

IAQM



Significance in air quality November 2009





Institute of Air Quality Management

Position on the Description of Air Quality Impacts and the Assessment of their Significance

Introduction

The IAQM is committed to enhancing the understanding and development of the science behind air quality by promoting knowledge and understanding of best working practices. Our membership is mainly drawn from practicing air quality professionals working within the fields of air quality science, air quality assessment and air quality management. Environmental Protection UK (formerly the NSCA) asked the IAQM to contribute to the revision of their widely referenced 2006 update to the guidance *Development Control: Planning for Air Quality*. This generated a great deal of interest amongst those members of the IAQM who's normal business is the assessment of the significance of air quality impacts as part of the planning process. At the initial IAQM open meeting on Planning Guidance and Significance Criteria, it became evident that while the 2006 document was widely used in the absence of any statutory guidance, it was not widely endorsed by those undertaking impact assessments. In contrast, decision makers and those advising the decision makers found the guidance valuable.

The task of describing the nature of air quality impacts and then assessing the significance of the associated effect, is distinct from the task of reviewing an impact assessment and employing the conclusions within the wider decision making process. The difference in the depth and type of air quality experience required to competently complete each of these two tasks should be recognised and separate guidance prepared to support those engaged with each role. The advice and opinion offered by the IAQM in this document relates to the task of describing local air quality impacts and assessing their significance.

Since the open meeting in London on the 25th June 2009, there has been an ongoing dialogue within the IAQM, that developed into a working group, some questionnaires seeking opinions on points of detail, a working group meeting in Bristol on 20th August 2009 and ultimately to this document which was circulated to a cross-section of members within the IAQM prior to it being issued to EPUK. As such this document represents the collective view of the Institute's professional membership.

The study of air pollutants in ambient air is not an exact science. The uncertainty is often increased further by the constraints on time and techniques that are typically associated with assessing air quality in the context of the planning process. Assessing the significance of impacts of development on air quality cannot be reduced to strict, formulaic methodology and judgement will always be required. An appreciation of the relative reliability and limitations of methods and data are required

to produce credible conclusions and therefore the significance of air quality impacts should always be undertaken by a suitably qualified person. For example:

- Membership of a professional institute is one indicator of a suitably qualified person but the individual should also be able to demonstrate they have relevant experience related to impact assessment for air quality;
- It is equally important that assessments are reviewed by someone with the knowledge and experience to judge the adequacy of the assessment and the validity of the conclusions presented; and
- Air quality impacts on ecology or built heritage receptors should be defined by an appropriate person in conjunction with the air quality specialist.

Descriptors for Magnitude of Change and Receptor Sensitivity

There is considerable benefit to the credibility of the air quality profession as a whole in attempting to develop a consistent terminology to describe the magnitude of impacts, and the sensitivity of receptors. Whenever it is practicable to do so:

- The minimum number of categories that an assessment method will meaningfully support, should be used to describe the magnitude of quantifiable impacts;
- Three categories of quantifiable impacts is sufficient for most assessments;
- Judgement phrases like negligible should be avoided when describing the magnitude of changes, as the magnitude of change is factual information;
- A robust assessment method should never be adapted solely to fit into a generic magnitude of impact classification, if it risks reducing the credibility of the assessment;
- The same descriptors for the magnitude of impact or change should be used in all assessments;
- A class of impacts that are too small to be perceptible given the limitations of the assessment method should be included. The term 'imperceptible' should be used, as it does not have the same absolute meaning as 'no change'.
- If a scale based on percentage change is used, it should be presented within the assessment in concentration units for the pollutant being assessed.

The number of decimal places that impacts are reported to is ultimately a compromise between reducing the number of places in recognition of the uncertainty normally associated with air quality calculations and the need to contribute to the decision making process by being able to demonstrate a small but widespread change, if one exists. Three significant figures should normally be appropriate, e.g. 0.813, 10.1, 123, 1230, however there may be occasions when it is better to present results to two significant figures, depending on professional judgement regarding the accuracy of the data.

