Air Quality and Emissions Mitigation

Guidance for Developers

August 2015

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Introduction

Air Pollution – What's the Problem?

Long-term exposure to air pollution is estimated to cause 29,000 premature deaths each year in the UK at an average loss of life expectancy of 6 months[1]. It has been estimated that removing all fine particulate air pollution would have a bigger impact on life expectancy in England and Wales than eliminating passive smoking or road traffic accidents[2]. The economic cost from the impacts of air pollution in the UK is estimated at £9-19 billion every year. This is comparable to the economic cost of obesity (over £10 billion)[3].

There is however, very little awareness of the issue, making air pollution an invisible public health problem that affects much of the UK. Gedling Borough, like most Local Authorities in the UK has air pollution difficulties, largely from 'tail-pipe' emissions from vehicles using the roads within the Borough. As such we are trying to put measures in place to both ease the problem and prevent the situation from getting worse.

Air Pollution and Planning Policy – National Context

The impact on air quality is material consideration in making planning decisions. Paragraph 124 of the National Planning Policy Framework (NPPF)[4]. highlights that planning decision should ensure that new development in AQMAs is consistent with the local action plan and that policies should contribute to EU limit values and national objectives.

The NPPF also states that:

'Plans should protect and exploit opportunities for the use of sustainable transport modes for the movement of goods or people. Therefore, developments should be located and designed where practical to:

….

- *incorporate facilities for charging plug-in and other ultra-low emission vehicles; and…'*

(Paragraph 35)

and;

'If setting local parking standards for residential and non-residential development, local planning authorities should take into account:

….

- *an overall need to reduce the use of high-emission vehicles.'*

(Paragraph 39)

The National Planning Practice Guidance includes a section on air quality which identifies that concerns on air quality could arise if a development in likely to generate an impact where air quality is known to be poor and particular where it could lead to a breach of EU legislation.

[1] http://comeap.org.uk/images/stories/Documents/Reports/COMEAP_Mortality_Effects_Press_Release.pdf
[2] Comparing estimated risks for air pollution with risks for other health effects, Miller and Hurley, IOM (2006)
[3] Air Pollution: Action in a changing climate Defra 2010
[4] https://www.gov.uk/government/publications/national-planning-policy-framework--2

Currently, there is no statutory guidance on how to deal with air quality considerations through the planning system. Most guidance concerns itself with technical modelling of impacts with little information provided on how to mitigate against impacts. Gedling Borough Council, has taken the approach developed by other councils in the West Midlands, West Yorkshire and Sussex that both simplifies the assessment of air quality for development schemes while placing more emphasis on incorporating road transport emission mitigation as standard, thereby, defining what sustainability means in air quality terms.

It is envisaged that by securing reasonable emission mitigation on each scheme, where appropriate, cumulative impact effects, arising from overall development can be minimised. The new approach provides greater clarity and consistency for developers, which should help to speed up the planning process.

Air Pollution and Planning Policy – Local Context

This guidance is initially intended for use as 'good practice guidance'. However, in the longer term key elements of the guidance will be incorporated into the Council's emerging Local Planning Document which is being prepared within the framework set by the National Planning Policy Framework and the Aligned Core Strategy.

The Local Planning Document addresses both non-strategic site allocations and generic development management issues. Once adopted, the Local Planning Document will form part of the development plan for Gedling Borough Council and the policies within the document will be used to determine planning applications.

Air Pollution and Climate Change

The Councils *Sustainability Strategy and Action Plan* is seen as fundamental in taking forward the Council's objective, set out in the 2012/13 Council Plan, to *"reduce the Council's and the Borough's carbon footprint and energy usage"*.

Amongst the strategies aims are to:

- Reduce the overall carbon emissions of the Borough.
- Continually improve the energy efficiency and performance of the Council's own estate and wider community.
- Promote a shift to a more sustainable mode of public and private transport system.
- Promote behavioural change towards more sustainable ways of living among staff and members of the public and enabling community resilience to a changing climate.
- Accelerate the shift towards a low carbon economy and facilitate the creation of "green" jobs.

Many of the measures promoted within this document also help to achieve the above carbon reduction aims.

Assessment and Mitigation – What is required?

Purpose of this Guidance

It is recognised that development will in the main inherently increase road transport emissions, both during the construction and operational phases. However, it is also recognised that sustainable development can be a positive force for change. The approach in this guidance seeks to minimise road transport emissions wherever practicable to sustainable levels, while also seeking to counter the cumulative impacts arising from the aggregation of incremental emissions arising from each development scheme.

Although the focus of this guidance concerns issues arising from road transport emissions it also considers the synergistic benefits of tackling both greenhouse gas and noise emissions from road transport as coincidental benefits. Separate guidance is available to assist with considering emissions from other sources; including point sources i.e. biomass installations.[5]

The NPPF introduces the presumption that planning approval will be granted for *sustainable development*. This guidance document seeks to define what is meant by 'sustainable' in air quality terms in order to provide consistency and clarity to both local authority practitioners and developers alike.

A key consideration in the NPPF is the cumulative impact of development on pollution levels; therefore, this guidance seeks to simplify assessment and mitigation procedures through a standardised development scheme classification, according to potential scheme impact, while recommending the types of appropriate and reasonable mitigation measures that should be designed into each scheme classification.

