Proposed mixed use development at land south of Tytton Lane East, Boston

Air Quality Assessment

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1. INTRODUCTION

Chestnut Homes Land Ltd is preparing a Hybrid planning application to develop a mixed use development near Boston, Lincolnshire, comprising residential dwellings, retail and commercial land and a new football stadium.

The site lies south of Tytton Lane East approximately 1.8km south of Boston town centre. The site is currently in agricultural use.

An Air Quality Assessment has been requested to accompany the planning application and ADAS UK Ltd has been appointed by the applicant to prepare this.

1.1 Scope of Assessment

The principal impact of the scheme on local air quality is likely to come from the emissions caused by the road traffic generated by the proposed development during its operational phase, comprising nitrogen dioxide and nitrous oxides (NO_2 and NO_x) and particulates (PM_{10}). Additional impacts considered in this assessment are the dust associated with the construction period of the development.

It is also necessary to provide an assessment of air quality within the proposed development site to determine whether future users of the development may be exposed to elevated levels of air pollutants.

The method of assessment of air quality uses the ADMS-Roads dispersion model to consider the changes in concentrations of NO_2, NO_x and PM_{10}.

The following scenarios are considered in the modelling of pollutant levels at selected receptors:

- Current baseline – existing conditions at the receptors as of 2013 (the base year of the transportation assessment);
- Future baseline –conditions at the receptors as of 2023 without the impact of the development taken into account; and

- With development – conditions at the receptors in 2023 assuming the development is complete and fully occupied.

The assessment focuses on the main pollutants associated with road traffic movements, which are nitrogen oxides (NO_x) as nitrogen dioxide (NO_2) and particulate matter less than 10 microns in diameter (PM_{10}).

The significance of the modelled results is assessed against relevant air quality criteria and verified against local monitoring data, followed by a discussion of uncertainties and mitigation measures.

Construction period effects and their significance are qualitatively assessed using relevant guidance.

1.2 Site Setting

The site lies on agricultural land east of Wyberton and south of Boston. The site is located south of Tytton Lane East and is intersected by the A16 running south from Boston towards Kirton.

The site is bordered to the north and west and partly to the south by residential dwellings on Tytton Lane East, London Road and Causeway respectively. A poultry unit is located adjacent to the south west corner of the site. The remainder of the southern boundary and the eastern boundary are bordered by recreational ground and agricultural land. The site is considered to be in a borderline suburban/rural location.

The site itself comprises a number of agricultural fields amounting to an area of approximately 28.83 hectares.

1.3 Guidance Followed

The assessment has been completed with reference to the following sources of guidance:

- Local Air Quality Management Technical Guidance 09 (LAQM TG09). Defra 2009 (Reference 1).

- Development Control: Planning for Air Quality 2010. Environmental Protection UK 2010 (Reference 2).
- Design Manual for Roads and Bridges Volume 11 Section 3 Part 1: Air Quality. Highways Agency (Reference 3).
- IAQM Guidance on the Assessment of the Impacts of Construction on Air Quality and the Determination of their Significance (Reference 4).

1.4 Regulatory Framework

Statutory air quality standards in the UK are set by the Air Quality Standards Regulations 2010 (hereafter referred to as 'the Regulations'), which transpose into UK law the requirements of several European Union Directives on air quality.

Underpinning the Regulations are the Air Quality Strategy (AQS) objectives which set health based standards for a range of key pollutants. The AQS objectives and those specified in the Regulations are the same for the key pollutants considered in this assessment, and hence the term 'objective' in this report refers to both sets of standards.

The key pollutants in terms of traffic emissions are NO_2 and PM_{10}.

The long term National AQS objective for each of these pollutants is 40ug/m^3 measured as an annual mean concentration. The short term objective for PM_{10} is also relevant to this assessment. This specifies that a 24 hour mean PM_{10} level of 50ug/m^3 is not to be exceeded more than 35 times per year.

Each Local Authority is required to monitor and review air quality in its district with reference to the AQS objectives. If an exceedance of any objective at one or more sensitive receptors seems likely then an air quality management area (AQMA) must be declared by the Local Authority. An action plan for improving air quality in that area should also be completed.

1.5 Planning Policy

National Planning Policy

Since its publication in March 2012, national planning policy has been set by the National Planning Policy Framework (NPPF) (Reference 5). This replaces the previous system of Planning Policy Statements, including PPS23: Planning and Pollution Control.

Section 109 of NPPF states that the planning system should contribute to and enhance the natural environment by:

"*preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability."*

It goes on to state at Sections 120 and 124 that:

"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.

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."

The policies contained with NPPF are material considerations from the date of its publication and must be taken account of in the preparation of Local Plans.

Local Planning Policy

The saved policies of the adopted Local Plan (1999) form the local planning policy for Boston Borough Council. An Interim Plan (Non-statutory Development Control Policy) 2006 is also used to guide planning decisions in the Borough.

