C11

SALDEN CHASE
OUTLINE PLANNING APPLICATION

Chapter 11: Air Quality

11.0 AIR QUALITY

Introduction

11.01 This chapter has been prepared by Peter Brett Associates LLP. It considers the potential air quality effects from the proposed Salden Chase development.

Scope and Method of Assessment

Scope

11.02 The potential issues with regard to air quality were agreed with Aylesbury Vale District Council (AVDC) to be as follows:

- dust annoyance and elevated concentrations of PM_{10} associated with construction works;
- the impact of emissions from traffic generated by the proposed development on existing residential receptors close to the development site;
- potential odour issues from Bletchley landfill;
- potential impact due to the proposed re-opening of the railway line at the southern boundary of Salden Chase; and
- the suitability of the site for residential use.

11.03 This air quality impact assessment provides baseline data on air quality around the area of the proposed development and investigates the effect that the development will have during the construction and operational phases. It focuses on those pollutants of most concern locally in the context of the proposed development i.e. nitrogen dioxide (NO_2), particulate matter (PM_{10}), dust and odour.

11.04 The other pollutants in the National Air Quality Strategy have not been included because the Air Quality Review and Assessments undertaken by AVDC and Milton Keynes Council (MKC) show that the NAQOs will be achieved and the proposed development is unlikely to significantly affect their concentrations.

Consultation

11.05 An Environmental Health Officer at AVDC was consulted over the approach to this air quality assessment and agreed with the methodology[7].

Baseline Air Quality

11.06 Current air quality around the site has been assessed by drawing on the following measured and modelled data.

11.07 AVDC's and MKC's LAQM review and assessment reports provide information regarding historical air quality in the area.

11.08 AVDC does not operate any continuous monitors close to Salden Chase. However MKC did operate a continuous monitor at Selbourne Avenue, Bletchley from October 2002 to May 2005. Background concentrations are likely to be similar at Salden Chase, as the monitor was located just 1.5km to the east (see Figure 11.1).

11.09 AVDC has not monitored using diffusion tubes close to the site. MKC monitored urban background concentrations at St Andrews Road between 2001 and 2004 using NO_2 diffusion tubes (see Figure 11.1). However no diffusion tube monitoring is currently carried out close to Salden Chase.

[7] Email from Bill Pegram, Land and Air Quality Team Leader AVDC, 6th July 2009

11.10 Data from NO_2 diffusion tube monitoring undertaken for this assessment is presented (see paragraph 11.12 to 11.16).

11.11 Modelled data for 1km x 1km grids referred to in LAQM.TG(09) and available at www.airquality.co.uk have been used to determine the background air quality in the area.

NO2 Diffusion Tube Monitoring

11.12 Nitrogen dioxide was monitored at 11 locations in and around Salden Chase using passive diffusion tubes prepared using 20% triethanolamine (TEA) in water and analysed by Gradko International Ltd, a UKAS accredited laboratory. The monitoring was undertaken over 13 periods of approximately four weeks, from 4th September 2008 to 24th September 2009. Triplicate tubes were used at each location in order to improve the precision of the monitoring.

11.13 The monitoring locations are described in Appendix 11.1 and shown in Figure 11.1.

11.14 Three tubes were co-located with a continuous monitor at Milton Keynes Civic Offices. The co-location of tubes was to enable a comparison of the data from the diffusion tubes with that of a more accurate real-time analyser. This was used to determine whether the tubes were under or over-reading and a bias adjustment factor calculated.

11.15 A bias adjustment factor (0.8) derived from this data was used to adjust the results from the rest of the monitoring survey, as recommended in LAQM.TG(09). This compares with a national bias adjustment figure of 0.91 for 2008 for this type of tube. As the monitoring did not cover a calendar year, good practice, as described in LAQM.TG(09), was followed, and the local factor used.

11.16 This adjustment will correct the systematic bias of the diffusion tubes, which generally have an uncertainty of around ±25%. The full set of results for all diffusion tubes and the bias adjustment calculation is shown in Appendix 11.2.

Predicted Baseline Concentrations

11.17 Annual mean concentrations of NO_2 and PM_{10} in 2008 have been modelled at receptors likely to be affected by local air pollution using the DMRB Screening Model (see Operational Impacts).

Construction Effects

11.18 During construction the main potential effects are dust annoyance and locally elevated concentrations of PM_{10}. The suspension of particles in the air is dependent on the surface characteristics, weather conditions and on-site activities. Dust effects will be greatest during dry windy weather, and least during wet calm conditions.

11.19 The potential for dust effects during construction is also dependent on the proximity of sensitive receptors. Large dust particles (greater than 30µm) will largely deposit within 100m of sources. Intermediate particles (10-30µm) can travel 200-500m. Smaller particles (less than 10µm) are deposited slowly and may travel up to 1km. Concentrations decrease rapidly with distance from the source due to dispersion and deposition and therefore significant dust annoyance is usually limited to within 200m of a major construction site. The effect on short-term PM_{10} concentrations occurs over a shorter distance from construction activity.

11.20 This assessment uses the dust sensitive receptors illustrated in MPS2:

- High sensitivity – hospitals/clinics, retirement homes, hi-tech industries, painting and furnishing, food processing
- Medium sensitivity – schools, residential areas, food retailers, greenhouses and nurseries, horticultural land, offices
- Low sensitivity – farms, light and heavy industry, outdoor storage

11.21 Hospitals, schools and residential areas were identified from the OS map of the area. The latter have been defined in terms of the number of dwellings.

11.22 The presence of clinics, retirement homes, doctor's surgeries and highly sensitive industry (hi-tech industry, painting and furnishing, and food processing) were searched for using scoot.co.uk, the Internet business directory[8].

