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Stag Brewery, Mortlake - LBRuT Internal Consultee and Peer Review Responses

Air Quality Responses

Date: August 2022

Client Name: Reselton Properties Limited

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This document has been prepared and checked in accordance with
Waterman Group's IMS (BS EN ISO 9001: 2015, BS EN ISO 14001: 2015 and BS EN ISO 45001:2018)

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01		

1. Introduction

1. Further to the issue of the Air Quality Response (ref: WIE18671-114-BN-1.2.2-AQ Response) to the London Borough of Richmond upon Thames (LBRuT) air quality officer's comments on 29 June 2022, a peer review of the air quality assessment submitted to the support planning application was received from AQE Global (AQEG) on behalf of LBRuT on the 19th July 2022.
2. In order to address the points, set out in the Peer Review and the original LBRuT comments, this briefing note provides a combined response to all comments, in order that these are submitted in a comprehensive and legible manner.

2. Air Quality Neutral

2.1 Using current guidance (Air Quality Neutral Planning Support: GLA 80371, April 2014) and as reported in the ES air quality chapter submitted to support the planning application

LBRuT Original Comment

3. Consultant's assessment illustrates it is not air quality neutral for transport emissions and therefore substantial mitigation required or refusal.

Waterman Original Response

4. Appendix 10.2 Air Quality Neutral Calculations states:
5. *The Total Transport NOx Emission of 3,4414.4kg/annum (as shown in Table A4) is below the benchmark of 3,633.9/annum (as shown in Table A5) and the Total Transport PM_{10} Emission of 586.2kg/annum (as shown in Table A4) is below the benchmark of 625.4kg/annum (as shown in Table A5).*

6. *The* Development *is therefore considered to be 'Air Quality Neutral', with respect to transport emissions, and no further mitigation measures are required.*

7. Therefore, the Proposed Development has been demonstrated to be Air Quality Neutral.

AQEG Additional Comment

8. *Appendix 10.2 Air Quality Neutral Calculations of the ES submitted to support the planning application, paragraph 10.2.12, clearly refers to the application of Air Quality Neutral Planning Support: GLA 80371, April 2014 guidance, to ascertain the air quality status of the proposed development. Using this guidance, and as reported in the Executive summary of this report, namely Tables 1.1 to 1.3,* the *guidance was incorrectly applied, and the proposed development is not air quality neutral. The benchmarks were compared with the incorrectly calculated proposed development emissions – this is clearly evidenced in Tables 1.1 to 1.3 above.*

9. *ES Chapter on Air Quality Neutral Table A3: 'Air Quality Neutral' Emissions Benchmarks for Transport footnote clearly indicates that, quote "No Emissions Benchmark for Use Classes A2, A3, A4, D1 and D2. Use Class B1 was used for a worst-case". Therefore, the calculated benchmarks per land use A2, A3, A4, D1 and D2 using B1 as a proxy for each of them, should had been compared with the proposed development real emissions equally for A2, A3, A4, D1 and D2 equally using B1 as a proxy for each of them, for worst case. Any deviation from such comparison between comparable entities is flawed. The report compared benchmarks of B1 against an average of land use A1 and B1 which is incorrect (which is comparing pears and apples). This is evidenced in Table A5: Calculation of the Benchmarked Transport Emissions for each Land-Use Category footnote which clearly states, quote "^Flexible Uses - No Emissions Benchmark for Use Classes A2, A3, A4, D1 and D2. An average of the A1 and B1 was used for a worst-case assessment. Such comparison is meaningless as is comparing a benchmark value of B1 with something different (average A1 and B1) and therefore incorrect reporting, with the proposed development not being air quality neutral. The applicant fails to recognise this and reiterates the reported figures in Appendix 10.2 Air Quality Neutral Calculations of the ES submitted to support the planning application as correct which is unacceptable.*

Waterman Additional Response

10. The air quality neutral calculations have been updated in accordance with the Air Quality Neutral Planning Support: GLA 80371, April 2014 guidance – presented in **Annex 1.**

11. For the flexible uses floorspace – an average of the A1 and B1 Land Use Classes were used for both the Transport Emission Benchmarks (TEBs) and average distance travelled by car per trip. The average of the A1 and B1 Land Use Classes was used as the flexible uses would predominantly be retail uses. The average of the A1 and B1 Land Use Classes also ensures the air quality neutral calculations present a reasonable worst case aligning with the EIA Regulations 2017, as amended.

12. The air quality neutral calculations within **Annex 1** shows the Development to be 'Air Quality Neutral', and no further mitigation measures are required. As a result there is no material change to the findings of the EIA presented in the ES, and therefore the ES remains robust and valid.

2.2 Using draft 2021 GLA guidance

LBRuT Comment

13. An analysis of the air quality neutral calculations for the proposed development reported in the ES Chapter Air Quality Neutral have indicated an inappropriate methodology and assumption has been applied to the Flexible uses category. The applicant has not calculated the benchmarks correctly. Tables 1, 2 and 3 below indicate the nature of each land use under evaluation in this application in terms of air quality neutral status.

14. In calculating the transport benchmarks for this group, as no emissions benchmark for classes A2, A3, A4, D1 and D2 are available, B1 use was applied as a proxy. However, when calculating the proposed development transport emissions, an average of the A1 and B1 uses was used. This is an erroneous approach given that two different entities are being compared (comparing Benchmark using B1 only with proposed development value using average of A1 and B1; this is comparing apples and pears).

    Furthermore, the average of A1 and B1 is less conservative than B1. Once again, a conservative approach is required so that the appropriate level of mitigation is ascertained and suitable mitigation measures are agreed, deployed and monitored.

Waterman Original Response

15. To ensure clarity – the Air Quality Neutral calculations have been re-calculated using the Air Quality Neutral Consultation draft, November 2021.

		Benchmark		
Land Use	GIA	Trip Rates Outer London	TEB	Development trips per annum
Residential	1085	447	484995	452,965
Office	4547.0	16	72752	143,810
Flexible Use	4839.0	16	77424	111,690
Hotel	1765.0	6.9	12178.5	5,110
School D1 C-H	9319.0	44.4	413763.6	97,000
Leisure (D2) A-D	1606.0	47.2	75803.2	59,860
	23,161		**1,136,916**	**870,435**

16. As shown in the Table above, the 870,435 annual vehicle trips generated by the Development would be lower than the TEB of 1,136,916.

17. As demonstrated in the submitted ES, the Development is therefore 'Air Quality Neutral' in relation to transport emissions.

AQEG Additional Comment

18. *The applicant does not address the issue reported in the LBRuT Air Quality observations in terms of having incorrectly applied the still not revoked 2014 Air Quality Neutral guidance as reported in the ES Chapter Air Quality Neutral and instead offers a recalculation of the Air Quality Neutral status of the proposed development using GLA's 2021 draft guidance. Not sure how that offers clarity. In any case, during the consultation period, Outer London Local Authorities have contested*

some of the benchmarks being proposed by GLA, including benchmarks for residential, hotels and leisure land use as being highly permissible and having suggested PTAL of proposed development to be used instead of a fixed value across the entire area, regardless of public transport facilities. Therefore, such benchmarks are not agreed to yet and cannot be used to derive air quality status at this stage.

19. *Further, even if the proposed benchmarks under consultation would be applied, the comparisons are to be undertaken on a land use by land use basis. As per LBRuT observations, different land use classes require different mitigation strategies and air quality neutral is to be calculated per class, not aggregated as the applicant's approach. I have highlighted in red both the benchmarks that were contested by Outer London Local Authorities and the classes for which, using the draft guidance, the proposed development is not air quality neutral for. In any instance, as LBRuT has more stringent requirements for sensitive areas and guidance 2014 (which is stricter) is to be applied until the draft guidance is published taking into account all consultation responses.*

20. *As it stands, as per Air Quality Neutral Planning Support: GLA 80371, April 2014 current published guidance (and as used in Appendix 10.2 Air Quality Neutral Calculations of the ES submitted to support the planning application), when the proposed development emissions per land use class are correctly calculated and compared, the proposed development is not air quality neutral and suitable mitigation is required to achieve the appropriate level of air quality neutral. Such calculations are to be undertaken as listed in the Executive summary of this report and in consultation with LBRuT.*

Waterman Additional Response

21. As per the previous comment, the air quality neutral calculations have been updated in accordance with the Air Quality Neutral Planning Support: GLA 80371, April 2014 guidance, please refer to **Annex 1.**

22. As the Air Quality Neutral Planning Support: GLA 80371, April 2014 guidance were used for the updated calculations, no further comment is required on the use of the Air Quality Neutral Consultation draft, November 2021 guidance.

23. The air quality neutral calculations within **Annex 1** shows the Development (both Applications A and B) to be 'Air Quality Neutral', and no further mitigation measures are required.

3. Damage cost and mitigation measures

LBRuT Comment

24. Current LAQM measures not sufficient to reduce air pollution.

25. Specific land use classes will require specific mitigation and therefore tailored mitigation is to be devised and deployed. Where this is not practical or desirable, pollutant off-setting will be applied.

26. The level of mitigation required associated with the operation phase of the proposed development was calculated using Defra's Damage Cost Approach1 over the estimated lifetime of the proposed development. The approach applied in using total emissions in this instance takes into account the fact that the area is highly polluted and that no additional emissions are acceptable (given the need to safeguard human health in the area the current situation is unacceptable and needs improvement).

27. The level of total emissions associated with the operation of the proposed development (taking traffic emissions into account only) equates to a mitigation level required of £2,618,642. – To deliver its air quality local action plan and or implement specific measures on/along the road

network affected by the proposal that reduce vehicle emissions and or reduces human exposure to nitrogen dioxide and particulate matter levels aiming at safeguarding human health.

28. To make the proposal air quality neutral (but still not air quality positive as sought by the London Plan) would be £415,604. Therefore, to make the proposed development acceptable, a Section 106 (S106) contribution is to be secured of a value to be agreed between £415,604 and £2,618,642.

Waterman Original Response

29. As above, the Development is 'Air Quality Neutral' and in accordance with the Air Quality Neutral Consultation draft, November 2021, off-setting payments (in addition to payments agreed previously) are not required.

AQEG Additional Comment

30. *Once again, the applicant does not address the issue. As per my comment above, current guidance (and as mentioned in Appendix 10.2 Air Quality Neutral Calculations of the ES submitted to support the planning application is to be applied) is to be used, not the draft version which was under consultation up to early this year and which clean approved version has not been published yet, addressing the consultation outcomes. As mentioned above, LBRuT has offered a consultation response challenging some of the benchmarks for Outer London as being highly permissive and not acceptable at locations where the PTAL is good. Therefore, according to GLA 80371, April 2014 (current published guidance), the proposed development is not air quality neutral, and an appropriate level of mitigation is required.*

31. *This is a material consideration, and the applicant must be advised to handle the matter suitably for compliance with the London Plan and LBRuT local policies*

Waterman Additional Response

32. As per the previous comments, the air quality neutral calculations have been updated in accordance with the Air Quality Neutral Planning Support: GLA 80371, April 2014 guidance, please refer to **Annex 1.**

33. The air quality neutral calculations within **Annex 1** shows the Development to be 'Air Quality Neutral', and no further mitigation measures are required. Off-setting payments (in addition to payments agreed previously) are not required.

4. Input data and assumptions

4.1 Vehicle fleet composition turnover

LBRuT Comment

34. Vehicle emissions used: a conservative approach should be applied in the assumption. It is standard practice to assume at least a couple of years delay in the fleet composition as defined in the Emission Factor Toolkit database to account for a lower vehicle fleet turnover rate (for instance, to predict ambient air concentrations for 2029, 2026 or 2027 vehicle emissions should had been used instead for a more realistic – and conservative approach).

Waterman Original Response

35. Using an incorrect year, such as 2026 or 2027 instead of 2029 (predicted opening year of the Development), for the fleet composition would be inaccurate and is not standard practice.

36. Air Quality Consultants published a report on Performance of Defra's Emission Factor Toolkit 2013-2019. The report concluded that recent analysis of recent NO_X measurements provides evidence that vehicle controls are working, and as a result, the Emission Factor Toolkit (EFT) is reflecting the rate of observed reductions. Therefore, the Development has been tested in line with guidance.

