steer davies gleave

Birmingham Clean Air Zone - Model Development

Report
September 2016

Birmingham City Council

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Executive Summary

1. This note describes the methodology to develop the forecasting element of a transport model to support the feasibility study of the proposed Clean Air Zone (CAZ) in Birmingham City Centre. The Joint Air Quality Unit (JAQU) (created by DfT and DEFRA to develop clean air zones in a number of cities across the country) requires the production of the following two documents before commencing the CAZ modelling:

    1. A transport **model review document** demonstrating that the base year model is fit for purpose. It should be noted that the Base Year model is still in development so this note will highlight the approach for building this model and the reporting required to meet JAQU's requirements.
    2. A Transport model **forecasting methodology report** outlining the approach for forecasting the future year CAZ scenarios and how the model outputs will be provided into the air quality modelling.

2. This note forms the forecasting methodology report, with the model review document attached in Appendix A for information, outlining the base year development methodology.

3. The full proposed methodology from base year to future year forecasting is summarised in the tables below, with more detail provided on the future year development in the remainder of the document. The methodology utilises a variety data sources, research and existing modelling platforms to efficiently meet JAQU's requirements. The modelling will be undertaken for the following periods:

    - 2016 Base Year Model
    - 2020 CAZ Opening Year Model
    - Average Weekday AM/ IP/ PM peak models.

4. The key sources for the model development are shown in Table 1.1 below, with assumptions supported by a variety analysis:

Table 1.1: Key Sources for CAZ Development

Source	Use
Birmingham City Council (BCC) SATURN model	Forecasting changes in City Centre flows by link for polluting/ non-polluting vehicles, through traffic assignment.
PRISM Regional Model	Providing forecasting of future year traffic growth. Deriving demand response of CAZ charging in terms of mode shift or redistribution for car users.
DfT Vehicle Ownership Research	Change in ownership of polluting/ non-polluting vehicles.
ANPR/ DVLA	ANPR data to provide existing vehicle makeup. Also information on proportion of through trips.
Traffic Counts	Used to expand the modelled period data to average weekday day and average day.

5. Base Year Development summarised in the Table 1.2 below:

Table 1.2: Base Year Development Key Elements

Base Year Methodology
Network: • BCC detailed simulation area • Network covering the region • Speed flow curves 1km outside city centre • Fixed Speed area for rest of modelled area

Calibration:
• Network:
  ◦ Check and update key junctions
  ◦ Check on bans and directional coding correct
  ◦ Use of SATURN error messages to identify and fix significant errors
• Use journey time Traffic Master data to check:
  ◦ Distances
  ◦ Speeds
• Matrix:
  ◦ Factoring at a global level to bring from 2011-2016
  ◦ City Centre Count Cordon used to factor matrix to be correct for traffic entering/ leaving the City Centre
  ◦ ANPR used to factor to get through trip proportion correct

• Validation:
  ◦ Screenlines as described in the BCC model development report (6 screenlines in total)
  ◦ Individual Count comparisons at a number of sites across the model
  ◦ Journey time routes (9 in total)
  ◦ Report on matrix changes
  ◦ Report and if necessary improve the convergence statistics

6. The development of the 2020 reference case year is shown in Table 1.3. This will be important in deriving what levels of interventions are required to deliver the CAZ requirements:

Table 1.3: Reference Case Development

Reference Case Methodology

• Network:
  ◦ Agree Committed schemes to be in place by 2021
  ◦ Code into the network (the majority of this coding will already exist)

• Demand: ◦ Overall demand growth from existing PRISM 2021 Do Minimum

• Refined by:
  ◦ City Centre committed development population/ employment growth figures compared against PRISM socio-economic figures. Demand would be updated to reflect where these future development assumptions are no longer correct.
  ◦ TEMPRO – TEMPro 7.0 has recently been realised, this could potentially be used to update elements of the demand matrices. In particular HGV and LGV growth which is based on TEMPRO within PRISM. **The PRISM team are currently developing an updated version of the model to include TEMPro 7.0 so the project could be delayed until this is available (there is a 7 week programme to update the model).**

• Polluting Vehicle Analysis:
  ◦ ANPR surveys used to split between polluting and non-polluting vehicles.
  ◦ Department for Transport analysis on change in take-up of lower polluting vehicles to derive factors to forecast proportion of future year polluting vehicles.

