Planning applications and air quality modelling in Newington (Dec 2021) V1.0

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1. Introduction

1. The Centre for Health Services Studies (CHSS) at The University of Kent has been commissioned by Newington Parish Council to provide an expert opinion on the impact of proposed local development on air quality and health.

2. This document examines the reliability of the air quality assessments accompanying the applications Eden Meadow (20/501475/FULL) [1], Willow Trees (20/505059/FULL) [2], School Lane (21/504028/FULL) [3], and 128 High Street (21/505722/OUT) [4].

3. This document also examines the current levels of pollution in Newington and their relation to health.

4. Of the four active planning applications for non-trivial development in Newington, each of them displays varying degrees of flaw in air quality modelling and model uncertainty which need addressing.

5. The predictions computed for each of the AQAs for these developments are inconsistent: for the same baseline locations and base year different values are predicted. This raises the valid concern of which to take as representative (if any), as well as highlighting the inherent variability and inaccuracy of modelling.

6. The AQAs provided for Eden Meadow, School Lane, and 128 High Street consider the cumulative impact of proposed and committed development to lesser or greater extents and conclude that the cumulative impact in this regard is either **“high”** or **“very high”**. The AQA for Willow Trees makes no consideration for cumulative impact and proposes no mitigation.

7. Despite high or very high cumulative impact, proposed mitigation for Eden Meadow, School Lane, and 128 High Street is vague, apart from the concrete standalone proposals for low emission boilers and EV charging spaces. Proposed mitigation for cumulative impact are simply vague suggestions with no reasoning or rationale provided as to their impact or implementation feasibility.

8. Current levels for NO_2, PM2.5, and PM10 within Newington exceed WHO guidelines for health and there are currently 68 excess annual deaths in Swale attributed to PM2.5. The developments, standalone, and cumulatively will increase air pollution and negatively impact population health.

9. The Newington AQMA has exceeded NO_2 objectives in the last reliable year measured (2019). All developments impinge upon the Newington AQMA, and are car-focused. They will not contribute towards AQMA compliance (NPPF paras 105,186).

10. Given the evidence presented herein, the planning applications should be rejected on the grounds of air quality at this time.

2. Local context

2.1. Active planning in and around Newington

11. There are four non-trivial planning applications currently under active consideration (at the time of publication) in Newington Parish, Kent. These are shown in the table Table 1 below:

Application No.	Address	Residences	Validated	AQA Ref
20/501475/FULL	Land To The Rear Of Eden Meadow, Newington, Kent, ME9 7JH	20	30/03/20	[1]
20/505059/FULL	Willow Trees, 111 High Street Newington, Sittingbourne, Kent, ME9 7JJ	20	08/01/21	[2]
21/504028/FULL	Land At School Lane, Newington, ME9 7JU	25	13/08/21	[3]
21/505722/OUT	128 High Street, Newington, Sittingbourne, Kent, ME9 7JH	46	04/11/21	[4]
TOTAL		**111**		

Table 1 - Active planning applications in Newington as of 24/11/21

12. The approximate outlines (taken from traces of respective site plans) of these developments are shown in Figure 1, relative to the local Newington AQMA.

Figure 1 - Active non-trivial developments around Newington

13. As can be seen, all of these developments are going to impinge upon the Newington AQMA.

2.2. Local authority pollutant measurement

2.3. Nearby AQMAs

14. There are three nearby AQMAs upon which any development in Newington is likely to have an impact. These are Rainham [5], Newington [6], and Keycol Hill [7], all declared for NO_2. AQMA boundaries are shown in Figure 2. Note that the Rainham AQMA extends to the east beyond the map boundary further into Rainham.

