Alexandra Basin Redevelopment 2

Bringing Dublin Port To 2040

Environmental Impact Assessment Report

Appendix 10-3 Air Quality Impacts on Designated Nature Conservation Sites

Volume 3



CALAFORT ÁTHA CLIATH
DUBLIN PORT

TETRA TECH

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1.0 INTRODUCTION

Purpose:

- To assist members in the assessment of the air quality impacts of development on designated nature conservation sites.
- May be useful for ecologists who use the results of air quality assessments to evaluate the effects of air pollution on habitats and species, by increasing understanding of information provided by air quality specialists.
- Focuses on air quality assessments in support of Habitats Regulations Assessment (HRA), but is also useful for assessing air quality impacts on national or local designated nature conservation sites.

Sites covered by this guidance:

- It is applicable to the assessment of European, national and local designated sites when required. This includes Special Areas of Conservation (SACs), Special Protection Areas (SPAs) (known as European sites), and Ramsar sites which are covered by the Habitats Regulation. It also applies to Sites of Special Scientific Interest (SSSIs), Areas of Special Scientific Interest (ASSIs), National Nature Reserves (NNRs), local nature reserves (LNRs), local wildlife sites (LWSs) and areas of ancient woodland (AW).

Habitats Regulations

The European Commission (EC) provides guidance on managing internationally designated nature conservation sites. The requirement to produce and HRA is driven in England and Wales by the Conservation of Habitats and Species Regulations 2017 (as amended), which states that 'A competent authority, before deciding to undertake, or give any consent, permission or other authorisation for, a plan or project which:

- Is likely to have a significant effect on a European site or a European offshore marine site (either alone or in combination with other plans or projects); and
- Is not directly connected with or necessary for the management of that site, must make an appropriate assessment of the implications for that site in view of that site's conservation objectives.

Similar requirements apply in Scotland.

2.0 RECEPTORS

Ecological Receptor

An ‘ecological receptor’ refers to any sensitive habitat affected by dust soiling. This includes the direct impacts on vegetation or aquatic ecosystems of dust deposition, and the indirect impacts on fauna (e.g. on foraging habitats). For locations with a statutory designation, e.g. Special Areas of Conservation (SACs) and Areas of Special Scientific Interest (ASSIs), consideration should be given as to whether the particular site is sensitive to dust and this will depend on why it has been designated. Some non-statutory sites (i.e. local wildlife sites) and/or locations with very specific sensitivities may also be considered if appropriate. The inclusion or exclusion of sites should be justified in the assessment.

Dust from construction sites deposited on vegetation may create ecological stress within the local plant community. During long dry periods dust can coat plant foliage adversely affecting photosynthesis and other biological functions. Rainfall removes the deposited dust from foliage and can rapidly leach chemicals into the soil. Plant communities near short-term works are likely to recover within a year of the dust soiling stress ceasing. However, large scale construction sites may give rise to dust deposition over an extended period of time and adversely affect vascular plants. For example cement dust deposited on leaves can increase the surface alkalinity, which in turn can hydrolyse lipid and wax components, penetrate the cuticle, and denature proteins, finally causing the leaf to wilt.

Limestone dust coating of lichen has been shown to damage its photosynthetic apparatus. These types of damage over a long period have the potential to change plant community structure and function. Noticeable effects include the increase in ruderal and pioneer plant communities.

Box 1: Key Issues for the Air Quality Assessment

1. Impacts vs. effects
   - The air quality practitioner calculates the air quality impacts.
   - The ecologist identifies the ecological effects.
2. IAQM document scope
   - This document is concerned with determining whether there will be a 'likely significant effect' on a habitat, and where this cannot be screened out, providing the ecologist with detailed information on the air quality impacts.
   - It is the job of the ecologist to determine whether in reality there will be a 'significant effect', or, for European sites, an 'adverse effect on the integrity of the site'
3. Consultation
   - Always consult the regulator on the:
     -assessment approach
     -pollutants to be included
     -designated sites to be considered; and
     -the list of projects and plans to be included in the in-combination or cumulative impact assessment.
4. Collaboration
   - Work closely with the project ecologist throughout the air quality assessment.
   - If there is no project ecologist, as is the case for many environmental permit applications, it may be necessary in some circumstances to recommend to the client that on is appointed.

5. Professional judgement
   - There are too many different types of plans and projects and regulatory regimes in the UK to be prescriptive on how to undertake air quality assessments.
   - Professional judgement of an experienced air quality practitioner is essential.
   - Demonstration of experience of undertaking similar assessments should be provided in the assessment report or other appropriate document.

6. Proportionate
   - The scope and detail of assessment should be proportionate to the risk.

7. Precautionary principle
   - The assessment should be precautionary, but not so precautionary as to produce results that are unrealistic.

8. Guidance changes with time
   - Always check for the most recent guidance from the relevant regulator.

OTHER GUIDANCE

For impacts associated with dust soiling e.g. from construction projects and mineral sites are not within the scope of this guide. IAQM offers alternative guidance specific to these associated impacts. There is existing guidance on planning and air quality

It is often necessary to incorporate a wider ecological impact assessment (EcIA) into the assessment of impacts. Guidance for the implementation of the EcIA has been produced by CIEEM.

3.0 BACKGROUND

After much research, the broad effects of air pollution on habitats are now substantially understood. Despite recent reductions in sulphur dioxide (SO_2) emissions in the UK, there remains a legacy effect in various habitats from the accumulated deposition since the Industrial Revolution. Effects of other pollutants are also apparent at many designated sites, especially from nitrogen (N) deposition. This problem is likely to persist for some time on a national and international scale.

- IAQM uses the term 'impact' where discussing changes in concentration or deposition and the term 'effect' when discussing ecological changes.
- There are two categories of pollutants that are typically the subject of AQAs for designated sites. These are pollutants that have an effect on vegetation/habitats in a gaseous form and those which have an impact through deposition.
- Some other pollutants, for example, heavy metals and hydrogen chloride, are emitted by industrial processes and these pollutants may also need to be assessed. It is recommended that, prior to the assessment of industrial emissions, the scope of any assessment is discussed with the regulator
- Another gaseous pollutant that has important effects on vegetation is ozone. This is a secondary pollutant, formed in the atmosphere from emissions of nitrogen oxides (NOx) and volatile/semi-volatile organic compounds. Its production through photochemical reactions occurs at a considerable distance from the release point and is not amenable to the assessment methods set out in this document. Consequently, no guidance on its assessment is provided

Table 1 below shows the critical levels for various significant gaseous pollutants, below which significant harmful effects are not thought to occur. These have been adopted the European Union and United Nations Economic Commission for Europe (UNECE) and are used as regulatory standards.

Table 1: Critical Levels

Pollutant	Averaging Period	Critical Level
Oxides of nitrogen (NO_x)	24 hours	75 µg/m^3 *
	Annual	30 µg/m^3
Sulphur dioxide (SO_2)	Annual	10 µg/m^3 (for lichens and bryophytes)
	Annual	20 µg/m^3
Ammonia (NH_3)	Annual	1 µg/m^3 (for lichens and bryophytes
	Annual	3 µg/m^3

** The critical level is generally considered to be 75 µg/m^3 ; but this only applies where there are high concentrations of SO_2 and ozone, which is not generally the current situation in the UK. See paragraph D.4.11 in Appendix D. 19.*

- For the deposition of air pollutants critical loads, given as a range, for different habitats have been provided by UNECE (see the APIS20). APIS provides critical loads for nitrogen deposition (leading to eutrophication) and acid deposition (leading to acidification)
- Critical loads for nitrogen deposition are in units of kilogrammes of nitrogen per hectare per year (kg N/ha/year) and vary with habitat sensitivity.
- Nitrogen and sulphur deposition both contribute to acid deposition, as do some other compounds such as hydrogen chloride. APIS provides a Critical Load Function that defines the contributions from sulphur and nitrogen deposition that will not cause harmful effects. Critical loads for acidification are in units of kilograms of H+ ion equivalents per hectare per year (keq/ha/year).

