

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

## Note 36: Representing the funds in the cost models, plus analytical inputs for the Funds/Vehicle Finance Model



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## **COVID-19 Pandemic Statement**

This work has not considered the impact of the COVID-19 pandemic. Whilst we are continuing, where possible, to develop the Greater Manchester Clean Air Plan, the pandemic has already had an impact on our ability to keep to the timescales previously indicated and there may be further impacts on timescales as the impact of the pandemic becomes clearer.

We are also mindful of the significant changes that could result from these exceptional times. We know that the transport sector has already been impacted by the pandemic, and government policies to stem its spread. The sector's ability to recover from revenue loss, whilst also being expected to respond to pre-pandemic clean air policy priorities by upgrading to a cleaner fleet, will clearly require further thought and consideration.

The groups most affected by our Clean Air Plan may require different levels of financial assistance than we had anticipated at the time of writing our previous submission to Government.

More broadly, we anticipate that there may be wider traffic and economic impacts that could significantly change the assumptions that sit behind our plans. We have begun to consider the impacts, and have committed to updating the government as the picture becomes clearer over time.

We remain committed to cleaning up Greater Manchester's air. However, given the extraordinary circumstances that will remain for some time, this piece of work remains unfinished until the impact of the COVID-19 pandemic has been fully considered by the Greater Manchester Authorities.

# 1 Introduction

## 1.1 Overview

1.1.1 Greater Manchester (GM) district authorities have been mandated by the Government to produce a Clean Air Plan (CAP) to set out how they will target and mitigate areas of poor air quality within their boundaries.

1.1.2 Arup and AECOM have been commissioned by Transport for Greater Manchester (TfGM) to develop cost response models in order to test how vehicle owners would react to the proposed Clean Air Zone (CAZ) charge. This technical note aims to describe the approach and methodology followed to represent the funds within these cost response models. The note also explains the supplementary analysis that was prepared to inform the vehicle funds and finance proposals for GM CAP to address two key points:

- How the funds have been represented within the Commercial Vehicles (HGVs and LGVs) and Taxi Cost Models (PHVs/Hackneys); and
- The outputs of the cost models and further analysis which has been prepared.

## 1.2 Structure of the Note

1.2.1 Following this introductory chapter, Section 2 describes how the funds are applied within the vehicle cost models, Section 3 then describes the calculation of the funds requirements from the cost model outputs and analysis developed. There are three appendices which provide supplementary information on the supporting tools.

## 2 Representing the Funds within the vehicle cost models

2.1.1 Cost models were developed to support the GM CAP following the completion of the OBC. These were used to inform the development of the behavioural response assumptions to GM CAP, which were applied in the October 2019 Interim submission of the 'Package for Consultation'. These include:

- Commercial Vehicles Cost Response Model; and
- Taxi (PHV/Hackneys) Cost Response Model.

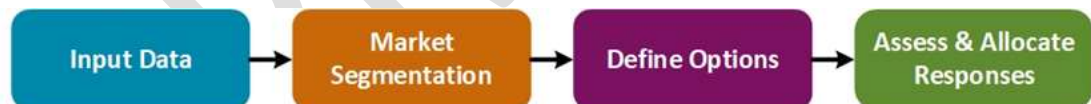
2.1.2 A key functionality within these models was the representation of the vehicle funds (clean freight fund and clean taxi fund), which are proposed in addition to a GM CAZ.

2.1.3 During the preparation of these models, supporting technical notes were prepared which discussed the development of these tools and their functionality. These include:

- Technical Note 7 – Commercial Vehicle Cost Response model; and
- Technical Note 30 – Taxi/PHV Cost Response model.

2.1.4 An overview of the methodology of the models from input data through to the vehicle owner responses, is described in the supporting technical notes, outlined in **Figure 2.1** below.

**Figure 2.1 Model methodology**



2.1.5 Each of the steps outlined within **Figure 2.1** are summarised below. This process is explained in greater detail within each of the supporting technical notes.

- **Input data** - the inputs available to the model to determine the number of vehicles that would be impacted by the CAZ. Across the different cost response models, ANPR data and vehicle registration lists, published by the Driver and Vehicle Licensing Agency (DVLA), provided the core information;
- **Market segmentation** - segmenting the market allows the model to allocate vehicle owners to different decisions/responses. The levels of segmentation are dependent on the amount of data inputted for each of the modes;
- **Define options** - a list of possible responses to CAZ have been identified which aims to capture a high percentage of the actual responses to the market; and

- **Assess and allocate responses** - a cash flow model was applied to determine the cost/value of each option to estimate the most financially beneficial for the vehicle owner. With outputs including the number of vehicles and how they would respond to the GM CAP.

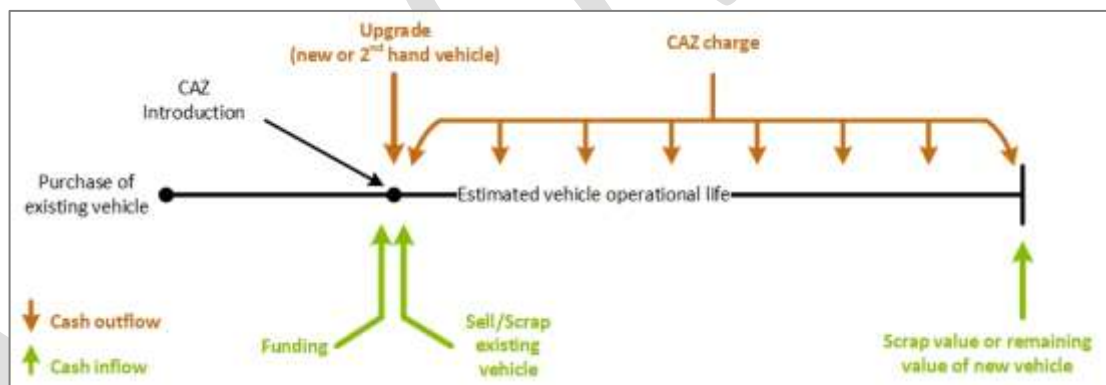
2.1.6 Whilst these notes provide a general overview of the two models, the focus of this technical note is to provide additional description relating to the key functionality of the model in relation to the funds. The section below discusses this further.

## 2.2 Overview of the approach to incorporate the funds within the Cost Models

2.2.1 A funding input function is built into the existing Commercial Vehicles and Taxi Cost models to enable the inclusion of a grant value to reflect any future financial assistance schemes which may form part of the wider CAP. These are reflected in the model in the form of a discount on the perceived purchase / upgrade price of a vehicle.

2.2.2 **Figure 2.2** summarises the financial decision process involved within the cost models to represent the inclusion of additional financial assistance.

**Figure 2.2 – Overview of representation of financial assistance in the cost models**



2.2.3 As shown **Figure 2.2**, the cost models take account of a range of financial considerations when representing the CAP and determining how vehicle owners are likely to respond. This is supported in the model with the following financial options:

- Selling and releasing the residual value of an existing non-compliant vehicle;
- It is also possible that some non-compliant vehicles will be scrapped to limited further lifespan;

- Purchase a new vehicle equivalent to the one being replaced. In the case of commercial vehicles, this could also include replacing the vehicle with a slightly different sized vehicle to improve efficiency in vehicle operations within GM and could include 'upsized' or 'downsized' options. In the case of some LGVs, this might include the downsizing to an estate car which isn't subject to the CAZ charges;
- Retrofit (though the funding impact of this option is not currently assessed by the cost models);
- CAZ charge related impacts, which might vary by how the vehicle owner responds; and
- The addition of financial assistance also forms a key input. This is in the form of a grant against the purchase price of a compliant vehicle.

2.2.4 As a result of all the financial options available, vehicle owners respond by either:

- Retain non-compliant vehicle, and 'Stay and Pay' the CAZ charge;
- Purchase a compliant upgrade vehicle (either equivalent or by upsizing or downsizing);
- The purchase of an electric vehicle is available for taxis (PHV & Hackneys), and vehicle retrofit is also an option for Hackneys;
- Change of business mode, which might include changing the frequency of operation within Greater Manchester due to the CAZ charge or choosing not to operate in GM; and
- Within the taxi modelling - leasing a vehicle is an alternative option.

2.2.5 Where vehicle owners upsize & downsize, or change business model, it is likely that this also results in a change in frequency of operation, which could affect the amount of applicable CAZ charge. For LGVs and HGVs, the Demand Sifting Tool assigns responses to 'Change Mode' which refers to when vehicle owners change from an LGV to an Estate Car or from a HGV to an LGV to reduce their CAZ charge payments in response to the CAZ. Where a change is made to upgrade to a vehicle type in scope, this response is deemed to 'Pay Charge' within the model<sup>1</sup>.

2.2.6 The financial impacts are brought together in present values (incorporating impacts of inflation/deflation). Where funding is applied, this is introduced in the same year as the CAZ is introduced for that mode.

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<sup>1</sup> 'Pay Charge' not applicable for downsizing LGVs to an estate car as GM CAZ charge does not include cars.

2.2.7 The funds offset against the other cost implications of the CAP, identifying the most attractive cost impact for the vehicle owner. This result is a change in the behavioural responses when the financial support is introduced. This also impacts on the number of vehicles which are likely to respond to the CAP.

## 2.3 Funding Inputs

2.3.1 The cost models include the ability to input different grant levels depending on which part of the fleet the grant applies too. For example, grant levels within the model vary by:

- Vehicle weight type for LGVs and HGVs;
- The upgrade to equivalent Euro 6 or Zero Emissions Compatible (ZEC) vehicles;
- For taxis, grants can be applied separately for Hackneys and PHVs. Also, in assessing the financial impacts for Hackneys, the Hackneys are further divided into London style and Non-London style hackneys which have very different purchase and running costs; and
- The application of the grant values can also be limited by organisation size, such as small and micro businesses, euro standard and businesses that are based/licensed in GM (mode dependent).

## 2.4 Outputs

2.4.1 The outputs for the cost models are:

- Behavioural responses, which identify how the vehicle fleet are likely to change due to the introduction of the CAZ plus funds;
- The resultant number of non-compliant vehicles, by mode following the intervention; and
- The number of vehicles upgrading to compliant as a result of the intervention, with the change to the number of overall compliant vehicles serving GM.

2.4.2 Whilst the cost model outputs vehicle information at the aggregate level, the supporting evidence behind the model, such as fleet composition (by commodity type), can be exported for certain categories to allow further disaggregation. This includes the vehicle numbers for certain sizes of business.