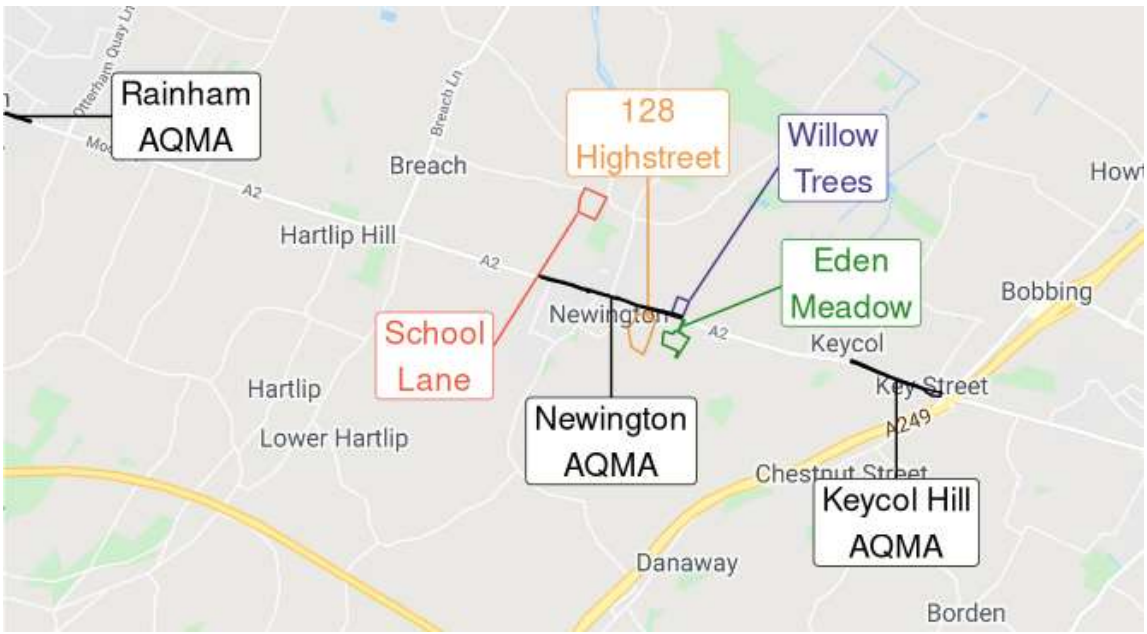

Figure 2 - AQMAs within and nearby to Newington, and relative to proposed development.

2.4. Local authority NO2 measurement

15. Figure 3 shows Swale Borough Council's (SBC) 2019 annually averaged, and bias corrected measurements for NO_2 for a number of locations within the Newington AQMA. This is taken directly from SBC's 2020 Annual Status Report [8].