4.0 ASSESSMENT OUTLINE

The main purpose of this document is to lay out a procedure to be followed by air quality specialists when evaluating the impacts of airborne pollution at designated sites. The procedure assumes that the assessment will be collaborative between air quality and ecology specialists, representing the ideal combination of expertise. Ecologists however are not always engaged on all projects for which air quality impact assessments are set out. **Table 2** below provides an overview of the different stages involved in the assessment.

Table 2: Outline of Assessment Stages

Stage	Who	What	Planning/permitting output (all sites)	HRA Output	Guidance in this document/elsewhere
Scoping	Air Quality specialist and ecology	Initial evaluation of potential receptors, consultation with competent authority/stakeholders	Study area, relevant receptors, pollutants	n/a	Chapter 4
Quantification and Screening					
Simple Assessment	Air quality specialist	Calculate/estimate PC and compare with screening thresholds (1%, 1000 AADT)	Identify if insignificant OR if further assessment required (e.g. detailed modelling	Screening Identification of likely significant effects (project alone & in-combination)	Chapter 12
	Ecologist		Assessment of significance of effects (inter & intra project		
Detailed Assessment	Air quality specialist	Calculate PC & PEC and compare against critical levels/loads at relevant receptors	Identification of impacts (project alone & cumulative impacts)	Identification of adverse effects on integrity (project alone & incombination)	
	Ecologist		Assessment of significance of the project alone and cumulative effect (i.e. inter and intra project effects)		
Mitigation and Monitoring	Air quality specialist and ecologist	The application of measures to address air quality impacts and associated ecological effects following a mitigation hierarchy, and the use of monitoring		Apply mitigation hierarchy. Identify imperative reasons of overriding public interest (IROPI)	IAQM position statement sets out the basic hierarchical principles for identifying mitigation measures[31]

Box 2 Initial Evaluation (Scoping)

Considerations

- Pollutants: Are there any that may cause adverse effects on vegetation or habitats?
- Study area: Has the relevant regulator specified any screening distances from air pollution sources?
- Has the ecologist identified any other designated sites that might be affected by the change in emissions?

Actions

Identify designated sites.

- Scope out any sites with habitats/species not sensitive to air pollution.
- Provide mapping showing the sites to be assessed.

Box 3 Key elements of the air quality assessment (Quantification and Screening)

Considerations

- Agreement between the air quality and ecology specialists on appropriate critical loads.
- Agreement on the locations where estimates of pollutant concentrations and deposition rates are required.
- Agreement with the regulator on the 'in-combination' effects that need to be accounted for.
- Are the estimated impacts sufficiently small that their effects could be described as insignificant?

Outputs

- A list of sites and/or pollutants that have been screened out and require no further assessment;
- A list of sites and/or pollutants that require further assessment to determine whether, or not, there may be a likely significant effect at the relevant site(s);
- The grid references or areas of the modelled impacts;
- The basis for emissions calculations, and whether it takes into account the operational characteristics e.g. batch processes do not operate continuously;
- A list of the emission sources considered in the incombination assessment and why they were included or excluded;
- Existing concentrations and deposition rates (except in some cases for permitting);
- The change due to the project, or the 'future baseline with project', and 'future baseline without project' concentrations and deposition rates;
- The change in the case of European sites should be quantified for the project without taking into account mitigation;
- A description of the assumptions used in the assessment e.g. hours of operation, assessment year, location of ecological habitats of concern, and future year conditions. The degree of conservatism and whether there are known uncertainties in the input data. A summary of the habitat categories selected, the critical levels and loads applied and existing concentrations and rates of deposition at each site;
- Tabulated results for the project or plan alone and, incombination with other projects and plans showing for all pollutants the totals and changes in concentrations and deposition rates at the key locations of interest, and contributions as a percentage of the air quality criteria (critical levels and loads);
- If they are likely to be useful in the interpretation (notably, when assessing impacts of point sources) concentration contours (isopleths) overlaid in a clear manner over an Ordnance Survey (or equivalent) base map

* Mitigation is generally considered to be any additional measure to reduce or remove emissions, or diminish their impacts, above and beyond those that would be expected to be present as part of a

4.1 THE ASSESSMENT OF AIR QUALITY IMPACTS

There is a range of existing statutory and non-statutory guidance and supporting tools provided by *inter alia* the Environment Agency (EA), Natural Resources Wales (NRW), Scottish Environmental Protection Agency (SEPA), Highways England, Defra, Natural England and the Air Pollution Information Service (APIS) on how to estimate the impact of a project or plan on ambient concentrations and pollutant deposition.

- Most of the existing published guidance predates the Wealden Judgement and CJEU rulings described in Chapter 3. The exception is guidance for road traffic produced by Natural England in 2018 to address specifically the issues raised in the Wealden judgement. The approaches to air quality assessment differ according to whether the project or plan comprises transport sources, industrial sources or agricultural sources.

The stages of air quality assessment can be summarised as:

1. Scoping
2. Quantification; and
3. Screening

4.1.1 In-combination Impacts

- The Habitats Regulations place a duty on competent authorities to assess the effect of new projects and plans both alone and in-combination with other projects and plans, i.e. the effects of the plan or project being assessed must also be considered together with the effects of other relevant projects and plans. This is because a series of individually modest impacts may, in-combination, produce a significant effect on a habitat/species.
- Similarly developments requiring an Environmental Impact Assessment (EIA) under the EIA regulations, require the consideration of cumulative effects of the development and other relevant developments.
- Projects and plans that may have been approved but are, as yet, incomplete, subject of an outstanding appeal or ongoing review, should all be considered.
- It should, however, be noted that where the impacts are due to road traffic emissions, the cumulative impact may not be explicitly identified. It is normal in an air quality assessment to include traffic growth estimates using the Department of Transport's TEMPRO growth factors or from a strategic transport model that explicitly includes traffic from other projects and/or plans.
- The impacts from different pollutants also need to be considered, such as the impact on deposition of nitrogen derived from NO_x and NH_3 . For example, the NH_3 contribution from agricultural activities may need to be considered together with NO_x and NH_3 emissions from road transport.
- Defining an 'isolated source' is not possible and where there is doubt, it should be assumed that there may be an in-combination effect.
- Further advice on in-combination assessments is provided in the European Commission's 2018 guidance.

4.1.2 Stage 1 – Scoping

- For individual planning applications for conventional residential or mixed-use development where European sites are a consideration, the assessor should first investigate whether the air quality issues have already been fully explored for the Local Plan HRA.
- For projects requiring assessment, the air quality specialist, assisted by the ecologist, should identify the designated sites likely to be affected by the source of emissions to air that require assessment, taking into account distance criteria in the relevant guidance documents, where these exist, relevant to the scale and type of development being assessed. These criteria are described below.
- The Design Manual for Roads and Bridges (DMRB) describes the approach for the assessment of the impact of emissions from schemes on the strategic road network. A quantitative air quality assessment is required if European Sites are within 200 m of affected roads. Natural England advises that if there are no qualifying features sensitive to air pollution within 200 m of a road, then no further assessment is required.
- The Defra/Environment Agency's Air emissions risk assessment for your environmental permit (which applies to industrial emission sources) currently identifies distances of 2 km for local and nationally important sites and areas of ancient woodland, and 5, 10 or 15 km depending on the emission source for European Sites. Different distances apply for agricultural emissions.

