Birmingham City Council

BIRMINGHAM CLEAN AIR ZONE FEASIBILITY

Additional Measures Study

MAY 2018

CONFIDENTIAL

Birmingham City Council

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Additional Measures Study

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EXECUTIVE SUMMARY

The 2017 UK Plan for Tackling Roadside Nitrogen Dioxide Concentrations identified a number of urban areas where roadside levels of the air pollutant nitrogen dioxide (NO_2) are exceeding the respective health-based annual mean EU limit value, as defined by the European *Ambient Air Quality Directive*. The Government's bespoke air quality model has indicated that some of these exceedances will remain up to and beyond 2020 should further action not be taken to primarily target the reduction of vehicle emissions in these areas.

The Air Quality Plan identified five cities, including Birmingham, where further action is mandatory to deliver compliance with the NO_2 annual mean limit value in the shortest time possible, including the implementation of a charging Clean Air Zone (CAZ). A charging CAZ will require drivers of specified classes of vehicles, which do not meet the necessary vehicle emissions standards, to pay a fee to enter the respective CAZ area.

Birmingham City Council's air quality model has predicted that a charging CAZ alone will not be sufficient to deliver compliance with the EU limit value by 2020 in Birmingham and, as such, additional measures targeted at improving air quality within the areas of concern will be required.

Birmingham City Council are progressing a number of work packages to identify a solution, which will incorporate a CAZ and additional measures, to achieve compliance with the EU Ambient Air Quality Directive within the shortest time possible time. (Referred to throughout this document as the *primary objective*).

WSP was commissioned by Birmingham City Council (BCC) to undertake a study to identify the additional measures that are considered to have the greatest potential to contribute to the primary objective. The additional measures study comprises three main phases of work:

1. ***Option Generation and Initial Sift***

   A desk-based review of national, regional, and local guidance and policy was completed to identify a long list of measures that were considered to target improvements in air quality. These measures were subjected to an initial sift using bespoke criteria to identify those that should be taken forward for further appraisal in Phase 2 of the study and those that should not be considered further within the study.

   The sift criteria focussed on the potential for each measure to: contribute to the primary objective; be scaled appropriately and implemented within a suitable timeframe; and, be acceptable within a social and economic context.

   From an initial list of 104 measures, 33 were identified as having the potential to contribute to the primary objective within a suitable timeframe and were progressed to Phase 2 of the study.

   A further 22 measures were identified as having potential to materially improve air quality within areas of concern, but not before 2020 and would therefore not contribute to the primary objective. However, these were appraised separately, in the event that further measures beyond 2020 should be required to improve air quality or form part of a potential bid to the Clean Air Fund.

   This phase of work included a stakeholder workshop with BCC and key experts from the Birmingham CAZ work streams to facilitate input to the sifting exercise and outcomes.

2. ***Option Appraisal and Selection***

   The 33 short listed measures were appraised within the context of a Multi Criteria Analysis (MCA) Framework. The MCA framework was developed to consist of a number of evaluation criteria that cover a suite of objectives, against which each potential measure was assessed and assigned a numeric score. Based on the ranked score, measures were identified to take forward for further development and detailed appraisal in Phase 3 or to remain aspirational.

   In addition to appraising the potential for the measure to materially contribute to achieving the primary objective, the MCA framework focussed on other key objectives linked to the feasibility of the CAZ, including: achieving immediate and sustained improvements to air quality and health; supporting local

growth and ambition; supporting acceleration towards a low emission economy; deliverability; and, preserving equality and acceptability.

Further to these, it was important that the MCA considered the extent to which each measure could be represented within transport and air quality modelling being completed by BCC in conjunction with each potential CAZ scenario. This will enable a quantitative assessment of the measure's potential to contribute to the primary objective.

Where the MCA score indicated that a measure has medium to large positive potential to achieve the criteria objectives, it was recommended that it be progressed to Phase 3 of the study.

Of the 33 additional measures appraised, 13 were recommended to be progressed to Phase 3, comprising:

- Increase LPG refuelling for Hackney Carriages and the installation of rapid EV infrastructure for taxi and private hire vehicles (ID 15)
- Retrofitting of black taxi's to LPG (ID 16)
- Highway/infrastructure improvements to bus services to make them more viable and accessible to the public and increase bus priority schemes (ID 19,21)
- Zero emission buses/retrofitting of public transport fleet (ID 20a)
- Remove free on-street parking within the city centre (ID 37)
- Incentivise or subsidise sustainable travel by up to 50% to improve public transport patronage (ID 56)
- Signing strategy to encourage northbound traffic on Suffolk Street, Queensway towards Sandpits Parade to reroute to west of Ring Road. (ID 67)
- Signing strategy to encourage southbound traffic from Great Charles St and Sandpits to re route to Ring Road rather tan A38 Suffolk Street Qway Close the junction on Dartmouth Middleway between Lister Street and Great Lister Street to avoid stop start traffic and reduce congestion (ID 69)
- Re-signing and rerouting scheme for the A38 (ID 73)
- Ban all through traffic on the A38 around Paradise Circus, diverting traffic to the A4540 (ID 74)
- Change the boundary of the CAZ to incorporate the A4540 and encourage traffic to divert to the west of the city (ID 74a)
- Restrict traffic on Moor Street Qway to bus, taxi and cycle only and close Park Street to all traffic (ID 75)

This process was repeated separately for the 22 *post-2020* measures identified in Phase 1. The MCA scoring for these measures identified 14 measures with medium to large positive potential for improving air quality beyond 2020. Although these measures were not progressed to Phase 3 of this study, they are recommended for further development at a later date, should the need arise.

Phase 2 of the study incorporated the outcomes of a stakeholder workshop BCC and key experts from the Birmingham Clean Air Zone work streams during September 2017.

3. *Detailed Appraisal Methodology*

The purpose of Phase 3 of the study is to generate the detailed appraisal methodologies for each of the 13 additional measures progressed from Phase 2. Specifically, this will comprise the development of methodologies to enable each measure to be represented within transport modelling alongside the future CAZ scenarios being assessed for their feasibility by BCC.

The outputs from the transport modelling will be utilised as inputs to BCC's air quality model to facilitate an in-combination quantitative assessment of the CAZ and additional measures, with the primary aim of achieving compliance with the NO_2 annual mean EU limit value in the shortest time possible.

This document reports on the outcomes of Phase 1 and Phase 2 of the Additional Measures Study. Phase 3 is reported in a separate technical document.

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PHASE 1: OPTION GENERATION & INITIAL SIFT

1 PHASE 1: OPTION GENERATION & INITIAL SIFT

1.1 INTRODUCTION

WSP was commissioned by Birmingham City Council (BCC) to identify additional supplementary measures which Birmingham will be required to implement in addition to a Clean Air Zone (CAZ) to ensure that improvements to air quality are delivered and annual mean nitrogen dioxide (NO_2) concentrations are compliant with the respective EU limit value by 2020.

The additional measures appraisal will be delivered in three phases;

1. Option Generation and Initial Sift - identification and analysis of measures using bespoke criteria to sift the high number of potential options and determine which should be taken forward for more detailed appraisal.

2. Option Appraisal and Selection - using a Multi Criteria Analysis (MCA) framework to enable all additional measures taken forward from Phase 1 to undergo rigorous appraisal and identify those measures to be taken forward for further development.

3. Detailed Appraisal Methodology - develop traffic and air quality modelling approaches for the selected measures identified in Phase 2 to determine the potential for the measures to be represented within the respective CAZ modelling scenarios.

1.2 OPTION GENERATION AND INITIAL SIFTING

OPTION GENERATION

A desk top study of available information relating to local, regional and national measures to improve air quality was undertaken, with a focus on existing and potential additional measures to be considered in conjunction with a CAZ to achieve compliance.

Other source material including, but not limited to the following, were reviewed to generate a suite of potential measures that were included in the initial sifting process:

- Birmingham City Blue Print for Low Carbon Fuel Refuelling Infrastructure (2015);
- Birmingham Connected White Paper - 20 year Transport Strategy (2014);
- Clean Air Zone Framework for England (2017);
- Guidance notes from National Institute for Health and Care Excellence (NICE);
- Regional low emission strategies;
- UK Air Quality Plan for tackling Nitrogen Dioxide (NO_2) (2017); and
- West Midlands Low Emission Bus Delivery Plan (2016).
- West Midlands Combined Authority: Movement for Growth: The West Midlands Strategic Transport Plan

In addition, BCC, Transport for West Midlands and key experts from the Birmingham CAZ work streams were consulted to help identify further measures to take through the initial sifting process.

INITIAL SIFTING

Each potential measure was subject to an initial sifting process, comprising the following criteria (*description in italics*):

Question 1 (Q1) – Is the measure likely to materially contribute to achieving the primary objective?

Description: The primary objective is to deliver an additional measure or package of measures, in combination with a charging CAZ, which leads to compliance with NO_2 concentration limits in the shortest time possible, but by 2020 at the latest. Therefore, this sifting criterion enables a review of the potential for the measure to contribute to reducing emissions of oxides of nitrogen (NO_x) and thus concentrations of NO_2.

Question 2 (Q2) – Is the measure already being applied on a local, regional and/or national basis?

- **Q2i - If 'Yes'; can it be up scaled and accelerated?**
- **Q2ii - If 'No'; is the measure viable given the timeline for compliance?**
- **Q2iii - If 'No', is the measure viable post 2020?**

Description: This criterion considers the timeline for implementing the measure. If the measure is currently being applied under local, regional, or national policy, this criterion aims to determine if it can be scaled and accelerated accordingly in order to materially contribute to the primary objective. If the measure is not currently being applied, is it viable for it to be implemented and affect compliance prior to 2020? If this timeline is not viable, would the measure still contribute to reducing NO_2 concentrations beyond 2020?

Question 3 (Q3) – Is the measure likely to be acceptable within a social context?

Description: The aim of this criterion is to consider if the measure would be appropriate and acceptable within communities likely to be impacted by the measure. Ideally, the measure would not negatively impact lifestyles of the local population or have a disproportionate effect on particular groups.

Question 4 (Q4) – Is the measure likely to be viable within an economic context?

Description: This criterion considers if the potential benefit of the measure will be proportionate to the likely cost of implementing it. Ideally, the measure would not negatively impact upon the wider local economy, including local businesses and the livelihoods of the local population.

For each of the above criteria a 'Yes'/'No' decision was made in relation to each potential measure along with a brief justification for the answer.

Finally, professional judgement was made as to whether to bring the additional measure forward to the next stage of option appraisal.

A stakeholder workshop was undertaken with BCC and key experts from the Birmingham CAZ work streams during July 2017 to enable the group to contribute to the outcome of the initial sifting exercise.

Table 1 presents the outcomes from the option generation and initial sifting exercise.

Table 1 – Option Generation and Initial Sifting Outcomes

ID	Potential Additional Measure	Evidence Base	Non-Technical Description	Sifting Criteria (Y/N)						Sifting Justification	Judgement
				Q1	Q2i	Q2ii	Q2iii	Q3	Q4		
POTENTIAL MEASURES											
01	Development of a freight partnership for city centre deliveries	UK Air Quality Plan	Development of a freight partnership for city centre deliveries to set and implement stretching targets to improve efficiency of fleet	Y	--	N	Y	Y	Y	Potential to reduce NO_x emissions and contribute to the effective distribution of freight; potential to accelerate through the West Midlands Freight Quality Framework (FQP). May not be viable given the timeline for compliance. Ongoing dialogue with businesses and operators to consider initiatives for reducing freight movements.	**Exclude, although the measure should be considered as part of a longer term post 2020 plan**
02	Freight consolidation centres	UK Air Quality Plan/Birmingham Connected technical paper 1&2	Freight consolidation through rearranging and combining goods shipments into fewer deliveries into the city centre	Y	--	N	Y	Y	Y	Will reduce NO_x emissions and contribute to the primary objective; potential to be accelerated through the TFWM freight strategy. However, the scope and scale of the change required together with the ability to identify and deliver site(s) would be extremely challenging ahead of 2020.Freight & Logistics engagement suggests that consolidation is not popular among businesses. Detailed data required on its target market.	**Exclude, although the measure should be considered as part of a longer term post 2020 plan**
03	Cargo hopper/ULEV deliveries from freight centres	Birmingham connected technical package 3	Use of sustainable (ULEV) vehicles to make deliveries in city centre from consolidation centres	Y	--	N	Y	Y	Y	Will reduce NO_x emissions; incentives and early engagement with operators. Reliant on freight centre in operation. As per comments at 02.	**Exclude, although the measure should be considered as part of a longer term post 2020 plan**
04	Local delivery hubs including cycle/EV logistics	Birmingham connected technical package3	Use of local delivery hubs for smaller businesses/ goods which use EV or cycle for onward travel	Y	--	N	Y	Y	Y	Will reduce NO_x emissions in the city, early engagement with operators; potential modal shift; however, the processes involved in such a scheme may make this initiative unviable given the timescale for compliance. Scope and scale required to deliver meaningful emissions reductions creates uncertainties regarding deliverability.	**Exclude, although the measure should be considered as part of a longer term post 2020 plan**

