

## The Mayor of London's response to the Airports Commission **supplementary** consultation on shortlisted options

# Air Quality

May 2015

### Key findings

- The Commission's air quality assessment represents stage 2 of the Commission's own two-stage process, which provides more detailed dispersion modelling however the report fails to provide detailed impacts and does not determine overall significance of the options.
- For example, for both Heathrow options, the Commission's Sustainability Appraisal previously concluded that without "substantial and forceful measures" the impacts of the schemes would be "SIGNIFICANTLY ADVERSE". An overall mitigation package of such measures has not been assessed, but the information presented indicates that significant residual impacts would remain. Therefore, it can only be concluded that the original significance assessment still stands and extensive additional measures are still required to fully mitigate the schemes.
- However, the consultation period of just three weeks is inadequate to properly assess all of the material provided by the Airports Commission and further time should be given to all parties.
- The input assumptions for this assessment should be consistent with other assumptions made for the other topics areas, including those relating to surface access and travel demand forecasting and airport operational measures. This cannot easily be validated because in many instances, the Commission has not published the relevant data.

### Specific Comments on the Technical Approach

- The assessment does not include determination of significance – it has not updated the Sustainability Appraisal. This means the Commission does not draw any conclusions about the significance of the results.
- Results for the Do Minimum scenario – both for Heathrow and Gatwick – have not been reported thereby rendering it impossible to determine the detailed impacts of the expansion options (relative to the future baseline).
- The model verification and adjustment (against observed data) is flawed, undermining

the reliability of the final results. Without a more robust approach, it is likely that the air quality impacts of Gatwick expansion have been overestimated, while there are key locations around Heathrow which have been underestimated. For example, using a few locations at Heathrow with sufficient reported results, 2009 modelled concentrations of NO<sub>2</sub> in the Harlington and Cranbrook areas directly to the north and east could be 10-15% higher than predicted. This means that predicted concentration in 2030 may be significantly higher, exceeding 40 µg/m<sup>3</sup> on A4 Bath Road for the NWR scheme.

- It remains the case that no quantitative assessment of proposed mitigation measures has been undertaken and so the expected impact of these and residual impacts cannot be known.
- For these three Commission options, the Green Book guidance requires use of a method based on abatement cost estimates. By not doing this, the assessment has noticeably underestimated the economic cost and scale of the air quality impact.
- Roads sources are critical in identifying exceedence; the consultation material provides limited detail of the traffic modelling and so its reliability cannot be ascertained.
- The road modelling assessment does not disaggregate airport-related traffic; not only does this not allow for attribution of surface-access related air quality impacts to the airports, it prevents proper identification of targeted mitigation measures focused on airport users.
- There are several specific concerns about the treatment of road links, notably: all concentrations in proximity to new roads have been excluded; all emissions from existing and new car parks have been excluded; the impact of wake vortices from runways on pollution dispersion at nearby tunnel portals (applicable to both Heathrow options) has been ignored.

#### Specific Comments on the Options

- With regard to the relative merits of the options, the picture presented by the assessment is mixed; however several issues with the methodology including the location of selected receptors suggest that the impacts for Gatwick expansion have been overstated relative to Heathrow. Selected receptor locations for Gatwick are predominantly roadside which makes some results seem higher for Gatwick, whereas many of the selected receptors for Heathrow are not worst case.
- There are locations around Heathrow with a noticeable worsening of NO<sub>2</sub> – in some cases a large increase of up to 12 µg/m<sup>3</sup>, which would require a level of mitigation previously unheard of without major scheme redesign. Neither the promoter's mitigation measures nor those considered by the Commission would adequately mitigate these impacts; a cumulative assessment of an overall mitigation package is not presented. Measures above and beyond those presented would be required to meet the necessary level of mitigation such as:

- » A significantly greater investment in public transport than put forward
- » Implementation of an airport-wide ULEZ and/or congestion charging zone

