

Brook Cottage Consultants

Specialists in Air Quality

North Hertfordshire Local Plan 2011-2031 Preferred Options:
Air Quality Impacts

Prepared for:
Wyndley Parish Council.

November 2017

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1 Introduction

1.1 Instruction

1. Brook Cottage Consultants was instructed in October 2017 by Wymondley Parish Council to prepare a report on the air quality impacts of the draft North Hertfordshire District Council Local Plan 2011-2031 (the 'NHLP'), with a particular focus on the impacts within the Parish.

1.2 Background

2. The Local Plan 2011-2031 Proposed Submission dated October 2016 was approved by the Council's Cabinet on 27 September 2016. Public consultation on the plan was undertaken from 19 October to 30 November 2016; the full Council approved the submission of the plan for examination on 11 April 2017 and submitted it to Government on 9 June 2017. The examination of the draft NHLP is scheduled to take place over the period 13 November 2017 to 1 March 2018.
3. The Wymondley Parish Neighbourhood Planning Forum submitted representations on the local plan covering a number of matters including the impact on air quality.
4. Wymondley Parish lies between Hitchin to the north west and Stevenage to the south east. The A1(M) runs approximately north-south through the Parish. The main settlement is Little Wymondley which lies to the south east of the railway line. A smaller settlement, Great Wymondley, is a conservation area and no sites are allocated in this village.

1.3 Development Proposals

5. The proposed North Hertfordshire Local Plan includes the provision of around 13,800 homes around Stevenage. Within the Wymondley Parish a site is allocated to the south of Little Wymondley for 300 dwellings (site WY1) with an area of urban open land covering the area between WY1 and the A602.
6. In the Parishes near to Wymondley the following have been proposed;
 - Strategic housing sites:
 - 900 homes to the north of Stevenage (NS1) in Graveley Parish, close to the boundary with Wymondley Parish.
 - 600 homes in Great Ashby Parish to the north east of Stevenage
 - Local housing allocations
 - 330 homes at Roundwood in Graveley Parish (GA1).
 - 136 homes in the St Ippolyts Parish to the west of Wymondley Parish (SI1 -40 homes, SI2 -12 homes and HT2 - 84 homes)
7. Another strategic site for 3,100 homes to the west of the A1(M) and north west of Stevenage for to be safeguarded to enable future development beyond 2026. This site is to the south of Wymondley Parish

1.4 Scope of Report

8. The NHLP will result in a significant increase in road traffic over the plan period. Traffic emissions are the main source of poor air quality in the UK which has been associated with significant adverse effects on public health. This report summarises the information available on current air quality in North Hertfordshire and Stevenage, focusing on the three pollutants of most concern regarding road transport. These are nitrogen dioxide (NO₂), and particulate matter (PM₁₀ and PM_{2.5}). A glossary is provided in Annex 1 which explains what these pollutants are.
9. This report explains why a detailed air quality assessment of the draft local plan should have been undertaken to ensure that the plan is consistent with air quality legislation.

1.5 Author

10. This report has been written by Dr Claire Holman, Director of Brook Cottage Consultants. She has a Bachelor of Science degree in molecular sciences (chemistry) and a Doctorate for research into air pollution. She is a Chartered Scientist and a Chartered Environmentalist. She is also a Fellow of the Institute of Air Quality Management (IAQM) and a Fellow of the Institution of Environmental Sciences.
11. Claire has worked in the field of air quality for over 35 years. Most of her experience has been as a consultant, but she has also held several University research posts.
12. She is currently a Director of Brook Cottage Consultants Ltd, which she established in 2013, and a visiting research associate at University College London. Previously she led ENVIRON's (now part of the Ramboll Group) European air quality practice and before that she was an Equity Director at Peter Brett Associates and responsible for the air quality practice for 10 years.
13. Since November 2015 Claire has been the Chair of the Institute of Air Quality Management, and from 2012 to 2015 she was the Vice Chair of the Institute.
14. She has undertaken a large number of air quality studies ranging from assessments for planning and environmental permit applications to modelling air quality over 5,000 square kilometres in the Middle East. She has provided policy support on air quality to the Greater London Authority, the European Commission and several Asian and European Governments, as well as serving on several Environment Agency and UK Government committees.

