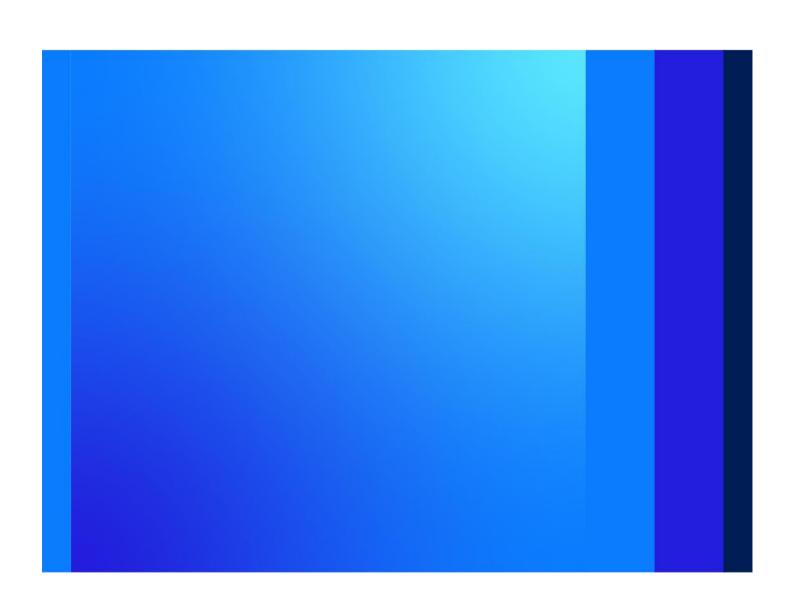
Jacobs

Snow Hill Phase Two

Project Report

12 February 2021

01





Snow Hill Phase Two

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Project Report



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1. Introduction

1.1 **Background and Context**

Snow Hill Strategic Outline Business Case (SOBC) was produced in 2020 to set out a high-level list of measures to address the drivers around the station through provision of sustainable and transformational changes. Since the production of the SOBC, a number of questions remained unanswered and a need to address these through a more robust platform, namely the Birmingham City Model¹ which has since been developed. In addition, the publication of the Draft Birmingham Transport Plan 2031 (DBTP) (published in Draft in January 2020) with a changing emphasis towards sustainable modes (rather than large scale highway improvements to the ring road) has also helped to inform this commission and requires a refresh of the options tested to ensure compliance.

The DBTP considers a set of principles that will guide investment in transport, so that it serves more people and is able to serve a future Birmingham in which everyone can live and work irrespective of age, disability or income. The measures identified in the plan are:

- Reduce transport's damaging impact on the environment, supporting Birmingham's commitment to becoming a carbon neutral city by 2030;
- Eliminate road danger particularly in residential areas;
- Connect people with new job and training opportunities;
- Reconnect communities by prioritising people over cars;
- Revitalise the city centre and local centres.

The plan sets out a series of policies to improve transport, ensuring inclusive growth for the city and setting out 'big moves' - where no single mode of transport will be dominant. The travelling public will have a choice between a range of modes of transport, accessible, viable and sustainable. The plan sets out policies to address the Climate challenge; air quality accommodating future growth; improving road and rail capacity and providing improved network resilience; promoting public transport use. There is also a short-term opportunity to boost the profile of the City and support the economy through hosting the 2022 Commonwealth Games (CWG). The plan identifies future challenges related to network management and travel demand management and the need for 'big moves' focused on:

- Reallocating Road Space (from cars to more sustainable modes of transport and to more economically productive or community use of space);
- Transforming the city centre the focus for the majority of economic growth in the Big City Plan;
- Prioritising active travel in local neighbourhoods;
- Managing demand through parking measures in key centres..

The moves are aimed at supporting improved quality of life, increasing road efficiency, reducing levels of air pollution/improving air quality, supporting inclusive growth, supporting housing growth and improving health and wellbeing. The DBTP sets out a Delivery Plan for city wide and city centre schemes including the Snow Hill Growth Strategy, including the A38 / Ring Road project to be delivered within the Transport Plan period (2031).

In addition, as part of the regeneration and city centre major developments, the Birmingham City Economic Recovery Plan sets the Snow Hill scheme centred on the major redevelopment and transformation of Snow Hill station and its immediate environs. The scheme is considered to play a significant role in contributing to the delivery of the growth agenda for the City by both improving the railway station and transport connectivity within the Snow Hill area and to/from surrounding areas and creating 112,000sqm of new office-led development accommodating over 7,700 jobs and 200 homes.

¹ SATURN Model



1.1.1 Project Background

There are local transport and connectivity issues / barriers within the Snow Hill district, together with solutions being considered, these are to date:

- Preparation of the SOBC for the Snow Hill Connectivity Study to Birmingham City Council (BCC) in 2019, which influenced the development of the Draft Birmingham Transport Plan; and
- Development of the TAG compliant Birmingham City (SATURN) Model (BCM), which brings the
 evidence base as a key tool in modelling options and undertaking assessment of the efficiency of the
 transport network and supporting package delivery.

The A38 is currently a barrier to free movement in the Snow Hill Masterplan area. Pedestrian access across the A38 is restricted to grade separated links including unattractive bridge and subways, and at-grade crossings where the road is in tunnel at Newhall Street and at St Chads Circus. Figure 1.1 shows the A38 passing through the city centre and the A4540 Middleway around the wider city centre.

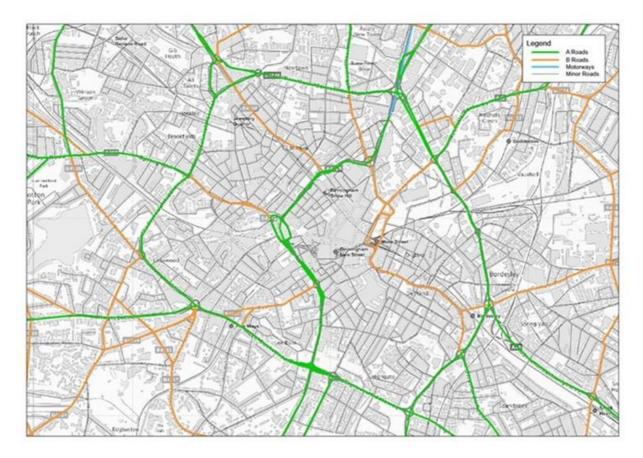


Figure 1.1 A38 through Birmingham city centre, and wider highway network

Figure 1.2 shows the wide high capacity carriageway with the difference in height of development on the City Centre side and outer area which is related to poor connectivity.



Figure 1.2 A38 Merge / Diverge Between Tunnels on Snow Hill Queensway, showing disparity in development

The proposed connectivity project aims to facilitate city-wide expansion, particularly in areas such as the Gun Quarter and Jewellery Quarter and will result in a step change in travel behaviour across the city, improving health and air quality.

Figure 1.3 shows the potential developable areas that could be released by the scheme including existing highway land in blue and available car parking land in green.

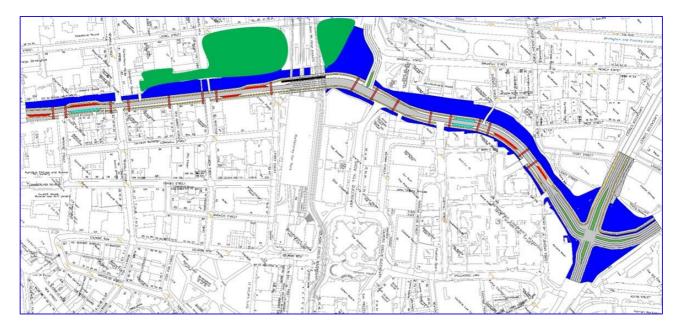


Figure 1.3: Developable Land Potential within Snow Hill Masterplan Area resulting from the Scheme.

The Snow Hill Connectivity Study considered three broad packages of interventions to support the closure of the A38 tunnels through the city centre, from Dartmouth Circus on the northern side through to Belgrave Interchange in the south. The removal of this through route, with associated reconfiguration of the surface roads, would support the expansion of the city centre core as part of the identified Snow Hill Area of Transformation.

The packages assessed were high-level combinations of highway, public transport and active mode interventions, to provide alternative transport opportunities for journeys destined for the city centre. Through traffic mostly re-routed from the A38 via the A4540 Middleway, with some re-assignment to other orbital roads including the motorway box.

Assessment outputs identified that a shift in emphasis away from private car traffic for trips to the City Centre could be supported with suitable interventions (such as increased parking capacity at stations, improved public



transport connectivity), and that further evolutions of financial, policy and appraisal techniques would demonstrate wider benefits to the city's economy and hence produce a positive business case.

1.1.2 Project Context

Jacobs have been commissioned to develop the options for Snow Hill Transport and Connectivity Package, following on from those assessed in the Connectivity Study outlined above and building from the Public Transport / Active Modes scenario. The remit of this current study encompasses:

- Redeveloping the long list of options and alternatives to support the transport / economic plan;
- Refining the appraisal tool to sift the options to a short list utilising DfT EAST tool and emerging Birmingham Draft Transport Plan;
- Develop options packages for Snow Hill;
- Using the developed Birmingham City Model (BCM) to test the effectiveness of option packages in terms of the efficiency of the highway network; and
- Recommend solutions compliant with the emerging transport plan and an action plan for implementation.

The project aimed to build on the earlier produced Snow Hill Connectivity Strategic Outline Business Case (SOBC) establishing an added layer of evidence base and focusing on recommendations for schemes to be taken forward to support the emerging Birmingham Transport Plan 2031 objectives, with a policy led approach for achieving housing and employment growth through improved connectivity. It also considers the impact of policy changes from Birmingham City Council, particularly in light of the 2020 Emergency Transport Plan and the evolution of these into a revised Birmingham Transport Plan.

1.2 Building on Previous Work

The Snow Hill Connectivity Study SOBC, utilising PRISM modelling, highlighted that the key issues and challenges were around the proposed closure of the A38 tunnels, creating major re-assignment of traffic, resulting in increased journey times. However, it was identified that a further level of desegregation of operational assessment at local level in the modelling was needed to address the questions raised at the earlier work stage to accurately represent network efficiency resulting from such major change. The SOBC focussed on options for the A38 through the City Centre, investment in public transport and A4540 Middleway changes to mitigate traffic impacts and constraints on connectivity. Meanwhile the Birmingham City Model has been developed with capacity constraining and modal shift / demand changes out to the motorway box and beyond to the north.

The earlier study concluded that the proposed A38 tunnels closure would produce significant journey time disbenefits. High-level modelling with PRISM (Regional Policy Model) re-assigned the traffic to other alternative links, (mainly the A4540 Middleway). This resulted in increased journey times and distances travelled and with far less modal shift. As a result, it forecast that re-assigned highway demand would increase travel costs and hence provide negative highway benefits. This led to the requirement of further detailed testing and options reconsideration associated with detailed modelling results analysis.

The DfT provided positive recommendations to this SOBC, including the need to explore air quality, noise, amenity and severance impacts. They also agreed that there was a need for testing new scenarios including the critical definition of the project's Do Minimum scenario, where the A38 declassification and tunnels closure could potentially form the reference case, with the value for money proposition focused on traditional plus new impact categories such as wider economic impacts, including associated land value uplifts, and other elements such as reduction in maintenance costs.

With the knowledge of DfT input at the previous stage of the work, the necessity to develop the evidence-based case further to further support the initial SOBC work was necessitated.



2. Approach to Project

2.1 Introduction

The approach to the project has been split into three distinct sections, with the tasks undertaken highlighted in the workflow diagram (Figure 2.1).

- Review Stage
- Strategic Modelling Stage
- Analysis Stage



Figure 2.1: Study Workflow Diagram



2.1.1 Review Stage

The review stage² was required to:

- review previously tested options and introduce enhancements required for further robust modelling to define and refine options / investment packages;
- review and incorporate the Draft Birmingham Transport Plan and subsequently Economic Recovery;
- identify current multi-modal network operations of the Snow Hill area, challenges and opportunities.

The new expanded BCC SATURN model demonstrated and ensured a thorough understanding in the appraisal of various scenarios as laid out in the draft Birmingham Plan ('Big Moves').

The review stage led to the development of long and short listing of options to be tested in the model, leading to the appraisal of the options, emerging towards a preferred scenario and an action plan for implementation.

A workshop was conducted to establish the issues identified in the earlier study. This led to the completion of the review stage in the light of this understanding, working together with Birmingham City Council, West Midlands Combined Authority and Department for Transport (DfT). DfT has informed that they were party to the project to support and inform with any requirements that BCC might have.

Refreshed appraisal criteria were informed by the Birmingham City Model (BCM) on the location and scale of issues, to add rigour to the assessment of Value for Money (VfM) for the package of investment. Key proposals from the Transport Plan incorporated into the modelling included the Clean Air Zone (CAZ); future charging options; servicing and access restrictions ("traffic cells"); and improved public transport.

The review process involved identification of previously tested measures but also the emerging Transport Plan measures, WMCA planned investment and any additional measures leading to a revised Long List of Interventions.

To sift the options to a short list of deliverable, policy-compliant and effective packages, achieving DfT appraisal requirements, the emerging DRAFT Birmingham Transport Plan policies and 'moves', coupled with the principles of the Early Appraisal and Sifting Tool (EAST) based approach were developed in the form of a Multi-Criteria Assessment (MCA) Options Assessment Framework (OAF).

This approach has built on the EAST's strengths and developed additional assessment criteria to ensure the MCA is more relevant to the study scope (such as policy, local objectives, viability, deliverability, constructability, affordability, finance and funding). This process has supported the production of the OAF, more likely to enable appropriate scheme selection.

The resulting short-list of schemes have then been packaged to be taken forward for scenario modelling within the simulated Birmingham City Model, coupled with a demand model element which has been employed to help develop the scenarios with targeted and timely public transport interventions which are introduced in the Strategic Modelling section.

2.1.2 Strategic Modelling Stage

Do Minimum Scenario (Reference Case) Network, Demand and Assignments

The BCM Do-Minimum (DM) scenario and forecast scenarios³ were employed to test the effectiveness of options. However, given the scheme location and the Area of Influence (AoI), (beyond the Middleway Ring Road onto other radial and orbital routes), a necessity was borne to improve the calibration and validation of the model,

² All stages of the project were undertaken before the Covid Pandemic impacts on transport and assumed a return to pre-Covid levels and patterns after lockdown.

³ All models and forecast scenarios were developed pre-Covid Pandemic.



specific to the Snow Hill Transport and Connectivity study. Following which the changes to the network since the model was developed had to be incorporated into the reference case, to ensure that the Uncertainty Log was updated to reflect recent completions and the revised programme of investment. These were considered to be critical to assess the Do Minimum (Reference case) against which the Do-Something (DS) scenarios would be compared.

Updating the Base and Reference Case: The BCM (with SATURN and CUBE elements) was expanded from the previous Birmingham City Centre Model, incorporating detailed junction simulation between the A4540 ring road to the M5 and M42 motorways in the west, south and east of Birmingham, and incorporated the Sutton Coldfield model and further northern expansion.

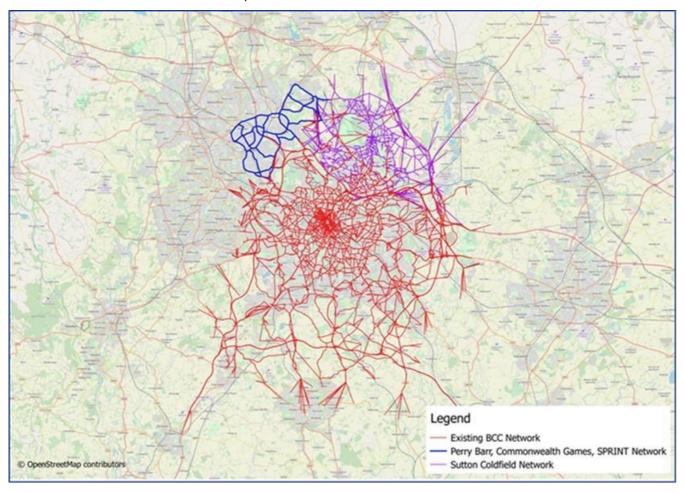


Figure 2.2: Revised Scope of the Birmingham Transport Model

A review of the existing BCC SATURN model in the Snow Hill area highlighted the necessity for improvements to the network calibration and validation specific to this project. Although this was minimal in the consideration of the extent of the model, the model improvements were brought in to improve the reliability of the model for accuracy of the forecasts for the schemes.

The model calibration and validation (both Highways and Demand Model) has achieved the TAG criteria following the local calibration and validation exercise. The TAG guidance compliant statistics are presented in Table 2.1.

Table 2.1 Base Model Flow Calibration / Validation % Pass Statistics

	AM Peak	Interpeak	PM Peak
Link Calibration 2016	85%	85%	85%
Link Validation 2016	85%	85%	86%
Local Area link Calibration (within A4540)	87%	84%	87%
Journey Time Validation	85%	79%	78%

For the Interpeak and PM Peak journey time validation, the previous model was validated. This model has a significant number of journey times that are marginally out from being validated. However, given the variable nature of traffic in the PM peak in Birmingham the model was considered sufficiently robust.

The DM (reference case) scenario included all committed highway changes, public transport provision and planned developments for the forecast years of 2022, 2026, and 2036 for the AM peak, average interpeak period (IP) and PM peak models.

The 2016 model base calibration and validation have been conducted and has improved the links shown in Figure 2.3 in relation to the Snow Hill Transport and Connectivity study.

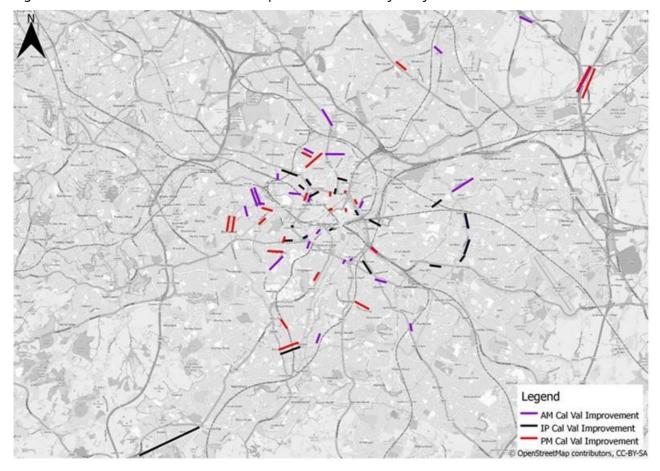


Figure 2.3: Location of Improved Links in the Highway Model

The models converged to the TAG criteria, and therefore the base and reference case models have been successfully prepared for the testing of the options. Appendix A provides more information on the improvements made to the model and graphics on the calibration pass and fail results across the study area.



The reference case has then been updated to include the recent completed changes and revised programmed activity for 2022, 2026 and 2027. These changes have been made with appropriate coding to the networks and matrices for the assignments. The full details of the Uncertainty Log (UL) are introduced in Table 2.2.

