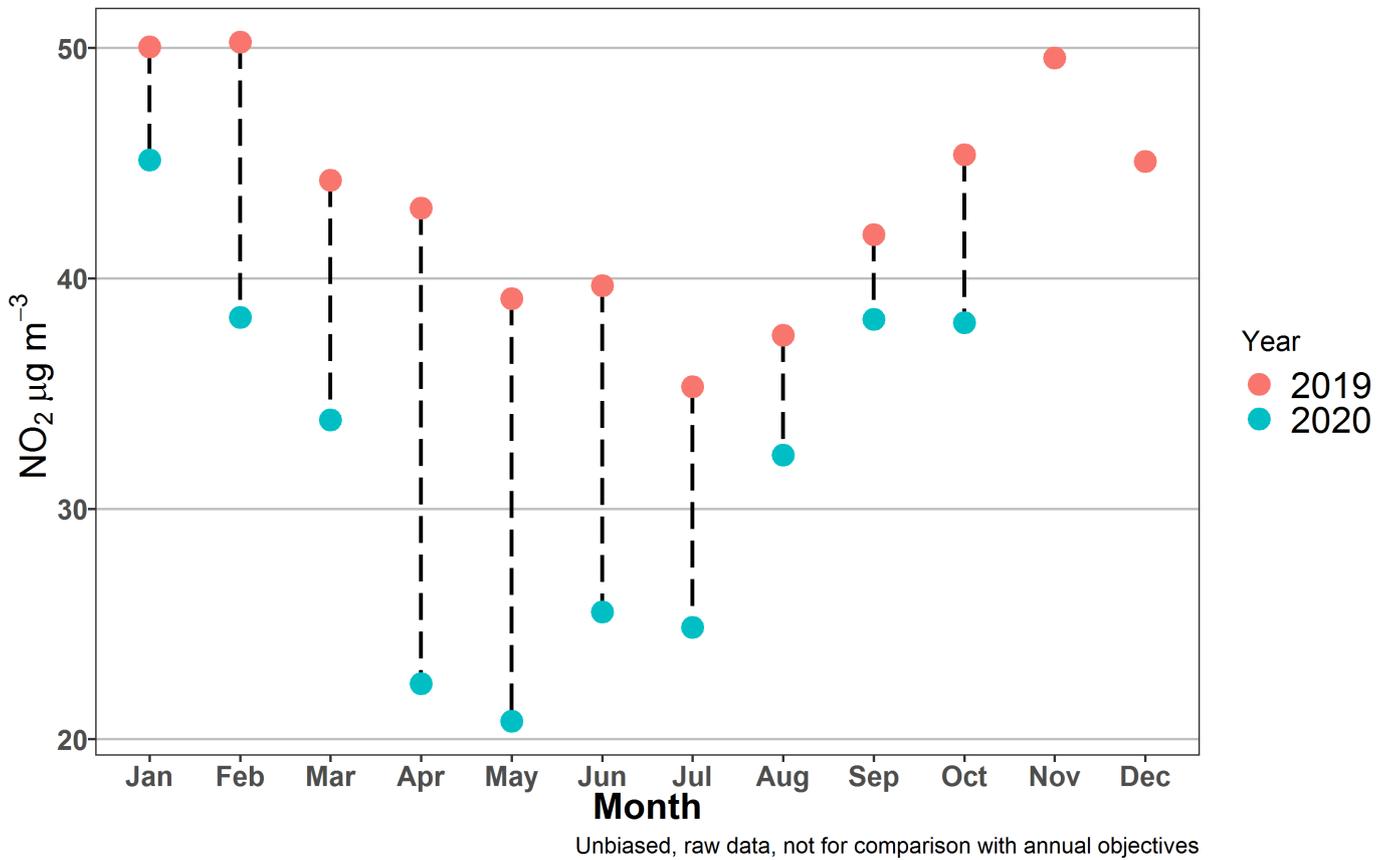
Changes in nitrogen dioxide at diffusion tube sites

Diffusion tubes are used to monitor ambient nitrogen dioxide. Nitrogen dioxide from the air diffuses into a metal grid in the tube and the tubes are sent for analysis in a laboratory. Diffusion tubes are placed according to a monthly calendar specified by Defra and BCC's diffusion tubes are exposed according to this calendar. April 2020 was the first

complete month where tubes were entirely exposed under the lockdown measures.

