

Town and Country Planning Act 1990 - Section 77

Town and Country Planning (Inquiries Procedure) (England) Rules 2000

Norwich Cycling Campaign

Proof of Evidence

Air Quality

PoE-CYC/001

Prepared by the Centre for Health Services Studies, 12/11/2019,
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Site	Anglia Square including land and buildings to the north and west
Appeal by	Weston Homes Ltd
PINS reference	APP/G2625/V/19/3225505
LPA reference	18/00330/F

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1. Summary

1. The Centre for Health Services Studies at the University of Kent has been commissioned by Norwich Cycling Campaign to provide an independent assessment of air quality in relation to planning for the proposed development by Weston Homes Plc at Anglia Square in Norwich (Application no 18/00330/F).
2. This document has been prepared by Professor Stephen Peckham and Dr Ashley Mills. Stephen is Professor of Health Policy and Director of the University of Kent's Centre for Health Services Studies and Professor of Health Policy at the London School of Hygiene and Tropical Medicine. He has been working with local residents groups, Parish Councils and voluntary groups on air quality issues in Kent and Essex to undertake air quality monitoring and support submissions to planning consultations.
3. Dr Ashley Mills has a doctorate in Systems Engineering and has 16 years of experience of mathematical modeling of complex physical systems and statistical analysis of them.
4. The proposed development is wholly within an AQMA, and is not only adjacent to roads with NO₂ in excess of the objective limits, but is at a location with the highest NO₂ measurements in the whole of the AMQA. NO₂ is also likely to breach hourly limits in this location. This is not an appropriate location for housing.
5. Despite pollution already being above objective limits, the development is predicted to increase pollution further, which is contrary to the government's objective to reduce pollution and Norwich City Council's statutory obligations in this regard. The development will canyonise Edward Street, increasing pollution in the worst area.
6. Norwich City Council conflates the unmet statutory obligations with its public health obligations by assuming that objective pollution limits represent thresholds for safe exposure, despite overwhelming medical evidence to the contrary. This leads it to disregard the fact that harmful levels of pollution exposure occur even in the best scenarios and locations.
7. The Public Health Department have already raised these concerns, and public health is a concern for planning applications according to guidance issued by DEFRA, NICE, the NPPF, Public Health England, and the IAQM. The meeting of air quality directives alone does not ensure full compliance with the NPPF or EIA regulations.

8. Modeling of air quality by the developer does not fall within DEFRA guidance for accuracy, and has an RMSE of 10 ug/m³ which is 25% of the objective limit for NO₂. This is not acceptable for a development in an area which already has pollution in excess of the objective limits.
9. There is a lack of effective mitigation proposed, and the proposal to add vegetation buffers might actually worsen the situation by creating street canyons.
10. For the project to be acceptable, the housing density would have to be scaled back considerably to enable a 3m grass border adjacent to the road and a 10m woodland border beyond this around the whole proposal, both to protect pedestrians from canyon creation, and to protect residents from surrounding pollution. The entire development should be car-free.

2. Public Health

2.1. Context

11. Local authorities are required under part IV of the Environment Act 1995 [1] to assess their compliance to the national AQS objectives by engaging in Local Air Quality Management (LAQM). This requires them to identify areas of concern, known as Air Quality Management Areas (AQMA), that either exceed or are likely to exceed national limits for PM₁₀, O₃ or NO₂. These AQMAs once identified must then be the subject of a defined Air Quality Action Plan (AQAP) whose goal is to eliminate the identified concerns.
12. The law states that both the AQMA and associated AQAPs must be regularly reviewed and the local authority must submit an Annual Status Report (ASR).
13. The National Planning Policy Framework [2] lists air quality as a direct material consideration, requires that the effects of pollution on health are considered (NPPF 180), and requires that air quality must be considered whenever there is a likely impact on an AQMA or on the observance of limit values, and a local authority should ensure that developments are consistent with its AQAP.
14. There is robust evidence linking exposure to air pollution to a variety of negative health outcomes [3], [4], and the emerging evidence base reviewed in [5] indicates that the harms attributed to air pollution may apply to a wider variety of health indicators and diseases than is currently assumed.
15. In the UK, the Committee on the Medical Effects of Air Pollutants (COMEAP), managed by Public Health England, is tasked with regularly reviewing the health effects of air

pollution [6]. The implementation of the LAQM regulations discussed above, as enacted through Defra technical guidance [7], relies heavily on NO₂ measurement. Whilst the specific effects of NO₂ are hard to untangle from co-varying pollutants such as PM mass, it is clear that annual NO₂ measurements are a marker for pollution severity and the associated severity of health effects [8].

16. It is important therefore that the air quality impact assessment methodology used by local authorities, produces outputs which reflect the actual risks to health, so that appropriate mitigation may be sought, or in the worst cases, planning refused.
17. The annual regulatory limits for NO₂, PM10, and PM2.5 in the UK (and EU) are 40 µg/m³, 40 µg/m³, and 25 µg/m³ respectively [9]. The World Health Organisation reviewed the health risks associated with key pollutants in 2005 [10] and, adopted 40 µg/m³ as a guideline for NO₂, the same as the UK limit, but adopted 10 µg/m³ for PM2.5 and 20 µg/m³ for PM10, that is half the respective UK limits for PM10 and 40% of the UK limit for PM2.5.
18. Since 2005 the research picture has changed significantly, and a 2016 comprehensive review by the Royal College of Physicians [3] concluded that:

“Neither the concentration limits set by government, nor the World Health Organisation's air quality guidelines, define levels of exposure that are entirely safe for the whole population.”

