



Bristol Clean Air Plan

Bristol City Council

ANPR Data Analysis and Application

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Bristol Clean Air Plan

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Acronyms and Abbreviations

AQMA	Air Quality Management Area
AQAP	Air Quality Action Plan
AQO	Air Quality Objective
B&NES	Bath and North East Somerset
BCC	Bristol City Council
CAZ	Clean Air Zone
Defra	Department for Environment, Food & Rural Affairs
DfT	Department for Transport
EU	European Union
EV	Electric Vehicle
HGV	Heavy Goods Vehicle
JAQU	Joint Air Quality Unit
LA	Local Authority
LGV	Light Goods Vehicle
NO _x	Nitrogen Oxides
NO ₂	Nitrogen Dioxide
SP	Stated Preference

1. Introduction

1.1 ANPR Surveys

Permanent Automatic Number Plate Recognition (ANPR) camera data is available in and around Bristol City Centre and was obtained from Bristol City Council for the duration of six months in 2017 (February – July).

In addition to these sites, Jacobs (then CH2M) commissioned IDC to carry out surveys at an additional 24 sites for the duration of one week between the dates of 18/07/2017 and 24/07/2017.

Figure 1-2 shows the location of both the permanent and commissioned ANPR sites.

The camera locations for additional surveys carried out by IDC have been selected to cover all of the key routes to/from Bristol City Centre for both the Inner and Medium Cordon areas.

The surveys capture both directions of traffic in each location. The surveys capture the number plate of each vehicle that passes the camera, along with the date/time and direction of journey. This enabled vehicles to be matched at multiple locations, providing an understanding of the movements across/within the city and how long these journeys take.

The registration data from the ANPR surveys have been cross referenced with data purchased from Carweb to gain information on vehicle type, fuel type and Euro Standard. The information on the vehicle specifications was obtained for June and July in 2017 to compare the July data with equivalent data from June, a neutral month.

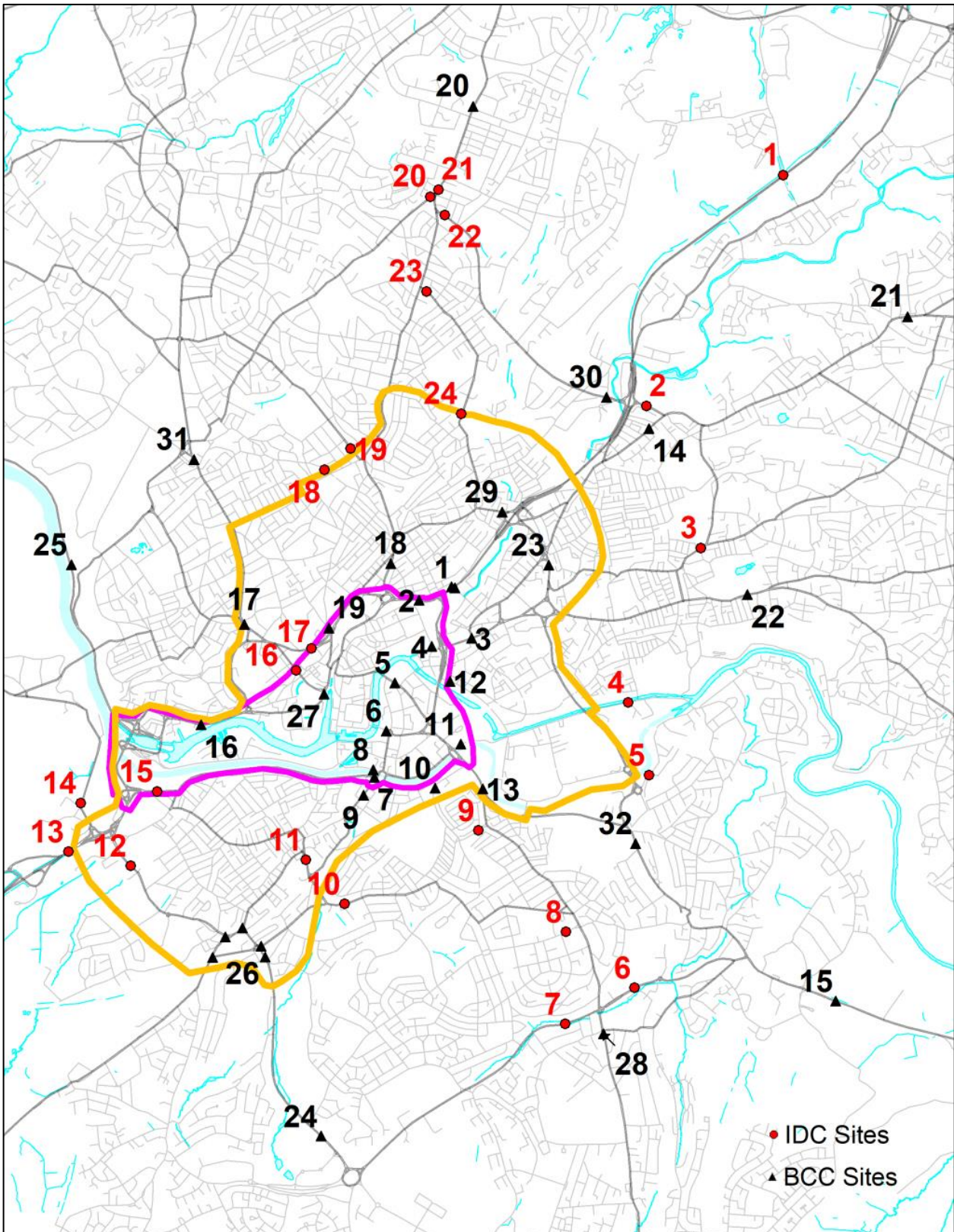


Figure 1-2: ANPR Survey Locations

1.2 ANPR Data Application

The data collected has been used to determine the proportion of compliant vehicles within the current fleet when compared to the CAZ framework criteria.

The vehicles that do not comply with the CAZ standards are as follows:

- Petrol vehicles with emissions standards earlier than Euro 4/IV (approximately registered pre-2006); and
- Diesel vehicles with emissions standards earlier than Euro 6/VI (approximately registered pre-2015).

