Ricardo Energy & Environment

Supplementary Planning Guidance: Air Quality

West Lothian Council

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Contact:

Andy Lewin
Ricardo Energy & Environment
Gemini Building, Harwell, Didcot, OX11 0QR,
United Kingdom

t: +44 (0) 1235 75 3189
e: andrew.lewin@ricardo.com

Ricardo-AEA Ltd is certificated to ISO9001 and ISO14001

Author:

Lewin, Andrew

Approved By:

Dr Scott Hamilton

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1 Introduction

West Lothian Council has a responsibility to ensure that health based air quality standards are achieved across West Lothian to protect the health of our citizens. The West Lothian Local Development Plan and this associated supplementary guidance document describe how air quality will be considered when determining planning applications.

The information contained in this guidance provides an overview of:

- The local policy context.
- Our current understanding of air quality within West Lothian.
- How air quality will be considered within the planning process by West Lothian Council.
- Clear guidelines on when information relating to air quality will be required with a planning application i.e. an air quality impact assessment.
- Our requirements for the methods that should be used when carrying out air quality impact assessments for development management purposes.
- Guidance on what type of mitigation measures may be required to reduce or offset air quality impacts.

2 Policy context

2.1 West Lothian Local Development Plan

The West Lothian Local Development Plan (LDP) is at Proposed Plan stage. The LDP acknowledges that there are known locations where air quality is a concern and that there is a statutory process to be followed to develop and agree prioritised measures to improve air quality.

Policy EMG 4 (reproduced below) of the LDP states how air quality will be considered within the planning process. Policies DES1 and HOU4 of the LDP also include requirements regarding air quality.

POLICY EMG 4 Air Quality

Where appropriate, developers will be required to provide additional information on the impact of their proposed development on air quality.

Development promoting behaviour change programmes in Linlithgow and Broxburn/Uphall to facilitate modal shift of shorter journeys to walking and cycling is supported in principle.

Development will not be supported where it is not possible to mitigate the adverse effects of that development on air quality effectively or where development proposals cause unacceptable air quality or dust impacts, or would result in sensitive uses, which give rise to air pollution concerns, being located within or close to uses with potential to generate such pollution.

Where appropriate, planning conditions will be imposed which require air quality monitoring apparatus to be installed.

Extract from POLICY DES1 Design Principles

When assessing development proposals, the developer will be required to ensure that:

- There is no significant adverse impact on amenity as a result of noise or particulates
- There are no significant adverse effects on air quality (particularly in and around Air Quality Management Areas) and, as appropriate, mitigation to minimise any adverse effects is provided.

POLICY HOU4 Windfall Housing Development in Linlithgow and Linlithgow Bridge

Linlithgow and Linlithgow Bridge are particularly sensitive to the impact of new infill housing development by virtue of unique historic character, environmental constraints (landscape setting, air quality and drainage), traffic congestion and the availability of education capacity.

Proposals for windfall housing development within the settlement boundary of Linlithgow/Linlithgow Bridge will therefore be subject to additional scrutiny and will only be supported where it can be demonstrated that their impact can be satisfactorily managed and would not singularly or cumulatively exacerbate these matters.

2.2 International, National and Local Policies

Activities relating to the monitoring and management of air quality in the UK are primarily driven by European (EU) legislation. The 2008 ambient air quality directive (2008/50/EC) sets legally binding limits for concentrations in ambient (outdoor) air of major air pollutants that are known to have a significant impact on human health including particulate matter (PM10 and PM2.5) and nitrogen dioxide (NO2). The 2008 directive replaced most of the earlier EU air quality legislation and was made law in Scotland through the Air Quality Standards (Scotland) Regulations 2010.

Alongside the EU limit values the World Health Organisation (WHO) has published guidelines for air pollutants. The WHO guidelines are designed to support the formulation of air quality policies to reduce the health impact of air pollution. The WHO guidelines are lower than the current limit values for a number of pollutants, specifically PM10 and PM2.5 which are associated with the greatest health impacts.

The UK has an Air Quality Strategy (UK AQS) which was developed by Government in 1997 and has subsequently been revised in 2003 and 2007. This sets out the national policy approach to air quality across the UK. The strategy states that the UK Government's and devolved administrations' primary objective is to ensure that all citizens should have access to outdoor air without significant risk to their health, where this is economically and technically feasible. The NAQS sets out a series of air quality objectives which Local Authorities must work towards achieving.

Local Authority obligations in this regard are laid out in the Environment Act 1995 which set out a system called Local Air Quality Management (LAQM). It should be noted that although the objectives are policy targets (the Council are not legally obliged to achieve them) all of the UK objectives are at least as stringent as the European Limit Values for the various pollutants. The Limit Values carry legal standing and have been written into UK law through the various Air Quality Standards Regulations. It is worth noting that Scottish Government has adopted a PM10 annual mean objective that is lower than the UK or EU standard. The Scottish PM10 standard is written into regulation and therefore carries equivalent weight to the Limit Value based standards.

Part IV of the Environment Act 1995 requires local authorities to regularly review and assess air quality in their areas against seven of the nine objectives in the Air Quality Strategy. If review and assessment indicates that any objective is unlikely to be met by the required date, the local authority concerned must declare an Air Quality Management Area (AQMA) and draw up an Action Plan. The plan should include measures to improve air quality so that the air quality objectives may be achieved in the future.

2.3 Cleaner Air for Scotland

The Clean Air for Scotland strategy which sets out the Scottish Government's proposals for delivering further improvements to air quality was published in November 2015. Cleaner Air for Scotland draws together Scottish Government policies which impact upon air quality into a single framework and sets out a series of actions for delivering further improvements to air quality. It summarises the key actions that CAFS aims to deliver across six main objectives, of transport, health, legislation & policy, place-making, communication and climate change, with a common thread of sustainability running through these.

CAFS also introduces the proposed National Modelling Framework (NMF) and the National Low Emission Framework (NLEF) both of which are pending preparation.

2.4 Air Quality – Why does it matter

2.4.1 Protection of human health

The primary driver for protecting and improving air quality is human health. Poor air quality is associated with both short and long-term adverse effects on human health. Exposure can lead to irritation of the respiratory system and exacerbation of existing health conditions (including heart disease and respiratory illnesses) in vulnerable individuals.

In Scotland it has been estimated that the mortality burden of long term exposure to ultra-fine particulate matter ($PM_{2.5}$) in 2010 was equivalent to nearly 2094 premature deaths in those aged 25 or older; with associated life years lost estimated at 22,474. The number of premature deaths is much higher in the large urban conurbations than in rural areas of Scotland as higher density of emission sources in urban areas mean greater exposure of the population.

2.4.2 Other impacts

Air pollution can also adversely impact upon sensitive eco-systems and the built environment; and also has an impact on climate change, as some air pollutants such as ground level ozone and ultrafine particulates of black carbon behave like greenhouse gases and contribute to global warming. Air quality and climate change can therefore be addressed using integrated policies and measures.

2.4.3 Economic benefits of clean air

The effect of air pollution has monetary costs associated with the other impacts described above. The main economic impact is associated with health i.e. cutting lives short, increasing medical costs, and reducing productivity through working days lost across the economy. Overall it has been estimated that the economic cost of air pollution in the UK is between £9 billion and £19 billion; reducing the impact of air pollution will therefore lead to significant economic benefit. The planning system can help with this.

3 Air Quality in West Lothian

3.1 Our responsibilities

3.1.1 Local Air Quality Management

West Lothian Council has a statutory responsibility to review and assess air quality within the local authority area under the Local Air Quality Management (LAQM) regime. This is done by identifying potential sources of air pollution and measuring pollutant concentrations at locations where there may be a risk of poor air quality occurring.

Two of the main pollutants of concern, nitrogen dioxide (NO_2) and fine particulate matter (PM_{10}) are measured by the Council at various locations throughout West Lothian. The Council prepares LAQM Reports annually to document recent measurements and trends; these are available to download from the dedicated air pollution pages on our website[1]

The Council has a responsibility through the planning system to ensure no new pollution hotspots are created or introduce new human exposure where there could be existing poor air quality. The Council is also determined to avoid development leading to a gradual worsening in air quality due to the cumulative impact of numerous small developments. To protect the health of our residents, it's therefore very important that air quality is considered appropriately through the planning process.

3.1.2 National climate change and sustainability objectives

There are significant synergies between reducing greenhouse gas emissions and reducing emissions of other atmospheric pollutants. Both sets of emissions largely arise from the same combustion processes – vehicle engines, power generation, homes and industry.

[1] http://www.westlothian.gov.uk/article/2216/Air-Pollution

Scottish climate change proposals and policies state that improving air quality is an additional benefit associated with decarbonising transport and energy production. The Scottish Government has also committed to half of all fossil-fuelled vehicles being phased-out of urban environments across Scotland by 2030 and almost complete decarbonisation of the road transport sector by 2050. A road map for the widespread adoption of plug-in and plug-in hybrid vehicles was published by Transport Scotland in 2014[2].

The Council therefore also aims to ensure that developments are designed to be sustainable. The planning system has an important role in ensuring that both carbon emissions and air quality impacts are reasonably mitigated.

3.2 Is there currently an air quality problem anywhere in West Lothian?

Air quality across West Lothian is generally very good in that pollutant concentrations are within the health based air quality objectives at most locations. There are however some localised hotspots that have been identified where pollutant concentrations are in excess of the national air quality objectives and there may be a risk to human health. These are mainly locations where there are busy roads and junctions with significant road traffic emissions, coupled with residents living nearby.

At locations where regular exceedances of the Scottish air quality objectives are known to occur and human exposure is present, the Council is required to declare an Air Quality Management Area (AQMA). To date, three AQMAs have been declared in West Lothian. These are located in Broxburn, Linlithgow and Newton. Road traffic emissions are the main source of pollution in Broxburn and Linlithgow. In Newton domestic combustion contributes a significant proportion of particulate emissions. A map showing the locations of the existing AQMAs are presented in Figure 1 to Figure 3.

Developers should consult with the Council's planning team to establish if your proposed development is in or near to an AQMA. Any development that influences traffic flows through an AQMA will be considered as near to an AQMA.