19. Fundamentally, the air quality regulatory framework in the UK does not protect population health. There are an estimated 40,000 annual deaths attributed to air pollution in the UK [3] under the current regulatory regime. However, both the NPPF (Paras 103, 181) and the Town and Country Planning (Environmental Impact Assessment) Regulations 2017 guidelines refer to the need to protect population health. Furthermore Para 202(d) of the NPPF states that development should also seek to include: “... *appropriate opportunities for avoiding and mitigating any adverse effects, and for net environmental gains*”.
20. Following the Appeals Court ruling in the summer which upheld refusal of planning permission on inadequate mitigation for air quality, planning guidance is also explicit that *“Mitigation options will need to be locationally specific, will depend on the proposed development and need to be proportionate to the likely impact.”* [11]. The meeting of air quality directives alone does not ensure full compliance with the NPPF or EIA regulations.
21. Public Health England and the National Institute for Health and Care Excellence have published guidance, which have helped to highlight the health impacts of air pollution with compelling evidence of a significant impact from both short-term roadside and longer term exposure on the burden of disease and mortality [8], [12], [13], [14], [15], [16]. Significant associations with hospital admissions for a variety of respiratory and cardiovascular diseases (including ischaemic heart disease, cerebrovascular disease

and heart failure) have been found with levels of PM below WHO limits and therefore significantly below current UK limits [17].

22. The evidence of significant adverse health impacts from low levels of poor air quality is now well established with children and older people being particularly at risk. NO₂ and low level ozone (O₃) are strongly associated with respiratory and cardiovascular diseases with the effects occurring from both short- and long-term exposure. There is strong evidence that daily (24-hour average) exposures to PM are associated with both mortality and morbidity immediately and in subsequent days. Repeated (multiple day) exposures may result in larger health effects than the effects of single days [17]. Both epidemiological and clinical studies have demonstrated that sub-daily exposures to elevated levels of PM can lead to adverse physiological changes in the respiratory and cardiovascular systems [17].
23. A recent international study concluded that an increase of 10 µg/m³ of PM₁₀ concentration compared to the previous day, was associated with increases of 0.44% in daily all-cause mortality, 0.36% in daily cardiovascular mortality, and 0.47% in daily respiratory mortality. For the same change in PM_{2.5} concentration the mortality impacts were 0.68%, 0.55%, and 0.74% respectively [18]. The associations remained significant after adjustment for other gaseous pollutants. The results showed a consistent increase in daily mortality with increasing PM concentration with the impact worse in areas of lower PM concentrations. In 2015, Public Health England estimated the impact of PM_{2.5} levels on early death in England (the data for Norfolk, including Norwich is shown in table 1). They estimated that in Norwich that 62 annual excess adult deaths arise from PM_{2.5} exposure with an estimated 720 years of life lost [14]. The relevant table is reproduced below for convenience:

Table 1: Excess mortality associated with PM

Area	Population age 25+ (x 10 ³)	Deaths age 25+	Mean anthropogenic PM _{2.5} (µg m ⁻³)*	Attributable fraction [†] (%)	Attributable deaths [‡] age 25+	Associated life-years lost [§]
Norfolk CC	618.2	8997	8.8	5.0	450	4479
Breckland	95.1	1397	8.8	5.0	70	633
Broadland	91.3	1355	8.8	5.0	68	591
Great Yarmouth	68.9	1091	8.6	4.9	53	558
King's Lynn and West Norfolk	105.2	1568	8.8	5.0	79	797
North Norfolk	78.0	1310	8.3	4.7	62	591
Norwich	92.3	1101	9.7	5.5	61	720
South Norfolk	87.3	1174	8.7	5.0	58	591

24. 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 [14], [19].

25. Current levels of Nitrogen Dioxide are above levels of 10µg/m³ that has been shown to lead to the permanent damage of children's lungs [3]. There is no local data on O₃ levels but the evidence clearly shows that levels of O₃ from 80µg/m³ in 6-8 hour period causes respiratory and cardiovascular morbidity.
26. We note that concerns were raised in the Public Health Department's comments on the development. In particular the response states: *"We are concerned that modelling of both current use and post-development use of the site indicates a number of locations which would fail to meet existing, never mind reduce current levels of, air quality standards in terms of NO₂ and also fall above current recommended WHO measures for PM₁₀. In some cases the modelling suggests NO₂ levels may exceed hourly as well as annual mean figures. These hourly exceedances represent potential risks to people who may work or shop in the area as well as pedestrians, cyclists and drivers"*

2.2. Norwich City Council has not made its 2019 ASR available to the public

27. To fulfil obligations to part IV of the Environment Act 1995 [1] local authorities are required to submit an annual status report (ASR) with regard to air quality and this is codified in section 2.5 of DEFRA policy guidance LAQM.(PG16) [20]

"Local authorities are required to submit an ASR each year and for the first year of operation of the new system, completed reports should be submitted by 30 June."

Section 2.6 states that:

"The report should also be made available to the public"

28. Norwich City Council is yet to make its 2019 ASR available to the public, and so the 2018 data (data is always a year in arrears) is not available to the public.
29. The 2019 draft of the ASR has been made available to the inquiry participants as of 27/11/2019, only a few days before the deadline for submission of proof of evidence, with the justification that Defra had not ratified it. Defra is very unlikely to challenge diffusion tube readings and calculations which use Defra tooling, so this is not a good justification for not sharing the data with inquiry participants.

2.3. Norwich City Council conflates regulatory obligations with public health obligations

30. The proposed development is in an area in breach of regulatory limits for NO₂, and which has pollution far in excess of levels harmful to health. This is not acknowledged by Norwich City Council.