This information has been applied to the traffic model, by vehicle type, in order to separate out those vehicles which would be affected by CAZ charges and those that would not.

The existing highway model has 6 user classes: Car Non-business (Low Income), Car Non-business (Medium Income), Car Non-business (High Income), Car Business, LGV and HGV. These have been split into 16 user classes using the compliance splits derived from the ANPR data, for each of the modelled years. The matrix compliance splitting processing is as follows:

- Split the Car user classes into Car and Taxi user classes;
- Split the HGV user class into HGV and Coach user classes; and
- Split Car, Taxi, LGV, HGV and Coach matrices into compliant and non-compliant using the time period splits.

The ANPR data collected has also been used to determine fuel type and HGV type to aid the further splits of the Transport Model link flow data during post-processing (outside the model) to feed into the Air Quality Model.

Also, Euro Standards have been calculated from the ANPR data for compliant and non-compliant vehicles, for each modelled year. These overwrite the national Euro Standards in the Emissions Factor Toolkit (EFT) used as an interface between the Transport Model and the Air Quality Model.

2. ANPR Data Analysis

2.1 Compliance Splits

The week in July (18/07/2017 - 24/07/2017) provided a better coverage of the routes to/from Bristol due to the additional surveys undertaken by IDC. However, the 2017 ANPR surveys were undertaken in July 2017 due to the programme pressures of the Feasibility Study at that time.

Data from permanent BCC sites was used to assess whether there is any substantial difference in fleet composition between the neutral month of June and summer month of July. As can be seen in Table 2-1, the comparison has not shown any substantial difference in the compliance splits.

Table 2-1: Compliance Splits by Time Period for BCC sites

Vehicle Category	June 2017						July 2017					
	AM		IP		PM		AM		IP		PM	
	Comp- liant	Non- comp- liant	Comp- liant	Non- comp- liant	Comp- liant	Non- comp- liant	Comp- liant	Non- comp- liant	Comp- liant	Non- comp- liant	Comp- liant	Non- comp- liant
Cars	52%	48%	49%	51%	50%	50%	52%	48%	50%	50%	50%	50%
LGV	10%	90%	11%	89%	10%	90%	11%	89%	12%	88%	10%	90%
HGV rigid	36%	64%	34%	66%	29%	71%	37%	63%	35%	65%	30%	70%
HGV artic	54%	46%	55%	45%	56%	44%	54%	46%	56%	44%	57%	43%
HGV	39%	61%	38%	62%	36%	64%	41%	59%	39%	61%	36%	64%
Taxi	21%	79%	17%	83%	19%	81%	21%	79%	17%	83%	19%	81%
Bus	25%	75%	26%	74%	26%	74%	26%	74%	26%	74%	26%	74%
Coach	27%	73%	28%	72%	33%	67%	28%	72%	29%	71%	35%	65%
Total	42%	58%	40%	60%	44%	56%	43%	57%	41%	59%	44%	56%

Table 2-2 shows the compliance splits calculated across all ANPR sites for the week in July for which the further sites were surveyed.

Table 2-2: Compliance Splits by Time Period for BCC and IDC sites

Vehicle Category	18 July – 25 July 2017 (excluding weekends)					
	AM		IP		PM	
	Compliant	Non-compliant	Compliant	Non-compliant	Compliant	Non-compliant
Cars	52%	48%	50%	50%	50%	50%
LGV	11%	89%	12%	88%	10%	90%
HGV rigid	36%	64%	35%	65%	31%	69%
HGV artic	55%	45%	56%	44%	58%	42%
HGV	40%	60%	39%	61%	38%	62%
Taxi	20%	80%	17%	83%	19%	81%
Bus	24%	76%	24%	76%	24%	76%
Coach	28%	72%	29%	71%	31%	69%
Total	43%	57%	41%	59%	44%	56%

For further calculations the data for the week in July from BCC and IDC sites was used.

The ANPR data has been processed in a number of ways to determine which was the most appropriate method of segmentation to apply the compliance splits to the transport model matrices. The following were assessed:

- By time period and CAZ Cordon (Medium and Inner);
- By time period and travel pattern by CAZ Cordon (Medium and Inner) e.g trips through or to the Cordon area; and
- By time period and grouped corridors within Bristol.

Figure 2-1 shows the grouping of ANPR sites by corridor for the analysis purposes.

This analysis enabled identification of the relationship between fleet composition and movements through the city, by matching registration number plates between cameras and identifying the vehicle details. The trip frequency was also taken into consideration when calculating the compliance splits. Weightings were allocated to each vehicle record based on how often it was captured by ANPR cameras within the surveyed period.

Tables 2-3 to 2-7 show the processed 2017 data by time period, travel pattern and corridor respectively.

Table 2-3: Compliance Splits by Time Period – Inner Cordon (2017)

Vehicle Category	Inner Cordon					
	AM		IP		PM	
	Compliant	Non-compliant	Compliant	Non-compliant	Compliant	Non-compliant
<i>Cars</i>	53%	47%	51%	49%	51%	49%
<i>LGV</i>	11%	89%	13%	87%	11%	89%
<i>HGV rigid</i>	38%	62%	35%	65%	29%	71%
<i>HGV artic</i>	54%	46%	57%	43%	54%	46%
<i>HGV</i>	41%	59%	39%	61%	35%	65%
<i>Taxi</i>	20%	80%	16%	84%	19%	81%
<i>Bus</i>	26%	74%	26%	74%	25%	75%
<i>Coach</i>	34%	66%	32%	68%	33%	67%
<i>Total</i>	44%	56%	41%	59%	45%	55%

Table 2-4: Compliance Splits by Time Period – Medium Cordon (2017)

Vehicle Category	Medium Cordon					
	AM		IP		PM	
	Compliant	Non-compliant	Compliant	Non-compliant	Compliant	Non-compliant
<i>Cars</i>	52%	48%	51%	49%	51%	49%
<i>LGV</i>	11%	89%	13%	87%	11%	89%
<i>HGV rigid</i>	37%	63%	35%	65%	29%	71%
<i>HGV artic</i>	55%	45%	57%	43%	54%	46%
<i>HGV</i>	40%	60%	39%	61%	35%	65%
<i>Taxi</i>	20%	80%	16%	84%	19%	81%
<i>Bus</i>	25%	75%	26%	74%	25%	75%
<i>Coach</i>	31%	69%	32%	68%	33%	67%
<i>Total</i>	43%	57%	41%	59%	45%	55%