ID	Potential Additional Measure	Evidence Base	Non-Technical Description	Sifting Criteria (Y/N)						Sifting Justification	Judgement
				Q1	Q2i	Q2ii	Q2iii	Q3	Q4		
05	Provide hold back parking for HGV's	Birmingham connected technical package3	Provide hold back parking bays to allow safe waiting areas away from the city centre	N	Y	--	--	Y	Y	Potential to contribute to primary objective by reducing HGV idling in the city centre; engagement with operators required.	**Exclude, however measure should be considered as part of a wider package of measures**
06	Off peak loading and unloading permits	Birmingham connected technical package 1	Off peak loading and unloading permits allowing access for servicing local business whilst encouraging loading outside of peak periods	N	--	Y	--	Y	Y	Potential to contribute to primary objective; potential to be accelerated through current permit schemes. However, dependent on extensive engagement with business and operators.	**Exclude, however measure should be considered as part of a wider package of measures**
07	Loading and Unloading code of practice	Freight Transport Association	Loading and Unloading code of practice specific to Birmingham	N	--	Y	--	Y	Y	Considered negligible in terms of contribution to primary objective. Engagement with the operators. However, dependent on extensive engagement with business and operators.	**Exclude, however measure should be considered as part of a wider package of measures**
08	Out of hours deliveries	Transport for London	Retiming deliveries to avoid the busiest times of day	N	Y	--	--	Y	Y	Unlikely to be a material contribution in isolation, but in combination with other measures, there is likely to be a contribution to reducing NO_x emissions. Potential for noise implications; potential conflict with existing planning condition restrictions on delivery times. However, dependent on extensive engagement with business and operators.	**Exclude, however measure should be considered as part of a wider package of measures**
09	Quiet delivery schemes	BCC / DfT	Retiming deliveries to avoid the busiest times of day using a standardised approach to circumvent delivery restrictions moving	N	Y	--	--	Y	Y	Unlikely to be a material contribution in isolation, but in combination with other measures, there is likely to be a contribution to reducing NO_x emissions. Potential noise implications require consideration, will require a standardised approach to planning conditions; engagement and public relations (PR) with operators required.	**Exclude, however measure should be considered as part of a wider package of measures**

ID	Potential Additional Measure	Evidence Base	Non-Technical Description	Sifting Criteria (Y/N)						Sifting Justification	Judgement
				Q1	Q2i	Q2ii	Q2iii	Q3	Q4		
			forward on new planning consents								
10	HGV/LGV/Taxi recognition schemes	UK Air Quality Plan / Local authority widespread measure	Recognition schemes such as Fleet Operator Recognition Scheme (FORS) to encourage business (HGV/LGV and Taxis) to improve efficiency, reduce fuel consumption and emissions.	N	Y	--	--	N	N	Unlikely to be a material contribution in isolation, but in combination with other measures, there is likely to be a contribution to reducing NO_x emissions. Incentives, engagement and PR with operators required.	**Exclude, however measure should be considered as part of a wider package of measures**
11	Delivery and Service Planning (DSPs)	BCC website	Delivery and Service Planning Toolkit for businesses and organisations operating in Birmingham.	N	Y	--	--	Y	Y	Unlikely to be a material contribution in isolation, but in combination with other measures, there is likely to be a contribution to reducing NO_x emissions. Potential to upscale through the Birmingham Freight and Logistics Engagement.	**Exclude, however measure should be considered as part of a wider package of measures.**
12	No stopping restrictions for deliveries	Birmingham connected technical package 2	Remove/ relocate parking/loading to an alternative area/ car park and loading bays off main routes to minimise congestion.	Y	Y	--	--	Y	N	May contribute to primary objective on main routes where implemented; potential localised deterioration in NO_X where bays are relocated; potential to impact on business and increase delivery times.	**Exclude**
13	Time of day restrictions for delivery vans in the area beyond the CAZ boundary	Oxford City Council / France	Time of day restrictions for delivery vans accessing areas outside of the CAZ boundary which could be based on	Y	Y	--	--	Y	Y	Will contribute to a reduction in NO_x emissions, engagement with operators and business is required. Significant changes to operations required.	**Appraise**

ID	Potential Additional Measure	Evidence Base	Non-Technical Description	Sifting Criteria (Y/N)						Sifting Justification	Judgement
				Q1	Q2i	Q2ii	Q2iii	Q3	Q4		
			euro/ULEV standard								
14	Taxi Emission Strategy and Implementation including incentives for private hire vehicles to change to EV vehicles	UK Air Quality Plan / BCC	Taxi Emission Strategy and Implementation alongside incentivising private hire vehicles to change to EV/ULEV through reduced permit fees/ free top up at taxi charge points	Y	Y	--	--	Y	Y	Will contribute to a reduction in NO_x emissions, potential to be upscaled and accelerated through tighter emission standards. Will require engagement with private hire operators. Taxi Licencing conditions updated to require vehicles to be CAZ compliant by 2019. Incentives including expansion of charging network to encourage take up of EV taxis.	**Exclude, however measure should be considered as part of a wider package of measures**
15*[1]	Increase LPG refuelling infrastructure for Hackney Carriages and the Installation of rapid EV infrastructure for taxi and private hire vehicles, including providing a mechanism to support change.	UK Air Quality Plan / BCC	Increase LPG refuelling infrastructure for Hackney Carriages and Installation of rapid electric vehicle infrastructure for taxi and private hire use, including providing a mechanism to support change.	Y	Y	--	--	Y	Y	Will reduce NO_x emissions and contribute to public health improvements. Infrastructure already in place for LPG, initiative can be upscaled to widen the network through government funding initiatives. Potential for EV infrastructure to be accelerated as funding obtained from OLEV for electric taxi infrastructure. Procurement for an EV Development Partner to to develop a city wide EV charge point network is underway. A Development Plan will be developed to install a 197 taxi EV charge point network using £2.92m from OLEV and commercial investment plan for a robust public accessible charge point network, and a commercial level EV network for larger vehicles such as electric vans, HGVs and buses.	**Appraise**

[1] Current CAZ scenario modelling assumes 100% compliance of taxi fleets

ID	Potential Additional Measure	Evidence Base	Non-Technical Description	Sifting Criteria (Y/N)						Sifting Justification	Judgement
				Q1	Q2i	Q2ii	Q2iii	Q3	Q4		
16	Retrofitting of black taxi's to LPG	UK Air Quality Plan / BCC	Retrofitting of black taxi's to LPG	Y	Y	--	--	Y	Y	Will reduce NO_x emissions. Action can be accelerated as funding obtained to convert 63 diesel cabs to LPG.	**Appraise**
17	Clean Air Taxi Ranks	BCC / West Yorkshire Low Emissions Strategy	Designate taxi ranks in strategic locations as 'clean air taxi ranks' whereby only ULEV taxis can enter	Y	Y	--	--	Y	Y	Will reduce NO_x emissions and contribute to improved public health. Engagement with operators required. Potential to accelerate as ULEV ranks being planned.	**Appraise**
18	BCC advanced quality partnership scheme	UK Air Quality Plan / Birmingham Connected technical package 2	Set stretching targets through a staged approach to improve the efficiency of fleet and specify emission standards in bus contracts and partnership agreements through the advanced quality partnership.	Y	Y	--	--	Y	Y	City Centre scheme has already supported an improvement in bus emissions in the city centre reducing NO_x emissions; however, CAZ standards will drive improvements to bus fleet, TfWM have secured funding to enable retrofit of 324 buses operating into Birmingham City Centre.	**Exclude**
19	Highway/ infrastructure improvements to bus services to make them more viable and accessible to the public	Birmingham connected technical package 2	Improvements to bus services to make them more viable and accessible to the public, including improvements to key priority routes	Y	Y	--	--	Y	Y	Will contribute to NO_x emissions via improvements to fleet, potential to accelerate through the advanced partnership scheme. Linked to ID 21. Working with TfWM to identify potential interventions – linked to Early Measures funding.	**Appraise**
	Zero emission buses/retrofit of public transport fleet	UK Air Quality Plan	Zero emission	Y	Y	--	--	Y	Y	Will reduce NO_x emissions. Potential to be accelerated through government funding and	**Appraise**

ID	Potential Additional Measure	Evidence Base	Non-Technical Description	Sifting Criteria (Y/N)						Sifting Justification	Judgement
				Q1	Q2i	Q2ii	Q2iii	Q3	Q4		
20*[2]										the advanced partnership scheme. Measure forms part of the requirements of a CAZ. TfWM have secured funding to retrofit 324 buses operating in Birmingham city centre.	
21	Increase bus priority schemes including; - reviewing city centre bus routes and interchanges - road space allocation	Birmingham connected technical package 1&2	Increase bus priority at traffic signals and increase bus lanes. Review bus routes and interchanges to ensure routes are not affected by bus congestion and a deterioration in air quality. Change road space allocation to encourage the uptake of public transport.	Y	Y	--	--	Y	Y	Will reduce NOx emissions. Initiative already implemented in Birmingham with the potential for it to be upscaled and accelerated to other areas through the Birmingham City Centre advanced partnership scheme and Policy TP38 of the Birmingham Development Plan. Linked to ID 19. Working with TfWM to identify potential interventions – linked to Early Measures funding. Large scale interventions unlikely to be delivered before 2020. Commonwealth Games SPRINT routes to be delivered by 2022.	**Appraise**
22	Develop and implement a mass transit network (Sprint)	Birmingham connected technical package 2	Develop and implement a mass transit network (Sprint)	Y	--	N	Y	Y	Y	Will contribute to a reduction in NO_x emissions; however, the delivery of significant infrastructure forsuch schemes make this initiative unviable given the timescale for compliance.	**Exclude, although the measure should be considered as part of a longer term post 2020 plan**

[2] Current CAZ scenario modelling assumes 100% compliance of bus fleets

ID	Potential Additional Measure	Evidence Base	Non-Technical Description	Sifting Criteria (Y/N)						Sifting Justification	Judgement
				Q1	Q2i	Q2ii	Q2iii	Q3	Q4		
23	Low emission bus and taxi routes	UK Air Quality Plan / Edinburgh	Designate certain routes as low emission/ULEV only for bus and taxi and to ensure the cleanest vehicles run on the most polluted routes	Y	Y	--	--	Y	Y	Will reduce NO_x emissions and contribute to an improvement in public health. Potential to be accelerated in conjunction with cleaner vehicle schemes and the CAZ. Work ongoing with operators to determine appropriate deployment of low emission buses.	**Appraise**
24	Increase the number and use of park and ride schemes to coincide with rail and metro services	UK Air Quality Plan / Transport for West Midlands	Increase the number and use of park and ride schemes and coincide with tram services and complement these sites with EV charge points and cycle storage facilities	Y	--	N	Y	Y	Y	Will reduce NO_x emissions and reduce vehicle trips into the city with a potential to contribute to public health and economic efficiency improvements; not considered viable given the timescale for compliance. Limited scope for further Park & Ride expansions ahead of 2020. Significant increase coupled with city centre demand management to deliver reductions in emissions.	**Exclude, although the measure should be considered as part of a longer term post 2020 plan**
25	Develop a network of low emission bus routes serving dedicated Park & Ride sites	Speculative	Utilise EV buses to run along the park and ride routes	Y	N	--	--	Y	N	Would reduce NO_x emissions; no buses run along the park and ride routes, making this initiative unviable. Rail park and ride is in operation in Birmingham.	**Exclude**
26	Further extensions of the Metro system	Birmingham connected technical package 2	Further extensions of the Metro system	Y	--	N	Y	Y	Y	Will reduce NO_x emissions and reduce private vehicle trips into the city with a potential to contribute to public health and economic efficiency improvements; additional schemes planned beyond the compliance date.	**Exclude, although the measure should be considered as part of a longer term post 2020 plan**
27	Reopen Camp Hill Rail Chords line for rail commuters	TfWM draft Delivery Plan 2026 for Transport / Birmingham connected	Open Camp Hill Rail Chords line for rail commuters	Y	--	N	--	Y	Y	Will reduce NO_x emissions and vehicle trips into the city with a potential to contribute to public health improvements; potential to be accelerated through the TfWM delivery plan proposals. Part of the Midlands Rail Hub	**Exclude, although the measure should be considered as part of a longer term post 2020 plan**

ID	Potential Additional Measure	Evidence Base	Non-Technical Description	Sifting Criteria (Y/N)						Sifting Justification	Judgement
				Q1	Q2i	Q2ii	Q2iii	Q3	Q4		
		technical package 2								proposals , the scheme will not be delivered before 2020.	
28	Open stations on the Camp Hill Line at Moseley, Kings Heath and Hazelwood to passenger services	TfWM draft delivery plan for transport 2026 / Birmingham connected technical package 2	Open stations on the Camp Hill Line at Moseley, Kings Heath and Hazelwood to passenger services	Y	--	N	--	Y	Y	Will reduce NO_x emissions and vehicle trips and contribute to public health improvements; potential to be accelerated through the TFWM delivery plan proposals. However, it is unlikely that the stations and services can be delivered ahead of 2020.	**Exclude, although the measure should be considered as part of a longer term post 2020 plan**
29	New Street Station - night freight deliveries	Birmingham connected technical package 3	Enable night freight at New Street Station to deliver to local businesses	Y	--	N	Y	Y	Y	Will reduce NO_x emissions and vehicle trips into the city; may contribute to primary objective subject to the rail line being electrified. Not viable given the timescale for compliance.	**Exclude, although the measure should be considered as part of a longer term post 2020 plan**
30	Birmingham Canal Network	Birmingham connected technical package 3	Support movement of goods through the city via the Birmingham Canal Network	Y	--	N	Y	Y	Y	Will reduce NO_x emissions and vehicle trips into the city with a potential to contribute to public health improvements; scheme may not be viable given the timescale for compliance.	**Exclude, although the measure should be considered as part of a longer term post 2020 plan**
31	Accelerate the uptake of infrastructure for electric, hydrogen, compressed natural gas (CNG) and LPG gas powered vehicles	UK Air Quality Plan / BCC	Accelerate the uptake of infrastructure for electric, hydrogen, compressed natural gas (CNG) and LPG gas powered vehicles	Y	Y	--	--	Y	Y	Will reduce NO_x emissions and incentivise the uptake of alternative powered vehicles; potential to upscale and accelerate as initiative is planned.	**Appraise**
33	Zoned CAZ to target inner city and arterial roads	Speculative	Zoned CAZ to target inner city and arterial roads	Y	--	Y	--	Y	Y	Will reduce NO_x emissions in the city centre and wider areas; public health improvements likely. Potential to have a greater impact on	**Exclude - measure being considered as part of CAZ**

