

Greater Manchester's Outline Business Case to tackle Nitrogen Dioxide Exceedances at the Roadside

Analysis of Distributional Impacts Appendix B Recommendations for Further Work



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1 Recommendations for further work

1.1 Mitigation and enhancement

It is recommended that further work be undertaken to fully embed the findings of the distributional impacts analysis in the context of the socio-economic baseline, and to ensure that sufficient mitigation measures are proposed to alleviate any disproportionate impacts on social and business groups. Similarly, it is recommended that further work be undertaken to explore potential enhancement measures for any beneficial distributional impacts.

1.2 Air quality

GIS techniques were used to calculate the change in emissions (tonnes) between the baseline scenario and each option for each LSOA in the study area. This method was based on the outputs of EMIGMA¹, resulting in LSOAs with no road links, being assigned a score of zero. It is recommended that further work be completed based on Atmospheric Dispersion Modelling System (ADMS) results for NO₂ and PM₁₀ rather than EMIGMA, subject to the development of a workable methodology. This would improve the accuracy of the distributional impacts analysis.

It is recommended that the replicability of the air quality results be tested using ADMS results, and that further sensitivity testing be completed.

In addition, provisional damage costs multipliers for NO_x and PM₁₀ were uplifted from 2015 prices to 2018 base year, using the WebTAG GDP deflator series. It is recommended that further work be completed to uplift these values by 2% per year over the appraisal period to reflect the assumption that willingness to pay for health will rise in line with economic growth.

1.3 Health and environmental impact assessment

1.3.1 Data sources and modelling

Consideration should be given to anticipated Government guidance on monetising health and environmental effects. An alternative methodology could also be applied to test the emissions modelling findings:

- Guidance from Defra on an updated set of damage cost multipliers for atmospheric pollutants is expected in November 2018. Once published, a sensitivity test could be conducted using high and low damage costs per tonne.
- It is also recommended that the replicability of findings for the health and environmental impact assessment (that used EMIGMA software) is tested against Atmospheric Dispersion Modelling System (ADMS) modelling for NO₂ and PM₁₀, subject to the development of a workable methodology.

¹ The EMIGMA model provided the change in mass emissions in tonnes. For FBC, ADMS modelling will provide the change in concentration in µgm³

1.3.2 Other effects

In addition to the key health and environmental concerns described in section 5.3, consideration could be given to the following effects, subject to the availability of suitable baseline data: diabetes, cognitive decline and dementia, mental health and risks to the unborn baby. These health concerns have not been screened out but are considered more relevant for future work when more detailed assessment might be required.

Diabetes

Evidence suggests a link between air pollution and diabetes, especially type 2 diabetes mellitus. The association was stronger for traffic associated pollutants including NO_x and PM (Royal College of Physicians, 2016).

Cognitive decline and dementia

There is emerging evidence to suggest that poor air quality affects cognitive functioning in both children and adults (Royal College of Physicians, 2016). Early evidence shows that prenatal exposure to heavy metals, particularly lead and mercury, that can cross the placenta and accumulate in the foetus, has been associated with reduced cognitive functioning in children (Canfield et al., 2003). Similarly, an association has been found between particulate air pollution and some measures of cognitive function, as well as decline over time in cognition (Tonne, C 2014).

Mental health

According to a growing body of evidence, air pollution can be associated with changes in behaviour within society, for example, spending less time outside, which can lead to more sedentary lifestyles and negative psychological effects on our mental health (Crowder, 2017). Additionally, it is well known that physical environments that promote good health can have a positive effect on reducing the socio-economic health inequalities of the area (Marmot Review, 2010).

Risks to the unborn baby

There is emerging evidence on the links between high levels of emissions and effects on the unborn child. Evidence shows that air pollution can affect the growth of the unborn baby and may be linked to premature birth or even still birth (Nezeeba Siddika et al., 2016). It is estimated that traffic-related air pollution exposure (particularly exposure to PM) of pregnant women accounts for more than one-fifth of all cases of low birth weight at term. Low birth weight is associated with low lung function, COPD, cardiovascular disease and early death in adulthood (Risnes et al., 2011, in Royal College of Physicians, 2016). Air pollution can also harm placental development, which affects the development of the unborn child and has been associated with several chronic diseases, including heart disease, obesity and type 2 diabetes. Poor foetal growth is linked to abnormal development of the kidneys, and to hypertension and kidney disease in later life (Luyck et al., 2013 in Royal College of Physicians, 2016).