2 Relevant Legislation and Policy

2.1 National Planning Policy Framework

16. The National Planning Policy Framework (NPPF) sets out planning policy for England. It places a general presumption in favour of sustainable development, stressing the importance of local development plans and states that the planning system has a role to play in minimising pollution. The effects, including cumulative effects, of pollution on health or amenity, and the potential sensitivity of the area or proposed development to adverse effects from pollution, should be taken into account.
17. Planning policies and decisions must reflect and where appropriate promote relevant EU obligations and statutory requirements. This includes air quality limit values
18. Local planning authorities should focus on whether the development itself is an acceptable use of the land and the impact of the use, rather than the control of processes or emissions themselves where these are subject to approval under pollution control regimes.
19. The need for compliance with statutory air quality limit values and national objectives is stressed and the presence of Air Quality Management Areas (AQMAs) must be taken into account in terms of the cumulative impacts on air quality from individual sites in local areas. New developments in AQMAs should be consistent with local air quality action plans.
20. The relevant NPPF paragraphs are as follow;
 - Paragraph 2: Planning law requires that applications for planning permission must be determined in accordance with the development plan, unless material considerations indicate otherwise. The National Planning Policy Framework must be taken into account in the preparation of local and neighbourhood plans, and is a material consideration in planning decisions. Planning policies and decisions must reflect and where appropriate promote relevant EU obligations and statutory requirements.
 - Paragraph 109: "The planning system should contribute to and enhance the national and local environment by ... preventing both new and existing development from contributing to or being put to an unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability..."
 - Paragraph 120: "To prevent unacceptable risks from pollution and land instability, planning policies and decisions should ensure that new development is appropriate for its location. The effects (including cumulative effects) of pollution on health, the natural environment or general amenity, and the potential sensitivity of the area or proposed development to adverse effects from pollution, should be taken into account. Where a site is affected by contamination or land stability issues, responsibility for securing a safe development rests with the developer and/or landowner."
 - Paragraph 124: "Planning policies should sustain compliance with and contribute towards EU limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and the cumulative impacts on air

quality from individual sites in local areas. Planning decisions should ensure that any new development in Air Quality Management Areas is consistent with the local air quality action plan.”

21. The Planning Practice Guidance¹ notes that air quality may be relevant to a planning decision when the development would:
- Significantly affect traffic
 - Introduce new point sources of air pollution
 - Expose people to existing sources of air pollution
 - Give rise to a potentially unacceptable impact during construction
 - Affect biodiversity.

2.2 Ambient Air Quality Directive

22. The Ambient Air Quality Directive (2008/50/EC) sets out a series of mandatory limit values, targets and objectives for eight pollutants for the protection of human health². It provides information on how to assess compliance and where the limits apply.
23. The EU limit values for those pollutants of most concern regarding traffic emissions are shown in Table 1 in the next section.
24. Ambient air is defined as “outdoor air in the troposphere excluding workplaces as defined by Directive 89/654/EEC where provisions concerning health and safety at work apply and to which members of the public do not have regular access”.
25. The Directive was transposed into UK legislation by the Air Quality Standards Regulation 2010.
26. The UK is divided into 43 zones for the assessment of compliance with the Directive, and North Hertfordshire lies within the Eastern zone (UK0029).

2.3 Eastern Zone Compliance

27. In 2016, the last year for which data is available, the Directive’s limit values were achieved for all pollutants and averaging periods in the Eastern zone with the exception of the annual mean nitrogen dioxide (NO₂) limit value.³ This is widely exceeded across the UK.
28. The Directive also contains a series of targets and objectives for ozone which were also achieved in the Eastern Zone.

¹ www.planningguidance.planningportal.gov.uk/blog/guidance/air-quality/when-could-air-quality-be-relevant-to-a-planning-decision/

² sulphur dioxide (SO₂), nitrogen dioxide (NO₂), carbon monoxide (CO), lead, benzene, particulate matter (PM_{2.5} and PM₁₀), and ozone (O₃).

³ Defra, 2017, Air Pollution in the UK 2016, Compliance Assessment Summary. <https://uk-air.defra.gov.uk/library/annualreport/index>

29. Directive (2004/107/EC) (known as the fourth daughter directive) sets a series of non-mandatory targets for four metals (arsenic, cadmium, mercury, nickel) and polycyclic aromatic hydrocarbons (PAHs). The Eastern zone also complied with these targets in 2016.

2.4 The Environment Act 1995

30. The Environment Act (Part IV) requires local authorities to review and assess the quality of air within their boundaries. This has become known as Local Air Quality Management (LAQM), and statutory technical guidance (LAQM.TG16) is provided to help local authorities undertake their duties under this Act.
31. A series of air quality objectives have been set in the Air Quality (England) Regulation 2000 and the Air Quality (England) (Amendment) Regulations 2002. Local authorities are required to identify whether the objectives have been, or will be, achieved at relevant locations, by the applicable date. If the objectives are not achieved, the authority must declare an Air Quality Management Area (AQMA) and should prepare an action plan. The action plan must identify appropriate measures and policies that can be introduced in order to work towards achieving the objective(s).
32. The objectives (and EU limit values) for the three main air pollutants of concern from road traffic are set out in Table 1. The objectives for NO₂ and PM₁₀ were to have been achieved by 2005 and 2004 respectively, and continue to apply in all future years thereafter. The PM_{2.5} objective is to be achieved by 2020.