ID	Potential Additional Measure	Evidence Base	Non-Technical Description	Sifting Criteria (Y/N)						Sifting Justification	Judgement
				Q1	Q2i	Q2ii	Q2iii	Q3	Q4		
										low income households and affected businesses.	**scenario testing process**
34	Enforce a CAZ D for weekday peak traffic periods only (AM/PM), CAZ C at all other times within the same boundary	Speculative	Enforce a CAZ D (Incl. private vehicles) for weekday peak traffic periods only (AM/PM), CAZ C at all other times within the same boundary	Y	--	Y	--	Y	Y	Will reduce NO_x emissions in the city centre and wider area; public health improvements likely. Potential to have a greater impact on low income households and affected businesses.	**Exclude - awaiting direction**
35	Workplace parking levy for businesses	UK Air Quality Plan / Nottingham City Council	Impose a charge for workplace parking	Y	Y	--	--	Y	Y	Will reduce NO_x emissions; modal shift benefits. Early engagement with local businesses/workplaces. May not be viable given the timescale for compliance.	**Appraise**
36	Priority / free parking for ULEV vehicles/car clubs in car parks	Leeds City Council / City of York Council	Priority/free parking for ULEV vehicles/car clubs in car parks	Y	Y	--	--	Y	Y	Will contribute to improving NO_x emissions and promote the uptake of ULEV and alternative transport modes; potential to be accelerated through revising parking policies.	**Appraise**
37	Remove free parking from BCC controlled areas	Birmingham connected technical package 1	Remove unrestrictive parking from areas controlled by BCC	Y	Y	--	--	Y	Y	Potential to contribute to improving NO_x emissions; initiative being undertaken in two areas with the potential for it to be upscaled and accelerated to other areas. Early consultation required with affected parties.	**Appraise**
38	Pedestrianise apart from for access only, Waterloo St, Colemore Rd and Church St	Speculative	Pedestrianise apart from for access only, Waterloo St, Colemore Rd and Church St	Y	Y	--	--	N	Y	Potential to contribute to primary objective, however potential to shift the vehicles elsewhere on the network.	**Appraise**
39	Ban certain vehicles in inner city which don't meet emission standards	Speculative	Ban certain vehicles in inner city which don't meet emission standards	Y	N	--	--	N	N	Potential to contribute to primary objective in area implemented; potential to have a greater impact on low income households/businesses. Effective enforcement required.	**Exclude**

ID	Potential Additional Measure	Evidence Base	Non-Technical Description	Sifting Criteria (Y/N)						Sifting Justification	Judgement
				Q1	Q2i	Q2ii	Q2iii	Q3	Q4		
40	Number plate restrictions on which vehicles can enter the city or particular roads at certain times/days	UK Air Quality Plan	Number plate restrictions on which vehicles can enter the city or particular roads at certain times/days	N	--	N	--	N	N	Potential to contribute to primary objective in the short term, however evidence from other European schemes found commuters acquiring second vehicles to circumvent the restrictions. Overall potential negative air quality impact and a long lead in time make this unviable given the timescale for compliance.	**Exclude**
41	Review junction layouts	UK Air Quality Plan / TfWM draft delivery plan 2026 for transport	Review junction layouts at congestion/air quality pinch points to reduce congestion	Y	Y	--	--	Y	Y	Will reduce NO_x emissions and improve congestion at key hotspot areas. Potential to be accelerated through the TfWM transport delivery plan.	**Appraise**
42	Intelligent Transport System (ITS) measures -speed changes through the day -Signage and rerouting -Advanced vehicle detection for freight -Temporary area restrictions	UK Air Quality Plan / Highways England / Oxford City Council	Change the speed on key routes throughout the day using ITS measures according to traffic conditions, intelligent signage to improve route optimisation and the use of advanced vehicle detection at key signalised junctions to provide some priority for large goods vehicles.	Y	Y	--	--	Y	Y	Will reduce NO_x emissions, alleviate congestion and smooth out traffic flows. Some initiatives are already undertaken in BCC, potential to upscale and accelerate through CAZ investment fund/Traffic Management Act.	**Appraise**
43	Reduce speed limits on certain routes and use variable speed limits	UK Air Quality Plan	Review speed limits and consider variable speed limits to ensure smooth driving and enforce through speed cameras	Y	Y	--	--	Y	Y	Potential to contribute to primary objective and smooth traffic out. Potential to accelerate through a speed limit review.	**Appraise**

ID	Potential Additional Measure	Evidence Base	Non-Technical Description	Sifting Criteria (Y/N)						Sifting Justification	Judgement
				Q1	Q2i	Q2ii	Q2iii	Q3	Q4		
44	Upgrade signalling to improve traffic flow	UK Air Quality Plan	Upgrade signalling to improve traffic flow at key hotspot areas	Y	Y	--	--	Y	Y	Will reduce NO_x emissions and contribute to primary objective. Will alleviate congestion and smooth out traffic flows. Initiative already undertaken in BCC, potential to upscale and accelerate.	**Appraise**
45	Enforce the existing network of red routes	BCC	Enforce the existing network of red routes	N	Y	--	--	Y	Y	Unlikely to be a material contribution in isolation, but in combination with other measures, there is likely to be a contribution to reducing NO_x emissions. Effective enforcement of routes required. Potential to be accelerated across Birmingham.	**Exclude, however measure should be considered as part of a wider package of measures**
46	Extend the network of red routes	UK Air Quality Plan	Extend the network of red routes with associated enforcement	N	N	--	Y	Y	Y	Unlikely to be a material contribution in isolation, but in combination with other measures, there is likely to be a contribution to reducing NO_x emissions. Effective enforcement of routes required, however, the processes involved in such a scheme may make this initiative unviable given the timescale for compliance.	**Exclude, although the measure should be considered as part of a longer term post 2020 plan**
47	Introduce a roadwork permit system	Greater Manchester Low Emission Strategy / West Midlands Combined Authority	Introduce a roadwork permit system across the city to minimise disruption on the network	Y	Y	--	--	Y	Y	Will contribute to primary objective; potential to accelerate and upscale though a planned West Midlands/Birmingham scheme.	**Exclude, however measure should be considered as part of a wider package of measures**
48	No idling zones at taxi ranks, schools, hospitals, residential areas	NICE document NG70	Introduce no idling zones in known problem areas	Y	--	Y	--	Y	Y	Will contribute to a reduction in NO_x where the scheme is implemented. Potential to be accelerated through the implementation of Road Traffic Regulations.	**Appraise**

ID	Potential Additional Measure	Evidence Base	Non-Technical Description	Sifting Criteria (Y/N)						Sifting Justification	Judgement
				Q1	Q2i	Q2ii	Q2iii	Q3	Q4		
49	Gate traffic	Birmingham connected technical package 2	Hold traffic back until there is capacity on the network for it to leave	N	N	--	--	Y	Y	Potential to contribute to overall primary objective, however, this could lead to congestion elsewhere on the network, thus leading to localised increases in NO_x in other areas.	**Exclude**
50	Encourage car sharing / low emission car clubs	UK Air Quality Plan	Encourage car sharing / low emission car clubs	Y	Y	--	--	Y	Y	Potential to contribute to a reduction in NO_x emissions; potential to upscale and promote wider as a 'Co-Wheels' scheme exists in the area.	**Exclude, however measure should be considered as part of a wider package of measures**
51	Creation of area wide travel plans	Birmingham Connected Green Travel Districts	Creation of area wide travel plans	N	Y	--	--	Y	Y	Potential to contribute to primary objective indirectly; potential to accelerate through the Birmingham Connected Business Travel Network.	**Exclude, however measure should be considered as part of a wider package of measures**
52	Targeted ANPR campaign (1)	BCC	Use ANPR data to target particular groups with a campaign relating to journey times/reliability by other modes of transport	N	--	Y	--	Y	Y	Potential to contribute to the primary objective indirectly by encouraging a shift to the use of other modes of transport.	**Exclude, however measure should be considered as part of a wider package of measures**
53	Targeted ANPR campaign (2)	BCC	Using ANPR data, write to vehicle owners driving within a targeted area and test different messaging / interventions	N	--	Y	--	Y	Y	Potential to contribute to the primary objective indirectly by encouraging a shift to the use of other modes of transport.	**Exclude, however measure should be considered as part of a wider package of measures**
	Parking charging and permits graded by vehicle standard or zone	Edinburgh City Council / York City	Parking charges or permits graded according to engine	Y	Y	--	--	Y	Y	Will contribute to improving NO_x emissions and promote the uptake of cleaner vehicles or alternative transport modes. Potential to be	**Appraise**

ID	Potential Additional Measure	Evidence Base	Non-Technical Description	Sifting Criteria (Y/N)						Sifting Justification	Judgement
				Q1	Q2i	Q2ii	Q2iii	Q3	Q4		
54		Council / Camden Council/Birmingham City University	size / emission class/ULEV vehicles or zonal charging based on the level of accessibility by other modes							accelerated through revising parking policies. Enforcement will be required.	
55	GLOSA / Green wave pilot project	BCC	Provide fleet vehicle drivers with an app to monitor traffic signals to enable drivers to adapt their speed to 'ride the green wave' and minimise stop start driving	Y	Y	--	--	Y	Y	Will contribute to a reduction in NO_x emissions. Pilot project underway for 12 months using 12 larger Council vehicles managed by Amey; potential to upscale.	**Appraise**
56	Incentivise or subsidise sustainable travel by up to 50% to improve public transport patronage	BCC	Incentivise or subsidise sustainable travel options by up to 50% to improve public transport patronage	N	Y	--	--	Y	Y	Considered negligible in terms of contribution to primary objective; potential to contribute to modal shift.	**Appraise**
57	Walking and cycling Infrastructure including adopting a 'safe systems' approach to road safety	UK Air Quality Plan/ NICE guideline PH41	Increase walking and cycling infrastructure including segregated cycle lanes/20mph where cycling and walking cannot be segregated	N	Y	--	--	Y	Y	Unlikely to be a material contribution in isolation, but in combination with other measures, there is likely to be a contribution to reducing NO_x emissions. Incentivise modal shift and improve public health. Initiatives being carried out through the Birmingham Cycle Revolution and BCC; potential to accelerate.	**Exclude, however measure should be considered as part of a wider package of measures**
	Walking and cycling promotion	BCC	Walking and cycling promotion	N	Y	--	--	Y	Y	Unlikely to be a material contribution in isolation, but in combination with other measures, there is likely to be a contribution to reducing NO_x emissions. Initiatives being	**Exclude, however measure should be considered as part of a wider**

ID	Potential Additional Measure	Evidence Base	Non-Technical Description	Sifting Criteria (Y/N)						Sifting Justification	Judgement
				Q1	Q2i	Q2ii	Q2iii	Q3	Q4		
58										carried out through Birmingham Cycle Revolution.	**package of measures**
59	One car per household policy	Speculative	One car per household policy	Y	--	N	--	N	N	Will reduce NO_x emissions; long lead in time makes in unviable in the timescale required.	**Exclude**
60	Clean Air Campaigning	NICE guideline NG70	Ensure healthcare professionals are aware that information on air quality is available, build air quality into MECC training (Make Every Contact Count)	N	Y	--	--	Y	Y	Considered limited in isolation in terms of contribution to primary objective; raising awareness of air quality but should form part of wider measures.	**Exclude, however measure should be considered as part of a wider package of measures**
61	Consider public awareness initiatives such as car-free days	NICE guideline NG70	Programme of street closure on the same day, encourage use of play streets/community events	N	Y	--	--	Y	Y	Considered negligible in terms of contribution to primary objective. Engagement with the public in raising awareness of air quality issues.	**Exclude, however measure should be considered as part of a wider package of measures**
62	Encourage smoother driving campaigns	UK Air Quality Plan/ NICE guideline NG70	Provide information about how to drive in a style that minimises emissions	N	Y	--	--	Y	Y	Considered negligible in terms of contribution to primary objective; potential to upscale through the 20mph zone project.	**Exclude, however measure should be considered as part of a wider package of measures**
63	Develop a local approach to engage communities about air quality	NICE guideline NG44 / DEFRA toolkit for DPHs	Act on community needs and preferences and take account of changes in these needs and preferences over time. Making the issue more local	N	Y	--	--	Y	Y	Considered negligible in terms of contribution to primary objective; engagement with communities to incentivise alternative transport modes and raise awareness.	**Exclude, however measure should be considered as part of a package of a wider package of measures**

ID	Potential Additional Measure	Evidence Base	Non-Technical Description	Sifting Criteria (Y/N)						Sifting Justification	Judgement
				Q1	Q2i	Q2ii	Q2iii	Q3	Q4		
			and setting out small behavioural changes that improve air quality.								
64	Promote active travel to schools	Public Health England	Promote safe active travel to schools to promote modal shift and reduce private vehicle use	N	Y	--	--	Y	Y	Unlikely to be a material contribution in isolation, but in combination with other measures, there is likely to be a contribution to reducing NO_x emissions. Potential to upscale and accelerate through Modeshift STARS.	**Exclude, however measure should be considered as part of a wider package of measures**
65	Active Travel Workplace Infrastructure fund	Speculative / Nottingham City Council	Revenues raised through CAZ and/or Workplace Levy (WPL) could be offered to fund workplace active travel initiatives	N	-	Y	Y	Y	Y	Potential to contribute to a reduction in NO_x; dependent upon if WPL is implemented prior to 2020 or a charged CAZ is taken forward post 2020.	**Exclude, however measure should be considered as part of a wider package of measures**
66	Scrappage scheme: - HGV/LDV - Cars	UK Air Quality Plan	Scrappage scheme to remove older vehicles off the road network	Y	--	N	Y	Y	Y	Will contribute to a reduction in NO_x; potential to be reliant on schemes run by vehicle manufacturers; a long lead in time make this unviable given the timescale for compliance.	**Exclude, although the measure should be considered as part of a wider package of measures**
67	Signing strategy to encourage northbound traffic on Suffolk Street, Queensway towards Sandpits Parade to reroute to west of Ring Road.	BCC		Y	--	Y	--	Y	Y	Will contribute to a reduction in NOx and vehicle trips and contribute to public health improvements in the local area.	**Appraise**
68	Signing strategy to encourage southbound traffic from Great Charles St and Sandpits to re	BCC		Y	--	Y	--	Y	Y	Will contribute to a reduction in NOx and vehicle trips and contribute to public health improvements in the local area. Potential to be accelerated.	**Appraise**