AQEG Additional Comment

37. *The applicant does not address the point made and the comments offered are not accepted. It is actually standard practice (and an appropriate due diligence approach in sensitive areas which is clearly the case of the application site) across the air quality community of experts to offer a conservative approach and, in many cases, assessments even maintain emissions and backgrounds as per baseline year to offer a robust approach. The applicant just assumed that Defra's fleet renewal rates (which are based on optimistic projections and when compared with local fleet compositions are usually different) are real, not taking into account the points made by LBRuT of the need of both taking into account the realistic yearly delay in fleet composition turnover and the need to be conservative given the sensitivity of the area of the application site.*

38. *Further, the comment made in relation to the good match between real world NOx emissions and EFT's emission factors being used in the most recent version (v11.0) released by Defra is totally irrelevant to the point made by LBRuT. The issue is the fleet composition (fleet turnover rate) as opposed to vehicle emissions – two totally distinct matters. LBRuT's point (as further expanded in the Executive summary of this report) was made in relation to the area's fleet composition as being older than Defra's national projections in terms of the different Euro classes percentage contributions accounted for each year. The suggested delay in the fleet turnover for a couple of years is a very reasonable assumption and offers the required both more realistic and conservative approaches. As to being "real", this is the approach to be taken, as opposed to assuming a generic theoretical (and very often optimistic assumptions, specially taking into account the financial climate in the next few years ahead the UK economy is likely to be subject to) vehicle fleet composition based on non-realistic/conservative national projections.*

Waterman Additional Response

39. To account for LBRuT's fleet composition (older than Defra's national projections in terms of the different Euro classes percentage contributions accounted for each year), the 2029 'without Development' and 'with Development' scenarios were assessed with 2027 as the emission year – as requested by LBRuT.

40. Refer to **Annex 2: Updates to Air Quality Results, Traffic Data and Model Verification** for more information.

41. Using 2027 as the emissions year, and the impact descriptors outlined in *Table 6.3: Impact descriptors for individual receptors* of the EPUK / IAQM 'Land-Use Planning & Development Control: Planning for Air Quality' guidance, the Development is predicted to have a 'negligible' impact on NO_2, PM_{10} and $PM_{2.5}$ concentrations at all existing receptors. The predicted effects remain unchanged from those presented in the ES.

4.2 Background years used

LBRuT Comment

42. Background years used: the submission assumes pollution backgrounds are declining as per DEFRA's estimated declining rates overtime which are equally optimistic. Background levels should be conservative, and in line with earlier vehicle composition years of 2026 or 2027 (see above). To support the above, the baseline pollution levels reported in the ES Air Quality Chapter

are lower in comparison to the both the LBRuT monitoring results for 2019 and LAEI modelled results for the same year. Therefore, predictions made for the opening year pollution levels are also like to be underestimated.

Waterman Original Response

43. As above using an incorrect year, such as 2026 or 2027 instead of 2029 (predicted opening year of the Development), for the fleet composition would be inaccurate and is not standard practice.

44. The monitored background concentrations at the Wetlands Centre Suburban monitor in 2019 (as 21µg/m^3 for annual mean NO_2 and 16µg/m^3 for annual mean PM_{10}) are lower than the Defra background maps. The Defra background maps were used for a conservative assessment.

45. Baseline pollution levels reported in ES were from LBRuT monitoring data as presented in Tables 10.11 & 10.12 in addition to the project specific air quality monitoring detailed in Table 10.13.

46. Therefore, the estimations are robust and are unlikely to be overestimated.

AQEG Additional Comment

47. *Comment not accepted, please see comments above. It is standard practice to offer a conservative approach in sensitive areas to secure a robust assessment of exposure in the opening year (and having confidence that predictions are not being underestimated) and not assume that backgrounds are declining at the Defra's predicted rates. Further, usage of higher backgrounds in the baseline year are not necessarily equivalent to conservative approaches; the inverse is often true – the higher the background value used, the lower the monitored traffic NOx emission contribution that is run through the NOx to NO2 calculator to inform the model verification and adjustment exercise. This will usually result in a much lower adjustment factor and therefore a less conservative set of predicted results in the opening year. However, please note that LBRuT observation was made in reference to the opening year usage of backgrounds, not baseline; therefore, the applicant's comment "Baseline pollution levels reported in ES were from LBRuT monitoring data as presented in Tables 10.11 & 10.12 in addition to the project specific air quality monitoring detailed in Table 10.13" is irrelevant. The mention to the applicant's site specific monitored baseline pollution levels reported in the ES Air Quality Chapter as being lower in comparison to the both the LBRuT monitoring results for 2019 and LAEI modelled results for the same year was used by LBRuT to highlight the fact that predictions made for the opening year pollution levels by the applicant are very likely underestimated.*

48. *It is assumed that in the applicant's last statement where it reads "Therefore, the estimations are robust and are unlikely to be overestimated" was meant to read "Therefore, the estimations are robust and are unlikely to be underestimated" instead. In any case, by not being conservative with emissions and backgrounds (by using 2029 values as opposed to assuming a couple of years delay in reaching national projections), the assessment is most likely significantly underestimating exposure impacts in the opening year.*

Waterman Additional Response

49. As comment above, the 2029 'without Development' and 'with Development' scenarios were assessed with 2027 as the emission year – as requested by LBRuT.

50. Additionally, the model has been updated to include monitored 2019 background concentrations at the Wetlands Centre Suburban monitor – as requested by LBRuT.

51. The background NO_2 and PM_{10} concentrations for the opening year at the Wetlands Centre Suburban monitor, assumed to be 2027, were predicted using Defra background maps. The ratio

reduction of Defra background maps from 2019 to 2027 were used to predict NO_2 and PM_{10} 2027 concentrations.

52. Refer to **Annex 2: Updates to Air Quality Results, Traffic Data and Model Verification** for more information.

4.3 Monitoring results

LBRuT Comment

53. The monitoring results in Table 10.12 indicate that 9 of the 10 diffusion tube monitoring locations closest to the Site were at or exceeded the annual mean NO_2 objective of 40µg/m^3 between 2015 and 2019. However, eight of the nine diffusion tubes, where data is available, recorded a reduction in the monitored annual mean NO_2 concentration from 2018 to 2019. The annual mean NO_2 concentration at the other diffusion tube on Mortlake Road remained the same.
    - This is in line with most of London but is not true here.
    - The most relevantly located diffusion tube – site 74 - near Chalker's Corner increased from 50ug/m^3 up to 52ug/m^3 from 2018 to 2019, which is very unusual, bucking national and local trends; with distance correction for the residential façade, this measures 49.6ug/m^3. This is high before moving the junction closer and highly significant for this development.

54. This LBRuT monitoring data is backed up by LAEI modelling data – see attached consultant's report and maps.

Waterman Original Response

55. It is noted at the bottom of Table 10.12 in Chapter 10 Air Quality that LBRuT moved site 21 and 51 closer to Chalkers Corner junction in 2018. When Site 21 was moved it was renumbered 74. This explains why the concentrations increased from 50ug/m^3 up to 52ug/m^3 at Site 74 from 2018 to 2019. As site 21 (now 74) moved closer to Chalkers Corner junction changed it should not be used to demonstrate that annual mean NO_2 concentrations are increasing at this location.

AQEG Additional Comment

56. *The key point is that, with distance correction for the residential façade, monitoring value of site ID74 indicates an exposure value of 49.6ug/m^3, well above the limit value to safeguard human health. Focus should be on that fact as it is people being exposed to hazardous levels of air pollution, and the need for the planning system secure safeguarding of public health.*

57. *Monitoring results in Table 10.12 indicate that 9 of the 10 diffusion tube monitoring locations closest to the Site were at or exceeded the annual mean NO_2 objective of 40µg/m^3 between 2015 and 2019, clearly indicating the sensitivity of the site.*

Waterman Additional Response

58. It is agreed that Chalker's Corner is sensitive to air quality impacts. It also important to note that annual mean NO_2 concentrations are reducing, illustrated by a decrease from 2018 to 2019 at seven of the nine diffusion tubes. The only increase recorded was at diffusion tube site 21 (now 74), which was moved closer to the Chalkers Corner junction and therefore not an appropriate monitor to illustrate an increase in annual mean NO_2 concentrations.

5. Model verification and adjustment

LBRuT Comment

59. It is noted that during consultation, the EHO at LBRuT requested that urban background concentrations from the Wetlands Centre, Barnes were used in the air quality assessment. However, background concentrations from Defra's predictions have been used instead. This is not supported; local measurements should had been used to ensure a robust assessment. Given that verification and adjustment is compared with and applied on modelled road NOx concentrations, the higher the background values used in the baseline year, the lower the traffic contributions derived and the lower the adjustment factor required, which, again, does not provide a conservative approach.

Waterman Original Response

60. The monitored background concentrations at the Wetlands Centre Suburban monitor in 2019 (as 21µg/m^3 for annual mean NO_2 and 16µg/m^3 for annual mean PM_{10}) are lower than the Defra background maps. The Defra background maps were used for a conservative assessment.

AQEG Additional Comment

61. *The applicant did not address LBRuT's observation of the need to use local background data, which is recommended by Defra/GLA LAQM technical guidance. Further, the applicant does not have clarity on the meaning of a robust conservative assessment in terms of usage of background values. Please see response 2.3.3 above. The higher the background values used in the baseline year, the lower the monitored traffic contributions, and the lower the adjustment factor, with a likely (and often significant) underestimation of the impacts predicted in the opening year. As evidenced in Appendix A, this is the case in the assessment undertaken by the applicant.*

62. *Further, it is best practice (and as indicated by technical guidance) to use local background data as these reflect more realistic local conditions.*

Waterman Additional Response

63. It is noted that, where appropriate, local background data should be used to reflect more realistic local conditions. However, it was considered the Wetlands Centre Suburban monitor located in Barnes was not realistic of local conditions at the Site. Despite this, the model has been updated to include background concentrations from the Wetlands Centre Suburban monitor – as requested by LBRuT.

64. Refer to **Annex 2: Updates to Air Quality Results, Traffic Data and Model Verification** for more information.

6. Emissions from additional transport

6.1 Additional Transport

LBRuT Comment

65. Additional transport emissions on roads and junctions, in particular at Chalkers Corner, already overcapacity, resulting in queueing, idling traffic for many hours of the day, not just at peak. This is particularly relevant with a failed TEB.

66. The Wetlands Centre Suburban monitor was not used as it was not considered representative of conditions of the site as the site is in a more urban environment. The use of Wetlands Centre Suburban monitor in 2019 would not alter the conclusions of Chapter 10 Air Quality.

Waterman Original Response

67. As stated in Appendix 10.1: Air Quality Modelling Study vehicle speeds and queue lengths were taken into account. The following is stated:
    - *To consider the presence of slow moving traffic near junctions, at roundabouts, the high level of congestion at the Chalkers Corner Junction; and vehicles idling at railway level crossings the following speeds have been used:*
    - *10kph at road links approaching junctions, Chalkers Corner Junction and the railway level crossings on Sheen Lane and White Hart Lane;*
    - *5kph at the Chalkers Corner Junction and the railway level crossings on Sheen Lane and White Hart Lane; and*
    - *at all other junctions a reduction of 10kph from the free-flowing speed.*

68. *Queue lengths at Chalkers Corner have been provided by Stantec to replicate the existing levels of congestion on the road network and to determine when to apply the above speeds.*

69. As detailed in Appendix 10.2 Air Quality Neutral Calculations states: *The Development does not exceed the transport emission benchmark (TEB).*

AQEG Additional Comment

70. *Queueing and idling traffic for many hours of the day at certain locations is not suitably modelled by using 10km/h and/or 5/km speeds in the model set up. Where severe capacity issues are observed, explicit modelling of queues in ADMS is required and should had been applied in this instance, given the significant congestion at Chalkers Corner.*

71. *Should explicit queuing in the model set up been accounted for, a better model verification would have been possible, with different adjustment factors at different locations (with distinct local conditions).*

72. *Given that explicit modelling of queuing conditions in the study area was not taken into account in the air quality assessment undertaken to support the planning application, predicted concentrations in the opening year are likely to be underestimated at locations where elevated emissions due to queuing are observed.*

73. *As evidenced in previous subsections of this report, the Development is not 'Air Quality Neutral' and appropriate mitigation is required.*

Waterman Additional Response

74. As previously mentioned, queue lengths at Chalkers Corner were provided by Stantec to replicate the existing levels of congestion on the road network and to determine when to apply the above speeds. The approach to the speeds and congestion was agreed with LBRuT during a meeting of the 14th November 2017.

