Air quality and emissions mitigation guidance for Sussex authorities (2013) - Appendices

Final draft for internal review

Appendices

Appendix 1 – UK Air Quality Objectives

The Air Quality Strategy establishes the framework for air quality improvements. Measures agreed at the national and international level are the foundations on which the strategy is based. It is recognised, however, that despite these measures, areas of poor air quality will remain, and that these will best be dealt with using local measures implemented through the Local Air Quality Management (LAQM) regime. The role of the local authority review and assessment process is to identify all those areas where the air quality objectives are being or are likely to be exceeded. Experience has shown that such areas may range from single residential properties to whole town centres.

The air quality objectives applicable to LAQM are set out separately in Air Quality Regulations for England, Scotland, Wales and Northern Ireland.
(Ref: http://aqma.defra.gov.uk/objectives.php)

A summary of the current UK Air Quality Objectives (England) is provided here.

Pollutant	Air Quality Objective Concentration	Measured as
Nitrogen Dioxide	200 µg m-3 not to be exceeded more than 18 times a year	1-hour mean
	40 µg m-3	Annual mean
Sulphur dioxide	350 µg m-3, not to be exceeded more than 24 times a year	1-hour mean
	125 µg m-3, not to be exceeded more than 3 times a year	24-hour mean
	266 µg m-3, not to be exceeded more than 35 times a year	15-minute mean
Particles (PM_{10}) (gravimetric)	50 µg m-3, not to be exceeded more than 35 times a year	Daily mean
	40 µg m-3	Annual mean

For the full list of air quality objective pollutants refer to http://aqma.defra.gov.uk/objectives.php.

Appendix 2 – Air quality policy

National and local policies set out the requirements for adhering to EU and UK statutory air quality directives and limits. These policies set out standards, types of pollutants of concern, their objective limits, the exposure limits and where the standards need to be adhered to.

Local planning policies and decisions must reflect the following statutory requirements and policies on air quality:

Table A2. 1: Planning policy context for air quality.

Level	Relevant Documents
EU	1) Air quality Directive (2008) 2) EIA Directive (2010)
National	1) Air Quality Strategy (2007) 2) Policy Guidance LAQM.PG(09) 3) Air Quality Standards Regulations (2010) 4) National Planning Policy Framework (2012) 5) Technical Guidance to the National Planning Policy Framework (2012)
Local	1) Development Plans (various) 2) Air Quality Action Plans (various)

A2.1 EU policy

The Air Quality Directive (2008/50/EC)

This sets out statutory health-based objectives for key air pollutants that Member States are expected to achieve by certain dates. The 2008 ambient air quality directive (2008/50/EC) sets legally binding limits for concentrations in outdoor air of major air pollutants that impact public health such as particulate matter (PM_{10} and $PM_{2.5}$) and nitrogen dioxide (NO_2).

- **Ambient air quality directive (2008/50/EC)**

The Environmental Impact Assessment Directive (85/337/EEC, as amended)

Planning applications for major developments may require an EIA, which may need to include a detailed assessment of the likely air quality effects.

A2.2 National policy

The Air Quality Strategy (2007)

This provides the policy context for air quality management and assessment in the UK. It sets out the national health-based air quality standards for nine pollutants, of which seven are incorporated into Regulations for use by Local Authorities, and the measures to work towards achieving the objectives. It recognises that air pollution often originates from the same activities that contribute to climate change (notably transport and electricity generation) and, therefore, the important co-benefits from considering reductions in CO2 emissions at the same time as tackling air pollution.

Policy Guidance LAQM.PG(09) (DEFRA)

The Environment Act 1995 introduced the Local Air Quality Management (LAQM) process to deal with localised 'hotspots' of poor air quality. A principle of LAQM is for local authorities to integrate air quality considerations with other policy areas, such as planning. LAQM.PG(09) states that 'any consideration of the quality of land, air or water and potential impacts arising from development, possible leading to impacts on health, is a material planning consideration where it arises from or affects land use.' Guidance on using the planning system to improve air quality, such as by using Section 106 agreements under the Town and Country and Planning Act 1990, is referred to in Practice Guidance accompanying the Policy Guidance.

UK Air Quality Standards Regulations (2010)

The 2008 directive replaced nearly all the previous EU air quality legislation and was made law in England through the Air Quality Standards Regulations 2010, which also incorporates the 4th air quality daughter directive (2004/107/EC) that sets targets for levels in outdoor air of certain toxic heavy metals and polycyclic aromatic hydrocarbons.

Air Quality Standards Regulations 2010

4th air quality daughter directive (2004/107/EC)

The National Planning Policy Framework (2012, DCLG)

This provides guidance on how planning policies for England are expected to be applied, and is a material consideration in planning decisions. The NPPF sets out the following main requirements for air quality:

- preventing both new, proposed and/or existing development from contributing to or being put at unacceptable levels of air pollution;
- sustaining compliance with and contributing to EU limit values or national objectives for pollutants, taking into account the presence of AQMAs;
- contributing to conserving and enhancing the natural environment;
- supporting local strategies to improve health;
- identifying priority areas for environmental enhancement;
- encouraging solutions to reducing congestion;

- protecting and exploiting opportunities for the use of sustainable transport modes for the movement of goods or people;
- requiring developments which generate significant amounts of movement to provide a Travel Plan
- setting out, in mineral plans, the environmental criteria against which planning applications will be assessed so as to ensure that unacceptable adverse impacts do not occur.