Policy G1 of the adopted Local Plan relates to amenity, stating:

Planning permission will only be granted for development which will not substantially harm the amenities of other nearby land users or residents, or the general character of the area because of its nature, scale, density, layout, appearance or level of traffic generation.

Policy G8 relates more specifically to air quality and states:

Planning permission will not be granted for developments which will have an adverse effect upon the quality of air or soil such as to lead to:-

1) harm to local living or working conditions or the operation of nearby land uses;

2) harm to the natural flora and fauna of interest in the locality; or

3) added constraints on future developments in the area.

Policy G1 of the Interim Plan states:

General considerations

Planning permission will be granted for development if:

… 8) if there are no adverse effects (including contamination) on the quality of air or soil that will be harmful to the amenities of nearby residents and/or other land users or natural flora and fauna of interest in the locality (particularly sites designated as being of local national or international nature conservation importance), and there are likely to be no adverse effects on future

developments in the area that are planned for in other policies of this plan. …

The South East Lincolnshire Local Plan (Preferred Options – May 2013) recognises that air quality is a planning policy issue in relation to both the natural environment and local community health and welfare, highlighting the presence of the region's two AQMAs in Boston and the high levels of car ownership across the area. The preferred policy options propose a number of approaches to contribute to better air quality: proposed policies seek to minimise emissions of pollutants; permit developments with no unacceptable impacts on the natural environment, general amenity, health and safety; enhance green spaces and green infrastructure; promote sustainable transport and accessibility and a reduction in traffic levels.

1.6 Air Quality in Boston

In fulfilment of its statutory duties, Boston Borough Council is responsible for a detailed and comprehensive air quality monitoring programme, with particular emphasis on Air Quality Management Areas (AQMAs) and areas likely to be subject to AQMA designation in the future.

Air Quality Management Areas

There are two AQMAs in the Boston area, which are both declared for exceedances of nitrogen dioxide (NO_2). Haven Bridge AQMA is located at the centre of Boston, along part of Sleaford Road (A52) and John Adams Way (A16). Bargate Bridge is located slightly north east of the centre of Boston, along part of Spilsby Road (A16). Figure 1.1 shows the location of both these AQMAs in Boston (shown in purple).

Figure 1.1: Location of AQMAs in Boston

1.7 Background concentrations

Nitrogen Dioxide

There are no longer automatic monitoring stations in use in the Borough, due to budget restrictions. Passive diffusion tube monitoring is undertaken within the AQMAs and the immediate vicinity of the centre of Boston. The latter are bias corrected where necessary. This is in accordance with standard practice.

Outside of the AQMAs, there are no exceedances of the NO_2 objective. However, in some areas of central Boston, annual mean concentrations are close to the objective limit (up to 35.6ug/m^3).

In 2012, 15 monitoring locations were used to monitor NO_2 in Boston. None of the monitoring locations accord exactly to the location of the application site.

The most relevant diffusion tube locations are Site 6: Adjacent to 37 Spayne Road (533125 343939) and Site 7: 29 Manor Gardens (533326 344013). Site

6 is considered to be representative of the receptor 22-23 Tytton Lane East for the purposes of model verification and is situated 2-3m from the road therefore taking account of some existing road traffic emissions. Site 7 is a background location, set back from the road, thereby reducing the influence that road traffic emissions on the measured concentration. The annual mean concentration from this tube is considered representative of the background concentration in Boston. It is located 2km NNW of the proposed site, in a suburban setting, with residential properties and roads to the north, west, south and the Maud Foster Drain to the east.

Monitoring data for this site is summarised in the following table.

Table 1.1: Summary of local nitrogen dioxide monitoring data (annual mean concentrations ug/m^3)

Location	2011	2012
Site 6	20.8	22.4
Site 7	19.2	20.5

The data indicates that nitrogen dioxide concentrations are within the statutory limits.

NO_2 concentrations for the scenario years 2013 and 2023 were projected from the 2012 concentrations at Site 6 using the updated Roadside Projection Factors found on the Local Air Quality Management (LAQM) website. Nitrous oxide (NO_x) concentrations, which are a required input to the ADMS Roads model, were interpolated from the recorded nitrogen dioxide levels using the nitrogen dioxide to NO_x calculator and the background maps on the LAQM website.

The background data used as input to the ADMS Roads model is summarised in Table 1.2 below.

<u>PM_{10}</u>

There is no monitoring for PM_{10} undertaken by Boston Borough Council. Background (i.e., without the addition of local sources, such as transport emissions) PM_{10} data was therefore downloaded from 1x1km grid square maps on the LAQM website to provide local context and background data for the ADMS Roads model. For the grid squares covering the application site, the mean background PM_{10} concentration for 2013 is 17.45ug/m^3.

The NO_x, NO_2 and PM_{10} background data used for input into the ADMS Roads model is summarised in Table 1.2 below.