75. The speeds were looked at again and the A3003 Lower Richmond Road (Mortlake Green) and A3003 Lower Richmond Road (Watney's Sports Ground) road links were reduced to 10kph to account for congestion along Lower Richmond Road. No further clarification on what speeds LBRuT believe to be 'over optimistic' have been provided.

76. Explicit modelling of queues in ADMS was accounted for on all road links with an average speed of 5mph for three hours over both the AM and PM weekday peaks.

6.2 Vehicle Speeds

LBRuT Comment

77. In the Stantec report, speed appears over optimistic which is likely to further under represent emissions. This needs reviewing.

Waterman Original Response

78. Stantec have confirmed that there was no reference to speeds in any of their reports. Further clarification is required to understand which speeds LBRuT believe to be 'over optimistic' in the air quality report.

AQEG Additional Comment

79. *The ES air quality chapter refers to Stantec as the provider of traffic data for the air quality calculations undertaken; it was assumed speed data used in the model set up was provided by the Transport consultants. Regardless of the source of traffic speed data (which should be confirmed for clarity), speed data appears over optimistic which is likely to further underrepresent emissions. These needs reviewing.*

Waterman Additional Response

80. Again, the approach to the speeds and congestion was agreed with LBRuT during a meeting of the 14th November 2017.

81. For the purposes of the air quality assessment Stantec provided speeds for the traffic data. However, Stantec have confirmed speeds were not referenced in any Stantec report. No further clarification on what speeds LBRuT believe to be 'over optimistic' have been provided.

7. Questionable Monitoring Data

LBRuT Comment

82. The 6 monthly monitoring data (deploying two NO_2 diffusion tubes at 10 monitoring sites), contained in a separate Waterman's document "Air Quality Monitoring Report" and on which significant reliance is placed, is questionable.

Waterman Original Response

83. Comments addressed individually below within this section.

LBRuT Comment

84. No information on the location of the monitoring sites used is provided.

Waterman Original Response

85. Location of the monitoring sites provided below
    - 1. Lower Richmond Road kerbside (519921, 175855)
    - 2. Chertsey Court metal railings roadside (519922, 175860)
    - 3. Chertsey Court Lower Richmond Road Façade (519921, 175870)
    - 4. Chalkers Corner Junction Kerbside (519874, 175862)
    - 5. Chertsey Court Carpark (519889, 175873)
    - 6. Clifford Avenue Kerbside (519893, 175913)
    - 7. Clifford Avenue metal railings roadside (519897, 175910)
    - 8. Chertsey Court Clifford Avenue façade (519907, 175904)

- School1. Stag Brewery Sports Club roadside (520268, 175881)
- School2. Stag Brewery Sports Club roadside (520260, 175881)

AQEG Additional Comment

86. *With the provided Eastings and Northings (X,Y) information on the applicant's site-specific monitoring locations as above for the six months (from July 2018 to January 2019) monitoring survey, their mapping and analysis was possible. Figure 2.1 shows their location in relation to LBRuT official monitoring locations in the vicinity of the site. It is observed that applicant's Diffusion tube location 4 (Chalkers Corner Junction Kerbside) is in close proximity to LBRuT Site ID 74, with an annualised annual mean value of 39.7$\mu g/m^3$ which is significantly lower than the full annual mean value of 52.9$\mu g/m^3$ at ID74 location (George Street). The LAEI NO_2 annual mean mapping at the Diffusion tube 4 location registers an annual mean value of 48.8$\mu g/m^3$ which is a clear indication that the site-specific monitored values are significantly underestimating pollution levels in the study area at base line conditions.*

87. *The air quality modelled results of the ES Air Quality Chapter and Associated Appendices have included the use of applicant's site-specific monitoring locations DT1, DT2, DT4, DT6, DT7 and School 1 and School 2 in the model verification and adjustment exercises. Given that the short-term site-specific monitoring data is significantly lower than LBRuT and LAEI NO_2 annual mean concentrations for 2019, the model is not suitably adjusted.*

88. *Appendix A of this document reports the verification exercise using only robust full year 2019 LBRuT monitoring data, namely diffusion tubes DT74, DT51, DT52, DT18, and DT70. As it is usually the case, ADMS underpredicts concentrations by kerbside/roadside locations, and a suitable and robust adjustment factor of 1.44 is to be applied to the modelled results instead. This peer review verification exercise has produced an improved RMSE of +/-3.2 $\mu g/m^3$, which is within the acceptable guidance and an improvement from the applicant's reported +/-4.0 $\mu g/m^3$ RMSE value (please note Table A11 extracted from Appendix 10.1: Air Quality Modelling Study does not offer units for the RMSE. For avoidance of doubt, it is +/- 10% of the limit value under scrutiny (i.e. 40 $\mu g/m^3$) which is equivalent to +/- 4.0 $\mu g/m^3$. It is also noted a typo highlighted in yellow, it should read presumably adjusted instead. Model results with RMSE values above +/- 10% of the limit value should be revisited, and input data and model set up questioned).*

89. *In addition, by using LBRuT monitoring data alone, both the Correlation Co-efficient and the Fractional bias are significantly improved, with achieved values of 1 and zero respectively*.

Table A11: Statistical Calculations of Error for the Modelled Results

Statistical Calculation	Perfect Value	Acceptable Variable Tolerance	Unadjusted Model Score	Unadjusted Model Score
Correlation Coefficient	1	N/A	0.88	0.88
Fractional Bias	0	+2 to -2	0.06	0.19
Root Mean Square Error	0	±10	4.4	4.0

90. *Therefore, as mentioned in sections above, given a much lower adjustment value applied to the NOx road modelled results by the applicant (1.13, which is practically no adjustment at all), the predicted concentrations in the opening year are significantly underestimated.*

Waterman Additional Response

91. The model verification and adjustment exercises have been updated to exclude the site-specific monitoring locations DT1, DT2, DT4, DT6, DT7 and School 1 and School 2 diffusion tubes.

92. Please note the RMSE, Correlation Co-efficient and the Fractional bias, shown in Annex 2, are different from AQEG's working above as the traffic data has been updated to account for the Hammersmith Bridge closure – see LBRuT comment on Hammersmith Bridge closure below for further details.

93. Refer to **Annex 2: Updates to Air Quality Results, Traffic Data and Model Verification** for more information.

LBRuT Comment

94. No tabulation of the eastings and northings nor mapping of locations were provided - Figure A1 is missing). Accurate location details (eastings/northings) are crucial to calculate exposure at the façade.

Waterman Response

95. Please see response to 6.3 above for locations of the monitoring sites. Figure A1 should have been provided previously and is now provided.

AQEG Additional Comment

96. *Noted.*

Waterman Additional Response

97. No comment.

LBRuT Comment

98. More recent, and complete monitoring information is available to ascertain the baseline conditions to the application site, as published by LBRuT in their ASR 2020, reporting data for 2019. It is noted that diffusion tubes ID 74 and ID 70 are located along the same road as the application site and report significantly higher values than the reported in the ES Chapter on air quality monitoring – this is also highlighted.

Waterman Original Response

99. The 2019 LBRuT monitoring data (including diffusion tubes ID 74 and ID 70) has been detailed within the Baseline Conditions section of Chapter 10 Air Quality.

AQEG Additional Comment

100. *The applicant's response does not address the point made. The key issue has been illustrated in paragraphs above and evidenced in Appendix A of this report. More recent, and complete monitoring information is available to ascertain the baseline conditions to the application site, as published by LBRuT in their ASR 2020, reporting full year data for 2019, which is more reliable and robust than the short-term annualised monitoring data collected by the applicant and included in the verification and adjustment exercise. By principle, and in the instance of available full year robust and official reported LBRuT 2019 data to suitably verify the modelled results, the short term site-specific data should have only been reported as informative, and not be included in the verification exercise given uncertainties associated with the annualization procedures and the fact*

that it does not reflect 2019 ambient air quality conditions (referring to July 2018 to January 2019 instead).

101. *The verification exercise is required to correct several model uncertainties associated with input data, meteorological representation, model set up parametrization, to mention a few. Including in the model verification uncertain monitoring data which had to be annualised, does not reflect ambient air conditions of 2019 and has much lower values than LBRuT and LAEI mapping for annual mean NO_2 values across the study area, counterfeits the purpose of the verification exercise. Further, two different datasets of monitoring data from two distinct sources were used in the model versification exercise, assuming identical data QA/QC procedures, handling of data, processing of blanks, etc. as well as assuming the quality of both datasets was similar which is certainly not the case. Furthermore, data collected by the applicant refers to a different time frame, including six months of 2018. This is not good practice, and the modelled results are not considered suitably adjusted as reported in the ES Air Quality Chapter and associated appendices*

Waterman Additional Response

102. As previous comment, the model verification and adjustment exercises have been updated to exclude the site-specific monitoring locations DT1, DT2, DT4, DT6, DT7 and School 1 and School 2 diffusion tubes.

103. Please note the RMSE, Correlation Co-efficient and the Fractional bias, shown in Annex 2, are different from AQEG's working above as the traffic data has been updated to account for the Hammersmith Bridge closure – see LBRuT comment on Hammersmith Bridge closure below for further details.

104. Refer to **Annex 2: Updates to Air Quality Results, Traffic Data and Model Verification** for more information.

LBRuT Comment

105. It is 6 months' data - not annual bias adjusted.

Waterman Original Response

106. The 6 month's monitoring results are bias adjusted and annualised. The bias adjustment and annualisation is provided in detail in Appendix 10.3 Air Quality Monitoring Report.

AQEG Additional Comment

107. *Noted.*

Waterman Additional Response

108. No comment.

LBRuT Comment

109. It focuses mainly on Chertsey Court.

Waterman Original Response

110. Agreed, the air quality monitoring was undertaken to:
    - Determine NO_2 concentrations at the façade of Chertsey Court to determine relevant residential exposure to traffic emissions;
    - Ascertain whether NO_2 concentrations fall-off with distance from the roadside to the façade of Chertsey Court;
    - Evaluate the effect of the existing landscaping at Chertsey Court on traffic emissions and thus NO_2 concentrations; and

- Ascertain the baseline conditions for the proposed school.

111. The locations selected for the diffusion tube monitoring study were appropriate to ascertain NO_2 concentrations at Chertsey Court and the proposed school.

AQEG Additional Comment

112. *LBRuT is making a point, being that the impacts of the proposed development are wider than Chertsey Court, with the catchment area of the proposed development including other sensitive receptor locations around the congested junctions where additional monitoring information would be useful to complement the LBRuT 2019 monitoring dataset.*

113. *As indicated in Figure 2.21, the cluster of site-specific monitoring locations is excessive around Chertsey Court, where one or two worst case locations could had been selected and suffice and releasing other DTs to cover other sensitive areas likely to be affected by the proposed development, where sensitive receptors are likely to be exposed to values above the NO_2 annual limit value set to protect human health. The school is suitably covered by two diffusion tubes.*

Waterman Additional Response

114. *As previous comments, the model verification and adjustment exercises have been updated to* exclude the site-specific monitoring locations DT1, DT2, DT4, DT6, DT7 and School 1 and School 2 diffusion tubes.

115. Refer to **Annex 2: Updates to Air Quality Results, Traffic Data and Model Verification** for more information.

LBRuT Comment

116. It lacks accurate location details.

Waterman Original Response

117. Location details provided above in response to 6.11 and provided within Figure A1.

AQEG Additional Comment

118. *Noted.*

Waterman Additional Response

119. No comment.

LBRuT Comment

120. It is pre closure of Hammersmith bridge - not representative of the current and foreseeable future situation of increased/diverted traffic flow adding to roads already over capacity.

Waterman Original Response

121. The Hammersmith Bridge was closed in April 2019 - 2019 LBRuT monitoring data is therefore the most representative of air quality concentrations in the area following the closure of the bridge. 2019 LBRuT monitoring has also been detailed within Chapter 10 Air Quality.

AQEG Additional Comment

122. *The applicant does not address the issue in their response. The point is that 2019 LBRuT monitoring data is the most representative of air quality concentrations in the area following the closure of the bridge and the only dataset suitable to verify and adjust model predictions for future years. Monitoring data collected from the July 2018 to January 2019 (as discussed above) is not suitable to adjust a model referring to 2019 traffic conditions.*

123. *As mentioned above, the predicted NO_2 annual mean concentrations as reported in the ES Air Quality chapter are therefore unreliable.*

Waterman Additional Response

124. As previous comments, the model verification and adjustment exercises have been updated to exclude the site-specific monitoring locations DT1, DT2, DT4, DT6, DT7 and School 1 and School 2 diffusion tubes.

