

## Planning, Housing & Environment Overview & Scrutiny Committee



**Date:** 15th November 2018

**Subject:** Greater Manchester Clean Air Plan: Update on Local Air Quality Modelling

**Report of:** Councillor Alex Ganotis Portfolio Lead for Green City Region and Jon Lamonte, Chief Executive, Transport for Greater Manchester

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### 1. PURPOSE OF REPORT

- 1.1 This report contains the results of one element of the feasibility study that will underpin the forthcoming Greater Manchester Clean Air Plan: the local modelling of predicted roadside nitrogen dioxide (NO<sub>2</sub>) exceedances beyond 2020. Once agreed by Government, these exceedances will constitute the problem that the options for reducing NO<sub>2</sub> contained in the Greater Manchester Clean Air Plan must address ('Target Determination').

### 2. RECOMMENDATIONS

- 2.1 That the committee:
- a) Note the outcomes of the local NO<sub>2</sub> modelling, particularly that it predicts exceedances in all ten Greater Manchester local authority areas beyond 2020;
  - b) Note the public awareness raising activity that has commenced since the last Committee meeting.
  - c) Note the feedback to the query raised at the August 2-18 Committee meeting about the use of chemical agents to reduce emissions in paragraph 9.3.

### 3. CONTACT OFFICERS

- 3.1 Simon Warburton, Transport Strategy Director, TfGM, 0161 244 1427

### 4. BACKGROUND

- 4.1 The 'UK plan for tackling roadside nitrogen dioxide concentrations' (hereafter referred to as the 'National Plan') (Defra and DfT, July 2017) identified 2 local authorities, including seven in Greater Manchester (GM), where the national Pollution Climate Mapping (PCM) model predicted areas where concentrations of NO<sub>2</sub> likely to exceed the legal annual mean EU Limit Value of 40 µg/m<sup>3</sup> beyond 2020. In March 2018, 33 more local authorities were defined as having "shorter-term NO<sub>2</sub> problems" - including Oldham in GM.

- 4.2 Government has directed the local authorities identified in the National Plan to undertake feasibility studies, culminating in a series of business cases for implementing measures to deliver compliance with the EU Limit Value in the 'shortest possible time'.
- 4.3 As agreed at the 1 September 2017 WLT meeting, TfGM has been coordinating the GM feasibility study on behalf of the GMCA and the ten GM local authorities, working closely with Districts, who remain legally responsible for compliance.
- 4.4 The purpose of taking a GM-wide approach was to avoid introducing measures in one part of the conurbation that displace NO<sub>2</sub> concentrations to other locations, and to ensure that (as far as possible) the eventual GM Clean Air Plan complements other GM-wide strategies including the existing GM Air Quality Action Plan and GM Low Emission Strategy.
- 4.5 A GM Clean Air Plan Senior Leadership Steering Group (Steering Group) is responsible for guiding the feasibility study, briefing senior officers and elected members in their respective organisations and securing local approvals. Members include Directors or Assistant Directors from each GM local authority and senior representatives from Highways England, Public Health England, AGMA, Local Partnerships and TfGM.

## **5. AIR QUALITY IN GREATER MANCHESTER**

- 5.1 Whilst air quality has been generally improving over time, particular pollutants that are not generally visible to the naked eye, remain a serious concern in many urban areas. These are oxides of nitrogen (NO<sub>x</sub>), principally nitrogen dioxide (NO<sub>2</sub>), and particulate matter (PM). NO<sub>2</sub> is formed from burning fossil fuels and contributes to the formation of photochemical smog. Particulates are formed from tyre friction, burning fuels that create smoke, construction, industry and other processes. Although non-transport sources of NO<sub>x</sub> are significant, road transport is responsible for some 80% of NO<sub>2</sub> concentrations at roadside, of which diesel vehicles are the largest source.
- 5.2 Improving air quality has been a key ambition for Greater Manchester for some time. The Greater Manchester Strategy (Oct 2017) states Greater Manchester should be 'a place at the forefront of action on climate change with clean air and a flourishing natural environment' including by 'reducing congestion and improving air quality'. Action is already underway under the Greater Manchester Low Emissions Strategy and Air Quality Action Plan, which introduced measures to reduce air pollution; increase behaviours that lower emissions by 2025; and support the Government to meet EU thresholds for key pollutants at the earliest date.
- 5.3 Recently, Greater Manchester also signed up to become a World Health Organisation (WHO) 'BreatheLife' city, with the associated aim of achieving WHO air quality targets by 2030.
- 5.4 Greater Manchester has also set targets for CO<sub>2</sub> emission reduction that exceed national ambitions – a reduction of 48% by 2020 (based upon 1990 levels). Greater Manchester road transport accounts for 31% of carbon

dioxide emissions in the city region. Greater Manchester's local authorities have also committed to eliminating fossil fuels by 2050 in a 100% clean energy pledge.