4.1.3 Stage 2 – Quantification

Approach and Methods

- Once all the required information on the project/plan and the projects/plans for the in-combination assessment, has been gathered, concentrations and deposition rates will be calculated.
- The change in pollutant concentrations due to an industrial or agricultural source is often determined simply by modelling the dispersion of the emissions. This is known as the process contribution (PC). The in-combination impacts would then be assessed by adding the PCs from the other relevant projects and plans.
- The PCs may be calculated by a variety of methods, depending on the circumstances and scale of the project but detailed dispersion modelling is used in most cases.
- To determine the concentration/deposition rates, the PC is added to the baseline concentration/deposition rates. All relevant emission sources should be included in the baseline e.g. traffic emissions. These may be taken from measurement data or other appropriate sources such as Defra or APIS background maps. The concentration/deposition rate is known as the predicted environmental concentration (PEC).
- Measurements of pollutant concentrations are made by local authorities and Defra. The choice of data source will often depend on the location of the study area, i.e. whether urban or rural, which dictates the amount of monitoring data available. Site-specific monitoring (e.g. using diffusion tubes) is sometimes undertaken to determine baseline concentrations, to obtain the most up to date information or where appropriate baseline data are not available.
- For projects/plans that generate road traffic, the dispersion modelling will estimate the PEC “without the project/plan” (i.e. the future baseline) and PEC concentrations “with the project/plan”.
- When modelling dispersion of emissions, several points should be assessed within each designated site, both along the site boundary and within the site itself to identify maximum impact at the site as well as the range experienced across the area. Consideration should also be given to the distribution of habitat features of interest within the site and receptor points and grids should be carefully selected. Meteorological data should also be used in dispersion modelling.
- For road transport sources, individual receptors along a transect, or along a series of transects at suitable intervals, perpendicular to the road up to 200 m are generally used.
- The changes in deposition rates (i.e. PC) resulting from the project or plan for the pollutants of interest are typically derived from the product of the atmospheric concentration and the deposition velocity55 (taking into account the units). The best available estimate of the deposition velocity available should be used for this calculation. The deposition velocity depends on the vegetation type (this can be general, for example, forest or heathland) at the location of interest. This information on vegetation type can be informed by the ecologist.

The most used deposition velocity values, taken from AQTAG guidance, are show below in **Table 3.**

Table 3: Deposition Velocities (after AQTAG)

Pollutant	Habitat	Deposition velocity (m/s)
NO_2	Grassland	0.0015
	Forest	0.003
SO_2	Grassland	0.012
	Forest	0.024
NH_3	Grassland	0.020
	Forest	0.030

Pollutant	Habitat	Deposition velocity (m/s)
HCl	Grassland	0.025
	Forest	0.060

Future Concentrations and Deposition Rates

- Natural England guidance signposts the APIS website which provides information on deposition trends drawn from the results of national modelling over a number of years. The trend data for these 3-year averages are provided for maximum and minimum deposition (nutrient nitrogen and acid). The APIS website also provides background concentrations data, but the higher spatial resolution background data available from Defra for certain pollutants should be used when possible.
- The air quality specialist may choose to assume no change in future baseline concentrations or deposition rates, where there is no evidence to indicate that they may decrease in value. This concerns projects/plans which are expected to be completed in a short period of time. For long lead-in periods, it may be appropriate to reduce future baseline concentrations/ deposition rate to allow for anticipated improvements in national emissions.
- There is clear evidence that UK NOx emissions, including those from road traffic, are declining but what is not certain is the exact rate of reduction of NOx emissions and therefore it is important that a conservative estimate is used for the modelling.
- In the UK, the Government has published a Clean Air Strategy, which sets out the mechanisms by which the target of a 73% reduction in NO_x emissions will take place by 2030 (relative to a 2005 baseline). This will ensure compliance with the National Ceilings Emission Directive. The strategy also includes a target for the reduction of deposition of reactive forms of nitrogen in England's protected priority sensitive habitats.
- There is more uncertainty regarding ammonia emissions, but the government is legally committed, under the 2016 National Emissions Ceiling Directive to reduce these emissions, along with SO_2 and NO_x emissions. The UK has a good track record on meeting its international emission reduction obligations. Any assumption should be clearly explained, with justification given.

4.1.4 Stage 3 – Screening

- A database of site-specific critical loads for nitrogen and acid deposition rates is available on the APIS website60. Unless the lowest value for a high-level screening assessment is adopted, the selection of critical loads requires knowledge of the habitat type, site interest features, and specialist knowledge, such as whether the environment is nitrogen or phosphorous limited, or whether grassland is acidic or calcareous. It also requires knowledge as to the relative reliability of the critical load in question as some are supported by firmer evidence than others. This is identified on the APIS website.
- APIS does not cover all habitat types. In these cases, for an assessment to be undertaken advice from a suitably qualified ecologist is required.
- For each site, and for each habitat within each site, the air quality specialist should calculate the PC as a percentage of the relevant critical level/load both alone and in-combination with other plans and projects. The calculated maximum PC is then used to determine whether the impacts will have an insignificant effect or, controversially, may be large enough to warrant further evaluation by an ecologist.
- In the case of Environment Agency permitting, an increment of 1% (or less) of the relevant long term critical level or critical load alone is considered inconsequential. The 1% threshold has become widely used throughout the air quality assessment profession to define a reasonable quantum of long term pollution which is not likely to be discernible from fluctuations in background/measurements.
- The 1% threshold is used in the context of an in-combination assessment. Crucially, it is not a threshold of harm and exceeding this threshold does not, of itself, imply damage to a habitat.
- For all types of project/plan, if the air quality specialist identifies that the impact is sufficiently large (alone and/or in-combination) that it cannot be screened out and therefore it could have a potential significant effect, the information should be passed to the ecologist to further assess the likelihood of a significant effect of the project or plan on the habitat, and, if so, whether for European Sites it is possible to ascertain that there will be no adverse effect on the integrity of the site and for other types of designated sites, no likelihood of damage.
- If it is concluded that adverse effects on site integrity cannot be ruled out, an assessment of the impact of mitigation measures and advice on emission control measures should be provided by an air quality specialist.

Industrial Point Sources

- The Environment Agency's risk assessment guidance advises that to screen out the need for further assessment for Ramsar, European and national designated sites, a PC for any substance emitted from an industrial source must meet both of the following criteria:
  - the short-term PC is less than 10% of the short-term environmental standard; and
  - the long-term PC is less than 1% of the long-term environmental standard.
- IAQM believe that the 1% and 10% screening criteria should not be used rigidly and, not to a numerical precision greater than the expression of the criteria themselves.
- Less stringent criteria are used for local wildlife sites and ancient woodlands. If either the short-term or long-term PC is less than 100% of the critical level or load, they do not require further assessment to support a permit application.
- In ecological impact assessments of projects and plans, it is, however, normal practice to treat such sites in the same manner as SSSIs and European Sites, although the determination of the significance of an effect may be different. It is difficult to understand how the Environment Agency's approach can provide adequate protection.
- A change of more than 1% does not necessarily indicate that a significant effect (or adverse effect on integrity) will occur; it simply means that the change in concentration or deposition rate cannot in itself be described as numerically inconsequential or imperceptible and therefore requires further consideration.