Figure 1: Broxburn AQMA

[2] Transport Scotland (2014) Switched On Scotland: A Roadmap to Widespread Adoption of Plug-in Vehicles

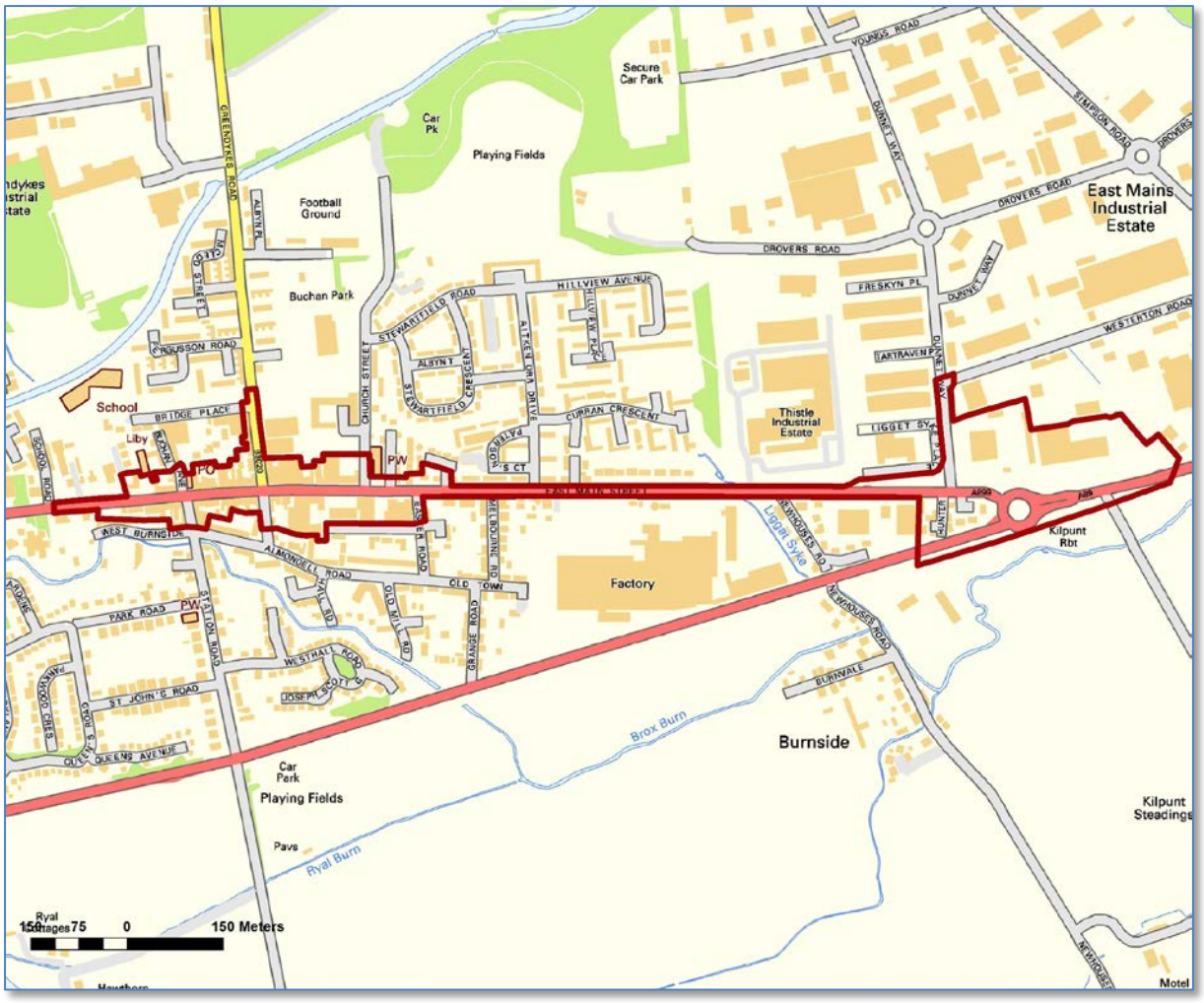

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Figure 2: Linlithgow AQMA

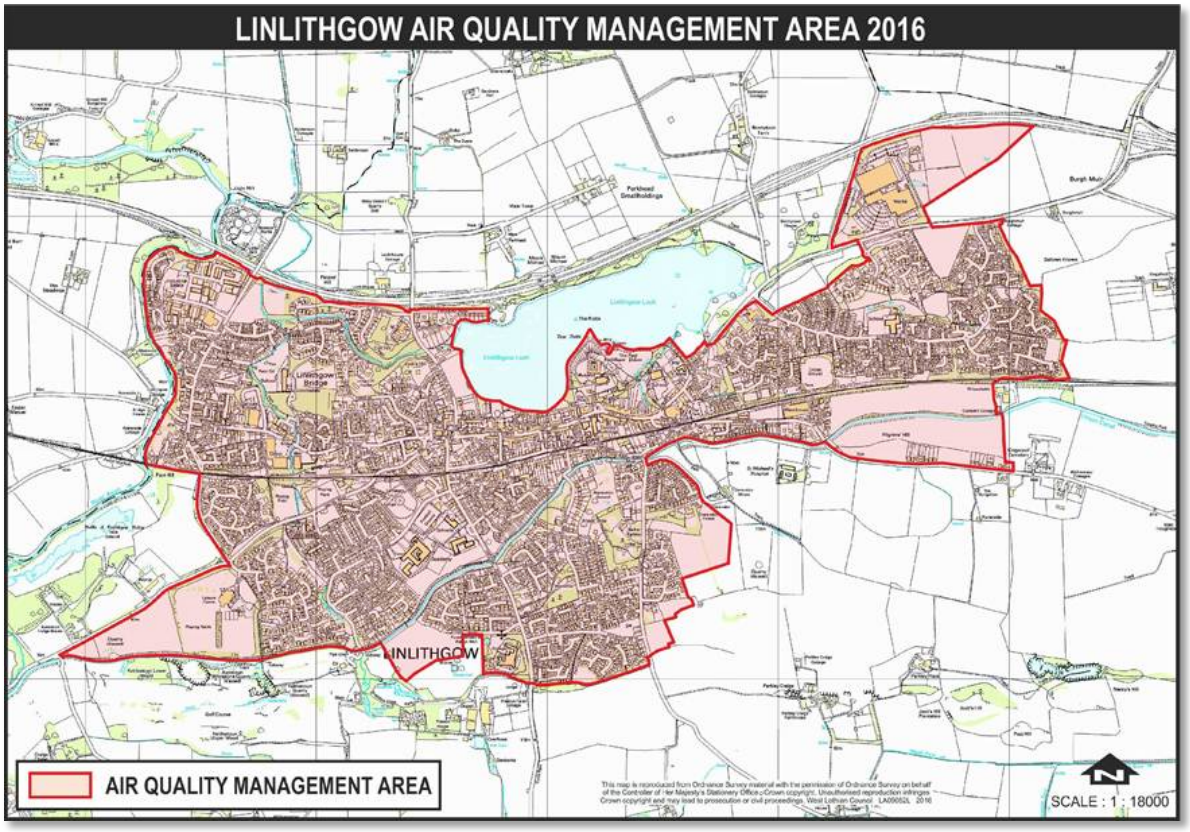


Figure 3: Newton AQMA

4 How Air Quality will be considered for planning applications in West Lothian

When considering planning applications, the Council needs to be certain the proposed development will not lead to unacceptably poor air quality or contribute to cumulative negative air quality impacts. The Council's approach presumes that some type of mitigation of air quality impacts will be required for all but only the smallest isolated developments. A diagram listing the basic steps of how air quality will be considered is presented in Figure 4.

Primarily the Council requires developers to engage in pre-application discussions with it's planning service to identify if any environmental assessment reports will be required in support of the planning application. Based on the location and scale of the proposed development the council will then be able to determine if more information is needed e.g. a requirement to conduct and submit an air quality impact assessment report.

The types of new or changed sources of air pollution that may require impact assessment and appropriate mitigation to be included in the scheme design are:

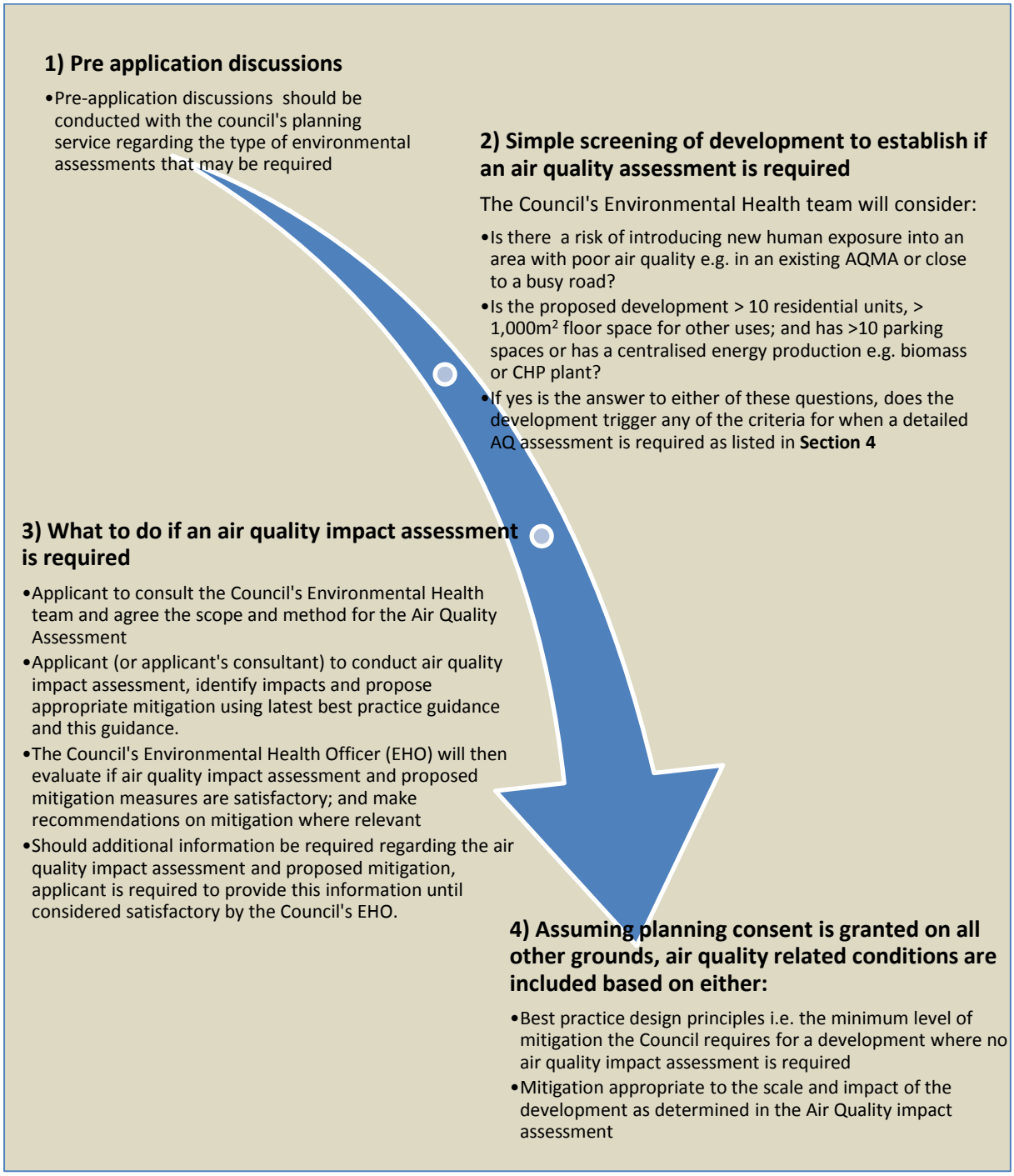
Road traffic emissions - Currently the main source of localised air pollution in Scotland's urban areas is road traffic. The majority of AQMAs have been declared due to road traffic emissions. The screening threshold at which additional road traffic will trigger the requirement for an air quality impact assessment is set out in Section 4.2.

Industrial and commercial point sources – All point source combustion emissions may require an impact assessment. Proposals for large commercial or industrial installations that have the potential to emit pollution may be regulated under the Pollution Prevention & Control (PPC) regime and will normally require an air quality assessment as part of the permit application. To avoid duplication of effort the same air quality assessment could be used to help determine the impact of the development in terms of air quality for a planning application.

Commercial biomass combustion – The combustion of biomass has the potential to impact on local air quality. While the council recognise that there are national policy commitments to promote the use of renewable heat and power through biomass combustion; we also have to protect air quality and public health. A screening air quality assessment will be conducted by the Council's Environmental Health officers for biomass installations with a thermal rating of greater than 50kW. This screening may identify a requirement for more detailed dispersion modelling assessment which will be required to be undertaken by the applicant. Further information on the biomass screening assessment is provided in Section A.1.6.1.