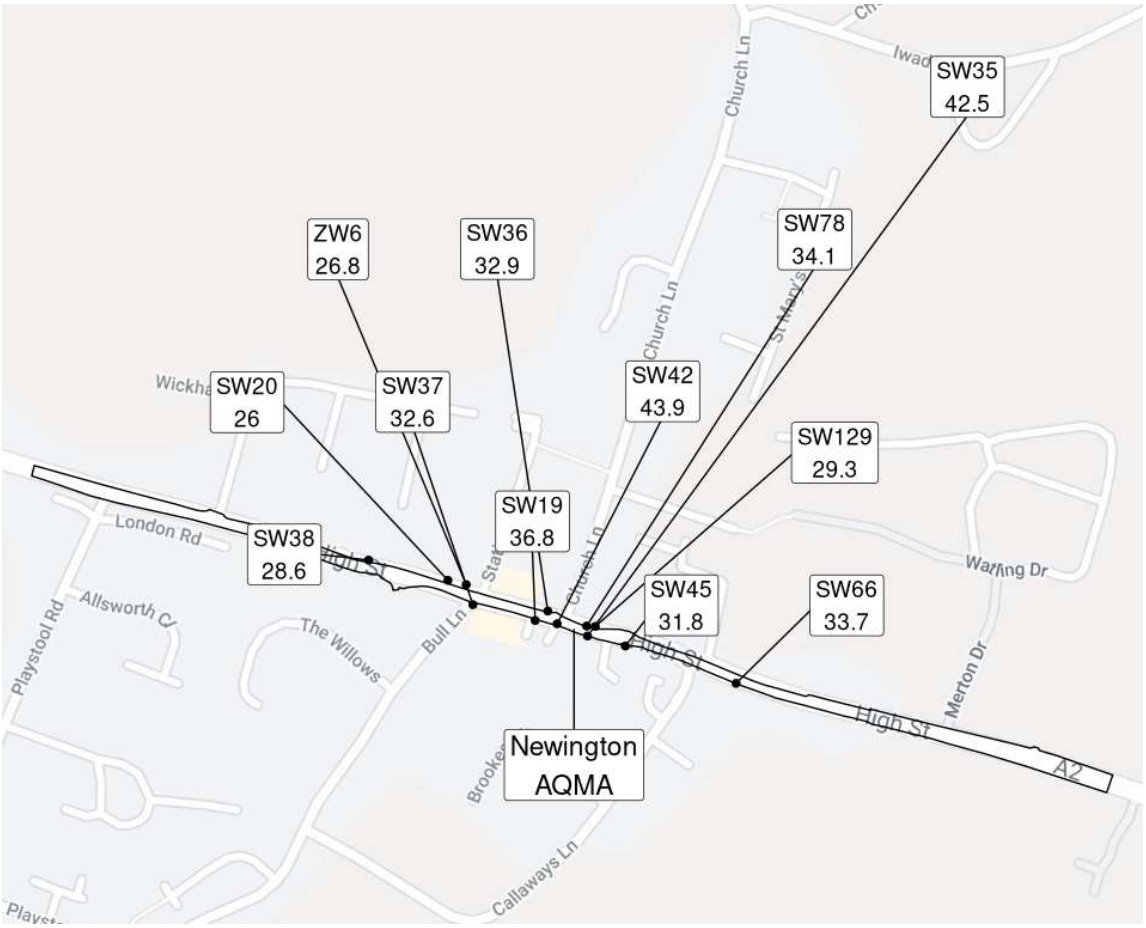

Figure 3 - Swale Borough Council NO_2 annual averages (µg/m^3) for 2019 inside the Newington AQMA.

16. As can be seen, the NO_2 levels are generally high and two sites (SW35 and SW42) have levels exceeding the objective reference of 40 µg/m^3 for NO_2.

17. Levels at all sites shown far exceed the WHO guidelines for health [9] for NO_2 of 10 µg/m^3 as an annual average and every site shown exceeds WHO's 24hr guideline for health for NO_2 of 25 µg/m^3.

2.5. Local authority automatic monitoring

18. There is one automatic monitoring site in Newington called "Swale Newington 4". This came into operation on 07/04/2021 and as such there is not yet a full year of data available. The previous site was known as "Swale Newington 3". The respective locations of these sites are shown in Figure 4.

Figure 4 - Automatic monitoring sites in Newington (historic and present)

19. Defra's data selector tool [10] was used to obtain data for these sites. The last full year of data collection for Swale Newington 3 was 2020. Swale Newington 4 has 244 days of collected data in 2021, of which 84 are of "Verified" status. Table 2 and Table 3 show selected data for each of these sites.

Year	NO2
2017	29.8
2018	29.1
2019	26.9
2020	19.6

Table 2 - Data from Swale Newington 3 through years 2017-2020. Values given are annual averages in μg/m^3.

Set	Year	NO2	PM2.5	PM10
Verified only	2021	21.8	8.6	17.2
All	2021	21.3	11.0	16.5

Table 3 - Data from Swale Newington 4 through 04/08/2021 to 07/12/2021. Values given are annual averages in μg/m^3.

20. Levels for all years at Swale Newington 3 exceeded the WHO guidelines for health [9] for NO_2 of 10 μg/m^3 and the WHO's 24hr guideline for health for NO_2 of 25 μg/m^3 for all years except 2020 which was an unusual year due to COVID-19.

21. Levels for both sets examined at Swale Newington 4 exceeded the annual WHO guidelines for health [9] for NO_2 of 10 μg/m^3.

22. For PM2.5 at Swale Newington 4, both data slices exceed the annual WHO guidelines for health [9] for PM2.5 of 5 μg/m^3.

23. For PM10 at Swale Newington 4, both data slices exceed the annual WHO guidelines for health [9] for PM10 of 15 μg/m^3.

24. It is necessary to wait for a full year of verified data to be available from Swale Newington 4 to make firm conclusion, but the indicative measurements paint a poor health picture.

2.6. Health impacts of particulate matter

25. In 2015, Public Health England estimated the impact of PM2.5 levels on early death in England [11]. They estimated that in Redbridge that 68 annual excess adult deaths arise from PM2.5 exposure with an estimated 700 years of life lost. The relevant data is replicated in Table 4 below for convenience.

