



## Impact significance in air quality assessment Application of EPUK criteria to road schemes?

25 June 2009, London

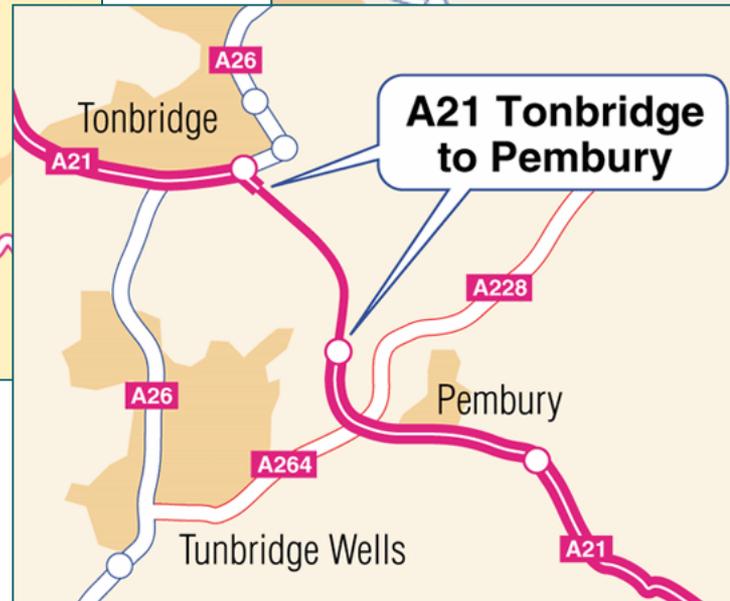
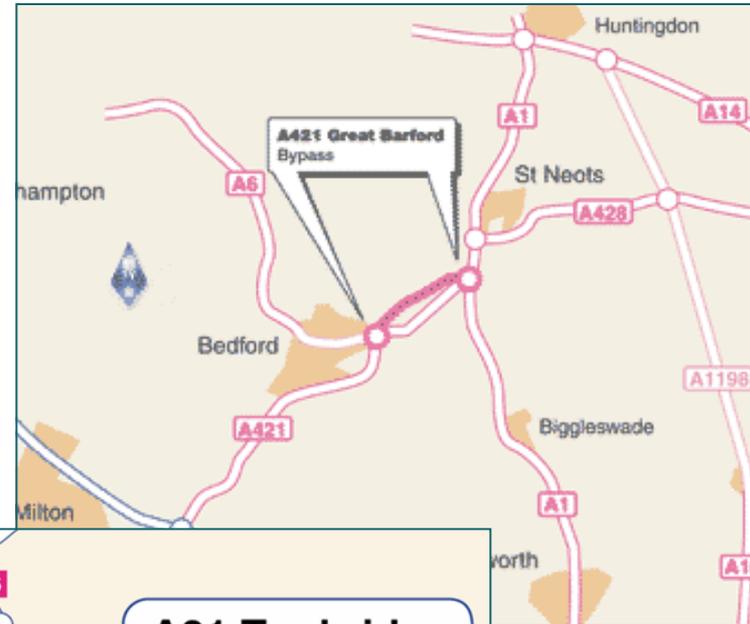
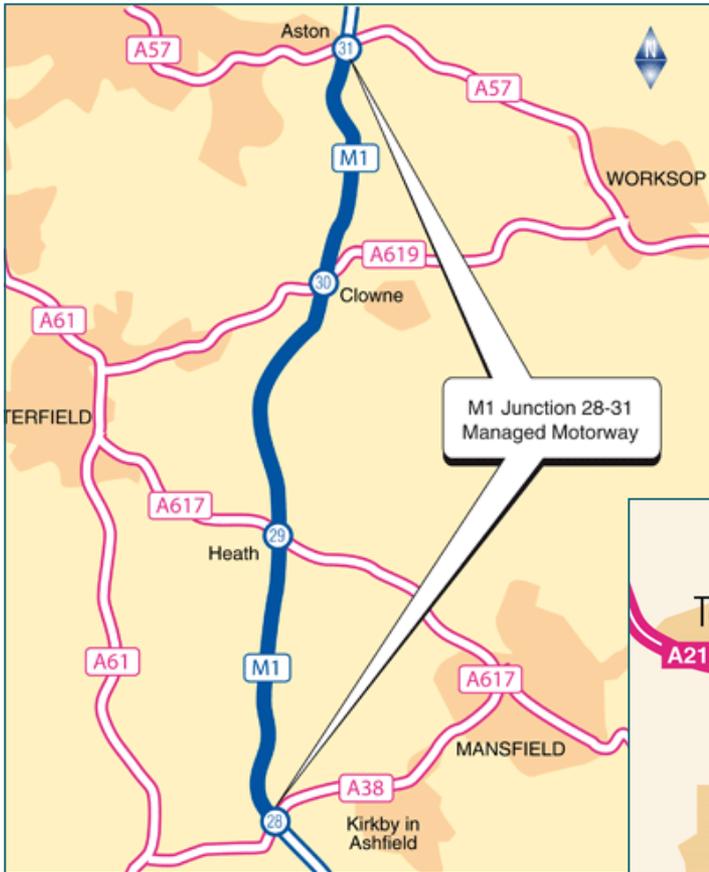
# A roads example