Construction Phase impacts – Localised impacts on air quality and dust soiling may occur during demolition and construction activities. A construction phase air quality/dust impact assessment may be required based on the size and location of the development and its proximity to nearby sensitive receptors. Developers should consult with the Council's Environmental Health team to establish if this is required. Further information on screening criteria for construction phase impact assessments is provided in Section A.1.3.

Figure 4: Steps explaining how air quality will be considered within the planning process



4.1 When is an air quality impact assessment likely to be required?

The three main ways a development may potentially impact on air quality are as follows:

1. Introducing new human exposure at a location within an existing AQMA or close to a busy road or junction. If a residential or commercial development is proposed in an area of existing poor air quality i.e. it could expose future occupiers to unacceptable health risks associated with high pollutant concentrations) e.g. at a location within an existing AQMA or close to a busy road or junction.
2. The development may itself cause a deterioration in local air quality e.g. from increased traffic flows and hence vehicle emissions; or point source flue emissions from heating or energy production plant.
3. If the demolition/construction phase will have an impact on the local environment e.g. through fugitive dust and/or exhaust emissions from machinery and vehicles.

Developers should always check with the Council's Environmental Health Department if an air quality assessment is required before submitting a planning application. It is reasonable to expect that an assessment will be required where there is the risk of an air quality impact on human health. For the majority of developments, there will be an emphasis on incorporating best practice design principles with the aim of reducing both road transport and other emissions.

4.2 Development categories

The level of detail required to assess the potential impact of a development on air quality, and the level of mitigation required, should be proportional to the scale of the proposed development. To provide clear guidance for developer's regarding when an air quality impact assessment is likely to be required the Council has prepared a development category matrix as presented in Table 1. For major developments the category matrix uses the criteria suggested in the latest IAQM/EPUK guidance (reproduced in Box 1 below).

When considering which development category is relevant, it should be emphasised that the concept of introducing new human exposure into an area with existing poor air quality is fundamental; and supersedes development type based on size.

For the largest developments an Environmental Impact Assessment (EIA) could be required under the EIA Regulations. In that case, a detailed study of the effects of a development on air quality would be necessary unless it has been screened out at the scoping stage of the EIA.

4.3 What should be included in an air quality impact assessment

An air quality impact assessment report should demonstrate that current best practice methods have been used to assess the potential impact of a proposed development on local air quality. More detailed information on reporting requirements is included in Appendix A.

The main points that should be covered in the air quality impact assessment reports are:

- **Relevant details of the proposed development:** providing information such as location, type of development and site layout with supporting maps or drawings.
- **The basis for determining significance of effects arising from the impacts** i.e. the assessment criteria.
- **Details of sensitive receptor locations –** this is likely to be where there may be relevant human exposure.
- **Baseline air quality –** Quantify the existing and future baseline air quality without the proposed development in place. When assessing emission form road traffic, details regarding model verification should also be included.
- **Impact assessment**: Numerical predictions of pollutant concentrations at receptors should be compared with and without development scenarios for the opening year of the proposed development.

- **Construction phase impacts:** Unless screened out, construction phase impacts should be assessed using the latest IAQM guidance and appropriate mitigation measures recommended.
- **Mitigation measures:** Where a significant impact is identified then the measures to be employed to avoid, reduce and, where appropriate, offset the air quality impact should be set out. Even where the effect is judged to be insignificant, good design and good practice measures as outlined in Section 5 below should be employed as a minimum.

For information, the Council has provided an example checklist in Appendix B which will be used by its Environmental Health team to evaluate the content of air quality impact assessments submitted.

Table 1: Development categories, impact assessment and mitigation requirements summary

Development Category	Insignificant	Minor	Medium	Major
Threshold	Below minor development thresholds	If any of the following apply: • 10 or more residential units or a site area of more than 0.5ha • More than 1,000 m^2 of floor space for all other uses or a site area greater than 1ha • Coupled with either of the following: • The development has more than 10 parking spaces. • The development will have a centralised energy facility or other centralised combustion process	Meets the current threshold requiring a Transport Assessment or Travel Plan as specified in the latest relevant Scottish transport assessment guidance[3],[4] Please note for Travel Plans criteria, these are only guidelines and that a full TA can be asked for if the Council considers that the traffic impact of a proposed development merits such an investigation.	Medium developments, or developments that may influence traffic or other emissions close to or within an AQMA; which also trigger any of the criteria specified in the latest IAQM/EPUK best practice air quality development control guidance (See Box 1)
Assessment Required	None (other than to assess new exposure in a location with a known risk of poor air quality)	For road traffic emissions - None (other than to assess new exposure in a location with a known risk of poor air quality) For centralised energy or combustion process e.g. biomass boilers - Screening assessment followed by detailed modelling if considered necessary by our Environmental Health team.	For road traffic emissions - None (other than to assess new exposure in a location with a known risk of poor air quality) For centralised energy or combustion process e.g. biomass boilers - Screening assessment followed by detailed modelling if considered necessary by our Environmental Health team.	For Road traffic emissions - Air quality impact assessment required to quantify the change in local pollutant concentrations. Should also include a quantification of the net change in NO_2 and PM_{10} emissions. As per minor and medium for centralised energy or combustion processes e.g. biomass.
Mitigation (See Section 5)	IAQM/EPUK Good practice design principles recommended (see Section 5.2)	IAQM/EPUK Good practice design principles required	IAQM/EPUK Good practice design principles required	IAQM/EPUK Good practice design principles required Will require offsetting of significant net increase in emissions through financial compensation by developer to fund additional mitigation measures (See section 5.4)
Construction phase assessment/mitigation	Applicable to all development categories where not screened out - a demolition/construction phase impact risk assessment is required. Appropriate mitigation should be included in the construction management plan as recommended in the latest IAQM guidance i.e. based on the outcome of the risk assessment.			

[3] Transport Scotland (2012) Transport Assessment Guidance
[4] SCOTS(2014) National Roads Development Guide

Box 1: Major Development Category – Indicative criteria for requiring an air quality assessment[5]

The development will:	Indicative Criteria to Proceed to an Air Quality Assessment [a]
1. Cause a significant change in Light Duty Vehicle (LDV) traffic flows on local roads with relevant receptors. (LDV = cars and small vans <3.5t gross vehicle weight)	A change of LDV flows of: - more than 100 AADT within or adjacent to an AQMA - more than 500 AADT elsewhere
2. Cause a significant change in Heavy Duty Vehicle (HDV) flows on local roads with relevant receptors. (HDV = goods vehicles + buses >3.5t gross vehicle weight)	A change of HDV flows of - more than 25 AADT within or adjacent to an AQMA - more than 100 AADT elsewhere
3. Realign roads, i.e. changing the proximity of receptors to traffic lanes.	Where the change is 5m or more and the road is within an AQMA
4. Introduce a new junction or remove an existing junction near to relevant receptors.	Applies to junctions that cause traffic to significantly change vehicle accelerate/decelerate, e.g. traffic lights, or roundabouts.
5. Introduce or change a bus station.	Where bus flows will change by: - more than 25 AADT within or adjacent to an AQMA - more than 100 AADT elsewhere
6. Have an underground car park with extraction system.	The ventilation extract for the car park will be within 20 m of a relevant receptor Coupled with the car park having more than 100 movements per day (total in and out)
7. Have one or more substantial combustion processes	Where the combustion unit is: - any centralised plant using bio fuel - any combustion plant with single or combined thermal input >300kWh - a standby emergency generator associated with a centralised energy centre (if likely to be tested/used >18 hours a year)
8. Have a combustion process of any size	Where the pollutants are exhausted from a vent or stack in a location and at a height that may give rise to impacts at receptors through insufficient dispersion. This criterion is intended to address those situations where a new development may be close to other buildings that could be residential and/or which could adversely affect the plume's dispersion by way of their size and/or height.

[5] IAQM/EPUK (2015) Land-Use Planning & Development Control: Planning for Air Quality; January 2017

5 Mitigation of air quality impacts

5.1 Mitigating construction phase impacts

Appropriate mitigation measures for demolition and construction phase impacts should be assessed and recommended using the latest IAQM guidance[6]. With correct implementation of site-specific mitigation measures the environmental effect should not be significant in most cases. These measures should be implemented and monitored via a site specific dust management plan at the construction site.

5.2 Mitigation of development

Air quality impact assessments for individual developments often conclude that the development will have a very small/negligible impact on air quality, and therefore little mitigation is required as no significant impact is occurring.

Multiple small developments, although with a small or negligible impact will however contribute to a cumulative impact or "creeping baseline". The Council is keen to avoid this creeping baseline, particularly at locations close to any existing air quality management areas (AQMA) in West Lothian where additional traffic is likely to lead to increased pollutant concentrations where the Council has been focussing resources and measures on improving air quality.

The Council is also keen to influence the take up of low emission technologies for both transport and energy production as these are the technologies of the future. As well as improving air quality, these low emission technologies will help Scotland reduce greenhouse gas emissions and achieve our climate change obligations.

To achieve this, we require that good practice design measures are implemented for all developments categorised as minor, medium or major (please refer to Table 1 for development category thresholds).

The basic concept is that good practice to reduce emissions and exposure is incorporated into all except very small developments at the outset, and at a scale commensurate with the emissions.

The design of each development should take into account West Lothian Council's Active Travel Plan and related Local Active Travel Network Plans (LATNPs) for settlements containing AQMAs. Furthermore, consideration should also be given to West Lothian Health Impact Assessment planning guidance.

The principles of good design and operational phases suggested in the latest IAQM/EPUK Planning for Air Quality guidance are reproduced in Box 2.

Box 2: IAQM/EPUK Guidance 2015 - Principles of good design

Design phase

- New developments should not contravene the Council's Air Quality Action Plan, or render any of the measures unworkable;
- Wherever possible, new developments should not create a new "street canyon", or a building configuration that inhibits effective pollution dispersion;
- Delivering sustainable development should be the key theme of any application;
- New development should be designed to minimise public exposure to pollution sources, e.g. by locating habitable rooms away from busy roads, or directing combustion generated pollutants through well sited vents or chimney stacks.

Operational phase

- Where on-site parking is provided for residential dwellings, one EV charging point for

[6] IAQM (2014) Guidance on the assessment of dust from demolition and construction

each parking space should be made. The provision of at least 1 Electric Vehicle (EV) "rapid charge" point per 10 residential dwellings and/or 1000m^2 of commercial floor space.

- Where development generates significant additional traffic, provision of a detailed travel plan (with provision to measure its implementation and effect) which sets out measures to encourage sustainable means of transport (public, cycling and walking) via subsidised or free-ticketing, improved links to bus stops, improved infrastructure and layouts to improve accessibility and safety.
- All gas-fired boilers to meet a minimum standard of <40 mg NOx/kWh.
- All gas-fired CHP plant to meet a minimum emissions standard of:
  - Spark ignition engine: 250 mg NOx/Nm^3;
  - Compression ignition engine: 400 mg NOx/Nm^3;
  - Gas turbine: 50 mg NOx/Nm^3.
- A presumption should be to use natural gas-fired installations in densely populated urban areas
- Where biomass is proposed within an urban area it is to meet minimum emissions standards of:
  - Solid biomass boiler: 275 mg NOx/Nm^3 and 25 mg PM/Nm^3 (please note: meeting this emission standard does not override our requirement to conduct a biomass screening assessment (See Section A.1.6.1 above))

(These suggested emission benchmarks represent readily achievable emission concentrations by using relatively common technologies. If necessary they can be bettered by using more advanced control technology and at additional cost over and above the 'typical' installation).

5.3 Sustainable Transportation for commercial developments

For medium and large category commercial developments additional sustainable transport measures may be required all of which relate to managing and minimising vehicle emissions. These measures are presented in Box 3.

