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Gatwick Northern Runway Project: Air Quality Written Representation Deadline 8

Client: CAGNE

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1. Introduction

1.1. Air Pollution Services (APS) has been commissioned by CAGNE (the 'Client') to provide a technical review of the air quality assessment undertaken by the Applicant for the Gatwick Northern Runway Project (herein the 'Proposed Development' or 'Project').

1.2. APS previously produced:

- "*Technical Note: Gatwick Northern Runway Project: Critical Review of Air Quality Assessment*" and attended virtually the Issue Specific Hearing (ISH) on Air Quality held on 1 May 2024.

1.3. Following the ISH APS produced:

- "*Gatwick Northern Runway Project: Air Quality Written Representation Deadline 4*" (dated 14 May 2024)

1.4. The following Applicant documents have been reviewed:

1. *The Applicant's Response to Actions ISH 7: Other Environmental Matters* (the 'Hearing 7 Response')
2. *Appendix A: Air Quality, The Applicant's Response to Deadline 4 Submissions submitted at Deadline 6* (the 'GAL response') (dated June 2024)

1.5. This note responds to these Applicant documents and provides further representations on the air quality action plan and the air quality section so the draft S106 agreement.

Summary

1.6. The road transport modelling does not follow good practice as set out in Defra's TG22, despite the Applicants assertion that it does. It also does not meet the government's Joint Air Quality Unit (JAQU)'s expectations for modelling compliance with the air quality limit values and it does not meet industry standards of good practice. The roads modelling is not fit-for-purpose. That is, it does not reliably estimate concentrations at locations across the study area. This is the case before considering the model performance evaluation.

1.7. The Applicant acknowledges that effects on air quality occur below the current standards, but the air quality chapter fails to assess the significance of these effects.

1.8. The Applicant has made it clear that the concentrations inferred from the modelled grid are not appropriate to determine concentrations at specific locations, however, the Health Assessment uses the concentrations from the modelled grid at specific locations to assess exposure.

1.9. Regarding ultrafine particles (UFP), the Applicant suggests that the health effects are unimportant because the hazard ratio of smoking is 20 times higher. This would suggest that the Applicant also considers the health effects of $PM_{2.5}$ exposure is unimportant, as the hazard ratio for $PM_{2.5}$ exposure is a similar to that for UFP according to the most recent study. This is clearly wrong, as it is widely accepted that exposure to $PM_{2.5}$ is a major health risk.

1.10. The applicant have stated they will report on studies carried out based on monitoring but there is no commitments to carry out any studies, including for evaluating the real effect. There are a number of mentions of developing 'watching briefs' in the ES, such as for UFP. These 'watching

briefs' and a commitment to evaluate the effects of the project should be incorporated into the DCO and s106.

1.11. It is important that where the air quality monitoring with the Proposed Development demonstrates the effect on air quality is greater than the EIA demonstrated, that there are mechanisms in place to mitigate these unpredicted effects. These mechanisms should be incorporated into the DCO and the s106 agreement. If the Applicant is confident in their assessment this will not be a restrictive covenant, but should be regarded as an aid to ensure the EIA is fit-for-purpose.

1.12. The s106 agreement needs to provide a cap on the number of flights permitted if the real effects exceed the ES predicted effects until the effect is mitigated or it is agreed with all parties that the additional effect is acceptable. Only with this requirement in the DCO and s106 can the ES assessment be considered appropriate. Without this clause the ES is purely a paper exercise, with no bearing on reality, which is not the purpose of EIA.

1.13. The future air quality action plans (AQAPs) should not only provide details of the GAL measures in the previous five years, but also set out and quantify its plans to have meaningful improvements to air quality over the following five years.

2. Response by GAL to Issues Raised by CAGNE

2.1. The following issues were raised in the APS document "*Technical Note: Gatwick Northern Runway Project: Critical Review of Air Quality Assessment*":

- Proportionality in Air Quality Assessments
- Reliability of the Air Quality Modelling
- Assessment of significance
- Health and Exposure Assessment
- Ultrafine Particles (UFP)
- Other

2.2. The following sections discuss the Applicant's responses to these issues.

2.3. Model files were provided by the Applicant, but the important 2018 files were missing and other files were incorrectly labelled. The 2018 files are particularly important because these were the files used for model verification. These should be provided.

Reliability of the Air Quality Modelling

2.4. The GAL response continues to rely on the statement: (e.g., Response to Point AQ4 on Page 30 of the Hearing 7 Response).

