Greater Manchester's Clean Air Plan to tackle Nitrogen Dioxide Exceedances at the Roadside: Option for Consultation

Local Plan Air Quality Modelling Tracking Table (AQ1)

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Version Status:	APPROVED	**Prepared by:**	Transport for Greater Manchester on behalf of the 10 Local Authorities of Greater Manchester
Authorised by: **Date:**	Ian Palmer 31st January 2020		

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.

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Transport for Greater Manchester Version: 0.8 31/01/2020

Note:

Target Determination phase comments in **BLACK**

OBC phase comments were added in version 0.7 (March 2019) in **BLUE**

Consultation Option phase comments were added in this version 0.8 in **ORANGE**

A	**Air quality model specification**	**LA Proposal Description**	**JAQU Review Comments**
A.1	**Model selection**		
A.1.1	Details of emissions model based on COPERT 5 emissions to be used.	EFT 8.0.1 has been used to calculate emissions for the TfGM EMIGMA process. It is understood that the emissions and all associated assumptions are not altered from EFT7.4a, with only additional functionality added. The projection of fleet mix was undertaken before the new tool became available. A review of the fleet projections indicates that method applied tends to fall between the two projection options in EFT.	OK
A.1.2	Gradient effects included?	Gradient effects will not be taken into account directly, but local verification has been applied to Mottram. If the assessment process identifies key areas of AQ risk, then local modelling will be considered at that stage. Not updated during OBC or for Consultation Option. Key final exceedance sites were reviewed and are not affected by gradient.	OK Please keep us in the loop with any changes to modelling (e.g. if gradient effects are applied at a later date)
A.1.3	Details of air quality dispersion model to be used.	ADMS Urban version 4.0.1.0	OK

A.1.4	Canyon effects included?	Yes, within the Manchester city centre Inner Relief Road and at the A57 through Mottram. In all other areas the Canyons module is not used. Further information is provided to the approach in AQ3.	OK
A.1.5	Tunnels and flyovers included?	Significant elevated sections modelled, no significant tunnels. Elevated roads: A627, Oldham Way, Oldham A57(M), Mancunian Way, Manchester M60 Junction 10-11, Salford/Trafford Figure added into A2 for OBC. Elevated sections applied into ADMS.	OK Please confirm methodology used in AQ methodology document (AQ2)
A.2	**Air quality model domain**		
A.2.1	Please provide a map (in report) showing model domain in relation	Full coverage of GM, consistent with the Saturn modelling described in T1. Map to be provided in modelling methodology reports. The currently issued maps show all of the modelled roads, which extend ~200m beyond the GM boundary. No modelling of receptors has taken place beyond the GM boundary.	OK
A.2.2	Locally identified exceedance locations included?	Yes, using AQMA and monitoring to define receptor locations. Initial modelling results have been used to identify roads where PCM TD receptors in 2021 are >35ug/m3. Receptors at junctions of these roads have then been manually selected, based on building usage in Ordnance Survey Address Base+ datasets.	OK
A.2.3	Domain includes displacement routes?	GM Saturn model will represent re-routing, although as the model extends beyond the GM boundary, it becomes less spatially detailed. The response of the model to any re-routing measures will be reviewed, particularly at the edge of the model domain.	OK You may like to consider sensitivity analysis focussed on the edges of

		The maps show all of the modelled roads, which extend ~200m beyond the GM boundary. No modelling of receptors has taken place beyond the GM boundary. The preferred options which are GM-wide limit the potential for re-routing, and the model is not capable of handling regional scale re-routing.	the model domain where the model is less well verified
A.3	**Air quality model receptor locations**		
A.3.1	Details of receptor grid size and other receptor locations.	As per JAQU requirements, (ie 10 x 10m grid close to roads), with 50m spacing >50m from modelled roads. ADMS intelligent gridding is being used for all modelled roads, with a regular grid beyond. Model run times are being reviewed to determine the balance of resolution that is feasible. This will give a full spatial output to enable the distributional analysis and population weighted means, including locations that are not in exceedance.	OK
A.3.2	Methods to be used to assign subset of receptors for AQD assessment	As per JAQU requirements, 4m back from PCM links at 2m height, representing 100m stretches of road >25m from major junctions. Plus other locations beyond the PCM network meeting these criteria. The mid point of each link has been autogenerated using GIS on both sides of the road. These points were then manually reviewed and excluded based on professional judgement.	OK