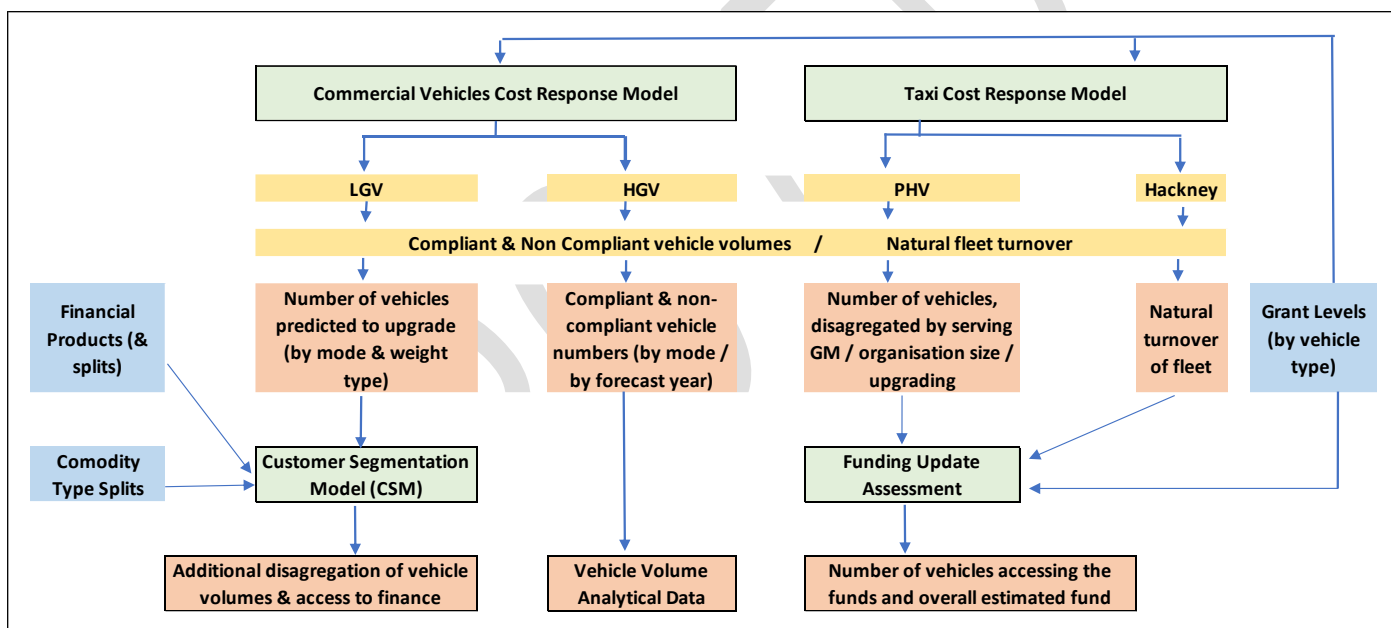
### 3 Relevant analytical inputs for the Funds/Vehicle Finance Model

#### 3.1 Overview

3.1.1 The Commercial Vehicles and Taxi Cost response models have generated a series of output analyses which have been incorporated into the estimation of the financial assistance for vehicle owners, to support the introduction of the CAP and have been assessed within the Funds/Vehicle Finance Modelling. This has primarily considered the changes in vehicle volumes due to various tests from the cost model.

3.1.2 An overview of the linkages of data between the cost models and the funds are summarised in **Figure 3.1**.

#### 3.1.3 **Figure 3.1 – Overview of the key Data**



This section discusses the additional analytical data analysis which are based on outputs of the cost response models and form input to the assessment of the funds by the Vehicle Finance project CAP team. This section discusses the following:

- Supplementary Volumetric Analysis;
- Customer Segmentation Model; and
- Funding Uptake Assessment Tool.

#### 3.2 Volumetric Analysis to inform the assessment of funding requirement

3.2.1 The cost models include a breakdown of the vehicle fleet to understand how these are impacted by the CAZ and funds. This includes disaggregating the fleet into different categories. These include:



- Disaggregation by intensity of operation – the typical number of days per year vehicles are expected to operate. This allows a review of the impact of funding against the CAZ charge, though has also been used to forecast CAZ revenue forecast for non-compliant vehicles choosing not to upgrade (including those not eligible for funding who decide to Stay and Pay);
- Assessment of scrappage or no scrappage if utilising the funds (noticing that the October 2019 package included the requirement for scrappage, though this has since been removed);
- Fleet serving Greater Manchester – those vehicles operating within Greater Manchester;
- GM registered – those vehicles registered to an address within Greater Manchester;
- The proportion of vehicles belonging to Small and Medium Enterprises (SME) / Small and Micro businesses (SMi).
- For commercial vehicles – additional disaggregation by weight category and by commodity type; and
- For taxis vehicles – split by operation type, e.g. Hackney Carriages and Private Hire Vehicles (PHV).

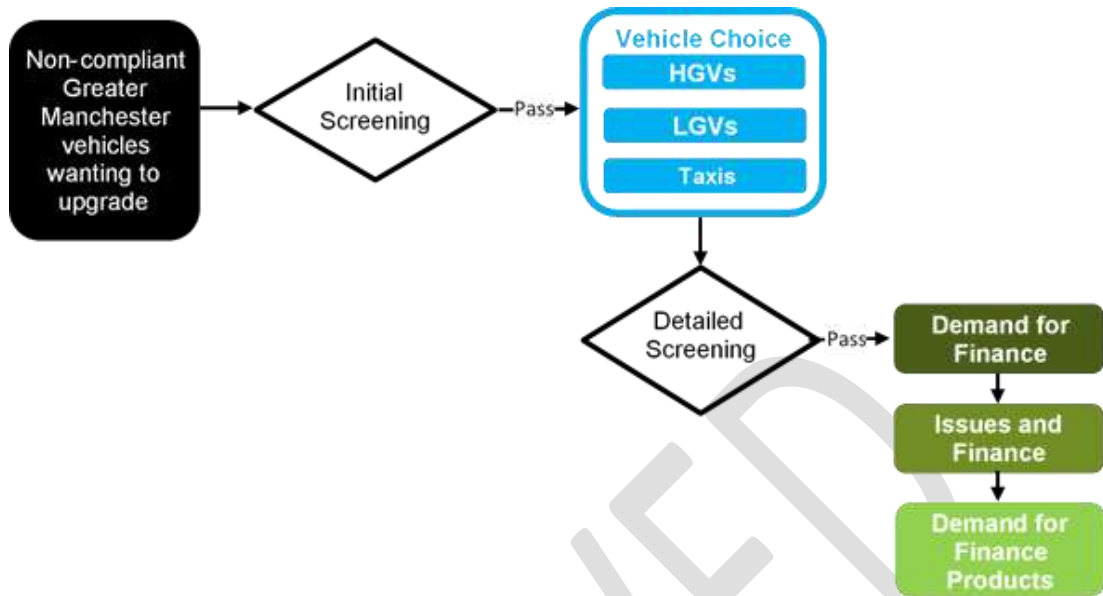
3.2.2 These categories enable the identification of the fleet proportion that is eligible for funding and is likely to apply for funding. This is produced for the different years represented in the modelling. In addition, this also includes the projection and natural turnover of the vehicle fleet which could potentially utilize the funds in the years where available.

### 3.3 Customer Segmentation Model Tool

#### **Overview**

3.3.1 As part of the supplementary analysis to the cost response models, the Customer Segmentation Model (CSM) tool has been developed. This tool uses vehicle numbers from the Commercial Vehicles and Taxi Cost Response models and applies various factors from other vehicle fleet and commodity type commercial vehicle data sources (which are utilised by the cost models) and calculates the disaggregated demand for various finance products. The overall process is illustrated in **Figure 3.2**.

**Figure 3.2 Customer Segmentation Model Process**



### Key Inputs

3.3.2 The key input to the CSM are the number of vehicles outputted from the vehicle cost response models which responded to the CAP. This includes the disaggregation by weight type for HGV/LGV, and by vehicle type for taxis (PHV / Hackneys). Vehicle volumes are also disaggregated based on the following criteria (scenarios):

- Determine if scrappage is required to access financial assistance (at the time of preparing the October submission, scrappage was required though this is no longer the case); and
- Organisation size eligibility e.g. Small/SME and Micro businesses.

3.3.3 Vehicle volumes are presented for the year the CAZ starts to apply for that vehicle type (e.g. LGVs and WAV Hackneys are exempt until 2023).

3.3.4 **Appendix A** provides a summary of the inputs which are an output from the cost response models.

3.3.5 Initial screening assumptions are applied on when each of the HGV, LGV, PHV and hackney vehicles will be applied within the model.

3.3.6 Six finance product categories have been used within the CSM which are shown in **Table 3.1**. The percentages show the proportion of upgrading vehicles that are assumed to fall into each of these categories.

**Table 3.1 - Financial Products Applied and percentage impact**

No.	Business impact/barrier to upgrade	Mitigation	Target market	Estimate	Percentage
1	Lack of deposit	Reduce deposit required	Old vehicle owners	3 <sup>rd</sup> hand owners	n/a
2	Higher depreciation expense	Reduced monthly repayments	Old vehicle owners	3 <sup>rd</sup> hand owners	n/a
3	Lack of creditworthiness proof	Widen acceptance criteria	New entrants (% of the market)	One year worth of sales/scraps	10%
4	Long term commitment	Increased flexibility	New entrants/old vehicle owners	3 <sup>rd</sup> hand owners	n/a
5	Unredeemable sunken costs	Support retrofit schemes (engine or bodywork)	Newer customised vehicle market	2 <sup>nd</sup> hand customised or expensive vehicle owners	20%
6	Loss of vehicle value due to market distortion	Discounted finance and easier trade-in for NC vehicles	Newer vehicles	2 <sup>nd</sup> Hand vehicle owners	20%

3.3.7 Other key inputs to the CSM include the segmentation of commercial vehicles by commodity type, based on the vehicle weight classification. The assumptions were based on the Specialised Goods Vehicle Counts (SGVCs), adjusted to Greater Manchester. These are shown in **Appendix A**.

3.3.8 Further evidence on the disaggregation of vehicles by type is provided based on SMMT data and DfT data on HGV type populations (2018), see **Appendix A** for breakdowns.

### **Model Process and Calculations**

3.3.9 The CSM runs a series of processes to disaggregate the vehicle fleet into more detailed subcategories and is undertaken separately by vehicle mode. This includes the following approach:

- Firstly, the CSM model selections are applied, which include the selection of in-scope vehicles and input assumptions;
- The model then applies a breakdown of vehicles by commodity type (LGVs & HGVs), which is applied separately by weight category;
- The vehicles are then re categorised by more detailed vehicle classifications from the SGVC to determine the number of vehicles in each category that are due to upgrade; and
- Finally, the upgrading vehicle volumes are disaggregated by those that fall into the categories for financial products identified in **Table 3.1**.