The process outlined below provides an indicative step by step approach to dealing with planning applications that have the potential to create relevant exposure to road transport emissions (NO_2 and $PM_{10/2.5}$) for future occupants of a development, or where the proposed development scheme has the potential to increase concentrations of pollutants arising from road transport emissions (see flow chart – Figure 1 below).

Step 1 – Pre-Application Discussion

It is important that planning authority requirements regarding scheme sustainability and the planning application validation process are identified at the earliest stage possible.

For this reason pre-application discussion involving planning management and air quality professionals should take place at the outset to ensure optimum scheme design and avoid unnecessary delays in the planning process. This is particularly pertinent in relation to major schemes.

[5] EPUK guidance available at http://www.iaqm.co.uk/text/guidance/epuk/biomass_developers_leaflet.pdf

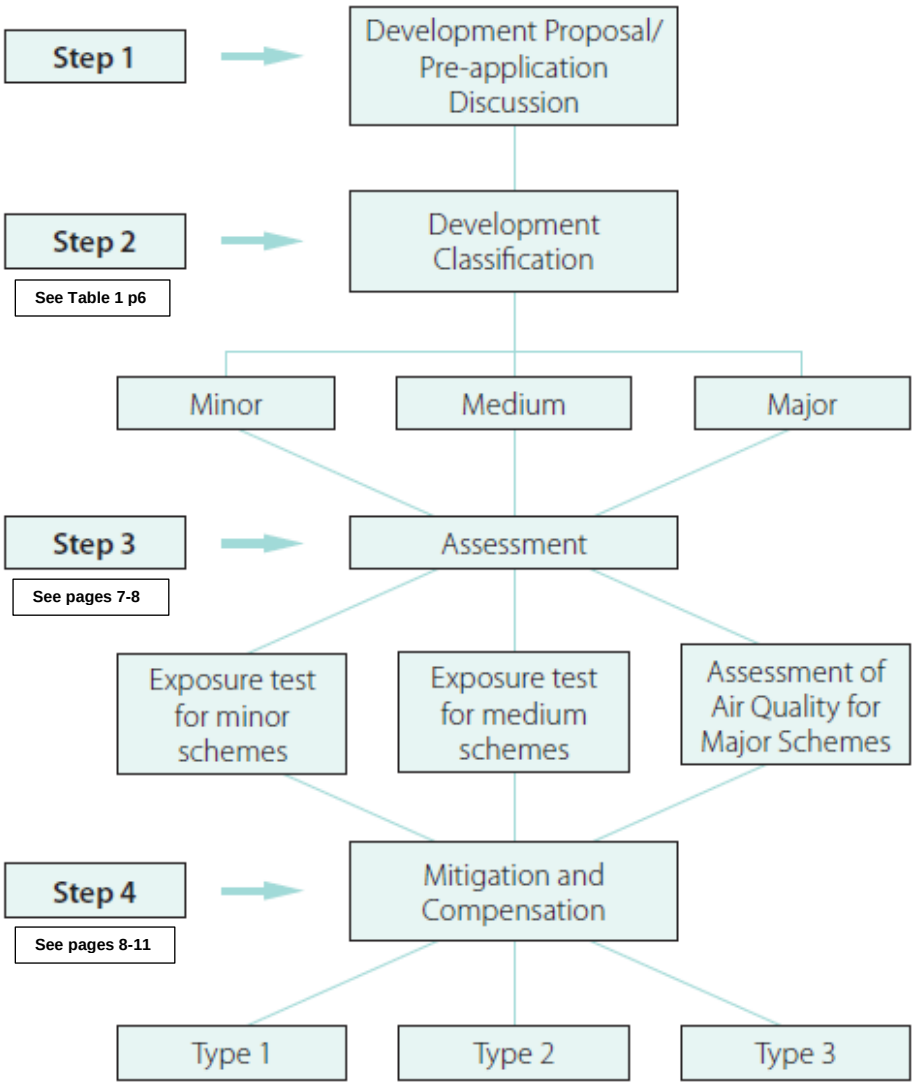


Figure 1 – Assessment and Mitigation Flow Chart
(Source: *Good Practice Air Quality Planning Guidance*, West Midlands Low Emissions Towns & Cities Programme, May 2014)

Step 2 – Classification of the Development

Following discussions with Local Authority Planning and County Council Transport Officers, the likely air quality impact of developments have been categorised using the DfT Threshold Criteria for Transport Assessments in addition to Defra Technical Guidance [TG (09)]; into minor, medium and major classifications (See Table 1).

Table 1: Development Classification

Scheme Type	Minor	Medium	Major
Threshold	Below DfT threshold criteria for Transport Assessment[6]	Meets DfT threshold criteria for Transport Assessment. Where development meets DfT threshold criteria for a Transport Assessment based on considerations other than size or scale of land use. Or where the development is for any B2 or B8 use falling below the major classification[7].	Medium type developments, which also trigger any of the following criteria: i.) Where development requires an EIA[8] ii.) Where development is likely to increase traffic flows by more than 5% on roads with >10,000 AADT[9] or change average vehicle speeds by > 10 kph/likely to cause increased congestion iii.) Where a proposal is likely to increase traffic by more than 5% on road canyons with >5,000 AADT. iv.) Where a development requires a Transport Assessment and HGV movements are =/> 10% of total trips. v.) Where significant demolition and construction works are proposed.
Assessment	None (other than for exposure)	None (other than for exposure)	Air Quality Assessment[10] required including an evaluation of changes in vehicle related emissions[11]

Step 3 – Assessment

Where Exposure May Arise

Whilst no assessment is required for minor and medium impact schemes developers need to consider whether the development will expose future occupiers to unacceptable levels of air pollution.

