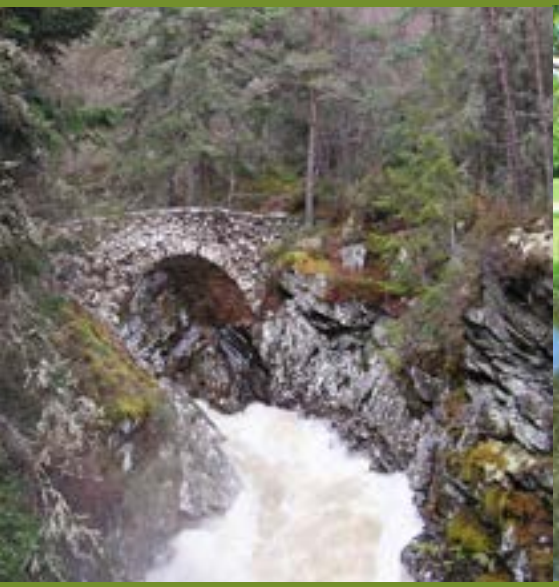
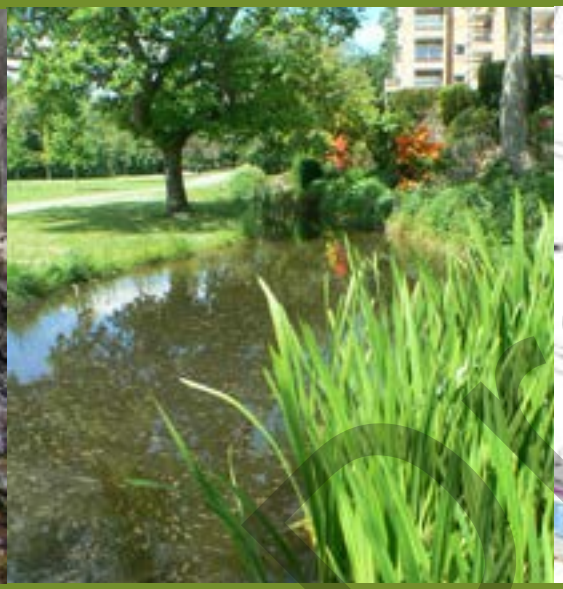
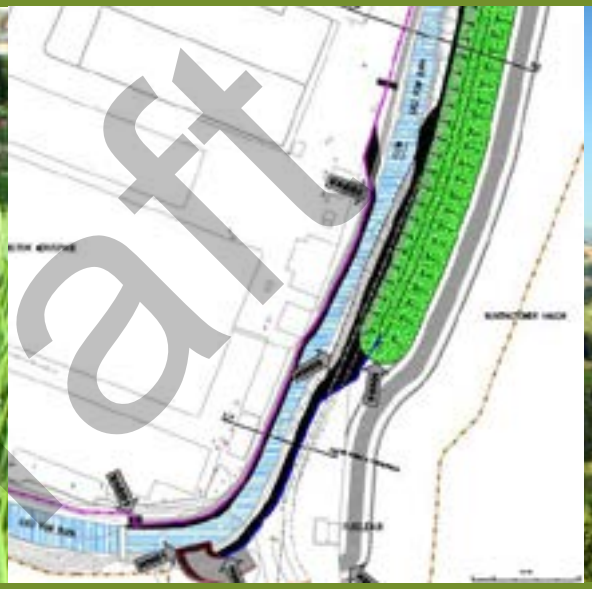
PERTH & KINROSS COUNCIL


Air Quality and Planning

2020

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Boxes

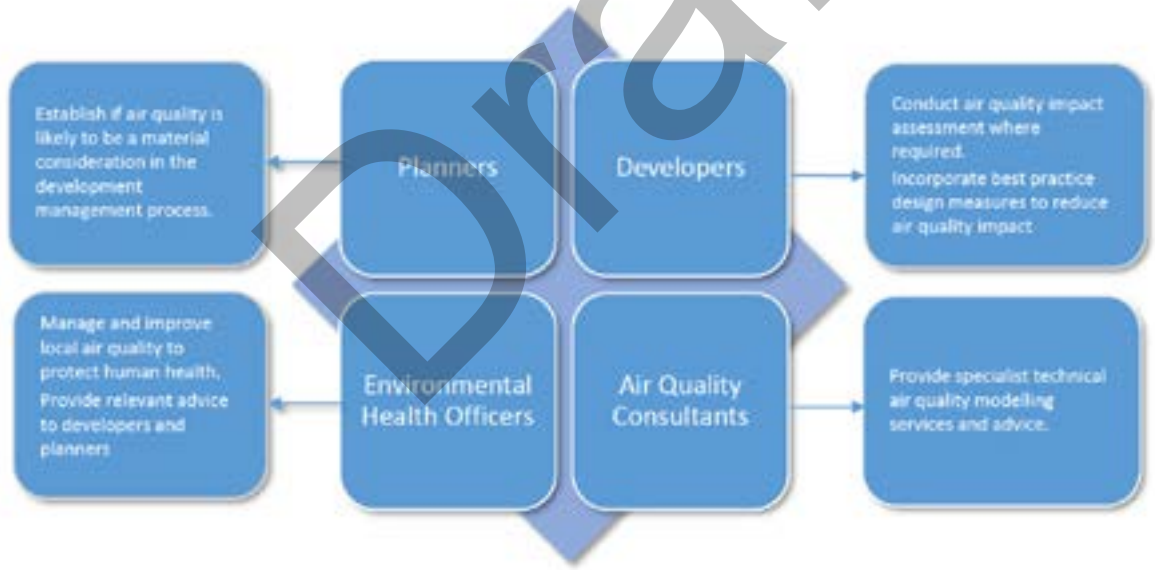
Introduction 1

1.1 Purpose of this guidance

The quality of the air that we breathe should not be compromised by new or existing development. This supplementary guidance provides information regarding how air quality will be considered when determining planning applications, and in particular details the circumstances in which an air quality assessment may be required.

1.2 Who is this guidance for?

This document is for developers and their consultants; and for the Perth and Kinross Council Development Management Team and Environmental Health Officers. It aims to provide consistent guidance for all parties regarding how air quality will be considered when determining planning applications in Perth and Kinross.



1.3 How to use this document

This guidance should be used as a reference when compiling a planning application. We require developers to engage in pre-application discussions with the Perth and Kinross Council Development Management Team 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 Perth and Kinross 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.

Section 2 provides a brief summary of the national and local policy context. This section also provides an overview of the current understanding of existing and future air quality in Perth & Kinross.

Section 3 provides more information regarding how air quality will be considered for planning applications and when an air quality impact assessment is likely to be required.

Section 4 provides information on the mitigation of adverse air quality impacts.

Appendix A of this guidance provides a detailed technical guide for developers or their consultants to follow when conducting air quality impact assessments. The Technical guide is a supporting document that may be subject to change when either legislation, best practice methods or available datasets are updated.

