



Welsh Air Quality Forum 2015

Air Quality and Housing

Penny Wilson

Air Quality Consultants Ltd

Air Quality and Housing Developments

- Impacts associated with housing developments
- Revised EPUK/IAQM Guidance
- Contents of an AQ Assessment
- Important Points

Potential Air Quality Impacts in Relation to Housing Developments

- Generation of **additional emissions** – e.g extra traffic
- **Changing the pattern of emissions** – e.g changing road layout
- Introducing **new relevant exposure** in area of poor Air Quality or near source of nuisance



Potential Impacts of New Housing Developments

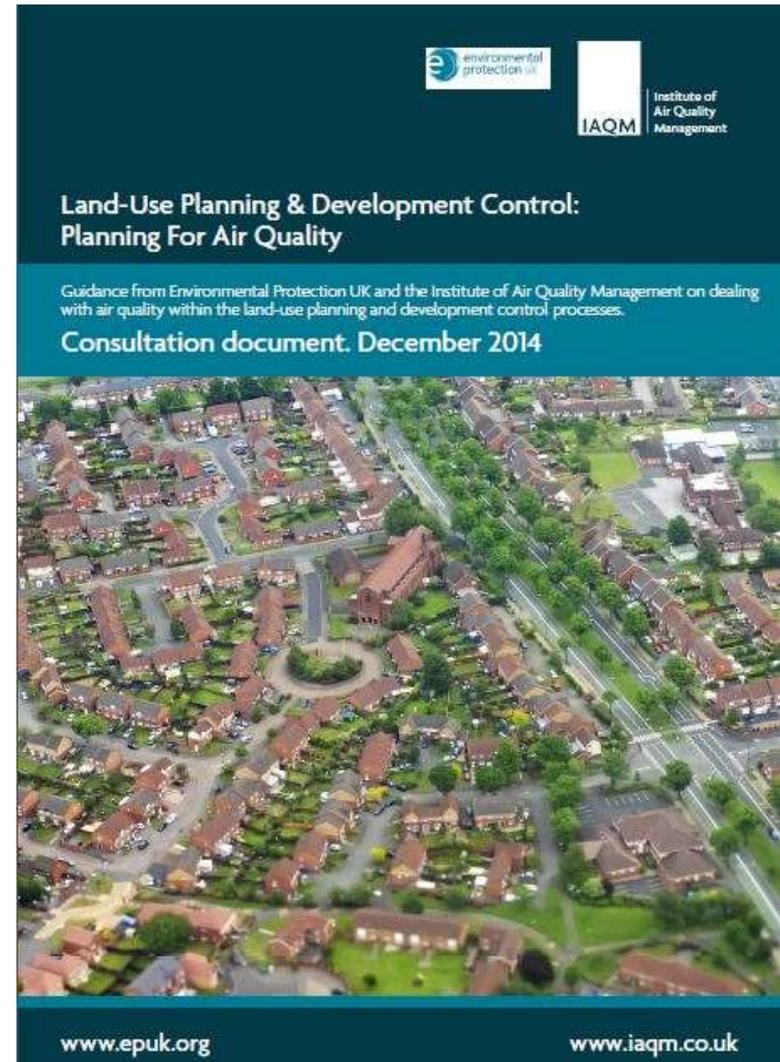
- **Changes in traffic flows** – take into account existing use of site
- **Changes in traffic management** – new junction, road layout or distributor road
- **Large biomass boilers or CHP** (gas or biomass)
- **Underground or enclosed car parks** – impact on existing nearby receptors if very close to extraction points
- **Construction phase** – dust, PM and traffic

Potential Impacts Upon New Housing Developments

- Emissions from **busy roads** – most likely within 5-10m of busy roads. Take into consideration canyons, receptor height, proximity to junctions
- Emissions from **adjacent boiler/CHP plant** – most likely to have an impact if new receptors higher than emission source or if dispersion restricted
- **Odours** – WWTW, waste sites, cooking odours
- **Dust** – waste sites, wood processing, minerals handling
- **Diesel generators** – can have a big impact on adjacent NO₂ concentrations
- **Underground or enclosed car parks**

Revised EPUK/IAQM Guidance

- Final Draft issued May 2015
- Replaces previous 2010 version
- Applies to Wales and England



