Planning applications and air quality modelling in Newington - Gladman Addendum - V1.1

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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 is an addendum to *"Planning applications and air quality modelling in Newington (Dec 2021) V1.0"* which was previously delivered. The previous document examined 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 looks at the air quality assessment associated with the outline application Land South of London Road (22/500275/OUT) [5] submitted by Gladman Developments Ltd. In the following sections, various issues are highlighted and discussed.

2. Summary and Recommendations

4. The development is proposed in an area with a high level of air pollution and will impact an existing AQMA. Despite this, the developer's AQA does not consider cumulative impact of all committed and proposed development in the area.

5. There are large differences between the baseline predictions used for verification of the presented model, and the presented models of other contemporary developments in the area. It isn't clear what accounts for these differences and which of the reports are the more accurate. The discrepancies cast doubt however on the accuracy of all the models.

6. The baseline predictions for "existing sensitive receptors" fall very close in location in some instances to diffusion tube measurements made by SBC. In some of these instances there appear to be large differences between the measured and predicted values that point toward deficiencies in the accuracy of the model. Let it be clear we are not saying "locations that are close should always have similar values", we are saying that the values need to make sense given the context. The predictions for ESR13 and ESR9 do not make sense. The developer should share predictions for SW37 and SW130 to clear up this confusion.

7. The model should be re-executed using more diffusion tube locations for verification and without omitting SW37 and SW130. I would like to see the baseline model predictions for all of the diffusion tube locations near to the ESR locations presented as this would give a good indication of how accurate the model is and these locations should be included in verification.

8. Health effects are not considered using contemporary scientific evidence and the latest WHO guidelines. The area is extremely unhealthy in terms of air quality and will be impacted negatively by this development.

9. Due to the incomplete list of committed developments included, the cumulative impact is underestimated. Proposed mitigation is consequently non-specific and probably inadequate.

3. Cumulative impact of several proposed developments are not considered in modelling

10. In section A.15 the developer's AQA [5] cites a paragraph from the NPPF [6] which regarding planning policies and decisions asks to consider *"cumulative impacts from individual sites in local areas."*.

11. The developer's AQA considers: 17/505711: Wises Lane, Borden, Kent, 18/502190: Land north of Quinton Road, Sittingbourne, 17/500727/OUT: Manor Farm, Key Street, Sittingbourne and 18/500258/FULL: Land at Hill Farm, Bobbing, Sittingbourne.

12. The developer's AQA model however does not consider the cumulative impacts of proposed sites Willow Trees (20/505059/FULL) [2], School Lane (21/504028/FULL) [3], and 128 High Street (21/505722/OUT) [4] and several other sites which are considered by other local developments (see for example list of committed developments given in the AQA for 128 High Street (21/505722/OUT) [4]).

4. Baseline predictions appear highly irregular in some instances

13. We are unable to make a direct comparison between Wardell-Armstrong's baseline 2019 predictions and actual diffusion tube measurement sites for 2019 (except for those outlined in the verification section) because Wardell-Armstrong have chosen to use their own locations. These are outlined in Table 7 on page 12 of their AQA [5].

14. Some of the locations they have modelled are very close to the original sites, and show some anomalies, as will be shown.

15. Figure 1 compares Swale's SW37 measurements for 2019 as taken from their 2020 ASR [7] with the baseline predictions for 2019 given in the AQA for ESR9 [5].

Figure 1 - Comparison of SW37 measurement annual average NO_2 for 2019 with baseline prediction for ESR9. Image shows siteID followed by NO_2 value in brackets. Location of ESR9 is drawn approximately as it is listed as being 1m north of and 1m west of SW37. Note that ESR9 is 1.5m in the air but its location without elevation is shown in the image. All values shown are in ug/m^3. Base image Google 2022.

16. It is extremely unlikely that the prediction for ESR9 is accurate, given that it is both closer to the road than SW37 and closer to the ground (2.32m for SW37 vs 1.5m for ESR9). A difference of 15.04 ug/m^3 can be seen between the two.

17. Incidentally, the verification section of the AQA has a strange excuse for omitting SW37 from the verification dataset.