- Assessments of road schemes for both the Highways Agency and Local Authorities.
- Need to fit the outcome of our assessments into planners' requirements for significance criteria.
- No clear definition of significance in the literature although some reference to exceedences and exposure.
- A roads assessment will often be looked at by the local authority.
- We have tried to apply EPUK examples but often not a satisfactory interpretation of the results.

# Effect on air quality of road scheme

- Road schemes tend to **redistribute existing traffic**, don't necessarily create new vehicle movements.
- Road widening may increase flow on road itself but also **alleviates congestion** on that and surrounding roads.
- Bypass introduces new flows to an area where previously **no road**, takes traffic away from town being bypassed.
- Managed motorway increases capacity but should take traffic away from other roads where greater exposure.
- Scheme may result in both **positive and negative** effects.

# Examples of road schemes



# Basis of EPUK criteria

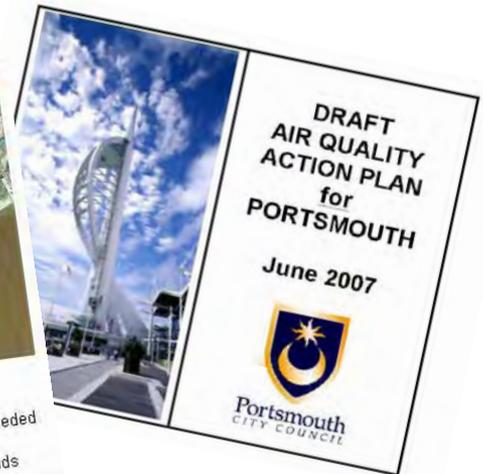
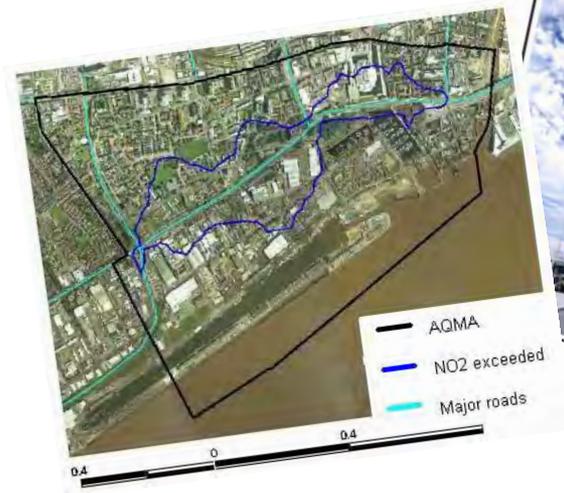
- EPUK criteria = % change in existing levels, compared to conc before and after scheme, and AQ objectives.
- Problem:
  - Existing: 18  $\mu\text{g}/\text{m}^3$  at bypass and 48  $\mu\text{g}/\text{m}^3$  in town,
  - Increase of 5  $\mu\text{g}/\text{m}^3$  near bypass = “very large” (>25%)
  - Decrease of 5  $\mu\text{g}/\text{m}^3$  in town = “medium” (10-15%)
  - With scheme: 23  $\mu\text{g}/\text{m}^3$  and 43  $\mu\text{g}/\text{m}^3$
  - EPUK interprets increase as “moderate adverse” but well below AQO.
  - Decrease is “substantial beneficial”, AQO still exceeded.
- Worst case approach, scheme has adverse effect, even though AQO not exceeded.
- Criteria don't allow for variation in effects across the study area.