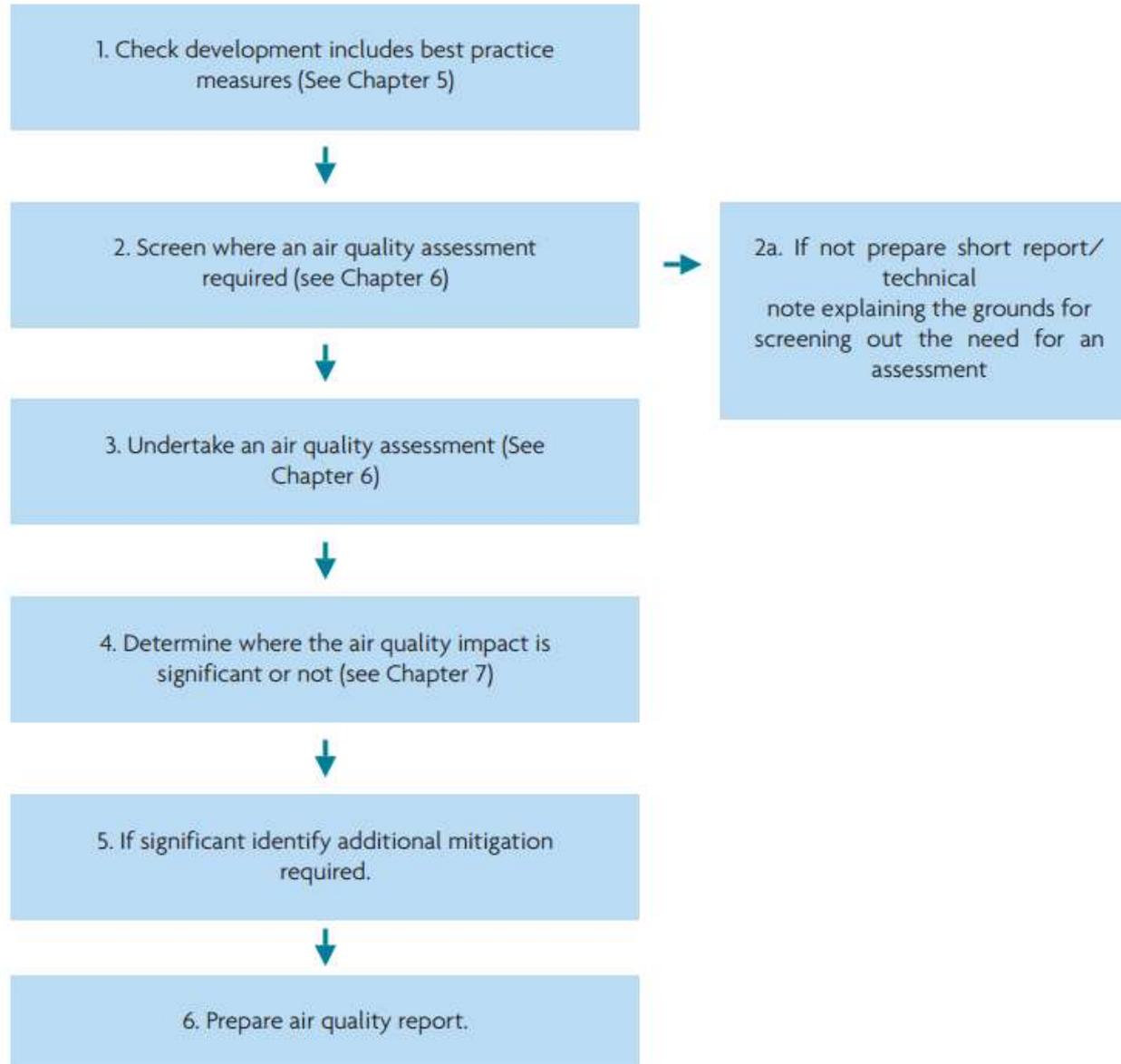
What's New?