125. Refer to **Annex 2: Updates to Air Quality Results, Traffic Data and Model Verification** for more information.

126. In response to LBRUT's original comment, Stantec have provided traffic data to address the Hammersmith Bridge Closure. The updated traffic data shows a reduction in heavy duty vehicles on the local road network – Stantec have stated this reduction may be due to the introduction of the ultra-low emission zone and HGV's using alternative routes.

LBRuT Comment

127. This means it is less robust than the Council's ratified and bias adjusted annual data for 2019.

Waterman Original Response

128. 2019 LBRuT monitoring data has also been detailed within Chapter 10 Air Quality.

AQEG Additional Comment

129. *As above. The issue is not whether the applicant has reported 2019 monitoring LBRuT data or not within Chapter 10 Air Quality the but the reliance on the inclusion of monitoring data from a different time frame and (July 2018 to January 2019) in the verification exercise, which, together with the reasons listed above, is deemed unsuitable to verify and adjust a model referring to 2019 baseline conditions and which is required to robustly predict concentrations in the opening year.*

Waterman Additional Response

130. As previous comments, the model verification and adjustment exercises have been updated to exclude the site-specific monitoring locations DT1, DT2, DT4, DT6, DT7 and School 1 and School 2 diffusion tubes.

131. Refer to **Annex 2: Updates to Air Quality Results, Traffic Data and Model Verification** for more information.

LBRuT Comment

132. The report refers to 60ug/m^3, the hourly target for residential facades - this is incorrect. For facades of residential property, schools, hospitals and care homes, it should be the annual mean of 40ug/m^3 – see LLAQM (TG16) (10).

Waterman Original Response

133. The reference in Paragraph 3.1 of the Air Quality Monitoring Report to *'annual mean NO_2 concentration of 60µg/m^3'* is a typographic error and should have referred to '*hourly mean NO_2 concentration of 60µg/m^3'*.

AQEG Additional Comment

134. *Noted.*

Waterman Additional Response

135. No comment.

LBRuT Comment

136. Additional lane for a left hand turn on the opposite side of the road, on Lower Richmond Rd, reducing/removing the mini car park and cutting down 2 x mature trees, thereby moving the houses from 137 – 171 closer to the source and removing a useful, mature green buffer against pollution at this very busy junction. These residents are likely to be exposed to increased levels of pollution and the date of compliance is likely to be delayed, which is against London Plan 2021 SI1.
"Development proposals should not: lead to further deterioration of existing poor air quality…. or delay the date at which compliance will be achieved in areas that are currently in exceedance of legal limits"

Waterman Original Response

137. The NO_2, PM_{10} and $PM_{2.5}$ concentrations at all existing residential receptors are all predicted to be significantly below the UK air quality strategy (AQS) objectives in 2029 with the development in place.

138. The predicted concentrations in 2029 are predicted to be approximately half of the relevant AQS objectives.

139. With regard to London Plan 2021 Policy SI1, in 2029 the development would therefore not delay the date at which compliance will be achieved or lead to further deterioration of existing poor air quality.

AQEG Additional Comment

140. *The applicant's response does not address the issue pointed out by LBRuT. No receptor locations were modelled under the road network layout mentioned by LBRuT above, where the houses from 137 – 171 Lower Richmond Rd will be significantly closer to the source and removing a useful, mature green buffer against pollution at this very busy junction. Exposure in the opening year considering such close proximity of receptors to traffic emissions at worst case residential locations has not been accounted for in the EA Air Quality sections nor modelling exercises.*

141. *Further, the predicted concentrations in 2029 are not reliable and significantly underestimated as evidenced in paragraphs above and in Appendix A. In addition, the London Plan requires development to comply with $PM_{2.5}$ annual mean limit value of 10$\mu g/m^3$, not 25$\mu g/m^3$ as reported by the applicant and mitigation is required as all the modelled receptors will be above this value set to safeguard human health.*

Waterman Additional Response

142. Receptor 20 was incorrectly referenced in the ES Chapter but was modelled as 165 Lower Richmond Road. However, a further three receptors (129, 141 & 145 Lower Richmond Road) have been included as requested.

143. There is no standard or recognised methodology to predict the effectiveness of vegetation in reducing pollutant concentrations at sensitive receptors. The modelling exercise is therefore a worst-case assessment as it does not consider the existing or proposed vegetation.

144. With regard the predicted 2029 concentrations, as previous comments, the model has been updated and the 2029 'without Development' and 'with Development' scenarios were assessed with 2027 as the emission year – as requested by LBRuT.

145. The London Plan makes no reference to the requirement of developments to comply with $PM_{2.5}$ annual mean limit value of 10$\mu g/m^3$, Reference is however made to commitments to achieving

World Health Organisation (WHO) targets for Particulate Matter. The WHO provide interim targets and the achievement of reaching these interim targets should be considered a critical indicator of improving health conditions for populations. The Development would meet the Stage 3 of the interim target of 15μg/m^3.

8. Air Quality Positive Observations

LBRuT Comment

146. Significant additional work is required to agree suitable air quality positive measures - To date, no concrete suitable air quality positive measures have been specifically selected and proposed and negotiations with the LA need to take place to agree and secure a suitable list of air quality positive measures with an indication of how much emission reductions are expected to be achieved. It is noted that the air quality measures need to be above and beyond the measures that will be required to make the proposal air quality neutral.

147. The air quality positive statement does not meet the required LA objectives - too vague and generic - The Air Quality Positive Statement should be SMART (Specific, Measurable, Achievable, Realistic, and Timely).

148. LBRuT does not have sufficient information to ascertain either what exact measures are being proposed and where, when, and for how long nor the benefits expected associated with each of them.

149. A way to monitor their efficiency and adjust as and when necessary is also expected.

Waterman Original Response

150. The Air Quality Positive Statement (AQPS) was prepared in line with the Air Quality Positive Draft Guidance.

151. The AQPS provides multiple suitable measures (Table A1) and summarises the expected benefits of these measures. The AQPS also provides an implementation plan (Table A2) to illustrate how these measures would be implemented.

152. As above, the Development is 'Air Quality Neutral'.

153. At the time of writing LBRuT have not published any air quality positive objectives. The latest available Air Quality Action Plan (2019-2024) available on LBRuT's website makes no reference to air quality positive.

AQEG Additional Comment

154. *As evidenced earlier in this report, the proposed development is not air quality neutral. Therefore, prior to ascertaining appropriate air quality positive measures, measures to make the proposal compliant with the London Plan air quality neutral are required and must be separately listed and secured.*

155. *Once an agreement with regards to an appropriate level of air quality neutral mitigation is reached between the applicant and the LBRuT, further discussions and negotiations are required between the two parties to agree on a suitable and effective list of air quality positive measures. The air quality positive guidance is still in its draft form and therefore does not include feed back from Local Authorities on various aspects including quantification of the effectiveness of the measures proposed, monitoring of the improvements achieved on local air quality, consultation and liaison with Environmental Health officers, to mention a few.*

156. *Further, air quality positive measures will need to be above and beyond both air quality neutral measures and the default measures already required by the London Plan (e.g. electric vehicle charging, etc). Table A1: Air Quality Positive Matrix of Appendix 10.4: Air Quality Positive Statement content is a tick box exercise, listing fairly standard measures that would be done already by default anyway by the vast majority of planning applications of this size and location, not expanding on any of the listed measures by title with almost all the entries not requiring monitoring to ascertain any benefits claimed. This document must be significantly improved to meet the spirit of GLA's intention of an air positive development.*

157. *Finally, and as recommended by GLA during the consultation period of the draft Air Quality Positive guidance text, the Air Quality Positive document is meant to be dynamic and thoroughly consulted with the Local Authority in order to integrate its principles and measures with long terms strategic projects that may be part of the Borough's vision and opportunities to improve air quality and or measures already included in the Local Action Plan, so that any synergies can be explored and benefited from.*

158. *In conclusion, Appendix 10.4: Air Quality Positive Statement needs substantial additional effort by the applicant to positively engage with the LA and thoroughly agree and document details of suitable air quality positive measures and how this will be described in S106 agreements and monitored so that they are effective in their contribution to improve air quality. A list of well thought opportunities beyond the listed default standard measures must be discussed and agreed with the LBRuT.*

159. *To date, no air quality positive measures have been discussed nor consulted with the LA which needs to take place to agree and secure a suitable list of appropriate air quality positive measures with an indication of how much emission reductions are expected to be achieved, beyond the standard default measures listed.*

160. *Please note that an air quality positive approach is required by LBRuT's Air Quality SPD.*

Waterman Additional Response

161. As above, the updated air quality neutral calculations within **Annex 1** shows the Development to be 'Air Quality Neutral', and no further mitigation measures are required. Air quality positive measures are therefore above and beyond the air quality neutral measures required. Off-setting payments (in addition to payments agreed previously) are not required.

162. Again, it is worth noting the Air Quality Positive Statement (AQPS) was prepared in line with the GLA's Air Quality Positive Draft Guidance. In the absence of published final guidance, the following comment is moot '*the air quality positive guidance is still in its draft form and therefore does not include feed back from Local Authorities on various aspects including quantification of the effectiveness of the measures proposed, monitoring of the improvements achieved on local air quality, consultation and liaison with Environmental Health officers, to mention a few is'*.

163. The Air Quality Positive Consultation draft was published by the GLA in November 2021; however, it should be noted Waterman, the air quality consultants, have been integral to the design process from the beginning to maximise air quality benefits of the Development. Waterman have been involved in design team meeting regarding the design and have undertaken monitoring and modelling of numerous reconfigurations to the Chalkers Corner junction to alleviate the air quality, transport and traffic implications associated with the operation of the Development. It is therefore disputed the air quality measures are just default measures already required by the London Plan.

164. LBRuT were not directly consulted on air quality positive measures, due to time constraints from publication of the Air Quality Positive Draft Guidance to submission of the planning application. However, LBRuT have been consulted and provided input throughout the planning application process. LBRuT's Air Quality Supplementary Planning Document (SPD) and Air Quality Action Plan (AQAP) were reviewed when preparing the air quality positive statement, however neither made reference to any air quality positive measures.

165. The air positive guidance states that where specific measures are put in place to improve air quality, these should be secured through the use of planning conditions or s106 agreements. The air quality positive statement details this as mitigation for the majority of air quality measures listed. This enables LBRuT to ensure the air quality positive measures are effective in their contribution to improve air quality. It is not thought the air positive statement is the place to describe S106 agreements or details of monitoring – these should be secured or agreed by planning condition.

LBRuT Comment

166. A roadmap for air quality impacts, mitigation measures and air quality neutral and positive aspects should be reported distinctly for the detailed and the outline stages of the application. This will enable LBRuT to better ascertain where and when mitigation is required as well as the suitable level of effort to be deployed.

Waterman Original Response

167. An air quality neutral assessment and air quality positive will be submitted for every phase of the development. It is anticipated that a suitably worded planning condition will be attached to any permission to this end.

AQEG Additional Comment

168. *As mentioned above, the air quality positive statement as it is, is minimalist and does not go beyond the standard default measures that any sustainable proposed development would already propose and follow anyway. There will be no use of having similar documents being submitted at later stages, for each phase of the proposed development as there is no workable content to make the proposal air quality positive. As mentioned above, an engaged improvement of the document is required, working closely with the LA transport officers, EHO, public health, panners, LA landscape officers, etc. to brainstorm on possible opportunities to effectively and successfully produce an air quality positive proposal.*

Waterman Additional Response

169. As evidenced above, the air quality positive statement does go beyond the standard default measures. As above, LBRuT were not directly consulted on air quality positive measures, however, LBRuT have been consulted and provided input throughout the planning application process.

9. Size/massing

LBRuT Comment

170. Current mitigation does not satisfy requirements of London Plan and LBRuT SPD. It needs to go further, either by reducing inputs - capacity/dwellings or reducing outputs – more/better incentives for modal shift/public transport or reduced road emissions.

Waterman Original Response

171. Not an air quality related comment. The travel plan provides incentives for modal shifts for sustainable and active travel.

