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Wirral Local Plan

Air Quality Assessment
Review of Associated Reporting

Wirral Metropolitan Borough Council

July 2020

Quality information

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1. Introduction

The following document constitutes a review of pertinent Local Plan documents in the context of the Air Quality Assessment (herein referred to the 'AQA'), reported in the 'Wirral Local Plan 2020-2035 Air Quality Modelling Study' report undertaken by AECOM in July 2020.

The following documents have been reviewed:

- Wirral Intelligence Service (2019) *Environmental Health JSNA: Outdoor Air Quality*;
- Hitch Marketing (2019) *Wirral Borough Council: Interim Health Impact Assessment of Emerging Wirral Council Local Plan*;
- Wirral Council (2019) *Health and Wellbeing Board Air Quality in Wirral: Status, Progress and Priorities Report*; and
- Prof. David Gregg (2020) *Comments on Wirral Local Plan Sustainability Appraisals 2019 / 2020 'Air Quality & Health' : Death by Planning?*

The review highlights statements and sections within each document that are considered to be relevant to the AQA, along with a corresponding reference or response.

2. Document Reviews

2.1 Environmental Health Joint Strategic Needs Assessment: Outdoor Air Quality, Wirral Intelligence Service, November 2019

Table 1. Environmental Health Joint Strategic Needs Assessment: Outdoor Air Quality Wirral Intelligence Service November 2019

Location	Description	Local Plan AQA Comment
Page 5	There is a focus on NO_2, PM_{10} and $PM_{2.5}$, although at this stage there is no mention of limit values / objectives, or contextual assessment thresholds.	These are the pollutants of concern for the AQA. They are appraised primarily with reference to the EU Limit Values, although it is explicitly noted there is no 'safe level' for exposure.
Page 6	Citations for health effects of AQ and links to associated economic costs	The health effects of the pollutant of concern are outlined.
Page 7	Recognition that some pollutants can contribute to climate change, as well as effect on ecosystems and habitats. The legal status of LAQM is introduced; 2008 ambient air quality directive, and 2010 AQS Regulations, including national reporting compliance zones and the 2019 Clean Air Strategy.	The legislative framework for local air quality management and reporting is clearly outlined.
Page 8	The specific health effects of PM and NO_2 are summarised, although there is no refence to limit values. Indoor air quality and occupational exposure is also introduced, including commentary on ventilation and ingress as well as indoor emission sources.	The AQA is focussed on ambient air quality. No consideration is made to indoor air quality as this is beyond the scope of the work. However, it is recognised that ambient AQ does potentially contribute indoor conditions, subject to highly localised factors.
Page 10	Description of study area and major transport routes	This is outlined in the AQA in terms of local emission sources
Page 11	Air quality monitoring in Wirral. Notes that only NO_2 is monitoring and there is no local data for PM_{10}. $PM_{2.5}$ is monitored at one background site.	The AQA includes an LAQM summary.