18. Figure 2 shows the AQAs baseline predictions for 2019 around Keycol Hill and compares them with the measurements from SBCs 2020 ASR.

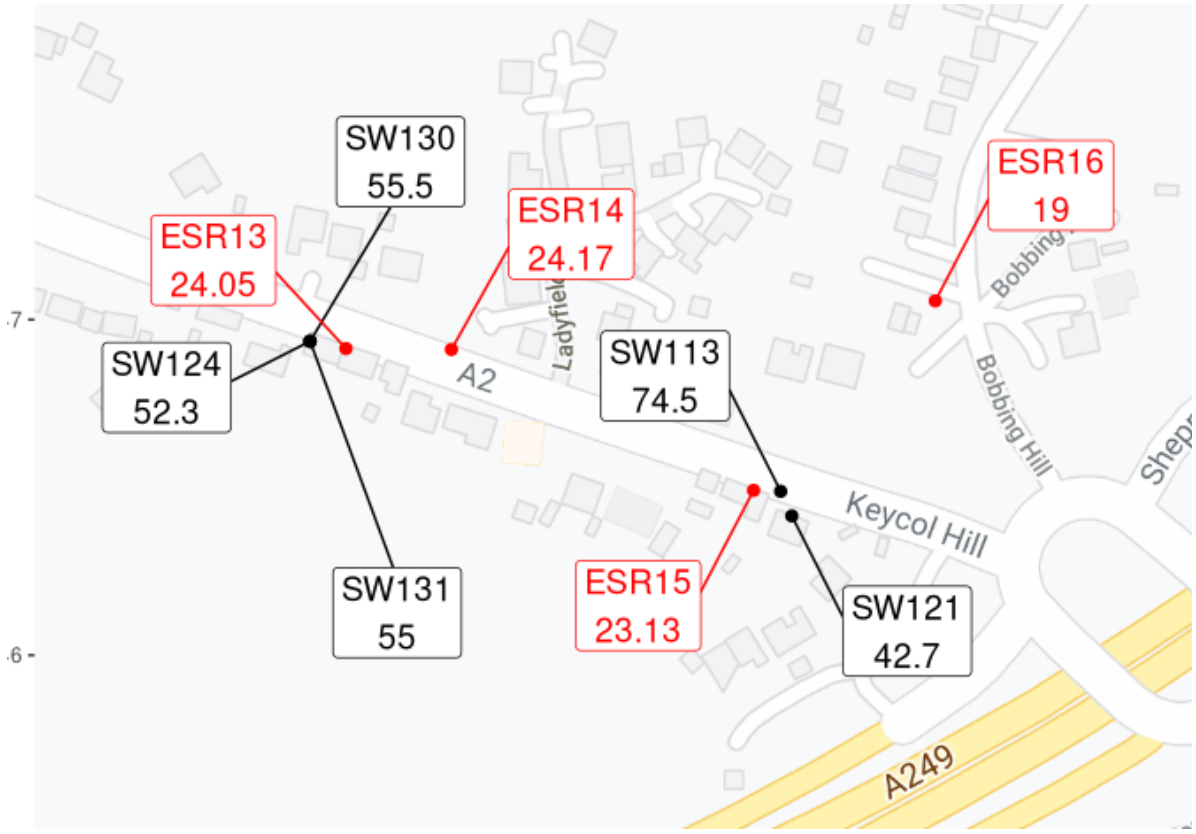

Figure 2 - Comparison of 2019 baseline predictions (ESR prefix) with actual measurements made by SBC in 2019 (SW prefix). All measurement values are annual averages provided in ug/m^3.

19. There are a few observations to make here. First of all, the location given for the DT triplicate SW130, SW124, SW131 in their 2020 ASR [7] (and online DT spreadsheet) appears to be incorrect. These tubes are attached to a downpipe on the front of 31 Keycol Hill, this can be seen in the Google Streetview shown in Figure 3.

20. In general we can observe that ESR13 seems to be out of keeping with the surrounding local authority measurements, as does ESR15.

Figure 3 - Streetview for the location of SW130 on Keycol Hill. Base image Copyright Google 2022.

