Town and Country Planning Act 1990 - Section 77
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Site:	Anglia Square including land and buildings to the north and west
Appeal by:	Weston Homes PLC
PINS reference:	APP/G2625/V/19/3225505
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Norwich Cycling Campaign

Opening Statement

Air Quality

CYC1/5

28th January 2020

Prepared by Dr Andrew Boswell, Climate Emergency Planning and Policy (CEPP), Norwich
Contact: andrewboswell@fastmail.co.uk 07787127881

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20 Also looking to go beyond legal limits, the new Planning Policy Guidance on Air Quality released in November made clear that reaching limits is only the first step when it said air quality assessments should look at measures "*that could deliver improved air quality even when legally binding limits for concentrations of major air pollutants are not being breached*".

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- Second, that the AQA takes a precautionary approach. Given the health issues involved, it is only right to apply the precautionary principle. However, for legal reasons, it is also necessary to prove a clear conclusion that air quality will improve, and become legal as rapidly as possible. In particular, there cannot be optimistic assumptions, which may fail, meaning air quality will not improve as stated.

- And thirdly the AQA is lawful and compliant with the regulations and planning guidance.

6.1 Software Modelling – The Ghost in The Machine

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The quality of the outputs of such a model is determined by the quality of the inputs. Or we could say, the trustworthiness of the outputs is determined by the trustworthiness of the inputs.

Our evidence assesses the trustworthiness of the outputs of AQA V3 by scrutinising the inputs and the modelling process.

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24 It is therefore necessary to not just consider the trustworthiness of each assumption in isolation, but also to consider the overall trustworthiness of the entire modelling endeavour.

25 I now summarise some of the points that accumulate optimism through the model:

- A key input is the reference data for model calibration. This was switched between V2 and V3 from measurements from eight diffusion tubes WITHIN the development to three diffusion tubes OUTSIDE the development area.

    - The **first** issue is that more representative data was replaced with less representative data.

- The **second** issue is that a much smaller statistical sample was used. Both issues are counter to DEFRA advice, and not sound practice.

There is no doubt that the AQA V2 diffusion tube set was much closer to a good representative configuration for calibrating the model. However, even it required more tubes, particularly to look at particular issues in the development – we give an example later.

So, the existing monitoring should have been extended for a longer period, which would have naturally given *better temporal sampling*, and with addition of further diffusion tubes within the development area, *better spatial sampling*. This would have generated not just a more up-to-date data, but much more relevant, statistically safe, and therefore more valuable, data.

- The new data comes from the City Council monitoring. The **third** issue is that rather than add more relevant diffusion tube monitoring sites where development is planned, as DEFRA recommend and their own Annual Status Report says is good practice, the Council removed relevant diffusion tubes from the Anglia Square area. As well removing accuracy from the reference set, this was also a lost opportunity to resolve some of the issues in AQA V2.

- The **fourth** issue is that a bias factor is applied to the data with the assumption that it automatically makes it "good data". However, the bias factor is generated using a chemiluminescence analyser as a reference, and it may be out by up to +/-15% itself.

  If we consider a diffusion tube reading at the legal limit of 40 $\mu g/m^3$ NO2, this error from just the bias factor could be +/-6 $\mu g/m^3$ NO2. When you look at the numbers discussed, this is a significant error factor.

  The **fifth** issue is that the Council chose a locally calculated bias factor for the data, when in all previous years they had chosen a national averaged bias factor and had rejected a local factor. The bias factor, so chosen, is 13% below the average of all previous bias factors used, and causes a downward spike in the year-on-year NO2 data trend. The applicant says this is a real downward trend, but there is no reason to trust this, especially given the inherent uncertainty in using a chemiluminescence analyser for reference.

26 All these issues have generated untrustworthy, and optimistic, reference data for the software model which are transmitted into the ADMS model by the calibration, or verification, step.

27 Continuing:

- There are two existing four storey blocks at the west end of Edward Street (on the north side of the street) which face development block A which is seven storeys at this point. This should have been modelled as a street canyon, where pollutants can be trapped, and it has not been (the **sixth** issue).