Location	Description	Local Plan AQA Comment
Page 15	Reference to the AQ Standards Regulation 2010	As above, the legislative framework for local air quality management and reporting is clearly outlined in the AQA.
Page 18	Presentation of NO_2 monitoring data	The AQA includes an LAQM summary. The monitored air quality data is used to inform the baseline conditions and validate the air quality model.
Page 21	Presentation of Benzene monitoring data	Benzene was not appraised in the AQA as it was not considered to be a pollutant of concern
Page 22	Statement there is no 'safe' level of exposure to $PM_{2.5}$ or NO_2. The one location above the EU limit value is not considered to be relevant in terms of long-term exposure.	See above, comment for page 5. The AQA includes an LAQM summary.
Page 22	Socio-demographic sensitivity to AQ, including pre-existing health conditions, proximity to source (i.e. roads) and areas of deprivation	The predicted air quality conditions in the baseline and future scenarios are clearly correlated to the socio-economic scores defined by the Index of Multiple Deprivation.
Page 23	Socio-demographic sensitivity are likely to be correlated, and so the monitoring is focussed on the areas in East Wirral	See above, comment for page 22.
Page 24	Opportunities and constraints to mitigation, including uncertainties and a need for a holistic approach	This is recognised in the mitigation discussion, whereby it is only considered to be effective where the most significantly affected populations can react and adapt to proposed measures.
Page 25	Local action, including Wirral Council AQ Group, LCR AQ Task Force, AQ Technical Group	See above, comment for page 7 and 11.
Page 26	Environmental permitting	It is noted in the AQA there are numerous discrete emission sources that contribute to the background and total pollutant concentrations. These sources are not explicitly modelled as transport emissions are the primary concern but are quantified in accordance with guidance published by DEFRA.
Page 27	Recognition of the role of planning in AQ management, including the NPPF and the PPG documents. The LCR Transport Plan for Growth is highlighted due to the links to the strategic priorities for health and wellbeing through emission reductions for local air quality and climate	The legislative framework for local air quality management and reporting is clearly outlined. These documents are summarised in the context of the study and the recommendations.
Page 28	Specific local and regional actions to improve Local air quality include; LCR EV Strategy, Taxi licensing management, anti-idling, Wirral Council policy for sustainable employee transport, Merseytravel bus upgrades and support for active travel	The legislative framework for local air quality management and reporting is clearly outlined along with an LAQM summary, including the local Actions.
Page 29	Summary of Mersey Forest green infrastructure planting barriers at schools, and links to the Wirral Climate Change Strategy and declaration of the Climate Emergency to connect LAQ and climate	This is not discussed in the AQA. However, Green Infrastructure is a recognised method for disrupting the exposure pathway at a local resolution or can reduce background concentrations at regional level. There are essential links to climate, although these should be appraised carefully to ensure there are no conflicts.
Page 30	Comment on the potential future projections, and specifically the vehicle fleets	The fleet breakdowns and projections have been explicitly discussed in the AQA in terms of confidence and uncertainty, and the potential effects on the conclusion of the study
Page 31	The 2019 JSNA audit identified the following recommendations: 1. Air pollutants (specifically NO_2 and $PM_{2.5}$) continue to be strategically monitored across Wirral to identify long term trends and areas for action locally. 2. Continue to annually review and update the Outdoor Air Quality Joint Strategic Needs Assessment.	No comment. It is suggested that the most significant benefits may be achieved where multidisciplinary and holistic benefits can be used to support improvements to health and wellbeing.

Location	Description	Local Plan AQA Comment
	3. Wirral Council maintains its current commitment to air quality, evidenced by the absence of Air Quality Management Areas, and considers extending membership of the Wirral Air Quality Group to include health partners and other anchor organisations. 4. NHS partners use their Sustainable Development Management Plans to deliver on the air quality goals in the NHS Long Term Plan and share how they are supporting patients and staff to reduce the health impacts of air pollution. 5. Prioritisation of air quality activities is based on the hierarchy of interventions (prioritising prevention of emissions over reducing/avoiding exposure). 6. Air quality initiatives continue to employ a focus on vulnerable populations and foster collaborations with internal/external stakeholders and the wider community. 7. Embed actions related to air quality emerging from the Health Impact Assessment of the Wirral Council Local Plan. 8. Local air quality interventions are formally evaluated to identify/share good practice. 9. The Wirral Air Quality Group drafts a dedicated local air quality plan to clearly and comprehensively define local air quality commitments, priorities and monitoring/evaluation over the next five to ten years, aligned to LCR and national air quality strategies. 10. Key strategic plans for the borough embed air quality considerations across all actions, prioritising initiatives that deliver a net health gain within the local population.	

2.2 Interim Health Impact Assessment of Emerging Wirral Council Local Plan, November 2019

Table 2. Interim Health Impact Assessment of Emerging Wirral Council Local Plan November 2019

Location	Description	Local Plan AQA Comment
Section 3: Community Profile		
Section 3.2 Population and demographics, Multiple Deprivation Inequalities	Detailed outline of IMD highlights the significant disparity in the rankings across the district	The AQA refers to the IMD to indicate socio-economic disparity
Section 3.3 Population health determinants	Green Infrastructure provision is good compared to the national average, although this is also distributed unevenly and tends towards the wards with highest socio-economic scores	See above, comment for page 29 in Table 1.
Section 3.3 Population health	The Wirral has a higher population density than the England average that increases exposure, whilst effects of poor AQ are exacerbated for sensitive groups as there is a	The location of existing and proposed properties is quantified in the AQA