Predicted Environmental Concentration (PEC)

- The PEC (which applies to both annual mean concentrations and deposition rates) should be calculated with the project or plan alone and in-combination with other projects and plans to identify whether the

critical levels or critical loads will be exceeded. This information should be passed on to the ecologist if the PC exceeds 1% of the critical level/load either alone or in-combination.

- As stated by the Environmental Agency risk assessment guidance, if the PEC is less than 70% of the long-term criterion it can be deemed insignificant, regardless of the PC.

Traffic Impacts

- There is evidence that ammonia emissions from road vehicles may contribute more than half the local traffic related increment to nitrogen deposition.
- The DMRB methodology only requires the assessment of NO_x emissions and nitrogen deposition. It does not consider NH_3 or its contribution to nitrogen deposition. As road transport is a source of ammonia, albeit a small source compared to agriculture at a national level, consideration should be given to including it and its contribution to local nitrogen deposition.

4.2 LOCAL PLANS

- It has been increasingly common practice for air quality assessments to be undertaken to support the development of Local Plans for local planning authorities where sensitive internationally important wildlife sites may be affected. This is to enable an HRA to be completed for that Local Plan. Due to the nature of Local Plans, this means that all growth expected across a given district over a long period is assessed collectively.
- The scale of physical separation between a Local Plan area and European site will clearly be an important factor in making the decision, given that there is a limit to the accuracy of transport modelling at considerable distances (i.e. tens of kilometres) from source, as well as the fact that very small changes in air quality (such as are likely to occur at these distances) are unlikely to be detectable in air quality calculations, or in monitoring data.
- It is no longer advised for individual local authorities to reply purely on a change in flows of less than 1000 AADT as a reason to dismiss traffic-related air quality impacts in-combination with other local plans, unless there is reason to believe that flows on the road in question would likely be dominated by journeys arising from that district.
- Air quality calculations should also make reasonable assumptions about expected changes in the baseline NO2 concentrations over the plan period; given the 15 to 20 year or so timescale of most Local Plans. Making a suitable allowance for improvements in baseline air quality can, given the long timescale of most Local Plans, mean that overall air quality at the end of the plan period is very likely to be better than air quality at the start, even allowing for the effects of Local Plan growth on traffic flows.
- Assessing the results of both the ‘alone’ and ‘in-combination’ assessments, it is possible to identify the relative contribution of the Local Plan being assessed. This is necessary if the ecologist concludes that there is an adverse effect on the integrity of the designated site to enable the appropriate scale of mitigation measures that may be needed (such as transport management plans, rerouting of heavy duty vehicles,).
- The preceding discussion is concerned with Local Plans, but the same principle would apply to the traffic impacts of Minerals & Waste Plans where those plans are expected to result in any net increase in vehicle movements within 200 m of sensitive designated sites.

4.3 GENERAL PRINCIPLES

There are a number of principles that should be applied when undertaking assessments of the air quality impacts on designated sites, which are set out below.

1. Suitably qualified, experienced and competent assessors should be responsible for the assessment.
2. A precautionary approach is required.
3. The assessment should be appropriate to the risk.
4. The assessment should be undertaken with an ecologist.
5. Always consult with the regulator.

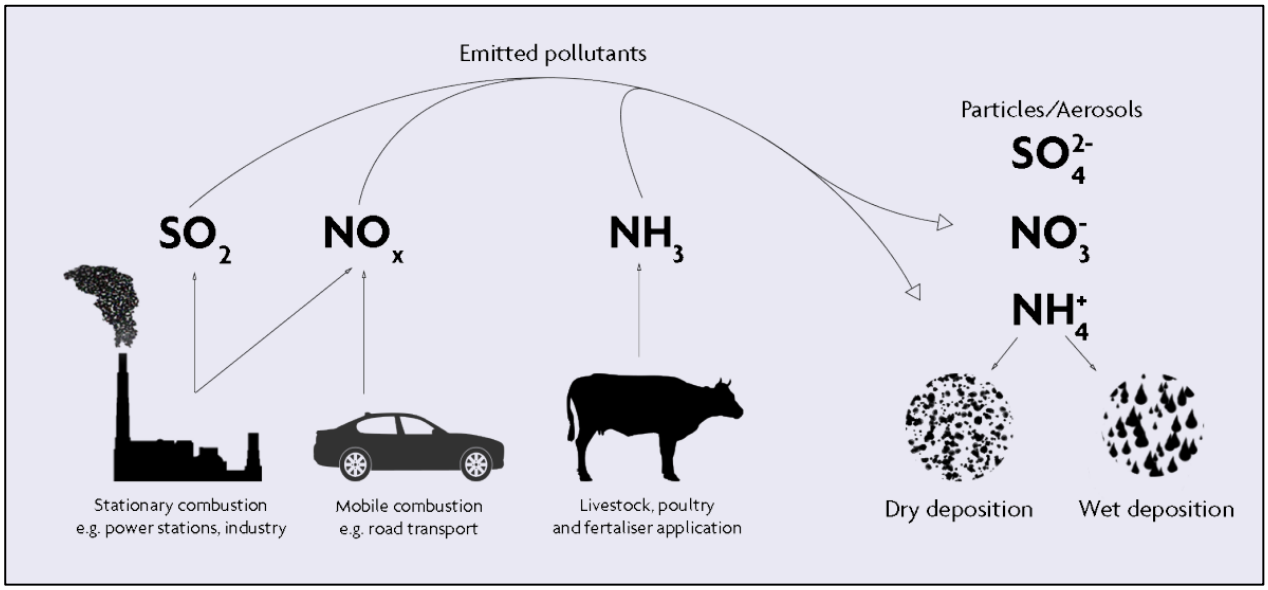


Figure 1: Schematic of the sources of air pollution

Table 4: Typical relationship between Ecological Impact Assessment (EcIA) and Air Quality Assessment (AQA)

EcIA Stage[1]	Interactions with this guidance
Scoping: Determining the matters to be addressed in the EcIA. Scoping is an ongoing process – the scope of the EcIA may be modified following further ecological survey/ research and during impact assessment.	The initial stages of the air quality assessment process will determine whether air quality impacts on designated sites require consideration. See Chapter 4.
Establishing the baseline: Collecting information and describing the ecological conditions in the absence of the proposed project, to inform the assessment of impacts.	The ecologist and air quality specialist will often jointly identify designated sites that are relevant to the plan or project and describe these. See Chapter 12. It should be noted that ecologists are not instructed on all projects that require an AQA, for example, many applications for environmental permits.
Important ecological features: Identifying important ecological features that may be affected, with reference to a geographical context in which they are considered important.	
Impact assessment: An assessment of whether important ecological features will be subject to impacts and characterisation of these impacts and their effects. Assessment of residual ecological impacts of the project remaining after mitigation and the significance of their effects, including cumulative effects.	The assessment of air quality impacts on designated sites is an iterative process, with consideration of potential impacts starting early in the process set out in this guidance. Initial consideration of impacts starts during the air quality scoping (see Chapter 4) with the assessment becoming more detailed in the latter stages (see Chapter 4).
Avoidance, mitigation, compensation and enhancement: Incorporating measures to avoid, reduce and compensate ecological impacts, and the provision of ecological enhancements. Monitoring impacts of the development and evaluation of the success of proposed mitigation, compensation and enhancement measures.	An IAQM Position Statement[2] sets out the basic hierarchical principles for identifying mitigation measures.
Consequences for decision making: Consideration of the legal and policy framework throughout the EcIA process and assessment of how the Project has responded to this.	This will be assessed iteratively throughout the process of assessing air quality impacts on designated sites.