The 2006 NSCA guidance promoted by way of an example the use of six distinct magnitude of change descriptors, ranging from 'Extremely Small' up to 'Very Large', but lacked an 'Effectively no change' descriptor. It is highly unlikely that any commonly used assessment method would have a small enough error associated with its predictions, to justify such a detailed breakdown of magnitude of change descriptors. Instead we propose the following table of magnitude of impact descriptors as a more robust alternative. A further change from the 2006 NSCA guidance is that the change should **always** be used in relation to the relevant and

agreed Objective/Limit Value/Environmental Assessment Level and **never** in relation to the existing or other ambient concentrations of pollutants. In other words the table should always be presented in reports in terms of a change in concentration, e.g. for an objective of 40 $\mu\text{g}/\text{m}^3$ the 'Large' category will be for concentrations above 4 $\mu\text{g}/\text{m}^3$.

Assessment levels have been established by reputable organisations for most air pollutants at concentrations of specific relevance to the potential effects on a known receptor type, such as human health. By defining the magnitude as a percentage of the assessment level it is possible to apply a common approach to assessments of impacts for any pollutant. The use of 1% as the threshold for an imperceptible change provides consistency with existing screening methods promoted by the Environmental Agency and Natural England.

Table 1 Generic Basis of Definition of Impact Magnitude for Changes in Ambient Pollutant Concentrations as Percentage of Objective/Limit Value/Environmental Assessment Level.

Magnitude of Change	Annual Mean
Large	Increase/decrease >10%
Medium	Increase/decrease 5 - 10%
Small	Increase/decrease 1 - 5%
Imperceptible	Increase/decrease <1%

There is no need to explicitly define the sensitivity or importance of receptors when using the descriptors described in Table 1. Should a definition of receptor sensitivity be required the following points should be considered:

- The sensitivity, value or importance of ecological or built heritage receptors should be established by an ecologist or built heritage specialist;
- If the receptor is the facade of a residential building, then it should be assumed that any member of the general public could be present within the building including the elderly, infants or other vulnerable groups. No distinction should be made between the sensitivity of dwellings, hospitals, schools, etc. and all should be considered as being of equal sensitivity for the purposes of the assessment.

Description of Impact

Once the magnitude of the change is known, the next step is to describe the impact at each relevant receptor.

The 2006 NSCA document included an example of a descriptor table. This has been modified following discussions within IAQM. Its use will provide a transparent and repeatable means of describing the impact at a single receptor. Table 2 sets out the impact descriptors for application to nitrogen dioxide, with the magnitude of change descriptors related to the Objective/Limit Value of 40 $\mu\text{g}/\text{m}^3$.

Table 2 should not be used as a generic significance matrix that could be used to assess the overall significance of a development project in one step and the IAQM does not endorse its use for that purpose.

Table 2: Air Quality Impact Descriptors for Changes to Annual Mean Nitrogen Dioxide Concentrations at a Receptor

Absolute Concentration in Relation to Objective/Limit Value	Change in Concentration		
	Small	Medium	Large
Increase with Scheme			
Above Objective/Limit Value <i>With</i> Scheme (>40 µg/m³)	Slight Adverse	Moderate Adverse	Substantial Adverse
Just Below Objective/Limit Value <i>With</i> Scheme (36-40 µg/m³)	Slight Adverse	Moderate Adverse	Moderate Adverse
Below Objective/Limit Value <i>With</i> Scheme (30-36 µg/m³)	Negligible	Slight Adverse	Slight Adverse
Well Below Objective/Limit Value <i>With</i> Scheme (<30 µg/m³)	Negligible	Negligible	Slight Adverse
Decrease with Scheme			
Above Objective/Limit Value <i>Without</i> Scheme (>40 µg/m³)	Slight Beneficial	Moderate Beneficial	Substantial Beneficial
Just Below Objective/Limit Value <i>Without</i> Scheme (36-40 µg/m³)	Slight Beneficial	Moderate Beneficial	Moderate Beneficial
Below Objective/Limit Value <i>Without</i> Scheme (30-36 µg/m³)	Negligible	Slight Beneficial	Slight Beneficial
Well Below Objective/Limit Value <i>Without</i> Scheme (<30 µg/m³)	Negligible	Negligible	Slight Beneficial