		Where a PCM link is represented by multiple SATURN links and receptors, the maximum receptor location will be used. Clarification from JAQU will be required whether which road operator (HE or LA) is responsible for locations close to the strategic road network.	
B	**Air quality base Year modelling**		
B.1	**General**		
B.1.1	Base year to be used.	2016	OK
B.1.2	Details of Meteorological data to be used.	Manchester airport, hourly sequential met data obtained from Manchester Airport. Data with null values of 0^0 set to -999 (unknown).	OK
B.2	**Traffic input data**		
B.2.1	Source of traffic activity data and vehicle types.	GM Saturn model (see T1), and ANPR cross referenced with Bus, Black cab and PH licensing information. Car (petrol & diesel), Vans (diesel), HGVs (diesel), Buses. Coaches and motorcycles are not represented within the model. It will not be possible to incorporate coaches into the modelling assessment process at this stage within programme. We will analyse available datasets to understand the sensitivity of the modelling to this. No data available at this stage to understand total coach flows or ages. ANPR analysis has identified that coaches and minibuses combined form less than 1% of traffic flows. There is no transport demand data to enable explicit modelling of coaches or minibuses, and they are not considered	OK – should undertake a sensitivity test to estimate the potential impact of not explicitly modelling coaches

		material to the modelling approach or assessment of the CAP.	
B.2.2	Details of representation of road locations (achieved through use of a georeferenced transport model or another approach?).	Saturn model converted to real-world alignments using OS ITN.	OK
B.2.3	Source of vehicle fleet composition information (local/EFT).	ANPR for 2016 for urban network, EFT for Motorways	OK
B.2.4	Source of vehicle speed information.	Modelled 2016 journey times from the Saturn model have been validated against Trafficmaster data collected during the period September 2013 to August 2014 for a selection of radial/orbital and motorway routes within the county, as described in the Transport Model Validation Report (T2). We will consider updating the journey time validation results in the T2 Report to make use of observed data for 2016, if possible. Trafficmaster data has been used to confirm speeds at the worst case exceedance location where local knowledge and experience contradicted the Saturn model outputs.	OK
B.3	**NOx/NO2 emissions assumptions**		
B.3.1	Source of primary NO2 emission fractions (f-NO2).	NAEI f-NO2 and EFT 9.1a NOx emission factors The modelling process was developed before EFT 8.0.1 became available.	OK
B.3.2	Details of method used to calculate projections for f-NO2 and to calculate NO2 concentrations from NOx concentrations.	Defra NOxtoNO2, using link specific f-NO2 from EMIGMA The NAEI f-NO2 factors were to determine the proportion of emissions from every link by vehicle type and Euro class based on local fleet mixes for the relevant year.	OK

		The link specific total NOx and f-NO2 (as NO2) emissions for every road link were input to the dispersion model. The outputs of the dispersion model for NOx and NO2 at every monitoring site and receptor could be used to calculate the f-NO2 for every output location.	
B.4	**Non-road transport modelling**		
B.4.1	Details of modelling for non-road transport sources.	Defra background map (2015 based) have been used, with only road traffic emissions modelled explicitly in ADMS.	OK
B.5	**Measurement data for model calibration**		
B.5.1	Details used for the model calibration e.g. dates, locations.	2016 annual mean monitoring data	OK
B.5.2	Type of monitoring data (automatic and/or diffusion tubes) used for the model calibration.	Continuous analyser data for NOx, NO2, PM10 and PM2.5, NO2 diffusion tubes	OK
B.5.3	All available automatic (and/or diffusion tube) monitoring data in included in the model calibration.	AQ3 sets out the model verification process and how sites have been included for Defra background map verification, and roadside verification.	OK
B.5.4	Quality assurance of measurement data.	All monitoring data are collected and reported to Defra by TfGM for the Combined Authority through the Annual Status Report (ASR) Local Air Quality Management Technical Guidance (TG16) is followed for all Quality Assurance / Quality Control (QA/QC) information, such as data capture; Bias adjustment factors. All continuous monitoring data from the 16 sites is collected and ratified by Ricardo AEA, before being published. NO2 diffusion tube data are corrected for bias, using the national bias adjustment factor for Staffordshire	OK

		Scientific Services. Details regarding the laboratory performance and precision of the tubes is provided by Staffordshire Scientific Services.	
C	**Projections modelling**		
C.1	**Baseline projections modelling**		
C.1.1	Years to be modelled.	Transport model years have been built for 2016 and 2021, with additional forecast years of 2023 and 2025 also built and used in the appraisal. Interim years will be calculated by linear interpolation. We are not aware of any committed major infrastructure projects that could lead to a significant risk of wider exceedances beyond 2021.	OK
C.1.2	Details of method for projected vehicle fleet composition.	ANPR analysis using GMP vehicle class information was used to identify vehicle type and fuel, plus cross referencing with local authority licensing information on buses, and taxis (hackney carriage and private hire). Fleet projection was undertaken before EFT8.0.1a was released. Fleet mix projection is based on identifying the date of registration from the licence plate number. These are matched against the date of enforcement of the relevant Euro standard, to develop the Euro standard for that vehicle type. Licence plates from GMP cannot be issued onwards due to Data Protection, and therefore direct matching with the DVLA database is not possible. The projection approach keeps the vehicle age constant for any the given future year (e.g 2021), and then re-	OK

