Bristol City Council Clean Air Plan

Outline Business Case

Primary Behavioural Response Calculation Methodology

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Contents

1. Introduction

1.1 Context

Poor air quality is the largest known environmental risk to public health in the UK[1]. Investing in cleaner air and doing more to tackle air pollution are priorities for the EU and UK governments, as well as for Bristol City Council (BCC). BCC has monitored and endeavoured to address air quality in Bristol for decade and declared their first Air Quality Management Area in 2001. Despite this, Bristol has ongoing exceedances of the legal limits for Nitrogen Dioxide (NO_2) and these are predicted to continue until around 2029 without intervention.

The UK has in place legislation transposing requirements in European Union law, to ensure that certain standards of air quality are met, by setting Limit Values on the concentrations of specific air pollutants. In common with many EU member states, the EU limit value for annual mean nitrogen dioxide (NO_2) is breached in the UK and there are on-going breaches of the NO_2 limit value in Bristol. The UK government is taking steps to remedy this breach in as short a time as possible, with the aim of reducing the harmful impacts on public health. Within this objective, the government has published a UK Air Quality Plan and a Clean Air Zone Framework, both published in 2017. The latter document provides the expected approach for local authorities when implementing and operating a Clean Air Zone (CAZ).

Due to forecast air quality exceedances, in 2017 Bristol City Council has been directed by the Minister Therese Coffey (Defra) and Minister Jesse Norman (DfT) to produce a Clean Air Plan to achieve air quality improvements in the shortest possible time. In line with Government guidance, as part of the Plan, Bristol City Council has considered a range of options for the implementation of a Clean Air Zone (CAZ), including both charging and non-charging measures, in order to achieve sufficient improvement in air quality and public health and in line with legal requirements as set out below. This process requires the production of a Strategic Outline Case, an Outline Business Case (this report and a Full business Case, that will be prepared following the Outline Business Case.

Jacobs has been commissioned to support BCC to produce an Outline Business Case (OBC) for the delivery of the CAP; a package of measures which will bring about compliance with the Limit Value for annual mean NO_2 in the shortest time possible in central Bristol. The OBC assesses the shortlist of options set out in the Strategic Outline Case[2], and proposes a preferred option including details of delivery. The OBC forms a bid to central government for funding to implement the CAP. This report provides information about the behavioural response rates analysis, which is used in the transport modelling work reported in business case.

1.2 Purpose of this Report

This document is written to support the OBC and the methodology for calculating the behavioural response rates of non-compliant vehicles when they enter the scheme.

A draft version of this report was published in January 2019, which supported the draft economic case that was also published at this time. Since this report, further work has been undertaken to develop the scheme options, and this work is reported in the Option Assessment Report, appended to the OBC.

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

[2] Bristol City Council Clean Air Plan: Strategic Outline Case, April 2018 (https://www.cleanairforbristol.org/wp-content/uploads/2018/05/Strategic-Outline-Case_BCC_Final_05.04.18.pdf)

2. Overview of Methodology

The aim is to determine the local proportions for each of the four primary responses for non-compliant vehicles to the implementation of the scheme, which will replace the percentages shown in Table 2-1.

Figure 2-1: 'Table 2 – Behavioural responses to charging Clean Air Zones' from JAQU Evidence Package

Proportions of non-compliant vehicle trips which react to the zone								
	Petrol Cars	Diesel Cars	Petrol LGVs	Diesel LGVs	RHGVs	AHGVs	Buses	Coaches
Pay charge – Continue into zone	7.1%	7.1%	20.3%	20.3%	8.7%	8.7%	0.0%	15.6%
Avoid Zone – Trips removed, modelled elsewhere	21.4%	21.4%	10.0%	10.0%	4.3%	4.3%	0.0%	0.0%
Cancel journey – trips removed completely	7.1%	7.1%	6.0%	6.0%	4.3%	4.3%	6.4%	12.5%
Upgrade Vehicle – trips replaced with compliant trips	64.3%	64.3%	63.8%	63.8%	82.6%	82.6%	93.6%	71.9%