Location	Description	Local Plan AQA Comment
determinants, Air Quality	correlation between poor AQ and low income. There is no AQMA declared in the district, although elevated concentrations of atmospheric pollution are recognised as a concern.	screening model, and correlated with socio-economic scores
Section 3.3.3 Social and community networks, Transport	The transport sector contributes greatly to climate change, negatively impacting on health. The main drivers for this are land transport, mostly light-duty vehicles, but also freight transport. Equally, there is increased likelihood that in areas of deprivation, any private transport is likely to be older vehicles with high emission levels and accompanying impacts on air pollution and greenhouse gas emissions	The AQA does not quantify disparity in different wards but does specifically include an emissions source apportionment on modelled links and also discusses the IMD.
Section 3.3.5 Consequences of inequalities in determinants of health, Respiratory infection	Prevalence of COPD, pneumonia and lung cancer are all significantly worse in Wirral than average figures for England and subject to huge inequalities	See above in reference to IMD
Section 5: Appraisal		
Strategic Objective 1, Positive Implications	Redesign of deprived communities to allow more 'compact liveable neighbourhoods' that decrease the need for costly driving or public transport to reduce car dependency increase levels of active travel and result in increased levels of health and wellbeing.	This is discussed at a high level in the AQA recommendations.
Strategic Objective 1, Negative Implications	Numerous risk mitigation measures to reduce the need for journeys and enable access to travel choice, including provision for safe walking and cycling in new developments, siting away from services, and access to public transport.	See above in comment on recommendations
Strategic Objective 2, Positive Implications	Location of new development to ensure deprived communities can become 'compact neighbourhoods' to reduce reliance on cars, and incentivising walking, cycling and public transport.	See above in comment on recommendations. The AQA used the traffic flow provided for the scenario, so it is assumed this is incorporated in the scenarios.
Strategic Objective 2, Negative Implications	If planning makes assumptions of transport mode by current levels rather than possible/desirable levels, the opportunity to expand active transport will be lost; e.g. cycling infrastructure planned to accommodate 2.0% of short journeys vs what is needed to accommodate 50.0%. Changes in transport infrastructure need to be planned Borough-wide to guard against shifting the problem to other communities and ensure communities are not isolated from access to services Build a greater understanding of why communities do not access opportunities for physical activity or utilise public transport.	The evidence for modal shift is a very significant subject beyond the scope of the AQA. Further scenario testing could be undertaken if required, although this would need to refer to robust evidence-reports to determine the real-world feasibility of the modal shift.
Strategic Objective 3, Positive Implications	Implementing a tree planting scheme for all new developments and across the Borough creating a cleaner environment/reducing air pollution - and education of future residents Reduction of emissions through renewable sources of energy may impact incidence of some cancer and heart disease The use of renewable sources of energy will lead to improved air quality and reduced incidence of respiratory disease.	The AQA focussed on road traffic emissions. Coordinated green infrastructure and energy / waste strategies can achieve strategic benefit, although this is outside the scope of the AQA.
Strategic Objective 3, Negative Implications	Increased traffic arising from new developments in green technologies, waste management or mineral extraction will have a negative impact on air quality in adjacent communities.	The AQA used the traffic flow provided for the scenario, so it is assumed this is 'built-in' to the scenarios.