1.4 Air Quality in Perth and Kinross

Air quality in Perth and Kinross Council is generally very good, and pollutant concentrations are within the Scottish health based air quality objectives at most locations. There are however some localised hotspots that have been identified. To date, two air quality management areas (AQMA) have been declared in Perth and Kinross. These cover the entire City of Perth and the High Street corridor in Crieff. More information regarding the AQMAs and the associated air quality management plans (AQAP) is presented in Section 2.4 and 2.5, and more information including Air Quality progress reports is available from www.pkc.gov.uk/airquality

Our responsibilities, policies and the local air quality situation 2

2.1 Cleaner Air for Scotland (CAFS)

The Scottish Government's national strategy Cleaner Air for Scotland – The Road to a Healthier Future (CAFS) was published in November 2015 and is a national cross government strategy that sets out how the Scottish Government and its partner organisations propose to reduce air pollution further to protect human health and fulfil Scotland's legal responsibilities as soon as possible.

One of the 6 key objectives relates to place-making: *A Scotland where air quality is not compromised by new or existing development and where places are designed to minimise air pollution and its effects.*

Section 7 of CAFS provides more detailed information on how place-making can help improve and protect air quality. In addition, it is noted in the introductory section that one of the reasons for non-compliance with legal objectives is topography and spatial planning of urban areas creating street canyons, which can trap air pollution close to ground level.

2.2 Synergies with other national policies on climate change and sustainable transport

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 2017[1].

To help the Scottish Government in their aims; the planning system has an important role in ensuring that both carbon emissions and air quality impacts from proposed developments are reasonably mitigated. Future communities, workplaces, recreation and retail facilities in Perth and Kinross should have access to sustainable transport options and charging points for plug-in vehicles.

1 *Transport Scotland (2014) Switched On Scotland: A Roadmap to Widespread Adoption of Plug-in Vehicles*

2.3 Perth and Kinross Proposed Local Development Plan (2017)

This supplementary guidance should be read in conjunction with the policies contained in the Perth & Kinross Proposed Local Development Plan; specifically:

Policy 1: Placemaking

Good air quality is recognised as an element of sustainable place making which contributes towards health and well-being, this policy and Perth and Kinross Council's Placemaking Supplementary Guidance[2] incorporate the relevant objectives of the Scottish Government's national strategy (CAFS). Policy 1 is reproduced in Box 1. The recognition of air quality as an element of sustainable place-making also accords with the vision in NPF3[3] for a Successful, Sustainable place which states "We have a growing low carbon economy which provides opportunities that are more fairly distributed between, and within, all our communities. We live in high quality, vibrant and sustainable places with enough, good quality homes. Our living environments foster better health".

Box 1: Policy 1 Placemaking

Policy 1: Placemaking

Policy 1A

Development must contribute positively to the quality of the surrounding built and natural environment. All development should be planned and designed with reference to climate change, mitigation and adaptation.

The design, density and siting of development should respect the character and amenity of the place, and should create and improve links within and, where practical, beyond the site. Proposals should also incorporate new landscape and planting works appropriate to the local context and the scale and nature of the development.

Policy 1B

All proposals should meet all the following placemaking criteria:

(a) Create a sense of identity by developing a coherent structure of streets, spaces, and buildings, safely accessible from its surroundings.

(b) Consider and respect site topography and any surrounding important landmarks, views or skylines, as well as the wider landscape character of the area.

2 *Perth and Kinross Council (2020) Placemaking Supplementary Guidance*
3 *Scottish Government (2014) Scotland's Third National Planning Framework*

(c) The design and density should complement its surroundings in terms of appearance, height, scale, massing, materials, finishes and colours.

(d) Respect an existing building line where appropriate, or establish one where none exists. Access, uses, and orientation of principal elevations should reinforce the street or open space.

(e) All buildings, streets, and spaces (including green spaces) should create safe, accessible, inclusive places for people, which are easily navigable, particularly on foot, bicycle and public transport.

(f) Buildings and spaces should be designed with future adaptability, climate change and resource efficiency in mind wherever possible.

(g) Existing buildings, structures and natural features that contribute to the local townscape should be retained and sensitively integrated into proposals.

(h) Incorporate green infrastructure into new developments to promote active travel and make connections where possible to blue and green networks.

(i) Provision of satisfactory arrangements for the storage and collection of refuse and recyclable materials (with consideration of communal facilities for major developments).

(j) Sustainable design and construction.

Policy 1C

For larger developments (more than 200 houses or 10 hectares (ha)) the main aim is to create a sustainable neighbourhood with its own sense of identity. Neighbourhoods should seek to meet the key needs of the residents or businesses within or adjacent to the neighbourhood, ie local shopping, recreation, recycling etc. The development of a Masterplan will be required. The Placemaking Supplementary Guidance for Perth & Kinross Council will provide a full breakdown as to how this can be achieved.

Policy 1D

Sites allocated in the Plan for housing development have a capacity range identified. These capacities are indicative. On sites with an identified capacity range, any proposal for residential development that falls outside this range will be considered where adequately justified by the applicant and when any associated impacts upon infrastructure, open space and residential amenity can successfully be addressed.

Note: Placemaking Supplementary Guidance will set out how the Council aims to implement the above policy. Technical notes will provide further detailed information as to how the individual criteria can be achieved. Further information will also be provided on how capacity ranges have been calculated on allocated sites. It will also set out how capacity ranges will be calculated on windfall sites, and how proposals for changes to the capacity on consented sites will be dealt with.

Policy 57: Air Quality

This policy refers to planning requirements for locations within or adjacent to designated AQMAs; the policy is reproduced in Box 2.

Box 2: Policy 57 Air Quality

Policy 57: Air Quality

The Council has a responsibility to improve air quality. The LDP does this by seeking to prevent the creation of new pollution hotspots, and to prevent introduction of new human exposure where there could be existing poor air quality.

The LDP extends support to low emission technologies for both transport and energy production.

As well as aspiring to improve air quality, the policy also aspires to eliminate the gradual worsening in air quality that is caused by the cumulative impact of many small developments.

Within or adjacent to designated Air Quality Management Areas, where pollutant concentration are in excess of the national air quality objectives and may pose a risk to human health, development proposals that would adversely affect air quality may not be permitted. There is a presumption against locating development catering for sensitive receptors in areas where they may be exposed to elevated pollution levels.

Any proposed development that could have a detrimental effect on air quality, through exacerbation of existing air quality issues or introduction of new sources of pollution (including dust and/or odour), must provide appropriate mitigation measures. The LDP expects that some type of mitigation of air quality impacts will be required for all but the smallest developments. Best practice design measures should therefore be considered early in the design and placemaking process.

Proposals and mitigation measures must not conflict with the actions proposed in Air Quality Action Plans.

An air quality impact assessment will usually be required where the Council considers that there may be a risk of an air quality impact upon human health. The main ways in which development may potentially impact upon air quality are as follows:

(a) introducing new human exposure at a location with poor air quality (eg within an existing Air Quality Management Area or close to a busy road or junction);

(b) the development may itself lead to a deterioration in local air quality (eg from increased vehicle emissions or flue emissions from heating or energy production plant); and

(c) if the demolition/construction phase will have an impact upon the local environment (eg through fugitive dust and/or exhaust emissions from machinery and vehicles).

