

12 Air Quality and Dust

12.1 Introduction

12.1.1 The original air quality assessment for the proposed Kent International Gateway (KIG) development is contained within the chapter on air quality (Chapter 12) in the Environmental Statement (ES) dated June 2007.

12.1.2 There has since been a scheme change as reflected in the revised Parameters Plans contained within this supplemental ES (SES). This SES chapter on air quality assesses the impact of the revised scheme.

12.1.3 Since the submission of the original ES, Maidstone Borough Council (MBC) has extended their Air Quality Management Area (AQMA) to include the majority of the built-up area of Maidstone and the M20 between Junctions 6 and 8. Furthermore, Defra have revised technical guidance for local authorities on the assessment of air quality. The latest guidance, LAQM.TG(09)¹, published in February 2009, details the most current methodologies and tools to be used. The most significant changes are revised modelled background concentration maps, an updated NO_x to NO₂ relationship calculator, new future year adjustment tools and more detailed guidance on the assessment of biomass installations. As such, the air quality assessment set out in this SES follows the methodologies provided in LAQM.TG(09) and use the latest methodologies and tools to assess local air quality impacts.

12.1.4 Other significant revisions to the original ES include the following:

- The previous base year of assessment, 2006, has now changed to 2008, which is the most recent full calendar year for which both air quality monitoring and meteorological data are available;
- The study area has been extended to include the M20, between Junction 4 and Junction 8 and the A20 west of the proposed development site up to the junction with Willington Street; and
- Additional sensitive receptors within Maidstone and Tonbridge & Malling have been considered.

12.1.5 Whilst this chapter of the SES should be read in conjunction with the original ES (Chapter 12 Air Quality and Dust), the changes to the assessment methodologies employed, as described above, mean that the data and results set out in this SES and appendices should be considered to supersede those provided in the original ES unless otherwise stated.

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

12.2 Policy Context

Overview of Recent Air Quality Literature and Policy

12.2.1 The provisions of Part IV of the Environment Act 1995 establish a national framework for air quality management, which requires all local authorities in England, Scotland and Wales to conduct local air quality reviews. Section 82(1) of the Act requires these reviews to include an assessment of the current air quality in the area and the predicted air quality in future years. Should the reviews indicate that the standards prescribed in the Air Quality (England) Regulation 2000² and the Air Quality (England) (Amendment) Regulations 2002³ will not be met; the local authority is required to designate an Air Quality Management Area (AQMA). An Action Plan must then be prepared to ensure that air quality in the area improves. This process is known as 'local air quality management (LAQM)'. The European Union has set mandatory limit values which are similar to the AQS objectives. These are transcribed into the Air Quality Standards Regulations 2007⁴.

UK Air Quality Strategy (AQS)

12.2.2 The AQS (published in 2007) sets out an overall strategic framework for air quality in the UK. The AQS contains a list of national air quality objectives that need to be achieved by certain dates. These objectives are derived from EU limit values, which are transposed into national legislation by member states. The AQS is essentially a statement of policy intentions or policy targets, therefore there is no legal requirement to meet the objectives as set out in the AQS except where the objective is equivalent to the legally binding limit values as set out in EU Directives.

12.2.3 The AQS identifies ten ambient air pollutants that have the potential to cause harm to human health and three pollutants that have the potential to affect vegetation and ecosystems. Of the ten pollutants that have the potential to cause harm to human health, seven of these are associated with local air quality (benzene, 1,3-butadiene, carbon monoxide, lead, sulphur dioxide, nitrogen dioxide (NO₂) and particulate matter (PM₁₀)). The Air Quality Regulations as described in Paragraph 12.2.1 set standards and objectives for these seven pollutants. These objectives aim to reduce the health impacts of the pollutants to negligible levels.

² The Air Quality (England) Regulation 2000

³ The Air Quality (England) (Amendment) Regulations 2002 SI 2002 No 3043.

⁴ The Air Quality Standards Regulations 2007 SI 2007 No. 64.

12.2.4 The air quality objectives and limit values currently applying to the UK can be split into three groups. Each has a different legal status and is therefore handled differently within the framework of UK air quality policy. These are:

- UK air quality objectives set down in Regulations for the purposes of local air quality management (Table 1 of Appendix 12.1);
- UK air quality objectives not included in Regulations for the purposes of local air quality management (Table 2 of Appendix 12.1); and
- Legally binding EU limit values transcribed into UK legislation (Table 3 of Appendix 12.1).

12.2.5 With respect to local air quality management, local authorities only have a statutory obligation to review and assess the seven pollutants as described in Table 1 of Appendix 12.1.

12.3 Methodology

Scope of Assessment

12.3.1 The proposed development has the potential to impact on air quality during both the construction and operational phases. The main impacts during the construction phase will be related to the airborne dust generated by construction activities. These impacts have been assessed qualitatively. Following completion of the development, the main impacts on air quality will be the change in emissions of road traffic pollutants, in particular NO₂ and PM₁₀, caused by changes in traffic flows on routes to and from the proposed site. These impacts have been assessed on a local level using the AAQulRE regional dispersion model for the base year (2008) and the proposed opening year of the scheme (2016).

12.3.2 The base year of the assessment has changed to 2008 (2006 was used as the base year in the original ES) as this is the most recent year for which a full calendar year of monitoring data is available.

12.3.3 The following scenarios have been assessed in 2016:

- the Do-Minimum scenario (DM), which describes the local road network without the proposed development in place; and
- the Do-Something scenario (DS), which describes the local road network as affected by the proposed development.

- 12.3.4 An assessment has also been undertaken of the effect of construction traffic on local air quality using estimated construction traffic data provided by White Young Green Consulting Ltd. An assessment has been made for the year 2011, which is considered likely to have the greatest number of vehicle movements during the construction period.
- 12.3.5 The study area of this assessment has also been extended to include Junction 4 to Junction 8 of the M20 and the A20 west of the proposed development site up to the junction with Willington Street. Junction 4 to Junction 5 of the M20 is located within the administrative boundary of Tonbridge and Malling Borough Council. This study area is herein referred to as the Tonbridge and Malling study area. The remaining roads in this assessment are considered to be in the Maidstone study area.
- 12.3.6 Stationary diesel locomotives can give rise to high levels of sulphur dioxide (SO₂) close to the point of emission. LAQM.TG(09) suggests that emissions of SO₂ from diesel locomotives need to be considered in detail where there is the potential for regular outdoor exposure of individuals within 15 metres of the stationary locomotives. As there would be no regular outdoor exposure within 15 metres of idling diesel engines as a result of the proposed development then a detailed assessment is not required, which can be considered a positive indication that emissions from diesel engines would be unlikely to have a significant effect on local air quality.
- 12.3.7 LAQM.TG(03)⁵, which has since been replaced by LAQM.TG(09), suggested that NO_x emissions from diesel trains are *'unlikely to have any significant impact alongside railway tracks, but there is the potential for problems to occur in close proximity to large numbers of stationary, idling engines, for example at depot or terminus. The impact is unlikely to extend beyond a distance of about 50 metres'*.
- 12.3.8 With regards to idling engines, MDS Transmodal has confirmed that at the proposed site, one mainline locomotive will arrive or depart each hour of the day, with a number of extra trains at night. The mainline locomotive will arrive at the proposed site and then depart with a different train the next hour. During the time at the depot, trains will either be idling or moving while waiting to depart. In addition, a shunting locomotive will be operating continuously, moving two sections of one train into the terminal and returning with two sections of another train during this hour. Locomotives' engines will be switched off in the event that they have to remain on site for a longer period. Overall, there will be no more than two active locomotives on site at any one time.

⁵ Defra (2003). Local Air Quality Management: Technical Guidance LAQM.TG(03).

- 12.3.9 Therefore whilst diesel trains will be present on the proposed development site, they will not be present in large numbers at any one time and will predominantly be over 50 metres away from residential properties. As such, it is considered that NO_x emissions from diesel locomotives are unlikely to be significant and so have not been included within this assessment.
- 12.3.10 LAQM.TG(03) also suggested that '*whilst diesel locomotives ... emit PM₁₀ there is no evidence to suggest that there is any risk of the 24-hour or annual mean objectives being exceeded in 2004 or 2010. No further assessment is required.*' As such it is considered that PM₁₀ emissions from diesel locomotives are also unlikely to be significant and so have not been included within this assessment.
- 12.3.11 A preliminary assessment of emissions from proposed biomass boilers, which are likely to provide heating to some of the proposed development, has also been undertaken within this assessment using the BREEZE AERMOD model (version 6.2.1).
- 12.3.12 No sensitive ecosystems designated to be of national or European importance (SSSI, SPA, SAC or Ramsar sites) have been identified within 200 metres of roads likely to be significantly affected by the proposed development. The Design Manual for Roads and Bridges (DMRB)⁶ therefore suggests that no sensitive ecosystems will be significantly affected by pollutant emissions associated with the proposed development.

Methodology (Local Air Quality)

- 12.3.13 The AAQuIRE regional dispersion model, used to assess the effect of road traffic and biomass boiler emissions from the proposed development on local air quality, was developed by AECOM (formerly known as Faber Maunsell) and has been used widely for the past 15 years. The model uses the dispersion algorithms, CALINE4 and AERMOD, which have been independently and extensively validated. A more detailed description of the AAQuIRE dispersion model is included in Appendix 12.2.
- 12.3.14 There are 4 main categories of air pollutant sources: road traffic sources; industrial sources (Part A and B processes); diffuse sources (e.g. domestic heating); and mobile sources (e.g. airports, rail and shipping). For this assessment road traffic was modelled as line sources and biomass boilers as point sources. Emission from car and HGV car parking upon the proposed development site have been modelled as areas sources according to the methodology suggested within LAQM.TG(09). Further details can be found Appendix 12.7
- 12.3.15 Pollutant concentrations were predicted at sensitive receptors where the air quality objectives apply. In addition to the sensitive receptors modelled in the original ES, additional receptors

⁶ Available online at <http://www.standardsforhighways.co.uk/dmrb/>

located close to roads likely to be affected by traffic from the development have also been included in this assessment.

12.3.16 Note that contour plots were not produced for this SES and that the contour plots in the original ES are no longer valid.

Background Data

12.3.17 A large number of small sources of air pollutants exist, which individually may not be significant, but collectively, over a large area, need to be considered in the modelling process. The emissions from these background sources were applied to the model as background concentrations. Background concentrations used in this study were sourced from the Detling Rural Background automatic monitoring station. This site was chosen as it is considered representative of background concentrations at receptors likely to be affected by road traffic from KIG. To avoid double counting, the contributions from the M20 to background concentrations at this location were obtained from the UK national background maps⁷ centred on the grid square where the Detling monitoring station is located (580500, 189500) and subtracted from the monitored NO_x and PM₁₀ concentrations at the Detling station.

12.3.18 Since the relationship between NO_x and NO₂ is not linear, the calculator provided on the UK Air Quality Archive website⁸ was used to convert background NO_x concentrations to background NO₂ concentrations. The background concentrations used in this assessment are detailed in Table 12.1 and the background contribution from the M20 removed from monitored background concentrations to determine these concentrations shown in Table 12.2.