Note: RHGVs – Rigid HGVs and AHGVs- Artic HGVs

The results from the local stated preference surveys have been used to determine primary behavioural responses rates for non-compliant cars if a CAZ were implemented in Bristol. For non-compliant light goods vehicles (LGVs), LGV responses from the stated preference surveys were used. Bus and Taxi responses are based on discussions with BCC and the service providers. For coaches, there are ongoing discussions with local coach operators to understand the fleet and likely responses, however due to the uncertainty and the relatively small proportion of the fleet that are coaches, the national response rates have been used as taken from 'Table 2 – Behavioural responses to charging Clean Air Zones' within the JAQU Evidence package, also shown above. The response rates for HGVs have also been taken from 'Table 2 – Behavioural responses to charging Clean Air Zones' in the Evidence Package, provided by JAQU in absence of reasonable local data.

3. Stated Preference Surveys

Stated preference surveys have been undertaken to determine local behavioural responses to the implementation of a charging CAZ in Bristol. The structure, implementation and outcomes of the survey are provided fully in OBC-28, Stated Preference Survey Report, whilst a brief summary is set out in this report.

The main part of the survey are two stated preference exercises, the first asked the respondent to consider their most recent trip through the zone and how they would have responded from the following choices:

- Paid the charge and travelled as before;
- Made the same journey but changed mode;
- Not have made the journey at all;
- Made the same journey purpose but changed the destination;
- Made the same journey but changed route to avoid the zone; or,
- Made the same journey but switched to another compliant vehicle in their household (this option will only be shown if the respondent has indicated in an earlier question that such a vehicle exists).

The second exercise asked respondents about the longer-term choice of whether they would continue to pay the charge to travel in the zone or would pay to upgrade the vehicle to a compliant one for a given hypothetical cost.

Once completed, the survey data underwent a cleaning process to identify and discard nonsensical questionnaires.

Statistical models were fitted to the data for each exercise and then combined into a single model in order to allow predictions to be made on behavioural changes in response to a specified charge level and upgrade cost. This information was then fed into the highway transport model as detailed in OBC-23, Local Plan Transport Modelling Methodology Report (T3), and outputs are detailed in OBC-27, Local Plan Transport Modelling Forecasting Report (T4).

4. Upgrade Costs

In order to determine the primary response rates over a range of CAZ charges from the stated preference surveys, an upgrade cost is required. The methodology for calculating the upgrade costs for Cars, LGVs and HGVs is outlined below.

The upgrade costs of other vehicle types (Taxi, Buses and Coaches) were not used to calculate the primary response rates. The primary response rates were determined by other information collated and this is discussed in the next section.

4.1 Cars

The cost of a new car was calculated by determining the most popular car models in the local area. A national list was obtained from the www.smmt.co.uk website, which is comparable with the most popular car models identified from the Bristol Automatic Number Plate Registration (ANPR) data. Prices for Petrol and Diesel models of the list of popular cars were extracted from the Parkers database for new car prices. Table 4-1 shows the new car prices for the most popular cars.

Table 4-1: New Car Prices based on Most Popular Cars

Model	New					
	Petrol			Diesel		
	High	Low	Ave	High	Low	Ave
Ford Fiesta	£ 20,000	£ 13,200	**£ 16,600**	£ 19,000	£ 14,200	**£ 16,600**
Ford Focus	£ 22,400	£ 17,600	**£ 20,000**	£ 22,500	£ 19,100	**£ 20,800**
Vauxhall Corsa	£ 19,300	£ 11,800	**£ 15,550**	£ 17,500	£ 13,500	**£ 15,500**
Vauxhall Astra	£ 23,400	£ 14,500	**£ 18,950**	£ 21,900	£ 16,100	**£ 19,000**
Volkswagen Golf	£ 25,000	£ 18,500	**£ 21,750**	£ 24,500	£ 19,100	**£ 21,800**
BMW 3 Series	£ 29,000	£ 22,900	**£ 25,950**	£ 32,500	£ 24,500	**£ 28,500**
MINI	£ 15,905	£ 20,635	**£ 18,270**			**£ -**
Volkswagen Polo	£ 17,500	£ 15,500	**£ 16,500**	£ 17,400	£ 15,800	**£ 16,600**
Renault Clio	£ 15,000	£ 11,000	**£ 13,000**	£ 15,500	£ 12,500	**£ 14,000**
Audi A3	£ 33,500	£ 20,500	**£ 27,000**	£ 31,000	£ 20,500	**£ 25,750**
Toyota Yaris	£ 14,500	£ 12,500	**£ 13,500**			**£ -**
Mercedes C Class	£ 35,500	£ 26,000	**£ 30,750**	£ 38,000	£ 27,000	**£ 32,500**
Average	**£ 22,584**	**£ 17,053**	**£ 19,818**	**£ 23,980**	**£ 18,230**	**£ 17,588**