Table 4 - Baseline population, modelled population-weighted mean concentrations (μg/m^3) and estimated effects on annual mortality in 2010 of anthropogenic PM2.5 air pollution.

Area	**Population age 25+ (x 10^3)**	**Deaths age 25+**	**Mean anthropogenic PM2.5 (μg/m^3)**	**Attributable fraction (%)**	**Attributable Deaths age 25+**	**Associated life-years lost**
Swale	91	1194	10.0	5.7	68	700

26. A core element of any proposed development must therefore consider how further excess deaths and years of life lost can be avoided. In particular, there should be focus on reductions in PM levels. Any increase in PM has been shown by Public Health England and the WHO to lead to a wide range of health problems and additional health and social care costs [11], [12].

3. Policy violations

3.1. National Planning Policy Framework (NPPF)

27. The National Planning Policy Framework [13] is central government's planning policy document from which all local plans must derive. It's purpose (paras 7-9) is to *"contribute to the achievement of sustainable development", "to support strong, vibrant and healthy communities",* and *" to protect and enhance our natural, built and historic environment;"*.

28. In this section a non-exhaustive list of policy violations are discussed.

3.1.1. Development is not sustainability focused and does not contribute towards AQMA compliance

29. Paragraph 105 on page 30 of the NPPF states that:

> *"Significant development should be focused on locations which are or can be made sustainable, through limiting the need to travel and offering a genuine choice of transport modes. This can help to reduce congestion and emissions, and improve air quality and public health."*

30. Paragraph 186 on page 53 of the NPPF states that:

> *"Planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and Clean Air Zones, and the cumulative impacts from individual sites in local areas. Opportunities to improve air quality or mitigate impacts should be identified, such as through traffic and travel management, and green infrastructure provision and enhancement. So far as possible these opportunities should be considered at the plan-making stage, to ensure a strategic approach and limit the need for issues to be reconsidered when determining individual applications. Planning decisions should ensure that any new development in Air Quality Management Areas and Clean Air Zones is consistent with the local air quality action plan"*

31. The A2 has several AQMAs in force. Newington has its own and is flanked to the west by Rainham AQMA, and to the east by the AQMA at Keycol Hill. The developments are car-focused and will contribute to congestion on the A2. Proposed mitigation is weak, inspecific, and does not provide any reasonable method by which the impact on the AQMA can be made sustainable or compliant.

32. The National Institute for Health and Care Excellence (NICE) recently released guidelines for outdoor air quality with respect to health (NG70) [14], the guidance is specifically targeted towards local authorities as the following bullet points, quoted verbatim under the "Who is it for?" section of the document:

- *Local authority staff working in: planning, local air quality management and public health, including environmental health*
- *Staff working in transport and highways authorities*

33. Broadly the guidelines recommend (Section 1.1.1) to:

"include air pollution in 'plan making' by all tiers of local government, in line with the Department for Communities and Local Government's National Planning Policy Framework"

34. In Section 1.1.2 the guidelines explicitly mention that when 'plan making', all levels of government should consider:

"minimising the exposure of vulnerable groups to air pollution by not siting buildings (such as schools, nurseries and care homes) in areas where pollution levels will be high"

3.2. Nice guidelines

35. The National Institute for Health and Care Excellence (NICE) recently released guidelines for outdoor air quality with respect to health (NG70) [14], the guidance is specifically targeted towards local authorities as the following bullet points, quoted verbatim under the "Who is it for?" section of the document:

- *Local authority staff working in: planning, local air quality management and public health, including environmental health*
- *Staff working in transport and highways authorities*

36. Broadly the guidelines recommend (Section 1.1.1) to:

"include air pollution in 'plan making' by all tiers of local government, in line with the Department for Communities and Local Government's National Planning Policy Framework"

3.2.1. Housing is sited in an area with high pollution levels

37. In Section 1.1.2 the NICE guidelines on outdoor air quality and health (NG70) [14] explicitly mention that when 'plan making', all levels of government should consider:

"siting living accommodation away from roadsides"

And that developments should be:

"*minimising the exposure of vulnerable groups to air pollution by not siting buildings (such as schools, nurseries and care homes) in areas where pollution levels will be high"*

38. The proposed developments are sited in an area where pollution is objectively high from the standpoint of both health effects and regulatory limits. Any pedestrian access to the A2 from residences will subject residents to high levels of pollution.