- Indeed, the level of impacts around Heathrow would potentially offset any efforts by the Government to meet EU limit values as soon as possible and would work against any air quality plans being drawn up by Defra.
- In terms of assessment of compliance against EU limit values, for both Heathrow schemes, the increase in annual NO<sub>2</sub> concentrations on the A4 Bath Road PCM link would result in greater exceedence of the EU limit value, and is predicted to be at a higher concentration in 2030 than the otherwise maximum PCM predicted concentration in the Greater London agglomeration. This will have a direct effect on Defra's air quality plans by making them unworkable in terms of achieving compliance as additional measures would need to be identified and included.
- The Heathrow area already exceeds EU limit values for annual average NO<sub>2</sub> (PCM links) and these findings indicate that expansion at the airport will exacerbate this. As such, the assessment fails to demonstrate that Heathrow expansion could be compatible with the UK's air quality obligations under EU law.
- The measures being identified by Defra – in response to the recent Supreme Court decision – to address the existing air pollution problem as part of its NO<sub>2</sub> Action Plan will not be available to mitigate the impacts of expansion.

### Further work required

- The model verification requires revisiting, especially the lack of adjustment of airport sources at Gatwick, the lack of use of local monitoring data for roads sources at Gatwick, and the use of a single adjustment for roads NO<sub>x</sub> and total NO<sub>2</sub> across all sites.
- The Commission should determine the post-mitigation local air quality impact significance in order to be able to assess performance against its objective to “*improve air quality consistent with EU standards and local planning policy*”.
- The Commission should determine the impacts during initial and mature phases of the scheme development.
- For surface access, the detail underpinning the traffic modelling should be provided; the airport-related fraction of traffic should be identified and realistic road geometry used for new and amended infrastructure.
- Impact pathway (abatement) monetised cost estimates should be undertaken.

[PCM = Pollution Climate Mapping (model)]

## Key observations

### 1. Appraisal Framework requirements have not been met

- 1.1. The Commission's analysis within the Business Case and Sustainability Appraisal for each shortlisted option has not been updated with the stage 2 findings.
- 1.2. The Commission's analysis, in the technical report as well as the previous business case and sustainability appraisal, fails to include an assessment of the initial and mature phases of the scheme introduction.
- 1.3. The analysis does not adequately account for potential mitigation solutions; it only provides a qualitative/offline estimate on those provided by the promoters and by the Commission. Thus the assessment does not provide residual impacts and so a) the expected impact is not known, and b) the level of commitment to any suggested mitigation is very unclear.
- 1.4. The Appraisal Framework confirmed that the Commission would refer to the supplementary Green Book guidance in its assessment. According to this guidance, where monetised disbenefits are over £50 million and there is risk on non-compliance with the EU limit values – both of which apply for all three shortlisted schemes – then abatement cost estimate methods should be used for all relevant impacts. This has not been done. As these would be noticeably higher than those using the current method, these would worsen the scale of the air quality impact.

### 2. Inadequate treatment of surface access road links

- 2.1. Traffic data used covered all periods (AM peak, PM peak, Inter-peak, Off-peak) but it is unclear how much of this is derived from actual traffic modelling. There is no mention of any consideration of a weekend model or sensitivity of weekend traffic impact which, given the increased airport activity at the weekend, is a notable omission.
- 2.2. The traffic model did not provide the fraction of link traffic which was airport related. This restricts source apportionment and does not allow any evidence on the proportion of surface access-related air quality impacts attributable to the airport – a major argument put forward by Heathrow option promoters. This also means that airport-specific mitigation cannot be determined or justified; yet focused mitigation (i.e. influencing airport users) is more likely to be effective than general mitigation methods (i.e. influencing all road vehicles).
- 2.3. The consultation material does not include details of the traffic modelling used, what assumptions were applied for those major roads around the airport which are at or near capacity and it certainly does not demonstrate that the LMVR (Local Model Validation Report) or Forecasting have passed best practice criteria with regard to

reliability for use in air quality. This increases uncertainty about the air quality assessment outcomes.

- 2.4. The road geometry for existing roads is not always constant across scenarios. The assessment takes no account of vertical alignment which would make a noticeable difference at motorway junctions.
- 2.5. The actual alignment of new road infrastructure will be different from that modelled in the assessment, which has employed a simple straight line geometry using the traffic model nodes. This has been used to justify excluding all relevant receptors adjacent to new infrastructure from the concentration results and the maximum changes. Given these are liable to be the very locations with the largest changes in air quality, this will likely result in an underestimate of the scale of impact of the capacity changes.
- 2.6. Both Heathrow options would require the M25 to be placed in a tunnel under the runway. The modelling of these tunnel portals is quite simplistic. Also, no account has been taken of the wake vortices effect of aircraft using the runway overhead on the tunnel portal dispersion. The effect of the tunnel on any relevant receptors must therefore be heavily caveated – the impacts are likely to have been understated.
- 2.7. Emissions from the airport car parks have not been included on the grounds that they only make a minor contribution to ground-level concentrations. This is debatable for multi-storey ventilated carparks, especially as they tend to be close to roads (and associated receptors). Several airport car parks will be relocated under the expansion options – the effect of this is also not assessed and given the land constraints these too would quite possibly be near to receptors.