31. Norwich City Council's planning officer report to the planning committee for the development [21] makes several statements that confound the objective limits for key pollutants with safe exposure levels.

32. For example in paragraph 5.18 it is stated that:

"In locations where emissions are above 60 µg/m³ exposure for a period longer than one hour would raise public health concerns."

The implication is that if levels are below 60 ug/m³ then exposure for a period longer than one hour is fine.

33. Paragraph 5.18 also states that:

"PM₁₀ was also modelled but no breach of the air quality objective for particulates PM₁₀ was predicted. "

The implication being that because there is no breach of the objective, the values do not matter.

34. Values do matter. For example if we consider Public Health England's 2014 particulate mortality report [14], 61 excess deaths are calculated as being attributable to PM_{2.5} in Norwich despite annual mean PM_{2.5} values in the city centre being less than half of the objective limits. This serves to illustrate that sub-objective values matter. This is also true of PM₁₀ [22] and NO₂ [8].

35. As established in the context for this section, the NPPF, DEFRA policy documents, Public Health England publications, NICE publications, and IAQM publications all contain guidance which factors in public health. Norwich City Council has ignored this.

3. Current and projected air quality

3.1. Local authority NO₂ monitoring

36. Figure 1 shows the Norwich City Council bias corrected and annualised diffusion tube results and automatic monitoring results for 2017 for NO₂ in ug/m³. The figure also shows the Central Norwich AQMA [23] (dark red outline), and proposed development location to the North of the AMQA (dark blue outline). Figures are taken from Norwich City Council 2018 ASR [24]

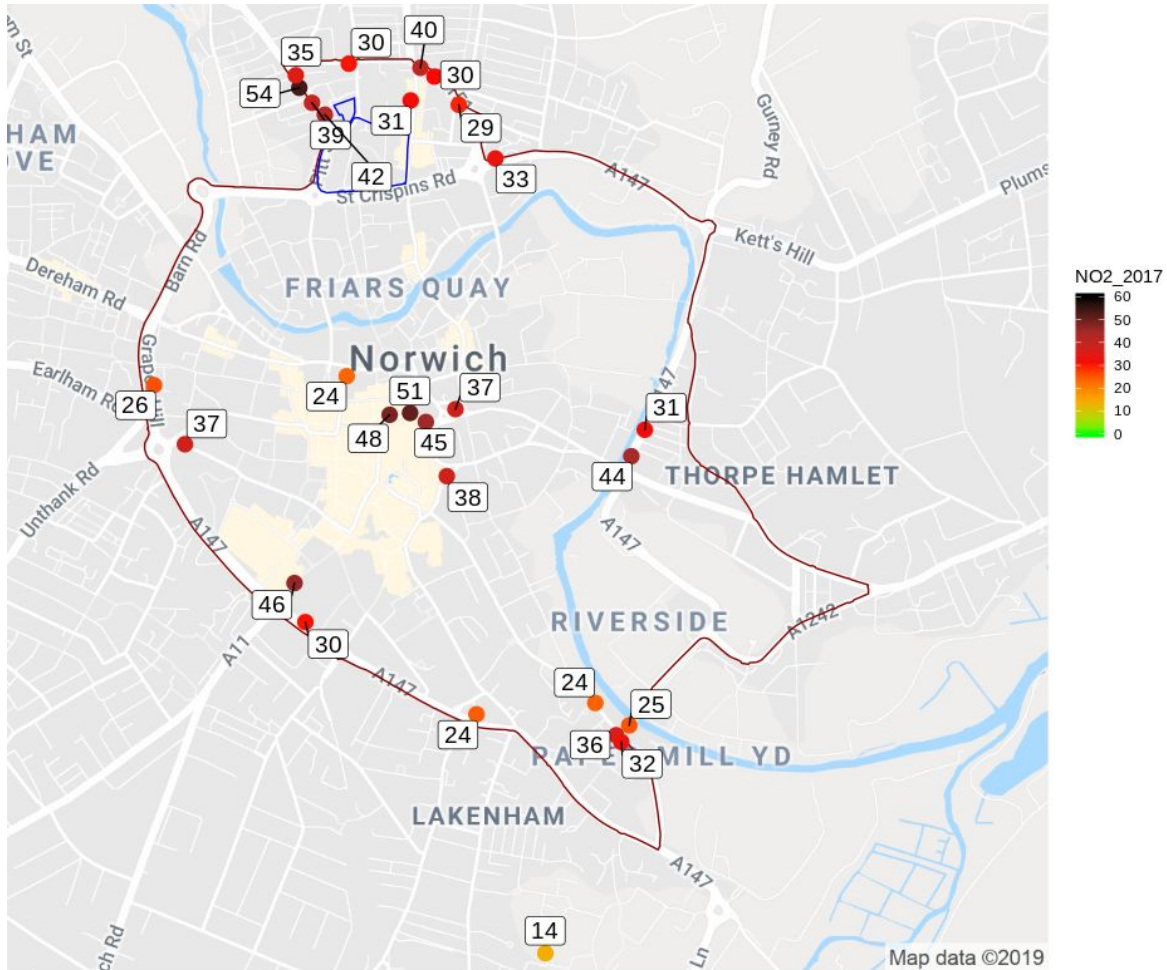


Figure 1 - Norwich City Council 2017 NO₂ measurements from diffusion tubes and automatic monitors. Results are annualised and bias corrected. The city's AQMA outline is shown in red, and the proposed development boundaries are shown in blue.

37. As the proposed development is wholly within an existing AQMA it is imperative that it makes no addition to the current pollution levels.