Location	Description	Local Plan AQA Comment
		The areas at potential risk of effects may be identified from the regional screening model results to inform decision making.
Strategic Objective 4, Positive Implications	Preserving and expanding access to cultural and green infrastructure can be a significant driver of mental wellbeing, respiratory function and physical activity. The promotion of renewable sources of energy will lead to improved air quality reduced incidence of respiratory disease.	See above, comment for Strategic Objective 3.
Strategic Objective 4, Negative Implications	Current air quality management programme focuses on emissions but not proximity to exposure - access to environment assets may increase exposure to poor air quality.	The AQA identifies properties in proximity to the modelled road network, and properties within 50m of the network used in the screening tool were correlated to IMD score.
Strategic Objective 5, Positive Implications	Tree planting schemes to aid in drainage and air quality – sustaining current coastal areas for residents to use.	See above for comments on green infrastructure
Strategic Objective 5, Negative Implications	N/A	N/A
Strategic Objective 6, Positive Implications	Improved design of housing stock can improve internal air quality and reduce the incidence of childhood asthma.	See above for comments on indoor AQ
Strategic Objective 6, Negative Implications	Limited availability of new sites may mean that there is not good access to local services and walking distance to public transport is overlooked – this will undermine other areas of the Plan.	The AQA used the traffic flow provided for the scenario, so it is assumed this is 'built-in' to the scenarios.
Strategic Objective 7, Positive Implications	Improved development and self-efficacy to aid independent living will help manage respiratory related conditions.	Agreed, but not explicitly included in the AQA
Strategic Objective 7, Negative Implications	N/A	N/A
Strategic Objective 8, Positive Implications	Essential infrastructure within easy reach should diminish car use and improve air quality.	The AQA used the traffic flow provided for the scenario, so it is assumed this is 'built-in' to the scenarios.
Strategic Objective 8, Negative Implications	N/A	N/A
Strategic Objective 9, Positive Implications	Coordination of transport infrastructure with local infrastructure is required to ensure the potential benefits of active transport are realised alongside the wider development.	See above for comments on the evidence for modal shift and uptake of active travel
Strategic Objective 9, Negative Implications	Routing of heavy traffic away from residential areas – where possible. Segregated walking and cycling routes in areas with heavy traffic.	The AQA used the traffic flow provided for the scenario testing, so it is assumed this is incorporated in the scenarios. The areas at potential risk of effects may be identified from the regional screening model results to inform decision making.
Strategic Objective 10, Positive Implications	Coordination of transport infrastructure with local infrastructure is required to ensure the potential benefits of active transport are realised alongside the wider development.	See above for comments on the evidence for modal shift and uptake of active travel
Strategic Objective 10, Negative Implications	Where plans do not sufficiently account for impacts of light, noise, odour, traffic and disturbance, the social and physical environment of communities will be negatively impacted. Increased business traffic can result in increase in transport traffic which, if not environmentally sustainable, will lead to higher levels of air and noise pollution – impacting on residents physical and mental health.	See above for comments on the evidence for modal shift and uptake of active travel.
Strategic Objective 11, Positive Implications	Limiting the development of out-of-centre facilities should improve affordable access for those not owning a car and facilitate increased public	See above for comments on the evidence for modal shift and uptake of active travel.

Location	Description	Local Plan AQA Comment
	Develop solutions to traffic congestion (especially parking limitations/removing vehicles from main areas) in local centres and the need for much retail to require the use of a personal car. Install high quality public realm which supports increased levels of walking and cycling in main retail areas – including cycle parking and seating.	Reduced need to travel by car will have local air quality benefits. The AQA use the traffic flow provide for the scenario, so it is assumed this is 'built-in' to the scenarios. Congestion is a specific complex discussion in terms of air quality and emissions and was not explicitly included in the AQA. Recent evidence from monitoring COVID-19 has indicated that traffic reductions ~20% can have significant benefits for local AQ. AQ effect of congestion can be modelled using accepted methods, subject availability of queuing data.
Strategic Objective 11, Negative Implications	Town centre congestion associated with increased driving and associated pollution and risks to pedestrians.	See above comments on congestion
Strategic Objective 12, Positive Implications	N/A	N/A
Strategic Objective 12, Negative Implications	N/A	N/A
Section 6: Recommendations		
All of section	Focus on reducing the need to travel, and to use active or public transport where possible Improve quality of housing includes a note on indoor AQ, which is related to ventilation, so there is a need to balance it with energy efficiency requirements. Reduce exposure to environmental hazards includes a broad commentary on the wider health benefits of reducing exposure to poor AQ, and specifically PM.	The AQA includes recommendations that consider the themes of modal shift and wider benefits of reducing exposure. Indoor AQ is outside the scope of the assessment.

2.3 Air Quality in Wirral: Status, Progress and Priorities, Health and Wellbeing Board, 13 November 2019

Table 3. Air Quality in Wirral: Status, Progress and Priorities, Health and Wellbeing Board, 13 November 2019

Location	Description	Local Plan AQA Comment
Summary	Public Health England has identified por air quality as a major holistic threat to public health, environment and the economy. Air quality in the Wirral does not exceed legal compliance, but should be managed collaboratively at the sources, rather than by mitigation.	Existing conditions are summarised in the baseline review. The holistic and socio-economic effects are a core aspect of the AQA.
1.0 Reasons for Recommendations	Reference to national government focus on local leadership to manage AQ	National legislation and policy are summarised in the AQA
2.0 Other Options Considered	N/A	N/A
3.0 Background Information	Summary of the health and socio-economic cost of poor local air quality, and the potential inks to climate change.	Pollutants of concern and associated health and environmental effects summarised in the AQA