4.2 LGVs and HGVs

The cost of a new LGV, rigid HGV and artic HGV have been calculated from the Publication by Road Haulage Association on the LGV and HGV operating costs, 2018, linked below.
http://www.transportengineer.org.uk/article-images/166209/Out_of_our_hands.pdf

Table 4-2: LGV and HGV 2018 New Vehicle Costs

Vehicle type	Detailed Vehicle Type	2018 Cost
LGV	Car derivative Vans - diesel	£14,244
	Vans of 3.5 tonnes gvw - diesel	£26,186
	Average	**£20,215**
Rigid HGV	7.5 tonne gvw	£42,570
	10 to 12 tonnes gvw	£50,419
	12 to 14 tonnes gvw	£53,934
	16 to 18 tonnes gvw	£70,929
	3 axle rigid veh 26 tonnes gvw	£90,457
	4 axle rigid tipper	£98,334
	Average	**£67,774**
Artic LGV	33 tonne gvw artic, 2 axle	£56,579
	38 tonne gvw artic, 2 axle	£81,300
	38 tonne gvw , 3 axle	£81,300
	32.5 tonne gvw drawbar combination, 2 axle	£63,363
	40 tonne gvw, 3 axle	£99,747
	44 tonne gvw, 3 axle	£106,680
	Average	**£81,495**

4.3 Depreciation Rates

A non-compliant vehicle will not always be replaced with a new compliant vehicle; therefore, depreciation rates were used to calculate the value of differing vehicles and ages. Table 4-3 4-3 shows the depreciation rates from the National data inputs for Local Economic Models, provided by JAQU for this project. These have been used, since no locally derived depreciation values are available.

Table 4-3: Depreciation Rates

Veh Type	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10+
Cars	37%	18%	16%	16%	16%	16%	16%	16%	16%	16%
LGVs	37%	18%	16%	16%	16%	16%	16%	16%	16%	16%
RHGVs	35%	18%	18%	18%	18%	18%	18%	18%	18%	18%
AHGVs	35%	18%	18%	18%	18%	18%	18%	18%	18%	18%
Buses	35%	18%	18%	18%	18%	18%	18%	18%	18%	18%

4.4 Vehicle Value by Age and Vehicle Type

The depreciation rates were used to calculate the value of Cars (Petrol and Diesel), LGVs and HGVs (Rigid and Artic) by age pivoting from the new prices calculated above. Table 4-4 shows the value by age and vehicle type.

Table 4-4: Value by Age and Vehicle Type

Year >>	2017	2016	2015	2014	2013	2012	2011	2010	2009	2008	2007	2006	2005
Cars (Petro	£12,486	£10,238	£8,600	£7,224	£6,068	£5,097	£4,282	£3,597	£3,021	£2,538	£2,132	£1,791	£1,504
Cars (Diese	£11,080	£9,086	£7,632	£6,411	£5,385	£4,524	£3,800	£3,192	£2,681	£2,252	£1,892	£1,589	£1,335
LGVs	£12,735	£10,443	£8,772	£7,369	£6,190	£5,199	£4,367	£3,669	£3,082	£2,589	£2,174	£1,827	£1,534
Rigid HGV	£44,053	£36,123	£29,621	£24,289	£19,917	£16,332	£13,392	£10,982	£9,005	£7,384	£6,055	£4,965	£4,071
Artic HGV	£52,972	£43,437	£35,618	£29,207	£23,950	£19,639	£16,104	£13,205	£10,828	£8,879	£7,281	£5,970	£4,896