Table 2.2 Reference Case Uncertainty Log

Scheme Promoter	Scheme Name	Probability	Construction Start	Opening Year
BCC	Birmingham Cycle Revolution (BCR) A34N	Complete	2017	2018
BCC	BCR A38S	Complete	2017	2018
BCC	Ashted Circus A4540	Complete	2017	2018
BCC	Tyseley Energy Park Access	Complete	2017	2018
BCC	Holloway Circus	Complete	2017	2020
BCC	Battery Way Extension	Complete	2017	2020
BCC	Curzon Circus Pinchpoint	Complete	-	-
TfWM	Harborne Road Bus Lane	Complete	2018	2018
BCC / WMCA/ HS2 / NR/ National Express	Moor Street Queensway Enabling Works and Urban Realm "One Station"	More than likely	2019	2024
Highways England	M42 J6 and Clock Interchange improvements	More than likely	2019	2023
BCC	Dudley Road	More than likely	2021	2022
BCC	Bus Lane Enforcement #2	More than likely	2021	2022
BCC	Clean Air Fund	More than likely	2021	2021
Highways England	M42 J9 Access	More than likely	2018	2026
BCC	Bristol Road Downgrading	More than likely	2021	2022
BCC	Bradford Street Cycle Path	More than likely	2020	2021
BCC	A41 Soho Road BID Highway Connect and Plan	Near Certain	2020	2020
BCC	Clean Air Zone Early Measures	Near Certain	2018	2021
BCC	Perry Barr Interchange	Near Certain	2020	2020
BCC	Digbeth bus/cycle/taxi only between Floodgate Street and Chapel House Street	Near Certain	2022	2022`
BCC	Paradise Circus bus/cycle/taxi only Cambridge Street to Centenary Square	Near Certain	2022	2022



Scheme Promoter	Scheme Name	Probability	Construction Start	Opening Year
BCC	Clean Air Zone	Near Certain	2020	2022
BCC	Selly Oak Bypass Phase 1b	Under Construction	2019	2020
BCC	Iron Lane	Under Construction	2019	2020
BCC	Snow Hill Public Realm	Under Construction	2020	2021
BCC	Moor Street Queensway Bus Gate (Carrs Lane to Moor Street Station)	Under Construction	2020	2020
TfWM	Westside Metro Extension (Broad Street)	Under Construction	2020	2021
TfWM	Sprint A45	Under Construction	2020	2022
TfWM	Sprint A34N	Under Construction	2020	2022
BCC	Digbeth Controlled Parking Zone	Under Construction	2020	2021

It should be noted that the Draft Birmingham Transport Plan City Centre traffic cells scheme and 20mph zone are not treated as committed and are included within the Do-Something scenarios.

The matrix change between base and forecast is detailed in table 2.3 and 2.4 below for 2026 and 2037 respectively with a comparison with TEMPro. These growths rates have been applied directly across the network using the PRISM 5.2 forecast models. These growth rates have been constrained to TEMPro within the PRISM model, so they have not been re-constrained as part of BCM. The demand may provide higher growth than TEMPro as a result network supply and is also based upon network operational performance.

Table 2.3: 2026 Matrix Growth (AM/IP/PM) (excluding intra-zonals)

User Class	Base	2026	% Change	TEMPro
UC1: Car EB	19797/24143/18130	24129/28456/22343	21%/18%/23%	10%/9%/9%
UC2: Car Other	171001/141938/209065	205820/172354/247656	20%/21%/18%	14%/14%/12%
UC3: LGV	27762/22075/24401	33005/27180/29097	19%/23%/19%	-
UC4: HGV	22986/26823/17057	23884/27798/17656	3.9%/3.6%/3.5%	-
Total	241547/214979/268654	286839/255788/316753	19%/19%/18%	-

Table 2.4: 2037 Matrix Growth (AM/IP/PM) (excluding intra-zonals)

User Class	Base	2037	% Change	TEMPro
UC1: Car EB	19797/24143/18130	25583/30621/24231	29%/27%/34%	19%/16%/17%
UC2: Car Other	171001/141938/209065	222403/188963/268854	30%/33%/29%	26%/26%/23%
UC3: LGV	27762/22075/24401	35944/30092/32072	29%/36%/31%	-
UC4: HGV	22986/26823/17057	24222/27895/18071	5.3%/4.0%/5.9%	-
Total	241547/214979/268654	308153/277569/343228	28%/29%/28%	-

It was not possible to produce Covid scenarios as the impact on traffic patterns was not understood at the time of the study.



Do Something Scenarios Modelling

Working collaboratively with BCC and TfWM through a series of workshops, the long list was redeveloped and sifted using the MCA process to a short-list of schemes, leading to the development of the scenarios.

The network and demand modelling methodology for the DS scenarios and associated appraisal was agreed with the client. This created an efficient process for the development of the public transport and highway models and representation of other policy changes.

A key focus of core options for modelling has been included in the following table.

Table 2.5 Core Modelling Considerations

Issue	Approach
Treatment of the A38 closure	Rather than inclusion within the reference case, incremental changes to the A38 including full closure were included within the packages with agreement with stakeholders.
Traffic flows to reflect the modelled outputs for Birmingham CAZ	The CAZ costs has been modelled as half of the proposed daily cost to reflect a return trip at all locations where the CAZ charge applies. This ensures that the CAZ cost for trips going into the CAZ area is included within the VDM calculations.
A set of option tests to model outputs for Birmingham CAZ in terms of increase in 'home working', further improvements to public transport and step change in active mode travel to facilitate a significant modal shift, a 'future charge' for through traffic on A38	A series of options have been modelled through the BCM Variable demand model with associated highways supply changes in addition to some direct matrix adjustments in accordance with the scheme.
A combination of Options	Scenario development to build on previous work with refreshed considerations, reducing need for testing what's known that did not work from the PRISM Modelling results.

Appropriate coding has been conducted to test these considerations as part of the scenarios developed.

The model is capable of testing highways and highway demand scenarios. However, schemes associated with parking choice and active modes are not specifically treated within the model structure, and so careful adjustment of the demand matrices was required in the modelling of options, utilising information from other sources on the proportions of demand and locations where the measure would realistically impact. The details of the variable demand model are detailed in the Variable Demand Modelling report.

The key activities for Do-Something Scenario Coding were:

The options coding was based on an approach adopted successfully through:

- Revisiting O-D patterns and Generalised Journey Time (GJT) assumptions in light of improved public transport services and other modal shifts (e.g. active mode travel)
- The highway coding conducted in BCM to introduce severed links and road-space re-allocation as well as
 any highway capacity enhancements such as A4540. This led to adjustment of the highway supply and
 costs for the variable demand model (VDM) application. The coding principles established throughout
 the model development process were maintained;
- Public transport provision coded directly into the BCM SATURN Highways Model and the VDM were used to adjust the trip demand based on the resultant supply side changes.
- Model checks were conducted, and verified;



 The model results were generated for transport assessment as well as use of modelling outputs to consider future price of carbon emissions based on data sourced from the public domain (e.g. DEFRA / JAQU).

The model assessment years all converged for the scenarios tested, providing a robust platform for analysis. Model specification and scheme coding is presented in **Appendix F**.

2.1.3 Analysis Stage

Summary outputs were produced for each scenario, utilising various outputs from the BCM and producing graphical outputs to aid interpretation including overall network efficiency and scale of scheme benefits (to inform VfM considerations). These include change in the number of trips by mode; trip lengths by mode; journey time changes by mode; journey lengths; capacity constraint locations; and change in emissions.

2.1.4 Project Outputs and Deliverables

The scale of achievement of the stated objectives, coupled with value for money, delivery and fundability to suggest the preferred option(s) to take forward, are identified through the analysis of options. The technical analysis details are included in **Appendix D**. A high-level programme for the preferred scenario, with critical stages, is set out to support the recommendations.

The outcome is introduced to support the ongoing refresh of the TfWM Movement for Growth and Birmingham Transport Plan and programmed investment by BCC and TfWM.

Next steps should consider the need for further modelling approaches for DfT requirements, further review of O-D patterns and GJT assumptions based on tested Public Transport patterns and demand, and future price of Carbon based on data sourced from public domain (e.g. DEFRA / JAQU).



3. Options Development

3.1 Long List of Options

Following on from the scenarios assessed in the Snow Hill Connectivity Study (SHCS), the long list of potential schemes for consideration for this study was derived from two sources:

- Firstly, from the interventions proposed in the SHCS, with highway schemes within the BCC area (mostly on the A4540 Middleway), additional Park & Ride capacity across the West Midlands Rail network⁴, along with Sprint schemes and additional bus priority corridor measures; and
- Secondly, from a review of appropriate updated regional and local policies and strategies, particularly referencing the Emergency Travel Plan, the Draft Birmingham Transport Plan and the Local Cycling and Walking Infrastructure Plan.

The long list numbered 137 potential schemes, under the following headings:

- Rail schemes 39, including Park & Ride site expansion and new stations/services;
- Additional Bus & Sprint schemes 13, including Sprint Park & Ride sites and bus priority corridors;
- Road schemes 68, including options from the SHCS for junction alterations on the A4540 Middleway, many with several alternative potential interventions;
- Active Mode schemes 10, mostly cycling schemes; and
- Other schemes 7 including workplace parking levy and Parking SPD and charging options.

The derived long list of options was circulated to relevant client officers for consideration, with agreement that the list would be reviewed as part of the initial study workshop. Specific discussions were subsequently held with BCC's Walking and Cycling Strategy team and Transport for West Midlands' Head of Park & Ride, to review and agree their relevant potential schemes. Following these discussions, a few schemes were removed from the list as either having been superseded by other schemes on the list, or that they were no longer being pursued or supported by the relevant body.

This cleaned long list was then re-circulated for final consideration by the study technical group. The resultant long list is included at **Appendix C**.

3.2 Multi Criteria Analysis and Short-listing Process

Following from similar MCAs used on similar studies elsewhere, an initial 63 criteria were proposed grouped under ten broad themes encompassing DfT EAST and local policy objectives. These were:

- Policy fit 7;
- Strategic 6;
- Engineering/deliverability 11;
- Transport Impacts 10;
- Safety 5;

⁴ Recognising TfWM/WMCA park and ride policy and the potential impact on the levy / requirement revenue transfer from train operations.



- Environmental 9;
- Managerial 3;
- Financial/Economic 4;
- Development Impacts 4;
- Commercial 4

The detailed criteria are listed in Appendix C.

For discussion at the first workshop, the MCA table was circulated to the relevant client officers, with sample scoring included for each of the mode categories. This allowed the client group to review how the criteria scoring was proposed to be undertaken, including the consultant's interpretation of the criteria and its application to the scheme under consideration.

A seven-point Likert scale was used, as Beneficial Large / Medium / Slight. Neutral, Adverse Slight / Moderate / Large. These were given the numerical values of +3 to -3, which was subsequently used during shortlisting and option development. The completed MCA is enclosed at **Appendix D**.

During the workshop, it was suggested that a more streamlined approach could be taken to the long list scoring, with an initial sift of schemes on the basis of Policy Fit and Strategic themes. If a scheme failed to score positively on any of the thirteen criteria under these two themes, then it should not be progressed for more detailed scoring. A further refinement was suggested, being that if any scheme scored a Large Adverse (-3) score, assessment should stop and the scheme dropped.

Applying these refined methodology elements reduce the time required to undertake the analysis of the schemes. The scoring reduced the list from the initial 137 to 116. The changes were as follows:

- Rail schemes 38, reduced by one from 39;
- Bus & Sprint schemes 13, no change;
- Road schemes 48, reduction of 20 from original 68;
- Active Mode schemes 10, no change; and
- Other schemes 7, no change.

The most significant reduction is schemes was under the road category. These were mostly significant reconstructions of junctions on the A4540 Middleway, which would have increased severance, visual intrusion and impacted negatively on active mode crossings of the Middleway. Overall, many of the road schemes had negative scores, due to their impacts on the surrounding communities.

3.3 Short List of Options

A further sifting was then applied to produce the final short list of options to be used within packages for testing in the BCM.

A preliminary assessment of the sifted list of schemes against the four broad Birmingham Transport Plan policy themes of Reallocating Road Space; Transforming the city centre; Prioritising active travel in local neighbourhoods; and Managing demand through parking measures, reiterated the perceived fit against these objectives and hence their likelihood of being supported by BCC officers and Members.



The review identified that many of the road schemes did not support the renewed strategic direction for Birmingham's transport. As mentioned previously, many of the road schemes achieved negative overall scores, indicating their poor fit with policy.

By applying a final filter of receiving a score greater than 0, the final short list of schemes was derived. The numbers of short-listed schemes under the five headings were:

- Rail schemes 11
- Metro schemes 5
- Bus & Sprint schemes 11;
- Road schemes 5;
- Active Mode schemes 10; and
- Other schemes 5.

The detailed short-listed scheme list is shown in Table 3.1.

Table 3.1 Shortlisted Scheme Options

Schemes
Rail: P & R Blake Street
Rail: P & R Butlers Lane
Rail: P & R Four Oaks
Rail: P & R Sutton Coldfield
Rail: P & R Chester Road
Rail: P & R Aston
Rail: P & R Selly Oak
Rail: P & R Bournville
Rail: P & R Kings Norton
Rail: Birmingham International Integrated Transport Hub
Rail: Dudley Road new station
Metro: East Birmingham & Solihull Metro
Metro: Connection Livery Street to St Paul Metro stop
Metro: Extend Metro from Edgbaston Terminus
Metro: Southern Gateway Metro (Eastside to University of Birmingham/University Hospitals Birmingham)
Metro: City wide/regional
Bus & SPRINT: Sutton-Langley
Bus & SPRINT: Bristol Road
Bus & SPRINT: Hagley Road



Bus & SPRINT: Sprint P&R - A34 M6J7

Bus & SPRINT: Sprint P&R - Hagley Road M5J3

Bus & SPRINT: Sprint P&R - Sutton M6J5

Bus & SPRINT: Bus Improvement Corridor - A435 Alcester Road

Bus & SPRINT: Bus Improvement Corridor - A441 Pershore Road

Bus & SPRINT: Bus Improvement Corridor - A41 Holyhead Road/Soho Road

Bus & SPRINT: Bus Improvement Corridor - A5127 Sutton

Bus & SPRINT: Cross-city centre bus services

Road: Birchley Island M5J2 Improvement

Road: M5J1 Improvement

Road: Traffic cells (city centre)

Road: 20mph across city centre (inside A4540)

Road: Options to address A4540 Crossings

AM: Local centres walking and cycling access

AM: Bham cycle revolution - phase 1 Soho Road

AM: Bham cycle revolution - phase 1 Alcester Road

AM: Bham cycle revolution - phase 1 Lichfield Road

AM: Bham cycle revolution - phase 2 Tyburn Road

AM: Bham cycle revolution - phase 3 outer connections

AM: Middleway cycle routes

AM: Last mile cycle routes

AM: Cross-city cycle routes

AM: Development of Active mode measures

Other: Workplace Parking Levy (WPL)

Other: Birmingham parking SPD (inside A4540 reductions/CPZ/RPZ etc)

Other: CM750 Selly Oak/Edgbaston and Uni/Hospitals area wide parking scheme

Other: Low Traffic Neighbourhood (Places for People)

Other: Options for the use of the former A38 through the City Centre

Two considerations when shortlisting, but not used as assessment factors, were the likely delivery date of the potential scheme (required for scenario testing in the BCM) and also likely body responsible for delivery. Most of the road, active mode and other schemes were determined to be within BCC's remit, and so more easily delivered within anticipated timescales, whereas the rail and bus/Sprint schemes would more likely be led by Transport for West Midlands and would also require further stakeholder engagement and support (for example with Network Rail or other West Midlands authorities) to secure delivery.

The collaborative approach taken to the development of the long list of schemes, along with the agreement of the assessment criteria and the methodology for their application, meant that the sifting of schemes from long



to short list was efficiently undertaken and produced a meaningful list of schemes for inclusion under the scenario tests.

Drawing many of the initial long list from adopted policy documents further strengthens the likelihood of delivery, as these are schemes that are already in the public domain and have been subject to initial considerations and deliverability assessments.

The anticipated delivery dates, in line with BCM future assessment years, gives a broad indication of likely timescales required to develop interventions, produce business cases and secure funding, meaning that a pragmatic approach has been applied to estimated delivery of enhanced transport capacity.

3.4 Development of Packages for Scenario Testing

The approach taken to development of the Packages was undertaken in stages building progressively on the model results. Initially two scenarios were developed based on;

- The Draft Birmingham Transport Plan 2031initiatives including the proposed traffic cells in the City Centre, 20 mph zone and closure of the A38 weaving sections within the City Centre all within Birmingham City Council's capability without relying on other agencies
- Maximum implementation of sifted public transport options with reductions on highway supply, plus full
 closure of the A38 tunnels. This would involve significant additional Birmingham City Council
 capabilities working with Transport for West Midlands particularly for the delivery of the SPRINT and
 Metro services.

Following assessment of the effectiveness of these two alternatives two further scenarios were developed;

- First Optimisation inclusion of additional public transport (park and ride schemes), complementary parking (Workplace Parking Levy and on-street parking reductions) to reduce highway demand as much as possible. This package contains a mix of BCC areas of control in terms of parking supply and charging but also areas wholly delivered by third parties in terms of the park and ride schemes.
- Final Optimisation addition of best performing highway options to mitigate delay hot-spots revealed in the modelling. Two junction schemes that fell just outside the list above were included having looked into the results from the other tests. The delivery of this package would require partnership working with both TfWM and Highway England.

The contents of each of the scenarios is shown in Table 3.2 below.

Table 3.2 Content of each of the Packages for Modelling - 2026

2026	Test 1 BCC TP	Test 2 Full Tunnel Closure	Test 3 Optimisation 1	Test 4 Optimisation 2
Traffic cells (city centre)	✓	✓	✓	✓
20mph across city centre (inside A4540)	✓	✓	✓	✓
Snow Hill Test 1 (A38 weaves closed)	✓			
Snowhill Test 2 (A38 tunnels closed)		✓	✓	✓
Sprint - Sutton-Langley		√	√	√
Sprint - Bristol Road		✓	✓	✓



Sprint - Hagley Road (Halesowen and Dudley routes)	✓	✓	✓
Bus Improvement Corridors	✓	✓	✓
Parking SPD including roll-out of CPZ's and closure of car parks (-10% traffic based on the Birmingham Parking Study 2016 analysis of proportion of unrestricted on-street parking slightly above this figure)		✓	✓

Table 3.3 Contents of the Packages for Modelling - 2037

2037	Test 1 BCC TP	Test 2 Full Tunnel Closure	Test 3 Optimisation 1	Test 4 Optimisation 2
Traffic cells (city centre)	\checkmark	✓	✓	✓
20mph across city centre (inside A4540)	✓	✓	✓	✓
Snow Hill Test 1 (A38 weaves closed)	✓			
Snowhill Test 2 (A38 tunnels closed)		✓	✓	✓
Sprint - Sutton-Langley		✓	✓	✓
Sprint - Bristol Road		✓	✓	✓
Sprint - Hagley Road (Halesowen and Dudley routes)		✓	✓	✓
Bus Improvement Corridors		✓	✓	✓
City wide/regional future expansion of Metro network		✓	✓	✓
Workplace Parking Levy			✓	✓
Parking SPD including roll-out of CPZ's and closure of car parks (-10% traffic)			✓	✓
Park and Ride - See table above			✓	✓
M5 Junction 1 capacity improvement				✓
Five Ways (3 Arm Signalised) (Op 5)				✓
Spring Hill (4 Arm Signalised) (Op 2)				✓

The coding approach for these schemes is included within Appendix F



4. Appraisal of Scenarios

4.1 Approach to the Assessment of Options

The aim of the process was to assess how the schemes aligned with the DBTP Policies and DfT objectives, also how additional measures would support BCC with their robust evidence base to inform DfT and support an application for funding for next stage development of the scheme. The options assessment utilises the capabilities of the transport models developed for BCC including:

- Overall change in demand (multi-modal / shift).
- Overall journey time reduction in the network and specifically the Snow Hill area.
- Change in highway trips origins and destinations.
- Change in vehicle kms.
- Highway network speeds change for the whole network and specifically in the Snow Hill area.
- Total highway delay change for the whole network and specifically in the Snow Hill area.

CO2, NOX and PM10 analysis has been provided using SATURN LPT outputs, this has limitations and a more detailed assessment would need to be carried out for the OBC in line with WebTAG and potentially including Air Quality modelling. SATURN outputs also do not account for change in average vehicle emissions over time and this should be considered for further detailed modelling at outline business case stage.

4.2 City Area Analysis

Table 4.1 to Table 4.6 shows the key highway model statistics for the four packages for each time period and for 2026 and 2037. The average distance and average journey time figures take account of the change on size of the matrices and change is compared to the reference case.