ID	Potential Additional Measure	Evidence Base	Non-Technical Description	Sifting Criteria (Y/N)						Sifting Justification	Judgement
				Q1	Q2i	Q2ii	Q2iii	Q3	Q4		
	route to Ring Road rather than A38 Suffolk Street Qway										
69	Change the junction on Dartmouth Middleway between Lister Street and Great Lister Street to avoid stop start traffic and reduce congestion	BCC		Y	--	Y	--	Y	Y	Will contribute to a reduction in NOx in the local area; vehicles will be displaced onto the wider network but Dartmouth Middleway should experience a smooth traffic flow. Potential to be accelerated.	**Appraise**
70	Use the NEC car park for parking outside of the city with direct links for train and bus services into the city	BCC		Y	N	--	Y	Y	Y	Will contribute to a reduction in NOx; would require early negotiations with the NEC management group and Solihull Council. May not be viable given the timescales for compliance.	**Exclude, although the measure should be considered as part of a longer term post 2020 plan**
71	Average speed enforcement along the A38 to manage traffic and smooth flows	BCC	Average speed enforcement along the A38 to manage traffic flows and smooth flows	Y	Y	--	--	Y	Y	Will contribute to a reduction in NOx; alleviate congestion and smooth out traffic flows. Initiatives is already undertaken in BCC, potential to upscale and accelerate	**Appraise**
72	Average speed enforcement on the Ring Road near Dartmouth Circus to manage traffic and smooth flows	BCC	Average speed enforcement on the Ring Road near Dartmouth Circus to manage traffic and smooth flows	Y	Y	--	--	Y	Y	Will contribute to a reduction in NOx; alleviate congestion and smooth out traffic flows. Initiatives is already undertaken in BCC, potential to upscale and accelerate	**Appraise**
73	Re-signing and rerouting scheme for the A38 and Ring Road	BCC	Re-signing and rerouting scheme for the A38	Y	--	Y	--	Y	Y	Will contribute to a reduction in NOx; alleviate congestion and smooth out traffic flows. Potential to be accelerated through Defra funding which has been obtained for a resigning and rerouting strategy.	**Appraise**
	Ban all through traffic on the A38 diverting traffic to the A4540.	BCC	Ball all through traffic on the A38 around Paradise	Y	--	Y	--	Y	Y	Will contribute to a reduction in NOx and public health improvements. Congestion in the area will improve; however it may displace	**Appraise**

ID	Potential Additional Measure	Evidence Base	Non-Technical Description	Sifting Criteria (Y/N)						Sifting Justification	Judgement
				Q1	Q2i	Q2ii	Q2iii	Q3	Q4		
74			Circus, diverting traffic to the A4540.							emissions elsewhere on the network. Enforcement and consultation required.	
74a	Change the boundary of the CAZ to incorporate and encourage traffic to divert to the west of the city.	BCC	Change the boundary of the CAZ to incorporate and encourage traffic to divert to the west of the city.	Y	--	Y	--	Y	Y	Will contribute to a reduction in NOx and public health improvements. Congestion in the area will improve; however it may displace emissions elsewhere on the network. Enforcement and consultation required.	**Appraise**
75	Restrict traffic on Moor Street Qway to bus, taxi and cycle only and close Park Street to all traffic	BCC	Restrict traffic on Moor Street Qway to bus, taxi and cycle only and close Park Street to all traffic	Y	N	Y	--	Y	Y	Will contribute to a reduction in NOx and public health improvements. Congestion in the area will improve; however it may displace emissions elsewhere on the wider network.	**Appraise**
MEASURES SPECIFIC TO BIRMINGHAM CITY COUNCIL											
76	Update Council vehicle fleet to electric/LPG/low emission through a procurement policy including setting a target to aim for a specific proportion of fleet to be Euro VI or ULEV by 2020. Consider switching refuelling stations for fleet to GtL	UK Air Quality Plan / Highways England / Liverpool	Update Council vehicle fleet to electric/LPG/low emission through a procurement policy	Y	Y	--	--	Y	Y	Will reduce NO_x emissions; potential to be accelerated through the Green Fleet Strategy and government funding.	**Exclude, however measure should be considered as part of a package of measures focussing on Birmingham City Council actions**
77	Minimise staff parking at council sites	Speculative	Minimise staff parking facilities at council sites	Y	Y	--	--	Y	Y	Potential to contribute to primary objective; potential to be accelerated through staff travel policy amendments.	**Exclude, however measure should be considered as part of a package of measures focussing on Birmingham City Council actions**

ID	Potential Additional Measure	Evidence Base	Non-Technical Description	Sifting Criteria (Y/N)						Sifting Justification	Judgement
				Q1	Q2i	Q2ii	Q2iii	Q3	Q4		
78	Review car user allowance	Local authority action	Review car user allowance for officers to disincentive private car travel on council business	N	Y	--	--	Y	Y	Low potential to materially contribute to primary objective, but would contribute to incentivising alternative transport modes; potential to be accelerated through policy changes.	**Exclude, however measure should be considered as part of a package of measures focussing on Birmingham City Council actions**
79	Implement a travel hierarchy	Local authority action	Set out a travel hierarchy policy and implement to encourage alternative transport modes to the car for staff travel	N	Y	--	--	Y	Y	Potential to contribute to a reduction in NO_x emissions; can be accelerated through policy changes and engagement with staff.	**Exclude, however measure should be considered as part of a package of measures focussing on Birmingham City Council actions**
80	Workplace parking: remove, charge or ULEV only	Speculative	Remove staff parking all together at council sites or charge for the use or make it ULEV only, except for disability parking requirements	Y	--	Y	--	Y	Y	Will reduce NO_x emissions; potential to be accelerated through staff travel policy amendments.	**Exclude, however measure should be considered as part of a package of measures focussing on Birmingham City Council actions**
81	Revisit BCC staff Travel Plan	BCC	Revisit the staff travel plan to ensure it responds to the needs of the council, provides a meaningful document and is implemented	Y	Y	--	--	Y	Y	Potential to contribute to primary objective if implemented; can be accelerated and upscaled as a travel plan is already in place.	**Exclude, however measure should be considered as part of a package of measures focussing on Birmingham City Council actions**
82	Further incentivise or subsidise sustainable travel to work	BCC	Incentivise or subsidise transport passes/ cycling equipment for staff	N	Y	--	--	Y	Y	Potential to contribute to primary objective; can be upscaled and accelerated as initiative already exists.	**Exclude, however measure should be considered as part of a package**

ID	Potential Additional Measure	Evidence Base	Non-Technical Description	Sifting Criteria (Y/N)						Sifting Justification	Judgement
				Q1	Q2i	Q2ii	Q2iii	Q3	Q4		
			to encourage alternative transport modes								**of measures focussing on Birmingham City Council actions**
83	Parking standards and demand Supplementary Planning Document (SPD)	BCC	Review parking standards SPD and car parking demand to ensure standards are implemented and future public transport, walking and cycling access is considered	N	Y	--	--	Y	Y	Unlikely to be a material contribution in isolation, but in combination with other measures, there is likely to be a contribution to reducing NO_x emissions.Will only affect new developments permitted in the future. Review of Parking Standards underway as part of Development Management DPD.	83
84	Driver training	NICE guideline NG70	Introduce fuel-efficient driving as part of any test carried out when appointing or re-appraising staff who drive as part of their work	N	Y	--	--	Y	Y	Unlikely to materially contribute to primary objective but will facilitate minor NO_x emissions reduction through efficient driving; can be upscaled and accelerated as driver training already in place.	**Exclude, however measure should be considered as part of a package of measures focussing on Birmingham City Council actions**
85	Vehicle telematics	NICE guideline NG70	Telematics technology to provide real time or next day information about driving style	N	Y	--	--	Y	Y	Unlikely to materially contribute to primary objective, but will encourage more efficient driving styles; can be upscaled and accelerated as a number of vehicles in the fleet already have this technology.	**Exclude, however measure should be considered as part of a package of measures focussing on Birmingham City Council actions**
86	Seeking to reduce the number of personal office deliveries	Speculative	Preventing personal deliveries to offices	Y	--	Y	--	Y	Y	Will contribute to a reduction in NO_x emissions; can be accelerated through HR policy changes. Engagement with businesses required.	**Exclude, however measure should be considered as part of a package of measures focussing on**

ID	Potential Additional Measure	Evidence Base	Non-Technical Description	Sifting Criteria (Y/N)						Sifting Justification	Judgement
				Q1	Q2i	Q2ii	Q2iii	Q3	Q4		
											Birmingham City Council actions
87	Ensure all relevant policies and plans consider walking and cycling	NICE Public health guideline PH41	Ensure local, high-level strategic policies and plans support and encourage both walking and cycling. This includes a commitment to invest sufficient resources to ensure more walking and cycling – and a recognition that this will benefit individuals and the wider community.	Y	Y	--	--	Y	Y	Will contribute to the primary objective and contribute to modal shift; potential to upscale through the revision of relevant plans and policies. **Birmingham Cycle Revolution schemes on A38 and A34 delivered.** **Developing Local Cycling & Walking Investment Plan.**	**Exclude, however measure should be considered as part of a package of measures focussing on Birmingham City Council actions**
88	Adopt supplementary planning document on air quality	BCC	Adopt supplementary planning document for air quality which sets out the councils requirements for improving air quality in new, converted and change of use developments	Y	Y	--	--	Y	Y	Will contribute to the primary objective; air quality is already considered as part of the Birmingham Development Plan Document-policy DM4. Further detailed policy on air quality and new development will feature in new Development Management DPD. Council is reviewing its Air Quality Action Plan.	**Exclude, however measure should be considered as part of a package of measures focussing on Birmingham City Council actions**
MEASURES AT THE REGIONAL LEVEL											
89	Regional Low Emission Strategy	UK Air Quality Plan	Regional wide Low Emission Strategy covering all aspects of transport, procurement and	Y	Y	--	Y	Y	Y	Will contribute to a reduction in NO_x emissions; potential to be accelerated and upscaled through the West Midlands Delivery Plan for low emission buses. May not be viable given the timescale for compliance.	**Exclude, although the measure should be considered as part of a longer term post 2020 plan**

ID	Potential Additional Measure	Evidence Base	Non-Technical Description	Sifting Criteria (Y/N)						Sifting Justification	Judgement
				Q1	Q2i	Q2ii	Q2iii	Q3	Q4		
			planning for the West Midlands							Low Emissions Towns & Cities Programme provides guidance https://go.walsall.gov.uk/low_emissions_towns_and_cities_programme	
90	Regional low emission refuelling networks	UK Air Quality Plan	Regional wide low emission refuelling network to encourage the public/fleet operators to consider lower emission alternatives	Y	Y	--	--	Y	Y	Will contribute to a reduction in NO_x emissions; potential to be accelerated through the TfWM transport plan. May not be viable given the timescale for compliance.	**Exclude, although the measure should be considered as part of a longer term post 2020 plan**
91	Mass transit network	Birmingham connected technical package 2 Movement for Growth	Regional mass transit network to cover the West Midlands region	Y	--	N	Y	Y	Y	Will contribute to a reduction in NO_x emissions; however, the processes involved in such a scheme make this initiative unviable given the timescale for compliance. Improvements being delivered as part of HS2 Connectivity Package including SPRINT and new rail stations but opening likely to be 2021/2022.	**Exclude, although the measure should be considered as part of a longer term post 2020 plan**
92	Link up the Birmingham Urban Traffic Management Control(UTMC) with that of Highways England	Birmingham connected technical package 2	Integrated Traffic Control Centre	Y	--	N	Y	Y	Y	Potential to contribute to primary objective by taking traffic away from the congested routes. Scheme may not be viable given the timescale for compliance. Transport for West Midlands, on behalf of the WMCA, developing a business case and options for a Regional Integrated Control Centre, including both 'virtual' and 'physical' solutions.	**Exclude, although the measure should be considered as part of a longer term post 2020 plan**
93	Joint procurement strategies	Birmingham connected technical package 3	Joint procurement strategy between all local authorities in	Y	--	N	Y-	Y	Y	Will contribute to a reduction in NO_x emissions; aid in the reduction of congestion; early engagement between each local authority required. Potential to accelerate	**Exclude, although the measure should be considered as part**

ID	Potential Additional Measure	Evidence Base	Non-Technical Description	Sifting Criteria (Y/N)						Sifting Justification	Judgement
				Q1	Q2i	Q2ii	Q2iii	Q3	Q4		
			the region to reduce deliveries							through the West Midlands Combined Authority Procurement process. Guidance developed through Low Emissions Towns & Cities Programme https://go.walsall.gov.uk/Portals/0/Uploads/PollutionControl/etcp_good_practice_procurement_guidance_final_september_2014.pdf	**of a longer term post 2020 plan**
94	Zoned CAZ to target wider regional area	Speculative	Zoned CAZ to target wider regional area	Y	--	N	--	Y	Y	Will reduce NO_x emissions in the region and contribute to primary objective; public health improvements likely. A larger CAZ or multiple CAZ areas have been discounted.	**Exclude.**
95	Region-wide workplace Levy	Speculative	Charge for workplace parking, potential to have different charge rates according to area	Y	--	N	Y	Y	Y	Will reduce NO_x emissions; modal shift benefits; potential to be accelerated through legislation. Early engagement between local authorities, local businesses/workplaces. Considered undeliverable before 2020.	**Exclude, although the measure should be considered as part of a longer term post 2020 plan**
96	West Midlands Districts's Consolidation centre	TFL case study for London Boroughs	A consolidation centre which will receive goods on behalf of Councils from its suppliers before collating and consolidating the goods and preparing them for onward delivery to the council sites using planned and optimised delivery routes using Euro IV or ULEV capable trucks. Returns can	Y	--	N	Y	Y	Y	Will reduce NO_x emissions and contribute to primary objective; potential to be accelerated through the TfWM freight strategy; early engagement between local authorities/suppliers required.	**Exclude, although the measure should be considered as part of a longer term post 2020 plan**