The determination of relevant exposure should be ascertained through reference to the Councils latest review and assessments of air quality; this can be checked on a case-by-case basis with the Public Protection Service at the Council during the pre-application stage.

For major developments, the Air Quality Assessments will include the consideration of potential increased exposure for relevant receptors affected by the development. (See Appendix 1)

[6] The DfT Threshold criteria for Transport Assessments and Travel Plans (TA/TP) http://webarchive.nationalarchives.gov.uk/20100409053417/http://www.dft.gov.uk/adobepdf/165237/202657/guidanceontaappendixb

[7] B2 and B8 uses can generate significant HGV movements and would normally require mitigation to a Type 2 standard.

[8] Required where development is within or likely to create an area of exceedance of EU Limit Values and is within the scope.

[9] Annual Average Daily Traffic flow.

[10] See Appendix 1

[11] Assessment includes monetisation of the impacts arising from emission changes in line with Defra IGCB Damage Costs

The Council, in considering policies on exposure, may give weight to the following mitigation measures:

- Can the curtilage of a residential building be set back beyond the pollutant exceedance zone?

- Can the scheme be designed to place residential units at the rear of the development or on higher floors?

- Can vegetative barriers, including appropriate tree species, offer some degree of separation from the road? (While several reports[12] [13] have highlighted some potential for certain vegetation species to reduce particulate concentrations, they also indicate a limited effectiveness in reducing exposure to NO_2 in the urban area)

- Can design of built forms avoid the creation of canyons, allowing a greater degree of pollutant dispersal?

- Mechanical ventilation should not automatically be seen as providing effective mitigation against exposure and should be scrutinised carefully, not only in terms of the acceptability of providing living conditions in what could be described as a hermetically sealed unit, but also in terms of the increase in energy requirements and maintenance that is incurred and the attendant secondary noise effects that can arise.

Evaluation for all other circumstances

For all developments classified as minor and medium, where relevant exposure is not a concern, an air quality assessment is not required and mitigation to make the development sustainable is specified for each classification of development and is termed Type 1 or Type 2 (see Table 2)

An air quality assessment is required for all major developments, a protocol for which is provided in Appendix 1. The protocol includes details of how to undertake an emissions assessment for a development and a calculation of damage costs. Damage costs are used to determine the level of Type 3 mitigation and/or compensation required to make the scheme acceptable – an explanation and an example of the calculation are provided in Appendix 2.

Table 2 below summarises the type of assessment, mitigation and/or compensation required for each of the development classifications.

[12] http://www.es.lancs.ac.uk/people/cnh/docs/UrbanTrees.htm
[13] http://www.woodlandtrust.org.uk/en/planting-woodland/ why-plant-trees/environmental-benefits/Pages/default.aspx

Table 2 – Summary of the Air Pollution Mitigation Requirements

Development Classification	Assessment Required	Mitigation	Compensation
Minor	None (other than for exposure)	Type 1	-
Medium	None (other than for exposure)	Type 1 and 2	-
Major	Full AQ Assessment in line with Council Guidance, including evaluation of emission and concentration changes.	Type 1 and 2	Type 3

Step 4 – Mitigation and Compensation

This guidance assumes that minor and medium schemes should not have a significant impact on air quality if the appropriate Type 1 and 2 mitigation, as outlined, is incorporated into development proposals. Where appropriate mitigation has been incorporated, such schemes can be considered as being sustainable in air quality terms.

In addition to Type 1 and Type 2 mitigation, major schemes may require additional Type 3 mitigation which is determined in scale by the calculation of emission damage costs associated with the scheme.