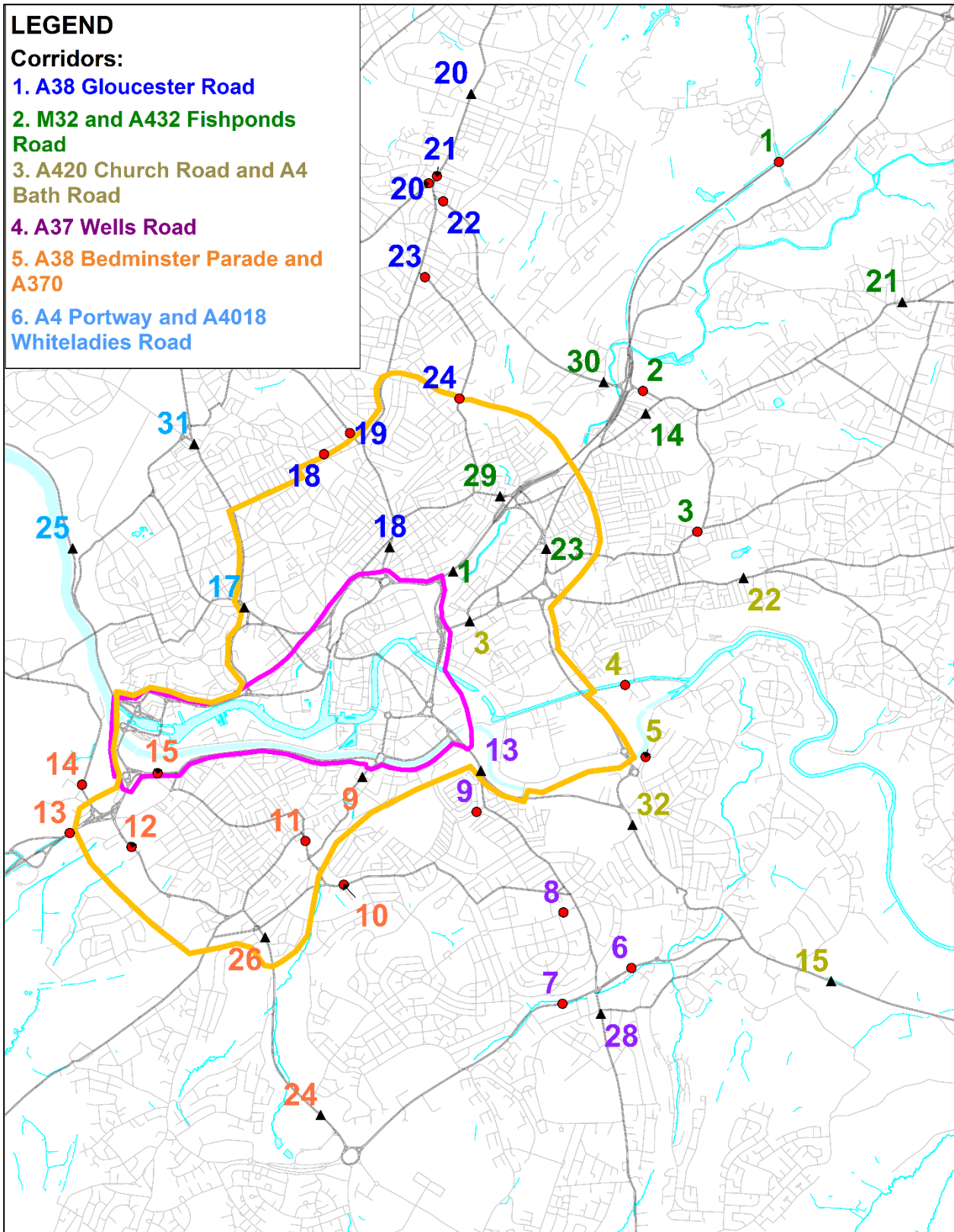


Figure 2-1: Analysed Corridors

Table 2-5: Compliance Splits by Travel Pattern – Inner Cordon (2017)

Vehicle Category	Inner Cordon Through Trips Proportion						Inner Cordon Non-Through Trips Proportion					
	AM		IP		PM		AM		IP		PM	
	Comp-liant	Non-comp-liant	Comp-liant	Non-comp-liant	Comp-liant	Non-comp-liant	Comp-liant	Non-comp-liant	Comp-liant	Non-comp-liant	Comp-liant	Non-comp-liant
<i>Cars</i>	53%	47%	51%	49%	51%	49%	52%	48%	50%	50%	51%	49%
<i>LGV</i>	12%	88%	14%	86%	11%	89%	11%	89%	12%	88%	10%	90%
<i>HGV rigid</i>	42%	58%	38%	62%	31%	69%	36%	64%	34%	66%	31%	69%
<i>HGV artic</i>	58%	42%	58%	42%	57%	43%	49%	51%	54%	46%	55%	45%
<i>HGV</i>	45%	55%	42%	58%	38%	62%	39%	61%	37%	63%	37%	63%
<i>Taxi</i>	21%	79%	18%	82%	20%	80%	19%	81%	16%	84%	18%	82%
<i>Bus</i>	30%	70%	29%	71%	28%	72%	24%	76%	23%	77%	26%	74%
<i>Coach</i>	42%	58%	38%	62%	38%	62%	29%	71%	27%	73%	32%	68%
<i>Total</i>	43%	57%	41%	59%	44%	56%	44%	56%	41%	59%	44%	56%

Table 2-6: Compliance Splits by Travel Pattern – Medium Cordon (2017)