[1] Modified from page iv of: CIEEM (2016) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal, 2nd edition. Chartered Institute of Ecology and Environmental Management, Winchester.

[2] iaqm.co.uk/text/position_statements/mitigation_of_development.pdf.

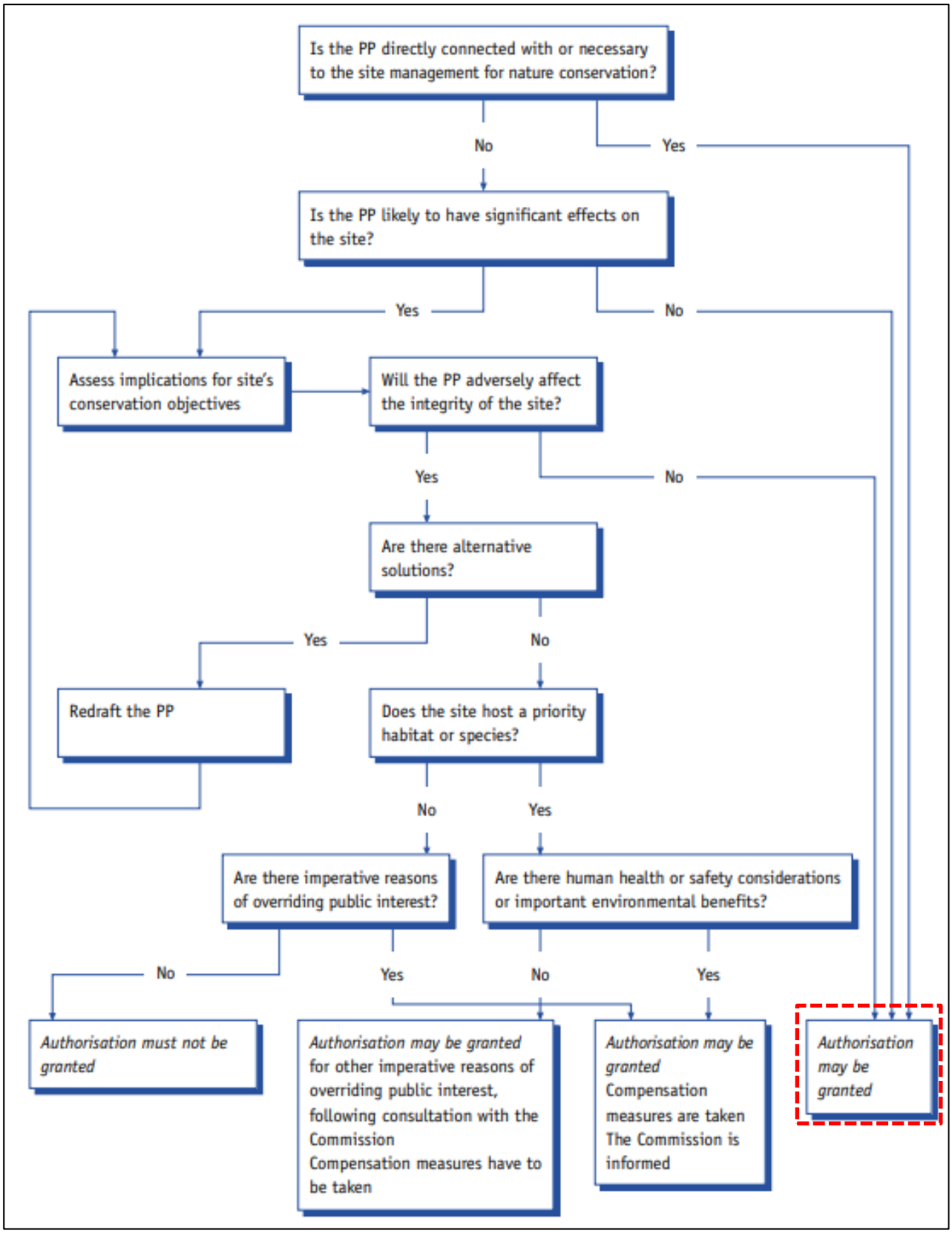


Figure 2: Flowchart reproduced from Annex III of European Commissions guidance on managing Natura 2000 sites.

4.4 SENSITIVITY RATING OF RECEPTORS TO ECOLOGICAL EFFECTS

Dust deposition due to demolition, earthworks, construction and trackout has the potential to affect sensitive habitats and plant communities.

Dust can have two types of effect on vegetation: physical and chemical. Direct physical effects include reduced photosynthesis, respiration and transpiration through smothering. Chemical changes to soils or watercourses may lead to a loss of plants or animals for example via changes in acidity. Indirect effects can include increased susceptibility to stresses such as pathogens and air pollution. These changes are likely to occur only as a result of long-term demolition and construction works adjacent to a sensitive habitat. Often impacts will be reversible once the works are completed, and dust emissions cease.

The advice of an ecologist should be sought to determine the need for an assessment of dust impacts on sensitive habitats and plants[1] Professional judgement is required to identify where on the spectrum between high and low sensitivity a receptor lies, taking into account the likely effect and the value of the ecological asset. A habitat may be highly valuable but not sensitive, alternatively it may be less valuable but more sensitive to dust deposition. Consequently, specialist ecological advice should also be sought to determine the sensitivity of the ecological receptors to dust impacts. In general most receptors will either be of high sensitivity or low sensitivity i.e. either sensitive or not to dust deposition. The following provides an example of possible sensitivities:

High sensitivity receptor

- locations with an international or national designation and the designated features may be affected by dust soiling; or
- locations where there is a community of a particularly dust sensitive species such as vascular species included in the Ireland Red List No. 10 Vascular Plants[2].
- indicative examples include a Special Area of Conservation (SAC) designated for acid heathlands or a local site designated for lichens adjacent to the demolition of a large site containing concrete (alkali) buildings.

Medium sensitivity receptor

- locations where there is a particularly important plant species, where its dust sensitivity is uncertain or unknown; or
- locations with a national designation where the features may be affected by dust deposition.
- indicative example is a Natural Heritage Areas (NHAs) with dust sensitive features.

Low sensitivity receptor

- locations with a local designation where the features may be affected by dust deposition.
- indicative example is a local Nature Reserve with dust sensitive features.

For this development there are no close proximity watercourses which flow around the site. The Project is not located within or immediately adjacent to any National, and European Designated Sites.

[1] Habitat Regulation Assessment of the site may be required as part of the planning process, if the site lies close to an internationally designated site i.e. Special Conservation Areas (SACs), Special Protection Areas (SPAs) designated under the Habitats Directive (92/43/EEC) and RAMSAR sites.

[2] Since 2009, all-Ireland Red Lists have been published as part of a dedicated Irish Red List publication series by the National Parks and Wildlife Service of the Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs (and its predecessors) in collaboration with the Northern Ireland Environment Agency of the Department of Agriculture, Environment and Rural Affairs (and its predecessors).

Table 5 shows how the sensitivity of the area may be determined for ecosystem impacts. These tables take account of a number of factors which may influence the sensitivity of the area. When using these tables, it should be noted that distances are to the dust source and so a different area may be affected by trackout than by on-site works. The highest level of sensitivity from each table should be recorded. It is not necessary to work through the whole of each table once it is clear that the highest level of sensitivity has been determined.