Table 1.2: Summary of background data input into the ADMS Roads model

Scenario Year	NO_2	NO_x	PM_{10}
2013 and 2023	19.58	31.64	17.45

2. METHODOLOGY

2.1 Model Selection

The air quality assessment considers road links around the proposed development that are predicted to experience a change in traffic flows as a result of the development, as well as receptors consequently most likely to experience an impact. The ADMS-Roads dispersion model is used to predict changes in nitrogen oxide (NO_x), nitrogen dioxide (NO_2) and particulate matter (PM_{10}) concentrations as these three pollutants are most closely associated with traffic emissions and are the most likely to change as a result of the development.

The ADMS-Roads model is a comprehensive tool for investigating air pollution in relation to road networks and small industrial sources. The model has been validated in a number of studies by the manufacturer, Cambridge Environmental Research Consultants (CERC).

2.2 Emissions Factors

The model calculates emission factors for the pollutants from traffic data entered into the model by the user. ADMS-Roads has recently been issued with an update to take into account the most recent publication of the updated Emission Factors Toolkit (EFT) (Version 5.1) in 2012. This update incorporates updated vehicle exhaust emission factors as well as consideration of abrasion sources of particulates. No further calculations were required to establish emission factors for the road emission sources.

2.3 Sensitive Receptors

The ADMS-Roads model can accommodate specific receptor locations in its assessment of pollutant concentrations. Receptors have been selected to be representative of the type and scale of impact at properties adjoining the road(s) affected by the scheme. The predicted impact at these receptors can then be extrapolated to other similarly located properties in the vicinity of the scheme.

In the context of air quality, sensitive receptors are typically defined as locations where people may regularly undergo long-term exposure to road traffic emissions. This corresponds to the terms of the air quality standards, which for the key pollutants considered in this assessment are expressed as either 24-hour or annual averages. Receptors in accordance with this definition will include residential properties, hospitals and schools, but not locations where exposure to emissions will be transient, for example; workplaces, playing fields, pedestrianised areas or footpaths.

The following receptors were selected for consideration in the assessment. This was based on their location relevant to the application site, observations made during the site visit and the coverage of the traffic data.

1. Wyberton Primary School (532008, 341032);
2. Sandergate Park (531905, 341061);
3. London Road (west side) (531656, 341386);
4. London Road (east side) (531687, 341400);

5. 22-23 Tytton Lane East (532055, 341871);
6. 86 Tytton Lane East (532427, 341870); and
7. Allerton Court (532024, 340947).

A plan showing the location of these receptors is included in Appendix A.

Receptor locations were selected to include consideration of effects at the locations most likely to be subject to adverse effects as a result of a change in traffic flows following the proposed development.

For the purposes of verifying the model against local monitoring data, a receptor has been selected to represent a location equivalent to the local monitoring site used for verification (Site 6). The receptor 22-23 Tytton Lane East is considered to be equivalent to Site 6 in terms of setting and surrounding land use. The projected concentration of NO_2 at Site 6 in 2013 is 21.40ug/m^3.

2.4 Traffic Data

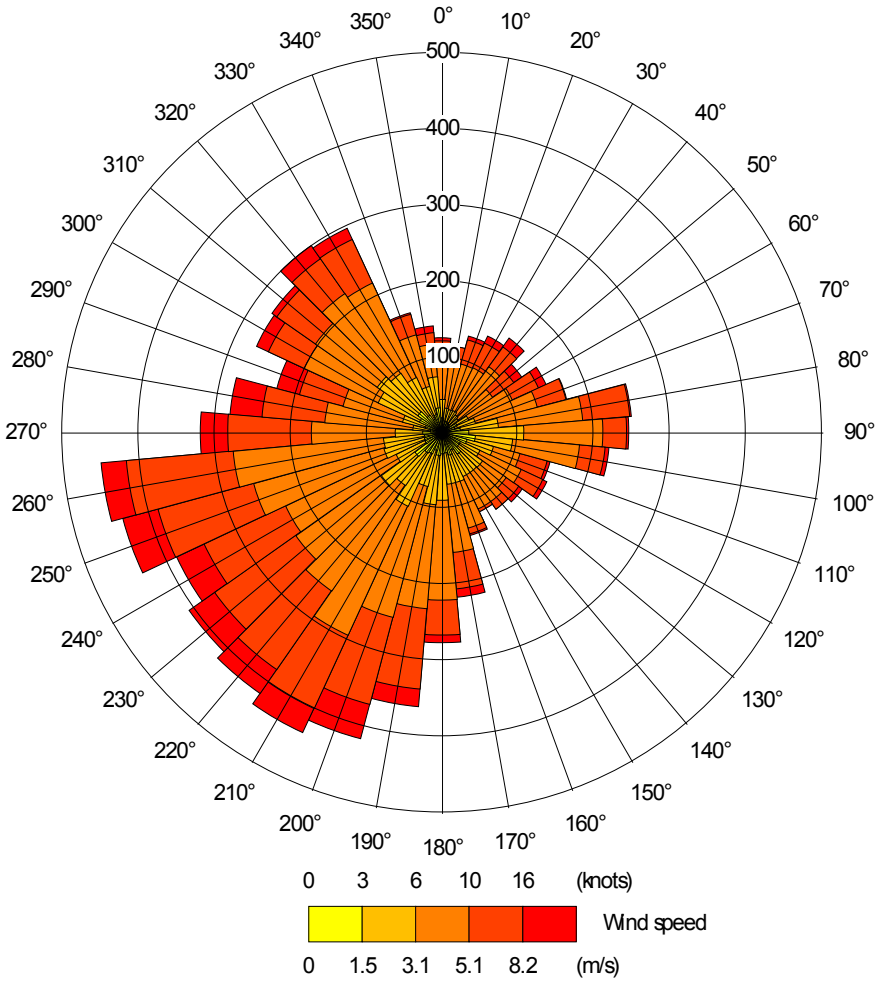
The traffic data used in this assessment was provided by Northern Transport Planning Ltd. The data was supplied in the form of Annual Average Daily Traffic (AADT) and is set out in Appendix B. A light duty and heavy duty vehicle split was included and it was assumed that this was unlikely to change significantly with the opening of the proposed development.