Technical Guidance to the National Planning Policy Framework (2012, DCLG)

a) Dust: the NPPF makes it clear that unavoidable dust from mineral workings must be controlled, mitigated or removed at source. The Technical Guidance sets out what's required from a dust assessment study.

b) PM_{10}: the Technical Guidance sets out when a minerals site assessment might be required.

A2.3 Local policy:

Development planning authorities in Sussex

In Sussex there are 15 Local Planning Authorities, consisting of 8 District Councils, 4 Borough Councils, Brighton & Hove City Council (Unitary Authority) and East and West Sussex County Councils. The South Downs National Park Authority is the Planning Authority for it's' area. Outside the National Park area, East and West Sussex County Councils are the Waste and Minerals Planning Authorities.

Transport planning authorities in Sussex

In Sussex there are 3 local transport/highways authorities; Brighton and Hove City Council, East Sussex County and West Sussex County Council. In addition the Highways Authority (HA) are responsible for major "A" roads in Sussex.

Local Plans

Planning law requires that applications for planning permission are determined in accordance with the relevant development plan, unless material considerations indicate otherwise. Local Plans and the Core Strategies within them, set-out key elements which can determine the policy link for improving air quality in relation to developments.

Air Quality Action Plans (AQAP)

Part IV of the Environment Act 1995 places a statutory duty on local authorities to periodically review and assess the air quality within their area. This involves consideration of present and likely future air quality against relevant statutory air quality objectives. Areas where it is measured or predicted that the targets will not be met must be declared as Air Quality Management Areas (AQMAs) and an Air Quality Action Plan (AQAP) must then be produced which sets out measures to reduce air pollution.

Appendix 3 – Development type definitions (for Checklist 1: Screening assessment)

A3.1 National development definitions

Table A3.1 National definitions of development type and size.

National Definition	No. of Residential Units	Sq. metres of commercial, industrial, retail floor space	Other criteria
Major	10 +	1,000m2 +	0.5 ha +

Reference: Town and Country Planning (Development Management Procedure) Order (England) 2010 definitions. http://www.legislation.gov.uk/uksi/2010/2184/contents/made

The Town and Country Planning (Development Management Procedure) Order (England) 2010 defines major developments as follows:

Interpretation , 2, i (page 5)

“major development” means development involving any one or more of the following—

(a) the winning and working of minerals or the use of land for mineral-working deposits;

(b) waste development;

(c) the provision of dwelling houses where —

  (i) the number of dwelling houses to be provided is 10 or more; or

  (ii) the development is to be carried out on a site having an area of 0.5 hectares or more and it is not known whether the development falls within sub-paragraph (c)(i);

(d) the provision of a building or buildings where the floor space to be created by the development is 1,000 square metres or more; or

(e) development carried out on a site having an area of 1 hectare or more;

Appendix 4 – Planning Obligations

Planning obligations are made between local authorities and developers to make developments acceptable which would otherwise be unacceptable in planning terms. Where there is a choice between imposing conditions and entering into a planning obligation, the imposition of a condition is preferable and subject to it satisfying the "tests" as set out in Circular 11/95

The NPPF (Para. 152) suggests that "where adequate mitigation measures are not possible, compensatory measures may be appropriate", thus mitigation options should be delivered through contributions.

It is important to note the legal changes to the use of Planning Obligations as a result of the CIL Regulations (2010); planning obligations are now required by law to meet the following three statutory tests:

- Necessary to make the development acceptable in planning terms;
- Directly related to the development; and
- Fairly and reasonably related in scale and kind to the development

As part of the planning process, a developer may be required to enter into a legal agreement, to provide infrastructure and/or services on or off the development site where this cannot be achieved through planning conditions.

Such agreements are a delivery mechanism for matters that are necessary to make the development acceptable, through mitigation or compensation.

Section 106 Agreements are an appropriate mechanism for mitigating or compensating against the impact of major developments through the requirement to deliver mitigation measures.

A4.1 Community Infrastructure Levy

Planning authorities should consider carefully whether it is appropriate to pursue mitigation measures through CIL or through planning obligations using Section 106 agreements.

Key considerations include scheme viability within an area, which will determine the level of funding achieved through CIL.

If mitigation measures are included as part of the published CIL list then they cannot be pursued through a planning obligation.

If major planning applications are anticipated to come forward within an area it may be appropriate to consider Section 106 as the most appropriate mechanism to deliver mitigation measures, necessary to make such development schemes acceptable.

Appendix 5 – Environmental Impact Assessments

A5.1 Habitats directive

The Habitats Directive forms the cornerstone of Europe's nature conservation policy. It is built around two pillars: the **Natura 2000 network** of protected sites and the strict system of species protection. All in all the directive protects over 1,000 animal and plant species and over 200 so called "habitat types" (e.g. special types of forests, meadows, wetlands, etc.), which are of European importance. Article 6, paragraphs (3) and (4) set out the requirements to adhere to.

Where the site concerned hosts a priority natural habitat type and/or a priority species the only considerations which may be raised are those relating to human health or public safety, to beneficial consequences of primary importance for the environment or, further to an opinion from the Commission, to other imperative reasons of overriding public interest.'

A5.2 Environmental Impact Assessment Process

Stage One: Screening

— the process which identifies the likely impacts upon a Natura 2000 site of a project or plan, either alone or in combination with other projects or plans, and considers whether these impacts are likely to be significant;

Stage Two: Appropriate assessment

— the consideration of the impact on the integrity of he Natura 2000 site of the project or plan, either alone or in combination with other projects or plans, with respect to the site's structure and function and its conservation objectives. Additionally, where there are adverse impacts, an assessment of the potential mitigation of those impacts;

Stage Three: Assessment of alternative solutions

— the process which examines alternative ways of achieving the objectives of the project or plan that avoid adverse impacts on the integrity of the Natura 2000 site;

Stage Four: Assessment where no alternative solutions exist and where adverse impacts remain

— an assessment of compensatory measures where, in the light of an assessment of imperative reasons of overriding public interest (IROPI), it is deemed that the project or plan should proceed (it is important to note that this guidance does not deal with the assessment of imperative reasons of overriding public interest).