## Key Outputs

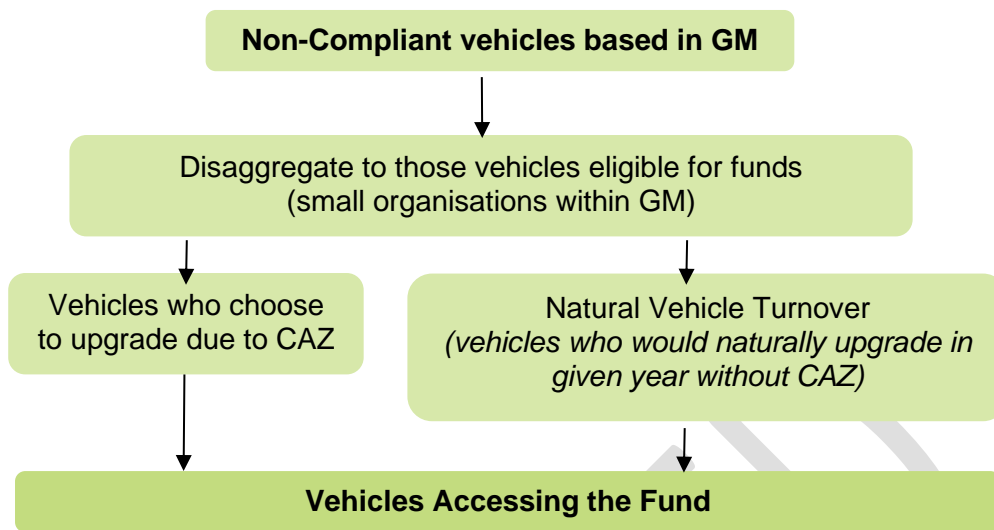
- 3.3.10 The output of the CSM are details of the number of upgrading vehicles eligible for finance, disaggregated further than the summary values reported in the cost response models for commercial vehicles and taxis.
- 3.3.11 For commercial vehicles (HGV/LGV), this includes the following vehicle types for freight (which are further disaggregated by weight category):
- Panel Van;
  - Box HGV;
  - Pickup truck;
  - Refrigerated vehicle;
  - Custom/specialized vehicle;
  - Waste lorry; and
  - Articulated vehicle.
- 3.3.12 For taxis, these maintain the splits from the cost response models of PHV, London style Hackney, and Non-London style hackney.
- 3.3.13 In addition to the vehicle volumes, relevant cost information for new and used vehicles (at 4 years old) is provided for each disaggregated vehicle type based on vehicle purchase cost research.
- 3.3.14 Detail of the outputs of the CSM are provided in **Appendix A**.

## 3.4 Fund Uptake Assessment Tool

### Overview

- 3.4.1 Outputs of the cost models are inputs into the Fund Update Assessment tool which assesses the levels of grant against the number of in-scope vehicles to consider the funding allocation for each vehicle type. The tool was then used by the project teams, in combination with other information, to determine a suitable level of funding requirement to support GMCAP. **Figure 3.3** shows the processes followed within the tool. The remainder of **Section 3.4** discusses this tool in more detail, considering key inputs, processes and outputs of the assessment.

**Figure 3.3 – Overview of Funding Update Assessment Tool**



### Inputs

3.4.2 The key inputs to the tool are the output responses from the Commercial Vehicles and Taxi cost models. These include the resultant vehicle volumes (2021 and 2023 analysis) which are disaggregated as follows:

- Vehicles based in GM;
- Non-compliant vehicles based in GM;
- Belonging to small organisations;
- Choosing to upgrade; and
- Expected to access the funds.

3.4.3 The assessment tool includes the equivalent for micro business as an alternative to small organisations. In addition, the assessment also considers the scenario of scrappage required and scrappage not required (which are both assessed by the cost models, though the current preferred funding solution does not include a requirement for vehicle scrappage in order to access the funds.)

3.4.4 Another input to the assessment is the natural fleet turnover. This is because in the period of funding being available there will also be a number of vehicles being naturally replaced and these vehicle owners could utilise the GM-CAP funding if they meet the eligibility criteria. This includes the number of vehicles that are naturally expected to change from non-compliant to compliant in each of the assessment years. This includes details for those that belong to small organisations and micro businesses (those that would qualify to access the funds).

## Process

- 3.4.5 The assessment process, as summarised in **Figure 3.2**, brings together the vehicle volumes responding to GM-CAP (discussed above). This includes those identified in the cost response models as responding to the CAP, and the background natural turnover of vehicles which are expected to respond regardless of the CAP.
- 3.4.6 The tool then applies the grant level to the number of in-scope vehicles to identify the level of funding if serving the full number of in-scope vehicles. These are then reviewed against the funding allocations identified to check alignment with the policy and funding ask from JAQU, to ensure the tools align with the funding levels identified by TfGM to support GM CAP.

## Assumptions

- 3.4.7 The cost model is based on all users responding to the CAZ & funds at the point of introduction of the scheme. It is highly likely that uptake will be spread across the funding availability period and that even after the introduction of the CAZ, there could be a lag time before all vehicle owners respond and take up available funds. As a result, three assumptions have been included, these assume:
- 20% of non-compliant vehicle owners will delay upgrading in order to receive funding;
  - 50% of those non-compliant vehicle owners who will upgrade, due to the implementation of the CAZ, do so after the implementation period; and
  - 50% of those non-compliant vehicle owners who will upgrade, due to the implementation of the CAZ, do so in the year prior to implementation.
- 3.4.8 Note, these are options within the funding assessment spreadsheet – which may be varied by the user.

## Outputs

- 3.4.9 A summary of the funding requirement to serve the in-scope fleet is provided by vehicle type with the option of scrappage or no scrappage and identifying those who might respond to vehicle finance.
- 3.4.10 **Appendix B** provides details of the key outputs from the funding update assessment that was used to inform the allocation of the funds.

## 3.5 Dataset of Non-Compliant vehicle numbers Projection

- 3.5.1 An additional input to the analysis of the funds are the volumetric data on the vehicle numbers for each vehicle type (discussed in **section 3.2**). This includes details of the compliant and non-compliant fleets.

3.5.2 To understand the number of chargeable trips so as to inform revenue forecasts for the CAZ, data from the cost model for Non-Compliant vehicle and annual chargeable trips (based on Cost Model frequency assumptions) was identified and extracted from the cost models. This determined the number of non-compliant vehicles which remain following the introduction of the CAZ, and CAZ plus funds.

3.5.3 This included:

- Number of unique vehicles, in particular the remaining non-compliant vehicle numbers after the introduction of the CAZ + funds;
- Split of the fleet into frequency of travel:
  - For LGV/HGV this was low and high frequency.
  - For PHVs/Hackneys this was based on intensity of taxi operation from occasional to intensive usage;
- Annualisation factors were identified based on vehicle usage to assess typical days of operation per week and the number of weeks per year the vehicles are typically expected to operate within Greater Manchester; and
- The annual vehicle volumes were identified and projected over the proposed lifespan of the project.

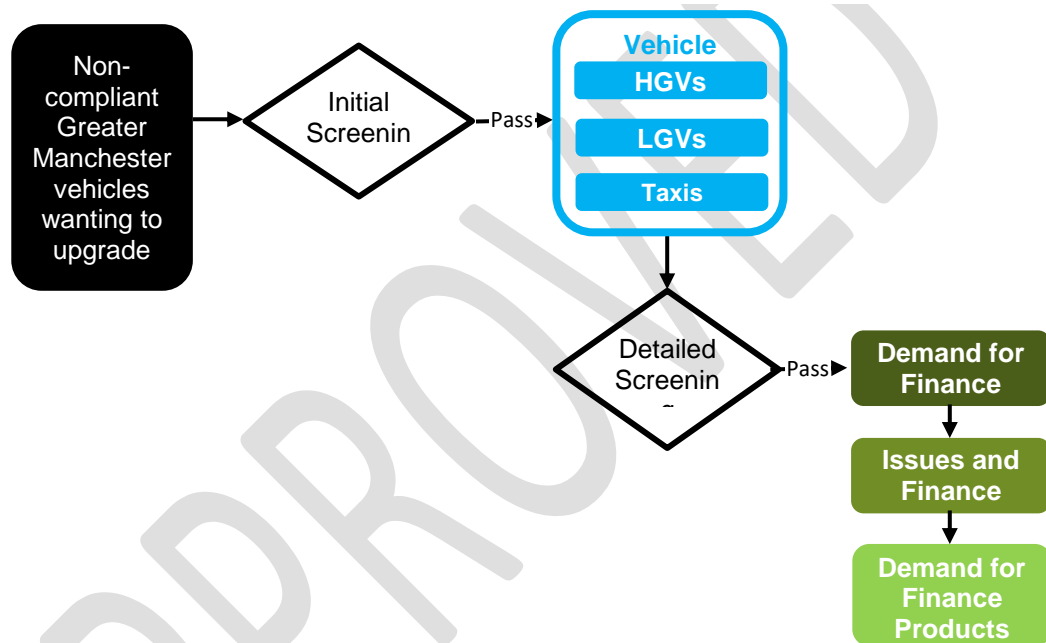
3.5.4 **Appendix C** provides a more detailed description of this analysis, including details of the number of non-compliant vehicles and number of CAZ 'chargeable' days for those non-compliant vehicles.

## Appendix A – Customer Segmentation Tool

### Overview

As part of the analysis, the Customer Segmentation Model tool has been developed which uses the vehicle numbers from the Commercial Vehicles and Taxi Cost models and applies various factors from other data sources and calculates the demand for various finance products. The overall process is illustrated in the Figure below.

Figure A1 Customer Segmentation Model Process



### Vehicle Numbers

The vehicle volumes have been extracted from the Commercial Vehicles Cost Response Model, this includes alternative datasets to be selected between scrappage requirement and business size. The vehicle numbers are shown below. These include modelled disaggregation of the fleet by upgrade to new, 2<sup>nd</sup> hand and third hand vehicles.



