

Greater Manchester's Clean Air Plan to tackle Nitrogen Dioxide Exceedances at the Roadside

Note 5: GM CAP ANPR Surveys: Summary of Initial Findings



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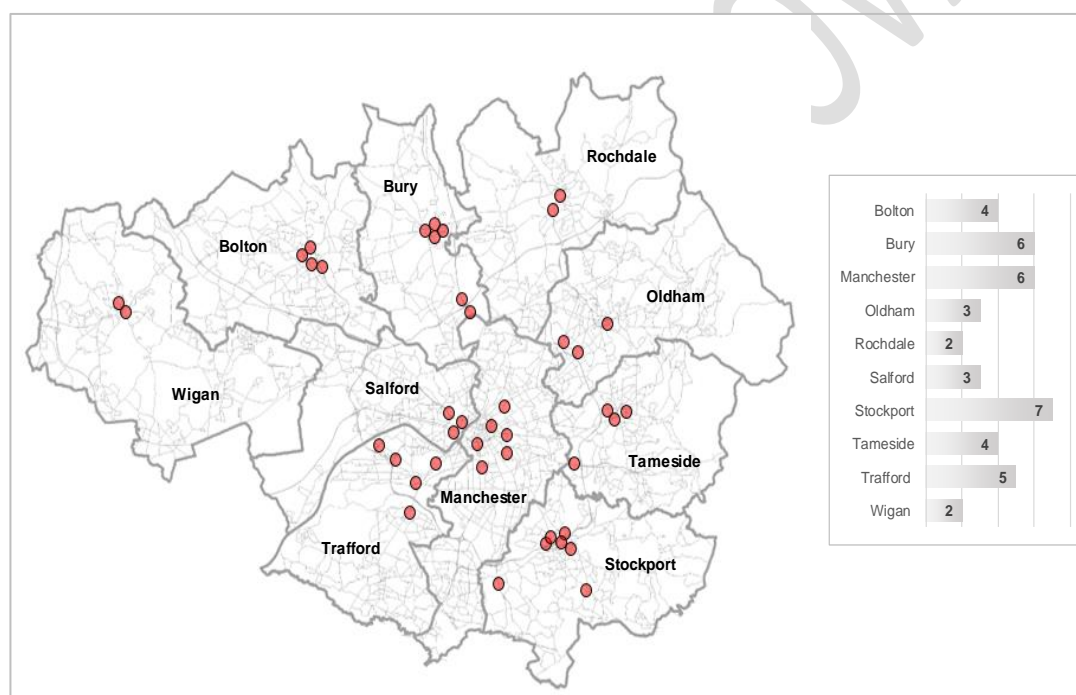
1 Introduction

1.1 Overview

1.1.1 This Technical Note reports on the initial analysis of the Automatic Number Plate Recognition (ANPR) survey that was undertaken in relation to TfGM's Clean Air Plan (CAP). The survey covered a total of 42 locations across Greater Manchester (GM) as shown in **Figure 1-1**. Data was collected for a single week in January 2019.

1.1.2 Registration plates collected were submitted to the Driver and Vehicle Licensing Agency (DVLA) who processed the data set to append anonymised information concerning each vehicle identified.

Figure 1-1. ANPR camera locations



1.2 Purpose of the Survey

1.2.1 The survey was designed to provide a representative profile of the vehicle fleet operating in Greater Manchester in terms of:

- Vehicle type (including fuel used); and
- Age profile.

1.2.2 The new survey results are intended to inform trend analysis, when comparing against the ANPR data available for the OBC modelling which came from Greater Manchester Police. The DVLA dataset parameters enable further refinement in identifying vehicle type and size. This dataset will also be used to underpin a range of analytical tasks to support the development of the Full Business Case (FBC) being prepared in relation to the CAP.

1.3 Key Dates

1.3.1 Key dates in relation to the survey are as follows:

- Start date: Monday, 21st January 2019 (00:00);
- End date: Sunday, 27th January 2019 (23:59); and
- Processed dataset received back from DVLA on 18th April 2019.