The traffic data considered three scenarios: existing baseline (2013), future baseline (2023) and with development (2023).

2.5 Meteorological Data

The meteorological data used in the air quality modelling was obtained from ADM Ltd, who are listed in LAQM.TG(09) as suitable suppliers. Data was obtained for the last full calendar year, 2012. At the time of writing, data for 2013 was not available. The data provided hourly wind speed and direction information. The wind rose for this data is shown in Figure 2.1 below.

Figure 2.1: Windrose for modelled MET data



2.6 Model verification

Briefly, model verification involves a comparison of modelled and measured concentrations for the site under assessment. The process is explained in detail in LAQM.TG (09).

Of the 15 locations where NO_2 was monitored by Boston Borough Council, Site 6, was considered to be a suitable site for use in verification. Verification was undertaken on NO_x concentrations independently of the background concentrations and converted to roadside NO_2 to avoid complications caused by the relationship between NO_x and NO_2. Background concentrations were then re-applied to provide total concentrations.

Verification for PM_{10} was not carried out due to the lack of PM_{10} monitoring within the study area.

2.7 Magnitude and Significance Criteria

Due to the size and nature of the proposed development and the high dispersion rate of NO_2 and PM_{10}, any air quality impacts from the proposed development will be of local geographical importance.

The assessment is conducted with reference to the impact magnitude criteria and impact descriptors provided by the Institute of Air Quality Management (IAQM) and published in Development Control: Planning for Air Quality 2010. Environmental Protection UK 2010. As recommended in Section 5.28 of this guidance, the criteria from Table 15 in Appendix 3 of the guidance are used over the generic values provided in Table 4 of the document. These criteria are reproduced in the following tables:

Table 2.1: Definition of Impact Magnitude

Impact Magnitude	Description
Large	Increase / decrease >4 ug/m^3
Medium	Increase / decrease 2 – 4 ug/m^3
Small	Increase / decrease 0.4 - 2 ug/m^3
Imperceptible	Increase / decrease <0.4 ug/m^3

Table 2.2: Impact descriptors for annual mean NO_2 and PM_{10}

Absolute Concentration in Relation to Objective/Limit Value	Change in Concentration		
	Small	**Medium**	**Large**
Increase with Scheme			
Above Objective/Limit Value *With* Scheme (>40 ug/m^3)	Slight Adverse	Moderate Adverse	Substantial Adverse
Just Below Objective/Limit Value *With* Scheme (36-40 ug/m^3)	Slight Adverse	Moderate Adverse	Moderate Adverse
Below Objective/Limit Value *With* Scheme (30-36 ug/m^3)	Negligible	Slight Adverse	Slight Adverse
Well Below Objective/Limit Value *With* Scheme (<30 ug/m^3)	Negligible	Negligible	Slight Adverse
Decrease with Scheme			
Above Objective/Limit Value *Without* Scheme (>40 ug/m^3)	Slight Beneficial	Moderate Beneficial	Substantial Beneficial
Just Below Objective/Limit Value *Without* Scheme (36-40 ug/m^3)	Slight Beneficial	Moderate Beneficial	Moderate Beneficial
Below Objective/Limit Value *Without* Scheme (30-36 ug/m^3)	Negligible	Slight Beneficial	Slight Beneficial
Well Below Objective/Limit Value *Without* Scheme (<30 ug/m^3)	Negligible	Negligible	Slight Beneficial

3. ASSESSMENT OF CONSTRUCTION PERIOD EFFECTS

3.1 Introduction

The key issue in respect of construction period effects will be dust and the

particulates emissions associated with construction activities. This may lead to three separate dust impacts:

- Annoyance due to dust soiling;
- The risk of health effects due to an increase in exposure to PM_{10}; and
- Harm to ecological receptors.