3.2. Developer NO₂ monitoring

38. Aether Ltd was commissioned by Weston Homes Plc to produce an air quality assessment [25] for the proposed Development at Anglia Square, Norwich. As part of this assessment Aether used NO₂ diffusion tubes to establish a baseline for modeling and future pollutant level prediction. Diffusion tubes were exposed for three months and the results annualised. Figure 2 plots the measured values in the context of the development site.

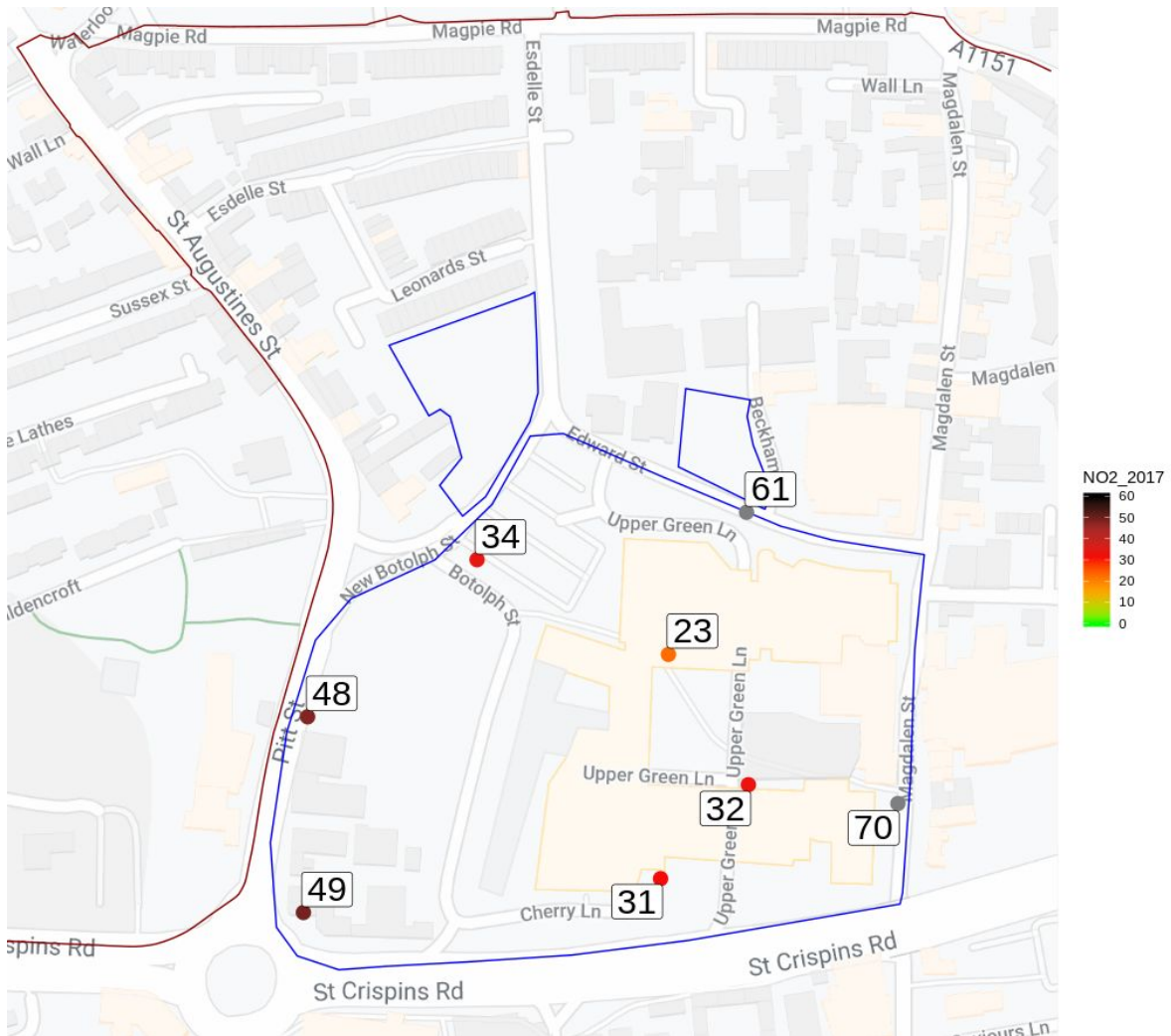


Figure 2 - Aether's three-month exposure diffusion tube modeling results in $\mu\text{g}/\text{m}^3$. The development boundaries are shown in blue, and the other boundary in dark red is the edge of the Central Norwich AQMA

39. This evidence reveals that the highest values in the entire area monitored by Norwich City Council can be found directly adjacent to the proposed development area, and these values are far in excess of objective limits.

3.3. NO2 projections modeled by Aether

40. Aether does not provide the easting and northing for the modeled receptor locations, so Figure 3 shows Aether's own figure of the development site and receptor locations (blue circles), annotated to show the baseline modeling values.