Vehicle Category	Medium Cordon Through Trips Proportion						Medium Cordon Non-Through Trips Proportion					
	AM		IP		PM		AM		IP		PM	
	Comp-liant	Non-comp-liant	Comp-liant	Non-comp-liant	Comp-liant	Non-comp-liant	Comp-liant	Non-comp-liant	Comp-liant	Non-comp-liant	Comp-liant	Non-comp-liant
<i>Cars</i>	52%	48%	50%	50%	50%	50%	52%	48%	49%	51%	50%	50%
<i>LGV</i>	11%	89%	13%	87%	10%	90%	11%	89%	12%	88%	9%	91%
<i>HGV rigid</i>	41%	59%	37%	63%	34%	66%	35%	65%	34%	66%	32%	68%
<i>HGV artic</i>	60%	40%	58%	42%	60%	40%	53%	47%	56%	44%	58%	42%
<i>HGV</i>	45%	55%	41%	59%	41%	59%	38%	62%	38%	62%	38%	62%
<i>Taxi</i>	21%	79%	19%	81%	20%	80%	20%	80%	17%	83%	18%	82%
<i>Bus</i>	23%	77%	23%	77%	22%	78%	27%	73%	26%	74%	30%	70%
<i>Coach</i>	30%	70%	33%	67%	27%	73%	29%	71%	27%	73%	32%	68%
<i>Total</i>	41%	59%	40%	60%	43%	57%	43%	57%	41%	59%	44%	56%

Table 2-7: Compliance Splits by Corridor (2017)

AM												
Vehicle Category	1		2		3		4		5		6	
	A38 Gloucester Road		M32 and A432 Fishponds Road		A420 Church Road and A4 Bath Road		A37 Wells Road		A38 Bedminster Parade and A370		A4 Portway and A4018 Whiteladies Road	
	Compliant	Non-Compliant	Compliant	Non-Compliant	Compliant	Non-Compliant	Compliant	Non-Compliant	Compliant	Non-Compliant	Compliant	Non-Compliant
Cars	51%	49%	51%	49%	52%	48%	51%	49%	51%	49%	55%	45%
LGV	10%	90%	11%	89%	12%	88%	10%	90%	9%	91%	11%	89%
HGV rigid	29%	71%	34%	66%	36%	64%	36%	64%	37%	63%	40%	60%
HGV artic	48%	52%	58%	42%	59%	41%	56%	44%	49%	51%	58%	42%
HGV	30%	70%	41%	59%	40%	60%	41%	59%	39%	61%	44%	56%
Taxi	21%	79%	23%	77%	18%	82%	18%	82%	21%	79%	19%	81%
Bus	17%	83%	29%	71%	20%	80%	30%	70%	14%	86%	39%	61%
Coach	7%	93%	27%	73%	11%	89%	10%	90%	28%	72%	37%	63%
Total	43%	57%	43%	57%	42%	58%	42%	58%	41%	59%	45%	55%
IP												
Vehicle Category	1		2		3		4		5		6	
	A38 Gloucester Road		M32 and A432 Fishponds Road		A420 Church Road and A4 Bath Road		A37 Wells Road		A38 Bedminster Parade and A370		A4 Portway and A4018 Whiteladies Road	
	Compliant	Non-Compliant	Compliant	Non-Compliant	Compliant	Non-Compliant	Compliant	Non-Compliant	Compliant	Non-Compliant	Compliant	Non-Compliant
Cars	49%	51%	49%	51%	50%	50%	50%	50%	49%	51%	53%	47%
LGV	11%	89%	12%	88%	13%	87%	12%	88%	11%	89%	13%	87%
HGV rigid	26%	74%	34%	66%	34%	66%	34%	66%	37%	63%	39%	61%
HGV artic	41%	59%	57%	43%	59%	41%	55%	45%	55%	45%	51%	49%
HGV	27%	73%	40%	60%	38%	62%	40%	60%	40%	60%	42%	58%
Taxi	20%	80%	18%	82%	17%	83%	16%	84%	19%	81%	17%	83%
Bus	18%	82%	31%	69%	21%	79%	28%	72%	13%	87%	36%	64%
Coach	10%	90%	36%	64%	12%	88%	5%	95%	24%	76%	18%	82%
Total	41%	59%	41%	59%	41%	59%	42%	58%	41%	59%	43%	57%
PM												
Vehicle Category	1		2		3		4		5		6	
	A38 Gloucester Road		M32 and A432 Fishponds Road		A420 Church Road and A4 Bath Road		A37 Wells Road		A38 Bedminster Parade and A370		A4 Portway and A4018 Whiteladies Road	
	Compliant	Non-Compliant	Compliant	Non-Compliant	Compliant	Non-Compliant	Compliant	Non-Compliant	Compliant	Non-Compliant	Compliant	Non-Compliant
Cars	50%	50%	49%	51%	50%	50%	49%	51%	49%	51%	53%	47%
LGV	8%	92%	11%	89%	11%	89%	9%	91%	9%	91%	11%	89%
HGV rigid	19%	81%	30%	70%	34%	66%	34%	66%	29%	71%	38%	62%
HGV artic	31%	69%	58%	42%	68%	32%	65%	35%	55%	45%	62%	38%
HGV	20%	80%	38%	62%	39%	61%	44%	56%	35%	65%	47%	53%
Taxi	20%	80%	21%	79%	17%	83%	18%	82%	17%	83%	18%	82%
Bus	18%	82%	31%	69%	19%	81%	27%	73%	12%	88%	38%	62%
Coach	7%	93%	31%	69%	17%	83%	10%	90%	29%	71%	35%	65%
Total	45%	55%	44%	56%	44%	56%	43%	57%	42%	58%	47%	53%

The ANPR data processing has shown that for all vehicle types (with the exception of buses), the compliance splits remain relatively uniform across the corridors and by travel pattern, but they do vary slightly by time period. Therefore, the compliance splits were derived from the time period splits over all areas for the middle cordon.

2.2 Bus Splits

Bus compliance was split using information provided to Jacobs by First Bus, using Euro Standard of vehicle by service. For the other service providers, the compliance splits from the ANPR data have been used.

2.3 Taxi and Coach Splits

The Transport Model was not originally developed with separate taxi or coach user classes. Therefore, the ANPR data has also been used to split the taxi fleet from the car matrices and the coaches from the HGV matrices, by applying global factors for each time period. The ANPR data provides general splits by time period. Table 2-8 shows the splits used.