**Table A1 Freight vehicles (HGVs - 2021, LGVs - 2023)**

Vehicle Type	Gross Weight	Modelled			
		No Funds		With Funds	
		New	2 <sup>nd</sup> Hand	New	2 <sup>nd</sup> Hand
LGV	1.6	-	3,494	-	11,210
	3.5	-	19,840	-	35,207
HGV	7.5	1	1,000	1	1,021
	18	1	1,321	1	1,321
	26	-	667	-	667
	32	-	726	-	726
	44	-	355	-	355
From 3 <sup>rd</sup> Hand owners only					
LGV	1.6	-	934	-	5,680
	3.5	-	3,868	-	17,456

Vehicle Volumes output from Commercial Vehicles Cost Response Model. Values based on first year CAZ applies (2021 HGVs, 2023 LGVs)

**Table A2 Freight vehicles – Scrappage Required**

Vehicle Type	Gross Weight	Small / SME			
		No Funds		With Funds	
		New	2 <sup>nd</sup> Hand	New	2 <sup>nd</sup> Hand
LGV	1.6	-	3,494	-	7,866
	3.5	-	19,840	-	32,915
HGV	7.5	1	1,000	1	1,021
	18	1	1,321	1	1,321
	26	-	667	-	667
	32	-	726	-	726
	44	-	355	-	355
From 3 <sup>rd</sup> Hand owners only					
LGV	1.6	-	934	-	5,227
	3.5	-	3,868	-	16,943

Vehicle Volumes output from Commercial Vehicles Cost Response Model. Values based on first year CAZ applies (2021 HGVs, 2023 LGVs)

**Table A3 Freight vehicles – Scrappage not Required**

Vehicle Type	Gross Weight	Small / SME			
		No Funds		With Funds	
		New	2 <sup>nd</sup> Hand	New	2 <sup>nd</sup> Hand
LGV	1.6	-	3,494	-	11,210
	3.5	-	19,840	-	35,207
HGV	7.5	1	1,000	1	1,021
	18	1	1,321	1	1,321
	26	-	667	-	667
	32	-	726	-	726
	44	-	355	-	355
From 3 <sup>rd</sup> Hand owners only					
LGV	1.6	-	934	-	5,680
	3.5	-	3,868	-	17,456

Vehicle Volumes output from Commercial Vehicles Cost Response Model. Values based on first year CAZ applies (2021 HGVs, 2023 LGVs)

The Hackney volumes have been extracted from the Taxi Cost Models which are shown in the tables below.

**Table A4 Hackney Cabs (with Funds - 2023)**

Vehicle Type	Euro 6		Electric		Retrofit
	New	2 <sup>nd</sup> Hand	New	2 <sup>nd</sup> Hand	
Hackney	-	54	233	-	156
Non-London Hackney	2	222	190	-	-
From 3 <sup>rd</sup> Hand owners only					
Hackney	-	40	117	-	21

Source: Hackney Cost Model - Number of vehicles estimated to upgrade after funding is applied that are registered in Greater Manchester

**Table A5 Hackney Cabs – Scrapping Required**

Vehicle Type	Euro 6		Electric		Retrofit
	New	2 <sup>nd</sup> Hand	New	2 <sup>nd</sup> Hand	
Hackney	-	56	201	-	172
Non-London Hackney	2	237	170	-	-
From 3 <sup>rd</sup> Hand owners only					
Hackney	-	40	117	-	21

Source: Taxis Cost Response Model

**Table A6 Hackney Cabs – Scrapping not Required**

Vehicle Type	Euro 6		Electric		Retrofit
	New	2 <sup>nd</sup> Hand	New	2 <sup>nd</sup> Hand	
Hackney	-	54	233	-	156
Non-London Hackney	2	222	190	-	-
From 3 <sup>rd</sup> Hand owners only					
Hackney	-	40	117	-	21

Source: Taxis Cost Response Model

The Private Hire Vehicles (PHV) volumes have been extracted from the Taxi Cost Models which are shown in the tables below.

**Table A7 Private Hire Vehicles (with Funds - 2021)**

Vehicle Type	Euro 6		Electric		Retrofit
	New	2 <sup>nd</sup> Hand	New	2 <sup>nd</sup> Hand	
Private Hire	-	2,531	1,554	-	-

Source: PHV Cost Model - Number of vehicles estimated to upgrade after funding is applied that are registered in Greater Manchester

**Table A8 Private Hire Vehicles – Scrapping Required**

Vehicle Type	Euro 6		Electric		Retrofit
	New	2 <sup>nd</sup> Hand	New	2 <sup>nd</sup> Hand	
Private Hire	-	1,815	1,781	-	-

**Table A9 Private Hire Vehicles – Scrapping not Required**

Vehicle Type	Euro 6		Electric		Retrofit
	New	2 <sup>nd</sup> Hand	New	2 <sup>nd</sup> Hand	
Private Hire	-	2,531	1,554	-	-

## Other Inputs and Assumptions

The following initial screening assumptions are used in the process:

**Table A10 Initial Screening Assumptions**

Vehicles that pass the initial screening	Percentage
HGVs	100%
LGVs	100%
Taxis	100%
3 <sup>rd</sup> Hand only	
LGVs	100%

## Finance Products

The finance products are categorized into six categories which are listed in the table below.

**Table A11 Finance Products**

No.	Business impact/barrier to upgrade	Mitigation	Target market	Estimate	Percentage
1	Lack of deposit	Reduce deposit required	Old vehicle owners	3 <sup>rd</sup> hand owners	
2	Higher depreciation expense	Reduced monthly repayments	Old vehicle owners	3 <sup>rd</sup> hand owners	
3	Lack of creditworthiness proof	Widen acceptance criteria	New entrants (% of the market)	One year worth of sales/scraps	10%
4	Long term commitment	Increased flexibility	New entrants/old vehicle owners	3 <sup>rd</sup> hand owners	
5	Unredeemable sunken costs	Support retrofit schemes (engine or bodywork)	Newer customised vehicle market	2 <sup>nd</sup> hand customised or expensive vehicle owners	20%
6	Loss of vehicle value due to market distortion	Discounted finance and easier trade-in for NC vehicles	Newer vehicles	2 <sup>nd</sup> hand vehicle owners	20%

## Vehicle Segmentation

The analysis has been carried out based on various segmentation data which are listed below and can be selected in the process:

- Market Data
- CAZ Adjusted Data

The splits for vehicle weights and commodity groups for each of the above selections are shown in the following sections.

## Vehicle Segmentation – Market Data

**Table A12 LGVs Segmentation – Market Data**

LGV Commodities	Percentage	3 <sup>rd</sup> Hand Only
Construction	24.4%	53%
Wholesale, retail & repair of motor vehicles	15.8%	9%
Manufacturing	13.1%	8%
Transport & storage	8.8%	5%
Accommodation & food services	8.5%	3%
Information & communication	6.3%	2%
Professional, scientific & technical activities	4.5%	3%
Mining, energy & water supply	4.0%	2%
Public admin. & defence; social security	3.8%	4%
Human health & social work activities	2.1%	2%
Other services	2.0%	2%
Financial & insurance activities	1.9%	1%
Administrative & support services	1.9%	2%
Agriculture, forestry & fishing	1.3%	3%
Real estate activities	0.9%	0%
Education	0.9%	1%

Source: SMMT

**Table A13 HGVs Segmentation – Market Data**

HGV Commodities	7.5	18	26	32	44
Building	24.7%	22.7%	52.4%	85.1%	47.7%
Container	0.0%	0.0%	0.0%	0.0%	1.8%
Drink and Food	11.1%	13.9%	4.3%	0.3%	10.6%
General Haulage	41.0%	25.4%	10.8%	0.9%	21.1%
Manufacturing	4.2%	2.6%	3.3%	0.3%	7.3%
Others	6.1%	4.1%	2.3%	0.2%	2.1%
Retail (Non-food)	5.9%	4.5%	1.5%	0.0%	1.8%
Fuel	0.9%	2.0%	1.8%	1.0%	1.5%
Waste	6.2%	24.8%	23.7%	12.3%	6.0%

Source: London Specialised Goods Vehicle Count survey (SGVC). (SGVS)

## Vehicle Segmentation – CAZ Adjusted Data

**Table A14 LGVs Segmentation – CAZ Adjusted Data**

LGV Commodities	All		3 <sup>rd</sup> Hand	
	No Funds	with Funds	No Funds	with Funds
Construction	19%	36%	34%	53%
Wholesale, retail & repair of motor vehicles	15%	13%	3%	9%
Manufacturing	12%	11%	3%	8%
Transport & storage	8%	7%	2%	5%
Accommodation & food services	12%	7%	13%	3%
Information & communication	8%	5%	8%	2%
Professional, scientific & technical activities	4%	4%	1%	3%
Mining, energy & water supply	6%	3%	11%	2%
Public admin. & defence; social security	3%	4%	6%	4%
Human health & social work activities	2%	2%	3%	2%
Other services	2%	2%	3%	2%
Financial & insurance activities	3%	1%	3%	1%
Administrative & support services	2%	2%	6%	2%
Agriculture, forestry & fishing	1%	2%	2%	3%
Real estate activities	1%	1%	1%	0%
Education	1%	1%	2%	1%

Source: SMMT and LGV Cost Model

**Table A15 HGVs Segmentation (No Funds) – CAZ Adjusted Data**

HGV Commodities	7.5	18	26	32	44
Building	27%	23%	50%	83%	58%
Container	0%	0%	0%	0%	2%
Drink and Food	8%	9%	3%	0%	0%
General Haulage	44%	25%	10%	1%	26%
Manufacturing	3%	2%	2%	0%	0%
Others	5%	3%	2%	0%	2%
Retail (Non-food)	4%	3%	1%	0%	0%
Fuel	1%	2%	2%	1%	2%
Waste	7%	33%	31%	14%	11%

Source: London SGVCs and HGV Cost Model

**Table A16 HGVs Segmentation (with Funds) – CAZ Adjusted Data**

HGV Commodities	7.5	18	26	32	44
Building	26%	23%	50%	83%	58%
Container	0%	0%	0%	0%	2%
Drink and Food	8%	9%	3%	0%	0%
General Haulage	43%	25%	10%	1%	26%
Manufacturing	3%	2%	2%	0%	0%
Others	5%	3%	2%	0%	2%
Retail (Non-food)	4%	3%	1%	0%	0%
Fuel	1%	2%	2%	1%	2%
Waste	9%	33%	31%	14%	11%

Source: London SGVCs and HGV Cost Model

**Table A17 Segmentation by Vehicle Type - HGVs**

Gross Weight	Rigid	Artic
7.5	100%	0%
18	100%	0%
26	97%	3%
32	82%	18%
44	0%	100%

Source: DfT

**Vehicle Choice (Rigid Only)**

The splits for various commodity types and vehicle types are obtained from the Specialised Goods Vehicle Count survey (SGVC).