Box 3: Potential sustainable transport mitigations measures for medium and large developments with commercial use

- Designation of parking spaces for low emission vehicles
- Differential parking charges depending on vehicle emissions
- All commercial vehicles should comply with either current or previous European Emission Standards from site opening, to be progressively updated for the lifetime of the development
- Fleet operations should provide a strategy for considering and reducing emissions.
- Use of ultra-low emission vehicles.
- Production of travel plans to support sustainable travel to work by staff and by visitors / customers.
- Facilities provided to support walking and cycling to work for staff and visitors such as secure, covered cycle parking and showering and changing facilities

Design should take into account of West Lothian Council's Active Travel Plan and related Local Active Travel Network Plans (LATNPs) for settlements containing AQMAs. Furthermore, consideration should also be given to West Lothian Health Impact Assessment planning guidance.

5.4 Offsetting emissions

As specified in Table 1 for major category developments that trigger specific criteria (as listed in Box 1). The Council requires that the net change in emissions attributable to the proposed development is quantified and included in the air quality impact assessment report.

In addition to implementation of the good practice design principles; the Council may specify a requirement for additional measures to offset emissions from the proposed development; this may be required if the impact of the development on air quality in the surrounding area is considered as unacceptable without additional off-site mitigation. Any planning obligations to include offsetting will be proportional to the nature and scale of development proposed and the level of concern about air quality at the locations affected.

A starting position for such offsetting, where required, will be based on a quantification of the net change in emissions associated with the development and should be calculated using the 'Damage Cost Approach' used by Defra. This can be applied as an indicator of the level of offsetting required to be included or as a financial obligation on the developer. This technique has been applied for such purposes by Local Authorities across the UK in recent years. An extract from the IAQM/EPUK guidance describing the calculation method is presented in Box 4. Detailed information regarding how to conduct the calculation is available in the latest version of the Defra guidance[7].

Box 4: Defra Damage Cost Approach

The approach that has been widely used to quantify the costs associated with pollutant emissions from transport is to:

- Identify the additional trip rates (as trips/annum) generated by the proposed development (this information will normally be provided in the Transport Assessment to;
- Assume an average distance travelled of 10km/trip;
- Calculate the additional emissions of NOx and PM_{10} (kg/annum), based on emissions factors in the Emissions Factor Toolkit, and an assumption of an average speed of 50 km/h;
- Multiply the calculated emissions by 5, to assume emissions over a 5-year time frame;
- Use the HM Treasury and Defra IGCB damage cost approach[8] to provide a valuation of the excess emissions, using the currently applicable values for each pollutant[9]; and
- Sum the NOx and PM_{10} costs.

[7] https://www.gov.uk/guidance/air-quality-economic-analysis
[8] Dickens R, Gill J, Rubin and Butterwick M (2013) Valuing impacts on air quality: Supplementary Green Book guidance. HM Treasury and Defra.
[9] www.gov.uk/air-quality-economic-analysis#damage-costs-approach.

6 Further Information

This guidance aims to provide developers and their consultants with guidance regarding how West Lothian Council will consider air quality within the planning process. Should you have any queries, please contact either the Council's Planning service to discuss proposals or the Environmental Health Team to discuss technical matters.

Our contact details can be found at the following website addresses.

- https://www.westlothian.gov.uk/planning-applications
- https://www.westlothian.gov.uk/article/2216/Air-Pollution

Appendices

Appendix A: Technical Guidance for conducting air quality impact assessments

Appendix B: Air quality impact assessment evaluation checklist

Appendix A : Technical Guidance for conducting air quality impact assessments

The aim of any air quality impact assessment is to either quantify existing air quality in an area to estimate exposure at proposed residential properties; and/or to estimate the effect on local air quality arising from increased emissions attributable to the proposed development.

Air quality impact assessments are often technical exercises with potential variations in approach. Sometimes these methodological variations can lead to problems whereby an approach which may not be considered satisfactory by the Council is used. This can lead to delays in making planning decisions and therefore delay the progress of your development.

To help prevent this, the Council outlined our preferred approaches that should guide developers and their consultants when preparing air quality assessments in support of planning applications within West Lothian. This guidance has been prepared based on a combination of the latest best practice guidance adopted across Scotland and the UK, and the Council's knowledge of air pollution within our area.

Developers or their consultants must consult the Council's Environmental Health team on the proposed scope of the air quality impact assessment. This should ensure that the proposed method is considered appropriate prior to submission of the assessment report and should help avoid re-submission of further information being required. Failure to consult with Environmental Health may lead to delays in processing your application.

To assist developers with considering the scope of an air quality impact assessment, the Council has provided a checklist which lists all of the elements that could be relevant; this will be used when evaluating the air quality impact assessment report. The checklist is presented in Appendix B.

A.1.1 Other recommended sources of guidance

A.1.1.1 Local Air Quality Management Technical Guidance LAQM.TG(16)

The methods developed to support the Local Air Quality Management (LAQM process) in the UK are described in the LAQM.TG (16) technical guidance[10]. The Council requires developers to use methods that are closely aligned with the TG (16) guidance (or the latest updated equivalent LAQM technical guidance) when undertaking air quality impact assessments. Of particular relevance to developers conducting air quality assessments are the sections in TG (16) on making emissions estimates, dispersion modelling including model verification and quantifying model uncertainty; and ambient monitoring.

When applying the methods in LAQM.TG (16) there is room for some variation in approaches to modelling; we set out our preferred approaches in this guidance document.

A.1.1.2 Environmental Protection UK and Institute of Air Quality Management (IAQM): Planning for Air Quality

In recent years, the Environmental Protection UK (EPUK) Planning for Air Quality guidance has been widely accepted by Environmental Health practitioners, developers and their consultants as best practice guidance when considering air quality in relation to development. This guidance aims to ensure that air quality is properly accounted for in the development management process.

Currently, the latest version of the Planning for Air Quality guidance[11], which was prepared collaboratively by the Institute of Air Quality Management (IAQM) and EPUK, was published in January 2017. Previous versions of the guidance were published in 2004, 2006, 2010 and 2015.

Developers should use the latest version of the EPUK/IAQM guidance when preparing air quality impact assessments, using the updated impact descriptors specified in Table 6.3 of the guidance (we have reproduced these in Section A.1.8.2). The Council's requirements regarding mitigation of air quality are also based on those recommended in the current IAQM/EPUK guidance (see Section 5).

[10] Defra and the devolved administrations (2016) Local Air Quality Management Technical Guidance LAQM.TG(16)
[11] IAQM/EPUK (2015) Land-Use Planning & Development Control: Planning for Air Quality; January 2017

A.1.1.3 IAQM Guidance on the assessment of dust from demolition and construction

The latest (2014) publication of the IAQM construction dust impact assessment guidance[12] has an emphasis on identifying the risk of air quality and dust soiling impacts from demolition and construction sites. The method identifies mitigation measures appropriate to the risk of impacts occurring at nearby sensitive receptors. With correct implementation of site-specific mitigation measures the environmental effect will not be significant in most cases.

A.1.2 Pollutant monitoring

In some circumstances, the Council may require that ambient monitoring is undertaken to underpin air quality assessments. This may be required for verification of dispersion modelling results for road traffic emission assessments (see Section A.1.7.3.9 of this Appendix); or to quantify baseline pollutant concentrations in a location where there is a risk that other localised sources of emissions may mean that baseline concentrations are higher than the mapped background concentration. The recommended minimum period for a monitoring campaign to quantity annual average pollutant concentrations is 3 months, preferably 6 months. The results from short term monitoring periods should be adjusted to represent an annual mean concentration using the methods recommended in the LAQM.TG (16) technical guidance[13].

To avoid delays, the Council recommends that developers consult with its Environmental Health team early in the application process to determine if this will be required. A decision on the requirement for additional monitoring by the developer will be based on current Council monitoring data availability and its relevance to the development site. The Council undertakes monitoring at many locations, and it may be that existing monitoring can be used in an air quality assessment, but this should not be assumed. The Council reserves the right to refuse acceptance of air quality assessment methods that do not include proper consideration of the requirement to conduct monitoring in advance.

A.1.3 Construction Phase risk/impact assessment

Air quality impacts that may arise during demolition and construction activities are:

- Dust deposition, resulting in the soiling of surfaces;
- Visible dust plumes, which are evidence of dust emissions;
- Elevated PM_{10} concentrations, as a result of dust generating activities on site; and
- An increase in concentrations of airborne particles and NO_2 due to exhaust emissions from diesel powered vehicles and equipment used on site (non-road mobile machinery) and vehicles accessing the site

The requirement for a demolition/construction phase impact risk assessment will be based on risk of the impacts listed above occurring, using a simple screening test which considers proximity of the site to nearby residential properties or other sensitive receptors (the screening criteria are presented in Box 5).

Developers should consult with the Council's Environmental Health team to confirm the outcome of the simple screening test. When a construction phase risk assessment is required we recommend using the method described in the latest IAQM best practice guidance on assessing the risk of air quality and dust soiling impacts.

The construction phase assessment should recommend appropriate mitigation measures based on the sensitivity of the surrounding area; and the risk of the proposed demolition and construction activities leading to dust emissions. These measures should then be implemented and monitored via a site specific dust management plan at the construction site.

[12] IAQM (2014) Guidance on the assessment of dust from demolition and construction
[13] Defra and the devolved administrations (2016) Local Air Quality Management Technical Guidance LAQM.TG(16)

Box 5: Screening Criteria for construction phase risk/impact assessment

A demolition/construction phase risk/impact assessment will normally be required where there is:

- a 'human receptor' within:
  - 350 m of the boundary of the site; or
  - 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the site entrance(s).
- an 'ecological receptor' within:
  - 50 m of the boundary of the site; or
  - 50 m of the route(s) used by construction vehicle on the public highway, up to 500 m from the site entrance(s).

A.1.4 Operational phase air quality assessments

There is no single method for conducting an air quality impact assessment of the operational phase of a proposed development robustly; the chosen method should be appropriate to the size and nature of the development.

For some developments screening models may be acceptable; in other cases, more detailed dispersion modelling will be required. Any air quality assessment undertaken must demonstrate how a development would affect pollution concentrations in relation to the health based statutory air quality standards and objectives applicable in Scotland. Impact descriptors should correspond with those recommended in the latest EPUK/IAQM Planning for Air Quality Guidance.

Developers or their consultants must consult with the Council's Environmental Health team on their proposed approach prior to conducting the air quality impact assessment. This should ensure that the proposed method and approach is considered appropriate prior to submission of the assessment report and should help avoid re-submission of further information being required. This technical guidance aims to reduce the scope for inconsistency within these assessments.

Section A.1.6 of this guidance provides information on different types of screening assessments.

Section A.1.7 of this guidance provides detailed information regarding air quality assessments where atmospheric dispersion models are used.

A.1.4.1 Overview of typical approach to air quality impact assessment

The basis of an impact assessment should be to compare the air quality following completion of the development with that expected at that time without the development (the future 'baseline'). Comparison with existing conditions (current baseline) will also be required. There are three basic steps in an assessment:

1. Assess the existing air quality in the study area (existing baseline);
2. Predict the future air quality without the development in place (future baseline which may or may not include the contribution of other nearby committed developments);
3. Predict the future air quality with the development in place (with development) i.e. future baseline + other committed/consented developments + proposed development

The predicted impacts of the development are then described using a consistent approach as detailed in the latest EPUK/IAQM best practice guidance.

A.1.4.2 Other committed developments

The impact of other consented or committed developments should be included when calculating future baseline air quality. This is particularly applicable at development sites which are part of a wider strategic land allocation.