The South Dublin Bay and River Tolka Estuary SPA at 0m. The IAQM assessment determines that a high sensitivity receptor within 20m is deemed as **High Risk**.

Table 5: Sensitivity of the Area to Ecological Impacts [a]

Receptor Sensitivity	Distance from the Source (m)[c]	
	<20	<50
High	High	Medium
Medium	Medium	Low
Low	Low	Low

4.5 SENSITIVITE RECEPTOR SUMMARY

Designated and non-designated areas within 2km of the Project were identified through a desktop review. These conservation sites include Special Areas of Conservation (SAC), Special Protection Areas (SPA), RAMSAR site and Proposed Natural Heritage Areas (pNHA). The desk study identified four statutory designated areas for nature conservation and two non-statutory designated areas within 2km of the Site. Details are provided in **Table 6** below.

Table 6: Sensitive Receptors to Ecological Effects

Designated Sites	Designation	Distance from Site	Qualifying Features
South Dublin Bay and River Tolka Estuary	SPA	0km	Light-bellied Brent Goose (Branta bernicla hrota) [A046] Oystercatcher (Haematopus ostralegus) [A130] Ringed Plover (Charadrius hiaticula) [A137] Grey Plover (Pluvialis squatarola) [A141] Knot (Calidris canutus) [A143] Sanderling (Calidris alba) [A144] Dunlin (Calidris alpina) [A149] Bar-tailed Godwit (Limosa lapponica) [A157] Redshank (Tringa totanus) [A162] Black-headed Gull (Chroicocephalus ridibundus) [A179] Roseate Tern (Sterna dougallii) [A192] Common Tern (Sterna hirundo) [A193] Arctic Tern (Sterna paradisaea) [A194] Wetland and Waterbirds [A999]
South Dublin Bay	pNHA	0.47km	This site is designated for the same features for which the South Dublin Bay SAC and the South Dublin Bay and River Tolka Estuary SPA have been: intertidal/coastal habitats and bird species.
South Dublin Bay	SAC	0.5km	Mudflats and sandflats not covered by seawater at low tide [1140] Annual vegetation of drift lines [1210] Salicornia and other annuals colonising mud and sand [1310] Embryonic shifting dunes [2110]
North Dublin Bay	pNHA	0.67km	This site is designated for the same features for which the North Dublin Bay SAC and the South Dublin Bay and River Tolka Estuary SPA have been: intertidal/coastal habitats and bird species.
North Dublin Bay	SAC	1.5km	Mudflats and sandflats not covered by seawater at low tide [1140] Annual vegetation of drift lines [1210]

Designated Sites	Designation	Distance from Site	Qualifying Features
			Salicornia and other annuals colonising mud and sand [1310] Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330] Mediterranean salt meadows (Juncetalia maritimi) [1410] Embryonic shifting dunes [2110] Shifting dunes along the shoreline with Ammophila arenaria (white dunes) [2120] Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130] Humid dune slacks [2190] Petalophyllum ralfsii (Petalwort) [1395]
North Bull Island	Ramsar	1.7km	The Site covers most of an island within the wider coastal and estuarine waters of Dublin Bay. Salt marshes extend along the length of the landward shore, and a well-developed and dynamic dune system along the seaward shore, where annual vegetation of drift lines is found in places. The island shelters two intertidal lagoons divided by a causeway. The dunes and salt marshes support characteristic plant communities and a number of rare plants which are legally protected. The intertidal habitats feature a rich macrofauna, small areas of eel grass and, in the summer months, green algal mats. The wider estuarine complex provides feeding and roosting habitat for more than 1% of the global population of more than 20 wintering birds, including black-tailed godwit (Limosa limosa) and light-bellied brent goose (Branta bernicla hrota). The Site also supports notable invertebrates. It is a very popular recreational area and important for educational and research purposes: nature conservation is a main land use within the Site. Much of the land surface of the island outside the Site is taken up by two golf courses. Due to its proximity to the Dublin urban area, the Site is impacted by urban wastewater, extensive tourism and roads.
Sandymount Strand/Tolka Estuary	Ramsar	1km	The Site in Dublin Bay features extensive intertidal mud and sand flats which extend for almost three kilometres at their widest, and an intertidal biogenic reef and a small section of saltmarsh. The sands support the largest stand of seagrass beds (Zostera noltii) on Ireland's east coast. South Dublin Bay is the premier site in Ireland for the Mediterranean gull (Larus melanocephalus) and is a regular autumn

Designated Sites	Designation	Distance from Site	Qualifying Features
			roosting ground for significant numbers of terns. More than 1% of the global population of light-bellied brent goose (Branta bernicla hrota), black-tailed godwit (Limosa limosa) and bar-tailed godwit (Limosa lapponica) are present in the Site. The proximity of the city of Dublin makes the Site a very popular recreational area, while bait-digging is a regular activity on the sandy flats. It is also important for educational and research purposes. The Site is subject to natural eutrophication and is threatened by the accumulation of organic material. It is also affected by disturbances from roads, land conversions and urban wastewater.



Figure 3: Designated Conservation Sites Surrounding Project

The South Dublin Bay and River Tolka Estuary SPA is the closest designated protected area to the Project, shown in **Figure 3**. It supports an internationally important breeding bird populations some of which are under Annex 1 species The site also hosts a strong population of rare plant species some of which can only be found there.

APIS Background

Different deposition estimates are presented for each grid cell: 'Short-vegetation' (e.g. bogs, heath, acid grassland, dunes), 'Forest' and 'Grid-Average'. Forest habitats receive more deposition due to a greater overall surface roughness. Grid-Average takes into account urban areas and fertilised farmland within the grid cell.

These areas receive less deposition than unfertilised habitats (e.g. habitats at protected sites), and Grid-Average deposition is generally less than the deposition to short-vegetation, particularly in grid cells with large areas of arable or improved grassland. Grid-Average deposition is provided to allow estimation of total deposition for catchment-wide studies.

Direct deposition onto habitats with little or no surface vegetation, such as freshwaters or shingle, will be less than onto e.g. bogs, heath etc. in the same location, but modelled deposition rates are not currently available for these habitats. Using the EMEP4UK model, direct deposition of total nitrogen onto freshwaters has been estimated at 63 % of the deposition rate onto moorland. This proportion of the local nitrogen deposition onto moorland could be used as an estimate of direct deposition onto freshwater within the same grid cell, but measurements are scarce and the proportion remains uncertain. The nitrogen or acidity that enters freshwaters as a result of atmospheric pollution also depends on leaching rates and lateral flows from the land uses within the catchment. The following figures show extracted APIS data for nitrogen dioxide, ammonia and NOx for the latest **year available 2021.**