[8] Searched on 29th June 2009

11.23 The potential for dust annoyance and locally elevated PM_{10} concentrations during construction were assessed by analysing long-term wind and rainfall data. A 10-year wind rose from the weather station at Luton Airport from 1994 to 2004 (not including 1998) provided by ADM Ltd was used (see Figure 11.2), along with data for the annual average number of days when rainfall is greater than 0.2mm (1971-2000) for the area, obtained from the Met Office website, www.metoffice.gov.uk. The airport is approximately 30km east-south-east from Salden Chase, where meteorological conditions are likely to be similar.

Operational Impacts

Traffic

11.24 The effect of the operation of the proposed development was assessed by modelling concentrations of NO_2 and PM_{10} at the façade of the following receptors (the receptor number in brackets is shown on Figure 11.3):

- Thrift Farm (R1)
- Woodpond Farm (R2)
- 102 to 112 Porthcawl Green (R3)
- 38 Darnel Close (R4)
- 1 Ascot Place (R5)
- 1 Church End (R6)
- 1 Stoke Road (R7)
- 8 Bletchley Road (R8)
- 19a Bletchley Road (R9)
- 10 Whaddon Road (R10)
- Proposed dwellings (PR1 to PR8)

11.25 The receptors were chosen to represent those locations most likely to be affected by emissions from traffic using Salden Chase.

11.26 Concentrations were estimated for the following years and scenarios:

- 2008 – baseline conditions;
- 2011 – future assessment year without and with the proposed development; and
- 2026 – future assessment year without and with the proposed development.

11.27 The Design Manual for Roads and Bridges (DMRB) screening model (v1.03c, 2007) was used to estimate concentrations of NO_2 and PM_{10}. This model has been widely used in the UK for this type of assessment.

11.28 Data from the pollutant concentration maps referred to in LAQM.TG(09) were used to determine the background concentrations. The primary A road and minor road contributions from within the grid was removed from the background concentrations where the emissions from these sources were explicitly modelled. The background concentrations used are shown in Appendix 11.5. They are only available up to 2020, the 2026 background concentrations were assumed to be the same as those in 2020.

11.29 Annual average daily traffic (AADT) and percentage of heavy duty vehicles (HDVs), defined as vehicles over 3.5 tonnes, were provided by PBA's transport department, and are shown in Appendix 11.6. It was assumed that the average speed of the traffic was the same as the speed limit. The traffic from the proposed development was modelled for a 2026 assessment year only. Therefore, in order to assess a worst case assumption in terms of air quality, the predicted development traffic from 2026 was added to the 2011 baseline traffic flow for a 2011 with development scenario. Vehicle emissions are not available for years beyond 2025, therefore the modelled 2026 scenarios assumed that emissions would be the same as in 2025.

11.30 Predicted NO_x concentrations were converted to NO_2 using the NO_x to NO_2 conversion spreadsheet (v1.1) available from www.airquality.co.uk for Aylesbury Vale. Given the close proximity of Milton Keynes, a sensitivity test was undertaken using the converter for MKC. This produced slightly lower NO_2 concentrations, and therefore was not used.

11.31 Verification of the modelled results was carried out by comparing the modelled road contribution of NO_x with that derived from the concentrations measured using the diffusion tube monitoring carried out for this assessment using the methodology recommended in LAQM.TG(09). Details of the model verification calculations are shown in Appendix 11.3. The verification factor used for NO_x was 1.6.

11.32 As no local monitoring for PM_{10} is carried out a default factor of 5 was applied to the modelled data.

Proposed Railway Line

11.33 There are proposals to re-open the disused railway line to the south of the site as part of the East-West Rail project. PBA's transport department estimate that the re-opened rail line would – if it was opened to all forms of rail traffic - be unlikely to carry more than six diesel trains per hour (four passenger and two freight) throughout the day (0600-2300) and two freight trains per hour throughout the night (2300-0600). Given that receptors on the submitted development framework plan are approximately 75m from the rail line, the air quality impact will be insignificant and has not been considered further.

Landfill Odour

11.34 The potential for odour from Bletchley landfill to affect future residents at the site has been assessed by taking account of the distance and direction of Salden Chase from the landfill with regard to the prevailing wind direction. The 10-year wind rose from Luton Airport has been used to establish the prevailing wind (see Figure 11.2).

Impact Assessment Criteria

11.35 The following tables show the significance criteria used in this assessment, separate criteria have been used for the local amenity (dust complaints), and human health effects.

11.36 The significance criteria take account of the magnitude of the impact (i.e. the possible number of complaints or the predicted increase in concentrations) and the sensitivity of the receptors. The significance criteria for the operation of the site is based on experience of using the example criteria in 'Development Control: Planning for Air Quality' issued by the National Society for Clean Air and Environmental Protection (now know as Environmental Protection UK) in 2006, and the guidance on significance criteria being prepared by the Institute for Air Quality Management (IAQM).

11.37 Table 11.1 describes the magnitude of impact.

Table 11.1 Magnitude of Impact

Magnitude	Change in annual mean concentration[(a)]	Change in number of days[(b)] PM_{10} > 50µg/m^3 [(c)]	Dust Annoyance
Large	Increase/ decrease > 4.0 µg/m^3	>15 days	Large number of complaints possible from a wide area
Medium	Increase/ decrease 2.1 – 4.0 µg/m^3	5-15 days	Large number of complaints possible from a small area
Small	Increase/ decrease 0.4 – 2.0 µg/m^3	1-5 days	Few complaints possible
Imperceptible	Increase/ decrease < 0.4 µg/m^3	< 1 day	Complaints unlikely

Notes: (a) For pragmatic reasons the predicted concentrations should be presented to one decimal point i.e 0.1 µg/m^3. This does not reflect the model accuracy (b) When part days are calculated, round to nearest whole number. (c) For the construction phase it is not possible to quantify PM_{10} emissions, therefore the likelihood of an increase in PM_{10} leading to an exceedence of the 24-hour objective is used

11.38 In defining the sensitivity of receptors to dust deposition, the illustrative categories in MPS2 have been used (see section on Dust Annoyance). The sensitivity of receptors with respect to human health is defined by the air quality with development, i.e. the higher the concentrations the more sensitive it is to further increases.