There is a consistent decrease in total vehicular trips across all time periods with the scheme in place. This accounts for some trips not being made with the scheme in place. There are also modelled benefits to overall average speeds and average journey times. There are small increases noted for the average journey distance implying that there is a change to the trip length distribution with a higher impact on shorter distance trips or rerouting to longer routes for individual trips. This represents all the trips within the full Birmingham City Model.

To understand the potential economic benefit of the test scenarios there are 3 critical indicators. These are also named as scheme matrices for economic assessment, which includes:

- Total Matrix Size
- Travel Distance between Origins and Destinations
- Journey Times between Origins and Destinations

These three together give a good indications of potential user economic benefits. Therefore, these indicators are extracted to comparatively analyse and report changes against the reference case. In addition, change in overall network speed together with fuel consumption for each scenario leads into a comparative analysis of network performance. As a final set of outputs, the SATURN model has been utilised to generate environmental factors such as CO2, NOX and PM10, which provides an understanding of environmental impact of each tested scenario against the reference case. These set of summary outputs are also selected to be able to analyse each scenario against the core objectives of the emerging Birmingham Draft Transport Plan.



Table 4.1 Key Network Statistics for the Four Package Scenarios - AM Peak 2026

AM 2026	Reference Case	Test 1	Test 2	Test 3	Test 4
Total Matrix Size (Vehicles)	297,512	285,360	288,791	286,779	286,779
Free Flow Time (PCU Hrs)	45,427	45,469	44,690	44,274	44,274
Total Travel Time (PCU Hrs)	77,173	77,669	75,534	72,941	72,941
Total Delays (PCU Hrs)	31,746	32,200	30,844	28,667	28,667
Travel Distance (PCU Kms	3,059,659	3,057,205	3,019,627	2,998,175	2,998,175
Overall Average Speed (kph)	39.6	39.4	40	41.1	41.1
Fuel Consumption (Ltrs)	267,437	267,851	263,035	258,267	258,267
Time Saving (hrs)		496 0.6%	-1,639 -2.1%	-4,232 -5.5%	-4,232 -5.5%
Average Journey Distance (km) + % Change	10.28	10.71 4.2%	10.46 1.7%	10.45 1.7%	10.45 1.7%
Average Journey Time (mins) + % Change	15.56	16.33 4.9%	15.69 0.8%	15.26 -1.9%	15.26 -1.9%
Total CO2 emissions (kg)	120,890	121,349	117,735	115,627	115,627
Average CO2 emissions (kg per veh)	0.406	0.425	0.408	0.403	0.403

Table 4.2 Key Network Statistics for the Four Package Scenarios – Inter-peak 2026

IP 2026	Reference Case	Test 1	Test 2	Test 3	Test 4
Total Matrix Size (Vehicles)	266,667	256,799	259,800	258,165	258,165
Free Flow Time (PCU Hrs)	38,933	38,879 38,300 37,975 3		37,975	
Total Travel Time (PCU Hrs)	62,661	62,661 62,021 59,579 58,631		58,631	58,631
Total Delays (PCU Hrs)	23,728	23,142	21,279	20,656	20,656
Travel Distance (PCU Kms	2,608,301	2,601,267	2,569,580	2,552,665	2,552,665
Overall Average Speed (kph)	41.6	41.9	43.1	43.5	43.5
Fuel Consumption (Ltrs)	223,386	221,761	217,250	214,979	214,979
Time Saving (hrs)		-640	-3,082	-4,030	-4,030
%		-1.0%	-4.9%	-6.4%	-6.4%



Average Journey	9.78	10.13	9.89	9.89	9.89
Distance (km) + %		3.6%	1.1%	1.1%	1.1%
Change					
Average Journey Time	14.10	14.49	13.76	13.63	13.63
(mins) + % Change		2.8%	-2.4%	-3.3%	-3.3%
Total CO2 emissions (kg)	101,193	100,963	99,216	97,747	97,747
Average CO2 emissions (kg per veh)	0.379	0.393	0.382	0.378	0.378

Table 4.3 Key Network Statistics for the Four Package Scenarios - PM Peak 2026

PM 2026	Reference Case	Test 1	Test 2	Test 3	Test 4	
Total Matrix Size (Vehicles)	329,238	317,527	320,673	319,241	319,241	
Free Flow Time (PCU Hrs)	49,513	49,444	48,729	48,427	48,427	
Total Travel Time (PCU Hrs)	86,613	85,704	83,125	82,536	82,536	
Total Delays (PCU Hrs)	37,100	36,260	34,396	34,109	34,109	
Travel Distance (PCU Kms	3,247,389	3,239,260	3,216,088	3,200,650	3,200,650	
Overall Average Speed (kph)	37.5	37.8	38.7	38.8	38.8	
Fuel Consumption (Ltrs)	288,717	286,902	283,093	281,235	281,235	
Time Saving (hrs)		-909	-3,488	-4,077	-4,077	
%		-1%	-4.0%	-4.7%	-4.7%	
Average Journey	9.86	10.20	10.03	10.03	10.03	
Distance (km) + % Change		3.4%	1.7%	1.6%	1.6%	
Average Journey Time	15.78	16.19	15.55	15.51	15.51	
(mins) + % Change		2.6%	-1.5%	-1.7%	-1.7%	
Total CO2 emissions (kg)	131,871	131,106	128,716	127,143	127,143	
Average CO2 emissions (kg per veh)	0.401	0.413	0.401	0.398	0.398	

Table 4.4 Key Network Statistics for the Four Package Scenarios - AM Peak 2037

AM 2037	Reference Case	Test 1	Test 2	Test 3	Test 4
Total Matrix Size (Vehicles)	319,448	316,085	312,709	308,521	309,741
Free Flow Time (PCU Hrs)	49,041	48,964	48,886	47,853	48,103
Total Travel Time (PCU Hrs)	88,080	88,334	89,735	82,767	82,845
Total Delays (PCU Hrs)	39,039	39,370	40,849	34,914	34,742
Travel Distance (PCU Kms	3,310,153	3,300,690	3,297,967	3,243,994	3,257,674



Overall Average Speed (kph)	37.6	37.4	36.8	39.2	39.3
Fuel Consumption (Ltrs)	295,614	295,089	296,883	284,743	285,516
Time Saving (hrs)		254	1,655	-5.313	-5,235
%		0.3%	1.9%	-6.0%	-5.9%
Average Journey	10.36	10.44	10.55	10.51	10.52
Distance (km) + %		0.8%	1.8%	1.5%	1.5%
Change					
Average Journey Time	16.54	16.77	17.22	16.10	16.05
(mins) + % Change		1.4%	4.1%	-2.7%	-3.0%
Total CO2 emissions	130,501	130,608	130,446	125,143	125,999
(kg)					
Average CO2 emissions	0.409	0.413	0.417	0.406	0.407
(kg per veh)					

Table 4.5 Key Network Statistics for the Four Package Scenarios – Inter-peak 2037

IP 2037	Reference Case	Test 1	Test 2	Test 3	Test 4
Total Matrix Size (Vehicles)	289,097	286,851	284,359	280,811	281,845
Free Flow Time (PCU Hrs)	42,244	42,270	42,211	41,398	41,585
Total Travel Time (PCU Hrs)	70,647	71,522	72,196	68,518	68,538
Total Delays (PCU Hrs)	28,403	29,252	29,985	27,120	26,953
Travel Distance (PCU Kms	2,833,161	2,829,015	2,821,882	2,781,267	2,791,396
Overall Average Speed (kph)	40.1	39.6	39.1	40.6	40.7
Fuel Consumption (Ltrs)	246,167	246,730	247,612	240,373	240,857
Time Saving (hrs) %		875 1.2%	1,549 2.2%	-2,129 -3.0%	-2,109 -3.0%
Average Journey Distance (km) + % Change	9.80	9.86 0.6%	9.92 1.3%	9.92 9.90	
Average Journey Time (mins) + % Change	14.66	14.96 2.0%	15.23 3.9%	14.64 -0.2%	14.59 -0.5%
Total CO2 emissions (kg)	109,969	110,041	110,806	106,790	107,052
Average CO2 emissions (kg per veh)	0.380	0.383	0.390	0.380	0.380

Table 4.6 Key Network Statistics for the Four Package Scenarios - PM Peak 2037

PM 2037	Reference Case	Test 1	Test 2	Test 3	Test 4
Total Matrix Size (Vehicles)	356,475	354,481	350,530	347,603	348,708



Free Flow Time (PCU Hrs)	54,279	54,422	54,117	53,381	53,538
Total Travel Time (PCU Hrs)	104,859	105,095	106,089	100,521	101,217
Total Delays (PCU Hrs)	50,580	50,673	51,972	47,140	47,679
Travel Distance (PCU Kms	3,571,376	3,576,369	3,575,851	3,535,355	3,549,077
Overall Average Speed (kph)	34.1	34	33.7	35.2	35.1
Fuel Consumption (Ltrs)	330,088	330,190	332,106	322,825	324,119
Time Saving (hrs)		236	1,230	-4,338	-3,642
%		0.2%	1.2%	-4.1%	-3.5%
Average Journey	10.02	10.09	10.20	10.17	10.18
Distance (km) + % Change		0.7%	1.8%	1.5%	1.6%
Average Journey	17.65	17.79	18.16	17.35	17.42
Time (mins) + % Change		0.8%	2.9%	-1.7%	-1.3%
Total CO2 emissions (kg)	147,342	146,382	145,689	142,684	142,577
Average CO2 emissions (kg per veh)	0.413	0.413	0.416	0.410	0.409

Table 4.7 shows the travel demand matrices sizes and change in the tested scenarios compared to the reference case. The additional public transport and active mode provision is expected to enable an increase in capacity. This would sufficiently address to reduction in highway matrix sizes to avoid the core area being disadvantaged by reduced demand to the city by car trips. However, a full demand analysis should be conducted in the next stage of business case development this should include, distribution of additional supply and willingness to change mode.

Table 4.7 Total Highway Matrix Size in each Scenario / modelled year

Total Matrix Size	Reference Case	Test 1	Test 2	Test 3	Test 4
AM 2026	297,512	285,360	288,791	286,779	286,779
AM 2026 % Difference		-4%	-3%	-4%	-4%
IP 2026	266,667	256,799	259,800	258,166	258,166
IP 2026 % Difference		-4%	-3%	-3%	-3%
PM 2026	329,238	317,527	320,673	319,241	319,241
PM 2026 % Difference		-4%	-3%	-3%	-3%
AM 2037	319,448	316,085	312,709	308,521	309,741
AM 2037 % Difference		-1%	-2%	-3%	-3%
IP 2037	289,097	286,851	287,081	280,811	281,845
IP 2037 % Difference		-1%	-1%	-3%	-3%
PM 2037	356,475	354,481	352,864	347,603	348,708
PM 2037 % Difference		-1%	-1%	-2%	-2%



Table 4.8 shows the change in total highway model delay time for the tested scenarios compared to the reference case.

Table 4.8 Highway Model Total Change in Delay in each Scenario / Modelled Year

Total Change in Delays	Reference Case	Test 1	Test 2	Test 3	Test 4
AM 2026	31,746	32,200	30,844	28,667	28,667
AM 2026 % Difference		1%	-3%	-10%	-10%
IP 2026	23,728	23,142	21,279	20,656	20,656
IP 2026 % Difference		-2%	-10%	-13%	-13%
PM 2026	37,100	36,260	34,396	34,109	34,109
PM 2026 % Difference		-2%	-7%	-8%	-8%
AM 2037	39,039	39,370	40,849	34,914	34,742
AM 2037 % Difference		1%	5%	-11%	-11%
IP 2037	28,403	29,252	29,985	27,120	26,953
IP 2037 % Difference		3%	6%	-5%	-5%
PM 2037	50,580	50,673	51,972	47,140	47,679
PM 2037 % Difference		0%	3%	-7%	-6%

Appendix E presents the diagrams of changes in demand flows, change in delays and changes in demand across the study area and wider region.

Figure 4.1 shows the change in delays across all time periods for the options for 2026 and 2037, showing the relatively poor performance of test 1 compared to the base and Test 2 in 2037. Whereas tests 3 and 4 result in significant delay time savings with option 4 incrementally better in the AM and IP periods in 2037.

Figure 4.2 shows the change in total travel time which presents a similar picture between the options.

Figure 4.3 shows the change in the vehicle matrices revealing a substantial reduction in test 1 compared to the reference case in 2026 but not in 2037. Tests 1, 2 and 3 show progressive reductions in the matrices with test 4 – which relieves congestion at key junctions releasing capacity for more journeys to be made.



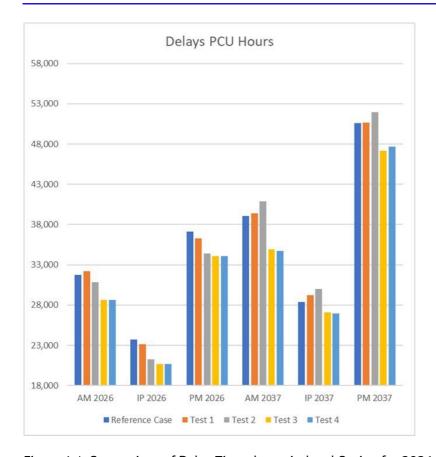


Figure 4.1: Comparison of Delay Times by period and Option for 2026 and 2037

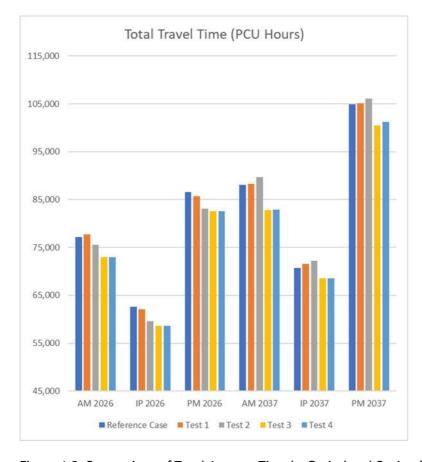


Figure 4.2: Comparison of Total Journey Time by Period and Option for 2026 and 2037



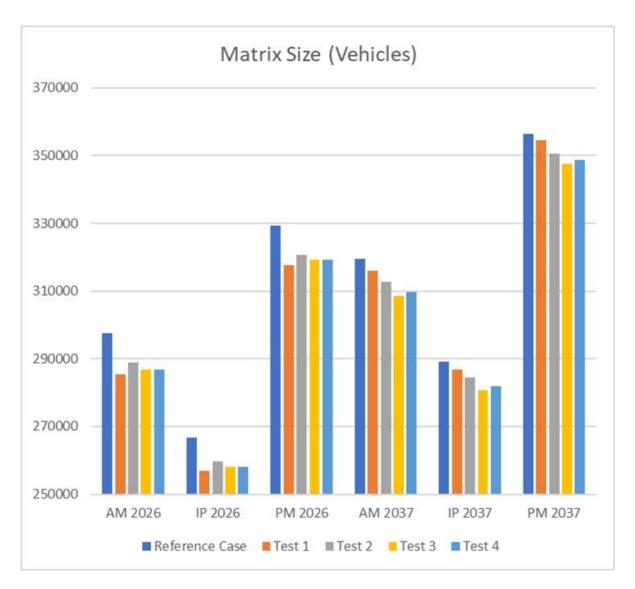


Figure 4.3: Comparison of Vehicle Matrix Sizes by Period and Option for 2026 and 2037

4.3 City Centre Impacts

Table 4.9 to 4.15 shows the City Centre cordoned statistics for each test for CO2, NOX, PM10 emissions, average speed, delays, total travel time and total travel distance within the City Centre to highlight the contribution of the scenarios to the achievement of the Snow Hill masterplan objectives and delivery of the growth strategy. As traffic is primarily directed onto the ring-road as a result of the A38 closure within the modelling the ring road is included in the city centre cordon area for purposes of analysis. This is detailed in Figure 4.4



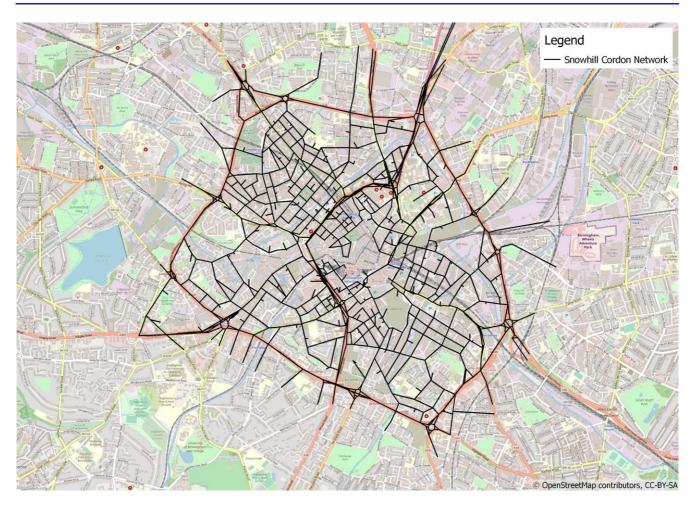


Figure 4.4: City Centre Cordon Area



Table 4.9 Change in CO2 emissions within the City Centre for Tests in 2026 and 2037

Inside the City Centre CO2	Reference Case	Test 1	Test 2	Test 3	Test 4
AM 2026	23281.64	22729.44	19203.57	17814.15	17814.15
		-2%	-18%	-23%	-23%
IP 2026	19421.46	18370.07	16449.97	15317.65	15317.65
		-5%	-15%	-21%	-21%
PM 2026	22860.79	21830.34	19250.91	18174.05	18174.05
		-5%	-16%	-21%	-21%
AM 2037	25309.02	24525.88	23226.87	20072.05	20122.91
		-3%	-8%	-21%	-20%
IP 2037	21258.01	20704.47	19691.98	16906.31	17420.78
		-3%	-7%	-20%	-18%
PM 2037	25202.97	24640.43	23751.43	20927.19	20734.02
		-2%	-6%	-17%	-18%

Table 4.10 Change in NOX emissions within the City Centre for Tests in 2026 and 2037

Inside the City Centre NOX	Reference Case	Test 1	Test 2	Test 3	Test 4
AM 2026	499.83	479.69	407.39	389.84	389.84
		-4%	-18%	-22%	-22%
IP 2026	442.7	434.28	378.17	360.51	360.51
		-2%	-15%	-19%	-19%
PM 2026	514.06	495.84	426.81	411.83	411.83
		-4%	-17%	-20%	-20%
AM 2037	519.5	493.84	451.23	423.62	434.64
		-5%	-13%	-18%	-16%
IP 2037	475.42	456.78	413.72	375.46	396.63
		-4%	-13%	-21%	-17%
PM 2037	525.85	515.85	465.78	448.82	443.44
		-2%	-11%	-15%	-16%



Table 4.11 Change in PM10 emissions within the City Centre for Tests in 2026 and 2037

Inside the City Centre PM10	Reference Case	Test 1	Test 2	Test 3	Test 4
AM 2026	2.58	2.51	2.14	2	2
		-3%	-17%	-22%	-22%
IP 2026	2.18	2.09	1.88	1.76	1.76
		-4%	-14%	-19%	-19%
PM 2026	2.61	2.51	2.21	2.1	2.1
		-4%	-15%	-20%	-20%
AM 2037	2.77	2.67	2.52	2.23	2.26
		-4%	-9%	-19%	-18%
IP 2037	2.38	2.31	2.19	1.9	1.98
		-3%	-8%	-20%	-17%
PM 2037	2.8	2.76	2.62	2.37	2.34
		-1%	-6%	-15%	-16%

Table 4.12 Change in Average Speed within the City Centre for Tests in 2026 and 2037

Overall Average Speed Within City Centre	Reference Case	Test 1	Test 2	Test 3	Test 4
AM 2026	12.7	12.2	11.9	13	13
		-4%	-6%	2%	2%
IP 2026	14.7	15.8	15.2	16	16
		7%	3%	9%	9%
PM 2026	12.2	12.5	12.5	13	13
		2%	2%	7%	13
AM 2037	11.3	10.8	9.8	12	12.5
		-4%	-13%	6%	11%
IP 2037	14.3	13	11.6	13.5	13.9
		-9%	-19%	-6%	-3%
PM 2037	10.3	10.3	8.7	11.2	11
		0%	-16%	9%	7%