- Greater emphasis on encouraging **best practice** for all developments (e.g. low-NOx boilers, EV charging points etc.)
- **Screening criteria** for an air quality assessment have been revised. Two-stage process. Some criteria have disappeared (car parks) and some more stringent (changes to HGV flows)
- Traffic associated with **extant permissions** should not be included in future baseline
- **Impact descriptors more stringent**

Best Practice Examples

- **Design Phase**
 - avoid creating street canyons,
 - minimise exposure to pollution (e.g. habitable rooms away from busy roads)
- **Operational Phase**
 - electric charging points,
 - travel plans,
 - low emission boilers,
 - avoid biomass in urban areas,
 - minimum standards for CHP in AQMA
- **Offsetting Emissions**
 - based on calculated damage costs of transport,
 - may include contributions to car clubs, low emission vehicle refuelling infrastructure, walking/cycling infrastructure

Air Quality Assessment Procedure



Stage 1 Criteria

Criteria to Proceed to Stage 2

A. If any of the following apply:

- 10 or more residential units or a site area of more than 0.5ha
 - more than 1,000 m² of floor space for all other uses or a site area greater than 1ha
-

B. Coupled with any of the following:

- the development has more than 10 parking spaces
- the development will have a centralised energy facility or other centralised combustion process

Note: Consideration should still be given to the potential impacts of neighbouring sources on the site, even if an assessment of impacts of the development on the surrounding area is screened out.

Stage 2 Criteria

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: <ul style="list-style-type: none"> - more than 100 AADT within or adjacent to an AQMA - more than 500 AADT elsewhere
2. Cause a significant change in Heavy Duty Vehicle (HDV) flows on local roads with relevant receptors. (HDV = goods vehicles + buses >3.5t gross vehicle weight)	A change of HDV flows of <ul style="list-style-type: none"> - more than 25 AADT within or adjacent to an AQMA - more than 100 AADT elsewhere
3. Realign roads, i.e. changing the proximity of receptors to traffic lanes.	Where the change is 5m or more and the road is within an AQMA
4. Introduce a new junction or remove an existing junction near to relevant receptors.	Applies to junctions that cause traffic to significantly change vehicle accelerate/decelerate, e.g. traffic lights, or roundabouts.
5. Introduce or change a bus station.	Where bus flows will change by: <ul style="list-style-type: none"> - more than 25 AADT within or adjacent to an AQMA - more than 100 AADT elsewhere
6. Have an underground car park with extraction system.	The ventilation extract for the car park will be within 20 m of a relevant receptor Coupled with the car park having more than 100 movements per day (total in and out)
7. Have one or more substantial combustion processes	Where the combustion unit is: <ul style="list-style-type: none"> - any centralised plant using bio fuel - any combustion plant with thermal input >400kW - a standby emergency generator associated with a centralised energy centre (if likely to be tested/used >18 hours a year)

Stage 2 Criteria – Traffic Flows

- A change of LDV flows **on roads with relevant receptors** of:
 - more than 100 AADT within or adjacent to an AQMA
 - More than 500 AADT elsewhere
- A change of HDV flows **on roads with relevant receptors** of:
 - more than 25 AADT within or adjacent to an AQMA
 - More than 100 AADT elsewhere

Stage 2 Criteria – Traffic Management/Car parks

- Realign roads – where change is $>5\text{m}$ and within an AQMA
- Introduce or remove a junction – applies to junctions that cause traffic to significantly accelerate/decelerate, e.g. roundabouts, traffic signals
- Underground car park with extraction system – if extract within 20m of relevant receptor and >100 movements in car park per day

Stage 2 Criteria – Combustion Sources

- Substantial combustion process where:
 - using biofuel
 - thermal input >300kw
 - standby generator if used/tested for >18 hours/year
- Any combustion process, of any size where:

“Where the pollutants are exhausted from a vent or stack in a location and at a height that may give rise to impacts at receptors through **insufficient dispersion**. This criterion is intended to address those situations where a new development may be close to other buildings that could be residential and/or which could adversely affect the plume’s dispersion by way of their size and/or height.”

Need for Air Quality Assessment

- If a development does not meet any of the Stage 1 criteria may still need to consider **impact on** the development
- If a development meets any of the Stage 2 criteria assessment can be 'simple' or 'detailed'
- Where whole borough AQMA – 'elsewhere' criteria apply where concentrations $<36 \mu\text{g}/\text{m}^3$

Impact Descriptors - Annual

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

Impact Descriptors

- 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**
- The table is only designed to be used with **annual mean concentrations**
- 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

Impact Descriptors NO₂

Long-Term Average Nitrogen Dioxide Concentration At Receptor In Assessment Year ^a	µg/m ³ change in concentration relative to AQAL ^b				
	<0.2	0.2 - <0.6	0.6 - <2.2	2.2 - ≤ 4.0	>4.0
< 30.2	Negligible	Negligible	Negligible	Slight	Moderate
30.2 - <37.8	Negligible	Negligible	Slight	Moderate	Moderate
37.8 - <41.0	Negligible	Slight	Moderate	Moderate	Substantial
41.0 - <43.8	Negligible	Moderate	Moderate	Substantial	Substantial
≥ 43.8	Negligible	Moderate	Substantial	Substantial	Substantial

^a Values are rounded to the nearest whole number.