Table 2-8: Taxi and Coach Splits

Vehicle Type	AM	IP	PM
<i>Car + Taxi</i>	452,360	451,916	287,596
<i>Taxi</i>	16,847	28,103	14,880
<i>Taxi %</i>	3.7%	6.2%	5.2%
<i>HGV + Coach</i>	20,701	23,590	5,151
<i>Coach</i>	1,256	1,854	1,046
<i>Coach %</i>	6.1%	7.9%	20.3%

2.4 Fuel Type Splits

The ANPR data collected has been used to determine the proportions of vehicles by fuel type, to split the traffic data during post-processing for inputs into the EFT. Fuel type splits have been identified for cars and LGVs (HGVs, buses and coaches are all Diesel). Table 2-9 shows the fuel type splits obtained from the 2017 ANPR data.

Table 2-9: Fuel Type Splits (2017)

Vehicle Category	Flows			Proportion		
	Petrol	Diesel	Electric	Petrol	Diesel	Electric
<i>Cars</i>	1,270,394	977,197	3,030	56.45%	43.42%	0.13%
<i>LGVs</i>	2,902	447,045	644	0.64%	99.21%	0.14%

2.5 HGV Type Splits

HGV rigid / artic splits have also been derived from the 2017 ANPR data, as the HGV matrices need to be split into rigid and artic, by compliance, for a more accurate level of detail for inputs into the EFT for each modelled year. The daily ratios for 2017 are shown in Table 2-10.

Table 2-10: HGV Rigid / Artic Ratio (2017)

Vehicle Type	Average	Compliant	Non-Compliant
<i>Rigid HGV</i>	81.1%	69.7%	84.8%
<i>Artic HGV</i>	18.9%	30.3%	15.2%

2.6 Euro Standard Splits

The EFT has national Euro Standard splits within it. These can be overwritten with splits calculated from local data. The values based on the 2017 ANPR data are shown in Table 2-11 by vehicle type.

The 'global' Euro splits for buses have been derived from ANPR data since they are applied globally in the EFT. Since separate EFTs have been used for compliant and non-compliant vehicles the bus Euro splits for First buses have only been used to sub-divide compliant and non-compliant buses into specific Euro Standards in the EFT calculations. The compliant / non-compliant splits for First buses at a service level have been derived from operator data.

Table 2-11: 2017 Euro Standard Splits

Petrol Car	Calculated Bristol Euro Proportions 2017	EFT Default Proportions 2017 - England (not London)	Diesel Car	Calculated Bristol Euro Proportions 2017	EFT Default Proportions 2017 - England (not London)
1Pre-Euro 1	0.00	-	1Pre-Euro 1	0.00	-
2Euro 1	0.01	-	2Euro 1	0.00	-
3Euro 2	0.06	0.01	3Euro 2	0.01	0.00
4Euro 3	0.24	0.11	4Euro 3	0.14	0.06
5Euro 4	0.27	0.23	5Euro 4	0.23	0.19
6Euro 5	0.25	0.34	6Euro 5	0.38	0.40
7Euro 6*	0.17	0.20	7Euro 6	0.25	0.22
7Euro 6c*	-	0.12	7Euro 6*	-	0.13
			7Euro 6c*	-	0.00

Petrol LGV	Calculated Bristol Euro Proportions 2017	EFT Default Proportions 2017 - England (not London)	Diesel LGV	Calculated Bristol Euro Proportions 2017	EFT Default Proportions 2017 - England (not London)
1Pre-Euro 1	0.21	-	1Pre-Euro 1	0.00	-
2Euro 1	0.07	0.00	2Euro 1	0.01	0.00
3Euro 2	0.25	0.03	3Euro 2	0.03	0.01
4Euro 3	0.26	0.11	4Euro 3	0.13	0.05
5Euro 4	0.17	0.20	5Euro 4	0.23	0.20
6Euro 5	0.03	0.34	6Euro 5	0.49	0.41
7Euro 6*	0.02	0.32	7Euro 6*	0.11	0.33
7Euro 6c*	-	-	7Euro 6c*	-	-
			7Euro 6d*	-	-

Rigid HGV	Calculated Bristol Euro Proportions 2017	EFT Default Proportions 2017 - England (not London)	Artic HGV	Calculated Bristol Euro Proportions 2017	EFT Default Proportions 2017 - England (not London)
1Pre-Euro I	0.00	-	1Pre-Euro I	0.00	-
2Euro I	0.00	-	2Euro I	0.00	-
3Euro II	0.02	0.01	3Euro II	0.00	0.00
4Euro III	0.10	0.09	4Euro III	0.05	0.02
5Euro IV	0.13	0.08	5Euro IV	0.05	0.03
6Euro V_EGR	0.10	0.07	6Euro V_EGR	0.08	0.06
7Euro V_SCR	0.29	0.20	7Euro V_SCR	0.25	0.18
8Euro VI	0.35	0.55	8Euro VI	0.57	0.72
9Euro II SCRRF	-	-	9Euro II SCRRF	-	-
10Euro III SCRR	-	-	10Euro III SCRR	-	-
11Euro IV SCRR	-	-	11Euro IV SCRR	-	-
12Euro V EGR +	-	-	12Euro V EGR +	-	-

Buses	Calculated Bristol Euro Proportions 2017	EFT Default Proportions 2017 - England (not London)	Coaches	Calculated Bristol Euro Proportions 2017	EFT Default Proportions 2017 - England (not London)
1Pre-Euro I	0.00	-	1Pre-Euro I	0.11	-
2Euro I	0.00	-	2Euro I	0.01	-
3Euro II	0.15	0.00	3Euro II	0.02	0.00
4Euro III	0.40	0.05	4Euro III	0.16	0.05
5Euro IV	0.09	0.04	5Euro IV	0.10	0.04
6Euro V_EGR	0.03	0.04	6Euro V_EGR	0.06	0.04
7Euro V_SCR	0.09	0.13	7Euro V_SCR	0.17	0.13
8Euro VI	0.24	0.73	8Euro VI	0.38	0.73
9Euro II SCRRF	-	-	9Euro II SCRRF	-	-
10Euro III SCRR	-	-	10Euro III SCRR	-	-
11Euro IV SCRR	-	-	11Euro IV SCRR	-	-
12Euro V EGR +	-	-	12Euro V EGR +	-	-

3. Base Year 2015

3.1 Compliance Splits

The base year compliance splits were determined from the data collected at the ANPR sites in 2017 and adjusted to 2015 using the change in fleet compliance between the years. The change in compliance was derived from the national values available in EFT. Table 3-1 shows the 2015 compliance splits.