"The assessment has been based on a number of conservative assumptions, as such the effects reported in the ES represent a reasonable worst-case situation."

2.5. However, this is incorrect. The modelling approach for road traffic is not conservative because it is not fit-for-purpose. This is set out in APS's *Technical Note: Gatwick Northern Runway Project: Critical Review of Air Quality Assessment* and "*Gatwick Northern Runway Project: Air Quality Written Representation Deadline 4*".

2.6. Paragraph 3.4.2 of the GAL response states (APS emphasis):

'…The Applicant considers best practices and proportionality has been correctly applied and the approach provides a realistic worst-case assessment. Proportionality has been considered in the assessment with respect to using the level of detail applied to the calculation of emission (using an 'advanced approach' rather than 'simple' or 'sophisticated', as defined in the ICAO Airport Air Quality Manual (2020)) and using conservative assumptions in the calculations and to represent future scenarios. Using these conservative assumptions (detailed throughout ES Appendix 13.4.1: Air Quality Assessment Methodology [APP-158] and further expanded in Supporting Air Quality Technical Notes to the SoCGs [REP1-050]), the approach provides a realistic worst-case, accommodating for any uncertainty in the modelling assessment.'

2.7. Paragraph 5.2.2 of the GAL response states:

"The model set up was reviewed before finalising the approach used within the air quality assessment."

2.8. The Applicant has failed to provide responses to the detailed comments made regarding the limitations of the assessment; choosing to respond only to the questions in red. It is clear in the APS document that the text in red were not exclusive issues. If this was the case there would have been no merit in providing the text in black.

2.9. In simple terms, one important area of uncertainty of the Applicant's assessment lies it the modelling of the road transport impacts. The model excludes the presence of street canyons. Buildings have a very significant impact on the dispersion of air pollution, even where there are no 'traditional street canyons'. One way of thinking about the impact of buildings on dispersion is to think about their impact on wind speeds. In general (there are exceptions) it is much windier in parks than nearby streets. Again in general terms, more wind is associated with more dilution and better air quality. Conversely buildings restrict the wind and causes the buildup of air pollution. Ignoring this important element of the modelling means that the model results are unreliable no matter how "conservative" the other assumptions are. Differences in including verses excluding the street canyons effect in the model can easily be 100%.

2.10. The applicant relies heavily on Defra's LAQM.TG22 which clearly states (paragraph 7.558) that consideration of street canyons is a common improvement that can be made to a 'base' model. ADMS can account for street canyons using either a 'basic' approach or an 'advanced' approach. The Applicant has been explicit that the modelling of the airport emissions is good because it has followed an 'advanced' approach however, it has not followed even a 'basic' approach for street canyons in the modelling of road transport emissions.

2.11. Paragraph 7.559 of TG22 states:

"Where discrepancies still remain, local authorities may need to consider adjusting the model."

2.12. The applicant has adjusted the model before improving the model and therefore the guidance in LAQM.TG22 has not been followed.

2.13. Section 2.17 of APS's note identifies a number of errors and concerns related to the modelling. None of these have been addressed and the impact of such errors should be taken into account by the Examining Authority when determining the level of confidence in the information provided

when making the determination. This includes a seemingly arbitrary assignment of zones to receptors with no justification, inaccurate road widths and a complete omission of accounting for the 'street canyon' effects on concentrations.

2.14. It is important that the Applicant responds to all APS's comments in CAGNE's deadline 4 submission. The exclusion of the 'street canyon effect' in the model affects the model verification and the predicted impact at the receptors.

2.15. Section 5 of the GAL response provides a sensitivity test for the road transport emission model for 2032. Paragraph 5.2.14 states:

"The RMSE values are within ±25% of the objective being assessed. The annual mean objective for NO_2 is 40µg/m^3, and the RMSE for all zones are lower than 10µg/m^3, which is in line with the criteria outlined in section 7.585 of Defra's TG22."

2.16. The same is stated for PM in paragraph 5.3.4 of the GAL response.

2.17. These statements are incorrect because the paragraph in TG22 states (paragraph 7.585, APS emphasis):

"Ideally an RMSE within 10% of the air quality objective would be derived, which equates to 4µg/m^3 for the annual average NO_2 objective.'

2.18. Stating that the RMSE is within ±25% does not provide evidence that the model is performing well. It may be acceptable if the uncertainty is numerically taken into account during the assessment of the significance of the predicting effects, which is not the case.