The chart below shows that the difference in concentrations between 2019 and 2020 increased dramatically as the first lockdown took effect and diminished as lockdown measures were eased during the summer.

Difference between 2019 and 2020 monthly diffusion tube means



De - weathering ambient air quality measurements

The de-weather functions of the [openair package](#) were used to remove the effect of the weather on concentrations of regulated pollutants measured by Bristol City Council’s and Defra’s monitoring sites in Bristol. The de-weather package uses a boosted regression tree approach for modelling air quality data. This technique builds a statistical model of the air quality data and thereby takes account of the many complex interactions between variables as well as non-linear relationships between the variables.

Predictions of daily mean concentrations are derived from the modelled hourly means of data that are aggregated by site type. The accepted classifications of “Urban Background” (distant from busy road) and “Urban Traffic” (close to busy road) were used, as well as a classification of “City Centre” to cover the most polluted site, Colston Avenue, as this site represents the most polluted air in the city. Sites with a data capture less than 90% are not used in the analysis. The table below shows the classes for each of the sites analysed.

Site Class	Site Name
City Centre	Colston Avenue
Urban Background	AURN St Pauls
Urban Background	Brislington Depot
Urban Traffic	Parson Street School
Urban Traffic	Temple Way
Urban Traffic	Wells Road

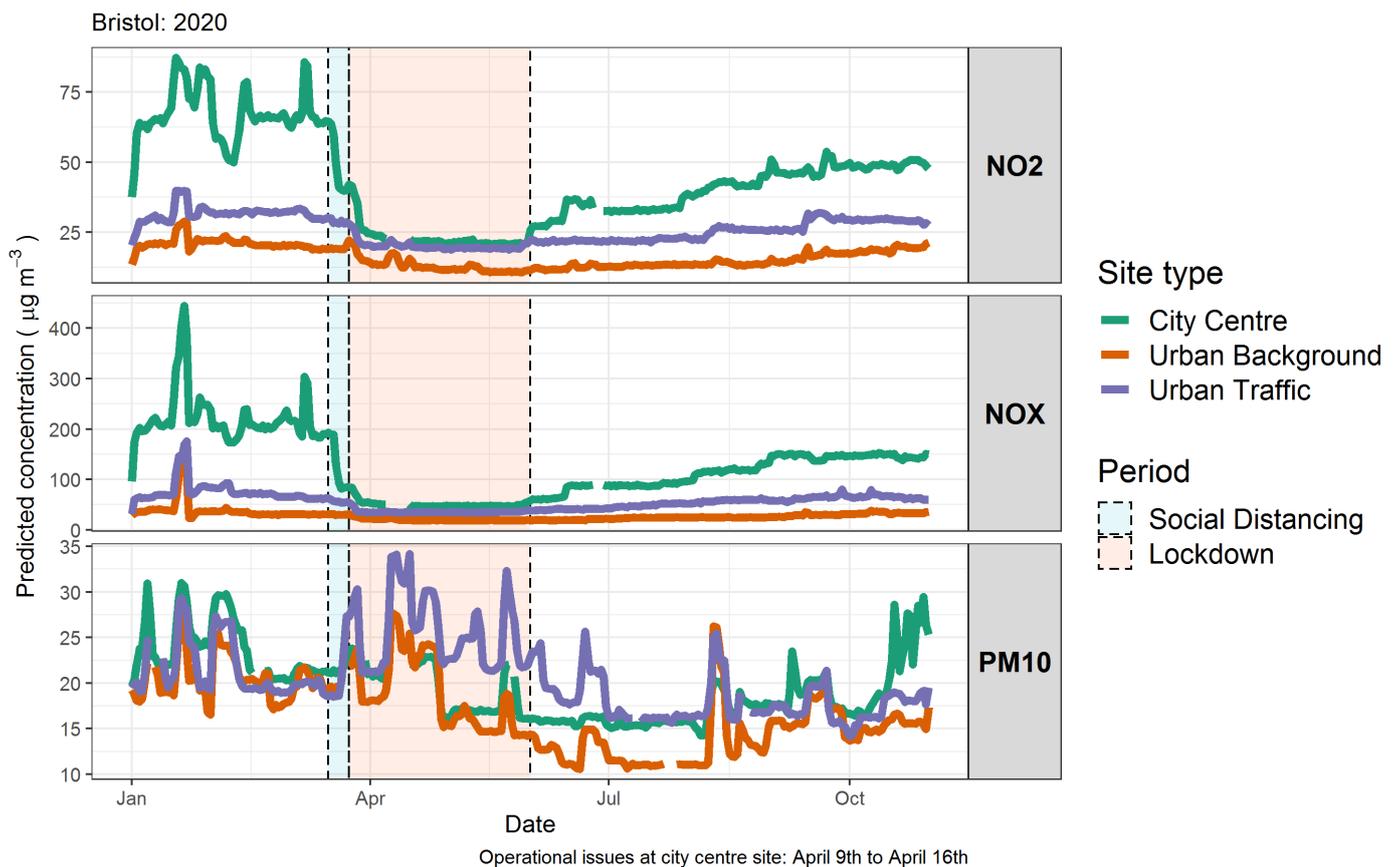
The chart shown below is the predicted “de - weathered” concentrations of three pollutants grouped into site types. The removal of the influence of the weather indicates that the reductions in measurements of traffic pollutants are probably not due solely to the weather. Reductions in traffic emissions due to the Covid-19 lockdown measures are the likely explanation.