An authority to which this section applies (referred to in this section and in sections 28H and 28I as "a section 28G authority") shall have the duty set out in subsection (2) in exercising its functions so far as their exercise is likely to affect the flora, fauna or geological or physiographical features by reason of which a site of special scientific interest is of special interest.

The duty is to take reasonable steps, consistent with the proper exercise of the authority's functions, to further the conservation and enhancement of the flora, fauna or geological or physiographical features by reason of which the site is of special scientific interest.

Appendix 6 – Emissions calculator

The emissions mitigation calculation utilises the current Emissions Factor Toolkit to determine the transport related emissions from a scheme or development.

Example emissions calculation

The following example demonstrates the calculation based on a development with 10 domestic properties with an average trip rate = 2.7, 100% cars, trip length = 10km (NTS), avg speed = 30mph/50kph, for the year 2012. Trip rates can be sourced from transport assessment or local authority/transport authority.

Example emissions calculation

EFT input:

10 Household (urban not London) (2012) (NOx and PM_{10})

X 27 (trip/traffic ratio for 10 houses)

X cars only (0% HGV)

X 50 kph (avg. speed)

X 10km (NTS UK avg.)

EFT Output = 32.55 kg/annum (NOx) & 3.795 kg/annum (PM)

= 0.0325 tonnes/annum (NOx) & and 0.003795 tonnes/annum (PM_{10})

X *£955/tonne (NOx) + *£48,517/tonne (PM_{10})

= £31.08 + £184.15

X 5 (years)

= £155.42 + £920.76

Total = £1,076

Note:
The IGCB damage cost used for Sussex are the IGCB Air Quality Damage Costs per Tonne, 2010 prices (Central estimate: NOx = £955/tonne and PM_{10} Transport Average £48,517).

Calculating emissions from alternative fuels and technologies

The emissions calculator (above) provides a basic emission calculation, however if a development proposal is to include alternative fuels or technology i.e. LPG, EV etc, then there are “advanced options” within the EFT to accommodate this. Always check in advance with the air quality officer to agree these options.

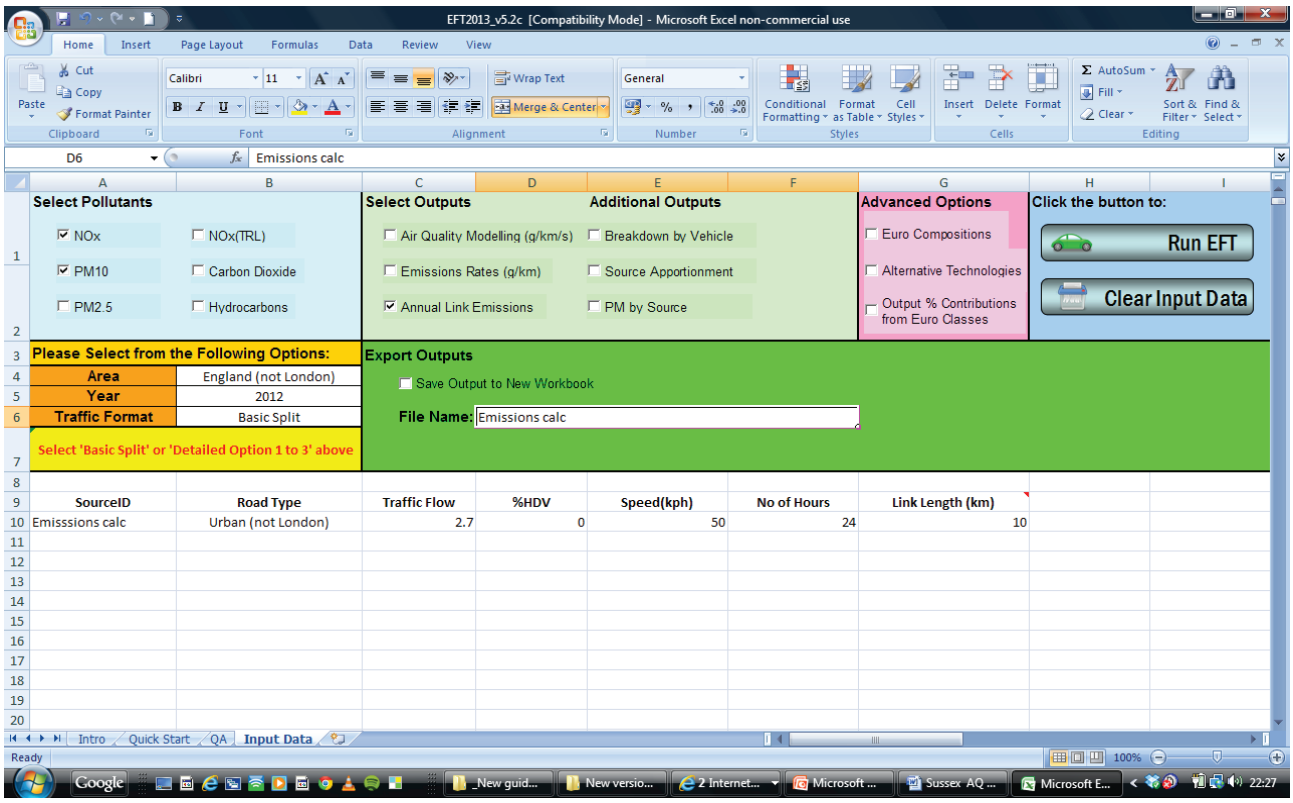
The EFT calculates the emissions to air from specified input data and outputs kilograms of a specified pollutant in kg/year. A screen shot of the input screen for the EFT2013_V5.2 is below:

Ref: DEFRA Emissions Factor Toolkit

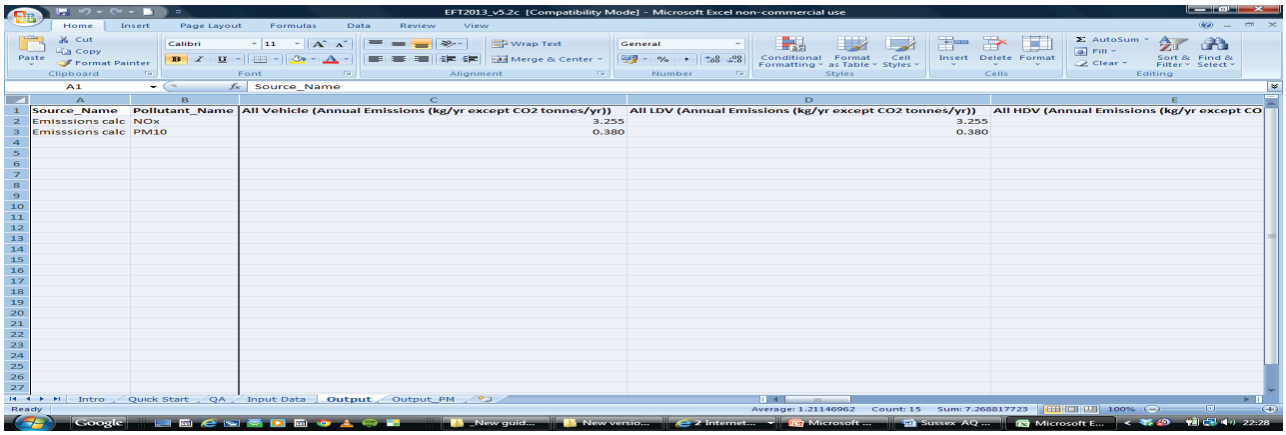
http://laqm.defra.gov.uk/review-and-assessment/tools/emissions.html

EFT2013_V5.2c

Input screen



Output screen

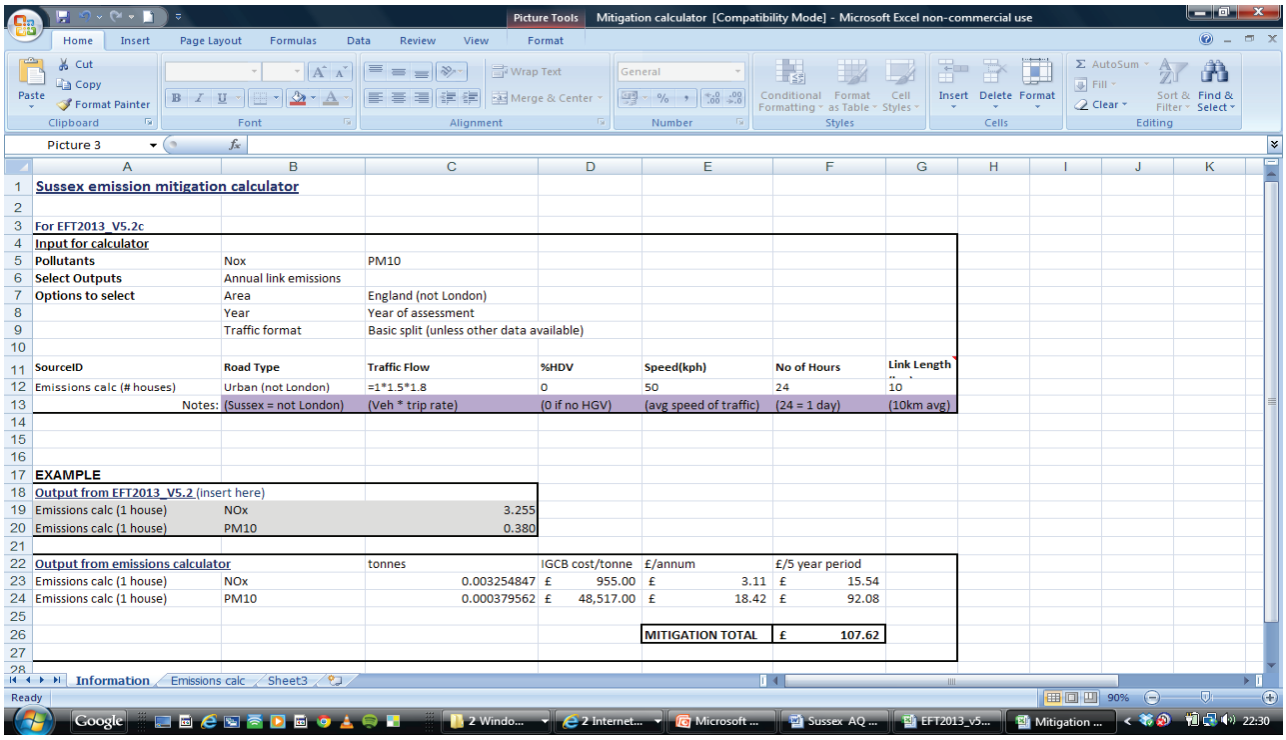


To complete the calculation, the calculation must be converted to tonnes/annum and then multiplied by the IGCB damage cost for the specific pollutant in this case NOz and PM_{10}. The IGCB damage cost used for Sussex are the IGCB Air Quality Damage Costs per Tonne, 2010 prices (Central estimate: NOx = £955/tonne and PM_{10} Transport Average £48,517)