11.39 Table 11.2 describes the sensitivity of receptors.

Notes: (a) Where there is relevant exposure, (b) The effect zone is assumed to be 200m around the site boundary, reducing to 100m with mitigation. Residential area is defined as a medium sensitive receptor, in the assessment we have assumed that a residential area comprised of 100 homes or more. Due to the temporary nature of dust impacts during construction there is considered to be no very highly sensitive receptors.

Table 11.2 Sensitivity of Receptors

Sensitivity	NO_2 and PM_{10} Annual mean concentrations [(a)]	Dust Annoyance [(b)]
Very high	Above NAQO with scheme (>40µg/m^3)	n/a
High	Just below NAQO with scheme (36-40µg/m^3)	More than two highly sensitive receptors within affected zone
Medium	Below NAQO with scheme (30-36µg/m^3)	More than one medium sensitive receptors, or one highly sensitive receptor within affected zone
Low	Well below NAQO with scheme (<30µg/m^3)	One medium sensitive receptor within affected zone.

11.40 Table 11.3 provides the significance criteria developed for assessing the effect on dust annoyance from the construction phase of the proposed development. As the effect on dust annoyance cannot be robustly quantified a risk based approach has been used to define the significance. It has been assumed that, due to the temporary and short-term nature of dust annoyance, there can be no major impact.

Table 11.3 Significance Criteria: Amenity

Dust Annoyance		Sensitivity		
		Low	Medium	High
Magnitude	Imperceptible	Negligible	Negligible	Negligible
	Small	Negligible	Minor	Minor
	Medium	Minor	Minor	Moderate
	Large	Minor	Moderate	Moderate

11.41 Table 11.4 shows the significance criteria developed for assessing the effect on human health, and applies to both the construction and the operational phases.

Table 11.4 Significance Criteria: Human Health

Human Health		Sensitivity			
		Low	Medium	High	Very High
Magnitude	Imperceptible	Negligible	Negligible	Negligible	Negligible
	Small	Negligible	Negligible	Minor	Minor
	Medium	Negligible	Minor	Moderate	Moderate
	Large	Minor	Minor	Moderate	Major

11.42 The significance criteria in Table 11.4 will vary for different receptors. In assigning the overall significance of the air quality impact professional judgement has been used, taking account of a range of factors such as the number of people likely to be affected, whether an NAQO is breeched as a result of the development, the extent by which any objective is exceeded and the duration of the impact.

11.43 Long term monitoring, where road traffic is the primary source of pollution, shows that the short term NO_2 objective is unlikely to be exceeded unless the annual mean concentration exceeds 60µg/m^3. This concentration has been used to assess the potential for exceedence of the short term objective.

Legislation and Policy

Legislation

Local Air Quality Management

11.44 Part IV of the Environment Act 1995 introduced a system of Local Air Quality Management (LAQM). This requires Local Authorities to regularly and systematically review and assess air quality within their boundaries against a series of objectives, and appraise development and transport plans against these assessments.

11.45 The Air Quality Strategy (2007) establishes the policy for ambient air quality for the UK. Its primary objective is to ensure that everyone can enjoy a level of ambient air quality in public places that poses no significant risk to health or quality of life, and to protect the environment. The Strategy sets out the national air quality objectives (NAQOs). Those included in LAQM are prescribed in the Air Quality (England) Regulations 2000 and the Air Quality (England) (Amendment) Regulations 2002.

11.46 The air quality objectives for the protection of human health apply to outdoor locations where people are regularly present, and where they might reasonably be expected to be exposed over the relevant averaging times (which vary from 15 minutes to a year). The air quality objectives do not apply to occupational, indoor or in vehicle exposure.

11.47 Where a NAQO is unlikely to be met, the local authority must designate an Air Quality Management Area (AQMA) and may need to draw up an Air Quality Action Plan (AQAP) setting out the measures it intends to introduce in pursuit of the objectives within its AQMA.

11.48 Over 230 local authorities have declared AQMAs. AVDC has declared three AQMAs for NO_2, however these are all located in Aylesbury, approximately 18km south of Salden Chase, and will not be affected by traffic generated by the proposed development. Milton Keynes Council (MKC) has also declared an AQMA for NO_2, however at approximately 20km north-north-east of Salden Chase, it will also be unaffected by traffic from the proposed development.

Air Quality Objectives

11.49 The NAQOs for NO_2 and PM_{10}, set out in the Air Quality (England) Regulations 2000 are shown in Table 11.5.

11.50 The Air Quality Strategy includes a new exposure reduction target of 25µg/m^3 for smaller particles known as $PM_{2.5}$ to be achieved by 2020. $PM_{2.5}$ is a subset of PM_{10}; therefore if concentrations of PM_{10} are less than 25µg/m^3, then the exposure reduction target for $PM_{2.5}$ is achieved. This pollutant has not been included in this assessment because it is not included in LAQM.