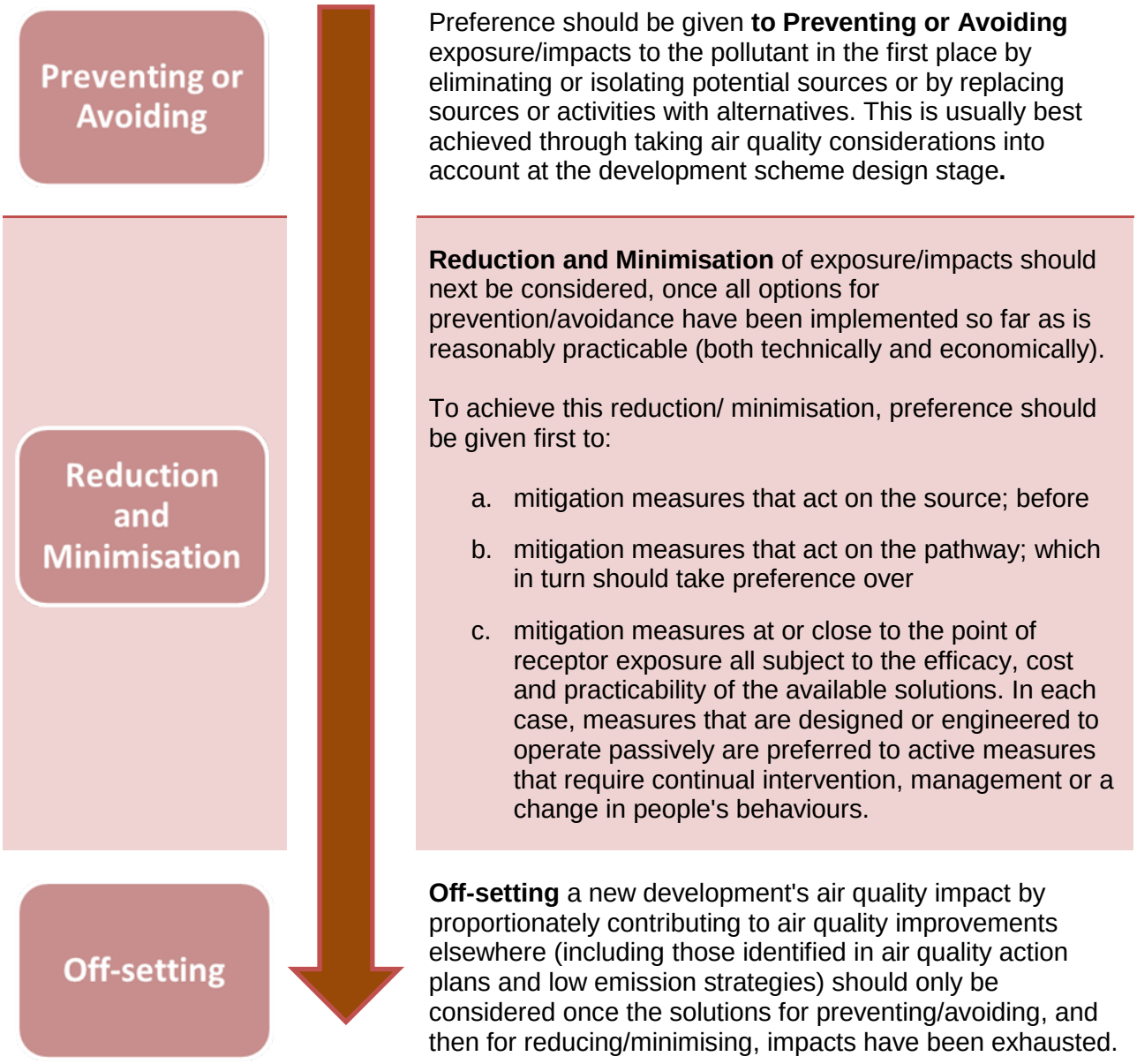
The required mitigation is summarised as:

Type 1	Electric Vehicle Recharging and the adoption of an agreed protocol to control emissions from construction sites
Type 2	Practicable mitigation measures supported by the NPPF; and
Type 3	Additional measures that may be required by either planning condition or Planning Obligation by a Section 106 Agreement to make the site acceptable, using reasonable endeavours. The Type 2 & 3 mitigation measures presented in this guidance are not exhaustive lists and should be seen as defaults. Innovative solutions to air quality mitigation are encouraged.

The type of mitigation agreed will be informed by:

- Outcomes from the Transport Statement/ Assessment;
- Specific needs identified in site specific spatial policy allocations;
- Travel Awareness/Planning and Highway Development requirements;
- Defra air quality guidance

It is recommended that the following basic hierarchy principles are used as the basis for selecting Type 2 and 3 measures; mitigating the operational air quality impacts associated with development schemes.



Source: *Position Statement – Mitigation of Development Air Quality Impacts, January 2015*
www.iaqm.co.uk

By incorporating mitigation measures into scheme design as standard, it is envisaged that this approach will help counteract the incremental emission creep, inherent with most development schemes.

Type 1 Mitigation

Electric Vehicle Charging Infrastructure

A key theme of the NPFF is that developments should enable future occupiers to make green vehicle choices and it explicitly states that low emission vehicle infrastructure, including electric vehicle (EV) re-charging, should be provided. This guidance seeks to develop consistent EV re-charging standards for new developments in the Borough.

It is anticipated that initially electric or hybrid electric powered vehicles will form a small percentage of the total number of vehicles on the road. However, on the basis that as electric/hybrid vehicles will become more popular coupled with further advances in the technology, the likelihood is that these vehicles will become less expensive. Therefore, on this assumption, it is possible that a significant percentage of vehicles will be electric or part electric powered in the near future.

Table 3.1: Type 1 Mitigation Measures - EV Charging

	Residential	Retail	Commercial	Industrial
Provision Rate	1 charging point per unit (house with dedicated parking)	To be agreed with the developer based on strategic need; the level of EV provision will be based upon the following:		
	1 charging point per 10 spaces (unallocated parking)**	5% of parking spaces; 10 EV points maximum (this may be phased with 2.5% provision initially and a further 2.5% by agreement) See Table 3.1a		
	To prepare for increased demand in future years, appropriate cable provision should be included in scheme design and development in agreement with the local authority.			