http://www.defra.gov.uk/environment/quality/air/air-quality/economic/damage/

Example spreadsheet

Inputs and calculation screen



	A	B	C	D	E	F	G
1	**Sussex emission mitigation calculator**						
2							
3	For EFT2013_V5.2c						
4	**Input for calculator**						
5	**Pollutants**	Nox	PM10				
6	**Select Outputs**	Annual link emissions					
7	**Options to select**	Area	England (not London)				
8		Year	Year of assessment				
9		Traffic format	Basic split (unless other data available)				
10							
11	**SourceID**	**Road Type**	**Traffic Flow**	**%HDV**	**Speed(kph)**	**No of Hours**	**Link Length**
12	Emissions calc (# houses)	Urban (not London)	=1*1.5*1.8	0	50	24	10
13	Notes:	(Sussex = not London)	(Veh * trip rate)	(0 if no HGV)	(avg speed of traffic)	(24 = 1 day)	(10km avg)
14							
15							
16							
17	**EXAMPLE**						
18	**Output from EFT2013_V5.2** (insert here)						
19	Emissions calc (1 house)	NOx	3.255				
20	Emissions calc (1 house)	PM10	0.380				
21							
22	**Output from emissions calculator**		tonnes	IGCB cost/tonne	£/annum	£/5 year period	
23	Emissions calc (1 house)	NOx	0.003254847	£ 955.00	£ 3.11	£ 15.54	
24	Emissions calc (1 house)	PM10	0.000379562	£ 48,517.00	£ 18.42	£ 92.08	
25							
26					**MITIGATION TOTAL**	£ 107.62	
27							

National Travel Survey (NTS)

Average trip distance taken as 10km = 7.1 miles (UK average 2011 – see below Table NTS010)

https://www.gov.uk/government/statistical-data-sets/nts01-avergage-number-of-trips-made-and-distance-travelled

Department for Transport statistics							
National Travel Survey							
Table NTS0101							
Trips, distance travelled and time taken: Great Britain, 1972/73 to 2011							
	Per person per year						Trips/miles/hours/ minutes/number
Year	**All trips[1]**	**Trips of 1 mile or more**	**Distance travelled (miles)**	**Time taken (hours)**	**Average trip length (miles)**	**Average trip time (minutes)**	**Unweighted sample size (individuals)**
1972/73	956	594	4,476	353	4.7	22.2	15,879
1975/76	935	659	4,740	330	5.1	21.2	24,692
1978/79	1,097	736	4,791	377	4.4	20.6	18,433
1985/86	1,024	689	5,317	337	5.2	19.8	25,785
1989/91	1,091	771	6,475	370	5.9	20.4	26,285
1992/94	1,053	742	6,439	359	6.1	20.5	24,671
1995/97[2]	1,086	794	6,981	369	6.4	20.4	22,861
1998/00	1,071	810	7,164	376	6.7	21.1	21,868
2002	1,047	819	7,135	380	6.8	21.8	16,886
2003	1,034	812	7,192	381	7.0	22.1	19,467
2004	1,026	806	7,103	382	6.9	22.3	19,199
2005	1,044	818	7,208	385	6.9	22.1	19,904
2006	1,037	812	7,133	383	6.9	22.2	19,490
2007	972	786	7,103	377	7.3	23.3	19,735
2008	992	800	6,923	376	7.0	22.7	18,983
2009	973	774	6,775	372	7.0	22.9	19,914
2010	960	773	6,726	367	7.0	22.9	19,072
2011	958	764	6,826	364	7.1	22.8	18,069

Appendix 7 – Air quality assessment modelling

A7.1 Developments that require an Air Quality Assessment

The overall outcome of an air quality assessment is to determine whether the development will have a significant impact on air quality and/or whether the existing air quality environment is acceptable for the proposed development.

The four ways in which a development may have a significant impact are:

- If the development is likely to have an impact upon an AQMA.
- If the development has the potential to cause deterioration in local air quality (i.e. once completed it will increase pollutant concentrations).
- If the development is located in an area of poor air quality (i.e. it will expose future occupiers to unacceptable pollutant concentrations) whether the site lies within a designated AQMA or, if so advised by the Local Authority, or a "candidate" AQMA (an area that may or is likely to be designated an AQMA).
- If the demolition/construction phase will have a significant impact on the local environment (e.g. through fugitive dust and exhaust emissions).

Where it is clear from the initial specification of the development that it will have a minimal impact on air quality, an air quality assessment may still be required (e.g. it introduces new relevant exposure within an AQMA, or an area which has been identified as having poor air quality and is in the process of being declared or will have an impact on an AQMA).

Key point

The developer/air quality consultant must agree in advance all input data and reporting of air quality assessment with the relevant (air quality) local authority officer to ensure consistency in modelling approach and resulting reports.

A7.2 General Principles of Air Quality Assessments

There are two primary factors that impacts upon the air quality assessment of a proposed development are set out in the table below.