Table 4.13 Change in Delays within the City Centre for Tests in 2026 and 2037

Delay Within City Centre	Reference Case	Test 1	Test 2	Test 3	Test 4
AM 2026	9116.3	9149.8	7763.1	6546.4	6546.4
		0%	-15%	-28%	-28%
IP 2026	6670.8	5702.5	5010	4435.9	4435.9
		-15%	-25%	-34%	-34%
PM 2026	9323.3	8566.1	7027.8	6388.4	6388.4
		-8%	-25%	-31%	-31%
AM 2037	11156.4	11390.1	11267.2	7933.2	7535.3
		2%	1%	-29%	-32%
IP 2037	7380.2	8082.9	8158.3	6015.9	5950.5
		10%	11%	-18%	-19%
PM 2037	12312.4	11875.8	13014.8	8870.4	8987.9
		-4%	6%	-28%	-27%

Table 4.14 Change in Total Travel Time within the City Centre for Tests in 2026 and 2037

Total Travel Time Within City Centre	Reference Case	Test 1	Test 2	Test 3	Test 4
AM 2026	12812.5	12836.4	10977.3	9631	9631
		0%	-14%	-25%	-25%
IP 2026	10008.3	9015.2	7967.3	7267.7	7267.7
		-10%	-20%	-27%	-27%
PM 2026	13221.3	12432.5	10409.6	9659.8	9659.8
		-6%	-21%	-27%	-27%
AM 2037	15018.8	15252.2	14882.4	11255.1	10924.8
		2%	-1%	-25%	-27%
IP 2037	10912.4	11617.6	11443.4	9001.8	9076.3
		6%	5%	-18%	-17%
PM 2037	16431.1	16006.7	16859.4	12466.2	12577.8
		-3%	3%	-24%	-23%



Table 4.15 Change in Total Travel Distance within the City Centre for Tests in 2026 and 2037

Travel Distance Within City Centre	Reference Case	Test 1	Test 2	Test 3	Test 4
AM 2026	162645.8	156575.5	130623.6	125487.4	125487.4
		-4%	-20%	-23%	-23%
IP 2026	146820.5	142145.3	120940.6	116233.9	116233.9
		-3%	-18%	-21%	-21%
PM 2026	161610.6	155335.2	129952.5	125957.3	125957.3
		-4%	-20%	-22%	-22%
AM 2037	169739.2	163964.5	146136.5	134576.7	136439.2
		-3%	-14%	-21%	-20%
IP 2037	155526.5	150578.2	133157.6	121601.6	126519.1
		-3%	-14%	-22%	-19%
PM 2037	169639.9	164987.2	147277.3	139277	138587.2
		-3%	-13%	-18%	-18%

There are indications within the outputs from the modelling there are clear economics benefits that will need further analysis in combination with the likely cost implications from the schemes assessed.

4.4 Interpretation of Test Results

All test scenarios have been run through the purpose-built demand model. There were some convergence issues for tests 2-4 with the closure of the tunnels and resulting significant increases in delay in key sections of the network due to traffic rerouting as would be expected. Convergence in flows is typically 95-97% of links, below the TAG requirement of 98%. As this is designed to be informative rather than as a full TAG compliant forecast, for purposes of scheme funding this is considered acceptable. Most changes between iterations are between large delays and very large delays so results inform where issues are; the exact scale for the worst areas may not be converged. This does not impact on where the need for the interventions that the model shows. (Note that convergence issues would need to be resolved at the OBC stage).

Interpreting the results of the tested scenarios show that the junctions along the Middleway could be subject to further improvements as part of the development of the Business Case. It should be noted that improvements at these locations may bring localised economic and environmental benefits but also have negative impacts at both upstream and downstream junctions on key routes. This may trigger the need for additional junction improvements. The key junctions that experience such an impact are introduced in figure 4.5 for PM 2037 Test 3 and summarised below.

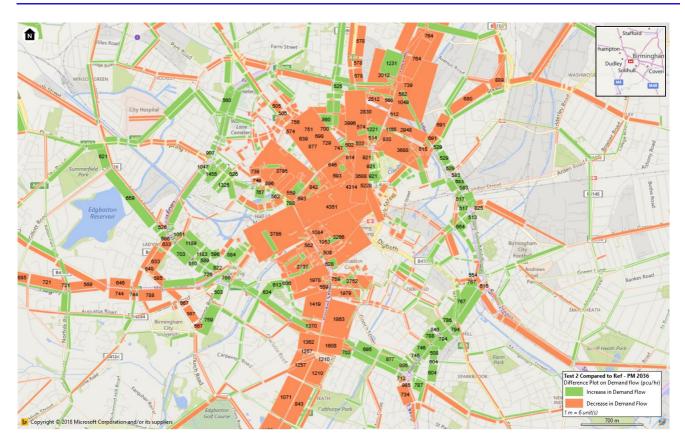


Figure 4.5: PM Test 3 Change in Demand Flows

The graphics, presented in Appendix E, also demonstrated that in opening year of 2026 and forecast year 2037 (available model assessment years) for tests 2-4 that:

- Increase in traffic demand on the A4540 on both sides of the A38 (east and west of A38)
- Significant decreases on the A38 and A34 into the city centre from outside of the A4540
- Some re-routing down minor roads through and around the city centre in response to the highways changes
- Considerable increases in delays along sections of the A4540
- Overall decrease in traffic to the city centre particularly around Snow Hill and A38.

Progressively from the test 1 to test 4 the analysis of overall network performance as well as localised performance at Snow Hill (area within the Middleway) have demonstrated compliance with the objectives and the results are explained in the following sections for each tested scenario.

4.4.1 BCC Transport Plan – Test 1:

Closing the accesses to and from the A38 near Snow Hill and across the city centre has limited impact on the amount of traffic using the A38 – actually making it a more attractive route for through traffic. This is a direct effect of the removal of delays associated with these accesses to the A38. This will not meet the aspirations for air quality and carbon emissions in the city centre. The introduction of traffic cells in the city centre and a 20mph zone coupled with the changes to A38 access significantly increases the use of the A4540 Middleway especially in 2037.

The Birmingham Transport Plan schemes result in initial significant reductions in the highway demand matrices but with smaller impacts in the longer term.



The 2026 models forecast overall highway network time savings in the interpeak and PM peak but disbenefits in 2037, these benefits are related to changes in the size of the matrix as average journey times and distances per journey are significantly greater in all time periods.

Within the city centre there are forecast reductions of emissions which are greater in 2026 than 2037 and relate to the matrix changes which result from increased network congestion. This test alone does not achieve the overall aspirations of the scheme so a more significant change would be required.

4.4.2 All shortlisted Schemes – Test 2

The full closure of the A38 tunnels to traffic plus the implementation of public transport schemes, result in greater reduction of the highway demand matrices and a substantial reduction in traffic through the city centre. Traffic switches to the A4540 Middleway east and west and in the wider area there is reduced use of the A38(M) and M6 and increased use of the A38 Tyburn Road and the outer ring road (A4040). Overall, there is a reduction in delays compared to the reference case in 2026, but some key junctions experience increased delays include Five Ways and Spring Hill junctions on the A4540 in 2026 as a result of the rerouting or A38 journeys to the Middleway. By 2037 the model begins to show worse results than test 1 as the reduction in capacity from the tunnels begins to have a greater impact. This shows that the tunnels are of increasing importance with increasing traffic levels (although with air quality and severance disbenefits).

There are significant reductions in CO2, NOX and PM10 emissions in the city centre in all periods and years as traffic is displaced from the centre. Travel time savings in the city centre in 2026 are lost in 2037.

4.4.3 Optimisation Process – Test 3

The additional Public Transport schemes and parking measures lead to further reductions of the highway demand matrices and reduction of delays. However, there remains substantial increases in flows on the A4540 Middleway east and west, as the measures do not particularly impact on through traffic. There remain residual issues at key junctions.

The test results forecast network level time savings, with average journey time savings in all years and time periods. Average journey distances are slightly greater as a result of rerouting away from the city centre. Matrix reductions are sustained in 2037 and there are more substantial benefits in reduced emissions in the city centre.

Overall, this test complements the range of policy objectives more comprehensively. However, it is noted that a significant amount of the benefits relate to the parking constraints and more analysis of the impacted journeys and availability of suitable public transport supply / capacity should be undertaken to determine acceptability and effectiveness of the proposals in Test 3 and Test 4.

At the OBC stage there will be a need to undertake a social and distributional analysis and equity assessment.

4.4.4 Final Optimisation Process – Test 4

The addition of crucial (limited) highway improvements at specific junctions resolves specific delay issues and further improves the network efficiency – enabling more use of the strategic highway network and less ratrunning on unsuitable roads.

The modelling statistics are similar to test 3 in most respects but with additional network level average journey time savings. Overall this analysis suggests that there may be scope to further assess the design of key junction improvements to provide higher benefits and in all time periods. All further improvements in this test are localised around problem points on the network. These improvements are also limited in benefit by the capacities available at neighbouring junctions, which may require further interventions to maximise benefits. At Outline Business Case Stage options assessment and reporting will be conducted to address feasible, affordable and value engineered performance in line with Draft Birmingham Transport Plan.



5. Recommendations and Action Plan for Next Stage

5.1 Recommendations

The further development of the Birmingham City Model (BCM) to a revised calibration and validation in response to the Snow Hill access study has provided a robust platform to test the refined and revised set of schemes packaged to bring a coherent and policy-responsive approach. The revised Uncertainty Log (developed in line with TAG) has enabled establishment of a reliable "reference case" to provide a well-understood base case for options development. This has enabled multi-modal network operations to guide the options development process.

The development of a revised short-list of options has been fundamental to revise and refine the earlier developed schemes list in line with EAST as well as the Draft Birmingham Transport Plan 2031 objectives. This has led to the development of packaged scenarios, developed initially from the Draft Birmingham Transport Plan, and gradually developed with progressive closure of the A38 and addition of measures from the short list from Test 1 to Test 4. This has enabled understanding of progressive multi-modal network performance in a policy led approach.

All modelling has been undertaken with data collected before the Covid-19 Pandemic and its' impacts on travel demand. There will be a need to consider the impacts at the next stage including the difference between city centre access by car and by public transport and traffic levels and routings. Changes to travel behaviour since the pandemic and potentially sustained in the long term introduce the potential that PT investment is no longer required but also that the case for commercial investment is changes undermining the viability of development at Snow Hill Station.

The modelling approach has been proportionate and effective at demonstrating the effectiveness of the tested options on a range of metrics. The options tested have also highlighting the multi-agency delivery team that will be necessary to deliver the push and pull factors that will deliver the transport changes necessary to deliver the Snow Hill growth strategy.

There will be a need to further develop the modelling capability to assess the wider range of measures and interventions being recommended including the individual effectiveness of measures and their sustainability. This will require fitting public transport modelling supply and demand capability to the BCM and development of the 4 stage modelling capability of the VDM. The advantage would be ability to report achievement of the mode shift objective and equality assessment. The business case would need to widen out analysis to cover impacts on the health and wellbeing objectives. Also, the treatment of the A38 corridor through the Snow Hill Masterplan area, reduction of severance and improved local connectivity – with detailed analysis from the traffic models.

At this level of assessment, the packaged measures are limited to establishing the likely nature of schemes and not incorporating scheme designs to test the options. Whilst engineering judgement is utilised for these, there is now a need to identify options for each scheme, as tested in the model, and guided by the model to consider deliverability and likely costs at concept to preliminary design stages.

To be able to do this, we recommend that the adopted options (testing) stages are revised and commented/ agreed by Birmingham City Council and WMCA, to enable progression to the next stage. This needs to include the changes within the Snow Hill masterplan area to establish the local economic, environmental and social benefits. Once such an agreement is reached, the schemes can be developed to a sufficient stage to justify options completion, leading to a revised Strategic Outline Business Case and funding programme. Therefore, it is important that the proposed preferred option, Test option 4, is considered relative to other options and an agreement is reached to move to next stage. This is particularly of relevance for the Park & Ride expansion proposals and other public transport proposals which are expected to be delivered by other agencies in parallel to the BCC elements.

The business case needs to be presented in terms of the wider policy aims;



- o Reducing transport's damaging impact on the environment and supporting Birmingham's commitment to becoming a carbon neutral city by 2030;
- o Eliminating road danger particularly in residential areas;
- o Connecting people with new jobs and training opportunities;
- o Reconnecting communities by prioritising people over cars;
- o Revitalising the city centre and local centres.

The modelling needs to be developed to support this analysis.

The next stage actions should be considered in a timeline of activities to not lose momentum as the timescales for delivery is considered to be 2026 for Snow Hill. Accordingly, we have developed an initial programme of activity in the form of an action plan to support the aspirations of Birmingham City Council, collaboratively with Transport for West Midlands and in conjunction with Department for Transport.

5.2 Action Plan

The action plan is only set out as guidance at this stage and would be subject to change following review of the report and adopted approach by Birmingham City Council and its partners, such as TfWM.

The action plan is presented in Table 5.1 below.

Table 5.1 Highway Model Total Change in Delay in each Scenario / Modelled Year

Activities	Time Scales
Review of Report Recommendations for the Proposed Test Option	2020
Consultation with TfWM for the recommendations of the Proposed Test Option	2020
Approach DfT with the evidence base and funding request for scheme next stage	2020
Commissioning of the production of feasible Options for each scheme within the preferred package for SOBC	2021
Commissioning of Schemes package development and SOBC Update	2021
DfT Approval and OBC Development	2022
Scheme Design and Delivery Commissioning and FBC	2022-2023
Contract for Delivery	2024
Delivery Plan for the Schemes for 2026	2024-2026

The development of the SOBC can be supported by the existing transport models and would require application of TUBA to estimate the benefits for the options, estimation of costs for the scheme options and for the public transport options the operating and maintenance costs, application of PRISM to estimate demand and revenues, financial sustainability and economic benefits. For the parking options the capital and ongoing costs would need to be estimated and we would need to determine internal financial sustainability as well as establish behavioural changes and economic impacts. Following the DfT earlier advice we recommend examination of wider economic, social and environmental impacts, development impacts and introduce maintenance costs savings related to the



A38. Further consideration of change to the physical infrastructure along the A38 alignment and costs needs to be developed as a central element of the project with land value uplift and regeneration benefits, employment and urban realm benefits quantified and brought into the overall analysis.

There is potential for the SOBC and parallel design and estimation work to be undertaken in parallel in the first quarter of 2021.

The Outline Business Case stage will require;

- Option design and comparisons and selection of the preferred option both for treatment of the A38 and the other supporting measures.
- Development of the transport models to including a fully functioning public transport model aligned to the highway model and demand model to create a full Variable Demand Modelling Suite of models. The highway model will require further development to ensure robustness in calibration and validation statistics.
- Further development and quantification of the costs and benefits of the supporting measures.
- Risk assessment and development of the programme for implementation, working with the other agencies to determine a robust investment and implementation plan.
- Development of the planning proposals for utilising the opportunities created by closure of the A38 and additional costs, incomes and benefits.
- Development and presentation of the Strategic, Economic, Financial, Commercial and Management cases.

It is recommended that the initial work for development of the appraisal models fit to assess the scheme and supporting measures, plus the planning and engineering design work is initiated in the first quarter of 2021 – subject to available funding, otherwise the SOBC should be used to support applications for development funding from available sources.

The development of the schemes and OBC is expected to require 18 months and therefore would be completed in 2022 subject to available funding.



Appendix A. Base Model Calibration and Validation

Network changes were made to improve overall performance of the base models. These changes were highlighted by the error list and experience of the modelled area.

Change #1 - Distance differences (Excluding Bends) were identified and corrected.

Change #2 - Minor junction coding improvements within the buffer area of network to better reflect base model network conditions.

Change #3 - Signal timing checks and alterations to reduce delays in forecast scenario.

Change #4 - Removing redundant Speed Flow Curves that had been left in from previous modelling have been removed to apply a more consistent approach to SATURN model throughout the simulated area with focus on delays at junctions.

Figures A.1 to A.3 show the calibration and validation results (pass / fail) for links within the whole model for the AM Peak, Interpeak and PM Peak. There are no consistent failures within the model across the time periods.

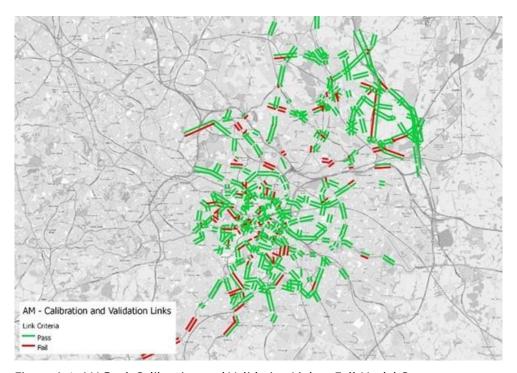


Figure A.1: AM Peak Calibration and Validation Links – Full Model Coverage

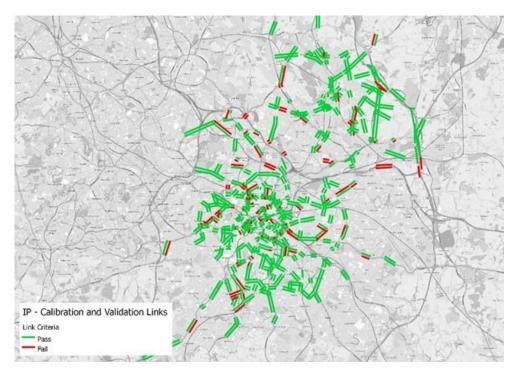


Figure A.2: Interpeak Calibration and Validation Links – Full Model Coverage

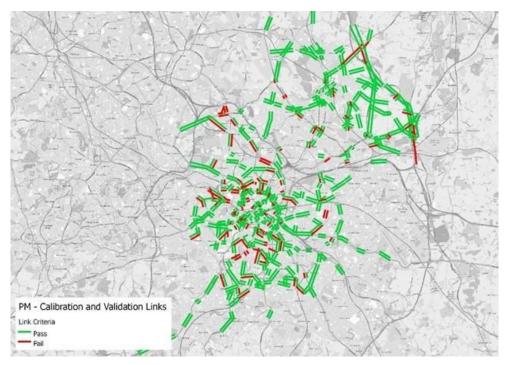


Figure A.3: PM Peak Calibration and Validation Links – Full Model Coverage

Figures A.4 to A.6 show the study area calibration for each time period. There are no consistent failures across time periods.