The cumulative impact of other consented development and of these three criteria will be taken into account. In line with best practice, screening criteria will be used to identify where impacts are insignificant. Supplementary guidance will set out how air quality will be considered when determining planning applications

The Council keeps an evidence base of air quality and has developed a high-resolution dispersion model for the LDP area.

Note: Sensitive receptors include (but are not limited to) children and older people. Therefore, the location of a children's nursery, school, hospital, housing for older people, and residential properties in areas where elevated pollution levels are evident may not be appropriate.

Note: Mitigation measures may include both on-site, through design changes, and off-site, through a hierarchy of transport measures that favour active travel, for example. Measures to avoid and reduce air quality impacts should be set out. Even where the effect is judged to be insignificant, good design and best practical measures should be employed to ensure that future problems are prevented or minimised.

More information on the Active Travel Strategy is on our website www.pkc.gov.uk

2.4 What Perth and Kinross Council is doing about air quality

Perth and Kinross Council has a responsibility through the planning system to ensure that we do not create any new pollution hotspots or introduce new human exposure where there could be existing poor air quality. Perth and Kinross Council also aspires to eliminate a gradual worsening in air quality due to the cumulative impact of numerous small developments.

2.5 The current understanding of air quality in Perth and Kinross

To date, two air quality management areas (AQMA) have been declared in Perth and Kinross. These cover the entire City of Perth and the High Street corridor of Crieff; both have been declared for nitrogen dioxide (NO2) and fine particulate matter (PM10). Road traffic is the main contributor to the elevated levels within both of these AQMAs. A Map showing the boundary of each AQMA is presented in Figure 1 and Figure 2.

Perth and Kinross Council is actively engaged in updating the evidence base on air quality on an ongoing basis. For example, a high resolution dispersion model has recently been developed for the whole of Perth and Kinross. The outputs of the model can be used to highlight areas where air quality is already compromised within the council boundary.

Developers should consult with the Perth and Kinross Council, Environmental Health Team to establish if their proposed development is in or near to a location where pollutant concentrations are either in excess of, or close to, the Scottish air quality objectives. This could be a location within or close to an AQMA, or a location close to busy roads.

Figure 1: Perth AQMA boundary

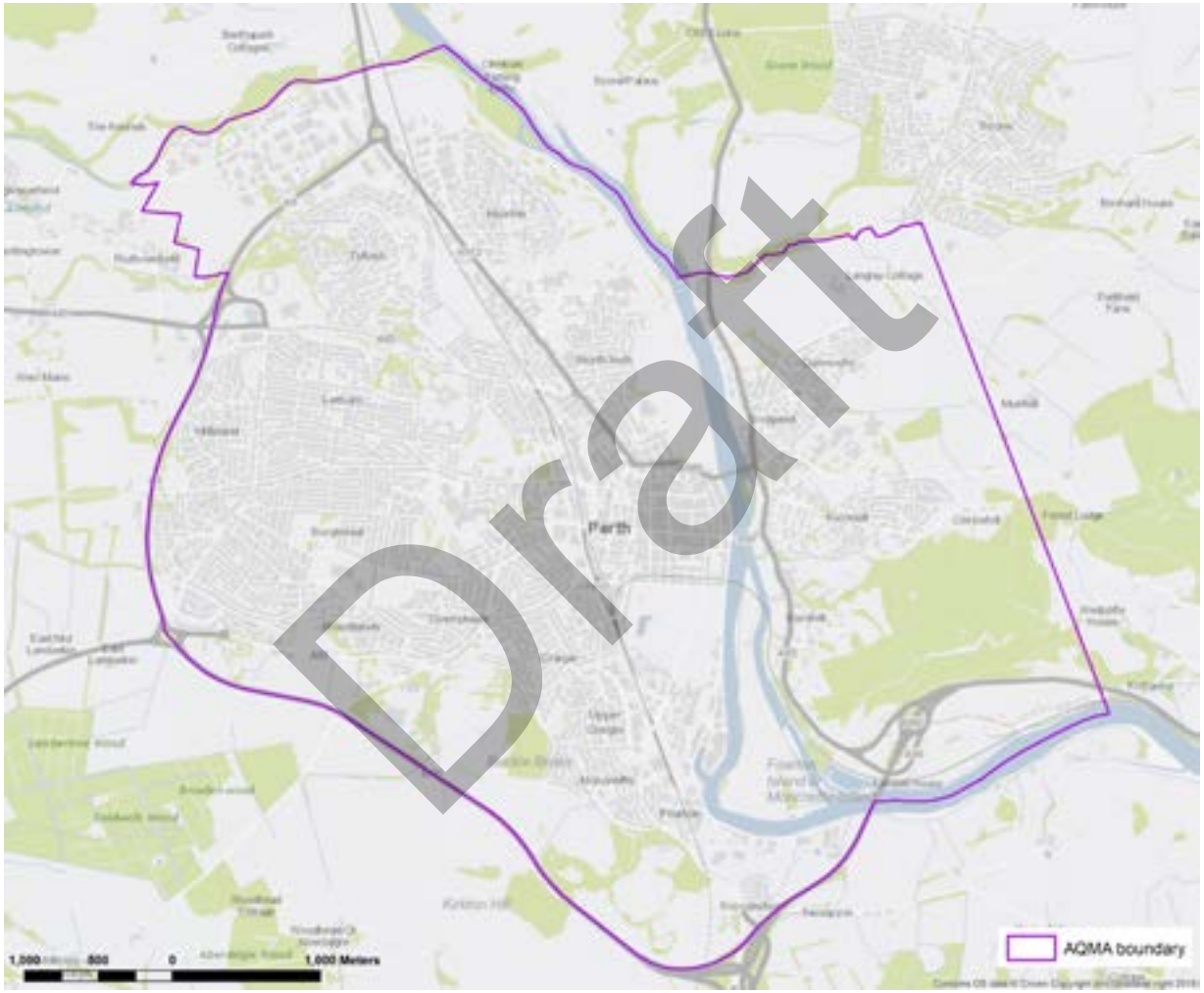
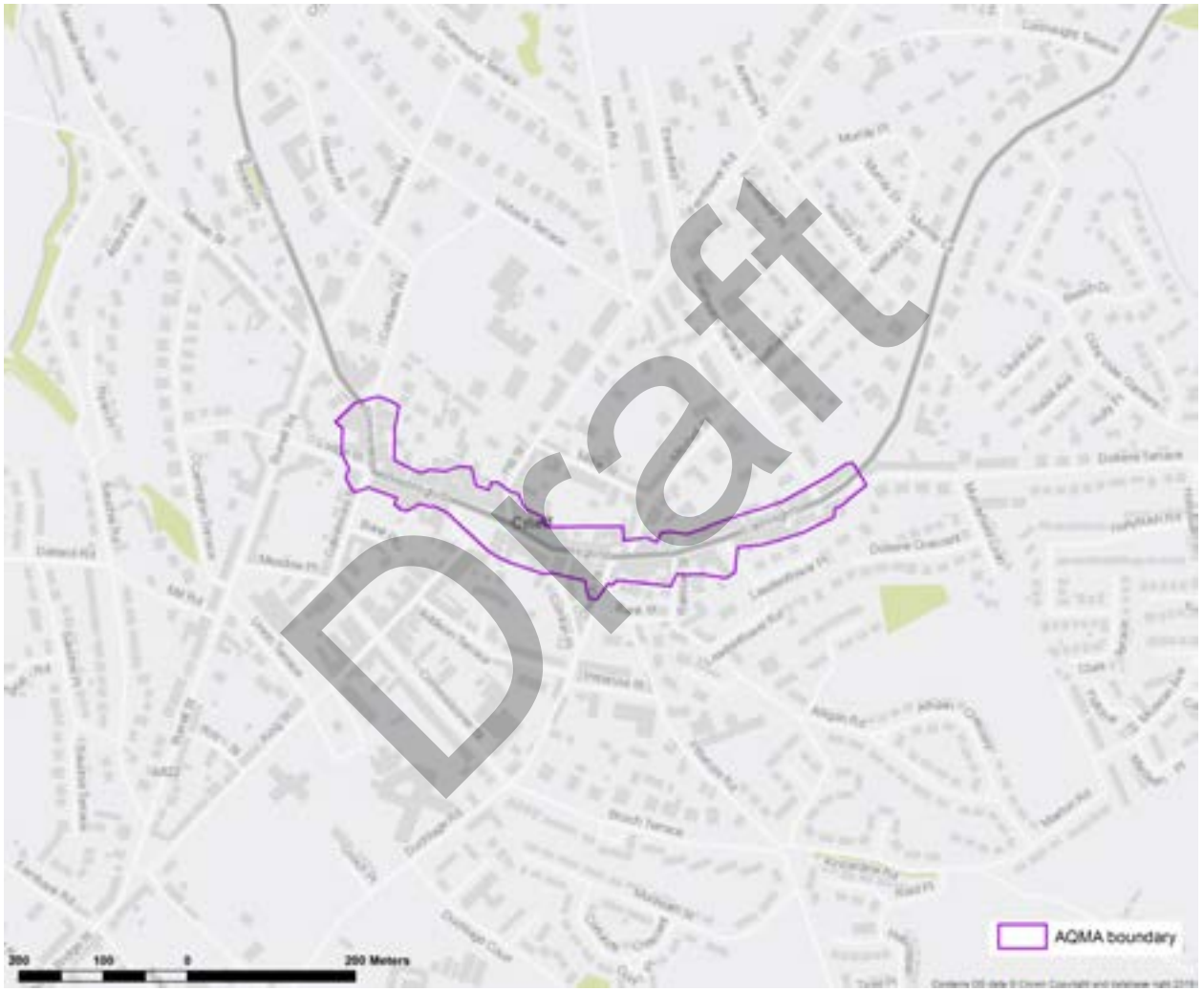