For NO₂ it is noticeable that at the city centre site (Colston Avenue) concentrations started to decline around the 16th March, and continued to decline further in the days immediately following lockdown on the 24th March. The post - lockdown decline was also apparent in the urban traffic and urban background site classes. A small increase in NO₂ at urban traffic and urban background sites was seen around 8th - 12th of April. This could be explained by a regional pollution episode that also increased PM₁₀ concentrations during the same period. Unfortunately operational issues at the city centre site mean that data was unavailable from the 9th April to the 15th April.

For NO_x, a similar reduction was seen at the city centre site after the 16th April and a small reduction in concentrations at urban traffic sites is apparent.

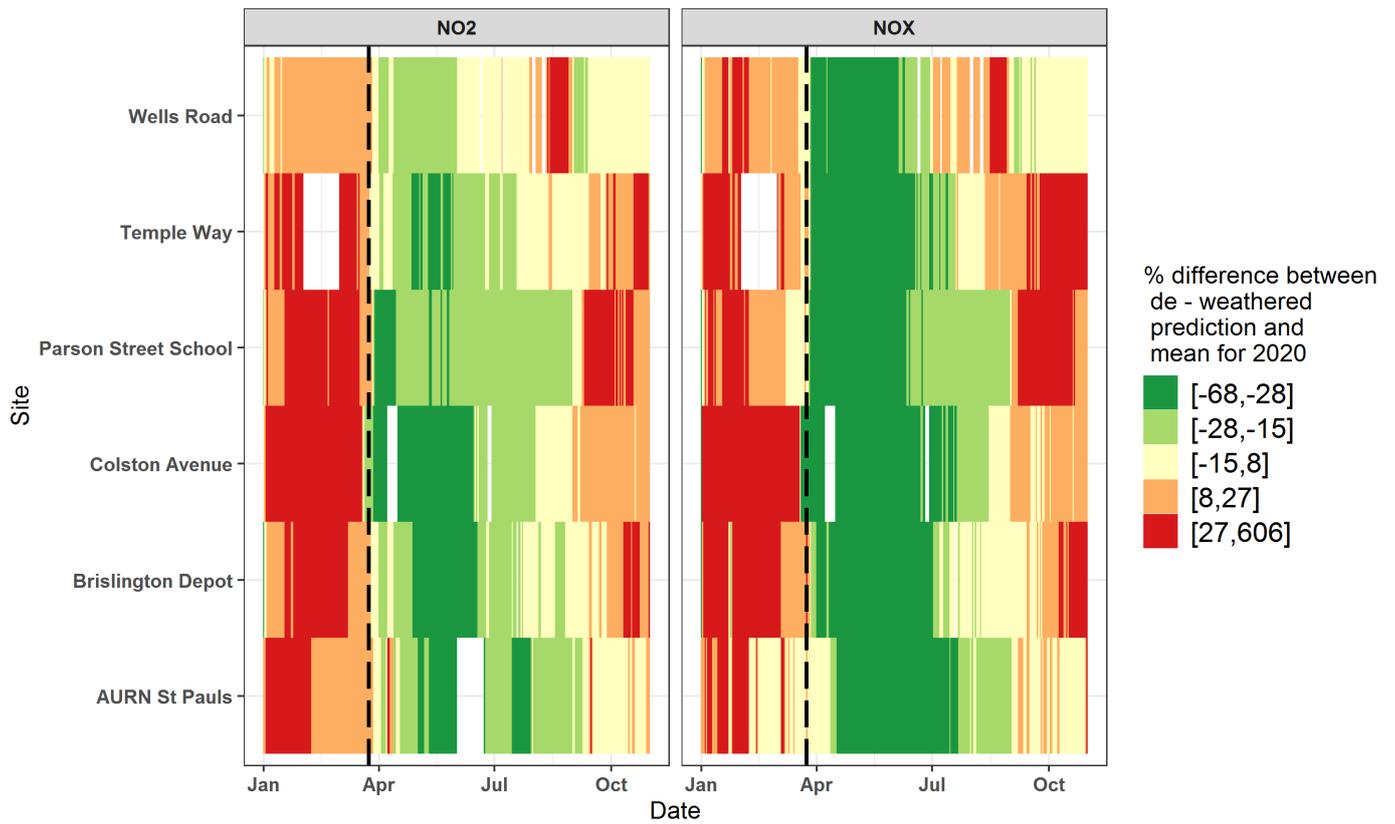
PM₁₀ concentrations did decline in the immediate post - lockdown period but then rose steeply during the pollution episode over Easter weekend when polluted air from northern Europe moved over the southern half of the UK. This caused elevated concentrations of PM₁₀, PM_{2.5} and ozone at sites in Bristol and across the south of the UK. The boosted regression tree model used in the de - weathering process take into account wind speed and direction but cannot account for elevated pollutant levels in the incoming air and hence are unable to remove the effect of regional pollution episodes such as the one that occurred at this time.