### 3. The verification of airport and road traffic sources is flawed

- 3.1. Airport verification: The argument used to not adjust Heathrow or Gatwick is debatable. Heathrow monitoring suggests that the model slightly underestimates the airport fraction (but significantly underestimates the total). For Gatwick, the modelling overestimates the airport fraction materially and should be adjusted downward, potentially reducing the impact of Gatwick capacity increases.
- 3.2. Roads verification: The roads method subtracts modelled airport and background sources from monitoring to estimate the roads monitored fraction. This makes it very sensitive to the adjustments applied to these sources as part of their own verification steps.
- 3.3. No separate roads verification for Gatwick has been undertaken (although there are five diffusion tubes in the area which could have been used). Instead an adjustment of 1.808 (i.e. a factor to counter the model underestimating roads sources) has been applied to all sites in Gatwick based on the Heathrow data. Given the importance of

roads sources to total concentrations this is likely to substantially weaken the reliability of the results for Gatwick.

- 3.4. Total concentration verification (NO<sub>2</sub> adjustment): A single adjustment factor of 0.931 has been determined and applied at both Heathrow and Gatwick. This is inappropriate. Adjustments should be by separate study areas for models which are separate (and use different meteorological data). All Gatwick comparisons show overestimates, whilst Heathrow half under-estimate and half overestimate. On this basis, Gatwick total concentrations would likely reduce even further, whilst Heathrow total concentrations would likely increase where zonal adjustments could be applied to reflect underestimates.
- 3.5. For example, using a few locations at Heathrow with sufficient reported results, 2009 modelled concentrations of NO<sub>2</sub> in the Harlington and Cranbrook areas directly to the north and east could be 10-15% higher than predicted as the road traffic contribution here appears to be under-predicted to a greater extent than the rest of the model area.
- 3.6. Using this, receptors in Harlington and Cranbrook receptors show an increase in concentrations of between about 0.3 – 2.6 µg/m<sup>3</sup> (based on Receptors J,L,M and S); by far the highest increase was at the more roadside location (S).
- 3.7. Similarly, the maximum predicted 2030 concentration for the NWR is at Bath Road (34.7 µg/m<sup>3</sup>). Re-verified, this concentration is likely to be more like 38-42 µg/m<sup>3</sup> in 2030. This would result in greater levels of mitigation being required.
- 3.8. In terms of the PCM predicted concentrations at this location, using the A4 Bath Road PCM Link under NWR as an illustration: if the predicted increment was 0.4 µg/m<sup>3</sup> giving a total concentration of 48.7 µg/m<sup>3</sup>, then as a result of re-verification this is likely to increase to approximately 49 µg/m<sup>3</sup> taking account of increased road contributions of NO<sub>x</sub>. This is likely to result in a greater level of mitigation being required, and would further delay Defra in achieving compliance with the EU Limit Value.

#### 4. Receptor results are inadequately reported

- 4.1. Selected receptor locations are reported in detail and used for source-apportionment. These are not necessarily the worst case locations, which could lead to misleading results. Tabulated results are only provided for the 2030 Do Something scenario but not the Do Minimum scenario. Therefore changes in source contribution cannot be determined, undermining confidence that the effect of the extra runway and changes to surface assess has been reflected appropriately.
- 4.2. The source apportionment locations selected introduce some bias: it is notable for Heathrow that many are not roadside locations (Figure 6.9), but those used for the

Gatwick modelling (Figure 4.9) are predominantly roadside locations. This makes tabulated road contributions for Gatwick in 2030 seem higher than those for Heathrow - e.g. Table 4.5 (Gatwick) versus Table 6.5 (Heathrow).

- 4.3. Receptors within 200m of any new roads have been excluded from the assessment and therefore no impacts at these locations are presented. This particularly favours the Heathrow options, which include significant sections of new road outside of the airport footprint.