- The blocks 8-22 Edward Street, and Dalymond Court, have downstairs flats with windows opening onto Edward Street. This would make them locations where the annual objective level must be met – that is less than 40 μg/m^3 NO2. They are opposite model receptor G that modelled at over 70 μg/m^3 NO2 in AQA V2 and over 55 μg/m^3 NO2 in AQA V3 with the development.

  Both the applicant and the Council appear to have paid no attention to these existing residents in all their many discussions on Air Quality. It is most surprising that the Council did not add a judiciously-placed set of diffusion tubes outside these blocks: both to get more data on the existing pollution levels, but crucially to provide more refined and representative inputs to the model verification, and for potential street canyon modelling (the **seventh** issue).

- There are other issues with the ADMS model as in section 6 of CYC1/4 rebuttal – the **eighth** issue.

28 So now we come to issues with the "Policy Applied" scenario:

- Transport is a complex policy area, and policy does fail, as well as succeed. As a result, in predicting outcomes, policy should be assessed across a spectrum covering both failure and success. An example of policy fail is that UK has policies to reduce carbon emissions from transport, but road transport emissions keep rising in recent years.

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- The applicant presents two cases which are extremes of transport policy intervention – 0% policy and 100% policy success, and the **tenth** issue is that they only consider these two extremes. They have done no sensitivity testing of the many possible outcomes that lie between these extremes.

  This is despite the applicant's consultant writing that "***there is no certainty***" in the 'policy applied' scenario succeeding (bottom of page 2, Aether rebuttal, WH8/4).

- Evidence will be provided as to why the "Policy Applied" measures input to the model are unlikely to succeed 100% (**eleventh** issue) with examples from the policy set given, and crucially how key receptors will still have the moderate adverse impacts associated with significant effects on human health.

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> *"In different circumstances, and on different evidence, an inspector might be able to assess the impact of a particular development on local air quality by taking into account the content of a national air quality plan, compliant with the Air Quality Directive, which puts specific measures in place and thus enables a clear conclusion to be reached on the effect of those measures."*

31 The evidence, which we will present in a fortnight, will show that it is **not** possible to reach that a clear, trustworthy conclusion that legal levels of air quality will be delivered with the development. This is due to the accumulated flaws in the AQA V3, each untrustworthy and optimistic in themselves, which taken in sum add up to very significant optimism. In contrast, decisions impacting human health must rely on trustworthy, precautionary data.

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The quality of the outputs of such a model is determined by the quality of the inputs. Or we could say, the trustworthiness of the outputs is determined by the trustworthiness of the inputs.

Our evidence assesses the trustworthiness of the outputs of AQA V3 by scrutinising the inputs and the modelling process.

7 DOES AQA V3 MEET SCIENTIFIC, PRECAUTIONARY AND REGULATORY SOUNDNESS?

23 A key point is that the AQA V3 model introduces a completely new set of assumptions, input data and methods. Each assumption introduces optimism which accumulates through the stages of the modelling process.

24 It is therefore necessary to not just consider the trustworthiness of each assumption in isolation, but also to consider the overall trustworthiness of the entire modelling endeavour.

25 I now summarise some of the points that accumulate optimism through the model:

- A key input is the reference data for model calibration. This was switched between V2 and V3 from measurements from eight diffusion tubes WITHIN the development to three diffusion tubes OUTSIDE the development area.

    - The **first** issue is that more representative data was replaced with less representative data.

- The **second** issue is that a much smaller statistical sample was used. Both issues are counter to DEFRA advice, and not sound practice.

There is no doubt that the AQA V2 diffusion tube set was much closer to a good representative configuration for calibrating the model. However, even it required more tubes, particularly to look at particular issues in the development – we give an example later.

So, the existing monitoring should have been extended for a longer period, which would have naturally given *better temporal sampling*, and with addition of further diffusion tubes within the development area, *better spatial sampling*. This would have generated not just a more up-to-date data, but much more relevant, statistically safe, and therefore more valuable, data.

- The new data comes from the City Council monitoring. The **third** issue is that rather than add more relevant diffusion tube monitoring sites where development is planned, as DEFRA recommend and their own Annual Status Report says is good practice, the Council removed relevant diffusion tubes from the Anglia Square area. As well removing accuracy from the reference set, this was also a lost opportunity to resolve some of the issues in AQA V2.