The IAQM guidance states that an assessment of the impact of dust is required if a sensitive receptor (either human or ecological) exists within 350m of the site. Receptors within 20m of the site boundary are considered to be the most sensitive to construction dust.

There are no sites designated for nature conservation within the vicinity of the site. Therefore this assessment will focus on human receptors only. There are a number of residential streets within 350m of the site boundary, though few are within 20m of the site boundary or construction activities.

Construction period effects are assessed qualitatively with reference to IAQM guidance (Reference 4). This advocates that construction risk be assessed in terms of four main activities:

- Demolition
- Earthworks
- Track-out
- Construction

Dust and/or particulates from these activities may lead to three separate dust impacts:

- Annoyance due to dust soiling;
- The risk of health effects due to an increase in exposure to

PM_{10}; and

- Harm to ecological receptors.

The IAQM guidance is based on assessing the risk from the key construction activities accounting for the proximity of the nearest sensitive receptors, the characteristics of the site and the nature of the proposed works. The IAQM guidance follows a series of steps to assess potential dust emissions in order to define appropriate mitigation measures to ensure that there will be no significant effects.

3.2 Step 1: Screen the Need for a Detailed Assessment

A detailed assessment of the impact of dust is required if a sensitive human receptor exists within 350m of the boundary of the site, or an ecological receptor exists within 50m of the boundary of the site, or any sensitive human or ecological receptors within 50m of the route to be used by construction vehicles on the public highway up to 500m from the site entrance.

A number of human receptors are located within 350m of the proposed development boundary comprising residential dwellings located west, north and south.

No sensitive ecological habitats (internationally, nationally or locally designated) are located within 50m of the proposed site boundary, or within 50m of the route likely to be used by construction traffic up to 500m from the site entrance.

3.3 Step 2: Assess the Risk of Dust Impacts

This step is split into three sub-steps.

3.3.1. Step 2A: Define the Potential Dust Emission Magnitude

The potential dust emission magnitude for each of the four activities to be assessed are set out below.

<u>Demolition</u>

Two houses on London Road will be demolished to allow the inclusion of a new distributor road as part of the proposed development. The total building volume being demolished is very small (less than 20,000m3) and the site will therefore have a small dust emission magnitude for this activity.

Earthworks

The site is more than 10,000m2 in area. Using the definitions provided in the IAQM guidance, this site is classified as having a large dust emission magnitude.

Construction

The approximate total building volume of the completed site will be greater than 100,000m3. Using the definitions provided in the IAQM guidance, the site is classified as having a large dust emission magnitude.

Trackout

There is no data at the current time on the numbers and timings of construction vehicle movements although due to the phased nature of the development it is considered that HGV trips in one day would be less than 50 which constitute the definition of a medium dust emission magnitude.

In summary, the dust emission magnitude for each activity in at the site is shown in the following table.

Table 3.1: Dust Emission Magnitudes

Activity	Dust Emission Magnitude
Demolition	Small
Earthworks	Large
Construction	Large
Trackout	Medium

3.3.2. Step 2B: Define the Sensitivity of the Area

The number and sensitivity of receptors to the two potential impacts from the proposed site (dust soiling and human health) vary depending on the impacts and with distance from the boundary. In accordance with the IAQM guidance, only the highest level of area sensitivity needs to be considered.

The sensitivity of receptors is discussed in the following section with reference to tables 2 and 3 of the IAQM guidance.

Sensitivity to Dust Soiling

There are between one and ten receptors within 20m of the proposed demolition activities. The sensitivity of the receptors in this area to dust soiling is considered to be high due the residential land use in the area. Therefore the area has a medium sensitivity to dust soiling from demolition.

There are more than ten residential dwellings within 20m of the proposed development boundary. The sensitivity of the receptors in this area to dust soiling is considered to be high due to the predominantly residential land use in this area. Therefore the area has a high sensitivity to dust soiling from earthworks and construction.

There are more than ten residential dwellings within 20m of the road network likely to be used by construction traffic generated by the proposed

development. The sensitivity of the receptors in this area to dust soiling is considered to be high due to the predominantly residential land use in this area. Therefore the area has a high sensitivity to dust soiling from trackout.

Sensitivity to Health Impacts

There are between one and ten receptors within 20m of the proposed demolition activities. The sensitivity of the receptors in this area to human health impacts is considered to be high due to the predominantly residential land use in the area. The annual mean concentration of PM_{10} in the area is approximately 17.45ug/m^3. Therefore the sensitivity of the area in relation to demolition is low.

There are between ten and 100 residential dwellings within 20m of the proposed development boundary. The sensitivity of the receptors in this area to human health impacts is considered to be high due to the predominantly residential land use in this area. The annual mean concentration of PM_{10} in the area is approximately 17.45ug/m^3. Therefore, the sensitivity of the area in relation to earthworks and construction is low.

