

ASSESSMENT OF AIR POLLUTION IMPACT FOR HABITATS REGULATIONS

Christopher Sidle¹, Ji Ping Shi², Betty Ng³, Linda Pope⁴ and Colin Powlesland⁵

¹ Air Quality Modelling and Assessment Unit, The Environment Agency, Cambria House, 29 Newport Road, Cardiff CF24 0TP, U.K. Christopher.sidle@environment-agency.gov.uk

² Air Quality Modelling and Assessment Unit, The Environment Agency, Cambria House, 29 Newport Road, Cardiff CF24 0TP, U.K. Jiping.shi@environment-agency.gov.uk

³ Air Quality Modelling and Assessment Unit, The Environment Agency, Cambria House, 29 Newport Road, Cardiff CF24 0TP, U.K. Betty.ng@environment-agency.gov.uk

⁴ Centre for Risk and Forecasting, The Environment Agency, Kings Meadow Road, Reading, RG1 8DQ, U.K. Linda.pope@environment-agency.gov.uk

⁵ The Environment Agency, Block 1, Government Buildings, Burghill Road, Westbury on Trym, Bristol BS10 6BF, U.K. Colin.powlesland@environment-agency.gov.uk

ABSTRACT

This paper aims to discuss and demonstrate the assessment approach developed and adopted by the UK Environment Agency, English Nature and Countryside Council for Wales, for determining applications for authorisation under the Pollution Prevention and Control Regulations in relation to the requirements of the Habitats Directive. The approach comprises 4 stages:

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| Stage 1 | Identifying relevant applications by establishing whether the Habitats Regulations apply |
| Stage 2 | Assessing likely significant effect of the installation alone or in combination with other plans/projects |
| Stage 3 | Undertaking appropriate assessment of the in-combination impact for the European site in terms of its conservation objectives and local conditions, considering both long- and short-range transport |
| Stage 4 | Determining the application based on implications of the assessment and other socio-economic considerations. |

Stage 3 is the most difficult part of the assessment. The methodology needs to be practical, robust and scientifically based. Long-range transport from the 42 big UK power stations and refineries, other UK sources as detailed in the National Emission Inventory, and European background levels are modelled. Results are compiled in the Environment Agency's "European Sites" Database along with relevant critical loads for each protected feature. Both dry and wet deposition fluxes due to releases from the installation in the authorisation application and other significant local sources are estimated in the short-range modelling study. The assessment needs to address the issue of double counting of contributions from local sources and uncertainties in the predicted impacts. Examples are given to demonstrate this approach and highlight the practical challenges of implementing the Habitats Directive.

INTRODUCTION

The EU Habitats Directive (92/43/EEC) creates a range of safeguards for Europe's most endangered habitats, plants and animals. The Directive requires the assessment of the impacts of plans or projects on protected areas. This means that the Environment Agency must take full account of the Directive requirements when considering new licences and permissions,

major variations, or before carrying out operational work, such as flood defence maintenance. It must also review all existing licences to ensure compliance with the Directive and where necessary amend or revoke those that are found to be causing damage to habitats or species of European importance.

Internationally important wildlife sites within the Member States of the European Union have been given protection under the European Directives on the Conservation of Wild Birds and Habitats and Species. There are currently 425 European Sites (also known as Natura 2000 sites) in England and Wales. These consist of:

- 101 Special Protection Areas (SPAs)
- 304 candidate Special Areas of Conservation (cSACs)
- 20 potential Special Areas of Conservation (pSACs)

In the UK, the Environment Agency is one of several competent authorities under regulations implementing the Habitats Directive.

Information concerning the European Sites is available from the Environment Agency's European Sites Database. The database includes:

- The list of European features and their associated critical loads.
- The annual deposition fluxes of nitrogen and sulphur arising from 42 large combustion sources individually, the combined background deposition arising from all other sources (including National Emissions Inventory sources, roads, European and global contributions) and the background reduced Nitrogen deposition due to ammonia.

The Habitats Directive requires that impacts are assessed in relation to the conservation objectives of the European site. In the UK, critical loads in relation to the acidification of terrestrial and aquatic ecosystems and the eutrophication of terrestrial ecosystems have been set for a number of different ecosystems and mapped on a 1km grid. Since national critical loads are only assigned to a limited number of habitats, there is not always a direct match between these habitats and the features present on European sites. In addition, the national mapping procedure may not include small areas of habitat which are nevertheless important for a particular European site.