• Forecasts for Air Quality Model:
  ◦ Assignment of future year demand split by polluting and non-polluting vehicles.
  ◦ Output of link based data to feed into air quality model

7. CAZ scenario development described Table 1.4 below:

Table 1.4: CAZ Modelling

Modelling of CAZ interventions

• New Vehicle:
  • DfT/ DEFRA advice on take up of new vehicles.
  • DfT TrafficMaster analysis to identify frequency of visitor (which is important in deriving likelihood of switching vehicle type.
  • TfL stated preference study.

• Redistribution and Mode Shift:
  • PRISM run with tolls coded in used to derive demand response to toll for car users. This will only apply to trips with an origin and destination within the City Centre.
  • Response will be benchmarked against TfL and DfT research.
  • LGV and HGV response is only switching vehicle type or route choice for through vehicles.

• Route Choice: • Tolls coded onto the network on a cordon into to the city centre. Traffic assigned with polluting vehicles generalised costs including the toll. Non-polluting vehicles will be able to travel for free.
• Scenario Testing including sensitivity testing

• Other Policy Interventions that needs to be considered:
  • Parking Policy
  - Increased costs used as an additive cost to the toll.
  - Removal of parking capacity to test:
  - Demand suppression; or
  - Impact on traffic diverting to other areas of the City.
  • Time of Day. Estimation of trips which would re-time if they could travel free outside of peak period. This will not be necessary if JAQU guidance is that any CAZ measures should 24hrs
  • Change in road layout for further impact on network conditions.
  • Smarter Choices/ Improved Public Transport services.

• Forecasts for Air Quality Model:
  • Assignment of future year demand split by polluting and non-polluting vehicles.
  • Output of link based data to feed into air quality model

1 Reference Case Development

Overview

1.1 The initial stage in developing the model is to produce a non CAZ future year 2020 scenario. This non CAZ "reference case" scenario will be established as a basis for:

- Understanding to what extent Birmingham will or will not meet their clean air requirements if no CAZ interventions are implemented;
- As a point of comparison with the CAZ scenarios; and
- As a pivot point for deriving the CAZ demand scenarios

1.2 The three steps in creating the reference case model:

1. Updating the BCC base year network with future year scheme coding.
2. Updating the BCC demand, with traffic growth from the PRISM model.
3. Defining polluting/ non-polluting vehicle split (prior to traffic assignment).

Network

1.3 Proposed future year network schemes that could be built by 2020 will be identified. Schemes to include are those that have committed funding or are considered by Birmingham Council to be likely to be implemented by 2020. This will be documented and included in a certainty log to be discussed with JAQU before finalising.

1.4 Table 1.1 below provides an example of schemes included in the recent Edgbaston Metro scheme model update.

Table 1.1: 2021 Road Schemes – Interim List

Scheme	Description
City Centre Schemes	
Eastside	Improvements at junction of Cardigan Street/Jennens Road
Birmingham city centre Interchange	Moor Street Queensway two-way for all traffic, modifications to junctions on Carrs Lane, Albert Street, Old Square, James Watt Queensway, Newton Street, Masshouse Lane, Lower Bull Street.
Holloway Circus	Left-slips on Holloway Head and Smallbrook Queensway and signalisation of Bristol Street approach
Metro to New St Station	Modifications to Colmore Circus Queensway and Corporation Street.
Paradise Circus	Re-arrangement of Paradise Circus Gyratory.
Broad St/Paradise Circus	Broad Street Public Transport only at the junction with Paradise Circus

Birmingham Gateway	New station car park arrangements. Access to car park at Navigation Street closed (egress only) and signalised access/egress on Hill Street.
Bath Row / Cregoe St	Signalisation of priority junction.
Navigation Street Link	Link road between Navigation Street and Holliday St. This is a complementary measure for the PT only movement from/ to Centenary Square.
Ring Road Schemes	
Bordesley Circus	Partial signalisation of roundabout with half-hamburger arrangement.
Haden Circus	Signalisation of roundabout, with half- hamburger arrangement including provision of slip road between Belgrave Middleway and Highgate Middleway.
Ashted Circus	Signalisation of junction
Southern Gateway Early Works	
As above	Ladywell Walk Closed to Traffic
As above	Improved junction to provide single phase pedestrian crossings at Smallbrook Queensway/Hill Street
As above	Junction changes on other roads including Thorpe St, Sherlock St and Barford St

1.5 The model network coding for the majority of proposed schemes already exist. For these schemes building the reference case network will therefore involve merging the coding with the recalibrated base year network, rather than developing new network coding. Checks will be done to ensure that improvements to the coding as part of the base year calibration are not overwritten (unless part of a new scheme) and that the coding is in line with standards defined in the base year network development.