Year >>	2004	2003	2002	2001	2000	1999	1998	1997	1996	1995	1994	1993	1992
Cars (Petro	£1,263	£1,061	£892	£749	£629	£528	£444	£373	£313	£263	£221	£186	£156
Cars (Diese	£1,121	£942	£791	£665	£558	£469	£394	£331	£278	£233	£196	£165	£138
LGVs	£1,289	£1,083	£909	£764	£642	£539	£453	£380	£319	£268	£225	£189	£159
Rigid HGV	£3,339	£2,738	£2,245	£1,841	£1,509	£1,238	£1,015	£832	£682	£560	£459	£376	£309
Artic HGV	£4,014	£3,292	£2,699	£2,213	£1,815	£1,488	£1,220	£1,001	£821	£673	£552	£452	£371

4.5 Average Upgrade Cost by Vehicle Type

Upgrade costs for each vehicle type and Euro Standard (and fuel type for cars) were calculated using the depreciated vehicle values presented in Table 4-4, comparing the resale cost of a non-compliant vehicle and the cost of purchasing a compliant vehicle.

To derive an average upgrade cost by vehicle type, the upgrade costs by vehicle type and euro standard were weighted by vehicle type sightings. The sightings of each vehicle type were calculated from the ANPR survey data for Bristol, split by euro standard. Table 4-5 shows the vehicle types split by euro standard.

Table 4-5: Vehicle Type by Euro Standard

Eurostandard	Cars			HGVs	
	Diesel	Petrol	LGV	Artic	Rigid
Euro 0	881	3758	1630	33	62
Euro 1	2253	7922	4232	28	125
Euro 2	10567	74509	13139	57	1484
Euro 3	132979	306612	56654	818	6512
Euro 4	222200	344012	104469	781	8629
Euro 5	366712	312304	220162	5752	24799
Euro 6	241605	221277	50323	9832	22576
Total	977197	1270394	450609	17301	64187

It was necessary to also account for 'secondary' behavioural responses within these calculations, to estimate the proportion of vehicles replaced by new or used vehicles, and the switch between diesel and petrol cars. In the absence of more accurate/local information, JAQU's assumptions from paragraph 3.3 of the Evidence Package, have been used, and are as follows:

- 25% of those with a non-compliant vehicle who upgrade will buy a brand-new vehicle of the same fuel type.
- The other 75% will replace their vehicle with a second-hand complaint vehicle. Of these, 75% of diesels owners will switch to petrol with the remainder keeping the same fuel type.

Table 4-6 shows the weighted upgrade cost calculations for Cars (Petrol and Diesel), LGV and HGVs (Rigid and Artic). The cost of resale is based on the lowest value of that vehicle type and euro standard. The cost of a compliant vehicle was calculated using on the secondary behavioural responses outlined above, and also based on an assumption that the lowest cost second-hand compliant vehicle will be purchased.