- 5.5 However, whilst these targets, strategies and action plans aim to improve air quality and pollution in Greater Manchester in the round, the specific breaches of the statutory Limit Values for NO<sub>2</sub> has prompted a series of court rulings and national Air Quality Plans that have implications for local authorities.

## **6. LOCAL NITROGEN DIOXIDE MODELLING**

- 6.1 The National Plan identified eleven areas of road, across seven local authorities within Greater Manchester, where the national Pollution Climate Model predicts NO<sub>2</sub> concentrations are likely to exceed the statutory NO<sub>2</sub> annual mean EU Limit Value beyond 2020. Oldham were added in a later supplement to the National Plan (March 2018).
- 6.2 As the predictions in the national model are based on national scale assumptions and datasets, they must be verified against local evidence before any detailed assessment of options for reducing NO<sub>2</sub>. Subsequently, during their feasibility studies, local authorities must submit 'Initial Evidence' to define and confirm the local air quality problem and model concentrations of NO<sub>2</sub> in 2021 based on a "do minimum" scenario. This scenario is based on historical patterns in vehicle turnover and already planned junction improvements, changes to road layout etc. The Greater Manchester authorities submitted their 'Initial Evidence' to Government in June 2018.
- 6.3 The Initial Evidence identifies road links which are forecast to exceed the EU Limit Value beyond 2020, including destination links, radial links and those with a close relationship with the Strategic Road Network (motorway network managed by Highways England).
- 6.4 Whilst the local model is generally in agreement with the Pollution Climate Model exceedances, it reveals a bigger problem than that initially identified by Government. It predicts a greater spatial distribution of NO<sub>2</sub> exceedances across roads in Greater Manchester and higher concentrations of NO<sub>2</sub> in specific locations.
- 6.5 Local modelling identified 152 stretches of road (road links) where concentrations of NO<sub>2</sub> are forecast to exceed the legal Limit Value (40 µg/m<sup>3</sup>) beyond 2020. 112 of these road links are on the national PCM model, which have the highest car use and heavy freight flows. 40 of these are shorter stretches of local roads, around town centres across Greater Manchester. These are routes that are frequently used by buses and vans, which are not included in the national model.
- 6.6 These road links are distributed across all 10 Greater Manchester local authorities, in a similar distribution to the air quality problems identified in the established Air Quality Management Area. This means stretches of road where concentrations of NO<sub>2</sub> are predicted to exceed legal Limit Values beyond 2020 are found in all 10 Greater Manchester local authorities.

- 6.7 Local modelling also predicts stronger concentrations of NO<sub>2</sub> in locations across Greater Manchester. This means the concentration of NO<sub>2</sub> in the air at roadside is higher (worse) than originally predicted by Government.
- 6.8 The reasons for this are the vehicles using Greater Manchester's roads are typically older than the national average (especially buses and taxis); that local traffic data showed that in some areas vehicles are moving more slowly than the national modelling anticipated; and because local modelling also showed higher background concentrations of NO<sub>2</sub>.
- 6.9 Background concentrations of NO<sub>2</sub> come from sources including domestic fuel burning; industry; and non-road mobile machinery. However, as transport is the primary source of NO<sub>2</sub> at roadside, this is considered the primary means of dealing with exceedances and is the target of the National Plan.
- 6.10 In addition, higher concentrations of NO<sub>2</sub> were identified in the regional centres (particularly Manchester city centre) due to the volume of demand on these roads, and also in part due to something referred to as the 'canyon effect'. This term refers to the reduced air flow and circulation caused by tall buildings or in densely built up areas that acts to reduce the diffusion and dissipation of air pollutants that occurs in more open or low-rise locations.
- 6.11 A list of the additional local data used is included in Appendix 1.
- 6.12 Appendix 2 provides a summary table of the road links across Greater Manchester forecast to be in exceedance beyond 2020 in the Initial Evidence (by road type).
- 6.13 Appendix 3 contains a high level map of NO<sub>2</sub> exceedance points. This map also includes identified road links where NO<sub>2</sub> levels were just below the legal Limit Value, and therefore are considered at risk.
- 6.14 It should be noted that these maps do not include the exceedances on the Strategic Road Network and motorways that are managed by Highways England. Highways England have not been directed to act to reduce NO<sub>2</sub> on these roads under the same directive as local authorities. Highways England is currently assessing sections of the road network around GM to explore potential measures.