2.19. Paragraph 5.2.7 of the GAL response states regarding the sensitivity test undertaken:

'It shows that the use of one factor across the whole study area would reduce the accuracy of the results compared with the approach used in the ES assessment. This is demonstrated by the number of sites that are within ±25% after adjustment, as well as the statistical parameters used to evaluate model performance."

2.20. In fact, what both the single adjustment and the zonal adjustment factors demonstrate is that at locations where there is no monitoring (i.e. the modelled receptors), there is large uncertainty in the predicted concentrations. As the Applicant is unable to provide individual justification for each zonal adjustment factor (i.e. there is no explanation of why the adjustment factor should be different in each zone; the ES only quotes generic reasons for differences) it is not possible to determine whether that approach is better or worse for predicting concentrations at the receptors than the use of a generic adjustment factor. What is worrying is that the model using the zonal adjustment factors failed to estimate concentrations at the monitoring sites within 10% of the measured concentration at over half the monitoring sites. The application of a zonal adjustment factor to a particular receptor is not justified and there are many examples of close receptors allocated to different zones for no apparent reasons (see Figures 20 to 36 in *Gatwick Northern Runway Project: Air Quality Written Representation Deadline 4*"). This is lack of specific justification for the zones adopted s unacceptable.

Assessment of significance

2.21. Paragraph 13.13.6 of ES Chapter 13 and Paragraph 17.3.4 of the Hearing 7 Response recognises that effects on pollutant concentrations due to the Project occur (APS's emphasis):

"the Project recognises the non-threshold effects of air pollution."

2.22. The Hearing 7 Response states in paragraph 17.3.1:

'The thresholds to assess the Project have followed those set in national legislation and policy".

2.23. The applicant relies in many places on policy and strategy trajectories for delivering improvements and for determining the effects in future years, however, the uncertainty in the future air quality assessment level (AQAL) due to the trajectory of such standards, has not been considered, despite noting explicitly that there are acknowledged health effects due to the project below the current legislated thresholds (see Hearing 7 Response paragraph 17.3.4).

2.24. The Applicant has considered sensitivity assessments for many factors but the key factor which has not been considered in any sensitivity test is the effect of the AQAL used, noting that the methodology used determines the effect relative to the AQAL rather than the change in the concentrations due to the Project relative to the baseline.

2.25. Table 1 in APS's 'Air Quality Written Representation Deadline 4 '(14 May 2024) provides recommended AQALs for the sensitivity tests (e.g. for annual mean NO_2 in 2032 onwards a value of 20 $\mu g/m^3$). These sensitivity tests have not been undertaken. Where there is a deviation in the effects outcome compared to the core assessment in the ES, these should be considered, and mitigation measures developed to address this is in line with the requirements for uncertainty to be accounted for.

2.26. Furthermore, it is important to contextualise the impact of the project in the context of total concentrations and how it changes over time. It is clear that the Project will become an increasing proportion of the total concentrations in the future as emissions from other modes of transport (e.g. NOx from cars) decreases. Given the non-threshold effects of air quality on health, the project should present the significance of that change in contribution over time. Should the project not go ahead this would not change and therefore the change in contribution due to the project proceeding could have a disproportionate impact in the future. This analysis is important in determining the effect of a Project and needs to be presented, then appropriate mitigation measures implemented to account for this.

2.27. The draft s106 agreement acknowledges that standards are likely to change over the lifetime of the project and therefore the ES should consider the implications of this on the assessment. It states:

"8.1.4 reporting on relevant updates to national standards or legislative requirements relating to air quality at Gatwick Airport".

Health and Exposure assessment

2.28. Page 71, GAL response states (emphasis added):

"The health impact assessment methodology is detailed in Section 6 of ES Appendix 13.4.1: Air Quality Assessment Methodology [APP-158]. A grid resolution of 100m was used and a grid height

of 1.5m to be representative of human exposure. This is considered to provide enough detail needed to calculate population exposure for the health impact assessment.

As noted in ES Appendix 18.4.1 Methods Statement for Health and Wellbeing [APP-205], the quantitative analyses are pragmatic estimates of changes in selected health outcomes to identify the scale of change associated with the Project changes. The health outcomes quantified are only intended to be used to indicate the scale of change due to the Project, not precise predictions of actual health outcome changes."

2.29. Action Point 15 of the Hearing 7 Response explains that a 100 m grid was used and that values integrated from the grid do not reflect the concentrations at discrete locations. It states (paragraph 15.1.3 of the Hearing 7 response):

"For this reason, it would not be appropriate to extrapolate concentrations from the contour maps in precise locations."