Figure 2: Crieff AQMA boundary



How Air Quality will be considered for planning applications 3

3.1 Air quality and the planning application process

A flow chart listing the basic steps of how air quality will be considered throughout the application process is presented in Figure 3.

Air quality may be a material consideration when determining applications, dependant upon the nature, scale and location of the proposed development. Developers should always therefore engage in pre-application discussions with the Perth and Kinross Council Development Management team. Based on the location and size of any proposed development Perth and Kinross Council will initially determine if an Environmental Impact Assessment (EIA) is required (See: www.pkc.gov.uk/article/14995/Major-planning-applications-and-Environmental-impact-assessments for more information).

For applications where an EIA is not applicable the next step is to determine if an air quality impact assessment report is required; in which case you will be referred to the Perth and Kinross Council Environmental Health Team

Figure 3: Process describing how air quality impacts will be considered when determining planning applications

3.2 When is an air quality impact assessment likely to be required

An impact assessment will usually be required where Perth and Kinross Council considers there may be a risk of an air quality impact on human health. Developers should always check with the Environmental Health Team whether or not an air quality impact assessment is required during pre-application discussions i.e. before submitting a planning application. Where appropriate the Perth and Kinross Council Development Management Team will consult with the Environmental Health Team, and where relevant the Transportation Team to determine requirements for any impact assessment reports.

The Perth and Kinross Council Environmental Health Team will be able to advise if there is a risk that the proposed development is in a location with poor air quality.

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

(a) Introducing new human exposure at a location with poor air quality e.g. within an existing AQMA or close to a busy road or junction i.e. the development could expose future occupiers to unacceptable health risks.

(b) The development may itself lead to a deterioration in local air quality e.g. from increased vehicle emissions; or flue emissions from heating or energy production plant. It may also be necessary to consider the cumulative effects of a number of developments.

(c) 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.

Guideline triggers for an air quality impact assessment

To provide clear guidance for developer's regarding when an air quality impact assessment is likely to be required, and to be consistent with current Scottish and UK best practice, Perth and Kinross Council use the hierarchy and criteria suggested in the EPS/RTPI Scottish planning for air quality guidance[4], these criteria are the same as those used across the rest of the UK from the latest IAQM/EPUK Planning for Air Quality guidance[5] and are summarised in Box 3 and Box 4.

4 Environmental Protection Scotland & RTPI Scotland (2017) DELIVERING CLEANER AIR FOR SCOTLAND Development Planning & Development Management Guidance from Environmental Protection Scotland and the Royal Town Planning Institute Scotland January 2017

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

Do I need to be aware of any other requirements relating to air quality?

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. However, if a scheme changes through the permitting process we would expect to be notified of the changes and information provided regarding the effect on air quality.

It is noted that medium combustion plant with a net rated thermal input of between 1 and 50MW that are put into operation after 20th December 2018 must be registered/permitted by SEPA under Pollution Prevention and Control Regulations and will require to meet specified emission limits, depending on the size, type of fuel, etc. Assessment of air quality and stack heights for these developments will however be for the local authority to consider at planning application stage as these issues will not form part of the PPC permit application for Medium Combustion Plant Directive developments, unless there is an impact on relevant conservation sites.