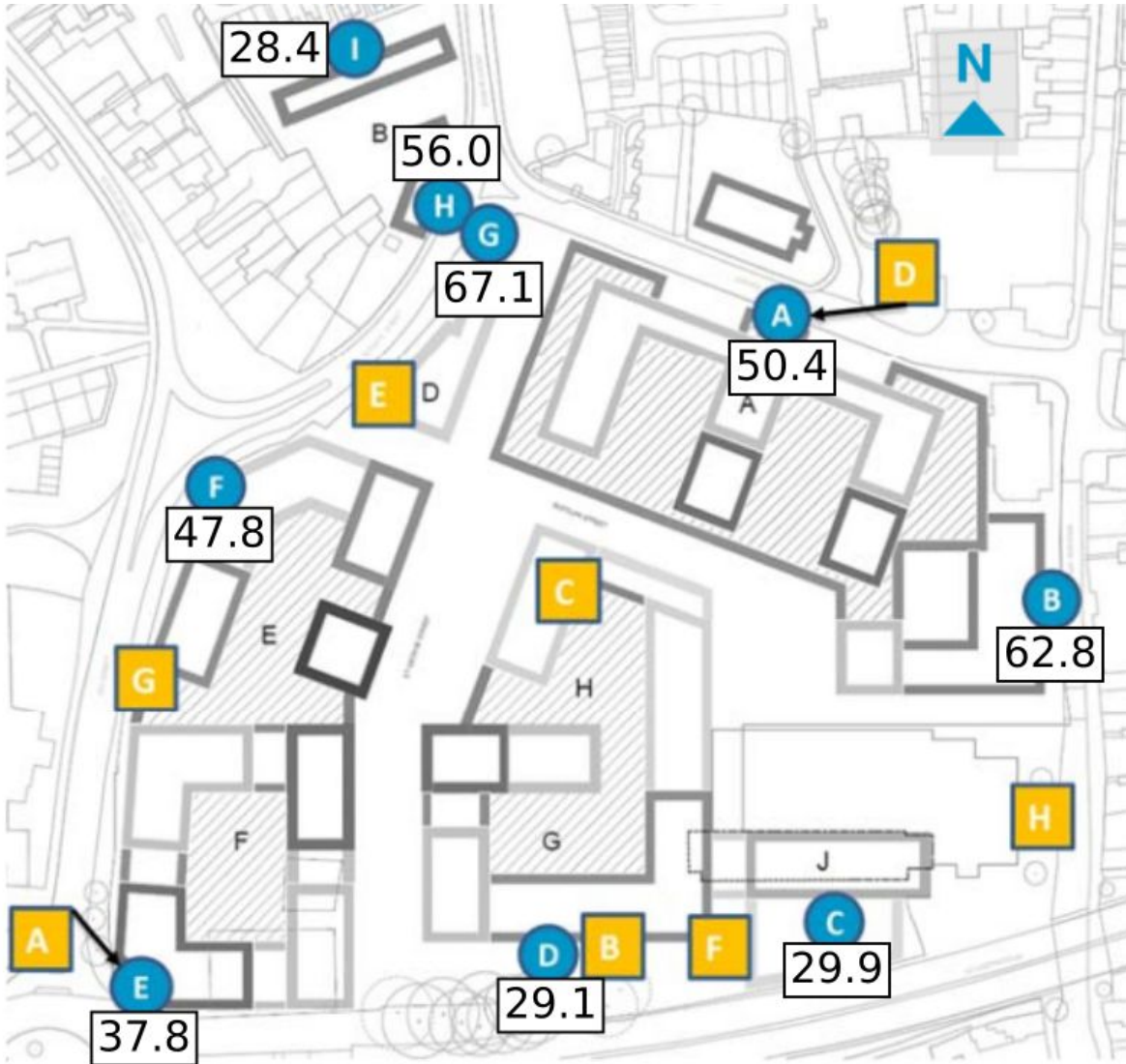


Figure 3 - Modeled NO₂ 2017 baseline according to Aether for receptors A to I, values are in ug/m³.