Table 1: Air Quality Limit Values and Objectives for NO₂, PM₁₀ and PM_{2.5}

Pollutant	Time Period	Limit Value/Objective	Notes
Nitrogen Dioxide (NO ₂)	1-hour Mean	200 µg/m ³	Not to be exceeded more than 18 times a year Objective to be achieved in 2005 Limit value in 2010
	Annual Mean	40 µg/m ³	Compliance dates as above
Fine Particles (PM ₁₀)	24-hour Mean	50 µg/m ³	Not to be exceeded more than 35 times a year Objective to be achieved by 2004 Limit value in
	Annual Mean	40 µg/m ³	Compliance dates as above
Fine Particles (PM _{2.5})	Annual Mean	25 µg/m ³	English objective to be achieved by 2020 Stage 1 EU limit value to be achieved by 1 January 2015
		20 µg/m ³	Stage 2 EU limit value to be achieved by 1 January 2020

33. It should be noted that local authorities in England have a flexible role in working towards reducing emissions and concentrations of PM_{2.5} and the objective, is not in the Air

Quality(England) Regulations. There is no requirement for local authorities to assess it, although they are encouraged to do so.

34. The objectives apply at locations where members of the public are likely to be regularly present and exposed over the averaging period of the objective. Examples of where the annual mean objectives should apply are provided in LAQM.TG16 and include the building facades of residential properties, schools, hospitals. The 24-hour objective for PM₁₀ is considered to apply at the same locations as the annual mean objectives, as well as in gardens of residential properties and at hotels.
35. The 1-hour objective for NO₂ also applies wherever members of the public might regularly spend 1-hour or more, including outdoor eating locations, pavements of busy shopping streets, car parks and bus stations which are not fully enclosed. The 1-hour objective does not apply at kerbside sites where the public do not have regular access.

2.5 Air Quality Management Areas (AQMAs)

36. North Hertfordshire has declared two AQMAs due to high annual mean levels of NO₂, in excess of the objective. These are:
 - Payne's Park Roundabout, Hitchin on 9 January 2017
 - Stevenage Road, Hitchin on 29 June 2012.
37. The single largest source of the emissions is from cars and taxi, and it has been estimated that to meet the NO₂ objective that emission will need to reduce by about 11% along Stevenage road and up to 27% at Payne's Park. This large reduction is required whilst substantial growth in traffic is anticipated as a result of the draft local plan.
38. A draft air quality action plan for both AQMAs in Hitchin was issued for consultation in June 2017. The final document has not been published on the council's website at the time of writing this report. The draft plan outlines the action that the Council will deliver between 2017 and 2021 to improve air quality and reduce public exposure.
39. The number of AQMAs in England declared due to high NO₂ levels is increasing not declining, with 10% more NO₂ AQMAs in July 2017³ than August 2015⁴. This is despite:
 - the deadlines for achieving the objective was 12 years ago;
 - the deadline for the EU limit value was 7 years ago; and
 - the Local Air Quality Management regime has been in place for over 20 years.
40. The NHDC air quality action n includes a number of measures including:
 - to improve freight and delivery management,
 - vehicle efficiency,
 - promoting alternatives to car use and low emission transport,
 - traffic management.

⁴ Defra, 2015, Air Pollution in the UK 2014

41. These are similar measures to those that have been included in many local authority air quality action plans. They have not been proved to be effective elsewhere⁵ as reflected in the widespread exceedence of the NO₂ limit across the UK and the increasing number of AQMAs.
42. No AQMAs have been declared in Stevenage.

2.6 World Health Organization (WHO) Guidelines

43. The WHO air quality guidelines values for NO₂ are numerically the same as those in the EU and English standards, but do not allow any exceedence of the guideline value for short term exposure.
 - 1- hour – 200 µg/m³
 - Annual average – 40 µg/m³
44. A WHO review of the evidence of the health effects identified that health effect occur below these levels¹⁰ and, as a consequence WHO has started a review of these guideline values. Long term effects on childhood lung development have been identified at significantly lower levels.
45. There has been an order of magnitude more research reported into the health effects of particulate matter than NO₂, much of it published in the years since the EU limit values were set in 1999 for NO₂ and PM₁₀ and 2008 for PM_{2.5}. The English objectives were set out 2000 and 2007 respectively.
46. For PM₁₀ and PM_{2.5} the WHO guideline values are more stringent than the EU and UK standards. The annual mean guideline values are:
 - PM₁₀ – 20 µg/m³
 - PM_{2.5} – 10 µg/m³
47. For exposure over 24-hours the WHO guideline values are:
 - PM₁₀ – 50 µg/m³
 - PM_{2.5} – 25 µg/m³
48. It should be noted that the WHO guidelines do not allow any exceedences of the short term values, unlike the EU and English standards.

