Analytical assurance statement

Version: 1

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Analytical Assurance Statement for transport and air quality modelling.

1. Limitations of the Analysis
  - Has the Analysis been constrained by time or cost, meaning further proportionate analysis has not been undertaken?
  - Could the further analysis that could be done lead to different conclusions?
  - Does the analysis rely on appropriate sources of evidence?
  - How reliable are the underpinning assumptions?
2. Risk of Error / Robustness of the Analysis
  - Has there been sufficient time and space for proportionate levels of quality assurance to be undertaken?
  - Have sufficient checks been made on the analysis to ensure absence of errors in calculations?
  - Have sufficiently skilled staff been responsible for producing the analysis?
3. Uncertainty
  - What is the level of residual uncertainty (the level of uncertainty remaining at the end of the analysis)?

4. Use of analysis

  - Does the evidence provided support the business case?
  - Is there evidence the agreed target will be achieved?

1. Limitations of the Analysis

- *Has the Analysis been constrained by time or cost, meaning further proportionate analysis has not been undertaken?*

  The analysis has been constrained by time and cost. However, this has not constrained proportionate analysis from being undertaken. In fact, the modelling of air pollutants has been carried out in a much greater level of detail and complexity than is typical of studies of comparable size. This particularly relates to the background sources which have been considered in detail.

- *Could the further analysis that could be done lead to different conclusions?*

  No. Any further analysis would not be expected to lead to different conclusions, but may provide a greater understanding and/or greater refinement of the results presented.

- *Does the analysis rely on appropriate sources of evidence?*

  The best available evidence has been used as specified by JAQU. Both the traffic model and emissions and air quality model meet the quality criteria provided by JAQU. Local fleet composition data was derived from an analysis of ANPR data from 18 sites across the city.

This data indicated that the Euro distribution was consistent across the modelling domain, but that there were zonal differences in the rigid/artic split and the proportion of taxis in the car fleet

- *How reliable are the underpinning assumptions?*

  The transport (SRTM) base year model has been constructed according to WebTAG recommendations, and validated against DMBR guidelines. The calibration process did not reveal any significant problems or shortcomings in the base year model. The quality of validation of the model is generally good, with the screenline validation performing particularly well. This is critical, ensuring that the demand in the model is correct for assessing multi-modal interventions and future changes.

  The journey time validation and the patterns of junction delay appear consistent, although the link flow and journey time validation do not meet the WebTAG criteria. However, these recommended criteria mask a good model performance that is close to meeting the acceptability guidelines.

  It is often considered that the WebTAG thresholds of acceptability are more suited to smaller, less complex models, and that given the scale and complexity of the SRTM, a certain level of flexibility regarding the WebTAG thresholds is acceptable. The calibration and validation suggest that the SRTM is fit for the purpose of representing the highway traffic patterns in the base year, as part of the SRTM.

  In terms of the detailed fleet composition data this was derived from local ANPR data, with forward projection done on the basis of a methodology agreed with JAQU using national trends. In addition, JAQU provided data on the proportion of vehicles that will upgrade to meet the standard. There is some uncertainly around whether this generic figure will match the response to local schemes. However, with not local information on behavioural response these provide the best assumptions available.

  The emissions and air quality modelling follow current best practice. The emissions data is the latest COPERT V data which represents latest information on the real world emission performance of vehicles. The average speed approach adopted by the COPERT emissions data set is a simplification but is the most practical approach over a modelling domain of this size.

2. Risk of Error / Robustness of the Analysis

- *Has there been sufficient time and space for proportionate levels of quality assurance to be undertaken?*

  Yes. All modelling work is reviewed internally before issuing the results. This internal review includes sense checking, review of the assumptions, and checking of both the modelling inputs and outputs.

- *Have sufficient checks been made on the analysis to ensure absence of errors in calculations?*

  The checks undertaken have been proportionate to the scale and complexity of the modelling analysis.

- *Have sufficiently skilled staff been responsible for producing the analysis?*

  The team working on the Southampton CAZ study within SYSTRA consists of experienced team members, including the Project Director who has 30 years of experience in multi-modal and uni-modal transport modelling and has led SYSTRA's Transport Modelling and Appraisal

Team. The team also includes the Project Manager who is an experienced transport modeller and data analyst supported by a background in software development and transport related academic research, and the Business Case Project Manager, who has the TPPQ and over 14 years of transport planning experience including modelling and data analysis. The team is also supported by a strong pool of modellers who specialise in modelling and analysis, in particular with the SRTM. Within SYSTRA, there are other staff members working on other CAZ studies, and an internal user group has been set up to discuss the methodology and assumptions to ensure that the approach taken is the same for all studies.

The air quality modelling team at Ricardo have significant experience of developing, assessing and recommending measures to reduce emissions and improve air quality at the city scale, including extensive expertise in air pollution modelling from the development of inventories and baselines to modelling the future impacts of abatement scenarios. The team is led by a Project Director who holds over 20 years of experience of working on transport and emissions reduction projects. His key areas of expertise include vehicle emissions modelling, low emission vehicle technologies, sustainable transport measures and local air quality management and policy and he has worked on a number of LES, LEZ and CAZ projects in the UK including in Southampton, Derby, Nottingham, Oxford, London, Leicester and South Oxfordshire. The modelling work is led by an experienced atmospheric scientist with a strong focus on modelling transport and industrial emissions and characterising their effects on ambient air quality who is an advanced user of ADMS, ADMS-Roads, ADMS-Urban, AERMOD, CALPUFF, Envi-Met CFD, ArcGIS, QGIS and other air dispersion modelling tools as well as meteorological modelling software such as WRF, and has also developed Ricardo's in-house dispersion modelling suite (RapidAir). The modelling lead is supported by a team of experienced consultants specialising in air quality impact assessment and atmospheric dispersion modelling.

3. Uncertainty

- *What is the level of residual uncertainty (the level of uncertainty remaining at the end of the analysis)?*

  In relation to the transport model, the base year model relies on the input data (screenline and cordon counts) used for calibration. This has gone through an internal rigorous check. The Department for Transport and Highways England are currently in the process of reviewing the 2015 LMVR. If any feedback is obtained these will be put into the ongoing SRTM model up-keep. To evaluate model performance and uncertainty of the air quality model, the Root Mean Square Error (RMSE) for the observed vs predicted NO_2 annual mean concentrations was calculated, as detailed in Technical Guidance LAQM.TG(16). In this case the RMSE was calculated at 6.7 $\mu g.m^{-3}$. An RMSE was also calculated when clear outliers were excluded which reduced the average model error to 5.3 $\mu g.m^{-3}$. Further information on residual uncertainty in the air quality model can be found in section **Error! Reference source not found.** and Appendix 5.

4. Use of analysis

- *Does the evidence provided support the business case?*

  To be completed once CAZ options have been modelled.

- Is there evidence the agreed target will be achieved?

  To be completed once CAZ options have been modelled.