Box 3: EPS/RTPI Stage 1 (pre-application screening) criteria

Criteria to determine if an air quality assessment is likely to be required		
(1)	Is there a risk of introducing new receptors to poor air quality?	Is the proposed development within, or adjacent to, an existing AQMA, close to a heavily trafficked road, or close to an industrial or dusty process?
(2)	Can the development be screened out as insignificant?	May be screened out as insignificant if the development proposals: ● are less than 10 residential units or a site area of less than 0.5ha ● are less than 1,000 m2 of floor space for all other uses or a site area less than 1ha ● Coupled with either of the following: o has less than 10 parking spaces. o The development does not have a centralised energy facility or other centralised combustion process
(3)	Does the development trigger the Indicative criteria for requiring an air quality assessment?	These criteria relate to changes in traffic and combustion processes. (See EPS/RTPI indicative criteria reproduced in Box 4)

Box 4: EPS/RTPI Stage 2 criteria for determining if an air quality impact assessment is required[6]

Indicative Criteria for Requiring an Air Quality Assessment	
The Development will:	**Indicative Criteria to Proceed to an Air Quality Assessment:**
(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 Annual Average Daily Traffic (AADT) within or adjacent to an AQMA /LEZ ● 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 /LEZ ● 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/LEZ
(4) Introduce a new junction or remove an existing junction near to relevant receptors.	Applies to junctions that cause traffic to significantly change vehicle acceleration/ deceleration, 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/LEZ ● more than 100 AADT elsewhere
(6) Have an underground car park with extraction system.	The ventilation extract for the car park will be within 20m 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 >300kW ● a standby emergency generator associated with a centralised energy centre (if likely to be tested/used >18 hours a year)

6 *EPS/RTPI Scotland (2017) Delivering Cleaner Air for Scotland; Development Planning & Development Management; Guidance from Environmental Protection Scotland and the Royal Town Planning Institute Scotland; January 2017*

3.3 What should be included in an air quality impact assessment

An air quality assessment should clearly establish the likely change in pollutant concentrations at relevant receptors resulting from the proposed development including both the construction and operational phase. It must take into account the cumulative air quality impacts of committed developments (those with planning permission).

The main points which should be addressed within an assessment report are:

- Relevant details of the proposed development
- The basis for determining significance of effects arising from the impacts, i.e. the assessment criteria
- Details of sensitive receptor locations
- Baseline air quality
- Impact assessment
- Construction phase impacts
- Mitigation measures

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 location, proposed use and scale of the development. The air quality impact assessment report may therefore be a simple qualitative or screening assessment, or a more detailed dispersion modelling assessment.

Detailed information regarding methods of assessment and reporting requirements are presented in the technical guide in Appendix A of this document.

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

Mitigation of air quality impacts 4

4.1 Best practice design principles

Perth and Kinross Council aims to ensure that any new development will not lead to unacceptably poor air quality or contribute to the cumulative impact of multiple developments. It is expected that some type of mitigation of air quality impacts will be required for all but only the smallest developments. While small developments on their own may have only a small or negligible impact on air quality, multiple small developments may contribute to a cumulative impact or 'creeping baseline'. This is something which PKC are keen to avoid and therefore our approach aims to ensure that any proposed development is 'air quality neutral' as far as practicable. However mitigation measures sought will be in line with the scale of the impact of the development.

Perth and Kinross Council are also keen to influence the up-take of low emission technologies for both transport and energy production as these aspirations align with those of the Scottish Government. As well as improving air quality, these low emission technologies will help Scotland reduce greenhouse gas emissions and achieve climate change obligations.

Best practice design measures that aim to mitigate the cumulative impact of ongoing development should therefore be considered early in the design process. Principles of design that should be incorporated into a development are suggested in the latest EPS/ RTPI Planning for Air Quality guidance and are reproduced in Box 5.

4.2 Mitigating impacts

Mitigation of air quality impacts should be considered during the design stage, and should cover impacts from both the construction and operational phases of the development.

Appropriate mitigation measures for demolition and construction phase impacts should be assessed and recommended using the latest IAQM guidance[7]. 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 management plan at the construction site. PKC may request developers to undertake monitoring at construction sites in line with the most recent IAQM guidance[8].

There are various ways to mitigate the impact of a development upon air quality including design solutions, e.g. building design or energy system design, and the support of modal shifts.

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7 IAQM (2014) Guidance on the assessment of dust from demolition and construction

8 IAQM (2018) Air quality monitoring in the vicinity of demolition and construction sites

4.3 Section 75 Planning Obligations

Section 75 Planning Obligations are a mechanism in the planning system for mitigating the impact of new development. They may be used both to address specific issues arising from individual proposed developments, and as a vehicle for a developer contribution policy that addresses a more general requirement to share the costs of infrastructure and/or mitigation.

Perth and Kinross Council are however of the opinion that, in the case of air quality, it makes more sense to focus on avoiding adverse impacts from proposed developments where possible and to incorporate mitigation within the design of the proposed development.

Box 5: Best practice design principles

EPS Guidance 2017 – Principles of good design to mitigate air quality impacts

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 each parking space should be made. The provision of at least 1 Electric Vehicle (EV) "rapid charge" point per 10 residential dwellings and/or 1,000m^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 combined heat and power (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.
- 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 an air quality impact screening assessment)**

  (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).
- A presumption should be to use natural gas-fired installations in densely populated urban areas

Additional information and useful contacts 5

This guidance aims to provide developers and their consultants with guidance about how Perth and Kinross Council will consider air quality when determining planning applications. Should you have any queries, please contact either the Development Management or Environmental Health Team.

Further information and contact details can be found at the following Perth and Kinross Council website links.

www.pkc.gov.uk/planning

http://www.pkc.gov.uk/article/15309/Air-quality-guidance-for-developers

Further information on air quality can be found at:

www.scottishairquality.co.uk

www.uk-air.defra.gov.uk

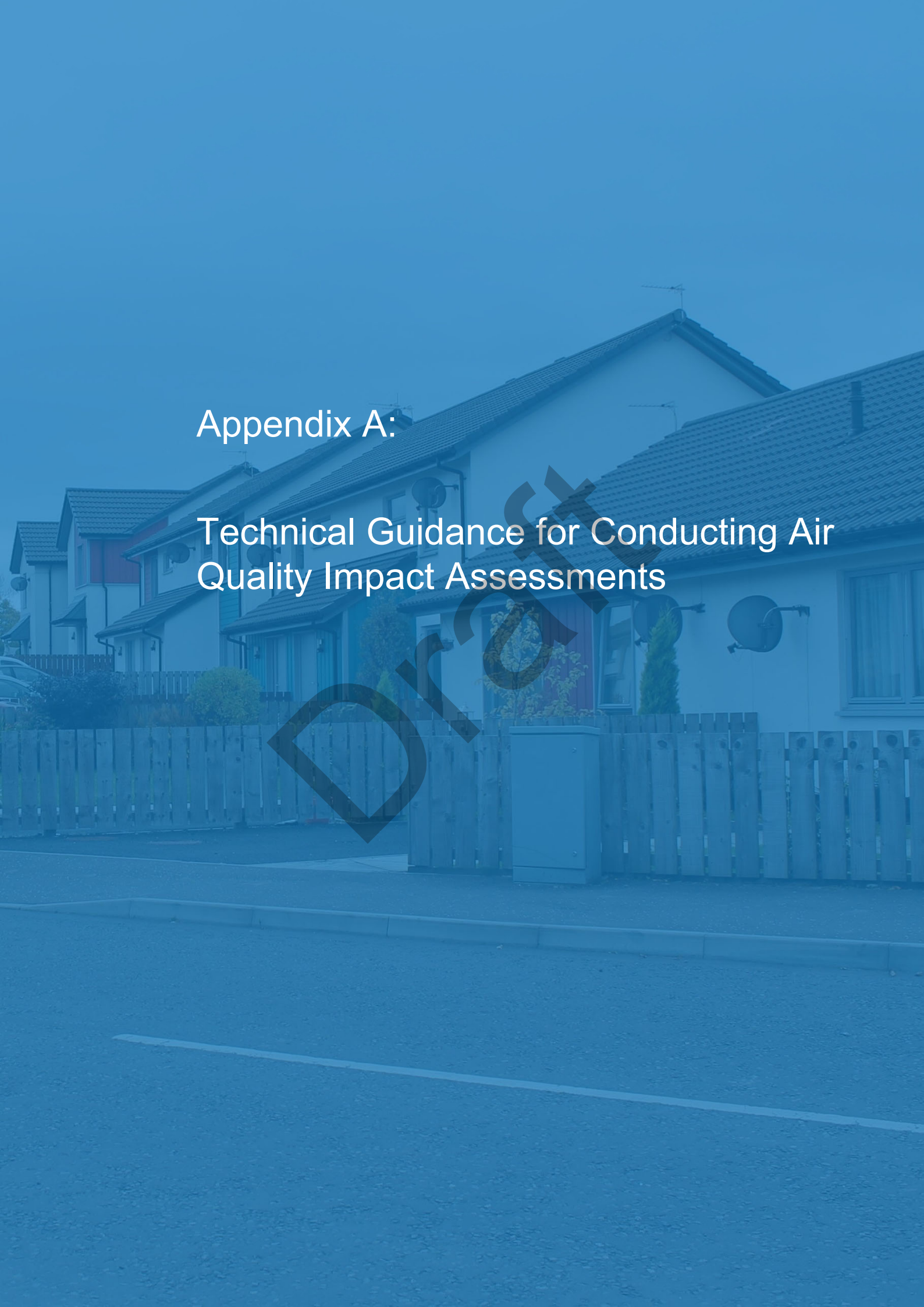
http://www.gov.scot/Publications/2015/11/5671