Consequently, the Environment Agency, in conjunction with specialists from the Conservation Agencies, have developed site-relevant critical loads for European sites. In order to produce site-relevant critical loads, the national critical load values (based on the EUNIS/BAP classification system) have been assigned by national experts to specific European features. Sometimes there is a very close relationship between the habitats or species listed in the Habitats Directive and the EUNIS or BAP habitat for which a critical load is applied, at other times this is more uncertain. It should be remembered, however, that they do not necessarily directly protect the feature concerned. For example, a bird species may rely on a particular habitat for its survival (and this forms part of the conservation objective), critical loads are not available directly for the bird but would be set based on the habitat

required. In the case of acidity, the critical load is intended to provide protection for the soil, rather than being based directly on the sensitivity of the habitat.

The contributions to the N and S deposition fluxes impacting on a European site arising from each of the 42 large combustion sources (National sources) are available from the EA European Sites Database, as is their combined impact. These have been obtained using both the HARM and FRAME long-range transport models.

An example of the assessment approach is given below applying the 4-stage assessment procedure to a fictional PPC application. This example only considers the impact of nitrogen deposition to a European site.

STAGE 1

The first stage of the assessment procedure determines whether the Habitats Regulations apply. If the process in the PPC permit application is found to be within 10 km of a European site then a Habitats assessment is required. Figure 1 displays a map of the area containing the European Site (Coedydd Llawr-y-glyn SAC) and the fictional process. The process only emits NO_x and has negligible SO₂ releases.

STAGE 2

The second stage of the assessment procedure makes use of simplified modelling approaches to determine whether the impact of the process warrants a more detailed assessment i.e. whether the impact is greater than 1 % of the relevant critical level or load. In the current case a simple screening run indicates that a stage 3 detailed assessment is required.

STAGE 3

The purpose of the assessment is to determine whether the plan or project, alone or in combination with other plans or projects can not be considered to be having an adverse effect on the integrity of the European site. This is a relatively stringent requirement as it requires the regulator to determine that there will not be an adverse effect.

The detailed assessment consists of:

- Consideration of the national modelling exercise results as given in the EA European Sites Database.
- Carrying out local dispersion modelling to estimate the impact arising from the application under consideration, which is not included in the EA European Sites Database.
- Consideration of data quality control, model uncertainty and issues of source double counting.

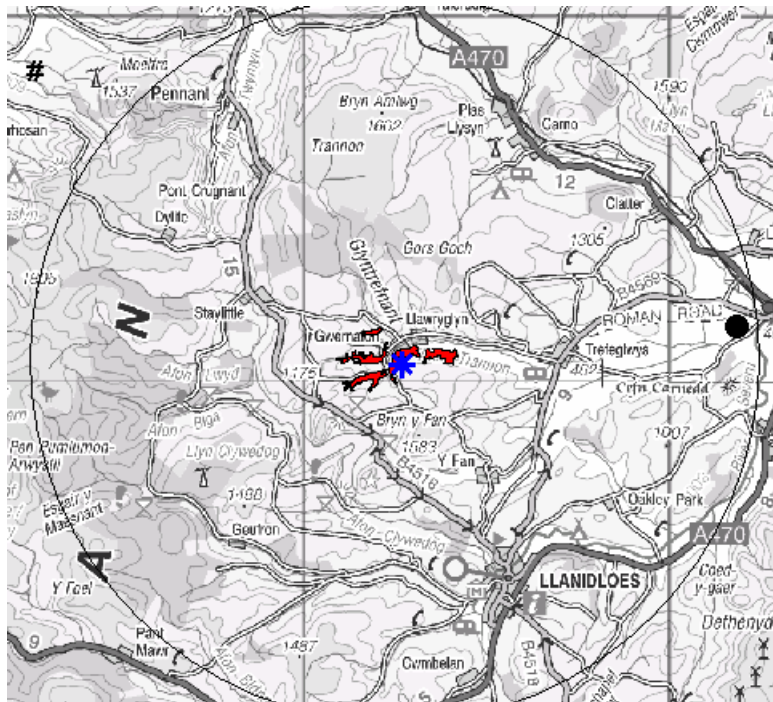


Figure 1. Map showing the location of the proposed PPC process (shown by the black disc), located within 10km of the Coedydd Llawr-y-glyn SAC (shown by the red shaded polygons). The blue star shows the location of the X,Y receptor used to represent the SAC. The outer circle is of 10km radius. The European site is situated within complex hilly terrain.

Local Modelling

The dispersion of emissions from the proposed PPC process is modelled using a short-range atmospheric dispersion model. The impact of the emissions on all SACs and SPAs within 10km of the source (15km if the source is a power station) must be assessed. This includes comparison of the predicted ground level concentrations against the relevant critical levels and of the predicted annual average deposition fluxes against the critical loads for acidification and eutrophication.

It is necessary to ensure that a sufficient number of years of meteorological data are used in the modelling, and that the impact of any buildings and complex terrain that may be present are considered.