12.3.19 Background concentrations were determined for the relevant year according to the method outlined in LAQM.TG(09) where the ratio between the mapped background concentrations for 2016 and 2011 respectively, and 2008 was found, and this ratio applied to the base year background concentrations.

Table 12.1: Background Pollutant Concentrations (µg/m³)

Pollutant	Base Year 2008	Peak Construction Year 2011	Opening Year 2016
NO _x	19.1	17.0	14.8
NO ₂	16.1	14.5	12.9
PM ₁₀	18.5	18.0	17.7

⁷ Available online at <http://www.airquality.co.uk/laqm/tools.php?tool=background06>. Accessed 18/06/2009.

⁸ Downloaded from <http://www.airquality.co.uk/laqm/tools.php>. Accessed 17/06/2009.

Table 12.2: Contribution of M20 to Background Concentrations in Grid Square 580500, 189500

Pollutant	Base Year 2008	Peak Construction Year 2011	Opening Year 2016
NO _x	3.2	2.5	1.5
PM ₁₀	0.3	0.2	0.1

Meteorological Data

12.3.20 A meteorological dataset was compiled using data from Gatwick in 2008, with 16% missing cloud sourced from Gravesend. The use of this meteorological data correlates to the base year of this assessment and is considered to be representative of meteorological conditions affecting the study area.

12.3.21 The windrose for this location is shown in Appendix 12.3 along with further details about the methodology used to compile the meteorological data ready for the model.

Traffic Data

12.3.22 Traffic data were supplied by the Denis Wilson Partnership in the form of Annual Average Daily Traffic (AADT) flows and HGV proportions. Average speeds for the roads in the study area were estimated based upon local speed limits. Vehicle speeds were also reduced accordingly to between 20 kph and 40 kph to simulate vehicles slowing down when approaching traffic lights, junctions and roundabouts.

12.3.23 It should be noted that the traffic data used in this assessment do not account for a proposed reduction in floor space at KIG by approximately one sixth. Traffic flows associated with the development are therefore likely to be reduced by a similar amount. The air quality impacts presented in this assessment can therefore be considered more than worst case and are likely to overestimate the effect of the development on local air quality.

12.3.24 Existing traffic flows for the M20 between Junctions 4 to 7, were obtained from two sources; the Highways Agency's Traffic Information Database and the Department for Transport. Traffic flows for the latter are detailed in Maidstone's 2009 Updating and Screening Assessment⁹.

12.3.25 Full details of the traffic data used in this assessment can be found in Appendix 12.4.

⁹ Bureau Veritas (2009). Maidstone Borough Council LAQM Updating and Screening Assessment.

Boiler Emissions

12.3.26 Emissions of NO_x and particulates from three 500 kW biomass boilers have been included within this assessment based upon the information shown in Table 12.3 below, which was provided by Cudd Bentley Consulting Ltd. These boilers have been positioned at the larger buildings which form the proposed development. It should be noted that these data are the best that can be obtained at this stage pending more detailed design.

Table 12.3: Biomass Boiler Emissions Data

Parameter	Data Used
Grid References	580683, 156192 581015, 155991 581057, 155653
Gas Exit Temperature	140 °C
Stack Diameter	350 mm
Stack Exit Velocity	10 m/s
NO _x Emissions	0.065 g/s
Particulate Emissions	0.022 g/s
Stack Height	16 m

12.3.27 The assessment of these biomass boilers was undertaken in accordance with LAQM.TG(09), against the long-term (annual mean) and short-term (hourly mean for NO₂ and daily mean for PM₁₀) objectives. For the short-term calculations, contributions from these boilers were added to local background concentrations using the approach detailed in LAQM.TG(09). These calculations are detailed in Appendix 12.6.

Conversion of NO_x to NO₂

12.3.28 The proportion of NO₂ in NO_x varies greatly with location and time according to a number of factors, including the amount of ozone available and the distance from the emission source. The Air Quality Expert Group (AQEG)¹⁰ reported that urban NO_x concentrations had declined since the early 1990s as a result of decreasing road traffic emissions. Decreases in NO₂ were not as distinct, resulting in an increase in the NO₂/NO_x ratio. The magnitude of the increase was inconsistent with the increase expected solely as a consequence of reduced NO_x concentrations. The findings were supported by monitoring data from a number of locations in London and AURN data from across the UK.

¹⁰ AQEG (2004). Nitrogen Dioxide in the United Kingdom. Report prepared for Defra.

12.3.29 The observations prompted research into the NO₂/NO_x relationship and an updated version of the relationship was published, which is described in LAQM.TG(09). The spreadsheet provides a revised methodology for converting NO_x to NO₂ for any given year. This methodology has been used for the purpose of this assessment for all scenarios as the best representation of the NO₂/NO_x relationship for Maidstone. The 'All UK Traffic' setting was used.

Calculation of Daily Mean Exceedences

12.3.30 The number of PM₁₀ daily mean exceedences has been calculated from predicted annual average PM₁₀ concentrations using the equation below:

$$\text{No. of days PM}_{10} > 50 \mu\text{g/m}^3 = -18.5 + 0.00145 \times (a)^3 + 206/a$$

where a is the predicted annual mean PM₁₀ concentration

Model Verification (Maidstone Study Area)

12.3.31 Model verification involves the comparison of modelled data with monitored data. For this assessment, monitored NO₂ concentrations at diffusion tube sites have been compared with modelling results for the 2008 base case. Two diffusion tube sites at Amberleigh and Boxley Close, located between Junction 6-7 of the M20, and one diffusion tube site located on the A20 Ashford Road were used to verify the results of the AAQuIRE model. Monitored NO₂ concentrations were converted to monitored NO_x concentrations using the NO₂/NO_x relationship described above.

12.3.32 An initial comparison between monitored and modelled road NO_x contributions indicated that the AAQuIRE model was over-predicting NO_x concentrations at the two diffusion tube sites located close to the M20 and under-predicting NO_x concentrations at the A20 diffusion tube site. Due to the different characteristics of the pollution sources affecting these locations, one a motorway and another an A road, two separate adjustments were made as suggested within LAQM.TG(09). The first adjustment reduced NO_x contributions from the M20 and the second increase NO_x contributions from the A20 and surrounding roads.

12.3.33 The first factor of 0.83 was derived from the ratio of modelled road NO_x contribution to monitored road NO_x contributions at the Amberleigh diffusion tube site (Maid 41). An adjustment factor based on this one site was used (instead of an average ratio between Amberleigh and Boxley Close) as the recorded NO₂ concentration at the Amberleigh site was above the UK annual mean objective and significantly greater than the concentration measured at Boxley Close in 2008. Whilst an adjustment factor based solely on the Amberleigh site would lead to an over-prediction at Boxley Close this adjustment factor would be worst-case in terms of absolute pollutant concentrations. This factor of 0.83 was applied to the modelled NO_x contributions from the M20.

12.3.34 A second verification was carried out based on monitored NO₂ concentrations at the A20 diffusion tube site to adjust modelled road NO_x contributions from all other roads in the study area (i.e. all roads except the M20). An adjustment factor of 1.86 was obtained using the equation below:

$$\frac{(\text{Monitored road NO}_x \text{ contribution} - \text{'Adjusted' modelled road NO}_x \text{ contribution from M20})}{\text{Modelled road NO}_x \text{ contribution from all other roads}}$$

12.3.35 Following these model adjustments, modelled results were in good agreement with monitored concentrations. Modelled and monitored NO₂ concentrations at the A20 Ashford Road site (Maid 17) and the Amberleigh site (Maid 41) matched exactly, whilst NO₂ concentrations at Boxley Close site (Maid 14) were over-predicted by 11.5%.

12.3.36 Therefore a factor of 0.83 has been applied to modelled road NO_x contributions from the M20 within this assessment and a factor of 1.86 applied to modelled road NO_x contributions from all other roads.

12.3.37 LAQM.TG(09) recommends that in the absence of PM₁₀ monitoring against which predicted concentrations can be verified, the adjustment factor derived for NO_x can be used. Therefore, the adjustment factors derived for NO_x (all other roads), have also been applied to all modelled PM₁₀ concentrations.

Model Verification (Tonbridge & Malling Study Area)

12.3.38 NO_x concentrations modelled using the AAQuIRE model for the base year 2008 were verified against monitored data collected from four diffusion tube sites; New Hythe Lane, Bell Lane, Station Road and Teapot Lane, located in close vicinity to the M20 in Tonbridge & Malling. Monitored NO₂ concentrations at diffusion tube sites were converted to monitored roadside NO_x using the NO_x to NO₂ calculator (diffusion tubes worksheet), as described above.

12.3.39 An initial comparison of monitored roadside NO_x and modelled roadside NO_x indicated over-prediction of NO_x concentrations at three sites and an under-prediction at one site, Teapot Lane (Table 12.5). Whilst three of the modelled results were within 15% of monitored data, the Bell Lane site recorded a discrepancy of 19.4% between monitored and modelled NO₂ results.

12.3.40 With no further improvement of the model considered feasible (such as reducing vehicle speeds or using different pollutant background etc), an adjustment factor of 0.87 (Figure 12.1) was calculated to adjust modelled roadside NO_x concentrations. This factor was derived in accordance with LAQM.TG(09), based on a linear regression of the modelled and monitored road source contribution of NO_x, with the trend line intercepting zero.

12.3.41 After applying an adjustment factor of 0.87 to modelled traffic contributions NO_x the model under-predicted NO_2 concentrations at New Hythe Lane and Teapot Lane but over-predicted concentrations at Bell Lane and Station Road. More importantly, discrepancies between monitored and modelled results at all four sites fell to within 15%. Overall, modelled NO_2 concentrations were found to be in better agreement with monitored data.

12.3.42 A final comparison between total monitored NO_2 and total modelled NO_2 is shown in Figure 12.2. A regression factor of 0.9957 was derived from the graph, which suggests a good correlation between monitored concentrations and adjusted modelling results.

12.3.43 A summary of the model verification for Tonbridge and Malling study area can be found in Table 12.5, Figures 12.1 and 12.2.

12.3.44 Modelled PM_{10} concentrations for this study area were left unadjusted as this would represent a worst-case analysis.

Table 12.4: Model Verification against Maidstone's Diffusion Tubes

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Ref	Location	Total Mon NO ₂	Bckgrd NO ₂	Mon Road NO _x	Mod Road NO _x (M20)	Mod Road NO _x (Other)	Mod Road NO _x Total	Unadj Total Mod NO ₂	% Diff Unadj NO ₂	NO _x Adj Factor 1 (M20)	Adj Mod Road NO _x (M20)	NO _x Adj Factor 2 (Other)	Adj Mod Road NO _x (Other)	Overall Adj Total Mod NO _x (M20 and Other)	Overall Adj Total Mod NO ₂ (M20 and Others)	% Diff Adj NO ₂
		µg/m ³	µg/m ³	µg/m ³	µg/m ³	µg/m ³	µg/m ³	µg/m ³	µg/m ³			µg/m ³	µg/m ³	µg/m ³	µg/m ³	µg/m ³
Maid17	A20 Ashford Road (Façade No. 12)	23.1	16.1	15.6	2.3	7.3	9.7	20.6	-12		1.9	1.86 ^b	13.6	15.6	23.1	0.0
Maid14	Boxley Close (Lamp Post by No. 38 and 40)	31.8		37.9	58.7	0.1	58.7	38.7	18		48.6		0.1	48.8	35.5	11.5
Maid41	Amberleigh, Boxley Road	40.1		63.5	76.6	0.1	76.6	43.8	8	0.83 ^a	63.5		0.1	63.6	40.1	0.0

Note: ^a Ratio of Mon Road NO_x to Mod Road NO_x (M20) at highest NO₂ monitored site.