Table 1. Primary factors affecting an air quality assessment

- **Site suitability: it should be recognised that a development in an area that is already exceeding air quality objectives could have a detrimental impact upon its residents and other sensitive receptors;**
- **Impact of development: the impact of the development on the environment needs to be detailed. An air quality assessment should clearly indicate the likely change in pollutant concentrations including the cumulative impacts (relevant to the air quality objectives) arising from the proposed development, during both the construction and operational phases. The assessment must consider the change in air quality as a result of the proposed development.**

There is no single, definitive method for carrying out an air quality assessment, but the method must be appropriate for the development and should be carried out by a technically competent person. The air quality assessment should include key components set out in the table below.

Table 2. Key components required for an air quality assessment

- **Assess the current (baseline) air quality situation in the locality (refer to the local authority's air quality modelled and monitoring results, to ensure that they broadly agree);**
- **Provide estimates of emissions of local air pollutants resulting from the development;**
- **Predict statistics relevant to the air quality objectives with and without the development in place, relative to the year of opening and air quality objective target years, to assess the magnitude of the change in air quality associated with the proposed development and significance relative to health based UK air quality standards and objectives;**
- **The developer must agree in advance with the local authority which developments within the area should be included in the assessment to ensure the cumulative impact is considered;**
- **Put forward recommendations for mitigation.**

The granting of outline planning permission should follow the precautionary principle.

In the case of high-risk developments a full EIA is likely to be required; which should provide the detailed information needed to assess the impact of the development upon air quality or the impact of the air quality upon the future users of the development.

If the development is proposed within an AQMA or area otherwise known to be of poor air quality (e.g. a "candidate" AQMA), then a full air quality assessment must be provided as part of the planning application, be that a full planning application or application for outline permission.

This should not be an undue burden upon developers as the necessary mitigation measures should have formed part of the fundamental design process.

Where a development is seen as low risk, outline planning permission may be granted, with requirements for an air quality assessment to be provided at the full planning application stage. Local authorities should ensure that suitable planning conditions are attached to the outline planning permission requiring further consideration to be given to environmental issues at a later stage.

A7.3 Detailed modelling assessments

Where detailed dispersion modeling is required, developers are advised to contact the local authority's air quality officer to agree the methodology with reference to this guidance.

Key point

The developer/air quality consultant must agree in advance all input data and reporting formats of the air quality assessment with the relevant (air quality) local authority officer to ensure consistency in modelling approach and resulting reports.

Modelling of air quality requires detailed input data to ensure the quality of the modelled outputs for an air quality assessment. The following section details the modelling data for inputs and reports that is required for a detailed air quality assessment.

A7.4 Reporting air quality assessments

In summary, the following information should be provided as a minimum when reporting an air quality assessment.

Table 3. Air quality assessment reporting information.

- **A description of the methodology used.**
- **Evidence of model performance and verification**
- **Input data sources included e.g. traffic data, emissions factors, input parameters specific to the model, site, meteorology, background data, etc.**
- **Location of receptors**
- **Years modelled (baseline, occupation, objective years)**
- **Model output data, in tables and on maps, where appropriate**
- **Scenarios to include: without development (baseline), with development and with development plus mitigation.**
- **Discussion of results.**
- **Assessment against relevant air quality objectives.**
- **Determination of significance**
- **Conclusions and recommendations, including any additional mitigation options.**

A7.5 Model input data and sources.

Depending on the model used and the area in question, there are particular parameters that should be agreed prior to modelling being undertaken, for example:

- Traffic and emissions data
- The location and dimensions of any street canyons (streets where pollutant dispersal is adversely affected by surrounding buildings);
- The location and heights of sensitive receptors representative of public exposure to be included in the assessment.
- Point or area source information

A7.6 Emissions Data

The most up-to-date emission factors available should be used in the modelling. The current emissions factors, released in 2010 by DEFRA and department for Transport (DfT), are incorporated within the Emissions Factor Toolkit. The emissions factors are available for different road types which act as a proxy for the differences in fleet composition of traffic in different conditions; urban, rural and motorway.

Further information on emissions factors and atmospheric emissions inventories, can be found in the DEFRA Technical Guidance document LAQM. TG(09).

A7.7 Traffic data

Where a Transport Assessment (TA) has been prepared for a proposed development, predicted development traffic flows in the TA should generally be used as the basis for the calculation of 'with development' emissions and subsequent model runs.

Key point

Before an air quality assessment based on a Traffic Assessment (TA) is undertaken, the consultant should liaise with the local authority officer and confirm the findings of the TA are appropriate for the needs of the air quality assessment.

Furthermore the TA should be approved by the local authority's transport planners, in consultation with their air quality officers and the local transport authority if there is likely to be a requirement for an air quality assessment.

Developers/consultants undertaking an air quality assessment without thoroughly consulting the local authority before hand, risk the assessment becoming obsolete on the basis that the traffic proposals may subsequently change.

The most up to date traffic flow data should be obtained in a suitable format to perform the emissions calculations from:

- Local authorities' review and assessment reports
- Highways Agency
- County Council/City Council/Borough Council
- Department for Transport (DfT)

Any traffic counts conducted outside these sources require verification by the local authority. Where the proposed development is likely to result in additional congested traffic conditions, the TA will need to provide sufficient information to quantify the times when queuing around junctions is likely to occur. Particular care should be taken in selecting appropriate traffic speeds. Individual traffic speeds need to be verified by the local transport authority in consultation with their air quality officers.