## **7. CONFIRMING TARGET AREAS FOR ACTION**

- 7.1 After receiving the 'Initial Evidence' from Greater Manchester, JAQU undertook a process called 'Target Determination', which involves comparing the outputs of the local and national modelling, verifying the local modelling process and then agreeing the forecast exceedances. JAQU also ensure consistent approaches to local modelling are being used by different local authorities.
- 7.2 The outcome of this process is an agreement of the NO<sub>2</sub> exceedances that Greater Manchester must resolve when determining possible solutions. Once

the Greater Manchester modelling is agreed by Government, illegal exceedances in all ten GM local authority areas need to be addressed.

- 7.3 The 'Target Determination' process is ongoing and Greater Manchester is responding to final requests for clarification from JAQU at this stage. JAQU have confirmed they anticipate no material changes, and so Greater Manchester can proceed with confidence with the remaining elements of the feasibility study. This means the Steering Group can model the options to achieve legal compliance in the shortest possible time.

## **8. PUBLIC AWARENESS AND COMMUNICATIONS CAMPAIGN**

- 8.1 As part of the feasibility study work, focus groups have been undertaken to understand public awareness of air pollution, its sources and possible remedies. This research has revealed a mixed understanding of air pollution – many are aware that air pollution exists but are unaware of the scale of the issue or its impacts on health, and also what people can do to reduce emissions and their exposure.
- 8.2 In recent on-street polling conducted to assess how Greater Manchester residents currently think about air pollution as an issue, 68% of the 400 respondents felt that personal action could have some impact in reducing air pollution, and 58% were already taking some sort of action to reduce air pollution.
- 8.3 However, this survey and a series of focus groups undertaken revealed there was a varied level of understanding about the impacts of air pollution on health and different groups of people, and a lack of understanding about the seriousness of the air quality problem in Greater Manchester.
- 8.4 To address these issues a number of initial actions have been taken to start to raise public awareness about the sources, impacts of and solutions to air pollution. This will be an ongoing activity that will span at least the next 12 months, and the Steering Group has been working with Lead Executive Members, the Heads of Communications and Directors of Public Health, along with Public Health England and the GM Health and Social Care partnership to develop the initial materials and resources needed.
- 8.5 A new website has been launched called 'Clean Air Greater Manchester': <https://www.cleanairgm.com/> that provides information about what air pollution is, its impact on people's health, actions that people can take to reduce their exposure to air pollution and activity being undertaken already.
- 8.6 The intention is for this website to act as the home of air quality information for Greater Manchester. A new interactive map will show live air quality data for every street in Greater Manchester and a 3 day air quality forecast.
- 8.7 People will also be able to sign up for a free air quality text alert service, telling them if the forecast is for moderate or high air pollution in their area.
- 8.8 The research also revealed that there is some confusion between penalties related to air pollution and congestion charging.

8.9 Clean Air Zones differ from Congestion Charging systems because of their very different objectives and time-spans. The objective of any penalty in a CAZ is for all vehicles which drive in a Clean Air Zone to have engines which comply with emissions standards set out at 9.4 above. A CAZ does not seek to reduce the number of vehicles on roads. This also means as vehicles are upgraded the number of penalties levied reduces and are therefore relatively short-term and only apply to non-compliant vehicles. Under a Congestion Charge, the requirement to pay applies to all vehicles, is enduring, and creates a long-term revenue stream. CAZ typically make a loss, particularly in the later years the zones are in place.

8.10 These differences are summarised in Appendix 4.

## 9. NEXT STEPS

9.1 At this stage, no decisions have been taken over the precise mix of measures that will be included in the OBC. However, over the summer a process of refining measures and developing a range of options that combine the measures in different ways has been undertaken to understand the type and scale of intervention needed to reduce NO<sub>2</sub> to within legal Limit Values in the “shortest possible time” across Greater Manchester.