Deposition fluxes are obtained from ground level concentrations via the use of a wet-to-dry deposition ratio obtained from the HARM modelling and an appropriate dry deposition velocity.

Consideration of Quality Control, Model Uncertainty, and Double Counting

The list of European features in the EA European Sites Database does not contain information as to the location of the European features within the overall European Site. It is therefore necessary to check the exact location of the European Features with the local conservation officer.

Uncertainties in model predictions can be obtained, via a series of sensitivity runs and scenarios.

Other than for the 42 large combustion sources, the individual contribution to the N & S deposition flux from any given local source is not available separately in the EA European Sites Database but only in-combination with all the other sources. This means that the background deposition of N and S given in the EA Database may already include a contribution from the PPC applications/permits being assessed using local dispersion modelling, i.e. there is a possibility of double counting. If the impact of the local modelling appears sufficiently large and the installation already exists, a further modelling exercise can be performed in an attempt to remove the double counting. The results from the local modelling can then be combined with the national modelling results from the EA Database to estimate the potential in-combination impacts on a given European Site.

Example of the stage 3 assessment

The SAC in this example has only one European feature listed, namely “Old sessile oak woods with Ilex and Blechnum in the British Isles”. The minimum critical load for eutrophication obtained from the EA Database is $10 \text{ KgN ha}^{-1} \text{ yr}^{-1}$. The minimum critical load for acidification is found to be $1.83 \text{ keq ha}^{-1} \text{ yr}^{-1}$. The annual average critical level for NO_x is $30 \mu\text{g m}^{-3}$.

The local modelling exercise predicts an annual NO_x ground level concentration of $0.8 \mu\text{g m}^{-3}$ at the discrete receptor used to represent the SAC. The maximum deposition flux predicted over the SAC is 0.6 KgN/ha/yr (0.05 keq/ha/yr).

Table 1 presents the contribution arising from the national and background sources and from the installation under consideration, as a percentage of the critical load for eutrophication. The critical load for eutrophication was found, in this case, to be the more stringent requirement, as compared to the minimum critical load for acidification or the critical level for NO_x .

European Site Name	Deposition as a % of the minimum critical load				
	National (42 large sources)	Background		Installation	Total
		N-NO2	N-NH3		
Coedydd Llawr-y-glyn	5%	64%	182%	6%	258%

Table 1 Deposition as a percentage of the critical load for eutrophication for the Coedydd Llawr-y-glyn SAC.

It is difficult to set out definitive guidance on the relative contribution arising from the processes which may lead to an adverse effect on the integrity of the site since this will depend on the nature of the receiving environment, the sensitivity of the feature concerned at that location and the presence of any local factors, which may influence the effect of the pollutant. It is therefore important that local information is taken into the assessment through consultation with the local conservation officer.

STAGE 4

At stage 4 the decision needs to be taken as to whether the proposed level of releases can be confirmed or should be modified or refused. The Agency may only agree to a permission that is judged likely to have a significant effect on a European Site if it has established that it will not adversely effect the integrity of the site. Alternative solutions such as the implementation of additional abatement techniques may be explored at this stage. Where there are no alternative solutions and the Agency concludes that there would be adverse effects it must refer the matter to the Secretary of State or the National Assembly for Wales, depending on the site location, if it intends to grant the permission. The plan or project will then be determined by the Secretary of State or the National Assembly for Wales in accordance with the provisions of the Regulations. The proposed project can only be approved in the absence of alternative solutions if it must be carried out for "imperative reasons of overriding public interest". These reasons may be "social or economic" except where a site hosts a priority habitat or species. For priority habitats or species the reasons may only "relate to human health, public safety or beneficial consequences of primary importance to the environment or be an imperative reason of overriding importance in the view of the European Commission."

The decision as to whether to confirm modify or refuse the application must be taken on a case by case basis but will need to take into account;

- Uncertainties in the modelling and critical loads;
- The relative contribution of other sources of the pollutant concerned;
- The magnitude of the contribution from the process concerned, alone and in combination with other plans or projects.

As can be seen, in this instance the impact of the source being assessed is small and that before its contribution the critical load is already estimated to be greatly exceeded.

CONCLUSIONS

This paper has summarised the assessment procedure used in England and Wales to implement the requirements of the habitats regulations under the PPC regime. A simple case study has been presented to demonstrate the approach. The tools and guidance required to carry out stage 3 of the assessment approach now exist, although site specific problems not covered by the method will inevitably arise in some instances. There is at present no universally applicable criteria to determine an authorisation application when an in-combination exceedence of the critical level or load is predicted.

Disclaimer

The views expressed in this paper are those of the authors and are not necessarily those of the Environment Agency.