Transport assessments for proposed developments, particularly in areas allocated for wider development, typically include the impact of traffic attributable to other committed developments. Where available, projected future traffic flows attributable to other committed developments should be

included in calculations when modelling the future baseline air quality (and future 'with development' scenario.

Where information on other committed developments is not immediately available in a Transport assessment, consultation with the Council's Planning Services and Environmental Health Service will identify if any other committed developments should be included in the future baseline calculations.

Committed development may also apply to point source emissions such as biomass combustion or CHP plant; consultation with the Council's Planning Services and Environmental Health Service will identify if any other energy plant point sources are planned within the area of interest.

A.1.4.3 Pollutants to be considered

Typically, when assessing the operational phase of the most common types of development NO_2, PM_{10} and $PM_{2.5}$ should be assessed. This includes developments that will influence or be influenced by road traffic, and combustion sources including biomass boilers.

For industrial or waste management processes, other pollutants may need to be assessed. Developers or their consultants must check with the Council's Pollution Control Team to determine which pollutants should be included in the assessment e.g. sulphur dioxide (SO_2), carbon monoxide (CO) and poly aromatic hydrocarbons (PAH).

A.1.5 Treatment of background concentrations

Background pollutant concentrations can be accessed from either nearby representative background monitoring sites; or more commonly from national background mapping provided by the Scottish Government.

West Lothian Council does currently operate a small number of urban background NO_2 diffusion tube monitoring sites. Developers or their consultants can initially look at the Council's latest LAQM review and assessment report to identify if there is nearby representative background monitoring; and then consult with our Pollution Control Team to agree if the site location and data quality is considered suitably representative of background NO_2 concentrations for an air quality impact assessment.

Where relevant measured background data is not available for a given location the Council recommends using the national background mapping in the assessment. Background maps are provided by Scottish Government that estimate concentrations of air pollutants at 1 km^2 resolution for the whole of Scotland. Background maps are also produced by Defra covering the entire United Kingdom, these may be updated prior to the Scotland specific maps.

Mapped background concentrations are the outputs of a national scale pollution model and are therefore an area where the evidence base is periodically updated. The Council expects the method of deriving background concentrations to be agreed in advance of use in modelling.

The Council also recommends being familiar with the background maps users guide[14] (current version referenced). These datasets are also useful in that the relative contribution from various source sectors to the total background are provided. Care should be taken when using the background maps to avoid double counting of specific source sectors e.g. local A-class roads.

The impact assessment report should clearly provide the co-ordinates of the grid square used. Treatment of background concentrations should be agreed with the Council prior to completion of any assessment.

It is important that the background mapped values are not used to characterise existing air quality at resolution higher than 1km^2 near important sources (i.e. existing concentrations arising as a result of the background contribution plus traffic or other emissions sources) as they are not intended for this purpose. For instance, the background mapped value is not appropriate to use as a baseline at roadside locations unless the roads in question are included as sources in the dispersion modelling.

Please note that evidence has emerged recently regarding real world NOx emissions from diesel vehicles and how these differ from the projected vehicle emission factors and traffic emissions date used to derive the Defra and Devolved administrations pollutant background maps. The Council is currently adopting a precautionary approach when considering future projections of NOx emissions from road traffic. The Council require future year background concentrations to be the same as in the

[14] http://laqm.defra.gov.uk/documents/Background-maps-user-guide-v1.0.pdf

year used for model verification i.e. the latest year when pollution measurements are available, so no reduction in background concentrations should be assumed. Please see Section A.1.7.3.4for more information. This is applicable to both NOx and particulate concentrations at this time until further evidence is available. Please consult with the Council's Pollution Control Team if you are proposing an alternative approach.

A.1.6 Screening Assessments

Screening assessments are conducted using basic models with limited input parameters, they are primarily designed to quickly determine if a development can be 'screened' out as having no significant impact or if a more detailed assessment is required.

A.1.6.1 Screening point source industrial and biomass emissions

The "Planning tool" sheet of the "biomass unit conversion screening tool" spreadsheet is a screening model currently available for estimating maximum annual mean ground level concentrations from both industrial and biomass point source emissions. It is currently available to download from the IAQM website[15].

A biomass screening assessment will be conducted by officers from the Council's Pollution Control team as part of the application process for this type of combustion plant. The screening assessment may identify a requirement for the applicant to conduct a more detailed dispersion modelling assessment.

Some proprietary simplified dispersion screening models are also available e.g. ADMS-Screen and Lakes Screen view. The USEPA also provides a free screening model AERSCREEN which produces estimates of "worst-case" 1-hour concentrations for a single source. Screening models usually do not require hourly meteorological data so can save time and money when conducting an initial assessment of a point source emission. These screening models can be used to indicate if further more detailed dispersion modelling is required. Please consult with the Council's Environmental Health Team during pre-application discussions if you are considering use of a screening model for an air quality impact assessment.

A.1.6.2 Screening the impact of road traffic emissions – DMRB

The Design Manual for Roads and Bridges (DMRB) screening method is widely accepted in the UK for simplified air quality impact assessment of road traffic emissions. Being a screening method, it does however have it limitations and may not be suitable for all circumstances. The latest version of the DMRB was released in 2007; the vehicle emission factors are therefore fairly outdated. An updated version of the model is in preparation and the Council expects that this version is used when it is available.

Modelling carried out with a screening model of any kind should still include model verification using local NO_2 measurements (Converted to Road NOx see Section A.1.7.3.9) and where available PM_{10} measurements. If a developer wishes to use a screening model they should justify this approach in writing to seek agreement with the Council, providing information regarding the screening model's suitability for assessing the potential impact of the proposed development.

A.1.7 Detailed dispersion modelling

In comparison to screening models, local scale atmospheric dispersion modelling utilises more detailed meteorological data, emissions data and site specific topographical parameters.

The Council considers that the use of a dispersion model is appropriate in almost all cases for developments classified as major (See development categories in Table 1), or those developments proposed in areas where air quality is approaching or exceeding the relevant air quality standards or objectives.

There are various dispersion models that can be used for air quality assessments; the Council requires that the chosen model is agreed with its Pollution Control Team in advance of conducting the assessment. Generally speaking, the model must be appropriate for the application and should be able to account for the conditions in and around the study area.

[15] http://iaqm.co.uk/guidance/

A.1.7.1 Model input data and reporting requirements

The air quality impact assessment report submitted should provide a full and transparent account of the modelling undertaken. It should also include details of all assumptions made and the input data used.

The Council will be guided by the principle that all reports should include the necessary information such that, if required, we could re-run the model ourselves or pass to a third party expert for technical review given the input data/input files provided. We require that model input and output files are prepared in such a way as to facilitate provision to us in addition to the impact assessment report. The Council reserves the right to re-run the modelling itself using provided input files ,developers and their consultants should bear this in mind when preparing their modelling studies.

A.1.7.2 Modelling of point source emissions

Whilst the suggestions below are provided to guide applicants, the Council requires all methods to be agreed in writing in advance. In cases where this is not done the Council reserves the right to refuse to accept the assessment in the first instance.

It is recognised that model verification is not normally possible for non-road sources; when modelling point source or flue emissions you should account for potential model or emissions data error by using conservative/worst case model assumptions.

A.1.7.2.1 Model choice

The most widely used detailed local scale dispersion models appropriate to point source emissions are ADMS and AERMOD. When modelling the impact of stack emissions, the Council expects that the model will be able to account for issues such as building downwash, variable surface roughness and terrain (where a model domain is quite large for example).

A.1.7.2.2 Input data and emission calculations

Since the predicted impact at a given location is proportional to the emission rate modelled from any given source; it is important that the emissions data used are based on the best available information about the emission source and have been calculated correctly. The Council will not condone an applicant choosing the lowest emission rate or factor for their source from those available and we reserve the right to require re-modelling under such circumstances.

For point source assessments the developer should outline the source of the emissions data used. This could be derived from plant manufacturer data, or from measurements at other similar plant.

If no such data is available, the developer may have to use emissions factors from the National Atmospheric Emissions Inventory (NAEI) or other libraries of emissions factors (such as the EMEP/EEA air pollutant emission inventory guidebook or the USEPA AP-42 datasets).

Whichever data source is used; the impact assessment report must clearly reference the data source/s, and the reason for choosing the emissions dataset used. If possible, the developer should discuss the uncertainties in the emission factor, for example the USEPA AP-42 dataset includes a “rating” which indicates the quality of the emission factor.

Plant manufacturers often present emissions data at “standard” or “normalised” conditions, that is for a given temperature, oxygen percentage and moisture content (e.g. in mg/Nm^3). It is therefore essential to correct to actual conditions at the point of release (e.g. in mg/m^3) and provide all calculations in the submitted report. We require that all emissions and stack gas correction calculations are presented in submitted reports so that we may check their accuracy (this will mainly involve calculations that make that stated corrections for moisture, O_2 and temperature).

If using manufacturer’s technical specifications to derive pollutant emission rates, pollutant concentrations and flue gas volume flow rates at both standard and actual conditions should be included in the impact assessment report. A copy of the technical specification information should be appended to the impact assessment report.

In the absence of manufacturer’s plant specific data in the UK the “Emissions” tab of the “biomass unit conversion screening tool”[16] spreadsheet can be used to estimate emissions. However, we would suggest that this is only appropriate in cases where the applicant demonstrates that emissions data is

[16] IAQM(2015) Institute of Air Quality Management website - Guidance section ; http://iaqm.co.uk/guidance/ (accessed August 2015

not available from preferred sources (this should hardly ever occur for modern plant which will probably have emissions testing certification available from type approvals). If this tool is used, the outputs of the spreadsheet should be included in the impact assessment report.

A.1.7.2.3 NOx/NO_2 chemistry for point source emissions

Guidance issued by the Environment Agency for England and Wales[17] provides a conservative phased screening approach to assessing worst-case NO_2 emissions- this guidance is also widely accepted in Scotland. As a first phase of the screening approach, 50% of NOx emitted is considered to be NO_2 for the calculation of short-term NO_2 concentrations and 100% of NOx emitted is considered to be NO_2 for the calculation of long-term NO_2 concentrations. If predicted concentrations are below the objective levels, then no further assessment is required. If the predicted concentrations are above the objective level, then the guidance recommends that 35% and 70% can be used for assessing the short and long term objectives respectively. Additional guidance is provided for circumstances where predicted concentrations at receptors are above the objective level using the 35% and 70% approach.

As a worst-case approach, the Council recommends that this method is used when assessing NO_2 concentrations influenced by point source emissions. Any deviation from this method should be discussed with our Pollution Control Team.

A.1.7.2.4 Meteorological data

For detailed dispersion modelling of point source emissions, the Council requires at least 5 years of hourly sequential meteorological data be used. The model should be run separately for each year and the worst case year dataset should be identified and used to calculate the impact of the proposed flue emissions. A sensitivity analysis of inter-year variability in meteorological conditions should be provided in the report.

The choice of meteorological station should be included when consulting with the Council's Pollution Control Team on the scope of the air quality impact assessment. A description of the meteorological data used should be included in the impact assessment report; the data must meet accepted quality standards as described in the TG(16) guidance. Applicants should provide metrics describing missing data in their meteorological inputs and how these were addressed in the work. The Council recommends that where data filling is necessary applicants use the methods outlined by the USEPA (usually this involves interpolating over small gaps of a few hours, and using substitution from another site where necessary). Meteorological data vendors can provide this information readily or applicants can derive this themselves when they source their own met data. It is worth noting that cloud cover data can be sporadic in Scotland and the common dispersion models do not make calculations for hours where it is missing so care should be taken to account for missing cloud data properly.