2.30. However, the Health Impact Assessment in the Health and Wellbeing Chapter of the ES extrapolates concentrations at individual properties from the 100 m grid data to inform the exposure assessment (see quote in paragraph 2.28 of this document). It is common knowledge that pollutant concentrations (e.g. NO_2) rapidly reduce with distance from roads. The exposure (e.g. at people's homes) is mainly near the roads. The use of the regularly spaced 100m grid is not fit for purpose (as it does not account for the true exposure). It is standard practice to use a regular grid with source orientated receptors embedded and located parallel to roads to address this (which is straightforward and a built in feature of the model). In summary:

- The applicant has stated that the information derived from the 100 m grid should not be used.
- The Health and Wellbeing exposure assessment uses the 100 m grid to get concentrations at specific locations.
- Therefore this invalidates the HIA air quality exposure assessment and cannot be used to indicate the scale of change due to the Project.

Ultrafine Particles (UFP)

2.31. It is acknowledged by the Applicant that UFP around airports are elevated (paragraph 17.2.2 of the Respond to Hearing 7) and therefore the exclusion of an assessment of UFP in the AQ chapter undermines the ES. A semi-quantitative and semi-qualitative assessment of the change in UFP concentrations can and should be included in the air quality chapter. It is not beyond the capability of a competent air quality consultant to develop an appropriate methodology.

2.32. Paragraph 17.2.5 (Response to Hearing 7) states:

"For particles less than 2.5µm in diameter ($PM_{2.5}$) the risks of health effects have been well studied, leading to the establishment of air quality standards and routine monitoring."

2.33. Paragraph 17.2.7 (Response to Hearing 7) states:

"The hazard ratio (a measure of relative risk) for UFP related lung cancer was 1.01, where 1.00 is no change in risk. For comparison, frequently smoking in a similar population has been associated with a hazard ratio of 20.7, i.e. a twenty-fold risk increase."

2.34. The comparison with smoking , which is a choice of an individual, with an air pollutant, which an individual has no control over, is inappropriate, even for providing a magnitude of scale.

2.35. According to the WHO Air Quality Guidelines the $PM_{2.5}$ hazard ratio is 1.11 for circulatory mortality, 1.10 for non-malignant respiratory mortality and 1.12 for lung cancer mortality. The latest study the health effects of UFP (Health Effects Institute., 2024), funded by the highly respected Health Effects Institute, explains that the hazard ratios for UFP are in the range of 1.057 (for lung cancer) to 1.174 (for respiratory causes of mortality). These hazard ratios are in the same order of magnitude as the WHO $PM_{2.5}$ hazard ratios. The applicant has therefore likely underestimated the risk.

2.36. While there is no agreed threshold for acceptable UFP number or mass concentration there is a clear risk associated with UFP and it has a higher spatial variation than for $PM_{2.5}$. An estimate of the likely magnitude of change in UFP due to the Project is feasible, particularly in relation to engine emissions (regardless of the evolution of volatile particles), and would provide the context for understanding the change due to the project (e.g. a 50% increase in UFP emissions).

2.37. The evolution of the volatile UFP is acknowledged to be complex, however all assessments, including the air quality assessment undertaken for the Proposed Development, simplify such complexities.

2.38. In simplified terms:

- Airports are an acknowledged source of UFPs and elevated local UFP levels.
- The assessment of effects is a comparison between no project and project, therefore most variables (such as the atmosphere e.g. temperature, wind etc. and engine parameters e.g. exhaust temperature) are broadly the same in both situations.
- Furthermore the distance between the airport and receptors remains broadly the same for both situations.
- The main change is the magnitude of emissions.
- If the aim is to compare the UFP to an acceptable threshold e.g. a standard, the absolute amount of UFP in the atmosphere is important. However, when the aim is to look at the magnitude of change as a result of a project the relative change (e.g. percent change) becomes relevant.
- The airport contribution to the concentration of non-volatile UFP in the atmosphere would be broadly related to the amount of non-volatile UFP emissions. If the Proposed Development results in twice the number of non-volatile UFP emissions the airport contribution at a specific location will be approximately double because all the other parameter have remained broadly constant.
- The airport contribution to the concentration of volatile UFP emissions in the atmosphere would also be broadly related to the amount of volatile UFP emissions in the same way as for the non-volatile UFP. The evolution of the emission in the atmosphere will be broadly the same per unit of emission and therefore the complexity of the volatile component can be negated in the assessment. If the Proposed Development results in twice the number of volatile UFP emissions the airport contribution from the volatile component, at a specific location will be approximately double because all the other parameter have remained broadly constant.