⁵ Air Quality Consultants and Aether, 2013, Review of Effectiveness of Local Authority Action Plans and Future Policy Options for LAQM, Report prepared for Defra. https://uk-air.defra.gov.uk/library/reports?report_id=760

3 Health Effects of Traffic Pollutants

49. The main source of air pollution is the emission of nitrogen oxides (NO_x) and particulate matter from road transport. NO_x emissions from vehicles are mainly in the form of nitric oxide (NO) and to a lesser extent nitrogen dioxide (NO₂). However the NO is rapidly converted to NO₂ once it is released from the exhaust, and it is the NO₂ that is considered to have the adverse health effects.
50. A number of different metrics are used to assess the concentration of particulate matter in the air. The air quality legislation sets standards for the concentration (based on the mass) of two overlapping sizes of particles: PM₁₀ and PM_{2.5}. These are generally defined as particles with a diameter of less than ten micrometres⁶ (µm) or less than 2.5 µm respectively (see glossary for the strict definition). These particles are emitted from the exhaust of vehicles and as a result of abrasion of the tyres and brakes. Additional particulate matter is emitted due to wearing of road surfaces and the resuspension of dust deposited on roads.
51. According to the Government "*Poor air quality is the largest environmental risk to public health in the UK*" *Error! Bookmark not defined.*
52. There have been various estimates of the health effect of air pollution in recent years. These include 29,000 premature deaths due to exposure to particulate matter, and 23,000 due to exposure to for NO₂.⁷ There may be an overlap between the health effects of these two pollutants as they come from the same sources, and separating the effect is technically difficult. The Royal College of Physicians has estimated that air pollution causes about 40,000 deaths each year.⁸
53. Air pollution is known to have more severe effects on particularly sensitive groups of the population, including the elderly, children and people already suffering from pre-existing health conditions such as respiratory and cardiovascular conditions.⁹
54. A very wide range of health effects have been associated with air pollution. Long term exposure to PM_{2.5} can reduce life expectancy by several months to a few years from respiratory and cardiovascular diseases. Short term exposure to PM_{2.5} over a few hours to a few weeks can cause respiratory effects such as wheezing, coughing and exacerbation of asthma and chronic bronchitis. It can trigger cardio vascular disease related mortality and non-fatal events including myocardial ischemia, myocardial infarctions and strokes⁷.

⁶ One micrometre (µm) is a 1000th of a millimetre(mm) and is invisible to the naked eye.

⁷ Defra, Public Health England, Local Government Association, 2017, Air Quality: a Briefing for Directors of Public Health. <https://laqm.defra.gov.uk/assets/63091defraairqualityguide9web.pdf>

⁸ Royal College of Physicians and Royal College of Paediatrics and child Health, Every breath we take - The lifelong impact of air pollution. <https://www.rcplondon.ac.uk/projects/outputs/every-breath-we-take-lifelong-impact-air-pollution>

⁹ World Health Organization, 'Review of evidence on health aspects of air pollution – REVIHAAP Project', 2013 http://www.euro.who.int/__data/assets/pdf_file/0004/193108/REVIHAAP-Final-technical-report-finalversion.p

55. There is also emerging evidence of links between long term PM_{2.5} exposure and the health of the central nervous system, the progression of Alzheimer's and Parkinson's diseases, developmental outcomes in children, and such reproductive health outcomes as low birth weight, as well as other chronic conditions such as diabetes⁷.
56. Short term exposure to high concentrations of NO₂ can lead to coughing, production of mucus, and shortness of breath. Long term exposure can reduce lung development, increasing respiratory infections in each childhood and effecting lung function into adulthood.⁷
57. Although limits are in place to protect human health it is recognised that there are no absolutely safe levels of particulate matter. Any improvements in air quality will have positive health consequences.
58. Recent advice from Defra, Public Health England and the Local Government Association to local authority Directors of Public Health states that "*Negative health impacts have been found well below current EU & UK limits*" and "*the absence of an Air Quality Management Area does not mean that there is no public health problem from air pollution*".⁷
59. Those who spend more time in highly polluted locations will be affected more. Since air pollution levels are typically as high or higher within vehicles compared to outside, this is likely to include not only those who live and work near busy roads, but also those who have a long commute or drive for a living.