1.4 Affordability

Further issues relating to private transport include the requirement of some jobs for employees to have their own car. This includes occupations such as community-based care work that involve travelling between private homes. In these cases, using public transport is often unfeasible due to complications of appointments, schedules and availability of transport services. Whilst there is potential for an adverse effect on low income households, further work should look at the percentage of low income households working within this sector to identify any disproportionate effects on this group.

1.5 Mapping of vehicle compliance distribution

Using DVLA registration data identifying vehicle compliance, a mapping of the distribution of compliant cars can be used to look at the relative levels of non-compliant cars within income-deprived areas to identify whether people in those areas would be differentially affected by costs associated with upgrading private cars to compliant vehicles.

1.6 Boundary parking measures

Some areas bordering the IRR already have parking schemes, but these are generally free for residents and businesses. A more in-depth look at the proposals for boundary parking measures and their impacts may reveal further insight into personal affordability impacts for low income households and people with a disability. For example, if residents parking charges are introduced this may have distributional impacts depending on the eventual locations.

1.7 Key workers

There are hospitals and places of education located within the IRR. Exemptions for key workers (to include social workers and other LA/NHS staff who travel such as midwives) should be investigated, especially for option 5(ii) as which would increase the percentage of non-compliant vehicles given that all diesel cars would incur a charge. A review of MCC staff travel arrangements could be undertaken to understand the likely impact on staff and measures such as use of pool cars.

1.8 Taxis and PHVs

Business affordability impacts for taxis and PHVs could be explored using licensing information obtained from councils within GMCA (including vehicle age, registration address, age of driver/owner, whether WAV or not). Analysis could be done focusing on number of vehicles requiring upgrade to become compliant (Euro 6) by 2021. As stated in Table 6.4, it is assumed that 100% of taxis will achieve compliance through the implementation of the Clean Taxi Fund; therefore, further investigation is required to understand the affordability implications of taxi operators absorbing the residual costs (i.e. the proportion of the total upgrade cost not covered by the fund).

1.9 Bus fleet data

As stated in Table 6.4, it is assumed that 100% of taxis will achieve compliance through the implementation of the Clean Bus Technology Fund; therefore, further investigation is required to understand the affordability implications of bus/coach operators absorbing the residual costs (i.e. the proportion of the total upgrade or retrofit cost not covered by the fund). This could have particular implications for smaller operators on rural routes, where any increase in cost could affect the viability of maintaining a service on those routes. An analysis of TfGM bus fleet, route and frequency data should be undertaken as the conclusions may also have implications for the accessibility assessment.

1.10 LGV and HGV dependent businesses

Fleet analysis of the Driver and Vehicle Licensing Agency (DVLA) registration data could be undertaken to determine the proportion of HGVs within Greater Manchester anticipated to be non-compliant by 2021 and the proportion of LGVs anticipated to be non-compliant by 2023 (not incorporating any CAP behavioural change assumptions).

Analysis of DVLA vehicle operator licencing statistics could also be undertaken to identify spatial distribution of small (<5 vehicle) HGV operators across Greater Manchester.

This could be compared with the analysis undertaken here which is based on trip origin / destination as opposed to the location of vehicle registration to provide further insight as to where businesses are located that are likely to be the most significantly affected.

1.11 Other business affordability impacts

Other business affordability impacts that could be explored further in future investigations include:

- visitor and night time economy; and
- costs to businesses associated with potential loss of workers as a result of altered travel behaviour.

1.12 Accessibility

The accessibility appraisal uses the outputs of SATURN to locate areas with increased or decreased journey times. Whilst this method effectively highlights areas affected by the intervention, the magnitude of this impact (i.e. how much the journey time is increased or reduced by) has not been reported. Further work should include analysis of the percentage increase in journey time to determine the significance of this increase/decrease on the key social groups.

1.13 Severance

Changes in traffic flows can lead to a significant impact on community severance when Annual Average Daily Traffic (AADT) flows exceed 8,000 vehicles per day (Highways Agency, 1993). However, it is noted that there are limitations in using AADT. For example, a school route may require a road to be crossed where traffic is heavily 'peaked'. While the AADT may be below the 8,000 vehicles per day threshold, if the majority of this traffic flows at a time when the school route is most in use (for example traffic to a business park where peak flows may coincide with journey to school times), there is a likelihood that this would be sufficient to dissuade some journeys on foot by children and parents. The consideration of the AADT threshold has been used, but the assessment and appraisal has relied more on a qualitative review of community facilities and the local conditions. It is recommended that further monitoring of traffic flows be completed to improve the accuracy of the assessment.

Identification of medical/health and education facilities that could experience severance has used ONS data. There may be instances where some data is out of date. It is recommended that additional datasets are used to confirm the facilities for routes where there is potential for severance effects.