Location	Description	Local Plan AQA Comment
3.1 Outdoor Air Quality in Wirral	Summary of LAQM, including a specific mention of the taxi rank in Liscard	Existing conditions are summarised in the baseline review, and it is recommended that monitoring continue in the Liscard location to evidence local conditions.
3.2 Impact of Air Pollution on Health and Wellbeing	Summary of the health effects from the specific pollutants of concern for LAQM	Pollutants of concern and associated health effects summarised in the AQA
3.3 Action to Improve Air Quality in Wirral	Reference to the source, pathway receptor model of prioritising measures for LAQM, as well as recognising holistic strategies for co-beneficial outcomes. No AQMA have been declared in Wirral, which informs the annual reporting, whilst the environmental team collaborates with many other teams in the Council and neighbouring authorities, including the LCR Task Force and AQTECH. Wirral Council implements a wide range of air quality interventions, incorporating traffic-related; non-traffic related; and public behaviour approaches Many measures in Wirral are focussed on emissions reduction to generate sustainable improvements in wider health and social outcome. The Climate Change Strategy is currently being updated, providing further opportunity to improve air quality. Recognition that local interventions are tailored to vulnerable groups to address health inequalities in air quality health impacts with a focus on schools. Reference to the NHS Long Term Plan	Existing measures undertaken by Wirral, the combined authority and Merseytravel are outlined in the AQA. It is noted that climate change and LAQ can be complementary or oppositional, subject to the context; e.g. rerouting vehicles to reduce exposure may contribute to higher CO_2 emissions. Therefore, careful oversight should be considered to link LAQ into the Climate Change Strategy. The AQA includes a comment on the practicality of implementing measures with regard to the ability of a population to respond to the proposed measure. It is not clear from the document how the NHS Long-Term Plan links into the local data.
3.4 Summary	Continued improvement in air quality is challenging and will take time to achieve. National legislation, mass behaviour change and new infrastructure will be required to support progress. Whilst air pollution levels in Wirral are within legal limits and estimated health impact are below regional and national average it is important to continue to work together to improve air quality The Health and Wellbeing Board has an important role in ensuring that the actions included in the Annual Air Quality Status Report and the Outdoor Air Quality Joint Strategic Needs Assessment are implemented and that opportunities to embed air quality improvement in key strategic plans are maximised.	The AQA used the traffic flow provided for the scenario testing. It is agreed there is opportunity to embed LAQ at a strategic level to inform multiple outcomes and priorities due to the co-benefits that may be achieved.

Table 4. Appendix: Air Quality Audit Summary Report

Location	Description	Local Plan AQA Comment
Recommendations for Implementation	Air pollutants (specifically NO_2 and $PM_{2.5}$) continue to be strategically monitored across Wirral to identify long term trends and areas for action locally.	Existing conditions are summarised in the baseline review.
	Continue to annually review and update the Outdoor Air Quality Joint Strategic Needs Assessment	No comment in AQA
	Wirral Council maintains its current commitment to air quality, evidenced by the absence of Air Quality Management Areas, and considers extending membership of the Wirral Air Quality Group to include health partners and other anchor organisations	Not considered in the AQA. However, there is clear benefit to this highlighted by the comments received on the draft report wherein AECOM requested steer from Wirral Public Health officers.

Location	Description	Local Plan AQA Comment
	NHS partners use their Sustainable Development Management Plans to deliver on the air quality goals in the NHS Long Term Plan and share how they are supporting patients and staff to reduce the health impacts of air pollution	Outside scope of the AQA. However, it is not clear how the NHS Plan is coordinated with the Local Plan.
	Prioritisation of air quality activities is based on the hierarchy of interventions (prioritising prevention of emissions over reducing/avoiding exposure)	No comment in AQA
	Air quality initiatives continue to employ a focus on vulnerable populations and foster collaborations with internal/external stakeholders and the wider community	The socio-economic effects were a core principle of the AQA in terms of interpreting exposure and outlining recommendations
	Embed actions related to air quality emerging from the Health Impact Assessment of the Wirral Council Local Plan	No comment in AQA
	Local air quality interventions are formally evaluated to identify/share good practice	No comment in AQA
	The Wirral Air Quality Group drafts a dedicated local air quality plan to clearly and comprehensively define local air quality commitments, priorities and monitoring/evaluation over the next five to ten years, aligned to Liverpool City Region and national air quality strategies	The AQA linked relevant recommendations to regional plans, including LCR CA strategy and the LCC Clean Air Plan.
	Key strategic plans for the borough embed air quality considerations across all actions, prioritising initiatives that deliver a net health gain within the local population	The AQA priorities health and wellbeing within the context of national policy and legislation. However, it was explicitly recognised that improved AQ can have holistic benefits