Demand Growth

PRISM reference case growth

1.6 The basis for the demand matrices, both in the current (2016) and future year (2020) scenarios is the regional PRISM model. A summary of the PRISM model is below.

Figure 1.1: PRISM Model Summary

> **PRISM model** (Policy Responsive Integrated Strategy Model) - is a strategic model for the West Midlands, supported by the 7 district authorities, the Highways Agency and CENTRO. PRISM covers the West Midlands metropolitan area in about 1,000 zones, with a detailed network description of the highway and public transport networks. The model operates in the VISUM software, and represents in a detailed manner the various travel responses to congestion, investment and policy.

1.7 Matrices are taken directly from the PRISM highway assignments with processing between the PRISM and BCC network and zonal structure undertaken by the PRISM team (this is described in more detail in the **model review document)**. There are however a number of additional processes that need to occur before the PRISM reference case can be used to adjust the base year demand.

1.8 Matrix growth will be derived separately for the three model periods (AM, IP, and PM), with the PRISM demand model forecasting time of day travel and providing growth to the separate period assignment models.

PRISM Version Options

1.9 The PRISM model uses the Department for Transport's TEMPro software to provide inputs into its growth model. TEMPro provides forecasts of growth from the National Trip End Model (NTEM), which includes changes in land use collated from local authority sources, and forecast changes in demographics and trip making. An updated version of TEMPro has recently been released by the DfT which is available for use in creating the CAZ scenarios.

Option 1 – Updated PRISM

1.10 The existing version of PRISM is based on an older version of TEMPro than the recently released TEMPro 7.0. However the PRISM team are currently updating the model to reflect this new version. There is therefore the option to wait until the updated PRISM version is available before undertaking the forecasting. This approach has the following advantage/ disadvantage:

- Advantage – PRISM will reflect latest version of TEMPRO reducing the need for post model adjustments, and reflecting latest government thinking.
- Disadvantage – This will push the timescales back as there is currently a 7 week programme to produce the updated PRISM version. Risk that initial results will not be sensible and PRISM programme will be further delayed.

Option 2 – Existing PRISM

1.11 The alternative method is to use the existing PRISM reference case and then refining these growth rates with the updated TEMPro 7.0 forecasts. There are three demand segments where the approach to growth is treated differently within PRISM. Below is how the three different demand segments would be updated using the latest TEMPro version.

1. Internal Car Trips – For car trips (taxis are treated the same as cars for this process) with an origin or destination within the West Midlands area, future year demand is estimated within the PRISM demand model. Changes in the overall demand for travel is derived from the input demographic data, this includes forecasts of the change in trip rates, trip distribution, and mode shares. The demographic data input into the current PRISM model is constrained to the District Level forecasts of TEMPro V6.2.
   In order to update the demand to TEMPro V7, a comparison of the changes in demographic data will be undertaken. This assumes that the trip rates, mode share and trip distribution forecast by PRISM will not change significantly as a result of the change in TEMPro version, with adjustments only made for the changes in demographic forecast. The process for updating this demand is as follows:

- Comparison of population forecasts between TEMPro Version 7 and Version 6.2 at the district level.
- Difference in the population growth rates between the two TEMPro scenarios will be used to adjust the overall district level traffic growth rates.
- Trips between two districts in the West Midlands will take an average of the adjusted growth rates.
- Trips with an origin or destination external to the modelled area would take the adjustment rate of the internal zone.

2. External Car Trips – External Car Trips that do not have an origin or destination are grown by a fixed factor using the DfT's Road Traffic Forecasts 2013, in the PRISM model. This would be updated using the DfT's Road Traffic Forecasts 2015 forecasts.

3. **Freight Trips (LGV, HGV)** - Freight Trips are grown by a fixed factor using the DfT's Road Traffic Forecasts 2013. This would be updated using the DfT's Road Traffic Forecasts 2015 forecasts.