Daily mean de - weathered predictions



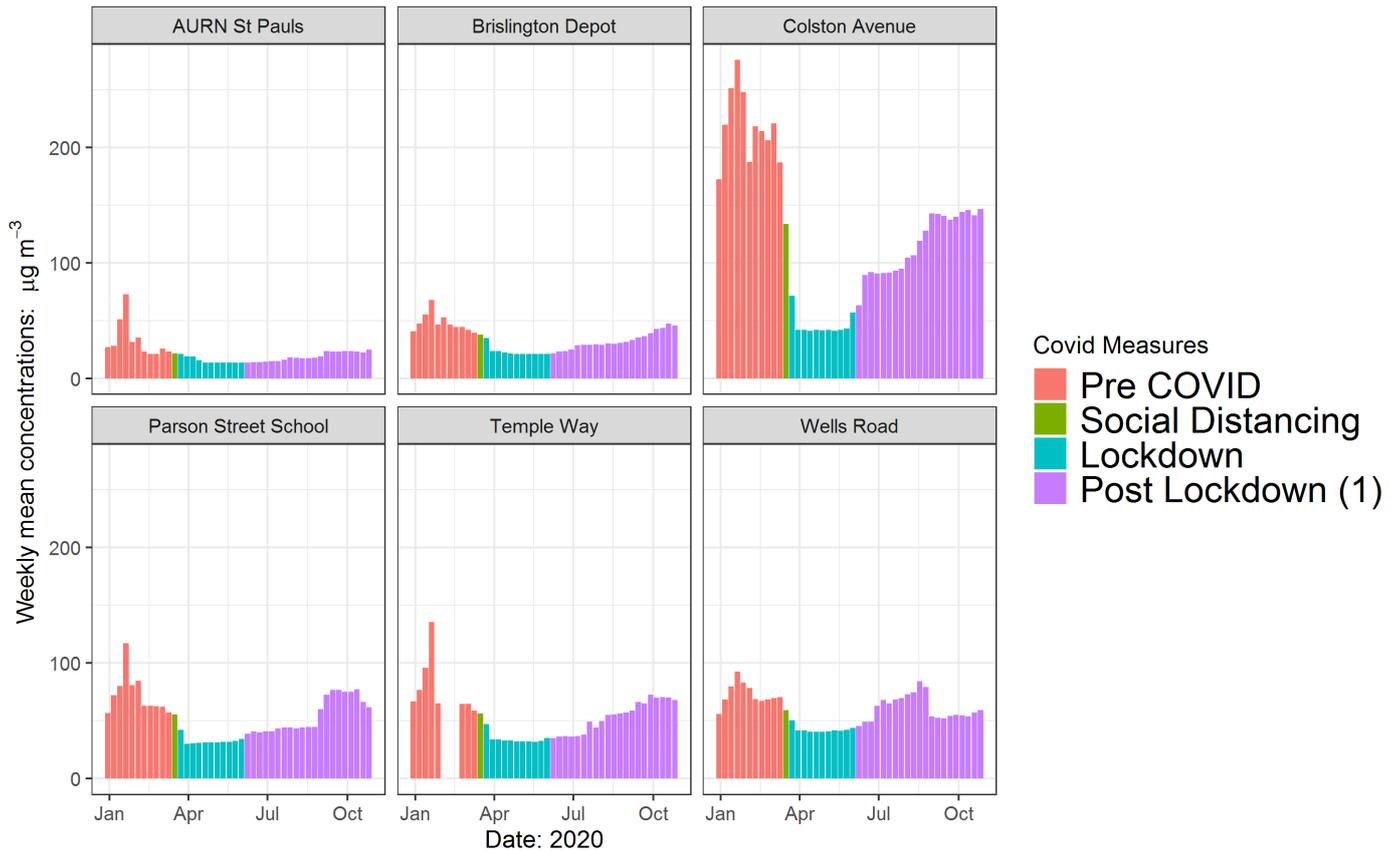
The de - weathering process can also be applied to individual sites. The chart below shows how the de-weathered daily predictions vary from the mean levels for traffic pollutants for 2020 for each site. It is clear that from the date of lockdown, significant reductions have occurred at all sites for NO_x and NO₂ and that these reductions are not primarily driven by weather. It can be seen that de-weathered concentrations start to rise from mid- June.