2.4 Comments on Wirral Local Plan Sustainability Appraisals: 'Air Quality & Health': Death by Planning?

Table 5. Comments on Wirral Local Plan Sustainability Appraisals: 'Air Quality & Health'

Location	Description	Local Plan AQA Comment
Introduction	Comment on detrimental effects of air pollution for existing residents	The AQA explicitly includes existing properties in the screening model
Section 1 para 1	Quote from NPPF	National legislation and policy are summarised in the AQA
Section 1, page 1, para 3	Statement on 'significant' additional risk	The classification of significance in the AQA refers to IAQM guidance on development planning and control
	Statement on diesel / petrol car projections uncertainty	The AQA cautiously applies the latest data available from DEFRA for fleet projections
	Statement on traffic flow	The AQA used the traffic flow provided for the scenario testing.
	Statement on 'geographical pattern' of air pollution across the district	The AQA includes a plot of regional background pollutant concentrations published by DEFRA
Section 1, page 1, para 4	Statement on NO_2 and PM	Pollutants of concern and associated health and environmental effects summarised in the AQA
Section 1, page 3, para 1	Statement on 'no analysis' in health impact assessment	The AQA specifically quantifies roadside pollutant concentrations across the district with further detailed modelling in areas of concern.
Section 1, page 3, para 3	Statement on ventilation and indoor AQ	Evidence is complex, but ventilation may be beneficial in some cases, subject to the magnitude and proximity of emission sources compared to indoor sources, such as heating
Section 1, page 3, para 6	Statement on health effects of poor AQ	Broadly agreed and similarly summarised in the AQA
Section 1, page 3, para 6	Comment on quantification of Local Plan options	The AQA quantifies the AQ effects of the proposed option scenarios based on the traffic flow data.

Location	Description	Local Plan AQA Comment
Section 1, page 4, para 1	Statement that 'health and pollution impact will be significant and negative'	See above; the AQA specifically quantifies roadside pollutant concentrations across the district with further detailed modelling in areas of concern.
	Statement of increased PM as a direct proportion of car growth extrapolated from Local Plan allocation capacity	Direct extrapolation may not be appropriate. The AQA modelled the traffic flow data.
Section 2,	Commentary on health effects of air pollution	Pollutants of concern and associated health and environmental effects summarised in the AQA.
Section 2, page 6, para 8	Comment on PM (not defined as PM_{10} or $PM_{2.5}$) threshold >10 $\mu g/m^3$	The AQA incorporates a threshold of 10 $\mu g/m^3$ of $PM_{2.5}$ for the purpose of interpretation of the model results, although it is recognised this is not a statutory limit
Section 2, page 6, para 9	Statement that 'Much of the Wirral is above this limit currently and as vehicle numbers and miles travelled increase in the medium-term PM levels will increase, not decrease'	This is not clarified as PM_{10} or $PM_{2.5}$, and evidence does not support this statement. Furthermore, background sources contribute a significant proportion of the total.
	Comment on projected growth	The AQA cautiously applies the latest data available from DEFRA for fleet projections
Section 3, page 8	Comment on use of local monitoring data for model validation	The local air quality monitored data is used to inform the baseline conditions and validate the AQ model.
	Comment on model resolution and use of 1km grids	Comment is possible referring to modelled background data, which is not appropriate to indicate roadside concentrations. These data are presented in the AQA.
Section 3, page 9, para 3	Quote from LP SA 2019 Scoping Report tells us (2.6) that 'No hotspots are associated with the Boroughs motorway junctions, nor the toll point of the Kingsway Tunnel'	The AQA has identified a location north of the Kingsway Tunnel portal that is close to the annual mean objective threshold for NO_2.
	Comment on high concentration at motorway junctions	The screening tool is noted to focus on long model links and is not suitable to praise complex junctions. However, the predicted concentrations at locations near junctions do not indicate any extensive areas of concern.
Section 4, page 10, para 7	Comment on links between the prevalence of several important disease classes across the Wirral and the levels of pollutants	Socio-economic disparity is explicitly included in the AQ with reference to the IMD. However, the AQA does not include detailed correlation of specific health indicators or statistics.
Section 4, page 15, para 1	Comment on suitability of IMD for correlation with COPD	Wider evidence supports the use of IMD as indicator for health, but in this context is also used to inform wider socio-economic sensitivity. It is considered outside the scope of the AQA to comment on the specific correlation to COPD, although it is suggested there is greater prevalence in more deprived areas[1].
Section 5	No Section 5	N/A
Section 6.1, page 24	Air quality projections	Future projections for emissions and backgrounds are included cautiously in the AQA in with reference to DEFRA guidance.
Section 6.1, page 25	Comment on PM trends	It is noted that $PM_{2.5}$ is locally significantly affected by background sources
Section 6.1, page 26	Comment on projection of traffic growth	The AQA applied the traffic flow data in the transport model
Section 6.1, page 28	Comment on meteorology and regional distribution of air quality	Background sources are included in the AQA
Section 6.1, page 29	Comment on resolution of background modelled pollution concentrations	See above
Section 6.1, page 30	Commentary on fleet composition	The AQA includes source apportionment data and correlations to nation and regional fleets.