1.12 This approach has the following advantage/ disadvantage:

- **Advantage** – The process of deriving the reference case matrices for the BCC model can be undertaken immediately. It provides a proportionate approach to incorporate the latest population forecasts while maintaining the PRISM demand model responses.
  Disadvantage - The focus is on changes to population and does not look at the changes in employment forecasts. Response to changes in congestion as a result of different growth rates are not reflected in the demand response.

Adjustments for Modelled Years

1.13 There are various inconsistencies between the PRISM and BCC model years that need to be addressed as part of the matrix development process. Table 1.2 highlights these differences.

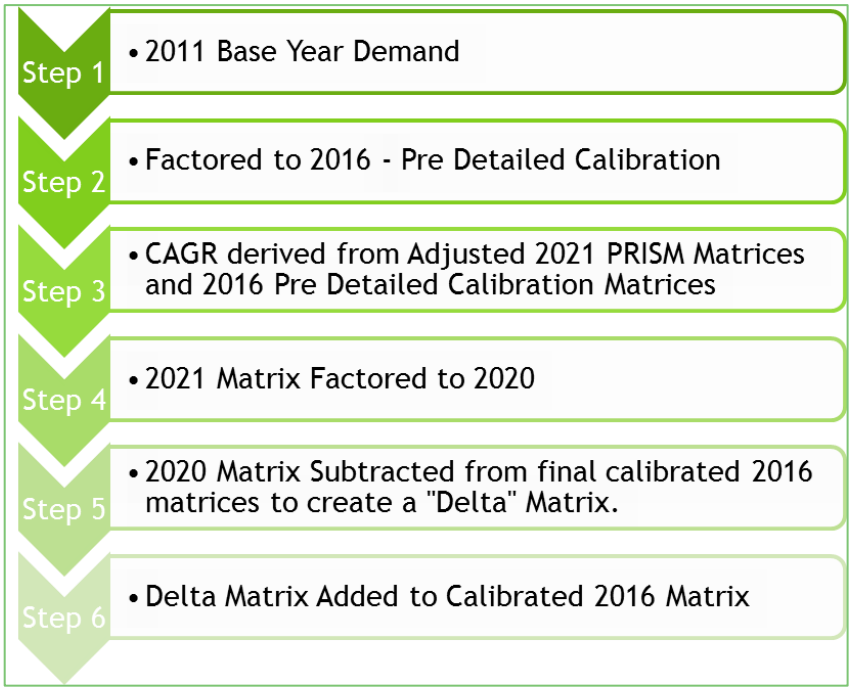
Table 1.2: Models and Years

Model	Base Year	Forecast Year
BCC CAZ Model	2016	2020
PRISM Model	2011	2021

1.14 In order to ensure that the change in traffic reflects 2016 to 2020 changes we will undertake the following (which is also shown in Figure 1.2 below):

- As part of the base year calibration process, the 2011 PRISM matrices will be factored based on permanent count sites around the city centre. This matrix will therefore be treated as a 2016 Prior PRISM matrix.
- The matrix will be compared to the adjusted PRISM 2021 (to account for TEMPRO v7 if required) matrices to provide Compound Annual Growth Rates (CAGR) to adjust the future year demand to 2020.
- Produce a Delta matrix by subtracting the 2020 PRISM matrix from the 2016 prior PRISM matrices
- Add the Delta matrix to the final calibrated 2016 matrices.

Figure 1.2: Modelled Years Adjustments Process



City Centre Adjustments

1.15 A set of developments that are likely to be built between now and 2020 will be agreed with Birmingham City Council. This will be derived in a similar way to the network changes, with a certainty log produced showing those schemes with planning permissions and likelihood of them being fully occupied by 2020.

1.16 This would be compared to the demographic data with PRISM on a zonal basis within the City Centre. The traffic growth for the zones would be adjusted if significant new developments are under or overestimated in PRISM.

1.17 The overall demand growth in the model will be adjusted so that the district level trips remain at the same level prior to the city centre update.

1.18 Once this processing has been undertaken checks will be done on the growth in the traffic growth in City Centre. Recent trends have been in a reduction in traffic in the city centre, and we would not expect significant increases in City Centre demand in the next four years.

Modelling Polluting/ Non Polluting Vehicles

1.19 Before assigning the modelled demand needs to be split further into different user classes. Taxis are effectively part of the car matrices within the PRISM model and these need be split back out as part of the BCC model. Existing proportions would be used unless there is evidence that taxis have grown significantly different from car trips in recent years.