Other meteorological model input parameters that should be included in the impact assessment report are the surface roughness at both the dispersion site and meteorological measurement site; and minimum Monin-Obukhov length used.

A.1.7.2.5 Buildings and stack dimensions

The ADMS and AERMOD dispersion models both contain an option to model algorithms that account for building downwash effects. Nearby buildings (within five stack heights from the stack; and with a height of more than one third of the stack height) can affect the dispersion of emissions from a stack. The main effect can be to increase concentrations in the immediate vicinity of the building, while reducing concentrations further away.

The physical characteristics of any stack or stacks and the site buildings should be provided. This should include as a minimum the chosen stack height (or range of heights), stack width, building co-ordinates and dimensions. A map should be included in the impact assessment report that shows the location of the stack and nearby buildings.

Flue or stack height should be at least 3m above the ground and any adjacent area to which there is general access and opening windows or ventilation air inlets within a distance of five flue heights. Flue or stack height should also be at least 3m above any opening windows or vents within a distance of five flue heights.

[17] Environment Agency – Guidance note on: Conversion ratios for NOx and NO_2

A.1.7.2.6 Treatment of terrain and topography

The requirement for terrain effects to be modelled should be determined on a case by case basis. Generally speaking, if the model domain does not include gradients of more than 10% then inclusion of terrain effects is not recommended. For large point sources, it is more likely that terrain will have to be included due to the typically longer range impacts that can cover areas with different terrain characteristics.

A.1.7.2.7 Rain cap correction

Emissions from flues with rain caps have little or no initial vertical velocity. Plume rise calculations in most dispersion models (including ADMS and AERMOD) take into account both rise due to vertical momentum of the plume as it leaves the stack and the thermally derived buoyancy of the plume.

Using the standard model set-up when modelling emissions from a flue fitted with a rain cap may result in over-prediction of plume rise, and resulting under-prediction of ground-level concentrations.

One approach to alleviating this problem is to modify the source input parameters to minimize the effects of momentum while leaving the buoyant plume rise calculations unchanged. The U.S. EPA outlines such an approach in its Model Clearinghouse Memo 93-II-09(20) which has now been adopted in various other international guidance documents[18] on dispersion modelling.

This approach is to reduce the stack gas exit velocity to 0.001 $m.s^{-1}$, and calculate an equivalent diameter so that the buoyant plume rise is properly calculated. To do this, the stack diameter is specified to the model such that the volume flow rate of the gas remains correct.

In the case of vertical flues with rain caps, there will be frequent occurrences of stack tip downwash; however, the effect of the stack tip downwash (reduction of the plume height by an amount up to three times the stack diameter) may be underestimated in the model. This can be corrected, somewhat conservatively, by turning off the stack tip downwash calculations in the model and lowering the specification of the stack height by three times the actual stack diameter (the maximum effect of stack tip downwash).

It should be noted however that when modelling emissions from flues with rain caps, very low exit velocities can cause issues with the model operation. As a result the guidance recommends using an exit velocity of 0.1 $m.s^{-1}$. This exit velocity still effectively eliminates momentum flux and can produce parameters that will not impede model execution.

A.1.7.2.8 Time-varying emissions

For industrial or biomass flue emissions a precautionary/worst-case approach is recommended i.e. that emissions are modelled at the same rate 24 hours per day, 7 days a week, all year.

If an assessment carried out in this way predicts exceedances of either the annual mean or respective short-term mean air quality objectives (with an important contribution from the new source) a more flexible time varying approach may be appropriate.

For installations with an operating profile that can be modelled discretely (i.e. emissions switching on and off at certain times) applicants should be aware that the Council may seek to establish a planning conditions that limits operation to hours whose impacts are evidenced in the modelling. In such instances we would suggest preparing a model with accurate operating conditions with reasonable safety factors included to provide for some flexibility- e.g. modelling additional hours around the known plant operating cycle.

Any assumptions with respect to time varying emissions should be clearly stated within the impact assessment report.

A.1.7.2.9 Model output area/domain (Point source emissions dispersion modelling)

The model domain should include the area likely to be affected by the proposed emission source and should cover locations where human exposure is present.

Model results should initially be presented as detailed contour plots of predicted pollutant concentrations. Ideally the receptor grid spacing (modelled concentration at which will be interpolated

[18] Ontario Ministry for the Environment (2009) Air Dispersion Modelling Guidelines Version 2

to produce pollutant contour plots) should not be more than 5 metres to ensure reasonable spatial resolution which helps reduce uncertainty when interpreting pollutant contours.

Following production of pollutant contours which will identify the location where the highest ground level impact will occur; more accurate model predictions should be modelled at worst case discrete receptor locations. Examination of the detailed contour plots will identify the worst case locations where residential properties or other sensitive receptors may be present e.g. schools, hospitals or nursing homes. Model receptors should be placed at the façade of buildings closest to the emission source. The use of accurate mapping e.g. OS Mastermap which shows accurate building footprints, or geo-referenced aerial photography can help with this.

Comparison of the modelled concentrations with and without the proposed development at worst case receptor locations will allow a maximum magnitude of change to be calculated and impact descriptors derived. Further information on impact descriptors is presented in Section A.1.8.2)

In some cases, where the population density is sparse, it may be most appropriate for the assessment to only predict concentrations at a number of carefully selected receptors rather than include pollutant contours as well. All receptor locations should be presented on an appropriately scaled Ordnance Survey map.

In the case of buildings, developers may need to consider the vertical 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.

Please consult with the Council's Pollution Control Team regarding receptor locations in advance of conducting an air quality impact assessment.

A.1.7.3 Modelling of road traffic emissions

Whilst the suggestions below are provided to guide applicants, the Council requires all methods to be agreed in writing in advance. In cases where this is not done it reserves the right to refuse to accept the assessment in the first instance.

A.1.7.3.1 Model choice

Typical examples of atmospheric dispersion models used for road traffic emissions in the UK are ADMS-Roads and ADMS-Urban, and less commonly the USEPA Caline group of models (available commercially in the Breeze Roads package or in freely available command line driven applications). Depending on local circumstances, when modelling road traffic emissions, the Council may require that the chosen model can account for the presence of street canyons and queuing traffic.

Details of the model and version number used should be included in the assessment report.

The Council requires that all dispersion models of road traffic emissions are verified using appropriate local roadside pollutant measurements (which may have to be taken by the applicant). Further information on model verification is presented in Section A.1.7.3.9 below.

A.1.7.3.2 Transport assessment data

For larger developments it is common to prepare a transport assessment (TA). Where a TA has been prepared, modelled or predicted development traffic flows in the TA should generally be used as the basis for the calculation of 'with development' emissions.

Important note: The TA will require approval by West Lothian Council. Should the TA not be approved, there is a risk that an air quality assessment that has already been undertaken may become obsolete if the traffic proposals change significantly.

For smaller developments where a Traffic Assessment is not required and the air quality assessment is concerned with assessing exposure only (i.e. introducing future occupiers into a location with poor air quality); the data source for baseline traffic flows and fleet split; and the method used to calculate baseline traffic growth should be included in the assessment report.

Any assumptions used to calculate average annual daily traffic AADT from peak hour traffic count information should be included in the air quality impact assessment report.

A.1.7.3.3 Emissions data – Road Traffic

All road traffic data used to calculate vehicle emissions rates should be included in the air quality impact assessment report along with a reference to the data source. Any assumptions made regarding speed and treatment of slowing traffic at junctions should be clearly outlined as these are primary determinants of traffic emissions in an urban setting.

Emission rates should be derived for the roads in question using an emissions model appropriate for use in the UK. Our current preferred method is to calculate emissions using the latest version of the Emissions Factors Toolkit (EFT)[19]. Some dispersion models contain built in emissions factors; care should be taken to ensure the emission factors used are up to date. The EFT spreadsheet is often updated months in advance of proprietary dispersion models.

If other emission data is needed for specific situations, for example to represent queuing or cold starts, the methods outlined in LAQM.TG(16) should be used. Applicants should be able to provide any emissions calculations on request and we may request copies of the EFT used in the assessment or model input files if internal emission factors are used.

A.1.7.3.4 Future year road traffic emission projections

A body of evidence has emerged recently regarding real world NOx emissions from diesel vehicles; and how these differ from the projected vehicle emission factors and traffic emissions date used to derive the Defra and Devolved administrations pollutant background maps.

The LAQM.TG(16) guidance also recommends that where existing forecasting of vehicle emission rates information is used for decision making or Review and Assessment and Action Planning work, local authorities may wish to take account of the emerging findings on the performance of different vehicle types, the performance of Euro standards overall, and the expected effect on forecast background concentrations[20].

Based on the emerging evidence, the Council is currently adopting a precautionary approach when considering future projections of NOx emissions from road traffic. We require future year traffic emissions to be calculated using the same year emission factors as used for model verification i.e. the latest year when pollution measurements are available. This also applies to future year background concentrations in that no reduction in background concentrations should be assumed. This conservative approach is already used in many air quality impact assessments and should provide worst case impact descriptors when assessing any proposed development. This is applicable to both NOx and PM_{10} concentrations at this time. Please consult with the Council's Pollution Control Team if you are proposing an alternative approach. **Please note:** We do not require this worst case approach to be used when calculating a net change in emissions for offsetting purposes (see Table 1 and Section 5.4).

A.1.7.3.5 Time-varying emissions

Traffic flows and speeds, and hence emissions, vary throughout the day. If appropriate, emissions from vehicles should vary within the model, by time of day and by day of week. Where possible, time-varying traffic movements should be based on diurnal flow profiles measured using local automatic traffic count data. Where no local diurnal traffic flow profile has been measured, the use of published national statistics[21] on traffic distribution can be used e.g. the TRA03 Road traffic statistics tables[22], produced by the Department for Transport

The additional emissions that arise during traffic congestion should always be properly addressed in the assessment; we would suggest using a time varying emissions file in a road source dispersion model.

A.1.7.3.6 Treatment of terrain and topography

An important consideration when modelling road sources is the potential presence of street canyons which can greatly reduce the rate of dispersion of vehicle emissions. The Council therefore recommends that any roads dispersion model used has the capability to model street canyons. In instances where an alternative road dispersion model cannot model street canyons explicitly, there may be methods available to cope with this. For example, when verifying the model, it could be

[19] http://laqm.defra.gov.uk/review-and-assessment/tools/emissions-factors-toolkit.html
[20] Defra and the devolved administrations (2016) Local Air Quality Management Technical Guidance LAQM.TG(16); Paragraph 7.75
[21] www.gov.uk/government/collections/road-traffic-statistics
[22] www.gov.uk/government/statistical-data-sets/tra03-motor-vehicle-flow

appropriate to use different adjustment factors for locations inside canyons than those lying outside of canyons. How street topography has been modelled should be fully described in the assessment report.

Care should be taken when modelling canyons using ADMS Roads or ADMS Urban. Due to the way that the canyon model works, placing a receptor out-with the canyon will mean that the modelled concentration is much lower than when the receptor is placed within the canyon. This is a common issue with setting up ADMS Roads which often becomes apparent when verifying model results.

A.1.7.3.7 Road gradients

Hills with gradients may slow traffic significantly. As vehicles start to climb the hill, the power demand from the engine will increase, hence vehicle emissions will increase. However, for vehicles going downhill, the opposite occurs and emissions decrease.

A method to derive the change in vehicles emissions attributable to a vehicle ascending or descending a hill is described in the TG(16) technical guidance document TG(16)(Section 7.249). The guidance recommends that for passenger cars and light diesel vehicles (LDVs) normal speed related emission factors should be used, taking into account that the average speed on the hill section may differ to that on the flatter sections.