1.3.2 Confirmation of issues associated with DVLA assumptions on estimated Euro Class on 15th May 2019

1.4 DVLA Analysis

1.4.1 The processed dataset received from the DVLA included the following information for each vehicle:

- Vehicle categorisation by body and propulsion type;
- Year of manufacture;
- Registration address (postcode sector); and
- Vehicle age.

1.4.2 This was used to derive a breakdown of compliant and non-compliant vehicles by type and location.

2 **Survey and Analysis Headlines**

2.1 Key Statistics

2.1.1 The key statistics from the survey and the subsequent processing by DVLA are set out in **Table 2-1**.

Table 2-1. ANPR Key Statistics

Item	Number	Notes
Total unique vehicle registrations	9,277,572	Number of ANPR entries sent to the DVLA for processing
Total matched to DVLA database as reported by the DVLA	8,948,866	Implies the DVLA processed data accounts for 96.5% of all vehicles recorded by the ANPR survey
Actual total survey records received from the DVLA	8,822,494	Implies the received DVLA processed data accounts for 95.1% of all vehicles recorded by the ANPR survey
Total records received from the DVLA with postcode sector information	8,651,434	Implies 93.3% of all vehicles captured by the ANPR survey can be allocated to a UK registered address

Source: TfGM 2019 CAP ANPR Survey

2.1.2 The breakdown of the vehicle fleet, using the 8.65 million postcode matched records returned by DVLA, is summarised in the following sections.

2.2 Breakdown by Vehicle Type

2.2.1 **Table 2-2** summarises the ANPR data received from the DVLA by vehicle type. It should be noted that taxis will only include Hackney cabs since the DVLA data does not distinguish Private Hire Vehicles (PHV) from other vehicle types. PHVs will be included under the car category. Minibuses have been separated from buses and coaches as these are usually classified as LGV.

Table 2-2. ANPR Data by Vehicle Type

DVLA Body Type	Vehicle Category	No. Records	% Records
Buses & Coaches (excluding Minibus)	Bus	83,251	1.0%
Cars	Car	7,313,319	84.5%
Goods – Light	LGV	946,865	10.9%
Buses & Coaches (Minibus only)	Minibus (MNB)	24,578	0.3%
Motorcycles, Mopeds & Scooters	Motorcycles (MOT)	2,529	0.0%
Goods – Heavy	OGV	211,395	2.4%
Agricultural Not Recorded Others Special Purpose Tricycles	Other (OTH)	16,130	0.2%
Taxis	Taxi	53,367	0.6%
Total		8,651,434	100%

2.3 Breakdown by Registered Location

2.3.1 From the postcode sector relating to the registered address, vehicles have been categorised as being based either within GM or elsewhere. This breakdown is shown in **Table 2-3**.

2.3.2 Overall 72% of vehicles operating within GM are registered within GM. For freight vehicles this proportion is significantly lower with only around 50% of vehicles registered in GM. However, it is recognised that for commercial vehicles, including freight, the potential for a difference between the operational location versus the registered location is also greater than for private vehicles, with vehicle fleets operating regionally. This does however mean that a greater number of non-compliant vehicles are potentially in-scope for a penalty charge although frequency of visits would also need to be estimated too.

Table 2-3. ANPR Data by Vehicle Type by Registered Location

DVLA Body Type	GM Records	Non-GM Records	% GM	% Non-GM
Car	5,527,598	1,785,721	76%	24%
LGV	502,108	444,757	53%	47%
OGV	77,599	133,796	37%	63%
Bus	68,943	14,308	83%	17%
Taxi	51,748	1,619	97%	3%
MNB	20,769	3,809	85%	15%
MOT	493	2,036	19%	81%
OTH	3,597	12,533	22%	78%
Total	6,252,855	2,398,579	72%	28%

2.4 Breakdown by Vehicle and Fuel type

2.4.1 Vehicle types have been further broken down by fuel type with the distribution shown in

2.4.2 as follows:

- (P): Petrol;
- (D): Diesel;
- (E): Electric;
- (HE): Hybrid Electric; and
- (O): Other¹

¹ including Steam; Gas; Petrol/Gas; Gas Bi-Fuel; Gas Diesel; Electric Diesel; New Fuel Technology

Table 2-4. ANPR Data by Vehicle Type and Fuel Type

Fuel Type	Vehicle Category	No. Records	% Records	% Vehicle Category	Vehicle Category	No. Records	% Records	% Vehicle Category
Petrol	Car	3,666,903	42.4%	50.1%	TAXI	-	-	-
Diesel		3,412,144	39.4%	46.7%		52,940	0.6%	99.2%
Electric		13,085	0.2%	0.2%		-	-	-
Hybrid Electric		212,271	2.5%	2.9%		427	0.0%	0.8%
Other		8,916	0.1%	0.1%		-	-	-
Petrol	LGV	4,533	0.1%	0.5%	MNB	84	0.0%	0.3%
Diesel		941,432	10.9%	99.4%		24,482	0.3%	99.6%
Electric		592	0.0%	0.1%		-	-	-
Hybrid Electric		17	0.0%	0.0%		-	-	-
Other		291	0.0%	0.0%		12	0.0%	0.0%
Petrol	OGV	10	0.0%	0.0%	MOT	2,522	0.0%	99.7%
Diesel		211,217	2.4%	99.9%		1	0.0%	0.0%
Electric		45	0.0%	0.0%		6	0.0%	0.2%
Hybrid Electric		-	-	-		-	-	-
Other		123	0.0%	0.1%		-	-	-
Petrol	Bus	34	0.0%	0.0%	OTH	208	0.0%	1.3%
Diesel		83,022	1.0%	99.7%		15,648	0.2%	97.0%
Electric		15	0.0%	0.0%		92	0.0%	0.6%
Hybrid Electric		-	-	-		163	0.0%	1.0%
Other		180	0.0%	0.2%		19	0.0%	0.1%

2.5 Breakdown by Vehicle Type and Compliance

2.5.1 Vehicle compliance has been defined following JAQU guidelines and based on the European Emissions Standard estimated for each ANPR record, not those supplied by the DVLA (which are also only estimated). Euro Standards have been defined for each record based on (i) the year of manufacture of the vehicle or (ii) the year of first registration of the vehicle, where (i) was not available.

2.5.2 Compliance of vehicles varies depending on the fuel type as set out below:

- Euro 4: Petrol Cars, LGV, Minibuses and Taxis;
- Euro 6: Diesel Cars, LGV, Minibuses and Taxis;
- Euro 3: Motorcycles;
- Euro VI: Buses/Coaches and OGV; and
- Electric Vehicles.

- 2.5.3 For the purposes of initial reporting, hybrid electric vehicles have been considered compliant although compliance will ultimately depend on the level of emissions. Other fuel types, not included in this list, have been considered to be compliant from Euro 6/VI standards for simplification.
- 2.5.4 **Table 2-5** presents the level of compliance observed within the fleet captured by the ANPR survey. The data shows that there is a majority of non-compliant vehicles in the Taxi, LGV, Minibus, OGV and Bus/Coach categories currently operating in Greater Manchester through the sites surveyed.

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Table 2-5. ANPR Data by Vehicle Type and Compliance (2019)