AQEG Additional Comment

172. *This is clearly an air quality related comment. Transport management is part of appropriate air pollution mitigation in order to reduce pollutant emissions into the atmosphere. This is where the multidisciplinary approach between air quality consultants, transport consultants and the design team must be discussed and opportunities for better design and emission reduction strategies jointly explored. This is also linked with what is expected to happen during the production of the Air Quality positive statement, which is in reality to be based on a series of interactions and workshops involving all the relevant disciplines to see ways to optimise the proposal for air quality positive outcomes. I cannot therefore accept the applicant's dismissive response and the points raised by LbRuT must be suitably addressed.*

Waterman Additional Response

173. A multidisciplinary approach between the design team, stakeholders including TfL, air quality and transport consultants was successfully undertaken to ensure emissions were reduced wherever practicable. The results of the multidisciplinary approach are shown by the Development being air quality neutral and resulting in no significant adverse air quality effect on existing and future sensitive receptors as presented in Chapter 10 Air Quality of the ES.

LBRuT Comment

174. The river should be reconsidered – LBRuT has been in touch with the PLA. If neither are possible damage costs have been calculated.

Waterman Original Response

175. As set out in Chapter 6 of the ES, the use of the river for construction logistics was considered by the Applicant, however, at this stage significant constraints have been identified in respect of river use (refer to Chapter 4 of the ES which lists the constraints). On this basis river transport of construction materials is currently discounted. The FCMS submitted for planning provides an indicative strategy for construction logistics. A Construction Logistics Plan would be prepared upon appointment of the Principal Contractor. Recognition is given to traffic and pedestrian management, as well as the segregation of construction activities. The use of just-in-time deliveries would look to minimise material delivery waiting times and reduce congestion and pollution on local highways. The segregation of construction traffic and public vehicles would be maintained wherever possible and deliveries would be aimed for times avoiding traffic rush-hours.

AQEG Additional Comment

176. *This aspect must be thoroughly discussed and agreed with LBRuT. Depending on the outcome of the negotiations between the applicant and the LA, damage costs are to be inserted in a S106 agreement.*

Waterman Additional Response

177. No further air quality comment to what was provided above in Waterman's original response.

10. Conditions / HOTs (if objections can be overcome):

LBRuT Comment

178. Car club bays: Must comply with LBRuT's Air Quality SPD s92, and include financial incentives/membership for 2 years.

Waterman Original Response

179. Car club bays have been agreed as part of the travel plan whereby all residents would have membership. This will also form part of the S106 agreement.

AQEG Additional Comment

180. *I strongly recommend the applicant's appointed air quality consultants are involved in the drafting of the Head of Terms as well as air quality related conditions. This will make sure there is an integrated approach and air quality aspects for achievement of air quality neutral and air quality positive status will be safeguarded and appropriately worded (which to date neither of them meet the expected standards; prerequisites should had been agreed at the pre-application stage and confirmed/consolidated at the air quality consultation stage with the EHO).*

181. *My professional perception is that the Air Quality Positive statement was a desk-based exercise where the appointed air quality consultants listed a series of standard measures, without the GLA's envisaged staged and dynamic process which would start before information is presented and discussed at the preapplication meeting, involving a series of optimized proposals/options and discussions where possible alternatives would be explored, negotiated between parties (LBRuT and the applicant) and agreed. And here we are, post submission stage, still unsure about compliance with crucial policy documents (regional and local) and how these prerequisites are to be woven into a S106 agreement.*

Waterman Additional Response

182. As above, the air quality neutral calculations within **Annex 1** shows the Development to be 'Air Quality Neutral', and no further mitigation measures are required. Off-setting payments (in addition to payments agreed previously) are not required. The air quality positive measures are therefore above and beyond the air quality neutral measures required.

183. Please refer to Section 8 for Waterman's response to the Air Quality Positive Statement.

LBRuT Comment

184. Robust travel and service plans, with measurable, reportable targets, will need careful conditioning.

Waterman Original Response

185. Agreed.

AQEG Additional Comment

186. *Ditto.*

Waterman Additional Response

187. No further air quality comment to what was provided above in Waterman's original response.

LBRuT Comment

188. Section 106 will be required – see report and maps attached.

Waterman Original Response

189. The Development is 'Air Quality Neutral' and in accordance with the Air Quality Neutral Consultation draft, November 2021 off-setting payments are not required.

AQEG Additional Comment

190. *As evidenced earlier in this report, the proposed development is not air quality neutral and off-setting payments are required. Damage cost calculations are to be undertaken using EFT v11.0 over the period of 30 years, using Defra's damage cost approach and toolkit.*

Waterman Additional Response

191. As above, the air quality neutral calculations within **Annex 1** shows the Development to be 'Air Quality Neutral', and no further mitigation measures are required. Off-setting payments (in addition to payments agreed previously) are not required. The air quality positive measures are therefore above and beyond the air quality neutral measures required. The Development is therefore compliant with the Air Quality Neutral Planning Support: GLA 80371, April 2014 guidance and does not require any mitigation or payment.

LBRuT Comment

192. Conditions:

- Low Emission Strategy
- Reducing emissions from demolition and construction

Waterman Original Response

193. No comment.

AQEG Additional Comment

194. *These conditions are the bare minimum; the delivery and implementation of and effective air quality positive approach may need additional conditions to secure their performance over the lifetime of the proposed development. An air quality positive delivery plan may also be required.*

Waterman Additional Response

195. No comment.

11. Conclusions

196. This briefing note provides a further air quality modelling exercise which demonstrates that the air quality assessment undertaken and presented in the March 2022 ES remains valid, and that the Development is air quality neutral.

197. Additional modelling works have been undertaken to meet the requirement of LBRuT and their consultant. Waterman disagrees with a number of these requests and maintain they are outwith current good practice. Notwithstanding this, as set out above, the likely environmental effects remain insignificant as a result of the updated modelling.

Annex 1: Air Quality Neutral Calculations

Introduction

10.2.1 This Annex presents the calculations undertaken by Waterman Infrastructure & Environment Limited (Waterman) to demonstrate how the Development (LBRuT reference numbers: 22/0900/OUT and 22/0902/FUL) performs against relevant 'air quality neutral' benchmarks.

10.2.2 The air quality neutral calculations have been updated in response to comments presented in the '*Peer Review of the Air Quality Assessment Report Submitted to Support Planning Application 22/0900/OUT Phase 2'*, hereafter referred to as the 'Peer Review'. The Peer Review was undertaken by Air Quality Experts Global Ltd on behalf of the London Borough of Richmond upon Thames (LBRuT).

Description of the Development

10.2.3 The Development is located within Outer London and would provide a mixed-use scheme. The total amount of floorspace proposed by the Development, relevant to the Air Quality Neutral Assessment criteria is set out below in **Table A1**.

Table A1: 'Air Quality Neutral' Emissions Benchmarks for Buildings

Land Use (Use Class)	Use Class		Proposed Floorspace Areas
	Pre- September 2020	Current	GIA (m^2)
Residential	C3	C3	111,370
Office	B1	B1	4,468
Flexible Uses - Restaurant / bar / retail / community / leisure	A1 / A2 / A3 / A4 / B1 / D1 / Boathouse	A1 / A2 / A3 / A4 / B1 / D1 / Boathouse	4,784
Hotel	C1	C1	1,765
School	D1	D1	9,319
Cinema	D2	D2	1,606
Total			**133,312**

Note: Table 1 is not the Total Floor Space provided within the Development and excludes non-habitable uses such as plant and storage areas, play space, private amenity space, car park space, which are not used within the Air Quality Neutral Assessment calculations.
The AQNA assessment requires the comparison of Development against relevant benchmarks for each use class and therefore it is necessary for them to be included in Table A1.

Assumptions, Exclusions and Limitations

10.2.4 The Development does not propose combustion plant, it shall, therefore, not give rise to any significant adverse air quality impacts. The heating plant is therefore 'Air Quality Neutral' with respect to building emissions. As a result, building emissions have not been considered further within the air quality neutral assessment.

10.2.5 The Air Quality Neutral assessment has been based on the Greater London Authority's Sustainable Design and Guidance – Supplementary Planning Guidance (SPG) and Air Quality Consultants Air Quality Neutral Planning Support: GLA 80371, April 2014, referred to later in this appendix. These guidance documents apply an emission benchmark based on the Land Use Classes detailed in the Use Classes Order 1987 (as amended) in force at that time. However,

the most recent amendment of the Use Classes Order of 1st September 2020[1] resulted in a change to the list of Land Use Classes. However, for consistency with the guidance documents, the Land Use Classes referred to in this report reflect those in place prior to September 2020.

10.2.6 There are no Transport Emission Benchmarks (TEBs) for Use Classes C1, D1, and D2. The Air Quality Neutral Planning Support document states '*Where a specific TEB has not been calculated, it will be possible to shown that a development would meet the benchmark if the scheme-generated trip rate for a particular land-use class does not exceed the benchmark trip rate, derived from TRAVL, as shown in Appendix A1*'. The C1, D1, and D2 benchmark trip rates were therefore derived from TRAVL as shown in Appendix A1 of the Air Quality Neutral Planning Support document.

10.2.7 The proposed floorspace areas for each use class are presently unknown for the 4,784m^2 GIA of flexible uses within the Development (Restaurant / bar / retail / community / leisure). An average of the A1 and B1 Land Use Classes were used for both the Transport Emission Benchmarks (TEBs) and average distance travelled by car per trip as the flexible uses would predominantly be retail uses. The average of the A1 and B1 Land Use Classes also ensures the air quality neutral calculations present a reasonable worst case aligning with the EIA Regulations 2017, as amended.

Planning Policy

The London Plan, March 2021

10.2.8 Policy SI1 Improving air quality of the Mayor of London's London Plan2 states that:

"…a) development proposals must be at least Air Quality Neutral…"

The Mayor's Air Quality Strategy 'Clearing the Air', 2010

10.2.9 Similarly, the Mayor's Air Quality Strategy[3] states that:

"New developments in London shall as a minimum be 'air quality neutral' through the adoption of best practice in the management and mitigation of emissions".

Sustainable Design and Construction - Supplementary Planning Guidance, 2014

10.2.10 The Sustainable Design and Guidance – Supplementary Planning Guidance (SPG) provides updated guidance to support the implementation of the London Plan.

10.2.11 Further to Policy 7.14 of the London Plan, Section 4.3 of the SPG focusses on air pollution and the effects from the operation of new developments within Greater London. The SPG requires all new developments to be at least 'air quality neutral'.

10.2.12 Paragraph 4.3.15 of the SPG states:

"This policy applies to all major developments in Greater London. Developers will have to calculate the NO_x and / or PM_{10} emissions from the buildings and transport elements of their developments and compare them to the benchmarks set out in Appendix 5 and 6."

[1] https://www.legislation.gov.uk/uksi/1987/764/contents/made

2 Greater London Authority. 2021. The London Plan: The Spatial Development Strategy for Greater London, March 2021, GLA, London

3 Greater London Authority (GLA), 'The Mayor's Air Quality Strategy: Cleaning London's Air', London, 2002.

10.2.13 The SPG presents emission benchmarks for buildings (associated with emissions from combustion plant introduced as part of a development to provide heating and power) and transport (associated with vehicle trips related to the operation of the development). It is considered that where a development does not exceed these benchmarks, it would be 'air quality neutral' and would not increase NO_x (oxides of nitrogen) and PM_{10} (particulate matter of 10µm diameter or less) emissions across London as a whole. A discussion on the Transport Emission Benchmarks (TEBs) as set out within the SPG is presented below.

10.2.14 Section 4.3.18 of the SPG notes that the design of a development should encourage and facilitate walking, cycling and the use of public transport, thereby minimising the generation of air pollutants.

10.2.15 As well as providing benchmarks the SPG also recommends emission standards for combustion plant to comply with, in addition to meeting the overall 'air quality neutral' benchmark

Air Quality Neutral Planning Support: GLA 80371, April 2014

10.2.16 In April 2014, the GLA published the Air Quality Neutral Planning Support (AQNPS): GLA 80371[4] to provide support to the development of the Mayor's policy related to 'air quality neutral' developments. The report provides a method to enable a development to be assessed against the air quality neutral benchmarks set out in the Sustainable Design and Construction SPG.

10.2.17 The report provides a methodology required to apply the air quality neutral policy. It requires the transport and building emissions for the development to be identified and then compared to the benchmark emissions. The report notes that the building and transport emissions should be calculated separately and not combined.

Transport Emissions Benchmarks (TEBs)

10.2.18 Table 11 of the Air Quality Neutral Planning Support document sets out the TEBs defined by a series of land-use class for both NO_x and PM_{10}, presented in **Table A2**.