- Therefore a magnitude of change in engine emissions can be used to determine a likely magnitude of change in the airport contribution to UFP concentrations in the local area. i.e. a doubling of emissions (either volatile or non-volatile) would likely lead to approximately double the airport related UFP concentration (either volatile or non-volatile) in the atmosphere.

2.39. This shows a simple approach to assess the magnitude of the UFP impacts of the Proposed Development.

2.40. The Health and Wellbeing assessment of UFP relies on the $PM_{2.5}$ magnitude of change to determine the likely magnitude of change in UFP. However, the applicant claims (paragraph 17.2.9 of the Hearing 7 Response):

"There is not a reliance on the UFP $PM_{2.5}$ relationship being linear"

"However, for the health assessment the relevant relationship is that both UFP and $PM_{2.5}$ of aviation origin independently correlate with aircraft movements (being the common source)".

2.41. The WHO Air Quality Guidelines state (paragraph 4.3.2 of the guidelines):

"Generally, there is very little or no relationship between PNC [particle number concentration] *and mass concentration of larger particles ($PM_{2.5}$),… Therefore, no other pollutant is a good proxy for UFP. However, quantitative knowledge of UFP is needed, since focusing only on $PM_{2.5}$ may result in overlooking the impact of UFP and there is no evidence that mitigating particle mass only (PM_{10}, $PM_{2.5}$), as the existing air quality measures do, will necessarily lead to a reduction in UFP."*

2.42. If the relationship between UFP and $PM_{2.5}$ is not linear the evidence for the conclusion that the magnitude of change in UFP is small needs to be provided as the Health and Wellbeing assessment relies on this assumption.

Sustainable Aviation Fuels (SAFs)

2.43. No assessment of the implication on local air quality of the adoption of SAFs has been presented, however, SAFs are relied upon on the climate mitigation and UFP mitigation.

3. Accountability, Mitigation, Monitoring

3.1. It remains a concern that the assessment has not fully defined the likely effects (mainly due to poor quality roads modelling, limitations in the approach regarding future standards and the lack of an appropriate UPF assessment). On this basis the Applicant has minimised their mitigation obligations, although it is noted the Applicant intends to implement some measures to improve air quality.

3.2. Paragraph 17.3.4, of the Response to Hearing 7 states:

'As noted in paragraph 13.13.6 of ES Chapter 13: Air Quality [APP-038], the Project recognises the non-threshold effects of air pollution, which is related to the possibility of future changes to air quality standards. Therefore, notwithstanding the outcome which demonstrates no significant effects as a result of the Project, the Applicant has provided a draft air quality action plan (AQAP) at Appendix 5 of the Draft Section 106 Agreement [REP2-004]. The document sets out measures and

monitoring commitments related to air quality and odour management to be undertaken by the Applicant which are secured under the DCO and s106 Agreement.'

3.3. It is also noted that in relation to surface access commitments (paragraph 6.1.1, Environmental Statement Appendix 5.4.1: Surface Access Commitments – Clean) that:

"GAL recognises that it is necessary to monitor the actual outcomes that are anticipated to result from deploying the measures listed above [in the document] and to provide periodic review of whether, and assurance that, the committed mode shares are being achieved."

3.4. On-going monitoring and 'post-project analysis' of the air quality effects is required to support the EIA process.

3.5. It is important that where the air quality monitoring demonstrates the effect on air quality is greater than the EIA demonstrated that there are mechanisms in place to mitigate these unpredicted effects. These mechanisms should be incorporated into the DCO and s106 agreement. If the Applicant is confident in their assessment this will not be a restrictive covenant, but should be regarded as an aid to ensure the EIA is fit-for-purpose.

3.6. The s106 agreement needs to provide a cap on the number of flights permitted when the real effects exceed the ES predicted effects until the effect is mitigated or it is agreed with all parties that the additional effect is acceptable. Only with this requirement in the DCO and s106 can the ES assessment be considered appropriate. Without this clause the ES is purely a paper exercise, with no bearing on reality, which is not the purpose of EIA.