Further information and guidance on planning and air quality is available at:

http://www.ep-scotland.org.uk/

http://www.environmental-protection.org.uk/

http://iaqm.co.uk/guidance/



Appendix A:

Technical Guidance for Conducting Air Quality Impact Assessments

A.1 Introduction

This technical Appendix provides information about best practice when conducting air quality impact assessments. Information regarding when an air quality assessment is likely to be required for development proposals in Perth and Kinross is included in Section 3 of this guidance document.

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 to air 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, Perth and Kinross Council's preferred approaches that should guide developers and their consultants when preparing air quality assessments in support of planning applications within Perth and Kinross are outlined in this guidance document.

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 the council boundary.

Important note: Developers or their consultants must consult with their Planning Case Officer 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 the Planning Case Officer on the scope of the assessment may lead to delays in processing your application.

To assist developers with considering the scope of an air quality impact assessment, a checklist has been provided which lists all of the elements that could be relevant. Perth and Kinross Council will use the checklist when evaluating air quality impact assessment reports. The checklist is presented in Appendix B.

A.2 Other recommended sources of guidance

A.2.1 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[8]. Perth & Kinross 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; Perth and Kinross Council's preferred approaches are set out in this guidance document.

A.2.2 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

[8] Defra and the devolved administrations (2016) Local Air Quality Management Technical Guidance LAQM.TG(16)

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[9], which was prepared collaboratively by the Institute of Air Quality Management (IAQM) and EPUK, was published in January 2017.

A.2.3 Environmental Protection Scotland (EPS) and the Royal Town Planning Institute (RTPI) Scotland; Delivering Cleaner Air for Scotland; Development Planning & Development Management

Environmental Protection Scotland (EPS) and the Royal Town Planning Institute Scotland (RTPI Scotland) have published a revised and updated Scottish version[10] of the 2015 UK guidance on Planning and Air Quality published by Environmental Protection UK (EPUK) and the Institute of Air Quality Management (IAQM). This was to make it relevant for the Scottish planning system and air quality objectives to ensure that air quality is adequately considered in development planning and development management in Scotland.

Developers should use the latest version of the EPS/RTPI guidance when preparing air quality impact assessments, using the impact descriptors specified in Table 6.3 of the guidance (these are reproduced in Section 0). Perth and Kinross Council's requirements regarding mitigation of air quality are also based on those recommended in this guidance (see Section 4).

A.2.4 IAQM Guidance on the assessment of dust from demolition and construction

The latest (2014) publication of the IAQM construction dust impact assessment guidance[11] 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.2.5 Pollutant monitoring

In some circumstances, Perth and Kinross 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 0 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[12].

To avoid delays, developers are advised to consult with the Perth and Kinross Council 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 the

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

[10] EPS/RTPI Scotland (2017) Delivering Cleaner Air for Scotland; Development Planning & Development Management; Guidance from Environmental Protection Scotland and the Royal Town Planning Institute Scotland; January 2017

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

[12] Defra and the devolved administrations (2016) Local Air Quality Management Technical Guidance LAQM.TG(16)

availability of Council monitoring data close to the development location and its relevance to the development site. Perth and Kinross 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. We reserve 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.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 **Error! Reference source not found.**).

Developers should consult with the Perth and Kinross Council Environmental Health team to confirm the outcome of the simple screening test. When a construction phase risk assessment is required Perth and Kinross Council 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.

Box A.1: 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.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.

Section 0 of this guidance provides information on different types of screening assessments.

Section 0 of this guidance provides detailed information regarding air quality assessments where atmospheric dispersion models are used.

A.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.4.1.1 Other committed developments

The impact of other consented or committed developments should be included when calculating future year baseline air quality. This is particularly applicable at development sites which are part of a wider strategic land allocation. Developments that require transport assessments often include the impact of traffic attributable to other committed developments within the transport assessment. 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). Committed development may also apply to point source emissions such as biomass combustion or CHP plant; consultation with the Perth and Kinross Council Planning and Environmental Health Teams is recommended to gain knowledge on any other relevant pending developments within the area of interest.

A.4.1.2 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 Perth and Kinross Council Environmental Health Team to determine if any other pollutants should be included in the assessment.

A.4.1.3 Treatment of background concentrations

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

Urban background NO_2 and PM_{10} measurements are taken at both automatic analysers and NO_2 diffusion tube monitoring sites in Perth and Kinross. Developers or their consultants can access the latest LAQM review and assessment reports at the Perth and Kinross Council website[13] to identify if there is nearby representative background monitoring. Developers are advised to consult with the Environmental Health Team to agree if the site location and data quality is considered suitably representative of background concentrations for an air quality impact assessment.

Where relevant measured background data is not available for a given location the national background mapping should be used in the assessment. The background maps produced by the Scottish Government provide estimated concentrations of NO_2 and PM_{10} at 1 km^2 resolution for the whole of Scotland. Background maps for $PM_{2.5}$ are also produced by Defra covering the entire United Kingdom.

Mapped background concentrations are the outputs of a national scale pollution model and are therefore an area where the evidence base is periodically updated.

Users of the background maps should be familiar with the associated user guide[14] (current version referenced). The mapped background datasets are also useful in that the relative contribution from various source sectors to the total background concentration 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. The source of background concentrations used should be agreed with Perth and Kinross Council Environmental Health team prior to conducting the impact assessment.