41. Figure 4 shows Aether's 2028 modeled values for for NO₂ across the development for the with-development scenario.

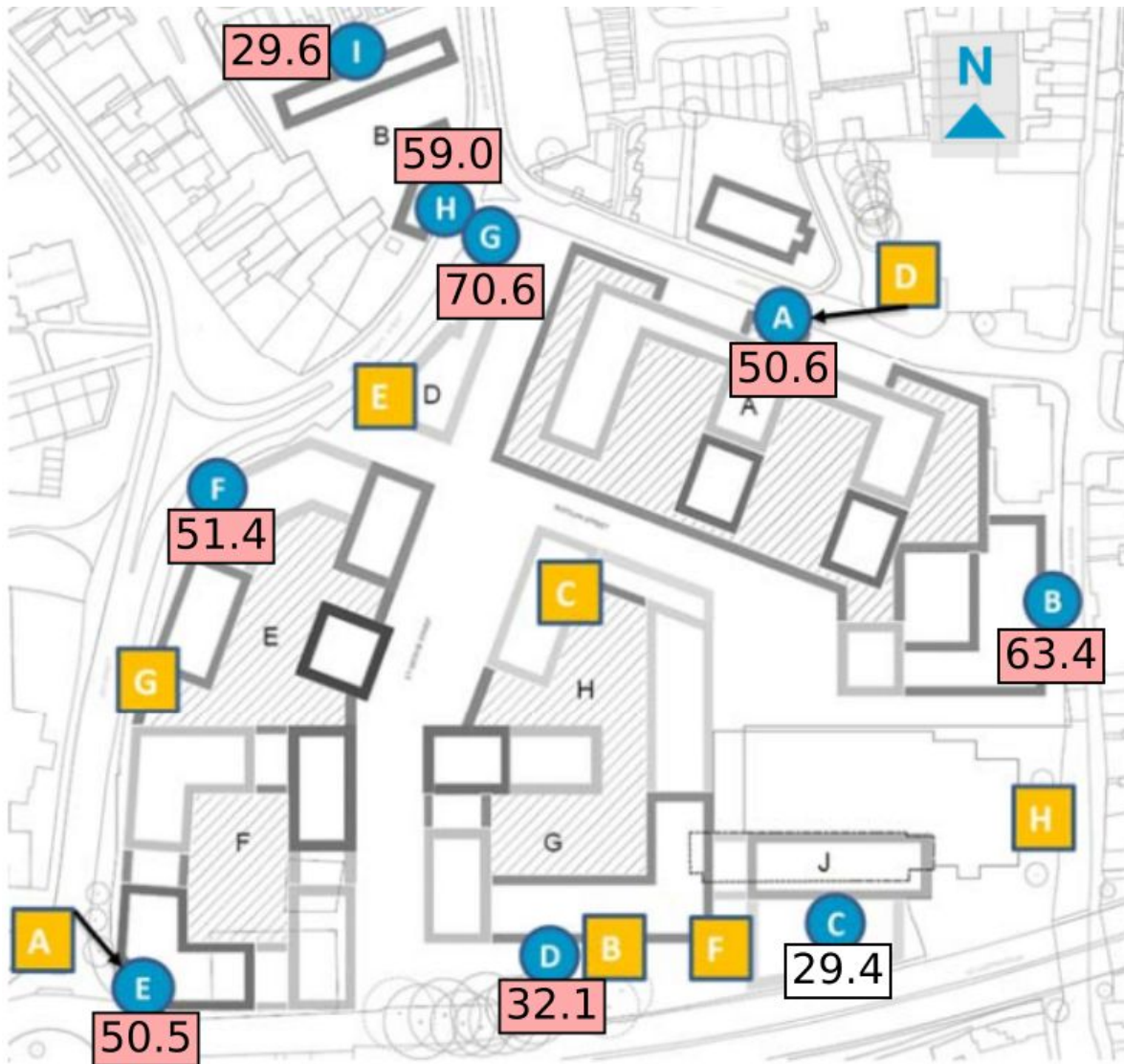


Figure 4 - Aether's NO₂ projections for 2028 (with-development scenario). Values are in ug/m³. Boxes shaded red show an increase over both the baseline and the without-development scenario.

42. All but one receptor location shows an increase over baseline and the without-development scenario for NO₂.

3.4. Comment on Norwich 2019 Draft ASR

43. Norwich City Council has made the Draft 2019 ASR available to inquiry participants at a very late stage (27/11/2019, 2-3 working days before the proof of evidence submission deadline). This itself is indicative of an obstructive pattern of behaviour.

44. From a cursory analysis, it would appear that there has been a reduction in NO₂ at all but two sites between the 2018 and 2019 ASRs (2017 and 2018 data), but it is worth noting that the bias correction factor for the diffusion tube laboratory has reduced

between the reports from 0.97 to 0.86, and this will have an impact. The table below illustrates that for years 2018 and 2019, Norwich has always chosen the lowest bias correction factor it can, and switches between using the nationally derived factor from the spreadsheet that Defra publishes, and the locally derived factor depending on which is lowest.

ASR year (data year)	National factor	Local factor	Factor chosen
2018 (2017)	0.97	1.05	National
2019 (2018)	0.92	0.86	Local

Table 2 - Comparison of national spreadsheet derived and local

45. The lower value has been chosen in each case, and this has a significant impact on the results, as illustrated in Table 3 below.

2018 data factor used	2018-2017 mean difference (ug/m3)	Number of diffusion tube locations showing an increase
0.86	-2.27	2
0.92	-0.38	3
0.97	-0.24	4

Table 3 - Sensitivity of ASR results to bias factor

46. It should be clear that choice of bias factor is very significant, and that had Norwich been consistent in choosing the nationally derived bias factor, the average reduction in NO₂ would be only 0.38 ug/m³.

47. The purpose of this section is to provide a counter to the argument that NO₂ is improving in the city, because it would appear that the improvements shown are more likely to be due to the bias factor used, rather than actual improvements. Some locations have worsened, regardless of bias factor, and crucially NO₂ at the automatic analyser CM1 has got worse.

3.5. Evaluation

48. The proposed development is within an existing AQMA. Monitoring by Aether on behalf of the developer to establish baseline pollutant values for the proposed development provides estimates for annual values for NO₂ and PM₁₀. The highest of the NO₂ measurements is more than 75% higher than the objective limit of 40 ug/m³ and this is the highest value that has ever been measured within the AQMA area.

49. Aether's projections for 2028 show that at sensitive receptor sites, pollution is set to increase with or without development, and will increase more with-development than without-development.

50. Given that under current projections, air quality standards will not be met even without any further development, there cannot be justification for increasing traffic and pollution in the area with further development. According to Norwich City Council's 2015 Air Quality Action Plan:

"Norwich City Council and Norfolk County Council are committed to improving air quality in the AQMA to bring it in line with the National Air Quality Standard for nitrogen dioxide."

The National Planning Policy Framework paragraph 181 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

"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."

Therefore it would be in violation of Norwich's air quality obligations, both with regard to the NPPF and Norwich's AQAP to approve any development that increase air pollution.

4. NICE guideline violations

51. The National Institute for Health and Care Excellence (NICE) recently released guidelines for outdoor air quality with respect to health (NG70) [12], 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*

52. 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”

53. 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”

4.1. Housing is sited in an area with pollution levels above objective limits

54. In Section 1.1.2 the NICE guidelines on outdoor air quality and health (NG70) [12] 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”

55. The proposed development is sited in an area where pollution is objectively high from the standpoint of both health effects and regulatory limits, in clear violation of the NICE guidelines.

4.2. Development creates street canyons which will trap pollution

56. The NICE guidelines explicitly mention that when ‘plan making’, all levels of government should consider (Section 1.1.2):

- *avoiding the creation of street and building configurations (such as deep street canyons) that encourage pollution to build up where people spend time*

57. The development proposes new housing to front both sides of Edward St. Edward St is currently not a street canyon as can be seen in the Google streetview in Figure 5 and the satellite view in Figure 6.



Figure 5 - Google Street View of Edward St. Copyright Google 2019.