ID	Potential Additional Measure	Evidence Base	Non-Technical Description	Sifting Criteria (Y/N)						Sifting Justification	Judgement
				Q1	Q2i	Q2ii	Q2iii	Q3	Q4		
			be collected to maximise vehicle capacity.								
97	Regional wide FORS recognition scheme	UK Air Quality Plan	Recognition schemes such as FORS to encourage business to improve efficiency, reduce fuel consumption and emissions on a regional basis	N	--	Y	--	N	N	Potential to contribute to primary objective considered negligible; incentives, engagement with operators is required.	**Exclude, however measure should be considered as part of a package of wider measures**
98	Regional Advanced Quality Partnership (Bus)	Speculative	A region wide advanced quality partnership scheme which would introduce requirements for bus operators to meet emissions requirements everywhere or on certain routes in return for investment in bus service infrastructure (including but not limited to bus prioritisation)	Y	--	Y	--	Y	Y	Will contribute to reducing NO_x emissions regionally; potential for it to be difficult to implement on a regional scale. Through the West Midlands Bus Alliance: By May 2020, all buses operating across the region will be at least Euro V. 10. We will use the powers in the Bus Services Act 2017 to implement local action to tackle air quality issues. 11. By May 2020, we will pilot zero emission buses (such as electric or hydrogen) on at least two corridors.	**Exclude**

99	Subsidised public transport ticketing	Speculative	Revenues from area wide CAZ and/or WPL could be used to offer subsidised public transport tickets for particular groups in order to reduce car usage.	Y	--	N	Y	Y	Y	Potential to contribute to a reduction in NO_x regionally; potential to be accelerated if regional wide WPL/ charged CAZ initiatives are taken forward. Targeted subsidies considered as part of CAF bid.	**Exclude, although the measure should be considered as part of a longer term post 2020 plan**
100	Switch regional fuelling stations to Gas to Liquid (GtL)	Highways England / DfT / Liverpool	Use of GtL fuel as a diesel alternative	Y	Y	--	--	Y	Y	Will contribute to a reduction in NO_x regionally; engagement with suppliers and operators.	**Appraise**
101	Loading and Unloading Code of Practice	London	Loading and Unloading Code of Practice specific to the West Midlands region	N	Y	--	--	Y	Y	Considered negligible in terms of contribution to primary objective. Engagement with the operators required.	**Exclude, however measure should be considered as part of a wider package of measures.**
102	Standardised approach to regional out of hours deliveries	Speculative	Retiming deliveries to avoid the busiest times of day using a standardised approach to circumvent delivery restrictions moving forward	Y	--	N	Y	Y	Y	Potential to contribute to primary objective; potential to accelerate through the West Midlands Logistics Forum and early engagement between local planning authorities. May not be achievable given the timescale for compliance.	**Exclude, although the measure should be considered as part of a longer term post 2020 plan**
103	Enhanced bus partnership within the wider area of Birmingham	TFWM	An enhanced bus partnership scheme extending out of Birmingham which would introduce requirements for bus operators to meet targets	Y	N	Y	--	Y	Y	Will contribute to reducing NO_x emissions wider than the Birmingham area; potential for the Birmingham Advanced Bus Quality Partnership programme to be built upon.	**Appraise**

1.3 INITIAL SIFTING OUTCOMES SUMMARY

An option generation and initial sifting exercise was undertaken to assess each identified additional measure and judge whether to take the additional measure forward to **Phase 2; Option Appraisal and Selection**.

Those measures judged in Table 1 as '*appraise*' were progressed to Phase 2 to undergo an option appraisal using a Multi Criteria Analysis (MCA) framework.

Measures judged as '*exclude - measure should be considered as part of a longer term post 2020 plan*' were taken forward separately to the Phase 2 appraisal to determine which measures would have the greatest potential to contribute to air quality improvements, should further measures be required post-2020.

The above measures that were judged with the following; '*exclude - measure should be considered as part of a longer term post 2020 plan*', were measures which were judged to be beneficial in meeting the primary objective but the next stage of sifting decided the whether these were long term measures, for example: *'If the measure is currently being applied under local, regional, or national policy, this criterion aims to determine if it can be scaled and accelerated accordingly in order to materially contribute to the primary objective. If the measure is not currently being applied, is it viable for it to be implemented and affect compliance prior to 2020? If this timeline is not viable, would the measure still contribute to reducing NO_2 concentrations beyond 2020?'.*

Measures judged as *'exclude - measure should be considered as part of a wider package of measures'* were not progressed further. However, these measures are considered to have an important role in improving air quality within the city and wider region, thus should be considered within the Council's Air Quality Action Plan.

2

PHASE 2: OPTION APPRAISAL & SELECTION

2 PHASE 2: OPTION APPRAISAL & SELECTION

2.1 OVERVIEW OF APPRAISAL

Measures taken forward from the Phase 1 option generation and initial sifting exercise have been progressed to the option appraisal and subjected to a Multi Criteria Analysis (MCA) Framework. A total of 33 options have been considered within the context of contributing to the primary objective – compliance with the national air quality limit values for NO_2 within the shortest possible timeframe and by 2020 at the latest.

The MCA framework was developed, as outlined below, consisting of a number of criteria that cover a suite of objectives, against which each potential option was assessed and assigned a numeric score. Based on the ranked score, measures are identified to take forward for further development or to remain aspirational.

A stakeholder workshop was undertaken with Birmingham City Council and key experts from the Birmingham Clean Air Zone work streams during September 2017 to enable group input into the MCA appraisal, which is reflected in the outcomes of the appraisal reported here.

2.2 MULTI CRITERIA ANALYSIS FRAMEWORK DEVELOPMENT

APPRAISAL FRAMEWORK CRITERIA

A number of evaluation criteria were defined against which each option has been appraised. The evaluation criteria were based around key objectives linked to the feasibility of a CAZ[3]. These were identified through consultation with Birmingham City Council and comprise:

- Local growth and ambition;
- Accelerating transition to a low emission economy;
- Immediate action to improve air quality and health;
- Deliverability; and,
- Equality and Acceptability.

The MCA framework criteria developed and used to appraise each option are presented overleaf (*description in italics*):

[3] Birmingham City Council (2017) AQ Defra Plan Birmingham Response_2017

Criteria

a) Representation within CAZ traffic and air quality scenario modelling

Description: This criterion considers if and to what extent the measure can be represented in transport and air quality modelling. This will enable a quantitative assessment of the measure's potential to contribute to the primary objective.

b) Sustained improvement to human health within short timeline

Description: This criterion considers the potential for the measure to contribute to achieving compliance with the health-based air quality limit values in the shortest time possible (by 2020), but also that any improvement is sustained beyond the initial implementation period.

c) Ability for measure to be targeted geographically

Description: This criterion appraises the ability of the measures to be focussed within specific areas of non-compliance, thus ensuring it can be targeted accordingly to achieve the primary objective.

d) Promotion of a low emission economy

Description: This criterion evaluates the potential for the measure to encourage and promote a shift towards a reduction in local and regional emissions of NO_x, but also emissions of particulates (PM_{10}, $PM_{2.5}$) and carbon dioxide (CO_2). This primarily relates to vehicle emissions, but may be applied to other sources such as domestic heating and energy plant.

e) Facilitate local growth and ambition

Description: This criterion provides the opportunity to consider if the measure will present a barrier to local economic growth or, as would be ideal, the measure facilitates such growth. This might include facilitating future development ambitions, growth of local businesses, and/or improving public transport links between residential and employment districts.

f) Protect and enhance social equality

Description: The aim of this criterion is to appraise the extent to which the measure could affect the local population with respect to local air quality changes, in addition to lifestyle changes that may result from its implementation. Ideally, the measure will protect areas of existing good air quality whilst enhancing air quality within areas of concern, with no disproportionate effects across particular

An additional criterion was initially included as part of the assessment; '*Impact on Network Resilience Programme*'. However, this has not been included within the analysis as it became apparent during the stakeholder workshop that the programme had not yet been published and the group felt that, without knowledge of the programme, appraisal against this criterion was not possible.

In addition to the above MCA criteria, each measure underwent an appraisal to determine if any of the following anticipated category responses, in terms of traffic flow and vehicle use, are applicable:

- **Reduce** – *reduce congestion, remove traffic from the network or links*
- **Shift** – *encourage modal shift*
- **Improve** – *encourage transition to cleaner vehicles*.

SCORING SYSTEM

A scoring system was developed for the appraisal to rank the performance of each option against the specific MCA criteria (a - f), as detailed within Table 2. The scoring focusses on appraising the potential effectiveness of a measure to contribute to achieving the primary objective, whilst preserving and/or promoting the respective criterion.

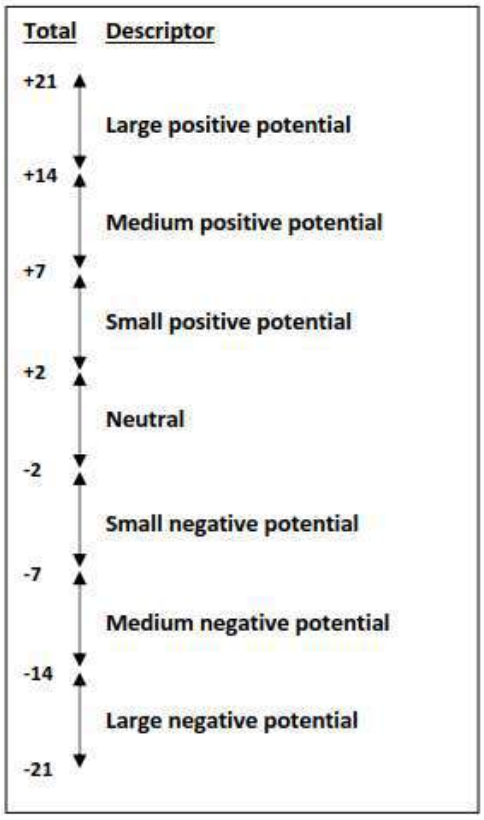
Therefore, a positive potential score indicates that the particular measure in question is considered to have higher potential in terms of upholding the criterion and contributing to the primary objective versus the other measures being assessed. The opposite is true for a negative score.

Each option was given a total score and associated descriptor based on the overall performance against the respective criteria, as outlined in Figure 1.

Table 2 – Option appraisal scoring against MCA Framework criteria

Score	Potential to uphold respective criterion and contribute to primary objective
+3	Large positive potential
+2	Medium positive potential
+1	Small positive potential
0	Neutral
-1	Small negative potential
-2	Medium negative potential
-3	Large negative potential

Figure 1 – Overall performance of each option based on total score



2.3 OPTIONS APPRAISAL

The outcomes of the MCA framework appraisal and associated justification for the scores assigned to each measure are presented in Table 3.

Table 3 – MCA Framework Appraisal for Measures up to 2020

ID	Additional Measure	Non-technical description	MCA Framework score							Justification for assigned score	Anticipated response- Reduce/Shift/Improve
			a	b	c	d	e	f	Total		
19 +21	Highway/infrastructure improvements to bus services to make them a viable and accessible option for the public Increase bus priority schemes	Improvements to bus services to make them a viable and accessible option for the public, including improvements to key priority routes Increase bus priority at traffic signals and increase bus lanes. Review bus routes and interchanges to ensure routes are not affected by bus congestion and a deterioration in air quality. Change road space allocation to encourage the uptake of public transport.	3	2	3	2	2	3	**15**	Measure is able to be represented simply within CAZ traffic and air quality modelling. Potential improvements to health as a result of less overall car usage/congestion and an increase in public transport patronage but could have the potential to displace emissions elsewhere on the network. The measure can easily be targeted geographically and promotes public transport patronage by making services more viable and accessible to the public. It would facilitate local growth and will enhance social equality on those routes the improvements are implemented.	Reduce, Shift, Improve
20a	Zero emission buses/retrofit of public transport fleet	Zero emission buses/ retrofitting of buses to cleaner alternatives (ULEV)	3	3	3	2	2	2	**15**	Measure can be represented simply within CAZ traffic and air quality modelling and will potentially contribute to an improvement in air quality and health as a result of less overall car usage/congestion and an increase in public transport patronage. It can be easily targeted geographically and will contribute to a low emission economy. If local manufactures are used for the retrofit or zero emission buses there will be a benefit to the local economy. It will enhance social equality by the improvements made to public transport.	Reduce, Shift, Improve
56	Incentivise or subsidise sustainable travel by up to 50% to	Incentivise or subsidise sustainable travel by up to 50% to	3	2	3	2	2	3	2	**17**	Reduce, Shift, Improve

ID	Additional Measure	Non-technical description	MCA Framework score							Justification for assigned score	Anticipated response-Reduce/Shift/Improve
			a	b	c	d	e	f	Total		
	improve public transport patronage	improve public transport patronage									
75	Restrict traffic on Moor Street Qway to bus, taxi and cycle only and close Park Street to all traffic		3	2	3	3	1	0	3	**15**	The measure can be represented simply within CAZ traffic and air quality modelling. Potential for improvements to ambient air quality adjacent to these routes. It can be targeted geographically, promotes the drive towards a low emission economy and helps to facilitate modal shift. In terms of social equality, the measure is not seen as having an impact. The scheme is already planned and is therefore seen as being financially viable.
74	Ban all through traffic on the A38 around Paradise Circus, diverting traffic to the A4540.	Ball all through traffic on the A38 around Paradise Circus, diverting traffic to the A4540.	3	2	3	3	0	0	**11**	The measure can be represented simply within CAZ traffic and air quality modelling. There will be potential improvements to air quality and health adjacent to the route although it may move the problem to the A4540. It can be targeted geographically. There would be a negligible impact upon local growth as the traffic is through traffic, not stopping in Birmingham. In terms of social equality, the measure is not seen as having an impact.	Reduce, Shift, Improve
74a	Change the boundary of the CAZ to incorporate the A4540 and	Change the boundary of the CAZ to incorporate the A4540 and encourage traffic to	3	2	3	3	0	0	**11**	The measure can be represented simply within CAZ traffic and air quality modelling. There will be potential improvements to air quality and health adjacent to the route and A4540, although it may move the problem to the west of the city. It can be targeted	Reduce, Shift, Improve