^b (Mon Road NO_x – Adj Mod Road NO_x (M20) / Mod Road NO_x (Other)

Column 3 – Total monitored NO₂ concentrations by Diffusion Tubes in 2008

Column 4 – Background NO₂ concentrations (see Table 12.1)

Column 5 – Monitored roadside NO_x (conversion undertaken using NO_x/NO₂ calculator)

Column 6 – Modelled roadside NO_x for M20 only, from AAQulRE

Column 7 – Modelled roadside NO_x for all other roads, from AAQulRE

Column 8 – Unadjusted total modelled NO_x concentrations

Column 9 – Unadjusted total modelled NO₂ concentrations (conversion undertaken using NO_x/NO₂ calculator)

Column 10 – % difference between unadjusted total modelled NO₂ concentrations and total monitored NO₂ concentrations

Column 11 – Adjustment factor applied to emissions from M20

Column 12 – Adjusted M20 NO_x emissions

Column 13 – Adjustment factor applied to all other roads

Table 12.5: Model Verification against Tonbridge & Malling's Diffusion Tubes

	Location	Total Mon NO ₂	Bckgrd NO ₂	Mon Road NO _x	Mod Road NO _x	NO _x Adj Factor (Fig.12.1)	Unadj Mod Road NO ₂	Unadj Total Mod NO ₂	% Diff Unadj NO ₂	Adj Mod Road NO _x	Adj Mod Road NO ₂	Adj Total Mod NO ₂	% Diff Adj NO ₂
		µg/m ³	µg/m ³	µg/m ³	µg/m ³		µg/m ³	µg/m ³		µg/m ³	µg/m ³	µg/m ³	
TN7	New Hythe Lane, Larkfield	34.7	16.1	46.3	49.0	0.87	19.5	35.6	2.6	42.5	17.3	33.4	-3.8
TN28	Bell Lane, Ditton	34.4		45.3	66.7		25.0	41.1	19.4	57.8	22.3	38.4	11.8
TN29	Station Road, Aylesford	30.4		34.0	46.2		18.6	34.7	14.2	40.1	16.5	32.6	7.2
TN30	Teapot Lane, Aylesford	42.0		70.0	64.0		24.2	40.3	-4.1*	55.5	21.6	37.7	-10.2

Note: * negative value denotes under-prediction.

Figure 12.1: Unadjusted Road Traffic NO_x Contribution

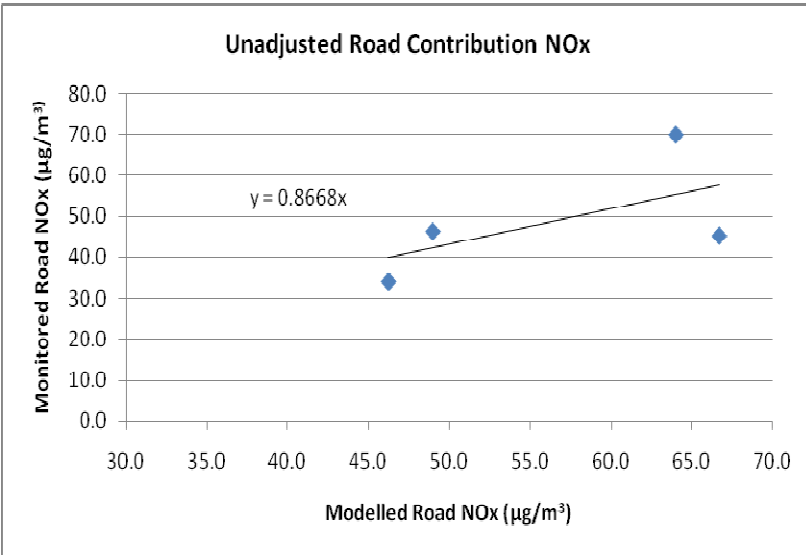
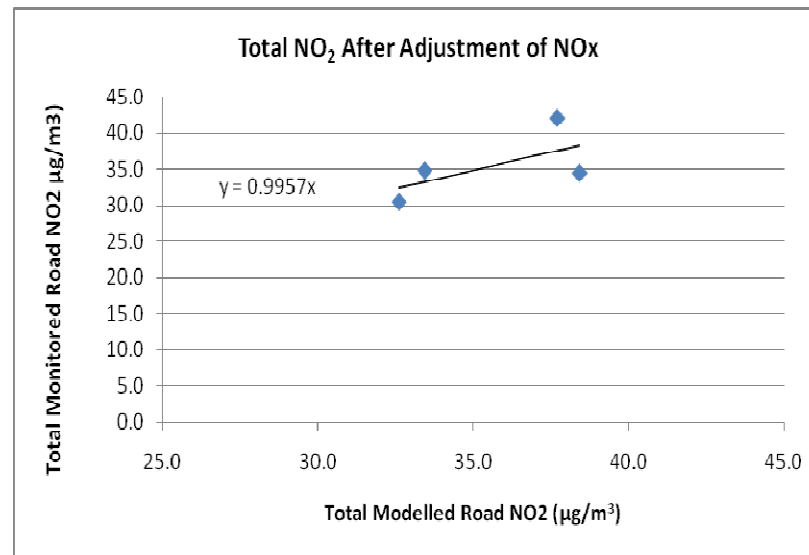


Figure 12.2: Total Modelled NO₂ after Adjustment



Methodology (Regional Air Quality)

12.3.45 Local air quality is characterised by pollutants with short-term, immediate impacts, but many of these pollutants can travel longer distances, and can have impacts on a regional, national, or international scale. These impacts, which include acidification, excess nitrogen deposition and generation of tropospheric (ground level ozone), may be felt by humans or ecosystems at considerable distances from the source of emissions.

12.3.46 Whilst increased traffic flows on local roads as a result of KIG (e.g. the M20) will lead to an increase in emissions of regional pollutants within the local area, consideration needs to be given to the effect of the KIG on emissions of regional pollutants over the UK road network as a whole. Freight transported by rail is considered to produce around 0.05 kg of CO₂ per tonne km compared to around 0.17 kg of CO₂ per tonne km for road transport. This indicates that freight transported by rail is likely to result in significantly less emissions of carbon per tonne (and presumably other regional pollutants) than if the same freight would be transported by road.

12.3.47 In the event KIG is not built, the freight concerned would be directed to warehouses at other locations. It is assumed that regional freight would instead travel to a site in Sittingbourne (the site of a recent major new consent for a warehouse) and national freight would travel to a site in Milton Keynes. Overall it is believed that KIG would reduce total HGV kms in the UK by 48 million HGV kms per year as compared to these likely alternatives, suggesting that KIG will have a significant beneficial impact on emissions of regional pollutants.

12.3.48 It is also important to note that at those locations along the Strategic Road Network (SRN) where reductions in traffic are predicted compared to alternative schemes, local air quality will also be improved. There are a significant number of AQMAs along the Strategic Road Network (SRN) which would therefore be adversely affected by traffic associated with alternative schemes¹¹, when compared to KIG.

Methodology (Construction Effects)

12.3.49 Fugitive dust emissions can pose a number of problems including detrimental effects on health, nuisance problems and effects on vegetation. The potential for a demolition or construction site to impact at sensitive receptors is dependent on many factors including the following:

- Proximity of sensitive receptors;
- Whether demolition will take place;
- Extent of any intended excavation;

¹¹ <http://www.highways.gov.uk/knowledge/1798.aspx> Accessed 26/06/2009

- Nature, location and size of stockpiles and length of time they are on site;
- Occurrence and scale of dust generating activities;
- Necessity for on site concrete crusher or cement batcher;
- Number and type of vehicles and plant required on site;
- Potential for dirt or mud to be made airborne through vehicle movements; and
- Weather conditions.

12.3.50 Examples of dust-sensitive receptors to be considered in this part of the assessment are listed in Table 12.6 below (taken from Minerals Policy Statement 2¹²).

Table 12.6: Dust Sensitive Receptors

High Sensitivity	Medium Sensitivity	Low Sensitivity
Hospitals and clinics	Schools	Farms
Retirement homes	Residential areas	Light and heavy industry
Hi-tech industries	Food retailers	Outdoor storage
Painting and furnishing	Greenhouses and nurseries	
Food processing	Horticultural land	
	Offices	

12.3.51 The following activities have the potential to give rise to dust emissions:

- Demolition processes;
- Site Preparation and Establishment;
- Storage/use of cement or other fine particulate materials;
- Wind blown material from areas with no vegetation cover;
- Material transfer to and from trucks/lorries;
- Material spills during transportation and handling;
- Vehicle/plant movements on unpaved haul routes and over construction sites;
- Construction and Fabrication processes (e.g cutting, grinding and sand-blasting);
- Concrete batching and finishing; and
- Construction Phase Impacts resulting from Site Traffic.

¹² Office of the Deputy Prime Minister (2005). Minerals Policy Statement 2: Controlling and Mitigating the Environmental Effects of Minerals Extraction in England.

12.3.52 The construction phases of the proposed redevelopment also have the potential to impact upon air quality on a local and regional scale through emissions from site vehicles and machinery.

12.4 Assessment Criteria

12.4.1 Reference has been made to the following planning guidance and strategic documents in order to determine the significance of the assessment results:

- The Defra 2009 policy and technical guidance notes, LAQM.PG(09)¹³ and LAQM.TG(09), issued by the Government to assist local authorities in their Local Air Quality Management responsibilities;
- The UK Air Quality Strategy;
- Planning Policy Statement 23 (PPS 23): Planning and Pollution Control¹⁴;
- The National Society for Clean Air and Environmental Protection (NSCA), Development Control: Planning for Air Quality (2006)¹⁵;
- Policy ENV 1 of the December 2000 Maidstone Borough-Wide Local Plan¹⁶;
- Policies NR5, 6 and 7 of the Kent and Medway Structure Plan¹⁷;
- Maidstone Borough Council's Local Air Quality Management Review and Assessment reports¹⁸;
- Tonbridge and Malling Council's Local Air Quality Management Review and Assessment reports¹⁹;
- Building Research Establishment (BRE), Control of Dust from Construction and Demolition Activities, 2003²⁰;
- Associated British Ports, Dibden Bay Air Quality Impact Assessment-Terminal TS/AQ1, 2000; and
- Office of the Deputy Prime Minister, Minerals Policy Statement 2, Controlling and Mitigating the Environmental Effects of Mineral Extraction in England: Annex 1 Dust.

12.4.2 Air quality impacts of a proposed scheme may be considered to be significant if air quality objectives are predicted to be breached and if the development leads to impacts on air quality at sensitive receptors. According to Environmental Protection UK (formerly known as the

¹³ Defra (2009). Local Air Quality Management: Policy Guidance LAQM.PG(09).