Variation between de - weathered predictions and mean concentrations in 2020



Plotting the weekly mean concentrations of the traffic pollutants NO_x and NO₂ shows the effect of lockdown rules on weekly concentrations by controlling for the effect of the weather. It can be seen from the plot below that concentrations remained low throughout May, despite some evidence that traffic levels had started climbing since mid- April. There is some evidence of rising concentrations towards the end of June though, particularly at Colston Avenue.

Weekly de - weathered NO_x



Report conclusions

Combining the evidence base available for both traffic volumes and air quality before, during and post lockdowns, it seems fair to conclude that this evidence shows a decline in traffic volumes and improvements to air quality during the first lockdown in particular. The second lockdown was less restrictive than the first and as such didn't lead to such a steep decline in traffic volumes but a not insignificant decline in traffic volumes was still observed.

For comparative purposes, data from October 2019 and October 2020 have been focussed on. October 2020 was the key period when traffic had most chance to return to normal levels; before lockdown 2 and the Christmas period changed things. This showed that traffic in the key locations during October 2020 was 82% of the same time the previous year. While this signifies a rise in traffic volume compared with the dramatic drop in levels seen during lockdown 1, it also demonstrates a sustained 18% drop in traffic volumes, which should not be understated. This could, amongst other things, be attributed to new ways of working resulting in less people needing to access the central location and potential positive effects following the implementation of the Street Space schemes.

Whilst we cannot say from this data that traffic levels and associated pollution levels will definitely return to pre COVID levels, we also don't have sufficient evidence to say otherwise. This data will be reviewed by the science team at JAQU as part of a full technical review of all the data submitted. JAQU will subsequently conclude what measures Bristol are required to implement.

Recommendations:

That the CAZ Board;

1. Agrees to the inclusion of the technical data in this report as an appendix to the final technical note and submission to JAQU.

Background Documents:

- N/A

Appendix A – Further essential background / detail on the proposal or to provide supporting information	YES
Appendix B – Details of consultation carried out - internal and external	NO
Appendix C – Summary of any engagement with scrutiny	NO
Appendix D – Risk assessment	NO
Appendix E – Equalities impact assessment of proposal	NO
Appendix F – Eco-impact screening/ impact assessment of proposal	NO
Appendix G – Financial Advice (<i>Financial officer must be the author of the advice</i>)	NO

DRAFT