For heavy diesel vehicles (HDVs) there are larger and more significant changes in emissions when ascending and descending a hill. Equations have been derived to calculate how gradients change emission rates; the equations are based on relationships developed from fitting speed related emission factors in the EMEP Corinair Emissions guidebook for gradients of +2%, +4% and +6%.

A.1.7.3.8 Meteorological data

For traffic based air quality assessments, the Council requires that the most recent year of hourly sequential meteorological data available will be used; and that it should match the most recent year of air quality measurement data and traffic data used in the assessment; i.e. all datasets should describe the same period. A single year of met data is appropriate for traffic based assessments. A description of the meteorological dataset used should be included in the impact assessment report; the data must meet accepted quality standards as described in the TG(16) guidance.

As when modelling point source emissions, the other meteorological model input parameters that should be included in the impact assessment report are the surface roughness at both the dispersion site and meteorological measurement site; and minimum Monin-Obukhov length used. It is unlikely that the meteorological and dispersion sites will share the same values for parameters like surface roughness length and Monin-Obukhov length and failure to represent this can substantially affect model outputs. Therefore, applicants should carefully apply relevant parameterisations to account for this.

The choice of meteorological station should be included when consulting with the Council's Pollution Control Team on the scope and method of assessment.

A.1.7.3.9 Model Verification (Road traffic dispersion modelling)

Dispersion modelling results are subject to uncertainty. The LAQM.TG(16) guidance explains that predicted results from a dispersion model may differ from measured concentrations for a large number of reasons:

- Estimates of background concentrations;
- Meteorological data uncertainties;
- Uncertainties in source activity data such as traffic flows, stack emissions and emissions factors;
- Model input parameters such as roughness length, minimum Monin-Obukhov; and overall model limitations; and
- Uncertainties associated with monitoring data, including locations.

Model verification is the process by which these uncertainties are investigated and where possible minimised by refining the model inputs. The differences between modelled and monitored results are likely to be a combination of all of these aspects.

For road traffic emission assessments, we require that the model results are verified using appropriate local road side NO_2, PM_{10} and $PM_{2.5}$ air quality measurements. Model verification should closely follow the methods described in LAQM.TG(16) and information on model verification should be included in the air quality impact assessment report.

The Council recommends that the proposed approach to model verification and the monitoring data that will be used is discussed with the Council's Pollution Control team prior to conducting the air quality impact assessment. This should outline the monitoring sites that will be used (if any) and also whether any additional monitoring will be carried out (with locations) that will be used for verification purposes.

Pollutant monitoring used to verify the model results

In locations where roadside PM_{10} or $PM_{2.5}$ measurements are not available, it is possible to verify the model results using roadside NO_2 measurements. Please consult with the Council's Pollution Control Team regarding which measurements sites should be used for model verification and if using NO_2 measurements alone will be acceptable.

In locations where no roadside NO_2 or PM_{10} measurements are available, it may be appropriate to model and verify road traffic emissions at a suitable nearby proxy monitoring location. The aim being to demonstrate that the dispersion model has adequately predicted pollution concentrations in a similar urban environment, preferably within a short distance of the locality where the development is proposed.

In locations where there is no suitable roadside NO_2 monitoring or suitable nearby proxy site; we may require measurements to be conducted as part of the air quality impact assessment. This will particularly relevant at locations where there is a risk of introducing new human exposure at a location where there is a risk of poor air quality e.g. proposed residential properties next to a busy road where there are no nearby measurements. More information on our preferred approach to monitoring is provided in Section A.1.2 above.

Important note: Please verify road dispersion models using modelled vs measured Road NOx (not NO_2)

When modelling NO_2 for road traffic air quality impact assessments, our preference is that the model should be verified based on the predicted NOx contribution from the traffic versus the measured road NOx. The model should not be verified by comparing modelled vs measured NO_2 concentrations.

This corresponds with the approach recommended in the LAQM.TG(16) guidance and in our opinion represents current best practice; the Council has presented an extract from the guidance in Box 6 which explains why this represents a more robust approach than comparing modelled with measured NO_2 concentrations.

This approach means that the dispersion model should calculate annual mean NOx concentrations rather than annual mean NO_2 concentration. NOx to NO_2 chemistry should therefore be calculated externally to the dispersion model using the latest version of the Defra NOx to NO_2 calculator spreadsheet[23]. Measured road NOx can also be estimated using the Defra NOx:NO2 calculator, whereby a representative NOx background is subtracted from the measured value.

Box 6: Importance of an Approach to Verifying Modelled NO_2 Concentrations from Road Traffic[24]

There are two important reasons why initial verification of the model output should be based on the source contribution to NOx, rather than the total NOx concentration (i.e. source plus background NOx) or the NO_2 concentration alone:

- The contribution of source NOx to total NOx (including the background NOx) is often small. If the source and background NOx values are added together, the effect will be to 'smooth' the performance of the model, and any adjustment of the model output based on the verification study will be weighted towards the background assumptions.
- The annual mean NO_2 to NOx relationship is relatively flat in the principal region of interest (i.e. around the 40 $\mu g.m^{-3}$ objective). Relatively large changes in NOx around this region may

[23] http://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html#NOxNO2calc
[24] LAQM.TG(16) Box 7.16

result in only small changes in predicted NO_2 levels. Again, the effect is to 'smooth' the model performance.'

When reporting results, any model adjustment required to improve agreement with local measurements should be documented in the air quality impact assessment report. Reporting of model verification should also include a scatter plot showing the spread of modelled vs measured Road NOx; and a scatter plot showing modelled vs measured Total NO_2 following model adjustment and conversion of Road NOx to NO_2 annual mean values. This will provide us with an indication of the overall model performance and any clear outliers that may indicate poor model performance at a specific location.

Model verification and adjustment should not be carried out without first investigating errors and uncertainties in the model set up. In cases where large Road NOx adjustment factors are required, say greater than two, commentary on the steps taken to investigate potential reasons for the under prediction should be included in the impact assessment report.

LAQM.TG(16) recommends the following check when refining model set-up.

- Checks on traffic data
- Checks on road widths;
- Checks on distance between sources and monitoring as represented in the model – i.e.
- Consideration of speed estimates on roads in particular at junctions where speed limits are unlikely to be appropriate;
- Consideration of source type, such as roads and street canyons;
- Checks on estimates of background concentrations; and
- Checks on the monitoring data.

Important note: Please include a quantification of model uncertainty/error in the impact assessment report

The impact assessment report should contain an estimation of model uncertainty where it has been possible to verify the model against several local measurements. Estimation of model error is more difficult for PM_{10} assessments due to the usual scarcity of measurements, therefore the Council recommends using NO_2 measurements from multiple sites to characterise model error in most cases.

Where sufficient local NO_2 measurements are available, the air quality impact assessment report should characterise the uncertainty in the model using the methods outlined in LAQM.TG(16).

The Root Mean Square Error (RMSE) of the model is reasonably straightforward to calculate and gives a good indication of the likely variation in model predictions. An RMSE within 10% of the air quality objective should be demonstrated; for annual mean NO_2 concentrations, this is an RMSE of less than 4 $\mu g.m^{-3}$. The Council expects that RMSE will be calculated for all modelling studies submitted to us, with full justification of alternative error metrics used should this not be possible.

As advised in LAQM.TG(16), in addition to quantifying model uncertainty, we would also stress that it is important to check that a model is performing well where measured concentrations are greatest, or where they may be close to the relevant air quality objective.

For example, a model may over-predict at locations in a study area where the lowest concentrations have been measured, but under-predict at locations where higher concentrations were measured; the model has an average error of less than 10% of the air quality objective so does appear to be performing well. This demonstrates that the average performance of a model is not necessarily a good description of how representative the results are at all locations. Reporting of model verification in support of planning applications should therefore demonstrate that the model is performing well at the locations where the highest concentrations have been measured.

The characterisation of error is an important inclusion in any modelling study. The Council reserve the right to refuse acceptance of modelling results that do not have an associated discussion of error or sufficient justification for not including it.

A.1.7.3.10 Model output area/domain (Road traffic dispersion modelling)

The model domain for a roads type air quality impact assessment the model domain should cover locations where human exposure is or may be present, and traffic flows are likely to be changed by the development.

To provide an accurate comparison of modelled pollutant concentrations for the development scenarios tested; pollutant concentrations should be modelled at discrete receptor locations. Comparison of the modelled concentrations with and without the proposed development at worst case receptor locations will allow a maximum magnitude of change to be calculated and impact descriptors derived. Further information on impact descriptors is presented in Section A.1.8.2)

Model receptors should be located at the façade of buildings closest to the roads being modelled. The use of accurate mapping e.g. OS Mastermap which shows accurate building footprints, or geo-referenced aerial photography can help with this. Lower accuracy mapping such as the Ordnance Survey OS Opendata mapping does not always provide accurate building footprints. To enable accurate receptor placement in the absence of accurate mapping or geo-referenced aerial photography; building façade distances from the road centreline can be measured using freely available spatially referenced aerial photography e.g. Google Earth.

In addition to accurate model predictions at a selection of worst case receptor locations, future year model results can be presented as detailed contour plots of predicted pollutant concentrations. Displaying the results using contour plots can be useful when assessing the likelihood of introducing new human exposure into a location where there may be poor air quality, in that it will provide a good indication of the spatial variation in predicted pollution concentrations and any potential locations where exceedances of the air quality objectives may be occurring.

Ideally, the receptor grid spacing (modelled concentrations which will be interpolated to produce pollutant contour plots) should not be more than 5 metres to ensure reasonable spatial resolution; this will help reduce uncertainty when interpreting pollutant contours. The source oriented grid option should be used in ADMS Road or ADMS Urban to maximise the density of receptor points close to the roadside.

A.1.8 Describing the air quality impacts and assessing significance

A.1.8.1 Introduction of new human exposure

For air quality impacts arising from existing sources of pollution on new occupants at a proposed development; the air quality impacts should be determined by comparing the modelled future 'with development' scenario pollutant concentrations with the relevant air quality objectives. If the objective will be exceeded at locations where there will be relevant exposure, or if there is at risk of this occurring; the impact is likely to be considered as being significant and appropriate mitigation/design measures will be required to reduce exposure for future occupants.

A.1.8.2 Impact of the development

It is important that an air quality assessment evaluates air quality in terms of predicted changes in pollution concentrations where there is relevant public exposure. The Council will assess the significance of air quality impacts using the same method as that described in the latest publication of the IAQM/EPUK Planning for Air Quality guidance[25]. Air quality impact assessment reports are therefore required to include a description of impacts using this method. The impact descriptors outlined in this guidance are therefore consistent with other areas of the UK and are applicable to all types and scales of development.

The impact of a proposed development should be assessed in this way at a selection of 'receptors' where the worst case concentrations and largest magnitude of change in pollutant concentrations have been modelled. The current IAQM/EPUK impact descriptors and method for deriving them are presented in Figure 5.

The first step is to describe the impact in terms of its magnitude which compares the impact with the change in annual mean concentration as a percentage of the pollutant objective being considered.

[25] IAQM/EPUK(2015) Land-Use Planning & Development Control: Planning for Air Quality; January 2017

The next step is to consider this change in the context of the new total concentration as a percentage of the respective air quality objective.

Impacts can also be described as either ‘Adverse’ where an increase in pollutant contours is predicted; or ‘Beneficial’ e.g. ‘moderate beneficial’ if a development leads to a reduction in pollutant concentrations e.g. if an alternative traffic route was proposed as part of the development. This approach is commonly used in environmental statements for EIA.