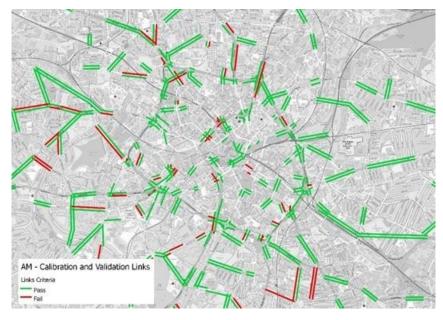


Figure A.4: AM Calibration and Validation Links at Local Level

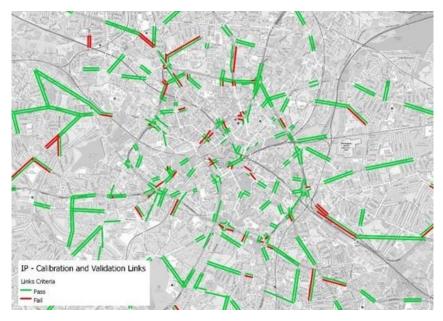


Figure A.5: Interpeak Calibration and Validation Links at Local Level



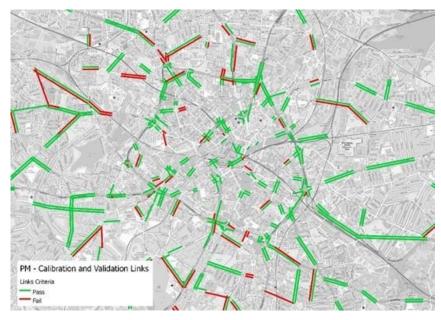
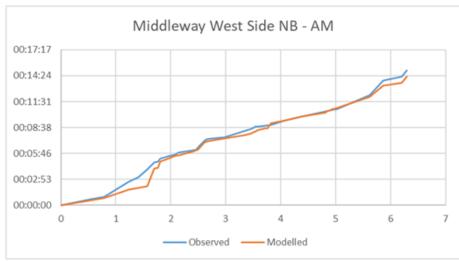


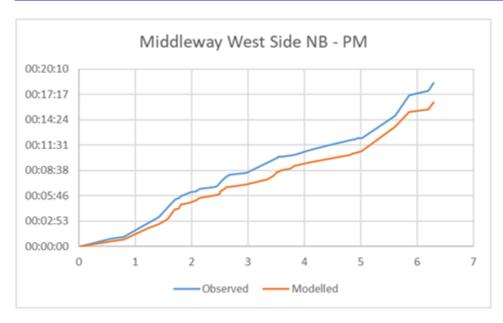
Figure A.6: PM Calibration and Validation Links at Local Level







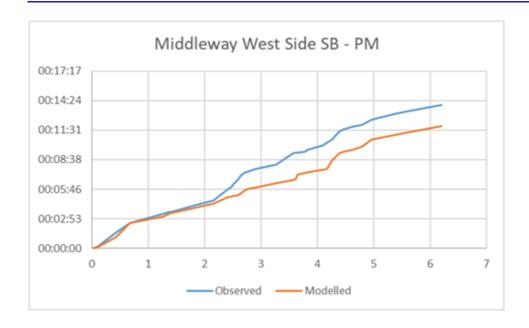




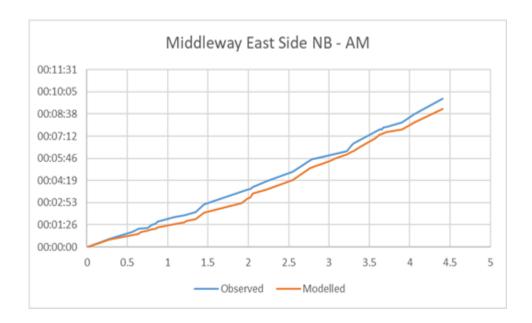




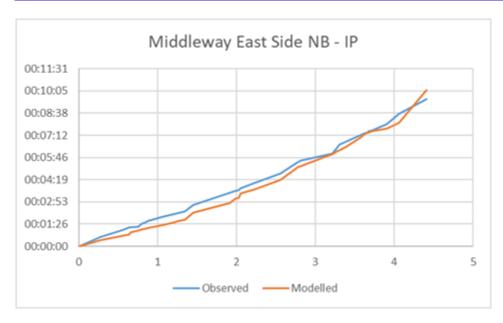


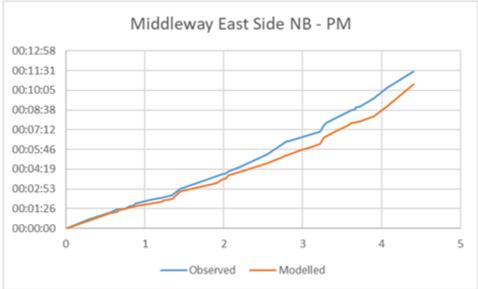


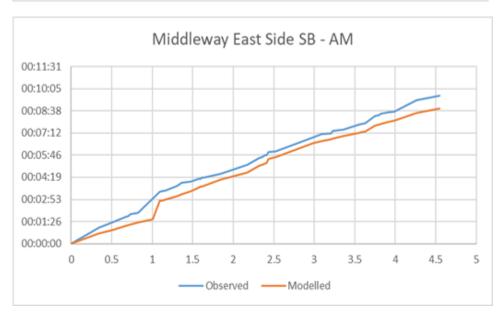
Figures A.14- A.19: Middleway Eastern Side Journey Time Validation Graphs



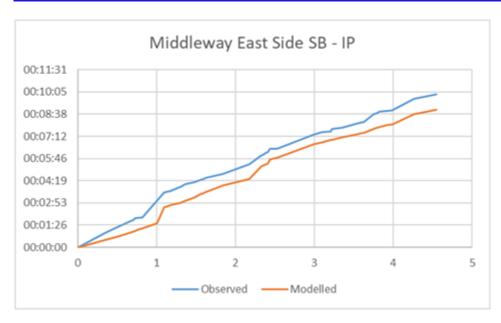


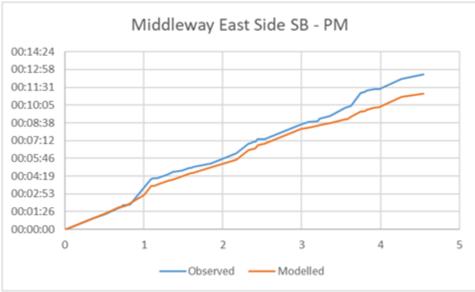














Appendix B. Multi-Criteria Appraisal Criteria.

Policy Fit

- Fit with Big Moves: Reallocating road space; Transforming the city centre; Prioritising active travel in local neighbourhoods; managing demand through parking measures
- Improve Access to City Centre
- Use of Brownfield Land Improve reliability for people and goods
- Supports MfG Delivery corridor(s) Carbon net zero by 2030?
- Fit within other policy

Strategic

- Supporting economic growth (increasing connectivity to employment sites e.g. Enterprise Zones)
- Supporting housing growth (committed sites)
- Encourage sustainable/active travel
- Strategic road access
- Supporting passenger growth
- Supporting redevelopment opportunities

Engineering / Deliverability

- Any known geotechnical issues
- Water Courses and Buried Infrastructure (culverts / drains)
- Operational efficiency
- Construction and maintenance
- Programme
- Land availability (including CPO requirements)
- Location conflict with existing planning permission
- Flexibility regarding future expansion/land availability (with additional future demand for parking spaces (not city or local centres))?
- Dependency reliant on delivery of partner's schemes (additional rail capacity etc)
- Costs Capital Costs
- Costs Operating Costs

Transport Impacts

- Impact on future passengers Abstraction from existing stations Reduce road traffic on A38(M)
- Reduce road traffic on A38S Bristol Road
- Reduce road traffic on A4540
- Impact on City Centre traffic levels
- Impact on train and bus operations
- Impact on ease of crossing the A4540 Mode shift (from car)
- Integration with current public transport services

Safety

- Passenger safety and security
- Severance to movement
- Highway Safety Highway traffic
- Highway Safety Active mode users
- Highway safety collision statistics

Environmental

- Cycle Access
- Air quality
- Archaeology
- Noise
- Public realm
- Biodiversity
- Landscape / Townscape
- Greenhouse Gases
- Flood risk

Managerial

- Public acceptability
- Quality of supporting evidence
- Key risks

Financial/Economic

- Providing Value for Money
- Job creation
- Agglomeration/ connecting business
- Connecting employers and labour markets

Development Impacts

- Opportunity for development (land released or land opened-up)
- Support Planned development / Land use integration
- Land value uplift
- Impacts on business rates/council tax

Commercial

- Flexibility of option
- Funding source *
- Revenue (direct) *
- Revenue (indirect) *



Appendix C. Long List of Scheme Options

Do 1	Rail P&R Coseley - 50 space potential deck on Gough Road. Option to acquire part of Cannon
Ra1	Business Park?
Ra2	Rail P&R Tipton - 375 space expansion, incl on NR compound, 2 or 3 level deck
D 2	Rail P&R Dudley Port - 120 spaces, interchange with Metro. Potential further expansion to Park Lane
Ra3	E car park, consider 2 or 3 levels (Consider knowledge of DPI scheme commission
Ra4	Rail P&R Sandwell & Dudley - 100 space second deck to further expand
	Rail P&R Smethwick Rolfe Street - 200 space potential at grade car park (potentially second deck) on
Ra5	Rolfe Street
	Rail P&R Stourbridge Junction - 150 spaces, potential to be more ambitious with decking proposals.
Ra6	Section of CP by industrial buildings to north of station could be decked. Also tree lining of main car
	park by station building could provide screening for a 2nd deck here.
	Rail P&R Cradley Heath - 200 spaces, potential to CPO private car park land. Further potential to
Ra7	sensitively deck the CPO'd land, so as to not overlook residential properties. Also potential for council
	owned land and to take over the closed CP.
Ra8	Rail P&R Old Hill - 200 spaces, potential to acquire businesses of Station Road (near junction).
Nao	Further option to remove redundant railway embankment to provide larger site
	Rail P&R Rowley Regis - 900 space new MSCP for derelict site off Cakemore Road/Nimmings Road,
Ra9	walk distance shorter than extreme end of current CP. Pedestrian crossing and signage strategy
	required. Potential for 2 or 3 storey CP.
Ra10	Rail P&R Blake Street - 100 spaces, potential to partially deck 'to Birmingham' CP. Only 2nd storey
	due to residential area
Ra11	Rail P&R Butlers Lane - TfWM exploring scheme, more detail needed
_	Rail P&R Four Oaks - 200 spaces - revisit why main car park not decked. Explore acquisition of Four
Ra12	Oaks House to enable expansion of extension to CP. Car parking on Station Drive (5-8 spaces) would
	have to be removed to reduce edge friction of access
Ra13	Rail P&R Sutton Coldfield - check within Jacobs re Sutton Interchange study. Potential acquisition of
	Sutton TC car park off Station Street, excavate down to provide ~2 storeys with interchange on top
D-4/	Rail P&R Chester Road - 270 spaces - existing plans being developed to deck, could support with
Ra14	additional funding. Potential to acquire current industrial uses opposite existing CP on Chester Road,
	would require enhanced crossing facilities. Potential 3 storey facility) Rail P&R Aston - 700 spaces - acquire businesses on south side of Lichfield Road (north of railway)
Ra15	line) to develop 2 or 3 storey CP with foot overbridge to Birmingham bound platform. Access from
Rais	M6 via Salford Circus or A38(M) via Park Circus and Waterlinks Boulevard
	Rail P&R Selly Oak - 100 spaces - support plans already under development by TfWM. Opportunity to
Ra16	fund additional deck (to give 3 storeys)?
	Rail P&R Bournville - 300 spaces - potential to acquire car repair businesses on Mary Vale Road (east
Ra17	of station) to provide decked car park. Not overlooked by residences. Would also serve Stirchley
	Rail P&R Kings Norton - 100 spaces - work with Network Rail to reconfigure land and accesses to
Ra18	permit decking of part of site
Ra19	Birmingham Intl Integrated Transport Hub
Ra20	CG400 - Snow Hill Lines (Plat4 reinstatement and Rowley Regis turnback)
Ra21	CJ550 Sutton Park Line: New local stations
Ra22	CD250 Aldridge Station
Ra23	CB700 Walsall-Wolverhampton new local stations (Willenhall, Darlaston)
Ra24	Camp Hill railway stations (interim service)
Ra25	Camp Hill railway stations (full service)
D-24	Midlands Rail Hub - Bordesley Chords and 4 track into Moor Street station. 2 tph extra to Leicester, 2
Ra26	tph extra to Nottingham, 1 tph extra to Hereford, diversion of camp hill line 2 tph.
Ra27	Tamworth line new local stations and services - Fort, Castle Bromwich, Kingsbury
Ra28	Dudley Road new Station (for Birmingham City Hospital) - On Wolverhampton - Birmingham line
Ra29	Walsall - Brownhills reopening
Ra30	Soho / Handsworth Wood Station (on Birmingham - Walsall - Rugeley line)
•	



Ra31	Tettenhall Station (Between Wolverhampton and Billbrook)
Ra32	Restore Harborne Railway stations at Rotten Park, Hagley Road and Harborne (Park Hill Road)
Ra33	Cross City line tunnel and increased frequencies of other local rail services that come into New Street
Ra34	East Birmingham & Solihull Metro
Ra35	Connection Livery St to St Pauls Metro stop (over the railway)
Ra36	Extend Metro from Edgbaston Terminus - Harborne via Hagley Road (possibly on to UoB/UHB?)
Ra37	Southern Gateway Metro extension from eastside to UoB / UHB
Ra38	City wide/regional future expansion of Metro network
Ra39	Tram-Train from University via Bournbrook Corridor to Quinton
BS1	Sprint - A34N
BS2	Sprint - A45
BS3	Sprint - Sutton-Langley
BS4	Sprint - Bristol Road
BS5	Sprint - Hagley Road (Halesowen and Dudley routes)
BS6	Sprint P&R - A34 M6J7
BS7	Sprint P&R - Hagley Road M5J3
BS8	Sprint P&R - Sutton M6J5
BS9	Bus Improvement Corridor - A435 Alcester Road
BS10	Bus Improvement Corridor - A441 Pershore Road
BS11	Bus Improvement Corridor - A41 Holyhead Road/Soho Road
BS12	Bus Improvement Corridor - A5127 Sutton
BS13	Cross-city centre bus services
Ro1	CK200 Iron Lane
Ro2	CL150 Battery Way Extension
Ro3	20mph wider roll-out
Ro4	CALL80 A4123 Birmingham New Road
Ro5	CG100 Birchley Island M5J2 Improvement
Ro6	CG600 M5 J1 Improvement
Ro7	Traffic cells (city centre)
Ro8	20mph across city centre (inside A4540)
Ro9	Dartmouth Circus Option 1 - Through-about
Ro10	Dartmouth Circus Option 2 - Grade separated westbound, one way
Ro11	Dartmouth Circus Option 3 - Grade separated westbound, two way
Ro12	Dartmouth Circus Option 4 - Grade separated eastbound, one way
Ro13	Dartmouth Circus Option 5 - Grade separated eastbound, two way
Ro14	Dartmouth Circus Option 6 - Grade separated both directions, one way
Ro15	Dartmouth Circus Option 7 - Grade separated A38 and ring road
Ro16	Dartmouth Circus Option 8 - Grade separated with ring road through-about
Ro17	New Town Row/Summer Lane Option 1 - Ring road underpass
Ro18	New Town Row/Summer Lane Option 2 - Ring road overpass
Ro19	New Town Row/Summer Lane Option 3 - A34 overpass and closed Summer Lane
Ro20	New Town Row/Summer Lane Option 4 - Lane widening
Ro21	New John Street West Option 1 - Link widening
Ro22	Lucas Circus Option 1a - Convert to signalised roundabout
Ro23	Lucas Circus Option 1b - Convert to through-about
Ro24	Lucas Circus Option 1c - Convert to signalised crossroads
Ro25	Lucas Circus Option 2 - Remove junction
Ro26	Pitsford Street Option 1 - Remove right turners
Ro27	Spring Hill Circus Option 1 - Carriageway widening
Ro28	Spring Hill Circus Option 2a - Convert to signalised roundabout
Ro29	Spring Hill Circus Option 2b - Convert to through-about
Ro30	Spring Hill Circus Option 2c - Convert to signalised crossroads
Ro31	Spring Hill Circus Option 3 - Grade separated, long overpass



Ro32	Spring Hill Circus Option 4 - Grade separated, short overpass
Ro33	Five Ways Option 1 - Westbound through-about
Ro34	Five Ways Option 2 - Westbound through-about with carriageway widening
Ro35	Five Ways Option 3 - Full through-about with carriageway widening
Ro36	Five Ways Option 4 - Signalised T-junction
Ro37	Five Ways Option 4a - Signalised T-junction, Monument Road changes
Ro38	Five Ways Option 5 - Signalised T-junction with minor road left in / left out
Ro39	Five Ways Option 5a - Signalised T-junction with minor road left in/left out, Monument Road changes
Ro40	Five Ways Option 6 - Grade separated both directions
Ro41	Belgrave Interchange Option 1 - Carriageway realignment and widening
Ro42	Haden Circus Option 1a - Convert to signalised roundabout
Ro43	Haden Circus Option 1b - Convert to through-about
Ro44	Haden Circus Option 1c - Convert to signalised crossroads
Ro45	Haden Circus Option 2 - Grade separated
Ro46	Camp Hill Circus Option 1 - Carriageway widening
Ro47	Camp Hill Circus Option 2a - Convert to signalised roundabout
Ro48	Camp Hill Circus Option 2b - Convert to through-about
R048	Camp Hill Circus Option 26 - Convert to through-about Camp Hill Circus Option 2c - Convert to signalised crossroads
Ro50	Camp Hill Circus Option 3 - Grade separated
Ro51	Bordesley Circus Option 1 - Carriageway widening
Ro52	Bordesley Circus Option 2 - Change direction of through-about
Ro53	Bordesley Circus Option 3 - Coventry Road bus and taxi only
Ro54	Bordesley Circus Option 4 - Convert to signalised crossroads and T-junction
Ro55	
	Bordesley Circus Option 5 - Grade separated
Ro56	Garrison Circus Option 1 - Carriageway widening
Ro57 Ro58	Garrison Circus Option 2a - Convert to signalised roundabout
Ro59	Garrison Circus Option 2b - Convert to through-about Garrison Circus Option 2c - Convert to signalised crossroads
Ro60	Garrison Circus Option 3 - Grade separated
Ro61	Curzon Circus Option 1 - Carriageway widening
Ro62	Curzon Circus Option 2 - Close Curzon Street
Ro63	Curzon Circus Option 3a - Convert to signalised roundabout
Ro64	Curzon Circus Option 3b - Convert to through-about
Ro65	Curzon Circus Option 3c - Convert to timough-about Curzon Circus Option 3c - Convert to signalised crossroads
Ro66	Curzon Circus Option 4 - Close Curzon Street and convert to signalised junction
Ro67	Curzon Circus Option 5 - Increase diameter of roundabout
Ro68	Options to address A4540 crossings
AM1	Local centres walking and cycling access
AM2	Bham cycle revolution - phase 1 Soho Road
AM3	Bham cycle revolution - phase 1 Solio Road Bham cycle revolution - phase 1 Alcester Road
AM4	Bham cycle revolution - phase 1 Aicester Road Bham cycle revolution - phase 1 Lichfield Road
AM5	Bham cycle revolution - phase 1 Elemeta Road Bham cycle revolution - phase 2 Tyburn Road
AM6	Bham cycle revolution - phase 3 outer connections
AM7	Middleway cycle routes
AM8	Last mile cycle routes
AM9	Cross-city cycle routes
AM10	Development of Active mode measures
Ot1	CAZ
Ot2	Workplace parking levy
Ot2	Birmingham parking SPD (inside A4540 reductions/CPZ/RPZ etc)
Ot4	CM750 Selly Oak/Edgbaston and Uni/Hospitals area wide parking scheme
Ot6	Low Traffic Neighbourhood (Places for People)
Ot7	Options for the use of the former A38 through the City Centre
U .	The state of the s