9.2 The first output of the Greater Manchester feasibility study was the Strategic Outline Case (SOC) that was approved by the ten GM local authorities and submitted to Government in March 2018. In this document a long-list of 96 options was presented and sifted to a shortlist of 17 based on Government’s Primary Success Criteria (reduction of NO<sub>2</sub> concentrations in the “shortest possible time”). The SOC recognised that as locations of exceedances identified by Government covered areas across Greater Manchester, no single measure was likely to deliver legal compliance on its own.

9.3 The next step is to submit an Outline Business Case (OBC) to Government, which assesses the options for achieving compliance in GM and identifies a ‘preferred option’. The OBC will be assessed by Government and accepted or rejected.

9.4 Government’s deadline for the OBC is 31 December 2018, however GM has written to Government advising them that a draft will be available in December, but it will not be approved by all ten local authorities and the GMCA until early 2019.

9.5 This approach was reconfirmed at the 26<sup>th</sup> October meeting of the GMCA, at which the outcome of the ‘Target Determination’ process was reviewed. Leaders reaffirmed their intention to address harmful levels of NO<sub>2</sub> exceedance in Greater Manchester. However, they noted that this issue would not be resolved without the full support and partnership of Government. In particular, GMCA confirmed a series of key requirements of Government to support any GM Clean Air Plan. These include:

) Clear arrangements and funding to develop workable, local vehicle scrappage / upgrade measures;

- ) Short term effective interventions in vehicle and technology manufacturing and distribution, led by national Government with local authorities;
- ) Replacement of non-compliant buses; and
- ) A clear instruction to Highways England to implement measures which deliver compliance with legal limits for NO<sub>2</sub> on the strategic road network, for which they are responsible, in the shortest possible time.

9.6 Members will recall that an earlier briefing on the approach for developing the GM Clean Air Plan was provided at the Committee meeting in August 2018. In discussion then, the merits of using solutions that can be added to engines to improve emissions was raised, specifically relating to the 'AdBlue' chemical. AdBlue is a catalyst injected into the combustion process within the engine system of vehicles using Selective Catalytic Reduction (SCR) in their emissions management technology. It needs topping up in a vehicle regularly and would be part of an annual service for Euro 6 with SCR. It is an effective NOx reduction technology and often now forms part of the preferred solution for manufacturers of new vehicles. Effectiveness is typically greater when used in heavier vehicles like HGVs and buses, although Euro 6d emissions results are showing promising results for cars and vans (especially the bigger/heavier variants) using SCR. However, there are no available SCR retrofitting technologies for cars, vans or HGVs, meaning it does not currently represent a possible solution for any vehicles other than buses.

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The following is a list of the background papers on which this report is based in accordance with the requirements of Section 100D(1) of the Local Government Act 1972. It does not include documents, which would disclose exempt or confidential information as identified by that Act.

- ) 16 August 2018 – GM Clean Air Plan Report to HPEOS Committee
- ) 'UK plan for tackling roadside nitrogen dioxide concentrations', Defra and DfT, 2017

The above papers and documents may be inspected during normal office hours at GMCA, Churchgate House, 56 Oxford Street, Manchester M1 6EU.

**Dr Jon Lamonte**  
**Chief Executive, TfGM**

## **Appendix 1: List of additional local data used to model predicted NO<sub>2</sub> exceedances in GM beyond 2020**

Based on Government guidance the following local evidence was used to understand likely NO<sub>2</sub> concentrations in Greater Manchester beyond 2020:

- ) Detailed Base Year (2016) and Future Year (2021) transport model (actual and future demand on the road network)
- ) Local vehicle fleet profiles (e.g. ages and types of vehicle) using Automatic Number Plate Recognition data
- ) Local background concentrations of NO<sub>2</sub>
- ) More detailed road network & junction data (e.g. alignment and width)
- ) Representation of canyons (e.g. tall buildings)
- ) Local air quality monitoring data (from across GM)
- ) Confirmed future changes to the road network, regional traffic growth and changes to the traffic fleet.