Table 11.5: NO_2 and PM_{10} Objectives included in the Air Quality (England) Regulations 2000

Pollutant	Objective	Date to be achieved by and maintained thereafter
Nitrogen dioxide (NO_2)	200µg/m^3 measured as a 1 hour mean, not to be exceeded more than 18 times a year	31 December 2005
	40µg/m^3 measured as an annual mean	
Particulate matter (PM_{10})	50µg/m^3 measured as a 24 hour mean, not to be exceeded more than 35 times a year	31 December 2004
	40µg/m^3 measured as an annual mean	

11.51 The Air Quality Standards Regulations 2007 implement the European Union's 1996 Air Quality Framework Directive on ambient air quality assessment and management (96/62/EC) and it's 'daughter' directives (1999/30/EC, 2000/69/EC, 2002/3/EC and 2004/107/EC). It includes limit values for NO_2 and PM_{10}. These are essentially the same as the NAQO values but the compliance date for NO_2 is 2010 instead of 2005. The onus is on central not local government for ensuring that the limit values are met. These are mandatory whereas there is no legal obligation to meet the NAQOs. Therefore, the limit values carry more weight than the NAQOs.

Air Quality Limit Values

11.52 The Directive on Ambient Air Quality and Cleaner Air for Europe (2008/50/EC) came into force in June 2008. This does not change the existing limit values but allows flexibility where compliance is difficult. The deadline for complying with the PM_{10} limit values can be postponed for three years after the Directive's entry into force (i.e. to June 2011), or by a maximum of five years from the compliance date for NO_2 (i.e. to January 2015), provided action measures are proposed.

11.53 Given the widespread exceedence of these objectives, the Government has applied to the European Commission for exemption from the obligation to apply the 24-hour mean limit value for PM_{10} in 8 zones/agglomerations, including the South East zone where Salden Chase is located. It is anticipated that the UK Government will also apply to the European Commission for exemption from the obligation to apply the annual mean limit value for NO_2 in many areas in 2010.

Planning Policy

National Policy

11.54 PPS23 advises that statutory nuisance is not intended to secure a high level of amenity, but is intended to deal with excessive emissions. Nuisance does not equate to a loss of amenity; that is there may be a loss of amenity before statutory nuisance occurs. It is therefore important for planning authorities to consider the loss of amenity from dust during construction in the planning process in its wider context and not just from the narrow perspective of statutory nuisance.

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Regional Policy

11.56 The South East Plan, Regional Spatial Strategy for the South East of England (2009) contains Policy NRM9: Air Quality:

"Strategies, plans, programmes and planning proposals should contribute to sustaining the current downward trend in air pollution in the region. This will include seeking improvements in air quality so that there is a significant reduction in the number of days of medium and high air pollution by 2026. Local development documents and development control can help to achieve improvements in local air quality through:

i. ensuring consistency with Air Quality Management Plans

ii. reducing the environmental impacts of transport, congestion management, and support the use of cleaner transport fuels

iii. mitigating the impact of development and reduce exposure to poor air quality through design, particularly for residential development in areas which already, or are likely to, exceed national air quality objectives

iv. encouraging the use of best practice during construction activities to reduce the levels of dust and other pollutants

v. assessing the potential impacts of new development and increased traffic levels on internationally designated nature conservation sites, and adopt avoidance and mitigation measures to address these impacts."

11.57 A County-wide Regional Air Quality Strategy (2006) has been produced by the Bucks Air Quality Management Group (BAQMG) and sets out the plans and actions drawn up to improve air quality in Buckinghamshire and Milton Keynes.

11.58 The strategy aims to ensure a uniform approach to air quality management and has identified key areas where it may influence and advance measures to improve air quality, including land use and transport planning, education and advice, alternative modes of transport and fuel and through enforcement and nuisance.

Local Policy

11.59 AVDC's Local Plan (2004) will be superseded by documents prepared as part of the Local Development Framework. The Secretary of State for Communities and Local Government has given permission for some policies to be saved until replaced by suitable LDF policies. However none of the saved policies relate to air quality.

11.60 The Aylesbury Vale Local Development Framework Proposed Submission Core Strategy (2009) includes within its strategic objectives a provision to ensure that the principles of the County Council's transport strategy for Aylesbury are applied, including the enhancement of public transport, traffic management and cycling and walking links in order to improve air quality.

11.61 Traffic Policy T10 in Milton Keynes Local Plan (2005) has been saved until replaced by a suitable LDF policy and states that *"Planning permission will be refused for development if it would be likely to generate motor traffic … (ii) Causing significant disturbance, noise, pollution or risk of accidents"*.

11.62 One of the objectives of Policy CS12 in the emerging Milton Keynes Council Core Strategy is to avoid the risk of exposure to poor air quality through the inappropriate location and design of development.

Air Quality Planning Guidance

11.63 Guidance for local authority air quality and planning officers on how to consider air quality within the development control process was issued by Environmental Protection UK (formerly the National Society for Clean Air and Environmental Protection (NSCA)) in November 2006. Although this has no statutory standing it is widely used by local authorities.

Dust and Odour Annoyance

11.64 There are no statutory limits on dust deposition or soiling during construction of infrastructure, and a number of different criteria and monitoring methods have been developed to assess whether or not complaints are likely.

11.65 Minerals Policy Statement 2 (MPS2) on controlling and mitigating the environmental effects of mineral extraction in England was published in March 2005. Annex 1 covers dust, and lays out the planning considerations the Government expects to be applied by Mineral Planning Authorities to dust emissions from surface mineral operations. It explicitly excludes building operations from its scope but then goes on to state that, as these operations share many features with surface mineral operations, operators should take account of the annex.

11.66 There are no statutory limits or recognised criteria defining levels of odour that can cause annoyance. The impacts are subjective and depend on the frequency, nature and intensity of the odour.

11.67 Enforcement action to control dust or odour annoyance can be taken under Part III of the Environmental Protection Act 1990. However, the Government expects developers to make proposals that are environmentally acceptable from the outset rather than relying on retrospective action.