4 Air Quality in North Hertfordshire

4.1 North Hertfordshire Air Quality Status Report ¹⁰

60. The Council measures concentrations of NO₂, PM₁₀ and PM_{2.5} using automatic instruments along Stevenage Road in the Payne's Park AQMA in Hitchin. It also measures NO₂ using passive diffusion tubes at 39 other locations in Hitchin, Royston and Baldock.
61. In 2017 the English annual mean air quality objective for NO₂ was exceeded at the automatic monitoring site and seven diffusion tube monitoring locations. All of these locations were within one of the two Hitchin AQMAs.
62. According to the Council's Air Quality Status Reports NO₂ levels have been reducing, but it should be noted that determining trends requires long term data, a minimum of five years, preferably considerably longer. This is because there are a number of other factors that can affect measured concentrations including the weather (which in turn affects both dispersion of emissions and the use of private cars), road works and traffic diversions. As a consequence that can be significant year to year variation in air quality.
63. Air quality is below the health based limits set by Government across the majority of the District, but there remain two areas in Hitchin where the health limits are exceeded. These are the air Quality Management areas at Stevenage Road and in the vicinity of Payne's Park. The primary source of the pollution is the exhaust emissions from road vehicles moving through these areas.
64. The Status Report notes that:
- many vehicles using North Hertfordshire's roads do not begin or end their journeys within the District
 - housing growth in and around North Hertfordshire is likely to impact upon the levels of road traffic.
 - The road network within North Hertfordshire is managed either by Hertfordshire County Council (HCC) or Highways England not the district Council.
 - Local air pollution has a direct public health impact and Hertfordshire County Council Public Health has a significant public health protection remit in Hertfordshire.
65. The biggest challenge facing the management of local air quality in North Hertfordshire is, according to the Status Report, population growth and the associated demand for housing. The need to accommodate approximately 15,000 new homes in North Hertfordshire by 2031 will result in increased road traffic and increase pressure on already congested areas.

¹⁰ <https://www.north-herts.gov.uk/home/environmental-health/pollution/air-quality/air-quality-reports>

4.2 Defra's modelling for Compliance with the EU Directive

66. Defra model annual mean NO₂ levels at a nominal distance of 4m from the roadside of approximately 9,000 road links across the UK for assessing compliance with the EU limit value¹¹.
67. The results of the modelling show that only one road in North Hertfordshire is predicted to exceed 40 µg/m³ in 2015. This is the A602 Stevenage Road between the B656 and Whitehall Road in Hitchin.¹² The concentration in 2015 is estimated to be 41 µg/m³.
68. No road link in Stevenage was predicted to exceed the limit value, although the A602 between Coreys Mill Lane and the A1072 was predicted to be close to the limit value (39 µg/m³)¹¹ in 2015.
69. It is acknowledged in the UK Air Quality Plan that there are significant uncertainties with Defra's model, which is accurate to ±29%.¹³
70. Future concentrations are predicted to decline rapidly and the EU limit value is anticipated to be achieved along Stevenage Road in 2017.
71. Defra's forecasts of NO₂ levels have, however, consistently over many years underestimated future air quality, always assuming that future vehicle emission standard would deliver large improvements. This has not happened in reality.
72. In the November 2016 judgement in the High Court challenge by ClientEarth of Defra's 2015 air quality plan, Mr Justice Garnham concluded¹⁴ that
 - The Secretary of State must aim to achieve compliance by the soonest date possible, that she must choose a route to that objective which reduces exposure as quickly as possible, and that she must take steps which mean meeting the value limits is not just possible, but likely;
 - that the Secretary of State fell into error in fixing on a projected compliance date of 2020 (and 2025 for London);
 - that the Secretary of State fell into error by adopting too optimistic a model for future emissions; and
 - that it would be appropriate to make a declaration that the 2015 AQP fails to comply with Article 23(1) of the Directive and Regulation 26(2) of the Air Quality Standards Regulations 2010, and an order quashing the plan.
73. In the event the judge did not quash the plan but instead ordered the Government to prepare a modified plan. This was published in July 2017.

¹¹ Air Quality Plan for nitrogen dioxide (NO₂) in UK (2017) 2017 NO₂ projections data (2015 reference year) <https://uk-air.defra.gov.uk/library/no2ten/2017-no2-projections-from-2015-data>

¹² Department of transport road census ID 78226

¹³ Defra and Department for Transport, 2017, UK Plan for tackling roadside nitrogen dioxide concentrations. Technical report, July 2017.

¹⁴ Client Earth (no 2) v Secretary of State for Environment, Food and Rural Affairs [2016] EWHC 2740.

74. The ability of the new plan to deliver the required improvements to air quality “by the soonest date possible”, however, remains uncertain as it relies on assumptions regarding the emissions performance of vehicle which have yet to reach the market.
75. There may be further litigation in the High Court regarding the legality of this most recent plan.
76. It is noteworthy that the main measure modelled during the development of the 2017 Plan is charging Clean Air Zones (CAZs), which would restrict the dirtiest vehicles for areas of poor air quality. There is little evidence on the efficacy of other traffic management measures to improve air quality.

5 North Hertfordshire's Local Plan

77. The examination documents for the assessment of the soundness of the submission NHLP are provided on North Hertfordshire District Council's website ¹⁵. These include
- ED14 North Hertfordshire District Council's Transport Strategy;
 - LP4 Draft Sustainability Appraisal;
 - LP8 Sustainability Appraisal Supplementary Paper,
 - T16 Baldock Air Quality Paper.
 - T1 Infrastructure Delivery Plan
78. No air quality assessment appears to have been undertaken to determine whether future air quality in Hitchin will be acceptable with the NDLP.
79. A short paper has been prepared in air quality in Baldock. The opening of the A505 bypass in 2006 resulted in a significant reduction in traffic through the town and improvement to air quality. The District Council, in conjunction with Hertfordshire County Council, has committed to the preparation of a Transport Strategy to sit alongside the Local Plan. This will consider how transport measures can contribute to wider objectives including air quality. This Transport Strategy, published in October 2017, is discussed below and does not adequately address air quality in Hitchin.
80. As noted earlier, the number of air quality management areas declared for nitrogen dioxide has increased by 10% in just the last two years as local authorities continue to identify new areas where there is a problem. Few have been un-declared during the 20 years of Local Air Quality Management.
81. It is only relatively recently that NHDC has realised it has an air quality problem in Hitchin, with its first AQMA being declared five years ago and its second this year.