21. In order to determine the locations of the tubes more precisely, we used the OS OpenMap Local product from Ordnance Survey [8] and plotted the tube locations in QGis along with the building vector and GeoTiff backdrop for the area. In Figure 4 we show the building rectangle (gold) next to which SW130 and ESR13 are located. The map has been rotated so that the building block is horizontal and dotted lines have been inserted to estimate the locations of the three houses in each of the two terrace rows the block comprises.

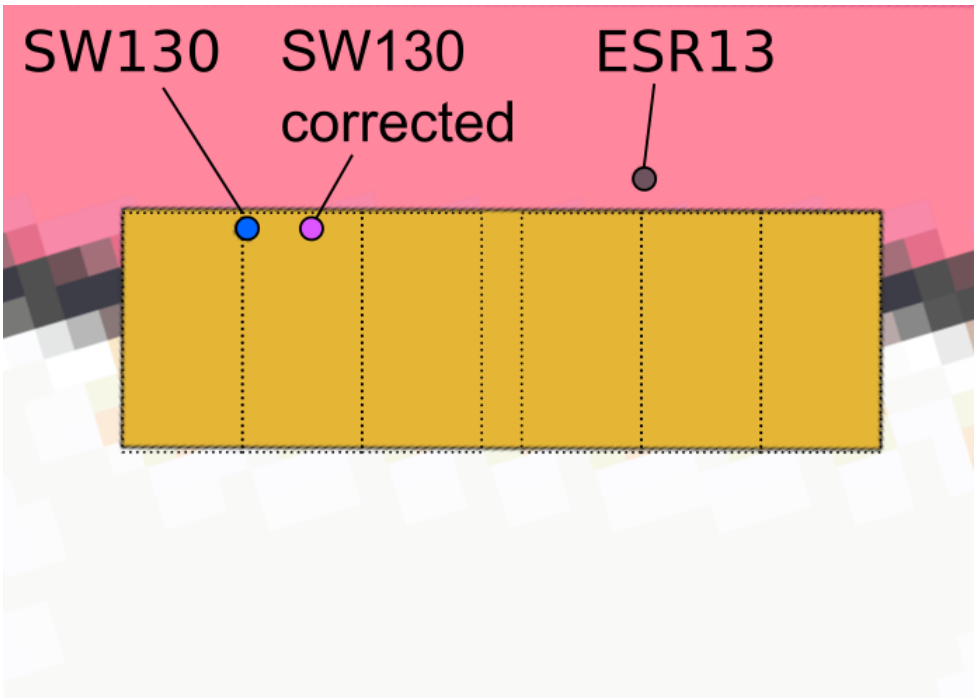

Figure 4 - Likely actual location of SW130 based on Google Streetview of site, relative to the locations of SW130 and ESR13. Contains OS data © Crown copyright and database right 2022.

22. As can be seen. It is likely that SW130's actual location is further to the east than is recorded by SBC. However, on Google Streetview we can see the actual tubes, so the location is certain.

23. Figure 5 compares the 2019 measurements made by SBC at SW130 with the 2019 baseline prediction for ESR13 in Streetview using Figure 4 to estimate the location of ESR13 on the image.

Figure 5 - 2019 baseline predictions for ESR13 compared against actual measurements made at SW130 by SBC. All values are 2019 annual averages shown in ug/m^3. Image Copyright Google 2022.

24. It is highly unlikely that the predicted value of ESR13 is anywhere near correct given that the difference with SW130 is 31.45 ug/m^3! The two locations front onto the same road, are approximately equidistant from the road, and have the same backdrop of a two-storey house, and are separated by only a few metres as shown.

5. Verification data is incorrectly labelled

25. Section C.18 onwards of the developer's AQA [5] provides information regarding model verification. Their Table C7 and Table C8 supposedly provide the adjusted model predictions for various tube locations. However, both Tables C7 and C8 contain entries for

SW6, SW66, SW45, and SW35 but with different values for the “observed value” which cannot possibly be true since these values should not change.