Existing Baseline Conditions

Dust

11.68 Dust deposition is not typically monitored on a routine basis and there is no data available for the site.

Nitrogen Dioxide (NO2)

11.69 AVDC's and MKC's LAQM review and assessments conclude that the annual NAQO for NO_2 should be achieved at all locations where there is relevant exposure outside the AQMAs.

11.70 Annual mean NO_2 concentrations at MKC's Bletchley continuous monitor were 18µg/m^3 and 17µg/m^3 in 2003 and 2004 respectively, well below the annual objective.

11.71 Annual mean background NO_2 concentrations measured by MKC using diffusion tubes at St Andrews Road ranged from 21µg/m^3 to 26µg/m^3 between 2001 and 2004, also well below the annual objective.

11.72 The modelled background NO_2 concentration from data referred to in LAQM.TG(09) is 11µg/m^3 in 2008 at Salden Chase.

11.73 The data for the unadjusted and bias adjusted monitored annual mean concentrations from the Salden Chase NO_2 diffusion tube monitoring programme are shown in Table 11.6.

Table 11.6: Results from diffusion tube monitoring

Diffusion tube (number on Figure 11.1)[(a)]	Annual mean NO_2 concentration (µg/m^3)	
	Unadjusted	Bias adjusted (0.8)
D1 (R)	40	32
D2 (R)	25	17
D3 (K)	25	17
D4 (R)	23	16
D5 (R)	46	32
D6 (R)	35	24
D7 (R)	28	19
D8 (R)	51	35
D9 (B)	19	13
D10 (B)	19	13
D11 (B)	18	12

Notes: (a) K = kerbside (within 1m of kerb of busy road), R = roadside (within 1-5m of kerb of busy road), B = background (these locations are close to Whaddon Road, however low traffic volumes mean the data is likely to be representative of background concentrations)

11.74 Close to roads, annual mean NO_2 concentrations ranged from 16µg/m^3 to 35µg/m^3 and the annual objective is achieved. The annual objective is achieved at all locations monitored.

11.75 Away from busy roads, equivalent annual mean NO_2 concentrations ranged between 12 - 13µg/m^3, well below the annual objective.

11.76 Table 11.7 shows predicted annual mean NO_2 concentrations for the baseline year of 2008.

Table 11.7: Predicted annual mean NO_2 concentrations for 2008	
Receptor name (number on Figure 11.3)	**Predicted annual NO_2 concentrations ($\mu g/m^3$).**
Thrift Farm (R1)	28.6
Woodpond Farm (R2)	28.0
102 to 112 Porthcawl Green (R3)	23.9
38 Darnel Close (R4)	30.9
1 Ascot Place (R5)	18.5
1 Church End (R6)	18.3
1 Stoke Road (R7)	17.3
8 Bletchley Road (R8)	16.2
19a Bletchley Road (R9)	14.5
10 Whaddon Road (R10)	15.4

11.77 The results in Table 11.7 show that annual mean NO_2 concentrations are predicted to be below the annual objective at all modelled receptors in 2008.

Particulate Matter (PM10)

11.78 AVDC's and MKC's LAQM Review and Assessments conclude that the NAQOs for PM_{10} should be achieved at all locations within their boundaries.

11.79 The modelled background PM_{10} concentration from data referred to in LAQM.TG(09) is 16$\mu g/m^3$ at Salden Chase.

11.80 Annual mean PM_{10} concentrations at MKC's Bletchley continuous monitor were 23$\mu g/m^3$ and 16$\mu g/m^3$ in 2003 and 2004 respectively, well below the annual objective. The 24-hour objective value of 50$\mu g/m^3$ was exceeded on a maximum of 7 days out of a permitted 35 during a single year of the monitoring period.

11.81 Table 11.8 shows the predicted annual mean PM_{10} concentrations and the number of days when the 24-hour concentration is likely to exceeded 50µg/m^3 in 2008.

Table 11.8: Predicted PM_{10} concentrations for 2008

Receptor Name (number on Figure 11.3)	Annual mean PM_{10} concentrations (µg/m^3)	Number of days when PM_{10} >50µg/m^3
Thrift Farm (R1)	29.6	26
Woodpond Farm (R2)	29.0	24
102 to 112 Porthcawl Green (R3)	26.2	15
38 Darnel Close (R4)	31.9	35
1 Ascot Place (R5)	21.1	5
1 Church End (R6)	20.8	5
1 Stoke Road (R7)	20.1	4
8 Bletchley Road (R8)	19.3	3
19a Bletchley Road (R9)	18.3	2
10 Whaddon Road (R10)	18.8	2

11.82 The annual mean objective for PM_{10} is predicted to be achieved at all modelled receptors in 2008. The 24-hour objective is predicted to be just achieved at 38 Darnel Close (R4). However the predicted concentration may be an overestimate due to the assumed verification factor for PM_{10} of 5.

Summary of Baseline Air Quality

11.83 Air quality at the site is good. Measured and modelled NO_2 and PM_{10} concentrations indicate that the NAQOs are likely to be achieved.

Potential Effects

Construction Effects

11.84 The main potential effects during construction are dust deposition and elevated PM_{10} concentrations. The following activities have the potential to cause emissions of dust:

- Site preparation including:
    - demolition
    - delivery of construction material
    - erection of fences, barriers and scaffolding
    - removal of existing surfaces and structures
- Earthworks including:
    - stripping and relaying topsoil
    - excavation, digging foundations and landscaping
- Materials handling such as:
    - storage of material in stockpiles
    - spillage
- The construction of temporary roads
- Movement of construction traffic including haulage, vehicles and plant movements
- Construction and fabrication of infrastructure and buildings
- Disposal of waste materials off-site

11.85 Typically the main cause of unmitigated dust generation on construction sites is from demolition and vehicles using unpaved haul roads, and off-site from the suspension of dust from mud deposited on local roads by construction traffic.