**this requirement will be dependent on the necessary 'payment for charging' technological solutions being available.

Table 3.1a: Indicative EV Charging Point Provision (Retail/Commercial/Industrial)

	Provision of EV Points	
Proposed Parking Spaces	**2.5%**	**5%**
10	1	2
20	1	2
50	1	3
100	3	5
200+	5	10

Note: Percentage numbers rounded up.

Residential

An external charging point shall be provided per unit (Table 3.1). To allow for an easy upgrade to a faster charge bespoke facility in the future, the charging points should be supplied with an independent 32 amp radial circuit complying with BS7671 or equivalent.

Please refer to guidance produced by IET '*Code of Practice for EV Charging Equipment Installation'* for details of charging points and plugs specifications; for both exterior and garage situations.

With regard to flatted developments and those without dedicated parking, EV provision should be in-line with Table 3.1; subject to the 'payment for charging' technological solutions being available.

Retail, Commercial and Industrial

The Council will take a more strategic approach to EV provision installed at non-residential development. This will ensure that provision throughout the Borough is considered and proportionate to the needs and site specific characteristics, such as:

- The period of time users are likely to be present at the site
- Vehicle access to charging points
- The number of vehicles accessing the site
- The number of charging points already in the vicinity
- Existing gaps in the strategic network provision
- Other emission mitigation measures already being provided by the developer.

Where the Council requests EV charging to be installed it may be appropriate to prepare for increased demand in future years, appropriate cable provision could be included in scheme design and development in agreement with the local authority.

Construction Dust Assessment

See *Construction Phase - Emissions Mitigation and Assessment* below.

Table 3.2: Type 1 Mitigation Measures – Adherence to Construction Good Practice

	Minor	Medium	Major
Appropriate Code of Construction Practice	London Best Practice Guidance[14]	London Best Practice Guidance	London Best Practice Guidance
	Diesel exhaust emission controls on Non-Road Mobile Machinery (NRMM – 37 kwh power rating or above) should be required on sensitive sites at the discretion of the local authority		

[14] The Control of Dust and Emissions from Construction and Demolition, Best Practice Guidance. Available at http://www.london.gov.uk/sites/default/files/BPGcontrolofdustandemissions.pdf

Type 2 Mitigation Measures

The NPPF recommends that where a development scheme requires a Travel Plan then all road transport mitigation measures may be included within the Plan. For medium and major development categories, Type 2 mitigation should be incorporated into scheme design where appropriate (*Preventing or Avoiding*), in addition to Type 1.

A list of some typical Type 2 mitigation measures are provided in the table below:

Table 4: Examples of Type 2 Standard Mitigation for Scheme Sustainability.

Mitigation Options	• Travel Plan (where required), including mechanisms for discouraging high emission vehicle use and encouraging the uptake of low emission fuels and technologies. • Designation of parking spaces for low emission vehicles. • Differential parking charges depending on vehicle emissions. • All commercial vehicles should comply with either current or previous European Emission Standards from store opening, to be progressively maintained for the lifetime of the development. • Fleet operations should provide a strategy for considering and reducing emissions, including possibilities for the take up of low emission fuels and technologies. • Use of ultra-low emission service vehicles.

Note: The above list is not exhaustive and further options may be suggested where the Council feel it is appropriate, depending on the scale of development and air quality issues within an area.

Type 3 Mitigation Measures

This type of mitigation is only required in the case of Major development; in addition to Type 1 and 2 measures having been applied. In some cases the value of the impact may be used on projects to 'off set' the emissions from the proposal.

The process by which these measures are calculated and chosen can be found in Appendix 2.

Travel Plan Requirements

Travel Plans should be designed to:

With respect to travel planning it is essential that;

The content of the travel plan is fully assessed prior to its approval in co-ordination with Nottinghamshire County Council transport officers. The County Council has produced a separate guidance document *Guidance for the Preparation of Travel Plans In support of Planning Applications*[15].

The measures and targets included in the travel plan are secured for implementation by mutual agreement of the Borough Council and the developer/applicant (normally by means of a s106 Legal Agreement). Procedure for failure to meet objectives must form part of the agreement.

The outputs of the travel plan (normally trip levels and mode split) are annually monitored against the agreed targets and objectives

The travel plan is reviewed annually to assess whether it is delivering its anticipated outputs or whether it has failed to meet its targets and if the latter what mitigation/ alternative measures need to be put in place to address the travel impact/ requirements of the scheme.

A named co-ordinator will be an essential element of any travel plan. For larger schemes a commitment in terms of staff resource allocation will be expected, this will be determined on a case by case basis in co-ordination with the Local Authorities.

[15] Available at http://www.nottinghamshire.gov.uk/travelling/travel/plansstrategiesandtenders/travelplans/

Construction Phase - Emissions Mitigation and Assessment

Mitigation

All development should consider the effect construction operations will have on emissions and as such mitigation should be considered (See Table 3.2) in all cases. The London Best Practice Guidance[15] should be used to inform the choice of mitigation measures required during construction.

Assessment

In the case of a major development, where an air quality assessment is required, that assessment should also include an assessment of the air quality effects of the construction phase.