¹⁴ Office of the Deputy Prime Minister (2004). Planning Policy Statement 23: Planning and Pollution Control.

¹⁵ NSCA (2006). Development Control: Planning for Air Quality – 2006 Update.

¹⁶ http://www.maidstone.gov.uk/planning_building_control/local_development_framework/maidstone_local_plan_2000.aspx. Accessed 25/06/2009.

¹⁷ <http://www.kmsp.org.uk>. Accessed 25/06/2009.

¹⁸ Maidstone Borough Council LAQM Review and Assessment Reports. Available from http://www.maidstone.gov.uk/environment/environmental_enforcement/air_quality.aspx#laqm. Accessed 25/06/2009.

¹⁹ Tonbridge and Malling Borough Council LAQM Review and Assessment Reports. Available from <http://www.tmbc.gov.uk/cgi-bin/buildpage.pl?mysql=356>. Accessed 25/06/2009.

²⁰ BRE (2003). Control of Dust from Construction and Demolition Activities.

National Society for Clean Air (NSCA)) there are two main aspects which need to be taken into account when determining significance. These are:

- the magnitude of the change; and
- the absolute concentration in relation to air quality objectives.

12.4.3 The first aspect is addressed in Table 12.7 below, in which impacts are assigned a magnitude according to the relative change in pollutant levels.

Table 12.7: Assessment of the Magnitude of Change

Magnitude of Change	Annual Mean NO₂/PM₁₀	Days PM₁₀ > 50 µg/m³
Very Large	Increase / decrease > 25%	Increase / decrease > 25 days
Large	Increase / decrease 15-25%	Increase / decrease 15–25 days
Medium	Increase /decrease10-15%	Increase / decrease 10-15 days
Small	Increase / decrease 5-10%	Increase / decrease 5-10 days
Very Small	Increase / decrease 1-5%	Increase / decrease 1-5 days
Extremely Small	Increase / decrease < 1%	Increase / decrease < 1 day

12.4.4 The magnitude of change can then be compared to the absolute concentration in relation to the relevant air quality standard to derive an overall significance as detailed below in Table 12.8.

Table 12.8: Assessment of Significance

		Absolute Concentration in Relation to Standard				
		Above Standard with / without scheme	Below Standard without scheme, above Standard with scheme	Above Standard without scheme, below standard with scheme	Below Standard with / without scheme but not well below	Well Below Standard with / without scheme (< 75% of the standard level)
Magnitude of Impact	Extremely Small	Slight Adverse / Beneficial	Slight Adverse	Slight Beneficial	Negligible	Negligible
	Very Small	Slight Adverse / Beneficial	Moderate Adverse	Moderate Beneficial	Slight Adverse / Beneficial	Negligible
	Small	Substantial Adverse / Beneficial	Substantial Adverse	Substantial Beneficial	Slight Adverse / Beneficial	Slight Adverse / Beneficial
	Medium	Substantial Adverse / Beneficial	Substantial Adverse	Substantial Beneficial	Moderate Adverse / Beneficial	Slight Adverse / Beneficial
	Large	Very Substantial Adverse / Beneficial	Very Substantial Adverse	Very Substantial Beneficial	Moderate Adverse / Beneficial	Slight Adverse / Beneficial
	Very Large	Very Substantial Adverse / Beneficial	Very Substantial Adverse	Very Substantial Beneficial	Substantial Adverse / Beneficial	Moderate Adverse / Beneficial

Note: 'standard' in this table relates to the specific air quality objective or Limit value in question.

12.4.5 The impacts of airborne dust generated during the construction phase of the proposed scheme have been assessed qualitatively. Fugitive dust emissions can pose a number of problems including detrimental effects on health, nuisance problems and effects on vegetation. The criteria listed in Table 12.9 are drawn from professional experience of many different types of project, discussions with practitioners in the field and published reports. Together with a consideration of the scale and duration of construction activities close to sensitive receptors, these criteria form the basis of the evaluation of significance and severity of effects.

Table 12.9: Assessment Criteria for Dust and PM₁₀ from Construction Activities

Source	Potential Distance for Significant Effects (Distance from Source)				
	Description	Scale	Duration ^a	Soiling	PM ₁₀ ^b
No Mitigation					
Large sites, high use of haul routes.	Major	Year or more	500 m	100 m	100 m
Moderate sites, moderate use of haul routes.	Moderate	Months	200 m	50 m	50 m
Minor sites, limited use of haul routes.	Minor	Weeks	100 m	25 m	25 m
Mitigation					
Large sites, high use of haul routes.	Major	Year or more	100 m	25 m	25 m
Moderate sites, moderate use of haul routes.	Moderate	Months	50 m	15 m	15 m
Minor sites, limited use of haul routes.	Minor	Weeks	25 m	10 m	10 m

Notes: ^a – duration applies to time near to a particular receptor; ^b – significance is based on the 24-hour PM₁₀ objective.

12.5 Pollutants of Concern

12.5.1 The pollutants of concern considered in this assessment are detailed in Section 14(d) of the original ES.

12.6 Baseline Conditions

12.6.1 Baseline information provided in the original ES remains valid, however, a number of changes have occurred in Maidstone since the submission of the original ES, namely the expansion of the Maidstone AQMA in 2008. This section of the SES provides an update of Local Air Quality Management in Maidstone and reviews the most recent air quality monitoring undertaken.

12.6.2 The study area of this assessment has extended to Junction 4 of the M20, which is located within the administrative area of Tonbridge and Malling Council, therefore, this section also includes additional an additional summary of local air quality conditions in Tonbridge & Malling.

Summary of Local Air Quality Management – Maidstone Borough Council (MBC)

12.6.3 Part IV of the Environment Act 1995 places a statutory duty on local authorities to review and assess the air quality within their area and take account of Government guidance when undertaking such work.

12.6.4 The first round of assessments undertaken by MBC between 1998 and 2001 concluded that it was necessary to declare an AQMA for NO₂ along the M20 corridor between Junctions 6 and

7 due to road traffic emissions. An Air Quality Action Plan²¹ was developed in order to improve air quality within the M20 AQMA, in partnership with the Highways Agency.

12.6.5 The second round of Review and Assessment (2003 – 2004) undertaken by MBC concluded that there was a risk of exceedences of the NO₂ annual mean objective at the nearest receptors to the main roads through Maidstone Town Centre. MBC declared a further AQMA within the Town Centre on 1st January 2005. Road traffic emissions were identified as the major source of NO_x and PM₁₀ emissions in the AQMA. Following this declaration, MBC produced an Air Quality Action Plan for Maidstone Town Centre²², in partnership with Kent County Council.

12.6.6 The third round of the Review and Assessment process was carried out between 2006 and 2008. The 2006 USA²³ undertaken in April 2006 concluded that the air quality objectives for benzene, 1, 3-butadiene, carbon monoxide, lead, and sulphur dioxide would be met within the Borough, although a Detailed Assessment was required for NO₂ because of emissions from road traffic at two locations in the Borough, along Well Road and Fountain Lane. A Detailed Assessment was also required for both NO₂ and PM₁₀ at the junction of Loose Road and Sutton Road. The conclusion of the 2007 Detailed Assessment²⁴ was that the annual mean objective for NO₂ was likely to be exceeded at locations of relevant exposure in 2006 and 2010, although the annual mean and 24-hour mean objectives for PM₁₀ were likely to be achieved at these receptors. It was recommended that MBC declared an AQMA at the three assessed locations – Well Road, Fountain Lane and the junction of Loose Road/Sutton Road, for the pollutant NO₂. Also, it was recommended that the Council undertook further monitoring of NO₂ at the worst-case receptor at the Loose Road/Sutton Road junction to confirm the findings of the Detailed Assessment.

12.6.7 Following the completion of the Detailed Assessment, MBC published an AQMA Options Report in 2008²⁵, detailing the various AQMA options available. The Council then revoked the 2001 AQMA Order and amended the 2005 Maidstone Town centre AQMA to include the whole of Maidstone Town conurbation, including the M20 between Junctions 6 and 7 and a further area between Junctions 7 and 8. The AQMA declared in July 2008, applies to both NO₂ (annual mean) and PM₁₀ (24-hour mean).

Local Air Quality Monitoring in Maidstone

12.6.8 MBC undertakes monitoring of NO₂ and PM₁₀ at two automatic monitoring sites within the Borough, the results from which are shown in Tables 12.10 to 12.12 below.

²¹ Maidstone Borough Council (2003). Air Quality Action Plan for Maidstone.

²² Maidstone Borough Council (2007) Maidstone Town Centre Air Quality Action Plan.

²³ Maidstone Borough Council (2006). Updating and Screening Assessment.

²⁴ Maidstone Borough Council (2007). Local Air Quality Management Detailed Assessment Report.

²⁵ Maidstone Borough Council (2008). Report to Outline the Options Regarding the Declaration of New or Amended Air Quality Management Area(s).

Table 12.10: Monitored Annual Average NO₂ Concentrations (µg/m³)

Monitoring Site	2005	2006	2007	2008
Detling Rural Background Site	17	18	18	18
Fairmeadow Roadside Site	51	51	51	44

Table 12.11: Monitored Annual Average PM₁₀ Concentrations (µg/m³)

Monitoring Site	2005	2006	2007	2008*
Detling Rural Background Site	20	21	21	17 (19)
Fairmeadow Roadside Site	31	33	31	24 (28)

Note: 2008 PM₁₀ results were obtained using the Volatile Correction Model (VCM) to estimate gravimetric equivalence. The results for previous years and the results for 2008 in brackets were corrected by a factor of 1.3 as suggested within LAQM.TG(03).

Table 12.12: Monitored Number of Exceedences of Daily PM₁₀ Objective

Monitoring Site	2005	2006	2007	2008*
Detling Rural Background Site	4	4	9	4 (8)
Fairmeadow Roadside Site	18	25	27	12 (13)

Note: 2008 PM₁₀ results were obtained using the Volatile Correction Model (VCM) to estimate gravimetric equivalence. The results for previous years and the results for 2008 in brackets were corrected by a factor of 1.3 as suggested within LAQM.TG(03).

12.6.9 It can be seen that the annual average objective for NO₂ was exceeded at the Fairmeadow roadside site in all four years since 2005. NO₂ concentrations at the Detling rural background site however are well below the annual mean objective.

12.6.10 No exceedences of the annual objective or daily mean objective for PM₁₀ have been recorded at either site.

12.6.11 In addition to the automatic monitoring of pollutants, MBC also measure concentrations of NO₂ using diffusion tubes at forty-seven sites across the Borough of which twelve of these are located within the study area.

12.6.12 The diffusion tubes used within the Maidstone diffusion tube network are supplied and analysed by Harwell Scientifics, using the 50% Triethanolamine (TEA) in acetone preparation method. Locally derived bias adjustment factors were applied to diffusion tube results. These factors were 0.97 for 2006, 0.92 for 2007 and 0.79 for 2008.

12.6.13 Table 12.13 below show the monitoring results obtained from the twelve diffusion tube sites located within the study area.