Fuel Type	Vehicle Category	Compliant	Non-Compliant	Vehicle Category	Compliant	Non-Compliant
Petrol	CAR	89%	11%	TAXI	-	-
Diesel		39%	61%		13%	87%
Electric		100%	0%		-	-
Hybrid Electric		100%	0%		100%	0%
Others		28%	72%		-	-
TOTAL		66%	34%		13%	87%
Petrol		LGV	58%		42%	MNB
Diesel	40%		60%	12%	88%	
Electric	100%		0%	-	-	
Hybrid Electric	100%		0%	-	-	
Others	1%		99%	0%	100%	
TOTAL	40%		60%	12%	88%	
Petrol	OGV		0%	100%	MOT	
Diesel		60%	40%	100%		0%
Electric		100%	0%	100%		0%
Hybrid Electric		-	-	-		-
Others		89%	11%	-		-
TOTAL		60%	40%	67%		33%
Petrol		BUS	0%	100%		OTH
Diesel	23%		77%	36%	64%	
Electric	100%		0%	100%	0%	
Hybrid Electric	-		-	100%	0%	
Others	100%		0%	21%	79%	
TOTAL	23%		77%	36%	64%	

2.5.5 The same methodology previously used at the OBC stage has been applied to project the new dataset forward to 2023 to estimate the levels of non-compliance that would be expected to be observed in 2023. The results of this forecast are presented in **Table 2-6**. (This analysis excludes the impacts of taxi minimum standards proposals).

Table 2-6. ANPR Data by Vehicle Type and Compliance (2023)

Fuel Type	Vehicle Category	Compliant	Non-Compliant	Vehicle Category	Compliant	Non-Compliant
Petrol	CAR	98%	2%	TAXI	-	-
Diesel		72%	28%		48%	52%
Electric		100%	0%		-	-
Hybrid Electric		100%	0%		100%	0%
Others		54%	46%		-	-
TOTAL		86%	14%		49%	51%
Petrol	LGV	77%	23%	MNB	26%	74%
Diesel		71%	29%		30%	70%
Electric		100%	0%		-	-
Hybrid Electric		100%	0%		-	-
Others		4%	96%		0%	100%
TOTAL		71%	29%		30%	70%
Petrol	OGV	0%	100%	MOT	78%	22%
Diesel		84%	16%		100%	0%
Electric		100%	0%		100%	0%
Hybrid Electric		-	-		-	-
Others		93%	7%		-	-
TOTAL		84%	16%		78%	22%
Petrol	BUS	15%	85%	OTH	7%	93%
Diesel		56%	44%		73%	27%
Electric		100%	0%		100%	0%
Hybrid Electric		-	-		100%	0%
Others		100%	0%		26%	74%
TOTAL		56%	44%		73%	27%