Guidance published by the Institute of Air Quality Management[16] (IAQM) sets out the methodology for assessing the impacts on air quality from the construction phase of any development. (See Appendix 1)

Scheme Mitigation Statement

Each development requires a brief mitigation statement; outlining the measures proposed (Type 1-3) depending on development scale.

This would also include the mitigation measures suggested from the London Best Practice Guidance[15], to minimise dust and other emissions to atmosphere during the construction phase.

In addition, in the case of Major developments, the statement must also include (from Appendix 2):

- Development traffic input data for emissions calculation.
- Emissions calculation and totals.
- Mitigation proposed to be equivalent to the value of emissions calculation (appropriate to the type and size of development and local policy requirements).

[16] Assessment of Dust from Demolition and Construction 2014 http://iaqm.co.uk/guidance/

Appendix 1

Air Quality Assessments

Introduction

The purpose of an air quality assessment is to determine whether the predicted impact of a development on local air quality will adversely affect public health and/or the local environment, both to help determine the appropriate level of mitigation from a development. The assessment should be carried out by a developer's air quality consultant.

Air Quality Assessment Process

The Borough Council has used similar assessment methods to fulfil its requirements of its detailed Review and Assessment that led to the AQMA designation. For consistency, air quality assessments for developments should, where possible, follow similar methodologies.

Local authorities will work with developers by providing guidance on the suitability of such measures, which should be incorporated at the early design stage of any proposal.

Guidance on the methodologies to be used for air quality assessments is also available in the Department for the Environmental, Food and Rural Affairs (DEFRA) Technical Guidance Note LAQM TG (09), and other guidance available from the DEFRA and IAQM webpages.

Key Components of an Air Quality Assessment

The assessment will require dispersion modelling utilising agreed monitoring data, traffic data and meteorological data. The modelling should be undertaken using recognised, verified local scale models by technically competent personnel and in accordance with LAQM TG.09. The study will comprise of:

1. The assessment of the existing air quality in the study area for the baseline year with agreed receptor points and validation of any dispersion model;

2. The prediction of future air quality without the development in place (future baseline or do-nothing);

3. The prediction of future road transport emissions and air quality with the development in place (with development or do-something).

4. The prediction of future road transport emissions and air quality with the development (with development or do-something) and with identified mitigation measures in place.

5. Sensitivity test allowing for no improvement in traffic and background emissions.

The assessment report should include the following details:

A. Detailed description of the proposed development, including:

- Identify any on-site sources of pollutants;
- Overview of the expected traffic changes;
- The sensitivity of the area in terms of objective concentrations;
- Local receptors likely to be exposed;
- Pollutants to be considered and those scoped out of the process.

B. The relevant planning and other policy context for the assessment.

C. Description of the relevant air quality standards and objectives.

D. The assessment method details including model, input data and assumptions:

For traffic assessment;

- Traffic data used for the assessment;
- Emission data source;
- Meteorological data source and representation of area;
- Baseline pollutant concentration including any monitoring undertaken;
- Background pollutant concentration;
- Choice of base year;
- Basis for NOx:NO_2 calculations;
- A modelling sensitivity test for future emissions with and without reductions;

For point source assessments:

- Type of plant;
- Source of emission data and emission assumptions;
- Stack parameters – height, diameter, emission velocity and exit temperature;
- Meteorological data source and representation of area;
- Baseline pollutant concentrations;
- Background pollutant concentrations;
- Choice of baseline year;
- Basis for deriving NO_2 from NOx.

E. Model verification for all traffic modelling following DEFRA guidance LAQM.TG (09):

F. Identification of sensitive locations:

G. Description of baseline conditions:

H. Description of demolition/construction phase impacts:

I. Summary of the assessment results:

- Impacts during the demolition/construction phase;
- Impacts during the operation phase;
- The estimated emissions change of local air pollutants;
- Identified breach or worsening of exceedances of objectives (geographical extent)
- Whether Air Quality Action Plan is compromised;
- Apparent conflicts with planning policy and how they will be mitigated.

J. Mitigation measures.

Air Quality Monitoring

In some case it will be appropriate to carry out a short period of air quality monitoring as part of the assessment work. This will help where new exposure is proposed in a location with complex road layout and/or topography, which will be difficult to model or where no data is available to verify the model. Monitoring should be undertaken for a minimum of six months using agreed techniques and locations with any adjustments made following Defra technical guidance LAQM.TG (09).

Assessment of the Air Quality Impacts of Construction

Guidance published by the Institute of Air Quality Management[17] (IAQM) sets out the methodology for assessing the impacts of air quality from the construction phase of any development.

The guidance, produced in consultation with the construction industry, considers the potential for dust emissions from the following activities:

- Demolition
- Earthworks (soil stripping, ground levelling, excavation)
- Construction, and
- Track out (the transportation of soil from the site onto public roads)

For each of these activities, the guidance considers three separate dust effects:

- Annoyance due to dust soiling;
- Harm to ecological receptors; and
- The risk of human effects due to a significant increase in exposure to PM_{10}

The methodology takes into account the scale (classed as small, medium, large) to which the above effects are likely to be generated and the distance of the closest receptors in determining the significance of effects arising from construction.

