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

Note 8: GM CAP: Updating behavioural responses for HGVs

Warning: Printed copies of this document are uncontrolled

Version Status:	APPROVED	**Prepared by:**	Transport for Greater Manchester on behalf of the 10 Local Authorities of Greater Manchester
Authorised by: **Date:**	Ian Palmer 1st November 2019		

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.

This note contains early work on revised behavioural response estimates which is superseded by later work – see Note 37 and Report T4 for the latest assumptions.

1 Introduction

1.1 This Technical Note provides details of updates to the behavioural responses for HGVs to be applied as a trial within the Demand Sifting Tool (DST) for the Greater Manchester Clean Air Plan (GM-CAP).

1.2 The purpose of this note is to:

- Provide a summary of the behavioural responses applied at Outline Business Case (OBC) stage;
- Discuss revised behavioural responses based on new available information;
- Explain recent updates to the DST capturing revised behavioural responses and resultant changes in compliance levels; and
- Report ongoing assessments to further refine HGV assumptions to take account of emerging information.

2 Background to OBC Behavioural Assumptions

2.1 The behavioural responses for HGVs used in the OBC are shown in **Table 2-1**. The values were derived using a combination of JAQU guidance (based on London Ultra-Low Emissions Zone SP data) and VTPI[1] research, alongside average HGV trip costs and times from the Greater Manchester (GM) SATURN transport model.

Table 2-1 HGV OBC Behavioural Responses Greater Manchester (2023)

Modelled Response	HGV Response (OBC)
Pay Charge	0.03%
Change Mode	0.00%
Cancel Trip	4.60%
Upgrade	95.37%

Source: London Behavioural Responses adjusted to GM (values quoted above are after the application of cost sensitivities)

3 Updated Behavioural Responses (July 2019)

3.1 Since the completion of the OBC, a review of the behavioural responses was undertaken in May / June 2019 to take account of additional new information and to derive a method for identifying evidence-based behavioural response assumptions for HGVs. To support this, a cost response model for HGVs

[1] Victoria Transport Policy Institute

was developed. This included the disaggregation of the HGV mode to understand better the variations in vehicles and journeys under a range of different business sectors and commodities.

3.2 Overview of HGV Cost Response Model

3.2.1 A cost response model to better understand the HGV responses to the GM-CAP was developed by assembling available data on the known HGV fleet and movements within GM.

3.2.2 This included a detailed review of the HGV fleet serving Greater Manchester which was split into a series of 'commodity types' based on the types of vehicles used, including age of vehicles kept, and typical mileage travelled for that commodity type. This identified key commodity types which would be most highly impacted by the Clean Air Zone (CAZ), such as the construction sector, which typically operates older HGVs which are more likely to be non-compliant.

3.2.3 Behavioural responses and operational costs for commodity types were amalgamated to derive a total HGV-weighted behavioural response for the GM HGV fleet. Further details of the development of this cost response model is discussed within the accompanying note (Note 7) Freight Cost Model, October 2019.

3.3 Revised Responses

3.3.1 The behavioural responses applied within the DST to reflect the inclusion of data from the cost response model is shown in **Table 3-1**, based on a £100 charge (aligning with the OBC). When comparing these responses to the values used for the OBC, the overall responses align reasonably well with a similar upgrade and pay charge response identified. The cancel trip / change mode response is quite different, though in the revised modelling.

3.3.2 At the time of that modelling, the DST did not include the functionality to enable the transfer of demand from one mode to another. As a result, the change mode response was renewed and other responses reproportioned to ensure no loss of overall demand. This results in a 100% upgrade response in the current version of the DST. This also reflects the significant cost impact on HGV users of a £100 daily charge.

Table 3-1 Updated Behavioural Response CAZ Only (2023 £100 CAZ charge)

Modelled Response	HGV Response	HGV Reproportioned Response
Pay Charge	0.0%	0.0%
Change Mode	2.4%	0.0%
Cancel Trip	0.0%	0.0%
Upgrade	97.6%	100%

Source: HGV Cost Response Model inputs to the DST

3.4 Impact on Compliance

3.4.1 The DST was run with the updated responses to determine the impacts on compliance. The results are shown in **Table 3-2**. The inclusion of the revised HGV response does have a small impact on the level of compliance identified. It is therefore important to note the following:

- Including the change mode response would result in an overall reduction to the level of HGV journeys, though likely to respond with an increase in LGVs. As discussed above, this behavioural response is not yet fully captured within the DST though will be addressed at FBC; and
- This test takes account of the impact of the CAZ only, and does not consider the potential benefits offered by other proposals in the GM CAP affecting HGVs.