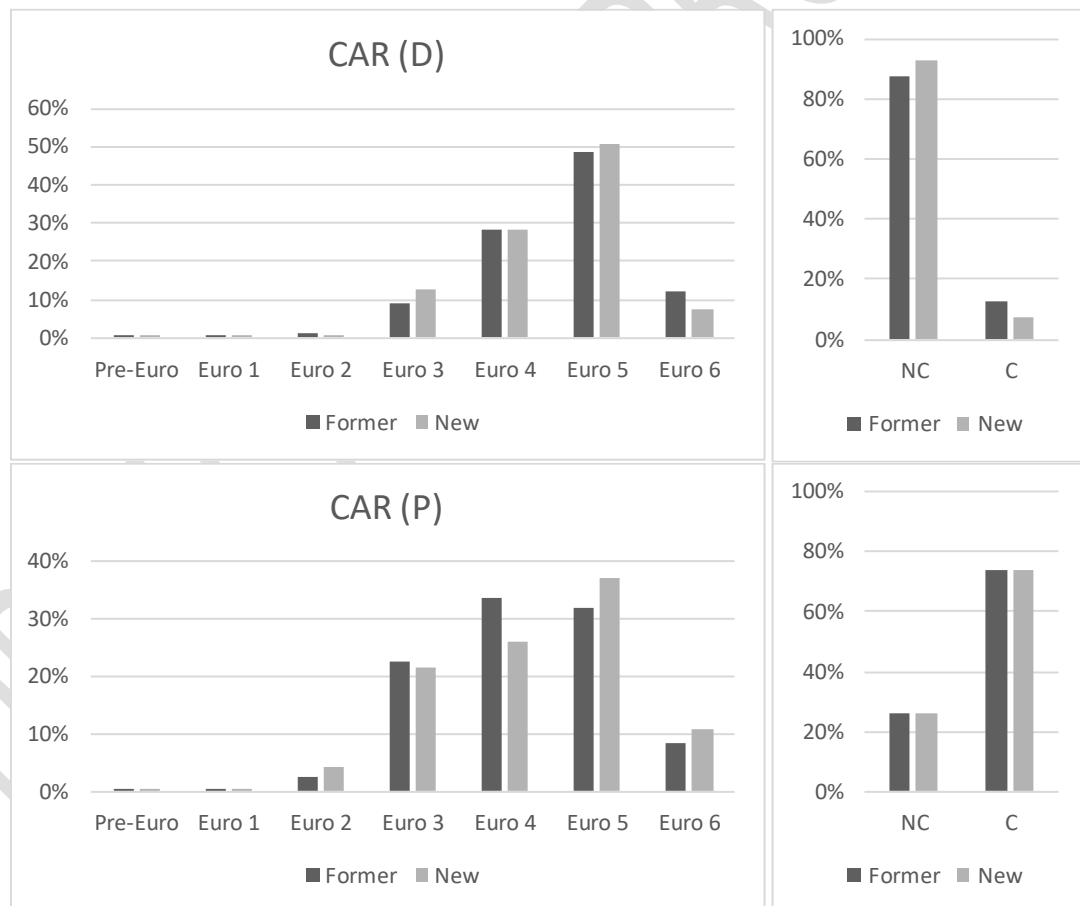
2.6 Comparison to previous dataset

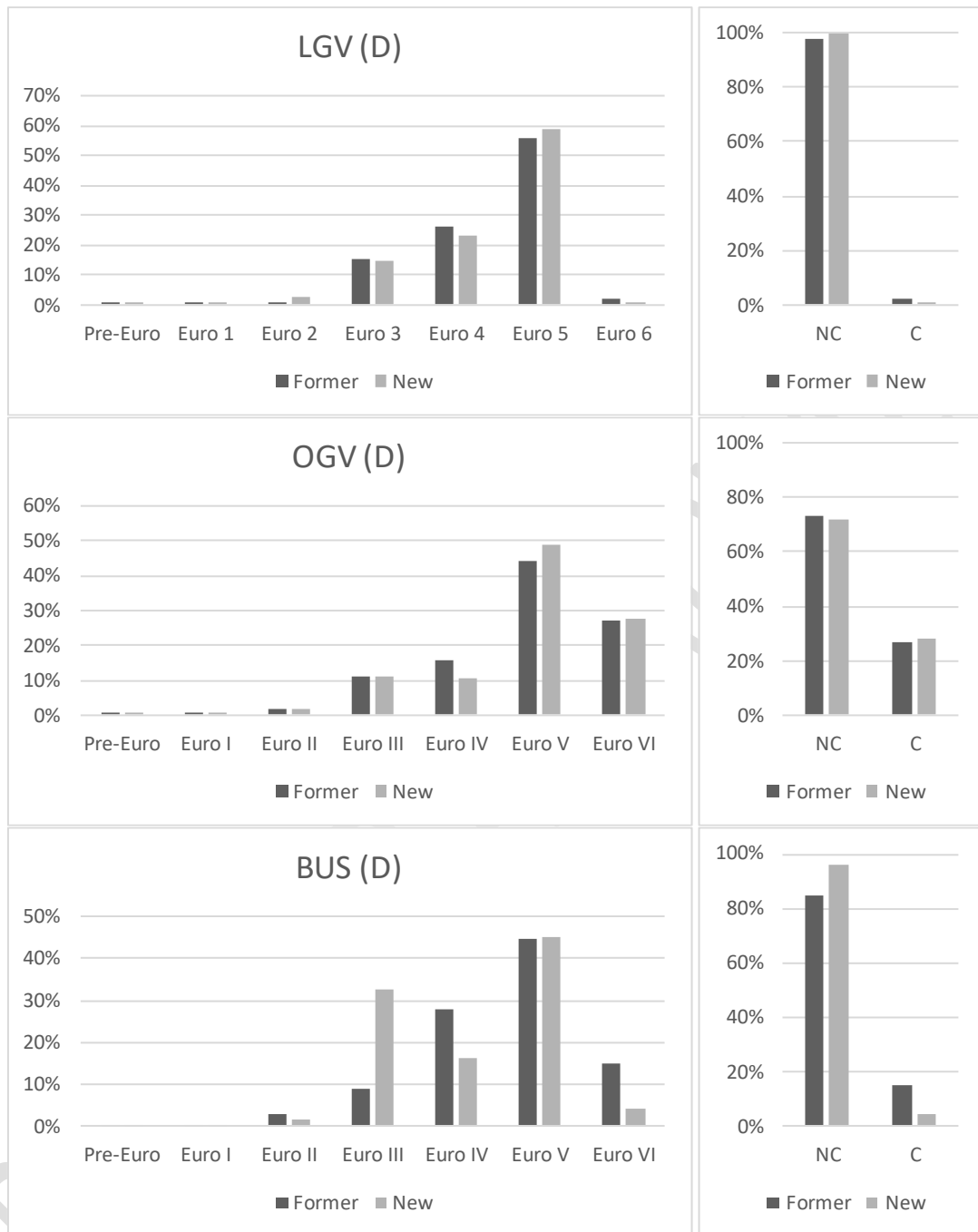
2.6.1 The new dataset age profile was compared to the outputs from the dataset previously used at the OBC stage which was projected from a 2016 ANPR dataset. The same roll-over methodology used to forecast compliance levels in 2023 was used to backcast the 2019 dataset to 2016 to allow a comparison with the earlier dataset.