5.1 Transport Strategy

82. The NHDC Transport Strategy supports the emerging NHPL. It is aimed at assessing the implications of the Local Plan proposals on the local transport networks, and to recommend a strategic approach to provide for transport through the Local Plan period. It does not explicitly assess the air quality impacts; it just makes general comments regarding air quality.
83. The Strategic Principles include reducing impacts "*on air quality management areas*". This, however, assumes that NHDC does not identify any other areas where there are high levels of traffic related pollutants. It would be more appropriate for the Principles to include "*reducing the impacts on air quality on human health*".
84. It places greater emphasis on more sustainable travel choices such as cycling and public transport, with a lower emphasis on highway improvements that previous strategies. This is described in the strategy as "*a focus on alternate/ 'better' ways of doing things, rather than retrospectively trying to 'fix' a series of longer standing highway issues*". This

¹⁵ <https://www.north-herts.gov.uk/home/planning/planning-policy/local-plan/local-plan-examination>

approach implies that all “*longer standing highway issues*” have been resolved; this is clearly not the case as NHDC declared an AQMA in 2017.

85. It should be noted that the promotion of a modal shift to sustainable transport is a component of virtually every air quality management plan for AQMAs declared for high levels of NO₂ over the last 20 years. However, the only robust evidence of measures that reduce air pollution and to protect public health are those that either:
- significantly reduce the volume of traffic; and/or
 - significantly reduce the emissions per vehicle kilometre driven.
86. Large reductions in emissions of nitrogen oxides (NO_x)¹⁶ are necessary to reduce NO₂ concentrations. There is a non-linear relationship between NO_x and NO₂ in the atmosphere, which means that a disproportionately large reduction in NO_x is required to reduce NO₂ to acceptable levels.
87. According to a Defra study on measures to improve air quality those that appear to offer the most potential to reduce NO₂ concentrations focus on “*reducing the demand for diesel vehicles, particularly passenger cars in the fleet, and promoting alternative fuels/technologies*”.¹⁷ These measure are not considered in the Transport Strategy, as it only explicitly considers transport not air quality. The solutions to poor air quality are often different to those for transport.
88. The Transport Strategy states that there needs to be a balance between providing new road capacity and reducing the growth of traffic in towns (paragraph 5.7). However those local authorities who have successfully reduced air pollution from traffic have typically done it by building new infrastructure or pedestrianizing hotspots. Indeed that is the experience of North Hertfordshire in Baldock.
89. A general increase in highway capacity into and through the towns is not recommended. The “*exception is where junction improvements can reduce AQMA issues without significantly increasing traffic through the town. The focus should instead be on managing the networks, smoothing flows, reducing speeds in the towns and providing better facilities for walking, cycling and buses*” (paragraph 5.9).
90. Reducing high traffic speeds to moderate speeds may be effective at reducing emissions, but high speeds are not typical in towns. Reducing speeds from moderate speeds (say 30-40 mph) to a low speed (say 20 mph) will increase emissions. This illustrates again that the Transport Strategy has failed to adequately consider air quality.
91. Modelling for the Transport Strategy indicates that the measures proposed in Hitchin result in improvements to the operation of the A602 route and around the Payne’s Park area but do cause some traffic re-routeing. There is no indication as to whether this is sufficient to resolve the air quality issue in the shortest possible time, or whether the re-routing will mean that these improvements will not be implemented..

¹⁶ Nitrogen oxides (NO_x) is a mixture of nitric oxide (NO) and nitrogen dioxide (NO₂); emissions are mainly in the form of NO which is rapidly converted to NO₂ in the atmosphere, but this is limited by the amount of ozone present. The evidence shows that NO₂, but not NO, has adverse health effects.