[17] Assessment of the Impacts of Construction on Air Quality and the Determination of their Significance. http://iaqm.co.uk/guidance/

Appendix 2

Valuing Impacts on Air Quality for Type 3 Mitigation Measures

Emissions Assessment and Mitigation Calculation

For development schemes that have the potential for major detrimental impact on air quality, this guidance specifies an assessment procedure to evaluate the likely change in relevant concentrations and emissions arising from the scheme using the guidance produced by HM Treasury and DEFRA.

Two approaches are used to value changes in air quality, dependent on the nature of the change. They are:

- the ***impact pathway approach***, which is used in the majority of instances to value the consequences of changes in air quality such as on health, crops and buildings; and
- the ***abatement cost approach***, which is used in the limited instances where the change in air quality is likely to affect compliance with a legally binding obligation (whether causing, removing or changing the extent of non-compliance).

Chart 1.A (over) illustrates how to identify the appropriate approach.

The *abatement cost approach*[18] is relevant for the minority of situations where the breach of legally binding obligations is an issue. In such instances, it is still only those changes in air quality in excess of the relevant obligation that should be valued using this approach. Changes below the obligation should be valued using the *impact pathway approach*.

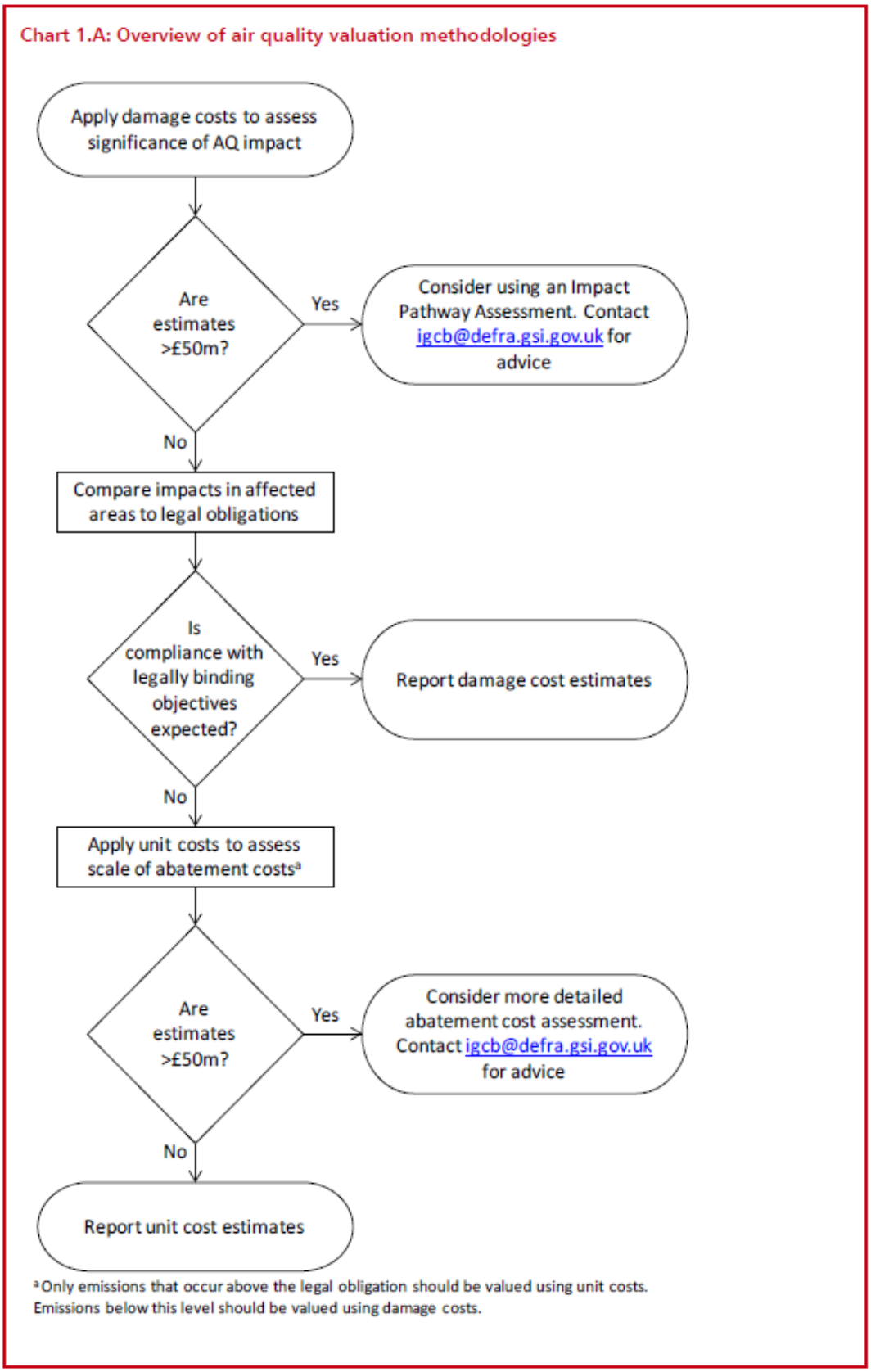
The *impact pathway approach* (I-PA) is the central methodology for appraisal. It values the air quality impacts of proposed decisions by estimating how changes in the ambient concentrations of air pollutants affect a range of health and environmental outcomes.