There are between ten and 100 residential dwellings within 20m of the road network likely to be used by construction traffic. The sensitivity of the receptors in this area to human health impacts is considered to be high due to the predominantly residential land use in this area. Therefore, the sensitivity of the area in relation to trackout is low.

As background levels of PM_{10} are below 24ug/m^3 and there are fewer than 100 receptors within 20m of the proposed development site boundary and road network, the sensitivity identified to human health impacts is the highest level possible.

In summary, the sensitivity of the area for each construction activity in relation to the three potential dust impacts is shown in the table below.

Table 3.2: Sensitivity of the Area

Potential Impact	Sensitivity of the surrounding area			
	Demolition	Earthworks	Construction	Trackout
Dust soiling	Medium	High	High	High
Human health	Low	Low	Low	Low
Ecological	Not applicable			

3.3.3. Step 2C: Define the Risk of Impacts

The dust emission magnitude determined in Step 2A is combined with the sensitivity of the area determined in Step 2B to determine the risk of impacts with no mitigation applied. The level of risk identified is used to determine the level of mitigation that would be required to offset potential impacts (Step 3). The following table summarises the risk of impacts identified.

Table 3.3: Risk of Impacts

Potential Impact	Risk			
	Demolition	Earthworks	Construction	Trackout
Dust soiling	Low	High	High	Medium
Human health	Negligible	Low	Low	Low
Ecological	Not applicable			

3.3.4. Step 3: Site-specific Mitigation

The IAQM guidance no longer provides significance matrices for the evaluation of construction impacts as this is considered to be inappropriate. The justification for this is that for almost all construction activity, the aim should be to prevent significant effects through the use of mitigation. This is normally achievable and therefore the residual effect will normally be 'not

significant'.

The guidance proposes a number of mitigation measures; some are general and applicable to all sites, some are specific to each construction activity. The measures proposed in the guidance vary depending on the risk category of the site. Taking account of the site specific risk classification summarised in Table 3.3 the relevant mitigation measures from the IAQM guidance are summarised in later sections.

4. ASSESSMENT OF OPERATIONAL RESULTS

4.1.1. Modelled Baseline 2013 and 2023

The modelled baseline concentrations for 2013 and 2023 are shown in Table 4.1 below. The table details modelled concentrations for NO_x, NO_2 and PM_{10}.

Table 4.1: Predicted baseline concentrations (ug/m^3)

Receptor	NO_x		NO_2		PM_{10}	
	2013	2023	2013	2023	2013	2023
Wyberton Primary School	32.53	31.92	19.78	19.64	17.54	17.51
Sandergate Park	32.98	32.01	19.89	19.66	17.58	17.52
London Road (west side)	34.34	32.93	20.20	19.84	17.76	17.73
London Road (east side)	34.88	33.20	20.32	19.90	17.82	17.79

22-23 Tytton Lane East	32.42	32.28	19.76	19.71	17.53	17.58
86 Tytton Lane East	33.07	32.36	19.91	19.73	17.59	17.60
Allerton Court	32.98	32.08	19.89	19.67	17.58	17.54

NO_2 concentrations in both baseline scenarios are predicted to be below the objective at all of the receptors. This accords with the monitoring data available in the area.

NO_2 concentrations range from 19.76ug/m^3 to 20.32ug/m^3 for 2013 and from 19.64ug/m^3 and 19.90ug/m^3 for 2023.

There is a decrease in nitrogen dioxide levels between 2013 and 2023, ranging between 0.05ug/m^3 and 0.42ug/m^3, which is likely to be due to changes in vehicle fleet and technology. This change is slight and reflects the less than anticipated decrease in emissions in future years, particularly from diesel vehicles.

PM_{10} concentrations are within objective limits at all receptors for both baseline scenarios, ranging from 17.54ug/m^3 to 17.82ug/m^3 in 2013 and from 17.51ug/m^3 to 17.79ug/m^3 in 2023. There is a decrease in concentration in the future year scenario at five of the seven receptors compared to the current baseline ranging from 0.03ug/m^3 to 0.06ug/m^3. At two of the receptors (both on Tytton Lane) there is a slight increase in PM_{10} concentration ranging from 0.01 and 0.05ug/m^3.

4.1.2. Modelled future years scenario for 2023

The modelled NO_x, NO_2 and PM_{10} pollutant concentrations for the 2023 scenarios (the future baseline and 'with development') are shown alongside

each other in the table below. Verified values are included in brackets.