26. It appears that the entries for SW6, SW66, SW45, and SW35 in Table C8 are actually supposed to correspond to DT01, DT15, DT16, and DT01 again if we match up the observed values with those already stated. Thus DT01 is doubly entered and all the entries in Table C8 are wrongly labelled. This makes it a little confusing

6. SW37 omitted from verification dataset for no sensible reason

27. In paragraph C.23 of the developer’s AQA, concerning verification data, it is stated that:

    “Diffusion tube SW37 is located along High Street, Newington, however, it has not been included in the model verification process as it is located in close proximity to a junction for which complete rod traffic data was unavailable”

28. Note that in the section above we pointed out how ESR9 is very unlikely to have a correct baseline prediction, based on where it lies relative to SW37 and the value of SW37. This might explain why the ESR9 baseline prediction is so poor, since SW37 was not included in verification.

29. The justification for omitting SW37 stated above is quite odd. The implication appears to be that SW37 was omitted because it might be difficult to make an accurate prediction due to a lack of “rod (sic) traffic”. The entire point of verification is to see how well the model performs on known datapoints, thus it makes no sense to omit SW37 for the stated reason.

30. If it were to make sense, we would have to conclude that the modelled points are also inaccurate in that area.

7. Comparison of baseline with other local AQAs shows large discrepancies

1. Since we have 5 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.

2. 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.

3. There are six sites: SW19, SW20, SW35, SW42, SW66, and ZW6 that all AQAs provided 2019 baseline predictions for. 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	This AQA	Eden Meadow AQA	Willow Trees AQA	High Street and School Lane
SW19	36.37	35.0	35.6	32.7
SW20	21.33	25.8	35.0	24.3
SW35	43.51	43.7	34.8	40.8
SW42	44.42	43.9	37.4	41.0
SW66	34.18	34.7	33.0	32.4
ZW6	20.95	24.9	35.0	23.5

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

4. Table 1 shows the absolute differences between the 2019 predictions of this AQA compared to the predictions of other local AQAs for other local developments.

SiteID	Eden Meadow AQA	Willow Trees AQA	High Street and School Lane	Mean discrepancy	Maximum discrepancy
SW19	1.37	0.77	3.67	1.94	3.67
SW20	4.47	13.67	2.97	7.04	13.67
SW35	0.19	8.71	2.71	3.87	8.71
SW42	0.52	7.02	3.42	3.65	7.02
SW66	0.52	1.18	1.78	1.16	1.78
ZW6	3.95	14.05	2.55	6.85	14.05

Table 1 - Discrepancies expressed as absolute differences between 2019 baseline predictions of this AQA with other local AQAs that make 2019 predictions for the same sites.

5. Given the enormous discrepancies (upto 14.05 ug/m^3) in baseline predictions, it isn't clear which, if any should be considered the more accurate.

8. True health impacts are neglected

6. All predicted values for the development exceed WHO guidelines for health (See Appendix A) for NO_2 and PM2.5. This is however, not even mentioned, and the outdated objective limits are instead used as a proxy for health impact.

7. The development contributes negatively to an already unhealthy environment.

9. Mitigation proposals are non-specific

8. Section 5.2.19 of the developer's AQA claims that the impact of the development will be "negligible" and thus don't propose any specific mitigation advice. They do state that:

   "... mitigation measures will assist in reducing any potential impact and general best practice measures in relation to air quality could be implemented. SBC's Technical Guidance stipulates these should include Electric Vehicle charging points and low NOx boilers as a minimum. Additional measures outlined in the guidance could include a green travel plan or a bike/e-bike hire scheme."

9. As indicated in the AQAs for other local developments, where a larger number of proposed and committed sites were considered, the cumulative impact was considered high or very high (see para 6.6 of the AQA for 128 High Street (21/505722/OUT) [4].)

10. Given the likelihood of significant cumulative impact, mitigation proposed should be specific and actionable.

10. Appendix A - WHO Guidelines for health

31. 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

11. 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/

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[3] Lustre Consulting, ‘School Lane, Newington. Air Quality Assessment’. 07/21 [Online]. Available: Search SBC planning portal for 21/504028/FULL: https://pa.midkent.gov.uk/online-applications/

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