**Table A18 Vehicle Choice (Rigid Only) - LGVs**

LGV Commodities	Panel	Pickup	Refrigerated	Special/Custom
Construction	60%	20%	0%	20%
Wholesale, retail & repair of motor vehicles	80%	20%	0%	0%
Manufacturing	80%	20%	0%	0%
Transport & storage	60%	10%	10%	20%
Accommodation & food services	20%	0%	80%	0%
Information & communication	80%	0%	0%	20%
Professional, scientific & technical activities	100%	0%	0%	0%
Mining, energy & water supply	60%	20%	0%	20%
Public admin. & defence; social security	80%	0%	0%	20%
Human health & social work activities	80%	0%	20%	0%
Other services	100%	0%	0%	0%
Financial & insurance activities	100%	0%	0%	0%
Administrative & support services	100%	0%	0%	0%
Agriculture, forestry & fishing	10%	90%	0%	0%
Real estate activities	100%	0%	0%	0%
Education	100%	0%	0%	0%

**Table A19 Vehicle Choice (Rigid Only) - HGVs**

HGV Commodities	Standard Rigid (Box)	Refrigerated Rigid	Special/Custom	Waste Lorry
Building	70%	0%	30%	0%
Container	0%	0%	0%	0%
Drink and Food	20%	80%	0%	0%
General Haulage	100%	0%	0%	0%
Manufacturing	70%	0%	30%	0%
Others	100%	0%	0%	0%
Retail (Non-food)	100%	0%	0%	0%
Fuel	0%	0%	100%	0%
Waste	0%	0%	0%	100%

Source Specialised Goods Vehicles Survey

### Calculations - LGVs

The numbers of non-compliant vehicles eligible for finance (choosing to upgrade) are shown in Table .

**Table A20 Number of non-compliant Vehicles Upgrading - LGVs**

Gross Weight	No Funds	with Funds	Percentage (Initial Screening)
<b>1.6</b>	3,494	11,210	100%
<b>3.5</b>	19,840	35,207	100%
<b>3<sup>rd</sup> Hand only</b>			
<b>1.6</b>	934	5,680	100%
<b>3.5</b>	3,868	17,456	100%

Source: Commercial Vehicles Cost Response Model

The percentages from the vehicle segmentation and vehicle choice sections are applied to the “with Funds” volumes in the table above and the results are shown in the tables below.

**Table A21 Allocation of Vehicle Upgrade Demand – LGVs – Market Data**

Gross Weight	Panel	Pickup	Refrigerated	Special/Custom	Total
1.6	7,732	1,509	910	1,058	11,210
3.5	24,284	4,739	2,859	3,324	35,207
<b>3<sup>rd</sup> Hand only</b>					
1.6	3,741	989	192	758	5,680
3.5	11,498	3,038	589	2,330	17,456



**Table A22 Allocation of Vehicle Upgrade Demand – LGVs – CAZ Adjusted Data**

Gross Weight	Panel	Pickup	Refrigerated	Special/Custom	Total
1.6	7,569	1,684	727	1,230	11,210
3.5	23,772	5,288	2,282	3,865	35,207
<b>3<sup>rd</sup> Hand only</b>					
1.6	3,741	989	192	758	5,680
3.5	11,498	3,038	589	2,330	17,456

The results from the above analysis have been compared against the data derived from the SGVC survey that was conducted as part of the CAZ project. The comparison is shown in the table below.

**Table A23 Comparison of the Results - LGVs**

Validation	Model	SGVC
Panel	68%	89%
Pickup	15%	7%
Refrigerated	6%	3%
Custom	11%	1%

### Calculations - HGVs

The numbers of non-compliant vehicles eligible for finance (choosing to upgrade) are shown in **Table A24**.

**Table A24 Number of Non-Compliant Vehicles Upgrading - HGVs**

Gross Weight	No Funds	With Funds	Percentage (Initial Screening)
7.5	1,001	1,023	100%
18	1,322	1,322	100%
26	667	667	100%
32	726	726	100%
44	355	355	100%

Source: Commercial Vehicles Cost Response Model

The percentages from the vehicle segmentation and vehicle choice sections are applied to the volumes in the table above and the results are shown in the tables below.

**Table A25 Allocation of Vehicle Upgrade Demand – HGVs – Market Data**

Gross Weight	Standard Rigid (Box)		Refrigerated Rigid		Special/ Custom		Waste Lorry		Artic	
	No Fund	with Fund	No Fund	with Fund	No Fund	with Fund	No Fund	with Fund	No Fund	with Fund
7.5	674	689	79	81	79	81	58	59	-	-
18	640	640	131	131	106	106	307	307	-	-
26	310	310	20	20	102	102	148	148	18	18
32	367	367	1	1	160	160	83	83	133	133
44	201	201	27	27	53	53	20	20	355	355
Total	2,192	2,206	259	261	501	502	617	618	505	505

**Table A26 Allocation of Vehicle Upgrade Demand – HGVs – CAZ Adjusted Data**

Gross Weight	Standard Rigid (Box)		Refrigerated Rigid		Special/ Custom		Waste Lorry		Artic	
	No Fund	with Fund	No Fund	with Fund	No Fund	with Fund	No Fund	with Fund	No Fund	with Fund
7.5	666	680	64	66	81	82	86	88	-	-
18	588	588	98	98	102	102	406	406	-	-
26	279	279	14	14	94	94	193	193	18	18
32	352	352	1	1	154	154	95	95	133	133
44	203	203	0	0	55	55	36	36	355	355
Total	2,089	2,103	177	179	486	488	817	819	505	505

**Table A27 Comparison of the Results - HGVs**

Validation	Model	SGVC
Standard	51%	59%
Refrigerated	4%	7%
Custom	12%	21%
Waste	20%	9%
Artic	12%	4%

### Vehicle Demand Summary for Commercial Vehicles

Vehicle volumes and cost of purchasing new and used vehicles are summarised in the tables below.

**Table A28 Commercial Vehicles Demand - Market Data**

No.	Freight Vehicles	Upgrading vehicles eligible for finance	from 3rd Hand	Cost (New)	Cost (Used)
<i>Panel Van</i>					
1	<2.5t	7,732	3,741	£15,740	£9,241
2	2.5t-3.5t	24,284	11,498	£23,289	£13,570
<i>BoxHGV</i>					
3	3.5t-12t	689	-	£44,465	£15,902
4	12t-21t	640	-	£66,746	£23,541
5	21t-29t	310	-	£84,461	£29,615
6	29t-38t	367	-	£111,580	£38,913
7	>38t	201	-	-	-
<i>Pickup Truck</i>				20%	20%
8	<2.5t	1,509	989	£18,900	£11,100
9	2.5t-3.5t	4,739	3,038	£27,900	£16,300
<i>Refrigerated</i>				30%	30%
10	<2.5t	910	192	£20,500	£12,000
11	2.5t-3.5t	2,859	589	£30,300	£17,600
12	3.5t-12t	81	-	£57,800	£20,700
13	12t-21t	131	-	£86,800	£30,600
14	21t-29t	20	-	£109,800	£38,500
15	29t-38t	1	-	£145,100	£50,600
16	>38t	27	-	-	-
<i>Custom/Specialised</i>				30%	30%
17	<2.5t	1,058	758	£20,500	£12,000
18	2.5t-3.5t	3,324	2,330	£30,300	£17,600
19	3.5t-12t	81	-	£57,800	£20,700
20	12t-21t	106	-	£86,800	£30,600
21	21t-29t	102	-	£109,800	£38,500
22	29t-38t	160	-	£145,100	£50,600
23	>38t	53	-	-	-
<i>Waste Lorry</i>				30%	30%
24	3.5t-12t	59	-	£57,800	£20,700
25	12t-21t	307	-	£86,800	£30,600
26	21t-29t	148	-	£109,800	£38,500
27	29t-38t	83	-	£145,100	£50,600
28	>38t	20	-	-	-
<i>Arctic</i>					
29	3.5t-12t	-	-		
30	12t-21t	-	-		
31	21t-29t	18	-		
32	29t-38t	133	-	£69,981	-
33	>38t	355	-	£83,215	£15,948

**Table A29 Commercial Vehicles Demand – CAZ Adjusted Data**

No.	Freight Vehicles	Upgrading vehicles eligible for finance	from 3rd Hand	Cost (New)	Cost (Used)
<i>Panel Van</i>					
1	<2.5t	7,569	3,741	£15,740	£9,241
2	2.5t-3.5t	23,772	11,498	£23,289	£13,570
<i>BoxHGV</i>					
3	3.5t-12t	680	-	£44,465	£15,902
4	12t-21t	588	-	£66,746	£23,541
5	21t-29t	279	-	£84,461	£29,615
6	29t-38t	352	-	£111,580	£38,913
7	>38t	203	-	-	-
<i>Pickup Truck</i>				20%	
8	<2.5t	1,684	989	£18,900	£11,100
9	2.5t-3.5t	5,288	3,038	£27,900	£16,300
<i>Refrigerated</i>				30%	
10	<2.5t	727	192	£20,500	£12,000
11	2.5t-3.5t	2,282	589	£30,300	£17,600
12	3.5t-12t	66	-	£57,800	£20,700
13	12t-21t	98	-	£86,800	£30,600
14	21t-29t	14	-	£109,800	£38,500
15	29t-38t	1	-	£145,100	£50,600
16	>38t	0	-	-	-
<i>Custom/Specialised</i>				30%	
17	<2.5t	1,230	758	£20,500	£12,000
18	2.5t-3.5t	3,865	2,330	£30,300	£17,600
19	3.5t-12t	82	-	£57,800	£20,700
20	12t-21t	102	-	£86,800	£30,600
21	21t-29t	94	-	£109,800	£38,500
22	29t-38t	154	-	£145,100	£50,600
23	>38t	55	-	-	-
<i>Waste Lorry</i>				30%	
24	3.5t-12t	88	-	£57,800	£20,700
25	12t-21t	406	-	£86,800	£30,600
26	21t-29t	193	-	£109,800	£38,500
27	29t-38t	95	-	£145,100	£50,600
28	>38t	36	-	-	-
<i>Arctic</i>					
29	3.5t-12t	-	-		
30	12t-21t	-	-		
31	21t-29t	18	-		
32	29t-38t	133	-	£69,981	-
33	>38t	355	-	£83,215	£15,948

## Vehicle Demand Summary for Taxis

The vehicle demand summary and the purchasing cost for new and used vehicles are shown in the table below. Under certain scenarios investigated, there is a requirement for Non-London style Hackneys to upgrade to London style Hackney carriages and would therefore be subject to the additional purchase costs for these Hackneys.

**Table A30 Taxi Demand**

No.	Taxis and PHV	Upgrading vehicles eligible for finance	from 3 <sup>rd</sup> Hand	Cost (New)	Cost (Used)
<i>Euro 6</i>					
34	Hackney (Taxi)	54	40	£42,795	£22,512
35	Non-London Hackney (Taxi)	224	-	£30,000	£15,810
36	Private Hire Vehicle	2,531	-	£25,000	£11,646
<i>Electric</i>					
37	Hackney (Taxi)	233	117	£66,500	-
38	Non-London Hackney (Taxi)	190	-	£66,500	-
39	Private Hire Vehicle	1,554	-	£26,500	-
<i>Retrofit</i>					
40	Hackney (Taxi)	156	21	£5,000	-

## Finance Product Summary for Commercial Vehicles

The commercial vehicle demand from the previous section has been categorized into the six categories listed above and the results are shown in the tables below.