Figure 6 - Overhead view of Edward St. Copyright Google Imagery 2019

58. Figure 7 shows the proposed development plan.

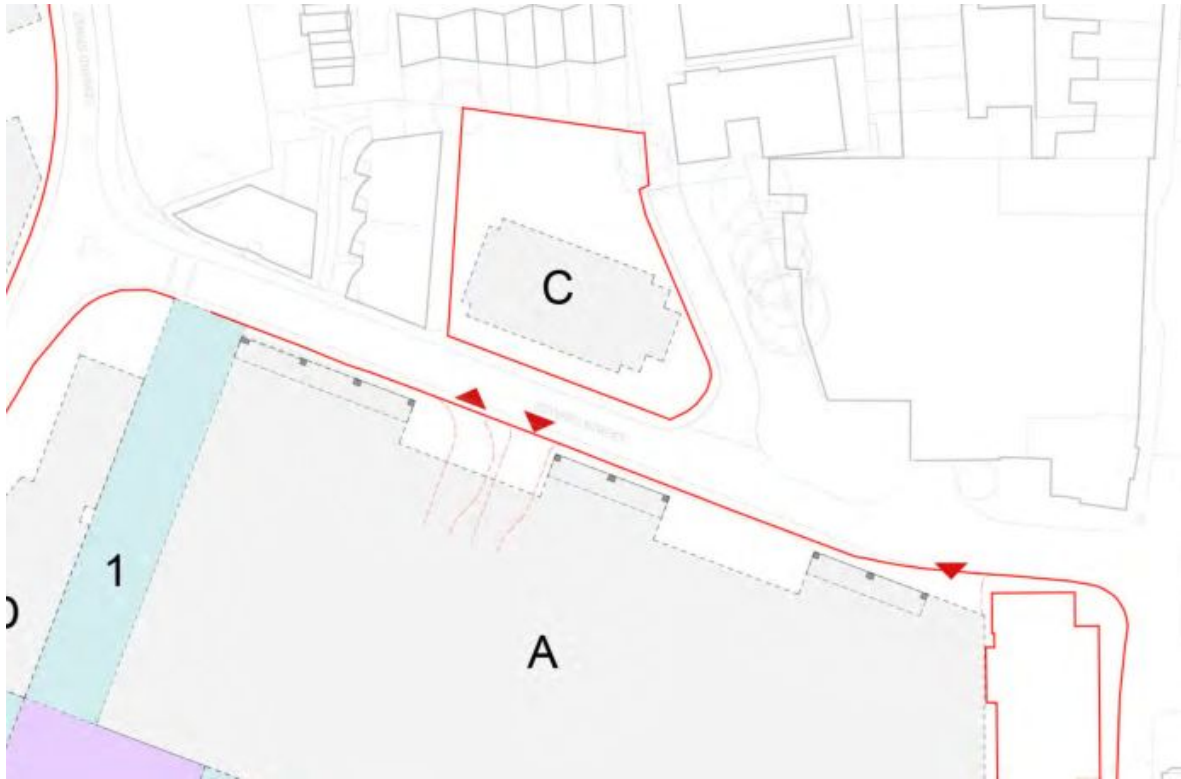


Figure 7 - Proposed location of housing development relative to Edward St

59. The block A along with the filling in with the open car park at block C, will create a new street canyon at Edward street. This can be seen clearly in the developers rendering of the situation shown in Figure 8

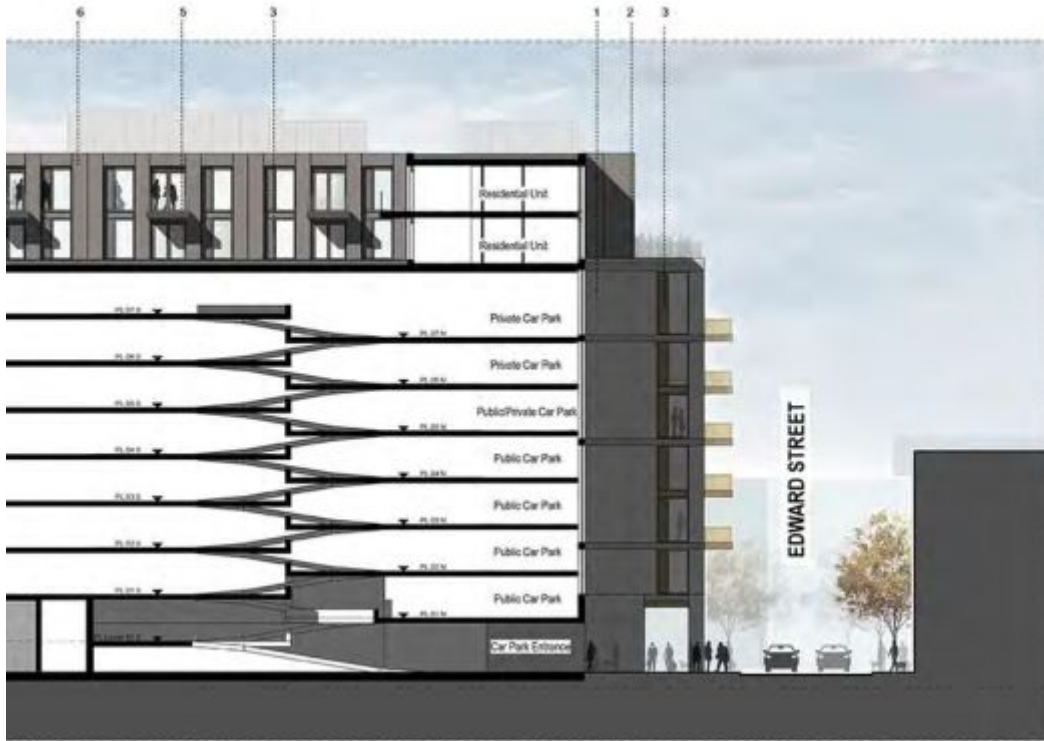


Figure 8 - Developer's render of the housing adjacent to Edward Street, clearly showing the street canyon it will create.