- The **fourth** issue is that a bias factor is applied to the data with the assumption that it automatically makes it "good data". However, the bias factor is generated using a chemiluminescence analyser as a reference, and it may be out by up to +/-15% itself.

  If we consider a diffusion tube reading at the legal limit of 40 $\mu g/m^3$ NO2, this error from just the bias factor could be +/-6 $\mu g/m^3$ NO2. When you look at the numbers discussed, this is a significant error factor.

  The **fifth** issue is that the Council chose a locally calculated bias factor for the data, when in all previous years they had chosen a national averaged bias factor and had rejected a local factor. The bias factor, so chosen, is 13% below the average of all previous bias factors used, and causes a downward spike in the year-on-year NO2 data trend. The applicant says this is a real downward trend, but there is no reason to trust this, especially given the inherent uncertainty in using a chemiluminescence analyser for reference.

26 All these issues have generated untrustworthy, and optimistic, reference data for the software model which are transmitted into the ADMS model by the calibration, or verification, step.

27 Continuing:

- There are two existing four storey blocks at the west end of Edward Street (on the north side of the street) which face development block A which is seven storeys at this point. This should have been modelled as a street canyon, where pollutants can be trapped, and it has not been (the **sixth** issue).

- The blocks 8-22 Edward Street, and Dalymond Court, have downstairs flats with windows opening onto Edward Street. This would make them locations where the annual objective level must be met – that is less than 40 μg/m^3 NO2. They are opposite model receptor G that modelled at over 70 μg/m^3 NO2 in AQA V2 and over 55 μg/m^3 NO2 in AQA V3 with the development.

  Both the applicant and the Council appear to have paid no attention to these existing residents in all their many discussions on Air Quality. It is most surprising that the Council did not add a judiciously-placed set of diffusion tubes outside these blocks: both to get more data on the existing pollution levels, but crucially to provide more refined and representative inputs to the model verification, and for potential street canyon modelling (the **seventh** issue).

- There are other issues with the ADMS model as in section 6 of CYC1/4 rebuttal – the **eighth** issue.

28 So now we come to issues with the "Policy Applied" scenario:

- Transport is a complex policy area, and policy does fail, as well as succeed. As a result, in predicting outcomes, policy should be assessed across a spectrum covering both failure and success. An example of policy fail is that UK has policies to reduce carbon emissions from transport, but road transport emissions keep rising in recent years.

  The applicant only considers the success part of the spectrum, and optimistically equates "worst case" with 0% policy outcomes. "Worst case" is air pollution getting worse, so the **ninth issue** is the unicorn assumption that things can only get better.

- The applicant presents two cases which are extremes of transport policy intervention – 0% policy and 100% policy success, and the **tenth** issue is that they only consider these two extremes. They have done no sensitivity testing of the many possible outcomes that lie between these extremes.

  This is despite the applicant's consultant writing that "***there is no certainty***" in the 'policy applied' scenario succeeding (bottom of page 2, Aether rebuttal, WH8/4).

- Evidence will be provided as to why the "Policy Applied" measures input to the model are unlikely to succeed 100% (**eleventh** issue) with examples from the policy set given, and crucially how key receptors will still have the moderate adverse impacts associated with significant effects on human health.

8 LEGAL IMPLICATIONS

29 I have laid out significant case law on the legal issues in my Proof, both the ClientEarth cases nationally and the Gladman case within the planning system.

30 In the appeal court, on Gladman, Lord Justice Lindblom said (this is para 41, page 66 of appendices CYC1/3):

> *"In different circumstances, and on different evidence, an inspector might be able to assess the impact of a particular development on local air quality by taking into account the content of a national air quality plan, compliant with the Air Quality Directive, which puts specific measures in place and thus enables a clear conclusion to be reached on the effect of those measures."*

31 The evidence, which we will present in a fortnight, will show that it is **not** possible to reach that a clear, trustworthy conclusion that legal levels of air quality will be delivered with the development. This is due to the accumulated flaws in the AQA V3, each untrustworthy and optimistic in themselves, which taken in sum add up to very significant optimism. In contrast, decisions impacting human health must rely on trustworthy, precautionary data.