It is important that the background mapped values are not used to characterise existing air quality at a more resolved resolution 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 to estimate baseline air quality at a roadside location unless the roads in question are modelled as discrete sources in the dispersion modelling.

A.4.2 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.4.2.1 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].

[13] http://www.pkc.gov.uk/article/13505/Air-quality-reports

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

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

A biomass screening assessment will be conducted by officers from the Perth and Kinross Council Environmental Health 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 Screenview. 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 Perth and Kinross Council Environmental Health Team during pre-application discussions if you are considering use of a screening model for an air quality impact assessment.

A.4.2.2 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 its limitations and may not be suitable for all circumstances. The currently available version of the DMRB was released in 2007; the vehicle emission factors are therefore outdated. An updated version of the model is in preparation and should be used in preference to the 2007 version 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 0) 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 us, providing information regarding the screening model's suitability for assessing the potential impact of the proposed development.

A.4.3 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.

Perth and Kinross Council consider that the use of a dispersion model is appropriate in most cases for developments that trigger the EPS/RITP criteria for when an air quality assessment is required (see Box 3), 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 chosen model should be agreed with our Environmental Health 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.

A.4.3.1 Model input data and reporting requirements

The air quality impact assessment report submitted should provide a full description of the modelling undertaken; including details of all assumptions made and the input data used. All reports should include sufficient information such that, if required, Perth and Kinross Council could repeat the modelling ourselves or pass to a third party expert for technical review. Perth and Kinross Council require that model input and output files are prepared in such a way as to be available in addition to the impact assessment report if requested. Perth and Kinross Council reserve the right to re-run the modelling ourselves using the original model input files; developers and their consultants should consider this when preparing their modelling studies.

A.4.3.2 Modelling of point source emissions

Whilst the suggestions below are provided to guide applicants, Perth and Kinross Council require all methods to be agreed in writing in advance. In cases where this is not done, and the assessment is considered unsatisfactory Perth and Kinross Council reserve the right to refuse to accept the assessment.

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.4.3.2.1 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, Perth and Kinross Council expect that the model will be able to account for issues such as building downwash, variable surface roughness and terrain.

A.4.3.2.2 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. Perth & Kinross Council will not condone an applicant choosing the lowest emission rate or factor for their source from those available and 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 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. All emissions and stack gas correction calculations should be presented in the dispersion modelling report so that their accuracy can be checked (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 plant manufacturers 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, this is only appropriate in cases where the applicant demonstrates that emissions data is not available from preferred sources (this is unusual for modern plant which often have emissions test

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

certification available from type approvals). If this tool is used, the outputs of the spreadsheet should be included in the impact assessment report.

A.4.3.2.3 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 (1-hr mean) and 100% of NOx emitted is considered to be NO_2 for the calculation of long-term NO_2 concentrations (annual mean). 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, this method should be used when assessing NO_2 concentrations influenced by point source emissions. Any deviation from this method should be discussed with the Perth and Kinross Council Environmental Health team.

A.4.3.2.4 Meteorological data

For detailed dispersion modelling of point source emissions, we require 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 Perth and Kinross Council Environmental Health 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. Where data filling is necessary applicants are advised to 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.

Applicants must be prepared to supply meteorological data used for model inputs on request from PKC and be able to provide explanation on data filling routines used. In addition Perth and Kinross Council may wish to inspect model output log files which will contain missing data statistics so applicants should retain these for submission on request.

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, the minimum Monin-Obukhov length, the Bowen ratio and surface albedo. Values for these parameters will usually differ between the location where the meteorological measurements were taken and the application site. For example many meteorological stations are sited at airports with surface roughness values of less than 0.1m, whereas most applications are for urban settings where this value can be 1m or more. This can in some cases affect the concentration outputs markedly so should be accounted for properly by using appropriate values. Given the availability of

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

easy to access land cover data it is not acceptable to judge these parameters without reference to source data.

A useful source of land cover information is the CORINE dataset which is available through the COPERNICUS Land Monitoring Service free of charge[18]. The land use classes can then be mapped to the required physical parameters provided by other agencies.

In summary the following recommendations are made for determining surface characteristics:

1) Determining appropriate values for surface roughness involves sourcing and interpreting land cover data and applicants may use an average roughness value derived from a 1km radius around the meteorological station. When using a model that can accept values in wind angle sectors this functionality should be used where practicable with a minimum wind sector angle of 30 degrees. Roughness values for the application site are expected to represent the topography of the site (normally the value will be higher than the meteorological site) and should be agreed with PKC. Variable surface roughness can be treated by some models and where practicable this is encouraged.

2) The recommended approach to determining Bowen ratio and albedo is to use an average value across a 5km radius centred on the meteorological station. Values for the application will be site specific and should be agreed with PKC.

3) Monin-Obhukov length (if required by the model) may be derived from defaults in the dispersion model or derived by an alternative method if agreed with PKC in advance.

If model vendors do not provide suitable default values the applicant should refer to guidance from authoritative sources such as the World Meteorological Organisation or the USEPA and reference these in the assessment report. Most dispersion models can account for this and the applicant should explain how this was treated in their report.

A.4.3.2.5 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 reported. 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.

The non-linear response in the concentration outputs to changes in buildings and stack dimensions means that it is very important that applicants agree these with PKC prior to running the model. If these parameters change from those presented in the assessment report Perth and Kinross Council may request a full re-run of the model.

A.4.3.2.6 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

[18] http://land.copernicus.eu/pan-european/corine-land-cover

will have to be included due to the typically longer range impacts that can cover areas with different terrain characteristics. The source of terrain height data should be provided and input files readied for inspection on request.

A.4.3.2.7 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 on dispersion modelling[19].

The recommended 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. If this calculation is carried out the applicant should provide evidence of this in the assessment report.

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 due to mathematical instabilities in the code. As a result this 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.4.3.2.8 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 perhaps for a backup power generator) applicants should be aware that Perth & Kinross Council may seek to establish planning conditions that limits operation to hours whose impacts are evidenced in the modelling. In such instances the model should be set up to represent 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.4.3.2.9 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

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

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 (which will be interpolated 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. For large point sources with zones of influence over 1km this condition may be relaxed somewhat; and in such cases an acceptable approach will be a stepwise reduction in model resolution starting at 5m within 1km and increasing with distance to a maximum not exceeding twice the stack height.

In addition to 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. PKC require that receptor locations are agreed during the pre-application discussions and may require additional receptors to be placed in the domain.

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 0).

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.

A.4.3.3 Modelling of road traffic emissions

Whilst the suggestions below are provided to guide applicants, all methods should be agreed in writing in advance with the Perth and Kinross Council Environmental Health Team. In cases where this is not done Perth and Kinross Council reserves the right to refuse to accept the assessment in the first instance.

A.4.3.3.1 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, Perth and Kinross 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.

Perth and Kinross Council require 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 0 below.