Table 12.13: Bias Adjusted NO₂ Diffusion Tube Results – Maidstone (µg/m³)

Ref	Monitoring Site	OS Grid Reference	Data Capture 2008 (%)	2006	2007	2008
Maid 10	Grange Lane South (Telegraph Pole by Yew Tree PH)	575714, 158504	83	37	44	35
Maid 11	Boarley Lane (Telegraph Pole Near Letterbox)	575718, 158653	83	39	36	30
Maid 12	Grange Lane North (Opposite Cookes's Cottage)	576473, 158198	33*	32	33	24
Maid 14	Boxley Close (Lamp Post by No. 38 and 40)	577018, 157758	100	39	40	32
Maid 17	A20 Ashford Road (Façade No. 12)	578658, 155367	100	30	33	23
Maid 24	Brookbank (Outside No. 10)	576536, 15927	58*	28	33	24
Maid 41	Amberleigh, Boxley Road	576893, 157763	92	48	47	40
Maid 55	1 Pilgrims Way (Sign Post) (Start Date 06/08/2007)	579106, 158411	100	-	43	39
Maid 57	29A Forstal Road Cottages, Forstal Road (Start Date 07/08/07, triplicate from 30/09/2008)	573929, 158763	83	-	77	59
Maid 60	30mph Sign Near 119 Hockers Lane	578987, 156769	17*	-	-	21
Maid 61	Fence around Land Adjacent to 8 Fancy Row Thurnham Lane	580130, 156453	25*	-	-	21
Maid 62	Road Sign Outside Front of White Heath	582046, 154775	17*	-	-	31

12.6.14 Monitored NO₂ concentrations at Amberleigh, Boxley Road (Maid 41) breached the UK annual mean NO₂ objective of 40 µg/m³ in 2006, 2007 and 2008. In addition, four other sites exceeded the objective in 2007, one of which, 29A Forstal Road Cottages (Maid 57), also recorded concentrations of NO₂ in excess of the objective in 2008.

12.6.15 The diffusion tubes located at Boxley Close (Maid 14), A20 Ashford Road (Maid 17) and Amberleigh, Boxley Road (Maid 41) were used to verify modelled NO₂ concentrations. These three sites were selected for model verification due to their proximity to the roads most likely to be affected by the proposed development, the M20 and A20, as well as their high data capture rates for 2008.

Summary of Local Air Quality Management – Tonbridge and Malling Borough Council

12.6.16 Tonbridge and Malling BC undertook Round 1 of the Review and Assessment process between 1998 and 2000. All seven pollutants with the exception of NO₂ and PM₁₀ were predicted to meet their respective air quality objectives. The Stage 3 and Stage 4 assessments revealed that the objectives for NO₂ and PM₁₀ were unlikely to be met adjacent to the M20 between New Hythe Lane, Larkfield and Hall Road, Aylesford. Consequently, an AQMA was declared along this stretch of the M20 in May 2001, referred to as the M20 AQMA. An Air Quality Action Plan²⁶ was produced jointly with the neighbouring Maidstone Borough Council, which found similar issues relating to the M20.

12.6.17 The Council started Round 2 of the Review and Assessment process with the 2003 Updating and Screening Assessment²⁷. The UAS concluded that a Detailed Assessment was not required for any of the pollutants apart from NO₂, which required assessment at four junctions – the A228 Castle Way/London Road, Leybourne; the A26 Tonbridge Road/Red Hill, Wateringbury; the A20 London Road/Station Road, Ditton; and the southern end of Tonbridge High Street.

12.6.18 Modelling undertaken in 2004²⁸ indicated that the annual mean objective for NO₂ was likely to be met at sensitive receptors located near to the A228 Castle Way/London Road junction. The remaining three assessed junctions were unlikely to achieve the objective and therefore the Council proceeded to declare AQMAs at these three junctions in May 2005. Actions to improve air quality within these AQMAs were proposed in the Local Transport Plan for Kent²⁹ and the Tonbridge Central Area Action Plan.

12.6.19 The third round of Review and Assessment began with the Updating and Screening Assessment³⁰ in 2005. A Detailed Assessment³¹ for NO₂ was found to be necessary at locations on the A20 London Road corridor in the Medway Gap. Modelling concluded the need for two AQMAs, which the Council proceeded to declare. These two AQMAs encompass the A20 at Larkfield/Ditton and Aylesford.

Local Air Quality Monitoring in Tonbridge & Malling

12.6.20 Tonbridge & Malling Borough Council currently undertakes monitoring for NO₂ by automatic analyser at one location and by diffusion tubes at twenty-six locations within the Borough.

²⁶ Tonbridge and Malling Borough Council (2003). Air Quality Action Plan for Tonbridge and Malling.

²⁷ Air Quality Consultants Ltd on behalf of Tonbridge and Malling Borough Council (2003). Updating and Screening Assessment of Air Quality in the Borough of Tonbridge & Malling.

²⁸ Tonbridge and Malling Borough Council (2004). Detailed Assessment of Local Air Quality.

²⁹ Kent County Council. Local Transport Plan for Kent; 2006 – 2011. Available online at <http://www.kent.gov.uk/static/local-transport-plan/>. Accessed 25/06/2009.

³⁰ Bureau Veritas on behalf of Tonbridge and Malling Borough Council (2006). Updating and Screening Assessment of Local Air Quality.

³¹ Bureau Veritas on behalf of Tonbridge and Malling Borough Council (2007). Detailed Assessment of Local Air Quality.

12.6.21 The Council first located a continuous monitoring station at the south end of Tonbridge High Street (within the AQMA) in April 1997. Monitoring was undertaken at this location until 2004. This continuous monitoring station was moved to another location within the AQMA on Tonbridge High Street in July 2007, at the first floor of property number 12-14.

12.6.22 NO₂ concentrations measured at these continuous monitoring sites can be obtained from the KentAir website and previous Review and Assessment reports.

12.6.23 Table 12.8 below shows the measured concentrations at five diffusion tube sites located along the M20 in Tonbridge and Malling. These tubes, except for Hall Road, were used in this assessment for verification purposes. The diffusion tube at Hall Road was excluded due the low capture rate in 2008.

Table 12.14: Bias Adjusted NO₂ Diffusion Tube Results – Tonbridge & Malling (µg/m³)

Ref	Monitoring Site	OS Grid Reference	Type	Data Capture 2008 %	2006	2007	2008
TN7	New Hythe Lane, Church Farm, Larkfield	570428, 158936	Urban Industrial	92	40	37	35
TN05	Hall Road, Aylesford	572600, 158600	Urban Industrial	33*	54	50	44*
TN28	Bell Lane, Ditton	570840, 158910	Urban Industrial	92	n/a	39	34
TN29	Station Road, Aylesford	571596, 158726	Urban Industrial	100	n/a	36	30
TN30	Teapot Lane, Aylesford	572031, 15877	Urban Industrial	92	49	46	42

Note: * Only four months of monitoring in 2008 giving a data capture of 33%.

12.6.24 Diffusion tubes used between 2006 and 2008 were supplied and analysed by Harwell Scientifics using the 50% TEA in acetone method.

12.6.25 The diffusion tubes at both Hall Road and Teapot Lane consistently measured concentrations of NO₂ above that of the UK annual mean objective between 2006 and 2008. Note however that the NO₂ concentration recorded at Hall Road in 2008 is an average of only four months data and has not been annualised.

Proposed Development in relation to AQMAs

12.6.26 The proposed development site is not located within the AQMA boundary declared by Maidstone Borough Council, however, the site is located in close vicinity to the AQMA boundary and has the potential to impact on pollutant concentrations in the vicinity of the M20 and A20.

12.7 Local Air Quality Assessment Results

Operational Effects

12.7.1 Concentrations of NO₂ and PM₁₀ were predicted for 2008 and 2016, with and without KIG, at existing sensitive receptors within the study area. A map showing the location of these receptors is provided in Appendix 12.5. The results of the assessment are shown in Tables 12.15 to 12.20 below. Table 12.21 also provides information regarding the predicted contributions from road traffic and biomass boilers respectively in 2016.

Table 12.15: Annual Average NO₂ Assessment Results (Maidstone Study Area)

Ref	Description	Annual Mean NO ₂ Concentration (µg/m ³)			
		2008	2016		
			DM	DS	Impact
1	45, Mallings Drive	18.8	14.5	15.2	0.7 (4.8%)
2	Springfield	21.1	16.2	16.9	0.6 (3.9%)
3	Nether Lodge	27.7	20.2	21.0	0.9 (4.3%)
4	Tollgate House	28.1	20.8	21.6	0.9 (4.2%)
5	Pine Cottage	22.2	16.7	18.1	1.5 (8.8%)
6	The Caves	22.4	16.9	21.4	4.5 (26.8%)
7	Old England Cottage	25.5	19.3	20.6	1.3 (6.5%)
8	Elsfield House	25.5	19.3	20.2	0.9 (4.8%)
9	Woodcut Cottage, Crismill Lane	25.0	18.6	21.9	3.2 (17.3%)
10	1 Eyhome Street	24.8	18.5	19.3	0.8 (4.2%)
11	Sandling Primary School	23.0	17.3	18.5	1.2 (6.6%)
12	Chestnuts, Ashford Road	23.7	17.6	21.5	3.9 (22.2%)
13	2 Crismill Cottage	19.6	15.1	16.2	1.1 (7.2%)
14	1 Keepers Cottages, Thurnham	19.6	15.2	15.8	0.7 (4.5%)
15	112 Hockers Lane	18.2	14.2	14.6	0.4 (3.0%)
16	8 Harbour Lane Cottages	44.3	32.9	37.1	4.2 (12.8%)
17	Amberleigh, Harbour Lane Close	41.3	30.5	34.3	3.9 (12.8%)
18	68 Hockers Lane	21.1	16.2	17.0	0.8 (5.2%)
19	40 Boxley Close	31.6	23.2	25.7	2.5 (10.7%)
20	Sheepwash Cottage, Downs View Road	29.9	22.0	24.2	2.2 (10.0%)

Ref	Description	Annual Mean NO ₂ Concentration (µg/m ³)			
		2008	2016		
			DM	DS	Impact
21	Cookes Cottage	26.9	19.9	21.6	1.7 (8.5%)
22	Little Holland, Boarley Lane	26.5	19.7	21.3	1.7 (8.4%)
23	4 Farthings Cottages	27.0	20.0	21.7	1.8 (8.8%)
24	Stream Cottages	21.9	16.6	17.5	0.9 (5.5%)
25	Willow Lodge	22.6	17.1	18.1	1.0 (5.7%)
26	29a Forstal Cottages	18.6	14.5	14.9	0.4 (2.6%)
27	Cobtree Manor House, Forstal Road	23.1	17.5	18.5	1.0 (5.8%)
28	Hillside	39.3	28.9	32.4	3.6 (12.3%)
29	12 Ashford Road	31.2	22.4	23.1	0.7 (2.9%)

Table 12.16: Annual Average NO₂ Assessment Results (Tonbridge & Malling Study Area)