Table 3-1: Compliance Splits by Time Period, Medium Cordon (2015)

Vehicle Category	Medium Cordon					
	AM		IP		PM	
	Compliant	Non-compliant	Compliant	Non-compliant	Compliant	Non-compliant
Cars	36.1%	63.9%	34.7%	65.3%	35.3%	64.7%
LGV	0.2%	99.8%	0.2%	99.8%	0.2%	99.8%
HGV rigid	20.2%	79.8%	19.0%	81.0%	15.2%	84.8%
HGV artic	35.0%	65.0%	36.3%	63.7%	34.0%	66.0%
HGV	22.7%	77.3%	21.7%	78.3%	19.2%	80.8%
Taxi	11.5%	88.5%	9.1%	90.9%	10.7%	89.3%
Bus	7.6%	92.4%	7.9%	92.1%	7.7%	92.3%
Coach	14.7%	85.3%	15.1%	84.9%	15.8%	84.2%
Total	28.4%	74.8%	27.1%	76.6%	30.0%	71.3%

3.2 Fuel Type Splits

The 2017 ANPR fuel splits for cars and LGVs have been adjusted to 2015 using the change over time in the latest WebTAG databook fuel split table. These were applied to the traffic link data extracted from the model runs during post-processing. Table 3-2 shows the fuel type splits obtained from the 2015 calculations.

Table 3-2: Fuel Type Splits (2015)

Vehicle Category	Proportion		
	Petrol	Diesel	Electric
Cars	55.21%	44.74%	0.04%
LGVs	0.80%	99.15%	0.05%

3.3 HGV Type Splits

During the post-processing of the transport link data, the HGV matrices have been split into rigid and artic, by compliance, for a more accurate level of detail for inputs into the EFT. These have been derived from the 2017 ANPR data worked back to 2015. The daily ratios for 2015 are shown in Table 3-3.

Table 3-3: HGV Rigid / Artic Ratio (2015)

Vehicle Type	Average	Compliant	Non-Compliant
Rigid HGV	81.1%	69.6%	84.8%
Artic HGV	18.9%	30.3%	15.2%

3.4 Euro Standard Splits

The EFT has national Euro Standard splits within it. These have been overwritten with splits derived from the 2017 ANPR data worked back to 2015. The results of which are shown in Table 3-4.

Table 3-4: 2015 Euro Standard Splits

Petrol Car	Calculated Bristol Euro Proportions 2015	EFT Default Proportions 2015 - England (not London)	Diesel Car	Calculated Bristol Euro Proportions 2015	EFT Default Proportions 2015 - England (not London)
1Pre-Euro 1	-	-	1Pre-Euro 1	-	-
2Euro 1	-	0.00	2Euro 1	-	0.00
3Euro 2	0.12	0.03	3Euro 2	0.03	0.01
4Euro 3	0.35	0.21	4Euro 3	0.23	0.12
5Euro 4	0.26	0.29	5Euro 4	0.26	0.27
6Euro 5	0.22	0.40	6Euro 5	0.40	0.51
7Euro 6*	0.05	0.08	7Euro 6	0.08	0.09
7Euro 6c*	-	-	7Euro 6*	-	-
			7Euro 6c*	-	0.00

Petrol LGV	Calculated Bristol Euro Proportions 2015	EFT Default Proportions 2015 - England (not London)	Diesel LGV	Calculated Bristol Euro Proportions 2015	EFT Default Proportions 2015 - England (not London)
1Pre-Euro 1	-	-	1Pre-Euro 1	-	-
2Euro 1	0.25	0.01	2Euro 1	0.08	0.01
3Euro 2	0.32	0.07	3Euro 2	0.04	0.02
4Euro 3	0.29	0.25	4Euro 3	0.19	0.12
5Euro 4	0.13	0.31	5Euro 4	0.26	0.32
6Euro 5	0.01	0.35	6Euro 5	0.43	0.53
7Euro 6*	-	-	7Euro 6*	-	-
7Euro 6c*	-	-	7Euro 6c*	-	-
			7Euro 6d*	-	-

Rigid HGV	Calculated Bristol Euro Proportions 2015	EFT Default Proportions 2015 - England (not London)	Artic HGV	Calculated Bristol Euro Proportions 2015	EFT Default Proportions 2015 - England (not London)
1Pre-Euro I	-	-	1Pre-Euro I	-	-
2Euro I	-	0.01	2Euro I	-	0.00
3Euro II	0.04	0.03	3Euro II	0.01	0.00
4Euro III	0.14	0.14	4Euro III	0.08	0.03
5Euro IV	0.19	0.13	5Euro IV	0.09	0.06
6Euro V_EGR	0.11	0.09	6Euro V_EGR	0.12	0.09
7Euro V_SCR	0.34	0.27	7Euro V_SCR	0.35	0.28
8Euro VI	0.19	0.33	8Euro VI	0.36	0.52
9Euro II SCRRF		-	9Euro II SCRRF		-
10Euro III SCRRF		-	10Euro III SCRRF		-
11Euro IV SCRRF		-	11Euro IV SCRRF		-
12Euro V EGR + SCRRF		-	12Euro V EGR + SCRRF		-