Table 4.2: Predicted development concentrations (ug/m^3)

Receptor	NO_x	NO_2		PM_{10}	
	2023	2023	Change	2023	Change
1	31.93	19.64	0.00	17.51	0.00
2	32.02	19.66	0.00	17.53	+0.01
3	32.94	19.86	+0.01	17.70	-0.03
4	33.63	20.01	+0.11	17.84	+0.05
5	32.29	19.71	0.00	17.58	0.00
6	32.42	19.74	+0.01	17.61	+0.01
7	32.10	19.67	0.00	17.54	0.00

NO_2 concentrations are predicted to increase as a result of the changes in traffic flow caused by the development at three of the receptors. At the remaining four receptors, no change in concentration is predicted. NO_2 concentrations remain below the objectives at all receptors, ranging from 19.64ug/m^3 to 20.01ug/m^3.

The changes in nitrogen dioxide concentration between the future baseline and 'with development' scenario ranges from 0.01 to 0.11ug/m^3. This equates to an increase of between 0.03 and 0.33% over the future baseline.

PM_{10} concentrations are within objective limits at all receptors for both scenarios, ranging from 17.51ug/m^3 to 17.84ug/m^3 in the with development scenario. There is an increase as a result of the development at three of the receptors, ranging from 0.01ug/m^3 to 0.05ug/m^3. Concentration decreases by 0.03ug/m^3 at one receptor. There is no change predicted at three of the receptors.

Model verification showed the modelled concentrations for NO_x at 22-23 Tytton Lane East to be approximately 8% lower than the predicted NO_x concentration at Diffusion Tube Site 6. This is within 10% range that TG 09 LAQM guidance considers the majority of results should be. Considering the fact that the verification location is in a more built up area than the selected receptor, the modelled results are regarded as representative. Therefore, no adjustment of the modelled results has been undertaken.

4.1.3. Assessment of Impacts

Following the criteria set out in the EPUK 2010 guidance, impact magnitude and corresponding significance definitions have been assigned to each change in concentration, as shown in the table below.

Table 4.3: Magnitude and significance of predicted impacts

Receptor	NO_2			PM_{10}		
	Change (ug/m^3)	Magnitude	Significance	Change (ug/m^3)	Magnitude	Significance
1	0.00	N/A	N/A	0.00	N/A	N/A
2	0.00	NA	N/A	+0.01	Imperceptible	Negligible
3	+0.01	Imperceptible	Negligible	-0.03	Imperceptible	Negligible
4	+0.11	Imperceptible	Negligible	+0.05	Imperceptible	Negligible
5	0.00	N/A	N/A	0.00	N/A	N/A
6	+0.01	Imperceptible	Negligible	+0.01	Imperceptible	Negligible
7	0.00	N/A	N/A	0.00	N/A	N/A

The proposed development is shown to have no impact on NO_2 concentrations at four receptors. At the other three receptors the change in concentration is so small as to be considered imperceptible. The

concentrations of NO_2 are shown to be below the objective at all receptors. Predicted changes to NO_2 concentrations as a result of the proposed development are considered to be of negligible significance.

The modelled PM_{10} concentrations for all scenarios are well within permitted levels, reflecting the weaker link between PM_{10} concentrations and traffic flows. There are no changes in PM_{10} concentration as a result of the proposed development at three of the receptors. Changes to PM_{10} concentrations at the other four receptors as a result of the proposed development are considered to be so small as to be imperceptible. Predicted changes to PM_{10} concentrations as a result of the proposed development are considered to be of negligible significance.

4.1.4. Discussion of Operation Period Effects

The assessment indicates that the proposed development will have no significant impact on pollutant concentrations at the receptors considered. The receptors considered in this assessment were selected as being representative of those locations most at risk of an adverse impact, including future occupants of the site and as being representative of the impact in general within the surrounding area.

No exceedances of the objective for NO_2 or PM_{10} are indicated by the predicted model concentrations and monitoring data studied as part of the assessment. This is most likely due to the redistribution of traffic using the roads around the site as a result of the proposed development, particularly the new distributor road.

5. MITIGATION MEASURES

5.1.1. Construction

The risk of impacts leading to dust soiling and human health impacts has been assessed. In particular, there is a risk of dust soiling impacts from earthworks and construction (high). The risk of human health impacts is considered to be low.

The IAQM guidance proposes a number of mitigation measures; some are general and applicable to all sites, some are specific to each construction activity. The dust control measures proposed in the IAQM guidance are based on the mitigation measures for London set out in The Control of Dust and Emissions During Construction and Demolition. The measures proposed in the guidance vary depending on the risk category of the site.