1.20 Further processing of the demand will be done to split into polluting and non-polluting vehicles. The following analysis will be done to achieve this:

- The ANPR surveys and carried out by Birmingham City Council and information from the DVLA database will be used to identify the polluting and non-polluting vehicles

- Department for Transport forecasts of changes in the makeup of the vehicle fleet. This change will be applied to the current vehicle composition to provide the 2021 vehicle compositions.

1.21 The vehicle classes included in the CAZ assignment model is shown in Table 1.3 .

Table 1.3: Vehicle Classes in the BCC CAZ Model

Matrix Level	CAZ Model	Polluting Type
1	Car - Public Car Park – Commuting/Other	Clean Vehicle
2	Car Private Car Park – Commuting/Other	Clean Vehicle
3	Taxi	Clean Vehicle
4	Private Car Park – Car Business	Clean Vehicle
5	LGV	Clean Vehicle
6	HGV	Clean Vehicle
7	Car - Public Car Park – Commuting/Other	Polluting Vehicle
8	Car Private Car Park – Commuting/Other	Polluting Vehicle
9	Taxi	Polluting Vehicle
10	Private Car Park – Car Business	Polluting Vehicle
11	LGV	Polluting Vehicle
12	HGV	Polluting Vehicle
Fixed Routes	Bus	Clean Vehicle
Fixed Routes	Bus	Polluting Vehicle

1.22 The following modelling outputs would be provided into the air quality models:

- Link level data for each period (AM/ OP/ PM), user class and pollution type would be provided, including:
  - PCU actual flow data
  - Vehicle actual flow data
  - Free flow and congested speeds
  - Level of service (Volume over Capacity) data
- Conversion of the traffic data into AADTs and AWDTs based on permanent count sites factors.
- GIS network layer for plotting the data.

2 CAZ

Demand Responses Overview

2.1 The proposed methodology will model demand responses to all vehicles with the potential to route through the CAZ area. The majority of responses are focused on polluting vehicles, but where the interventions removes highway demand, there is a potential for non-polluting vehicles to reassign to new routes which become less congested as a result of CAZ. Some scenario testing of different policy interventions are recommended as sensitivity which would be aimed at a general reduction in highway traffic within the CAZ area.

2.2 There are various responses to the introduction of charging for trips entering the city centre. We will model this hierarchically with the responses modelled in the order shown in Table 2.1 below. All demand adjustments will be pivoted off the reference case demand described in Chapter 1.

Table 2.1: Demand Response Hierarchy

Hierarchy	Response	Demand Segment	Method
1	Change Vehicle Type	Car, Taxi, LGV, HGV with an origin or destination within the CAZ zone.	Choice Modelling based on TfL Stated Preference Research
2	Trip Suppression/ Redistribution/ Mode Shift	Car, Taxi, with an origin or destination within the CAZ zone.	Elasticity to toll derived from PRISM runs
3	Route Choice	Car, Taxi, LGV, HGV for potential through trips.	BCC CAZ assignment model.
4	Policy Interventions	All Vehicle Types	Develop a set of scenarios to adjust assumptions applied to methods above, or bespoke demand model adjustments.

2.3 In order to provide a measure of the risk associated with the approach and the impact of different measures, a number of scenarios would be run to with different assumptions. This would include different policy interventions (such as parking policy or smarter choices) which would be run as sensitivities on the central scenario.

Purchase of New Vehicle

2.4 Given that the charge for polluting vehicles is likely to be set a relatively high level in order to ensure that the air quality targets are met, a key response to the charge will be in current users switching to a cleaner vehicle type.

2.5 Transport for London have undertaken considerable research in the development of the Ultra Low Emission Zone (ULEZ). This has included stated preference research of current drivers into

the proposed zone. They are happy to share their research with the Clean Air Cities including the choice model that they've developed.

2.6 The proposed methodology for the CAZ modelling will use TfL's choice model, to derive the numbers of polluting vehicles that will be exchanged for clean vehicles as a result of CAZ charging. Table 2.2 below shows the covariates used in the discrete choice model and the potential sources to update this to be relevant in Birmingham.