Table 4-6: Weighted Upgrade Costs

Vehicle Type	Euro Class	Euro Class Count	Resale Cost	Cost of Compliant Vehicle	Cost to Upgrade per vehicle	Cost to Upgrade total
Car (Petrol)	Euro 0	3758	£0	£ 6,297.58	£6,298	£23,666,314.01
	Euro 1	7922	£156	£ 6,297.58	£6,142	£48,654,184
	Euro 2	74509	£373	£ 6,297.58	£5,925	£441,446,269
	Euro 3	306612	£629	£ 6,297.58	£5,669	£1,738,037,809
	Weighted Average					**£5,732.69**
Car (Diesel)	Euro 0	881	£0	£ 6,835.12	£6,835	£6,021,743
	Euro 1	2253	£138	£ 6,835.12	£6,697	£15,087,769
	Euro 2	10567	£331	£ 6,835.12	£6,504	£68,730,373
	Euro 3	132979	£558	£ 6,835.12	£6,277	£834,692,484
	Euro 4	222200	£1,335	£ 6,835.12	£5,500	£1,222,161,742
	Euro 5	366712	£3,800	£ 6,835.12	£3,035	£1,113,107,712
	Weighted Average					**£4,431.54**
Weighted Average Car						**£4,884.47**
LGVs	Euro 0	1630	£0	£ 8,772	£8,772	£14,298,650.07
	Euro 1	4232	£159	£ 8,772	£8,613	£36,450,762
	Euro 2	13139	£380	£ 8,772	£8,392	£110,260,790
	Euro 3	56654	£642	£ 8,772	£8,131	£460,627,054
	Euro 4	104469	£1,534	£ 8,772	£7,238	£756,137,560
	Euro 5	220162	£4,367	£ 8,772	£4,405	£969,761,165
	Weighted Average					**£5,864.65**
HGV Rigid	Euro 0	62	£0	£29,621	£29,621	£1,836,516.36
	Euro 1	125	£309	£29,621	£29,313	£3,664,085.54
	Euro 2	1484	£832	£29,621	£28,789	£42,722,852.53
	Euro 3	6512	£1,509	£29,621	£28,112	£183,064,099.07
	Euro 4	8629	£4,071	£29,621	£25,550	£220,469,669.70
	Euro 5	24799	£13,392	£29,621	£16,229	£402,458,711.37
	Weighted Average					**£20,528.61**
HGV artic	Euro 0	33	£0	£35,618	£35,618	£1,175,398.35
	Euro 1	28	£371	£35,618	£35,247	£986,919.31
	Euro 2	57	£1,001	£35,618	£34,617	£1,973,191.44
	Euro 3	818	£1,815	£35,618	£33,803	£27,650,954.02
	Euro 4	781	£4,896	£35,618	£30,722	£23,994,264.50
	Euro 5	5752	£16,104	£35,618	£19,514	£112,246,825.31
	Weighted Average					**£22,496.66**

5. Proposed Charge Rates

The charges were initially set for cars, taxis and LGVs so that the responses of avoid zone, change mode / cancel journey and replace vehicle combined roughly equated to the combined JAQU CAZ responses in Table 2-1. These charges were found to be insufficient to bring about compliance and so testing with higher charges was undertaken. As the charge level increases, the additional response diminishes and the final values arrived at are shown in Table 5-1 for the Medium sized charging zone.

Table 5-1: Bristol Medium CAZ Proposed Charges

Charge Vehicle Class	Charge per day	CAZ Class
Cars	£9.00	D only
Taxis	£9.00	C & D
LGVs	£9.00	C & D
HGVs	£100.00	C & D
Buses	£100.00	C & D
Coaches	£100.00	C & D

6. Primary Behavioural Responses

6.1 Calculated Response Rates for Option 1

The methodology for calculating the primary response rates for all relevant vehicle types is summarised as follows (with cars not being charged in this option, there is no response required):

- LGVs - The primary response rates are calculated from the stated preference survey responses which were identified as a 'van'. Again, the upgrade cost is used to determine a range of primary responses for different charge rates from the Medium zone area;
- HGVs - The primary behavioural responses rates for HGVs were taken from 'Table 2 – Behavioural responses to charging Clean Air Zones' in the Evidence Package, provided by JAQU.;
- Taxis - The taxi response rate is based on Bristol enforcing compliance for Taxis through their licensing agreements with taxi operators;
- Coaches - The initial response rates for coaches were taken from 'Table 2 – Behavioural responses to charging Clean Air Zones' in the Evidence Package, provided by JAQU; and
- Buses - The response rates for buses were determined through discussions between Bristol and bus operators.