The mitigation measures to be applied at the proposed site will be written into a Dust Management Plan (DMP). Measures to be included in the DMP, taking into account the activities most at risk of producing impacts, will include:

Table 5.1 Measures to be considered in the DAP

Communications
Nominate site environmental manager and display contact details at site entrance, alongside head or regional office contact information.
Site Management
Record dust and air quality complaints and exceptional incidents, identify and record cause and measures taken to reduce emissions.
Monitoring
Carry out regular on and off-site visual inspections of dust emissions, particularly focusing on any visible dust being carried towards or across the site boundary, increasing during weather conditions conducive to dust emissions (prolonged dry or windy periods).
Carry out regular dust soiling checks of surfaces such as parked cars, street furniture and window sills within 100m of site boundary.
Keep under review the requirement for deployment of permanent dust monitoring equipment.
Preparing and maintaining the site

Plan site layout so machinery and dust causing activities are as far from receptors as is practical.
Consider the erection of screening around site boundaries or specific operations where necessary.
Store potentially dusty materials in the lees of existing structures or screens. Cover stockpiles to prevent wind whipping.
Minimise potential for run-off of sediment and mud.
Operating vehicle/machinery and sustainable travel
Switch off engines when stationary, avoiding idling.
Use mains or battery powered equipment where practicable.
Impose site speed limits.
Implement a Travel Plan supporting and encouraging sustainable travel.
Operations
Ensure the availability of an appropriate water supply for dust suppression.
Minimise drop heights when handling materials and when loading and tipping.
Use suitable dust suppression techniques with cutting, grinding and sawing equipment.
Use enclosed chutes, conveyors and skips wherever practicable.
Ensure availability of cleaning equipment for cleaning up spillages.
Waste Management
Avoid bonfires and burning of waste materials.
Earthworks

Re-vegetate earthworks and exposed areas or stockpiles as soon as practicable. Where this isn't possible consider the use of Hessian, mulches or trackifiers.
Remove cover in small areas as practical during work and not all at once.
Construction
Avoid scabbling (roughening on concrete surfaces) where possible.
Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.
Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery.
Trackout
Use water-assisted dust sweeper(s) on access and local roads, as necessary. Avoid dry sweeping of large areas in dry and windy conditions.
Ensure loads entering or leaving the site are covered.
Inspect on-site haul routes for integrity and instigate necessary repairs, recording inspections and actions.
Make use of hard surfaced haul routes and wheel washing systems if necessary, ensuring there is an adequate area of hard surfaced road between the wheel wash and site exit.
Access gates should be located at least 10m from receptors where possible.

Further to the adoption of the mitigation measures outlined and following the preparation and implementation of a DAP, the residual construction period effects are predicted to be temporary, short-term, reversible and Negligible in relation to all construction activities that would be part of the proposed

development.

5.1.2. Occupation

Operational period effects are assessed as being imperceptible and mitigation would not usually be considered necessary at such level of effect. The residual operation period effects will therefore remain imperceptible.

6. RESIDUAL EFFECTS

6.1.1. Construction Period Effects

Further to the adoption of the mitigation measures outlined and following the preparation and implementation of a DAP, the residual construction period effects are predicted to be **negligible** in relation to all three construction activities.

7. NON TECHNICAL SUMMARY

ADAS UK Ltd has been appointed to carry out an air quality assessment for a proposed mixed use commercial development near Boston, Lincolnshire.

It was identified that the main potential impact of the proposed development on local air quality will be the emissions from the extra traffic it is forecast to generate. The impact of the proposed development has been modelled using ADMS Roads.

Existing levels of atmospheric pollutants in the area are within the statutory objectives, except for some areas of central Boston. This is reflected by the fact that there are two Air Quality Management Areas in Boston town centre.

The assessment indicates that additional traffic generated by the proposed development will lead to a maximum change in nitrogen dioxide concentrations of 0.11 ug/m^3 and PM_{10} concentrations of 0.05 ug/m^3 as a result of the proposed development. In accordance with the guidelines

published by Environmental Protection UK in 2010, the development would have a **Negligible** impact on air quality.

It is therefore concluded that traffic emissions associated with the proposed development will not cause a significant impact on local air quality. As a result, no mitigation is proposed.

An assessment of the impacts arising from the construction of the proposed development was also undertaken in line with guidance published by the Institute of Air Quality Management. There is a risk of dust soiling impacts from earthworks and construction (**high**). The risk of human health impacts is considered to be low. Following the implementation of mitigation, comprising the development and use of a Dust Management Plan, these impacts would be reduced to **Negligible**.

8. REFERENCES

Reference 1: Local Air Quality Management Technical Guidance 09 (LAQM TG09). Defra 2009

Reference 2: Development Control: Planning for Air Quality 2010. Environmental Protection UK 2010.

Reference 3: Design Manual for Roads and Bridges Volume 11 Section 3 Part 1: Air Quality. Highways Agency.

Reference 4: IAQM Guidance on the Assessment of the Impacts of Construction on Air Quality and the Determination of their Significance.

Reference 5: National Planning Policy Framework. Department for Communities and Local Government.

Reference 6: Guidance on controlling air pollution and noise emissions from construction sites. Building Research Establishment. 2006.

APPENDIX A

LOCATION OF RECEPTORS IN RELATION TO PROPOSED SITE

The receptors are marked by the pink triangles, around the site border shown in orange.

APPENDIX B

TRAFFIC DATA