11.86 The main determinants of unmitigated dust annoyance are the weather and the distance to the nearest receptor.

11.87 Figure 11.2 shows the ten year average wind rose for Luton Airport from 1994 to 2004 (not including 1998).

11.88 The prevailing wind is from the south through to the west, which occurred for approximately 47% of the time.

11.89 Wind speeds of moderate strength (3m/s) or greater are required to suspend dust in the air. For approximately 30% of the time the wind speed was less than moderate, below which dust is unlikely to become suspended in the air.

11.90 A daily rainfall of 0.2mm is considered sufficient to suppress dust. Analysis of rainfall data for the area around Salden Chase shows that, over the 30 year period from 1971 to 2000, an average of 44-47% of days were 'wet days' when there will be natural dust suppression.

11.91 For the majority of the time there will be little potential for dust generation even with no mitigation in place because:

- On approximately 44-47% of days the rainfall is greater than 0.2mm when there will be natural dust suppression

- In winter months surfaces tend to stay damp for significant periods of time
- 30% of the time winds are typically less than moderate strength and would not suspend dust in the air

11.92 However, there will be periods when sufficient dust may cross the site boundaries and cause annoyance. This is more likely in the summer months, when higher temperatures evaporate surface moisture more readily.

11.93 There are no highly sensitive receptors within 200m of the site boundary.

11.94 There are approximately 320 dwellings within 200m of the site boundary, the majority of which are located to the east of the site and downwind of the prevailing wind. Approximately 15 dwellings are located to the west of Salden Chase around Chase Farm. Dwellings at Bletchley Leys Farm, The Leys and New Leys will be surrounded by the proposed development.

11.95 The wind blows with enough strength from Salden Chase towards the dwellings to the east with enough strength to suspend dust approximately 41% of the time. Construction at the east of Salden Chase is likely to occur close to the site boundary. Given the scale of construction, there is a risk of dust annoyance at these dwellings during unfavourable conditions i.e. dry/windy weather.

11.96 Bletchley Leys Farm, The Leys and New Leys will be surrounded by the proposed development; therefore there is a high risk of dust annoyance at these receptors.

11.97 Most construction at the west of Salden Chase is likely to occur over 100m from the site boundary. Given that the prevailing wind blows from the south-west, dwellings around Chase Farm are unlikely to experience significant dust annoyance.

11.98 Any farms within 200m of Salden Chase are likely to be less sensitive to dust, given the nature of their work. Future residents of dwellings completed prior to the completion of construction across the site will be less sensitive to dust as they will move in with full knowledge that construction will be on going.

11.99 Typically 15-45% of construction dust is emitted as PM_{10}. This may give rise to elevated PM_{10} concentrations within 10m of relatively small sites, extending to 50-100m from major construction sites.

11.100 Dwellings close to the eastern site boundary may be exposed to elevated PM_{10} concentrations, along with Bletchley Leys Farm, The Leys and New Leys. Elevated exposure to PM_{10} may also occur where ongoing construction takes place close to newly occupied dwellings on the residential plots. Therefore extra consideration should be given to the recommended mitigation measures discussed later to reduce the exposure to elevated PM_{10} concentrations at these receptors.

11.101 Background PM_{10} concentrations are low; therefore it is unlikely that the 24-hour objective for PM_{10} will be exceeded.

Operational Effects

Nitrogen Dioxide (NO_2)

11.102 Table 11.9 shows the predicted annual mean NO_2 concentrations in 2011 and 2026 for without and with development.

Table 11.9: Annual mean NO_2 concentrations predicted in 2011 and 2026				
Receptor (number on Figure 11.3)	**Predicted annual mean NO_2 concentrations ($\mu g/m^3$)**			
	2011		**2026**	
	without	**with**	**without**	**with**
Thrift Farm (R1)	26.6	27.3	21.5	22.1
Woodpond Farm (R2)	26.0	26.6	21.0	21.6
102 to 112 Porthcawl Green (R3)	21.5	21.6	17.4	16.6
38 Darnel Close (R4)	28.0	28.5	22.1	22.4
1 Ascot Place (R5)	16.9	20.8	11.9	15.6
1 Church End (R6)	15.2	15.6	12.7	13.1
1 Stoke Road (R7)	15.5	16.1	12.7	13.3
8 Bletchley Road (R8)	13.6	13.6	11.2	11.2
19a Bletchley Road (R9)	13.5	13.6	11.0	11.0
10 Whaddon Road (R10)	13.5	14.2	11.2	11.8
Proposed dwelling (PR1)		16.8		13.3
Proposed dwelling (PR2)		14.3		11.0
Proposed dwelling (PR3)		19.4		15.1
Proposed dwelling (PR4)		21.8		16.9
Proposed dwelling (PR5)		18.1		13.7
Proposed dwelling (PR6)		16.8		13.0
Proposed dwelling (PR7)		19.3		15.5
Proposed dwelling (PR8)		17.0		13.5

11.103 Air quality is predicted to improve from 2008 to 2011, and again to 2026 as a result of the implementation of pollution control measures, such as the introduction of cleaner vehicles.

11.104 The annual NO_2 objective/EU limit value is predicted to be achieved by a wide margin at all modelled receptors, both without and with the proposed development.

11.105 In 2011, annual mean NO_2 concentrations are predicted to increase by 4 $\mu g/m^3$ at one receptor (1 Ascot Place (R5)), by up to 1$\mu g/m^3$ at five receptors (Thrift Farm (R1), Woodspond Farm (R2), 38 Darnal Close (R4), 1 Stoke Road (R7) and 10 Whaddon Road (R10)) and by less than 0.4 $\mu g/m^3$ at all other receptors. This 2011 with development scenario used the traffic for the completed development, and therefore is a worst case scenario.