4. Evaluation of submitted air quality assessments

39. Each of the developments has an associated air quality assessment as referenced in Table 1 above. In the following sections we briefly examine them for flaws.

4.1. Eden Meadow (20/501475/FULL)

4.1.1. Consideration of committed development is incomplete

40. The AQA for Eden Meadow [1] does not include 20/505059/FULL (Willow Trees), 21/504028/FULL (School Lane), or 21/505722/OUT (128 High Street) as part of the proposed development scenario.
41. We understand that the AQA was submitted before these developments existed, but clearly the situation has changed.

4.1.2. Initial model does not meet minimum requirements for model adjustment

42. Table 12 on page 34 of the AQA for Eden Meadow by Lustre [1] compares modelled and monitored NO_2 for the base year of 2019. The table provides the differences between these values as a percentage.

43. In paragraph 5.5, Lustre cites the LAQM technical guidance [15] (LAQM-TG(16)) as justification as to why their values need adjustment, giving the reason *"Since the modeled NO_2 concentrations are outside +-10%"* and then proceed to model adjustment.

44. This misses an important gating procedure that should be applied **before** moving onto model adjustment. Box 7.17 on page 7-135 of LAQM-TG(16) [15] outlines the procedure for *"Initial Comparison of Modelled and Monitored Total NO_2 Concentrations"*. This procedure should be examined before moving onto Box 7.18 because Lustre compares NO_2 values in Table 12 and not NOx.

45. Box 7.17 outlines several conditions via the directive "If your checks confirm that:" and, relative, here requires that:

    A. *there is no systematic under or over prediction;*
    B. *predictions at sites where monitoring shows concentrations are close to the objective show good comparison; and*
    C. *the majority of results are within 25% (as a minimum - preferably within 10%) of monitored concentrations*

46. The initial model presented by Lustre in Table 12 systematically under-predicts, with an average under-prediction of 12.95 μg/m3.

47. Furthermore, 80% of the 10 sites modeled have percentage errors greater than 25% and the mean percentage error is 33.3%. Clearly then, the majority of results are not within

25%, and thus two of the conditions are not met. Box 7.17 states that if conditions are not met then:

> *"you will need to consider altering the model inputs and rerunning in order to improve the results of the comparison and verification"*

48. Thus, it is not appropriate for Lustre to proceed immediately to model adjustment via a simple scaling adjustment factor, they should rather follow the guidance and alter the model inputs **until** the majority of results are within 25%.

49. Given that the initial model isn't suitable, the final results should not be considered so.

4.1.3. Relevant verification sites have been excluded with a poor justification

50. In Table 5 on page 24 of Lustre's AQA [1] the modelled verification sites are listed. In paragraph 4.24 that follows the table, we are informed that SW45, SW37, SW38, SW36, and SW78, with the reason that:

> *"– designated kerbside sites. LAQM guidance states that kerbside sites are generally not recommended for the adjustment of road traffic modelling results as the inclusion of these sites may lead to an over-adjustment of modelling at roadside sites. The exception is where kerbside sites are relevant for exposure, for example properties fronting directly onto the road. In that case, kerbside sites may be used in the model verification process."*

51. The LAQM guidance referred to is correct and is verbatim quoted from paragraph 7.530 on page 7-132 of LAQM-TG(16) [15] . However, there are plenty of properties that front directly onto the road on the A2, and for which the location of these sites makes sense. For example, Figure 5 shows the location of SW36 and as you can see there is a property facade at number 6 highstreet just behind the tube. We can make similar arguments for other locations that have been excluded.

Figure 5 - Location of diffusion tube SW36 relative to facade of housing. Note the proximity of no. 6 Highstreet.

52. The exclusion of these sites is quite confusing, since in the AQAs for School Lane [3] and 128 High Street [4], these sites are included in the modelled verification locations. And yet, all three reports are written by Lustre, and by the same authors. It isn't clear why this discrepancy exists.