**Table A31 Commercial Vehicles Product Demand – Market Data**

No.	Freight Vehicles	Upgrading vehicles eligible for finance	from 3 <sup>rd</sup> Hand	1	2	3	4	5	6
<i>Panel Van</i>									
1	<2.5t	7,700	3,700	3,700	3,700	770	3,700	-	4,000
2	2.5t-3.5t	24,300	11,500	11,500	11,500	2,430	11,500	-	12,800
<i>BoxHGV</i>									
3	3.5t-12t	700	-	-	-	70	-	140	140
4	12t-21t	600	-	-	-	60	-	120	120
5	21t-29t	300	-	-	-	30	-	60	60
6	29t-38t	400	-	-	-	40	-	80	80
7	>38t	200	-	-	-	20	-	40	40
<i>Pickup Truck</i>									
8	<2.5t	1,500	1,000	1,000	1,000	150	1,000	-	500
9	2.5t-3.5t	4,700	3,000	3,000	3,000	470	3,000	-	1,700
<i>Refrigerated</i>									
10	<2.5t	900	200	200	200	90	200	-	700
11	2.5t-3.5t	2,900	600	600	600	290	600	-	2,300
12	3.5t-12t	100	-	-	-	10	-	20	50
13	12t-21t	100	-	-	-	10	-	20	50
14	21t-29t	-	-	-	-	-	-	-	-
15	29t-38t	-	-	-	-	-	-	-	-
16	>38t	-	-	-	-	-	-	-	-
<i>Custom/Specialised</i>									
17	<2.5t	1,100	800	800	800	110	800	300	300
18	2.5t-3.5t	3,300	2,300	2,300	2,300	330	2,300	1,000	1,000
19	3.5t-12t	100	-	-	-	10	-	20	50
20	12t-21t	100	-	-	-	10	-	20	50
21	21t-29t	100	-	-	-	10	-	20	50
22	29t-38t	200	-	-	-	20	-	40	100
23	>38t	100	-	-	-	10	-	20	50
<i>Waste Lorry</i>									
24	3.5t-12t	100	-	-	-	10	-	20	50
25	12t-21t	300	-	-	-	30	-	60	150
26	21t-29t	100	-	-	-	10	-	20	50
27	29t-38t	100	-	-	-	10	-	20	50
28	>38t	-	-	-	-	-	-	-	-
<i>Arctic</i>									
29	3.5t-12t	-	-	-	-	-	-	-	-
30	12t-21t	-	-	-	-	-	-	-	-
31	21t-29t	-	-	-	-	-	-	-	-
32	29t-38t	100	-	-	-	10	-	20	50
33	>38t	400	-	-	-	40	-	80	200

**Table A32 Commercial Vehicles Product Demand – CAZ Adjusted Data**

No.	Freight Vehicles	Upgrading vehicles eligible for finance	from 3 <sup>rd</sup> Hand	1	2	3	4	5	6
<i>Panel Van</i>									
1	<2.5t	7,600	3,700	3,700	3,700	760	3,700	-	3,900
2	2.5t-3.5t	23,800	11,500	11,500	11,500	2,380	11,500	-	12,300
<i>BoxHGV</i>									
3	3.5t-12t	700	-	-	-	70	-	140	140
4	12t-21t	600	-	-	-	60	-	120	120
5	21t-29t	300	-	-	-	30	-	60	60
6	29t-38t	400	-	-	-	40	-	80	80
7	>38t	200	-	-	-	20	-	40	40
<i>Pickup Truck</i>									
8	<2.5t	1,700	1,000	1,000	1,000	170	1,000	-	700
9	2.5t-3.5t	5,300	3,000	3,000	3,000	530	3,000	-	2,300
<i>Refrigerated</i>									
10	<2.5t	700	200	200	200	70	200	-	500
11	2.5t-3.5t	2,300	600	600	600	230	600	-	1,700
12	3.5t-12t	100	-	-	-	10	-	20	50
13	12t-21t	100	-	-	-	10	-	20	50
14	21t-29t	-	-	-	-	-	-	-	-
15	29t-38t	-	-	-	-	-	-	-	-
16	>38t	-	-	-	-	-	-	-	-
<i>Custom/Specialised</i>									
17	<2.5t	1,200	800	800	800	120	800	400	400
18	2.5t-3.5t	3,900	2,300	2,300	2,300	390	2,300	1,600	1,600
19	3.5t-12t	100	-	-	-	10	-	20	50
20	12t-21t	100	-	-	-	10	-	20	50
21	21t-29t	100	-	-	-	10	-	20	50
22	29t-38t	200	-	-	-	20	-	40	100
23	>38t	100	-	-	-	10	-	20	50
<i>Waste Lorry</i>									
24	3.5t-12t	100	-	-	-	10	-	20	50
25	12t-21t	400	-	-	-	40	-	80	200
26	21t-29t	200	-	-	-	20	-	40	100
27	29t-38t	100	-	-	-	10	-	20	50
28	>38t	-	-	-	-	-	-	-	-
<i>Arctic</i>									
29	3.5t-12t	-	-	-	-	-	-	-	-
30	12t-21t	-	-	-	-	-	-	-	-
31	21t-29t	-	-	-	-	-	-	-	-
32	29t-38t	100	-	-	-	10	-	20	50
33	>38t	400	-	-	-	40	-	80	200

## Finance Product Summary for Commercial Vehicles

The taxi demand from the vehicle demand section has been categorised into the six financial product categories listed in **Table A11** and the results are shown in the table below.

**Table A33 Taxi Demand**

No.	Taxis and PHV	Upgrading vehicles eligible for finance	from 3 <sup>rd</sup> Hand	1	2	3	4	5	6
<i>Euro 6</i>									
34	Hackney (Taxi)	50	40	40	40	5	40	-	-
35	Non-London Hackney (Taxi)	220	-	-	-	22	-	-	-
36	Private Hire Vehicle	2,530	-	-	-	253	-	-	-
<i>Electric</i>									
37	Hackney (Taxi)	230	120	120	120	23	120	-	-
38	Non-London Hackney (Taxi)	190	-	-	-	19	-	-	-
39	Private Hire Vehicle	1,550	-	-	-	155	-	-	-
<i>Retrofit</i>									
40	Hackney (Taxi)	160	20	-	-	-	-	-	160



## Appendix B – Funding Uptake Assessment Tool

### Supplementary Analysis and Data / Outputs

#### Overview

The tool uses volume information from the cost models and identifies the level of funding that should be requested for each vehicle type.

#### Outputs

For LGVs and HGVs the following assumptions were made:

- Scrappage is not required (updated since October 2019 from scrappage required); and
- Funding Eligibility is based on Euro standard criteria (Euro 4 and below + the oldest Euro 5 are eligible).

Vehicle numbers for all vehicles serving Greater Manchester, all compliant vehicles, all non-compliant vehicles, and compliant vehicles inside Greater Manchester are provided in **Table B1**.

**Table B1 - Vehicle Numbers for LGV and HGV**

		LGV	HGV
<b>Population Data</b>	All vehicles	277,428	70,792
	GM	135,746	25,737
	Non-GM	141,682	45,055
	All Compliant	147,067	54,140
	All Non-Compliant	130,360	16,652
	GM Non-Compliant	75,414	7,367
<b>Vehicles in Scope</b>	GM SMS Non-Compliant	58,789	4,093
	Upgrade	41,668	4,093
	Take the fund	23,135	2,100
	The remaining Non-Compliant	15,344	-

From this the funding uptake for the vehicle weight has been calculated shown in **Table B2** and **Table B3**.

**Table B2 LGV Funding Uptake**

Vehicle type	Number taking funding	Asked Fund
1.6	5,680	£20m
3.5	17,456	£61m
Total	23,135	£81m

**Table B3 HGV Funding Uptake**

Vehicle type	Number taking funding	Asked Fund
7.5t HGV	500	£1.2m
18t HGV	700	£2.4m
26t HGV	400	£1.7m
32t HGV (rigid)	400	£2.1m
44t HGV (artic)	100	£0.5m
Total	2,100	£8m

For PHVs and Hackney carriages the following assumptions were made on updates to the package since October 2019:

- MLS applied;
- Scrappage not required;
- OLEV fund changed from £3,500 to £3,000 for PHV;
- Fund change from £3k for both purchasing Euro 6 and EV to £2k for Euro 6 and £2.5k for EV; and
- Leasing PHV £2,000, Leasing Electric £2,500

Vehicle numbers for all vehicles serving Greater Manchester, all compliant vehicles, all non-compliant vehicles, and compliant vehicles inside Greater Manchester are provided in **Table B4**.

**Table B4 Vehicle Numbers for PHV and Hackney carriages**

		LGV	HGV
<b>Population Data</b>	All vehicles	17,174	2,376
	GM	12,401	2,080
	Non-GM	4,773	296
	All Compliant	9,792	1,013
	All Non-Compliant	7,382	1,363
	GM Non-Compliant	5,331	1,193
<b>Vehicles in Scope</b>	GM SMS Non-Compliant	5,331	1,091
	Upgrade	4,652	1,050
	Take the fund	4,652	10.4m
	Asked Fund	£10.2m	-

Vehicle numbers, vehicle proportions and compliancy portions for non-compliant vehicles serving Greater Manchester are shown in **Table B5** to **Table B7**.

**Table B5 Non-Compliant Vehicle Numbers serving Greater Manchester**

Vehicle type	Private Hire	Hackney	NL Hackney
Do Nothing	992	119	-
Purchase - Upgrade	2,949	19	28
Purchase - Retrofit	-	22	-
Change to NL Hackney	-	-	-
Change to Private Hire	-	-	-
Purchase Electric Hackney	2,076	363	317
Change to Lease (Hackney)	-	23	33
Change to Lease Elec	531	188	250
Change to Lease (Private Hire)	826	-	-
Leave Sector	10	-	0
Total	7,382	735	628

**Table B6 Non-Compliant Vehicle Proportions serving Greater Manchester**

Vehicle type	Private Hire	Hackney	NL Hackney
Do Nothing	13.4%	16.2%	0.0%
Purchase - Upgrade	39.9%	2.6%	4.4%
Purchase - Retrofit	0.0%	3.0%	0.0%
Change to NL Hackney	0.0%	0.0%	0.0%
Change to Private Hire	0.0%	0.0%	0.0%
Purchase Electric Hackney	28.1%	49.5%	50.5%
Change to Lease (Hackney)	0.0%	3.1%	5.2%
Change to Lease Elec	7.2%	25.6%	39.9%
Change to Lease (Private Hire)	11.2%	0.0%	0.0%
Leave Sector	0.1%	0.0%	0.1%

**Table B7 Non-Compliant Vehicle Compliancy Proportions serving Greater Manchester**

Compliancy	Private Hire	Hackney	NL Hackney
Stay and Pay	13%	16%	0%
Become compliant	86%	84%	100%
Leave	0%	0%	0%

Vehicle numbers, vehicle proportions and compliancy portions for non-compliant vehicles based in Greater Manchester are shown in **Table B8** to **Table B10**.