The Council also requires that when assessing the air quality impact of proposed residential developments and an adverse air quality impact is predicted; a figure for the number of houses/units which triggers each impact descriptor should be included in the impact assessment report. For example, if a ‘medium adverse’ impact is predicted for a proposed residential development of 200 houses; the impact assessment report should also include the number of residential units that would lead a ‘slight adverse’ impact. Please contact the Council’s Environmental Health team for further clarification of this if required.

A.1.8.3 Assessing the significance of air quality impacts

An assessment of significance of the predicted impacts should be included in the air quality impact assessment report.

The Council will also make a judgement on the significance of the impact predicted, which will be informed by the guidance on assessing significance contained in the latest EPUK/IAQM planning for air quality guidance. Any development that may lead to additional air pollution problems, could be significant. The Council’s Environmental Health team will make a judgement based on the outcome of the air quality impact assessment, the receiving environment, and their professional judgement. This will then inform recommendations to the Council’s planning service.

If a proposed development is located in an area of poor air quality and concentrations in excess of the respective air quality objectives are likely at the building façade, the air quality impact will be judged as significant and the Council will require mitigation measures (in addition to our minimum requirement for good practice design principles – see Section 5) to be included in the scheme design to ensure there is acceptable air quality for new occupants.

If a proposed development cannot be mitigated against and is in excess of the respective air quality objectives due to the proposed development, the development may not be supported by the Council’s Environmental Health Department.

Figure 5: IAQM/EPUK Guidance – Air Quality Impact Descriptors

Long term average Concentration at receptor in assessment year	% Change in concentration relative to Air Quality Assessment Level (AQAL)			
	1	2-5	6-10	>10
75% or less of AQAL	Negligible	Negligible	Slight	Moderate
76-94% of AQAL	Negligible	Slight	Moderate	Moderate
95-102% of AQAL	Slight	Moderate	Moderate	Substantial
103-109% of AQAL	Moderate	Moderate	Substantial	Substantial
110% or more of AQAL	Moderate	Substantial	Substantial	Substantial

Explanation

1. AQAL = Air Quality Assessment Level, which may be an air quality objective, EU limit or target value, or an Environment Agency 'Environmental Assessment Level (EAL)'.
2. The Table is intended to be used by rounding the change in percentage pollutant concentration to whole numbers, which then makes it clearer which cell the impact falls within. The user is encouraged to treat the numbers with recognition of their likely accuracy and not assume a false level of precision. Changes of 0%, i.e. .less than 0.5% will be described as Negligible..
3. The Table is only designed to be used with annual mean concentrations.
4. Descriptors for individual receptors only; the overall significance is determined using professional judgement (see Chapter 7). For example, a 'moderate' adverse impact at one receptor may not mean that the overall impact has a significant effect. Other factors need to be considered.
5. When defining the concentration as a percentage of the AQAL, use the 'without scheme' concentration where there is a decrease in pollutant concentration and the 'with scheme;' concentration for an increase.
6. The total concentration categories reflect the degree of potential harm by reference to the AQAL value. At exposure less than 75% of this value, i.e. well below, the degree of harm is likely to be small. As the exposure approaches and exceeds the AQAL, the degree of harm increases. This change naturally becomes more important when the result is an exposure that is approximately equal to, or greater than the AQAL.
7. It is unwise to ascribe too much accuracy to incremental changes or background concentrations, and this is especially important when total concentrations are close to the AQAL. For a given year in the future, it is impossible to define the new total concentration without recognising the inherent uncertainty, which is why there is a category that has a range around the AQAL, rather than being exactly equal to it.

A.1.9 Air quality impact assessment report requirements

The report structure should follow accepted best practice. Please refer to the latest IAQM/EPUK guidance. For information, the Council has also provided a checklist in Appendix B which will be used by our Pollution Control team to evaluate the content of air quality impact assessments submitted.

The report prepared detailing the results of the air quality impact assessment should contain the following information:

1. **Relevant details of the proposed development:** the report should describe the development in general terms, providing information such as location, type of development and site layout with supporting maps or drawings. Sources of the relevant source specific pollutants should be described and if appropriate changes in traffic flows should be outlined including projections to future baseline which may include other nearby committed developments.
2. **The Policy context for the assessment:** summary of environmental and planning policy instruments relevant to the assessment.
3. **Air quality standards and objectives:** the latest relevant Scottish air quality objectives, standards or EU limit values should be outlined for the pollutants being considered.
4. **The basis for determining significance of effects arising from the impacts:** impact descriptors (such as those presented in this guidance) should be used to ascribe a level of significance to the results of the air quality assessment. These descriptors should be outlined in the report.
5. **Assessment method (traffic):** a detailed explanation of the assessment method should be provided. This should include a thorough explanation of all monitoring and modelling methods, data and assumptions. The items below should be included in the discussion of the methodology with justification for choices made where appropriate. Of particular importance are issues such as:
    a. Description of the source and quality of any traffic data used in the assessment. Where the results of a Transport Assessment are being used, reference to approval of the TA by the Council should be provided in the report
    b. Characterisation of emission rates must be explained in detail with a description of the emission factors/tools used e.g. EFT version 7.0
    c. Treatment of meteorology- describe the meteorological data in terms of the year(s), station location, data quality (missing or calm hours), distance from assessment site. Comment should be provided on the location and topography of the met data site to ensure it is representative of the assessment site.
    d. Treatment of background concentrations. The choice of background data used should be explained and justified. In some circumstances e.g. when receptors are close to another pollutant source, it is not appropriate to use a background value and simply add a development contribution to estimate total concentrations. The difference between “background” air quality and “existing” air quality at the assessment site should be explained.
    e. Assessment year(s). It is likely that the baseline year will be the most recent year with monitoring, meteorological, traffic or emissions data sets covering the same period. The future year of assessment should be based on the scheme opening year and should include traffic attributable to other committed developments.
    f. Other methodological issues such as conversion method for NOx to NO_2, treatment of street canyons, adjustment of monitoring data from short-term to annual mean concentrations, treatment of congestion, receptors at height, other sources in the area
6. **Assessment methodology (point sources):** the Council’s requirements for the level of detail required when describing the method are similar to road traffic based assessment. However, for point sources issues of particular importance are:
    a. Description of the plant - information should be provided on the type of installation, power rating, fuel type and source, and number of fuel delivery vehicles servicing the site.

b. Characterisation of emission rates - a full description of the source of the emissions estimates must be provided. It is particularly important to outline if the data is based on measurements, manufacturer's data or emission factors. If manufacturers or other data is used to characterise stack emissions, extracts from test reports or library data should be reproduced in an appendix to the report. The report should also outline the corrections applied to the emissions data. For example, if manufacturers' data is expressed at standard temperature, oxygen and moisture content, but the emissions will be modelled at release conditions.

c. Stack and building parameters - all physical parameters pertaining to the stack (height, width, and location) should be provided in a table. Physical parameters of the emissions should also be provided (e.g. efflux velocity and or flow rate/mass flux). Buildings should be outlined and it should be clear whether the effects of building downwash or flue rain cap corrections have been included in the modelling.

d. Treatment of meteorology - describe the meteorological data in terms of the year(s), station location, data quality (missing or calm hours), distance from assessment site. Comment should be provided on the location and topography of the met data site to ensure it is representative of the assessment site.

e. Treatment of background concentrations - the choice of background data used should be explained and justified. In some circumstances e.g. when receptors are close to another pollutant source it will not be appropriate to use a background value and simply add a development contribution to estimate total concentrations. The difference between "background" air quality and "existing" air quality at the assessment site should be explained.

f. Assessment year(s) - it is likely that the baseline year will be the most recent year with monitoring, meteorological, traffic or emissions data sets covering the same period. The future year of assessment should be based on the scheme opening year.

g. Other methodological issues such as conversion method for NOx to NO_2, adjustment of monitoring data, receptors at height, other sources in the area.

7. **Model verification:** This is required for all traffic based assessments but not normally appropriate for point sources. A full and transparent description of the verification procedure must be provided with graphs or tables showing the results of any regression analyses carried out and the derivation of any adjustment factors. Methods outlined in LAQM.TG(16) should be followed and referenced. Model error should be calculated and included.
8. **Receptor locations**: A list and map showing all receptor locations should be provided outlining their location (OS co-ordinates), height and type.
9. **Characterisation of baseline air quality:** It is important to place the development impact in the context of the receiving environment. The report should detail any monitoring data used and explain the methods used to capture the data.
10. **Impact assessment**: The results of any modelling done should be placed in the context of the objectives being considered. For advanced models it is usual to provide dispersion contour plots showing spatial variation in pollutant concentrations. If these are provided, the symbology used in the maps should be clear and important features should be annotated to enable easy interpretation of the data. Numerical predictions at receptors should always be produced as these are more accurate than inferring concentrations at these locations from a contour plot. The report should clearly compare with and without development scenarios for the opening year.
11. **Impact descriptors:** Impacts should be described and the significance assessed using the latest IAQM/EPUK planning for air quality guidance. A figure for the number of houses/units which triggers each impact descriptor should be included in the impact assessment report (See Sections A.1.8.2 and A.1.8.3).
12. **Construction phase impacts:** Impacts from this phase will mainly arise from emissions of fugitive dust/particulates. There is also potential for plant and vehicles to emit NOx and PM_{10} during construction. Unless screened out (as described in Section A.1.3) Construction phase

impacts should be assessed and appropriate mitigation measures recommended using the latest IAQM guidance.

13. **Mitigation measures:** Where an impact is identified then the measures to be employed to avoid, reduce and, where appropriate, offset the air quality impact should be set out. Even where the effect is judged to be insignificant, good design and good practice measures as outlined in Section 5 below should be employed as a minimum.
14. **Summary**: A concise summary of the results of the assessment should be provided. This should outline construction phase impacts, operational phase impacts, comparison with objectives, maximum impact descriptors, and mitigation measures. Whether the development will compromise or render inoperative the measures within one of our Air Quality Action Plan, where the development affects an AQMA; any apparent conflicts with planning policy.

Appendix B - Air Quality Impact Assessment Evaluation Checklist

Criteria		Y/N?	Comments
Modelling Procedures			
Has an appropriate model been used?			
Has the model been appropriately verified?			
Are the modelling scenarios and projections appropriate?			
Have suitable on and off site receptors been selected, including those which are worst case?			
Adequacy of input data?	Is the traffic or point source emissions data adequate?		
	Meteorological data?		
	Background concentrations?		
	NOx/NO_2 relationship?		
	Other relevant input data?		
Adequacy of baseline information?	Monitoring locations described?		
	Relevant exposure considered?		
Adequacy of QA/QC information?	Bias adjustment of NO_2 tubes?		
	Other QA/QC information? (including laboratory records)		
Are appropriate pollutants and/or objectives considered?			
Have correct units been used?			
Do the predicted concentrations and changes in concentrations seem reasonable?			
Have the changes in concentrations been adequately described?			
Are the impacts assessed in relation to appropriate air quality objectives and EU limit values?			
Has the significance of the impacts been described?			
Has consideration been given to impacts on neighbouring local authorities?			
Are the potential impacts described appropriately?	Pollutant sources?		
	Expected changes to traffic volumes, composition, speed etc?		
Have construction phase impacts, including duration, activities to be carried out and properties likely to be affected been adequately described?			
Have the necessary mitigation measures been described?			
Has consideration been given to the likely impacts of the development on the implementation of the AQAP (where one is in place)?			

The Gemini Building
Fermi Avenue
Harwell
Didcot
Oxfordshire
OX11 0QR
United Kingdom

t: +44 (0)1235 753000
e: enquiry@ricardo.com

ee.ricardo.com