¹⁷ Defra / Ricardo, 2016, Exploring and appraising proposed measures to tackle air quality, Project summary report for contract AQ0959. https://uk-air.defra.gov.uk/library/reports?report_id=901

92. The Strategy suggests that the aim is to reduce through traffic through the Payne's Park and A602/B656 junctions. However it notes that "*options are difficult*" (Table 5.2)
93. The Strategy also notes that rat running is evident in the Wymondley area and modelling the impacts of the NHLP on the A1(M) shows that changing the junction priority in Great Wymondley attracts more traffic on these routes and exacerbates the problems (paragraph 6.10).
94. A relief road to the south-west of Hitchin is mooted in the Strategy (see Figure 5.4). One of its benefits would be "*Air quality and congestion delays would be reduced, particularly in the AQMA's*" (sic). This probably means that air pollution would be reduced and that air quality would improve.
95. Three broad options are presented:
 - The existing schemes for traffic capacity improvements at the key junctions;
 - Local 'mini-relief roads' which either use existing upgraded highways or new smaller links to take through traffic away from particular areas or junctions; and
 - A 'traditional' 'bypass' or set of bypasses on the town periphery, which will remove through traffic from one or all directions.
96. The last option is effectively dismissed as "*additional road capacity could also have detrimental impacts as noted above, and any options will require capital investment, which in the current economic climate is most likely be part-funded by new development, leading to more traffic*". Yet this is the best solution for air quality.
97. In summary, the Transport Strategy recognises the existence of the AQMAs in Hitchin yet provides no clear solution to the problem.
98. In addition to the air quality problems identified in Hitchin that are associated with elevated nitrogen dioxide (NO₂), levels of NO₂ are close to exceeding a national air quality objective around the A505 in the Hitchin Street/Whitehorse Street area of Baldock.
99. The Strategy recommends that any capacity increases should be targeted at:
 - AQMA areas, provided this improves air quality conditions and does not just generate more traffic
 - The strategic road network to encourage traffic to use this; and
 - Other severe problems where capacity increases are not likely to encourage additional through traffic or traffic on unsuitable roads.
100. It does not provide any solution to poor air quality if increased capacity does general more traffic.

5.2 Strategic Environmental Assessment

101. The Sustainability Appraisal acknowledges that air quality data is limited, and that this issue could become more significant with continued growth in development and traffic (Table 6: Key Sustainability Issues).
102. Table 3(d) states that "*The number of air quality management areas (AQMA's) declared on Hertfordshire's local roads has significantly increased in the last few years, from 4 in*

2008, to 10 in 2011, and 14 in 2012. A number of district/boroughs have warned the County Council that they will possibly be declaring more AQMAs in the near future (a further 4-5 AQMAs), this would bring the county's total to nearly 20 AQMAs."

103. However it seems that the Appraisal has had no input from an air quality specialist as there are many errors in it. The minor errors include the wrong year given for the Air Quality Strategy; indicators not clearly expressed (e.g. the relevant pollutants is not mentioned); and an incorrect target year given.

104. Table 34 on inter-plan cumulative effects states that "*Cumulative effects will be positive since the LTP and supporting strategies should help to facilitate the delivery of the housing and economic growth in the Local Plan in a way which limits some of the negative effects of this growth, e.g. in terms of traffic congestion, carbon emissions, noise and air quality*". There is no evidence that this is true in relation to air quality.

105. Under minimising pollution (Appendix 3) it gives one option for air quality "*Consider how to deal with problems of air quality, perhaps through the encouragement of mixed-use development as a means of reducing the need to travel thereby decreasing air pollution*" and concludes:

- "*The major air pollutant in North Hertfordshire is ozone which derives from traffic emissions, although air pollution is not considered a key sustainability issue for Hertfordshire*
- "*Traffic related air pollution needs to be tackled by a range of transport and location measures, for which mixed use developments is only one.*

Recommendations for changes to this option

- *None."*

106. Ozone is not considered to be the major air pollutant in North Hertfordshire.

107. A Sustainability Appraisal Supplementary Paper (Document LP8) is included in the examination library. A search of the term 'air quality' failed to find a match.

108. In summary the sustainability appraisal is grossly inadequate with regard to its assessment of the potential air quality impacts of the NHLP.

5.3 Adequacy of the assessment of the local plan on air quality

109. The impacts of the NHLP on local air quality has not been adequately assessed in either the Transport Strategy or the Sustainability Appraisal.

110. Therefore it is unclear as to whether the draft local plan will result in a) solving the current air quality breaches of statutory standards or b) cause any additional air quality issues.

6 Conclusions

111. The NHLP proposes approximately 13,800 additional homes in the District around Stevenage which will increase traffic and may give rise to poor air quality.
112. Health effects are observed at levels below the current statutory air quality standards, and advice to local authorities from Defra, Public Health England and the Local Government Association is to reduce exposure even when the statutory standards are achieved.
113. WHO guidelines for particulate matter are much lower than the current standards. WHO is currently reviewing the it's other air quality guidelines with a view to reducing them, particularly NO₂.
114. Even if the air quality standards are achieved there are likely to be adverse public health effects of traffic.
115. The Transport Strategy has not explicitly considered how to improve air quality in the two existing air quality management areas in Hitchin, or to reduce exposure more generally with the increased traffic with the NHLP.
116. The Sustainability Appraisal / Strategic Environmental Assessment does not adequately consider the air quality impacts of the local plan, and therefore it is not possible to assess whether it will result in a continuing breached of the statutory standards, or whether, as required by the High Court, that the NO₂ standard will be achieved "in the shortest possible time".