**Table B8 Non-Compliant Vehicle Numbers based in GM**

Vehicle type	Private Hire	Hackney	NL Hackney
Do Nothing	679	101	-
Purchase - Upgrade	2,202	-	-
Purchase - Retrofit	-	21	-
Change to NL Hackney	-	-	-
Change to Private Hire	-	-	-
Purchase Electric Hackney	1,454	328	286
Change to Lease (Hackney)	-	15	26
Change to Lease Elec	373	177	238
Change to Lease (Private Hire)	622	-	-
Leave Sector	-	-	-
Total	679	101	-

**Table B9 Non-Compliant Vehicle Proportions based in GM**

Vehicle type	Private Hire	Hackney	NL Hackney
Do Nothing	12.7%	15.8%	0.0%
Purchase - Upgrade	41.3%	0.0%	0.0%
Purchase - Retrofit	0.0%	3.3%	0.0%
Change to NL Hackney	0.0%	0.0%	0.0%
Change to Private Hire	0.0%	0.0%	0.0%
Purchase Electric Hackney	27.3%	51.0%	52.0%
Change to Lease (Hackney)	0.0%	2.4%	4.7%
Change to Lease Elec	7.0%	27.5%	43.3%
Change to Lease (Private Hire)	11.7%	0.0%	0.0%
Leave Sector	0.0%	0.0%	0.0%

**Table B10 Non-Compliant Vehicle Compliancy Proportions based in Greater Manchester**

Compliancy	Private Hire	Hackney	NL Hackney
Stay and Pay	13%	16%	0%
Become compliant	87%	84%	100%
Leave	0%	0%	0%

**Table B11** provides a breakdown of the vehicle change for PHV and Hackney carriages.

**Table B11 Breakdown of vehicle change for PHV and Hackneys**

Vehicle Type	PHV	Hackney	NL Hackney	Total
<b>GM Total Accept Funding</b>	4,652	526	524	5,702
<b>Purchase - Upgrade</b>	2,202	0	0	2,202
<b>Purchase - Retrofit</b>	0	21	0	21
<b>Change to NL Hackney</b>	0	0	0	0
<b>Change to Private Hire</b>	0	0	0	0
<b>Purchase Electric</b>	1,454	328	286	2,068
<b>Change to Lease (Hackney)</b>	0	0	0	0
<b>Change to Lease (Elec)</b>	373	177	238	789
<b>Change to Lease (Private Hire)</b>	622	0	0	622

APPROVED

## Appendix C - Non-Compliant Vehicle Volumes

### LGV/HGV Non-Compliant vehicle numbers Projection

This section provides Non-Compliant LGV and HGV vehicle and yearly chargeable trips (based on Cost Model frequency assumptions) for the purpose of GM CAZ revenue analysis.

- The vehicle numbers presented are based on results from the October 2019 Package which was submitted to JAQU and to be used for Consultation. Note that these numbers are subject to change though, due to on-going funding policy adjustments (Funding limitation, vehicle eligibility, etc); and
- Vehicle and trips numbers represent total vehicles serving GM, i.e., they include both GM-based and non-GM vehicles.

Non-Compliant vehicle number projections for the October 2019 LGV Submission Model, based on different scenarios are shown below. key considerations include:

- Non-compliant vans will become chargeable from Jan-2023, following a temporary exemption to end 2022;
- Non-compliant Vehicles are categorised into low/high frequency.<sup>2 3</sup>

In the 'with-mitigation funding' scenario, each grant amount offered to LGVs is assumed to be £3,500.

**Table C1 Vans Numbers – CAZ only (no mitigation funding)**

Date	Non-Compliant Vans		
	Low-Frequency	High-Frequency	Total
<b>2019</b>	67,724	108,267	175,991
<b>2020</b>	62,573	101,321	163,894
<b>2021</b>	58,196	94,595	152,791
<b>2022</b>	53,447	87,506	140,953
<b>2023 - CAZ</b>	28,112	21,797	49,909
<b>2024</b>	25,018	15,312	40,330
<b>2025</b>	21,178	8,123	29,301
<b>2026</b>	17,159	4,451	21,610
<b>2027</b>	13,396	2,725	16,122
<b>2028</b>	9,171	1,453	10,624
<b>2029</b>	5,845	592	6,438
<b>2030</b>	5,052	-	5,052
<b>2031</b>	4,053	-	4,053

<sup>2</sup> Low frequency - Vans only appeared 1 day across the GM 7-day ANPR Camera survey and have been assumed to operate 1 day per week for purposes of CAZ charge application.

<sup>3</sup> High frequency - Vans which appeared 2 day and more across the 7-day ANPR Camera survey have been assumed to operate 5 days per week for purposes of CAZ charge application.

**Notes:**

- **7.2% of 'Stay and Pay' (those non-compliant vehicle owners choosing not to change to a compliant vehicle) vans in the first year of CAZ (49,909) choose to upsize (factor 0.7) due to the CAZ.**
- **0% of Stay and Pay non-compliant vans of first year of CAZ choose to downsize.**
- **74% of Stay and Pay vans of first year of CAZ choose to change business frequency.**

**Table C2 Vans Numbers - Fund + £3500 Scrappage required**

Date	Non-Compliant Vans		
	Low-Frequency	High-Frequency	Total
2019	67,724	108,267	175,991
2020	62,573	101,321	163,894
2021	58,196	94,595	152,791
2022	53,447	87,506	140,953
<b>2023 - CAZ</b>	28,027	5,578	33,605
2024	25,018	3,487	28,505
2025	21,178	1,533	22,711
2026	17,159	801	17,961
2027	13,396	512	13,908
2028	9,171	288	9,459
2029	5,845	129	5,974
2030	5,052	-	5,052
2031	4,053	-	4,053

**Notes:**

- **2.9% of Stay and Pay vans (33,605) in the first year of the CAZ choose to upsize (factor 0.7) due to the CAZ.**
- **0% of Stay and Pay non-compliant vans of first year of CAZ choose to downsize.**
- **71% of Stay and Pay vans of first year of CAZ choose to change business frequency.**

Additional behavioural response options are being considered but have not been included within this assessment. These are small overall impacts and include:

- Fleet size changes due to upsizing/downsizing are **not** applied. For context though, a factor of 0.7 would be applied for 'Upsize', and a factor of 2 for 'Downsize';
- An adjusted trip frequency response option factor has not been applied. For context, when applied this factor would be 0.8.

An additional assumption is that 1.6t vans who choose to downsize to estate car (around 2-3% of total non-compliant vehicles) are regarded as compliant vehicles.

The following factors have been applied for the purpose of annualisation of trips.

**Table C3 Van numbers to Annual Trips Factor**

Trip Frequency*	Weekly Trip	Operational Weeks	Vehicle numbers to yearly trips factor
Low	1	46	46
High	5	46	230

The net annual trips generated based on vehicle numbers and conversion factors identified above are shown below. Non-compliant van trips become chargeable from Jan-2023, these are highlighted in red in the tables below.

**Table C4 Annual Non-compliant van Trips**

Date	Annual trips	
January	CAZ Only	CAZ + £3500 Fund + Scrappage required
2019	28,016,758	28,016,758
2020	26,182,233	26,182,233
2021	24,433,765	24,433,765
2022	22,584,864	22,584,864
2023 - CAZ	6,306,459	2,572,132
2024	4,672,502	1,952,806
2025	2,842,567	1,326,791
2026	1,813,047	973,666
2027	1,243,084	734,010
2028	755,949	488,025
2029	405,069	298,460
2030	232,376	232,376
2031	186,421	186,421

Non-Compliant vehicle number projections for the October 2019 HGV Submission Model, based on different scenarios are shown below. the following assumptions are made:

- Non-Compliant HGVs are assumed to be chargeable from Jan-2022 (End of 2021);
- All GM-based HGVs are assumed to be high-frequency vehicles.

The following funding variable grant amounts based on vehicle weight are applied:

- £2,500 for 7.5t;
- £3,500 for 18t;
- £4,500 for 26t;
- £5,500 for 32t;
- £4,500 for 44t;

In the 'with-mitigation funding' scenario, the average grant for each HGV is approximately £5,500 per vehicle.



**Table C5 Vehicle Numbers – CAZ only (no mitigation funding)**

Date	Non-Compliant Vans		
January	Low-Frequency	High-Frequency	Total
2019	9,050	19,678	28,728
2020	7,479	16,008	23,487
2021	6,415	13,516	19,931
2022 - CAZ	540	261	801
2023	442	10	452
2024	324	0	324
2025	248	0	248
2026	179	-	179
2027	104	-	104
2028	23	-	23
2029	3	-	3
2030	-	-	-
2031	-	-	-

**Notes:**

- 67% of Stay and Pay vehicles (801) in the first year of the CAZ choose to upsize.
- 4% of Stay and Pay vehicles choose to downsize to vans.
- 0% of Stay and Pay vehicles choose to change business frequency.

**Table C6 Vehicle Numbers - Fund + Scrappage required**

Date	Non-Compliant Vans		
January	Low-Frequency	High-Frequency	Total
2019	9,050	19,678	28,728
2020	7,479	16,008	23,487
2021	6,415	13,516	19,931
2022 - CAZ	540	240	780
2023	442	10	452
2024	324	0	324
2025	248	0	248
2026	179	-	179
2027	104	-	104
2028	23	-	23
2029	3	-	3
2030	-	-	-
2031	-	-	-

**Notes:**

- 69% of Stay and Pay vehicles (780) in the first year CAZ choose to upsize due to the CAZ.
- 0.8% of Stay and Pay vehicles choose to downsize to vans.
- 0% of Stay and Pay vehicles choose to change business frequency.

The following assumptions have been made:

- Fleet size changes are due to upsizing/downsizing are not applied. Factors are same as LGV; and
- 7.5t HGVs who choose to downsize to 3.5t vans are still regarded as non-compliant vehicles.

**Table C7 HGV numbers to Annual Trips Factor <sup>4 5</sup>**

Trip Frequency*	Weekly Trip	Operational Weeks	Vehicle numbers to yearly trips factor
Low	1	50.6	50.6
High	5	50.6	253

Non-Compliant trips become chargeable from beginning of 2022 (end of 2021), these are highlighted in red in the tables below.