11.106 In 2026, annual mean NO_2 concentrations are predicted to increase by 4 $\mu g/m^3$ at one receptor (1 Ascot Place (R5)), by up to 1$\mu g/m^3$ at four receptors (Thrift Farm (R1), Woodpond Farm (R2), 1 Stoke End (R7) and 10 Whaddon Road (R10)) and by less than 0.4 $\mu g/m^3$ at all other receptors.

11.107 Annual mean NO_2 concentrations are predicted to decline by 1 $\mu g/m^3$ at 102 and 112 Porthcawl Green (R3) due to a reduction of traffic flows on the A421 at this location.

11.108 As annual mean concentrations of NO_2 are predicted to remain well below 60$\mu g/m^3$, the 1-hour objective/EU limit value is achievable.

Particulate Matter (PM_{10})

11.109 Table 11.10 shows the predicted annual mean PM_{10} concentrations in 2011 and 2026 for without and with development.

Table 11.10: Annual mean PM_{10} concentrations predicted in 2011 and 2026				
Receptor (number on Figure 11.3)	**Predicted annual mean PM_{10} concentrations ($\mu g/m^3$)**			
	2011		**2026**	
	without	**with**	**without**	**with**
Thrift Farm (R1)	27.0	27.7	25.2	25.5
Woodpond Farm (R2)	26.5	27.1	24.8	25.1
102 to 112 Porthcawl Green (R3)	24.1	24.3	23.2	22.3
38 Darnel Close (R4)	29.1	29.7	27.2	27.2
1 Ascot Place (R5)	20.2	22.5	18.0	20.3
1 Church End (R6)	19.0	19.4	18.4	18.7
1 Stoke Road (R7)	19.2	19.7	18.5	18.8
8 Bletchley Road (R8)	17.9	17.9	17.3	17.3
19a Bletchley Road (R9)	17.8	17.8	17.1	17.2
10 Whaddon Road (R10)	17.8	18.3	17.3	17.7
Proposed dwelling (PR1)		20.0		19.0
Proposed dwelling (PR2)		18.6		17.6
Proposed dwelling (PR3)		23.1		21.5
Proposed dwelling (PR4)		25.3		22.8
Proposed dwelling (PR5)		20.9		19.0
Proposed dwelling (PR6)		20.8		19.4
Proposed dwelling (PR7)		23.0		21.4
Proposed dwelling (PR8)		21.2		19.7

11.110 Table 11.11 shows the number of days when PM_{10} concentrations are predicted to be greater than $50\mu g/m^3$ in 2011 and 2026 without and with development.

Table 11.11: The number of days when PM_{10} concentrations are predicted to be greater than $50\mu g/m^3$ in 2011 and 2026				
Receptor (number on Figure 11.3)	**Predicted number of days PM_{10} >$50\mu g/m^3$**			
	2011		**2026**	
	without	**with**	**without**	**with**
Thrift Farm (R1)	18	20	13	14
Woodpond Farm (R2)	16	18	12	13
102 to 112 Porthcawl Green (R3)	10	11	9	7
38 Darnel Close (R4)	24	26	18	18
1 Ascot Place (R5)	4	7	1	4
1 Church End (R6)	2	3	2	2
1 Stoke Road (R7)	3	3	2	2
8 Bletchley Road (R8)	1	1	1	1
19a Bletchley Road (R9)	1	1	1	1
10 Whaddon Road (R10)	1	2	1	1
Proposed dwelling (PR1)		3		2

Table 11.11: The number of days when PM_{10} concentrations are predicted to be greater than 50µg/m^3 in 2011 and 2026				
Receptor (number on Figure 11.3)	**Predicted number of days PM_{10} >50µg/m^3**			
	2011		**2026**	
	without	**with**	**without**	**with**
Proposed dwelling (PR2)		2		1
Proposed dwelling (PR3)		8		6
Proposed dwelling (PR4)		13		8
Proposed dwelling (PR5)		5		2
Proposed dwelling (PR6)		5		3
Proposed dwelling (PR7)		8		5
Proposed dwelling (PR8)		5		3

11.111 The PM_{10} objectives/EU limit values are predicted to be achieved at all modelled receptors both without and with the proposed development.

11.112 In 2011, annual mean PM_{10} concentrations are predicted to increase by 2 µg/m^3 at one receptor (1 Ascot Place (R5)), by up to 1µg/m^3 at five receptors (Thrift Farm (R1), Woodspond Farm (R2), 38 Darnal Place (R4)), 1 Stoke End (R7) and 10 Whaddon Road (R10)) and by less than 0.4 µg/m^3 at all other receptors.

11.113 In 2026, annual mean PM_{10} concentrations are predicted to increase by 2µg/m^3 at one receptor (1 Ascot Place (R5)) and by less than 0.4 µg/m^3 at all other receptors. Annual mean PM_{10} concentrations are predicted to decline by 1 µg/m^3 at 102 and 112 Porthcawl Green (R3) due to a reduction of traffic flows on the A421 at this location.

11.114 In 2011, the number of days where predicted concentrations exceed 50 µg/m^3 is predicted to increase by 1 – 4 days at five receptors (Thrift Farm (R1), Woodspond Farm (R2), 38 Darnal Place (R4), 1 Ascot Place (R5) and 8 Bletchley Road (R8)).

11.115 In 2026, the number of days where predicted concentrations exceed 50 µg/m^3 is predicted to increase by 1 – 2 days at three receptors (Thrift Farm (R1), Woodspond Farm (R2) and 1 Ascot Place (R3)) and to decline by 2 days at one receptor (102 and 112 Porthcawl Green (R3)).