Table A2: 'Air Quality Neutral' Emissions Benchmarks for Transport

Land Use	London Central Activity Zone	Inner	Outer
NOx (g/dwelling/annum)			
Retail (A1)	169	219	249
Office (B1)	1.27	11.4	68.5
Residential (C3)	234	558	1553
PM10 (g/dwelling/annum)			
Retail (A1)	29.3	39.3	42.9
Office (B1)	0.22	2.05	11.8
Residential (C3)	40.7	100	267

Note: No Emissions Benchmark for Use Classes A2, A3, A4, D1 and D2. Use Class B1 was used for a worst-case assessment

10.2.19 There are no TEBs for Use Classes C1, D1, and D2. The C1, D1, and D2 benchmark trip rates were therefore derived from TRAVL as shown in Appendix A1 of the Air Quality Neutral Planning

4 Air Quality Consultants Environ Air Quality Neutral Planning Support: GLA 80371. April 2014

Support document. The Benchmark trip rates for Use Classes C1, D1 and D2 are presented in **Table A3**.

Table A3: 'Average Number of Trips per Annum for Different Development Categories

	Number of Trips (trips/m²/annum)		
Land Use	**London Central Activity Zone**	**Inner**	**Outer**
Hotel (C1)	1.9	5.0	6.9
School (D1)	0.07	65.1	46.1
Cinema (D2)	5.0	22.5	49.0

Calculation of the Development Transport Emissions

10.2.20 Details of the trip generation per day for each land-use class have been provided by Stantec - the Applicant's transport consultant. The calculation of the Transport Emissions for residential, office and flexible uses of the Development are presented in **Table A4**.

Table A4: Calculation of the Benchmarked Transport Emissions for each Land-Use Category

Land Use	**Trips per annum**	**Average Distance per trip**	**Distance travelled km/annum**	**Emission Factors (g/vehicle-km)**	**Transport Emission (kg/annum)**	
					NO_x	**PM_{10}**
Residential	452,965	11.4	5,163,801	NO_x: 0.353 PM_{10}: 0.0606	1822.8	312.9
Office	143,810	10.8	1,553,148		548.3	94.1
Flexible Uses^	111,690	8.1	904,689		319.4	54.8
Total Transport Emissions					**2,690.4**	**461.9**

Notes: Average distance travelled by car per trip for sites within Outer London
^Flexible Uses - floorspace area for each use class and associated distances are presently unknown. An average distance derived from Use Classes A1 and B1 was used
* School trips assumed for 200 days per annum

10.2.21 The Transport Benchmark for the Development, as shown in **Table A5**, are calculated by multiplying the benchmarks in **Table A2** by the number of residential units, and floorspace for office and flexible uses within the Development.

Table A5: Calculation of the Benchmarked Transport Emissions for each Land-Use Category

Land Use	**Units**	**GIA (m^2)**	**Transport Emission Benchmark**		**Benchmarked Emissions**	
			gNO_x/m^2 or dwelling/ annum	**gPM_{10}/m^2 or dwelling/ annum**	**$kgNO_x$/ annum)**	**$kgPM_{10}$/ annum**
Residential	1,071	-	1553	267	1,663	286.0
Office	-	4,468	68.5	11.8	306.1	52.7
Flexible Uses*	-	4,784	158.75	27.35	759.5	130.8
Total Transport Emissions					**2,728.8**	**469.5**

Notes: Average distance travelled by car per trip for sites within Outer London Activity Zone
^Flexible Uses - floorspace area for each use class and associated TEB's are presently unknown. An average TEB derived from Use Classes A1 and B1 was used

10.2.22 The Total Transport NOx Emission of 2,690.4 kg/annum (as shown in **Table A4**) is below the benchmark of 2,728.8 kg/annum (as shown in **Table A5**) and the Total Transport PM_{10} Emission of 461.9 kg/annum (as shown in **Table A4**) is below the benchmark of 469.5 kg/annum (as shown in **Table A5**). The residential, office and flexible uses of the Development, combined, are 'Air Quality Neutral', with respect to transport emissions. and no further mitigation measures are required.

10.2.23 The calculation of the transport emissions for the hotel, school and cinema uses of the Development, as set out within the Air Quality Neutral planning support document, are presented in **Table A6**.

Table A6: Calculation of the Hotel, School and Cinema Transport Emissions

Land Use	Number of Trips (trips/m^2/annum) Benchmark[(a)]	Trips per day	Trips per annum	GIA (m^2)	Number of Trips (trips/m^2/annum)
Hotel (C1)	6.9	14	5,110	1765	2.9
School (D1)	46.1	485	97,000	9,319	10.4
Cinema (sui generis)	49	164	59,860	1,606	37.3

Note: [(a)] Number of Trips (trips/m^2/annum) for sites within Outer London
[(b)] Emissions factors used as presented in Table 10 of the Air Quality Neutral Planning Support Document

10.2.24 **Table A6** shows the hotel, school and cinema trip rates are below the respective benchmark trip rates for each land use. As such, the hotel, school and cinema components of the Development are also considered to be 'Air Quality Neutral' in relation to transport emissions.

10.2.25 The Development is 'Air Quality Neutral', with respect to transport emissions, and no further mitigation measures are required.

Annex 2: Updates to Air Quality Results, Traffic Data and Model Verification

Updated Likely Significant Effects

Completed Development

Changes in Local Air Quality from Traffic

The Development is predicted to be completed and operational in 2029. To account for a lower vehicle fleet turnover rate than predicted by Defra in the Emission Factor Toolkit for 2029, LBRuT requested the opening year be assessed assuming a couple of years delay in the vehicle fleet turnover rate. The likely impacts on local air quality of the complete and operational Development were therefore assessed assuming the opening year of the Development was 2027 rather than 2029. Changes in local air quality would result from changes to traffic flows on the local road network and emissions from the basement car parks associated with the Development. The results of the ADMS-Roads modelling of operational traffic (based on the emission rates and background concentrations for the year 2027 – as requested by LBRuT) are presented in **Table 1**.

Table 1 includes three additional receptors on Lower Richmond Road (Receptors 129, 141 & 145 Lower Richmond Road).

Table 1: Results of the Traffic Modelling at Select Sensitive Receptors

Receptor ID		NO_2 Annual Mean (µg/m^3)				PM_{10} Annual Mean (µg/m^3)				PM_{10} Number of Days >50µg/m^3				$PM_{2.5}$ Annual Mean (µg/m^3)			
		2019 Baseline	2029 as 2027 Without	2029 as 2027 With Development	2029 as 2027 Change	2019 Baseline	2029 as 2027 Without	2029 as 2027 With Development	2029 as 2027 Change	2019 Baseline	2029 as 2027 Without	2029 as 2027 With Development	2029 as 2027 Change	2019 Baseline	2029 as 2027 Without	2029 as 2027 With Development	2029 as 2027 Change
1	1 Varsity Row	27.2	19.4	19.7	0.3	17.3	16.7	16.8	0.1	0	0	0	0	12.1	11.0	11.1	0.1
2	6 Watney Cottages	35.3	23.4	23.9	0.4	17.9	16.5	16.6	0.1	1	0	0	0	13.0	11.9	12.0	0.1
3	1 Watney Cottages	33.1	20.9	21.3	0.4	17.5	16.2	16.3	0.1	1	0	0	0	12.8	11.7	11.8	0.1
4	1-3 Parliament Mews	23.5	17.3	17.5	0.2	16.4	15.1	15.2	0.1	0	0	0	0	11.5	10.6	10.6	0.0
5	Ship Lane	23.1	17.0	17.3	0.3	16.3	15.0	15.1	0.1	0	0	0	0	11.5	10.5	10.5	0.0
6	Lower Richmond Road	32.5	19.7	20.2	0.5	17.3	16.0	16.2	0.2	0	0	0	0	12.6	11.6	11.7	0.1
7	Lower Richmond Road	33.7	20.1	20.5	0.4	17.5	16.2	16.3	0.1	1	0	0	0	12.7	11.7	11.8	0.1
8	Lower Richmond Road	34.7	20.8	21.1	0.3	17.7	16.4	16.5	0.1	1	0	0	0	12.9	11.8	11.8	0.0
9	13 Sheen Lane	29.5	20.3	20.5	0.3	17.2	15.9	15.9	0.0	0	0	0	0	12.6	11.5	11.5	0.0
10	40 Mortlake High Street	34.4	22.4	22.7	0.3	18.4	17.1	17.2	0.1	1	0	0	0	13.3	12.2	12.2	0.0
11	Boat Race Court	34.6	22.5	22.8	0.3	18.5	17.2	17.3	0.1	1	0	0	0	13.3	12.2	12.3	0.1
12	My Sunshine Nursery	32.8	19.9	20.2	0.3	17.4	16.1	16.2	0.1	0	0	0	1	12.7	11.6	11.7	0.1
13	Thomas House Primary School	28.9	19.7	19.9	0.2	16.8	15.5	15.5	0.0	0	0	0	0	12.3	11.3	11.3	0.0
14	Barnes Children's Centre	30.5	19.9	20.2	0.2	17.2	15.9	15.9	0.0	0	0	0	0	12.6	11.5	11.5	0.0
15	St Mary Magdalen's Catholic Primary School	23.6	17.3	17.4	0.1	16.4	15.2	15.2	0.0	0	0	0	0	12.1	11.1	11.1	0.0
16	179 Lower Richmond Road	**45.8**	31.4	31.6	0.2	18.6	17.2	17.2	0.0	1	0	0	0	13.7	12.5	12.5	0.0

Receptor ID		NO_2 Annual Mean (µg/m³)				PM_{10} Annual Mean (µg/m³)				PM_{10} Number of Days >50µg/m³				$PM_{2.5}$ Annual Mean (µg/m³)			
		2019 Baseline	2029 as 2027 Without	2029 as 2027 With Development	2029 as 2027 Change	2019 Baseline	2029 as 2027 Without	2029 as 2027 With Development	2029 as 2027 Change	2019 Baseline	2029 as 2027 Without	2029 as 2027 With Development	2029 as 2027 Change	2019 Baseline	2029 as 2027 Without	2029 as 2027 With Development	2029 as 2027 Change
17	189 Lower Richmond Road	**42.1**	29.0	29.1	0.2	18.2	16.8	16.9	0.1	1	0	0	0	13.5	12.3	12.3	0.0
18	2 South Circular	**49.2**	33.7	33.9	0.1	19.0	17.6	17.6	0.0	2	1	1	0	14.0	12.7	12.8	0.1
19	67 Shalstone Road	**51.6**	35.4	35.5	0.1	19.2	17.8	17.9	0.1	2	1	1	0	14.1	12.9	12.9	0.0
20	165 Lower Richmond Road	**53.4**	36.4	36.7	0.3	19.6	18.2	18.2	0.0	2	1	1	0	14.4	13.1	13.1	0.0
21	83 Lower Richmond Road	34.0	23.1	23.5	0.4	17.7	16.3	16.4	0.1	1	0	0	0	12.9	11.8	11.8	0.0
22	1 Chertsey Court	33.7	22.9	23.2	0.4	17.6	16.3	16.3	0.0	1	0	0	0	13.1	12.0	12.0	0.0
23	23 Chertsey Court	32.6	22.4	22.7	0.3	17.5	16.1	16.2	0.1	1	0	0	0	12.8	11.7	11.7	0.0
24	139 Chertsey Court	35.9	24.2	24.4	0.2	18.0	16.6	16.7	0.1	1	0	0	0	13.3	12.2	12.2	0.0
25	77 Chertsey Court	34.5	23.5	23.6	0.1	17.8	16.4	16.5	0.1	1	0	0	0	12.5	11.3	11.3	0.0
26	145 Lower Richmond Road	**42.3**	28.8	**29.7**	0.9	18.2	16.9	17.0	0.1	1	0	0	0	13.5	12.3	12.4	0.1
27	141 Lower Richmond Road	**42.8**	29.0	**30.3**	1.2	18.3	16.9	17.1	0.2	1	0	0	0	13.5	12.4	12.5	0.1
28	129 Lower Richmond Road	**43.4**	29.3	**30.2**	0.9	18.3	17.0	17.1	0.1	1	0	0	0	13.6	12.4	12.5	0.1
29	Proposed Building 10 – Ground Floor Level	-	-	20.6	-	-	-	16.2	-	-	-	0	-	-	-	11.7	-
30	Proposed Building 5 – Ground Floor Level	-	-	26.9	-	-	-	17.7	-	-	-	1	-	-	-	12.6	-
31	Proposed Building 9 – Ground Floor Level	-	-	22.6	-	-	-	16.9	-	-	-	1	-	-	-	12.1	-
32	Proposed School – Ground Floor Level	-	-	19.4	-	-	-	15.5	-	-	-	0	-	-	-	11.3	-

Note: For accuracy, the changes arising from the Development have been calculated using the exact output from the ADMS-Road and ADMS model rather than the rounded numbers within the Table. This explains where there may a slight difference in the calculated change in concentrations from the 'without' and 'with' Development scenarios. Exceedences of the AQS objectives shown in **bold** text

Nitrogen Dioxide (NO_2)

The results in **Table 1** indicate that for 2019 the annual mean NO_2 objective is met at 20 of the 28 existing receptors. The highest concentration is predicted at Receptor 20 (53.4µg/m^3). As discussed in **Appendix 10.1** of the March 2022 ES, the 1-hour mean AQS objective for NO_2 is unlikely to be exceeded at a roadside location where the annual mean NO_2 concentration is less than 60µg/m^3. As shown in **Table 1**, the predicted annual mean NO_2 concentrations in 2019 are below 60µg/m^3 at all receptor locations. Accordingly, the 1-hour mean objective is likely to be met at these locations.