^b This is the 'without scheme' concentration where there is a decrease in pollutant concentration and the 'with scheme' concentration where there is an increase.

Short-term concentrations

The severity of the impact will be **substantial** when there is a risk that the relevant **AQAL for short-term concentrations is approached** through the presence of the new source, taking into account the contribution of other local sources

Maximum 1-hour concentration as a % of the AQAL	Impact Magnitude	Impact Severity
10 – 20%	Small	Slight
20 – 50%	Medium	Moderate
>50%	Large	Substantial

Significance

- Impacts should be described as **‘significant’** or **‘not significant’**
- “The judgement on significance relates to the consequences of the impacts; **will they have an effect on human health that could be considered as significant?** In the majority of cases, the impacts from an individual development will be insufficiently large to result in measurable changes in health outcomes that could be regarded as significant by health care professionals. In reality, therefore, it is **the impact on local air quality that is used as a proxy for assessing effects on health**”.
- “The effect on the **residents of any new development** where the air quality is such that an **air quality objective is not met** will be judged as **significant.**”

Mitigation

- If impacts are 'significant' then mitigation required.
- For significant impacts on development, consider design and ventilation arrangements
- For significant impacts of development these could be:
 - enhanced version of 'good practice' measures already incorporates
 - contributions to traffic management measures
 - contributions to reduce emissions from public transport