Odour from Bletchley Landfill

11.116 Bletchley landfill is currently licensed to operate until 2022, when it will be restored and landscaped. Active landfill areas at Bletchley are over 1km from the eastern boundary of Salden Chase (see Figure 11.1). The prevailing wind blows from the landfill towards Salden Chase less than 13% of the time.

11.117 The infrequency of winds blowing from the landfill towards Salden Chase and the distance mean that any odour is likely to be imperceptible at the proposed development. Therefore it is considered unlikely that future residents will experience odour annoyance due to the landfill.

Mitigation Measures

Construction Mitigation

11.118 With mitigation dust annoyance may occur within 100m of dust generating activities. The effect on local PM_{10} concentrations is likely to be closer to the site.

11.119 The construction effects can be minimised through use of the recommended mitigation measures outlined below. The mitigation measures will be included within a Construction Code of Practice (CCoP) to be agreed with the local authority.

11.120 Dust control measures should be rigorously applied close to existing dwellings to the east of Salden Chase and within the site, and when ongoing construction occurs close completed dwellings to reduce the risk of dust complaints and public exposure to elevated PM_{10} concentrations.

Site preparation:

- Any particles generated during the erection of boundary fences, barriers and screens should be damped down using water suppression
- All land clearing activities should be damped down using water suppression, if necessary

Earthworks:

- Should be kept damp or avoided if possible, especially during dry weather
- Vegetation should only be removed in discrete sections and not all at once and completed earthworks should be sealed or re-vegetated as quickly as possible
- Soil mounds should be treated with surface binding agents or sealed by seeding or surfacing with vegetation or covered with secured tarpaulins

Materials handling and storage:

- Stockpiles should be of the minimum practicable height and should be located away from the site boundary, if feasible
- Stockpiles should be downwind of any sensitive receptors, where practicable, and should be stored only for the minimum period of time possible
- Stockpiles should be damped down as necessary

Haul routes:

- For minimisation of dust, haul routes should be away from sensitive locations such as dwellings and recreational areas wherever possible
- Heavily used areas should be paved as well as an area on the exit of the site
- Paved areas should be swept on a regular basis using a vacuum sweeper
- Non paved areas should have vehicle speeds limited to 15mph and be damped down during dry windy weather

Public Highways;

- Roads should be swept once per day to remove any visible soil material caused by the demolition/construction activities, if necessary

Vehicles and plant:

- Wheels of all site plant and vehicles should be cleaned so that mud is not spread on surrounding roads
- Exhaust emissions should not discharge straight at the ground. Construction plant and vehicles should be well maintained and regularly serviced ensuring MOT emissions standards for vehicles are met at all times. Visible smoke from plant should be avoided
- Defective plant should not be used
- Engines should be switched off when vehicles are not in use and refuelling areas should be away from areas of public access
- Vehicles delivering to the site should be covered

Construction and fabrication:

- Large quantities of bentonite or concrete slurries should be mixed in enclosed/screened areas and large concrete pours should be kept clean after concrete has set as these can create large quantities of airborne dust
- Cutting and grinding on site should be minimised. Where cutting or grinding is necessary equipment and techniques to minimise dust should be used

Waste:

- All waste should be removed from site and disposed to an appropriately licensed waste facility
- There should be no burning of any material onsite

Operational Phase

11.121 As the air quality objectives are predicted to be achieved by a wide margin during the operation of the proposed development, no mitigation is necessary.

Residual Effects

Construction Effects

11.122 There are no highly sensitive receptors within 100m of the site boundary. There are approximately 165 dwellings within 100m of the site boundary, of which approximately 150 are to the east and downwind of proposed construction activities during the prevailing wind. Some construction will take place close to the site boundary; however most will be some distance from the site boundary, and the potential impact from dust will be reduced.

11.123 Dwellings that are within 100m of dust generating activities may experience temporary short-term dust annoyance during dry and/or windy conditions and mitigation should be fully implemented in these areas.

11.124 Future on-site receptors may also experience short-term elevated PM_{10} concentrations during construction, however background concentrations are low and it is unlikely that the 24-hour objective will be exceeded.

11.125 The residual impact of the construction of the proposed Salden Chase development will be temporary and minor adverse impact according to the criteria set out in Table 11.3.

Operational Effects

11.126 The maximum increase in annual mean pollutant concentrations between the without and with development scenarios is predicted to be 4µg/m^3 at one receptor. The NAQOs will be achieved by a wide margin.

11.127 This would equate to a permanent residual impact from the operation of the proposed development of minor adverse significance according the criteria set out in Table 11.4.

Conclusions

11.128 Baseline air quality at Salden Chase is good, and monitored and modelled data show that the NAQOs for NO_2 and PM_{10} are likely to be achieved close to the site.

11.129 Approximately 165 dwellings may be affected by dust emissions during construction at the site and a number of complaints may be received during unfavourable conditions i.e. when dry and windy. However the risk will be reduced provided the recommended mitigation measures are fully implemented during construction, particularly close to existing receptors. Elevated PM_{10} concentrations may be experienced at receptors close to Salden Chase boundary, and at future dwellings occupied prior to the completion of construction, however given the low background concentrations the 24-hour PM_{10} objective is unlikely to be exceeded. Therefore the impact from the construction of the proposed development on air quality will be temporary and of minor adverse significance.

11.130 NO_2 and PM_{10} concentrations are predicted to increase by a maximum of 4 $\mu g/m^3$, with the NAQOs achieved by a wide margin. The impact from the operation of the proposed development on air quality will be permanent but of minor adverse significance.

11.131 Odour from Bletchley landfill is considered unlikely to cause an annoyance at proposed dwellings at Salden Chase.