60. The creation of a street canyon at Edward street will make pollution even worse, bearing in mind that the developer's measurement of NO_2 at Edward Street was 61 ug/m^3 , more than 20 ug/m^3 above the objective limit.

61. A similar argument can be made for Pitt St which is currently very open as shown in Figure 9



Figure 9 - Google Streetview of Pitt St showing open profile. Copyright Google 2019.

62. After development, half of the road will have a barrier created by the housing, which will allow pollution to build up when the wind is in the right direction.

5. Air Quality Modeling flaws

5.1. Use of inappropriate modelling software

63. The modelling process adopted by Aether uses ADMS-roads which the software website states is for *“small towns or rural road networks.”* [26], yet the software company CERC provides an alternative modeling software called ADMS-urban which the website states is suitable for *“large urban areas, cities and towns.”* [27].

64. Given that the development is proposed next to major road infrastructure and is likely to have a city-wide impact on traffic flows, the more appropriate software to use would be ADMS-urban, which can take into consideration more factors and provide a more accurate output.

5.2. Aether’s model uncertainty exceeds Defra limits for acceptance, and Aether wrongly cites the Defra guidance to support its position in opposition to the wording of the guidance

65. In the section entitled “Appendix A - Model Verification” under a subtitle “RMSE”, Aether sets out the model performance in terms of Root Mean Squared Error (RMSE) and states that the calculated RMSE is 10 ug/m3.

66. They go on to argue that their model does not need to be revisited, with direct reference to Defra guidance to support their position:

“If the RMSE values are higher than $\pm 25\%$ of the objective being assessed, it is recommended that the model inputs and verification should be revisited in order to make improvements. In this case the model is being assessed against the annual mean objectives, which is 40 g/m3 for NO₂. An RMSE value of 10 $\mu\text{g}/\text{m}^3$ is obtained and therefore the model behaviour is acceptable.”

67. However, Paragraph 7.542 of Defra’s LAQM.TG(16) [7] directly contradicts this interpretation when it states:

“For example, if the model predictions are for the annual mean NO₂ objective of 40 $\mu\text{g}/\text{m}^3$, if an RMSE of 10 $\mu\text{g}/\text{m}^3$ or above is determined for a model, the local authority would be advised to revisit the model parameters and model verification. Ideally an RMSE within 10% of the air quality objective would be derived, which equates to 4 $\mu\text{g}/\text{m}^3$ for the annual average NO₂ objective.”

68. So the Defra guidance actually states that for the very case Aether gives, that the model should be revisited, yet Aether uses the same guidance to argue that they do not need to revisit the model.

69. Furthermore, the Defra guidance goes on to indicate that ideally the RMSE should be within 10%, with the clear implication that a 25% is barely acceptable.

5.3. Canyon modeling is incomplete

70. In section 2.2.1 of Aethers air quality report [25] they state that:

“Sections of Magdalen Street, St Augustines Street, Cowgate, Bull Close and Calver Street have been modelled as street canyons.”

71. Edward St does not appear in this list, but is the most important street to model since it measured the highest NO₂ reading.

6. Mitigation strategy concerns

6.1. Proposed vegetation buffers might increase particulate pollution by a factor of two and are ineffective for NO₂

72. Paragraph 521 of Norwich City Council's planning officer report to the planning committee for the development [21], cites the inclusion of buffer planting as a strategy for air pollution mitigation with regard to Pitt Street, New Botolph Street, Edward Street and Magdalen Street:

"The proposed landscape strategy proposes planting along all these road frontages and this will have a beneficial effect."

73. And goes on to say:

"On Pitt Street, New Botolph Street and Edward Street a combination of tree planting, soft buffer planting and green walls are proposed. This landscape approach provides scope for the planting to be designed and specified in a manner to assist local absorption of NO₂."

74. According to Defra's 2018 report on the impact of vegetation on urban pollution [28], under section 2 "Policy Implications", it is written that:

"For nitrogen dioxide (NO₂), vegetation is, generally speaking, of little benefit; it is not a very efficient sink."

And:

"The effects of realistic planting schemes to alleviate air quality problems by enhancing deposition to the surface with vegetation in cities are small"

75. Furthermore, vegetation does not always result in positive impacts:

"Where vegetation acts as a barrier close to a source, concentrations immediately behind the barrier owing to that source are reduced typically by a factor of about 2 relative to those which would occur without the barrier, whereas on the source side of the barrier concentrations are increased. Tree planting may also exacerbate the build-up of pollution within street canyons by reducing air-flow. "

76. In section 3.5 entitled "Trees within Street Canyons" it is written that tree planting may:

“increase concentrations by as much as a factor of 2 when there are a sufficient density of trees to substantially reduce the air flow within the canyon.”

77. So for Norwich City Council to claim that vegetation planting “*will have a beneficial effect*” is not only contradicted by Defra, but in areas where there are street canyons such as Magdalen Street (see Figure 10 for example) there is likely to be a worsening of pollution upto a factor of two if such a strategy is pursued. And the strategy is likely to be meaningless for NO₂.



Figure 10 - Google streetview of Magdalen Street illustrating the severity of the street canyon and exacerbating overhangs. Copyright Google 2019.

78. Clearly then this proposed mitigation strategy is inadequate and based on false premises.

7. References

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