[1] British Lung Foundation (2020) Available online at: https://www.blf.org.uk/sites/default/files/British%20Lung%20Foundation%20-%20Lung%20disease%20and%20health%20inequalities%20briefing.pdf

Location	Description	Local Plan AQA Comment
	Comment on non-exhaust PM	Sources of PM are explicitly included in the AQA, wherein the emission rates include both exhaust and non-exhaust source contributions.
Section 6.1, page 31	Comment on projection fleets	The AQA applied a cautious model year and fleet projection to the transport growth scenarios to reduce the risk of under-prediction of the potential AQ effects
Section 6.1, page 33, para 5	Comment on pedestrian exposure near major roads	This is not explicitly included in the AQA. However, DEFRA guidance advises that short-term exposure should be compared to the relevant objective. Furthermore, it is accepted that annual mean concentration of 60 $\mu g/m^3$ may indicate exceedance of the hourly objective for NO_2, although this threshold was not exceeded at any location in the study area. Walking near a busy road may exposure pedestrians to vehicles emissions and this activity may represent a significant proportion of the daily exposure (Kumar at. al., 2018[2]). However, evidence indicates the ambient concentrations at roadside locations may be lower than in-vehicle for some pollutants due to the exposure pathway (i.e. car ventilation). It is also recognised that children are shorter than adults and closer to exhaust point, and so may be exposure to relatively higher concentrations (Sharma and Kumar, 2018[3])
Section 6.2, page 35	Line (i.e. road) emission sources	The AQA explicitly considers road emissions
Section 6.2, page 35, para 3	Comment on junction hotspots	The quoted values of junction vs free-flowing transport emissions are nominal, and subject to local conditions. Therefore, these should be used very cautiously. It is recognised the screening model does not include junction detail. However, the concentrations predicted on free-flowing links do not indicate extensive areas of concern.
Section 6.2, page 35, para 4	Comment on in-car ventilation	This appears to contradict the earlier comment on roadside exposure but is broadly supported by current research.
Section 6.2, page 36	Comment on effects at distance from the road source	The screening model predicted roadside concentrations, whereas the detailed model applied a receptor grid for Option 1A in addition to selected receptor locations.
Section 6.3, page 37, para 1	Statement refers to DEFRA background pollutant maps	See above
	Discussion of 'green screening'	It is suggested this is a confused term; green belt to reduce proximity vs the use of green infrastructure (i.e. screens) to disrupt localised dispersion pathways
Section 6.3, page 37, para 2	Comments on filtration and screening	This is a reactive action and does not corelate with the Council focus on recusing emissions. However, there is evidence this can work in some situations.
Section 6.3, page 37, para 3	Reference to green infrastructure for pollution reduction	The use of green space and vegetation to reduce pollution on a regional basis is evidenced, although further comment or quantification is outside the scope of the AQA
Section 6.3, page 37, para 4	Reference to green infrastructure as screening barriers near roads	The use of green infrastructure as a barrier to disrupt exposure is evidenced, although this is subject to the local conditions; e.g. road width, alignment, speed, visibility and safety, proximity to the source, etc. Further comment or quantification is outside the scope of the AQA
Section 6.3, page 38, para 1 & 2	Comments on the design of green infrastructure as barriers	See above; it is noted that large, thick screens may not be viable at roadside due to visibility, safety and land availability.