A7.8 Meteorological data

The format required will depend on the model to be used, and should be checked with the supplier of the dispersion model. Met. data should be taken from an appropriate and representative site for the development (justification should be provided, such as Met Office approval and appropriate quality assurance/quality control). In Sussex, Gatwick and Shoreham airports can be considered an overall representative site. At least one year of hourly-sequential data should be used and this should correspond where possible with the baseline year of the model, being used for model verification purposes.

A7.9 Background pollutant data

Validated and ratified monitoring data should be taken from an appropriate local background site in the Sussex Air Quality Partnership (www.sussex-air.net) or, if not available, from the National Air Quality Archive. Background emissions data can also be gathered from the National Atmospheric Emissions Inventory (NAEI) database. For the baseline year (used for model verification) the same background year as the weather data and monitoring data should be used. The developer must agree in advance with the local authority which background data should be used.

A7.10 Monitoring data

For the purposes of model verification local monitoring data should be utilised to check the quality of the model output. Monitoring data should be sourced from quality assured monitoring sites (air quality monitoring stations or diffusion tubes) which the local authority can advise upon or from a quality assured monitoring program provided by a consultant. Monitoring data should cover a significant period over a year (preferably 1 year) and be annualised for verification purposes. Data is available for air quality monitoring stations on the Sussex Air Quality Network at www.sussex-air.net. The developer must agree in advance with the local authority which background data should be used.

In addition, the local authorities in Sussex collect nitrogen dioxide data from diffusion tubes. This data can also be used in the verification process. Diffusion tube monitoring data can be obtained by contacting the relevant the local authority.

A7.11 Pollutant-Specific Concerns

If a development is either expected to increase traffic volume or alter the types of traffic (e.g. increase in HGVs), NO_2, PM_{10} and $PM_{2.5}$ should normally be modelled. This is due to widespread exceedences of these pollutants being predicted across much of the main road network in Sussex, and motor vehicles are considered the main source of these pollutants.

If the development itself is a significant emitter, pollutants relevant to the type of development need to be taken into account (for instance, SO_2 and NO_2 should be considered for an oil-burning process or benzene from a petrol station or refinery or PM_{10} and NO_2 from a biomass plant or PM_{10} from a minerals facility).

A7.12 Model Output Area

The model should cover the area likely to be affected by the proposed development. For a development that affects traffic movement, the output should cover the area where traffic movement is significantly affected, i.e. as a minimum all the roads included in the transport assessment.

In those cases where an AQMA or an area identified as an area of poor air quality (candidate AQMA) is likely to be impacted by a proposed development, output results will be required to include appropriate receptors within these areas. The receptor selection should be discussed with the local authority officer.

The results produced should preferably be in the form of carefully selected modelled individual receptor point locations, which represent relevant exposure (as defined in the DEFRA Technical Guidance (TG09)).

In addition, a detailed contour plot of predicted pollutant concentrations and scale of air quality change may be appropriate. A map showing predicted concentrations with the development in place and a map of the difference in concentration with and without the development should be produced. The grid spacing for any contour plots should not be more than 5 metres, to ensure robust definition.

In the case of 2 or more storey buildings, developers should consider the vertical profile as well as the horizontal dispersion of pollutants in terms of model outputs. Developers should consider the surrounding environment of the development - any high level point sources, such as chimney stacks or ventilation outlets, should be identified to ensure that the proposed development does not encroach upon the plume dispersion.

The developer should agree the output area, location and number of receptors in advance with the local authority air quality officer. All receptors should be presented on an appropriately scaled Ordnance Survey map.

A7.13 Model Verification

The results of air dispersion modelling studies can show certain uncertainties associated with the model formulation, input data and measured data. The model variation is an important stage of modelling which evaluates the model performance and examines and reduces above the uncertainties. Therefore, the level of confidence in the verification process is important.

To identify the level of confidence attributed to the outcome of the modelling the estimation of the residual uncertainly should be stated. Where the model is used to predict statistics relevant to the air quality objectives (such as percentiles), the results should reflect the margin of error associated with predictions.

The approach to the verification of a model is set out in the Defra Technical Guidance LAQM TG(09). The completed verification methodology used in the assessment should be detailed in full in the report to demonstrate good model performance and reliability in the model predictions. Any scaling factors applied to model output must be clearly stated.

The developer should agree with the local authority officer the relevant monitoring sites, that can be use for the model verification.

A7.14 Audit trail

The assessment should provide a transparent account of the modelling undertaken and all assumptions made. Should an audit of the assessment be required, the local authority may request extra data.

Appendix 8 – Tables:

A8.1 Table A8.1: Model input data and sources:

This table provides the required data inputs for modelling in an air quality assessment; identifying data sources, expected data quality, presentation of the information and associated comments.

A8.2 Table A8.2: Model output and report information:

This table provides information on the modelling output information required for reports.

Table A8.1: Model input data and sources.

Input:	Source:	Data format: Units	Presented in the report as: Tables	 Maps/graphs	Comments:
Emissions data	Emissions factors should based upon the latest DEFRA Emissions data .http://laqm.defra.gov.uk/review-and-assessment/tools/emissions.html	n/a	Provide emission factors used in modeling report.		Emission factors may be used from individual factors or emissions inventories. The emission factors criteria need to be provided in the report. Discuss which emissions factor and base year for modelling should be used by contacting the LA officer or Sussex-air.
Traffic data	The most up to date traffic flow data from: Local authorities review and assessment reports Highways Agency County Council/City Council/ Borough Council Department for Transport (DfT) Sussex-air	Format of data should be suitable to perform the emissions calculations. *The more detailed vehicle categories will provide better modelling resolution. Traffic surveys or counts with more the 5 categories (or up to 13 categories) is preferred.*	Should include: Traffic data source Name of modelled road link Traffic flow for each modelled road link express as AADT with % of HDV Speed for each modelled road link Changes of traffic flow at each modelled links that correspond to modelled scenarios. Speed data in km/h or mph.	Map should show all modelled road links.	Before an air quality assessment based on a TA is undertaken, the TA should be approved by the local authority's transport planners, in consultation with their air quality officers and the local transport authority.Where the proposed development is likely to result in additional congested traffic conditions, the TA will need to provide sufficient information to quantify the times when queuing around junctions is likely to occur. Particular care should be taken in selecting appropriate traffic speeds.