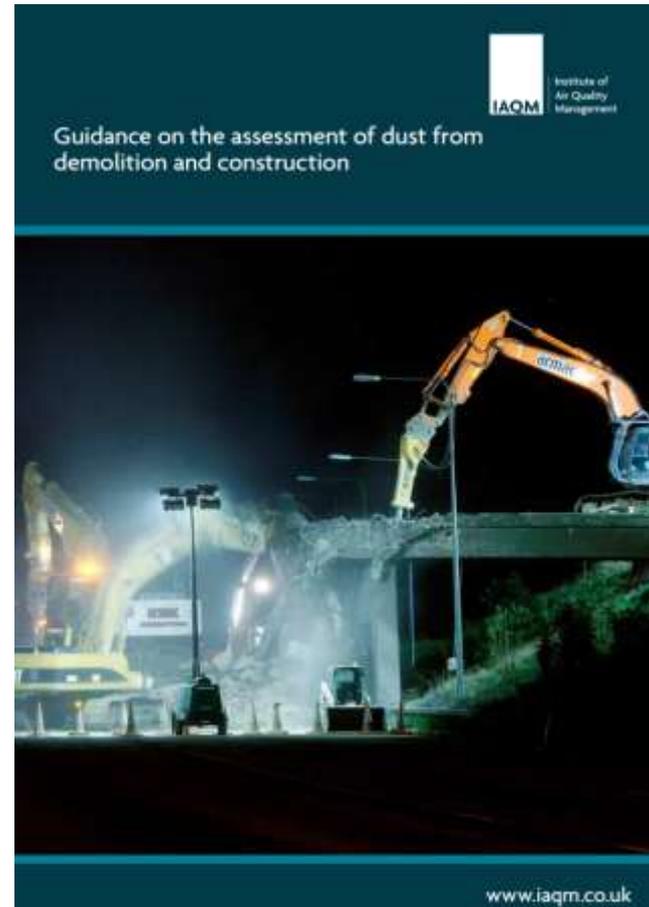
Construction Phase Impacts



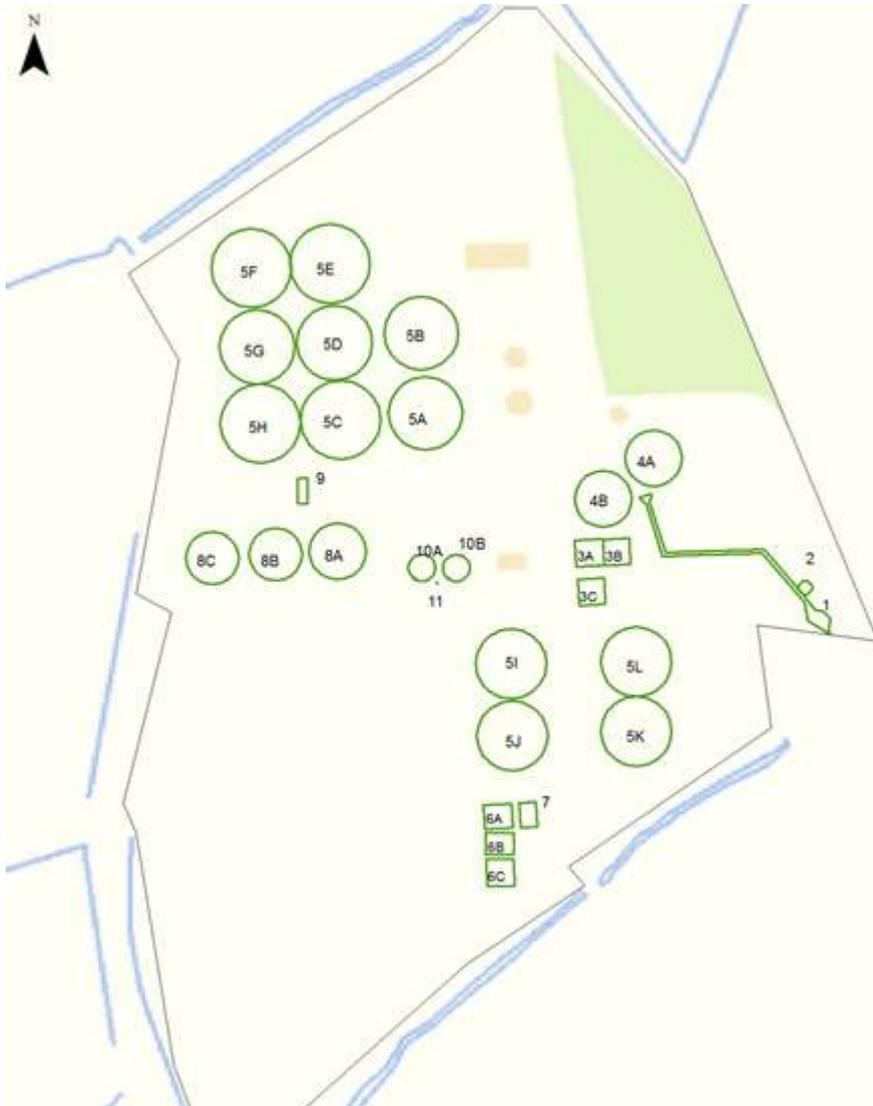
- Dust soiling
- Health effects
 - PM_{10} & $PM_{2.5}$
- Ecological effects
- Traffic Impacts

Construction Guidance

- IAQM Guidance on the Assessment of Dust from Demolition and Construction
- Published February 2014
- Specific guidance on monitoring also available (IAQM 2012)
- Risk Assessment
- Mitigation



Odours



- IAQM Guidance (2014)
- Qualitative risk assessment (distance, direction, offensiveness)
- Complaints
- Sniff tests
- Modelling
- Odour Management Plan
- Kitchen Risk Assessment

Dust

- Qualitative assessment
- Distance and direction from source
- Location of existing sensitive receptors
- Complaints
- Dust Management Plan



Contents of AQ Assessment - Simple

- Baseline conditions – existing monitoring data, relevant sources, location of sensitive receptors, relationship to AQMA
- Development description
 - identify any new sources of emissions or changes to existing sources
 - identify any new sensitive receptors
- Describe scale of changes in relation to relevant criteria
- Outline any best practice or mitigation measures