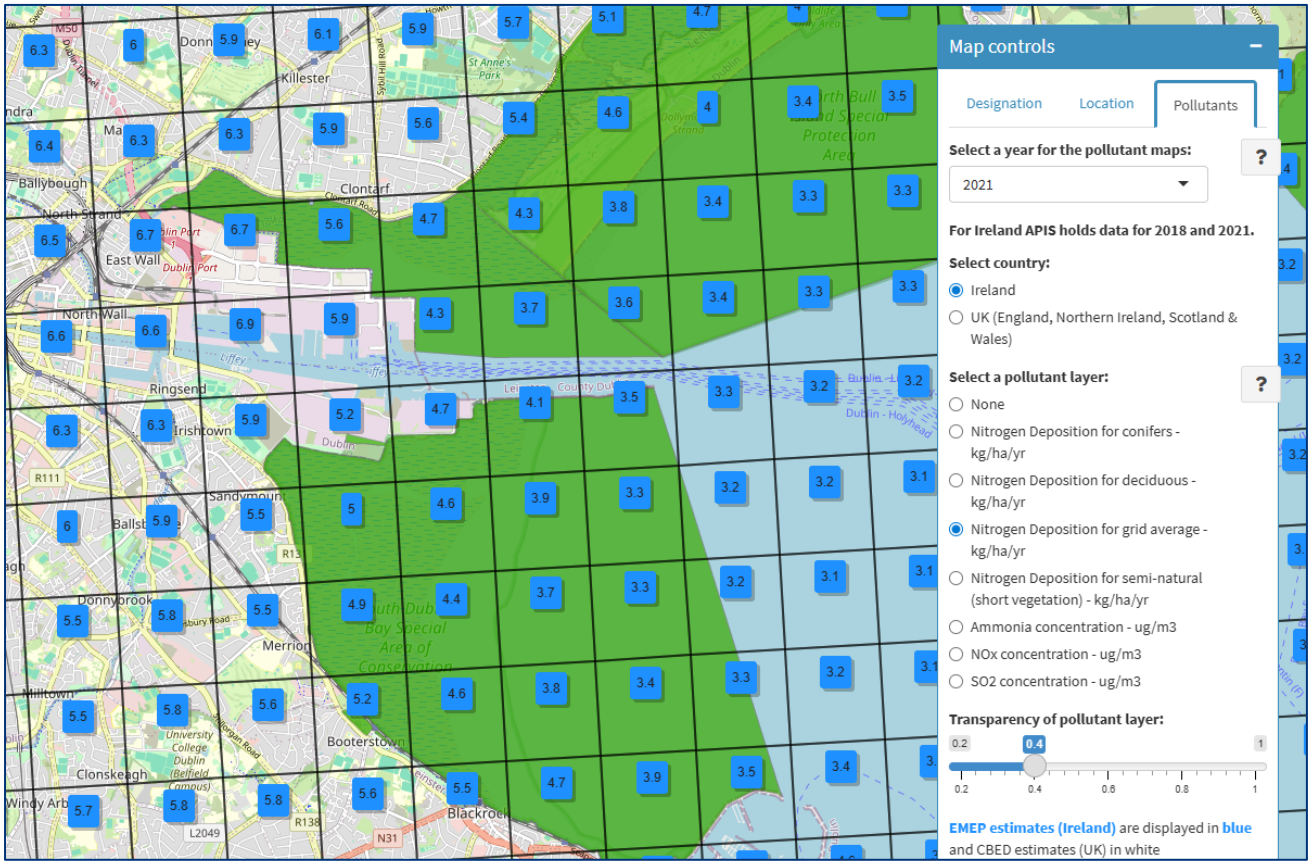


Figure 4: Nitrogen Dioxide – Average for grid Background. Nitrogen Deposition for grid average - KgN/ha/yr

Comment: All background levels well below relevant thresholds

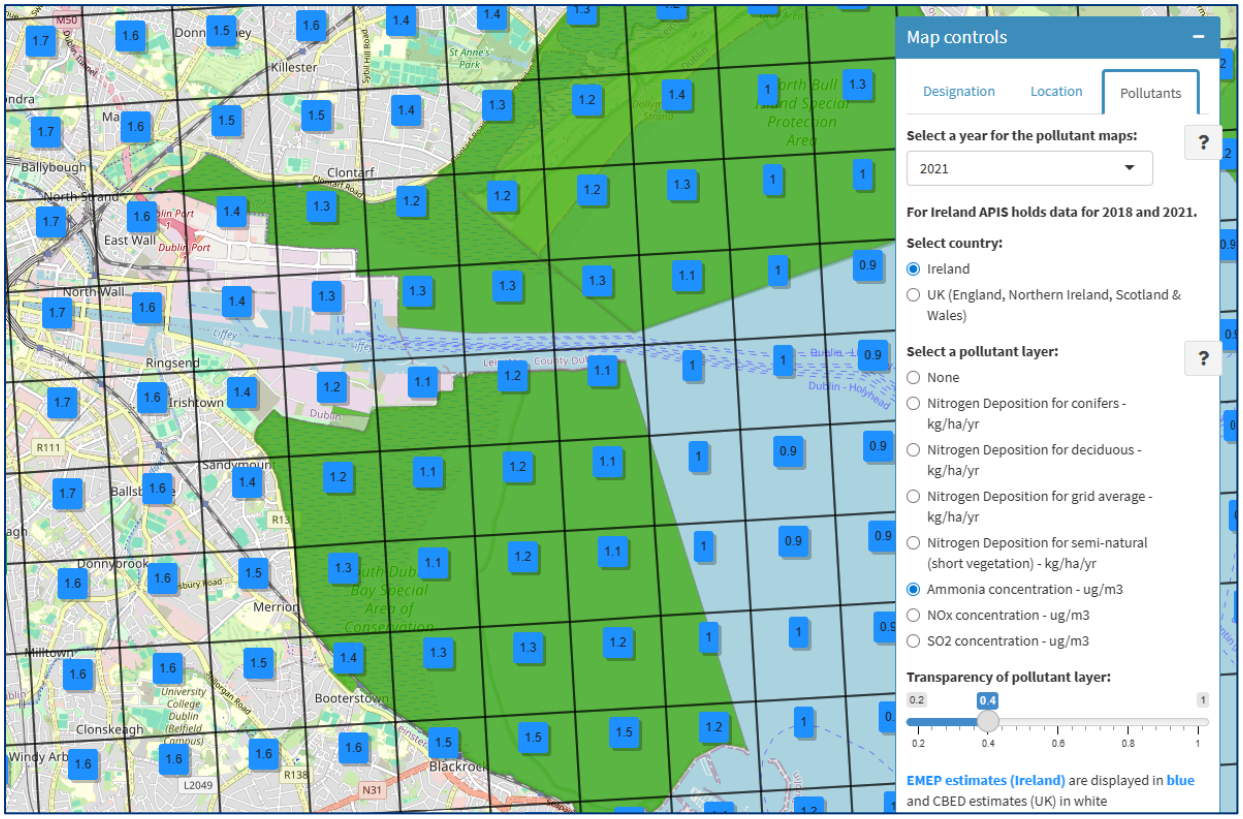


Figure 5: Ammonia Concentration (ug/m3)