ID	Additional Measure	Non-technical description	MCA Framework score							Justification for assigned score	Anticipated response-Reduce/Shift/Improve
			a	b	c	d	e	f	Total		
	encourage traffic to divert to the west of the city.	divert to the west of the city.								geographically and promotes a move towards cleaner vehicles on the A4540. There would be a negligible impact upon local growth as the traffic is through traffic, not stopping in Birmingham. In terms of social equality, the measure is not seen as having an impact.	
73	Re-signing and rerouting scheme for the A38 and Ring Road	Re-signing and rerouting scheme for the A38	3	3	3	1	1	0	**11**	Measure is able to be represented simply within CAZ traffic and air quality modelling. The group felt that its air quality benefit would be in the area around the A38. It can easily be targeted geographically and will contribute to an improvement in driving economically. The measure may make a small improvement to facilitating local growth. In terms of social equality, the measure is considered to have a negligible impact.	Reduce
67	Signing strategy to encourage northbound traffic on Suffolk Street, Queensway towards Sandpits Parade to reroute to west of Ring Road.	Ban the route of traffic travelling northbound on Suffolk Street that exits onto Paradise Circus to then access Sandpits Parade	3	3	3	0	1	0	**10**	Measure can be represented simply within CAZ traffic and air quality modelling and will potentially contribute to an improvement in air quality and health as a result of less overall congestion. There will be a negligible impact with regards to promotion of a low emission economy and can be easily targeted geographically. Local growth may be facilitated in the specific area as a result of reduced congestion. There will be a negligible impact with regards to social equality and with funding the measure will be financially viable.	Reduce
68	Signing strategy to encourage southbound traffic from Great Charles St and Sandpits to re route to Ring Road rather tan A38 Suffolk Street Qway.	Ban the route of traffic travelling southbound on Suffolk Street that then exits at the section between Paradise Circus, Queensway and St. Chads	3	3	3	0	1	0	**10**	Measure can be represented simply within CAZ traffic and air quality modelling and will potentially contribute to an improvement in air quality and health as a result of less overall congestion. There will be a negligible impact with regards to promotion of a low emission economy and can be easily targeted geographically. Local growth may be facilitated in the specific area as a result of reduced congestion. There will be a negligible impact with regards to social equality and with funding the measure will be financially viable.	Reduce
69	Change the junction at Dartmouth Middleway between Lister Street and Great	Close the junction on Dartmouth Middleway between Lister Street and Great Lister Street to avoid stop start	3	3	3	0	1	0	**10**	Measure is able to be represented simply within CAZ traffic and air quality modelling and will potentially contribute to an improvement in air quality and health as a result of less overall congestion. There will be a negligible impact with regards to promotion of a low emission economy and can be easily targeted	Reduce

ID	Additional Measure	Non-technical description	MCA Framework score							Justification for assigned score	Anticipated response-Reduce/Shift/Improve
			a	b	c	d	e	f	Total		
	Lister Street to avoid stop start traffic and reduce congestion	traffic and reduce congestion								geographically. Local growth may be facilitated in the specific area as a result of reduced congestion. There will be a negligible impact with regards to social equality.	
37	Remove free on-street parking .	Remove unrestrictive parking from areas under the control of BCC	3	2	3	2	1	-1	**10**	Measure can be represented simply within CAZ traffic and air quality modelling. The measure would provide potential improvements to health in the areas where the measure is implemented and results in less overall car usage. The measure can be easily targeted geographically and would encourage people to use public transport modes. The group felt that the measure would have a slight negative impact on social equality as people would have to start paying to park their vehicles or use public transport.	Reduce, Shift
15	Increase LPG refuelling infrastructure for Hackney Carriages and the Installation of rapid EV infrastructure for taxi and private hire vehicles, including providing a mechanism to support change.	Increase LPG refuelling infrastructure for Hackney Carriages and Installation of rapid electric vehicle infrastructure for taxi and private hire use, including providing a mechanism to support change.	2	1	3	3	1	0	**10**	The measure can be represented within CAZ traffic and air quality modelling although will require a number of assumptions to be made. The measure would likely contribute to sustained improvements in health as the move towards low emission vehicles increases. It can be easily targeted geographically, promotes the drive towards a low emission economy and helps to facilitate modal shift. The group felt that there would be no change in social equality.	Shift, Improve
16	Retrofitting of black taxi's to LPG	Retrofitting of black taxi's to LPG	2	2	3	3	0	0	**10**	The measure can be represented within CAZ traffic and air quality modelling although will require a number of assumptions to be made. It will potentially contribute to an improvement in air quality and health, dependent upon the number of taxi's being converted. The measure can be easily targeted geographically and will promote a low emission economy. It would provide a negligible improvement in local growth for those taxis that are converted. The group felt that there would be no change in social equality.	Improve
38	Pedestrianise Waterloo St,	Pedestrianise Waterloo St,	3	3	3	0	0	0	**9**	Measure can be represented simply within CAZ traffic and air quality modelling. The measure would give a	Reduce

ID	Additional Measure	Non-technical description	MCA Framework score							Justification for assigned score	Anticipated response-Reduce/Shift/Improve
			a	b	c	d	e	f	Total		
	Colemore Road and Church St (apart from for access only)	Colemore Road and Church St (apart from for access only)								sustained improvement to health at sensitive receptors adjacent to these roads and pedestrians that use the pavements. It can be easily targeted geographically but the group felt that there would be a negligible impact with regards to addressing air quality exceedance locations. The group did, however, feel that the measure would contribute to local growth by encouraging more pedestrian footfall to the area.	
23	Low emission bus and taxi routes	Designate certain routes as low emission/ULEV only for bus and taxi and to ensure the cleanest vehicles run on the most polluted routes	3	1	3	1	0	0	**8**	Measure is able to be represented simply within CAZ traffic and air quality modelling. The measure would potentially contribute to an improvement in health on the routes where the measure is implemented. It can be easily targeted according to area and would contribute towards a low emission economy along those routes. The group considered that there would be a negligible impact upon local growth as the costs would lie with the transport companies, in addition to being highly likely that a CAZ will require improvements to vehicles be implemented. There would be no change in social equality as patrons already use these routes.	Improve
71	Average speed enforcement along the A38 to manage traffic and smooth flows	Average speed enforcement along the A38 to manage traffic and smooth flows	-1	3	3	1	1	0	**7**	Measure is difficult to quantify within the traffic model as it represents average period conditions and whilst the group felt that there could be air quality benefits in the area around the A38 it would be difficult to evidence potential impact. It can easily be targeted geographically and will contribute to an improvement in driving economically. The measure may make a small improvement to facilitating local growth. In terms of social equality, the measure is considered to have a negligible impact. It is financially viable although there would be upfront costs associated with the technology and associated signage required for this measure.	Reduce, Improve
72	Average speed enforcement near to Dartmouth Circus to manage traffic and smooth flows	Average speed enforcement near to Dartmouth Circus to manage traffic and smooth flows	-1	3	3	1	1	0	**7**	Measure is difficult to quantify within the traffic model as it represents average period conditions. . Any air quality benefit would likely be realised in the vicinity of where the measure is implemented although this is considered to be limited. It can be targeted geographically and will contribute to an improvement	Reduce, Improve

ID	Additional Measure	Non-technical description	MCA Framework score							Justification for assigned score	Anticipated response- Reduce/Shift/Improve
			a	b	c	d	e	f	Total		
										in driving economically. The measure may make a small improvement to facilitating local growth. In terms of social equality, the measure is considered to have a negligible impact. It is financially viable although there would be upfront costs associated with the technology and associated signage required for this measure.	
31	Accelerate the uptake of infrastructure for electric, hydrogen, compressed natural gas (CNG) and LPG gas powered vehicles	Accelerate the uptake of infrastructure for electric, hydrogen, compressed natural gas (CNG) and LPG gas powered vehicles	-1	1	3	3	1	0	**7**	Assumptions on uptake of cleaner vehicles difficult to quantify, due to unattainable data. The measure would potentially contribute to health in the longer term as the move towards low /zero emission vehicles increases. It can be easily targeted geographically, promotes the drive towards a low emission economy and helps to facilitate modal shift. The group felt that there would be no change in social equality and is financially viable where funding is provided for the infrastructure.	Shift, Improve
13	Time of day restrictions for delivery vans in the area beyond the CAZ boundary	Time of day restrictions for delivery vans accessing areas outside of the CAZ boundary which could be based on euro/ULEV standard	2	1	3	2	-1	0	**7**	The measure can be represented simply within CAZ traffic and air quality modelling although it will require some assumptions to be made. There will be potential improvements to health, however this will be more in the long term. It can be easily targeted geographically and promotes a move towards cleaner vehicles. The group felt that the measure does not facilitate local growth and could potentially have an adverse impact on business. However, it was also felt that those businesses operating within a CAZ would also deliver outside of the area. In terms of social equality, the measure is not seen as having an impact.	Reduce, Improve
41, 42, 44	Intelligent Transport Measures Review junction layouts Upgrade signalling to improve traffic flow	Change the speed on key routes throughout the day using intelligent transport measures according to traffic conditions, intelligent signage to improve route optimisation and the use of advanced vehicle detection at key	-1	2	3	1	1	0	**6**	Measure is difficult to quantify within the traffic model as it represents average period conditions.. Potential to improve health in terms of impacts from localised air pollution within the short timescale where the measures are implemented. They can easily be targeted geographically and will assist with economic driving. The measure may make a small improvement to facilitating local growth. In terms of social equality, the measure is not seen as impacting anyone differently. The stakeholder group considered the measure to be financially viable dependent upon the measure taken forward.	Reduce

ID	Additional Measure	Non-technical description	MCA Framework score							Justification for assigned score	Anticipated response-Reduce/Shift/Improve
			a	b	c	d	e	f	Total		
		signalised junctions to provide some priority for large goods vehicles. Review junction layouts and traffic light improvements at congestion/air quality pinch points.									
36	Priority / free parking for ULEV vehicles/car clubs in car parks	Priority/free parking for ULEV vehicles/car clubs in car parks	3	1	3	1	0	-2	**6**	Measure is able to be represented simply within CAZ traffic and air quality modelling. Potential for improvements to health, however these are more likely in the long term. It can be easily targeted geographically and will contribute longer term to a move towards ULEV vehicles. The measure will have a negligible impact on facilitating local growth and will have a negative impact on social equality as the measure will only benefit those who are able to afford ULEV or are part of a car club.	Improve
43	Reduce speed limits on certain routes and use variable speed limits	Review speed limits and consider variable speed limits to ensure smooth driving and enforce through speed cameras	-1	2	3	1	1	0	**6**	Measure is difficult to quantify within the traffic model as it represents average period conditions. The group felt that if the measure focused on a particular area, its air quality benefit would be relatively localised, whereas if the measure was implemented on a wider area, benefits would be felt to a greater extent. It can easily be targeted geographically and will contribute to an improvement in driving economically. The measure may make a small improvement to facilitating local growth. In terms of social equality, the measure is considered to have a negligible impact. It is financially viable although there would be upfront costs associated with the technology and associated signage required for this measure.	Reduce
104	Enhanced bus partnership within the wider area of Birmingham	An enhanced bus partnership scheme extending out of Birmingham which would introduce requirements for bus operators to meet targets	-1	1	3	2	0	0	**5**	Measure is difficult to quantify using current traffic and air quality models, as impact of the bus partnership measures are uncertain . Potential for improvements to health, however this is more likely in the long term. It can be easily targeted geographically and promotes low emission public transport The group considered that there would be improvements to social equality as this would improve the attractiveness of public	Shift, Improve

ID	Additional Measure	Non-technical description	MCA Framework score							Justification for assigned score	Anticipated response-Reduce/Shift/Improve
			a	b	c	d	e	f	Total		
										transport. Improvements to the wider West Midlands bus fleet are being pursued through the West Midlands Bus Alliance.	
35	Workplace parking levy for businesses	Impose a charge for workplace parking	3	0	3	2	-2	-2	**4**	Measure can be represented within CAZ traffic and air quality modelling. . It can be easily targeted geographically and will contribute towards a low emission economy by encouraging a behaviour change and a potential move towards public transport if parking spaces arereduced. The measure could have a negative impact upon facilitating growth as it could discourage businesses away from the area or be seen as an 'extra tax'. There is potential for the measure to have an impact upon lower income employees. The group felt that the measure was financially viable but there were further questions regarding the viability of delivery given the timescale for achieving compliance.	Reduce, Shift
54	Parking charging and permits graded by vehicle standard or zone	Parking charges or permits graded according to engine size / emission standard / ULEV vehicles or zonal charging based on the level of accessibility by other modes	-1	1	3	1	1	-1	**4**	Measure can be represented within CAZ traffic and air quality modelling.. There is potential for improvements to health, but likely to be over a relatively longer term. It can be easily targeted geographically and will contribute longer term to a move towards ULEV vehicles. The measure may make a small improvement to facilitating local growth but will increase costs to users, most notably lower income households. The group felt that the measure is financially viable.	Reduce, Improve
100	Switch regional fuelling stations to Gas to Liquid (GtL)	Use of GtL fuel as a cleaner diesel	3	1	3	-2	-1	-1	**3**	Measure can be represented simply within CAZ traffic and air quality modelling and will help to contribute to a health improvement through cleaner diesel being used. It can be easily targeted geographically, however the measure still facilitates diesel usage, is a more expensive alternative and as it is within the testing stage, it is not possible to consider this measure further.	-
55	Green Light Optimised Speed Advisory (GLOSA) / Green wave pilot project	Provide council operated vehicle fleet drivers with a mobile application to monitor traffic	0	0	1	0	0	1	**2**	The measure can be represented within the CAZ traffic and air quality modelling. However, this would be a relatively basic model which would require a lot of assumptions to be made. It could be useful in improving flow, although route corridors could be	Reduce

ID	Additional Measure	Non-technical description	MCA Framework score							Justification for assigned score	Anticipated response-Reduce/Shift/Improve
			a	b	c	d	e	f	Total		
		signals, enabling drivers to adapt their speed to 'ride the green wave' and minimise stop start driving								created as a result. Sustained improvement to health within the timescale is negligible. It is considered as having a negligible effect with regards to promoting a low emission economy and facilitating local growth, although there is potential for a small improvement to deliver efficiency. The group considered that the option would result in less congested areas and provide a small improvement in social equality.	
17	Clean Air Taxi Ranks	Designate taxi ranks in strategic locations as 'clean air taxi ranks' whereby only ULEV taxis can enter	-1	0	3	1	-1	0	**2**	The measure would be difficult to represent within the CAZ traffic and air quality modelling	Improve
48	No idling zones at taxi ranks, schools, hospitals, residential areas	Introduce and enforce no idling zones in known problem areas	-1	0	3	0	0	0	**2**	The measure would be difficult to represent within the CAZ traffic and air quality modelling. . The cost to implement and enforce this measure is considered relatively high in terms of resource.	-

2.4 RECOMMENDATIONS FOR ADDITIONAL MEASURES UP TO YEAR 2020

The total score assigned to each measure within Table 3 was used to rank the measures and determine those that should be taken forward for further development within quantitative modelling.