Contents of AQ Assessment - Detailed

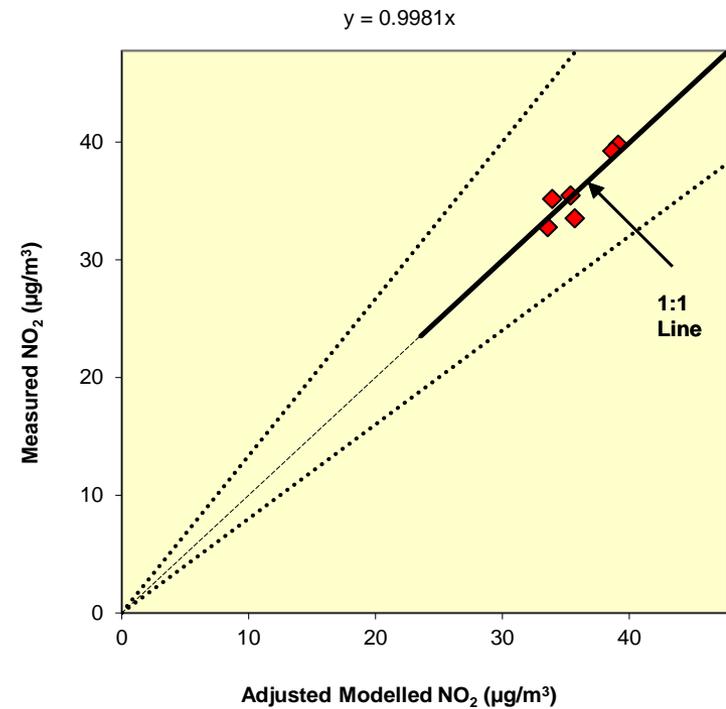
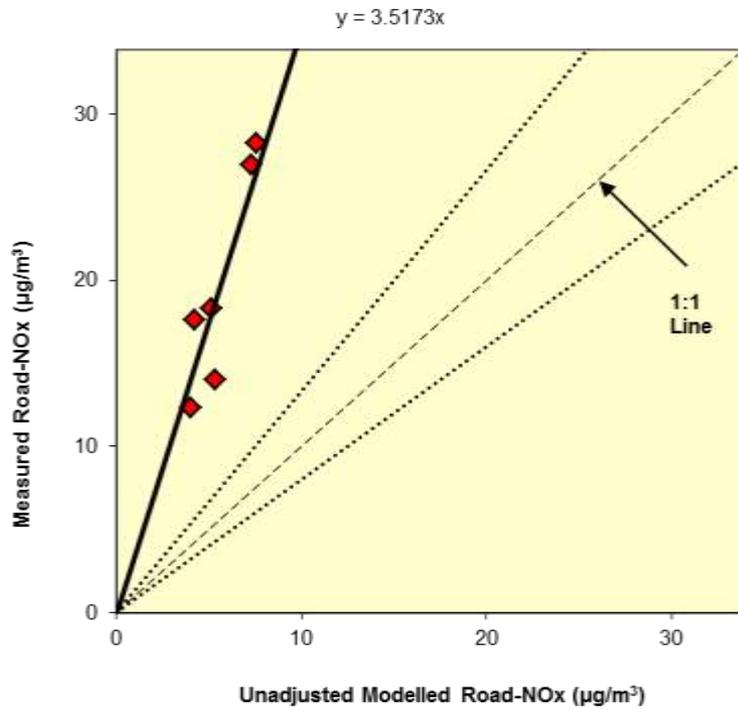
As for Simple Assessment plus:

- Description of assessment method to include all input data, such as traffic flows, boiler assumptions, met data, background concentrations, receptor locations, model verification
- Results – current, future baseline and future with development. Presented to enable direct comparison with the Impact Descriptors at each receptor
- Uncertainty - future emissions, input data, verification
- Details of all best practice and mitigation measures

Model Verification - Approach

- Results from road models must be verified against measured data, as per Defra LAQM.TG(09);
- Ideally using monitoring within the study area;
- If data from study area not available, other local sites;
- If no appropriate monitoring data available, then an 'average' factor derived from a number of studies using the same emission factors may be appropriate;
- Verification factors:
 - Motorways and dual carriageways often <1
 - Tend to be higher in more congested areas, where emissions not easily modelled

Model Verification - Example



Significance

- Determine whether overall impacts are 'significant' or 'not significant'
- Factors to be taken into account
 - existing and future air quality in the absence of the development,
 - extent of current and future population exposure to the impacts,
 - worst case assumptions adopted,
 - extent to which the proposed development has adopted best practice to eliminate and minimise emissions

Important Points - Housing

- Level of detail should be commensurate with the risk of exceedance and/or scale of impacts. Dispersion modelling not always required
- Long-term monitoring data (and detailed monitor locations and heights) necessary to verify model results
- Impact of nitrogen deposition on designated ecological sites (SAC, SSSI) may be required
- Consider dust, odour or fugitive impacts on new housing

Important Points – All Applications

- Need appropriate local policies
- Make sure your planners are well briefed – aware of local AQ issues, know situations where an AQ assessment may be required
- Get help with technical aspects of complex applications, e.g. EfW