**Table C8 Annual Non-compliant HGV Trips**

Date	Annual trips	
January	CAZ only	CAZ + Fund + Scrappage required
2019	5,436,485	5,436,485
2020	4,428,347	4,428,347
2021	3,744,141	3,744,141
2022 - CAZ	93,435	87,982
2023	24,938	24,938
2024	16,392	16,392
2025	12,534	12,534
2026	9,047	9,047
2027	5,243	
2028	1,163	488,025
2029	159	298,460
2030	-	232,376
2031	-	186,421

### PHV/Hackneys Non-Compliant vehicle numbers Projection

This section provides non-Compliant (non-compliant) taxi vehicle numbers and yearly chargeable trips (based on Cost Model frequency assumptions) for the purpose of GM CAZ revenue analysis. It is broken down by Private Hire Vehicle (PHV) and Hackney taxi cabs (Hackneys).

The vehicle numbers are based on modelling results from the October 2019 Package, which was submitted to JAQU and to be used for Consultation. Note that the numbers presented here are subject to changes, due to on-going funding policy adjustments (Funding limitation, vehicle funding eligibility and Minimum License Standards, etc).

<sup>4</sup> Low-Frequency - Vans which only appeared 1 day across 7 days ANPR Camera survey (1 day/week CAZ charge applied)

<sup>5</sup> High-Frequency - Vans appeared 2 day and more across 7 days ANPR Camera survey (5 day/week CAZ charge applied)

Vehicle and trips numbers in this section represent total vehicles serving GM, i.e., they include both GM-based and non-GM vehicles.

When estimating the non-compliant taxis in the future year, the existing non-compliant age profile as captured by the ANPR survey is maintained. As the model year is projected into the future year, the vehicle manufacture year for each age group is derived from the age profile based on the corresponding model year, thereby estimating the Euro-standards and levels of compliance in the future year.

The total non-compliant PHV numbers projections for the October 2019 LGV Submission Model, based on the different 'CAZ only' and 'with-funds' scenarios are shown below. It should be noted that non-compliant PHVs will become chargeable from Jan-2022 (end of 2021).

**Table C9 PHV Vehicles Numbers – CAZ only (No Funding)**

<b>Model Year - January</b>	<b>Non- Compliant vehicles CAZ Only</b>	<b>Non- Compliant vehicles £3000 Fund + Scrappage required</b>
<b>2021</b>	9,631	9,631
<b>2022-CAZ</b>	1,049	1,000
<b>2023</b>	1,023	974
<b>2024</b>	927	878
<b>2025</b>	704	655
<b>2026</b>	480	441
<b>2027</b>	372	342
<b>2028</b>	259	251
<b>2029</b>	168	168
<b>2030</b>	102	102
<b>2031</b>	65	65

The tables below show the proportional split of vehicle usage frequency types for remaining non-compliant (stay and pay) PHV vehicles based on the first year CAZ is in place (e.g. 1,049 remaining non-compliant vehicles in January 2022), for the 'CAZ only' and 'CAZ + funds' scenarios. It should be noted that the distribution of usage frequency is related to vehicle ownership and age profile.

There is a slight difference between the two scenarios as shown below, as the population distribution of upgrading vehicles differs slightly with or without the inclusion of funding, and hence the age profile of remaining non-compliant (stay and pay) PHV distribution also differs.

**Table C10 CAZ only (No Funding)**

Frequency		CAZ Only	£3000 Fund + Scrappage required
<b>GM operation frequency: Full Time</b>	Low	37.9%	38.9%
	Medium	45.7%	44.9%
	High	7.7%	7.2%
	Intensive	1.8%	1.7%
<b>GM operation frequency: Occasional</b>	Low	2.9%	3.1%
	Medium	2.3%	2.5%
	High	1.2%	1.2%
	Intensive	0.4%	0.5%
<b>Total</b>		100%	100%

**Table C11 Vehicle Usage Distribution**

		Low	Medium	High	Intensive
<b>Driver/Independent Owner</b>	<b>Hackney</b>	0%	80%	20%	0%
	<b>Private Hire</b>	35%	50%	15%	0%
<b>Shared Driver Owner</b>	<b>Hackney</b>	0%	20%	40%	40%
	<b>Private Hire</b>	0%	50%	40%	10%
<b>Operator Owner</b>	<b>Hackney</b>	0%	0%	20%	80%
	<b>Private Hire</b>	0%	20%	30%	50%
<b>Third Party Owner</b>	<b>Hackney</b>	0%	0%	20%	80%
	<b>Private Hire</b>	0%	20%	30%	50%

**Table C12 Vehicle Ownership Distribution**

Age	Driver/Independent Owner	Shared Driver Owner	Operator Owner	Third Party Owner
0	5.0%	5.0%	45.0%	45.0%
1	10.0%	10.0%	40.0%	40.0%
2	15.0%	15.0%	35.0%	35.0%
3	20.0%	20.0%	30.0%	30.0%
4	20.0%	20.0%	30.0%	30.0%
5	30.0%	30.0%	20.0%	20.0%
6	40.0%	30.0%	15.0%	15.0%
7	40.0%	30.0%	15.0%	15.0%
8	50.0%	40.0%	5.0%	5.0%
9	50.0%	40.0%	5.0%	5.0%
10	50.0%	40.0%	5.0%	5.0%
11	50.0%	40.0%	5.0%	5.0%
12	70.0%	30.0%	0.0%	0.0%
13	70.0%	30.0%	0.0%	0.0%
14	70.0%	30.0%	0.0%	0.0%
15	70.0%	30.0%	0.0%	0.0%
16	70.0%	30.0%	0.0%	0.0%
17	100.0%	0.0%	0.0%	0.0%
18	100.0%	0.0%	0.0%	0.0%
19	100.0%	0.0%	0.0%	0.0%
20	100.0%	0.0%	0.0%	0.0%
21	100.0%	0.0%	0.0%	0.0%
22	100.0%	0.0%	0.0%	0.0%
23	100.0%	0.0%	0.0%	0.0%
24	100.0%	0.0%	0.0%	0.0%

The table below shows estimates for the number of annualised yearly trips based on the assumed daily and weekly usage for each frequency type category.

**Table C13 CAZ only (No Funding)**

Frequency		Days per week	Weeks per year	Yearly Trips
<b>GM operation frequency: Full Time</b>	Low	3	46	138
	Medium	5	46	230
	High	5	52	261
	Intensive	5	52	261
<b>GM operation frequency: Occasional</b>	Low	-	-	30
	Medium	-	-	51
	High	-	-	57
	Intensive	-	-	57

It is assumed that all GM-based vehicles operate full-time in GM. For non-GM based vehicles who occasionally make trips into GM, annual trips are derived from Full-Time annual trips with 22% trip ratio applied (derived from the ANPR survey).

Annual non-compliant PHV trips have been generated based on vehicle numbers and conversion factors identified above, are shown below for the 'CAZ only' and 'with funds' scenarios.

It should be noted that the Non-Compliant trips become chargeable from Jan-2022 (End of 2021). WAV PHVs, although exempt from the GM CAZ charge until 2023, have been accounted for as part of the overall PHVs figures (c.100 PHVs).

**Table C14 Annual Non-compliant PHV Trips**

Model Year -January	CAZ Only	£3000 Fund + Scrappage required
2021	-	-
2022-CAZ	194,236	183,401
2023	189,436	178,648
2024	171,719	161,102
2025	130,373	120,155
2026	88,978	80,966
2027	68,906	62,693
2028	48,038	45,965
2029	31,109	30,809
2030	18,849	18,667
2031	11,953	11,838

Non-Compliant Hackney vehicle numbers projections for the October 2019 LGV Submission Model, based on the different 'CAZ only' and 'with-funds' scenarios are shown below.

Non-Compliant Hackneys will become chargeable from Jan-2023, following a temporary exemption to end 2022. For analytical purposes, the temporary exemption has been applied to all non-compliant Hackneys however the exemption will be granted to WAVs Hackneys in operation. This accounts for c.300 more Hackneys exempt in the modelling.

**Table C15 Hackney Vehicles Numbers**

Model Year - January	CAZ only	£3000 Fund + Scrappage required
2021	1,861	1,861
2022	1,648	1,648
2023 - CAZ	368	358
2024	317	302
2025	262	230
2026	189	144
2027	114	75
2028	70	51
2029	34	30
2030	16	16

The tables below show the proportional split of vehicle usage frequency types for non-compliant hackney vehicles, for the 'CAZ only' and 'CAZ + funds' scenarios. Similarly, there is a slight difference between the two as the population distribution of upgrading vehicles differs slightly with or without the inclusion of funding, and hence the remaining non-compliant population age distribution also differs.

**Table C16 CAZ only (No Funding)**

Frequency		CAZ only	CAZ plus funds (scrappage required)
<b>GM operation frequency: Full Time</b>	Low	0.0%	0.0%
	Medium	66.4%	74.2%
	High	28.3%	20.3%
	Intensive	1.1%	1.1%
<b>GM operation frequency: Occasional</b>	Low	0.0%	0.0%
	Medium	2.6%	2.7%
	High	1.3%	1.4%
	Intensive	0.4%	0.4%
<b>Total</b>		100%	100%

The table below shows estimates for the number of annualised yearly trips based on the assumed daily and weekly usage for each frequency type category.

**Table C17 CAZ only (No Funding)**

Frequency		Days per week	Weeks per year	Yearly Trips
<b>GM operation frequency: Full Time</b>	Low	3	46	138
	Medium	5	46	230
	High	5	52	261
	Intensive	5	52	261
<b>GM operation frequency: Occasional</b>	Low	-	-	30
	Medium	-	-	51
	High	-	-	57
	Intensive	-	-	57

As with PHVs, a 22% trip ratio is applied for vehicles that operate occasionally in GM.

Annual Hackney non-compliant trips have been generated based on vehicle numbers and conversion factors identified above, are shown below for the 'CAZ only' and 'with funds' scenarios.

Non-compliant Hackneys will become chargeable from Jan-2023.

**Table C18 Annual Non-compliant Trips**

<b>Model Year - January</b>	<b>CAZ only</b>	<b>CAZ + £3000 Fund + Scrappage required</b>
<b>2021</b>	-	-
<b>2022</b>	-	-
<b>2023 - CAZ</b>	88,455	84,348
<b>2024</b>	76,266	71,219
<b>2025</b>	62,937	54,234
<b>2026</b>	45,379	34,008
<b>2027</b>	27,311	17,688
<b>2028</b>	16,699	11,958
<b>2029</b>	8,081	7,115
<b>2030</b>	3,912	3,834

APPROVED