As previously mentioned, the likely impacts on local air quality of the complete and operational Development were assessed assuming the opening year of the Development was 2027 rather than 2029. In 2029, assumed to be 2027, both 'without' and 'with' the Development, concentrations are predicted to meet the NO_2 annual mean objective value at all receptor locations assessed. Therefore, the 1-hour mean objective is also predicted to be met at all existing receptor locations.

Using the impact descriptors outlined in **Table 10.10** of Chapter 10: Air Quality (of the March 2022 ES), the Development is predicted to result in 'slight' impact at Receptors 27 and 28 and a 'negligible' impact at all other 26 existing receptors assessed. In accordance with the EPUK / IAQM Guidance the overall significance is determined using professional judgement and not based on the impact of individual receptors. It is also considered the Development would have an 'negligible' impact on hourly NO_2 concentrations.

Particulate Matter (PM_{10} and $PM_{2.5}$)

As shown in **Table 1**, the annual mean concentrations of PM_{10} are predicted to be well below the objective of 40µg/m^3 in 2019 and in 2029 as 2027 both 'without' and 'with' the Development at all the existing receptor locations considered. The maximum predicted annual mean PM_{10} concentration is 19.6µg/m^3 at Receptor 20 in 2019. Using the impact descriptors outlined in **Table 10.10** of Chapter 10: Air Quality (of the March 2022 ES), the Development is predicted to result in an 'negligible' impact at all existing receptors assessed.

The results in **Table 1** indicate that in 2019 and in 2029 as 2027 for both 'without' and 'with' the Development, all existing receptor locations are predicted to be below the 24-hour mean PM_{10} objective value of 35 days exceeding 50µg/m^3. The maximum predicted concentration in all scenarios tested is 2 days at Receptors 18, 19 and 20.

The results in **Table 1** indicate that in 2019 and in 2029 as 2027 for both 'without' and 'with' the Development, all existing receptor locations are predicted to be below the annual mean $PM_{2.5}$ objective value of 25µg/m^3.

Using the impact descriptors outlined in **Table 10.10** of Chapter 10: Air Quality (of the March 2022 ES), the Development is predicted to result in an 'negligible' impact at all existing receptors.

In accordance with the EPUK / IAQM, guidance, and using professional judgement, based on the severity of the impact discussed above and the concentrations predicted at all the sensitive receptors considered in the air quality assessment, it is considered that the effect of the Development on local NO_2, PM_{10} and $PM_{2.5}$ concentrations would be **insignificant**.

Conditions within the Development

As shown by the results in **Table 1**, the predicted NO_2, PM_{10} and $PM_{2.5}$ concentrations for locations within the Development with relevant exposure are below the relevant objectives in 2029 as 2027 for all floor levels. As such, it is considered that the effect of introducing future residential and school uses to the Site is **insignificant**.

Overall Predicted Effects of the Development

Using professional judgement, based on the severity of the impact discussed above and the concentrations predicted at all the sensitive receptors considered in the air quality assessment - it is considered that the effect of the Development on local NO_2, PM_{10} and $PM_{2.5}$ concentrations would be **insignificant**.

Updated Air Quality Modelling

The traffic data, background, car park emissions and model verification has been updated and presented below. All other technical information and data upon which the operational phase of the air quality assessment is based has not been updated and remains as presented in **Appendix 10.1** of the March 2022 ES.

Traffic Data

Updated traffic flow data comprising Annual Average Daily Traffic (AADT) flows, traffic composition (% HDVs – Heavy-Duty Vehicles) and speeds (in kph) were used in the model as provided by Stantec for the surrounding road network. **Table A1** presents the traffic data used within the air quality assessment.

Table A1: 24 hour AADT Data Used within the Assessment

Receptor Name	Speed (kph)	Direction	Base 2019		Without Construction 2028		With Construction 2028		Without Development 2029 as 2027		With Development 2029 as 2027	
			AADT	%HDV	AADT	%HDV	AADT	%HDV	AADT	%HDV	AADT	%HDV
A316 Clifford Avenue	65	NB	17,116	2.5	18,547	2.5	18,591	2.7	18,694	2.5	18,846	2.5
	64	SB	15,123	2.8	16,387	2.8	16,431	3.0	16,517	2.8	16,811	2.8
A316 Lower Richmond Road	48	WB	13,917	4.1	15,081	4.1	15,108	4.3	15,200	4.1	15,472	4.1
	48	EB	15,685	3.7	16,997	3.7	17,024	3.8	17,131	3.7	17,388	3.7
South Circular (north of A316)	48	NB	7,708	4.7	8,352	4.7	8,363	4.8	8,418	4.7	8,504	4.6
	48	SB	9,114	4.0	9,876	4.0	9,887	4.1	9,954	4.0	10,083	3.9
South Circular (south of A316)	48	NB	10,774	4.0	11,674	4.0	11,702	4.2	11,766	4.0	11,766	4.0
	48	SB	10,025	4.1	10,863	4.1	10,890	4.4	10,949	4.1	11,035	4.1
A3003 Lower Richmond Road (Watney's Sports Ground)	44	WB	7,388	4.0	8,006	4.0	8,115	5.3	8,069	4.0	8,666	3.9
	48	EB	9,699	2.9	10,509	2.9	10,619	3.9	10,592	2.9	11,273	2.9
A3003 Lower Richmond Road (Mortlake Green)	39	WB	7,357	3.6	7,972	3.6	7,972	3.6	8,035	3.6	8,679	3.6
	45	EB	2,418	10.7	2,620	10.7	2,620	10.7	2,641	10.7	3,310	9.2
Williams Lane	41	NB	203	0.0	219	0.0	219	0.0	221	0.0	559	1.8
	42	SB	248	1.2	268	1.2	268	1.2	270	1.2	568	2.2

Receptor Name	Speed (kph)	Direction	Base 2019		Without Construction 2028		With Construction 2028		Without Development 2029 as 2027		With Development 2029 as 2027	
			AADT	%HDV	AADT	%HDV	AADT	%HDV	AADT	%HDV	AADT	%HDV
Mortlake High Street	51	WB	7,455	13.7	8,078	13.7	8,107	13.6	8,142	13.7	8,584	13.1
	33	EB	10,014	13.7	10,851	13.7	10,879	13.7	10,936	13.7	11,400	13.3
The Terrace (west of Barnes Bridge Station)	46	WB	8,607	8.7	9,326	8.7	9,355	8.6	9,400	8.7	9,749	8.5
	47	EB	9,267	8.7	10,042	8.7	10,071	8.7	10,121	8.7	10,552	8.5
White Hart Lane (south of Mortlake High Street)	39	NB	2,250	8.3	2,438	8.3	2,438	8.3	2,457	8.3	2,549	8.1
	41	SB	2,757	7.5	2,988	7.5	2,988	7.5	3,012	7.5	3,045	7.5
Sheen Lane (north of Level Crossing)	48	NB	2321	1.8	2515	1.8	2515	1.8	2535	1.8	2737	1.9
	48	SB	2327	2.6	2522	2.6	2522	2.6	2542	2.6	2747	2.7
Sheen Lane (south of Level Crossing)	48	NB	2321	1.8	2515	1.8	2515	1.8	2535	1.8	2737	1.9
	48	SB	2327	2.6	2522	2.6	2522	2.6	2542	2.6	2747	2.7
Sheen Lane (south of South Circular)	33	NB	2,394	3.3	2,594	3.3	2,594	3.3	2,615	3.3	2,743	3.3
	34	SB	2,605	5.1	2,823	5.1	2,823	5.1	2,845	5.1	2,965	5.0
South Circular Road (west of Sheen Lane)	43	WB	9,531	8.7	10,328	8.7	10,356	9.0	10,410	8.7	10,410	8.7
	44	EB	9,205	8.1	9,974	8.1	10,002	8.3	10,053	8.1	10,053	8.1

Underground Car Parks

11.1. The Development includes two basement car parks with extraction systems – one located in Development Area 1 and one in Development Area 2. The technical specification of the ventilation strategy for Development Area 2 was indicative at the time of writing. As such the basement extraction system for Development Area 2 has not been considered in the air quality assessment. The final extraction system would be designed in accordance with best practice design and appropriate regulations and be secured by a suitably worded planning condition. As such, it is anticipated that the car park extraction system used for Development Area 1 would not give rise to significant environmental effects and has not been considered further at this stage.

11.2. The Development Area 1 basement car park would provide 408 car park spaces, 43 motorcycle spaces and 1,426 cycle spaces. The Development Area 1 basement car park would be ventilated by 11 louvres located across Development Area 1.

11.3. The dimensions of the Development Area 1 car park and the exhaust vents was obtained from plans provided by Hoare Lea, and Stantec provided the number of vehicle trips predicted to use the car parks. To account for at least 20% of the car park spaces having active electric charging point infrastructure, the vehicle trips for the Development Area 1 car park were reduced by 20% (from 1,856 to 1,485). The diurnal variation in traffic flows, as presented in **Figure A1** of **Appendix 10.1** of the **March 2022 ES**, was used for the dispersion modelling of the car park emissions.

11.4. The characteristic petrol and diesel vehicle split for 2027, in addition to the indicative cold start emissions of NO_X and PM_{10} for 2027, were collated from the London Vehicle Fleet Composition Projections (Base 2013 revised in 2018) from the National Atmospheric Emission Inventory (NAEI) website[1].

11.5. The average distance travelled within the car park was calculated at 200m – a worst case assumption. The distance travelled was used to calculate the total 2027 car park emissions (in g/s) for both NO_X and PM_{10} as detailed in Row Q and Row U of **Table A2**. The emissions were then apportioned to the vent, and then divided by the volume of the source to get emissions in the $g/m^3/s$.

[1] Emission factors for transport - NAEI, UK (beis.gov.uk)

Table A2: Pollutant Emission for the Development Area 1 Car Park

ID	Input Parameter		Calculation	Development Area 1
A	2027 % Vehicle Split		Petrol	43.7
B			Diesel	33.6
C	Cold Start Emissions (g/trip)	NO_X	Petrol	0.047
D			Diesel	0.322
E		PM_{10}	Diesel	0.022
F	Car Park Trips (per day)			1,485
G	Car Park Trips (per hour)			61.9
H	Cold start trips (per day)		**F**/2	743
I	NO_X (petrol) Cold Start Trips (per second)		**A*****H**/86400	0.0039
J	NO_X (diesel) Cold Start Trips (per second)		**B*****H**/86400	0.00281
K	PM_{10} (diesel) Cold Start Trips (per second)			0.00281
L	NO_X Cold Start Emissions (g/s)		(**I*****C**)+(**J*****D**)	0.0011
M	PM_{10} Cold Start Emissions (g/s)		**K*****E**	0.00006
N	Average Distance Travelled (km)			0.2
P	NO_X Emission Rate (from ADMS Roads) (assuming 5kph) (g/km/s)			0.00008
Q	NO_X Emission Rate (g/s)		**N*****P**	0.0000153
R	NO_X Emission Rate with Cold Starts (g/s)		**Q**+**L**	0.00112
S	PM_{10} Emission Rate (from ADMS Roads) (assuming 5kph) (g/km/s)			0.00001
T	PM_{10} Emission Rate (g/s)		**N*****S**	0.0000010
U	PM_{10} Emission Rate with Cold Starts (g/s)		**T**+**M**	0.00006

11.6. The car park emissions were added as an industrial volume source in the ADMS-Roads model. The size of the louvres and emission rates from west to east across the Development Area 1 are presented in **Table A3**.