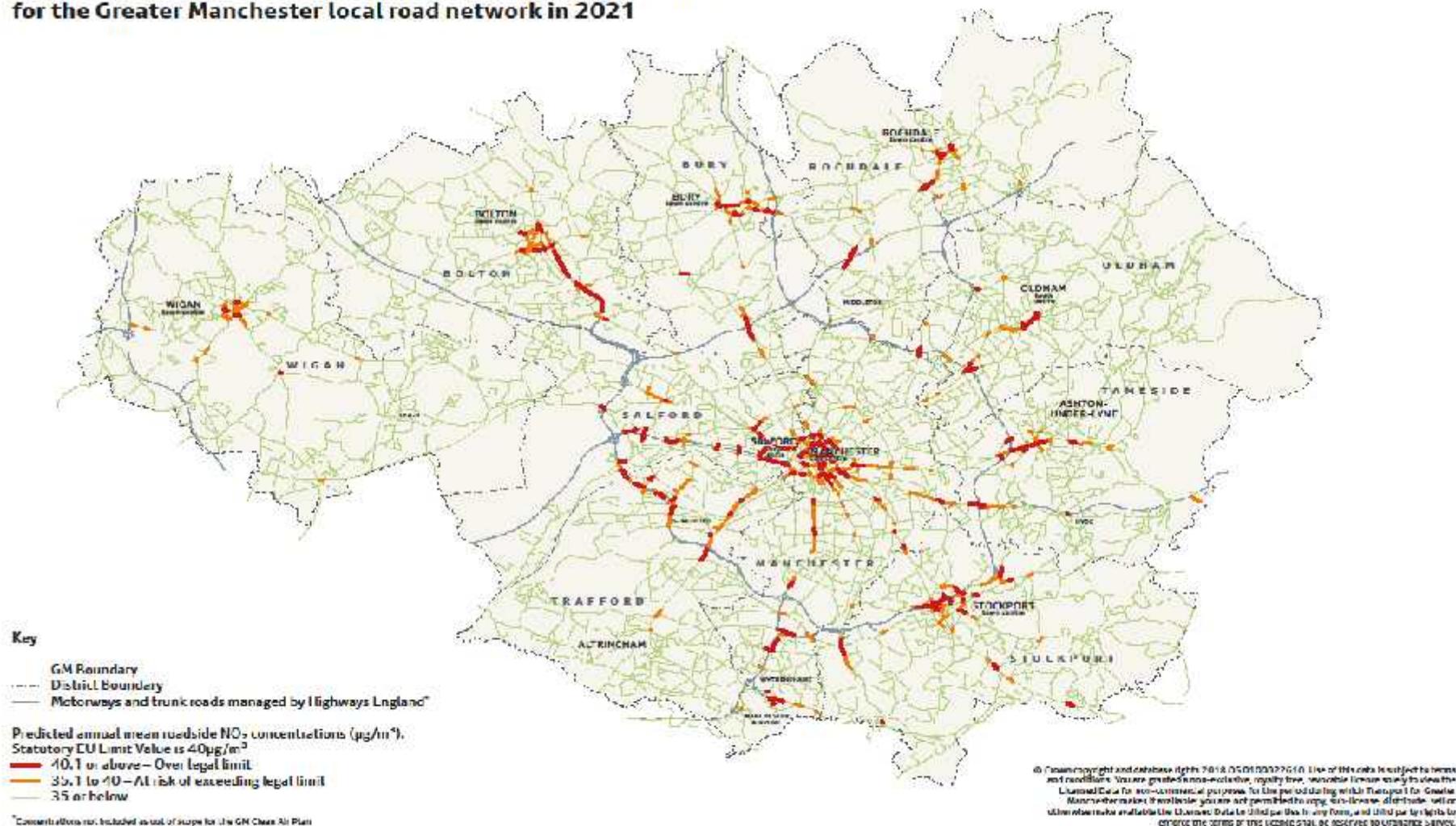
**Appendix 2: Summary of numbers of areas across GM forecast to exceed the EU Limit Value beyond 2020**

<b>Local Authority</b>	<b>National (PCM) Model Exceedances Links</b>	<b>Local Model Exceedances on PCM Links</b>	<b>Additional Local Model Exceedances on Minor (non-PCM) Links*</b>
Bolton	1	12	2
Bury	1	8	7
Manchester	4	35	16
Oldham	0	4	2
Rochdale	0	7	0
Salford	1	15	3
Stockport	2	13	6
Tameside	1	11	2
Trafford	1	4	1
Wigan	0	3	1
<b>Total</b>	<b>11</b>	<b>112</b>	<b>40</b>

\*These are road links that are not included in the national PCM model but have been modelled locally.

## Appendix 3: High level map of NO<sub>2</sub> exceedance points

**Predicted annual mean nitrogen dioxide (NO<sub>2</sub>) concentrations for the Greater Manchester local road network in 2021**



## Appendix 4: Differences between Congestion Charging and Clean Air or Low Emission Zones