## 5. General methodology concerns

- 5.1. The modelling uses a 2009 base and 2030 opening year. 2009 is rather old for an air quality model as several key Defra datasets no longer go that far back (only as far back as 2012) and verification would not follow best practice for surface access related sources – which would suggest no more than 3 years old.
- 5.2. Emissions are not reported for the Principal Study Area or the Wider Study, but against the entire Traffic Model Simulation Area, which by definition will generate a very small apparent percentage change in emissions. Averaging the changes over such a large area ensures that the figures do not show the much larger emissions changes due to road traffic that will occur in the areas immediately surrounding the airport.
- 5.3. The 2030 Do Something TIMs (aircraft ‘times in mode’) for take-off, climb-out and approach were assumed to be unchanged from the 2030 Do Minimum. This seems to be a bold assumption given the way an additional runway would be expected to alter airport operations and does not accord with previous additional capacity studies.
- 5.4. In terms of the overall trend, the assessment does not provide: analysis of how long current exceedences of the air quality criteria would remain; the extent to which the scheme impact would worsen this effect.

## 6. Conclusions to be drawn on the shortlisted options

- 6.1. Maximum concentrations are clearly most associated with surface access changes, echoing the Mayor’s conclusion following the interim assessment.
- 6.2. Though the Commission does not try to draw conclusions from the assessment, its data suggests a mixed picture; on some metrics Heathrow NWR and Heathrow ENR fare worse while for others, Gatwick expansion creates the greater pollution impacts.
- 6.3. However, for the reasons already stated, in particular relating to how the model verification has been undertaken, it is likely that the air quality impacts of Gatwick have been overstated relative to Heathrow.
- 6.4. Nonetheless, there are very specific concerns arising for the Heathrow expansion, which apply irrespective of the option.

- 6.5. There are locations around Heathrow with a noticeable worsening in NO<sub>2</sub>, with these locations at risk of exceedence in the future. The changes include up to 12 µg/m<sup>3</sup> increases (equal to a change of 3 standard deviations), which would require a level of mitigation previously unheard of without major scheme redesign. Neither the promoter's mitigation measures nor those considered by the Commission would adequately mitigate these impacts (and a cumulative assessment of an overall mitigation package is not presented). Measures above and beyond those presented would be required to meet the necessary level of mitigation potentially including:
- » A significantly greater investment in public transport than put forward
  - » Implementation of an airport-wide ULEZ and/or congestion charging zone
  - » A complete review of airport parking facilities with a view to reduced provision
- 6.6. Indeed, the level of impacts around Heathrow would potentially offset any efforts by the Government to meet EU limit values as soon as possible and would work against any air quality plans being drawn up by Defra.
- 6.7. In terms of assessment of compliance against EU limit values, for both Heathrow options, under the 2030 Do Something, there would be a worsening of annual mean NO<sub>2</sub> concentrations at the A4 Bath Road PCM link, the A4 (Fulham Palace Road to Earls Court Road) PCM link and the A40 Western Avenue. The incremental change at the Bath Road A4 PCM link would make this location have a higher concentration (up to 7.4 µg/m<sup>3</sup> more) in 2030 than the otherwise maximum PCM predicted concentration in the Greater London agglomeration. This will have a direct effect on Defra's air quality plans by making them unworkable in terms of achieving compliance as additional measures would need to be included. Were one to follow the re-verification approach set out above, this problem would be even worse than already shown.

## 7. Heathrow expansion incompatible with the UK's obligations to meet EU limit values

- 7.1. The Heathrow area continues to exceed EU limit values for annual average NO<sub>2</sub> (PCM links), and although action is being taken by some in the wider area of Heathrow, these actions will need re-evaluating and significantly expanding to demonstrate there is an achievable route to EU compliance against which extra capacity permissions can be considered. Given the concerns raised, it has not been demonstrated that expansion at Heathrow can be compatible with the UK's air quality obligations under EU law as set out in the recent Supreme Court decision.
- 7.2. Defra are currently developing an updated NO<sub>2</sub> Action Plan for the Greater London agglomeration (which includes the Heathrow area) in response to the recent Supreme Court ruling; this will include a range of mitigation measures to address the existing air pollution problem. Such measures would therefore not be available in the future to address the additional air quality impacts of an expansion of Heathrow.