3.7. To evaluate the real effects, post-project analysis is required. *'Post-project analysis'* within EIA is the process of monitoring and evaluating the real environmental impact of projects that were evaluated using the EIA process. The Applicant has stated they will report on studies carried out based on monitoring but there is no commitments to carry out any studies, including for evaluating the real world effect of the Project. There are a number of mentions of developing 'watching briefs' in the ES, such as for UFP. These 'watching briefs' should be incorporated into the DCO and s106 reporting with a requirement for action should there be a risk of effects identified incorporated into the DCO and s106.

3.8. Furthermore, as paragraph 13.9.13 and paragraph 13.9.14 of the ES Air Quality Chapter state (emphasis added):

'The aims of the monitoring are to be able to identify and manage key sources of emissions on the airport site and assess their effects ...'

"New monitoring locations on the airport site and external to the airport are proposed, in order to allow for future monitoring of concentrations and <u>allow for impacts of air quality reduction measures to be monitored</u>".

3.9. The draft s106 does not commit the applicant to the assessments mentioned in the ES.

3.10. To confirm, incorporating these as obligations into the DCO and s106 just confirms what the applicant is saying they will do in the ES and therefore is not an unreasonable expectation or requirement.

Monitoring

3.11. Schedule 1 of the draft s106 agreement (June 2024 version) is on Air Quality.

3.12. The monitoring and reporting obligations, as currently drafted, cease if the Joint Air Quality Monitoring Report shows that there have been no breaches of the relevant air quality standard for 2 consecutive years.

3.13. There is an obligation in the NPPF to improve air quality, not in relation to any assessment thresholds or standards. Therefore the monitoring should be continued to such a point that the project is clearly demonstrated not to have any effect on local air quality above the conditions which would occur should the project not go ahead. The project is for a major infrastructure development and therefore the expectation is that long-term reference quality monitoring is maintained for the life of the project. As discussed elsewhere in this document, the air quality standards are likely to change (maybe several times) during the life of the project and therefore it is important that the monitoring is long term.

3.14. It would be useful to removal all reference to 'AQ_Mesh' in the figures and text as this is a specific brand of air quality monitor which may not be appropriate to use now or in the future, and it is important that the monitoring is not tied to a particular manufacturer (who may or may not be operating in the future). Reference should be to a well validated air quality sensor, commonly referred to as low-cost sensors or 'LCS'. Furthermore, Defra has co-ordinated a published publicly available specification (PAS) on LCSs such as AQ_Mesh. This should be referenced.

3.15. The monitoring of ultrafine particles should not be conditional on the promulgation of national standards on ultrafine particles. Monitoring should be undertaken to determine the current levels of UFPs in the local community and repeated after commencement of dual runway operations, and as the number of ATM increases until such time that the local authorities agree that the air quality effects are acceptable.

AQAP

3.16. Section 8 of Schedule 1 currently covers the Air Quality Action Plan (AQAP). It is important that this is an explicit obligation of the DCO and s106 agreement. The future AQAPs should not only include reporting on actions taken (which is the current wording), it should also include future actions that GAL is committed to take to improve air quality over the following five-year period.

3.17. The AQAP should also be required to quantify the impact of measures in the same way Defra requires local authorities to do in their AQAPs.

4. Glossary

ADMS	Atmospheric Dispersion Modelling System
APS	Air Pollution Services
AQAL	Air quality assessment level
DCO	Development consent order
EIA	Environmental Impact Assessment

ES	Environmental Statement
ExA	Examining Authority
ISH	Issue Specific Hearing
JAQU	Joint Air Quality Unit
LAQM	Local Air Quality Management
LCS	Low cost sensor
NO_2	Nitrogen dioxide
NOx	Nitrogen Oxides
PAS	Publicly available specification
PM_{10}	Small airborne particles, more specifically particulate matter less than 10 micrometres in aerodynamic diameter
$PM_{2.5}$	Small airborne particles, more specifically particulate matter less than 2.5 micrometres in aerodynamic diameter
RMSE	Root mean squared error
SAF	Sustainable Aviation Fuel
SoCG	Statement of Common Ground
TG22	LAQM Technical Guidance published in 2022
UFP	Ultra-fine particles
WHO	World Health Organization

5. References

Health Effects Institute. (2024). *Long-Term Exposure to Outdoor Ultrafine Particles and Black Carbon and Effects on Mortality in Montreal and Toronto, Canada. Research Report 217. Boston, MA. Weichenthal, S; Lloyd, M; Ganji, A; Simon, L; Xu, J; Ve.*

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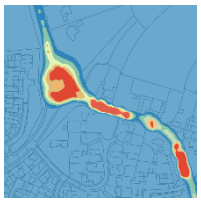

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