[2] Kumar et. Al (2018) Dynamics of coarse and fine particle exposure in transport microenvironments, Climate and Atmospheric Science. Available online at: https://www.nature.com/articles/s41612-018-0023-y
[3] Sharma and Kumar (2018) A review of factors surrounding the air pollution exposure to in-pram babies and mitigation strategies, Environment International. Available online at: https://www.sciencedirect.com/science/article/pii/S0160412018306585

Location	Description	Local Plan AQA Comment
Section 6.3, page 38, para 5	Comment on street canyon effects of green infrastructure	It is recognised that structure of green infrastructure must be designed to reduce exposure without contributing to detrimental effects; e.g. close canopies.
Section 6.3, page 39, para 1	Statement that air cleaning is feasible at a cost	Managing indoor AQ is an associated discipline and outside the scope of the AQA. Indoor AQ is a factor of indoor and outdoor emission sources and ventilation management.
Section 6.3, page 40	Costing for mechanical filtration	It is suggested that alternative measure may achieve grate long-term benefit on a case-by-case basis. It may be considered complex to directly relate conditions in London to other UK urban regions due to the relatively higher background pollutant concentrations typical in London that limit access to inlet air that is at a low concentration. Further comment or quantification is outside the scope of the AQA.
Section 6.3, page 41	Statement on the cost of 'good' handheld AQ monitoring devices	It is suggested that very low-cost monitoring devices may provide relatively poor confidence and should be used very cautiously regarding either absolute values or trends.
Section 7	Broad comments on potential AQ and transport projections associated with the Local Plan	The AQA quantifies the AQ effects of the proposed option scenarios based on the traffic flow data.
Section 7, Options	Comment on each Option	See above, comment for Section 6.1.
Section 7, Closing Comments	Reference to European Court of Justice	The EU mandate to achieve the EU limit values applies does not apply to any identified part of the study area as no evidence indicates these thresholds have been exceeded. However, it is recognised in the AQ that health effects can occur at concentrations below the EU limit values, and this steered the discussion of the model results.
	Discussion of mitigation through design	It is proposed that further discussion may be undertaken to ensure that effects for individual allocations are not significant, and that wider benefits can be supported.

Table 6. Wirral Air-Health Appendices 1 to 4

Location	Description	Local Plan AQA Comment
Appendix 1	Comments on available monitoring data, including the focus on NO_2, rather than PM	The AQA model included NOx/NO_2, PM_{10} and $PM_{2.5}$. The NO_2 values were validated by comparison with the monitoring data.
	Comment on validation of national AQ modelling	The national AQ model is intended for a specific purpose and purposefully relies on the AURN for validation and QA/QC.
	It is stated that the author used 1km data to indicate regional conditions	The 1km grid is intended to inform background concentrations and is not suitable to indicate conditions near a specific source; e.g. roadside. The pollution climate mapping (PCM) is a national road emission model published by DEFRA that is intended to fulfil this purpose.
	Comments on PM trends	It should be noted that PM composes multiple compounds, size and shape of matter from numerous sources. The AQA attributes a source apportionment to the sources, whereby it is suggested that 'background' sources are significant; e.g. agricultural dust, sea salt, etc.
	Multiple comments on the confidence attributed to monitoring data	It is outside the scope of the AQA to comment on this, although AQ monitoring data typically has define confidence limits based on manufacturer tolerance through intercomparison studies and routine calibration. DEFRA recognises reference methods and indicative methods to demonstrate compliance and/or long-term trends[4].
	Comments on long-term trends	It is outside of the scope of the AQA to comment on the reasons for long-term trends. The AQA applied cautious projections to predict the future conditions.

[4]EU Standard Methods for monitoring and UK Approach. Available online at: https://uk-air.defra.gov.uk/networks/monitoring-methods?view=eu-standards

Location	Description	Local Plan AQA Comment
Appendix 2	Statistical correlation of IMD and PM exposure	The AQA broadly confirms that area of higher concentrations tend towards the lower IMD scores
Appendix 3	Comment on long-term health and IMD	This is outside the scope of the AQA
	Comments on correlating mean PM to individual ward	This should be interpreted cautiously as it is unclear how the 'mean PM' concentration was calculated and whether it is biased or normalised in any way
Appendix 4	Comment on diabetes and PM exposure	This is outside the scope of the AQA

3. Summary

The AQA includes information and discussion that correlates to the statements identified in the document review. No significant statements were identified that did not have a correlating commentary or evidence in the AQA.

The review indicates there is a clear focus on the wider health effects of air quality, and recognition of risks and opportunities associated with the wider socio-economic effects. This is specifically recognised in the discussion of compliance, thresholds for the air quality objectives and potential effects below these thresholds.

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