Input:	Source:	Data format: Units	Presented in the report as: Tables	Maps/graphs	Comments:
Meteorological data	Modelling met data should be sourced from the nearest possible locations in Sussex to the area to be modelled. Local met. sources: Gatwick Airport Shoreham Airport	The format required will depend on the model to be used, and should be checked with the supplier of the dispersion model. At least one year of hourly-sequential data should be used and this should correspond where possible with the baseline year of the model, being used for model verification purposes.	Optional	Optional	The year of met data should correspond to background data used in air dispersion modelling. Met. data should be taken from an appropriate and representative site for the development.
Background pollutant data	Sources include: National Atmospheric Emissions Inventory (NAEI) database Appropriate local background site in the SAQN (www.sussex-air.net).	Depends on pollutant to be assessed. Data format should correspond to relevant objective level. e.g. for NO_2 or NOx annual mean concentrations expressed as µg/m^3	Should include: Source of data Year Grid reference Pollutant conc. and units	n/a	When using a local background monitoring site only validated and ratified monitoring data should be considered. For the baseline year (used for model verification) the same background year as the weather data and monitoring data should be used.
Monitoring data	Local Authority monitoring sites, the Sussex Air Quality Monitoring Network (SAQN) and/ or validated long-term monitoring by developer/ consultant.	Data format should correspond to relevant objective level. i.e. for NO_2 annual mean conc. expressed as µg/m^3	Should include: Site name and description Site grid reference Site height and distance from the kerb. Conc. of pollutant. Year (period annualised)	Map of all monitoring sites should be include in the report	The latest available data should be used for the AQA. Monitoring data can be found in Annual Air Quality Progress Report or Update & Screening Assessment. Air Quality data also can be downloaded from www.sussex-air.net

Input:	Source:	Data format: Units	Presented in the report as: Tables	 Maps/graphs	Comments:
Street Canyon	Street canyons to be identified in modelling, as recommended in TG(09)	n/a	Table should state the length and location of canyon traffic link	Map of all modelled road links	*Map of modelled canyon road links should clearly show which links were considered as canyons.* ***Choice of street canyons should be consulted with LA Air Quality Officer***
Receptors	Receptors to be identified in modelling, as recommended in TG(09).	n/a	Should include: Receptor name and location Receptor Grid reference Height and distance from source of pollution	Map with all receptors should be include in the report	*The choice of receptors should follow the precautionary principle and represent the worst-case location as well as providing a geographical spread across the modelled area. The choice of receptors should not be limited to AQMA only, but also should include area of poor air quality/ candidate AQMA and areas where new receptors will be introduce.*
Surrounding environment	Consult with LA officer. Modelling of air quality needs to consider other likely/ planned developments to ensure cumulative affects are taken into consideration.	Any high level point sources, such as chimney stacks or ventilation outlets, should be identified to ensure that the proposed development does not encroach upon the plume dispersion.	n/a	n/a	*Developer/consultants should consider the surrounding environment of the development; include any planned developments which may influence modelling of air quality.* ***Consult with LA officer.***

Table A7.2: Model output and report information.

Data	Format	Table	Map	Comments
Report	The report should include the modelling input data required above in Appendix Table G3.1, plus details given below.	Tables required should include: Air Quality Objectives Monitoring data Receptor info. Modelling results incl. comparison to AQO's	Maps required should include: Development area Receptor locations Monitoring locations Modelled results (total and dev. contribution)	
Modelled area	The model should cover the area likely to be affected by the proposed development. For a development that affects traffic movement, the output should cover all areas where traffic movement is affected and not only AQMA or areas consider within Traffic Assessment.	n/a	The map should include: Modelled area All traffic links with traffic flows figures Choice of receptor within modelled area.	
Modelled results	The results produced should preferably be in the form of carefully selected modelled individual receptor point locations.	The report should include a table with monitored and all modelled results for each sensitive receptor. The table should also clearly describe a magnitude of changes in pollution concentration against baseline modelled scenario.	The report should include: detailed contour plot of predicted pollutant concentrations and scale of air quality change. a map showing predicted concentrations with the development in place a map of the difference in concentration with and without the development .	*The grid spacing for any contour plots should not be more than 5m, to ensure robust definition. In the case of 2 or more storey buildings, developers should consider the vertical profile as well as the horizontal dispersion of pollutants in terms of model outputs.*

Data	Format	Table	Map	Comments
Model verification	The approach to the verification of a model is set out in the Defra Technical Guidance LAQM TG(09) Any scaling factors applied to model output must be clearly stated. The developer should agree with the local authority officer the relevant monitoring sites, to be used for the model verification.	Table with figures for each graph.	Maps produces should contain: Comparison of measured Road NOx to unadjusted Modelled Road NOx concentrations. Comparison of measured to total NO_2 to final adjusted modelled total NO_2 concentrations.	*Where the model is used to predict statistics relevant to the air quality objectives (such as percentiles), the results should reflect the margin of error associated with predictions*