Full I-PA modelling is therefore quite resource and time intensive, requiring the estimation of emissions, dispersion, population exposure and outcomes. ***Damage costs*** have been developed to enable proportionate analysis when assessing the scale of air quality impacts where they are less significant. They are derived from the I-PA methodology to offer approximations of the value using representative modelling. The full I-PA uses bespoke analysis to provide a fuller assessment, suitable for cases where air quality impacts are significant. (See Appendix 1 Air Quality Assessment).

When total air quality impacts are estimated to be <u>less than</u> £50 million (in present value terms) it is recommended that *Damage Costs* are used. Where total air quality impacts are estimated to be in excess of £50 million a full *impact pathway assessment* should be considered in consultation with Defra.

It is considered that the damage cost approach will be sufficient in the majority of cases; thus the remaining of this Appendix will concentrate on this method of impact assessment.

[18] http://www.gov.uk/air-quality-economic-analysis



Source: Dickens et al, *Valuing impacts on air quality: Supplementary Green Book guidance*, May 2013, HM Treasury and Defra.

Damage Costs Calculation

As part of the assessment procedure a simple calculation is proposed to allow the quantification of any emission changes – the pollution impact of a scheme can then be monetised using the pollutant damage costs (per tonne) specified by the Defra Inter-Governmental Department on Costs and Benefits (IGCB)[19].

Taking into account Type 1 and 2 Mitigation Measures built into the scheme

The emissions calculator or toolkit (below) provides a basic emission calculation; however the proposal should already include some mitigation measures e.g. alternative fuels or technology (LPG, EV etc.), and these need to be taken into account during the damage costs calculation. The "advanced options" within the toolkit can accommodate inputs for alternative fuels.

Calculating Emissions

The emissions calculator provides a calculation to determine the amount of pollutant emissions a development is likely to produce. This in turn, by multiplying the damage cost for the key pollutants (PM_{10} and NOx see below), determines the amount (value) of mitigation that is expected to be spent on measures to mitigation those impacts.

The calculation uses the most current DEFRA Emissions Factor Toolkit[20] (EFT) to estimate the additional pollutant emissions from a proposed development. This will provide the relevant pollutant emissions outputs for the mitigation calculation, which is then multiplied to provide an exposure cost value. This value is used for costing the required emissions mitigation for the development.

The emissions assessment and corresponding mitigation calculation follows this process:

1. An emissions assessment calculates additional trips[21, 22] generated by the development.

2. The emissions are calculated for pollutants of concern (NOx & PM_{10})

3. Using DEFRA IGCB Air Quality Damage Costs[19] for the specific pollutant emissions, the calculation then provides a resultant damage cost calculation.

4. The emissions total is then multiplied x 5, to provide a 5 year exposure cost value i.e.

5. The resulting 5-year exposure cost value, is the value that is to be used to implement mitigation measures within the development.

[19] https://www.gov.uk/air-quality-economic-analysis
[20] DEFRA Emissions Factor Toolkit: http://laqm.defra.gov.uk/review-and-assessment/tools/emissions.html
[21] Trip rates can be sourced from transport assessment or local authority/transport authority.
[22] Trip length uses the National Travel Survey:2011 - UK average = 7.1miles/10km
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/35738/nts2011-01.pdf

The following example demonstrates the calculation based on a development with 10 domestic properties.

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

=	0.0325 tonnes/annum (NOx) & and 0.003795 tonnes/annum (PM10)
X	£955/tonne (NOx) + £48,517/tonne (PM10)
=	£31.08 + £184.15
X	5 (years)
=	£155.42 + £920.76

Total = £1,076

Type 3 Mitigation/Compensation Measures

By establishing the damage costs arising from development scheme emission changes it is possible to assess any additional mitigation or compensation that is required to make the scheme acceptable. A suite of mitigation/compensation measures termed Type 3 mitigation is shown in the table below:

Table 2-1: Examples of Type 3 Additional Mitigation and/or Compensation Required for Scheme Acceptability

Mitigation/ Compensation Options	• On-street EV recharging. • Contribution to low emission vehicle refuelling infrastructure. • Car clubs. • Low emission bus service provision. • Low emission waste collection services. • Bike/e-bike hire schemes. • Bike infrastructure. • Contribution to renewable fuel and energy generation projects. • Incentives for the take-up of low emission vehicle technologies and fuels. • Air Quality Monitoring programmes. • Other sustainable transport provision as appropriate to the development. • Contribution towards other public transport improvements.

Note: Where Type 3 mitigation is required, the planning authority and developer will agree measures that are appropriate and in scale and kind to the development. Such measures may be taken forward by condition, where possible, or through the use of a Section 106 Agreement.

The planning authority will need to take into account of any Type 3 mitigation measures that are included on a Community Infrastructure Levy (CIL) list.

The list in Table 2-1 is not exhaustive and further options may be suggested where authorities feel it is appropriate, depending on the scale of development and air quality issues within an area.

The mitigation options selected for a development should be relevant and appropriate to:

- Any local policies including Air Quality Action Plans, which may determine the mitigation priorities for a scheme that the local authority may wish to see be incorporated within a particular scheme.

- Any local air quality concerns; to assist in the remediation of potential cumulative air pollution impacts of the development on the local community.

- The type, size and activity of the development.