Appendix D. MCA Appraisal Output

	Objective	ing road space. Transforming the dity centre, Prioritising	managing demand through panking measures			ដាំរម្យ to employment skes e.g.				S			dronal future demand	ral capacity etc																				(dh-p				
50	heme	it with Big Moves. Reallocat	ictive travel intocal neighbourhoods: riprove Access to City Centre	Use of Brownfield Land reprovereits bit hy for people and goods reprovereits MFG Delivery corritorits	carbon net zero by 2030?	ns warm other pour, apporting economic growth (increasing conner. Interprise Zones)	upporting housing growth (committed sites) incourage sustaina ble/active travel	s trategir ro ad access Upporting pass enger growth	supporting reae etopment apportunities	kry krown geatechrical issues Vater Courses and Burled Infrast ucture (curverts / drain	pperatonalefficiency construction and maintenance	Vogranme	card arabacky (archang c.Po requiements) ocaton conflict with existing planning permission featoning regarding future expension/land availability (with ad	or parking spaces (not otly or local centres))? Dependency - reliant on delivery of partner's schemes (addition a	costs - Capital Costs costs - Operating Costs	report on future passengers	lbs tocton from existing stations leake road traffic on A38/NI) leake road traffic on A38S - Bristo Road	heake nod traffic on A4540 mmact on Chycente traffic levels	mpact on train and bus operations	mpacton ease afcrossingthe A4540 lase ship (framcar)	ntagration with current public transport services has senger safety and security	ieverance to movement righway Safety - Highway traffic	rignway Sapty - Active mode users rignway sapty - collision statistics	your Access in quality	t/Cheology unke	ubit realm	Blodiversity andscape / Townscape	Sreenhouse Gases	to od risk tub lic acceptability	duality of supporting evidence eyrisks	Providing Value for Money	ioa creation i igg lomeration/connecting business	connecting employers and tabour markets	pportunity for development gand released or land opene Lucon Planned development 7. Land use interaction	aliport interpolation descriptions, care and engineering and e	mpacts on business rates council tax	sevibility of option	anding source "
la1 Ra	IPBR Coseley - 50 space gotential deck on Gough Road. Option to acquire part of Cannon Business 32	SHCS alte	Best Beneate	Be t Benet Ben	et BeneNeuts	mate Bevie	eutralht Activ	Veutrante Ber	Neutraht A	dwheutrane	sutratrit Adv	whit Activitis Ac	dwNeutralt B	eneNeutral	ht Adwht Adv	NeutralN	leutra Veutra Veutra	t Benet Ben	nervieutrat Bo	lenet Bene	NeutraNeutraNe	inalt BeneNe	utral Ne	utralt Bene	Neutrait Ber	neveutrav	eutraht Adv	et Benerale	Act Benes	Sement Adv	ate Berleut	ral Neutral N	Neutral Ne	utral Neutra	al Neutral	Neutral N	sutral gint A	Adver
la2 Ra	I PBR Tipton : 375 space expansion, incl on NR compounded, 2 or 3 level dack	SHCS ate	Best Beneate	e Be t Benet Ben	et BeneNeuts	seate Berle	eutralht Adv	Veutrante Ber	Noutraht A	kd veNeu tra Ne	sutrahii Adv	viri Advate E	Beveutat B	endNeutral	ht Advint Adv	oNeu train	leutraNeutsaNeutsa	t Benet Ben	neNeutrat Bo	lenet Bene	NeutraNeutraNe	inat BeneNe	utral Ne	utralt Bene	Neutral Ber	neNeutraN	eutralht Adv	it BeneNe.	trait Bence	Bernehit Activ	ete BeNeut	rai Neutrai I	Veutral Ne	utral Neutra	al Neutral	Neutral N	ieutral ght Ac	Activers
la3 Ra	I PBR Dudley Port - 120 spaces, interchange with Metro. Potential further expansion to Park Lane E car fs, consider 2 or 3 levels (Consider knowledge of DPI scheme commission	SHCS take	Bet Beneat	e Be t Benet Ben	et BeneNeuta	ane Beve	sutraint Adv	Veutraate Ber	Noutrant A	kd whileu tra Ne	sutrahi Adv	whit Activate E	Berkeutrat B	i eneNeutral	ht Advint Adv	/NeutralN	leutraNeutraNeutra	t Benet Ben	reviewtrat Be	lenet Bene	Neutra/Neutra/Ne	irait BeneNe	utral Ne	utralt Bene	Voutrast Ber	nerviesutrarvi	outraiht Adv	t Beneve.	irat Bener	Berrahit Activ	este Berveut	nal Neutral N	Veutral No	utal Neuta	al Neutral	Neutral N	eutal ght A	Adve
la4 Ra	I P&R Sandwell & Dudley : 100 space second deck to further expand	SHCS ale	Bet Beneat	e Be t Benet Ben	et BeneNeuts	aate BeNe	outraitit Adv	Veutrante Ber	Neutraht A	Nd whileu tra Ne	sutratht Adv	vist Advaste E	BeNeutrat B	eneNeutral	ht Advht Adv	NeutralN	leutraNeutraNeutra	t Benet Ben	revieutrat Bo	lenet Bene	Neutra/Neutra/Ne	irat BeneNe	utral Ne	utralt Bene	Noutrait Ber	neNeutraN	outraiht Adv	t BeneNe.	trat Benea	Beneht Adv	este Bervieus	ral Neutral N	Ventral No	utral Neutra	al Neutral	Neutral N	eutral ght A	Actives
	I P&R Smethwick Rolfe Street - 200 space potential at grade car park (potentially second dock) on Rolfe set	SHCS ale	Beit Beneate	Be t Benet Ben	et BeneNeuts	zante Berke	outrathi Adv	Veutrante Ber	Neutraht A	d when trans	sutrahii Adv	vht Advate E	BeNeutrat B	eneNeutral	hi Advini Adv	NeutralN	leutraNeutraNeutra	t Benet Ben	reNeutrat Be	lenet Bene	Neutra/Neutra/Ne	irait BeneNe	uiral Ne	utralt Bene	Neutrait Ber	neNeutraN	eutralht Adv	t Benchi /	dwt Bence	Berroht Adv	ete Berleut	ral Neutral 1	Merutral Ne	utal Neuta	al Neutral I	Neutral Ne	ieutral ght Ac	Active
la6 of	IPBR Stouthridge Junction - 150 spaces, potential to be more ambitious with decking groposals. Section CP by industrial buildings to north of station could be decked. Also tree lining of main car park by station iding could provide screening for a 2nd deck here.	SHCS ate	Best Beneate	a Be t Benet Ben	et BeneNeuta	aate BeNe	eutralht Adv	Veutrante Ber	Neutrafit A	ki wheu tra Ne	sutrahit Adv	whit Activistic E	Beveutralt B	encNeutral	ht Adwht Adv	NeutralN	leutraNeutraNeutra	t Benet Ben	neNeutrat Bo	lenet Bene	NeutraNeutraNe	inalt BendNe	utral Ne	utralt Bene	Neutralt Ber	neNeutraN	eutraht Adv	et Beneht /	dwt Bene	Bancht Adv	este Berleut	ral Neutral 1	Neutral Ne	sutral Neutra	al Neutral I	Neutral N	eutral ght Ac	Adve
Ra do	IPBR Cradiey Heath - 200 spaces, potential to CPD private car park land. Further potential to sensitively is the CPD diland, so as to not overbook residential properties. Also potential for council owned land and also over the closed CP.	SHCS ale	Bet Beneat	e Be t Benet Ben	et BeneNeuts	aate Beve	outraffit Adv	Veutrante Ber	Noutrant A	ki wheu tra Ne	sutraht Adv	viri Advetate	AcNeutrat B	endNeutral	ht Advint Adv	NeutralN	leutraNeutsiNeuts	t Benet Ben	nevieutrat Be	lenet Bene	NeutraNeutraNe	inst BeneNe	utral Ne	utralt Bene	Neutrat Ber	neNeutraN	eutralht Adv	t BeneNex	trat Bence	Sement Activ	ate Berleut	rai Neutrai N	Neutral Ne	utal Neutra	al Neutral	Neutral N	eutral ght A	Active
	1982 Cid VIII. 200 cores controlisto acquire businesses of Station Statistical Surface	SHCS non	Bet Beneat	e Be t Benet Ben	et BeneNeuto	ane Beve	suinahi Adw	Veutraate Ber	Neutraht A	d wheatra Ne	suirahi Adv	ohi Actoriane	Advisor trait B	eneNeutral	hi Adwhi Adv	ANeutraN	leutraNeutraNeutra	t Benet Ben	reviewinat Be	lenet Bene	Neutra/Neutra/Ne	irat BeneNe	utral Ne	utralt Bene	Neutrant Ber	verNeutran	eutralht Adv	t BeneNe.	inalt Bence	Bernehit Activ	ate Berleut	ral Neutral 1	Neutral Ne	sutal Neuta	al Neutral I	Neutral Ne	leutral ght Ac	Adve
Ra ds	I PBR Rowley Rigis - 900 space new MSCP for detellet site off Cakemore Road/Nimmings Road, walk ance shorter than extreme end of current CP. Pedestrian crossing and signage strategy required.	SHCS ale	Bet Beneate	e Be t Benet Ben	et BeneNeuts	aate BeNe	eui raht Adw	Veutrable Ber	Neutraht A	dveleutra Ne	sutratit Adv	whit Activities	Advisutrat B	eneNeutral	ht Advint Adv	NeutralN	leutraNeutraNeutra	t Benet Ben	neNeutrat Bo	lenet Bene	NeutraNeutraNe	inst BeneNe	utral Ne	utralt Bene	Neutrait Ber	reNeutraN	eutralht Adv	t Benerals	Act Bence	Beneht Adv	ete Bevleut	ral Neutral 1	Neutral Ne	utral Neutra	al Neutral I	Neutral No	ioutral gint Ac	Active
	central for 2 or 3 storey CP. I PBR Blake Street : 100 spaces, potential to partially dock to Birmingham' CP. Only 2nd storey due to idential area.	SHCS pie	Bet Berent	i Be t Benerleuts	at BeneNeuts	rente BeNe	eutralht Adv	Veutraete Ber	NeutraNeut	draNeu traNe	sutratri Adv	vint Advante E	Beveuta t B	eneNeutral	ht Advint Adv	nNeu train	leutraNeutraNeutra	t Benet Ben	neNeutrat Be	lenet Bene	NeutraNeutraNe	ina t BeneNe	utral Ne	utralt Bene	Neutralt Bor	neviouiravi	eutralht Adv	t Benerate	Act Berse	Surretht Adv	este BerVeut	ral Neutral N	Neutral Ne	utral Neutra	al Neutral	Neutral N	eutral ght A	Active
		SHCS gite	Best Beneate	e Be t Benerkeutra	at BendNouts	ante Berle	eutraiht Adv	Voutragle Ber	NeutraNeut	traNeutraNe	sutraht Adv	whit Advance B	Beveutrat B	eneNeutral	ht Advint Adv	NeutralN	(eutraNeutraNeutra	t Benet Ben	nevieutrat Be	lenet Bene	Neutra/Neutra/Ne	drait BeneNe	utrai Ne	utralt Bend	Veutrait Ber	neveutrav	eutralht Adv	t Benerale	Act Bence	Serretit Actv	ete Bevleut	ral Neutral 1	Neutral No	utral Neutra	al Neutral I	Neutral N	eutral ght Ac	Active
a12 H	IPBR Four Claks - 200 spaces - revisit why main car park not deciled. Explore acquisition of Four Claks use to enable expandion of extension to C.P. Car parking on Station Drive (5.8 spaces) would have to be	SHCS ale	Bet Beneat	a Be t Benevieutra	at BendNeuts	apte Berle	eutraht Adv	Veutrapte Ber	NeutraNeut	traNeutraNe	sutrahit Adv	ohi Activate E	BeNeutrat B	eneNeutsal	hi Achahi Ach	Neu traN	leutrali Beneveutra	t Benet Ben	neNeutrat Bo	ienet Bene	NeutraNeutraNe	itrati BeneNe	utral Ne	utralt Bene	Neutrat Ber	nevieutravi	eutraht Adv	t BeneNe.	trat Bence	Bernehit Activ	ete Berveut	rai Neutrai 7	Neutral Ne	utral Neutra	al Neutral	Neutral N	eutral gint A	Active
	noved to reduce edge friction of access I P&R Sutton Coldfield - check within Jacobs re Sutton Interchange study. Potential acquisition of Sutton car pask of it Station Street, excavate down to provide "2 storeys with interchange on top	SHCS atte	Bet Benenie	a Be t Benet Ben	et BeneNeuta	ante Berle	eutrahi Adw	Veutrapie Ber	NeutraNeut	iraNeu traNe	sutraht Adv	whi Activisie E	Berleutrat B	eneNeutral	hi Acheni Ach	ANeu train	leutralt Beneficutio	t Benet Ben	revieutrat Be	lenet Bene	Neutra/Neutra/Ne	draft BeneNe	utral Ne	utralt Bene	Neutrait Ber	neNeutraN	euiralht Adv	t BeneNe.	draft Bener	Bernaht Adv	ote Berleut	ral Neutral N	Neutral No	suital Neutra	al Neutral	Neutral N	A trig lecture	Adve
a14 fu	IPBR Chester Road: 270 spaces - existing plans being developed to deck, could support with additional ding. Potential to acquire current industrial useso goosite existing CP on Chester Road, would require	SHCS pile	Bet Beneat	e Be t Benet Ben	et BeneNeuts	aate BeNe	eui raibi Adw	Veutrapte Ber	NeutraNeut	itralNeutra Ne	sutratrit Adv	whit Activate E	BeNeutrat B	eneNeutral	ht Advent Adv	NeutralN	leutra i Benerieutra	t Benet Ben	neNeutrat Bo	lenet Bene	Neutra/Neutra/Ne	irat BeneNe	utral Ne	utralt Bene	Neutrait Ber	neNeutraN	eutralhi Adv	t Bencht/	dwt Bentar	e Beht Adv	ete Bevleut	ral Neutral N	Neutral Ne	utral Neutra	al Neutral	Neutral N	eutral ght.A	Active
a15 de	ranced crossing facilities. Potential 3 storey facility) I P&R Action - 700 spaces - acquire: businesses on south side of Lichfield Road (north of railway line) to eib p.Z or 3 storey CP with foot overbridge to Birmingham bound platform. Access from M6 via Salford	SHCS ale	Bet Berent	e Be t Benet Ben	et BeneNeuts	supte Berle	outsoft Adv	Veutrante Ber	NeutraNeut	tral Neu tra Ne	uirahi Adv	oht Adveste	Ackeutrat B	eneNeutral	ht Advint Adv	NeutralN	leuira i Benepleuira	t Benet Ben	reviewrat Be	lenet Bene	Neutra/Neutra/Ne	itsit BeneNe	utal Ne	utralt Bene	Neutrart Ber	neNeutraN	eutralht Adv	t Bencht/	dwt Benev			ral Neutral N						
G	rus or A38(M) via Park Circus and Waterlinks Boulevard	SHCS also	Bet Benenic	a Be t Benet Ben	et BeneNeuta	aute BeNe	eutralni Achv	Voutrante Ber	Neutravieur	tralt Benet E	Benefit Adv	whit Activate E	Berleutra (B	teneNeutral	ht Advent Adv	NeutralN	leutraNeutralt Bene	et Benet Ben	neveutrat Be	lenet Bene	Neutra/Neutra/Ne			utralt Bend	Neutralt Ber	nevieutrav	eutraht Adv	t BeneNe.	irat Benea			nal Neutral N						
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		Policy Fit	Strategic	Engineering / Deliverability	Transport Impacts	Safety	Environmental	Mana gerial Fin ancial/ Economic Development Impacts Commercial
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-	CESSO Sutton Park Line: New local stations	M/G It Bengate Beate Beate Belt Beneate Be	ate Beste Bert Benet Benefloutrae Benefloutra	Noutral outral loutraint Advint Advit Bendy outrait Bendy outrait Advint Advint Advi	Hou tra Noutra Houtra Houtra Houtra Bondt	okoutrak outralt Bend kou trai	ioutral Bendhoutral Bendhoutralkoutrahi Advis Bendhi A	tive Beneate Bent Adviste Belloutral Neutral Neutral Neutral Neutral Neutral Neutral Neutral Neutral neutral page Adviste Bent
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Ra23	C8700 Wahal-Wolverhumpton new local stations (Willerhall, Darlaston)	MIG uso Bear Beneste Belete Be Noutratite Be	ata Bas Bendt Bendt Bener <mark>koutras Benchoutra</mark>	Noutral outralious and Advint Advit Bench outrals Benchout and Advint Advi	Noutra Noutra Noutra Noutra Rendt Bendt Bendt Bendt Bendt Bendt Ben	eNoutraNeutralt Beneviou trai	loutrait Benefikoutrait Benefikoutraikkoutraint Advist Benefizie	Act Bonesto Bont Advisto Boyloutra Noutral Noutral Noutral Noutral Noutral Noutral Noutral Noutral ht Sono frate Bonn
Ra24	Camp Hill railway stations (informs service)	BTP t Bendate Beate Bert Benefite utalt Bene	a Benetite Benedicutrat Benedicutrae Benedicutra	Nousraki outrakiousranti Ashriti Ashti Bengi outrak Bengiousranti Ashriti Ashriti Ashri	rkou tra Noutra Noutra ki outra li Bondi Bond Hond Hondi Bondi Bondi Bondi Bondi Bondi Bondi Bondi Bondi Bondi	dioutral outralt Bendieu trai	ioutrait Bendhoutrait Bendhoutrakoutrahit Advet Bendhout	rait Benetic Bent Athetic Benkoutral Noutral Noutral Neutral Noutral Neutral Neutral Neutral Noutral ht Bene frate Benh
Ra25	Camp Hill railway stations (full service)	STP to Box Senate Bosto Se Noutratite Be	e Bendite Benkoutrat Beneficutrae Beneficutra	Noutral outral loutrant Advint Advit Bend outralt Bend loutral Advint Advint Advint Advint Advint Advint Advint	Noutra Noutra Noutra Noutra Eand Bond Bond Bond Bond Bond Bond Bond	eksutraNeutralt Benevioutral N	ioutrait BendNoutrait BendNoutraNoutraint Advist BendNoutra	rait Benetite Bent Advete Bevioutra Noutral Neutral Noutral Noutral Neutral Noutral Noutral Neutral ht Sene frate Bent
Ra26	Midlands Rail Hub - Bondeskey Chords and 4 back into Moor Screet station, 21gh oxina to Leiterster, 21gh oxina to Nottingham, 11gh oxina to Hereford, diversion of camp hill line 21gh.	Moderate Bee Benette Belate Belate Be	e Bene Benevloutrat Benevloutrae Benevloutra	Noutral outral cutral Advist Advist Bendy outrals Bendy outrals Adviss A	Hou tra Noutra Houtra Houtra Houtra Bondt	okoutraNoutralt Bengkoutral N	ioutrait BengNoutrait BengNoutraNoutrant Admit BengNout	rait Benetite Be <mark>nt Advette Belkoutral Neutral Neutral Noutral Noutral Neutral Noutral Noutral Neutral int Adve<mark>rate Be</mark>nt</mark>
Ra27	Tamworth line new local stations and services - Fort, Castle Bromwith, Kingsbury	Moderate Bes Benede Beit Benedt Benedte Be	ata Balde Bankoutrat Benerikuutras Benerikuutra	Noutral outral Autrant Advint Advit Bency outral Bency outral Bency outrant Advint Adv	Noutral Bendi outralt Bendi	ekeutrak eutralt Benevieu trai	ioutrait Beneficiurat Beneficiura Noutrant Admit Beneficte	Act Benetic Bent Adviste Belleutra Neutral Neutral Neutral Neutral Neutral Neutral Neutral Neutral Neutral state Bent
Ra28	Dudley Road new Station (for Binninghum City Hospital) - On Wolverhampton - Birninghum line	Moderate Beste Best Benef Benef Benef Benef	Nautrae Benevioutrat Bonovioutrae Benevioutra	Noutral outsilioutrant Admit Admit Bengloutsit Bengloutrant Admit Admit Admi	Noutra Noutra Noutra Noutra Benefit Be	disutral outralt Bendieu tral 1	ioutrait Bendhoutrait Bendhoutrakloutrant Adhit Bendhout	rat Benetite Bent Adviste Beleutra Neutral Neutral Neutral Neutral Neutral Neutral Neutral Neutral int Adverse Benn
Ra29 v	Waball - Brownhills reopening	Moderate Beide Beide BendNoutratite Be	ete Belde Berkeutralt Benerkeutras Benerkeutra	Noutral outral loutrain Advint Advint Advint Bend outrait Bend loutrain Advint	Noutra Noutra Noutra Noutra It Bendt Bendt Bendt Bendt Bendt Ben	oleutraki eutralt Bendieu tral	ioutral: Beneficutral: Beneficutral/ioutrant Admit Benefit Ac	tive Benetic Bont Adviso Bolioutra Noutral Noutral Noutral Noutral Noutral Noutral Noutral Noutral int Advisorate Bont
Ra30 >	Solno / Manchworth Wood Station (on Birmingham - Wahall - Rugsfeyling)	Moderate Beste Beste Benet Benet Benet Benet	Noutrait Benevioutrait Benevioutrais Benevioutrai	Noutral outral loutrant Advint Advit Bend loutrait Bendoutrant Advint Advi	Noutra Neutra Neutra Nautra It Bendt Bendt Bendt Bendt Bendt Bendt Ben	okutrakoutralt Bendeu trak - N	ioutrait Bendhoutrait Bendhoutrakioutrant Admit Bendhout	rak Benete Bent Advete Belloutra Noutral Neutral Noutral Noutral Noutral Noutral Noutral Noutral Int. Adve rate Bent
Ra31	To to the full Station (So tween t Wolve than pion and full trook)	Sight Bengate Bette Beng Beng Neutralt Beng	it Bendato Be <mark>rloutral</mark> t Bene <mark>rloutrals Benerloutra</mark> l	Noutral outral loutrains Advint Advit Bency outrals Bency outrals Bency outrains Advint Advin	Noutra Noutra Noutra Noutra It Benet Benet Benet Benet Benet Benet Ben	oloutrakioutrali Benglioutral N	ioutrait BendNoutrait BendNoutraitioutraint Admit BendNout	rait Benedio Be <mark>nt Adviste Ben</mark> eutra Noutral Noutral Noutral Noutral Noutral Noutral Noutral Noutral International Benedic
Ra32	Resons Harbonne Railway stations at Rotten Park, Hagley Road and Harborne (Park Hill Road)	Moderate Beate Beate Beate Be it Beneste Be	ate Beste Berkoutralt Beneficutras Beneficutra	Noutral outral loutrant Advint Advit Bend outralt Bend loutrant Advint Adv	Hou trahleutra Houtra Houtra It Sendt Bend Neutra It Sendt Bendt Bend Neutra	akleutrak eutralt Benekeu tral	loutrait Bendhoutrait Bendhoutrafioutra cte. A ut Bendhout	rat Benetic Bent Advicte Belleutra Neutral Neutral Neutral Neutral Neutral Neutral Neutral Neutral General Bene
Ra33	Cross City line turned and increased frequencies of other to call rail services that come into New Street.	Moderate Bee Beneveutrante Beit Beneste Be	o Bando Band-koutralt Benerkoutrale Bank Nocutral	Noutral outral loutrant Advert Advet Bench outralt Benchoutrant Advent Adve	New transcutra Newtrals Gustalit Bendt Bendt Bendt Bendt Bendt Bendt Ben	dioutrapieutralt Bendieutral ()	loutrait BendNoutrait BendNoutraiNoutrant Admit Bondate	Act Beneate Bent Advate Bentoural Noutral Neutral Neutral Noutral Noutral Neutral Neutral Neutral Neutral state Advate Bent
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Ra35	Connection Livery St to St Pauls Metro stop (over the nailway)	Sight Bendt Benette Beit Bendt Benerlauf	Neutra Neutra Neutra II. Bene Neutra Neutra Neutra	Noutral outralicus ant Advist Advist Bendioutrals Bendioutrals Advist Advist Advist Advist Advis	Noutra Noutra Noutral outrait Bendt Bendt Bendt Bendt Bendt Bendt Bendt Woutra	akoutrakioutrali Bendvioutral h	ioutrait Beneficutrat Beneficutraficutrant Admit Beneficut	rati Bondeto Bont Advote Borloutral Noutral Noutral Noutral Noutral Noutral Noutral Noutral Industrial Noutral Industrial Section 1
Ra36	Extend Motro from Edification Terminia - Harbome via Hagley Road (gossibly on to UoS/UHB?)	Moderate Beis Benedie Benedieutrahleutralitie Be	it Benet Benevioutrat Benevioutrae Benevioutra	Noutral outralisour ant Advint Advit Bench outrait Benchoutrant Advint Advi	Nou tra Noutra Noutra Noutra It Bendt Bendt Noutra It Bendt	oloutraNoutralt Benevioutral N	ioutrait Bend Noutrait Bend Neutrainloutrant Admit Bend III.	tivit Bonesto Bont Advete BoHoutral Noutral Noutral Noutral Noutral Noutral Noutral Noutral Noutral state Advate Bons
Ra37	Southern Gateway Metro extension from east-side to UoS / UHS	M/G to Boat Bendate Belate Sels Bendate Be	ata Bap Bandiautrat Beneficutras Bandiautra	Nous als outsalsous and Assent Astell Bend outsalt Bendsouts and Astell Astell	Houstan Noutran Houst and outrant Bonds Bonds Noutrant Bonds Bonds Bonds Bonds	deutrali outralt Bondeu trai	loutrait Bendhoutrait Bendhoutrahloutrahit Advis Bend <mark>ase</mark>	Adt Boneste Bont Advete Bolloutral Noutral Noutral Noutral Noutral Noutral Noutral Noutral Noutral state Advance Benn
Ra38	City wide/regional future expansion of Metro network	Large Bende Bendate Belate Se Noutralitie Be	oto Bee Bendrioutrat Beneficutrae Bendrioutra	Noutral outral loutrant Advint Advit Bend Journal Bend loutrait Advint A	Nou tra Nautra Noutra Nautra E Bond Bond Nautra E Bond Bond Bond Bond Bond	okautrakiautrait Bengkautrai h	ioutrait Bendhoutrait Bendhoutrakkoutraht Advist Bendht Ac	tvik Beneilte Be <mark>nt Advete Bel</mark> koutral Noutral Neutral Neutral Neutral Neutral Neutral Neutral Neutral <mark>Instellide</mark> rate Ben
Ra39	Tram-Train from University via 80 unbrook Corridor to Quinton	D vioutral Benerioutral Benerioutralite Be	Noutrable Berkoutralt Benerioutralt Benerioutra	Noutral outral loutrant Advint Advint Bend outrait Bend outrait Advint Advint Advint	Noutra Noutra Noutra Noutra It Bendt Bendt Bendt Bendt Bendt Bendt Be	dioutralioutralit Bendieutral N	ioutralt Beneficutralt Beneficutral Noutraint Advit Beneficut	rat Banada Bayi Assarsa