Table 2 includes concentration ranges that are specific to the annual mean Objectives/Limit Values for nitrogen dioxide and, in the UK except Scotland PM₁₀. The rows labelled “Just Below Objective/Limit Value...” represent a band from 100 % to 90% of the assessment level and the rows labelled “Well Below Objective/Limit Value...” represent a band of 75% of the assessment level or less. It may be appropriate to use the same 90% of assessment level and 75% of assessment level concentrations for other pollutants and assessment levels, but this should be confirmed by the assessor. For the assessment of changes to annual mean concentrations of nitrogen dioxide or PM₁₀ the table should be used without modification in England, Wales and Northern Ireland (Scotland has a lower annual mean Objective for PM₁₀).

Assessment of Significance

Once the magnitude of the change is known and the impact has been described at each relevant receptor the next step is to assess the significance of the air quality impacts. In all but the most straightforward of circumstances this will require the weighing of adverse and beneficial changes.

As a discipline air quality is not well suited to the rigid application of generic significance matrix to determine the overall significance of a development with respect to effects at air quality sensitive receptors. The assessment should take full account of site specific considerations. The use of rigid significance matrices within air quality assessments have the potential to restrict flexibility and the application of intelligent judgement by suitably trained professionals. In the hands of inexperienced practitioners they are likely to reduce the transparency of the decision making process, if a generic significance matrix is used as the sole justification for the conclusion of the assessment.

The IAQM does not support the adoption of a single method for determining the overall significance of air quality effects due to a development. However when an overall significance descriptor is required then this should be based on professional judgement, taking into account the factors in Box 1 relevant to the assessment:

Box 1: Factors to Judge Significance

Factors
The magnitudes of the changes and the descriptions of the impacts at the receptors i.e. Tables 1 and 2 findings.
Number of people affected by increases and/or decreases in concentrations and a judgement on the overall balance.
Where new exposure is being introduced into an existing area of poor air quality, then the number of people exposed to levels above the objective or limit value will be relevant.
Whether or not an exceedence of an objective or limit value is predicted to arise in the study area where none existed before or an exceedence area is substantially increased.
Whether or not the study area exceeds an objective or limit value and this exceedence is removed or the exceedence area is reduced.
Uncertainty, including the extent to which worst-case assumptions have been made.
The extent to which an objective or limit value is exceeded, e.g. an annual mean NO ₂ of 41 µg/m ³ should attract less significance than an annual mean of 51 µg/m ³ .

When reporting the overall significance of air quality impacts:

- If desired the overall impact can be expressed in terms of: ‘insignificant’, ‘minor’, ‘moderate’, ‘major’, or other standard terms being used within the Environmental Impact Assessment;
- The overall significance should be described separately for the impact of emissions related to the development on existing receptors and for the impacts of emissions from existing source(s) within the surrounding area on new exposure being introduced within the development;
- The assessment should include a clearly reasoned justification of the conclusions reached; and

- The assessment criteria used should be included in the assessment, together with sufficient information for others to confirm the basis for the conclusions reached, should they choose to do so.

The need for transparency and a willingness to justify professional judgements applies equally to the process of reviewing submitted impact assessments and making recommendations to decision makers. Clear guidance should be provided within the EPUK document on how to confirm the adequacy of an assessment. Those tasked with the review of air quality related impact assessments should have the training and experience to check the validity of the conclusions and to explain the significance of the impacts to a lay audience.