32 Sir, we will show that the data before you from the Applicant and Council does not enable you to reach in Lord Justice Lindblom words "*a clear conclusion",* and therefore you are **not** in the different circumstances to which he alludes.

<END OF DOCUMENT >

Town and Country Planning Act 1990 - Section 77
Town and Country Planning (Inquiries Procedure) (England) Rules 2000

Site:	Anglia Square including land and buildings to the north and west
Appeal by:	Weston Homes PLC
PINS reference:	APP/G2625/V/19/3225505
LPA reference:	18/00330/F

Norwich Cycling Campaign

Opening Statement

Air Quality

CYC1/5

28th January 2020

Prepared by Dr Andrew Boswell, Climate Emergency Planning and Policy (CEPP), Norwich
Contact: andrewboswell@fastmail.co.uk 07787127881

Contents

1 INTRODUCTION

1 I am Dr Andrew Boswell, and I am giving the Opening statement for Norwich Cycling Campaign. So, I am covering issues from Mr Clarke, our chair, and the Centre of Health Services Studies of the University of Kent, as well as my own evidence.

I am an independent environmental consultant, and I specialise in the interface of science, numerical footprinting, the planning system, policy and law.

2 By background, after studying chemistry at Imperial College, London, I researched molecular biophysics at Oxford, being awarded a doctorate in 1981. Most of my career has been in scientific simulation and modelling. I worked in commercial software systems for designing, modelling and simulation of very large-scale silicon chips, such as microprocessors where I led a software testing group.

3 Later I moved to academic scientific computing at the University of East Anglia (UEA), here in Norwich. I recently asked my former boss, Dr Kevin Worvill for a brief statement. Dr Worvill was at UEA for 35 years and Systems Manager across the whole campus. With his permission, I quote it here:

> "*In the 1990s Dr Andrew Boswell joined the group to help set up the first parallel computing facility and take the lead in scientific computing support for the University. He has proven expertise in the analysis of complex scientific problems, particularly in the area of environmental and climate issues, and in implementing computer codes for their solution. Based on his track record I would trust his judgment on any related issues.*"

2 NORWICH CYCLING CAMPAIGN EVIDENCE

4 Tony Clarke, the chair of Norwich Cycling Campaign has submitted evidence on:

- Rights of way, and issues, for pedestrian and cycling routes to be discussed in the Transport session;
- How the Edward Street car park will affect congestion and air quality;
- Issues, including asbestos, in the demolition of Sovereign House.

5 Overall with our expert witnesses from the University of Kent, we submit that the air quality assessment is untrustworthy, and is not a safe piece of work on which to decide in favour of planning consent. I explain why now.

3 KEY ARGUMENTS

6 Up until December, the position of both the Council and Weston Homes was that the development would increase air pollutants and create '*a wider detrimental public health impact'*.

7 Both parties have now thrown away the previous air quality model and replaced it with one which introduces much more uncertainty, and optimism.

8 The new model still does not provide **trustworthy evidence** that air quality levels can ever become legal, let alone safe to public health, with the development.

9 The public health risks of the development remain as both parties originally claimed.

4 AIR POLLUTION - PUBLIC HEALTH

10 There is robust evidence that air pollution is a very serious contributor to a major public health crisis. This is worldwide with the World Health Organisation attributing 7 – 8 million early deaths to air pollution a year.

11 The primary killers are nitrogen dioxide, or NO2, and particulates, referred to as PM2.5 and PM10: pollution from diesel engines is large generator of both. PM2.5 is essentially sooty particles 20 times smaller than a human hair. They are small enough to pass into the blood system, and then virtually everywhere in the body, and also into the human foetus. Generally, it is the young, old and vulnerable who are most at risk from these air pollutants.

12 A ground-breaking report from the Royal College of Physicians in 2016 reported evidence that inhaling particulates causes around 29,000 deaths in the UK increasing to 40,000 deaths a year when nitrogen dioxide exposure was also considered. The report found the health costs in the UK amounted to more than £20billion/year. (Core Documents CD15.10 and CD15.11).

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