# Limit values and objectives

- NO<sub>2</sub> annual mean 40 µg/m<sup>3</sup> set by WHO as robust value which protects **most sensitive** individuals.
- A **lack of evidence** of health effects at this level other than few studies where there may be other factors involved.
- Can anything **below** 40 µg/m<sup>3</sup> be significant, if no material effect?
- Different approach for **PM<sub>10</sub>** as no threshold below which no effects, though not reflected by current LVs.
- Different for local authorities, not **legally responsible** for complying with limit values
- They need to show **progress** towards AQS objectives.

# Non-health considerations

- For developments not financed by Government, assess significance in context of **AQS objectives**
- Re. health effects, issue of 'material importance' still applies when assessing whether effect is significant or not.
- Could develop **further impact criteria** that reflect how a development works with or against LAQM/Action Plan:
  - helps a 'little' - minor benefit,
  - work against 'a lot' - major disbenefit.



# Where to apply criteria?

- EPUK recommends **worst case** approach, but worst affected property may give a **false** impression.
- E.g. **Bypass** - one property has large increase in pollution if next to new route, but 1000s in town have moderate decrease.
- Assigning criteria to single property is **not representative**, vast majority receptors have improvement.
- Look at **typical changes** for majority of properties, are they above or below the AQ criterion of interest.
- Concentration changes above criterion more important than those below, and should be given **prominence**.

- The HA **DMRB** contains methodology for assessing effect of a scheme on air quality.
  - “*An assessment should be made of the **significance of the changes** in air quality. The assessment should bring together the earlier conclusions about **existing and forecast pollution** levels in relation to air quality criteria, and the **populations and locations** affected. Any change in the extent or **severity of exceedences** should be carefully noted.*”
- HA have classified **AQMAs** into **normal** (will meet NO<sub>2</sub> LV in 2010) and **priority** (exceed in 2010 and beyond)
- HA will not progress a road scheme “which would worsen air quality *overall* regarding compliance with limit values”.
- Here is an **example** of how we have interpreted this into significance criteria in tabular format:

# Significance table for road scheme

N.B. no 'slight' significance category as changes below assessment criteria (for NO<sub>2</sub>) can have **no material importance**

Result	Impact	Significance
Number of exceedances < than DM <u>including</u> ≥ 1 removed from Priority AQMA	Major improvement	Very large beneficial
Number of exceedances < than DM <u>including</u> ≥ 1 removed from other AQMA	Major improvement	Large beneficial
Number of exceedances < than DM	Major improvement	Moderate beneficial
No change in concentrations with scheme	No change	Neutral
Number of exceedances > than DM	Major worsening	Moderate adverse
Number of exceedances > than DM <u>including</u> ≥ 1 new exceedance in other AQMA	Major worsening	Large adverse
Number of exceedances > than DM <u>including</u> ≥ 1 new exceedance in Priority AQMA	Major worsening	Very large adverse
No exceedances in DM and none in DS	Negligible	Not significant

- DfT's **webTAG** is generalised approach to assessing effect of a transport scheme on air quality.
- It **weights change** in air quality at the roadside by number of properties in distance bands from the road.
- Same change in concentration gives **higher score** if properties within first 50 metres than within 50-100 metres.
- This takes into account positive and negative changes and degree of **exposure**.
- Scores totalled across all affected roads to give a final score, for annual mean  $\text{NO}_2$  and  $\text{PM}_{10}$ .
- Further comment required if  $\text{NO}_2$  increases by  **$>2 \mu\text{g}/\text{m}^3$**  and where concentrations are above AQO, or  **$>1 \mu\text{g}/\text{m}^3 \text{PM}_{10}$** .



# Summary

- Difficult to apply current examples in EPUK guidance to schemes where effect **varies across** different areas.
- Base magnitude of change on **actual**  $\mu\text{g}/\text{m}^3$  changes rather than **relative** % change.
- Take into account **health basis** for annual mean criterion i.e. **no effect** below  $40 \mu\text{g}/\text{m}^3$ .
- Look at where **majority** of changes occur, weighting result to where exposure is highest.
- Prominence given to results where criteria are **exceeded** or exceedences removed.
- Two approaches: **health effect** based and **action plan** based.

# Final thoughts

- EIA needs a common language to convey effects of lots of different environmental impacts.
- The reader needs an easily understood conclusion
- A simpler outcome requires more work to be done in making the evaluation criteria robust.
- Deriving a new set of criteria is not easy but is necessary to give truest reflection of impacts and improve our toolkit as practitioners.