An adjustment for foreign vehicles has been applied to the responses rates calculated from the methodology set out above, as foreign vehicles cannot be reliably charged (their details are not captured in the DVLA database in order to determine if the vehicle is compliant and so enforcement can only occur through a manual process with limited powers). The final response rates will assume a 'worst case', i.e. that these vehicles continue to drive within the zone but do not pay the charge. In reality it is unlikely that this will be the case for all foreign vehicles. Table 6-1 shows the final primary behavioural response rates by vehicle type produced by the methodology set out above and the charge rates in Table 5-1. These are the response rates that have been applied within the traffic model.

Table 6-1: Final Primary Behavioural Response Rates for Option 1

Response	Cars Low Income	Cars Medium Income	Cars High Income	Cars Employers Business	Taxis	LGVs	HGVs	Buses	Coaches
Pay Charge	-	-	-	-	4.1%	15.9%	8.8%	0.0%	17.8%
Avoid Zone	-	-	-	-	0.0%	19.2%	4.3%	0.0%	0.0%
Cancel Journey / Change Mode	-	-	-	-	0.0%	2.6%	4.3%	6.4%	11.4%
Replace Vehicle	-	-	-	-	95.9%	62.2%	82.6%	93.6%	70.8%

6.2 Calculated Response Rates for Medium CAZ D + Option 1

The methodology for calculating the primary response rates for all vehicle types is summarised as follows:

- Cars - The upgrade cost has been used to determine a range of primary responses for different charge rates using the stated preference survey responses from the medium size zone area;
- LGVs - The primary response rates are calculated from the stated preference survey responses which were identified as a 'van'. Again, the upgrade cost is used to determine a range of primary responses for different charge rates from the Medium zone area;
- HGVs - The primary behavioural responses rates for HGVs were taken from 'Table 2 – Behavioural responses to charging Clean Air Zones' in the Evidence Package, provided by JAQU.;
- Taxis - The taxi response rate is based on Bristol enforcing compliance for Taxis through their licensing agreements with taxi operators;

- Coaches - The initial response rates for coaches were taken from 'Table 2 – Behavioural responses to charging Clean Air Zones' in the Evidence Package, provided by JAQU; and
- Buses - The response rates for buses were determined through discussions between Bristol and bus operators.

An adjustment for foreign vehicles has been applied to the responses rates calculated from the methodology set out above, as foreign vehicles cannot be reliably charged (their details are not captured in the Driver and Vehicle Licensing Agency (DVLA) database in order to determine if the vehicle is compliant and so enforcement can only occur through a manual process with limited powers). The final response rates will assume a 'worst case', i.e. that these vehicles continue to drive within the zone but do not pay the charge. In reality it is unlikely that this will be the case for all foreign vehicles.

Table 6-2 shows the final primary behavioural response rates by vehicle type produced the methodology set out above and the charge rates in Table 5-1. These are the response rates that have been applied to the core modelling scenarios within the traffic model.

Table 6-2: Final Primary Behavioural Response Rates for Medium CAZ D + Option 1

Response	Cars Low Income	Cars Medium Income	Cars High Income	Cars Employers Business	Taxis	LGVs	HGVs	Buses	Coaches
Pay Charge	4.4%	7.3%	5.2%	9.4%	4.1%	15.9%	8.8%	0.0%	17.8%
Avoid Zone	10.8%	14.1%	16.1%	18.0%	0.0%	19.2%	4.3%	0.0%	0.0%
Cancel Journey / Change Mode	39.9%	22.1%	14.2%	14.5%	0.0%	2.6%	4.3%	6.4%	11.4%
Replace Vehicle	44.9%	56.5%	64.5%	58.1%	95.9%	62.2%	82.6%	93.6%	70.8%

6.3 Calculated Response Rates for Option 2

The methodology for calculating the primary response rates for the small area diesel car exclusion is summarised as follows:

- Calculate 24-hour car diesel exclusion response rate for the small area - the pay charge response rate was set to zero, the avoid zone, cancel trip/change mode and replace vehicle rates have been determined by the stated preference surveys for diesel cars which have been proportioned so that the total response rate totals 100 per cent, as shown in Table 6-3;
- Calculate 8-hour (7am-3pm) car diesel ban based on the assumptions outlined in Table 6-4 and final response rates are shown in Table 6-5. This methodology takes into account the estimated proportions of trips to change time of day (TOD response) to avoid the exclusion period and the estimated extent to which trips are linked between different time periods by trip purpose. Since not all trip purposes are modelled separately in GBATS, the relevant purposes were then re-combined using weighted averages to yield responses for each modelled trip purpose.