4.2. Willow Trees (20/505059/FULL)

53. The AQA for Willow Trees [2] is produced by enSAFE Consultants.

4.2.1. No consideration given for committed developments

54. The AQA for Willow Trees [2] appears to consider the proposed development in isolation, and does not consider proposed or committed developments in the area. Therefore future predictions are likely to be under-estimates.

4.2.2. Diffusion tube / Automatic inputs are not all correct and therefore the model is not

55. Ensafe provide adjusted predictions for a variety of sites for 2019 in "Table All 7" on page 41 of their AQA [2] for NO_2. They describe this as "Road NO_2 Concentration", but we have assumed they mean total NO_2 concentration (road + background) since they compare it to

the diffusion tube and automatic measurements provided by the local authority which measure everything.

56. Some of the values provided for monitored NO_2 do not match up with those provided in Table A.2 starting on page 27 of Swale's 2020 ASR [8]. These differences are outlined in Table 5

Site ID	Swale ASR	Ensafe AQA
SW129	29.3	33.3
ZW6	26.8	29.1

Table 5 - Difference between NO_2 values in Ensafe's AQA and Swale's ASR

57. Incidentally, the value provided for ZW6 is actually the 2018 value given in the Swale ASR. It isn't clear where the value of 33.3 for SW129 comes from.

58. Clearly then, the model cannot be correct if its inputs are not.

4.2.3. Initial model accuracy is poor

59. Notwithstanding the input errors outlined in the previous section, let us examine the model regardless.

60. Ensafe provides baseline predictions for a variety of sites for 2019 in "Table AII 6" on page 40 of their AQA [2] for road NOx directly. Unfortunately Ensafe doesn't provide NO_2 baseline predictions before model-adjustment so we cannot assess this for accuracy using the guidance of Box 7.17 of LAQM-TG(16) [15].

61. We can however speculate that the NO_2 conversions are likely to be broadly inline with the NOx predictions given.

62. The majority (8/12) of the modeled verification sites have errors more than 25%. The majority (10/12) under-predict monitored values, and the average under-prediction in these instances is 13.4 $\mu g/m^3$.

63. This doesn't seem like a very accurate model and it is our view that the initial model inputs should have been adjusted at this point before proceeding to model adjustment via a scaling factor.

64. It would be useful if Ensafe could provide initial model predictions in total NO_2 so that the accuracy of the initial model can be assessed against the criteria laid out in Box 7.17 of LAQM-TG(16) [15].

4.2.4. Final model accuracy is poor

65. Ensafe provide adjusted predictions for a variety of sites for 2019 in “Table All 7” on page 41 of their AQA [2] for NO_2. They describe this as “Road NO_2 Concentration”, but we have assumed they mean total NO_2 concentration (road + background) since they compare it to the diffusion tube and automatic measurements provided by the local authority which measure everything.

66. Model uncertainty can be evaluated in a variety of ways, but the section entitled “Model uncertainty” starting on page 7-137 of LAQM-TG(16) [15] provides guidance.

67. Ensafe do not provide any measures of model uncertainty in accord with this guidance, so we have calculated them. The results are provided below in Table 6:

Correlation coefficient	Root Mean Squared Error (RMSE)	Fractional bias
0.43	4.67	0.0026

Table 6 - Calculated model uncertainty statistics for Ensafe AQA.

68. The fractional bias is good.
69. The correlation coefficient shows a weak association that would be considered a “low correlation” [16].

70. The RMSE is 4.67 $\mu g/m^3$ which isn’t ideal as it should be within 10% of the objective limit of 40 $\mu g/m^3$. This is reflected in paragraph 7.554 on page 7-139 of LAQM-TG(16) [15] which ends with the sentence:

> *“Ideally an RMSE within 10% of the air quality objective would be derived, which equates to 4$\mu g/m^3$ for the annual average NO_2 objective.”*

4.3. School Lane (21/504028/FULL)

71. The AQA for School Lane [3] is written by Lustre Consulting Ltd.

4.3.1. Consideration of committed development is incomplete

72. The AQA for School Lane [3] does not include 20/505059/FULL (Willow Trees), Eden Meadow (20/501475/FULL), or 21/505722/OUT (128 High Street) as part of the proposed development scenario.

73. Both Willow Trees and Eden Meadow were submitted prior to School Lane so these could have been included. 128 High Street was submitted after School Lane so it is not unusual for this to be missing. However, it is still worth noting that it is not considered.