2.6.2 A comparison between the original 2016 dataset and the backcast 2019 dataset is contained in the charts in **Figure 2-1**. Overall these charts demonstrate a similar level of compliance in both sets of data and variations are less than 5% (Car Diesel), though in most cases less than 2%, in the backcasting process.

2.6.3 The new data seems to indicate a slightly higher level of non-compliance for Diesel Cars which would be expected given the change in trends of purchasing new diesel cars, though are compensated by improvements in petrol cars. Variations of bus fleet are more likely to be due to systematic changes to sampling locations than for other vehicles types, reflecting the differing fleet ownership of bus operators serving specific routes. Additionally, for the bus emissions modelling, the ANPR fleet mix data was not used to define the fleet, rather TfGM service surveys were used, due to the detailed existing information held by TfGM on the operation of bus services within GM.

Figure 2-1. Comparison of OBC ANPR data (2016) and FBC ANPR data (2019 rolled back to 2016)





3 Conclusions

3.1.1 The new ANPR dataset is considered to be more comprehensive and robust than the data used in the previous (OBC) stage of the GM Clean Air Plan. This is because the survey has been conducted to cover key areas where emissions had previously been estimated to be above legal levels, and has more reliable vehicle classification from cross reference with the DVLA dataset, which was not possible with the GMP data due to data protection reasons.

- 3.1.2 The results show that there are not major differences between observed levels of compliance in the overall GM fleet between the 2016 and 2019 surveys. This provides confidence in the general findings from the OBC stage, and the implications of more contemporary fleet mix data in conjunction with revised guidance of fleet project from JAQU is currently being reviewed.
- 3.1.3 This data set is now being widely used as part of the ongoing work to refine the proposals as part of the FBC development for the CAP.
- 3.1.4 Some of the areas of analysis currently underway as part of that FBC analysis, which the ANPR data will contribute to, include:
- Development of operating cost models for LGVs and HGVs using existing fleet mix as part of the input;
 - Further analysis of the coach market;
 - Further analysis of the private hire (PHV) and hackney carriage market;
 - Further analysis on the number of blue light fleet in operation
 - Potential development of operating cost models for PHV and Hackney;
 - Understanding of non-GM movements; and
 - Linkages to financial and models supporting the FBC.