6.4 Calculated Response Rates for Hybrid Option

The primary response rates for the Hybrid Option are as follows:

- Cars – as per Option 2, as shown in Table 6-5
- All other vehicle types – as per Option 1, as shown in Table 6-1.

Table 6-3: 24-hour Primary Behavioural Response Rates for Diesel Cars

Response	Cars Low Income	Cars Medium Income	Cars High Income	Cars Employers Business
Pay Charge	0.0%	0.0%	0.0%	0.0%
Avoid Zone	17.5%	17.5%	17.5%	17.5%
Cancel Journey / Change Mode	23.8%	23.8%	23.8%	23.8%
Replace Vehicle	58.7%	58.7%	58.7%	58.7%

Table 6-4: 8-hour (7am-3pm) Car Diesel Exclusion Methodology

Time Period	Commute	Education	Other	Business
AM (7-10)	TOD - shift to pre 7am, based on calcluated % that travel in 30 mins post 7am compared to 7am-10am CTCM - from SP AZ - from SP RV - from SP SV - from SP Percentages above proportioned so total equal 100%	TOD - 0% CTCM - from SP AZ - from SP RV - from SP SV - from SP Percentages above proportioned so total equal 100%	TOD - shift to post 3pm (as per SP RV) CTCM - from SP AZ - from SP RV - 0% SV - from SP Percentages above proportioned so total equal 100%	TOD - 0% CTCM - from SP AZ - from SP RV - from SP SV - from SP Percentages above proportioned so total equal 100%
IP (10-3)	TOD - 0% CTCM - from SP AZ - from SP RV - from SP SV - from SP Percentages above proportioned so total equal 100%	TOD - 0% CTCM - from SP AZ - from SP RV - from SP SV - from SP Percentages above proportioned so total equal 100%	TOD - shift to post 3pm (as per SP RV) CTCM - from SP AZ - from SP RV - 0% SV - from SP Percentages above proportioned so total equal 100%	TOD - 0% CTCM - from SP AZ - from SP RV - from SP SV - from SP Percentages above proportioned so total equal 100%
PM (3-7)	TOD - 0% CTCM - some linked to earlier trips - PA/OD factors used from RSI surveys AZ - 0% RV/SV - some linked to earlier trips - PA/OD factors used from RSI surveys	TOD - 0% CTCM - some linked to earlier trips - PA/OD factors used from RSI surveys AZ - 0% RV/SV - some linked to earlier trips - PA/OD factors used from RSI surveys	TOD - shift from pre 3pm CTCM - some linked to earlier trips - PA/OD factors used from RSI surveys AZ - 0% RV - 0% SV - some linked to earlier trips - PA/OD factors used from RSI surveys	TOD - 0% CTCM - some linked to earlier trips - PA/OD factors used from RSI surveys AZ - 0% RV - some linked to earlier trips - PA/OD factors used from RSI surveys

Key:
SP – Stated Preference Surveys
TOD – Time of Day Choice
CTCM – Cancel Trip / Change Mode
AZ – Avoid Zone
RV – Replace Vehicle
SV – Switch Vehicle

Table 6-5: Final 8-hour (7am-3pm) Car Diesel Exclusion Primary Response Rates

Response Rate	Cars Low-High Inc			Cars Emp Bus		
	AM	IP	PM	AM	IP	PM
Pay Charge	NA	NA	NA	NA	NA	NA
Avoid Zone	15.44%	14.56%	0.00%	17.47%	14.56%	0.00%
Cancel Journey / Change Mode	21.03%	21.85%	15.74%	23.79%	23.52%	22.18%
Replace Vehicle	43.04%	19.45%	31.54%	58.74%	58.07%	54.75%
Time of Day Choice	20.49%	31.94%	0.00%	0.00%	0.00%	0.00%