4.3.2. Initial model does not meet minimum requirements for model adjustment

74. Table 12 on page 33 of the AQA for School Lane [3] outlines the initial comparison of Modelled and Monitored NO_2 and provides percentage differences.

75. Out of 15 locations, 11 (73%) have an error of 25% or more. The model systematically under-predicts (every location), with an average underprediction of 11.25 $\mu g/m^3$

76. Following the same argument outlined for Eden Meadows given above under the same subsection heading *"Initial model does not meet minimum requirements for model adjustment"*, the model inputs should have been re-examined and the model re-ran.

4.3.3. Model uncertainty statistics not reported

77. It is usual to report uncertainty statistics concerning the final model, at least RMSE. This has not been done. We have therefore calculated the uncertainty of the model, with respect to the data presented in Table 12 on page 33 (Pre-adjustment) and Table 14 on page 36 (Post-adjustment) of Lustre's AQA [3]. These are shown in Table 7 below.

Lustre Dataset	Correlation Coefficient	RMSE	Fractional Bias
Pre-adjustment	0.51	12.98	0.38
Post-adjustment	0.92	3.47	0.006

Table 7 - Model uncertainty statistics for school lane

78. The pre-adjustment model has weak correlation, an RMSE in excess of 25% of the objective reference of 40 $\mu g/m^3$ and a poor fractional bias.

79. The post-adjustment model has good correlation, an RMSE below 10% of the objective reference of 40 $\mu g/m^3$, and a good rational bias.

80. As we have already outlined, the initial model should not have proceeded to adjustment via a factor without revision and re-execution.

81. Although the final model meets LAQM-TG(16) guidance, it is important that the numbers are reported, because any receptor predictions should be taken under the consideration that the mean error of the model is 3.47 $\mu g/m^3$ and therefore treated with the appropriate skepticism.

4.4. High Street (21/505722/OUT)

82. The AQA for 128 High Street [4] is written by Lustre Consulting Ltd.

4.4.1. Consideration of committed development is incomplete

83. The AQA for 128 High Street [4] does not consider School Lane (21/504028/FULL) or 20/505059/FULL (Willow Trees). The AQA does consider Eden Meadow (20/501475/FULL)

4.4.2. See arguments for School Lane (identical AQA model)

84. The AQA for 128 High Street [4] and the AQA for School Lane [3] are identical in terms of modeling. They use the same sites for inputs, and the same receptor locations for outputs. All of the arguments regarding model uncertainty and initial accuracy therefore also apply to 128 High Street.

4.5. Comparison of model predictions between submitted AQAs for baseline year 2019

85. Interestingly, since we have 4 planning applications with AQAs, and each of them uses 2019 as a baseline year, we can perform a comparison of their model predictions for the verification sites they share.

86. Eden Meadow [1], School Lane [3] , and 128 High Street [4] AQAs are all produced by Lustre Consulting Ltd, whereas the AQA for Willow Trees [2] has been produced by enSAFE Consultants Ltd.

87. There are six sites: SW19, SW20, SW35, SW42, SW66, and ZW6 that all AQAs provided 2019 baseline predictions for. As discussed earlier, the AQAs for High Street and School Lane are identical in terms of their model inputs and outputs so have been combined into one. Table 8 compares the final model 2019 baseline predictions for the shared verification locations.

SiteID	Eden Meadow AQA	Willow Trees AQA	High Street and School Lane
SW19	35.0	35.6	32.7
SW20	25.8	35.0	24.3
SW35	43.7	34.8	40.8
SW42	43.9	37.4	41.0
SW66	34.7	33.0	32.4
ZW6	24.9	35.0	23.5

Table 8 - Comparison of 2019 baseline model predictions for different AQAs

88. As you can see, they are all different, sometimes substantially so. Table 9 shows the pairwise differences (absolute magnitude) between the sets:

SiteID	Eden Meadow - Willow Trees	Eden Meadow - School Lane	Willow Trees - School Lane

SW19	0.60	2.30	2.90
SW20	9.19	1.50	10.69
SW35	8.95	2.90	6.05
SW42	6.50	2.90	3.60
SW66	1.67	2.30	0.63
ZW6	10.09	1.40	11.49
Mean	**6.17**	**2.22**	**5.89**

Table 9 - Pairwise differences between different AQA baseline 2019 predictions

89. Note we have used “School Lane” to represent “High Street and School Lane” for brevity.

90. The mean differences between the Lustre and Ensafe predictions are more than 10% of the objective limit of 40 µg/m^3 and some of the differences exceed 10µg/m^3 (25% of the objective limit)! Even the differences between the Lustre reports reach as high as 2.9 µg/m^3.