			Policy i	Fit Strategic	Engineering / Deliverability	Transport Impacts	Safety	Environmental	Managerial	Financial/ Economic Development I	Impacts Commercial
		Objective	spoot; Transforms Real Boostings road spoot; Transforms Bre Ely ceres; Improve Access to City Ceres Else Of Brown/lists Land	Support an annuary y or purpor and y pour Support all \$5 Delianty contact (\$5) Carbon net amo by 2030? It within other policy Supporting economic ground (the most hy Supporting economic ground (the most hy Supporting to employment sites e.g., Supporting to employment sites e.g., sites)	Supporting posts angue growth Supporting posts angue growth Supporting trade existing the supportunities Arry thrown growt check at leaves (solvers (-decles) Operations of Burket hybostructure (cohers) (-decles) Arry thrown and maintenance Construction and maintenance construction and maintenance and evaluation (-decles) and evaluation and maintenance and evaluation (-decles) and evaluation (-decles) and evaluation (-decles) Arrange (-decle	postravir's schemes (additional autocasacity Costs - Cap kalC cets Costs - Cap and Costs Topic Costs - Cap and Costs Major to - Manue poisampiers Albamoc don- Your aciding strations Reduce most rough, on A3.8M.) Reduce most rough, on A3.84.9 Briticol Reduce most trough, on A3.85.9 Briticol Reduce most trough, on A3.85.9 Briticol Reduce most trough, on A4.85.0 Reduce most trough, on A4.85.0	Impact on one of cossing the 445 40 Mode ship (from col) arrives arrives framerger sujdy and security Proserpor sujdy and security Estement to movement Highway Salesy - Highway rouffic Highway Salesy - Highway rouffic	Sy to Access At quality At Noise Noise State of Towns app	Public accepsobility Guality of supporting evidence Key risks	Providing Value Schloney De beneation Agricum exitor's connecting beninsis Connecting employers and labour markets Opportunity for threshopment (land released or land opened up) Support Planned or land opened up)	Land value upilit hypocts on business rates fround tase funding source * Ravenue (blacct) *
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od	ALC: N	Sprint - A4S	SHCS Little Beak Bendate Belt Ben	nate Belt Benet Beneste Be <mark>neu tra</mark> it Bene <mark>vieutral</mark> s	te Belt Bend <mark>t outral</mark> t Bendt Bend <mark>t Adveloutraate Bes</mark> Benes Bendt B	ien a <mark>rt Advitt Advit Ben alleutrahleutraki eutrai</mark> t Benat Benat Benat Benat B	Sondt Benat Benat Benat autralt Benat Benefidal	Noutrait Bend outrait Bend (Bendle utrain) Advet Bendleutrai	t Benezte Best Benet i	Bendicutal Neutral Neutral Neutral Neutral Ne	outral Neutral rate Benints Benint Benefi
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	BS5	Sprint - Hagley (toad (Halksowen and Dudley routes)	MTG to Belt Bendt Benet Ben	hata Belt Benet Benato Bellou trat Benevautate	to Best Bond Outrat Bondt Bondt Advelour atte Bot Bondt Bondt B	en att Advitt Advit Ben dioutra Noutra Voutrait Bend t Bendt Bendt B	Bendt Bendt Bendt Bende Gutratt Bendt Beneficial	Noutralt Bendioutralt Bendie Bendie Utraint Advit Bendieutral	t Bengate Belt Bengt i	Benedicutral Noutral Noutral Noutral Noutral No	outral Noutral rate Benifate Benift Benefit
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	BS9	Bus Improvement Corridor - A435 Alcester Road	MTG to Belt Bendt Benet Ben	nd Noutra It Benefit Benefite Benkou trait Benefi outralis	Bendt Be	outral Advit Advit Bendioutra Noutral outrait Bendt Be	Benet Benet Benet Benet Benet Benet Banet dal	Noutrals Bend Noutrals Bend & Bend Noutrals Adves Bend Noutrals	t Bendate Beit Bendt i	Benck outral Neutral Neutral Neutral Neutral Ne	Neutral Neutral rate Benint Benefit
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	BS11	Bus improvement Carridor - A41 Holyhead Rosel/Saho-Rosel	M/G to Belt Bendt Benet Ben	asite Belt Benet Benate Berkeu trait Benev outrale	ie Beit Bendt Bendt Bendt Adveloutral t Bendt Benet Benet Be	en dit Advitt Advit Ben eleutraNeutrali eusalt Benet Benet Benet B	Bendt Bendt Bendt Bendt Bendt Benef dal	Noutral Bendloutal Bendloutals And Bendloutals Advis Bendloutals	t Benedie Beit Benet i	Bendikautral Noutral Noutral Neutral Neutral Neutral Ne	uutral Neutral rate Beninte Benint Benefi
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2	BS13	Cross-city contine bus services	4N/A to Belt Bendt Benet Ben	ndt Bendt Benet Bend <mark>ate Ber</mark> t Bendt Bend <mark>veutrat</mark>	t Bendt Bendt Bendt Bendt Bendt Adve Noutra t Bendt Bendt Bendt Bendt Be	en a <mark>nt Adwitt Adwi</mark> t Bena <mark>Neutra Neutra Neutralit Bena</mark> t Benat Benet B	Benet Benet Benet Benevalt Beneficial	Neutralt Bend leutralt Bend i Bend leutralit Advit Bend leutrali	t Benaste Bert Benat I	Bendvioutral Neutral Neutral Neutral Neutral Ne	utra) Noutra Noutra i rate Beninste Benint Benefi



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		Objective		Treadon by the Coty certa, Providing active troots pace; Treadon by the Coty certa, Prioritising active troot, Improve Mccas to City Certa Lise of Recurrishal tand Improve milability for people and goods Supports MIC Dalivery conducts. Cathon net zero by 2030?	Supporting postering grout th diversaling connectivity to employment sites ag, Enceptial Zones Supporting focusing grout th diversal Zones Supporting housing grout th documitated altest Encourage sustainable for the transf	Any known georachivical is sues Water Coor ses and Burked hytrastructure (cuberts / droks) Operation of life kincy Construction and maintenance	Land oxaliability (including CPO requirements) Cocolor conflit to be braining beneving permission Floatibility rigal and future expansionly and suitability (with additional future demand for partiting sacross (not Dependency - wither onderliving of partitine's schemes (additional rule casas) Costs - Capital Costs Costs - Capital Costs	Import on Juhan posternyers Abstraction from estating stations Reducerood troffit on ASBAN)	Reduce croad trails: an A385 - Related Road Reduce croad trails on A4540 Impact on City Cer ter trails lawels Impact certain and bus operations Impact certain and bus operations Mode skip (from ead)	hriagration with current public transport services. Persemper sofery and accurity. Severance to movement	Highwar Safaty - Highwar raiffe. Highwar Safaty - Active mode us as Highwar safaty - collision as this take	Cycle Access At quality Archeology Mosine Baddwenick Landscape / Townscape Green-boung Ganes	Flood rish Public occupiability Quality of su pporting evidence Reg rishs	Providing Value for Money Nob creation Agglorem along converting business Convective emoloues and labour notites	Opportunity for development (and released or land operator (Apportunity) and the properture of the control of t	Flanklity of opition Flanklity is contre * Reverue (direct i*
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	Ro9	Dertmouth CircusOption 1 - Through-about	SHCS	nt Advisio utra Noutra t Bendt Bendt Advisio A	Name											
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	Ro11	Dentmouth CircusOption 3 - Grade separated westbound, two way	SHCS	nt Advillo utraNoutralt Bondt Bencht Advise to	10100											
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	Ro14	Dartmouth CircusOption 6 - Grade separated both directions, one way	SHCS	ht Advike utra Noutrat Bendt Bendt Advis &	Na sa											
	Ro15	Derfmouth CircusOption 7 - Grade separated ASS and ringroad	SHCS	nt Advike utraNeutralt Benefit Benefit Advise Be	De rea											
	Ro16	Destination CircusOption 8 - Grade separated with ringroad through-about	SHCS	ht Advisious a Noutral Bendt Bendt Advision	Ne roa											
	Ro17	New Town Row/Summer Lent Option 1 - Ring road underpass	SHCS	nt Advisioustral Noutral Bendt Bendt Advis in	nema .											
	Ro18	New Town ito w/Summer Land Option 2 - it ing road overpass.	SHCS	nt Advisio utraficutrati Bon et Benefit Advision	101.704											
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	Policy Fit	Strategic	Engineering / Deliverability	Transport Impacts	Safety	En viron men ta I	Managerial	Finan dal/ Economic Development Impacts	Commercial
Objective	Transforming the city create, Phankibe active transforming the city create, Phankibe active transforming the city create, Phankibe active transformer to the city Centre. The city Counselfer Counter that city Counter the city Counter that city Co	Fit within other policy Supporting according growth (increasing connectivity to employment sites a, g. Electropia Zones) Supporting housing growth (connectivity is Encourage sust an order or one) Encourage sust an order order a rose! Supporting reducitio present organities Supporting reducitio present organities Any known gat suchvita dissues:	Motor Cooreas and Burinal Infrastructure (Culverts, I decots) Denatorial efficiency Construction and analyse around Land analysishing forcluding CPD requirements) Land analysishing forcluding CPD requirements) Land analysishing forcluding CPD requirements) Land analysishing forcluding planning planning in the register of the second force of the register of the second force of the register on delivery of patriners or delivery of patriners or delivery act of additional mili casading arc) Coas - Capital Coas Coas - Capital Coas	Impact on June passenyers Abare erood to file on A3 8(M) Rathe erood to file on A3 8(M) Rathe erood to file on A3 85. Alta of Rood Anabee rood to file on A4 54.0 Rathee rood to file on A4 54.0 Ampact on CAy Centre traffs invals Ampact or train and bus operations Ampact or train or dibus operations Ampact or neare of trouting the A45.40 Mode sA/F (from on)	Prosence of componence of security Sevenave a componence Highway Solety - Highway Folff Highway Solety - Active mode users Highway colem - collision statistics	Ar quality Are haciass Are haciagy Movie Public readm Backwerthy Landac aper / Tourns aper Greenhouse Gress	Public occ epublity Quality of supporting existence Key risks	Providing Value for Norwy Job creation Apploment flory corne cling bushess Cornected employers and labour markets Opportunity for development (land use integration Support Pl amod development / Land use integration Land value uplift: Amport is on business roated court it ton	Flankhity of opritor Flankhity source * Reverue (sheer) *
Ro21 New John Street Ward Option 1 - Linkwidering	SHCS Int Advisional Neutral Benefit Benefit Advis	ate Advoctratious and Adve Bendvactratious avactual	Noutral outraint. Advisate Advisate Advourrant outraineutrain outrainte Advisoutra	aNoutra Voutait Benet Benetit Advivio utra Noutra ht Adviste Acht Advi	Noutra Noutra Noutra nt Adver sell (one Advine Advinous some Advine Advine Advine Advine Advine Advine Advine Advine	rNoutralt Beneal Advit Be	nd Autral Noutral Noutral Noutral Noutral Noutral Noutral Noutral Noutral	outral antitio Aid Noutral Noutra
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Ro24 Lucas CircusOption 1c - Convert to signalised crossroads	SHCS Int Advintential Neutral Benefit Rendrit Advis	ate Advioustatious and Advid Bendioustatious avouss	Noutral Coural atte Advate Advate Advatral Gutral Noutral Coural atte Advata	a Noutra Noutrald Bendt Bendhif Adv Neutra Neutralt Bendhitte Acht Advil	Neutra Neutra/Neutra nt Adver sei g	nt Benant Advelout raft Advel Advel Adveloutrafit Advel Advel Advel Advel Advel	vNoutralit Bendrif Advit Be	end Noutral Noutral Noutral Noutral Noutral Noutral Noutral Noutral Noutral No	outral brate Aid Neutral Neutr
Ro25 Lucias Circua Option 2 - Remove junt don	SHCS Int Advinteration of Bendit Advin	nt Advirlautra Noutraint Advirt Bend Voutrainoutra Voutrai	Noutra pi outra tate Advate. Advoutra pi outra Noutra pi outra tate. Advi outra	a Noutra Noutralt Bendt Bendhit Adv-Heutrarate Adt Bendrate Acht Advil	Noutra viou trafficutra nt Adver séil (aha Adwini Adwinious raiha Adwini	vNoutralt Benefit Advet Be	nd outral Noutral Noutral Noutral Noutral Noutral Noutral Noutral Noutral	outral state Act Noutral Noutr
Ro26 Pit stand Street Option 1 - Remove right burners	SHCS ht Advisioutral Noutral Bendt Bendt Advis	nt Advi-Noutra-Noutrant Advit Bend Noutra-Noutra Noutra	koutra Noutra ht. Advitate. Advoutra Noutra Noutra Noutra ate. Advoutra	akoutrak outrak Bendt Bendhil Advike utraktuurrake utraktate Advil Advil	Noutra Nt Advinoutra Nt Advier se 1	pte Advine Advinous raine Advine Advinousraine Advine Advine Advine Advine	rNoutralt Beneal Advit Be	ind Noutral Noutral Noutral Noutral Noutral Noutral Noutral Noutral Noutral	outral siste Adv Noutral Noutr
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RO28 Spring Hill CircusOption 2a - Convert to signalised roundabout	SHCS ht Advineutra/Neutral Bendt Bendt Advis	atte. Ad Noutral Houtrant Activit Bend Noutral Houtra Noutral	koutra Noutra l'ato Adatte Au-Noutra Noutra Houtra Houtra Houtra l'atte. Achi outra	a Noutral Noutral Bendt Bendt Kahrlie utal Noutral le utaliste Acht Acht	Neutra Houtra Noutra nt Adher s& I	DE Advis Advisor sale Advis Advisor Advisor Advis	r Noutralt Benefit Advit Be	nd Noutral Noutral Noutral Noutral Noutral Noutral Noutral Noutral No	outral Erato Ach Noutral Noutr
RO29 Spring Hill CircusOption 2b - Convert to through-about	SHCS ht Advisious Noutral Bendt Bendt Advis	ate Advoctratious and Advid Bendious a Nous a vious a	Hoursal outsal rate Adrate Advoutsal outsal Houtsal outsal este Advouts	a Noutra Noutra Rendt Bendt Adville uta Noutra lie uta rate Advil	Noutra Hou trainioutra nt Adher seil (giệ Adveit Advelous raint Adveit Advelousraint Adveit Adveit Ad	rNoutralt Benefit Advit Be	nd outral Noutral Noutral Noutral Noutral Noutral Noutral Noutral No	outral trate Adv Noutral Nout
Ro30 Spring HB CircusOption 2c - Convert to signalized crossroads	SHCS of Advivious and Bendit Advis	ate Adveutra Neutra ht Advet Bend Veutra Neutra veutra	Houtrahi outrahase Adrese Adrese Adreset an outrahout an outrahase Adrioutr	a Noutra Noutra it Benefit Benefit Adv Noutra it Benefit Benefit Benefit Advit Advit	Noutra Houtra Noutra nt Adher Ski g	nt Bendat Advelous rate Advet Advelousrate Advet Advet Advet Adve	r <mark>Noutral</mark> t Benerit Advit Be	nd <mark>Noutral Noutral No</mark>	utral state Adv Noutral Nout
RO31 Spring HB CircusOpision 3 - Grade separated, long overpass	SHCS ht Advision Neutral Benefit Rendet Advis	6 Aprezio							
Ro32 Spring HE CriticOption 4 - Grade separated, short townpass	SHCS ht Advisious Noutrals Bon at Benant Adve	i Atresa							
RO33 five WaysOption 1 - Westbound through-about	SHCS ht Advinioutral Noutral Bendt Bendt Advis	ate Achicutra Noutraint Activit Beneficiutra Noutra Noutrai	koutra Noutra l'ato Adatte Au-Noutra Noutra Houtra Houtra Houtra l'atte. An Noutra	a Houtrak outrak Bondt Bondtit Advike utrakkoutrakio utrakste Advit Advi	Neutra Neutra Neutra nt Adver se I	ate Advis Advisor sale Advise Advisor Advisor Advise Advis	nNoutralt Benefit Advet Be	nd Noutral Noutral Noutral Noutral Noutral Noutral Noutral Noutral Noutral	utral Erato Ach Noutral Noutr
RO34 five WaysOption 2 - Westbound through-about with carriageway widening	SHCS ht Advisious Noutral Benefit Benefit Advis	ate Achioutra Noutrant Autrit Beneficoutra Noutra Noutra	Noutral Courtaine Admite Advoctral Courtain Courtain et a Advoctra	a Noutra Noutra Rendt Bendt Rendt Adville utra Noutra Noutra Routra at Advil	Noutra Hou trainioutra nt Adher seil (ate Advet Advelous rate Advelo Advelousrate Advelo Advelo Advelo	rNoutralt Bendtit Advit Be	individual Noutral Noutral Noutral Noutral Noutral Noutral Noutral No	Litral Islate Adv Noutral Noutr
RO35 Five WaysOption 3 - Full through-about with carriage way widering	SHCS ht Advinours Noutral Bendt Bendt Advin	ata Adri autra Nautra nti Adriki Bengi autra Nautra ni autra	Houtrain outraitate Adresse Adresse Adresser and outrain and outraitate Advioutra	akkoutrakkoutrak Beneti Benetit Adyrkle utrakkoutrakkoutrariau Adrif Adyr	Noutra Houtra Noutra nt Adher se I (atë Advetë Adrevout sahë Advetë Advetoutsahtë Advetë Advetë Advetë Ad	vNoutralt Bendtit Advet Be	ndi outra Noutral Noutral Noutral Noutral Noutral Noutral Noutral No	utral sizzo Ach Noutral Nout
RO36 five WaysOption 4 - Signalized T-junt Son	SHCS hit Advineutral Neutral Benefit Advin	nt Advivi outra Noutraint Advit Bondt Bond Noutrain outrai	Noutra Noutra l'atte Adatte Advoutra Noutra Noutra Noutra Noutra l'atte Advoutra	aNoutral outrait Bendt Bendt Adville utrait Bendtte Berate Adt Bend	Neutra II BeneNeutra H. Adver 96 g	në Bendre Advelous rapë Advele Advelousratrë Advele Advele Advele Ad	vNo.tralt Benetil Advit Be	neNeutral Neutral Neutral ht Benefi Neutral Neutral Neutral Neutral	outral Indite Adv Noutral Nout
R037 Five WaysOption 4a - Signalised Equicition, Monument Road changes	SHCS ht Advinoutral Noutral Benefit Benefit Advin	nt Advil outra Noutraint Advil Bondt Bond loutrain outra	Noutral Benefate Advance Advance All outral Noutral Noutral and Advance	aNoutral outsit Bendt Bendt Advilloutsit Bendtte Berate Adt Bend	Noutra It Beneficiation It Adversary	në Bendre Advisious rajnë Advise Ad vhioustraine Advise Advise Advise Ad	Noutralt Benefit Advit Be	neNoutral Noutral Noutral ht Benefi Neutral Neutral Noutral Noutral N	outral brate Adv Neutral Neut
RO38 five WaysOption 5 - Signatured T-junt bon with mirror road but in / felt out	SHCS ht Advineutra/Neutralt Bendt Bendt Advin	tt Advel outra Noutrant Autret Benefit Beneriloutran outra	koutralt Benefate Adate Advoutral outral koutral koutral ate Acid outra	a Noutral outrait Bendt Bendt Adville utrait Bendtte Berate Adt Bend	Noutra It Bendhoutra Ht Adver \$60	ns Bendis Administratis Adminis Administratis Adminis Administration Administ	nNoutralit Benefit Advit Be	neNoutral Noutral Neutral Int Benefi Neutral Neutral Neutral Neutral Ne	outral Erato Ach Noutral Noutr
RO39 five WaysOption Se - Signelised T-junction with minor road left in / left out, Monument Road changes	SHCS ht Admheutra Neutralt Benetit Benetit Admh	ti Adviri outra Noutrant Advir Bendt Bendrioutrari outra	Noutral Beneficie Adrate Advoutral outral houtral outral site Advoutra	aNoutral outral Bendt Bendt Advise utral Bendte Berate Ad: Bend	Noutra It Bend Noutra nt Adver 98 g	nt Bendit Advelous ant Advet Advelous ant Advet Advet Advet A	rNoutralt Bendtit Advit Be	nd outral Noutral Noutral ht Bonef Noutral Noutral Noutral Noutral	outral brate Adv Noutral Nout
RO40 Free Ways Oystem 6 - Grade supported both directions.	SHCS Int Advivoustral Neutrals Benight Benight Adviv	6 Apremi							