A.4.3.3.2 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 Perth & Kinross 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.4.3.3.3 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. Perth and Kinross Council's current preferred method for impact assessment studies is to calculate emissions using the latest version of the Emissions Factors Toolkit (EFT)[20]. Applicants should be aware that emissions factors change through time and must provide evidence that they are using the most up to date publicly available data. 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.

[20] http://laqm.defra.gov.uk/review-and-assessment/tools/emissions-factors-toolkit.html

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. Perth and Kinross Council may request copies of the EFT used in the assessment or model input files if internal emission factors are used.

A.4.3.3.4 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 are 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[21].

The Institute of Air Quality Management (IAQM) have also recently published a position statement on this.

'*It is important air quality practitioners acknowledge the uncertainty in the EFT emissions factors and that they are adequately accounted for when predicting future NO_2 concentrations. There are a number of approaches that could be taken, based on applying a sensitivity test that assumes NOx emissions will not reduce as rapidly as shown by the EFT. The choice of approach will depend on the specific circumstances of the project being assessed*'[22].

Based on the emerging evidence and the current position of the IAQM; Perth & Kinross Council are also currently adopting a precautionary approach when considering future projections of NOx emissions from road traffic. For all air quality impact assessment considering the impact of future year road traffic emissions on NO_2 concentrations, the applicant should agree an appropriate approach/sensitivity test with the Council.

A.4.3.3.5 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[23] on traffic distribution can be used e.g. the TRA03 Road traffic statistics tables[24], produced by the Department for Transport.

The additional emissions that arise during traffic congestion should always be properly addressed in the assessment; one method of modelling this is via use of a time varying emissions file in a road source dispersion model.

A.4.3.3.6 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. Perth and Kinross Council therefore recommend that any roads dispersion model used has the capability to model

[21] Defra and the devolved administrations (2016) Local Air Quality Management Technical Guidance LAQM.TG(16); Paragraph 7.75

[22] IAQM (2016) Dealing with Uncertainty in Vehicle NOx Emissions within Air Quality Assessments October 2016

[23] www.gov.uk/government/collections/road-traffic-statistics

[24] www.gov.uk/government/statistical-data-sets/tra03-motor-vehicle-flow

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 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 common sense check of model outputs around street canyons is the presence of unexpectedly low or zero values which can indicate an error in receptor placement.

A.4.3.3.7 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.4.3.3.8 Meteorological data

For traffic based air quality assessments, Perth and Kinross Council require 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. Please refer to the earlier section on meteorological data, all of these requirements apply to both road traffic and point source studies (other than the acceptability of a single year of meteorology for road studies).

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 these parameters and failure to represent this can affect model outputs. The choice of meteorological station should be included when consulting with the Perth and Kinross Council Environmental Health Team on the scope and method of assessment.

A.4.3.3.9 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 and vehicle 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, Perth and Kinross Council 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 proposed approach to model verification and the monitoring data that will be used should be discussed and agreed with the Perth and Kinross Council Environmental Health 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 Perth and Kinross Council Environmental Health 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; Perth and Kinross Council may require measurements to be conducted as part of the air quality impact assessment. This will be 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 Perth and Kinross Council's preferred approach to monitoring is provided in Section A2.5 above.

Important: 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, Perth and Kinross Council's preference is that the model should be verified based on the predicted NOx contribution from traffic (Road NOx) versus the measured road NOx. The model **should not** be verified by comparing modelled vs measured NO_2 concentrations alone.

This corresponds with the approach recommended in the LAQM.TG(16) guidance and represents current best practice; an extract from the guidance is presented in Box A.2 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 predict the road contribution to annual mean NOx concentrations rather than annual mean NO_2 concentrations. 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[25]. Measured road NOx can also be estimated using the Defra NOx: NO_2 calculator, whereby a representative NOx background is subtracted from the measured value.

Box A.2: Approach to verifying modelled NO_2 concentrations from road traffic

LAQM TG(16) Box 7.16

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 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 (combined with background 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.

The LAQM technical guidance recommends the following checks 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: Please include a quantification of model uncertainty/error in the impact assessment report

[25] http://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html#NOxNO2calc

The impact assessment report should contain an estimate 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 Perth and Kinross Council recommend 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 $\mu g.m^{-3}$. Perth & Kinross Council expect 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, it should be stressed 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 has an average error of less than 10% of the air quality objective so does appear to be performing well; but on closer examination has over-predicted at locations in a study area where the lowest concentrations have been measured, but under-predict at locations where higher concentrations were measured. This demonstrates that the average performance of a model is not necessarily a good description of how representative the results are at all locations and particularly the locations of most concern where the highest concentrations are occurring. 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 Perth and Kinross 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.4.3.3.10 Model output area/domain (Road traffic dispersion modelling)

The model domain for a roads type air quality impact assessment should cover locations close to the road 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 0).

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. Perth and Kinross Council require that receptor placement is agreed with us prior to submission of the final assessment.

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 at discrete points 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 Roads or ADMS Urban to maximise the density of receptor points close to the roadside.

A.4.4 Describing the air quality impacts and assessing significance

A.4.4.1 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 a 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.4.4.2 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. Perth & Kinross Council will assess the significance of air quality impacts using the same method as that described in the latest publication of the EPS/RITPPlanning for Air Quality guidance[26]. Air quality impact assessment reports are 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 EPS/RITPimpact descriptors and method for deriving them are presented in Figure A4.1.

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. 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.

A.4.4.3 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. Perth & Kinross 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 Perth and Kinross Council 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 the recommendations made to the planning officer.

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 Perth and Kinross Council will require mitigation measures (in addition to the minimum requirement for good practice design principles – see Section 4) to be included in the scheme design to ensure there is acceptable air quality for new occupants.

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

Figure A4.1: EPS/RITPGuidance – 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.4.5 Air quality impact assessment report requirements

The report structure should follow accepted best practice. Please refer to the latest EPS/RITP guidance. For information, a checklist is provided in Appendix B which will be used by The Perth and Kinross Council Environment Service 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

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 describing the predicted air quality impact:** Impact descriptors as specified in the current UK best practice guidance should be used to describe the magnitude of change in pollutant concentrations attributable to the proposed development. These descriptors and the basis for determining the significance of the predicted impacts 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 traffic data used in the assessment. Projected traffic flows should be summarised, including growth projections to future baseline which may include other nearby committed developments. Where the results of a Transport Assessment are being used, reference to approval of the TA by Perth & Kinross 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 – please 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. A discussion of how land use parameters were used to derive surface characteristics should be provided.

    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):** our requirements for the level of detail required are similar to those for road traffic based assessments. 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, 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. A discussion of how land use parameters were used to derive surface characteristics should be provided.

   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 methods 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 Section 0 of this guidance and the relevant sections of 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 dispersion models contour plots showing spatial variation in pollutant concentrations can be presented. 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 also always be included 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 and any other future year phases of the development.

11. **Impact descriptors and determining significance:** Impacts should be described and the significance assessed using the latest EPS/RITPplanning for air quality guidance.

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 0) construction phase impacts should be assessed and appropriate mitigation measures recommended using the latest IAQM guidance.

13. **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 4 of this guidance 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

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)?			

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