A measure scoring +10 ('*medium positive potential*') and above has been recommended to proceed to Phase 3; **detailed appraisal methodology**.

Given the primary objective, two key determinants in deciding to progress an option related to its potential impact on human health and ability to be represented within quantitative traffic and air quality modelling. As such, any measure taken forward had to achieve a positive score for those two criteria. In addition to these determinants, extra weight has been given to those measures which are more likely to have impact across at least one or more category response themes (i.e. reduce/shift/improve).

The measures recommended for further development in Phase 3 are:

- Increase LPG refuelling for Hackney Carriages and the installation of rapid EV infrastructure for taxi and private hire vehicles (ID 15)
- Retrofitting of black taxi's to LPG (ID 16)
- Highway/infrastructure improvements to bus services to make them more viable and accessible to the public and increase bus priority schemes (ID 19,21)
- Zero emission buses/retrofitting of public transport fleet (ID 20a)
- Remove free on-street parking within the city centre (ID 37)
- Incentivise or subsidise sustainable travel by up to 50% to improve public transport patronage (ID 56)
- Signing strategy to encourage northbound traffic on Suffolk Street, Queensway towards Sandpits Parade to reroute to west of Ring Road. (ID 67)
- Signing strategy to encourage southbound traffic from Great Charles St and Sandpits to re route to Ring Road rather tan A38 Suffolk Street Qway Close the junction on Dartmouth Middleway between Lister Street and Great Lister Street to avoid stop start traffic and reduce congestion (ID 69)
- Re-signing and rerouting scheme for the A38 (ID 73)
- Ban all through traffic on the A38 around Paradise Circus, diverting traffic to the A4540 (ID 74)
- Change the boundary of the CAZ to incorporate the A4540 and encourage traffic to divert to the west of the city (ID 74a)
- Restrict traffic on Moor Street Qway to bus, taxi and cycle only and close Park Street to all traffic (ID 75)

2.5 PHASE 3: DETAILED APPRAISAL METHODOLOGIES

Phase 3 of this study will outline the detailed appraisal methodologies generated for each of the aforementioned 13 additional measures progressed from Phase 2. Specifically, this will comprise the development of methodologies to enable each measure to be represented within transport modelling alongside the future CAZ scenarios being assessed for their feasibility by BCC.

The outputs from the transport modelling will be utilised as inputs to BCC's air quality model to facilitate an in-combination assessment of the CAZ and additional measures, thus enabling the effectiveness of these to be quantified with respect to achieving the primary objective.

2.6 POTENTIAL MEASURES POST 2020

Those measures judged as being part of a longer term plan post 2020, as identified in Phase 1 (*Option Generation and Initial Sifting*), were taken forward separately to the Phase 2 (*Option Appraisal*) to determine which measures would improve air quality within areas of concern, should further measures be required beyond 2020.

The appraisal framework criteria and scoring system detailed in Section 2.2 was used to appraise the post 2020 options. The outcomes of the MCA Framework and associated justification for the score assigned to each measure are presented in Table 4.

None of the measures identified for potential further development in this part of the Options Appraisal were taken forward to Phase 3 of this study, given that they would not materially contribute to the primary objective.

Table 4 – MCA Framework Appraisal applied to post 2020 measures

ID	Additional Measure	Non-technical description	MCA Framework score							Justification for assigned score	Anticipated response-Reduce/Shift/Improve
			a	b	c	d	e	f	Total		
22	Develop and implement a mass transit network (Sprint)	Develop and implement a mass transit network (Sprint)	3	3	3	3	3	2	**17**	Measure is able to be represented simply within CAZ traffic and air quality modelling and will potentially contribute to an improvement in air quality and health as a result of less overall car usage/congestion and an increase in public transport patronage. It can be easily targeted geographically and will contribute to a low emission economy. It will enhance social equality by the improvements made to public transport.	Reduce, Shift, Improve
91	Mass transit network	Regional mass transit network to cover the west midlands region	3	3	3	3	3	2	**17**	Measure is able to be represented simply within CAZ traffic and air quality modelling and will potentially contribute to an improvement in air quality and health as a result of less overall car usage/congestion and an increase in public transport patronage. It can be easily targeted geographically and will contribute to a low emission economy. It will enhance social equality by the improvements made to public transport.	Reduce, Shift, Improve
26	Further extensions of the Metro system	Further extensions of the Metro system	3	3	3	2	3	2	**16**	Measure is able to be represented simply within CAZ traffic and air quality modelling. Potential improvements to health as a result of less overall car usage/congestion and an increase in public transport patronage. The measure can easily be targeted geographically and promotes a drive towards a low emission economy. It would facilitate local growth through increased public transport usage and will enhance social equality in those areas the measure is implemented.	Reduce, Shift, Improve
27, 28	Reopen Camp Hill Rail Chords line and open stations at Moseley, Kings Heath and Hazelwell	Reopen Camp Hill Rail Chords line and open stations at Moseley, Kings Heath and Hazelwell	3	3	3	2	3	2	**16**	Measure is able to be represented simply within CAZ traffic and air quality modelling. Potential improvements to health as a result of less overall car usage/congestion and an increase in public transport patronage. The measure can easily be targeted geographically and promotes a drive towards a low emission economy. It would facilitate local growth through increased public transport usage and will enhance social equality in those areas the measure is implemented.	Reduce, Shift, Improve
24	Increase the number and use of park and ride	Increase the number and use of park and ride schemes and	3	2	3	2	3	2	**15**	Measure is able to be represented simply within CAZ traffic and air quality modelling. Potential improvements to health as a result of less overall car usage/congestion and an	Reduce, Shift, Improve

ID	Additional Measure	Non-technical description	MCA Framework score							Justification for assigned score	Anticipated response-Reduce/Shift/Improve
			a	b	c	d	e	f	Total		
	schemes to coincide with rail and metro services	coincide with tram services and complement these sites with EV charge points and cycle storage facilities								increase in public transport patronage. The measure can easily be targeted geographically and promotes a drive towards a low emission economy. It would facilitate local growth through increased public transport usage and will enhance social equality in those areas the measure is implemented.	
70	Use the NEC car parking for parking outside of the city with direct links to train and bus services into the city	Use the NEC car parking for parking outside of the city with direct links to train and bus services into the city	2	3	3	1	3	2	**14**	Measure is able to be represented within CAZ traffic and air quality modelling although it will require some assumptions to be made. It will contribute to an improvement in air quality and health as a result of less overall car usage/congestion in the city and an increase in public transport patronage. It can be easily targeted geographically and will contribute to a low emission economy. It would facilitate local growth through increased public transport usage and will enhance social equality.	Reduce, Shift, Improve
04	Local delivery hubs including cycle/EV logistics	Use of local delivery hubs for smaller businesses/ goods which use EV or cycle for onward travel	3	3	3	3	2	0	**14**	The measure can be represented simply within CAZ traffic and air quality modelling. There is potential improvements to health as there would be a reduced number of freight vehicles entering the city. It can be easily targeted geographically and promotes low emission vehicles. It is considered to help facilitate a modal shift in freight deliveries. It will have a negligible impact upon social equality.	Reduce, Shift, Improve
03	Cargo hopper/ULEV deliveries from freight centres	Use of sustainable (ULEV) vehicles to make deliveries in city centre from consolidation centres	3	3	3	2	2	0	**13**	The measure can be represented simply within CAZ traffic and air quality modelling. There is potential improvements to health as there would be a reduced number of freight vehicles entering the city. It can be easily targeted geographically, promotes low emission vehicles and helps to facilitate a modal shift in freight deliveries. It is considered to have a negligible impact upon social equality.	Reduce, Shift, Improve
02	Freight consolidation centres	Freight consolidation through rearranging and combining goods shipments into fewer deliveries into the city centre	3	3	3	1	1	0	**11**	The measure can be represented simply within CAZ traffic and air quality modelling. There is potential improvements to health as there would be a reduced number of freight vehicles entering areas of the city. It can be easily targeted geographically and would contribute to less congestion in the area enabling the promotion of a low emission economy and local growth. There would be a negligible impact upon social equality.	Reduce

ID	Additional Measure	Non-technical description	MCA Framework score							Justification for assigned score	Anticipated response-Reduce/Shift/Improve
			a	b	c	d	e	f	Total		
29	New Street Station - night freight deliveries	Enable night freight at New Street Station to deliver to local businesses	2	2	3	2	2	0	**11**	The measure can be represented within CAZ traffic and air quality modelling with assumptions. There is potential improvements to health as there would be a reduced number of freight vehicles entering the city. It can be easily targeted geographically and would contribute to less congestion in the area enabling local growth. It is considered to help facilitate a modal shift in freight deliveries. There would be a negligible impact upon social equality.	Reduce, Shift, Improve
30	Birmingham Canal Network	Support movement of goods through the city via the Birmingham Canal Network	2	2	3	2	2	0	**11**	The measure can be represented within CAZ traffic and air quality modelling with assumptions. There is potential improvements to health as there would be a reduced number of freight vehicles entering the city. It can be targeted geographically and would contribute to less congestion in the area enabling local growth. It is considered to help facilitate a modal shift in freight deliveries. There would be a negligible impact upon social equality.	Reduce, Shift, Improve
96	West Midlands Borough's Consolidation centre	A consolidation centre which will receive goods on behalf of Councils from its suppliers before collating and consolidating the goods and preparing them for onward delivery to the council sites using planned and optimised delivery routes using Euro IV or ULEV capable trucks. Returns can be collected to maximise vehicle capacity.	3	2	3	2	1	0	**11**	The measure can be represented simply within CAZ traffic and air quality modelling. There is potential improvements to health as there would be a reduced number of vehicles entering the city. It can be easily targeted geographically and would contribute to less congestion in the region enabling the promotion of a low emission economy and local growth. There would be a negligible impact upon social equality.	Reduce, Improve
01	Development of a freight partnership for city centre deliveries	Development of a freight partnership for city centre deliveries to set and implement stretching targets to improve efficiency of fleet	2	2	3	2	1	0	**10**	The measure can be represented within CAZ traffic and air quality modelling with assumptions. Potential for improvements to health through a gradual improvement in fleet. It can be easily targeted geographically and promotes low emission freight transport. It is considered as having a slight beneficial impact upon local growth as the	Improve

ID	Additional Measure	Non-technical description	MCA Framework score							Justification for assigned score	Anticipated response-Reduce/Shift/Improve
			a	b	c	d	e	f	Total		
										improvements will primarily benefit those areas where the requirements are implemented.	
66	Scrappage scheme: - HGV/LDV - Cars	Scrappage scheme to remove older vehicles off the road network	2	3	3	3	0	-2	**9**	The measure can be represented within CAZ traffic and air quality modelling with assumptions and will potentially contribute to an improvement in air quality and health as a result of fewer older vehicles on the network. It can be targeted geographically and promotes the drive towards a low emission economy. It is considered to have a negligible impact on facilitating local growth, unless new vehicles are sourced locally. The measure would have a negative impact on social equality as it will affect those households and businesses with older vehicles.	Shift, Improve
46	Extend the network of red routes	Extend the network of red routes with associated enforcement	2	1	3	0	0	1	**7**	The measure can be represented within CAZ traffic and air quality modelling with assumptions. The measure would potentially contribute to an improvement in health on the routes the measure is implemented. It is considered as having a negligible effect with regards to promoting a low emission economy and facilitating local growth, although there is potential for a small improvement to deliver efficiency on the network. There would result in less congested areas where the measure is implemented and provide a small improvement in social equality.	Reduce
95	Region wide workplace levy	Charge for workplace parking, potential to have different charge rates according to area	3	1	3	2	-1	-1	**7**	Measure is able to be represented simply within CAZ traffic and air quality modelling and will help to contribute to a health improvement. It can be easily targeted geographically and will contribute towards a low emission economy by encouraging a behaviour change and a potential move towards public transport should parking bays be reduced. The measure is considered to have a negative impact upon facilitating growth as it could discourage businesses away from the area or be seen as an 'extra tax'. There is potential for the measure to have an impact upon lower income employees if they have to start paying public transport fares.	Reduce, Shift
90	Regional low emission refuelling networks	Regional wide low emission refuelling network to encourage the public/fleet operators to consider	-1	1	3	3	1	0	**7**	The measure would be difficult to represent within the CAZ traffic and air quality modelling. The measure would likely contribute to health in the longer term as the move towards low emission vehicles increases. It can be easily targeted geographically, promotes the drive towards a low emission	Shift, Improve

ID	Additional Measure	Non-technical description	MCA Framework score							Justification for assigned score	Anticipated response-Reduce/Shift/Improve
			a	b	c	d	e	f	Total		
		lower emission alternatives								economy and helps to facilitate modal shift. There would be no change in social equality.	
99	Subsidised public transport ticketing	Revenues from area wide CAZ and/or WPL could be used to offer subsidised public transport tickets for particular groups in order to reduce car usage.	-1	1	3	0	0	3	**6**	The measure would be difficult to represent within the CAZ traffic and air quality modelling. There would be a marginal improvement to health through increased public transport patronage. It can easily be targeted geographically and would have a negligible impact with regards to promotion of a low emission economy and facilitating local growth. It would enhance social equality for the eligible groups.	Reduce, Shift
93	Joint procurement strategies	Joint procurement strategy between all local authorities in the region to reduce deliveries	-1	0	3	1	0	0	**3**	The measure would be difficult to represent within the CAZ traffic and air quality modelling. The measure would likely give little sustained improvement to health. It can easily be targeted geographically and would contribute towards a move to a low emission economy. There would be a negligible impact with regards to facilitating local growth and the promotion and enhancement of social equality.	Reduce
92	Link up the Birmingham UTMC with that of Highways England	Link up of BCC's urban traffic management system with that of Highways England to provide advice on the motorway network about which routes to use to access Birmingham	-1	0	3	0	0	0	**2**	The measure would be difficult to represent within the CAZ traffic and air quality modelling. The measure would likely give little sustained improvement to health. It can easily be targeted geographically. There would be a negligible impact with regards to promotion of a low emission economy, facilitating local growth and the promotion and enhancement of social equality.	Reduce
103	Standardised approach to regional out of hours deliveries	Retiming deliveries to avoid the busiest times of day using a standardised approach to circumvent delivery restrictions moving forward	-1	0	3	0	-1	0	**1**	The measure would be difficult to represent within the CAZ traffic and air quality modelling. The measure is unlikely to provide sustained improvement to health. It can easily be targeted geographically and will have a negligible impact on the promotion of a low emission economy. The measure does not facilitate local growth and could potentially have a negative impact on business. There would be a negligible impact upon social equality.	Reduce

2.7 RECOMMENDATIONS FOR POST 2020 MEASURES

The total score assigned to each measure within Table 4 has been used to identify the most viable effective measures that could play a role in improving air quality post 2020.