	Policy Fit Strategic	Engineering / Deliverability	Transport Impacts	Safety Environmental	Managerial Financial/Economic Development Impacts Commercial
Objective	The with Ray Mones is Realiscos tings room lapace; Transforming the city centre, Priorit lating as the transforming the city centre. Use of Resemblish for percept and goods Use of Resemblish for percept and goods Support has been by 20.30? Conton net and by 20.30? Conton net and by 20.30? Conton net and by 20.30? Support has consoning growth (Tocronality connectivity to employment laber ag, Enterprish a 20.40) Support hy road access Support hy match holder for the a one! Strap out by passanger growth.	Where the control grows it is not a back to the Codynets of should be codynets of the codynets of codynets of the codynets of	Absence foor betrave passersyers. Absence food troffic on A3.85(N) Reakroe road troffic on A3.85 (N) Reakroe road troffic on A3.85 (N) Reakroe road troffic on A4.54 (O) Another conditionity on A4.54 (O) Another foor troffic on A4.54 (O) Another foor troffic on A4.54 (O) Another foor size of crossing the A4.54 (O) Mode shift (Boon cad)	Anagranism with converse public hampore services Posservger activey and security Severance to movement Highway Safety - Highway maj fic Highway Safety - Highway maj fic Highway safety - Collis for statistics And worky And hacess And quality And hoology And hoology Cycle hocess Greenhouse agains Greenhouse agains	Flood rids Public acceptability Quality of supporting evidence Rep rids Plovating value for Money Plovating value for Money Applomeration/ connecting business Applomeration for development / landuals integration Support Plannad development / landuals integration Fanding source: Revealing source: Revealing source:
Ro 41 Bulge are intent bangs Option 1 - Carriagoway realignment and widening SHCS	ts Advisous a Noutral: Beindt Benefit Advise Advisious alsous ast Advis Beneficus allous alcustation	a Noutra Noutra Int. Advisite Antoutra Noutra Noutra Noutra I outra late Advoutra	o Noutra Noutra it Bendt Bendt Ad whoutra Noutra Noutra Ad whate Advit Ad	devices calleutravioussalts Advierses i gits Advins Advikoussans Advins Advikoussals Advins Advikoutraks Advins Adv	ht Adveloutsalt Boneht Advet Bonekoutsa Noutsal Noutsal Noutsal Noutsal Noutsal Noutsal Noutsal Noutsal state AdveNoutsal
Ro 42 Haden CircusOption 1a - Convent to signalised roundatout SHCS	s 1t Advisou to Neutral: Bendt Bendt Advisate Arkeu to Neutrant Advis Bend Neutrani outrakeu	raNoutrael outralistic Adratic Acid outraeloutraeloutrael outralistic Adeloutra	Noutra Noutral Bendt Bendt Ad Whoutrat Bendoutrarate Add Ad	d velocit ratio ist ani outraint. Ad verses i grit. Advent Ad velocit anti Advent Ad velocit anti Advent Ad v	nt Adveloutralt Bondyt Advet Bondelutra Noutral Noutral Noutral Noutral Noutral Noutral Noutral Noutral Industrial
Ro43 Hardon CircusOption 1b - Convent to through-about SHCS	s 11. Advisous a Neutral: Beindt Bendt Advisite Adveutra Neutra hi Advis Bend Neutra N	ra Noutra Noutra late Arrate And outra Noutra Noutra Noutra Noutra	Noutra Noutral Bendt Bendt Ad Wioutra Noutra Noutra Read Adnt Ad	d velout ratious an outsight Ad verses light Advert Ad velous and Advert Ad velous and Advert Advert Advert Ad	nt Advisoussalt Bengit Advis Bengioussa Noutsal Noutsal Noutsal Noutsal Noutsal Noutsal Noutsal Noutsal India
Ro 44 Hadim CircusOption Iz - Convert to signalised crossmark SHCS	18 Advelous Noutral: Bondt Bondt Advelate Advoustablous ant Adve Bondhous and outrakou	ta Noutr and outrations Automo Anni outraniou transcutraniou transcutrania Autour a	Noutra Noutral Bendt Bendt Ad Whoutrat Bendt Bendrate Adri Ad	dvelout rahkuut askoutrahti. Ad vier Skilgrit Benerit. Ad velkoutrahti Advent. Ad velkoutrahti Advent. Ad v	nt Admillautralt Benefit Advit Beneficiatra Noutral Noutral Noutral Noutral Noutral Noutral Noutral Noutral Industrial
Ro45 Harden CircusOption 2 - Grade separated SHCS	ht Advisout a Noutral: Bond: Bond thought Advis Between				
Ro 46 Camp HII CircusCystain 1 - Carriageway widening SHCS	nt Advisous a Noussalt Bondt Bondht Advis Advisore				
Ro 47 Camp Hill CircusOption 2a - Convert to signalised roundabout SHCS	s Int. Advikeutra Neutral: Beindt Benght Advisite Ankeutra Neutra hadvit Beng Neutra N	ra Noutra Noutra Late Agrate And outra Noutra Noutra Noutra Noutra	e Noutra Noutrait Bendt Bendt Ad w Noutrait Bendoutraites Acht Ad	dyklout rafloutrahloutraht AdvorseSight Advett Advikoutraht Advett Advett Advett Adv	ht Advilloutralt Bonort Advill Benorioutral Neutral Neutral Neutral Neutral Neutral Neutral Neutral Neutral India
Ro 48 Camp Hill CircusOption 2b - Convert to through-about SHCS	s Int Advisous Secret Bendt Bendt Advisite Askeuts Nouts Int Advis Bend Nouts	ra Noutra Houtra Italia de Adriado Andro Houtra Houtra Houtra Italia Ar Noutra	ol outrahou trait Bendt Bendt Ad whoutrahoutrahoutranate Acht Ad	ovelout rathout an outsight Ad verses ight Advert Adveloutrant Advelt Advelt Advelt Advelt Advelt Ad	nt Advisoutral Bondet Advis Bondesora Noutral Noutral Noutral Noutral Noutral Noutral Noutral Noutral Noutral
Ro49 Camp Hill CircusOption 2: - Convert to signalised crossmark. SHCS	is - 11 Advivious tra Noutrait. Bondt Bondht Advister Advious and Advir and Advir Beneficial autra Noutrain Court and Court an	raNoutraNoutraliste Autate AnloutraNoutraNoutraNoutraliste Ai Noutra	Noutra Noutrate Bendt Bendt Ad whoutrate Bendt Bendrate Advit Ad	dv-Noutra Noutra Neutra htt Ad ver Stight Benehit Ad v-Noutra htt Ad v-Noutra htt Ad v-Noutra htt Ad v-nit Ad v	ht Advilloutralt Bencht Advit Benchoutral Noutral Noutral Noutral Noutral Noutral Noutral Noutral Noutral Noutral
ROSO Camp Hill CircusOption 3 - Grade separated SHCS	1 N. Advisous a Noutral: Bend Bend Hondhi Advesulavens				
RO51 Bordesky CircusOption 1 - Carriageway widering SHCS	nt Advikou tra Neutralt. Bondt Bendht Adviste Advisutra Neutra ht Advis Bend Neutra Ne	ratioutral outraint Advista Advisoritation transcutral outrainte ArNoutra	N outra Noutrait Bendt Bendt Ad Wioutra Noutra ht Ad yeste Adrit Ad	dvelout ra Noutra Noutra ht AdverseSight Advert Adveloutrant Advelt Adveloutrant Advert Adveloutrant Advert Adv	nt Advidoutralt Bondyt Advit Bondykoutral Noutral Noutral Noutral Noutral Noutral Noutral Noutral Noutral pate AdviNoutral
RO52 Bordesley CircusOption 2 - Change direction of through-about SHCS	s Ht. Advisous a Noutral: Bendt Bendt Advisite Advisus Antoutra Noutral Advis Bend Noutral outral eutralieu	raNoutral outraliste Artiste Advoutration transcurs in outraliste Arthours	Noutra Noutra Bendt Bendt Ad Whoutraht Advisoutrarate Adrit Ad	dvikout raNoutraN outraint Ad vorsælight Advint. Ad vikoutrant Advint Ad vikoutraint Advint Adv	ht Advinious at Bendint Advik Bendinous a Noussal Noussal Noussal Noussal Noussal Noussal Noussal India Advinious at Advinious and Advinious and Advinious and Advinious and Advinious at Advinious and Advinious an
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RoS4 Bendesley CircusOption 4 - Convert to signalised crossroads and T-junction SHCS	nt Advelou tra Noutr at: Bondt Bondt Advest Advesti				
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Ro56 Garrison CircusOption 1 - Carriagoway widoning SHCS	ht Advisous a Noutral: Bond: Bond ht Advisor Artious and Advisor Bond houtral outral o	ra Noutr a Noutra Int. Adv. ste. Adv. outra Noutra Noutra Noutra Noutra I ste. Ar Noutr	N outra Noutral (Bendt Bencht Ad Whoutra'N outraint Ad vitate Acht Ad	dyrkout na Noutraell outrains. Ad verses i gins Advinst. Ad velloutraels. Advinst. Ad velloutraels. Advinst. Adv	ht Advinicultralt Bencht Advit Benchoutral Noutral Noutral Noutral Noutral Noutral Noutral Noutral Noutral Industrial
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Ro 58 Garrison CircusOption 26 - Convent to through-allo ut SHCS	ts Advisous a Noutrait. Bends Bendst Advisite Advisor Advisor and Advis Bendsous and outrain outrains	ra Noutra Noutra fate. An ate. An outra Noutra Noutra Noutra Noutra ate. An Noutra	Neutra Neutra et Bendt Bendt Ad w Neutra Neutra Neutra rate Acht Ad	dreisout ra Neutra et outrains Adverses i ghs Advent Advelsoutra et Advent Advelsoutra et Advent Adv	ht Advineutralt Benorit Advit Benorioutral Neutral Neutral Neutral Neutral Neutral Neutral Neutral Neutral Industrial
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Appendix F. Short Listed Options Coding Notes

The modelling methodology is listed for each scheme below.

Traffic cells (city centre)

All routes across a traffic cells boundary have been converted to bus only in the network (to avoid disrupting any existing bus routes)

20mph across city centre (inside A4540)

All links (except for existing A38 links) have had their free flow speeds coded at 20mph.

Snow Hill Test 1 (A38 weaves closed)

All weaves joining and leaving the A38 between Holloway and Lancaster Circuses are converting to bus only.

Snowhill Test 2 (A38 tunnels closed)

In addition to test 1 the tunnel underneath paradise circus is converted to bus only to force all traffic off the A38, without making unnecessary presumptions regarding bus routing through the area.

Sprint/ Bus Improvement Corridors & Metro Expansion

All Sprint/Bus Improvement Corridors have been coded to the following procedure:

- If the road link is of two or more lanes in any directions, one of the lanes is converted to a bus/sprint/metro lane for all directions with more than two lanes.
- If the road link is of one lane in both directions, there is no change.

Workplace Parking Levy

Using the Birmingham Parking Study, the proportion of non-residential private parking in each zone has been calculated. This proportion has been then been multiplied by the CAZ charge (in assumption that almost all vehicles would be compliant by 2037 so no longer affected by the CAZ and that this is an affective replacement). This cost is applied to all trips that start/finish in the city centre area (including five ways outside of the Middleway). These costs are then used by the variable demand model to adjust trip distribution and frequency.

Parking SPD including roll-out of CPZ's and closure of car parks (-10% traffic)

Using the Birmingham Parking Study it was observed that just over 10% of the parking spaces were accounted for by unrestricted on-street parking (around 7,000 of 60,000 spaces). It was considered that from this an aim from a roll out of changes to parking in the city centre could be to reduce traffic on a basis of this proportion, so a 10% reduction has been applied to all traffic with an origin or destination within the Middleway.

Park and Ride

Select links have been taken on routes alongside park and ride locations (and nearby major roads where appropriate) with a proportion of traffic re-routed to using the train station zone instead of its original origin/destination. This proportion has been based off the spaces to trip change from previous snowhill modelling.

M5 Junction 1 capacity improvement

Early runs indicated a potential for traffic to re-route via M5 J1. Without a scheme to test with and to understand in impacts of capacity here on the city centre re-routing all capacity constraints were removed here (whilst keeping signal-based delays).

Five Ways (3 Arm Signalised) (Op 5)

Roundabout at five ways has been modelled to be replaced with a 3-arm signalised junction connected to both sides of the Middleway and Hagley Road arms. Where possible free flow movements have been added for all left turning movements with additional lanes to attempt to maximise space. This leaves the potential for better signal optimisation and considerations of the final size and layout of the scheme to meet BCC objectives.

Spring Hill (4 Arm Signalised) (Op 2)

Roundabout at spring hill has been modelled to be replaced with a 4-arm signalised junction. As part of this all left turns are considered to have a segregated left turn into a give way. Additional lanes have been coded at the lights and detailed design will have to determine the potential for this to be achieved or expanded upon. This leaves the potential for better signal optimisation and considerations of the final size and layout of the scheme to meet BCC objectives.