Table 2.2: Covariates used in discrete choice modelling

Description	Birmingham Sources
Household income • Less than £20k • £20k to £50k • More than £50k	• PRISM Data on Income by Zone • Compare Economic growth assumptions with latest government projections and adjust if necessary.
Personal income: • Less than £20k • £20k to £50k • More than £50k	• PRISM Data on Income by Zone • Compare Economic growth assumptions with latest government projections and adjust if necessary.
Respondent age: • Less than 34 • 35-44 • 45-54 • 55-64 • 65+	• PRISM data on age
Respondent gender	• PRISM data on gender
Resident in London, anywhere Resident in London, inside CCZ	• PRISM data
Drive company car?	• ANPR data to identify company cars • DfT data where gaps in ANPR analysis
Company pays for travel?	• DfT Data
No. days per year respondent drives into zone	• DfT TrafficMaster analysis
How current vehicle was acquired: • Bought new • Bought used • Acquired another way	• ANPR data
Current vehicle age, fuel and class type	• ANPR data
Intended spend on next vehicle	• Based on London research adjusted for income
Vehicle replacement frequency: • More often than every 3 years • Every 3, 4 or 5 years • Every 6 to 10 years • Less often than every 10 years	• DVLA data for West Midlands
Intended fuel type of next vehicle: • Petrol • Diesel • Other	• DfT projections

Attitude to ULEZ:

- A great idea
- A good idea
- Neither good nor bad
- A bad idea
- A terrible idea

- Based on TfL numbers/ Birmingham/ DfT advice
- Consideration should also be given that London already has charging so the policy could be more accepted by the general population.

2.7 A separate model was derived for fleet vehicles, but using similar variables. To assess proportion of fleet vehicles in the Birmingham traffic makeup DfT research would be used.

2.8 Bus operators response to the charging is more difficult to assess. This would be derived as a fixed factor based on discussions with BCC, CENTRO and JAQU.

2.9 The output of this analysis will be used to switch a proportion of the polluting vehicles into the non-polluting classes. This can be derived for a number of different charging scenarios.

Trip Suppression, Redistribution and Mode Shift – The intermediate stage

2.10 PRISM will be used to estimate the impact of CAZ on higher order demand responses comprising of mode shift, redistribution or suppression of car trips for those with an origin or destination into the city centre. The PRISM model does not distinguish between polluting and non-polluting vehicles so it will not be possible to use PRISM's demand forecasts directly in the CAZ scenarios.

2.11 Therefore an intermediate stage will be developed which can be used to estimate the higher order demand responses for CAZ scenarios using forecasts obtained from PRISM runs. The PRISM demand model will be run for a 'Reference Case' or 'Do Minimum' scenario and then a CAZ scenario to derive the base case forecasts. These forecasts will then be converted to pollution and non-polluting vehicle level forecasts in the intermediate stage, to derive the BCC CAZ reference case model forecasts.

2.12 The methodology for using PRISM forecasts is as follows:

- Derive an average toll for traffic (considering it is a daily charge and PRISM models trip chains). The CAZ team to provide input assumptions on toll levels to be assumed for the PRISM model runs.
- PRISM team will implement the defined toll levels for the CAZ scenario within the city centre and run the full demand model for the CAZ scenario. Our prosposed approach to represent a CAZ charge within the city centre is to implement the charge on zone connectors to avoid any re-assignment issues.
- Additional outputs will be required from the PRISM consisting of the demand model outputs of the demand model matrices prior to combining into the assignment matrices. See below for the demand segmentation recently provided by the PRISM team, and also see Appendix C for the PRISM Demand Model Implementation Report:
  - Home-based commute (split by car availability, employment status and household income)
  - Home-based business (split by car availability and employment status)
  - Home-based education (split by car availability, employment status, age and education level)
  - Home-based shopping (split by car availability, employment status and household income)
  - Home-based other (split by car availability, employment status and household income)

  - Non home-based work (business/commute) (split by car availability and employment status)
  - Non home-based other (split by car availability)
- These outputs would then be analysed to establish the changes in mode share by OD pair implied by the PRISM forecasts by each user class and demand segment.
- Statistical analysis at an OD level for each of the demand segments will be used to define the relationship between toll changes and demand responses which will then be applied to trips with an origin or destination within the CAZ model. This process will be set up in the intermediate stage using a bespoke spreadsheet model.

2.13 These demand responses will be applied to 2020 polluting vehicle demand that has been adjusted to reflect the new vehicle uptake forecasts as described above . An assumption of trip redistribution outside of the City Centre will also be included in the intermediate stage model.