Therefore it is unknown whether or not the NHLP will have a significant adverse effect on public health. This is a major shortcoming of the evidence provided.

ANNEX 1: GLOSSARY

Ambient Air Quality Directive. The European Union's Directive 2008/50/EC of 21 May 2008, on Ambient Air Quality and Cleaner Air for Europe.

Air Quality Strategy Objective. The Air Quality Strategy sets objectives for the maximum concentrations of eight pollutants. These are at least as stringent as the limit values of the Air Quality Directive.

Ambient Air. Outdoor air.

Benzene. An organic chemical compound that is harmful to human health emitted from domestic and industrial combustion processes and road vehicles.

Benzo [a] Pyrene, often abbreviated to B[a]P, is one of a group of compounds called **polycyclic aromatic hydrocarbons (PAHs)**. The main sources in the UK are domestic coal and wood burning, fires, and industrial processes such as coke production.

1,3-Butadiene. An organic compound emitted into the atmosphere mainly from fuel combustion. It is also an important chemical in some industrial processes, particularly the manufacture of synthetic rubber..

Carbon Monoxide (CO) a gas released in road vehicle exhausts. When breathed in, carbon monoxide affects the blood's ability to carry oxygen around the body.

Limit value. The Air Quality Directive sets 'limit values' for ambient concentrations of pollutants. Limit values are legally binding and must not be exceeded.

Long-Term Objectives. As well as limit values and target values, the Ambient Air Quality Directive sets 'long-term objectives' for ozone concentration. These are similar to limit values but are not mandatory. Member States must take all necessary measures not entailing disproportionate costs to meet the target values and long-term objectives.

Microgramme per cubic metre ($\mu\text{g}/\text{m}^3$) is the unit used to express concentration of a pollutant in air. $1 \mu\text{g} = 1$ millionth of a gramme or 1×10^{-6} g.

Micrometre (μm). Unit of length often used for the size of particulate pollutants. $1 \mu\text{m} = 1$ millionth of a metre (1×10^{-6} m) or one thousandth of a millimetre.

Nickel (Ni) A toxic metallic element found in ambient air as a result of releases from oil and coal combustion, metal processes, manufacturing and other sources

Nitric oxide (NO). One of the oxides of nitrogen formed in combustion processes. NO is not considered to be harmful to human health but is converted to nitrogen dioxide (NO_2) in the atmosphere.

Nitrogen Dioxide (NO_2) One of the oxides of nitrogen formed in combustion processes. At high concentrations NO_2 is an irritant to the airways. It can also make people more likely to catch respiratory infections (such as flu), and to react to allergens.

Nitrogen Oxides (NOx) It comprises nitric oxide (NO) and nitrogen dioxide (NO_2) and is emitted from combustion processes. Main sources include power generation, industrial combustion and road transport.

Ozone (O₃). A pollutant gas which is not emitted directly from any source in significant quantities, but is produced by reactions between other pollutants in the presence of sunlight.

Particulate Matter (PM) Small airborne particles. PM may contain many different materials such as soot, wind-blown dust and components which are formed within the atmosphere as a result of chemical reactions. Some PM is natural and some is man-made. PM can be harmful to human health when inhaled, and research shows a range of health effects associated with it. In general, the smaller the particle the deeper it can be inhaled into the lung.

PM₁₀ Particles which pass through a size-selective inlet with a 50 % efficiency cut-off at 10 µm aerodynamic diameter, as defined in ISO 7708:1995, Clause 6. This size fraction is important as these particles are small enough to be inhaled into the airways of the lung. PM₁₀ is often described as '*particles of less than 10 micrometres in diameter*' though this is not strictly correct.

PM_{2.5} Particles which pass through a size-selective inlet with a 50 % efficiency cut-off at 2.5 µm aerodynamic diameter, as defined in ISO 7708:1995, Clause 7.1. This size fraction is important because these particles are small enough to be inhaled very deep into the lung PM_{2.5} is often described as '*particles of less than 2.5 micrometres in diameter*' though this is not strictly correct.

Polycyclic Aromatic Hydrocarbons (PAH). PAHs are a large group of chemical compounds that are toxic and carcinogenic. Once formed, they can remain in the environment for a long time, and can be passed up the food chain. The main sources are domestic coal and wood burning, outdoor fires, and some industrial processes. *Benzo [a] pyrene* is one of the more toxic PAH compounds and is used as a 'marker' for this group of pollutants.

Sulphur dioxide (SO₂). An acid gas formed when fuels containing sulphur impurities are burned. SO₂ irritates the airways of the lung.

Target Value. As well as limit values, the **Ambient Air Quality Directive** and the **Fourth Daughter Directive** set target values for some pollutants. These are similar to limit values but are not legally mandatory. *Member States* must take all necessary measures not entailing disproportionate costs to meet the target values.