Table 3-2 Impact on Compliance – 2023 Option 8

Scenario	Do Minimum	OBC (March 2019)	Cost Model HGV Response
AM Peak			
Compliant	26,613	30,091	30,256
Non-Compliant	5,842	2,200	2,198
Total	**32,455**	**32,291**	**32,455**
Interpeak			
Compliant	28,982	32,751	32,930
Non-Compliant	6,362	2,415	2,414
Total	**35,344**	**35,166**	**35,344**
PM Peak			

Compliant	14,004	15,703	15,784
Non-Compliant	3,074	1,295	1,294
Total	**17,078**	**16,998**	**17,078**

Source: DST – Trip volumes by compliance type

Note: *For the Cost Model HGV Response, the application of the 100% upgrade for HGVs is applied within GM. The remaining non-compliant trips shown in Table 3 relate to external non-GM trips, or those passing through GM (e.g. via the SRN).*

4 Further Refinement of Behavioural Responses

4.1 The preceding sections contain details on the recent updates to the treatment of HGVs within the DST. There are however, several additional enhancements to the treatment of HGVs within the overall modelling process which have been included. These enhancements relate specifically to an improved understanding of the vehicle fleet and the nature of HGV operations within GM. These updates are discussed further below.

4.2 Updated Fleet Information

4.2.1 Since the completion of the OBC, additional HGV data was gathered which provide a more thorough understanding of the HGV market. The information collected included:

- Specialised Goods Surveys to provide a better understanding of the goods vehicles operating within GM. This dataset enabled a better understanding of the various commodity types operating within GM;
- Latest ANPR survey data, providing wider understanding of HGVs within the wider vehicle fleet; and
- Refinement of the HGV cost model, including incorporating new data on the GM fleet, and representation of change mode functionality from HGV to LGVs where appropriate.

4.2.2 Furthermore, a public conversation was undertaken. The conversation closed on the 30th June and analysis of the results has been completed. The results were used to inform our understanding of possible behavioural responses.

4.2.3 A separate independent survey was undertaken by the Federation of Small Businesses to investigate the response of their members to the GM-CAP proposals. The outputs of this have been reviewed by TfGM and were used to add to the evidence base.

5 Refined Behavioural Responses (October 2019)

5.1 Revised Responses

5.1.1 Following the results from behavioural responses provided in July 2019, the models have been refined in order to provide a greater understanding of the possible behaviours. This section provides updates to the outputs for the behavioural responses following the refinements.

5.1.2 The refinements to the responses, allow for the impacts of the:

- CAZ Only Impacts; and
- CAZ, plus financial support via Clean Freight Fund.

A further refinement for HGVs is a lower CAZ charge from 2021, reduced from £100 to £60.

5.1.3 **Table 5-1** shows the updated behavioural responses for the CAZ Only result.

Table 5-1 CAZ Only (£60 charge): Refined Behavioural Responses

Modelled Response	2021	2023	2025
Pay Charge	2.8%	4.8%	1.9%
Change Mode	0.2%	0.0%	0.0%
Cancel Trip	0.0%	0.0%	0.0%
Upgrade	97.0%	95.2%	98.1%

Source: HGV Cost Response Model

5.1.4 The pattern of response across the years reflects that the age profile of the fleet is not a smooth distribution and takes account of the estimated changing cost of second-hand compliant vehicles over time. This results in what at first appears to be counter intuitive changes in the 'pay charge' response from 2021 through to 2025.

5.1.5 For CAZ plus funds, where some financial assistance is available to drivers assuming certain criteria, the funding for HGV upgrades varies by weight category and requires vehicle scrappage to access the funds. The variances in funds are as follows:

- 7.5t = £2,500;
- 18t = £3,500;
- 26t = £4,500; and
- 32t = £5,500.

5.1.6 **Table 5-2** below provides the outcome from the CAZ plus funds result.

Table 5-2 CAZ (£60 charge) plus funds: Refined Behavioural Responses

Modelled Response	2021	2023	2025
Pay Charge	2.7%	4.8%	1.9%
Change Mode	0.1%	0.0%	0.0%
Cancel Trip	0.0%	0.0%	0.0%
Upgrade	97.2%	95.2%	98.1%

Source: Cost Response Model

5.1.7 The impact of the funds forecast by the current cost model is clearly limited but this does not mean that there are no real-world benefits to be gained, particularly for small operators, because the modelling simplifies the variety vehicles and their value, removing the full range of variables operators consider.