2.14 This approach has the following advantages:

- Coding the charge onto the zone connectors will reduce the impacts on the highway assignment compared to coding in on a cordon, as through trips will still be able to use the City Centre network without paying a toll. This will enable a more realistic representation of the highway congestion costs.
- PRISM demand responses are applied to the reference case polluting vehicles with a destination in the City Centre only. This prevents the overestimation of vehicle responses as non-polluting vehicles and through trips are not affected.

Route Choice

2.15 The final impact of the charging as part of the core modelling will be through route in the BCC CAZ SATURN model. This will involve coding the tolls into the network model and running the traffic assignment. SATURN can be easily modified so that only select user classes need to pay the toll, in this case only polluting vehicles. Traffic is assigned based on minimising their generalised costs, with the standard formulation as described in WegTAG shown below.

Generalised cost = (time) +

(vehicle operating cost per km x distance / value of time) +

(road user charges / value of time)

2.16 The route choice element will affect the modelling of through trips for polluting vehicles. In addition any changes in costs as a result of changes in the distribution of demand will be modelled.

Benchmarking

2.17 The demand responses would be benchmarked against other modelling data as a sense check to ensure the results are reasonable. This will be considering the overall model elasticity for each vehicle class, rather than the separate processes described above.

2.18 The following information would be used:

- We have undertaken a number of studies in the West Midlands area, so will have a good understanding of the typical responses to various interventions.
- In addition our team have been involved in many charging studies (in particular toll roads).
- Exploring Transport for London's data and analysis will be a key part of this given that London already has a congestion charging zone.

- FORS TfL's Fleet Operator Recognition Scheme may also provide valuable information on freight traffics response to charging and other policy interventions.
- DfT published elasticities to road charging

Scenario Testing

2.19 To increase the levels of certainty that the policies introduced by Birmingham City Centre will they meet their clean air requirements a number of sensitivities will be on the core modelling scenario described above. Test will include:

- Various Charging Levels
- Different assumptions on new vehicle uptake (including on through trips)
- Different economic growth scenarios – will impact values of time and new vehicle uptake
- Reducing average speeds in the fixed flow area where there are significant increases in demand in these areas in CAZ scenarios.

2.20 In addition there are a number of other interventions that could be implemented to assist in meeting the clean air requirements. These interventions are less focused at the high polluting vehicles and will have less of an impact compared to charging. These policy interventions will modelled using some relatively simplistic assumptions, but will provide a reasonable assessment of the contribution they could have in achieving the Clean Air Requirements.

- Parking Policy:
  - Increased Charging – this will be applied to all traffic regardless of polluting type. Use the PRISM demand response to toll to assess the impact of extra parking charges . This would only be applied to zones with high provision of BCC parking. A proportion of demand would also be shifted to neighbouring zones rather than pure demand suppression.
  - The removal of parking capacity in the city centre should also be modelled. This would involve a simple factoring approach to the relevant zones within the city centre where controlled parking is introduced. The current car parking surveys undertaken by BCC as part of the city centre modelling could be utilised to assess how removing car parking will affect the capacity of parking in the City Centre, to inform this process.
- The removal of **highway capacity**, to improve the urban realm or PT accessibility. Would be modelled through the network coding in the BCC assignment model.
- **Smarter Choices**, an assessment of how investment encouraging walking and cycling could assist in the CAZ implementation. There are various studies looking at the impact of mode shift of such interventions. A mode shift factor would be applied to reduce short distance trips into the City Centre.
- **Public Transport Improvements** – any proposed improvement in public transport, could be modelled on a corridor level by factoring down the highway demand based on mode shares of existing corridors with similar PT levels of service.

Outputs

2.21 The outputs into the environmental modelling is identical to the reference case process, with the following modelling outputs provided into the air quality models:

- Link level data for each period (AM/ OP/ PM), user class and pollution type would be provided, including:
  - PCU actual flow data
  - Vehicle actual flow data

    - Free flow and congested speeds
    - Level of service (Volume over Capacity) data
- Conversion of the traffic data into AADTs and AWDTs based on permanent count sites factors.
- GIS network layer for plotting the data.

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B Birmingham City Centre Model – Model Specification Report

C PRISM Demand Model Implementation Report

file:///P:/Birmingham/Prism/PRISM%20Website/20150515_ForTimToUpdate/PRISMWEBSITE/Downloads/2011/Reports/PRISM_Data_Summary_Report2.pdf

CONTROL INFORMATION

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