Buses	Calculated Bristol Euro Proportions 2015	EFT Default Proportions 2015 - England (not London)	Coaches	Calculated Bristol Euro Proportions 2015	EFT Default Proportions 2015 - England (not London)
1Pre-Euro I	-	-	1Pre-Euro I	-	-
2Euro I	-	-	2Euro I	-	-
3Euro II	0.20	0.01	3Euro II	0.04	0.01
4Euro III	0.56	0.20	4Euro III	0.38	0.20
5Euro IV	0.12	0.15	5Euro IV	0.22	0.15
6Euro V_EGR	0.02	0.10	6Euro V_EGR	0.07	0.10
7Euro V_SCR	0.07	0.29	7Euro V_SCR	0.22	0.29
8Euro VI	0.03	0.26	8Euro VI	0.08	0.26
9Euro II SCRRF		-	9Euro II SCRRF		-
10Euro III SCRRF		-	10Euro III SCRRF		-
11Euro IV SCRRF		-	11Euro IV SCRRF		-
12Euro V EGR + SCRRF		-	12Euro V EGR + SCRRF		-

4. Baseline 2021/2031

4.1 Compliance Splits

The fleet projection tool within the EFT version 8 has been used to project the euro standard splits from the 2017 ANPR data to the Baseline years. The forecast compliance splits by vehicle type for the year of implementation of CAZ (2021) are summarised in Table 4-1 and the forecast compliance splits for the compliance year plus 10 (2031) are summarised in Table 4-2. It should be note that the EFT does not go beyond 2030, therefore 2030 was used as a proxy for 2031.

Table 4-1: Compliance Splits by Time Period (2021)

Vehicle Category	AM		IP		PM	
	Compliant	Non-compliant	Compliant	Non-compliant	Compliant	Non-compliant
Cars	74.0%	26.0%	72.8%	27.2%	73.4%	26.6%
LGV	58.0%	42.0%	63.1%	36.9%	58.2%	41.8%
HGV rigid	73.9%	26.1%	72.5%	27.5%	66.7%	33.3%
HGV artic	85.7%	14.3%	86.4%	13.6%	85.2%	14.8%
HGV	76.6%	23.4%	75.6%	24.4%	72.6%	27.4%
Taxi	39.7%	60.3%	33.7%	66.3%	37.7%	62.3%
Bus	65.2%	34.8%	66.3%	33.7%	65.7%	34.3%
Coach	68.8%	31.2%	69.6%	30.4%	70.6%	29.4%
Total	72.5%	30.8%	72.0%	31.7%	70.9%	30.3%

Table 4-2: Compliance Splits by Time Period (2031)

Vehicle Category	AM		IP		PM	
	Compliant	Non-compliant	Compliant	Non-compliant	Compliant	Non-compliant
Cars	98.2%	1.8%	98.1%	1.9%	98.2%	1.8%
LGV	97.0%	3.0%	97.6%	2.4%	97.0%	3.0%
HGV rigid	98.8%	1.2%	98.7%	1.3%	98.3%	1.7%
HGV artic	99.4%	0.6%	99.5%	0.5%	99.4%	0.6%
HGV	99.0%	1.0%	98.9%	1.1%	98.7%	1.3%
Taxi	92.8%	7.2%	90.8%	9.2%	92.2%	7.8%
Bus	99.4%	0.6%	99.4%	0.6%	99.4%	0.6%
Coach	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%
Total	101.1%	2.1%	101.4%	2.3%	99.0%	2.2%

4.2 Fuel Type Splits

Fuel type splits have been identified from the ANPR analysis for cars and LGVs and projected forward to 2021 and 2031, using the change over time in the latest WebTAG databook fuel split table. These were applied to the traffic link data extracted from the model runs via post-processing before input to the EFT. Table 4-3 shows the fuel type splits from the 2021 and 2031 projected ANPR data.

Table 4-3: Fuel Type Splits (2021 and 2031)

Vehicle Category	2021			2031		
	Petrol	Diesel	Electric	Petrol	Diesel	Electric
Cars	51.43%	48.23%	0.34%	53.36%	45.18%	1.46%
LGVs	0.37%	99.49%	0.14%	0.17%	99.69%	0.14%

4.3 HGV Type Splits

During the post-processing of the transport link data, the HGV matrices have been split into rigid and artic, by compliance. This has been derived from the projected 2021 and 2031 ANPR data with daily ratios as shown in Table 4-4.

Table 4-4: HGV Rigid / Arctic Ratio (2021 and 2031)

Vehicle Type	2021		2031	
	Compliant	Non-Compliant	Compliant	Non-Compliant
<i>Rigid HGV</i>	75.7%	88.3%	78.7%	89.9%
<i>Artic HGV</i>	24.3%	11.7%	21.3%	10.1%

4.4 Euro Standard Splits

The EFT has national Euro Standard splits within it. These have been overwritten with splits calculated based on the 2021 and 2031 projected ANPR data. The results of this are shown in Tables 4-5 and 4-6 for 2021 and 2031 respectively.

Table 4-5: Euro Standard Splits (2021)

Petrol Car	Calculated Proportions 2021 - Bristol	Default Euro Proportions 2021 - England (not London)	Diesel Car	Calculated Proportions 2021 - Bristol	Default Euro Proportions 2021 - England (not London)
1Pre-Euro 1	-	-	1Pre-Euro 1	-	-
2Euro 1	-	-	2Euro 1	-	-
3Euro 2	0.01	-	3Euro 2	0.00	-
4Euro 3	0.08	0.02	4Euro 3	0.03	0.01
5Euro 4	0.13	0.08	5Euro 4	0.09	0.07
6Euro 5	0.34	0.22	6Euro 5	0.37	0.26
7Euro 6*	0.18	0.13	7Euro 6	0.19	0.15
7Euro 6c*	0.26	0.54	7Euro 6*	0.28	0.30
			7Euro 6c*	-	0.21

Petrol LGV	Calculated Proportions 2021 - Bristol	Default Euro Proportions 2021 - England (not London)	Diesel LGV	Calculated Proportions 2021 - Bristol	Default Euro Proportions 2021 - England (not London)
1Pre-Euro 1	-	-	1Pre-Euro 1	-	-
2Euro 1	0.00	-	2Euro 1	-	-
3Euro 2	0.03	0.00	3Euro 2	0.01	0.00
4Euro 3	0.07	0.03	4Euro 3	0.03	0.01
5Euro 4	0.06	0.08	5Euro 4	0.10	0.07
6Euro 5	0.36	0.22	6Euro 5	0.27	0.21
7Euro 6*	0.33	0.17	7Euro 6*	0.20	0.14
7Euro 6c*	0.14	0.50	7Euro 6c*	0.39	0.38
			7Euro 6d*	-	0.18