5.2 Summary of other Modelling Refinements

5.2.1 Since the July submission of Note 8 to JAQU, in addition to the refinements of the behavioural responses noted above, several further refinements to the modelling tools have been undertaken. This has been to reflect the latest modelling assumptions and reflect the enhanced capabilities of the modelling tools. These updates are discussed in the Note '*Updates to the Do Minimum*' which accompanies this submission.

5.3 Impact on Compliance

5.3.1 The DST was run with the refined behavioural responses to understand the impact on compliant vehicles figures. The results for the various models are shown in **Table 5-3**, **TableTable** 5-4 and **Table**Table 5-5. The inclusion of the revised HGV response does have a small impact on the level of compliance. It is therefore important to note the following:

- A significant upgrade response to the CAZ is seen in all forecast years, even with the refined £60 CAZ charge;
- The incremental impact of the funds is small, this is because the CAZ Only scenario predicts a significant upgrade response; and
- The impact of the funds is limited to 2021.

Table 5-3 Impact on Compliance – 2021

Scenario	Do-Minimum	CAZ Only	CAZ plus funds
AM Peak			
Compliant	22,771	28,368	28,379
Non-Compliant	9,256	3,647	3,641
Total	32,026	32,015	32,021
Interpeak			
Compliant	24,795	30,861	30,873
Non-Compliant	10,078	4,000	3,994
Total	34,873	34,861	34,867
PM Peak			
Compliant	11,980	14,716	14,722
Non-Compliant	4,870	2,128	2,125
Total	16,850	16,844	16,847

Source: DST – Trip volumes by compliance type

Table 5-4 Impact on Compliance - 2023

Scenario	Do-Minimum	CAZ Only	CAZ plus funds
AM Peak			
Compliant	26,645	30,094	30,094
Non-Compliant	5,809	2,360	2,360
Total	32,455	32,455	32,455
Interpeak			
Compliant	29,018	32,755	32,755
Non-Compliant	6,327	2,589	2,589
Total	35,344	35,344	35,344
PM Peak			
Compliant	14,021	15,706	15,706
Non-Compliant	3,057	1,372	1,372
Total	17,078	17,078	17,078

Source: DST – Trip volumes by compliance type

Table 5-5 Impact on Compliance - 2025

Scenario	Do-Minimum	CAZ Only	CAZ plus funds
AM Peak			
Compliant	29,990	31,761	31,761
Non-Compliant	2,894	1,123	1,123
Total	32,883	32,883	32,883
Interpeak			
Compliant	32,664	34,583	34,583
Non-Compliant	3,152	1,233	1,233
Total	35,816	35,816	35,816
PM Peak			
Compliant	15,784	16,649	16,649
Non-Compliant	1,523	659	659
Total	17,307	17,307	17,307

Source: DST – Trip volumes by compliance type

6 Conclusion

6.1 The inclusion of updated responses, based on recently developed cost response models, for freight (HGV and LGV) have been applied to the DST. The key changes included are:

- Updates to previous behavioural responses to reflect new data from the developed cost response model;
- Behavioural response for HGVs in the cost response model reflect a separate response for a range of different commodity types which are then amalgamated to create an overall HGV behavioural response for the GM-CAP;
- The cost response model also allows the ability to vary the allocation of funds by weight category; and
- The response includes a ‘change mode’ response, which allows the functionality for a HGV trip to switch to a LGV trip (though noting the refined behavioural responses predict a negligible switch to mode response).

6.2 Runs of the DST have shown a similar, though slightly lower volume of non-compliant values than the OBC version. There are a number of reasons for this as a result of the various enhancements to the supporting data and model functionality.

6.3 Due to their complexity, the following have not yet been fully incorporated into the modelling process. These include:

- The design of Loan Finance measures is currently being reviewed and updated. New tools are being developed to assess the impacts of these measures, with the intention that these tools and outputs will be fed into the final Package Modelling process for FBC and facilitate the modelling of each measure affecting HGVs separately.
- Therefore, the update values presented above are CAZ plus funds responses only. It is likely that the inclusion of these other measures would further improve compliance; and
- Evidence from other research will be used to inform the development of sensitivity tests to better understand the uncertainty around the assumed responses.