Ref	Description	Annual Mean NO ₂ Concentration (µg/m ³)			
		2008	2016		
			DM	DS	Impact
30	Preston Hall Hospital	20.8	15.8	16.6	0.8 (4.9%)
31	17 Ash Close	35.2	25.7	28.7	3.0 (11.8%)
32	13 The Beeches	35.7	26.1	29.2	3.1 (11.8%)
33	11 Yew Tree Close	39.1	28.6	32.2	3.6 (12.7%)
34	10 Sedley Close	28.8	21.1	23.1	2.0 (9.6%)
35	Aylesford School Sports College	23.3	17.5	18.6	1.1 (6.3%)
36	101 Teapot Lane	35.7	26.0	29.2	3.2 (12.1%)
37	131 Station Road	27.0	19.9	21.7	1.7 (8.7%)
38	2 Oak Drive	32.7	23.8	26.5	2.7 (11.1%)
39	15 Cygnet Close	31.8	23.2	25.7	2.5 (10.7%)
40	Brookfield Junior School	20.6	15.8	16.5	0.7 (4.6%)
41	237 Lunsford Lane	37.8	27.6	31.0	3.4 (12.3%)

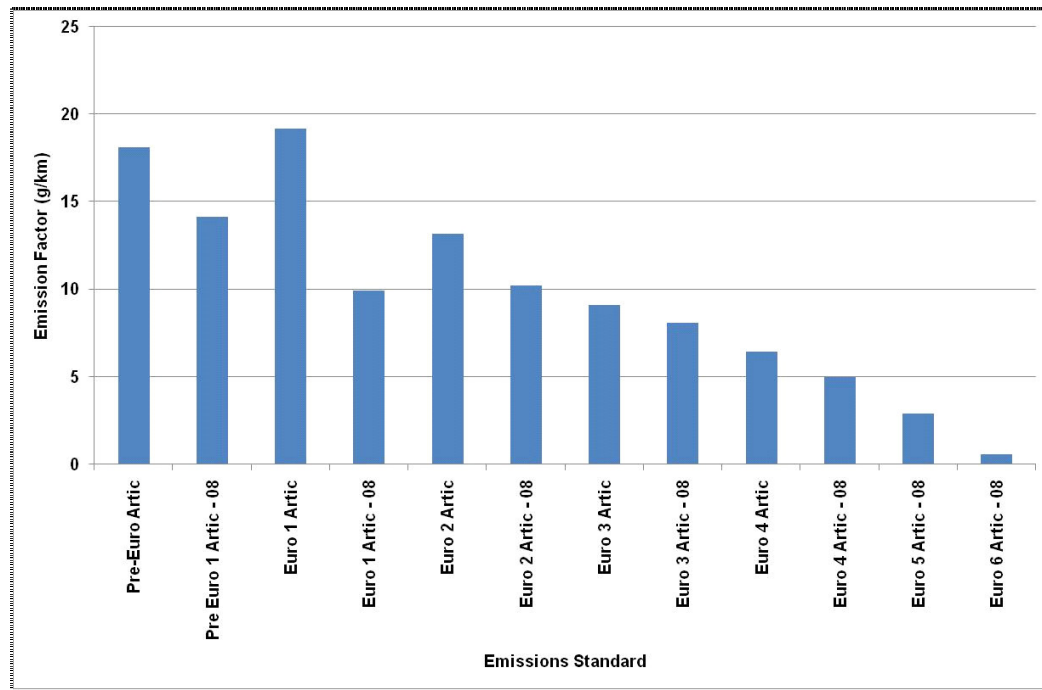
12.7.2 The results in Tables 12.15 and 12.16 indicate that NO₂ concentrations are predicted to decrease by 2016 due to lower pollutant background levels and improved vehicle emissions technology.

- 12.7.3 In 2008, Receptors 16 and 17, which are located in close proximity to the M20 (between Junctions 6 and 7) are predicted to experience NO₂ concentrations above the UK annual mean objective (exceedences are highlighted in bold). NO₂ concentrations at all other receptors in the Maidstone study area and the Tonbridge and Malling study area are predicted to achieve the annual average NO₂ objective.
- 12.7.4 By 2016, NO₂ concentrations at all receptors in both study areas are predicted to meet the annual mean objective. In addition, the majority of the receptors considered within this assessment are likely to experience NO₂ concentrations well below the objective (i.e. <75% of the objective).
- 12.7.5 Maximum concentrations of NO₂ are likely to occur at Receptor 16 (8 Harbour Lane Cottages) in 2008 and 2016, with or without the proposed development. For the Tonbridge & Malling study area, Receptor 33 (11 Yew Tree Close) is predicted to experience maximum NO₂ concentrations in all three scenarios.
- 12.7.6 Maximum impacts of up to 4.5 µg/m³ are predicted to occur at Receptor 6. This increase in annual mean NO₂ concentration can be considered as being of very large magnitude according to Table 12.7. This impact can be considered as moderate adverse significance according to the assessment criteria in Table 12.8 as annual mean NO₂ concentrations are well below the objective with or without the proposed development. It should be noted that this impact can be considered very much worst-case as worst-case traffic data have been used in this assessment.
- 12.7.7 Impacts of medium magnitude are predicted at Receptors 16, 17, 28, 33 and 41. As NO₂ concentrations at these locations are below, but not well below the objective, these impacts can also be considered to be of moderate adverse significance. Again these impacts are worst case.
- 12.7.8 Impacts at the remaining receptors considered within this assessment are predicted to experience changes in annual average NO₂ concentrations of medium to very small magnitude. As annual average NO₂ concentrations at these locations are predicted to be well below the objective, these impacts can be considered to be of slight adverse or even negligible significance. Of particular relevance are the results at Receptor 29 which represent the effect of road traffic from KIG travelling towards Maidstone town centre on local air quality. It can be seen that road traffic from KIG is predicted to have an impact of very small magnitude and of negligible significance at this receptor. This result demonstrates that road traffic from KIG will not have a significant effect on local air quality at roadside locations to the west of KIG and is therefore unlikely to significantly affect local air quality within Maidstone town centre.

12.7.9 The Department for Transport released updated vehicle emission factors in 2008³², which are currently under consultation. These emission factors take into account the latest emissions testing data as well as vehicles meeting the most recent vehicle emission standards (e.g. Euro 5 and 6). Whilst national projections are not currently available with regards to the penetration of Euro 5 vehicles in the national fleet, as HGVs produced after 01/10/09 will have to meet the Euro 5 standard, it is likely that by the opening year of the development (2016), a significant proportion of the HGVs using KIG will meet this standard.

12.7.10 NO_x emission rates for articulated HGVs at 48 kph are shown in Figure 1 for the current vehicle emission factors, which have been used in this assessment, and the 'new' emission factors (08), which are currently under consultation. It can be seen that the 'new' emission factors are lower than the current emission factors for each Euro standard and that emissions from Euro 5 are significantly lower than earlier vehicles.

Figure 12.1: Effect of Vehicle Emission factors on HGV NO_x Emissions



12.7.11 It is therefore likely that emissions associated with the HGVs using KIG will be significantly lower than presented in this assessment given that a significant proportion of HGVs accessing the site will meet the more stringent Euro 5 emission standard.

³² <http://www.dft.gov.uk/consultations/closed/consultvehicleemission>.

Table 12.17: Annual Average PM₁₀ Assessment Results (Maidstone Study Area)

Ref	Description	Annual Mean PM ₁₀ Concentration (µg/m ³)			
		2008	2016		
			DM	DS	Impact
1	45, Mallings Drive	19.0	18.2	18.3	0.1 (0.8%)
2	Springfield	19.5	18.6	18.8	0.2 (0.9%)
3	Nether Lodge	20.7	19.7	19.9	0.2 (1.2%)
4	Tollgate House	20.9	19.8	20.1	0.2 (1.2%)
5	Pine Cottage	19.7	18.7	19.0	0.3 (1.4%)
6	The Caves	19.8	18.8	19.4	0.6 (3.0%)
7	Old England Cottage	21.0	20.1	20.3	0.2 (0.9%)
8	Elsfield House	21.0	20.1	20.2	0.2 (0.8%)
9	Woodcut Cottage, Crismill Lane	20.3	19.3	19.8	0.4 (2.2%)
10	1 Eyhome Street	20.5	19.6	19.7	0.1 (0.5%)
11	Sandling Primary School	19.8	18.9	19.0	0.1 (0.5%)
12	Chestnuts, Ashford Road	20.0	19.1	19.7	0.6 (3.3%)
13	2 Crismill Cottage	19.1	18.3	18.5	0.2 (1.0%)
14	1 Keepers Cottages, Thurnham	19.2	18.3	18.4	0.1 (0.4%)
15	112 Hockers Lane	18.9	18.0	18.1	0.0 (0.2%)
16	8 Harbour Lane Cottages	25.3	23.8	24.3	0.5 (2.0%)
17	Amberleigh, Harbour Lane Close	24.4	23.0	23.4	0.4 (1.8%)
18	68 Hockers Lane	19.5	18.6	18.7	0.1 (0.5%)
19	40 Boxley Close	21.8	20.6	20.8	0.2 (1.1%)
20	Sheepwash Cottage, Downs View Road	21.3	20.2	20.4	0.2 (1.0%)
21	Cookes Cottage	20.6	19.6	19.8	0.2 (0.8%)
22	Little Holland, Boarley Lane	20.6	19.6	19.7	0.1 (0.7%)
23	4 Farthings Cottages	20.7	19.7	19.8	0.1 (0.8%)
24	Stream Cottages	19.6	18.7	18.8	0.1 (0.3%)
25	Willow Lodge	19.8	18.9	18.9	0.1 (0.4%)
26	29a Forstal Cottages	19.0	18.1	18.2	0.0 (0.2%)
27	Cobtree Manor House, Forstal Road	19.9	19.0	19.1	0.1 (0.4%)

Ref	Description	Annual Mean PM ₁₀ Concentration (µg/m ³)			
		2008	2016		
			DM	DS	Impact
28	Hillside	23.8	22.4	22.8	0.4 (1.6%)
29	12 Ashford Road	21.2	19.9	20.1	0.2 (0.9%)

Table 12.18: Annual Average PM₁₀ Assessment Results (Tonbridge & Malling Study Area)

Ref	Description	Annual Mean PM ₁₀ Concentration (µg/m ³)			
		2008	2016		
			DM	DS	Impact
30	Preston Hall Hospital	19.4	18.5	18.6	0.0 (0.3%)
31	17 Ash Close	22.7	21.5	21.7	0.2 (1.1%)
32	13 The Beeches	22.8	21.6	21.9	0.3 (1.2%)
33	11 Yew Tree Close	23.7	22.4	22.8	0.3 (1.4%)
34	10 Sedley Close	21.1	20.0	20.2	0.1 (0.7%)
35	Aylesford School Sports College	19.9	19.0	19.0	0.1 (0.4%)
36	101 Teapot Lane	22.8	21.6	21.8	0.3 (1.2%)
37	131 Station Road	20.7	19.7	19.8	0.1 (0.6%)
38	2 Oak Drive	22.0	20.9	21.1	0.2 (1.0%)
39	15 Cygnet Close	21.8	20.7	20.9	0.2 (0.9%)
40	Brookfield Junior School	19.4	18.5	18.5	0.0 (0.3%)
41	237 Lunsford Lane	23.4	22.1	22.4	0.3 (1.4%)

12.7.12 Annual mean PM₁₀ concentrations are likely to decrease by 2016 because of lower background concentration and improved vehicle emissions technology control.