		calculates the Euro standard at this point in time. The approach conserves the age distribution of the vehicle population for each class/fuel, to produce the fleet mix for the future year based on this constant distribution. A project specific ANPR survey in Jan 2019 was undertaken. Analysis of this showed that the projection methodology from the 2016 GMP data to 2019 observations was robust, and also highlighted the issue of changing proportion of petrol and diesel cars, reported from passenger car sales. The JAQU guidance on change in petrol to diesel splits for cars into future years was applied. This involved using JAQU assumptions on proportions of vehicles that would switch to diesel, and using ANPR trip frequency information to convert a journey based change (vehicle kilometre equivalent). This was updated to use the fleet splits available in EFT 9.1a, which updated the petrol/diesel fuel splits based on more recent changes in passenger car sales trends away from diesel.	
C.1.3	Details of method for projected vehicle activity.	Traffic forecasts from the Saturn model are based on the uncertainty log developed for the appraisal of the planned extension of the Greater Manchester Metrolink system through Trafford Park, which considered committed developments within 1km of the proposed alignment. Elsewhere, traffic growth rates are based on TEMPro growth forecasts, at a district level. See T1/2/3 Reports for additional information.	OK

C.1.4	Impact of RDE included?	Use of EFT 9.1a	OK
C.1.5	Details of methods to calculate future fleet emissions 10 years beyond compliance year	Growth of traffic using Tempro, EFT 9.1a for emissions calculation, and ANPR projections as described in C.1.2.	OK As for A.1.1 may be useful to compare your methodology with that using EFT 8.0.1
C.2	**With measures projections modelling**		
C.2.1	Years to be modelled.	2021, 2023, 2025	OK
	Details of method for projected vehicle fleet composition.	See C.1.2. When modelling the behavioural response to a charging CAZ D, we are proposing to assume that car drivers who choose to replace a non-compliant vehicle with a compliant model would purchase compliant vehicles in the same proportions as compliant vehicles in the existing fleet mix. If, for example, the proportions of compliant cars in the local fleet mix in 2021 (estimated from ANPR data) were as shown in the Table below, then we would assume that 37.5% of drivers who choose to acquire a compliant car would purchase a diesel Euro 6 car, 26.2% of drivers would acquire a Petrol Euro 6 car, 21.8% of drivers would acquire a Petrol Euro 5 car and 14.5% of drivers would acquire a Petrol Euro 4 car. We are suggesting this approach due technical difficulties implementing the responses described by JAQU in the Evidence Package, which would be very difficult to model in a consistent way in all but the very simplest of networks, especially for GM where there is potentially more than one CAZ boundary, which would have implications for model run times and complexity. It is considered a realistic behavioural response.	OK

<table>
<tr><td></td><td></td><td><table><tr><td colspan="2">Proportions of Compliant Cars in 2021 GM Fleet Mix (From ANPR Data)</td></tr><tr><td>Petrol Euro 4</td><td>14.5%</td></tr><tr><td>Petrol Euro 5</td><td>21.8%</td></tr><tr><td>Petrol Euro 6</td><td>26.2%</td></tr><tr><td>Diesel Euro 6</td><td>37.5%</td></tr><tr><td>All Compliant</td><td>100%</td></tr></table>
Further details on the fleet profiles and measures modelling are provided in the OBC reports and appendices.

A category D CAZ is not included within the Consultation Option, so this behavioural response and projection method has not been required.</td><td></td></tr>
<tr><td></td><td>Details of method for projected vehicle activity.</td><td>Please refer to C1.3 and T1/2/3 reports</td><td>OK</td></tr>
<tr><td>C.2.2</td><td>Details of methods to calculate future fleet emissions 10 years be</td><td>Growth of traffic using Tempro, EFT 9.1a for emissions calculation, and ANPR projections as described in C.1.5.</td><td>OK</td></tr>
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JAQU review
Green – Accepted – Information meets requirement
Grey – Accepted - Information meets requirement and JAQU to provide assistance in meeting requirement
Yellow – Requires further information or a response to a question to be provided either in the table or in the report
Red – Information provided does not meet the requirement
AQ modelling proposal is complete when all listed requirements are Green or Grey and required additional information are provided in the report