

**Name of Method:** Vulnerability analysis

**Summary of Method:** The method is based on the evaluation of feature vulnerability, to enable the nature of the impact, together with its significance, to be assessed. Vulnerability of a feature can be defined as the combination of the sensitivity of the feature to a given change and the value of that feature. The method combines the approaches used in GIS analysis and Multi Criteria Analysis.

A typical approach to conducting vulnerability analysis involves the following stages:

- Definition of the impacts and receptors.
- Preparation of vulnerability maps to show, for each receptor, the sensitivity of the receptor to the impacts and evaluation criteria (e.g. 0 = not vulnerable, 4 = very vulnerable).
- Use of a GIS package to overlay the vulnerability maps for all factors affecting each receptor - e.g. all vulnerability maps for flora can be 'added' together using weightings based on the standardised classes (e.g. very vulnerable has four times the weight of less vulnerable; habitat destruction is twice as important as fragmentation). Enables areas of high vulnerability to be identified.
- Using GIS, overlay the expected impacts of different development options onto the vulnerability maps to indicate expected locations of impacts for different receptors and/or impacts. GIS can then be used to add together the weighted impacts to identify those alternatives with the least impacts.

In evaluating impact, the vulnerability of the feature is essentially derived from a comparison of the anticipated exposure to the features sensitivity or response characteristics. Without an overlap of exposure and sensitivity, there can be no pathway for impact and hence no impact. Similarly, the degree of overlap between exposure and sensitivity can be used as a measure of impact. Both exposure and sensitivity can be expressed in terms of magnitude, acknowledging a degree of uncertainty.

**Advantages of Method:** Vulnerability analysis enables a quantitative description of spatial impacts at all scales.

**Limitations of Method:** Requires specialist software (GIS) together with the skills to use the package. The method can be costly and time-intensive, it only works with impacts that can be mapped, and 'hides' value judgments about the sensitivity and value of receptors.

**References:** ABPmer, 2004. Impact Assessment Guide – published on <http://www.estuary-guide.net/>.

ABPmer, 2003. Environmental Statement for Managed Retreat at Wherstead Strand, Ipswich. Report No. R.998

Ecological Planning and Research, 2004. Yachthaven, Copse Lane, Hayling Island: Appropriate Assessment. Final Report.

South West Ecological Surveys, Levett-Therivel sustainability consultants and Oxford Brookes University, 2004. Strategic Environmental Assessment and Biodiversity: Guidance for Practitioners. Report to CCW, EN, EA and RSPB.