12.7.13 Results given in Table 12.17 and 12.18 indicate that annual mean PM₁₀ concentrations are likely to be well below the UK annual mean objective in 2008 and 2016, with or without the proposed development.

12.7.14 Maximum concentrations of PM₁₀ are predicted to occur at Receptor 16 (Maidstone study area) and Receptor 33 (Tonbridge and Malling study area).

12.7.15 Maximum impacts of up to 3% can be considered to be of very small magnitude and of negligible significance.

Table 12.19: Daily PM₁₀ Assessment Results (Maidstone Study Area)

Ref	Description	Number of Days PM ₁₀ Concentration > 50 µg/m ³			
		2008	2016		
			DM	DS	Impact
1	45, Mallings Drive	2	2	2	0
2	Springfield	3	2	2	0
3	Nether Lodge	4	3	3	0
4	Tollgate House	5	3	4	0
5	Pine Cottage	3	2	2	0
6	The Caves	3	2	3	1
7	Old England Cottage	5	4	4	0
8	Elsfield House	5	3	4	0
9	Woodcut Cottage, Crismill Lane	4	3	3	0
10	1 Eyhome Street	4	3	3	0
11	Sandling Primary School	3	2	2	0
12	Chestnuts, Ashford Road	3	2	3	1
13	2 Crismill Cottage	2	2	2	0
14	1 Keepers Cottages, Thurnham	2	2	2	0
15	112 Hockers Lane	2	1	1	0
16	8 Harbour Lane Cottages	13	10	11	1
17	Amberleigh, Harbour Lane Close	11	8	9	1
18	68 Hockers Lane	3	2	2	0
19	40 Boxley Close	6	4	4	0
20	Sheepwash Cottage, Downs View Road	5	4	4	0
21	Cookes Cottage	4	3	3	0
22	Little Holland, Boarley Lane	4	3	3	0
23	4 Farthings Cottages	4	3	3	0
24	Stream Cottages	3	2	2	0
25	Willow Lodge	3	2	2	0
26	29a Forstal Cottages	2	2	2	0
27	Cobtree Manor House, Forstal Road	3	2	2	0

Ref	Description	Number of Days PM ₁₀ Concentration > 50 µg/m ³			
		2008	2016		
			DM	DS	Impact
28	Hillside	10	7	8	1
29	12 Ashford Road	5	3	4	0

Table 12.20: Daily PM₁₀ Assessment Results (Tonbridge & Malling Study Area)

Ref	Description	Number of Days PM ₁₀ Concentration > 50 µg/m ³			
		2008	2016		
			DM	DS	Impact
30	Preston Hall Hospital	3	2	2	0
31	17 Ash Close	7	5	6	0
32	13 The Beeches	8	6	6	0
33	11 Yew Tree Close	10	7	8	1
34	10 Sedley Close	5	3	4	0
35	Aylesford School Sports College	3	2	2	0
36	101 Teapot Lane	8	6	6	0
37	131 Station Road	4	3	3	0
38	2 Oak Drive	6	5	5	0
39	15 Cygnet Close	6	4	5	0
40	Brookfield Junior School	3	2	2	0
41	237 Lunsford Lane	9	6	7	1

12.7.16 All receptors considered in this assessment are predicted to meet the 24-hour mean PM₁₀ objective of 50 µg/m³ not to be exceeded more than 35 days in a year, in all three scenarios.

12.7.17 The predicted impacts of the proposed development on daily mean PM₁₀ concentrations can be considered to be of very small magnitude according to the assessment criteria in Table 12.7. The significance of these impacts can be considered to be of negligible significance.

12.7.18 Table 12.21 below provides a breakdown of the separate contributions from road traffic, biomass boilers, car parks and background levels to predicted annual mean NO_x and PM₁₀ concentrations.

Table 12.21: Percentage Contributions of Development Traffic and Biomass Boilers to Annual Mean Pollutant Concentrations (2016)

Ref	Description	Annual Mean NO _x Concentration (µg/m ³)				Annual Mean PM ₁₀ Concentration (µg/m ³)			
		Road Traffic	Biomass Boilers	Car Parks	Back-ground	Road Traffic	Biomass Boilers	Car Parks	Back-ground
1	45, Mallings Drive	22.4	1.0	1.0	76.7	2.9	0.3	0.1	96.7
2	Springfield	34.7	0.8	0.9	64.5	5.3	0.3	0.1	94.3
3	Nether Lodge	53.7	0.3	0.4	46.0	11.0	0.2	0.0	88.8
4	Tollgate House	55.7	0.2	0.4	44.2	11.8	0.1	0.1	88.1
5	Pine Cottage	42.1	0.2	0.9	57.8	6.7	0.1	0.1	93.2
6	The Caves	55.2	0.1	0.2	44.7	8.7	0.1	0.0	91.3
7	Old England Cottage	52.5	0.1	0.1	47.4	12.6	0.0	0.0	87.3
8	Elsfield House	51.3	0.1	0.1	48.7	12.5	0.0	0.0	87.5
9	Woodcut Cottage, Crismill Lane	56.1	0.2	1.2	43.8	10.2	0.1	0.2	89.7
10	1 Eyhome Street	47.8	0.1	0.1	52.1	10.0	0.0	0.0	90.0
11	Sandling Primary School	44.2	0.0	0.0	55.7	6.8	0.0	0.0	93.2
12	Chestnuts, Ashford Road	55.1	0.1	1.3	44.8	9.8	0.1	0.2	90.1
13	2 Crismill Cottage	30.6	0.4	0.8	69.1	4.0	0.1	0.1	95.9
14	1 Keepers Cottages, Thurnham	29.0	0.1	0.3	70.9	3.7	0.0	0.0	96.3
15	112 Hockers Lane	19.2	0.1	0.1	80.7	2.1	0.0	0.0	97.8
16	8 Harbour Lane Cottages	80.3	0.0	0.0	19.7	27.2	0.0	0.0	72.8
17	Amberleigh, Harbour Lane Close	77.8	0.0	0.0	22.2	24.3	0.0	0.0	75.7

Ref	Description	Annual Mean NO _x Concentration (µg/m ³)				Annual Mean PM ₁₀ Concentration (µg/m ³)			
		Road Traffic	Biomass Boilers	Car Parks	Back-ground	Road Traffic	Biomass Boilers	Car Parks	Back-ground
18	68 Hockers Lane	36.7	0.0	0.0	63.3	5.2	0.0	0.0	94.8
19	40 Boxley Close	65.9	0.0	0.0	34.1	15.0	0.0	0.0	85.0
20	Sheepwash Cottage, Downs View Road	62.8	0.0	0.0	37.2	13.4	0.0	0.0	86.6
21	Cookes Cottage	56.0	0.0	0.0	44.0	10.5	0.0	0.0	89.5
22	Little Holland, Boarley Lane	55.1	0.0	0.0	44.9	10.2	0.0	0.0	89.8
23	4 Farthings Cottages	56.3	0.0	0.0	43.6	10.7	0.0	0.0	89.3
24	Stream Cottages	39.5	0.0	0.0	60.5	5.8	0.0	0.0	94.2
25	Willow Lodge	42.4	0.0	0.0	57.6	6.6	0.0	0.0	93.4
26	29a Forstal Cottages	22.0	0.0	0.0	78.0	2.6	0.0	0.0	97.3
27	Cobtree Manor House, Forstal Road	44.3	0.0	0.0	55.7	7.1	0.0	0.0	92.9
28	Hillside	75.8	0.0	0.0	24.2	22.3	0.0	0.0	77.7
29	12 Ashford Road	59.8	0.1	0.1	40.0	11.9	0.1	0.0	88.0
30	Preston Hall Hospital	34.5	0.0	0.0	65.5	4.6	0.0	0.0	95.4
31	17 Ash Close	71.0	0.0	0.0	29.0	18.4	0.0	0.0	8.6
32	13 The Beeches	71.7	0.0	0.0	28.3	19.0	0.0	0.0	81.0
33	11 Yew Tree Close	75.5	0.0	0.0	24.5	22.2	0.0	0.0	77.8
34	10 Sedley Close	60.2	0.0	0.0	39.8	12.2	0.0	0.0	87.8
35	Aylesford School Sports College	44.9	0.0	0.0	55.1	7.0	0.0	0.0	93.0

Ref	Description	Annual Mean NO _x Concentration (µg/m ³)				Annual Mean PM ₁₀ Concentration (µg/m ³)			
		Road Traffic	Biomass Boilers	Car Parks	Back-ground	Road Traffic	Biomass Boilers	Car Parks	Back-ground
36	101 Teapot Lane	71.7	0.0	0.0	28.3	18.9	0.0	0.0	81.0
37	131 Station Road	56.1	0.0	0.0	43.9	10.6	0.0	0.0	89.4
38	2 Oak Drive	67.3	0.0	0.0	32.7	16.0	0.0	0.0	84.0
39	15 Cygnet Close	65.9	0.0	0.0	34.1	15.2	0.0	0.0	84.8
40	Brookfield Junior School	33.6	0.0	0.0	66.4	4.5	0.0	0.0	95.5
41	237 Lunsford Lane	74.1	0.0	0.0	25.9	21.0	0.0	0.0	79.0

12.7.19 It can be seen that emissions from the proposed biomass boilers and car parks constitute a negligible proportion of the predicted annual mean NO_x and PM₁₀ concentrations. Background levels tend to have the largest contribution to total pollutant concentrations in the study area, although at some receptors, which are located close to the M20 for example, road traffic contributions are greater than background levels.

12.7.20 Elevated point sources, such as the three proposed biomass boilers, are unlikely to impact significantly on annual mean pollutant concentrations. However, pollutant emissions from these sources may be significant in terms of short-term objectives, such as hourly mean concentrations in the case of NO₂ and 24-hour mean concentrations for PM₁₀.

12.7.21 Hourly NO₂ concentrations and 24-hour mean PM₁₀ concentrations were predicted at 15 worst-case receptor locations surrounding the development site according to the procedure outlined in Box 6.3 of LAQM.TG(09). The results of the hourly NO₂ and 24-hour mean PM₁₀ assessments are given in Table 12.22. The results were calculated based on the recommended approach for adding point sources contributions to background detailed in LAQM.TG(09). The total oxidant, which is the sum of NO₂ and O₃, were sourced from the Detling Continuous Monitoring Station for 2008.

Table 12.22: NO₂ and PM₁₀ Short-term Assessment Results – Biomass Boilers

Ref	Description	Maximum Hourly Mean NO ₂ Concentration 2016 (µg/m ³)	Maximum 24-Hour Mean PM ₁₀ Concentration 2016 (µg/m ³)
1	45, Mallings Drive	95.3	30.1
2	Springfield	95.3	30.1
3	Nether Lodge	95.1	30.0

Ref	Description	Maximum Hourly Mean NO ₂ Concentration 2016 (µg/m ³)	Maximum 24-Hour Mean PM ₁₀ Concentration 2016 (µg/m ³)
4	Tollgate House	95.0	30.0
5	Pine Cottage	95.0	30.0
6	The Caves	95.0	30.0
7	Old England Cottage	95.0	30.0
8	Elsfield House	95.0	30.0
9	Woodcut Cottage, Crismill Lane	95.0	30.0
10	1 Eyhome Street	95.0	30.0
12	Chestnuts, Ashford Road	95.0	30.0
13	2 Crismill Cottage	95.1	30.0
14	1 Keepers Cottages, Thurnham	95.0	30.0
15	112 Hockers Lane	95.0	30.0
29	12 Ashford Road	95.0	30.0

12.7.22 The full calculations for assessing compliance with short-term air quality objectives are detailed in Appendix 12.6.