Table A3: Emission Rates for the Proposed Car Park Vent

Car Park Louvre	Dimensions (m^3)	Release Height (m)	Emission Rate ($g/m^3/s$)		
			NO_X	PM_{10}	$PM_{2.5}$
1	2	0	5.09822E-05	2.93575E-06	2.97027E-06
2	7.1	0	1.43612E-05	8.26972E-07	8.36696E-07
3	11.1	0	9.18599E-06	5.28964E-07	5.35184E-07
4	6	0	1.69941E-05	9.78584E-07	9.9009E-07
5	6.5	0	1.56868E-05	9.03308E-07	9.13929E-07
6	6.5	0	1.56868E-05	9.03308E-07	9.13929E-07
7	13	0	7.84342E-06	4.51654E-07	4.56965E-07
8	5.2	0	1.96085E-05	1.12913E-06	1.14241E-06
9	9.2	0	1.10831E-05	6.38207E-07	6.45711E-07
10	5.4	0	1.88823E-05	1.08732E-06	1.1001E-06
11	9.4	0	1.08473E-05	6.24628E-07	6.31973E-07

Note: For accuracy, the changes arising from the Development have been calculated using the exact output from the ADMS models rather than the rounded numbers within Table A3.

Background Pollutant Concentrations

1.1.1 Background pollutant concentrations are pollution sources not directly considered in the dispersion modelling. Background pollutant concentrations have therefore been added to contributions from the modelled pollution sources, for each year of assessment.

1.1.2 The EHO at LBRuT requested background pollutant concentrations monitored at the Wetlands Centre, Barnes. The Wetlands Centre automatic monitor is located approximately 2.5km to the north-east from Site and is classified as a suburban monitor.

1.1.3 **Table A4** presents the most recent monitored concentrations measured at the Wetlands Centre automatic monitor.

Table A4: Measured Concentrations at the Wetlands Centre Suburban Background Automatic Monitor

Pollutant	Air Quality Strategy Objective	2015	2016	2017	2018	2019
NO_2	Annual Mean (40µg/m^3)	21	25	21	20	21
	200ug/m^3 as a 1 hour mean, not to be exceeded more than 18 times a year	0	0	0	0	0
PM_{10}	Annual Mean (40µg/m^3)	17	16	15	15	16
	50ug/m^3 as a 24 hour mean, not to be exceeded more than 35 times a year	1	3	3	0	3

Source: London Air Quality Network. Available at www.londonair.org.uk

1.1.4 **Table A4** shows all monitored pollutants at the Wetland Centre Suburban monitor were below their respective objectives in all years.

1.1.5 In addition to the monitoring data, forecast UK background concentrations of NOx, NO_2, PM_{10} and $PM_{2.5}$ are available from the Defra LAQM Support website[2] for 1x1km grid squares for assessment years between 2018 and 2030 (published in August 2020). **Table A5** presents the Defra background concentrations for the years 2019 and 2027, where applicable for the grid squares the Site, diffusion tubes for model verification, and local receptors are located within.

Table A5: Defra Background Maps in 2019 and 2027 for the Grid Squares at receptors

Pollutant	Annual Mean Concentration (µg/m^3)									
	520500, 175500(a)		519500, 175500(b)		518500, 175500(c)		519500, 176500(d)		520500, 176500(e)	
	2019	2027	2019	2027	2019	2027	2019	2027	2019	2027
NO_2	22.6	17.4	22.8	17.2	23.4	n/a	22.3	n/a	21.9	16.7
PM_{10}	17.5	16.1	17.9	16.5	17.8	n/a	17.1	n/a	16.8	16.1
$PM_{2.5}$	11.8	10.9	12.1	11.1	12.0	n/a	11.5	n/a	11.3	10.3

Notes:
(a) Representative of Diffusion Tubes CDT 51 & CDT 70, Receptors: 2,3 6-15, 21, 23, Proposed Receptors in Plots 1, 5, 6, 9, 10 12, 13, 14 and School
(b) Representative of Diffusion Tubes CDT 74 & CDT 52, Receptors: 16-20, 22, 24, 26-28
(c) Representative of Diffusion Tube CDT 18
(d) Representative of Diffusion Tube CDT 55
(e) Representative of Receptors: 1, 4, 5, Proposed Receptors in Plots 2, 3, 4, 7, 8, 9, 11, 15 - 21

1.1.6 As requested by LBRuT the monitored background concentrations at the Wetlands Centre Suburban monitor in 2019, as 21µg/m^3 for annual mean NO_2 and 16µg/m^3 for annual mean

[2] http://laqm.defra.gov.uk/

PM_{10}, were used in the assessment. The background NO_2 and PM_{10} concentrations for the opening year at the Wetlands Centre Suburban monitor, assumed to be 2027, were predicted using Defra background maps. The ratio reduction of Defra background maps from 2019 to 2027 were used to predict NO_2 and PM_{10} 2027 concentrations. In the absence of available $PM_{2.5}$ monitoring data, the Defra background maps $PM_{2.5}$ concentrations have been used

1.1.7 Background concentrations used in the assessment are presented in **Table A6**.

Table A6: Background Concentrations used within the Assessment

Pollutant	Annual Mean Concentration (µg/m³)							
	2019					2027		
	(a)	(b)	(c)	(d)	(e)	(a)	(b)	(e)
NO_2	21	21	21	21	21	16.1	15.8	16.0
PM_{10}	16	16	16	16	16	14.7	14.8	15.4
$PM_{2.5}$	11.8	12.1	12.0	11.5	11.3	10.9	11.1	10.3

Notes: The following adjustment factors were obtained from Defra Maps to calculate 2027 NO_2 and PM_{10} concentrations
Grid square (a)- adjustment factor of 0.7669 was used for NO_2, and 0.9203 was used for PM_{10}
Grid square (b)- adjustment factor of 0.7547 was used for NO_2, and 0.9232 was used for PM_{10}
Grid square (e)- adjustment factor of 0.7624 was used for NO_2, and 0.9631 was used for PM_{10}

Model Verification

Table A7 compares the modelled and equivalent measured roadside NO_2 concentrations at the diffusion tube sites.

Table A7: Annual Mean NO_2 Modelled and Monitored Concentrations

Site ID	Monitored Annual Mean NO_2 (µg/m³)	Modelled Total Annual Mean NO_2 (µg/m³)	% Difference
DT74	51.6	38.5	-25.3
DT51	30.0	25.1	-16.4
DT52	55.4	40.5	-26.8
DT18	42.3	32.0	-24.3
DT55	39.9	34.0	-14.8
DT70	41.8	28.0	-33.0

LAQM.TG(16) suggests that where there is no systematic over or under prediction at the diffusion tube results and where the majority of modelled results are within 10% of the monitored concentrations that the model verification is appropriate and no further adjustment factor is required. Given the results in **Table A7** model adjustment was undertaken.

Box 7.15 in LAQM.TG(16) indicates a method based on comparison of the road NOx contributions and calculating an adjustment factor. This requires the roadside NO_x contribution to be calculated. In addition, monitored NO_x concentrations are required, which were calculated from the annual mean NO_2 concentration at the diffusion tube site using the NO_x to NO_2 spreadsheet calculator as described above. The steps involved in the adjustment process are presented in **Table A8**.

Table A8: Model Verification Result for Adjustment NO_x Emissions (µg/m^3)

Site ID	Monitored NO_2	Monitored Road NO_x	Modelled Road NO_x	Ratio of Monitored Road Contribution NO_x/Modelled Road Contribution NO_x
DT21	51.6	73.9	38.8	1.9
DT51	30.0	18.9	8.3	2.3
DT52	55.4	85.1	43.8	1.9
DT18	42.3	48.3	23.4	2.1
DT55	39.9	42.2	27.9	1.5
DT70	41.8	47.0	14.5	3.2

Figure A1 shows the mathematical relationship between modelled and monitored roadside NOx (i.e. total NOx minus background NOx) in a scatter graph (data taken from **Table A8**), with a trendline passing through zero and its derived equation.

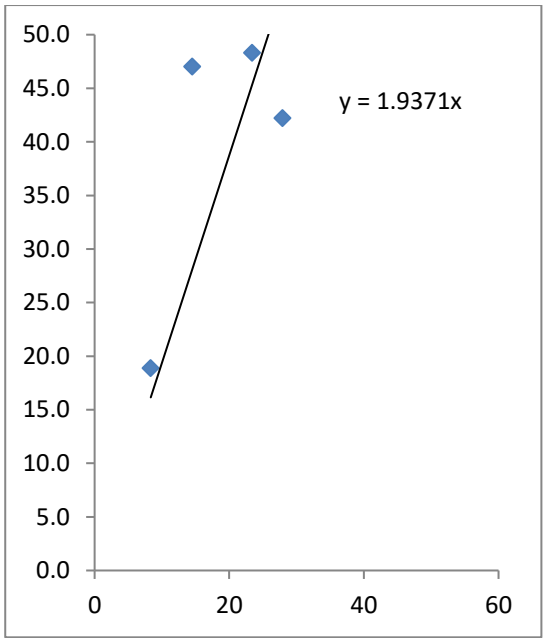

Figure A1: Unadjusted Modelled versus Monitored Annual Mean Roadside NO_x at the Monitoring Sites (µg/m^3)

Consequently, in **Table A9** the adjustment factor (1.9371) obtained from **Figure A1** is applied to the modelled NOx Roadside concentrations to obtain improved agreement between monitored and modelled annual mean NOx. This has been converted to annual mean NO_2 using the NOx:NO_2 spreadsheet calculator.

Table A9: Adjusted Annual Average NO_2 Concentrations Compared to Monitored Annual Mean NO_2 Concentrations (µg/m^3)

Site ID	Adjusted Modelled Road NO_x	Modelled Total NO_2	Monitored Total NO_2	% Difference
DT21	75.1	52.0	51.6	0.8
DT51	16.2	28.8	30.0	-4.2
DT52	84.9	55.3	55.4	-0.2
DT18	45.4	41.1	42.3	-2.7
DT55	54.1	44.5	39.9	11.5
DT70	28.1	34.1	41.8	-18.5

Statistical Analysis

To determine if the model is performing well further statistical analysis of the performance of the modelled results has been undertaken using the methodology detailed in LAQM.TG(16) Box 7.17: Methods and Formulae for Description of Model Uncertainty. This statistical analysis checks the performance of the model used and the accuracy of the results (observed vs predicted).

The methodology for the calculations is presented in LAQM.TG(16) for the following:

- Correlation Coefficient: This is used to measure the linear relationship between the predicted and observed data. A value of zero means no relationship and a value of 1 means an absolute relationship. This statistic can be particularly useful when comparing a large number of model and observed data points.
- Fractional Bias: this is used to identify if the model shows a systematic tendency to over or under predict. Values very between +2 and -2 and has an ideal value of zero. Negative values suggest a model over-prediction and positive values suggest a model under-prediction.
- Root Mean Square Error: This is used to define the average error or uncertainty of the model. The units of the Root Mean Square Error are the same as the quantities compared.

The results of the statistical calculation are presented in **Table A10**.

Table A10: Statistical Calculations of Error for the Modelled Results

Statistical Calculation	Perfect Value	Acceptable Variable Tolerance	Unadjusted Model Score	Adjusted Model Score
Correlation Coefficient	1	N/A	0.915	0.913
Fractional Bias	0	+2 to -2	0.29	0.10
Root Mean Square Error	0	±10%	11.8	3.8

Based on the results presented in **Table A10** it is considered that the model is performing well following adjustment. When adjusted there is no systematic over or under prediction of results and the root mean square error is within the acceptable tolerance levels, further adjustment is therefore not necessary.

Particulate Matter (PM_{10} and $PM_{2.5}$)

PM_{10} and $PM_{2.5}$ monitoring data is not available for the Site area. Therefore, the roadside modelled NOx factor of 1.9371 factor has been applied to the roadside PM_{10} and $PM_{2.5}$ modelling results.