91. Consider adding on the RMSE of each of these models and imagine if the RMSE of each of these models, compounded to maximise these differences. Willow Trees has an RMSE of 4.67 µg/m^3 whereas School Lane / High Street has an RMSE of 3.47 µg/m^3.

92. Now consider site SW20 in Table 9 above. The difference between models of 10.69 µg/m^3 when accounting for the RMSE of each model, the actual difference could be 18.83 µg/m^3.

93. This highlights the absurdity of the modelling process. It is not possible to conclude that any of these models are an accurate representation of reality.

4.6. Mitigation

94. Each of the development AQAs contains a section on mitigation. The proposed mitigations are summarised in Table 10

Site	**Mitigations proposed**	
Eden Meadow, School Lane, 128 High Street	Gas boiler standard	(standalone)
	EV charging points	“
	Travel plan	(cumulative)
	Welcome pack	“
	Car club	“
	Low emission parking spots	“
	Green infrastructure	“
	Working with SBC to abate pollution	“
Willow Trees	None	

Table 10 - Proposed mitigations for each of the 4 active planning applications discussed in this report

95. A few notes are necessary. Whilst Eden Meadow, 128 High Street, and School Lane all propose EV charging points, the former two state *"1 Electric Vehicle charging point per dwelling with dedicated parking or 1 charging point per 10 spaces (unallocated parking)"* whereas the last states only "*1 Electric Vehicle charging point per dwelling with dedicated parking"*.

96. The three Lustre AQAs otherwise propose identical mitigation with minor wording differences in some instances.

97. The Lustre AQAs differentiate between the impact of the developments as a standalone impact and classifies each one as *"low/imperceptible"*, and the cumulative impact of all proposed developments included in each AQA. 128 High Street and School Lane classify the cumulative impact as *"high or very high"* whereas Eden Meadow classifies the cumulative impact as *"very high"*.

98. The AQA for Willow Trees classifies the impact of the standalone development as *"not significant"* and does not consider cumulative impact. This is a mistake, as shown by the consideration given to mitigation and impact of the other AQAs.

99. The mitigation proposals against cumulative impact are extremely weak and vague and are caveated with the introductory phrase *"the following mitigation measures could be further considered"*. No real proposals are put forth, only vague suggestions.

5. Appendix A - WHO Guidelines for health

100. In 2021 the World Health Organisation updated its air quality guidelines for health [9]. These are replicated in Table 11 below.

Pollutant	Averaging Time	Guideline Value
$PM_{2.5}$ ($\mu g/m^3$)	Annual	5
	24-hour [a]	15
PM_{10} ($\mu g/m^3$)	Annual	15
	24-hour [a]	45
O_3 ($\mu g/m^3$)	Peak season [b]	60
	8-hour [a]	100

NO_2 ($\mu g/m^3$)	Annual	10
	24-hour [a]	25
SO_2 ($\mu g/m^3$)	24-hour [a]	40
CO (mg/m^3)	24-hour [a]	4

Table 11 - WHO guidelines for pollutants, recommended levels.
[a] 99th percentile [b] Average of 8-hour mean O_3 concentration in the six consecutive highest averaging months

6. References

[1] Lustre Consulting, 'Land to the rear of eden meadows, newington. Air Quality Assessment. Revision B. 3143/MD/07/2020'. 03/21 [Online]. Available: Search SBC planning portal for 20/501475/FULL: https://pa.midkent.gov.uk/online-applications/

[2] enSAFE consultants, 'Air Quality Assessment at 111 Newington High Street, SWALE. AQ109475'. 06-Nov-2020 [Online]. Available: Search SBC planning portal for 20/505059/FULL: https://pa.midkent.gov.uk/online-applications/

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