12.7.23 Emissions from the biomass boilers are predicted to meet the hourly NO₂ limit value of 200 µg/m³. The 24-hour PM₁₀ limit value of 50 µg/m³ is also likely to be achieved. Maximum concentrations of pollutant emitted from the biomass boilers are likely to occur at Receptors 1 and 2.

12.8 Construction Assessment Results

12.8.1 The construction phases of the proposed redevelopment will lead to the generation of dust and PM₁₀ within the boundaries of the construction areas. Although the majority of this dust would be contained within the boundaries, some will be transported in the air to sites outside the construction areas.

12.8.2 The proposed construction activities are likely to be of a major scale and duration; therefore, according to the assessment criteria listed in Table 12.9, significant effects may be felt up to 500 metres from the construction areas. The main impact is likely to be nuisance caused by the deposition of dust on properties, vehicles and street furniture. This deposition would hold particular significance for residential properties near to the site.

12.8.3 The predicted impacts of construction traffic on local air quality in the Maidstone study area are shown below in Tables 12.23 and 12.24.

Table 12.23: Annual Average NO₂ Assessment Results (Construction Traffic)

Ref	Description	Annual Mean NO ₂ Concentration (µg/m ³)		
		2011		
		DM	Construction	Impact
1	45, Mallings Drive	16.8	16.8	0.0
2	Springfield	18.8	18.8	0.0
3	Nether Lodge	24.0	24.0	0.0
4	Tollgate House	24.7	24.7	0.0
5	Pine Cottage	19.4	19.5	0.0
6	The Caves	19.7	19.9	0.2
7	Old England Cottage	22.5	22.6	0.1
8	Elsfield House	22.3	22.4	0.0
9	Woodcut Cottage, Crismill Lane	21.8	21.9	0.1
10	1 Eyhome Street	21.8	21.8	0.0
11	Sandling Primary School	20.1	20.1	0.0
12	Chestnuts, Ashford Road	20.8	20.9	0.0
13	2 Crismill Cottage	17.4	17.4	0.0
14	1 Keepers Cottages, Thurnham	17.5	17.5	0.0
15	112 Hockers Lane	16.3	16.3	0.0
16	8 Harbour Lane Cottages	38.2	38.3	0.1
17	Amberleigh, Harbour Lane Close	35.5	35.6	0.1
18	68 Hockers Lane	18.7	18.7	0.0
19	40 Boxley Close	27.1	27.2	0.0
20	Sheepwash Cottage, Downs View Road	25.7	25.7	0.0
21	Cookes Cottage	23.2	23.2	0.0
22	Little Holland, Boarley Lane	22.9	22.9	0.0
23	4 Farthings Cottages	23.3	23.4	0.1
24	Stream Cottages	19.3	19.3	0.0
25	Willow Lodge	19.9	19.9	0.0
26	29a Forstal Cottages	16.7	16.7	0.0
27	Cobtree Manor House, Forstal Road	20.4	20.4	0.0

Ref	Description	Annual Mean NO ₂ Concentration (µg/m ³)		
		2011		
		DM	Construction	Impact
28	Hillside	33.6	33.7	0.1
29	12 Ashford Road	25.4	25.4	0.0

Table 12.24: Annual Average PM₁₀ Assessment Results (Construction Traffic)

Ref	Description	Annual Mean PM ₁₀ Concentration (µg/m ³)		
		2011		
		DM	DS	Impact
Maidstone Study Area				
1	45, Mallings Drive	18.5	18.5	0.0
2	Springfield	19.0	19.0	0.0
3	Nether Lodge	20.2	20.2	0.0
4	Tollgate House	20.3	20.3	0.0
5	Pine Cottage	19.1	19.1	0.0
6	The Caves	19.2	19.2	0.0
7	Old England Cottage	20.5	20.5	0.0
8	Elsfield House	20.5	20.5	0.0
9	Woodcut Cottage, Crismill Lane	19.8	19.8	0.0
10	1 Eyhome Street	20.0	20.0	0.0
11	Sandling Primary School	19.3	19.3	0.0
12	Chestnuts, Ashford Road	19.4	19.4	0.0
13	2 Crismill Cottage	18.7	18.7	0.0
14	1 Keepers Cottages, Thurnham	18.7	18.7	0.0
15	112 Hockers Lane	18.4	18.4	0.0
16	8 Harbour Lane Cottages	24.5	24.5	0.0
17	Amberleigh, Harbour Lane Close	23.6	23.6	0.0
18	68 Hockers Lane	19.0	19.0	0.0
19	40 Boxley Close	21.1	21.1	0.0
20	Sheepwash Cottage, Downs View Road	20.7	20.7	0.0
21	Cookes Cottage	20.1	20.1	0.0
22	Little Holland, Boarley Lane	20.0	20.0	0.0
23	4 Farthings Cottages	20.1	20.1	0.0

Ref	Description	Annual Mean PM ₁₀ Concentration (µg/m ³)		
		2011		
		DM	DS	Impact
24	Stream Cottages	19.1	19.1	0.0
25	Willow Lodge	19.3	19.3	0.0
26	29a Forstal Cottages	18.5	18.5	0.0
27	Cobtree Manor House, Forstal Road	19.4	19.4	0.0
28	Hillside	23.0	23.0	0.0
29	12 Ashford Road	20.3	20.4	0.0

12.8.4 The results in Tables 12.23 and 12.24 indicate that construction traffic is likely to have a negligible effect on local air quality, even during peak construction periods.

12.9 Mitigation

Local Air Quality

12.9.1 The effect of emissions from employee vehicles accessing the proposed development on local air quality will be minimised through the implementation of green travel plans, which should seek to promote more sustainable forms of travel such as car sharing schemes, public transport, cycling and walking.

12.9.2 HGVs will be encouraged to avoid accessing the development at peak times so as to minimise contributing to congestion near to the site. Also, whilst on site, engines will be switched off as soon as practicably possible to minimise emissions from idling vehicles.

12.9.3 Although the effect of construction traffic is predicted to be negligible, the impacts of construction vehicle emissions whilst on site can be mitigated by employing vehicles that conform to Euro II standards. In addition, HGVs associated with construction should avoid accessing the site at peak times so as to minimise contributing to congestion near to the site.

Construction Dust

12.9.4 Guidance within the BRE's 'Guidance on the Control of Dust from Construction and Demolition Activities' and 'Controlling Particles, Vapour and Noise Pollution from Construction Sites' should be followed if planning permission is granted.

12.9.5 There are a number of mitigation measures that can be employed to lessen the nuisance and human-health impacts of the dust and PM₁₀ generated during construction activities; key examples of which are provided below. Construction dust usually responds well to these measures as long as a co-ordinated Construction Environmental Management Plan (CEMP) is implemented:

- Site Planning
 - Erect solid barriers to site boundary;
 - No bonfires;
 - Plan site layout—machinery and dust causing activities should be located away from sensitive receptors;
 - Identify responsible person in charge; and
 - Hard surface site haul routes.
- Construction Traffic
 - All vehicles to switch off engines – no idling vehicles;
 - All vehicles to conform to Euro II emission standards or better;
 - Effective vehicle cleaning and specific wheel-washing on leaving site;
 - All loads entering and leaving site to be sheeted;
 - No site runoff of water / mud;
 - All Non Road Mobile Machinery (NRMM) to use ultra low sulphur tax-exempt diesel (ULSD) where available; and
 - Hard surfacing and effective cleaning / watering of haul routes and appropriate speed limit around site.
- Demolition Works
 - Use water as dust suppressant;
 - Cutting equipment to use water as suppressant or suitable Local Exhaust Ventilation systems;
 - Securely cover skips and minimise drop heights; and
 - Wrap building/structures to be demolished.
- Site Activities
 - Minimise dust generating activities;
 - Use water as dust suppressant where applicable;
 - Enclose stockpiles or keep them securely sheeted; and
 - If applicable, ensure concrete crusher or concrete batcher has a permit to operate.

- 12.9.6 Further mitigation measures are included in Appendix 12.8.
- 12.9.7 It is considered that air quality monitoring should be undertaken during the construction period to enable proactive management of dust and fine particles, particularly during extended dry periods. The method, extent and duration of this monitoring shall be agreed with the local authority prior to the commencement of the works.
- 12.9.8 These measures have been included within the proposed CEMP for KIG³³.

12.10 Residual Effects

Local Air Quality

- 12.10.1 The effect of increased road traffic and car parking and biomass boiler emissions as a result of the proposed development on local air quality is considered to be of **moderate adverse** significance at six receptors and of **minor adverse** significance at all other receptors.

Regional Air Quality

- 12.10.3 As a result of the modal shift from road to rail, it is considered likely that the effect of the proposed development on regional air quality will be **beneficial**.

Construction Dust

- 12.10.4 Construction dust can be mitigated to be of **minor adverse** significance following the implementation of a Construction Environmental Management Plan and appropriate mitigation measures. The effectiveness of these measures shall be monitored during the construction process, particularly during extended dry periods.

12.11 Summary

- 12.11.1 This chapter of the SES provides details of an updated air quality assessment for the proposed KIG development, incorporating revised assessment methodologies and most recent baseline data.
- 12.11.2 The effects on local air quality of emissions from increased road traffic, car parking and biomass boilers associated with the proposed development have been predicted using the

³³ See Appendix 6.B (landscape chapter) of the original ES.

AAQuIRE dispersion model. A qualitative assessment of construction dust has also been undertaken.

12.11.3 Concentrations of NO₂ and PM₁₀ have been predicted with and without the proposed development at 41 sensitive receptors within the study area for the proposed opening year of the development, 2016. No exceedances of the national air quality objectives were predicted at any receptor in 2016.

12.11.4 Whilst impacts on annual average NO₂ concentrations of moderate significance are predicted at six receptors, slight adverse or negligible impacts are predicted at all other receptors. It should be noted that the traffic data used in this assessment is likely to over-estimate future traffic flows from KIG as the proposed floor space at the development has since been decreased by one sixth. Furthermore current vehicle emission factors, which have been used in this assessment, do not take into account the introduction of vehicles meeting the Euro 5 emission standard, which by 2016 are likely to make up a significant proportion of the HGVs accessing KIG. As emissions from these vehicles are predicted to be much lower than the emission factors used within this assessment, the predicted air quality impacts within this assessment can be considered very much worst-case.

12.11.5 KIG is considered likely to have a significant beneficial impact on emissions of regional pollutants and local air quality adjacent to the Strategic Road Network, in comparison to alternative schemes, due to the predicted reduction in freight transported by road.

12.11.6 Adherence to the CEMP which has been developed for KIG is likely to reduce construction dust impacts to of slight adverse significance. The impact of peak construction traffic movements (2011) on local air quality is predicted to be negligible.