Comment: All background levels well below relevant thresholds

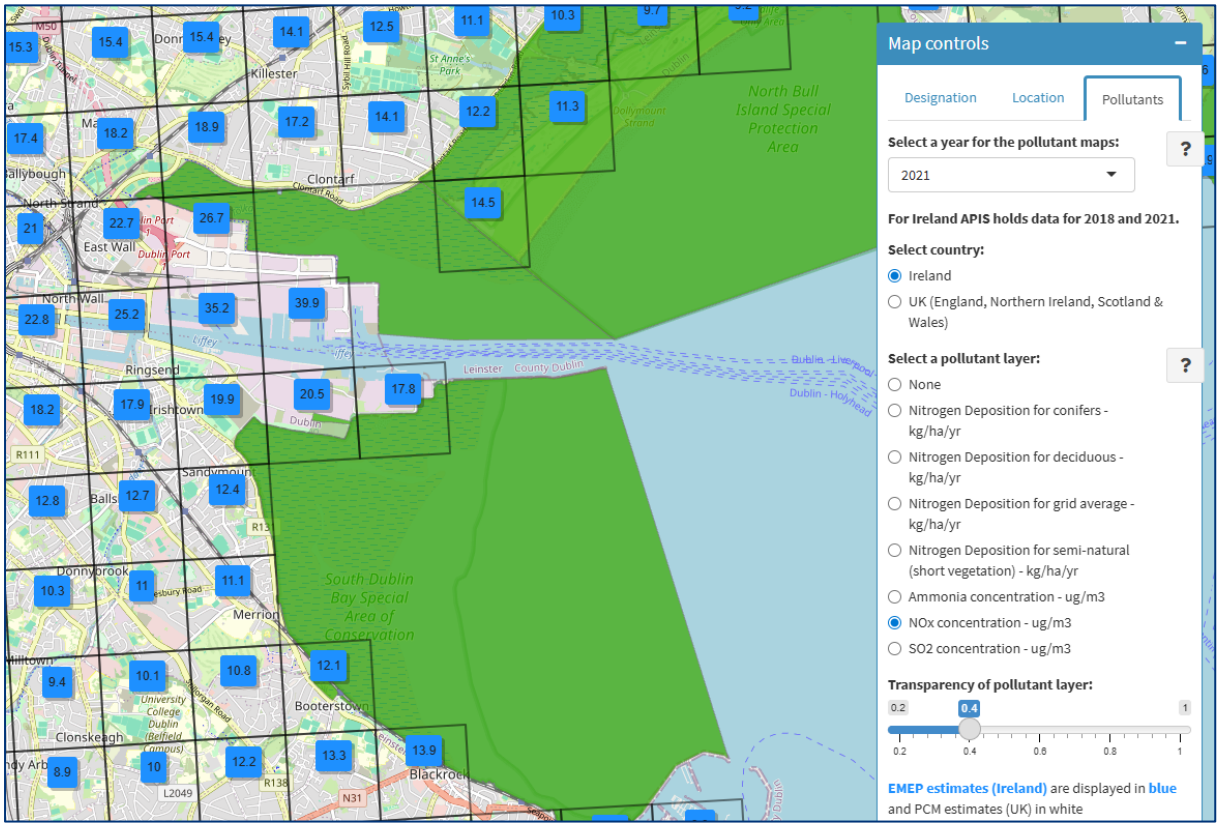


Figure 6: NOx Concentrations

Comment: All background levels well below relevant thresholds

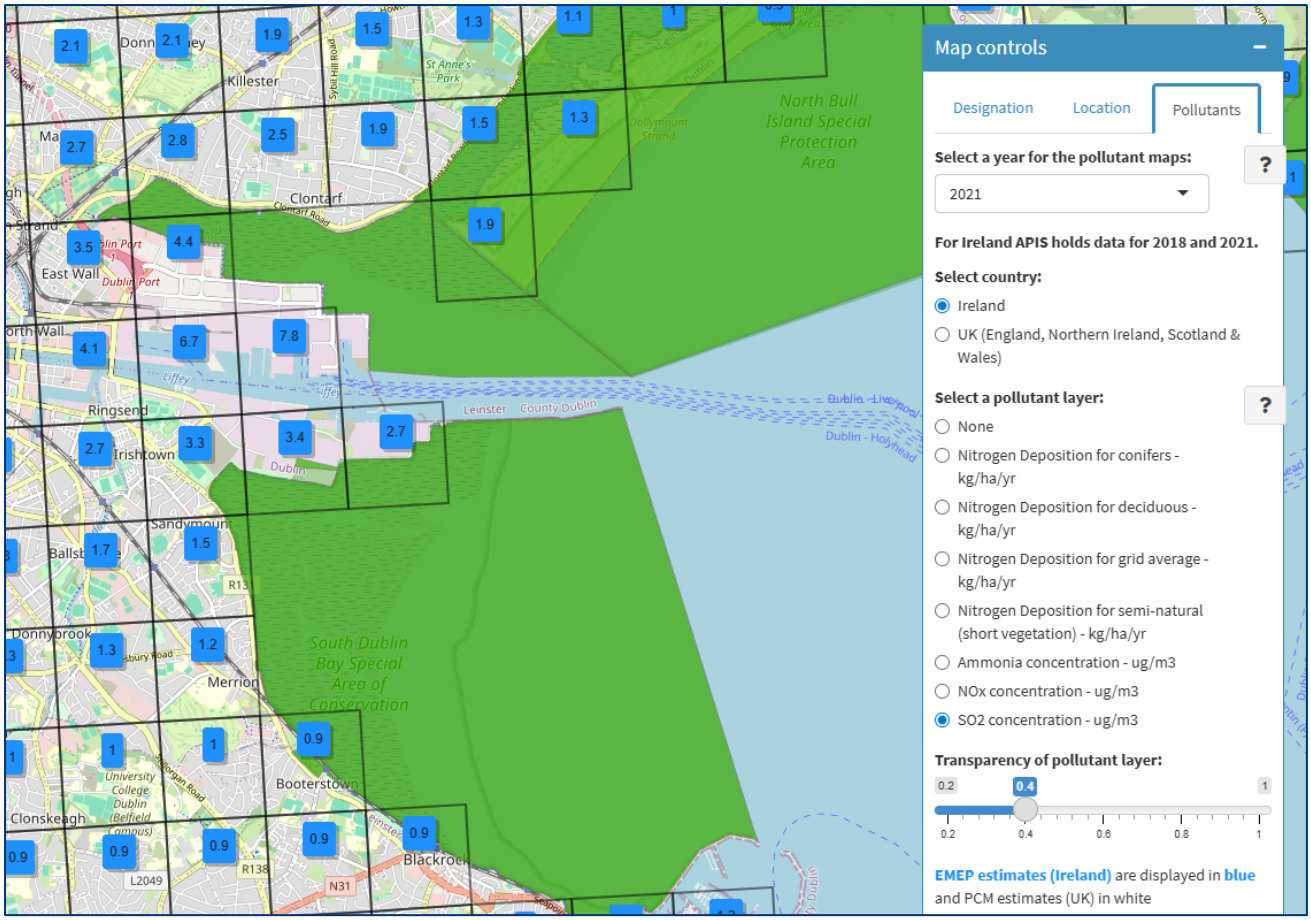


Figure 7: SO_2 Concentrations

Comment: All background levels well below relevant thresholds

DMRB

Selecting sensitive receptors - designated habitats

Internationally, nationally and locally designated sites of ecological conservation importance on protected species and on habitats and other species identified as being of principal importance for the conservation of biodiversity (known as designated habitats), within 200 m of the ARN, shall be included in the air quality assessment. Designated habitats include 'Ramsar' sites, special protection areas, special areas of conservation, natural heritage areas, local nature reserves, local wildlife sites, nature improvement areas, ancient woodland and veteran trees.

For each designated habitat, transect receptor points at 10-m intervals shall be modelled, starting from the nearest point of the designated habitat to the road, up to a maximum distance of 200 m regardless of whether the habitat extends beyond 200 m.

Only sites that are sensitive to nitrogen deposition should be included in the assessment. (It is not necessary to include sites, for example, that have been designated as a geological feature or water course.)

The South Dublin Bay and River Tolka Estuary SPA is on the boundary of the Project.

As such,

- An international or national designation within 20m of the site boundary.

Therefore, in line with IAQM guidance, the ecological impacts are considered to have **High sensitivity** to the Project, as seen in **Table 7**.

Table 7: Sensitivity of the Area to Ecological Impacts

Receptor Sensitivity	Distance from the Source (m)	
	<20	<50
High	High	Medium
Medium	Medium	Low
Low	Low	Low