Rigid HGV	Calculated Proportions 2021 - Bristol	Default Euro Proportions 2021 - England (not London)	Artic HGV	Calculated Proportions 2021 - Bristol	Default Euro Proportions 2021 - England (not London)
1Pre-Euro I	-	-	1Pre-Euro I	-	-
2Euro I	-	-	2Euro I	-	-
3Euro II	0.00	0.00	3Euro II	0.00	0.00
4Euro III	0.02	0.02	4Euro III	0.01	0.00
5Euro IV	0.05	0.02	5Euro IV	0.01	0.00
6Euro V_EGR	0.05	0.03	6Euro V_EGR	0.02	0.01
7Euro V_SCR	0.15	0.09	7Euro V_SCR	0.07	0.04
8Euro VI	0.73	0.83	8Euro VI	0.89	0.94
9Euro II SCRRF	-	-	9Euro II SCRRF	-	-
10Euro III SCRR	-	-	10Euro III SCRR	-	-
11Euro IV SCRR	-	-	11Euro IV SCRR	-	-
12Euro V EGR +	-	-	12Euro V EGR +	-	-

Buses	Calculated Proportions 2021 - Bristol	Default Euro Proportions 2021 - England (not London)	Coaches	Calculated Proportions 2021 - Bristol	Default Euro Proportions 2021 - England (not London)
1Pre-Euro I	-	-	1Pre-Euro I	-	-
2Euro I	-	-	2Euro I	-	-
3Euro II	0.04	0.00	3Euro II	0.02	0.00
4Euro III	0.16	0.05	4Euro III	0.07	0.05
5Euro IV	0.04	0.04	5Euro IV	0.03	0.04
6Euro V_EGR	0.02	0.04	6Euro V_EGR	0.02	0.04
7Euro V_SCR	0.05	0.13	7Euro V_SCR	0.07	0.13
8Euro VI	0.70	0.73	8Euro VI	0.79	0.73
9Euro II SCRRF	-	-	9Euro II SCRRF	-	-
10Euro III SCRR	-	-	10Euro III SCRR	-	-
11Euro IV SCRR	-	-	11Euro IV SCRR	-	-
12Euro V EGR +	-	-	12Euro V EGR +	-	-

Table 4-6: Euro Standard Splits (2031)

Petrol Car	Calculated Proportions 2031 - Bristol	Default Euro Proportions 2031 - England (not London)	Diesel Car	Calculated Proportions 2031 - Bristol	Default Euro Proportions 2031 - England (not London)
1Pre-Euro 1	-	-	1Pre-Euro 1	-	-
2Euro 1	-	-	2Euro 1	-	-
3Euro 2	-	-	3Euro 2	-	-
4Euro 3	-	-	4Euro 3	-	-
5Euro 4	0.00	0.00	5Euro 4	0.00	0.00
6Euro 5	0.05	0.01	6Euro 5	0.04	0.02
7Euro 6*	0.04	0.02	7Euro 6	0.04	0.03
7Euro 6c*	0.91	0.97	7Euro 6*	0.19	0.10
			7Euro 6c*	0.73	0.86

Petrol LGV	Calculated Proportions 2031 - Bristol	Default Euro Proportions 2031 - England (not London)	Diesel LGV	Calculated Proportions 2031 - Bristol	Default Euro Proportions 2031 - England (not London)
1Pre-Euro 1	-	-	1Pre-Euro 1	-	-
2Euro 1	-	-	2Euro 1	-	-
3Euro 2	-	-	3Euro 2	-	-
4Euro 3	-	-	4Euro 3	-	-
5Euro 4	0.00	0.00	5Euro 4	0.00	0.00
6Euro 5	0.02	0.00	6Euro 5	0.03	0.02
7Euro 6*	0.02	0.00	7Euro 6*	0.04	0.02
7Euro 6c*	0.96	0.99	7Euro 6c*	0.12	0.08
			7Euro 6d*	0.81	0.88

Rigid HGV	Calculated Proportions 2031 - Bristol	Default Euro Proportions 2031 - England (not London)	Artic HGV	Calculated Proportions 2031 - Bristol	Default Euro Proportions 2031 - England (not London)
1Pre-Euro I	-	-	1Pre-Euro I	-	-
2Euro I	-	-	2Euro I	-	-
3Euro II	-	-	3Euro II	-	-
4Euro III	-	-	4Euro III	-	-
5Euro IV	0.00	-	5Euro IV	-	-
6Euro V_EGR	0.00	0.00	6Euro V_EGR	0.00	0.00
7Euro V_SCR	0.01	0.00	7Euro V_SCR	0.00	0.00
8Euro VI	0.99	0.99	8Euro VI	1.00	1.00
9Euro II SCRRF	-	-	9Euro II SCRRF	-	-
10Euro III SCRR	-	-	10Euro III SCRR	-	-
11Euro IV SCRR	-	-	11Euro IV SCRR	-	-
12Euro V EGR +	-	-	12Euro V EGR +	-	-

Buses	Calculated Proportions 2031 - Bristol	Default Euro Proportions 2031 - England (not London)	Coaches	Calculated Proportions 2031 - Bristol	Default Euro Proportions 2031 - England (not London)
1Pre-Euro I	-	-	1Pre-Euro I	-	-
2Euro I	-	-	2Euro I	-	-
3Euro II	-	-	3Euro II	-	-
4Euro III	0.00	-	4Euro III	-	-
5Euro IV	-	-	5Euro IV	-	-
6Euro V_EGR	0.00	0.00	6Euro V_EGR	0.00	0.00
7Euro V_SCR	0.01	0.01	7Euro V_SCR	0.01	0.01
8Euro VI	0.98	0.98	8Euro VI	0.98	0.98
9Euro II SCRRF	-	-	9Euro II SCRRF	-	-
10Euro III SCRR	-	-	10Euro III SCRR	-	-
11Euro IV SCRR	-	-	11Euro IV SCRR	-	-
12Euro V EGR +	-	-	12Euro V EGR +	-	-