A measure scoring +10 (*'medium positive potential'*) and above has been recommended to proceed further, should this be required.

Two key determinants in deciding on taking an option forward related to its potential impact on human health and ability to be represented within quantitative traffic and air quality modelling. As such, any measure taken forward had to achieve a positive score for those two criteria. In addition to these determinants, extra weight has been given to those measures which are more likely to have impact across two or more category of response themes (i.e. reduce/shift/improve).

The measures recommended for further development, should these be required, are:

- Development of a freight partnership for city centre deliveries (ID 01)
- Freight consolidation centres (ID 02)
- Cargo hopper/ULEV deliveries from freight centres (ID 03)
- Local delivery hubs including cycle/EV logistics (ID 04)
- Develop and implement a mass transit network (Sprint) (ID 22)
- Increase the number and use of park and ride schemes to coincide with rail and metro services (ID 24)
- Further extensions of the Metro system (ID 26)
- Reopen Camp Hill Rail Chords line and open stations at Moseley, Kings Heath and Hazelwell (ID 27 &28)
- New Street Station- night freight deliveries (ID 29)
- Birmingham Canal Network (ID 30)
- Use the NEC car parking for parking outside of the city with direct links to train and bus services into the city (ID 70)
- Mass transit network (ID 91)
- West Midlands Borough's Consolidation centre (ID 96).

3

PHASE 3: DETAILED APPROACH TO APPRAISAL

3 DETAILED APPROACH TO APPRAISAL

3.1 INTRODUCTION

This Technical Note outlines the approach to traffic modelling for the short term measures identified during the option the selection (Phase 1) and appraisal phase (Phase 2) of the Birmingham Clean Air Zone – Additional measures study. This current phase of the study is referred to as Phase 3.

The Phase 1 and 2 of the study identified a list of measures to be taken forward for the detailed modelling in Phase 3. These measures were re-examined in detail in terms of their potential to be represented quantitatively in the traffic and air quality models. It was found during the investigation in this phase of the study; that some of the measures are not easily quantifiable using the current traffic and air quality models and therefore cannot be taken forward for economic assessment. These primarily included Intelligent Transport Measures and Speed Enforcement measures which cannot be modelled accurately using the strategic traffic models.

An iterative process was then followed in agreement with the BCC that included revisiting the scores assigned in the initial phases of the study, and a more refined list was produced to be taken forward to the detailed modelling and assessment.

The revised list of measures to be investigated in Phase 3 of the study is provided underneath:

- ID 15 & 16- Increase LPG refuelling for Hackney Carriages and the installation of rapid EV infrastructure for taxi and private hire vehicles and retrofitting of black taxi's to LPG
- ID 19 & 21 - Highway/infrastructure improvements to bus services to make them more viable and accessible to the public and increase bus priority schemes
- ID 20a - Zero emission buses
- ID 37- Remove free on-street parking within the city centre
- ID 56 - Incentivise or subsidise sustainable travel by up to improve public transport patronage
- ID 67- Signing strategy to encourage northbound traffic on Suffolk Street, Queensway towards Sandpits Parade to reroute to west of Ring Road.
- ID 68 - Signing strategy to encourage southbound traffic from Great Charles St and Sandpits to re route to Ring Road rather than A38 Suffolk Street Qway
- ID 69 - Change the junction on Dartmouth Middleway between Lister Street and Great Lister Street to avoid stop start traffic and reduce congestion
- ID 73 - Resigning and rerouting scheme for the A38
- ID 74 - Ban all through traffic on the A38 around Paradise Circus, diverting traffic to the A4540.
- ID 74a - Change the boundary of the CAZ to incorporate the A4540 and encourage traffic to divert to the west.
- ID 75 - The closure of Moor Street Queensway between Masshouse and Park Street to general traffic with only Public Transport, Hackneys and cycles allowed in the area.

3.2 CONSULTATION WITH INVOLVED DISCIPLINES

In order to develop an approach to the appraisal for these measures, consultations were undertaken with the various disciplines and stakeholders involved in the study. A meeting was organised with the representatives from the Traffic Modelling Team led by Steer Davies Gleave, Air Quality Modelling Team led by Jacobs, Appraisal Team led by Jacobs and Transport for West Midlands and Birmingham City Council to discuss the potential approach to modelling these measures and scenarios.

Following the discussion with the various involved disciplines, some of the measures were packaged further to generate six strategic scenarios to be taken forward for traffic and air quality modelling. Some of the measures were considered to be unachievable in the shorter term and were therefore excluded from the scenarios.

These scenarios are provided underneath

- **Public Transport Improvement Measures**

- ID 19 & 21 - Highway/infrastructure improvements to bus services to make them more viable and accessible to the public and increase bus priority schemes – identification of key corridors and measures.

- **Parking Strategy**
  - ID 37 - Remove free on-street parking from in the city centre within the ring road
- **Fleet Upgrade Strategy**
  - ID 15 & 16 - Increase LPG refuelling for Hackney Carriages and the installation of rapid EV infrastructure for taxi and private hire vehicles and retrofitting of black taxi's to LPG
  - ID 20a – Introduction of zero emission buses.
- **Public Transport Subsidy**
  - ID 56 - Incentivise or subsidise sustainable travel to improve public transport patronage
- **Traffic Management Measures involving changes to the existing transport network**
  - ID 67- Signing strategy to encourage northbound traffic on Suffolk Street, Queensway towards Sandpits Parade to reroute to west of Ring Road.
  - ID 68 - Signing strategy to encourage southbound traffic from Great Charles St and Sandpits to re route to Ring Road rather than A38 Suffolk Street Qway
  - ID 69 - Change the junction on Dartmouth Middleway between Lister Street and Great Lister Street to avoid stop start traffic and reduce congestion
  - ID 75 – The closure of Moor Street Queensway between Masshouse and Park Street to general traffic with only Public Transport, Hackneys and cycles allowed in the area.
- **Restricting through traffic to enter Birmingham City Centre and A38**
  - ID 73 - Resigning and rerouting scheme for the A38 and Ring Road
  - ID 74 - Ban all through traffic on the A38 diverting traffic to the A4540.
  - ID 74a - Change the boundary of the CAZ to incorporate the A4540 and encourage traffic to divert to the west.

3.3 DETAILED APPROACH TO ASSESSMENT

The detailed approach for traffic modelling for the selected measures is summarised in this section

PUBLIC TRANSPORT IMPROVEMENT MEASURES

Description

This package includes measures to improve Public Transport provisions, such as highway/infrastructure improvements to support bus services such as priority schemes and improved PT accessibility to support patronage to the PT modes.

Approach to Assessment

- Four bus corridors have been identified by the traffic modelling team in collaboration with Transport for West Midlands (TfWM) where the Bus Priorities would be implemented in order to improve the patronage for the Public Transport.
- TfWM's mode shift analysis will be used to identify the impact these measures on the traffic demand in the highway model.
- The network related changes required for the measures would be coded in the highway network.
- The updated demand matrices would then be assigned to the updated network and the assignment would provide the traffic flows associated with the PT Improvements.
- The resultant traffic flows would feed into the Air Quality model to assess the impacts of the PT improvements on the Air Quality (AQ) and the monetised values associated with that.
- The economic assessment of these measures would be undertaken by comparing the PT Improvement scenario with the Do Nothing scenario to assess the changes in the benefits

PARKING MEASURES

Description

This package includes removal of free parking from BCC controlled areas.

Approach to Assessment

- Birmingham City Council has provided the relevant parking data to the traffic modelling team
- Traffic modelling team would undertake some preliminary analysis to formulate the assumptions related parking to charges etc. to be applied in the traffic models.
- PRISM Model demand model runs with and without city centre charges would be used to calculate the demand elasticity to parking charges.
- BCC Parking Study would be used to identify the demand using the free parking areas targeted and to assess proportion of demand in the new CPZ zones that currently have free on street parking. This looks at:
  - Proportion of parking spaces in the zone
  - Utilisation of the different parking types (e.g. uncontrolled on street, PNR etc.)
- Combination of responsiveness and % of demand affected would then be used to calculate reduction in City Centre demand and create the demand matrices for the 'Parking Measures' scenario
- The model run would be undertaken and the resultant traffic flows would feed into the AQ model to assess the impacts of the parking strategy on the air quality related attributes and the monetised values associated with that.
- The economic assessment of these measures would be undertaken by comparing the Parking Strategy scenario with the Do Nothing scenario to assess the changes in the benefits.

FLEET UPGRADE STRATEGY

Description

This package includes measures to upgrade the fleet to improve the proportion of the Low Emission Vehicles through measures like increasing the LPG refuelling for Hackney Carriages and the installation of rapid EV infrastructure for taxi and private hire vehicles, retrofitting of black taxi's to LPG and zero emission buses/retrofitting of public transport fleet.

Approach to Assessment

- Birmingham City Council (BCC) has advised the traffic modelling team on the Fleet Upgrade Strategy they intend to test.
- It has been assumed that the new buses to be run on the four bus priority corridors would be the zero emission buses.
- The fleet mix in the traffic model would be reviewed and necessary amendments would be made in the fleet mix to test the fleet strategy and the traffic model runs would be undertaken.
- The resultant traffic flows would feed into the AQ model to assess the impacts of the fleet upgrade strategy on the air quality related attributes and the monetised values associated with that.
- The economic assessment of these measures would be undertaken by comparing the Fleet Upgrade scenario with the Do Nothing scenario to assess the changes in the benefits.

PUBLIC TRANSPORT SUBSIDY

Description

This includes measures to incentivise or subsidise sustainable travel to improve public transport patronage

Approach to Assessment

- Transport for West Midlands (TfWM) would support the traffic modelling team and provide details of the strategy to provide the subsidy to the Public Transport.
- TfWM's mode shift analysis will be used to identify the impact of this policy on the traffic demand in the highway model.
- The resultant traffic flows would feed into the Air Quality model to assess the impacts of this measure on

the air quality and the monetised values associated with that.

- The economic assessment would be undertaken by comparing the PT Subsidy outputs with the Do Nothing scenario to assess the changes in the benefits

TRAFFIC MANAGEMENT MEASURES INVOLVING CHANGES TO THE EXISTING HIGHWAY

Description

This package includes measures associated with traffic management strategies to complement the CAZ charging and aid in discouraging the vehicular traffic in areas where exceedances persist. The measures identified as a part of this package include:

- Discouraging the route of traffic travelling northbound along Suffolk Street, Queensway which then exit onto Paradise Circus, to then access Sandpits Parade;
- Discouraging the route of traffic travelling southbound who then exit at the section between Paradise Circus and St, Chads;
- Changing the junction of Dartmouth Middleway with Lister Street and Great Lister Street to a bus only route to reduce the amount of delay to traffic on the Ring Road
- The closure of Moor Street Queensway between Masshouse and Park Street to general traffic with only Public Transport, Hackneys and cycles allowed in the area.

Approach to Assessment

- These measures would be modelled by coding the traffic management related changes in the highway model network.
- These measures would be coded individually and the mode runs would be undertaken. The resulting traffic outputs for each of the measures would then be analysed. If these measures make significant difference in the traffic flows they would be taken forward for the AQ modelling.
- Some of the measures may be packaged or discarded following the results of the traffic modelling if they do not reflect reasonable changes in the traffic flows.
- The resultant measures or packaged measures would be taken forward for the AQ modelling to assess the impacts of the of the traffic management strategies on the air quality attributes and the monetised values associated with that.
- The economic assessment of these measures would be undertaken by comparing the Traffic Management and network improvement scenario with the Do Nothing scenario to assess the changes in the benefits.

RESTRICTING THROUGH TRAFFIC TO ENTER BIRMINGHAM CITY CENTRE AND A38

Description

This package includes measures facilitating reduction of through traffic from the Birmingham City Centre and from A38 around Paradise Circus. This measure would also be supported by changing the boundary of the CAZ to incorporate the A540 which would encourage the traffic to divert to the west. This measure would be tested only on the HGVs at this stage.

Approach to Assessment

- These measures would be modelled by coding the traffic management related changes in the highway model network.
- The charges would be applied on the HGVs entering the extended CAZ zones.
- Model runs would be undertaken and the outputs from the traffic modelling will be taken forward for the AQ modelling to assess the impacts of the measure on the air quality attributes and the monetised values associated with that.
- The economic assessment of these measures would be undertaken by comparing the ‘through traffic restriction’ scenario with the Do Nothing scenario to assess the changes in the benefits.

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